



## Full wwPDB EM Validation Report ⓘ

Jun 21, 2026 – 12:46 am BST

PDB ID : 30RB / pdb\_000030rb  
EMDB ID : EMD-57975  
Title : E. coli 70S ribosome with peptidyl-tRNA and Hsp15  
Authors : Larsson, D.S.D.; Akbar, S.; Selmer, M.  
Deposited on : 2026-05-10  
Resolution : 2.92 Å(reported)  
Based on initial models : 8CF1, 8CGJ, ., 7K00

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

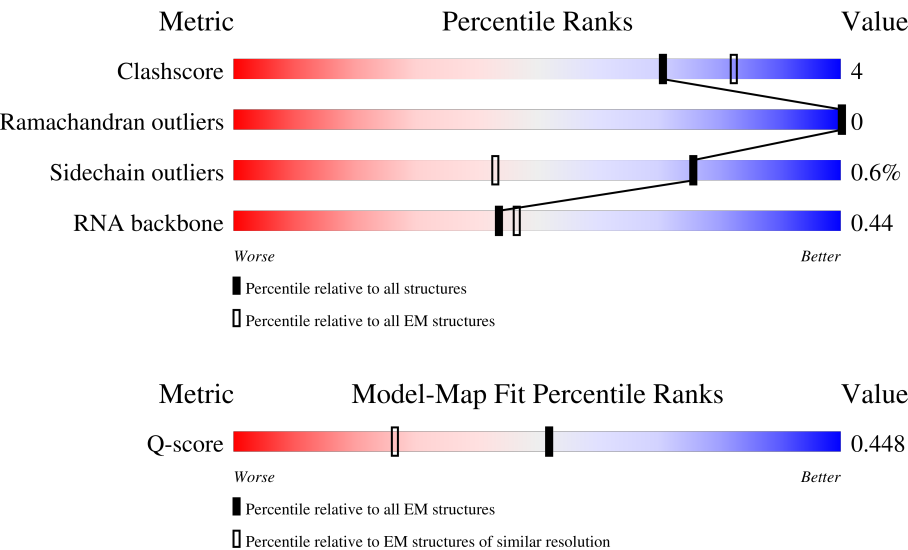
EMDB validation analysis : 0.0.1.dev132  
Mogul : 1.8.4, CSD as541be (2020)  
MolProbity : 4-5-2 with Phenix2.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:  
*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.92 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



| Metric                | Whole archive<br>(#Entries) | EM structures<br>(#Entries) | Similar EM resolution<br>(#Entries, resolution range(Å)) |
|-----------------------|-----------------------------|-----------------------------|----------------------------------------------------------|
| Clashscore            | 229148                      | 23984                       | -                                                        |
| Ramachandran outliers | 224038                      | 23583                       | -                                                        |
| Sidechain outliers    | 223484                      | 23102                       | -                                                        |
| RNA backbone          | 8273                        | 3508                        | -                                                        |
| Q-score               | -                           | 25397                       | 13007 ( 2.42 - 3.42 )                                    |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

| Mol | Chain | Length | Quality of chain                                                                         |
|-----|-------|--------|------------------------------------------------------------------------------------------|
| 1   | 0     | 55     | <div><div>33%</div><div><div></div><div>82%</div><div>11%</div><div>7%</div></div></div> |
| 2   | 1     | 46     | <div><div></div><div><div></div><div>91%</div><div>9%</div></div></div>                  |
| 3   | 2     | 65     | <div><div>6%</div><div><div></div><div>83%</div><div>15%</div><div></div></div></div>    |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 4   | 3     | 38     |                  |
| 5   | A     | 1542   |                  |
| 6   | B     | 241    |                  |
| 7   | C     | 233    |                  |
| 8   | D     | 206    |                  |
| 9   | E     | 167    |                  |
| 10  | F     | 135    |                  |
| 11  | G     | 179    |                  |
| 12  | H     | 130    |                  |
| 13  | I     | 130    |                  |
| 14  | J     | 103    |                  |
| 15  | K     | 129    |                  |
| 16  | L     | 124    |                  |
| 17  | M     | 118    |                  |
| 18  | N     | 101    |                  |
| 19  | O     | 89     |                  |
| 20  | P     | 82     |                  |
| 21  | Q     | 84     |                  |
| 22  | R     | 75     |                  |
| 23  | S     | 92     |                  |
| 24  | T     | 87     |                  |
| 25  | U     | 71     |                  |
| 26  | V     | 142    |                  |
| 27  | Z     | 77     |                  |
| 28  | a     | 2904   |                  |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 29  | b     | 120    |                  |
| 30  | c     | 273    |                  |
| 31  | d     | 209    |                  |
| 32  | e     | 201    |                  |
| 33  | f     | 179    |                  |
| 34  | g     | 177    |                  |
| 35  | h     | 149    |                  |
| 36  | i     | 142    |                  |
| 37  | j     | 123    |                  |
| 38  | k     | 144    |                  |
| 39  | l     | 136    |                  |
| 40  | m     | 127    |                  |
| 41  | n     | 117    |                  |
| 42  | o     | 115    |                  |
| 43  | p     | 118    |                  |
| 44  | q     | 103    |                  |
| 45  | r     | 110    |                  |
| 46  | s     | 100    |                  |
| 47  | t     | 104    |                  |
| 48  | u     | 94     |                  |
| 49  | v     | 85     |                  |
| 50  | w     | 78     |                  |
| 51  | x     | 63     |                  |
| 52  | y     | 59     |                  |
| 53  | z     | 57     |                  |

## 2 Entry composition

There are 57 unique types of molecules in this entry. The entry contains 228734 atoms, of which 88883 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Large ribosomal subunit protein bL33.

| Mol | Chain | Residues | Atoms |     |     |    |    | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|----|---------|-------|
| 1   | 0     | 51       | Total | C   | H   | N  | O  | 0       | 0     |
|     |       |          | 858   | 269 | 441 | 76 | 72 |         |       |

- Molecule 2 is a protein called Large ribosomal subunit protein bL34.

| Mol | Chain | Residues | Atoms |     |     |    |      | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|------|---------|-------|
| 2   | 1     | 46       | Total | C   | H   | N  | O S  | 0       | 0     |
|     |       |          | 788   | 228 | 411 | 90 | 57 2 |         |       |

- Molecule 3 is a protein called Large ribosomal subunit protein bL35.

| Mol | Chain | Residues | Atoms |     |     |     |      | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|------|---------|-------|
| 3   | 2     | 64       | Total | C   | H   | N   | O S  | 0       | 0     |
|     |       |          | 1066  | 323 | 562 | 105 | 74 2 |         |       |

- Molecule 4 is a protein called Large ribosomal subunit protein bL36A.

| Mol | Chain | Residues | Atoms |     |     |    |      | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|------|---------|-------|
| 4   | 3     | 38       | Total | C   | H   | N  | O S  | 0       | 0     |
|     |       |          | 639   | 185 | 337 | 65 | 48 4 |         |       |

- Molecule 5 is a RNA chain called 16S rRNA.

| Mol | Chain | Residues | Atoms |       |       |      |            | AltConf | Trace |
|-----|-------|----------|-------|-------|-------|------|------------|---------|-------|
| 5   | A     | 1514     | Total | C     | H     | N    | O P        | 0       | 0     |
|     |       |          | 47328 | 14504 | 14825 | 5965 | 10520 1514 |         |       |

- Molecule 6 is a protein called Small ribosomal subunit protein uS2.

| Mol | Chain | Residues | Atoms |      |      |     |       | AltConf | Trace |
|-----|-------|----------|-------|------|------|-----|-------|---------|-------|
| 6   | B     | 224      | Total | C    | H    | N   | O S   | 0       | 0     |
|     |       |          | 3504  | 1109 | 1751 | 315 | 321 8 |         |       |

- Molecule 7 is a protein called Small ribosomal subunit protein uS3.

| Mol | Chain | Residues | Atoms |      |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|------|-----|-----|---|---------|-------|
| 7   | C     | 206      | Total | C    | H    | N   | O   | S | 0       | 0     |
|     |       |          | 3293  | 1028 | 1669 | 305 | 288 | 3 |         |       |

- Molecule 8 is a protein called Small ribosomal subunit protein uS4.

| Mol | Chain | Residues | Atoms |      |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|------|-----|-----|---|---------|-------|
| 8   | D     | 200      | Total | C    | H    | N   | O   | S | 0       | 0     |
|     |       |          | 3245  | 1002 | 1640 | 307 | 292 | 4 |         |       |

- Molecule 9 is a protein called Small ribosomal subunit protein uS5.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 9   | E     | 154      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 2295  | 706 | 1160 | 215 | 208 | 6 |         |       |

- Molecule 10 is a protein called Small ribosomal subunit protein bS6, fully modified isoform.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 10  | F     | 101      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1620  | 520 | 796 | 149 | 149 | 6 |         |       |

- Molecule 11 is a protein called Small ribosomal subunit protein uS7.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 11  | G     | 134      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 2144  | 659 | 1087 | 204 | 190 | 4 |         |       |

- Molecule 12 is a protein called Small ribosomal subunit protein uS8.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 12  | H     | 129      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 1994  | 616 | 1015 | 173 | 184 | 6 |         |       |

- Molecule 13 is a protein called Small ribosomal subunit protein uS9.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 13  | I     | 125      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 2028  | 622 | 1027 | 200 | 176 | 3 |         |       |

- Molecule 14 is a protein called Small ribosomal subunit protein uS10.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 14  | J     | 96       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1581  | 487 | 806 | 148 | 139 | 1 |         |       |

- Molecule 15 is a protein called Small ribosomal subunit protein uS11.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 15  | K     | 117      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1742  | 540 | 865 | 173 | 161 | 3 |         |       |

There is a discrepancy between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment  | Reference  |
|-------|---------|----------|--------|----------|------------|
| K     | 119     | IAS      | ASN    | conflict | UNP P0A7R9 |

- Molecule 16 is a protein called Small ribosomal subunit protein uS12.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 16  | L     | 121      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1918  | 582 | 976 | 193 | 162 | 5 |         |       |

- Molecule 17 is a protein called Small ribosomal subunit protein uS13.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 17  | M     | 115      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1826  | 552 | 935 | 179 | 157 | 3 |         |       |

- Molecule 18 is a protein called Small ribosomal subunit protein uS14.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 18  | N     | 100      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1637  | 499 | 832 | 164 | 139 | 3 |         |       |

- Molecule 19 is a protein called Small ribosomal subunit protein uS15.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 19  | O     | 88       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1430  | 439 | 716 | 144 | 130 | 1 |         |       |

- Molecule 20 is a protein called Small ribosomal subunit protein bS16.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 20  | P     | 79       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1263  | 394 | 634 | 124 | 110 | 1 |         |       |

- Molecule 21 is a protein called Small ribosomal subunit protein uS17.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 21  | Q     | 79       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1309  | 406 | 668 | 120 | 112 | 3 |         |       |

- Molecule 22 is a protein called Small ribosomal subunit protein bS18.

| Mol | Chain | Residues | Atoms |     |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|----|---|---------|-------|
| 22  | R     | 64       | Total | C   | H   | N  | O  | S | 0       | 0     |
|     |       |          | 1052  | 330 | 528 | 99 | 94 | 1 |         |       |

- Molecule 23 is a protein called Small ribosomal subunit protein uS19.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 23  | S     | 84       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1346  | 427 | 678 | 127 | 112 | 2 |         |       |

- Molecule 24 is a protein called Small ribosomal subunit protein bS20.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 24  | T     | 86       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1380  | 414 | 710 | 138 | 115 | 3 |         |       |

- Molecule 25 is a protein called Small ribosomal subunit protein bS21.

| Mol | Chain | Residues | Atoms |     |     |     |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|----|---|---------|-------|
| 25  | U     | 70       | Total | C   | H   | N   | O  | S | 0       | 0     |
|     |       |          | 1210  | 366 | 621 | 125 | 97 | 1 |         |       |

- Molecule 26 is a protein called Heat shock protein 15.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 26  | V     | 109      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1817  | 562 | 917 | 174 | 162 | 2 |         |       |

There are 10 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment               | Reference  |
|-------|---------|----------|--------|-----------------------|------------|
| V     | -8      | MET      | -      | initiating methionine | UNP P0ACG8 |
| V     | -7      | HIS      | -      | expression tag        | UNP P0ACG8 |
| V     | -6      | HIS      | -      | expression tag        | UNP P0ACG8 |
| V     | -5      | HIS      | -      | expression tag        | UNP P0ACG8 |
| V     | -4      | HIS      | -      | expression tag        | UNP P0ACG8 |
| V     | -3      | HIS      | -      | expression tag        | UNP P0ACG8 |
| V     | -2      | HIS      | -      | expression tag        | UNP P0ACG8 |
| V     | -1      | GLY      | -      | expression tag        | UNP P0ACG8 |
| V     | 0       | SER      | -      | expression tag        | UNP P0ACG8 |
| V     | 1       | GLY      | -      | expression tag        | UNP P0ACG8 |

- Molecule 27 is a RNA chain called tRNA Asp.

| Mol | Chain | Residues | Atoms |     |     |     |     |    | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|----|---------|-------|
| 27  | Z     | 73       | Total | C   | H   | N   | O   | P  | 0       | 0     |
|     |       |          | 2271  | 693 | 714 | 275 | 516 | 73 |         |       |

- Molecule 28 is a RNA chain called 23S rRNA.

| Mol | Chain | Residues | Atoms |       |       |       |       |      | AltConf | Trace |
|-----|-------|----------|-------|-------|-------|-------|-------|------|---------|-------|
| 28  | a     | 2753     | Total | C     | H     | N     | O     | P    | 0       | 0     |
|     |       |          | 86112 | 26384 | 26982 | 10897 | 19096 | 2753 |         |       |

- Molecule 29 is a RNA chain called 5S rRNA.

| Mol | Chain | Residues | Atoms |      |      |     |     |     | AltConf | Trace |
|-----|-------|----------|-------|------|------|-----|-----|-----|---------|-------|
| 29  | b     | 119      | Total | C    | H    | N   | O   | P   | 0       | 0     |
|     |       |          | 3720  | 1135 | 1171 | 466 | 829 | 119 |         |       |

- Molecule 30 is a protein called Large ribosomal subunit protein uL2.

| Mol | Chain | Residues | Atoms |      |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|------|------|-----|-----|---|---------|-------|
| 30  | c     | 271      | Total | C    | H    | N   | O   | S | 0       | 0     |
|     |       |          | 4196  | 1288 | 2114 | 423 | 364 | 7 |         |       |

- Molecule 31 is a protein called Large ribosomal subunit protein uL3.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 31  | d     | 209      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 3152  | 980 | 1586 | 288 | 294 | 4 |         |       |

- Molecule 32 is a protein called Large ribosomal subunit protein uL4.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 32  | e     | 201      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 3142  | 974 | 1590 | 283 | 290 | 5 |         |       |

- Molecule 33 is a protein called Large ribosomal subunit protein uL5.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 33  | f     | 177      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 2831  | 899 | 1421 | 249 | 256 | 6 |         |       |

- Molecule 34 is a protein called Large ribosomal subunit protein uL6.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 34  | g     | 176      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 2670  | 832 | 1347 | 243 | 246 | 2 |         |       |

- Molecule 35 is a protein called Large ribosomal subunit protein bL9.

| Mol | Chain | Residues | Atoms |     |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|----|---|---------|-------|
| 35  | h     | 41       | Total | C   | H   | N  | O  | S | 0       | 0     |
|     |       |          | 627   | 194 | 324 | 54 | 54 | 1 |         |       |

- Molecule 36 is a protein called Large ribosomal subunit protein uL13.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 36  | i     | 142      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 2266  | 714 | 1137 | 212 | 199 | 4 |         |       |

- Molecule 37 is a protein called Large ribosomal subunit protein uL14.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 37  | j     | 123      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 1954  | 593 | 1008 | 181 | 166 | 6 |         |       |

- Molecule 38 is a protein called Large ribosomal subunit protein uL15.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 38  | k     | 144      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 2164  | 654 | 1111 | 207 | 190 | 2 |         |       |

- Molecule 39 is a protein called Large ribosomal subunit protein uL16.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 39  | l     | 136      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 2217  | 686 | 1142 | 205 | 177 | 7 |         |       |

- Molecule 40 is a protein called Large ribosomal subunit protein bL17.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 40  | m     | 118      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1916  | 585 | 971 | 194 | 161 | 5 |         |       |

- Molecule 41 is a protein called Large ribosomal subunit protein uL18.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 41  | n     | 116      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1800  | 552 | 908 | 178 | 162 |   |         |       |

- Molecule 42 is a protein called Large ribosomal subunit protein bL19.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 42  | o     | 114      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1864  | 574 | 947 | 179 | 163 | 1 |         |       |

- Molecule 43 is a protein called Large ribosomal subunit protein bL20.

| Mol | Chain | Residues | Atoms |     |      |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|------|-----|-----|---|---------|-------|
| 43  | p     | 117      | Total | C   | H    | N   | O   | S | 0       | 0     |
|     |       |          | 1955  | 604 | 1008 | 192 | 151 |   |         |       |

- Molecule 44 is a protein called Large ribosomal subunit protein bL21.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 44  | q     | 103      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1641  | 516 | 825 | 153 | 145 | 2 |         |       |

- Molecule 45 is a protein called Large ribosomal subunit protein uL22.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 45  | r     | 110      | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1761  | 532 | 904 | 166 | 156 | 3 |         |       |

- Molecule 46 is a protein called Large ribosomal subunit protein uL23.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 46  | s     | 93       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1533  | 466 | 795 | 139 | 131 | 2 |         |       |

- Molecule 47 is a protein called Large ribosomal subunit protein uL24.

| Mol | Chain | Residues | Atoms |     |     |     |     |  | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|--|---------|-------|
| 47  | t     | 102      | Total | C   | H   | N   | O   |  | 0       | 0     |
|     |       |          | 1602  | 492 | 823 | 146 | 141 |  |         |       |

- Molecule 48 is a protein called Large ribosomal subunit protein bL25.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 48  | u     | 94       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1523  | 479 | 770 | 137 | 134 | 3 |         |       |

- Molecule 49 is a protein called Large ribosomal subunit protein bL27.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 49  | v     | 78       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1172  | 362 | 586 | 116 | 107 | 1 |         |       |

- Molecule 50 is a protein called Large ribosomal subunit protein bL28.

| Mol | Chain | Residues | Atoms |     |     |     |     |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|-----|-----|---|---------|-------|
| 50  | w     | 77       | Total | C   | H   | N   | O   | S | 0       | 0     |
|     |       |          | 1263  | 388 | 638 | 129 | 106 | 2 |         |       |

- Molecule 51 is a protein called Large ribosomal subunit protein uL29.

| Mol | Chain | Residues | Atoms |     |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|----|---|---------|-------|
| 51  | x     | 62       | Total | C   | H   | N  | O  | S | 0       | 0     |
|     |       |          | 1027  | 308 | 526 | 98 | 94 | 1 |         |       |

- Molecule 52 is a protein called Large ribosomal subunit protein uL30.

| Mol | Chain | Residues | Atoms |     |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|----|---|---------|-------|
| 52  | y     | 58       | Total | C   | H   | N  | O  | S | 0       | 0     |
|     |       |          | 928   | 281 | 479 | 87 | 79 | 2 |         |       |

- Molecule 53 is a protein called Large ribosomal subunit protein bL32.

| Mol | Chain | Residues | Atoms |     |     |    |    |   | AltConf | Trace |
|-----|-------|----------|-------|-----|-----|----|----|---|---------|-------|
| 53  | z     | 56       | Total | C   | H   | N  | O  | S | 0       | 0     |
|     |       |          | 887   | 269 | 443 | 94 | 80 | 1 |         |       |

- Molecule 54 is ZINC ION (CCD ID: ZN) (formula: Zn).

| Mol | Chain | Residues | Atoms |    | AltConf |
|-----|-------|----------|-------|----|---------|
| 54  | 3     | 1        | Total | Zn | 0       |
|     |       |          | 1     | 1  |         |

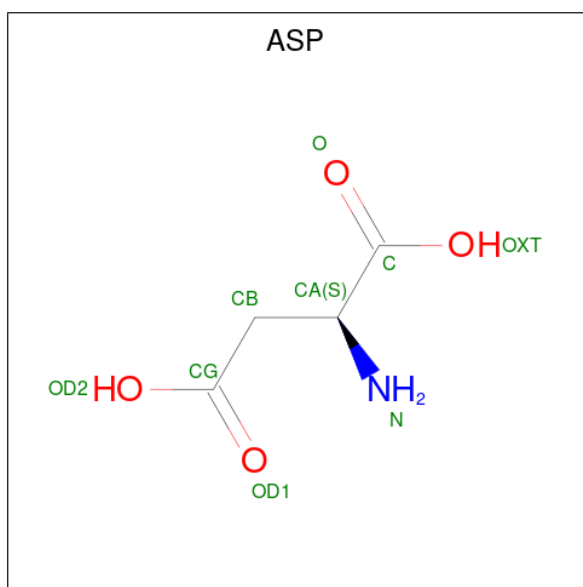
- Molecule 55 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

| Mol | Chain | Residues | Atoms |     | AltConf |
|-----|-------|----------|-------|-----|---------|
| 55  | A     | 17       | Total | Mg  | 0       |
|     |       |          | 17    | 17  |         |
| 55  | Q     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |
| 55  | a     | 185      | Total | Mg  | 0       |
|     |       |          | 185   | 185 |         |
| 55  | b     | 5        | Total | Mg  | 0       |
|     |       |          | 5     | 5   |         |
| 55  | c     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |
| 55  | z     | 1        | Total | Mg  | 0       |
|     |       |          | 1     | 1   |         |

- Molecule 56 is POTASSIUM ION (CCD ID: K) (formula: K).

| Mol | Chain | Residues | Atoms |   | AltConf |
|-----|-------|----------|-------|---|---------|
| 56  | A     | 1        | Total | K | 0       |
|     |       |          | 1     | 1 |         |
| 56  | F     | 1        | Total | K | 0       |
|     |       |          | 1     | 1 |         |

- Molecule 57 is ASPARTIC ACID (CCD ID: ASP) (formula: C<sub>4</sub>H<sub>7</sub>NO<sub>4</sub>).

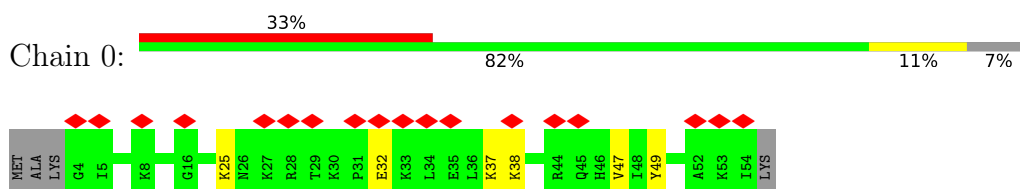


| Mol | Chain | Residues | Atoms |   |   |   |   | AltConf |
|-----|-------|----------|-------|---|---|---|---|---------|
|     |       |          | Total | C | H | N | O |         |
| 57  | Z     | 1        | 14    | 4 | 6 | 1 | 3 | 0       |

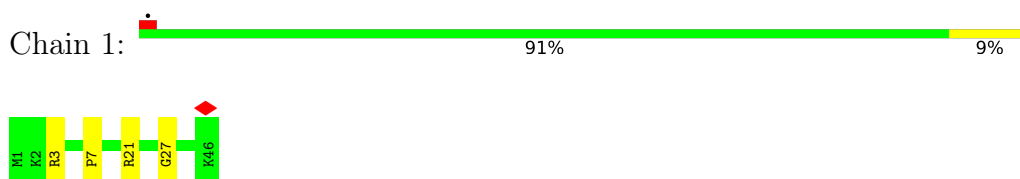
### 3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

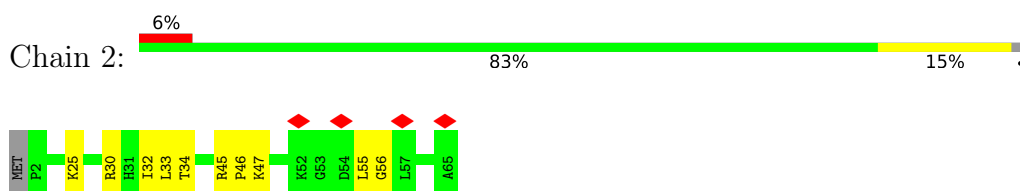
- Molecule 1: Large ribosomal subunit protein bL33



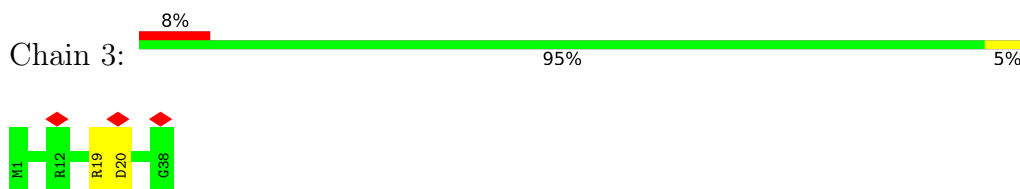
- Molecule 2: Large ribosomal subunit protein bL34



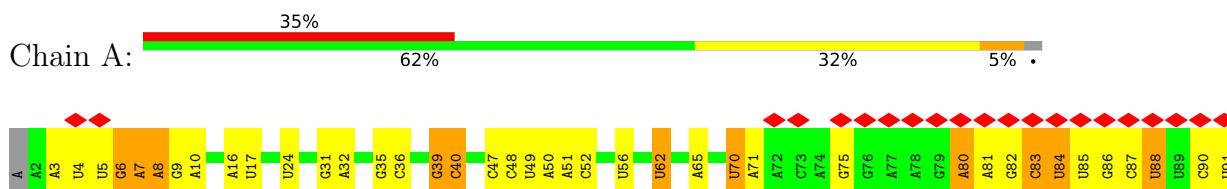
- Molecule 3: Large ribosomal subunit protein bL35

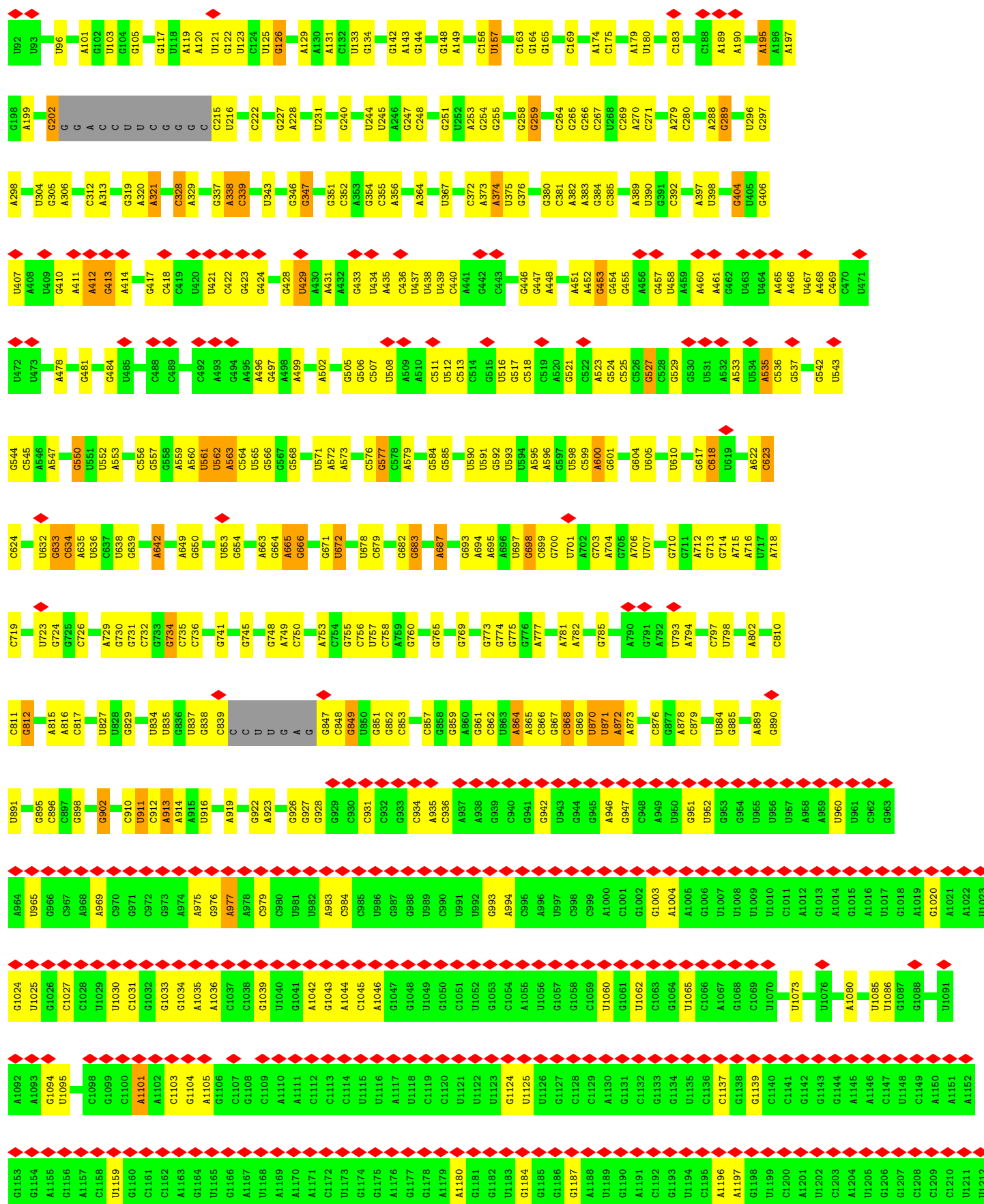


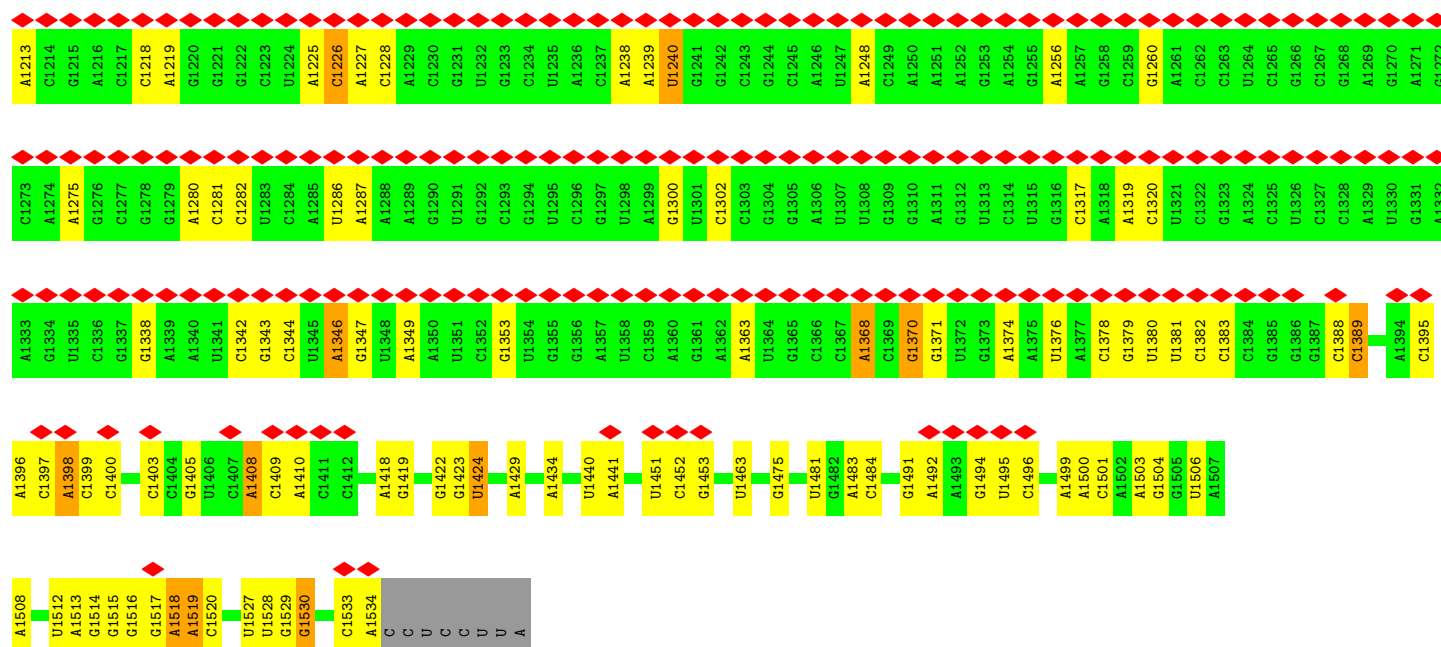
- Molecule 4: Large ribosomal subunit protein bL36A



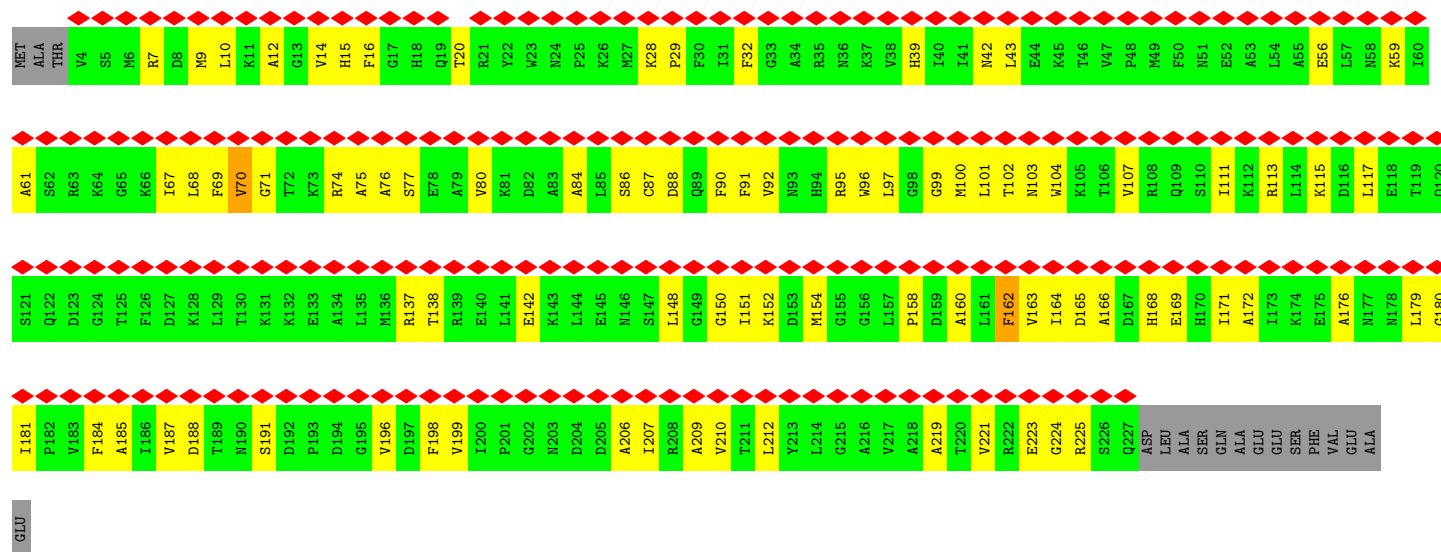
- Molecule 5: 16S rRNA



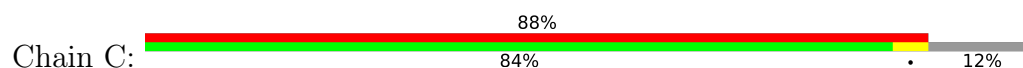


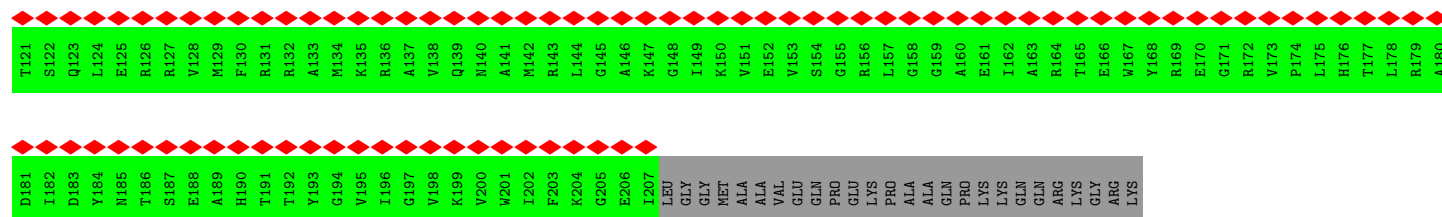


• Molecule 6: Small ribosomal subunit protein uS2

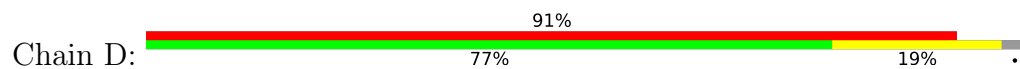


• Molecule 7: Small ribosomal subunit protein uS3

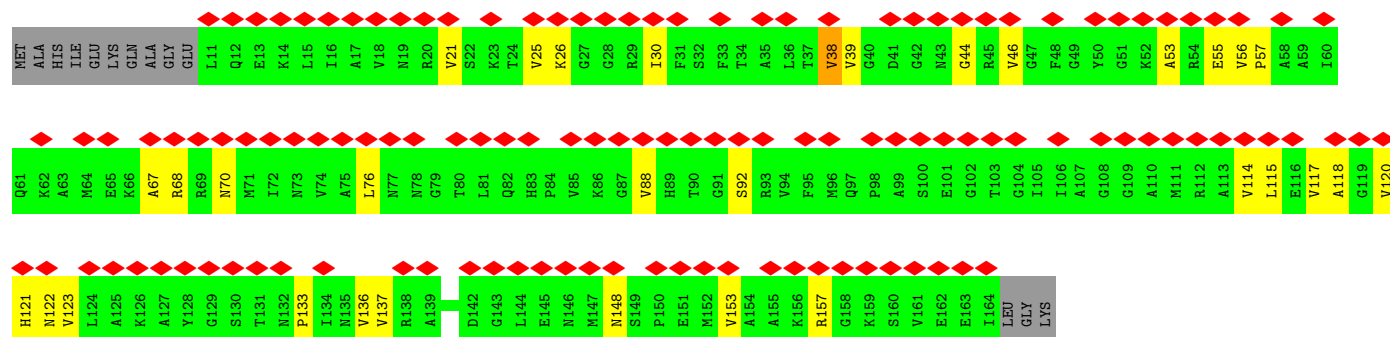
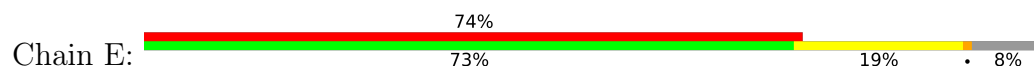




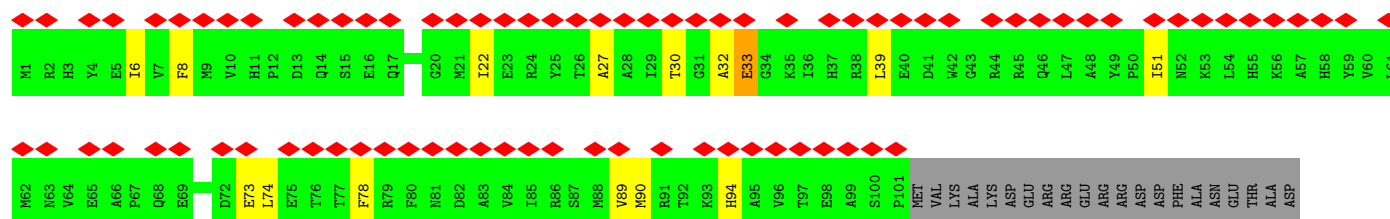
• Molecule 8: Small ribosomal subunit protein uS4



• Molecule 9: Small ribosomal subunit protein uS5

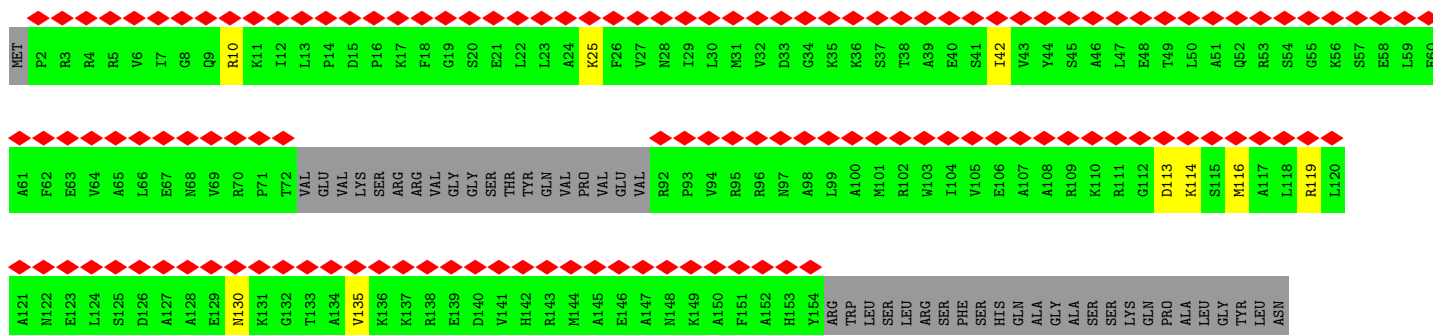
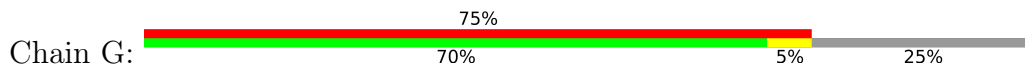


• Molecule 10: Small ribosomal subunit protein bS6, fully modified isoform

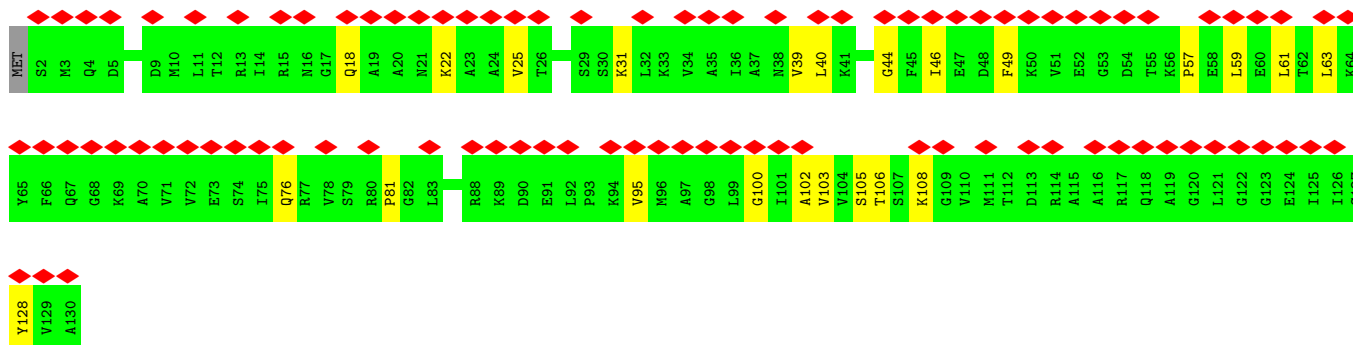
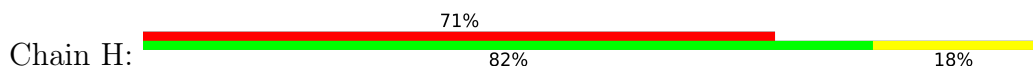


ASP  
ALA  
GLU  
ALA  
GLY  
ASP  
SER  
GLU  
GLU  
GLU  
GLU

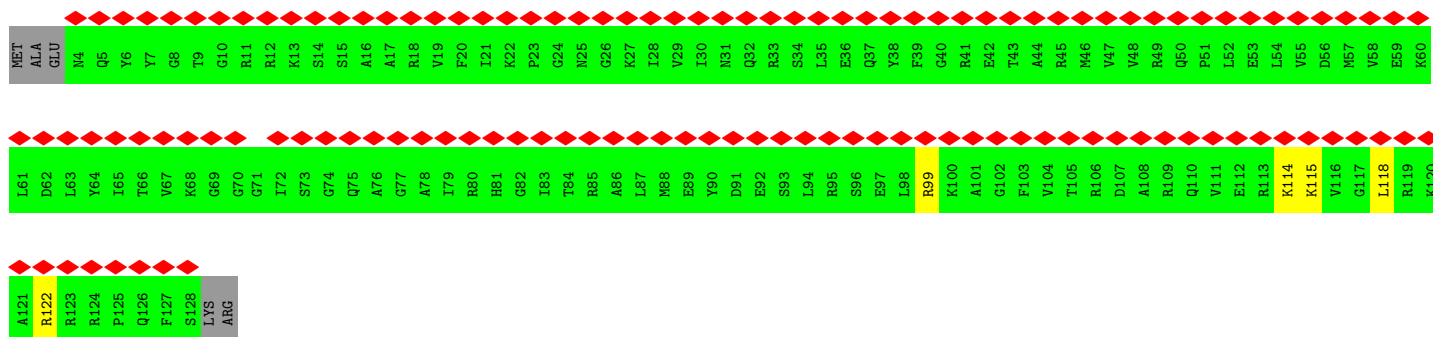
• Molecule 11: Small ribosomal subunit protein uS7



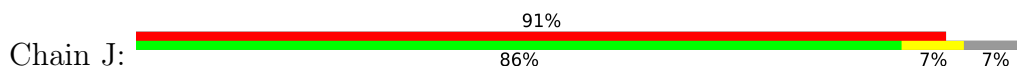
• Molecule 12: Small ribosomal subunit protein uS8

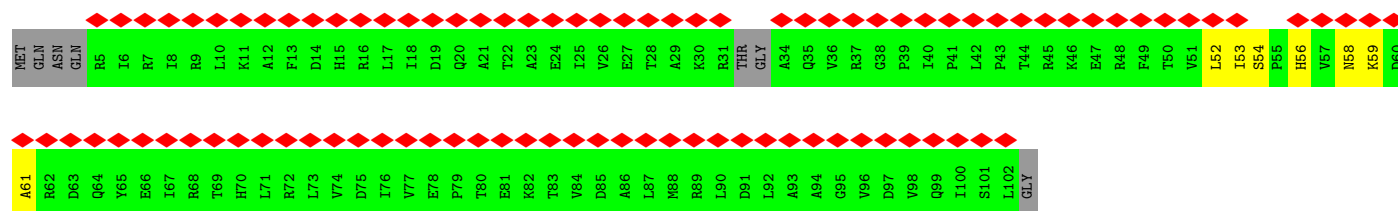


• Molecule 13: Small ribosomal subunit protein uS9

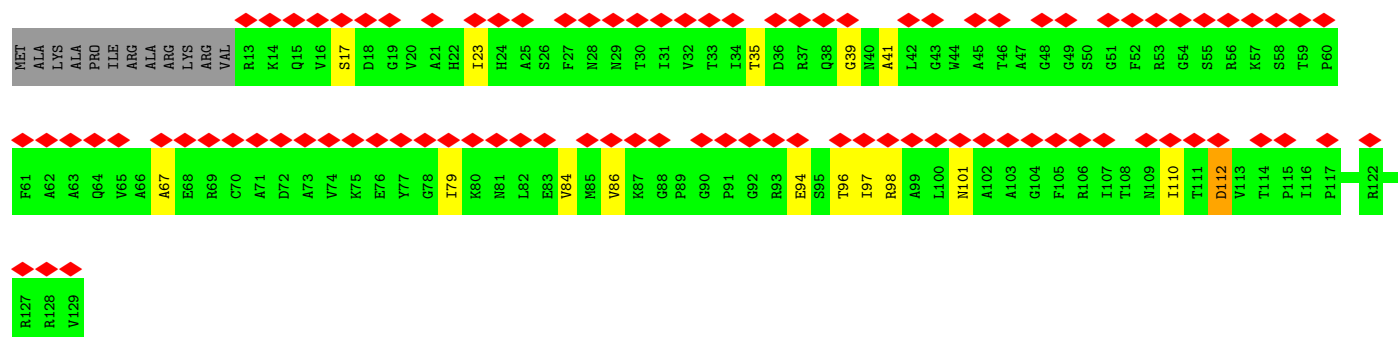
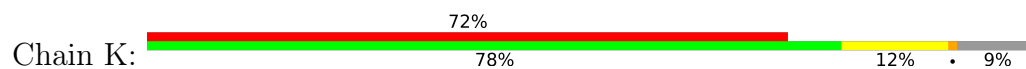


• Molecule 14: Small ribosomal subunit protein uS10

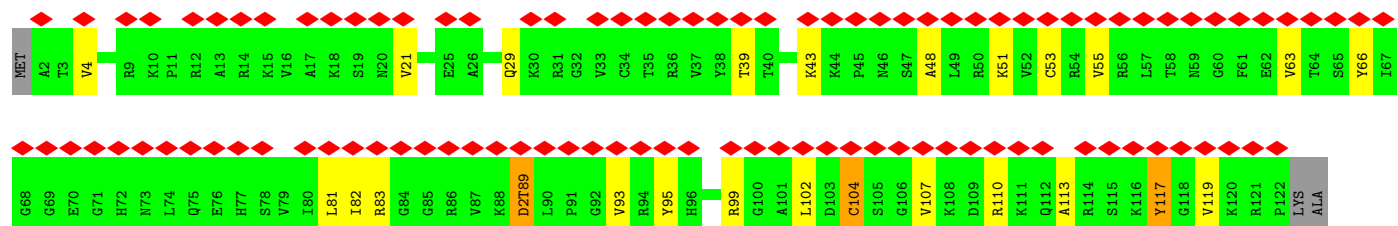
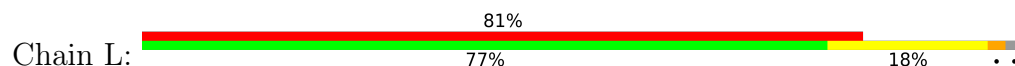




• Molecule 15: Small ribosomal subunit protein uS11



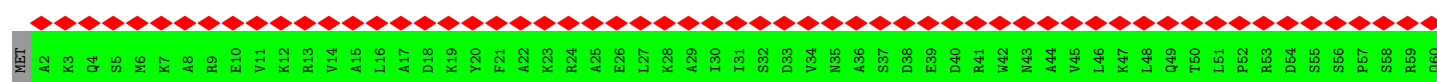
• Molecule 16: Small ribosomal subunit protein uS12

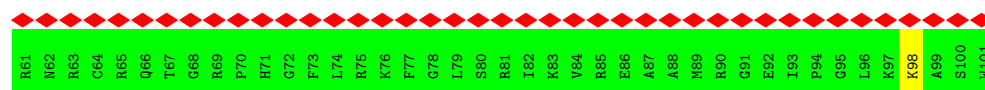


• Molecule 17: Small ribosomal subunit protein uS13

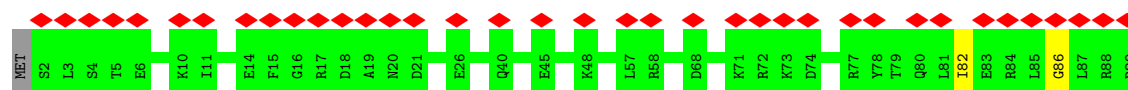
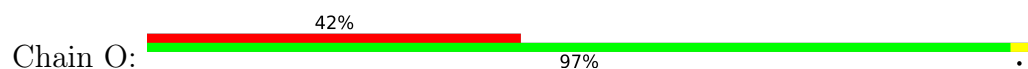


• Molecule 18: Small ribosomal subunit protein uS14

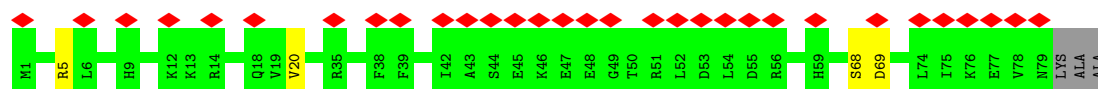
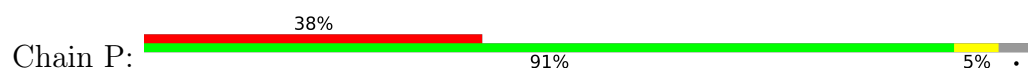




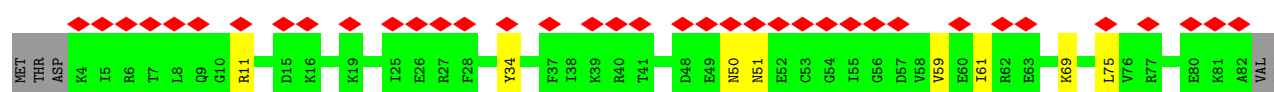
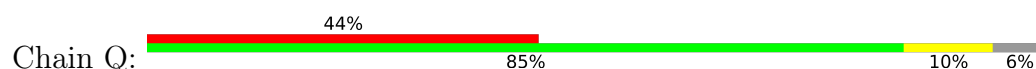
- Molecule 19: Small ribosomal subunit protein uS15



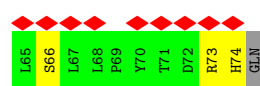
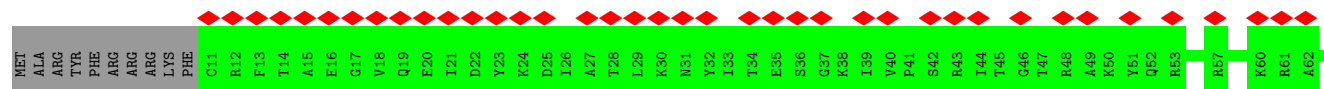
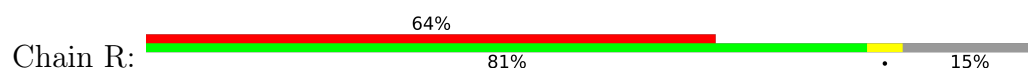
- Molecule 20: Small ribosomal subunit protein bS16



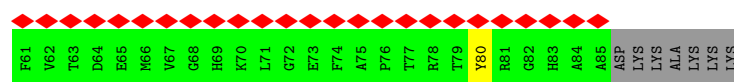
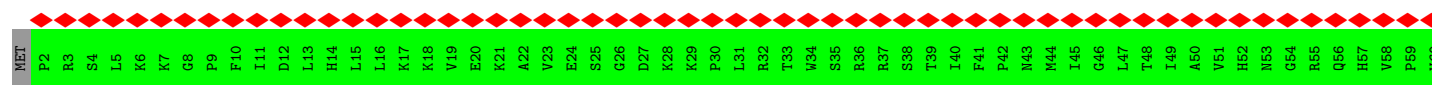
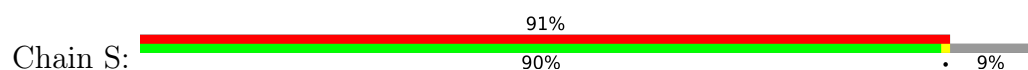
- Molecule 21: Small ribosomal subunit protein uS17



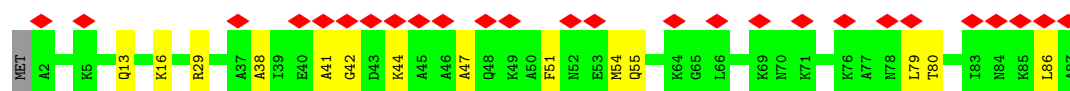
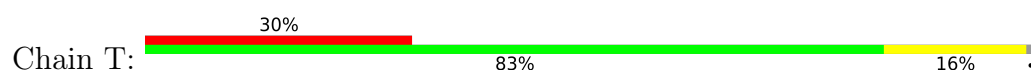
- Molecule 22: Small ribosomal subunit protein bS18



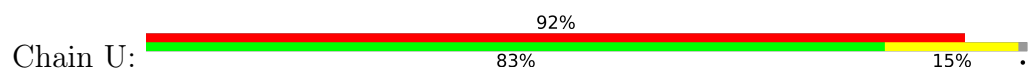
- Molecule 23: Small ribosomal subunit protein uS19



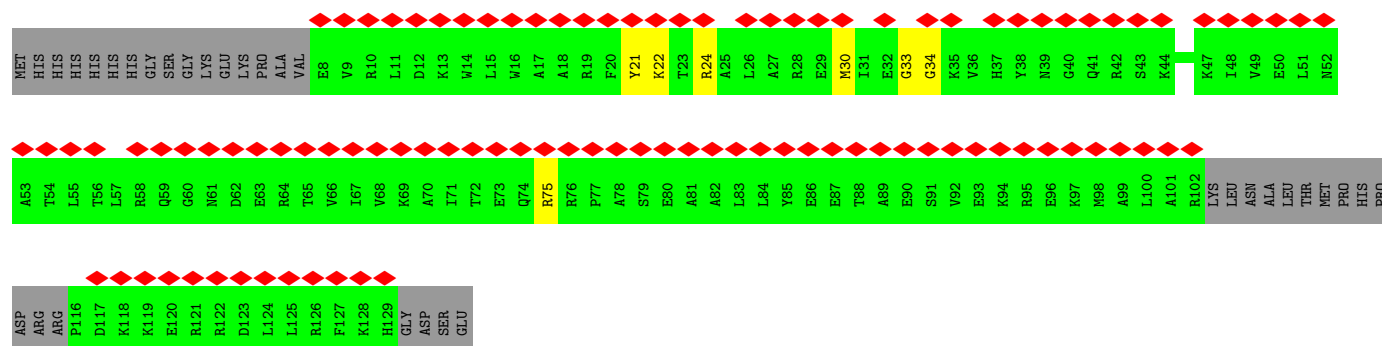
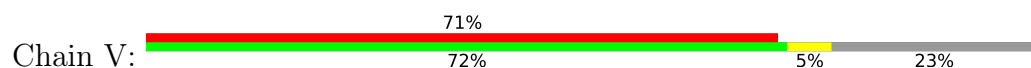
- Molecule 24: Small ribosomal subunit protein bS20



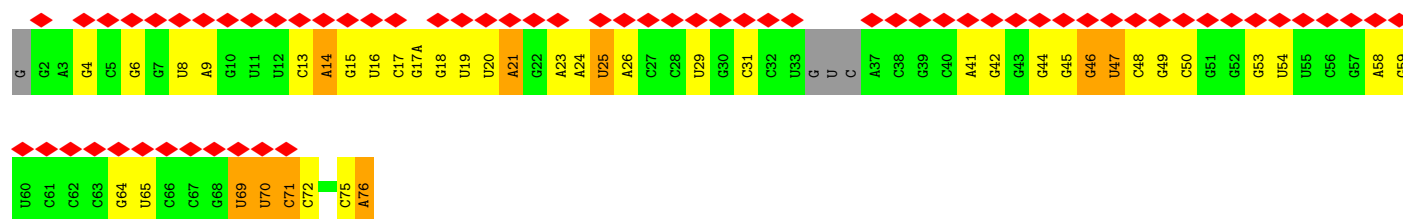
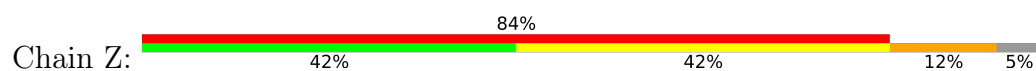
- Molecule 25: Small ribosomal subunit protein bS21



- Molecule 26: Heat shock protein 15



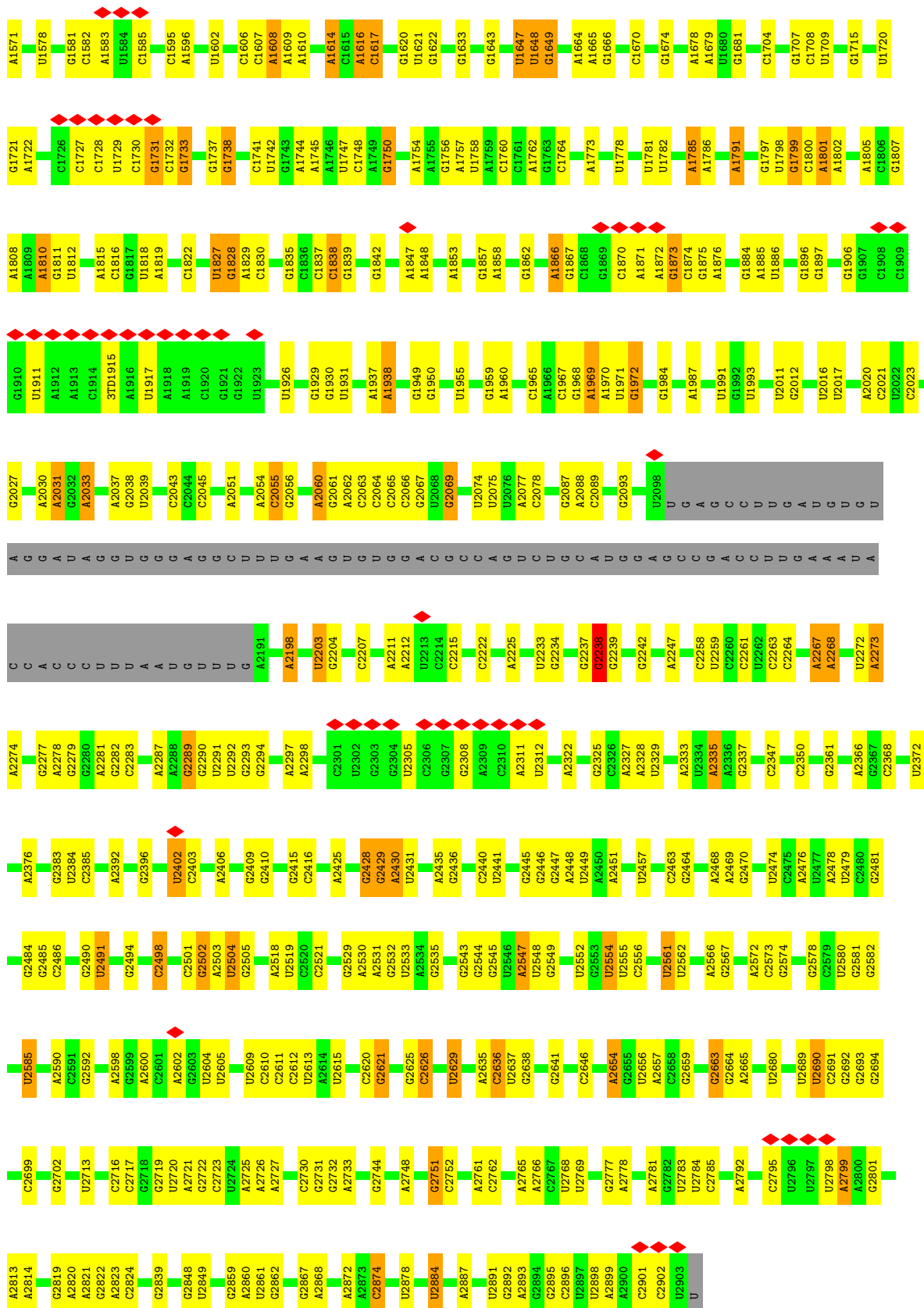
- Molecule 27: tRNA Asp



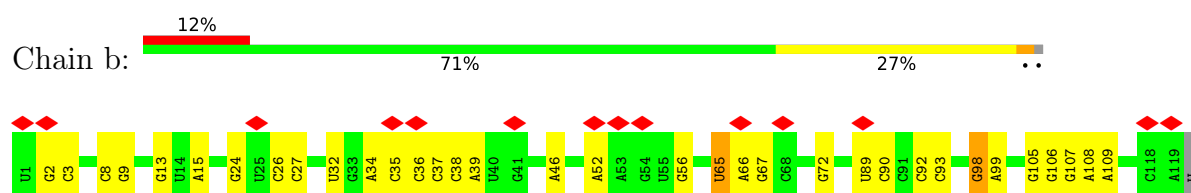
- Molecule 28: 23S rRNA



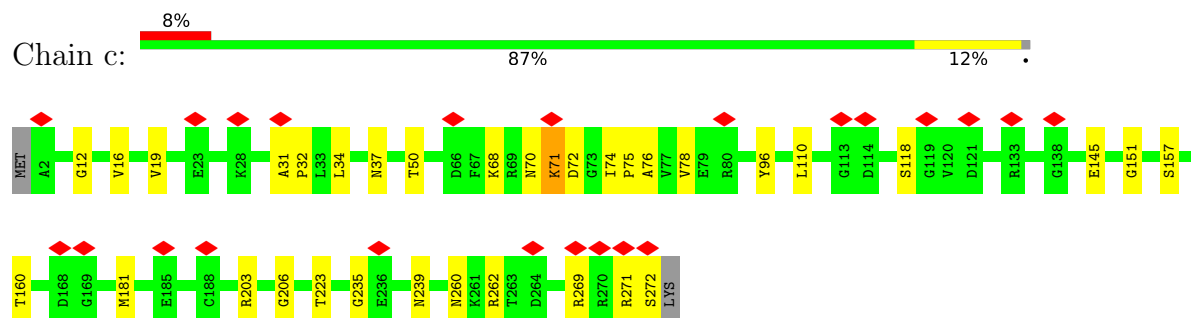




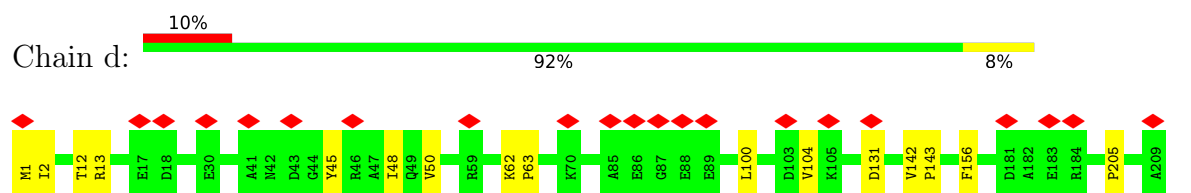
• Molecule 29: 5S rRNA



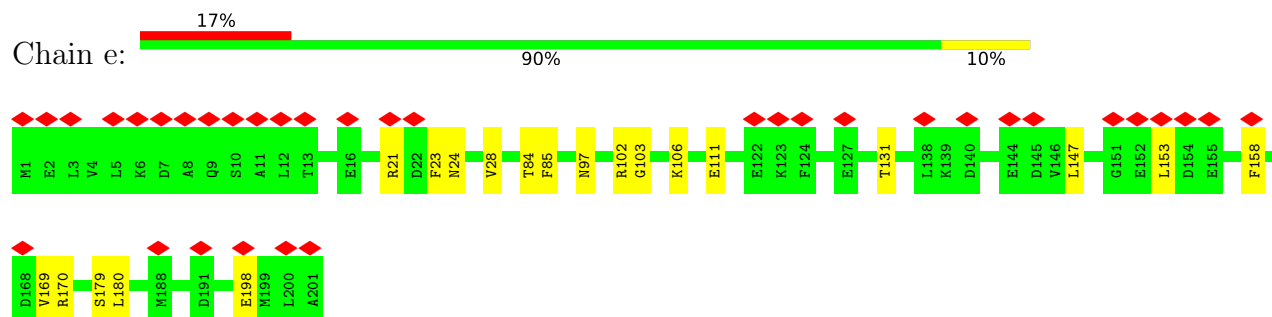
• Molecule 30: Large ribosomal subunit protein uL2



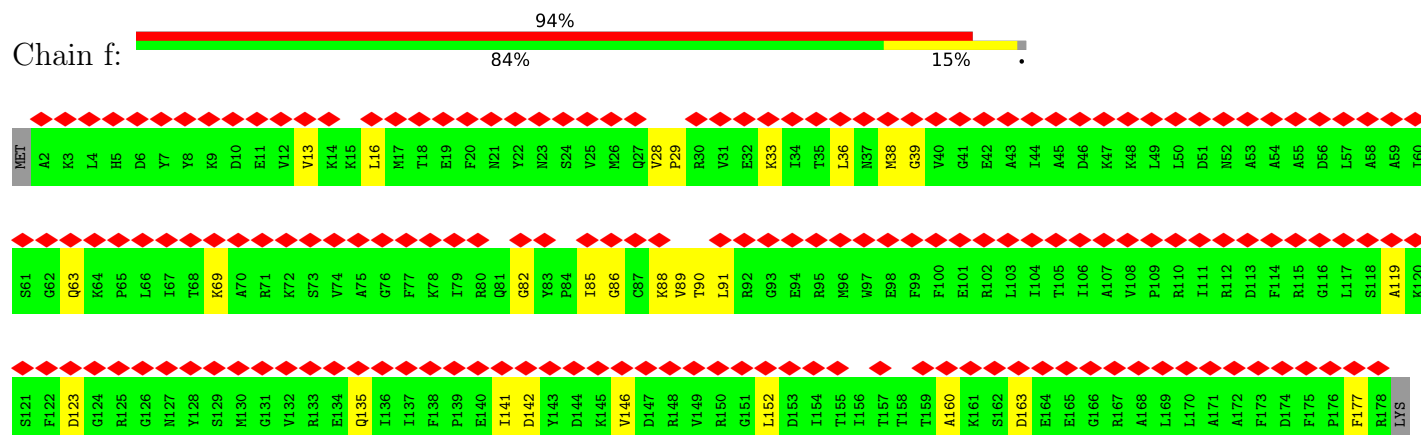
• Molecule 31: Large ribosomal subunit protein uL3



• Molecule 32: Large ribosomal subunit protein uL4

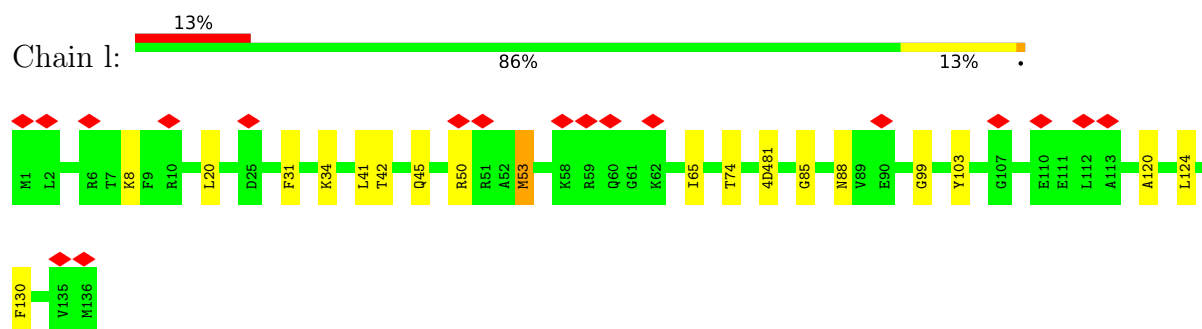


• Molecule 33: Large ribosomal subunit protein uL5

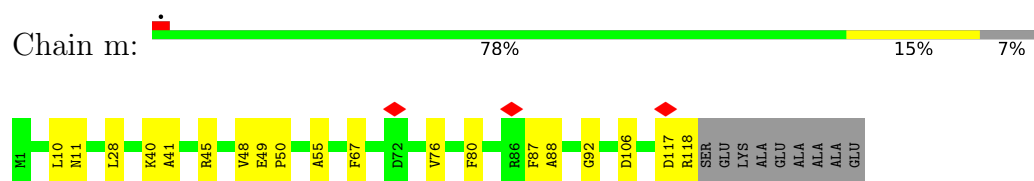


Chain k: 

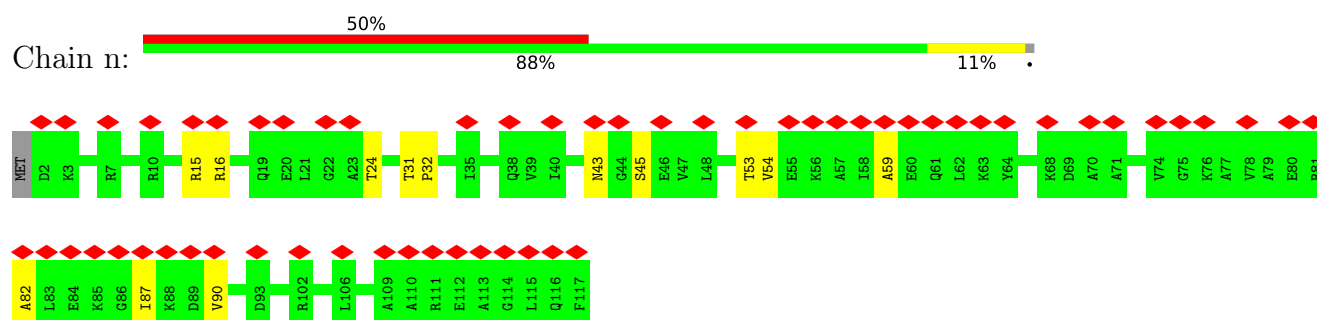
- Molecule 39: Large ribosomal subunit protein uL16



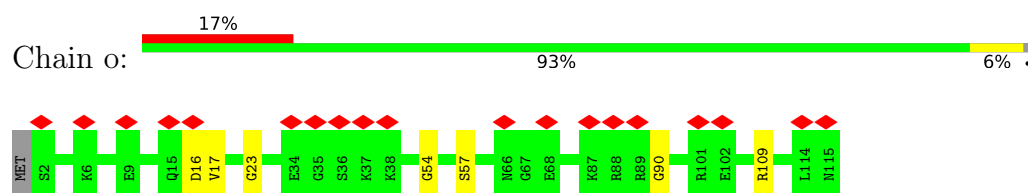
- Molecule 40: Large ribosomal subunit protein bL17



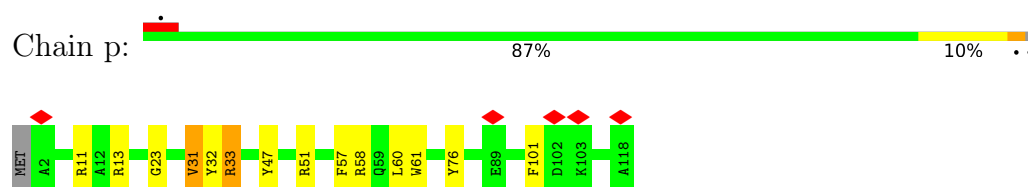
- Molecule 41: Large ribosomal subunit protein uL18



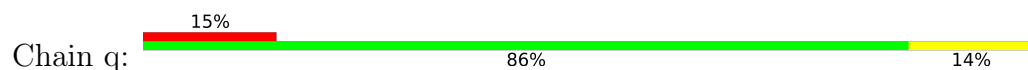
- Molecule 42: Large ribosomal subunit protein bL19

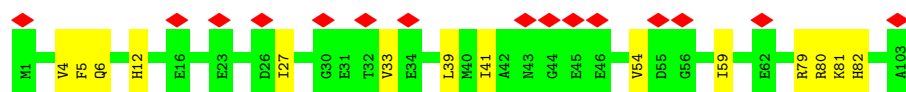


- Molecule 43: Large ribosomal subunit protein bL20

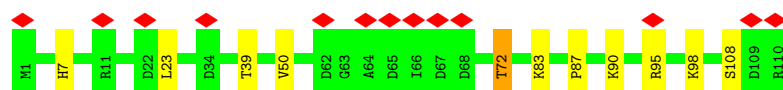
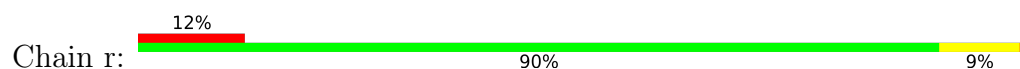


- Molecule 44: Large ribosomal subunit protein bL21

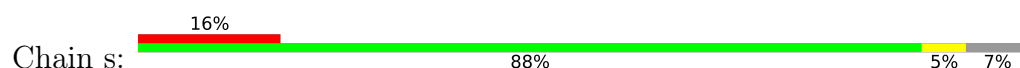




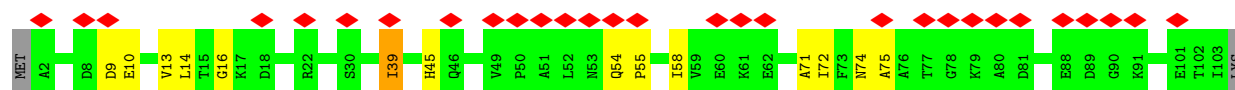
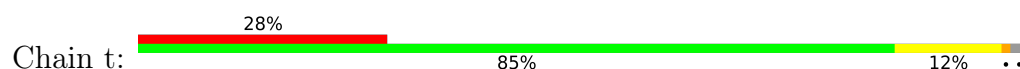
- Molecule 45: Large ribosomal subunit protein uL22



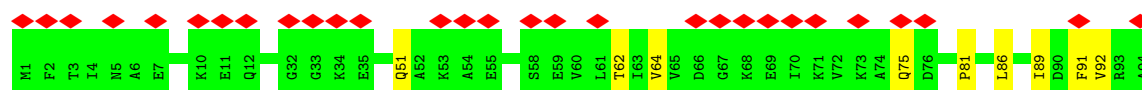
- Molecule 46: Large ribosomal subunit protein uL23



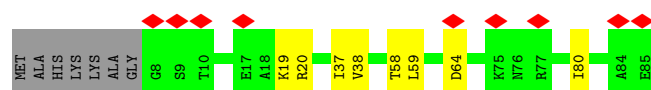
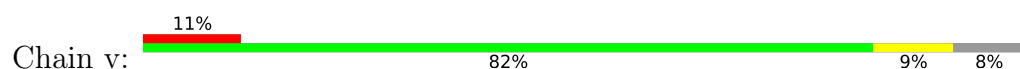
- Molecule 47: Large ribosomal subunit protein uL24



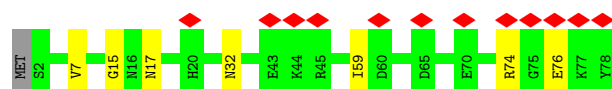
- Molecule 48: Large ribosomal subunit protein bL25



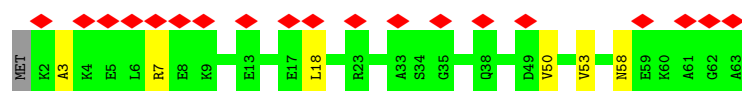
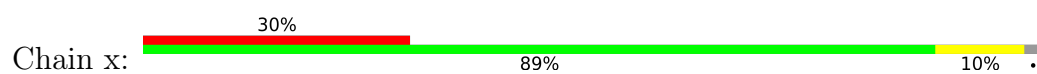
- Molecule 49: Large ribosomal subunit protein bL27



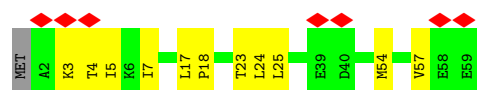
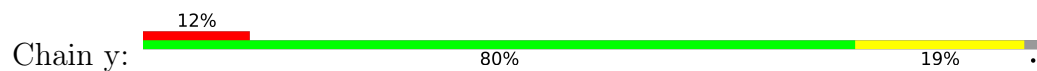
- Molecule 50: Large ribosomal subunit protein bL28



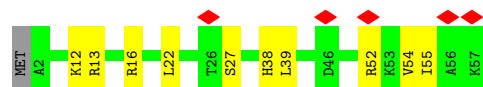
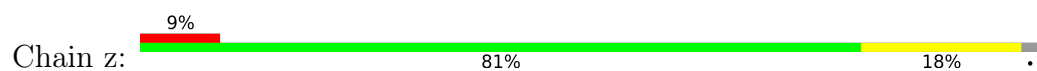
- Molecule 51: Large ribosomal subunit protein uL29



- Molecule 52: Large ribosomal subunit protein uL30



- Molecule 53: Large ribosomal subunit protein bL32



## 4 Experimental information

| Property                             | Value                                   | Source    |
|--------------------------------------|-----------------------------------------|-----------|
| EM reconstruction method             | SINGLE PARTICLE                         | Depositor |
| Imposed symmetry                     | POINT, C1                               | Depositor |
| Number of particles used             | 33268                                   | Depositor |
| Resolution determination method      | FSC 0.143 CUT-OFF                       | Depositor |
| CTF correction method                | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope                           | TFS GLACIOS                             | Depositor |
| Voltage (kV)                         | 200                                     | Depositor |
| Electron dose ( $e^-/\text{\AA}^2$ ) | 32.3                                    | Depositor |
| Minimum defocus (nm)                 | 500                                     | Depositor |
| Maximum defocus (nm)                 | 1500                                    | Depositor |
| Magnification                        | 165000                                  | Depositor |
| Image detector                       | TFS FALCON 4i (4k x 4k)                 | Depositor |
| Maximum map value                    | 0.215                                   | Depositor |
| Minimum map value                    | -0.062                                  | Depositor |
| Average map value                    | 0.000                                   | Depositor |
| Map value standard deviation         | 0.011                                   | Depositor |
| Recommended contour level            | 0.06                                    | Depositor |
| Map size (Å)                         | 411.36, 411.36, 411.36                  | wwPDB     |
| Map dimensions                       | 512, 512, 512                           | wwPDB     |
| Map angles (°)                       | 90.0, 90.0, 90.0                        | wwPDB     |
| Pixel spacing (Å)                    | 0.8034375, 0.8034375, 0.8034375         | Depositor |

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: 3TD, 5MC, 5MU, IAS, PSU, 2MA, D2T, H2U, 6MZ, MEQ, OMC, K, 4OC, 4D4, MG, 2MG, ZN, G7M, UR3, MS6, 1MG, MA6, OMU, OMG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Chain | Bond lengths |                | Bond angles |                   |
|-----|-------|--------------|----------------|-------------|-------------------|
|     |       | RMSZ         | # $ Z  > 5$    | RMSZ        | # $ Z  > 5$       |
| 1   | 0     | 0.57         | 0/424          | 1.14        | 0/565             |
| 2   | 1     | 0.69         | 0/380          | 1.26        | 0/498             |
| 3   | 2     | 0.65         | 0/513          | 1.21        | 0/676             |
| 4   | 3     | 0.61         | 0/303          | 1.13        | 0/397             |
| 5   | A     | 0.60         | 1/36114 (0.0%) | 0.92        | 28/56329 (0.0%)   |
| 6   | B     | 0.54         | 0/1784         | 1.19        | 5/2403 (0.2%)     |
| 7   | C     | 0.52         | 0/1651         | 0.94        | 0/2225            |
| 8   | D     | 0.56         | 0/1625         | 1.24        | 2/2172 (0.1%)     |
| 9   | E     | 0.58         | 0/1148         | 1.07        | 0/1545            |
| 10  | F     | 0.52         | 0/843          | 1.10        | 2/1140 (0.2%)     |
| 11  | G     | 0.50         | 0/1070         | 1.10        | 0/1431            |
| 12  | H     | 0.56         | 0/989          | 1.14        | 1/1326 (0.1%)     |
| 13  | I     | 0.51         | 0/1013         | 0.95        | 0/1350            |
| 14  | J     | 0.53         | 0/784          | 1.01        | 1/1059 (0.1%)     |
| 15  | K     | 0.60         | 0/884          | 1.10        | 1/1191 (0.1%)     |
| 16  | L     | 0.60         | 0/945          | 1.09        | 1/1268 (0.1%)     |
| 17  | M     | 0.52         | 0/900          | 0.98        | 0/1204            |
| 18  | N     | 0.51         | 0/817          | 0.99        | 0/1088            |
| 19  | O     | 0.53         | 0/722          | 1.15        | 0/964             |
| 20  | P     | 0.56         | 0/639          | 1.14        | 1/859 (0.1%)      |
| 21  | Q     | 0.55         | 0/650          | 1.04        | 1/871 (0.1%)      |
| 22  | R     | 0.51         | 0/532          | 1.05        | 0/715             |
| 23  | S     | 0.53         | 0/685          | 0.93        | 0/922             |
| 24  | T     | 0.52         | 0/676          | 1.12        | 1/895 (0.1%)      |
| 25  | U     | 0.52         | 0/597          | 1.18        | 0/792             |
| 26  | V     | 0.52         | 0/912          | 0.98        | 0/1218            |
| 27  | Z     | 0.61         | 0/1737         | 0.84        | 0/2704            |
| 28  | a     | 0.63         | 1/65651 (0.0%) | 1.10        | 293/102413 (0.3%) |
| 29  | b     | 0.62         | 0/2850         | 0.98        | 7/4444 (0.2%)     |
| 30  | c     | 0.64         | 0/2121         | 1.19        | 3/2852 (0.1%)     |
| 31  | d     | 0.63         | 0/1576         | 1.13        | 1/2119 (0.0%)     |

| Mol | Chain | Bond lengths |                 | Bond angles |                   |
|-----|-------|--------------|-----------------|-------------|-------------------|
|     |       | RMSZ         | # Z  >5         | RMSZ        | # Z  >5           |
| 32  | e     | 0.59         | 0/1571          | 1.17        | 1/2113 (0.0%)     |
| 33  | f     | 0.53         | 0/1434          | 1.15        | 2/1926 (0.1%)     |
| 34  | g     | 0.56         | 0/1343          | 1.14        | 1/1816 (0.1%)     |
| 35  | h     | 0.58         | 0/306           | 1.15        | 0/413             |
| 36  | i     | 0.63         | 0/1152          | 1.15        | 3/1551 (0.2%)     |
| 37  | j     | 0.59         | 0/955           | 1.15        | 1/1279 (0.1%)     |
| 38  | k     | 0.64         | 0/1062          | 1.22        | 0/1413            |
| 39  | l     | 0.58         | 0/1073          | 1.11        | 3/1433 (0.2%)     |
| 40  | m     | 0.68         | 0/958           | 1.30        | 2/1281 (0.2%)     |
| 41  | n     | 0.58         | 0/902           | 1.15        | 0/1209            |
| 42  | o     | 0.58         | 0/929           | 1.06        | 0/1242            |
| 43  | p     | 0.70         | 0/960           | 1.28        | 7/1278 (0.5%)     |
| 44  | q     | 0.60         | 0/829           | 1.13        | 0/1107            |
| 45  | r     | 0.69         | 0/864           | 1.20        | 2/1156 (0.2%)     |
| 46  | s     | 0.60         | 0/744           | 1.15        | 0/994             |
| 47  | t     | 0.63         | 0/787           | 1.19        | 1/1051 (0.1%)     |
| 48  | u     | 0.56         | 0/766           | 1.13        | 1/1025 (0.1%)     |
| 49  | v     | 0.60         | 0/593           | 1.13        | 2/785 (0.3%)      |
| 50  | w     | 0.61         | 0/635           | 1.21        | 3/848 (0.4%)      |
| 51  | x     | 0.53         | 0/502           | 1.24        | 0/667             |
| 52  | y     | 0.60         | 0/453           | 1.11        | 1/605 (0.2%)      |
| 53  | z     | 0.70         | 0/450           | 1.29        | 1/599 (0.2%)      |
| All | All   | 0.61         | 2/150803 (0.0%) | 1.06        | 379/225426 (0.2%) |

All (2) bond length outliers are listed below:

| Mol | Chain | Res  | Type | Atoms | Z    | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|-------|------|-------------|----------|
| 28  | a     | 2552 | OMU  | O3'-P | 5.94 | 1.62        | 1.56     |
| 5   | A     | 527  | G7M  | O3'-P | 5.67 | 1.61        | 1.56     |

All (379) bond angle outliers are listed below:

| Mol | Chain | Res  | Type | Atoms     | Z      | Observed(°) | Ideal(°) |
|-----|-------|------|------|-----------|--------|-------------|----------|
| 28  | a     | 786  | C    | O3'-P-O5' | -10.95 | 87.58       | 104.00   |
| 28  | a     | 2730 | C    | O3'-P-O5' | -9.35  | 89.98       | 104.00   |
| 28  | a     | 1328 | A    | O3'-P-O5' | -9.17  | 90.24       | 104.00   |
| 28  | a     | 792  | A    | O3'-P-O5' | -9.12  | 90.32       | 104.00   |
| 28  | a     | 1237 | A    | O3'-P-O5' | -8.98  | 90.53       | 104.00   |
| 28  | a     | 1468 | U    | O3'-P-O5' | -8.86  | 90.70       | 104.00   |
| 28  | a     | 2848 | G    | O3'-P-O5' | -8.49  | 91.27       | 104.00   |
| 28  | a     | 504  | A    | O3'-P-O5' | -8.43  | 91.35       | 104.00   |
| 28  | a     | 254  | G    | O3'-P-O5' | -8.39  | 91.42       | 104.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 28  | a     | 2272 | U    | O3'-P-O5'   | -8.16 | 91.75       | 104.00   |
| 28  | a     | 582  | A    | O3'-P-O5'   | -8.09 | 91.87       | 104.00   |
| 28  | a     | 2447 | G    | O5'-P-OP1   | -8.05 | 83.84       | 108.00   |
| 28  | a     | 1378 | A    | O3'-P-O5'   | -7.98 | 92.03       | 104.00   |
| 28  | a     | 2519 | U    | O3'-P-O5'   | -7.96 | 92.05       | 104.00   |
| 5   | A     | 872  | A    | O3'-P-O5'   | -7.94 | 92.09       | 104.00   |
| 28  | a     | 1151 | A    | O3'-P-O5'   | -7.93 | 92.10       | 104.00   |
| 28  | a     | 2713 | U    | O3'-P-O5'   | -7.91 | 92.14       | 104.00   |
| 28  | a     | 1827 | U    | O3'-P-O5'   | -7.79 | 92.31       | 104.00   |
| 28  | a     | 1810 | A    | O3'-P-O5'   | -7.77 | 92.35       | 104.00   |
| 28  | a     | 1353 | A    | O3'-P-O5'   | -7.69 | 92.47       | 104.00   |
| 28  | a     | 293  | U    | O3'-P-O5'   | -7.66 | 92.51       | 104.00   |
| 28  | a     | 62   | U    | O3'-P-O5'   | -7.65 | 92.52       | 104.00   |
| 28  | a     | 2263 | C    | O3'-P-O5'   | -7.65 | 92.53       | 104.00   |
| 28  | a     | 137  | U    | O3'-P-O5'   | -7.52 | 92.72       | 104.00   |
| 28  | a     | 915  | C    | O3'-P-O5'   | -7.51 | 92.73       | 104.00   |
| 28  | a     | 1168 | G    | O3'-P-O5'   | -7.51 | 92.73       | 104.00   |
| 28  | a     | 820  | A    | O3'-P-O5'   | -7.51 | 92.74       | 104.00   |
| 28  | a     | 2060 | A    | O3'-P-O5'   | -7.45 | 92.83       | 104.00   |
| 28  | a     | 1866 | A    | O3'-P-O5'   | -7.39 | 92.92       | 104.00   |
| 43  | p     | 57   | PHE  | N-CA-CB     | 7.38  | 121.08      | 110.16   |
| 28  | a     | 2485 | G    | O3'-P-O5'   | -7.36 | 92.96       | 104.00   |
| 28  | a     | 1154 | G    | O3'-P-O5'   | -7.36 | 92.96       | 104.00   |
| 28  | a     | 329  | G    | O3'-P-O5'   | -7.36 | 92.96       | 104.00   |
| 28  | a     | 242  | G    | O3'-P-O5'   | -7.35 | 92.97       | 104.00   |
| 28  | a     | 1633 | G    | O3'-P-O5'   | -7.33 | 93.01       | 104.00   |
| 28  | a     | 30   | G    | O3'-P-O5'   | -7.32 | 93.03       | 104.00   |
| 28  | a     | 739  | A    | O3'-P-O5'   | -7.31 | 93.03       | 104.00   |
| 28  | a     | 990  | A    | O3'-P-O5'   | -7.30 | 93.05       | 104.00   |
| 5   | A     | 811  | C    | C4'-C3'-O3' | -7.29 | 102.07      | 113.00   |
| 28  | a     | 2261 | C    | O3'-P-O5'   | -7.28 | 93.07       | 104.00   |
| 28  | a     | 2278 | A    | O3'-P-O5'   | -7.20 | 93.20       | 104.00   |
| 28  | a     | 1550 | C    | O3'-P-O5'   | -7.18 | 93.23       | 104.00   |
| 28  | a     | 1246 | A    | O3'-P-O5'   | -7.13 | 93.30       | 104.00   |
| 28  | a     | 162  | U    | O3'-P-O5'   | -7.12 | 93.31       | 104.00   |
| 28  | a     | 2892 | G    | O3'-P-O5'   | -7.11 | 93.34       | 104.00   |
| 28  | a     | 476  | G    | O3'-P-O5'   | -7.08 | 93.37       | 104.00   |
| 28  | a     | 1191 | G    | O3'-P-O5'   | -7.08 | 93.38       | 104.00   |
| 28  | a     | 2017 | U    | C2'-C3'-O3' | -7.05 | 103.12      | 113.70   |
| 28  | a     | 701  | G    | O3'-P-O5'   | -7.03 | 93.46       | 104.00   |
| 28  | a     | 469  | G    | O3'-P-O5'   | -7.03 | 93.46       | 104.00   |
| 28  | a     | 2690 | U    | O3'-P-O5'   | -7.03 | 93.46       | 104.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 30  | c     | 223  | THR  | CA-CB-OG1   | -6.94 | 99.18       | 109.60   |
| 28  | a     | 2468 | A    | O3'-P-O5'   | -6.92 | 93.61       | 104.00   |
| 15  | K     | 112  | ASP  | CA-CB-CG    | 6.92  | 119.52      | 112.60   |
| 28  | a     | 1238 | G    | O3'-P-O5'   | -6.91 | 93.64       | 104.00   |
| 28  | a     | 1138 | G    | O3'-P-O5'   | -6.85 | 93.72       | 104.00   |
| 28  | a     | 1643 | G    | O3'-P-O5'   | -6.83 | 93.76       | 104.00   |
| 28  | a     | 2384 | U    | O3'-P-O5'   | -6.82 | 93.77       | 104.00   |
| 28  | a     | 2222 | C    | O3'-P-O5'   | -6.79 | 93.82       | 104.00   |
| 5   | A     | 126  | G    | O3'-P-O5'   | -6.77 | 93.84       | 104.00   |
| 28  | a     | 2693 | G    | O3'-P-O5'   | -6.76 | 93.86       | 104.00   |
| 28  | a     | 2636 | C    | O3'-P-O5'   | -6.74 | 93.89       | 104.00   |
| 28  | a     | 1394 | U    | O3'-P-O5'   | -6.73 | 93.90       | 104.00   |
| 28  | a     | 2822 | G    | C4'-C3'-O3' | -6.71 | 102.93      | 113.00   |
| 28  | a     | 330  | A    | O3'-P-O5'   | -6.68 | 93.99       | 104.00   |
| 28  | a     | 575  | A    | O3'-P-O5'   | -6.67 | 94.00       | 104.00   |
| 28  | a     | 1647 | U    | O3'-P-O5'   | -6.66 | 94.00       | 104.00   |
| 28  | a     | 1760 | C    | C2'-C3'-O3' | -6.66 | 103.71      | 113.70   |
| 28  | a     | 1377 | G    | O3'-P-O5'   | -6.66 | 94.01       | 104.00   |
| 28  | a     | 382  | A    | O3'-P-O5'   | -6.66 | 94.02       | 104.00   |
| 28  | a     | 697  | G    | O3'-P-O5'   | -6.65 | 94.02       | 104.00   |
| 28  | a     | 1778 | U    | O3'-P-O5'   | -6.64 | 94.04       | 104.00   |
| 28  | a     | 2490 | G    | O3'-P-O5'   | -6.62 | 94.07       | 104.00   |
| 28  | a     | 1379 | U    | O3'-P-O5'   | -6.61 | 94.08       | 104.00   |
| 28  | a     | 1959 | G    | O3'-P-O5'   | -6.59 | 94.11       | 104.00   |
| 28  | a     | 1565 | C    | O3'-P-O5'   | -6.49 | 94.27       | 104.00   |
| 28  | a     | 1818 | U    | O3'-P-O5'   | -6.49 | 94.27       | 104.00   |
| 28  | a     | 2621 | G    | O3'-P-O5'   | -6.48 | 94.27       | 104.00   |
| 5   | A     | 902  | G    | C4'-C3'-C2' | -6.48 | 96.12       | 102.60   |
| 28  | a     | 2781 | A    | O3'-P-O5'   | -6.47 | 94.30       | 104.00   |
| 28  | a     | 2502 | G    | C4'-C3'-O3' | -6.47 | 103.30      | 113.00   |
| 28  | a     | 1373 | A    | O3'-P-O5'   | -6.47 | 94.30       | 104.00   |
| 5   | A     | 351  | G    | O3'-P-O5'   | -6.46 | 94.31       | 104.00   |
| 28  | a     | 2762 | C    | O3'-P-O5'   | -6.45 | 94.32       | 104.00   |
| 28  | a     | 1785 | A    | C4'-C3'-O3' | -6.45 | 103.33      | 113.00   |
| 28  | a     | 1756 | G    | O3'-P-O5'   | -6.43 | 94.36       | 104.00   |
| 28  | a     | 583  | G    | O3'-P-O5'   | -6.42 | 94.37       | 104.00   |
| 28  | a     | 1666 | G    | O3'-P-O5'   | -6.39 | 94.41       | 104.00   |
| 28  | a     | 2247 | A    | O3'-P-O5'   | -6.39 | 94.42       | 104.00   |
| 28  | a     | 2376 | A    | O3'-P-O5'   | -6.38 | 94.43       | 104.00   |
| 28  | a     | 1602 | U    | O3'-P-O5'   | -6.37 | 94.44       | 104.00   |
| 43  | p     | 13   | ARG  | N-CA-CB     | 6.37  | 119.43      | 109.94   |
| 28  | a     | 578  | G    | O3'-P-O5'   | -6.36 | 94.45       | 104.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 28  | a     | 2561 | U    | O3'-P-O5'   | -6.36 | 94.46       | 104.00   |
| 28  | a     | 456  | C    | O3'-P-O5'   | -6.36 | 94.46       | 104.00   |
| 28  | a     | 738  | G    | O3'-P-O5'   | -6.33 | 94.50       | 104.00   |
| 28  | a     | 1568 | G    | C2'-C3'-O3' | -6.33 | 104.20      | 113.70   |
| 28  | a     | 2731 | G    | O3'-P-O5'   | -6.30 | 94.55       | 104.00   |
| 29  | b     | 98   | G    | O3'-P-O5'   | -6.30 | 94.56       | 104.00   |
| 28  | a     | 1131 | G    | O3'-P-O5'   | -6.29 | 94.56       | 104.00   |
| 28  | a     | 1960 | A    | O3'-P-O5'   | -6.29 | 94.56       | 104.00   |
| 28  | a     | 1027 | A    | O3'-P-O5'   | -6.28 | 94.58       | 104.00   |
| 28  | a     | 2766 | A    | O3'-P-O5'   | -6.27 | 94.60       | 104.00   |
| 28  | a     | 1664 | A    | O3'-P-O5'   | -6.25 | 94.62       | 104.00   |
| 28  | a     | 1549 | A    | O3'-P-O5'   | -6.22 | 94.67       | 104.00   |
| 28  | a     | 206  | U    | O3'-P-O5'   | -6.20 | 94.70       | 104.00   |
| 28  | a     | 530  | G    | O3'-P-O5'   | -6.19 | 94.71       | 104.00   |
| 28  | a     | 2680 | U    | C4'-C3'-O3' | -6.19 | 103.71      | 113.00   |
| 53  | z     | 16   | ARG  | CD-NE-CZ    | 6.18  | 133.06      | 124.40   |
| 28  | a     | 2491 | U    | C3'-C2'-C1' | -6.16 | 95.34       | 101.50   |
| 28  | a     | 2878 | U    | O3'-P-O5'   | -6.15 | 94.78       | 104.00   |
| 5   | A     | 455  | G    | O3'-P-O5'   | -6.14 | 94.78       | 104.00   |
| 28  | a     | 754  | U    | O3'-P-O5'   | -6.14 | 94.80       | 104.00   |
| 33  | f     | 123  | ASP  | CA-CB-CG    | 6.14  | 118.74      | 112.60   |
| 5   | A     | 1481 | U    | O3'-P-O5'   | -6.12 | 94.82       | 104.00   |
| 28  | a     | 457  | A    | O3'-P-O5'   | -6.10 | 94.86       | 104.00   |
| 28  | a     | 804  | A    | O3'-P-O5'   | -6.10 | 94.85       | 104.00   |
| 28  | a     | 395  | U    | O3'-P-O5'   | -6.07 | 94.90       | 104.00   |
| 28  | a     | 421  | C    | O3'-P-O5'   | -6.05 | 94.92       | 104.00   |
| 28  | a     | 1496 | A    | O3'-P-O5'   | -6.05 | 94.92       | 104.00   |
| 28  | a     | 1359 | A    | O3'-P-O5'   | -6.03 | 94.96       | 104.00   |
| 5   | A     | 129  | A    | O3'-P-O5'   | -6.00 | 94.99       | 104.00   |
| 28  | a     | 1837 | C    | O3'-P-O5'   | -6.00 | 94.99       | 104.00   |
| 49  | v     | 58   | THR  | CA-CB-OG1   | -6.00 | 100.61      | 109.60   |
| 28  | a     | 2585 | U    | C4'-C3'-O3' | -5.98 | 104.03      | 113.00   |
| 28  | a     | 1485 | U    | O3'-P-O5'   | -5.98 | 95.03       | 104.00   |
| 28  | a     | 1648 | U    | C4'-C3'-O3' | -5.97 | 104.04      | 113.00   |
| 6   | B     | 162  | PHE  | N-CA-CB     | 5.97  | 118.74      | 109.97   |
| 28  | a     | 513  | A    | O3'-P-O5'   | -5.96 | 95.06       | 104.00   |
| 28  | a     | 1344 | U    | O3'-P-O5'   | -5.96 | 95.06       | 104.00   |
| 5   | A     | 105  | G    | O3'-P-O5'   | -5.96 | 95.07       | 104.00   |
| 28  | a     | 2463 | C    | O3'-P-O5'   | -5.95 | 95.08       | 104.00   |
| 6   | B     | 16   | PHE  | N-CA-CB     | 5.94  | 118.80      | 109.83   |
| 28  | a     | 1606 | C    | O3'-P-O5'   | -5.94 | 95.09       | 104.00   |
| 28  | a     | 2237 | G    | O3'-P-O5'   | -5.94 | 95.09       | 104.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 28  | a     | 563  | A    | O3'-P-O5'   | 5.93  | 112.90      | 104.00   |
| 43  | p     | 57   | PHE  | CA-CB-CG    | -5.93 | 107.87      | 113.80   |
| 28  | a     | 459  | U    | O3'-P-O5'   | -5.92 | 95.12       | 104.00   |
| 43  | p     | 31   | VAL  | N-CA-CB     | -5.92 | 103.88      | 110.99   |
| 50  | w     | 17   | ASN  | N-CA-CB     | 5.92  | 118.77      | 109.83   |
| 28  | a     | 1125 | G    | C4'-C3'-O3' | -5.91 | 104.14      | 113.00   |
| 28  | a     | 1267 | U    | C2'-C3'-O3' | -5.91 | 104.84      | 113.70   |
| 28  | a     | 1243 | C    | O3'-P-O5'   | -5.90 | 95.16       | 104.00   |
| 28  | a     | 2051 | A    | O3'-P-O5'   | -5.89 | 95.16       | 104.00   |
| 28  | a     | 262  | A    | O3'-P-O5'   | -5.88 | 95.19       | 104.00   |
| 5   | A     | 665  | A    | C2'-C3'-O3' | -5.87 | 104.89      | 113.70   |
| 28  | a     | 189  | G    | O3'-P-O5'   | -5.87 | 95.19       | 104.00   |
| 28  | a     | 1136 | G    | C4'-C3'-C2' | -5.87 | 96.73       | 102.60   |
| 28  | a     | 966  | G    | O3'-P-O5'   | -5.85 | 95.22       | 104.00   |
| 28  | a     | 409  | G    | O3'-P-O5'   | -5.85 | 95.22       | 104.00   |
| 28  | a     | 1503 | A    | O3'-P-O5'   | -5.85 | 95.23       | 104.00   |
| 52  | y     | 23   | THR  | CA-CB-OG1   | -5.84 | 100.84      | 109.60   |
| 5   | A     | 600  | A    | O3'-P-O5'   | -5.83 | 95.25       | 104.00   |
| 28  | a     | 573  | U    | O3'-P-O5'   | -5.80 | 95.30       | 104.00   |
| 39  | l     | 85   | GLY  | CA-C-O      | -5.79 | 118.28      | 122.45   |
| 28  | a     | 2045 | C    | O3'-P-O5'   | -5.79 | 95.32       | 104.00   |
| 28  | a     | 2054 | A    | C4'-C3'-O3' | -5.78 | 104.33      | 113.00   |
| 36  | i     | 88   | THR  | CA-CB-OG1   | -5.78 | 100.93      | 109.60   |
| 28  | a     | 2267 | A    | O3'-P-O5'   | -5.78 | 95.34       | 104.00   |
| 20  | P     | 20   | VAL  | N-CA-CB     | -5.77 | 103.40      | 111.25   |
| 28  | a     | 1294 | U    | O3'-P-O5'   | -5.77 | 95.34       | 104.00   |
| 28  | a     | 627  | A    | O3'-P-O5'   | -5.76 | 95.36       | 104.00   |
| 6   | B     | 188  | ASP  | CA-CB-CG    | 5.75  | 118.34      | 112.60   |
| 28  | a     | 781  | A    | O3'-P-O5'   | -5.74 | 95.39       | 104.00   |
| 28  | a     | 1272 | A    | O3'-P-O5'   | -5.73 | 95.40       | 104.00   |
| 28  | a     | 1416 | G    | O3'-P-O5'   | -5.72 | 95.42       | 104.00   |
| 43  | p     | 13   | ARG  | CB-CA-C     | -5.72 | 101.66      | 110.81   |
| 28  | a     | 2428 | G    | C2'-C3'-O3' | -5.71 | 105.13      | 113.70   |
| 28  | a     | 1984 | G    | C4'-C3'-C2' | -5.70 | 96.90       | 102.60   |
| 28  | a     | 159  | G    | O3'-P-O5'   | -5.69 | 95.46       | 104.00   |
| 28  | a     | 1154 | G    | C2'-C3'-O3' | -5.69 | 105.16      | 113.70   |
| 28  | a     | 1968 | G    | O3'-P-O5'   | -5.69 | 95.46       | 104.00   |
| 28  | a     | 1857 | G    | O3'-P-O5'   | -5.69 | 95.47       | 104.00   |
| 28  | a     | 64   | A    | C4'-C3'-O3' | -5.68 | 104.48      | 113.00   |
| 36  | i     | 7    | LYS  | CB-CA-C     | 5.68  | 116.17      | 109.47   |
| 28  | a     | 1328 | A    | C4'-C3'-O3' | -5.67 | 104.49      | 113.00   |
| 28  | a     | 2572 | A    | O3'-P-O5'   | -5.67 | 95.49       | 104.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 5   | A     | 730  | G    | O3'-P-O5'   | -5.67 | 95.50       | 104.00   |
| 5   | A     | 663  | A    | O3'-P-O5'   | -5.66 | 95.50       | 104.00   |
| 28  | a     | 83   | A    | C2'-C3'-O3' | -5.66 | 105.20      | 113.70   |
| 28  | a     | 1614 | A    | O3'-P-O5'   | -5.66 | 95.51       | 104.00   |
| 28  | a     | 404  | A    | C2'-C3'-O3' | 5.66  | 117.99      | 109.50   |
| 28  | a     | 2033 | A    | C4'-C3'-O3' | 5.65  | 117.88      | 109.40   |
| 37  | j     | 12   | ASP  | CA-CB-CG    | 5.65  | 118.25      | 112.60   |
| 28  | a     | 16   | C    | C3'-C2'-O2' | 5.63  | 119.15      | 110.70   |
| 28  | a     | 2641 | G    | C4'-C3'-C2' | -5.62 | 96.98       | 102.60   |
| 29  | b     | 52   | A    | O3'-P-O5'   | -5.62 | 95.57       | 104.00   |
| 5   | A     | 811  | C    | O3'-P-O5'   | -5.62 | 95.57       | 104.00   |
| 10  | F     | 8    | PHE  | CA-CB-CG    | 5.61  | 119.41      | 113.80   |
| 28  | a     | 861  | A    | O3'-P-O5'   | -5.61 | 95.58       | 104.00   |
| 28  | a     | 747  | 5MU  | O3'-P-O5'   | -5.61 | 95.59       | 104.00   |
| 28  | a     | 2884 | U    | C4'-C3'-O3' | -5.61 | 104.59      | 113.00   |
| 28  | a     | 1553 | A    | O3'-P-O5'   | -5.60 | 95.60       | 104.00   |
| 28  | a     | 1136 | G    | P-O5'-C5'   | -5.60 | 112.51      | 120.90   |
| 28  | a     | 1025 | G    | O3'-P-O5'   | 5.59  | 112.39      | 104.00   |
| 28  | a     | 2862 | G    | O3'-P-O5'   | -5.58 | 95.62       | 104.00   |
| 28  | a     | 2074 | U    | O3'-P-O5'   | -5.58 | 95.63       | 104.00   |
| 28  | a     | 246  | C    | C4'-C3'-O3' | -5.58 | 104.64      | 113.00   |
| 28  | a     | 2659 | G    | O3'-P-O5'   | -5.58 | 95.64       | 104.00   |
| 28  | a     | 310  | A    | O3'-P-O5'   | -5.57 | 95.64       | 104.00   |
| 28  | a     | 1367 | A    | O3'-P-O5'   | -5.57 | 95.64       | 104.00   |
| 28  | a     | 2819 | G    | O3'-P-O5'   | -5.57 | 95.65       | 104.00   |
| 28  | a     | 2629 | U    | O3'-P-O5'   | -5.56 | 95.66       | 104.00   |
| 28  | a     | 681  | G    | O3'-P-O5'   | -5.55 | 95.67       | 104.00   |
| 28  | a     | 1214 | A    | O3'-P-O5'   | -5.55 | 95.68       | 104.00   |
| 28  | a     | 204  | A    | O3'-P-O5'   | -5.55 | 95.68       | 104.00   |
| 5   | A     | 347  | G    | O3'-P-O5'   | -5.54 | 95.69       | 104.00   |
| 28  | a     | 827  | U    | C3'-C2'-C1' | 5.54  | 107.04      | 101.50   |
| 28  | a     | 1000 | A    | O3'-P-O5'   | -5.54 | 95.69       | 104.00   |
| 28  | a     | 205  | G    | C3'-C2'-C1' | -5.53 | 95.97       | 101.50   |
| 28  | a     | 784  | G    | O3'-P-O5'   | -5.53 | 95.71       | 104.00   |
| 28  | a     | 63   | A    | O3'-P-O5'   | -5.52 | 95.72       | 104.00   |
| 28  | a     | 1969 | A    | O3'-P-O5'   | -5.52 | 95.72       | 104.00   |
| 28  | a     | 512  | G    | O3'-P-O5'   | -5.51 | 95.73       | 104.00   |
| 28  | a     | 733  | G    | O3'-P-O5'   | -5.51 | 95.74       | 104.00   |
| 28  | a     | 2874 | C    | O3'-P-O5'   | -5.51 | 95.74       | 104.00   |
| 28  | a     | 1543 | G    | O3'-P-O5'   | -5.51 | 95.74       | 104.00   |
| 28  | a     | 2430 | A    | C1'-O4'-C4' | -5.50 | 104.20      | 109.70   |
| 28  | a     | 2615 | U    | O3'-P-O5'   | -5.50 | 95.75       | 104.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 31  | d     | 131  | ASP  | CA-CB-CG    | 5.49  | 118.09      | 112.60   |
| 5   | A     | 1347 | G    | O3'-P-O5'   | -5.49 | 95.76       | 104.00   |
| 28  | a     | 1408 | G    | O3'-P-O5'   | -5.49 | 95.77       | 104.00   |
| 28  | a     | 2761 | A    | O3'-P-O5'   | -5.49 | 95.77       | 104.00   |
| 28  | a     | 1377 | G    | C4'-C3'-O3' | -5.48 | 104.78      | 113.00   |
| 28  | a     | 1757 | A    | C4'-C3'-O3' | -5.47 | 104.79      | 113.00   |
| 28  | a     | 227  | A    | O3'-P-O5'   | -5.47 | 95.80       | 104.00   |
| 28  | a     | 682  | G    | O3'-P-O5'   | -5.46 | 95.81       | 104.00   |
| 28  | a     | 916  | G    | O3'-P-O5'   | -5.46 | 95.81       | 104.00   |
| 28  | a     | 504  | A    | C3'-C2'-C1' | -5.46 | 96.05       | 101.50   |
| 28  | a     | 2590 | A    | O3'-P-O5'   | -5.45 | 95.83       | 104.00   |
| 28  | a     | 2626 | C    | C3'-C2'-O2' | 5.43  | 118.84      | 110.70   |
| 28  | a     | 526  | A    | C1'-C2'-O2' | 5.42  | 116.53      | 108.40   |
| 6   | B     | 90   | PHE  | N-CA-CB     | -5.41 | 101.98      | 110.69   |
| 5   | A     | 1514 | G    | O3'-P-O5'   | -5.41 | 95.88       | 104.00   |
| 28  | a     | 727  | A    | O3'-P-O5'   | -5.41 | 95.89       | 104.00   |
| 28  | a     | 1799 | G    | P-O5'-C5'   | -5.41 | 112.78      | 120.90   |
| 28  | a     | 2021 | C    | C2'-C3'-O3' | 5.40  | 117.60      | 109.50   |
| 28  | a     | 2277 | G    | O3'-P-O5'   | -5.39 | 95.91       | 104.00   |
| 50  | w     | 17   | ASN  | CB-CA-C     | -5.39 | 100.77      | 109.72   |
| 28  | a     | 2730 | C    | C4'-C3'-O3' | -5.39 | 104.91      | 113.00   |
| 30  | c     | 71   | LYS  | N-CA-CB     | 5.39  | 118.12      | 109.28   |
| 5   | A     | 338  | A    | O3'-P-O5'   | -5.39 | 95.92       | 104.00   |
| 28  | a     | 2259 | U    | O3'-P-O5'   | -5.39 | 95.92       | 104.00   |
| 28  | a     | 687  | C    | O3'-P-O5'   | -5.38 | 95.94       | 104.00   |
| 10  | F     | 33   | GLU  | N-CA-CB     | 5.37  | 118.08      | 109.28   |
| 16  | L     | 117  | TYR  | N-CA-CB     | -5.37 | 102.33      | 110.92   |
| 28  | a     | 213  | A    | O3'-P-O5'   | -5.36 | 95.95       | 104.00   |
| 34  | g     | 9    | VAL  | N-CA-CB     | 5.36  | 119.14      | 110.13   |
| 28  | a     | 511  | U    | C2'-C3'-O3' | -5.36 | 105.66      | 113.70   |
| 28  | a     | 2054 | A    | O3'-P-O5'   | -5.35 | 95.97       | 104.00   |
| 45  | r     | 72   | THR  | CA-CB-OG1   | -5.35 | 101.58      | 109.60   |
| 5   | A     | 758  | C    | C4'-C3'-O3' | -5.35 | 104.98      | 113.00   |
| 28  | a     | 473  | G    | O3'-P-O5'   | -5.35 | 95.98       | 104.00   |
| 28  | a     | 134  | G    | O3'-P-O5'   | -5.34 | 95.98       | 104.00   |
| 28  | a     | 991  | C    | O3'-P-O5'   | -5.34 | 95.99       | 104.00   |
| 28  | a     | 241  | A    | O3'-P-O5'   | -5.34 | 95.99       | 104.00   |
| 28  | a     | 652  | U    | O3'-P-O5'   | -5.34 | 95.99       | 104.00   |
| 28  | a     | 1410 | G    | O3'-P-O5'   | -5.34 | 95.99       | 104.00   |
| 28  | a     | 1648 | U    | O3'-P-O5'   | -5.34 | 95.99       | 104.00   |
| 28  | a     | 2635 | A    | O3'-P-O5'   | -5.33 | 96.01       | 104.00   |
| 28  | a     | 2751 | G    | O3'-P-O5'   | -5.33 | 96.01       | 104.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 28  | a     | 859  | G    | C3'-C2'-C1' | -5.32 | 96.18       | 101.50   |
| 45  | r     | 39   | THR  | CA-CB-OG1   | -5.32 | 101.62      | 109.60   |
| 28  | a     | 2699 | C    | C4'-C3'-C2' | -5.31 | 97.29       | 102.60   |
| 40  | m     | 45   | ARG  | CB-CA-C     | -5.31 | 101.66      | 110.68   |
| 28  | a     | 2721 | A    | C2'-C3'-O3' | -5.30 | 105.75      | 113.70   |
| 28  | a     | 571  | U    | O3'-P-O5'   | -5.30 | 96.05       | 104.00   |
| 28  | a     | 1375 | U    | O3'-P-O5'   | -5.29 | 96.07       | 104.00   |
| 28  | a     | 2447 | G    | O3'-P-O5'   | -5.29 | 96.07       | 104.00   |
| 28  | a     | 1518 | C    | O3'-P-O5'   | -5.28 | 96.08       | 104.00   |
| 28  | a     | 2258 | C    | C1'-C2'-O2' | -5.28 | 103.88      | 111.80   |
| 28  | a     | 1270 | C    | C2'-C3'-O3' | -5.27 | 105.79      | 113.70   |
| 28  | a     | 2554 | U    | O3'-P-O5'   | -5.27 | 96.10       | 104.00   |
| 28  | a     | 1614 | A    | C2'-C3'-O3' | -5.27 | 105.80      | 113.70   |
| 28  | a     | 1374 | G    | O3'-P-O5'   | -5.26 | 96.11       | 104.00   |
| 28  | a     | 238  | C    | C4'-C3'-O3' | -5.26 | 105.11      | 113.00   |
| 28  | a     | 1781 | U    | O3'-P-O5'   | -5.26 | 96.12       | 104.00   |
| 28  | a     | 2585 | U    | C1'-O4'-C4' | -5.26 | 104.64      | 109.90   |
| 28  | a     | 1186 | G    | O3'-P-O5'   | -5.25 | 96.12       | 104.00   |
| 28  | a     | 1438 | U    | O3'-P-O5'   | -5.25 | 96.13       | 104.00   |
| 28  | a     | 1388 | G    | O3'-P-O5'   | -5.25 | 96.13       | 104.00   |
| 28  | a     | 2592 | G    | O3'-P-O5'   | -5.24 | 96.14       | 104.00   |
| 28  | a     | 2824 | C    | C4'-C3'-O3' | -5.24 | 105.14      | 113.00   |
| 28  | a     | 2440 | C    | O3'-P-O5'   | -5.24 | 96.14       | 104.00   |
| 28  | a     | 204  | A    | C4'-C3'-O3' | 5.23  | 117.25      | 109.40   |
| 28  | a     | 2198 | A    | O3'-P-O5'   | -5.23 | 96.16       | 104.00   |
| 39  | l     | 53   | MET  | CB-CA-C     | -5.22 | 102.12      | 110.79   |
| 5   | A     | 270  | A    | O3'-P-O5'   | -5.22 | 96.17       | 104.00   |
| 5   | A     | 435  | A    | O3'-P-O5'   | -5.22 | 96.17       | 104.00   |
| 28  | a     | 1184 | U    | O3'-P-O5'   | -5.22 | 96.17       | 104.00   |
| 33  | f     | 163  | ASP  | CA-CB-CG    | 5.22  | 117.82      | 112.60   |
| 21  | Q     | 11   | ARG  | CB-CA-C     | -5.21 | 100.74      | 109.65   |
| 28  | a     | 2078 | C    | C4'-C3'-O3' | -5.21 | 105.19      | 113.00   |
| 29  | b     | 32   | U    | O3'-P-O5'   | -5.21 | 96.19       | 104.00   |
| 28  | a     | 2824 | C    | O3'-P-O5'   | -5.20 | 96.20       | 104.00   |
| 6   | B     | 90   | PHE  | CB-CA-C     | 5.20  | 118.74      | 109.38   |
| 28  | a     | 924  | G    | O3'-P-O5'   | -5.20 | 96.20       | 104.00   |
| 47  | t     | 9    | ASP  | CA-CB-CG    | 5.20  | 117.80      | 112.60   |
| 5   | A     | 70   | U    | O3'-P-O5'   | -5.19 | 96.22       | 104.00   |
| 28  | a     | 221  | A    | O3'-P-O5'   | -5.19 | 96.22       | 104.00   |
| 28  | a     | 1135 | C    | C4'-C3'-O3' | -5.19 | 105.22      | 113.00   |
| 28  | a     | 1135 | C    | C2'-C3'-O3' | 5.18  | 121.48      | 113.70   |
| 28  | a     | 1254 | A    | C4'-C3'-O3' | -5.18 | 105.23      | 113.00   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 5   | A     | 561  | U    | O3'-P-O5'   | -5.18 | 96.23       | 104.00   |
| 28  | a     | 854  | C    | O3'-P-O5'   | -5.17 | 96.24       | 104.00   |
| 28  | a     | 1152 | C    | O3'-P-O5'   | -5.17 | 96.25       | 104.00   |
| 28  | a     | 1704 | C    | O3'-P-O5'   | -5.17 | 96.25       | 104.00   |
| 28  | a     | 696  | G    | C4'-C3'-C2' | -5.17 | 97.43       | 102.60   |
| 28  | a     | 1228 | G    | O3'-P-O5'   | -5.17 | 96.25       | 104.00   |
| 29  | b     | 34   | A    | O3'-P-O5'   | -5.16 | 96.25       | 104.00   |
| 28  | a     | 2612 | C    | C2'-C3'-O3' | -5.16 | 105.96      | 113.70   |
| 39  | l     | 8    | LYS  | N-CA-CB     | 5.16  | 117.80      | 110.16   |
| 28  | a     | 201  | C    | O3'-P-O5'   | -5.16 | 96.26       | 104.00   |
| 28  | a     | 418  | C    | O3'-P-O5'   | -5.16 | 96.26       | 104.00   |
| 5   | A     | 864  | A    | O3'-P-O5'   | -5.16 | 96.26       | 104.00   |
| 28  | a     | 2207 | C    | O3'-P-O5'   | -5.16 | 96.27       | 104.00   |
| 28  | a     | 822  | G    | O3'-P-O5'   | -5.15 | 96.27       | 104.00   |
| 28  | a     | 1365 | A    | O3'-P-O5'   | -5.15 | 96.28       | 104.00   |
| 28  | a     | 2402 | U    | C4'-C3'-O3' | -5.15 | 105.28      | 113.00   |
| 28  | a     | 244  | A    | C1'-C2'-O2' | 5.14  | 116.12      | 108.40   |
| 5   | A     | 374  | A    | O3'-P-O5'   | -5.14 | 96.29       | 104.00   |
| 28  | a     | 1897 | G    | O3'-P-O5'   | -5.14 | 96.28       | 104.00   |
| 48  | u     | 62   | THR  | CA-CB-OG1   | -5.14 | 101.89      | 109.60   |
| 28  | a     | 2479 | U    | O3'-P-O5'   | -5.14 | 96.30       | 104.00   |
| 28  | a     | 2501 | C    | O3'-P-O5'   | -5.14 | 96.29       | 104.00   |
| 50  | w     | 15   | GLY  | CA-C-O      | -5.14 | 116.55      | 121.38   |
| 28  | a     | 1617 | C    | C1'-C2'-O2' | -5.13 | 104.10      | 111.80   |
| 28  | a     | 2055 | C    | C2'-C3'-O3' | -5.13 | 106.00      | 113.70   |
| 28  | a     | 1217 | U    | O3'-P-O5'   | -5.13 | 96.30       | 104.00   |
| 24  | T     | 29   | ARG  | CB-CA-C     | -5.13 | 102.28      | 110.79   |
| 28  | a     | 1838 | C    | C1'-O4'-C4' | -5.12 | 104.58      | 109.70   |
| 28  | a     | 2037 | A    | O3'-P-O5'   | -5.12 | 96.32       | 104.00   |
| 28  | a     | 534  | U    | O3'-P-O5'   | -5.12 | 96.32       | 104.00   |
| 28  | a     | 860  | U    | O3'-P-O5'   | -5.12 | 96.32       | 104.00   |
| 28  | a     | 2874 | C    | C4'-C3'-C2' | -5.12 | 97.48       | 102.60   |
| 28  | a     | 1802 | A    | O3'-P-O5'   | -5.12 | 96.33       | 104.00   |
| 28  | a     | 2215 | C    | O3'-P-O5'   | -5.12 | 96.33       | 104.00   |
| 12  | H     | 57   | PRO  | CB-CA-C     | 5.11  | 118.05      | 111.56   |
| 28  | a     | 968  | C    | O3'-P-O5'   | -5.10 | 96.35       | 104.00   |
| 28  | a     | 674  | G    | O3'-P-O5'   | -5.10 | 96.35       | 104.00   |
| 8   | D     | 129  | VAL  | N-CA-CB     | 5.09  | 116.95      | 110.13   |
| 14  | J     | 56   | HIS  | CA-CB-CG    | -5.09 | 108.71      | 113.80   |
| 28  | a     | 443  | A    | C2'-C3'-O3' | -5.09 | 106.06      | 113.70   |
| 28  | a     | 621  | A    | O3'-P-O5'   | -5.09 | 96.37       | 104.00   |
| 32  | e     | 198  | GLU  | N-CA-CB     | -5.09 | 102.63      | 110.16   |

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| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 28  | a     | 352  | A    | O3'-P-O5'   | -5.08 | 96.37       | 104.00   |
| 28  | a     | 714  | U    | O3'-P-O5'   | -5.08 | 96.37       | 104.00   |
| 29  | b     | 92   | C    | O3'-P-O5'   | -5.08 | 96.38       | 104.00   |
| 28  | a     | 259  | G    | C4'-C3'-C2' | -5.08 | 97.52       | 102.60   |
| 28  | a     | 1148 | U    | C4'-C3'-C2' | -5.08 | 97.52       | 102.60   |
| 28  | a     | 1244 | A    | O3'-P-O5'   | -5.08 | 96.39       | 104.00   |
| 29  | b     | 93   | C    | O3'-P-O5'   | -5.08 | 96.39       | 104.00   |
| 28  | a     | 2242 | G    | O3'-P-O5'   | -5.07 | 96.39       | 104.00   |
| 43  | p     | 101  | PHE  | CA-CB-CG    | -5.07 | 108.73      | 113.80   |
| 28  | a     | 2600 | A    | O3'-P-O5'   | -5.07 | 96.40       | 104.00   |
| 28  | a     | 2717 | C    | O3'-P-O5'   | -5.06 | 96.41       | 104.00   |
| 28  | a     | 257  | C    | O3'-P-O5'   | -5.06 | 96.41       | 104.00   |
| 28  | a     | 979  | A    | C4'-C3'-C2' | -5.06 | 97.54       | 102.60   |
| 28  | a     | 2016 | U    | O3'-P-O5'   | -5.05 | 96.42       | 104.00   |
| 28  | a     | 1403 | A    | O3'-P-O5'   | -5.05 | 96.42       | 104.00   |
| 28  | a     | 583  | G    | C3'-C2'-C1' | -5.05 | 96.25       | 101.30   |
| 40  | m     | 28   | LEU  | N-CA-CB     | 5.04  | 117.54      | 110.12   |
| 36  | i     | 80   | HIS  | CA-CB-CG    | -5.04 | 108.76      | 113.80   |
| 28  | a     | 1002 | G    | O3'-P-O5'   | -5.03 | 96.45       | 104.00   |
| 28  | a     | 2692 | G    | C4'-C3'-C2' | -5.03 | 97.58       | 102.60   |
| 29  | b     | 65   | U    | O3'-P-O5'   | -5.03 | 96.46       | 104.00   |
| 5   | A     | 550  | G    | O3'-P-O5'   | -5.02 | 96.46       | 104.00   |
| 28  | a     | 918  | A    | O3'-P-O5'   | -5.02 | 96.47       | 104.00   |
| 28  | a     | 1244 | A    | C1'-C2'-O2' | 5.02  | 115.93      | 108.40   |
| 30  | c     | 223  | THR  | OG1-CB-CG2  | 5.02  | 119.33      | 109.30   |
| 5   | A     | 1408 | A    | O3'-P-O5'   | -5.01 | 96.48       | 104.00   |
| 5   | A     | 1530 | G    | C4'-C3'-C2' | -5.01 | 97.59       | 102.60   |
| 28  | a     | 2446 | G    | O3'-P-O5'   | -5.01 | 96.48       | 104.00   |
| 43  | p     | 33   | ARG  | NE-CZ-NH2   | 5.01  | 123.71      | 119.20   |
| 28  | a     | 451  | U    | C1'-O4'-C4' | -5.01 | 104.89      | 109.90   |
| 49  | v     | 64   | ASP  | CA-CB-CG    | 5.01  | 117.61      | 112.60   |
| 8   | D     | 182  | PHE  | N-CA-CB     | -5.01 | 102.10      | 110.37   |
| 28  | a     | 478  | A    | C4'-C3'-O3' | -5.01 | 105.49      | 113.00   |
| 28  | a     | 2238 | G    | O3'-P-O5'   | -5.00 | 96.50       | 104.00   |

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen

atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 1   | 0     | 417   | 441      | 451      | 3       | 0            |
| 2   | 1     | 377   | 411      | 418      | 3       | 0            |
| 3   | 2     | 504   | 562      | 572      | 6       | 0            |
| 4   | 3     | 302   | 337      | 340      | 1       | 0            |
| 5   | A     | 32503 | 14825    | 16377    | 169     | 0            |
| 6   | B     | 1753  | 1751     | 1780     | 60      | 0            |
| 7   | C     | 1624  | 1669     | 1696     | 7       | 0            |
| 8   | D     | 1605  | 1640     | 1665     | 24      | 0            |
| 9   | E     | 1135  | 1160     | 1179     | 21      | 0            |
| 10  | F     | 824   | 796      | 815      | 8       | 0            |
| 11  | G     | 1057  | 1087     | 1101     | 8       | 0            |
| 12  | H     | 979   | 1015     | 1031     | 17      | 0            |
| 13  | I     | 1001  | 1027     | 1044     | 4       | 0            |
| 14  | J     | 775   | 806      | 817      | 4       | 0            |
| 15  | K     | 877   | 865      | 883      | 9       | 0            |
| 16  | L     | 942   | 976      | 997      | 18      | 0            |
| 17  | M     | 891   | 935      | 952      | 0       | 0            |
| 18  | N     | 805   | 832      | 844      | 1       | 0            |
| 19  | O     | 714   | 716      | 734      | 1       | 0            |
| 20  | P     | 629   | 634      | 643      | 2       | 0            |
| 21  | Q     | 641   | 668      | 682      | 6       | 0            |
| 22  | R     | 524   | 528      | 543      | 2       | 0            |
| 23  | S     | 668   | 678      | 693      | 1       | 0            |
| 24  | T     | 670   | 710      | 719      | 7       | 0            |
| 25  | U     | 589   | 621      | 629      | 6       | 0            |
| 26  | V     | 900   | 917      | 931      | 6       | 0            |
| 27  | Z     | 1557  | 714      | 789      | 18      | 0            |
| 28  | a     | 59130 | 26982    | 29769    | 251     | 0            |
| 29  | b     | 2549  | 1171     | 1291     | 10      | 0            |
| 30  | c     | 2082  | 2114     | 2154     | 19      | 0            |
| 31  | d     | 1566  | 1586     | 1618     | 10      | 0            |
| 32  | e     | 1552  | 1590     | 1619     | 11      | 0            |
| 33  | f     | 1410  | 1421     | 1444     | 17      | 0            |
| 34  | g     | 1323  | 1347     | 1371     | 18      | 0            |
| 35  | h     | 303   | 324      | 327      | 4       | 0            |
| 36  | i     | 1129  | 1137     | 1162     | 13      | 0            |
| 37  | j     | 946   | 1008     | 1023     | 12      | 0            |
| 38  | k     | 1053  | 1111     | 1129     | 7       | 0            |
| 39  | l     | 1075  | 1142     | 1145     | 10      | 0            |
| 40  | m     | 945   | 971      | 989      | 10      | 0            |
| 41  | n     | 892   | 908      | 923      | 8       | 0            |

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| Mol | Chain | Non-H  | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|--------|----------|----------|---------|--------------|
| 42  | o     | 917    | 947      | 962      | 4       | 0            |
| 43  | p     | 947    | 1008     | 1019     | 7       | 0            |
| 44  | q     | 816    | 825      | 839      | 7       | 0            |
| 45  | r     | 857    | 904      | 922      | 7       | 0            |
| 46  | s     | 738    | 795      | 807      | 4       | 0            |
| 47  | t     | 779    | 823      | 831      | 9       | 0            |
| 48  | u     | 753    | 770      | 780      | 4       | 0            |
| 49  | v     | 586    | 586      | 596      | 4       | 0            |
| 50  | w     | 625    | 638      | 652      | 3       | 0            |
| 51  | x     | 501    | 526      | 531      | 3       | 0            |
| 52  | y     | 449    | 479      | 488      | 6       | 0            |
| 53  | z     | 444    | 443      | 458      | 5       | 0            |
| 54  | 3     | 1      | 0        | 0        | 0       | 0            |
| 55  | A     | 17     | 0        | 0        | 0       | 0            |
| 55  | Q     | 1      | 0        | 0        | 0       | 0            |
| 55  | a     | 185    | 0        | 0        | 0       | 0            |
| 55  | b     | 5      | 0        | 0        | 0       | 0            |
| 55  | c     | 1      | 0        | 0        | 0       | 0            |
| 55  | z     | 1      | 0        | 0        | 0       | 0            |
| 56  | A     | 1      | 0        | 0        | 0       | 0            |
| 56  | F     | 1      | 0        | 0        | 0       | 0            |
| 57  | Z     | 8      | 6        | 3        | 1       | 0            |
| All | All   | 139851 | 88883    | 94177    | 803     | 0            |

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (803) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

| Atom-1           | Atom-2             | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|--------------------|--------------------------|-------------------|
| 28:a:568:U:H1'   | 28:a:2030:6MZ:H9C1 | 1.61                     | 0.82              |
| 28:a:1141:U:H4'  | 28:a:1142:A:O4'    | 1.80                     | 0.82              |
| 5:A:1240:U:O4'   | 11:G:42:ILE:HD11   | 1.82                     | 0.79              |
| 5:A:1346:A:C2    | 11:G:10:ARG:HD3    | 2.19                     | 0.77              |
| 31:d:1:MET:HE2   | 31:d:205:PRO:HG3   | 1.67                     | 0.77              |
| 28:a:729:G:OP1   | 30:c:12:GLY:HA3    | 1.86                     | 0.75              |
| 30:c:78:VAL:HG21 | 30:c:110:LEU:HD21  | 1.70                     | 0.74              |
| 5:A:529:G:H22    | 16:L:48:ALA:HB2    | 1.53                     | 0.74              |
| 27:Z:9:A:N3      | 27:Z:45:G:H2'      | 2.03                     | 0.74              |
| 8:D:102:VAL:HG11 | 8:D:117:LEU:HD11   | 1.70                     | 0.72              |
| 6:B:70:VAL:HG22  | 6:B:163:VAL:HG22   | 1.70                     | 0.71              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 37:j:7:MET:HE1    | 37:j:44:LYS:HG3   | 1.73                     | 0.71              |
| 28:a:1434:A:H2'   | 28:a:1435:G:C8    | 2.26                     | 0.70              |
| 5:A:417:G:H2'     | 5:A:418:C:C6      | 2.26                     | 0.70              |
| 15:K:35:THR:HG22  | 15:K:41:ALA:HA    | 1.75                     | 0.68              |
| 5:A:296:U:O2'     | 5:A:556:C:O2      | 2.10                     | 0.68              |
| 15:K:67:ALA:HB2   | 15:K:96:THR:HG23  | 1.76                     | 0.68              |
| 28:a:1608:A:O2'   | 28:a:1610:A:OP2   | 2.09                     | 0.68              |
| 30:c:71:LYS:O     | 30:c:118:SER:OG   | 2.12                     | 0.67              |
| 5:A:24:U:H2'      | 5:A:24:U:O2       | 1.95                     | 0.67              |
| 28:a:2327:A:H2'   | 28:a:2328:A:C8    | 2.31                     | 0.66              |
| 37:j:58:LEU:HD11  | 37:j:86:LEU:HD13  | 1.78                     | 0.66              |
| 5:A:1376:U:O4     | 11:G:10:ARG:NH1   | 2.28                     | 0.66              |
| 27:Z:76:A:O3'     | 57:Z:101:ASP:C    | 2.38                     | 0.66              |
| 28:a:1434:A:H2'   | 28:a:1435:G:H8    | 1.61                     | 0.66              |
| 6:B:76:ALA:HA     | 6:B:210:VAL:HG11  | 1.76                     | 0.66              |
| 27:Z:4:G:H1       | 27:Z:69:U:H3      | 1.42                     | 0.65              |
| 28:a:395:U:O2'    | 28:a:396:G:N7     | 2.27                     | 0.65              |
| 5:A:411:A:H1'     | 5:A:412:A:H2'     | 1.77                     | 0.65              |
| 6:B:117:LEU:HD11  | 6:B:137:ARG:HB3   | 1.78                     | 0.65              |
| 24:T:42:GLY:O     | 24:T:86:LEU:HD11  | 1.97                     | 0.65              |
| 34:g:72:LEU:HD23  | 34:g:75:MET:SD    | 2.37                     | 0.65              |
| 28:a:1320:C:N3    | 28:a:1331:G:O6    | 2.30                     | 0.65              |
| 6:B:12:ALA:HB1    | 6:B:209:ALA:HA    | 1.78                     | 0.64              |
| 28:a:1607:C:N4    | 28:a:1622:G:OP2   | 2.25                     | 0.63              |
| 27:Z:23:A:H2'     | 27:Z:24:A:O4'     | 1.98                     | 0.63              |
| 28:a:1720:U:H2'   | 28:a:1721:G:O4'   | 1.98                     | 0.63              |
| 7:C:71:ALA:HA     | 7:C:106:VAL:HB    | 1.80                     | 0.63              |
| 8:D:117:LEU:HD12  | 8:D:118:VAL:HG23  | 1.80                     | 0.62              |
| 12:H:49:PHE:HB2   | 12:H:61:LEU:HD23  | 1.82                     | 0.62              |
| 16:L:82:ILE:HG21  | 16:L:95:TYR:HB3   | 1.81                     | 0.62              |
| 33:f:36:LEU:HB3   | 33:f:152:LEU:HD11 | 1.80                     | 0.62              |
| 36:i:17:VAL:HG23  | 36:i:137:PRO:HB2  | 1.81                     | 0.62              |
| 5:A:1376:U:OP2    | 11:G:25:LYS:NZ    | 2.33                     | 0.62              |
| 28:a:1607:C:H4'   | 28:a:1608:A:O5'   | 1.99                     | 0.62              |
| 30:c:271:ARG:O    | 30:c:272:SER:C    | 2.43                     | 0.61              |
| 5:A:264:C:H2'     | 5:A:265:G:O4'     | 2.01                     | 0.61              |
| 5:A:1518:MA6:H103 | 5:A:1519:MA6:H102 | 1.81                     | 0.61              |
| 28:a:890:C:H3'    | 28:a:891:G:O4'    | 1.99                     | 0.61              |
| 27:Z:24:A:H2'     | 27:Z:25:U:O4'     | 1.99                     | 0.61              |
| 15:K:23:ILE:HB    | 15:K:86:VAL:HG12  | 1.80                     | 0.61              |
| 38:k:122:VAL:HG21 | 38:k:135:ILE:HD13 | 1.83                     | 0.61              |

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| Atom-1            | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|------------------|--------------------------|-------------------|
| 28:a:18:U:O3'     | 43:p:23:GLY:HA2  | 2.01                     | 0.60              |
| 51:x:18:LEU:HD11  | 51:x:50:VAL:HG13 | 1.83                     | 0.60              |
| 45:r:72:THR:HG1   | 45:r:108:SER:HG  | 1.42                     | 0.60              |
| 6:B:77:SER:HA     | 6:B:80:VAL:HG22  | 1.82                     | 0.60              |
| 6:B:113:ARG:HH12  | 6:B:117:LEU:HD13 | 1.66                     | 0.60              |
| 28:a:1570:A:H2'   | 28:a:1571:A:C8   | 2.37                     | 0.60              |
| 6:B:76:ALA:O      | 6:B:80:VAL:HG13  | 2.01                     | 0.59              |
| 27:Z:25:U:H2'     | 27:Z:26:A:O4'    | 2.01                     | 0.59              |
| 28:a:1709:U:C2    | 28:a:1750:G:N2   | 2.70                     | 0.59              |
| 8:D:50:ASP:O      | 8:D:53:VAL:HG12  | 2.03                     | 0.59              |
| 16:L:82:ILE:CG2   | 16:L:95:TYR:HB3  | 2.32                     | 0.59              |
| 28:a:1048:A:N7    | 28:a:1111:A:C6   | 2.70                     | 0.59              |
| 28:a:658:U:O2     | 32:e:97:ASN:ND2  | 2.36                     | 0.59              |
| 28:a:788:A:OP1    | 28:a:790:U:H5    | 1.85                     | 0.59              |
| 6:B:70:VAL:CG2    | 6:B:163:VAL:HG22 | 2.33                     | 0.59              |
| 6:B:32:PHE:HB2    | 6:B:42:ASN:HA    | 1.86                     | 0.58              |
| 5:A:227:G:H2'     | 5:A:228:A:O4'    | 2.04                     | 0.58              |
| 29:b:106:G:H2'    | 29:b:107:G:O4'   | 2.02                     | 0.58              |
| 30:c:37:ASN:OD1   | 30:c:37:ASN:O    | 2.21                     | 0.58              |
| 28:a:1791:A:N6    | 28:a:1828:G:O2'  | 2.36                     | 0.58              |
| 31:d:12:THR:HG22  | 31:d:13:ARG:H    | 1.69                     | 0.57              |
| 42:o:23:GLY:O     | 42:o:90:GLY:HA3  | 2.03                     | 0.57              |
| 5:A:697:U:H5''    | 26:V:34:GLY:O    | 2.03                     | 0.57              |
| 5:A:1423:G:OP1    | 37:j:49:ARG:NH2  | 2.38                     | 0.57              |
| 37:j:19:VAL:CG1   | 37:j:41:ILE:HD13 | 2.35                     | 0.57              |
| 39:l:50:ARG:HD3   | 39:l:65:ILE:HD11 | 1.85                     | 0.57              |
| 28:a:1853:A:N1    | 28:a:2087:G:H1'  | 2.20                     | 0.56              |
| 5:A:977:A:O2'     | 5:A:979:C:OP2    | 2.21                     | 0.56              |
| 5:A:1516:2MG:HM21 | 5:A:1519:MA6:N7  | 2.21                     | 0.56              |
| 32:e:21:ARG:HD3   | 32:e:106:LYS:HB3 | 1.86                     | 0.56              |
| 5:A:381:C:H2'     | 5:A:382:A:O4'    | 2.05                     | 0.56              |
| 5:A:1103:C:OP1    | 6:B:95:ARG:NH1   | 2.38                     | 0.56              |
| 33:f:38:MET:HE2   | 33:f:152:LEU:HB2 | 1.87                     | 0.56              |
| 5:A:785:G:O3'     | 26:V:33:GLY:HA2  | 2.05                     | 0.56              |
| 5:A:80:A:C2       | 5:A:81:A:N7      | 2.74                     | 0.56              |
| 5:A:634:C:H2'     | 5:A:635:A:C8     | 2.41                     | 0.56              |
| 28:a:1380:G:C2    | 28:a:1381:G:C8   | 2.93                     | 0.56              |
| 5:A:678:U:H2'     | 5:A:679:C:C6     | 2.41                     | 0.56              |
| 28:a:547:A:H4'    | 28:a:548:G:O4'   | 2.06                     | 0.56              |
| 6:B:92:VAL:HG22   | 6:B:151:ILE:HD11 | 1.88                     | 0.55              |
| 30:c:31:ALA:HB3   | 30:c:32:PRO:HD3  | 1.89                     | 0.55              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 21:Q:59:VAL:HG13 | 21:Q:75:LEU:HD23 | 1.89                     | 0.55              |
| 37:j:64:ARG:HD3  | 37:j:102:PRO:O   | 2.06                     | 0.55              |
| 25:U:39:GLU:HG3  | 25:U:43:THR:HB   | 1.87                     | 0.55              |
| 28:a:1649:G:O2'  | 40:m:106:ASP:OD2 | 2.22                     | 0.55              |
| 5:A:253:A:H2'    | 5:A:254:G:C8     | 2.42                     | 0.55              |
| 15:K:17:SER:HA   | 15:K:79:ILE:HA   | 1.88                     | 0.55              |
| 39:l:20:LEU:HD13 | 48:u:81:PRO:HG2  | 1.88                     | 0.55              |
| 2:l:3:ARG:HH12   | 28:a:752:A:P     | 2.29                     | 0.55              |
| 28:a:624:C:O2'   | 28:a:657:U:OP1   | 2.23                     | 0.55              |
| 28:a:1432:G:H2'  | 28:a:1433:A:C8   | 2.42                     | 0.55              |
| 8:D:8:LYS:HB3    | 8:D:21:LEU:HD22  | 1.89                     | 0.55              |
| 5:A:1424:U:H2'   | 5:A:1424:U:O2    | 2.07                     | 0.54              |
| 44:q:41:ILE:HD12 | 44:q:54:VAL:HG11 | 1.89                     | 0.54              |
| 28:a:2887:A:N3   | 53:z:27:SER:OG   | 2.37                     | 0.54              |
| 30:c:16:VAL:HG22 | 30:c:206:GLY:HA3 | 1.89                     | 0.54              |
| 12:H:22:LYS:HD3  | 12:H:25:VAL:HG12 | 1.90                     | 0.54              |
| 40:m:117:ASP:O   | 40:m:118:ARG:C   | 2.50                     | 0.54              |
| 6:B:68:LEU:HD22  | 6:B:154:MET:HE1  | 1.90                     | 0.54              |
| 6:B:206:ALA:O    | 6:B:210:VAL:HG23 | 2.07                     | 0.54              |
| 28:a:1042:G:C6   | 28:a:1043:C:C4   | 2.95                     | 0.54              |
| 31:d:2:ILE:HG21  | 31:d:48:ILE:HD11 | 1.89                     | 0.54              |
| 5:A:714:G:H2'    | 5:A:715:A:C8     | 2.42                     | 0.54              |
| 5:A:912:C:H2'    | 5:A:913:A:C8     | 2.42                     | 0.54              |
| 6:B:115:LYS:HE3  | 6:B:152:LYS:HB2  | 1.89                     | 0.54              |
| 33:f:29:PRO:HB3  | 33:f:160:ALA:HB2 | 1.90                     | 0.54              |
| 28:a:1421:G:C2   | 28:a:1422:G:C8   | 2.96                     | 0.53              |
| 34:g:11:VAL:HB   | 34:g:48:ASN:HA   | 1.90                     | 0.53              |
| 39:l:42:THR:OG1  | 39:l:45:GLN:HG3  | 2.08                     | 0.53              |
| 28:a:876:C:H2'   | 28:a:877:A:O4'   | 2.08                     | 0.53              |
| 5:A:343:U:O2'    | 5:A:346:G:O6     | 2.20                     | 0.53              |
| 8:D:72:PHE:CE1   | 8:D:90:LEU:HD11  | 2.43                     | 0.53              |
| 28:a:860:U:C2    | 28:a:2268:A:C8   | 2.97                     | 0.53              |
| 28:a:1969:A:O2'  | 28:a:1972:G:N3   | 2.41                     | 0.53              |
| 41:n:82:ALA:HB1  | 41:n:87:ILE:HG21 | 1.91                     | 0.53              |
| 6:B:95:ARG:NH1   | 6:B:97:LEU:HA    | 2.24                     | 0.53              |
| 7:C:51:SER:OG    | 7:C:71:ALA:HB3   | 2.08                     | 0.53              |
| 28:a:766:U:H2'   | 28:a:767:U:C6    | 2.43                     | 0.53              |
| 28:a:1450:G:C6   | 28:a:1451:C:N4   | 2.77                     | 0.53              |
| 5:A:712:A:H2'    | 5:A:713:G:O4'    | 2.09                     | 0.53              |
| 28:a:1744:A:H3'  | 28:a:1745:A:H8   | 1.72                     | 0.53              |
| 37:j:113:MET:HE2 | 37:j:113:MET:HA  | 1.91                     | 0.53              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 28:a:1595:C:H2'   | 28:a:1596:A:O4'   | 2.09                     | 0.53              |
| 28:a:1681:G:N3    | 28:a:1762:A:H2'   | 2.24                     | 0.53              |
| 7:C:44:THR:O      | 7:C:48:ALA:HB2    | 2.09                     | 0.53              |
| 28:a:1731:G:C6    | 28:a:1733:G:C6    | 2.97                     | 0.53              |
| 5:A:174:A:C5      | 5:A:175:C:C5      | 2.96                     | 0.52              |
| 25:U:51:SER:HA    | 25:U:54:LYS:HD3   | 1.91                     | 0.52              |
| 31:d:1:MET:HE1    | 31:d:104:VAL:HG21 | 1.91                     | 0.52              |
| 28:a:813:U:H2'    | 28:a:814:C:C6     | 2.44                     | 0.52              |
| 47:t:10:GLU:O     | 47:t:72:ILE:HD12  | 2.08                     | 0.52              |
| 28:a:2561:U:H2'   | 28:a:2562:U:O5'   | 2.09                     | 0.52              |
| 43:p:58:ARG:HA    | 43:p:61:TRP:CE3   | 2.44                     | 0.52              |
| 5:A:1518:MA6:H103 | 5:A:1519:MA6:C10  | 2.39                     | 0.52              |
| 28:a:2328:A:H2'   | 28:a:2329:U:C6    | 2.44                     | 0.52              |
| 28:a:2038:G:H2'   | 28:a:2039:U:O4'   | 2.09                     | 0.52              |
| 46:s:53:VAL:HG11  | 46:s:93:LEU:HD23  | 1.91                     | 0.52              |
| 6:B:91:PHE:H      | 6:B:150:GLY:HA3   | 1.75                     | 0.52              |
| 6:B:166:ALA:HB3   | 6:B:191:SER:HB2   | 1.92                     | 0.52              |
| 5:A:928:G:O2'     | 5:A:1533:C:OP1    | 2.26                     | 0.52              |
| 9:E:114:VAL:HG21  | 9:E:137:VAL:HG22  | 1.92                     | 0.52              |
| 9:E:39:VAL:HG22   | 9:E:67:ALA:HB1    | 1.92                     | 0.52              |
| 16:L:4:VAL:HG23   | 21:Q:34:TYR:HB3   | 1.91                     | 0.52              |
| 28:a:1270:C:H5''  | 28:a:1271:G:O5'   | 2.09                     | 0.52              |
| 28:a:2273:A:H2'   | 28:a:2274:A:C8    | 2.44                     | 0.52              |
| 6:B:185:ALA:HB3   | 6:B:196:VAL:HG11  | 1.91                     | 0.52              |
| 28:a:337:C:H2'    | 28:a:338:G:O4'    | 2.10                     | 0.52              |
| 28:a:1797:G:C5    | 28:a:1798:U:C5    | 2.99                     | 0.51              |
| 5:A:553:A:H5''    | 16:L:21:VAL:HG21  | 1.92                     | 0.51              |
| 5:A:1086:U:H5''   | 5:A:1389:C:OP1    | 2.10                     | 0.51              |
| 28:a:1115:G:O2'   | 28:a:1116:G:O5'   | 2.27                     | 0.51              |
| 5:A:735:C:H2'     | 5:A:736:C:H6      | 1.76                     | 0.51              |
| 5:A:834:U:H2'     | 5:A:835:U:C6      | 2.46                     | 0.51              |
| 28:a:290:U:H2'    | 28:a:291:G:O4'    | 2.10                     | 0.51              |
| 28:a:811:U:H2'    | 38:k:21:ARG:HA    | 1.92                     | 0.51              |
| 3:2:32:ILE:HG22   | 3:2:32:ILE:O      | 2.10                     | 0.51              |
| 5:A:320:A:C2      | 5:A:321:A:C4      | 2.98                     | 0.51              |
| 6:B:163:VAL:HB    | 6:B:185:ALA:HB2   | 1.92                     | 0.51              |
| 14:J:53:ILE:HD11  | 14:J:61:ALA:HB1   | 1.93                     | 0.51              |
| 28:a:927:A:H2'    | 28:a:928:A:C8     | 2.45                     | 0.51              |
| 28:a:1045:C:H4'   | 28:a:1046:A:H5''  | 1.92                     | 0.51              |
| 28:a:2839:G:O2'   | 40:m:92:GLY:HA2   | 2.11                     | 0.51              |
| 30:c:68:LYS:HB3   | 30:c:70:ASN:ND2   | 2.26                     | 0.51              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 32:e:23:PHE:CD1   | 32:e:111:GLU:HG3  | 2.45                     | 0.51              |
| 5:A:1376:U:OP2    | 11:G:25:LYS:CE    | 2.59                     | 0.51              |
| 28:a:639:U:H2'    | 28:a:640:C:C6     | 2.46                     | 0.51              |
| 5:A:1240:U:C5     | 11:G:116:MET:HG2  | 2.45                     | 0.51              |
| 32:e:153:LEU:HD21 | 32:e:158:PHE:HB2  | 1.91                     | 0.51              |
| 38:k:50:PHE:CE2   | 38:k:52:GLY:HA2   | 2.45                     | 0.51              |
| 16:L:110:ARG:HB3  | 16:L:119:VAL:HG21 | 1.93                     | 0.51              |
| 39:l:31:PHE:HB3   | 39:l:130:PHE:CZ   | 2.45                     | 0.51              |
| 36:i:17:VAL:HG22  | 36:i:55:ILE:HB    | 1.93                     | 0.51              |
| 5:A:253:A:H2'     | 5:A:254:G:H8      | 1.76                     | 0.50              |
| 5:A:715:A:H2'     | 5:A:716:A:H8      | 1.77                     | 0.50              |
| 5:A:910:C:H2'     | 5:A:911:U:O4'     | 2.10                     | 0.50              |
| 8:D:48:LEU:HD21   | 8:D:56:ARG:HG2    | 1.92                     | 0.50              |
| 24:T:44:LYS:HB2   | 24:T:86:LEU:HD12  | 1.94                     | 0.50              |
| 28:a:1616:A:H4'   | 28:a:1617:C:OP2   | 2.10                     | 0.50              |
| 28:a:2625:G:H2'   | 28:a:2626:C:O4'   | 2.12                     | 0.50              |
| 47:t:13:VAL:HG21  | 47:t:39:ILE:HG23  | 1.93                     | 0.50              |
| 28:a:548:G:H2'    | 28:a:549:G:H1'    | 1.94                     | 0.50              |
| 28:a:910:A:N3     | 28:a:2264:C:O2'   | 2.37                     | 0.50              |
| 28:a:1874:C:H2'   | 28:a:1875:G:O4'   | 2.11                     | 0.50              |
| 5:A:297:G:H4'     | 5:A:557:G:H4'     | 1.91                     | 0.50              |
| 5:A:838:G:C4      | 5:A:849:G:C2      | 2.99                     | 0.50              |
| 30:c:145:GLU:HG2  | 30:c:151:GLY:C    | 2.36                     | 0.50              |
| 28:a:1028:A:N6    | 28:a:1125:G:H2'   | 2.27                     | 0.50              |
| 28:a:1542:U:H2'   | 28:a:1543:G:O4'   | 2.10                     | 0.50              |
| 40:m:55:ALA:HA    | 40:m:80:PHE:CE1   | 2.46                     | 0.50              |
| 6:B:9:MET:HG2     | 6:B:14:VAL:HG21   | 1.94                     | 0.50              |
| 6:B:101:LEU:HD13  | 6:B:181:ILE:HD12  | 1.94                     | 0.50              |
| 28:a:1232:G:C5    | 28:a:1233:C:C5    | 3.00                     | 0.50              |
| 28:a:2075:U:C4    | 28:a:2238:G:C6    | 3.00                     | 0.50              |
| 33:f:13:VAL:HA    | 33:f:28:VAL:HG11  | 1.93                     | 0.50              |
| 5:A:103:U:H2'     | 5:A:103:U:O2      | 2.11                     | 0.50              |
| 5:A:895:G:C6      | 5:A:896:C:C4      | 3.00                     | 0.50              |
| 11:G:113:ASP:HB2  | 11:G:119:ARG:HG3  | 1.93                     | 0.50              |
| 53:z:38:HIS:ND1   | 53:z:39:LEU:O     | 2.43                     | 0.50              |
| 44:q:27:ILE:HD13  | 44:q:33:VAL:HG12  | 1.92                     | 0.49              |
| 6:B:163:VAL:HG13  | 6:B:169:GLU:CG    | 2.42                     | 0.49              |
| 27:Z:48:C:H2'     | 27:Z:59:G:H4'     | 1.93                     | 0.49              |
| 28:a:580:U:O3'    | 43:p:31:VAL:HG13  | 2.12                     | 0.49              |
| 28:a:1810:A:O5'   | 28:a:1810:A:H8    | 1.95                     | 0.49              |
| 6:B:7:ARG:HA      | 6:B:10:LEU:HG     | 1.94                     | 0.49              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 6:B:96:TRP:CG    | 6:B:172:ALA:HB2   | 2.47                     | 0.49              |
| 28:a:480:A:H3'   | 28:a:481:G:H5''   | 1.93                     | 0.49              |
| 34:g:150:ALA:O   | 34:g:151:TYR:C    | 2.53                     | 0.49              |
| 1:0:37:LYS:HA    | 1:0:47:VAL:O      | 2.12                     | 0.49              |
| 5:A:706:A:C6     | 5:A:707:U:C4      | 3.00                     | 0.49              |
| 12:H:25:VAL:HG13 | 12:H:63:LEU:HD11  | 1.95                     | 0.49              |
| 31:d:1:MET:HB3   | 31:d:205:PRO:HG2  | 1.94                     | 0.49              |
| 35:h:3:VAL:HG23  | 35:h:3:VAL:O      | 2.12                     | 0.49              |
| 45:r:7:HIS:HB2   | 45:r:50:VAL:CG2   | 2.43                     | 0.49              |
| 5:A:591:U:OP2    | 12:H:31:LYS:CE    | 2.60                     | 0.49              |
| 5:A:623:C:C4     | 5:A:624:C:C5      | 3.01                     | 0.49              |
| 5:A:1101:A:H8    | 6:B:171:ILE:HD12  | 1.78                     | 0.49              |
| 28:a:1791:A:H61  | 28:a:1828:G:HO2'  | 1.59                     | 0.49              |
| 28:a:2533:U:OP1  | 28:a:2665:A:O2'   | 2.26                     | 0.49              |
| 33:f:135:GLN:HG2 | 33:f:141:ILE:HG21 | 1.94                     | 0.49              |
| 34:g:46:ALA:HB3  | 34:g:49:THR:HB    | 1.94                     | 0.49              |
| 9:E:39:VAL:HG21  | 9:E:68:ARG:HG3    | 1.95                     | 0.49              |
| 28:a:569:U:H1'   | 28:a:947:A:O4'    | 2.13                     | 0.49              |
| 44:q:6:GLN:HB2   | 44:q:39:LEU:HD11  | 1.95                     | 0.49              |
| 49:v:37:ILE:HG21 | 49:v:80:ILE:HG21  | 1.93                     | 0.49              |
| 5:A:39:G:C6      | 5:A:404:G:C6      | 3.00                     | 0.49              |
| 9:E:53:ALA:HB3   | 9:E:55:GLU:O      | 2.13                     | 0.49              |
| 28:a:2554:U:C4   | 28:a:2555:U:O4    | 2.65                     | 0.49              |
| 49:v:59:LEU:HD12 | 49:v:80:ILE:HD12  | 1.93                     | 0.49              |
| 5:A:411:A:C8     | 5:A:413:G:C5      | 3.01                     | 0.49              |
| 5:A:591:U:OP2    | 12:H:31:LYS:HE3   | 2.13                     | 0.49              |
| 28:a:1153:C:H2'  | 28:a:1154:G:O4'   | 2.12                     | 0.49              |
| 39:l:53:MET:HE2  | 39:l:120:ALA:HB1  | 1.94                     | 0.49              |
| 47:t:14:LEU:HD11 | 47:t:71:ALA:HB2   | 1.95                     | 0.49              |
| 5:A:592:G:H2'    | 5:A:593:U:O4'     | 2.13                     | 0.49              |
| 28:a:910:A:C6    | 28:a:911:A:C6     | 3.01                     | 0.49              |
| 33:f:16:LEU:HD13 | 33:f:29:PRO:HD2   | 1.94                     | 0.49              |
| 5:A:355:C:H2'    | 5:A:356:A:O4'     | 2.13                     | 0.48              |
| 6:B:99:GLY:HA2   | 6:B:102:THR:OG1   | 2.13                     | 0.48              |
| 8:D:8:LYS:O      | 8:D:21:LEU:HD13   | 2.13                     | 0.48              |
| 16:L:43:LYS:HG2  | 16:L:89:D2T:H7    | 1.95                     | 0.48              |
| 28:a:366:C:H2'   | 28:a:367:G:O4'    | 2.13                     | 0.48              |
| 28:a:2898:U:O2   | 36:i:134:ALA:HB1  | 2.13                     | 0.48              |
| 32:e:24:ASN:O    | 32:e:28:VAL:HG23  | 2.13                     | 0.48              |
| 6:B:176:ALA:O    | 6:B:180:GLY:N     | 2.45                     | 0.48              |
| 5:A:374:A:H2'    | 5:A:375:U:C6      | 2.48                     | 0.48              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 8:D:8:LYS:HB3    | 8:D:21:LEU:HB3    | 1.96                     | 0.48              |
| 9:E:67:ALA:HA    | 9:E:70:ASN:HB2    | 1.94                     | 0.48              |
| 28:a:483:A:C5    | 47:t:58:ILE:HD11  | 2.48                     | 0.48              |
| 29:b:66:A:H61    | 29:b:107:G:H2'    | 1.78                     | 0.48              |
| 30:c:181:MET:HE2 | 30:c:269:ARG:HH22 | 1.77                     | 0.48              |
| 40:m:40:LYS:O    | 40:m:41:ALA:C     | 2.54                     | 0.48              |
| 6:B:28:LYS:N     | 6:B:29:PRO:HD2    | 2.28                     | 0.48              |
| 7:C:47:LEU:HD22  | 7:C:76:VAL:HG22   | 1.96                     | 0.48              |
| 27:Z:9:A:H1'     | 27:Z:45:G:O2'     | 2.13                     | 0.48              |
| 28:a:26:G:C6     | 28:a:27:G:N1      | 2.81                     | 0.48              |
| 28:a:864:G:C6    | 28:a:865:C:N4     | 2.82                     | 0.48              |
| 28:a:1232:G:C4   | 28:a:1233:C:C6    | 3.02                     | 0.48              |
| 42:o:16:ASP:O    | 42:o:17:VAL:C     | 2.56                     | 0.48              |
| 5:A:756:C:H2'    | 5:A:757:U:O4'     | 2.13                     | 0.48              |
| 28:a:1754:A:N1   | 28:a:2716:C:O2'   | 2.37                     | 0.48              |
| 28:a:2620:C:H2'  | 28:a:2621:G:O4'   | 2.14                     | 0.48              |
| 39:l:53:MET:HE1  | 39:l:103:TYR:CD2  | 2.49                     | 0.48              |
| 50:w:74:ARG:NH2  | 50:w:76:GLU:OE2   | 2.46                     | 0.48              |
| 9:E:157:ARG:HA   | 12:H:44:GLY:HA3   | 1.95                     | 0.48              |
| 34:g:89:LEU:HD22 | 34:g:162:VAL:HG22 | 1.95                     | 0.48              |
| 6:B:165:ASP:HB3  | 6:B:168:HIS:HB2   | 1.96                     | 0.48              |
| 28:a:1342:A:O2'  | 28:a:1344:U:OP2   | 2.26                     | 0.48              |
| 28:a:2088:A:C5   | 28:a:2089:C:C5    | 3.02                     | 0.48              |
| 39:l:53:MET:HG3  | 39:l:120:ALA:HB2  | 1.95                     | 0.48              |
| 5:A:1218:C:H2'   | 5:A:1219:A:C8     | 2.49                     | 0.48              |
| 5:A:24:U:O2      | 5:A:24:U:C2'      | 2.62                     | 0.48              |
| 5:A:769:G:H4'    | 5:A:1513:A:H4'    | 1.96                     | 0.48              |
| 24:T:47:ALA:O    | 24:T:51:PHE:N     | 2.47                     | 0.48              |
| 38:k:92:LEU:HD21 | 38:k:105:ILE:O    | 2.14                     | 0.48              |
| 47:t:54:GLN:N    | 47:t:55:PRO:HD2   | 2.29                     | 0.48              |
| 5:A:189:A:H2'    | 5:A:190:A:O4'     | 2.14                     | 0.48              |
| 5:A:715:A:H2'    | 5:A:716:A:C8      | 2.48                     | 0.48              |
| 32:e:84:THR:HG22 | 32:e:85:PHE:CD2   | 2.49                     | 0.48              |
| 5:A:451:A:H4'    | 5:A:452:A:O4'     | 2.14                     | 0.47              |
| 5:A:563:A:C1'    | 5:A:566:G:H21     | 2.27                     | 0.47              |
| 5:A:683:G:N2     | 15:K:39:GLY:O     | 2.45                     | 0.47              |
| 25:U:17:ARG:O    | 25:U:21:ARG:HG3   | 2.13                     | 0.47              |
| 5:A:552:U:H5'    | 16:L:83:ARG:HD2   | 1.96                     | 0.47              |
| 34:g:98:VAL:HG23 | 34:g:125:CYS:SG   | 2.54                     | 0.47              |
| 28:a:1275:A:N1   | 28:a:1295:C:O2'   | 2.45                     | 0.47              |
| 6:B:111:ILE:HD13 | 6:B:148:LEU:HB3   | 1.97                     | 0.47              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 28:a:367:G:H2'   | 28:a:368:A:O4'    | 2.15                     | 0.47              |
| 5:A:62:U:OP1     | 5:A:385:C:O2'     | 2.31                     | 0.47              |
| 5:A:635:A:H2'    | 5:A:636:U:O4'     | 2.15                     | 0.47              |
| 5:A:1346:A:N1    | 5:A:1374:A:H5''   | 2.29                     | 0.47              |
| 6:B:67:ILE:HG12  | 6:B:160:ALA:HB3   | 1.96                     | 0.47              |
| 15:K:84:VAL:HB   | 15:K:110:ILE:HA   | 1.97                     | 0.47              |
| 28:a:346:A:C5    | 28:a:347:A:C8     | 3.02                     | 0.47              |
| 28:a:1278:C:H2'  | 28:a:1279:G:O5'   | 2.14                     | 0.47              |
| 5:A:642:A:N3     | 12:H:105:SER:OG   | 2.37                     | 0.47              |
| 6:B:61:ALA:HB3   | 6:B:224:GLY:HA3   | 1.96                     | 0.47              |
| 16:L:99:ARG:HB2  | 16:L:117:TYR:HA   | 1.96                     | 0.47              |
| 25:U:49:LYS:O    | 25:U:53:VAL:HG23  | 2.15                     | 0.47              |
| 28:a:309:A:H4'   | 47:t:16:GLY:HA2   | 1.97                     | 0.47              |
| 28:a:2293:G:H2'  | 28:a:2294:G:O4'   | 2.14                     | 0.47              |
| 46:s:47:VAL:HG13 | 46:s:51:PHE:CD2   | 2.48                     | 0.47              |
| 46:s:61:LEU:HD12 | 46:s:61:LEU:C     | 2.39                     | 0.47              |
| 5:A:380:G:N2     | 5:A:384:G:C5      | 2.82                     | 0.47              |
| 5:A:411:A:N7     | 5:A:413:G:C6      | 2.82                     | 0.47              |
| 26:V:75:ARG:HD3  | 27:Z:24:A:H4'     | 1.96                     | 0.47              |
| 28:a:1020:A:N1   | 28:a:1141:U:O2'   | 2.30                     | 0.47              |
| 28:a:2291:U:H2'  | 28:a:2292:U:C6    | 2.48                     | 0.47              |
| 28:a:2561:U:C2'  | 28:a:2562:U:O5'   | 2.63                     | 0.47              |
| 28:a:2859:G:H2'  | 28:a:2860:A:C8    | 2.50                     | 0.47              |
| 28:a:549:G:H2'   | 28:a:550:C:C6     | 2.49                     | 0.47              |
| 28:a:1441:G:H2'  | 28:a:1442:U:C6    | 2.50                     | 0.47              |
| 28:a:2066:C:O2'  | 28:a:2067:G:H5'   | 2.14                     | 0.47              |
| 28:a:2547:A:H2'  | 28:a:2548:U:C6    | 2.50                     | 0.47              |
| 34:g:19:ILE:HG12 | 34:g:24:ILE:HD12  | 1.96                     | 0.47              |
| 5:A:380:G:C2     | 5:A:384:G:C6      | 3.03                     | 0.47              |
| 6:B:61:ALA:HB2   | 6:B:221:VAL:HG23  | 1.96                     | 0.47              |
| 11:G:130:ASN:HA  | 11:G:135:VAL:HG21 | 1.97                     | 0.47              |
| 28:a:644:A:H2'   | 28:a:645:C:O4'    | 2.15                     | 0.47              |
| 40:m:10:LEU:O    | 40:m:11:ASN:C     | 2.56                     | 0.47              |
| 5:A:35:G:H2'     | 5:A:36:C:C6       | 2.50                     | 0.47              |
| 34:g:24:ILE:HD11 | 34:g:43:VAL:HG21  | 1.97                     | 0.47              |
| 44:q:79:ARG:O    | 44:q:80:ARG:HB2   | 2.15                     | 0.47              |
| 8:D:7:PRO:HB2    | 8:D:10:LYS:HG3    | 1.97                     | 0.46              |
| 15:K:86:VAL:HG23 | 15:K:112:ASP:HB2  | 1.97                     | 0.46              |
| 28:a:190:A:C4    | 28:a:207:A:C2     | 3.02                     | 0.46              |
| 28:a:1872:A:C5   | 28:a:1873:G:H1'   | 2.49                     | 0.46              |
| 30:c:157:SER:HB3 | 30:c:160:THR:HG21 | 1.97                     | 0.46              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 6:B:87:CYS:SG    | 6:B:225:ARG:HG3   | 2.55                     | 0.46              |
| 28:a:1798:U:C4   | 28:a:1819:A:C2    | 3.03                     | 0.46              |
| 36:i:73:VAL:HG11 | 36:i:75:TYR:CZ    | 2.50                     | 0.46              |
| 5:A:122:G:C5     | 5:A:123:U:C5      | 3.03                     | 0.46              |
| 8:D:118:VAL:HA   | 8:D:146:ARG:HH12  | 1.80                     | 0.46              |
| 41:n:53:THR:O    | 41:n:54:VAL:C     | 2.56                     | 0.46              |
| 3:2:45:ARG:N     | 3:2:46:PRO:HD2    | 2.29                     | 0.46              |
| 5:A:288:A:H2'    | 5:A:289:G:H4'     | 1.98                     | 0.46              |
| 6:B:163:VAL:HG13 | 6:B:169:GLU:HG3   | 1.97                     | 0.46              |
| 8:D:23:SER:HB3   | 8:D:161:LEU:HD11  | 1.97                     | 0.46              |
| 8:D:79:ALA:HA    | 8:D:82:LEU:HD12   | 1.97                     | 0.46              |
| 13:I:115:LYS:HB2 | 13:I:118:LEU:HD12 | 1.98                     | 0.46              |
| 28:a:2409:G:C6   | 28:a:2410:G:C5    | 3.04                     | 0.46              |
| 5:A:502:A:P      | 16:L:113:ALA:HA   | 2.56                     | 0.46              |
| 16:L:81:LEU:HB2  | 16:L:102:LEU:HD12 | 1.97                     | 0.46              |
| 19:O:82:ILE:O    | 19:O:86:GLY:N     | 2.48                     | 0.46              |
| 28:a:1282:U:H2'  | 28:a:1283:G:O4'   | 2.15                     | 0.46              |
| 5:A:376:G:H5''   | 20:P:5:ARG:HB2    | 1.98                     | 0.46              |
| 10:F:22:ILE:CG2  | 10:F:39:LEU:HD21  | 2.46                     | 0.46              |
| 28:a:1801:A:H5'  | 28:a:2203:U:O2'   | 2.16                     | 0.46              |
| 10:F:6:ILE:HG23  | 10:F:89:VAL:HG22  | 1.97                     | 0.46              |
| 28:a:646:U:C4    | 28:a:2368:C:H1'   | 2.51                     | 0.46              |
| 28:a:1050:A:C2   | 28:a:2751:G:C4    | 3.04                     | 0.46              |
| 32:e:179:SER:O   | 32:e:180:LEU:C    | 2.57                     | 0.46              |
| 34:g:5:ALA:HB2   | 34:g:66:GLY:HA2   | 1.98                     | 0.46              |
| 35:h:12:LEU:HD11 | 35:h:30:LEU:HD11  | 1.97                     | 0.46              |
| 6:B:104:TRP:HA   | 6:B:107:VAL:HB    | 1.96                     | 0.46              |
| 28:a:84:A:N1     | 28:a:98:G:O2'     | 2.41                     | 0.46              |
| 28:a:928:A:C5    | 28:a:929:U:C5     | 3.04                     | 0.46              |
| 28:a:2281:A:O2'  | 28:a:2282:G:H5'   | 2.15                     | 0.46              |
| 28:a:2783:U:H2'  | 28:a:2784:U:H6    | 1.80                     | 0.46              |
| 49:v:37:ILE:HG22 | 49:v:38:VAL:HG23  | 1.97                     | 0.46              |
| 5:A:542:G:C2     | 5:A:543:U:C2      | 3.03                     | 0.46              |
| 6:B:166:ALA:HB3  | 6:B:191:SER:CB    | 2.46                     | 0.46              |
| 9:E:115:LEU:HD22 | 9:E:123:VAL:HG21  | 1.98                     | 0.46              |
| 28:a:187:G:C6    | 28:a:188:G:C5     | 3.04                     | 0.46              |
| 28:a:2031:A:C6   | 28:a:2498:OMC:H1' | 2.51                     | 0.46              |
| 28:a:2415:G:C6   | 28:a:2416:C:C4    | 3.03                     | 0.46              |
| 28:a:751:A:H5'   | 45:r:90:LYS:HA    | 1.98                     | 0.45              |
| 28:a:901:C:H2'   | 28:a:902:C:O4'    | 2.16                     | 0.45              |
| 31:d:62:LYS:N    | 31:d:63:PRO:CD    | 2.79                     | 0.45              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 37:j:43:ILE:HD12  | 37:j:56:ASP:HB2   | 1.97                     | 0.45              |
| 5:A:382:A:C2      | 5:A:383:A:C4      | 3.04                     | 0.45              |
| 6:B:69:PHE:HA     | 6:B:162:PHE:HB3   | 1.99                     | 0.45              |
| 8:D:37:ALA:HB3    | 8:D:42:GLY:HA2    | 1.97                     | 0.45              |
| 24:T:38:ALA:O     | 24:T:41:ALA:HB3   | 2.16                     | 0.45              |
| 28:a:570:G:H2'    | 28:a:2030:6MZ:N7  | 2.31                     | 0.45              |
| 52:y:3:LYS:HD2    | 52:y:5:ILE:HD11   | 1.97                     | 0.45              |
| 5:A:337:G:H2'     | 5:A:338:A:C8      | 2.51                     | 0.45              |
| 5:A:389:A:H3'     | 5:A:390:U:H6      | 1.80                     | 0.45              |
| 5:A:735:C:H2'     | 5:A:736:C:C6      | 2.51                     | 0.45              |
| 5:A:1500:A:C6     | 5:A:1501:C:C4     | 3.05                     | 0.45              |
| 9:E:44:GLY:HA2    | 9:E:76:LEU:HD12   | 1.98                     | 0.45              |
| 38:k:112:LEU:HD22 | 38:k:130:GLY:HA3  | 1.98                     | 0.45              |
| 52:y:7:ILE:HG12   | 52:y:57:VAL:HG22  | 1.99                     | 0.45              |
| 14:J:52:LEU:HD11  | 14:J:59:LYS:HD2   | 1.96                     | 0.45              |
| 27:Z:25:U:C4      | 27:Z:26:A:C6      | 3.05                     | 0.45              |
| 32:e:21:ARG:HD3   | 32:e:106:LYS:CB   | 2.46                     | 0.45              |
| 5:A:545:C:H5''    | 8:D:69:GLU:HG2    | 1.99                     | 0.45              |
| 6:B:86:SER:C      | 6:B:88:ASP:H      | 2.25                     | 0.45              |
| 28:a:416:U:H2'    | 28:a:417:C:H6     | 1.82                     | 0.45              |
| 28:a:1678:A:H2'   | 28:a:1679:A:O4'   | 2.17                     | 0.45              |
| 28:a:2063:C:O2    | 28:a:2451:A:C2    | 2.69                     | 0.45              |
| 28:a:2311:A:H1'   | 33:f:85:ILE:HD13  | 1.98                     | 0.45              |
| 33:f:63:GLN:HE21  | 33:f:89:VAL:HB    | 1.81                     | 0.45              |
| 46:s:51:PHE:HB2   | 46:s:53:VAL:HG22  | 1.98                     | 0.45              |
| 5:A:910:C:C5      | 5:A:911:U:C5      | 3.04                     | 0.45              |
| 10:F:32:ALA:O     | 10:F:33:GLU:C     | 2.58                     | 0.45              |
| 24:T:13:GLN:O     | 24:T:16:LYS:HB3   | 2.17                     | 0.45              |
| 28:a:1440:U:H2'   | 28:a:1441:G:C8    | 2.52                     | 0.45              |
| 5:A:585:G:N3      | 5:A:879:C:H4'     | 2.32                     | 0.45              |
| 28:a:756:A:H2'    | 28:a:757:G:O4'    | 2.16                     | 0.45              |
| 28:a:1028:A:N3    | 28:a:2486:C:O2'   | 2.40                     | 0.45              |
| 28:a:1885:A:H2'   | 28:a:1886:U:O4'   | 2.17                     | 0.45              |
| 30:c:235:GLY:HA2  | 30:c:239:ASN:HD21 | 1.81                     | 0.45              |
| 37:j:4:GLU:O      | 37:j:5:GLN:HB2    | 2.17                     | 0.45              |
| 39:l:74:THR:HA    | 39:l:88:ASN:O     | 2.17                     | 0.45              |
| 44:q:5:PHE:HB3    | 44:q:59:ILE:HD12  | 1.98                     | 0.45              |
| 5:A:562:U:H4'     | 5:A:563:A:H5''    | 1.98                     | 0.45              |
| 28:a:19:A:H2'     | 28:a:20:C:C6      | 2.52                     | 0.45              |
| 28:a:1581:G:C2    | 28:a:1582:C:C2    | 3.04                     | 0.45              |
| 6:B:20:THR:HA     | 6:B:39:HIS:CD2    | 2.52                     | 0.45              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 9:E:25:VAL:HG22  | 9:E:30:ILE:HD11  | 1.99                     | 0.45              |
| 26:V:22:LYS:HG2  | 27:Z:25:U:H5''   | 1.98                     | 0.45              |
| 28:a:416:U:H2'   | 28:a:417:C:C6    | 2.52                     | 0.45              |
| 28:a:733:G:O6    | 28:a:761:A:C8    | 2.69                     | 0.45              |
| 28:a:1548:A:C2   | 28:a:1549:A:C4   | 3.05                     | 0.45              |
| 28:a:2521:C:C2   | 28:a:2545:G:N2   | 2.85                     | 0.45              |
| 33:f:33:LYS:HD2  | 33:f:90:THR:HG23 | 1.99                     | 0.45              |
| 9:E:25:VAL:HG13  | 9:E:30:ILE:HG13  | 2.00                     | 0.45              |
| 9:E:38:VAL:CG2   | 9:E:117:VAL:HG21 | 2.47                     | 0.45              |
| 9:E:88:VAL:HG13  | 9:E:92:SER:O     | 2.17                     | 0.45              |
| 22:R:73:ARG:O    | 22:R:74:HIS:C    | 2.59                     | 0.45              |
| 27:Z:14:A:C2     | 27:Z:15:G:H1'    | 2.52                     | 0.45              |
| 28:a:856:G:H2'   | 28:a:857:G:C8    | 2.52                     | 0.45              |
| 28:a:2784:U:H2'  | 28:a:2785:C:H6   | 1.82                     | 0.45              |
| 28:a:2799:A:C5   | 28:a:2801:G:C8   | 3.05                     | 0.45              |
| 34:g:149:ARG:HD3 | 34:g:164:TYR:CZ  | 2.52                     | 0.45              |
| 36:i:43:GLU:N    | 36:i:43:GLU:OE2  | 2.49                     | 0.45              |
| 5:A:312:C:H2'    | 5:A:313:A:O4'    | 2.17                     | 0.44              |
| 5:A:749:A:C6     | 5:A:750:C:C4     | 3.05                     | 0.44              |
| 8:D:145:ILE:HG23 | 8:D:150:LYS:HG2  | 1.99                     | 0.44              |
| 28:a:2233:U:H2'  | 28:a:2234:G:C8   | 2.52                     | 0.44              |
| 29:b:65:U:C4     | 29:b:108:A:C4    | 3.05                     | 0.44              |
| 48:u:51:GLN:HG2  | 48:u:86:LEU:HD11 | 1.99                     | 0.44              |
| 5:A:179:A:H2'    | 5:A:180:U:O4'    | 2.18                     | 0.44              |
| 5:A:411:A:N7     | 5:A:429:U:C5     | 2.85                     | 0.44              |
| 5:A:617:G:C2     | 5:A:618:C:C5     | 3.05                     | 0.44              |
| 5:A:1370:G:C2    | 5:A:1371:G:C8    | 3.05                     | 0.44              |
| 6:B:179:LEU:HB3  | 6:B:181:ILE:HG13 | 2.00                     | 0.44              |
| 28:a:36:G:N3     | 28:a:450:G:O2'   | 2.50                     | 0.44              |
| 28:a:741:U:C2    | 28:a:757:G:N2    | 2.85                     | 0.44              |
| 5:A:666:G:H5''   | 5:A:726:C:H1'    | 1.99                     | 0.44              |
| 8:D:65:TYR:CD2   | 8:D:94:LEU:HB3   | 2.53                     | 0.44              |
| 28:a:189:G:N2    | 28:a:206:U:C5    | 2.86                     | 0.44              |
| 28:a:1538:G:C2   | 28:a:1539:U:C2   | 3.05                     | 0.44              |
| 30:c:19:VAL:HG23 | 30:c:203:ARG:HB3 | 1.98                     | 0.44              |
| 35:h:9:VAL:HG11  | 35:h:12:LEU:HD12 | 2.00                     | 0.44              |
| 42:o:54:GLY:O    | 42:o:57:SER:OG   | 2.28                     | 0.44              |
| 5:A:601:G:N2     | 5:A:638:U:C2     | 2.86                     | 0.44              |
| 5:A:622:A:C8     | 5:A:623:C:C5     | 3.06                     | 0.44              |
| 5:A:946:A:H2'    | 5:A:947:G:C8     | 2.52                     | 0.44              |
| 6:B:75:ALA:HB1   | 6:B:207:ILE:HD12 | 1.98                     | 0.44              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 9:E:133:PRO:HA   | 9:E:136:VAL:HG22  | 1.99                     | 0.44              |
| 27:Z:9:A:C2      | 27:Z:46:G:C5      | 3.05                     | 0.44              |
| 28:a:1441:G:H2'  | 28:a:1442:U:H6    | 1.82                     | 0.44              |
| 28:a:2297:A:C2   | 28:a:2298:A:C8    | 3.05                     | 0.44              |
| 28:a:2328:A:H8   | 28:a:2328:A:O5'   | 2.00                     | 0.44              |
| 28:a:2646:C:OP2  | 28:a:2732:G:O2'   | 2.32                     | 0.44              |
| 28:a:2663:G:C6   | 28:a:2664:G:C4    | 3.06                     | 0.44              |
| 28:a:2725:A:C4   | 28:a:2727:A:C8    | 3.06                     | 0.44              |
| 52:y:3:LYS:O     | 52:y:4:THR:C      | 2.61                     | 0.44              |
| 16:L:107:VAL:HB  | 16:L:117:TYR:HB3  | 1.99                     | 0.44              |
| 28:a:397:U:H5''  | 50:w:32:ASN:HB2   | 2.00                     | 0.44              |
| 31:d:1:MET:HE3   | 31:d:100:LEU:HG   | 2.00                     | 0.44              |
| 37:j:12:ASP:HA   | 37:j:98:ARG:O     | 2.17                     | 0.44              |
| 41:n:24:THR:HG22 | 41:n:90:VAL:HG12  | 2.00                     | 0.44              |
| 2:1:21:ARG:O     | 2:1:27:GLY:HA3    | 2.18                     | 0.44              |
| 3:2:25:LYS:HB2   | 3:2:47:LYS:HE2    | 1.99                     | 0.44              |
| 5:A:460:A:H2'    | 5:A:461:A:O4'     | 2.18                     | 0.44              |
| 5:A:859:G:O6     | 5:A:869:G:H2'     | 2.18                     | 0.44              |
| 6:B:74:ARG:HD3   | 6:B:74:ARG:HA     | 1.86                     | 0.44              |
| 6:B:84:ALA:HB2   | 6:B:91:PHE:HB3    | 1.99                     | 0.44              |
| 7:C:10:ILE:HD13  | 18:N:98:LYS:HD3   | 1.99                     | 0.44              |
| 28:a:481:G:C4    | 28:a:507:A:C2     | 3.05                     | 0.44              |
| 28:a:483:A:C4    | 47:t:58:ILE:HD11  | 2.52                     | 0.44              |
| 28:a:687:C:H2'   | 28:a:688:U:O4'    | 2.17                     | 0.44              |
| 38:k:79:LEU:HD11 | 38:k:112:LEU:HD12 | 1.99                     | 0.44              |
| 28:a:904:G:H2'   | 28:a:905:A:O4'    | 2.18                     | 0.44              |
| 33:f:119:ALA:HA  | 33:f:177:PHE:CD1  | 2.51                     | 0.44              |
| 5:A:852:G:C6     | 5:A:853:C:C4      | 3.06                     | 0.44              |
| 5:A:1060:U:H4'   | 14:J:54:SER:HB2   | 2.00                     | 0.44              |
| 34:g:20:ASN:N    | 34:g:20:ASN:OD1   | 2.50                     | 0.44              |
| 5:A:698:G:H2'    | 5:A:698:G:N3      | 2.33                     | 0.44              |
| 6:B:12:ALA:HB3   | 6:B:14:VAL:HG23   | 1.99                     | 0.44              |
| 25:U:4:ILE:HG23  | 25:U:18:ARG:CZ    | 2.48                     | 0.44              |
| 27:Z:49:G:N3     | 27:Z:49:G:H2'     | 2.32                     | 0.44              |
| 28:a:700:G:H2'   | 28:a:701:G:O4'    | 2.18                     | 0.44              |
| 28:a:974:G:C4    | 28:a:989:G:C2     | 3.06                     | 0.44              |
| 31:d:142:VAL:HB  | 31:d:143:PRO:HD2  | 1.99                     | 0.44              |
| 51:x:18:LEU:HB2  | 51:x:53:VAL:HG11  | 2.00                     | 0.44              |
| 53:z:12:LYS:O    | 53:z:13:ARG:C     | 2.59                     | 0.44              |
| 5:A:39:G:H2'     | 5:A:40:C:O5'      | 2.18                     | 0.43              |
| 5:A:1349:A:C2    | 5:A:1374:A:C5     | 3.06                     | 0.43              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 6:B:187:VAL:HG21 | 6:B:199:VAL:HG13 | 2.00                     | 0.43              |
| 6:B:219:ALA:O    | 6:B:223:GLU:HG2  | 2.18                     | 0.43              |
| 8:D:102:VAL:HB   | 8:D:114:ALA:HB1  | 1.99                     | 0.43              |
| 28:a:408:G:C2    | 28:a:420:C:O2    | 2.71                     | 0.43              |
| 29:b:37:C:C5     | 29:b:38:C:C4     | 3.06                     | 0.43              |
| 5:A:600:A:C2     | 5:A:639:G:C2     | 3.07                     | 0.43              |
| 28:a:1048:A:C8   | 28:a:1048:A:OP2  | 2.71                     | 0.43              |
| 28:a:1529:G:H2'  | 28:a:1530:G:O4'  | 2.19                     | 0.43              |
| 34:g:9:VAL:HG23  | 34:g:69:ARG:HD2  | 1.99                     | 0.43              |
| 6:B:96:TRP:CZ2   | 6:B:100:MET:HB3  | 2.53                     | 0.43              |
| 8:D:130:VAL:HG11 | 8:D:135:TYR:CG   | 2.53                     | 0.43              |
| 28:a:1267:U:C5   | 28:a:2012:G:N2   | 2.86                     | 0.43              |
| 28:a:2064:C:H2'  | 28:a:2065:C:C6   | 2.53                     | 0.43              |
| 36:i:7:LYS:O     | 36:i:11:VAL:HG23 | 2.18                     | 0.43              |
| 12:H:106:THR:OG1 | 12:H:108:LYS:O   | 2.36                     | 0.43              |
| 28:a:2531:A:C4   | 28:a:2532:G:C8   | 3.06                     | 0.43              |
| 29:b:72:G:H1'    | 29:b:105:G:N2    | 2.34                     | 0.43              |
| 36:i:141:ASP:O   | 36:i:142:ILE:C   | 2.62                     | 0.43              |
| 6:B:15:HIS:HB3   | 6:B:43:LEU:HD11  | 2.00                     | 0.43              |
| 6:B:184:PHE:CE2  | 6:B:198:PHE:CD2  | 3.06                     | 0.43              |
| 28:a:26:G:H1'    | 28:a:514:A:N6    | 2.34                     | 0.43              |
| 28:a:2011:U:C4   | 28:a:2012:G:C5   | 3.07                     | 0.43              |
| 28:a:2469:A:N6   | 28:a:2481:G:O2'  | 2.51                     | 0.43              |
| 31:d:156:PHE:CE1 | 36:i:81:ILE:HD13 | 2.53                     | 0.43              |
| 39:l:34:LYS:HD3  | 39:l:99:GLY:HA2  | 2.00                     | 0.43              |
| 1:0:38:LYS:HB2   | 1:0:49:TYR:CD1   | 2.54                     | 0.43              |
| 5:A:6:G:H4'      | 5:A:298:A:H4'    | 2.01                     | 0.43              |
| 5:A:797:C:O2'    | 5:A:798:U:H5'    | 2.18                     | 0.43              |
| 10:F:78:PHE:CD1  | 10:F:78:PHE:N    | 2.86                     | 0.43              |
| 12:H:95:VAL:HG12 | 12:H:100:GLY:HA3 | 2.00                     | 0.43              |
| 28:a:723:C:H2'   | 28:a:724:U:O4'   | 2.19                     | 0.43              |
| 28:a:2289:G:C2   | 28:a:2290:G:C8   | 3.06                     | 0.43              |
| 28:a:2636:C:HO2' | 31:d:45:TYR:HH   | 1.63                     | 0.43              |
| 5:A:671:G:H2'    | 5:A:672:U:O4'    | 2.19                     | 0.43              |
| 16:L:99:ARG:HA   | 16:L:104:CYS:SG  | 2.58                     | 0.43              |
| 28:a:1570:A:C6   | 28:a:1571:A:C6   | 3.07                     | 0.43              |
| 28:a:2784:U:H2'  | 28:a:2785:C:C6   | 2.54                     | 0.43              |
| 5:A:373:A:C2     | 5:A:374:A:C8     | 3.07                     | 0.43              |
| 5:A:590:U:OP1    | 12:H:31:LYS:N    | 2.46                     | 0.43              |
| 6:B:138:THR:O    | 6:B:142:GLU:N    | 2.47                     | 0.43              |
| 16:L:39:THR:HA   | 16:L:51:LYS:HA   | 2.01                     | 0.43              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 20:P:68:SER:OG   | 20:P:69:ASP:N     | 2.52                     | 0.43              |
| 21:Q:59:VAL:HG12 | 21:Q:61:ILE:HG23  | 2.01                     | 0.43              |
| 28:a:1355:G:O2'  | 28:a:1356:G:H5'   | 2.18                     | 0.43              |
| 28:a:1949:G:C6   | 28:a:1950:G:C6    | 3.07                     | 0.43              |
| 5:A:632:U:H5''   | 5:A:633:G:C8      | 2.54                     | 0.43              |
| 5:A:714:G:H2'    | 5:A:715:A:H8      | 1.82                     | 0.43              |
| 28:a:1182:G:H2'  | 28:a:1183:U:O4'   | 2.19                     | 0.43              |
| 43:p:60:LEU:O    | 43:p:61:TRP:C     | 2.62                     | 0.43              |
| 50:w:7:VAL:HG21  | 50:w:59:ILE:HD11  | 2.00                     | 0.43              |
| 3:2:25:LYS:HE2   | 3:2:30:ARG:NH2    | 2.34                     | 0.43              |
| 28:a:2637:U:O2'  | 28:a:2638:G:H5'   | 2.19                     | 0.43              |
| 28:a:2720:U:C2   | 28:a:2872:A:C5    | 3.07                     | 0.43              |
| 28:a:2722:G:H2'  | 28:a:2723:C:C6    | 2.53                     | 0.43              |
| 41:n:43:ASN:OD1  | 41:n:45:SER:N     | 2.39                     | 0.43              |
| 5:A:1073:U:O2    | 6:B:103:ASN:ND2   | 2.52                     | 0.42              |
| 10:F:51:ILE:HD11 | 22:R:66:SER:HB3   | 2.01                     | 0.42              |
| 28:a:1545:A:H2'  | 28:a:1546:G:O4'   | 2.19                     | 0.42              |
| 28:a:1721:G:C6   | 28:a:1738:G:C6    | 3.07                     | 0.42              |
| 28:a:1737:G:C6   | 28:a:1738:G:N1    | 2.87                     | 0.42              |
| 34:g:9:VAL:HB    | 34:g:50:LEU:HB2   | 2.00                     | 0.42              |
| 5:A:84:U:C6      | 5:A:88:U:C2       | 3.07                     | 0.42              |
| 6:B:12:ALA:HB2   | 6:B:212:LEU:HG    | 2.01                     | 0.42              |
| 6:B:56:GLU:HA    | 6:B:59:LYS:HD3    | 2.01                     | 0.42              |
| 28:a:350:G:H2'   | 28:a:351:C:O4'    | 2.19                     | 0.42              |
| 28:a:1737:G:C6   | 28:a:1738:G:C2    | 3.07                     | 0.42              |
| 28:a:1747:U:H2'  | 28:a:1748:C:C6    | 2.54                     | 0.42              |
| 28:a:2233:U:H2'  | 28:a:2234:G:H8    | 1.84                     | 0.42              |
| 34:g:30:ASN:HB3  | 34:g:79:VAL:HA    | 2.02                     | 0.42              |
| 34:g:155:GLU:OE2 | 34:g:157:TYR:HB2  | 2.19                     | 0.42              |
| 36:i:140:LEU:HG  | 36:i:142:ILE:HG13 | 2.01                     | 0.42              |
| 16:L:110:ARG:HB3 | 16:L:119:VAL:HG11 | 2.01                     | 0.42              |
| 28:a:320:A:C4    | 32:e:131:THR:HG21 | 2.54                     | 0.42              |
| 28:a:667:U:H2'   | 28:a:668:A:O4'    | 2.19                     | 0.42              |
| 28:a:861:A:C2    | 28:a:917:A:C4     | 3.06                     | 0.42              |
| 28:a:1565:C:O2'  | 28:a:1567:G:N7    | 2.46                     | 0.42              |
| 28:a:1620:G:C6   | 28:a:1621:U:C4    | 3.08                     | 0.42              |
| 28:a:1707:G:C5   | 28:a:1708:C:C5    | 3.08                     | 0.42              |
| 47:t:74:ASN:O    | 47:t:75:ALA:HB3   | 2.19                     | 0.42              |
| 5:A:50:A:H1'     | 5:A:52:C:C6       | 2.54                     | 0.42              |
| 5:A:598:U:H2'    | 5:A:599:C:H6      | 1.85                     | 0.42              |
| 5:A:617:G:C2     | 5:A:618:C:C6      | 3.07                     | 0.42              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 6:B:70:VAL:HA     | 6:B:92:VAL:HB     | 2.02                     | 0.42              |
| 9:E:46:VAL:HG21   | 9:E:117:VAL:HG23  | 2.01                     | 0.42              |
| 28:a:2783:U:H2'   | 28:a:2784:U:C6    | 2.53                     | 0.42              |
| 36:i:18:VAL:HG21  | 36:i:142:ILE:HD12 | 2.01                     | 0.42              |
| 36:i:103:ILE:O    | 36:i:104:ALA:C    | 2.61                     | 0.42              |
| 48:u:75:GLN:HB2   | 48:u:92:VAL:HG23  | 2.02                     | 0.42              |
| 5:A:258:G:C2      | 5:A:259:G:H1'     | 2.55                     | 0.42              |
| 5:A:321:A:N7      | 5:A:328:C:O2'     | 2.50                     | 0.42              |
| 5:A:604:G:H2'     | 5:A:605:U:O4'     | 2.20                     | 0.42              |
| 8:D:19:LEU:HD13   | 8:D:63:ARG:HB2    | 2.02                     | 0.42              |
| 12:H:18:GLN:HG2   | 12:H:63:LEU:HD13  | 2.00                     | 0.42              |
| 13:I:118:LEU:HD13 | 13:I:122:ARG:HA   | 2.02                     | 0.42              |
| 28:a:418:C:C4     | 28:a:419:U:C4     | 3.08                     | 0.42              |
| 28:a:1417:C:H2'   | 28:a:1418:G:O4'   | 2.20                     | 0.42              |
| 28:a:1786:A:C4    | 28:a:1938:A:C6    | 3.07                     | 0.42              |
| 33:f:69:LYS:HG2   | 33:f:82:GLY:HA2   | 2.01                     | 0.42              |
| 34:g:149:ARG:HA   | 34:g:162:VAL:HB   | 2.01                     | 0.42              |
| 5:A:577:G:H1'     | 5:A:816:A:H2'     | 2.02                     | 0.42              |
| 28:a:253:C:H2'    | 28:a:254:G:H5'    | 2.02                     | 0.42              |
| 28:a:1361:G:H2'   | 28:a:1362:C:C6    | 2.55                     | 0.42              |
| 28:a:1805:A:N3    | 30:c:50:THR:HB    | 2.34                     | 0.42              |
| 28:a:2392:A:C8    | 28:a:2429:G:C2    | 3.07                     | 0.42              |
| 34:g:44:LYS:HB2   | 34:g:51:THR:HB    | 2.02                     | 0.42              |
| 49:v:19:LYS:O     | 49:v:20:ARG:C     | 2.62                     | 0.42              |
| 5:A:8:A:N6        | 8:D:206:LYS:HB2   | 2.35                     | 0.42              |
| 5:A:923:A:H5''    | 9:E:26:LYS:HE3    | 2.02                     | 0.42              |
| 12:H:22:LYS:CD    | 12:H:25:VAL:HG12  | 2.49                     | 0.42              |
| 12:H:76:GLN:HB2   | 12:H:128:TYR:HB2  | 2.01                     | 0.42              |
| 12:H:95:VAL:HG21  | 12:H:102:ALA:HB2  | 2.01                     | 0.42              |
| 28:a:1665:A:O2'   | 37:j:1:MET:HB3    | 2.20                     | 0.42              |
| 29:b:8:C:H5''     | 41:n:15:ARG:HH12  | 1.84                     | 0.42              |
| 37:j:103:VAL:O    | 37:j:122:VAL:HA   | 2.20                     | 0.42              |
| 6:B:71:GLY:HA2    | 6:B:164:ILE:HG12  | 2.02                     | 0.42              |
| 8:D:19:LEU:HD12   | 8:D:21:LEU:HD11   | 2.02                     | 0.42              |
| 15:K:94:GLU:HA    | 15:K:97:ILE:HD12  | 2.01                     | 0.42              |
| 28:a:79:C:O2'     | 28:a:346:A:N3     | 2.50                     | 0.42              |
| 28:a:842:U:H2'    | 28:a:843:G:O4'    | 2.20                     | 0.42              |
| 28:a:2335:A:C2    | 28:a:2337:G:C8    | 3.08                     | 0.42              |
| 40:m:67:PHE:HA    | 40:m:76:VAL:HG21  | 2.01                     | 0.42              |
| 3:2:55:LEU:O      | 3:2:56:GLY:C      | 2.61                     | 0.42              |
| 5:A:870:U:H5'     | 5:A:871:U:H3'     | 2.02                     | 0.42              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 9:E:133:PRO:O    | 9:E:137:VAL:HG23  | 2.20                     | 0.42              |
| 28:a:554:U:O4    | 28:a:555:G:C6     | 2.73                     | 0.42              |
| 28:a:609:A:H2'   | 28:a:610:C:O4'    | 2.20                     | 0.42              |
| 28:a:617:G:H2'   | 28:a:618:G:O4'    | 2.20                     | 0.42              |
| 28:a:685:A:H1'   | 28:a:688:U:O4     | 2.19                     | 0.42              |
| 33:f:39:GLY:HA2  | 33:f:86:GLY:HA3   | 2.01                     | 0.42              |
| 40:m:67:PHE:O    | 40:m:67:PHE:CG    | 2.73                     | 0.42              |
| 41:n:82:ALA:HB1  | 41:n:87:ILE:CG2   | 2.50                     | 0.42              |
| 52:y:25:LEU:C    | 52:y:25:LEU:HD13  | 2.45                     | 0.42              |
| 5:A:174:A:C6     | 5:A:175:C:C4      | 3.08                     | 0.42              |
| 5:A:565:U:C4     | 5:A:566:G:C5      | 3.07                     | 0.42              |
| 5:A:1463:U:H5''  | 42:o:109:ARG:NH2  | 2.34                     | 0.42              |
| 28:a:323:C:C4    | 28:a:333:G:C8     | 3.08                     | 0.42              |
| 28:a:554:U:C4    | 28:a:555:G:C5     | 3.08                     | 0.42              |
| 30:c:31:ALA:HA   | 30:c:34:LEU:HD12  | 2.01                     | 0.42              |
| 30:c:260:ASN:OD1 | 30:c:262:ARG:HB3  | 2.20                     | 0.42              |
| 35:h:12:LEU:HB3  | 35:h:19:VAL:HG21  | 2.01                     | 0.42              |
| 5:A:7:A:H3'      | 5:A:8:A:C5'       | 2.50                     | 0.41              |
| 5:A:544:G:C5     | 5:A:545:C:C4      | 3.08                     | 0.41              |
| 5:A:1516:2MG:N2  | 5:A:1520:C:O2     | 2.53                     | 0.41              |
| 6:B:69:PHE:HB3   | 6:B:80:VAL:HB     | 2.01                     | 0.41              |
| 9:E:38:VAL:HG23  | 9:E:117:VAL:HG11  | 2.02                     | 0.41              |
| 9:E:148:ASN:HB3  | 9:E:153:VAL:HG23  | 2.02                     | 0.41              |
| 10:F:6:ILE:HG12  | 10:F:89:VAL:HG13  | 2.02                     | 0.41              |
| 12:H:39:VAL:HG11 | 12:H:103:VAL:HG22 | 2.01                     | 0.41              |
| 15:K:98:ARG:HA   | 25:U:12:PHE:CZ    | 2.55                     | 0.41              |
| 16:L:53:CYS:SG   | 16:L:55:VAL:HG22  | 2.59                     | 0.41              |
| 28:a:150:U:H2'   | 28:a:151:C:C6     | 2.54                     | 0.41              |
| 28:a:1301:A:H2'  | 28:a:1301:A:N3    | 2.34                     | 0.41              |
| 43:p:47:TYR:CE2  | 43:p:51:ARG:NH2   | 2.88                     | 0.41              |
| 48:u:89:ILE:HG21 | 48:u:91:PHE:CZ    | 2.55                     | 0.41              |
| 5:A:125:U:H2'    | 5:A:126:G:O4'     | 2.20                     | 0.41              |
| 5:A:942:G:C2     | 5:A:1342:C:C2     | 3.08                     | 0.41              |
| 5:A:1422:G:O3'   | 37:j:49:ARG:NH1   | 2.51                     | 0.41              |
| 7:C:47:LEU:HD11  | 7:C:87:LEU:HD13   | 2.00                     | 0.41              |
| 28:a:1385:A:C4   | 28:a:1403:A:C2    | 3.09                     | 0.41              |
| 30:c:72:ASP:C    | 30:c:74:ILE:H     | 2.28                     | 0.41              |
| 33:f:36:LEU:HD11 | 33:f:91:LEU:HD11  | 2.01                     | 0.41              |
| 21:Q:59:VAL:CG1  | 21:Q:75:LEU:HD23  | 2.49                     | 0.41              |
| 24:T:79:LEU:O    | 24:T:80:THR:C     | 2.63                     | 0.41              |
| 28:a:1452:G:C5   | 28:a:2702:G:C6    | 3.09                     | 0.41              |

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| Atom-1           | Atom-2           | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|------------------|--------------------------|-------------------|
| 28:a:1727:C:C5   | 28:a:1728:C:C4   | 3.09                     | 0.41              |
| 28:a:2543:G:H2'  | 28:a:2544:G:O4'  | 2.20                     | 0.41              |
| 43:p:76:TYR:CD1  | 43:p:76:TYR:C    | 2.98                     | 0.41              |
| 44:q:81:LYS:O    | 44:q:82:HIS:C    | 2.64                     | 0.41              |
| 45:r:7:HIS:HB2   | 45:r:50:VAL:HG22 | 2.00                     | 0.41              |
| 8:D:124:MET:HB2  | 8:D:129:VAL:HG22 | 2.03                     | 0.41              |
| 10:F:27:ALA:HA   | 10:F:30:THR:OG1  | 2.19                     | 0.41              |
| 10:F:73:GLU:O    | 10:F:74:LEU:C    | 2.63                     | 0.41              |
| 28:a:1167:C:H2'  | 28:a:1168:G:O4'  | 2.21                     | 0.41              |
| 28:a:1581:G:C6   | 28:a:1582:C:C4   | 3.09                     | 0.41              |
| 28:a:2532:G:O2'  | 28:a:2657:A:N1   | 2.51                     | 0.41              |
| 30:c:76:ALA:HB2  | 30:c:96:TYR:CD1  | 2.56                     | 0.41              |
| 41:n:31:THR:HG22 | 41:n:32:PRO:HD2  | 2.01                     | 0.41              |
| 2:l:7:PRO:HB2    | 28:a:1309:G:H4'  | 2.02                     | 0.41              |
| 5:A:253:A:OP2    | 21:Q:69:LYS:HD3  | 2.21                     | 0.41              |
| 5:A:951:G:C6     | 5:A:952:U:C4     | 3.09                     | 0.41              |
| 5:A:1062:U:O4    | 7:C:2:GLY:HA2    | 2.20                     | 0.41              |
| 16:L:66:TYR:HB2  | 16:L:93:VAL:HG11 | 2.02                     | 0.41              |
| 28:a:654:A:O4'   | 28:a:654:A:OP1   | 2.38                     | 0.41              |
| 28:a:839:U:H2'   | 28:a:840:C:C6    | 2.55                     | 0.41              |
| 28:a:1389:G:H2'  | 28:a:1390:U:O4'  | 2.21                     | 0.41              |
| 28:a:1731:G:C8   | 28:a:1731:G:H5'' | 2.55                     | 0.41              |
| 38:k:57:LEU:HA   | 38:k:60:ARG:HG2  | 2.03                     | 0.41              |
| 53:z:52:ARG:HH21 | 53:z:54:VAL:HA   | 1.85                     | 0.41              |
| 5:A:410:G:H2'    | 5:A:429:U:C4     | 2.56                     | 0.41              |
| 5:A:923:A:H1'    | 5:A:1398:A:H2'   | 2.03                     | 0.41              |
| 28:a:883:G:O6    | 28:a:892:A:N6    | 2.53                     | 0.41              |
| 28:a:1225:G:C2   | 28:a:1226:A:C2   | 3.09                     | 0.41              |
| 28:a:1731:G:C6   | 28:a:1733:G:C5   | 3.08                     | 0.41              |
| 28:a:2415:G:C5   | 28:a:2416:C:C4   | 3.08                     | 0.41              |
| 28:a:2768:U:C4   | 28:a:2769:U:C5   | 3.09                     | 0.41              |
| 28:a:2895:G:H2'  | 28:a:2896:C:C6   | 2.56                     | 0.41              |
| 5:A:279:A:H4'    | 5:A:280:C:H5''   | 2.03                     | 0.41              |
| 5:A:506:G:C5     | 5:A:507:C:C4     | 3.08                     | 0.41              |
| 26:V:21:TYR:CE1  | 26:V:30:MET:HG3  | 2.56                     | 0.41              |
| 27:Z:25:U:H2'    | 27:Z:26:A:C8     | 2.56                     | 0.41              |
| 28:a:191:A:H2'   | 28:a:192:C:C6    | 2.56                     | 0.41              |
| 28:a:301:G:C6    | 28:a:317:G:C6    | 3.08                     | 0.41              |
| 28:a:323:C:H6    | 28:a:1205:A:N1   | 2.18                     | 0.41              |
| 28:a:1223:G:C6   | 28:a:1227:G:C6   | 3.09                     | 0.41              |
| 28:a:1558:C:O4'  | 28:a:1560:G:C8   | 2.73                     | 0.41              |

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| Atom-1            | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-------------------|-------------------|--------------------------|-------------------|
| 29:b:39:A:O2'     | 29:b:46:A:N1      | 2.40                     | 0.41              |
| 33:f:85:ILE:O     | 33:f:85:ILE:HG22  | 2.21                     | 0.41              |
| 36:i:17:VAL:HG23  | 36:i:137:PRO:CB   | 2.50                     | 0.41              |
| 45:r:23:LEU:HD21  | 53:z:22:LEU:HB2   | 2.03                     | 0.41              |
| 5:A:39:G:C2'      | 5:A:40:C:O5'      | 2.68                     | 0.41              |
| 5:A:338:A:H2'     | 5:A:339:C:O5'     | 2.21                     | 0.41              |
| 5:A:687:A:C5      | 5:A:701:U:C5      | 3.09                     | 0.41              |
| 5:A:1086:U:H4'    | 5:A:1389:C:H5'    | 2.02                     | 0.41              |
| 5:A:1343:G:H2'    | 5:A:1344:C:C6     | 2.56                     | 0.41              |
| 12:H:40:LEU:HB2   | 12:H:46:ILE:HD12  | 2.02                     | 0.41              |
| 27:Z:25:U:C4      | 27:Z:26:A:C5      | 3.08                     | 0.41              |
| 28:a:896:A:H3'    | 28:a:897:C:H4'    | 2.03                     | 0.41              |
| 44:q:4:VAL:HA     | 44:q:12:HIS:O     | 2.21                     | 0.41              |
| 45:r:83:LYS:HG3   | 45:r:95:ARG:HD3   | 2.01                     | 0.41              |
| 52:y:24:LEU:HD11  | 52:y:54:MET:HE2   | 2.02                     | 0.41              |
| 3:2:33:LEU:O      | 3:2:34:THR:C      | 2.63                     | 0.41              |
| 5:A:195:A:H1'     | 5:A:222:C:O2'     | 2.21                     | 0.41              |
| 5:A:505:G:C4      | 5:A:535:A:C5      | 3.09                     | 0.41              |
| 5:A:765:G:C6      | 5:A:812:G:C4      | 3.09                     | 0.41              |
| 5:A:868:C:H2'     | 5:A:869:G:O4'     | 2.21                     | 0.41              |
| 5:A:898:G:C2      | 5:A:902:G:C6      | 3.09                     | 0.41              |
| 9:E:56:VAL:N      | 9:E:57:PRO:CD     | 2.84                     | 0.41              |
| 9:E:118:ALA:HB3   | 9:E:120:VAL:HG23  | 2.03                     | 0.41              |
| 27:Z:21:A:N7      | 27:Z:47:U:O2      | 2.54                     | 0.41              |
| 28:a:1408:G:C2    | 28:a:1595:C:O2    | 2.73                     | 0.41              |
| 28:a:1614:A:C6    | 45:r:87:PRO:HB3   | 2.56                     | 0.41              |
| 28:a:1815:A:OP1   | 28:a:1822:C:H4'   | 2.21                     | 0.41              |
| 32:e:147:LEU:HD11 | 32:e:170:ARG:HG3  | 2.02                     | 0.41              |
| 43:p:32:TYR:O     | 43:p:33:ARG:C     | 2.64                     | 0.41              |
| 16:L:29:GLN:HB3   | 16:L:81:LEU:HG    | 2.03                     | 0.41              |
| 36:i:36:LEU:O     | 36:i:51:GLY:HA3   | 2.21                     | 0.41              |
| 39:l:41:LEU:HD22  | 39:l:124:LEU:HD22 | 2.01                     | 0.41              |
| 51:x:3:ALA:HB1    | 51:x:7:ARG:NH2    | 2.35                     | 0.41              |
| 52:y:17:LEU:O     | 52:y:18:PRO:C     | 2.63                     | 0.41              |
| 5:A:927:G:OP2     | 5:A:927:G:H4'     | 2.21                     | 0.40              |
| 5:A:1180:A:P      | 13:I:99:ARG:HH12  | 2.43                     | 0.40              |
| 26:V:24:ARG:NH2   | 28:a:1926:U:OP2   | 2.47                     | 0.40              |
| 28:a:813:U:H2'    | 28:a:814:C:H6     | 1.86                     | 0.40              |
| 28:a:1003:G:N2    | 28:a:1153:C:C2    | 2.89                     | 0.40              |
| 28:a:1811:G:C6    | 28:a:1812:U:C4    | 3.09                     | 0.40              |
| 28:a:2694:G:C2    | 28:a:2716:C:O2    | 2.74                     | 0.40              |

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| Atom-1           | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|------------------|-------------------|--------------------------|-------------------|
| 29:b:65:U:C4     | 29:b:108:A:N3     | 2.89                     | 0.40              |
| 32:e:102:ARG:O   | 32:e:103:GLY:C    | 2.64                     | 0.40              |
| 40:m:49:GLU:N    | 40:m:50:PRO:CD    | 2.85                     | 0.40              |
| 5:A:878:A:H5'    | 12:H:81:PRO:HG2   | 2.03                     | 0.40              |
| 8:D:9:LEU:HD13   | 8:D:32:CYS:HB3    | 2.04                     | 0.40              |
| 28:a:264:C:H4'   | 28:a:428:A:C2     | 2.57                     | 0.40              |
| 28:a:419:U:H2'   | 28:a:420:C:C6     | 2.57                     | 0.40              |
| 28:a:1317:G:C6   | 28:a:1318:U:N3    | 2.89                     | 0.40              |
| 28:a:2311:A:H1'  | 33:f:85:ILE:HG21  | 2.04                     | 0.40              |
| 28:a:2436:G:O2'  | 28:a:2598:A:N1    | 2.54                     | 0.40              |
| 28:a:2813:A:H2'  | 28:a:2814:A:C8    | 2.57                     | 0.40              |
| 29:b:2:G:H2'     | 29:b:3:C:C6       | 2.55                     | 0.40              |
| 1:0:25:LYS:NZ    | 1:0:32:GLU:O      | 2.49                     | 0.40              |
| 5:A:452:A:H2'    | 5:A:453:G:O4'     | 2.20                     | 0.40              |
| 5:A:734:G:H2'    | 5:A:735:C:C6      | 2.56                     | 0.40              |
| 5:A:1103:C:O2    | 6:B:103:ASN:ND2   | 2.54                     | 0.40              |
| 5:A:1104:G:C6    | 5:A:1105:A:C5     | 3.10                     | 0.40              |
| 5:A:1368:A:C8    | 13:I:114:LYS:HD3  | 2.56                     | 0.40              |
| 5:A:1512:U:H2'   | 5:A:1513:A:C8     | 2.57                     | 0.40              |
| 6:B:154:MET:SD   | 6:B:158:PRO:HB3   | 2.61                     | 0.40              |
| 28:a:460:A:C2    | 28:a:470:A:C4     | 3.09                     | 0.40              |
| 28:a:1741:C:C4   | 28:a:1742:U:C5    | 3.10                     | 0.40              |
| 4:3:19:ARG:O     | 4:3:20:ASP:C      | 2.64                     | 0.40              |
| 5:A:81:A:H5''    | 5:A:83:C:C5       | 2.57                     | 0.40              |
| 5:A:142:G:H2'    | 5:A:143:A:O4'     | 2.21                     | 0.40              |
| 5:A:156:C:H2'    | 5:A:157:U:O4'     | 2.22                     | 0.40              |
| 5:A:563:A:H1'    | 5:A:566:G:H21     | 1.87                     | 0.40              |
| 5:A:1226:C:H4'   | 23:S:80:TYR:CZ    | 2.56                     | 0.40              |
| 8:D:101:VAL:HG12 | 8:D:105:MET:HE2   | 2.04                     | 0.40              |
| 21:Q:50:ASN:O    | 21:Q:51:ASN:C     | 2.64                     | 0.40              |
| 24:T:54:MET:O    | 24:T:55:GLN:C     | 2.64                     | 0.40              |
| 27:Z:70:U:C4     | 27:Z:71:C:C4      | 3.10                     | 0.40              |
| 28:a:207:A:C8    | 28:a:208:C:C5     | 3.09                     | 0.40              |
| 28:a:498:G:H21   | 47:t:45:HIS:CE1   | 2.40                     | 0.40              |
| 28:a:569:U:H2'   | 28:a:570:G:O4'    | 2.22                     | 0.40              |
| 29:b:26:C:C4     | 29:b:27:C:C4      | 3.09                     | 0.40              |
| 30:c:74:ILE:HA   | 30:c:75:PRO:HD3   | 1.92                     | 0.40              |
| 33:f:36:LEU:CB   | 33:f:152:LEU:HD11 | 2.47                     | 0.40              |
| 34:g:52:PHE:HE2  | 34:g:72:LEU:HD12  | 1.87                     | 0.40              |
| 40:m:87:PHE:O    | 40:m:88:ALA:C     | 2.64                     | 0.40              |
| 5:A:39:G:H2'     | 5:A:40:C:O4'      | 2.22                     | 0.40              |

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| Atom-1          | Atom-2            | Interatomic distance (Å) | Clash overlap (Å) |
|-----------------|-------------------|--------------------------|-------------------|
| 5:A:148:G:H2'   | 5:A:149:A:O4'     | 2.22                     | 0.40              |
| 5:A:164:G:C2    | 5:A:165:G:C8      | 3.10                     | 0.40              |
| 5:A:202:G:N2    | 5:A:215:C:C2      | 2.90                     | 0.40              |
| 5:A:1080:A:H5'' | 9:E:21:VAL:HG11   | 2.04                     | 0.40              |
| 6:B:96:TRP:CD2  | 6:B:172:ALA:HB2   | 2.57                     | 0.40              |
| 14:J:54:SER:CB  | 14:J:58:ASN:HB2   | 2.51                     | 0.40              |
| 28:a:181:A:C2   | 28:a:182:A:C4     | 3.10                     | 0.40              |
| 28:a:346:A:C2   | 28:a:347:A:H1'    | 2.56                     | 0.40              |
| 28:a:608:A:H2'  | 28:a:609:A:C8     | 2.56                     | 0.40              |
| 28:a:2654:A:O4' | 28:a:2656:U:C6    | 2.75                     | 0.40              |
| 28:a:2691:C:C4  | 28:a:2719:G:N2    | 2.89                     | 0.40              |
| 33:f:142:ASP:O  | 33:f:146:VAL:HG23 | 2.20                     | 0.40              |
| 41:n:53:THR:O   | 41:n:59:ALA:HB2   | 2.22                     | 0.40              |

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed      | Favoured  | Allowed  | Outliers | Percentiles |     |
|-----|-------|---------------|-----------|----------|----------|-------------|-----|
| 1   | 0     | 49/55 (89%)   | 45 (92%)  | 4 (8%)   | 0        | 100         | 100 |
| 2   | 1     | 44/46 (96%)   | 43 (98%)  | 1 (2%)   | 0        | 100         | 100 |
| 3   | 2     | 62/65 (95%)   | 59 (95%)  | 3 (5%)   | 0        | 100         | 100 |
| 4   | 3     | 36/38 (95%)   | 33 (92%)  | 3 (8%)   | 0        | 100         | 100 |
| 6   | B     | 222/241 (92%) | 218 (98%) | 4 (2%)   | 0        | 100         | 100 |
| 7   | C     | 204/233 (88%) | 197 (97%) | 7 (3%)   | 0        | 100         | 100 |
| 8   | D     | 196/206 (95%) | 192 (98%) | 4 (2%)   | 0        | 100         | 100 |
| 9   | E     | 152/167 (91%) | 141 (93%) | 11 (7%)  | 0        | 100         | 100 |
| 10  | F     | 99/135 (73%)  | 89 (90%)  | 10 (10%) | 0        | 100         | 100 |
| 11  | G     | 130/179 (73%) | 126 (97%) | 4 (3%)   | 0        | 100         | 100 |

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| Mol | Chain | Analysed      | Favoured  | Allowed  | Outliers | Percentiles |     |
|-----|-------|---------------|-----------|----------|----------|-------------|-----|
| 12  | H     | 127/130 (98%) | 123 (97%) | 4 (3%)   | 0        | 100         | 100 |
| 13  | I     | 123/130 (95%) | 116 (94%) | 7 (6%)   | 0        | 100         | 100 |
| 14  | J     | 92/103 (89%)  | 90 (98%)  | 2 (2%)   | 0        | 100         | 100 |
| 15  | K     | 113/129 (88%) | 101 (89%) | 12 (11%) | 0        | 100         | 100 |
| 16  | L     | 118/124 (95%) | 111 (94%) | 7 (6%)   | 0        | 100         | 100 |
| 17  | M     | 113/118 (96%) | 111 (98%) | 2 (2%)   | 0        | 100         | 100 |
| 18  | N     | 98/101 (97%)  | 98 (100%) | 0        | 0        | 100         | 100 |
| 19  | O     | 86/89 (97%)   | 83 (96%)  | 3 (4%)   | 0        | 100         | 100 |
| 20  | P     | 77/82 (94%)   | 71 (92%)  | 6 (8%)   | 0        | 100         | 100 |
| 21  | Q     | 77/84 (92%)   | 67 (87%)  | 10 (13%) | 0        | 100         | 100 |
| 22  | R     | 62/75 (83%)   | 54 (87%)  | 8 (13%)  | 0        | 100         | 100 |
| 23  | S     | 82/92 (89%)   | 81 (99%)  | 1 (1%)   | 0        | 100         | 100 |
| 24  | T     | 84/87 (97%)   | 74 (88%)  | 10 (12%) | 0        | 100         | 100 |
| 25  | U     | 68/71 (96%)   | 65 (96%)  | 3 (4%)   | 0        | 100         | 100 |
| 26  | V     | 105/142 (74%) | 101 (96%) | 4 (4%)   | 0        | 100         | 100 |
| 30  | c     | 269/273 (98%) | 262 (97%) | 7 (3%)   | 0        | 100         | 100 |
| 31  | d     | 206/209 (99%) | 198 (96%) | 8 (4%)   | 0        | 100         | 100 |
| 32  | e     | 199/201 (99%) | 189 (95%) | 10 (5%)  | 0        | 100         | 100 |
| 33  | f     | 175/179 (98%) | 168 (96%) | 7 (4%)   | 0        | 100         | 100 |
| 34  | g     | 174/177 (98%) | 168 (97%) | 6 (3%)   | 0        | 100         | 100 |
| 35  | h     | 39/149 (26%)  | 37 (95%)  | 2 (5%)   | 0        | 100         | 100 |
| 36  | i     | 140/142 (99%) | 139 (99%) | 1 (1%)   | 0        | 100         | 100 |
| 37  | j     | 121/123 (98%) | 115 (95%) | 6 (5%)   | 0        | 100         | 100 |
| 38  | k     | 142/144 (99%) | 132 (93%) | 10 (7%)  | 0        | 100         | 100 |
| 39  | l     | 132/136 (97%) | 128 (97%) | 4 (3%)   | 0        | 100         | 100 |
| 40  | m     | 116/127 (91%) | 108 (93%) | 8 (7%)   | 0        | 100         | 100 |
| 41  | n     | 114/117 (97%) | 108 (95%) | 6 (5%)   | 0        | 100         | 100 |
| 42  | o     | 112/115 (97%) | 104 (93%) | 8 (7%)   | 0        | 100         | 100 |
| 43  | p     | 115/118 (98%) | 110 (96%) | 5 (4%)   | 0        | 100         | 100 |
| 44  | q     | 101/103 (98%) | 98 (97%)  | 3 (3%)   | 0        | 100         | 100 |
| 45  | r     | 108/110 (98%) | 106 (98%) | 2 (2%)   | 0        | 100         | 100 |

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| Mol | Chain | Analysed        | Favoured   | Allowed  | Outliers | Percentiles |     |
|-----|-------|-----------------|------------|----------|----------|-------------|-----|
| 46  | s     | 91/100 (91%)    | 87 (96%)   | 4 (4%)   | 0        | 100         | 100 |
| 47  | t     | 100/104 (96%)   | 98 (98%)   | 2 (2%)   | 0        | 100         | 100 |
| 48  | u     | 92/94 (98%)     | 91 (99%)   | 1 (1%)   | 0        | 100         | 100 |
| 49  | v     | 76/85 (89%)     | 71 (93%)   | 5 (7%)   | 0        | 100         | 100 |
| 50  | w     | 75/78 (96%)     | 75 (100%)  | 0        | 0        | 100         | 100 |
| 51  | x     | 60/63 (95%)     | 60 (100%)  | 0        | 0        | 100         | 100 |
| 52  | y     | 56/59 (95%)     | 55 (98%)   | 1 (2%)   | 0        | 100         | 100 |
| 53  | z     | 54/57 (95%)     | 50 (93%)   | 4 (7%)   | 0        | 100         | 100 |
| All | All   | 5486/5985 (92%) | 5246 (96%) | 240 (4%) | 0        | 100         | 100 |

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed      | Rotameric  | Outliers | Percentiles |     |
|-----|-------|---------------|------------|----------|-------------|-----|
| 1   | 0     | 46/49 (94%)   | 46 (100%)  | 0        | 100         | 100 |
| 2   | 1     | 38/38 (100%)  | 38 (100%)  | 0        | 100         | 100 |
| 3   | 2     | 51/52 (98%)   | 51 (100%)  | 0        | 100         | 100 |
| 4   | 3     | 34/34 (100%)  | 34 (100%)  | 0        | 100         | 100 |
| 6   | B     | 186/199 (94%) | 185 (100%) | 1 (0%)   | 81          | 93  |
| 7   | C     | 170/190 (90%) | 170 (100%) | 0        | 100         | 100 |
| 8   | D     | 168/173 (97%) | 165 (98%)  | 3 (2%)   | 51          | 79  |
| 9   | E     | 117/126 (93%) | 114 (97%)  | 3 (3%)   | 40          | 72  |
| 10  | F     | 88/116 (76%)  | 86 (98%)   | 2 (2%)   | 44          | 74  |
| 11  | G     | 109/147 (74%) | 108 (99%)  | 1 (1%)   | 70          | 88  |
| 12  | H     | 104/105 (99%) | 103 (99%)  | 1 (1%)   | 68          | 87  |
| 13  | I     | 103/107 (96%) | 103 (100%) | 0        | 100         | 100 |
| 14  | J     | 85/90 (94%)   | 85 (100%)  | 0        | 100         | 100 |

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| Mol | Chain | Analysed       | Rotameric  | Outliers | Percentiles |     |
|-----|-------|----------------|------------|----------|-------------|-----|
| 15  | K     | 89/98 (91%)    | 88 (99%)   | 1 (1%)   | 65          | 86  |
| 16  | L     | 101/103 (98%)  | 99 (98%)   | 2 (2%)   | 48          | 77  |
| 17  | M     | 93/96 (97%)    | 93 (100%)  | 0        | 100         | 100 |
| 18  | N     | 83/84 (99%)    | 83 (100%)  | 0        | 100         | 100 |
| 19  | O     | 76/77 (99%)    | 76 (100%)  | 0        | 100         | 100 |
| 20  | P     | 64/65 (98%)    | 64 (100%)  | 0        | 100         | 100 |
| 21  | Q     | 73/78 (94%)    | 73 (100%)  | 0        | 100         | 100 |
| 22  | R     | 55/65 (85%)    | 55 (100%)  | 0        | 100         | 100 |
| 23  | S     | 72/79 (91%)    | 72 (100%)  | 0        | 100         | 100 |
| 24  | T     | 65/66 (98%)    | 65 (100%)  | 0        | 100         | 100 |
| 25  | U     | 60/61 (98%)    | 60 (100%)  | 0        | 100         | 100 |
| 26  | V     | 93/121 (77%)   | 93 (100%)  | 0        | 100         | 100 |
| 30  | c     | 216/218 (99%)  | 216 (100%) | 0        | 100         | 100 |
| 31  | d     | 163/163 (100%) | 162 (99%)  | 1 (1%)   | 78          | 92  |
| 32  | e     | 165/165 (100%) | 164 (99%)  | 1 (1%)   | 78          | 92  |
| 33  | f     | 148/150 (99%)  | 147 (99%)  | 1 (1%)   | 76          | 91  |
| 34  | g     | 137/138 (99%)  | 137 (100%) | 0        | 100         | 100 |
| 35  | h     | 32/114 (28%)   | 32 (100%)  | 0        | 100         | 100 |
| 36  | i     | 116/116 (100%) | 116 (100%) | 0        | 100         | 100 |
| 37  | j     | 104/104 (100%) | 104 (100%) | 0        | 100         | 100 |
| 38  | k     | 103/103 (100%) | 102 (99%)  | 1 (1%)   | 68          | 87  |
| 39  | l     | 107/107 (100%) | 107 (100%) | 0        | 100         | 100 |
| 40  | m     | 98/103 (95%)   | 97 (99%)   | 1 (1%)   | 68          | 87  |
| 41  | n     | 86/87 (99%)    | 85 (99%)   | 1 (1%)   | 63          | 85  |
| 42  | o     | 99/100 (99%)   | 99 (100%)  | 0        | 100         | 100 |
| 43  | p     | 89/90 (99%)    | 88 (99%)   | 1 (1%)   | 65          | 86  |
| 44  | q     | 84/84 (100%)   | 84 (100%)  | 0        | 100         | 100 |
| 45  | r     | 93/93 (100%)   | 92 (99%)   | 1 (1%)   | 65          | 86  |
| 46  | s     | 80/84 (95%)    | 80 (100%)  | 0        | 100         | 100 |
| 47  | t     | 83/85 (98%)    | 82 (99%)   | 1 (1%)   | 63          | 85  |
| 48  | u     | 78/78 (100%)   | 77 (99%)   | 1 (1%)   | 61          | 84  |

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| Mol | Chain | Analysed        | Rotameric  | Outliers | Percentiles |     |
|-----|-------|-----------------|------------|----------|-------------|-----|
| 49  | v     | 58/63 (92%)     | 58 (100%)  | 0        | 100         | 100 |
| 50  | w     | 67/68 (98%)     | 67 (100%)  | 0        | 100         | 100 |
| 51  | x     | 54/55 (98%)     | 53 (98%)   | 1 (2%)   | 50          | 78  |
| 52  | y     | 48/49 (98%)     | 48 (100%)  | 0        | 100         | 100 |
| 53  | z     | 47/48 (98%)     | 46 (98%)   | 1 (2%)   | 47          | 76  |
| All | All   | 4578/4884 (94%) | 4552 (99%) | 26 (1%)  | 76          | 92  |

All (26) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 6   | B     | 70  | VAL  |
| 8   | D     | 17  | THR  |
| 8   | D     | 58  | LYS  |
| 8   | D     | 181 | THR  |
| 9   | E     | 38  | VAL  |
| 9   | E     | 121 | HIS  |
| 9   | E     | 122 | ASN  |
| 10  | F     | 90  | MET  |
| 10  | F     | 94  | HIS  |
| 11  | G     | 114 | LYS  |
| 12  | H     | 59  | LEU  |
| 15  | K     | 101 | ASN  |
| 16  | L     | 63  | VAL  |
| 16  | L     | 104 | CYS  |
| 31  | d     | 50  | VAL  |
| 32  | e     | 169 | VAL  |
| 33  | f     | 88  | LYS  |
| 38  | k     | 121 | THR  |
| 40  | m     | 48  | VAL  |
| 41  | n     | 16  | ARG  |
| 43  | p     | 11  | ARG  |
| 45  | r     | 98  | LYS  |
| 47  | t     | 39  | ILE  |
| 48  | u     | 64  | VAL  |
| 51  | x     | 58  | ASN  |
| 53  | z     | 55  | ILE  |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (61) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 3   | 2     | 31  | HIS  |
| 3   | 2     | 43  | HIS  |
| 6   | B     | 19  | GLN  |
| 6   | B     | 190 | ASN  |
| 7   | C     | 102 | ASN  |
| 7   | C     | 140 | ASN  |
| 8   | D     | 59  | GLN  |
| 8   | D     | 116 | GLN  |
| 8   | D     | 131 | ASN  |
| 9   | E     | 97  | GLN  |
| 9   | E     | 146 | ASN  |
| 12  | H     | 38  | ASN  |
| 13  | I     | 4   | ASN  |
| 13  | I     | 31  | ASN  |
| 13  | I     | 32  | GLN  |
| 16  | L     | 59  | ASN  |
| 17  | M     | 8   | ASN  |
| 19  | O     | 35  | GLN  |
| 20  | P     | 9   | HIS  |
| 20  | P     | 79  | ASN  |
| 21  | Q     | 45  | HIS  |
| 21  | Q     | 50  | ASN  |
| 23  | S     | 14  | HIS  |
| 24  | T     | 48  | GLN  |
| 24  | T     | 52  | ASN  |
| 24  | T     | 68  | HIS  |
| 24  | T     | 84  | ASN  |
| 25  | U     | 64  | ASN  |
| 26  | V     | 52  | ASN  |
| 30  | c     | 25  | HIS  |
| 30  | c     | 37  | ASN  |
| 30  | c     | 115 | GLN  |
| 30  | c     | 226 | ASN  |
| 30  | c     | 239 | ASN  |
| 30  | c     | 243 | HIS  |
| 31  | d     | 94  | GLN  |
| 32  | e     | 136 | GLN  |
| 33  | f     | 21  | ASN  |
| 33  | f     | 63  | GLN  |
| 34  | g     | 22  | GLN  |
| 36  | i     | 138 | GLN  |
| 37  | j     | 93  | GLN  |
| 39  | l     | 3   | GLN  |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 39  | l     | 60  | GLN  |
| 41  | n     | 19  | GLN  |
| 41  | n     | 29  | HIS  |
| 41  | n     | 38  | GLN  |
| 42  | o     | 12  | GLN  |
| 42  | o     | 66  | ASN  |
| 43  | p     | 52  | GLN  |
| 43  | p     | 81  | ASN  |
| 44  | q     | 43  | ASN  |
| 46  | s     | 92  | ASN  |
| 47  | t     | 54  | GLN  |
| 47  | t     | 66  | GLN  |
| 47  | t     | 74  | ASN  |
| 48  | u     | 24  | ASN  |
| 48  | u     | 87  | GLN  |
| 49  | v     | 76  | ASN  |
| 50  | w     | 6   | GLN  |
| 51  | x     | 27  | ASN  |

### 5.3.3 RNA ⓘ

| Mol | Chain | Analysed        | Backbone Outliers | Pucker Outliers |
|-----|-------|-----------------|-------------------|-----------------|
| 27  | Z     | 71/77 (92%)     | 31 (43%)          | 0               |
| 28  | a     | 2749/2904 (94%) | 416 (15%)         | 0               |
| 29  | b     | 118/120 (98%)   | 13 (11%)          | 0               |
| 5   | A     | 1512/1542 (98%) | 344 (22%)         | 54 (3%)         |
| All | All   | 4450/4643 (95%) | 804 (18%)         | 54 (1%)         |

All (804) RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 5   | A     | 3   | A    |
| 5   | A     | 4   | U    |
| 5   | A     | 6   | G    |
| 5   | A     | 8   | A    |
| 5   | A     | 9   | G    |
| 5   | A     | 10  | A    |
| 5   | A     | 16  | A    |
| 5   | A     | 17  | U    |
| 5   | A     | 31  | G    |
| 5   | A     | 32  | A    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 5   | A     | 39  | G    |
| 5   | A     | 40  | C    |
| 5   | A     | 47  | C    |
| 5   | A     | 48  | C    |
| 5   | A     | 49  | U    |
| 5   | A     | 51  | A    |
| 5   | A     | 56  | U    |
| 5   | A     | 62  | U    |
| 5   | A     | 70  | U    |
| 5   | A     | 71  | A    |
| 5   | A     | 75  | G    |
| 5   | A     | 80  | A    |
| 5   | A     | 82  | G    |
| 5   | A     | 83  | C    |
| 5   | A     | 84  | U    |
| 5   | A     | 85  | U    |
| 5   | A     | 86  | G    |
| 5   | A     | 87  | C    |
| 5   | A     | 88  | U    |
| 5   | A     | 90  | C    |
| 5   | A     | 91  | U    |
| 5   | A     | 96  | U    |
| 5   | A     | 117 | G    |
| 5   | A     | 120 | A    |
| 5   | A     | 121 | U    |
| 5   | A     | 131 | A    |
| 5   | A     | 133 | U    |
| 5   | A     | 134 | G    |
| 5   | A     | 144 | G    |
| 5   | A     | 157 | U    |
| 5   | A     | 163 | C    |
| 5   | A     | 169 | C    |
| 5   | A     | 195 | A    |
| 5   | A     | 197 | A    |
| 5   | A     | 202 | G    |
| 5   | A     | 216 | U    |
| 5   | A     | 231 | U    |
| 5   | A     | 240 | G    |
| 5   | A     | 244 | U    |
| 5   | A     | 245 | U    |
| 5   | A     | 247 | G    |
| 5   | A     | 248 | C    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 5   | A     | 251 | G    |
| 5   | A     | 255 | G    |
| 5   | A     | 259 | G    |
| 5   | A     | 266 | G    |
| 5   | A     | 267 | C    |
| 5   | A     | 269 | C    |
| 5   | A     | 271 | C    |
| 5   | A     | 289 | G    |
| 5   | A     | 305 | G    |
| 5   | A     | 306 | A    |
| 5   | A     | 319 | G    |
| 5   | A     | 321 | A    |
| 5   | A     | 328 | C    |
| 5   | A     | 329 | A    |
| 5   | A     | 339 | C    |
| 5   | A     | 347 | G    |
| 5   | A     | 352 | C    |
| 5   | A     | 354 | G    |
| 5   | A     | 364 | A    |
| 5   | A     | 367 | U    |
| 5   | A     | 372 | C    |
| 5   | A     | 392 | C    |
| 5   | A     | 397 | A    |
| 5   | A     | 398 | U    |
| 5   | A     | 404 | G    |
| 5   | A     | 406 | G    |
| 5   | A     | 407 | U    |
| 5   | A     | 412 | A    |
| 5   | A     | 413 | G    |
| 5   | A     | 414 | A    |
| 5   | A     | 421 | U    |
| 5   | A     | 422 | C    |
| 5   | A     | 423 | G    |
| 5   | A     | 424 | G    |
| 5   | A     | 428 | G    |
| 5   | A     | 429 | U    |
| 5   | A     | 431 | A    |
| 5   | A     | 433 | G    |
| 5   | A     | 436 | C    |
| 5   | A     | 437 | U    |
| 5   | A     | 438 | U    |
| 5   | A     | 439 | U    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 5   | A     | 440 | C    |
| 5   | A     | 447 | G    |
| 5   | A     | 448 | A    |
| 5   | A     | 453 | G    |
| 5   | A     | 454 | G    |
| 5   | A     | 457 | G    |
| 5   | A     | 458 | U    |
| 5   | A     | 465 | A    |
| 5   | A     | 466 | A    |
| 5   | A     | 467 | U    |
| 5   | A     | 468 | A    |
| 5   | A     | 469 | C    |
| 5   | A     | 478 | A    |
| 5   | A     | 481 | G    |
| 5   | A     | 484 | G    |
| 5   | A     | 496 | A    |
| 5   | A     | 497 | G    |
| 5   | A     | 499 | A    |
| 5   | A     | 508 | U    |
| 5   | A     | 511 | C    |
| 5   | A     | 512 | U    |
| 5   | A     | 513 | C    |
| 5   | A     | 517 | G    |
| 5   | A     | 518 | C    |
| 5   | A     | 521 | G    |
| 5   | A     | 523 | A    |
| 5   | A     | 524 | G    |
| 5   | A     | 525 | C    |
| 5   | A     | 527 | G7M  |
| 5   | A     | 533 | A    |
| 5   | A     | 535 | A    |
| 5   | A     | 536 | C    |
| 5   | A     | 537 | G    |
| 5   | A     | 547 | A    |
| 5   | A     | 550 | G    |
| 5   | A     | 559 | A    |
| 5   | A     | 560 | A    |
| 5   | A     | 561 | U    |
| 5   | A     | 562 | U    |
| 5   | A     | 563 | A    |
| 5   | A     | 564 | C    |
| 5   | A     | 568 | G    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 5   | A     | 572 | A    |
| 5   | A     | 573 | A    |
| 5   | A     | 576 | C    |
| 5   | A     | 577 | G    |
| 5   | A     | 579 | A    |
| 5   | A     | 584 | G    |
| 5   | A     | 595 | A    |
| 5   | A     | 596 | A    |
| 5   | A     | 610 | U    |
| 5   | A     | 618 | C    |
| 5   | A     | 623 | C    |
| 5   | A     | 633 | G    |
| 5   | A     | 634 | C    |
| 5   | A     | 642 | A    |
| 5   | A     | 650 | G    |
| 5   | A     | 653 | U    |
| 5   | A     | 654 | G    |
| 5   | A     | 664 | G    |
| 5   | A     | 665 | A    |
| 5   | A     | 666 | G    |
| 5   | A     | 672 | U    |
| 5   | A     | 682 | G    |
| 5   | A     | 683 | G    |
| 5   | A     | 687 | A    |
| 5   | A     | 693 | G    |
| 5   | A     | 694 | A    |
| 5   | A     | 695 | A    |
| 5   | A     | 698 | G    |
| 5   | A     | 699 | C    |
| 5   | A     | 700 | G    |
| 5   | A     | 703 | G    |
| 5   | A     | 704 | A    |
| 5   | A     | 710 | G    |
| 5   | A     | 718 | A    |
| 5   | A     | 719 | C    |
| 5   | A     | 723 | U    |
| 5   | A     | 724 | G    |
| 5   | A     | 729 | A    |
| 5   | A     | 731 | G    |
| 5   | A     | 732 | C    |
| 5   | A     | 734 | G    |
| 5   | A     | 741 | G    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 5   | A     | 745 | G    |
| 5   | A     | 748 | G    |
| 5   | A     | 753 | A    |
| 5   | A     | 755 | G    |
| 5   | A     | 760 | G    |
| 5   | A     | 773 | G    |
| 5   | A     | 774 | G    |
| 5   | A     | 775 | G    |
| 5   | A     | 777 | A    |
| 5   | A     | 781 | A    |
| 5   | A     | 782 | A    |
| 5   | A     | 793 | U    |
| 5   | A     | 794 | A    |
| 5   | A     | 802 | A    |
| 5   | A     | 810 | C    |
| 5   | A     | 812 | G    |
| 5   | A     | 815 | A    |
| 5   | A     | 817 | C    |
| 5   | A     | 829 | G    |
| 5   | A     | 837 | U    |
| 5   | A     | 839 | C    |
| 5   | A     | 848 | C    |
| 5   | A     | 849 | G    |
| 5   | A     | 851 | G    |
| 5   | A     | 857 | C    |
| 5   | A     | 861 | G    |
| 5   | A     | 862 | C    |
| 5   | A     | 864 | A    |
| 5   | A     | 865 | A    |
| 5   | A     | 866 | C    |
| 5   | A     | 867 | G    |
| 5   | A     | 868 | C    |
| 5   | A     | 870 | U    |
| 5   | A     | 871 | U    |
| 5   | A     | 872 | A    |
| 5   | A     | 873 | A    |
| 5   | A     | 876 | C    |
| 5   | A     | 885 | G    |
| 5   | A     | 889 | A    |
| 5   | A     | 890 | G    |
| 5   | A     | 891 | U    |
| 5   | A     | 911 | U    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 5   | A     | 913  | A    |
| 5   | A     | 914  | A    |
| 5   | A     | 916  | U    |
| 5   | A     | 919  | A    |
| 5   | A     | 922  | G    |
| 5   | A     | 926  | G    |
| 5   | A     | 931  | C    |
| 5   | A     | 934  | C    |
| 5   | A     | 935  | A    |
| 5   | A     | 936  | C    |
| 5   | A     | 960  | U    |
| 5   | A     | 965  | U    |
| 5   | A     | 969  | A    |
| 5   | A     | 975  | A    |
| 5   | A     | 976  | G    |
| 5   | A     | 977  | A    |
| 5   | A     | 984  | C    |
| 5   | A     | 993  | G    |
| 5   | A     | 994  | A    |
| 5   | A     | 1003 | G    |
| 5   | A     | 1004 | A    |
| 5   | A     | 1020 | G    |
| 5   | A     | 1024 | G    |
| 5   | A     | 1025 | U    |
| 5   | A     | 1027 | C    |
| 5   | A     | 1030 | U    |
| 5   | A     | 1031 | C    |
| 5   | A     | 1033 | G    |
| 5   | A     | 1034 | G    |
| 5   | A     | 1036 | A    |
| 5   | A     | 1039 | G    |
| 5   | A     | 1042 | A    |
| 5   | A     | 1043 | G    |
| 5   | A     | 1044 | A    |
| 5   | A     | 1046 | A    |
| 5   | A     | 1065 | U    |
| 5   | A     | 1085 | U    |
| 5   | A     | 1094 | G    |
| 5   | A     | 1095 | U    |
| 5   | A     | 1101 | A    |
| 5   | A     | 1124 | G    |
| 5   | A     | 1125 | U    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 5   | A     | 1137 | C    |
| 5   | A     | 1139 | G    |
| 5   | A     | 1159 | U    |
| 5   | A     | 1184 | G    |
| 5   | A     | 1187 | G    |
| 5   | A     | 1196 | A    |
| 5   | A     | 1197 | A    |
| 5   | A     | 1213 | A    |
| 5   | A     | 1225 | A    |
| 5   | A     | 1226 | C    |
| 5   | A     | 1227 | A    |
| 5   | A     | 1228 | C    |
| 5   | A     | 1238 | A    |
| 5   | A     | 1239 | A    |
| 5   | A     | 1240 | U    |
| 5   | A     | 1248 | A    |
| 5   | A     | 1256 | A    |
| 5   | A     | 1260 | G    |
| 5   | A     | 1275 | A    |
| 5   | A     | 1280 | A    |
| 5   | A     | 1281 | C    |
| 5   | A     | 1282 | C    |
| 5   | A     | 1286 | U    |
| 5   | A     | 1287 | A    |
| 5   | A     | 1300 | G    |
| 5   | A     | 1302 | C    |
| 5   | A     | 1317 | C    |
| 5   | A     | 1319 | A    |
| 5   | A     | 1320 | C    |
| 5   | A     | 1338 | G    |
| 5   | A     | 1346 | A    |
| 5   | A     | 1353 | G    |
| 5   | A     | 1363 | A    |
| 5   | A     | 1368 | A    |
| 5   | A     | 1370 | G    |
| 5   | A     | 1378 | C    |
| 5   | A     | 1379 | G    |
| 5   | A     | 1381 | U    |
| 5   | A     | 1382 | C    |
| 5   | A     | 1383 | C    |
| 5   | A     | 1388 | C    |
| 5   | A     | 1389 | C    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 5   | A     | 1395 | C    |
| 5   | A     | 1396 | A    |
| 5   | A     | 1397 | C    |
| 5   | A     | 1398 | A    |
| 5   | A     | 1399 | C    |
| 5   | A     | 1400 | C    |
| 5   | A     | 1403 | C    |
| 5   | A     | 1405 | G    |
| 5   | A     | 1408 | A    |
| 5   | A     | 1409 | C    |
| 5   | A     | 1410 | A    |
| 5   | A     | 1418 | A    |
| 5   | A     | 1419 | G    |
| 5   | A     | 1424 | U    |
| 5   | A     | 1429 | A    |
| 5   | A     | 1434 | A    |
| 5   | A     | 1440 | U    |
| 5   | A     | 1441 | A    |
| 5   | A     | 1451 | U    |
| 5   | A     | 1452 | C    |
| 5   | A     | 1453 | G    |
| 5   | A     | 1475 | G    |
| 5   | A     | 1483 | A    |
| 5   | A     | 1484 | C    |
| 5   | A     | 1491 | G    |
| 5   | A     | 1492 | A    |
| 5   | A     | 1494 | G    |
| 5   | A     | 1495 | U    |
| 5   | A     | 1496 | C    |
| 5   | A     | 1499 | A    |
| 5   | A     | 1503 | A    |
| 5   | A     | 1504 | G    |
| 5   | A     | 1506 | U    |
| 5   | A     | 1515 | G    |
| 5   | A     | 1517 | G    |
| 5   | A     | 1527 | U    |
| 5   | A     | 1528 | U    |
| 5   | A     | 1529 | G    |
| 5   | A     | 1530 | G    |
| 5   | A     | 1534 | A    |
| 27  | Z     | 6    | G    |
| 27  | Z     | 8    | U    |

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| Mol | Chain | Res   | Type |
|-----|-------|-------|------|
| 27  | Z     | 13    | C    |
| 27  | Z     | 14    | A    |
| 27  | Z     | 16    | U    |
| 27  | Z     | 17    | C    |
| 27  | Z     | 17(A) | G    |
| 27  | Z     | 18    | G    |
| 27  | Z     | 19    | U    |
| 27  | Z     | 20    | U    |
| 27  | Z     | 21    | A    |
| 27  | Z     | 25    | U    |
| 27  | Z     | 29    | U    |
| 27  | Z     | 31    | C    |
| 27  | Z     | 41    | A    |
| 27  | Z     | 42    | G    |
| 27  | Z     | 44    | G    |
| 27  | Z     | 46    | G    |
| 27  | Z     | 47    | U    |
| 27  | Z     | 50    | C    |
| 27  | Z     | 53    | G    |
| 27  | Z     | 54    | U    |
| 27  | Z     | 58    | A    |
| 27  | Z     | 64    | G    |
| 27  | Z     | 65    | U    |
| 27  | Z     | 69    | U    |
| 27  | Z     | 70    | U    |
| 27  | Z     | 71    | C    |
| 27  | Z     | 72    | C    |
| 27  | Z     | 75    | C    |
| 27  | Z     | 76    | A    |
| 28  | a     | 10    | A    |
| 28  | a     | 15    | G    |
| 28  | a     | 34    | U    |
| 28  | a     | 42    | A    |
| 28  | a     | 45    | G    |
| 28  | a     | 58    | G    |
| 28  | a     | 71    | A    |
| 28  | a     | 74    | A    |
| 28  | a     | 75    | G    |
| 28  | a     | 76    | C    |
| 28  | a     | 80    | G    |
| 28  | a     | 86    | G    |
| 28  | a     | 102   | U    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 28  | a     | 103 | A    |
| 28  | a     | 110 | G    |
| 28  | a     | 118 | A    |
| 28  | a     | 119 | A    |
| 28  | a     | 120 | U    |
| 28  | a     | 135 | U    |
| 28  | a     | 138 | U    |
| 28  | a     | 139 | U    |
| 28  | a     | 142 | A    |
| 28  | a     | 165 | A    |
| 28  | a     | 181 | A    |
| 28  | a     | 196 | A    |
| 28  | a     | 199 | A    |
| 28  | a     | 200 | U    |
| 28  | a     | 215 | G    |
| 28  | a     | 216 | A    |
| 28  | a     | 221 | A    |
| 28  | a     | 222 | A    |
| 28  | a     | 248 | G    |
| 28  | a     | 249 | C    |
| 28  | a     | 250 | G    |
| 28  | a     | 265 | A    |
| 28  | a     | 272 | A    |
| 28  | a     | 274 | C    |
| 28  | a     | 278 | A    |
| 28  | a     | 282 | A    |
| 28  | a     | 285 | G    |
| 28  | a     | 289 | G    |
| 28  | a     | 294 | A    |
| 28  | a     | 304 | U    |
| 28  | a     | 310 | A    |
| 28  | a     | 311 | A    |
| 28  | a     | 329 | G    |
| 28  | a     | 330 | A    |
| 28  | a     | 345 | A    |
| 28  | a     | 357 | C    |
| 28  | a     | 361 | G    |
| 28  | a     | 362 | A    |
| 28  | a     | 386 | G    |
| 28  | a     | 396 | G    |
| 28  | a     | 404 | A    |
| 28  | a     | 405 | U    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 28  | a     | 411 | G    |
| 28  | a     | 412 | A    |
| 28  | a     | 420 | C    |
| 28  | a     | 451 | U    |
| 28  | a     | 456 | C    |
| 28  | a     | 480 | A    |
| 28  | a     | 481 | G    |
| 28  | a     | 491 | G    |
| 28  | a     | 503 | A    |
| 28  | a     | 504 | A    |
| 28  | a     | 505 | A    |
| 28  | a     | 509 | C    |
| 28  | a     | 530 | G    |
| 28  | a     | 531 | C    |
| 28  | a     | 532 | A    |
| 28  | a     | 543 | G    |
| 28  | a     | 544 | C    |
| 28  | a     | 545 | U    |
| 28  | a     | 546 | U    |
| 28  | a     | 547 | A    |
| 28  | a     | 549 | G    |
| 28  | a     | 563 | A    |
| 28  | a     | 573 | U    |
| 28  | a     | 575 | A    |
| 28  | a     | 583 | G    |
| 28  | a     | 586 | A    |
| 28  | a     | 587 | C    |
| 28  | a     | 603 | A    |
| 28  | a     | 614 | A    |
| 28  | a     | 615 | U    |
| 28  | a     | 627 | A    |
| 28  | a     | 628 | G    |
| 28  | a     | 637 | A    |
| 28  | a     | 645 | C    |
| 28  | a     | 647 | G    |
| 28  | a     | 653 | U    |
| 28  | a     | 654 | A    |
| 28  | a     | 655 | A    |
| 28  | a     | 685 | A    |
| 28  | a     | 686 | U    |
| 28  | a     | 696 | G    |
| 28  | a     | 717 | C    |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 28  | a     | 729 | G    |
| 28  | a     | 730 | A    |
| 28  | a     | 738 | G    |
| 28  | a     | 747 | 5MU  |
| 28  | a     | 750 | A    |
| 28  | a     | 765 | C    |
| 28  | a     | 775 | G    |
| 28  | a     | 776 | G    |
| 28  | a     | 782 | A    |
| 28  | a     | 784 | G    |
| 28  | a     | 785 | G    |
| 28  | a     | 787 | C    |
| 28  | a     | 789 | A    |
| 28  | a     | 792 | A    |
| 28  | a     | 805 | G    |
| 28  | a     | 812 | C    |
| 28  | a     | 827 | U    |
| 28  | a     | 828 | U    |
| 28  | a     | 846 | U    |
| 28  | a     | 847 | U    |
| 28  | a     | 857 | G    |
| 28  | a     | 859 | G    |
| 28  | a     | 869 | G    |
| 28  | a     | 881 | G    |
| 28  | a     | 883 | G    |
| 28  | a     | 884 | U    |
| 28  | a     | 885 | C    |
| 28  | a     | 890 | C    |
| 28  | a     | 891 | G    |
| 28  | a     | 895 | U    |
| 28  | a     | 896 | A    |
| 28  | a     | 897 | C    |
| 28  | a     | 898 | C    |
| 28  | a     | 899 | A    |
| 28  | a     | 910 | A    |
| 28  | a     | 914 | G    |
| 28  | a     | 915 | C    |
| 28  | a     | 916 | G    |
| 28  | a     | 931 | U    |
| 28  | a     | 932 | U    |
| 28  | a     | 946 | C    |
| 28  | a     | 961 | C    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 28  | a     | 973  | A    |
| 28  | a     | 974  | G    |
| 28  | a     | 983  | A    |
| 28  | a     | 984  | A    |
| 28  | a     | 985  | C    |
| 28  | a     | 996  | A    |
| 28  | a     | 999  | U    |
| 28  | a     | 1012 | U    |
| 28  | a     | 1013 | C    |
| 28  | a     | 1022 | G    |
| 28  | a     | 1025 | G    |
| 28  | a     | 1026 | G    |
| 28  | a     | 1033 | U    |
| 28  | a     | 1040 | A    |
| 28  | a     | 1041 | G    |
| 28  | a     | 1045 | C    |
| 28  | a     | 1046 | A    |
| 28  | a     | 1047 | G    |
| 28  | a     | 1048 | A    |
| 28  | a     | 1051 | G    |
| 28  | a     | 1052 | C    |
| 28  | a     | 1111 | A    |
| 28  | a     | 1112 | G    |
| 28  | a     | 1115 | G    |
| 28  | a     | 1116 | G    |
| 28  | a     | 1128 | G    |
| 28  | a     | 1129 | A    |
| 28  | a     | 1130 | U    |
| 28  | a     | 1132 | U    |
| 28  | a     | 1133 | A    |
| 28  | a     | 1134 | A    |
| 28  | a     | 1135 | C    |
| 28  | a     | 1136 | G    |
| 28  | a     | 1142 | A    |
| 28  | a     | 1171 | G    |
| 28  | a     | 1187 | G    |
| 28  | a     | 1248 | G    |
| 28  | a     | 1253 | A    |
| 28  | a     | 1256 | G    |
| 28  | a     | 1262 | A    |
| 28  | a     | 1271 | G    |
| 28  | a     | 1272 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 28  | a     | 1273 | U    |
| 28  | a     | 1276 | A    |
| 28  | a     | 1294 | U    |
| 28  | a     | 1300 | G    |
| 28  | a     | 1301 | A    |
| 28  | a     | 1302 | A    |
| 28  | a     | 1315 | C    |
| 28  | a     | 1320 | C    |
| 28  | a     | 1321 | A    |
| 28  | a     | 1329 | U    |
| 28  | a     | 1330 | C    |
| 28  | a     | 1352 | U    |
| 28  | a     | 1365 | A    |
| 28  | a     | 1379 | U    |
| 28  | a     | 1383 | A    |
| 28  | a     | 1387 | A    |
| 28  | a     | 1396 | U    |
| 28  | a     | 1397 | U    |
| 28  | a     | 1407 | G    |
| 28  | a     | 1411 | U    |
| 28  | a     | 1416 | G    |
| 28  | a     | 1419 | A    |
| 28  | a     | 1421 | G    |
| 28  | a     | 1424 | G    |
| 28  | a     | 1427 | A    |
| 28  | a     | 1428 | C    |
| 28  | a     | 1444 | G    |
| 28  | a     | 1452 | G    |
| 28  | a     | 1453 | A    |
| 28  | a     | 1455 | G    |
| 28  | a     | 1478 | G    |
| 28  | a     | 1482 | G    |
| 28  | a     | 1486 | U    |
| 28  | a     | 1490 | A    |
| 28  | a     | 1491 | G    |
| 28  | a     | 1493 | C    |
| 28  | a     | 1497 | U    |
| 28  | a     | 1498 | C    |
| 28  | a     | 1508 | A    |
| 28  | a     | 1509 | A    |
| 28  | a     | 1510 | G    |
| 28  | a     | 1515 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 28  | a     | 1529 | G    |
| 28  | a     | 1534 | U    |
| 28  | a     | 1535 | A    |
| 28  | a     | 1536 | C    |
| 28  | a     | 1537 | G    |
| 28  | a     | 1542 | U    |
| 28  | a     | 1559 | U    |
| 28  | a     | 1566 | A    |
| 28  | a     | 1569 | A    |
| 28  | a     | 1578 | U    |
| 28  | a     | 1583 | A    |
| 28  | a     | 1585 | C    |
| 28  | a     | 1608 | A    |
| 28  | a     | 1609 | A    |
| 28  | a     | 1616 | A    |
| 28  | a     | 1647 | U    |
| 28  | a     | 1648 | U    |
| 28  | a     | 1649 | G    |
| 28  | a     | 1670 | C    |
| 28  | a     | 1674 | G    |
| 28  | a     | 1715 | G    |
| 28  | a     | 1722 | A    |
| 28  | a     | 1729 | U    |
| 28  | a     | 1730 | C    |
| 28  | a     | 1731 | G    |
| 28  | a     | 1732 | C    |
| 28  | a     | 1733 | G    |
| 28  | a     | 1738 | G    |
| 28  | a     | 1750 | G    |
| 28  | a     | 1758 | U    |
| 28  | a     | 1764 | C    |
| 28  | a     | 1773 | A    |
| 28  | a     | 1782 | U    |
| 28  | a     | 1785 | A    |
| 28  | a     | 1791 | A    |
| 28  | a     | 1799 | G    |
| 28  | a     | 1800 | C    |
| 28  | a     | 1801 | A    |
| 28  | a     | 1807 | G    |
| 28  | a     | 1808 | A    |
| 28  | a     | 1816 | C    |
| 28  | a     | 1827 | U    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 28  | a     | 1828 | G    |
| 28  | a     | 1829 | A    |
| 28  | a     | 1830 | C    |
| 28  | a     | 1838 | C    |
| 28  | a     | 1839 | G    |
| 28  | a     | 1842 | G    |
| 28  | a     | 1847 | A    |
| 28  | a     | 1848 | A    |
| 28  | a     | 1858 | A    |
| 28  | a     | 1862 | G    |
| 28  | a     | 1866 | A    |
| 28  | a     | 1867 | G    |
| 28  | a     | 1870 | C    |
| 28  | a     | 1871 | A    |
| 28  | a     | 1873 | G    |
| 28  | a     | 1876 | A    |
| 28  | a     | 1884 | G    |
| 28  | a     | 1896 | G    |
| 28  | a     | 1906 | G    |
| 28  | a     | 1929 | G    |
| 28  | a     | 1930 | G    |
| 28  | a     | 1931 | U    |
| 28  | a     | 1937 | A    |
| 28  | a     | 1938 | A    |
| 28  | a     | 1955 | U    |
| 28  | a     | 1965 | C    |
| 28  | a     | 1967 | C    |
| 28  | a     | 1970 | A    |
| 28  | a     | 1971 | U    |
| 28  | a     | 1972 | G    |
| 28  | a     | 1987 | A    |
| 28  | a     | 1991 | U    |
| 28  | a     | 1993 | U    |
| 28  | a     | 2020 | A    |
| 28  | a     | 2023 | C    |
| 28  | a     | 2027 | G    |
| 28  | a     | 2031 | A    |
| 28  | a     | 2033 | A    |
| 28  | a     | 2043 | C    |
| 28  | a     | 2055 | C    |
| 28  | a     | 2056 | G    |
| 28  | a     | 2060 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 28  | a     | 2061 | G    |
| 28  | a     | 2062 | A    |
| 28  | a     | 2069 | G7M  |
| 28  | a     | 2077 | A    |
| 28  | a     | 2093 | G    |
| 28  | a     | 2198 | A    |
| 28  | a     | 2203 | U    |
| 28  | a     | 2204 | G    |
| 28  | a     | 2211 | A    |
| 28  | a     | 2212 | A    |
| 28  | a     | 2225 | A    |
| 28  | a     | 2238 | G    |
| 28  | a     | 2239 | G    |
| 28  | a     | 2267 | A    |
| 28  | a     | 2268 | A    |
| 28  | a     | 2273 | A    |
| 28  | a     | 2279 | G    |
| 28  | a     | 2283 | C    |
| 28  | a     | 2287 | A    |
| 28  | a     | 2289 | G    |
| 28  | a     | 2305 | U    |
| 28  | a     | 2308 | G    |
| 28  | a     | 2312 | U    |
| 28  | a     | 2322 | A    |
| 28  | a     | 2325 | G    |
| 28  | a     | 2333 | A    |
| 28  | a     | 2335 | A    |
| 28  | a     | 2347 | C    |
| 28  | a     | 2350 | C    |
| 28  | a     | 2361 | G    |
| 28  | a     | 2366 | A    |
| 28  | a     | 2372 | U    |
| 28  | a     | 2383 | G    |
| 28  | a     | 2385 | C    |
| 28  | a     | 2396 | G    |
| 28  | a     | 2402 | U    |
| 28  | a     | 2403 | C    |
| 28  | a     | 2406 | A    |
| 28  | a     | 2425 | A    |
| 28  | a     | 2428 | G    |
| 28  | a     | 2429 | G    |
| 28  | a     | 2430 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 28  | a     | 2431 | U    |
| 28  | a     | 2435 | A    |
| 28  | a     | 2441 | U    |
| 28  | a     | 2445 | 2MG  |
| 28  | a     | 2448 | A    |
| 28  | a     | 2464 | G    |
| 28  | a     | 2470 | G    |
| 28  | a     | 2474 | U    |
| 28  | a     | 2476 | A    |
| 28  | a     | 2478 | A    |
| 28  | a     | 2484 | G    |
| 28  | a     | 2491 | U    |
| 28  | a     | 2494 | G    |
| 28  | a     | 2502 | G    |
| 28  | a     | 2504 | PSU  |
| 28  | a     | 2505 | G    |
| 28  | a     | 2518 | A    |
| 28  | a     | 2529 | G    |
| 28  | a     | 2530 | A    |
| 28  | a     | 2535 | G    |
| 28  | a     | 2547 | A    |
| 28  | a     | 2549 | G    |
| 28  | a     | 2556 | C    |
| 28  | a     | 2566 | A    |
| 28  | a     | 2567 | G    |
| 28  | a     | 2573 | C    |
| 28  | a     | 2574 | G    |
| 28  | a     | 2578 | G    |
| 28  | a     | 2581 | G    |
| 28  | a     | 2582 | G    |
| 28  | a     | 2585 | U    |
| 28  | a     | 2602 | A    |
| 28  | a     | 2609 | U    |
| 28  | a     | 2610 | C    |
| 28  | a     | 2611 | C    |
| 28  | a     | 2613 | U    |
| 28  | a     | 2629 | U    |
| 28  | a     | 2654 | A    |
| 28  | a     | 2663 | G    |
| 28  | a     | 2689 | U    |
| 28  | a     | 2690 | U    |
| 28  | a     | 2726 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 28  | a     | 2733 | A    |
| 28  | a     | 2744 | G    |
| 28  | a     | 2748 | A    |
| 28  | a     | 2752 | C    |
| 28  | a     | 2765 | A    |
| 28  | a     | 2777 | G    |
| 28  | a     | 2778 | A    |
| 28  | a     | 2792 | A    |
| 28  | a     | 2795 | C    |
| 28  | a     | 2798 | U    |
| 28  | a     | 2799 | A    |
| 28  | a     | 2820 | A    |
| 28  | a     | 2821 | A    |
| 28  | a     | 2823 | A    |
| 28  | a     | 2849 | U    |
| 28  | a     | 2861 | U    |
| 28  | a     | 2867 | G    |
| 28  | a     | 2868 | A    |
| 28  | a     | 2874 | C    |
| 28  | a     | 2884 | U    |
| 28  | a     | 2891 | U    |
| 28  | a     | 2893 | A    |
| 28  | a     | 2899 | A    |
| 28  | a     | 2901 | C    |
| 28  | a     | 2902 | C    |
| 29  | b     | 9    | G    |
| 29  | b     | 13   | G    |
| 29  | b     | 15   | A    |
| 29  | b     | 24   | G    |
| 29  | b     | 35   | C    |
| 29  | b     | 36   | C    |
| 29  | b     | 56   | G    |
| 29  | b     | 67   | G    |
| 29  | b     | 89   | U    |
| 29  | b     | 90   | C    |
| 29  | b     | 98   | G    |
| 29  | b     | 99   | A    |
| 29  | b     | 109  | A    |

All (54) RNA pucker outliers are listed below:

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
|-----|-------|-----|------|

| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 5   | A     | 5    | U    |
| 5   | A     | 7    | A    |
| 5   | A     | 47   | C    |
| 5   | A     | 48   | C    |
| 5   | A     | 65   | A    |
| 5   | A     | 70   | U    |
| 5   | A     | 84   | U    |
| 5   | A     | 101  | A    |
| 5   | A     | 119  | A    |
| 5   | A     | 183  | C    |
| 5   | A     | 199  | A    |
| 5   | A     | 244  | U    |
| 5   | A     | 304  | U    |
| 5   | A     | 305  | G    |
| 5   | A     | 434  | U    |
| 5   | A     | 438  | U    |
| 5   | A     | 446  | G    |
| 5   | A     | 535  | A    |
| 5   | A     | 559  | A    |
| 5   | A     | 560  | A    |
| 5   | A     | 562  | U    |
| 5   | A     | 571  | U    |
| 5   | A     | 649  | A    |
| 5   | A     | 653  | U    |
| 5   | A     | 703  | G    |
| 5   | A     | 718  | A    |
| 5   | A     | 723  | U    |
| 5   | A     | 827  | U    |
| 5   | A     | 847  | G    |
| 5   | A     | 870  | U    |
| 5   | A     | 872  | A    |
| 5   | A     | 884  | U    |
| 5   | A     | 983  | A    |
| 5   | A     | 993  | G    |
| 5   | A     | 1024 | G    |
| 5   | A     | 1035 | A    |
| 5   | A     | 1042 | A    |
| 5   | A     | 1045 | C    |
| 5   | A     | 1124 | G    |
| 5   | A     | 1225 | A    |
| 5   | A     | 1239 | A    |

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| Mol | Chain | Res  | Type |
|-----|-------|------|------|
| 5   | A     | 1275 | A    |
| 5   | A     | 1281 | C    |
| 5   | A     | 1300 | G    |
| 5   | A     | 1319 | A    |
| 5   | A     | 1320 | C    |
| 5   | A     | 1380 | U    |
| 5   | A     | 1395 | C    |
| 5   | A     | 1396 | A    |
| 5   | A     | 1440 | U    |
| 5   | A     | 1451 | U    |
| 5   | A     | 1452 | C    |
| 5   | A     | 1508 | A    |
| 5   | A     | 1528 | U    |

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

40 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Type | Chain | Res  | Link  | Bond lengths |      |          | Bond angles |      |          |
|-----|------|-------|------|-------|--------------|------|----------|-------------|------|----------|
|     |      |       |      |       | Counts       | RMSZ | # Z  > 2 | Counts      | RMSZ | # Z  > 2 |
| 28  | PSU  | a     | 2605 | 28    | 18,21,22     | 1.04 | 2 (11%)  | 22,30,33    | 0.75 | 0        |
| 28  | H2U  | a     | 2449 | 28    | 18,21,22     | 0.73 | 1 (5%)   | 21,30,33    | 1.37 | 3 (14%)  |
| 28  | OMU  | a     | 2552 | 28    | 19,22,23     | 0.41 | 0        | 26,31,34    | 0.64 | 0        |
| 28  | 5MU  | a     | 747  | 28    | 19,22,23     | 0.42 | 0        | 28,32,35    | 0.65 | 0        |
| 28  | 5MU  | a     | 1939 | 28    | 19,22,23     | 0.61 | 0        | 28,32,35    | 0.58 | 0        |
| 28  | 3TD  | a     | 1915 | 28    | 18,22,23     | 0.94 | 1 (5%)   | 22,32,35    | 0.65 | 0        |
| 39  | MS6  | l     | 82   | 39    | 5,7,8        | 0.31 | 0        | 2,7,9       | 0.61 | 0        |
| 5   | 2MG  | A     | 1207 | 5     | 23,26,27     | 0.40 | 0        | 32,38,41    | 0.41 | 0        |
| 28  | PSU  | a     | 2580 | 28    | 18,21,22     | 1.08 | 1 (5%)   | 22,30,33    | 1.23 | 1 (4%)   |
| 28  | PSU  | a     | 2604 | 28    | 18,21,22     | 0.91 | 1 (5%)   | 22,30,33    | 0.81 | 0        |
| 28  | 2MA  | a     | 2503 | 28,55 | 22,25,26     | 0.88 | 1 (4%)   | 33,37,40    | 1.19 | 4 (12%)  |
| 28  | OMC  | a     | 2498 | 28,55 | 19,22,23     | 0.57 | 0        | 26,31,34    | 0.67 | 1 (3%)   |
| 5   | MA6  | A     | 1519 | 5     | 23,26,27     | 0.31 | 0        | 34,38,41    | 0.71 | 1 (2%)   |

| Mol | Type | Chain | Res  | Link  | Bond lengths |      |          | Bond angles |      |          |
|-----|------|-------|------|-------|--------------|------|----------|-------------|------|----------|
|     |      |       |      |       | Counts       | RMSZ | # Z  > 2 | Counts      | RMSZ | # Z  > 2 |
| 28  | PSU  | a     | 1917 | 28    | 18,21,22     | 0.88 | 1 (5%)   | 22,30,33    | 0.64 | 0        |
| 5   | 5MC  | A     | 1407 | 5     | 18,22,23     | 0.36 | 0        | 26,32,35    | 0.56 | 0        |
| 28  | 2MG  | a     | 2445 | 28    | 23,26,27     | 0.51 | 0        | 32,38,41    | 0.69 | 0        |
| 28  | 5MC  | a     | 1962 | 28    | 18,22,23     | 0.50 | 0        | 26,32,35    | 0.52 | 0        |
| 28  | 2MG  | a     | 1835 | 28    | 23,26,27     | 0.36 | 0        | 32,38,41    | 0.53 | 1 (3%)   |
| 5   | 5MC  | A     | 967  | 5     | 18,22,23     | 0.34 | 0        | 26,32,35    | 0.49 | 0        |
| 5   | 4OC  | A     | 1402 | 5     | 20,23,24     | 0.42 | 0        | 26,32,35    | 0.47 | 0        |
| 28  | PSU  | a     | 2504 | 28    | 18,21,22     | 0.95 | 1 (5%)   | 22,30,33    | 1.01 | 1 (4%)   |
| 5   | PSU  | A     | 516  | 5     | 18,21,22     | 0.92 | 1 (5%)   | 22,30,33    | 1.13 | 1 (4%)   |
| 31  | MEQ  | d     | 150  | 31    | 8,9,10       | 0.53 | 0        | 5,10,12     | 0.65 | 0        |
| 39  | 4D4  | l     | 81   | 39    | 9,11,12      | 0.69 | 0        | 8,13,15     | 1.19 | 1 (12%)  |
| 16  | D2T  | L     | 89   | 16    | 7,9,10       | 0.89 | 0        | 6,11,13     | 1.79 | 3 (50%)  |
| 28  | PSU  | a     | 2457 | 28    | 18,21,22     | 0.94 | 1 (5%)   | 22,30,33    | 0.61 | 0        |
| 5   | 2MG  | A     | 1516 | 5     | 23,26,27     | 0.42 | 0        | 32,38,41    | 0.50 | 0        |
| 5   | UR3  | A     | 1498 | 5     | 19,22,23     | 0.34 | 0        | 26,32,35    | 0.66 | 0        |
| 5   | G7M  | A     | 527  | 5     | 23,26,27     | 0.74 | 1 (4%)   | 35,39,42    | 0.57 | 1 (2%)   |
| 28  | OMG  | a     | 2251 | 28,27 | 23,26,27     | 0.39 | 0        | 33,38,41    | 0.53 | 0        |
| 28  | 6MZ  | a     | 2030 | 28    | 22,25,26     | 0.55 | 0        | 30,36,39    | 0.67 | 0        |
| 28  | 6MZ  | a     | 1618 | 28    | 22,25,26     | 0.56 | 0        | 30,36,39    | 0.56 | 0        |
| 28  | G7M  | a     | 2069 | 28    | 23,26,27     | 0.62 | 0        | 35,39,42    | 0.87 | 1 (2%)   |
| 28  | 1MG  | a     | 745  | 28    | 22,26,27     | 0.82 | 1 (4%)   | 33,39,42    | 0.70 | 1 (3%)   |
| 28  | PSU  | a     | 1911 | 28    | 18,21,22     | 0.95 | 1 (5%)   | 22,30,33    | 0.59 | 0        |
| 15  | IAS  | K     | 119  | 15    | 6,7,8        | 0.98 | 0        | 6,8,10      | 1.04 | 0        |
| 28  | PSU  | a     | 746  | 28,55 | 18,21,22     | 0.97 | 2 (11%)  | 22,30,33    | 0.82 | 0        |
| 5   | 2MG  | A     | 966  | 5     | 23,26,27     | 0.40 | 0        | 32,38,41    | 0.37 | 0        |
| 28  | PSU  | a     | 955  | 28    | 18,21,22     | 0.92 | 2 (11%)  | 22,30,33    | 0.73 | 0        |
| 5   | MA6  | A     | 1518 | 5     | 23,26,27     | 0.28 | 0        | 34,38,41    | 0.74 | 1 (2%)   |

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

| Mol | Type | Chain | Res  | Link | Chirals | Torsions  | Rings   |
|-----|------|-------|------|------|---------|-----------|---------|
| 28  | PSU  | a     | 2605 | 28   | -       | 0/7/25/26 | 0/2/2/2 |
| 28  | H2U  | a     | 2449 | 28   | -       | 0/7/38/39 | 0/2/2/2 |
| 28  | OMU  | a     | 2552 | 28   | -       | 0/9/27/28 | 0/2/2/2 |
| 28  | 5MU  | a     | 747  | 28   | -       | 0/7/25/26 | 0/2/2/2 |
| 28  | 5MU  | a     | 1939 | 28   | -       | 0/7/25/26 | 0/2/2/2 |

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| Mol | Type | Chain | Res  | Link  | Chirals | Torsions   | Rings   |
|-----|------|-------|------|-------|---------|------------|---------|
| 28  | 3TD  | a     | 1915 | 28    | -       | 0/7/25/26  | 0/2/2/2 |
| 39  | MS6  | l     | 82   | 39    | -       | 2/4/6/8    | -       |
| 5   | 2MG  | A     | 1207 | 5     | -       | 0/9/27/28  | 0/3/3/3 |
| 28  | PSU  | a     | 2580 | 28    | -       | 0/7/25/26  | 0/2/2/2 |
| 28  | PSU  | a     | 2604 | 28    | -       | 0/7/25/26  | 0/2/2/2 |
| 28  | 2MA  | a     | 2503 | 28,55 | -       | 3/7/25/26  | 0/3/3/3 |
| 28  | OMC  | a     | 2498 | 28,55 | -       | 0/9/27/28  | 0/2/2/2 |
| 5   | MA6  | A     | 1519 | 5     | -       | 0/11/29/30 | 0/3/3/3 |
| 28  | PSU  | a     | 1917 | 28    | -       | 1/7/25/26  | 0/2/2/2 |
| 5   | 5MC  | A     | 1407 | 5     | -       | 2/7/25/26  | 0/2/2/2 |
| 28  | 2MG  | a     | 2445 | 28    | -       | 2/9/27/28  | 0/3/3/3 |
| 28  | 5MC  | a     | 1962 | 28    | -       | 0/7/25/26  | 0/2/2/2 |
| 28  | 2MG  | a     | 1835 | 28    | -       | 0/9/27/28  | 0/3/3/3 |
| 5   | 5MC  | A     | 967  | 5     | -       | 0/7/25/26  | 0/2/2/2 |
| 5   | 4OC  | A     | 1402 | 5     | -       | 0/9/29/30  | 0/2/2/2 |
| 28  | PSU  | a     | 2504 | 28    | -       | 2/7/25/26  | 0/2/2/2 |
| 5   | PSU  | A     | 516  | 5     | -       | 0/7/25/26  | 0/2/2/2 |
| 31  | MEQ  | d     | 150  | 31    | -       | 5/8/9/11   | -       |
| 39  | 4D4  | l     | 81   | 39    | -       | 3/11/12/14 | -       |
| 16  | D2T  | L     | 89   | 16    | -       | 1/7/12/14  | -       |
| 28  | PSU  | a     | 2457 | 28    | -       | 0/7/25/26  | 0/2/2/2 |
| 5   | 2MG  | A     | 1516 | 5     | -       | 0/9/27/28  | 0/3/3/3 |
| 5   | UR3  | A     | 1498 | 5     | -       | 2/7/25/26  | 0/2/2/2 |
| 5   | G7M  | A     | 527  | 5     | -       | 2/7/25/26  | 0/3/3/3 |
| 28  | OMG  | a     | 2251 | 28,27 | -       | 0/9/27/28  | 0/3/3/3 |
| 28  | 6MZ  | a     | 2030 | 28    | -       | 2/9/27/28  | 0/3/3/3 |
| 28  | 6MZ  | a     | 1618 | 28    | -       | 0/9/27/28  | 0/3/3/3 |
| 28  | G7M  | a     | 2069 | 28    | -       | 2/7/25/26  | 0/3/3/3 |
| 28  | 1MG  | a     | 745  | 28    | -       | 0/7/25/26  | 0/3/3/3 |
| 28  | PSU  | a     | 1911 | 28    | -       | 0/7/25/26  | 0/2/2/2 |
| 15  | IAS  | K     | 119  | 15    | -       | 2/7/7/8    | -       |
| 28  | PSU  | a     | 746  | 28,55 | -       | 1/7/25/26  | 0/2/2/2 |
| 5   | 2MG  | A     | 966  | 5     | -       | 0/9/27/28  | 0/3/3/3 |
| 28  | PSU  | a     | 955  | 28    | -       | 0/7/25/26  | 0/2/2/2 |
| 5   | MA6  | A     | 1518 | 5     | -       | 0/11/29/30 | 0/3/3/3 |

All (18) bond length outliers are listed below:

| Mol | Chain | Res  | Type | Atoms | Z    | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|-------|------|-------------|----------|
| 28  | a     | 1915 | 3TD  | C6-C5 | 3.62 | 1.39        | 1.35     |

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| Mol | Chain | Res  | Type | Atoms | Z     | Observed(Å) | Ideal(Å) |
|-----|-------|------|------|-------|-------|-------------|----------|
| 28  | a     | 1911 | PSU  | C6-C5 | 3.60  | 1.39        | 1.35     |
| 28  | a     | 1917 | PSU  | C6-C5 | 3.52  | 1.39        | 1.35     |
| 5   | A     | 516  | PSU  | C6-C5 | 3.50  | 1.39        | 1.35     |
| 28  | a     | 2504 | PSU  | C6-C5 | 3.26  | 1.39        | 1.35     |
| 28  | a     | 2605 | PSU  | C6-C5 | 3.19  | 1.39        | 1.35     |
| 28  | a     | 2580 | PSU  | C6-C5 | 3.17  | 1.39        | 1.35     |
| 28  | a     | 955  | PSU  | C6-C5 | 2.88  | 1.38        | 1.35     |
| 28  | a     | 746  | PSU  | C6-C5 | 2.80  | 1.38        | 1.35     |
| 28  | a     | 2457 | PSU  | C6-C5 | 2.75  | 1.38        | 1.35     |
| 5   | A     | 527  | G7M  | C8-N7 | 2.64  | 1.37        | 1.33     |
| 28  | a     | 2503 | 2MA  | C6-N6 | -2.58 | 1.27        | 1.34     |
| 28  | a     | 2604 | PSU  | C6-C5 | 2.52  | 1.38        | 1.35     |
| 28  | a     | 2605 | PSU  | C4-C5 | -2.42 | 1.37        | 1.44     |
| 28  | a     | 745  | 1MG  | C5-C6 | -2.24 | 1.39        | 1.45     |
| 28  | a     | 746  | PSU  | C4-C5 | -2.12 | 1.38        | 1.44     |
| 28  | a     | 2449 | H2U  | C2-N3 | -2.09 | 1.34        | 1.38     |
| 28  | a     | 955  | PSU  | C4-C5 | -2.02 | 1.38        | 1.44     |

All (21) bond angle outliers are listed below:

| Mol | Chain | Res  | Type | Atoms       | Z     | Observed(°) | Ideal(°) |
|-----|-------|------|------|-------------|-------|-------------|----------|
| 28  | a     | 2449 | H2U  | N3-C2-N1    | 4.03  | 120.91      | 116.65   |
| 5   | A     | 516  | PSU  | C3'-C2'-C1' | 3.79  | 106.05      | 101.64   |
| 28  | a     | 2580 | PSU  | C3'-C2'-C1' | 3.27  | 105.45      | 101.64   |
| 28  | a     | 2504 | PSU  | C2'-C3'-C4' | -3.16 | 96.50       | 102.64   |
| 28  | a     | 2503 | 2MA  | C5-C4-N3    | -2.94 | 123.88      | 127.19   |
| 5   | A     | 1519 | MA6  | C2-N1-C6    | 2.90  | 118.61      | 111.75   |
| 28  | a     | 2449 | H2U  | O2-C2-N1    | -2.86 | 119.51      | 123.11   |
| 5   | A     | 1518 | MA6  | C2-N1-C6    | 2.85  | 118.49      | 111.75   |
| 28  | a     | 2449 | H2U  | C4-N3-C2    | -2.77 | 123.50      | 125.79   |
| 16  | L     | 89   | D2T  | OD1-CG-CB   | -2.75 | 116.68      | 122.44   |
| 28  | a     | 2503 | 2MA  | N3-C2-N1    | -2.66 | 120.82      | 125.72   |
| 39  | l     | 81   | 4D4  | O-C-CA      | -2.63 | 117.88      | 124.78   |
| 28  | a     | 2069 | G7M  | N9-C8-N7    | -2.43 | 106.19      | 112.21   |
| 28  | a     | 2503 | 2MA  | C2-N1-C6    | 2.42  | 121.85      | 118.08   |
| 28  | a     | 2498 | OMC  | C2'-C1'-N1  | -2.31 | 109.75      | 114.22   |
| 16  | L     | 89   | D2T  | O-C-CA      | -2.23 | 118.94      | 124.78   |
| 16  | L     | 89   | D2T  | OD2-CG-CB   | 2.22  | 117.95      | 113.15   |
| 28  | a     | 2503 | 2MA  | CM2-C2-N1   | 2.19  | 120.57      | 117.15   |
| 28  | a     | 1835 | 2MG  | CM2-N2-C2   | -2.10 | 119.22      | 123.86   |
| 28  | a     | 745  | 1MG  | C2'-C3'-C4' | -2.05 | 98.66       | 102.64   |
| 5   | A     | 527  | G7M  | N9-C8-N7    | -2.02 | 107.21      | 112.21   |

There are no chirality outliers.

All (32) torsion outliers are listed below:

| Mol | Chain | Res  | Type | Atoms           |
|-----|-------|------|------|-----------------|
| 5   | A     | 527  | G7M  | C3'-C4'-C5'-O5' |
| 39  | l     | 81   | 4D4  | O-C-CA-CB       |
| 39  | l     | 81   | 4D4  | NH2-CZ-NE-CD    |
| 39  | l     | 81   | 4D4  | NH1-CZ-NE-CD    |
| 39  | l     | 82   | MS6  | C-CA-CB-CG      |
| 15  | K     | 119  | IAS  | N-CA-CB-CG      |
| 28  | a     | 2504 | PSU  | O4'-C4'-C5'-O5' |
| 5   | A     | 527  | G7M  | O4'-C4'-C5'-O5' |
| 5   | A     | 1407 | 5MC  | O4'-C4'-C5'-O5' |
| 28  | a     | 2504 | PSU  | C3'-C4'-C5'-O5' |
| 5   | A     | 1407 | 5MC  | C3'-C4'-C5'-O5' |
| 31  | d     | 150  | MEQ  | OE1-CD-NE2-CE   |
| 31  | d     | 150  | MEQ  | NE2-CD-CG-CB    |
| 31  | d     | 150  | MEQ  | OE1-CD-CG-CB    |
| 28  | a     | 2445 | 2MG  | C3'-C4'-C5'-O5' |
| 39  | l     | 82   | MS6  | CB-CG-SD-CE     |
| 31  | d     | 150  | MEQ  | CG-CD-NE2-CE    |
| 28  | a     | 2445 | 2MG  | O4'-C4'-C5'-O5' |
| 5   | A     | 1498 | UR3  | O4'-C4'-C5'-O5' |
| 28  | a     | 2030 | 6MZ  | O4'-C4'-C5'-O5' |
| 31  | d     | 150  | MEQ  | CA-CB-CG-CD     |
| 28  | a     | 2069 | G7M  | C4'-C5'-O5'-P   |
| 5   | A     | 1498 | UR3  | C3'-C4'-C5'-O5' |
| 28  | a     | 2069 | G7M  | O4'-C4'-C5'-O5' |
| 28  | a     | 2503 | 2MA  | O4'-C1'-N9-C8   |
| 28  | a     | 1917 | PSU  | O4'-C4'-C5'-O5' |
| 16  | L     | 89   | D2T  | CG-CB-SB-CB1    |
| 28  | a     | 746  | PSU  | O4'-C1'-C5-C6   |
| 28  | a     | 2030 | 6MZ  | C3'-C4'-C5'-O5' |
| 28  | a     | 2503 | 2MA  | O4'-C4'-C5'-O5' |
| 15  | K     | 119  | IAS  | C-CA-CB-CG      |
| 28  | a     | 2503 | 2MA  | C2'-C1'-N9-C8   |

There are no ring outliers.

6 monomers are involved in 8 short contacts:

| Mol | Chain | Res  | Type | Clashes | Symm-Clashes |
|-----|-------|------|------|---------|--------------|
| 28  | a     | 2498 | OMC  | 1       | 0            |
| 5   | A     | 1519 | MA6  | 3       | 0            |
| 16  | L     | 89   | D2T  | 1       | 0            |

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| Mol | Chain | Res  | Type | Clashes | Symm-Clashes |
|-----|-------|------|------|---------|--------------|
| 5   | A     | 1516 | 2MG  | 2       | 0            |
| 28  | a     | 2030 | 6MZ  | 2       | 0            |
| 5   | A     | 1518 | MA6  | 2       | 0            |

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 214 ligands modelled in this entry, 213 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Type | Chain | Res | Link | Bond lengths |      |             | Bond angles |      |             |
|-----|------|-------|-----|------|--------------|------|-------------|-------------|------|-------------|
|     |      |       |     |      | Counts       | RMSZ | $\# Z  > 2$ | Counts      | RMSZ | $\# Z  > 2$ |
| 57  | ASP  | Z     | 101 | -    | 6,7,8        | 1.08 | 0           | 5,8,10      | 1.03 | 0           |

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|-----|------|-------|-----|------|---------|----------|-------|
| 57  | ASP  | Z     | 101 | -    | -       | 0/5/6/8  | -     |

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|-----|-------|-----|------|---------|--------------|
| 57  | Z     | 101 | ASP  | 1       | 0            |

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

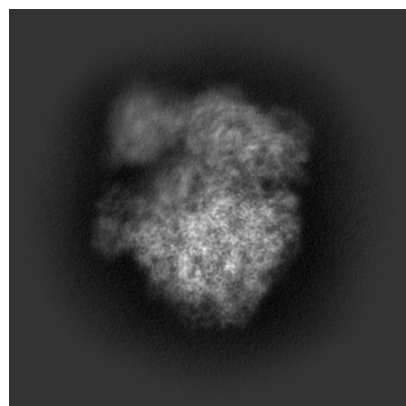
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-57975. These allow visual inspection of the internal detail of the map and identification of artifacts.

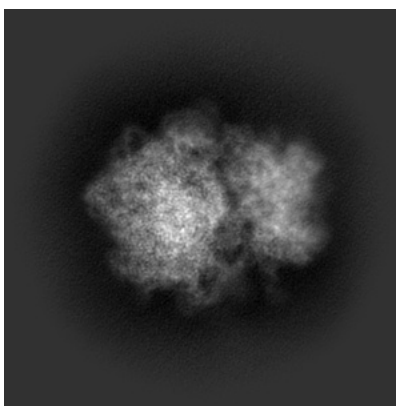
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

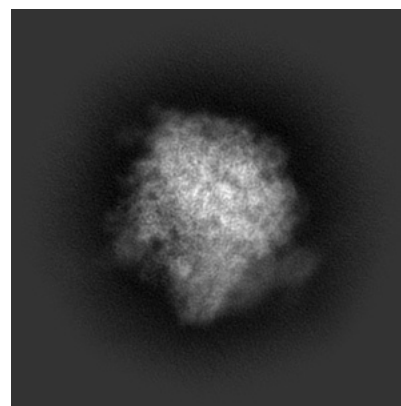
#### 6.1.1 Primary map



X

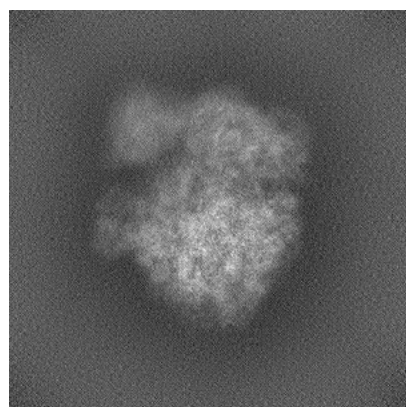


Y

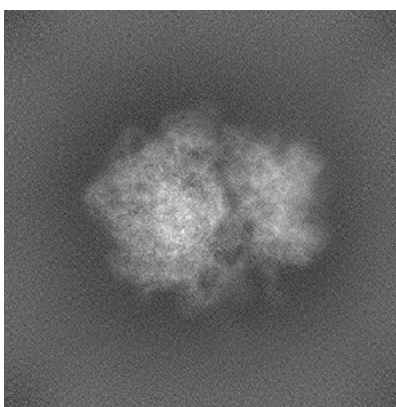


Z

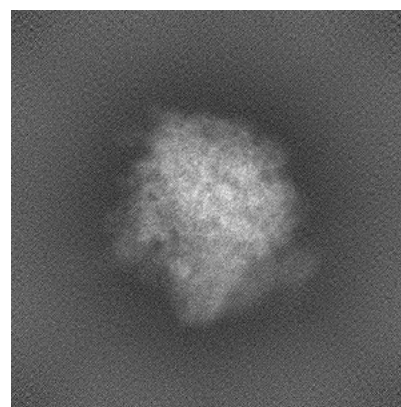
#### 6.1.2 Raw map



X



Y

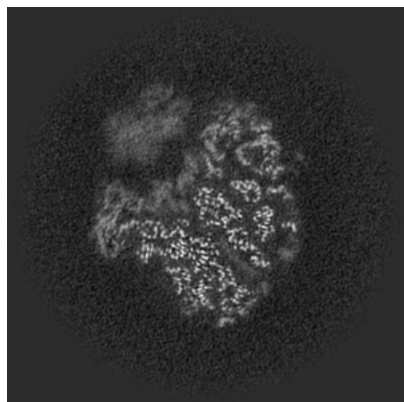


Z

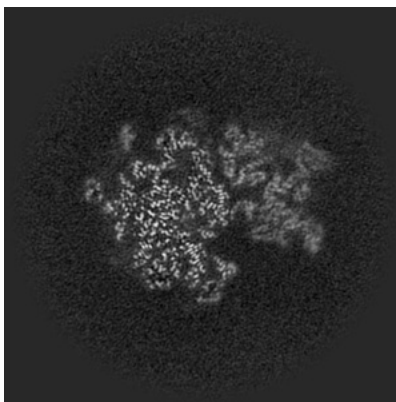
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

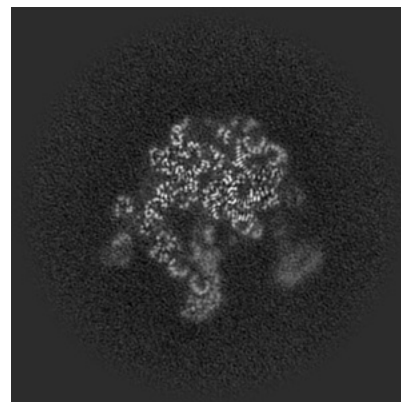
### 6.2.1 Primary map



X Index: 256

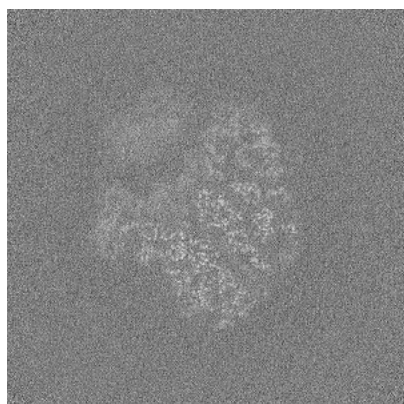


Y Index: 256

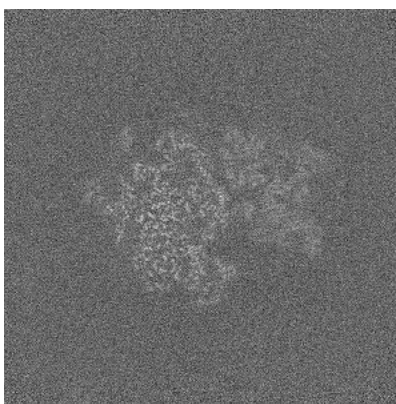


Z Index: 256

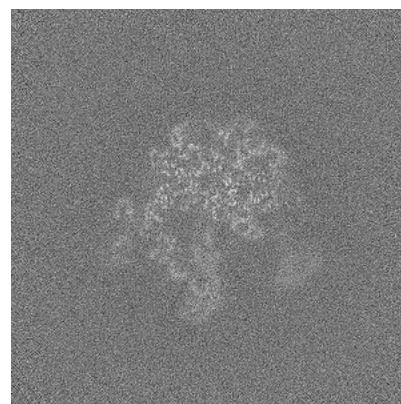
### 6.2.2 Raw map



X Index: 256



Y Index: 256

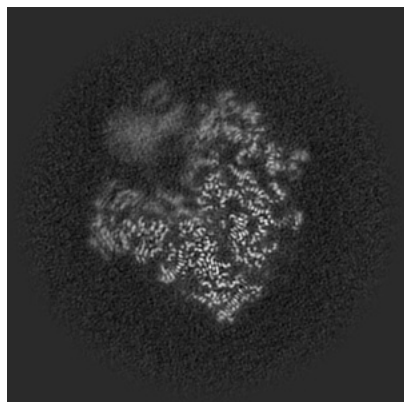


Z Index: 256

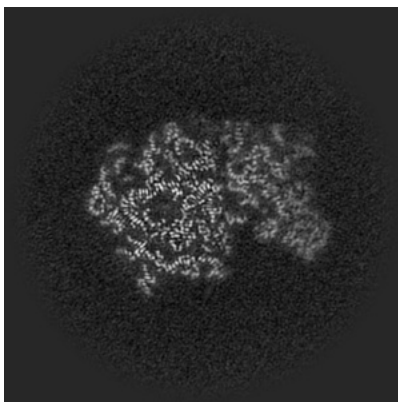
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

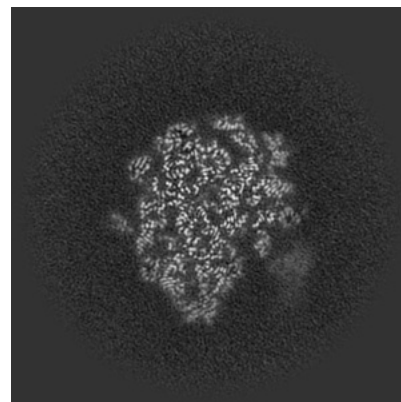
### 6.3.1 Primary map



X Index: 247

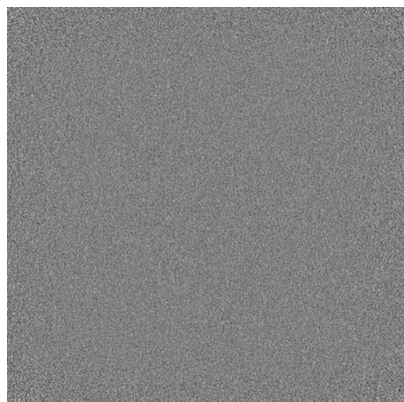


Y Index: 278

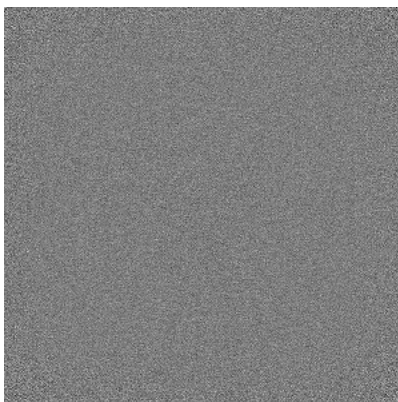


Z Index: 221

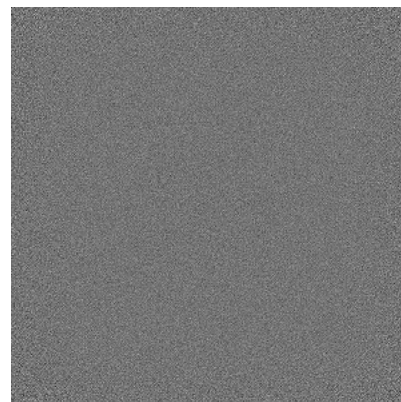
### 6.3.2 Raw map



X Index: 0



Y Index: 0

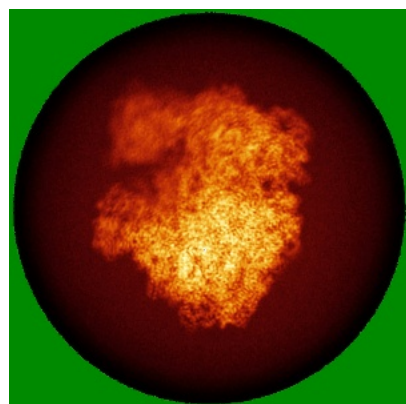


Z Index: 0

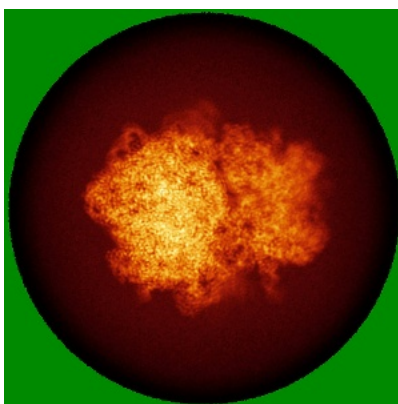
The images above show the largest variance slices of the map in three orthogonal directions.

## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

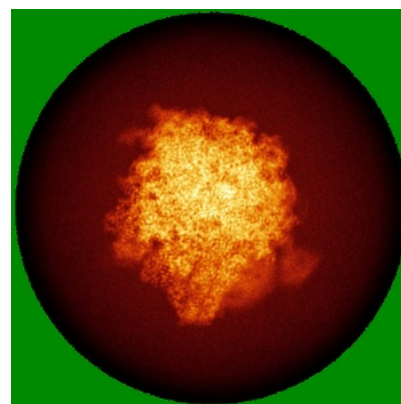
### 6.4.1 Primary map



X

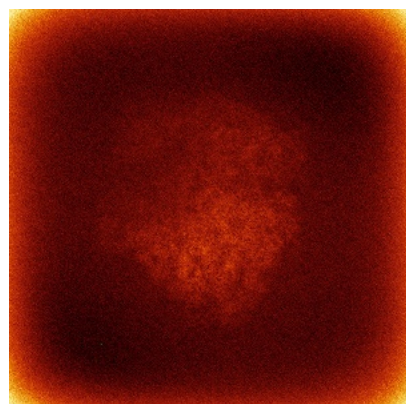


Y

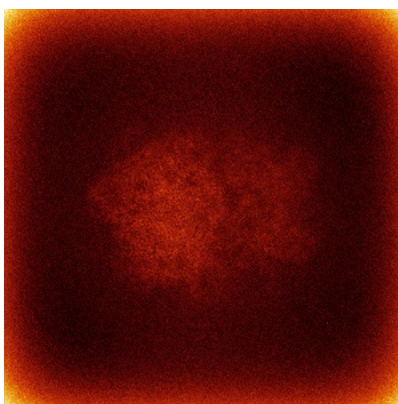


Z

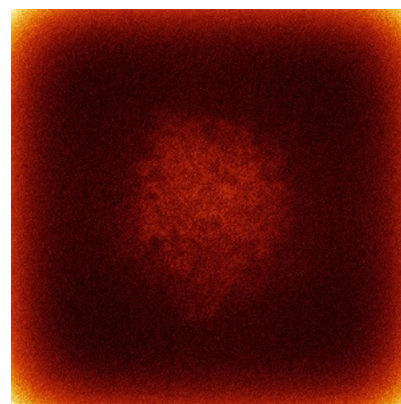
### 6.4.2 Raw map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



X



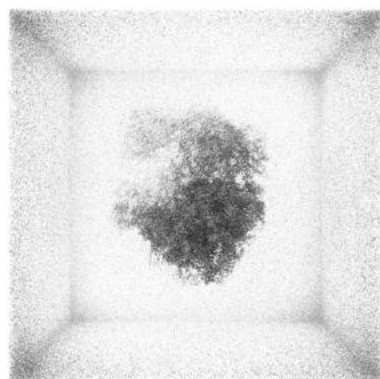
Y



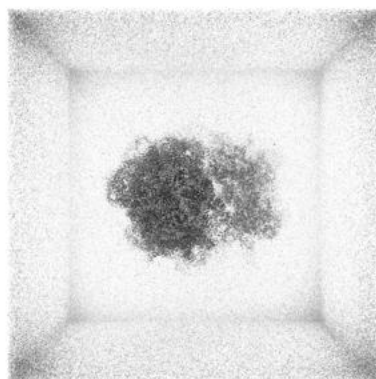
Z

The images above show the 3D surface view of the map at the recommended contour level 0.06. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

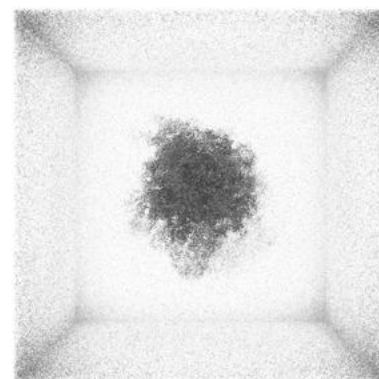
### 6.5.2 Raw map



X



Y



Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

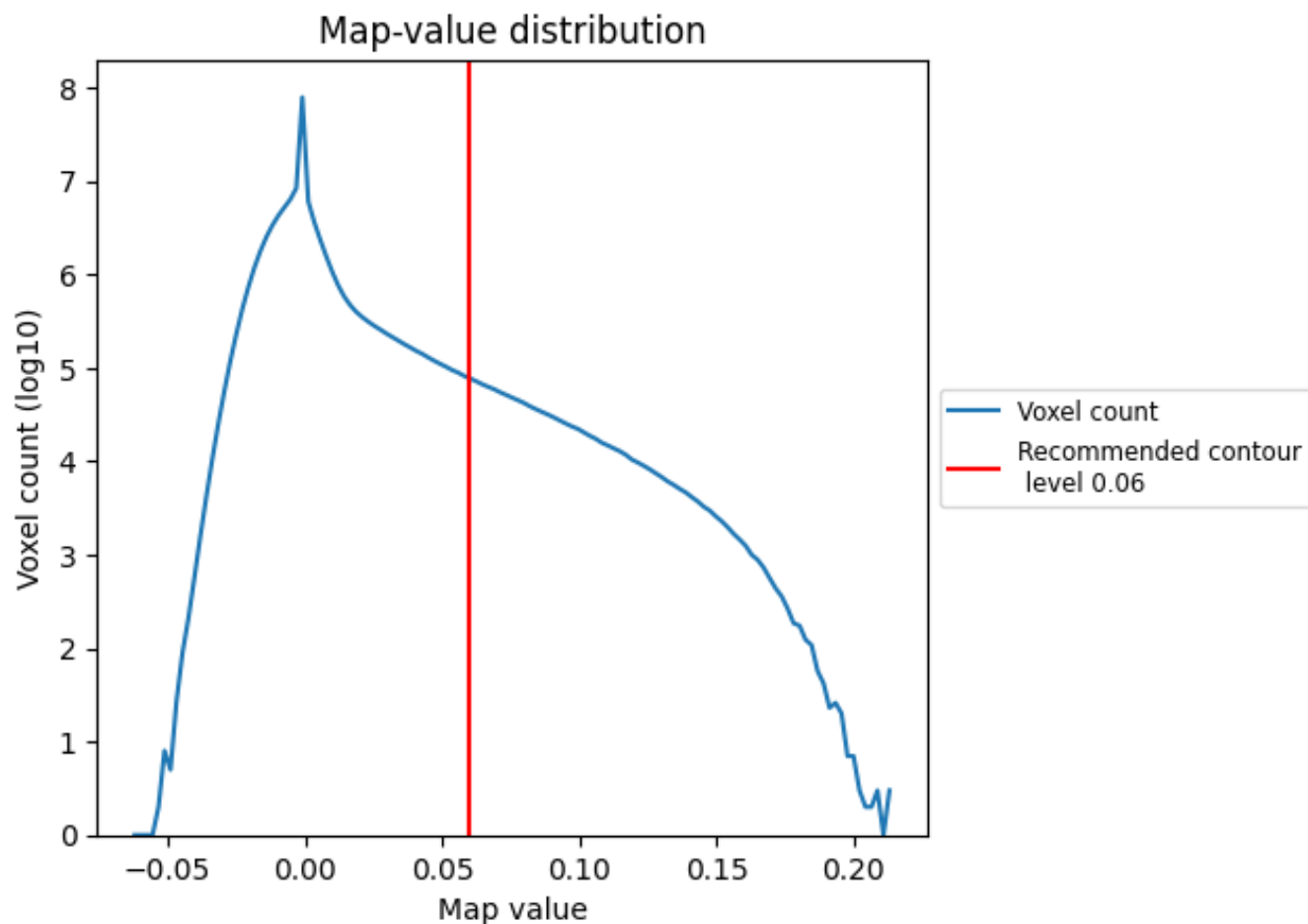
## 6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

## 7 Map analysis [i](#)

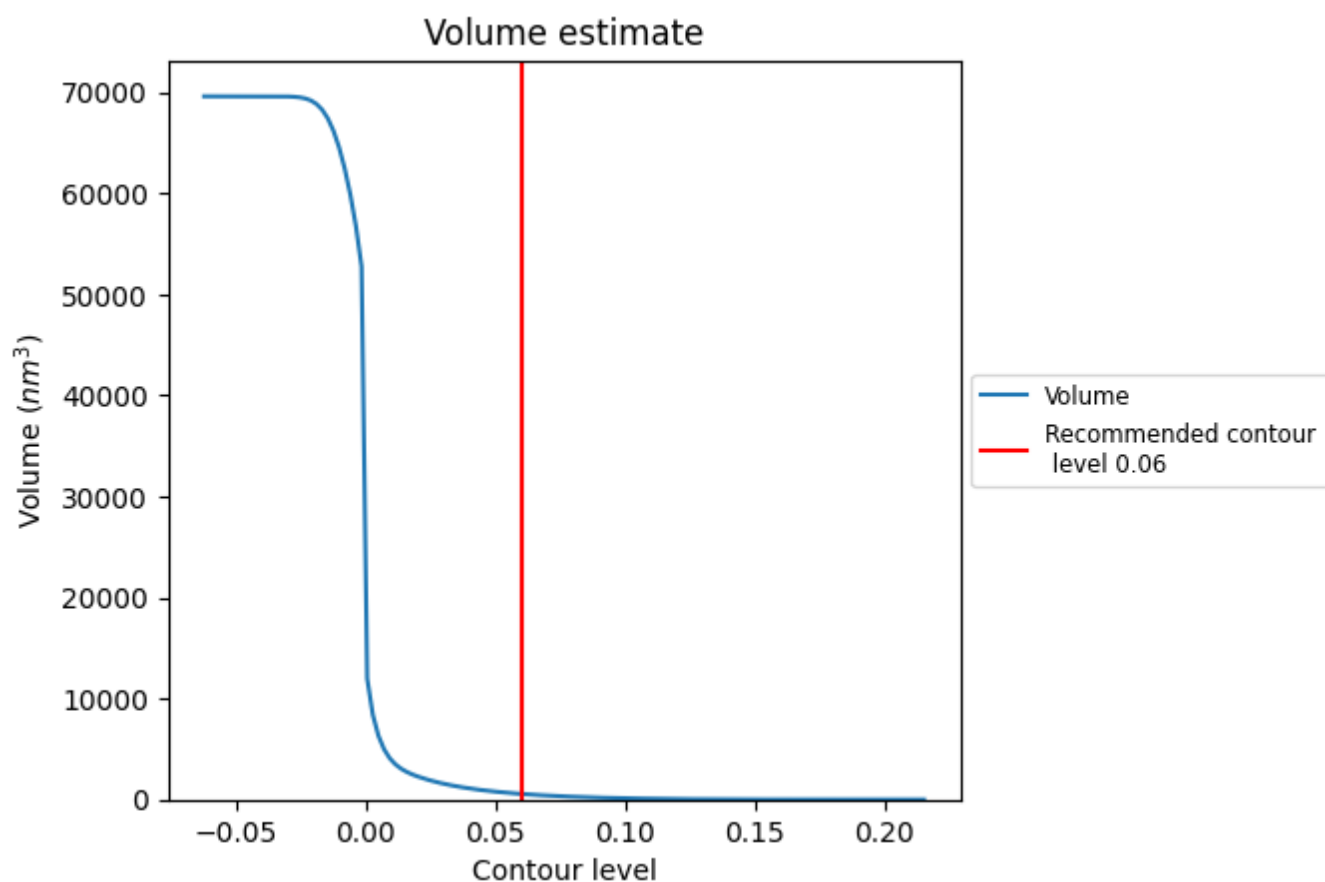
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

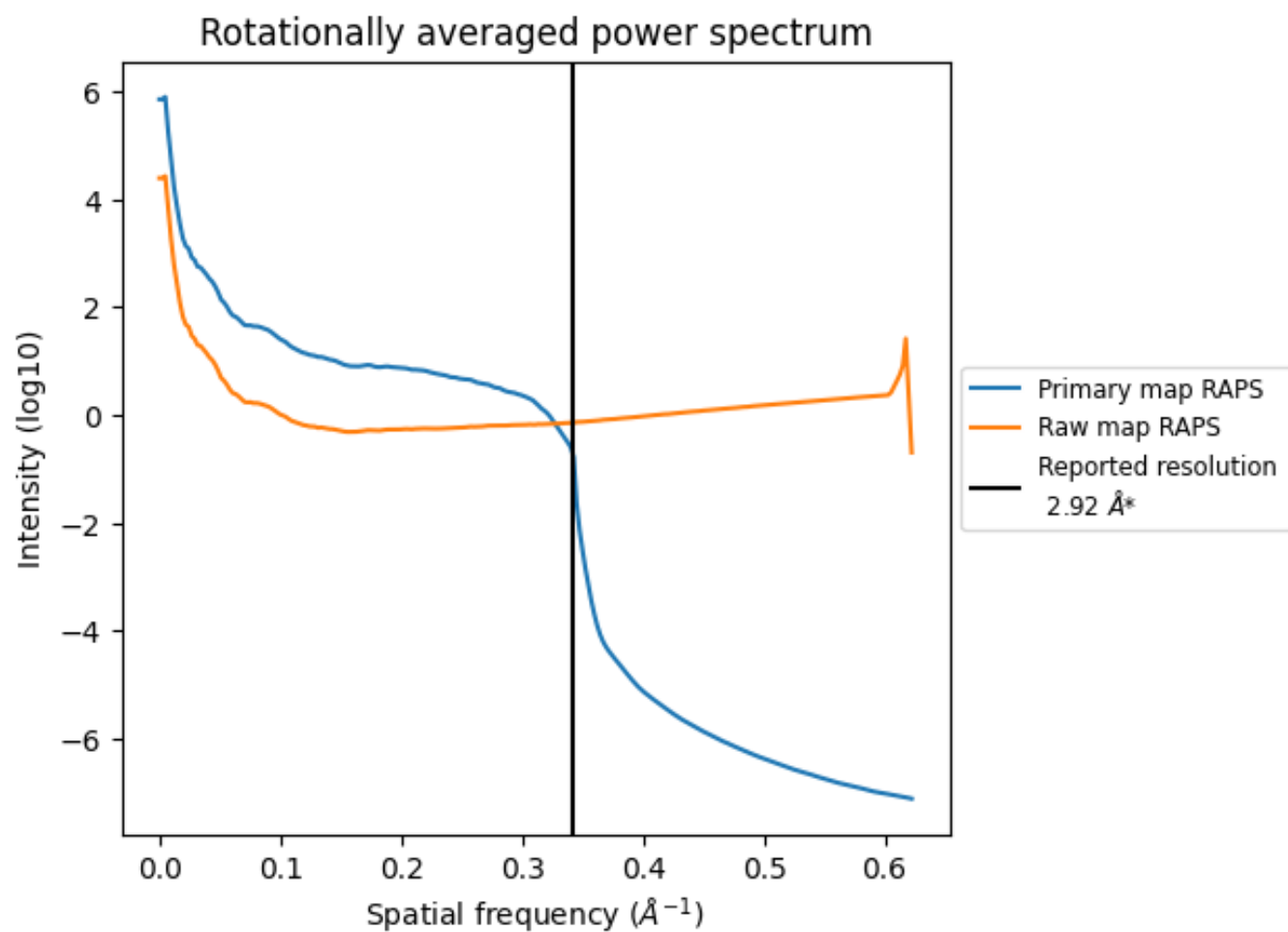
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 561 nm<sup>3</sup>; this corresponds to an approximate mass of 507 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

### 7.3 Rotationally averaged power spectrum ⓘ

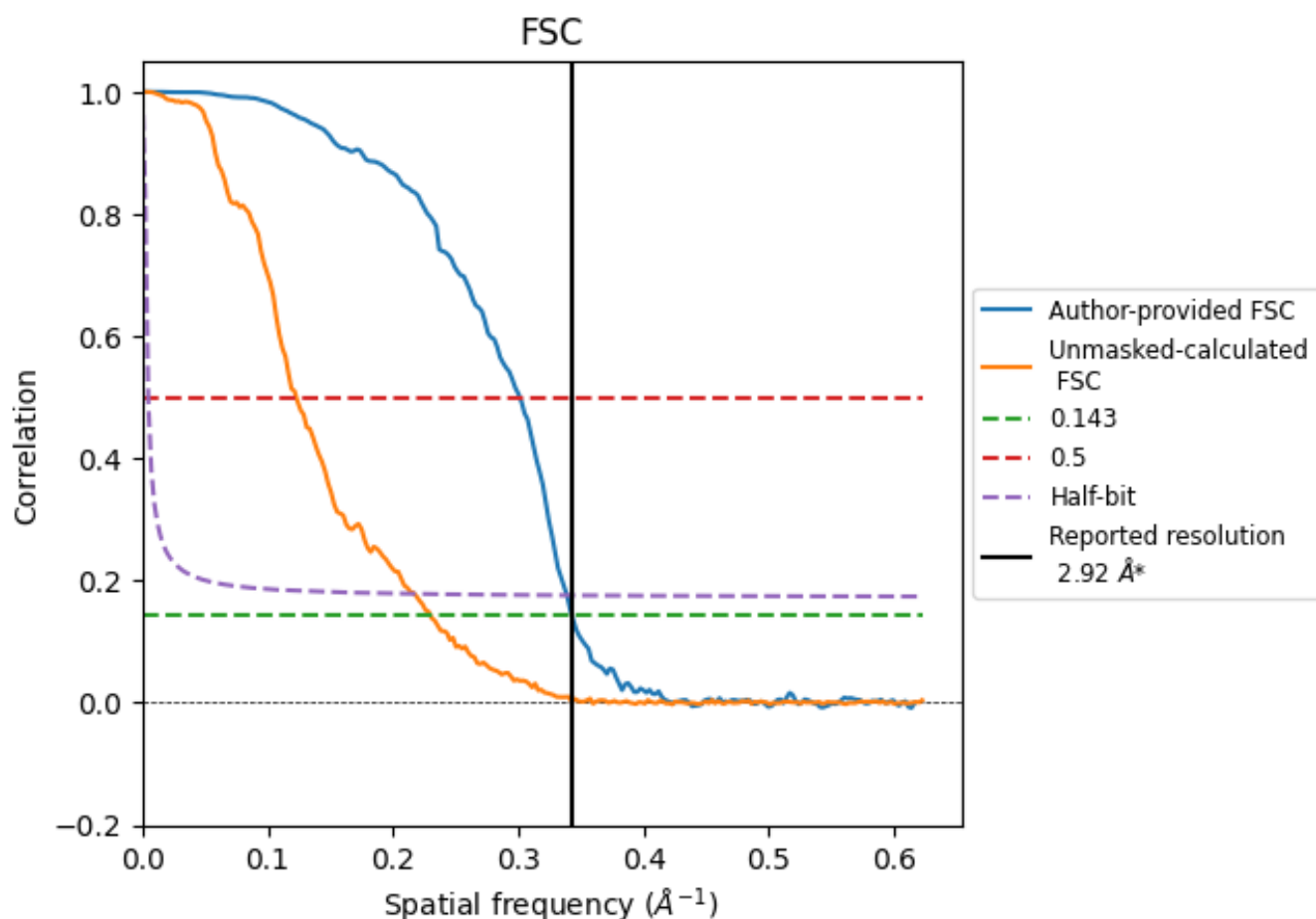


\*Reported resolution corresponds to spatial frequency of 0.342  $\text{\AA}^{-1}$

## 8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.342  $\text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

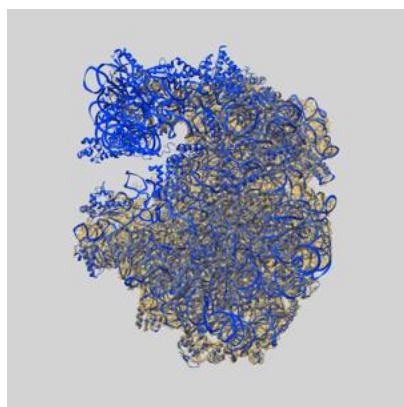
| Resolution estimate (Å)   | Estimation criterion (FSC cut-off) |      |          |
|---------------------------|------------------------------------|------|----------|
|                           | 0.143                              | 0.5  | Half-bit |
| Reported by author        | 2.92                               | -    | -        |
| Author-provided FSC curve | 2.92                               | 3.32 | 2.95     |
| Unmasked-calculated*      | 4.35                               | 8.14 | 4.61     |

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.35 differs from the reported value 2.92 by more than 10 %

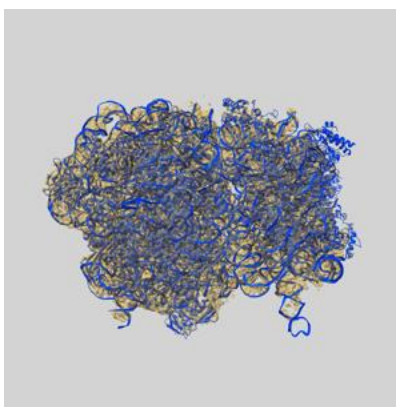
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-57975 and PDB model 30RB. Per-residue inclusion information can be found in section 3 on page 15.

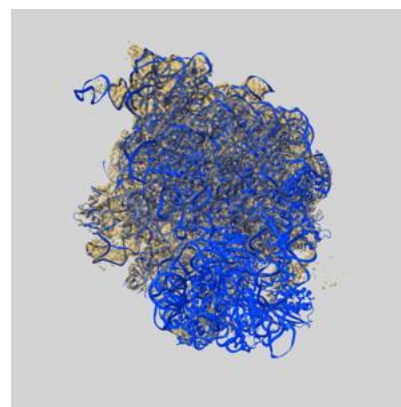
### 9.1 Map-model overlay [i](#)



X



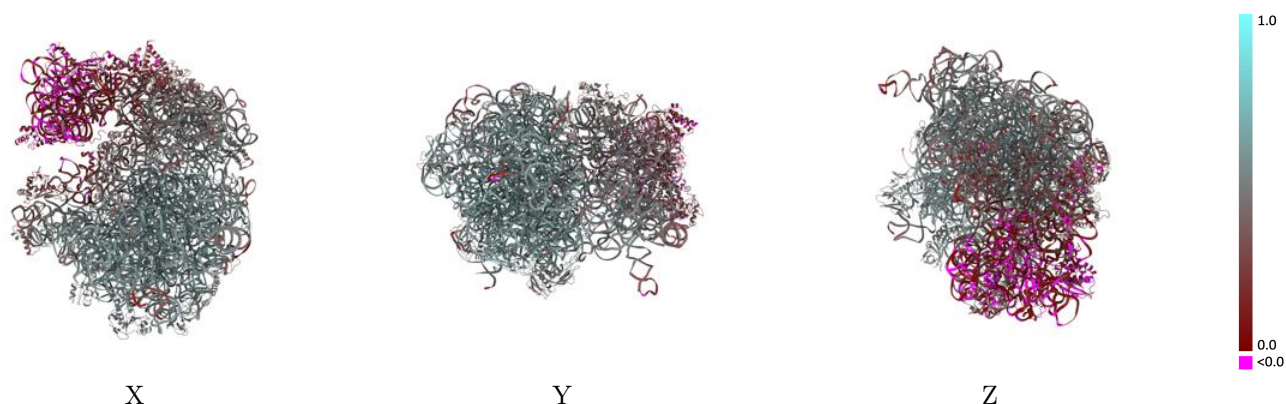
Y



Z

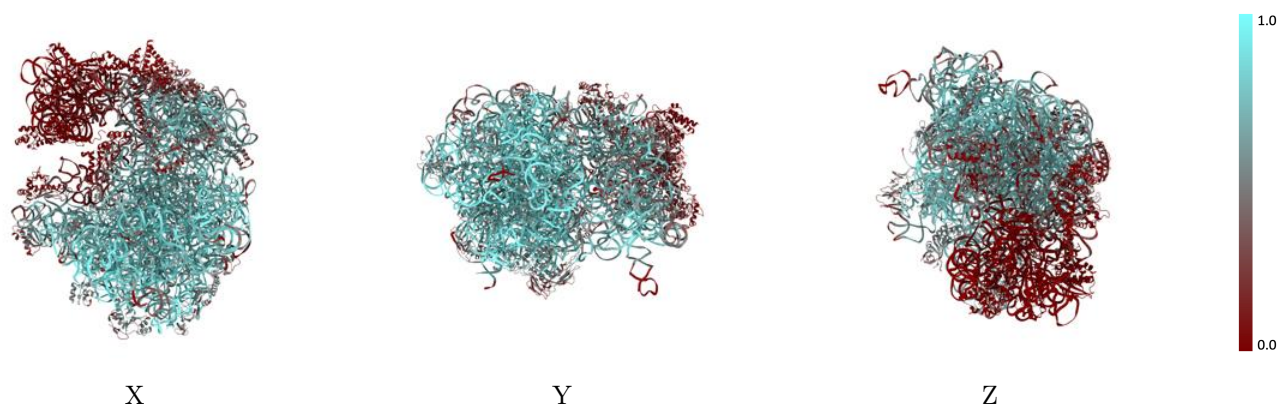
The images above show the 3D surface view of the map at the recommended contour level 0.06 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model [i](#)



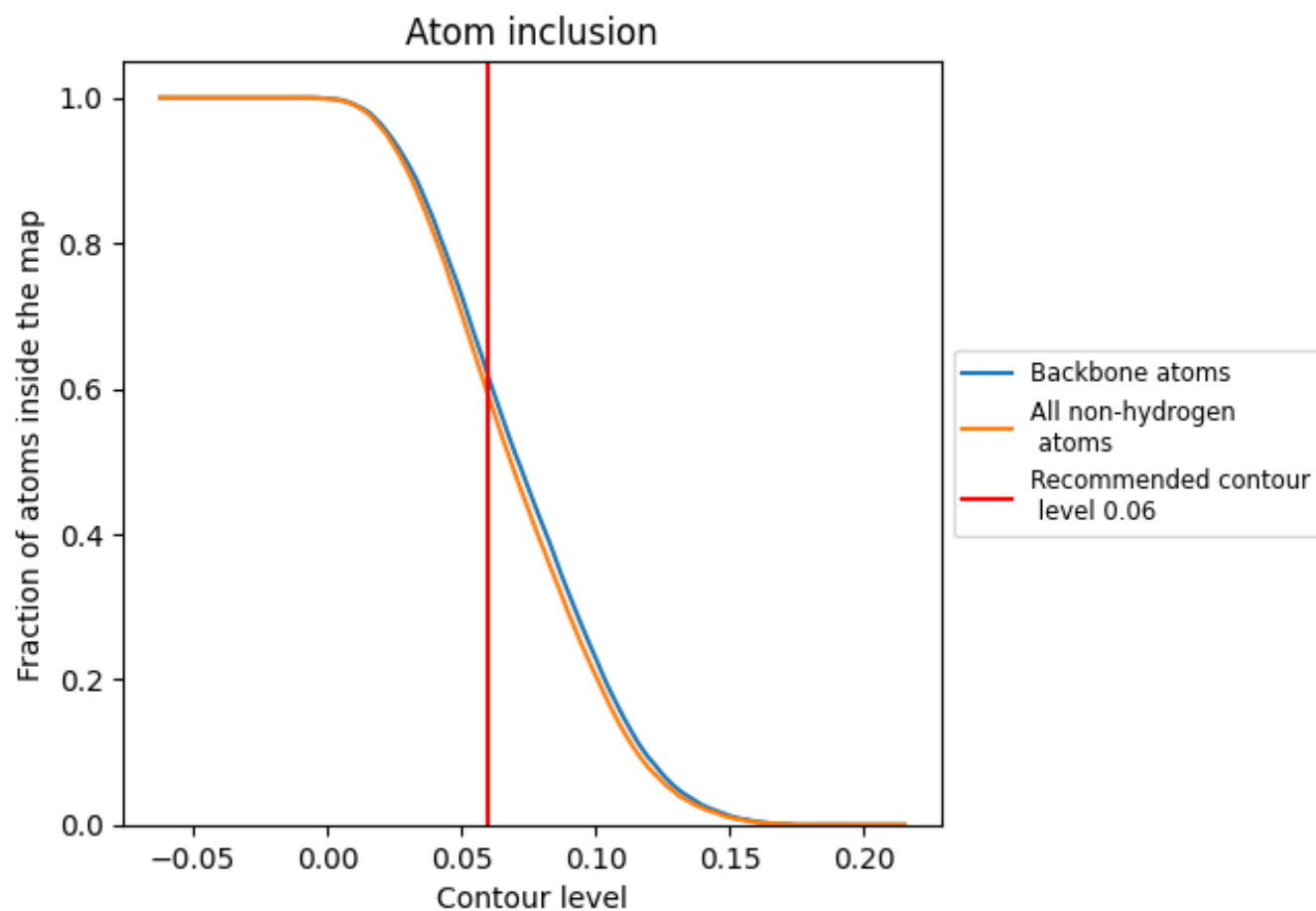
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

## 9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.06).

## 9.4 Atom inclusion [i](#)



At the recommended contour level, 62% of all backbone atoms, 59% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.06) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion                                                                             | Q-score                                                                                    |
|-------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| All   |  0.5910   |  0.4480   |
| 0     |  0.4990   |  0.5080   |
| 1     |  0.7580   |  0.5740   |
| 2     |  0.7150   |  0.5640   |
| 3     |  0.6110   |  0.5440   |
| A     |  0.4970   |  0.3470   |
| B     |  0.0380   |  0.1890   |
| C     |  0.0000   |  0.1000   |
| D     |  0.1350   |  0.2970   |
| E     |  0.2170   |  0.3230   |
| F     |  0.2250   |  0.3950   |
| G     |  0.0010   |  0.1120   |
| H     |  0.3030   |  0.3680   |
| I     |  0.0060   |  0.0380   |
| J     |  0.0130  |  0.0730  |
| K     |  0.2010 |  0.3870 |
| L     |  0.2240 |  0.3880 |
| M     |  0.0000 |  0.0080 |
| N     |  0.0000 |  0.0470 |
| O     |  0.4360 |  0.4440 |
| P     |  0.4500 |  0.4660 |
| Q     |  0.4310 |  0.4630 |
| R     |  0.2460 |  0.3860 |
| S     |  0.0000 |  0.0380 |
| T     |  0.4810 |  0.4800 |
| U     |  0.1270 |  0.3520 |
| V     |  0.1420 |  0.3340 |
| Z     |  0.1710 |  0.2370 |
| a     |  0.8510 |  0.5460 |
| b     |  0.6620 |  0.4640 |
| c     |  0.6670 |  0.5580 |
| d     |  0.6540 |  0.5530 |
| e     |  0.6070 |  0.5260 |
| f     |  0.1050 |  0.2860 |
| g     |  0.3730 |  0.4600 |



*Continued on next page...*

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| Chain | Atom inclusion                                                                             | Q-score                                                                                    |
|-------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| h     |  0.2570   |  0.4280   |
| i     |  0.6800   |  0.5540   |
| j     |  0.5790   |  0.5430   |
| k     |  0.6420   |  0.5390   |
| l     |  0.5860   |  0.5290   |
| m     |  0.7080   |  0.5570   |
| n     |  0.3940   |  0.4140   |
| o     |  0.5920   |  0.5420   |
| p     |  0.7240   |  0.5610   |
| q     |  0.6220   |  0.5280   |
| r     |  0.6530   |  0.5440   |
| s     |  0.5570   |  0.5060   |
| t     |  0.4800   |  0.4770   |
| u     |  0.4850   |  0.4990   |
| v     |  0.6430   |  0.5500   |
| w     |  0.6420   |  0.5430   |
| x     |  0.4850   |  0.4570   |
| y     |  0.6220  |  0.5320  |
| z     |  0.6690 |  0.5560 |