# WORLDWIDE wwPDB PROTEIN DATA BANK

# Full wwPDB EM Validation Report (i)

Dec 14, 2024 – 02:12 PM EST

|  |  |  |
|---|---|---|
| PDB ID | : | 8W0F |
| EMDB ID | : | EMD-43708 |
| Title | : | Cryo-EM structure of a human MCM2-7 double hexamer on dsDNA |
| Authors | : | Hunker, O.; Yang, R.; Bleichert, F. |
| Deposited on | : | 2024-02-13 |
| Resolution | : | 2.80 Å(reported) |

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

We welcome your comments at *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 (i) 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 (i)) were used in the production of this report:

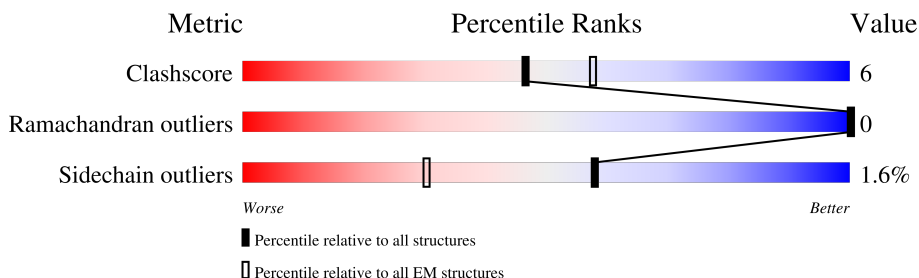|  |  |  |
|---|---|---|
| EMDB validation analysis | : | 0.0.1.dev113 |
| Mogul | : | 2022.3.0, CSD as543be (2022) |
| MolProbity | : | 4.02b-467 |
| buster-report | : | 1.1.7 (2018) |
| Percentile statistics | : | 20231227.v01 (using entries in the PDB archive December 27th 2023) |
| MapQ | : | 1.9.13 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.40 |

# 1   Overall quality at a glance   ⓘ

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

The reported resolution of this entry is 2.80 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.
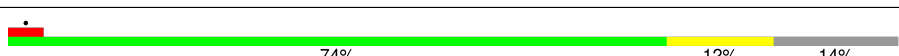
| Metric | Percentile Ranks | Value |
|--------|------------------|-------|
| Clashscore | | 6 |
| Ramachandran outliers | | 0 |
| Sidechain outliers | | 1.6% |

*Worse*                         *Better*

▮ Percentile relative to all structures

▯ Percentile relative to all EM structures
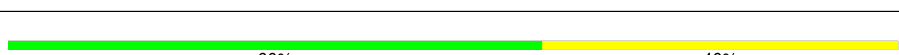
| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|--------|:---:|:---:|
| Clashscore | 210492 | 15764 |
| Ramachandran outliers | 207382 | 16835 |
| Sidechain outliers | 206894 | 16415 |

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 >=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 <=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 | 2 | 904 | 5% — 62% / 9% / 28% |
| 1 | A | 904 | 7% — 62% / 12% / 26% |
| 2 | 3 | 810 | • — 66% / 13% / 21% |
| 2 | B | 810 | 8% — 72% / 8% / 20% |
| 3 | 4 | 866 | • — 62% / 12% / 25% |
| 3 | C | 866 | • — 64% / 10% / 25% |
| 4 | 5 | 734 | • — 70% / 14% / • / 15% |
| 4 | D | 734 | • — 74% / 11% / 15% |

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| Mol | Chain | Length | Quality of chain |
|-----|-------|--------|------------------|
| 5 | 6 | 821 | 66%     12%     22% |
| 5 | E | 821 | 9%     72%     13%     15% |
| 6 | 7 | 719 | 72%     13%     15% |
| 6 | F | 719 | 74%     12%     14% |
| 7 | O | 47 | 60%     40% |
| 8 | S | 47 | 83%     17% |

# 2 Entry composition ⓘ

There are 12 unique types of molecules in this entry. The entry contains 126041 atoms, of which 62720 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 DNA replication licensing factor MCM2.

| Mol | Chain | Residues | Atoms | | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---|---------|-------|
| 1 | 2 | 649 | Total | C | H | N | O | S | | 0 | 0 |
| | | | 10277 | 3228 | 5143 | 917 | 959 | 30 | | | |
| 1 | A | 669 | Total | C | H | N | O | S | | 0 | 0 |
| | | | 10605 | 3336 | 5302 | 948 | 989 | 30 | | | |

- Molecule 2 is a protein called DNA replication licensing factor MCM3.

| Mol | Chain | Residues | Atoms | | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---|---------|-------|
| 2 | 3 | 638 | Total | C | H | N | O | S | | 0 | 0 |
| | | | 10019 | 3126 | 5018 | 879 | 970 | 26 | | | |
| 2 | B | 651 | Total | C | H | N | O | S | | 0 | 0 |
| | | | 10230 | 3189 | 5130 | 896 | 989 | 26 | | | |

There are 6 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|----------------|-------------|
| 3 | -1 | SER | - | expression tag | UNP P25205 |
| 3 | 0 | ASN | - | expression tag | UNP P25205 |
| 3 | 1 | ALA | - | expression tag | UNP P25205 |
| B | -1 | SER | - | expression tag | UNP P25205 |
| B | 0 | ASN | - | expression tag | UNP P25205 |
| B | 1 | ALA | - | expression tag | UNP P25205 |

- Molecule 3 is a protein called DNA replication licensing factor MCM4.

| Mol | Chain | Residues | Atoms | | | | | | | AltConf | Trace |
|-----|-------|----------|-------|---|---|---|---|---|---|---------|-------|
| 3 | 4 | 648 | Total | C | H | N | O | S | | 0 | 0 |
| | | | 10367 | 3246 | 5206 | 921 | 967 | 27 | | | |
| 3 | C | 646 | Total | C | H | N | O | S | | 0 | 0 |
| | | | 10337 | 3237 | 5190 | 919 | 964 | 27 | | | |

There are 8 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| 4 | -2 | SER | - | expression tag | UNP P33991 |
| 4 | -1 | ASN | - | expression tag | UNP P33991 |
| 4 | 0 | ALA | - | expression tag | UNP P33991 |
| 4 | 650 | MET | LEU | variant | UNP P33991 |
| C | -2 | SER | - | expression tag | UNP P33991 |
| C | -1 | ASN | - | expression tag | UNP P33991 |
| C | 0 | ALA | - | expression tag | UNP P33991 |
| C | 650 | MET | LEU | variant | UNP P33991 |

- Molecule 4 is a protein called DNA replication licensing factor MCM5.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | S | | |
| 4 | 5 | 627 | 9855 | 3073 | 4950 | 873 | 924 | 35 | 0 | 0 |
| 4 | D | 625 | Total | C | H | N | O | S | 0 | 0 |
| | | | 9814 | 3061 | 4932 | 868 | 918 | 35 | | |

- Molecule 5 is a protein called DNA replication licensing factor MCM6.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | S | | |
| 5 | 6 | 637 | 10175 | 3187 | 5099 | 903 | 960 | 26 | 0 | 0 |
| 5 | E | 696 | Total | C | H | N | O | S | 0 | 0 |
| | | | 11209 | 3510 | 5631 | 986 | 1055 | 27 | | |

- Molecule 6 is a protein called DNA replication licensing factor MCM7.

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | S | | |
| 6 | 7 | 614 | 9804 | 3057 | 4928 | 865 | 922 | 32 | 0 | 0 |
| 6 | F | 621 | Total | C | H | N | O | S | 0 | 0 |
| | | | 9921 | 3091 | 4988 | 878 | 932 | 32 | | |

- Molecule 7 is a DNA chain called DNA (47-MER).

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | P | | |
| 7 | O | 47 | 1505 | 470 | 542 | 163 | 283 | 47 | 0 | 0 |

- Molecule 8 is a DNA chain called DNA (47-MER).

| Mol | Chain | Residues | Atoms | | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | P | | |
| 8 | S | 47 | 1505 | 470 | 541 | 166 | 281 | 47 | 0 | 0 |

- Molecule 9 is ZINC ION (three-letter code: ZN) (formula: Zn).

| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 9 | 2 | 1 | Total 1 | Zn 1 | 0 |
| 9 | 4 | 1 | Total 1 | Zn 1 | 0 |
| 9 | 5 | 1 | Total 1 | Zn 1 | 0 |
| 9 | 6 | 1 | Total 1 | Zn 1 | 0 |
| 9 | 7 | 1 | Total 1 | Zn 1 | 0 |
| 9 | A | 1 | Total 1 | Zn 1 | 0 |
| 9 | C | 1 | Total 1 | Zn 1 | 0 |
| 9 | D | 1 | Total 1 | Zn 1 | 0 |
| 9 | E | 1 | Total 1 | Zn 1 | 0 |
| 9 | F | 1 | Total 1 | Zn 1 | 0 |

- Molecule 10 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 10 | 2 | 1 | Total 1 | Mg 1 | 0 |
| 10 | 3 | 1 | Total 1 | Mg 1 | 0 |
| 10 | 5 | 1 | Total 1 | Mg 1 | 0 |
| 10 | 6 | 1 | Total 1 | Mg 1 | 0 |
| 10 | 7 | 1 | Total 1 | Mg 1 | 0 |
| 10 | A | 1 | Total 1 | Mg 1 | 0 |
| 10 | B | 1 | Total 1 | Mg 1 | 0 |

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| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 10 | D | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |
| 10 | E | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |
| 10 | F | 1 | Total | Mg | 0 |
| | | | 1 | 1 | |

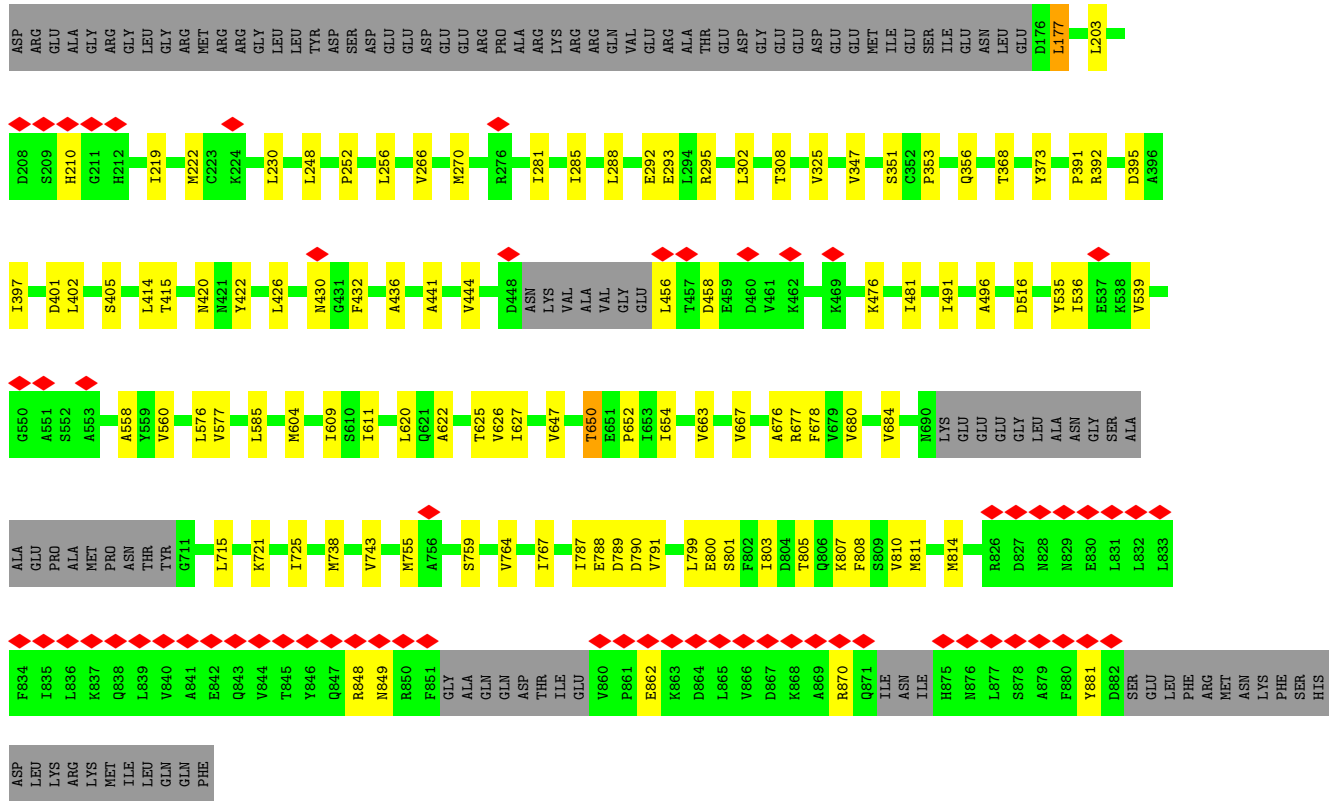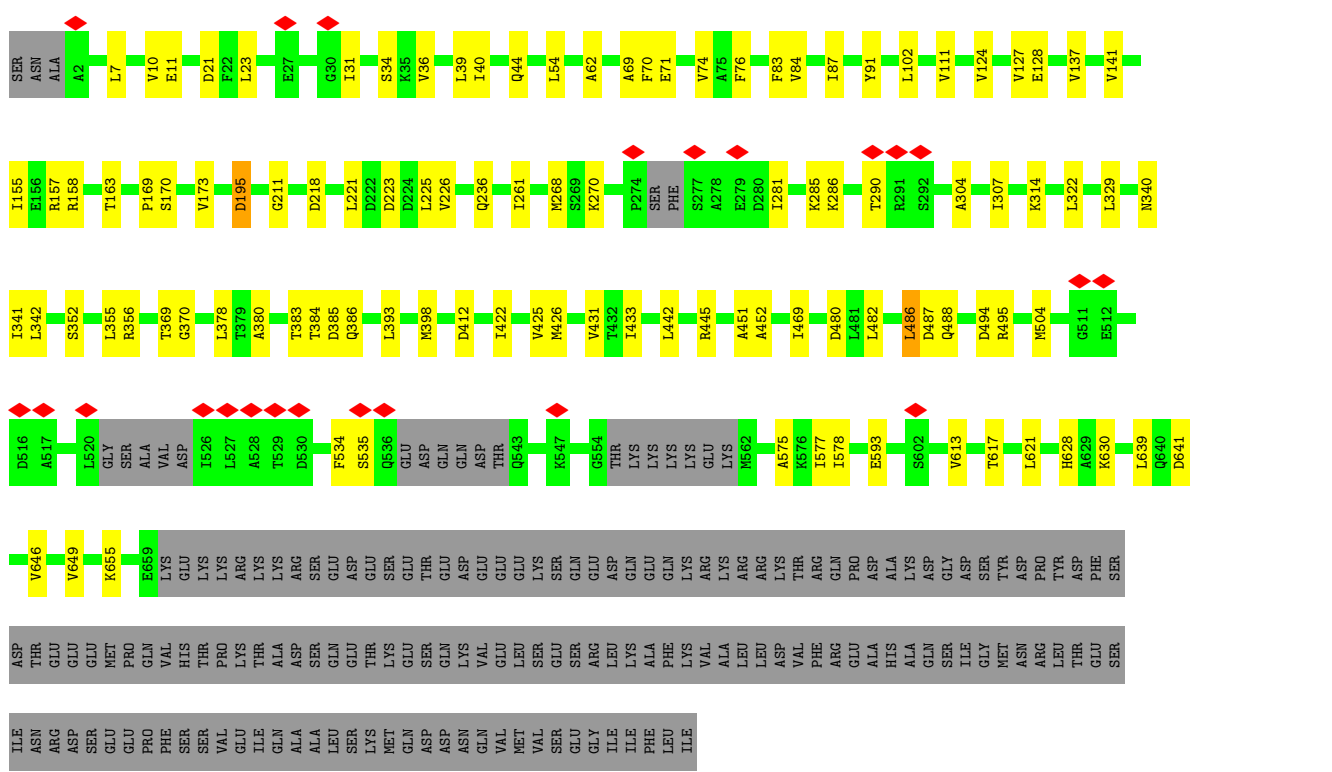- Molecule 11 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).
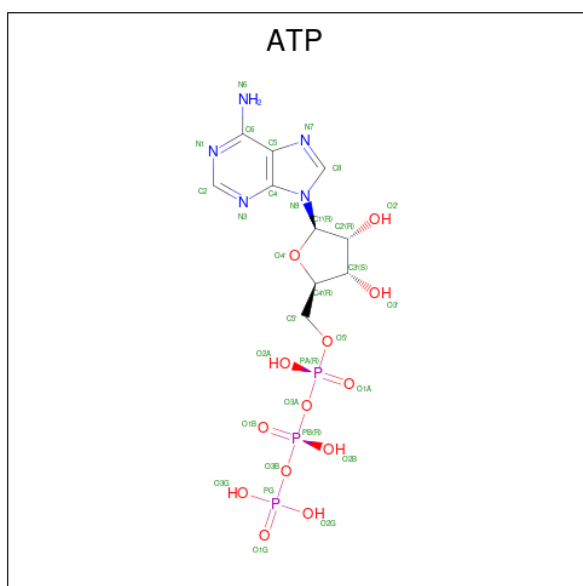


| Mol | Chain | Residues | Atoms | | | | | | AltConf |
|---|---|---|---|---|---|---|---|---|---|
| 11 | 2 | 1 | Total | C | H | N | O | P | 0 |
| | | | 43 | 10 | 12 | 5 | 13 | 3 | |
| 11 | A | 1 | Total | C | H | N | O | P | 0 |
| | | | 43 | 10 | 12 | 5 | 13 | 3 | |

- Molecule 12 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).

**ADP**

| Mol | Chain | Residues | Atoms | | | | | | AltConf |
|-----|-------|----------|-------|-----|-----|-----|-----|-----|---------|
| 12 | 3 | 1 | Total | C | H | N | O | P | 0 |
| | | | 39 | 10 | 12 | 5 | 10 | 2 | |
| 12 | 5 | 1 | Total | C | H | N | O | P | 0 |
| | | | 39 | 10 | 12 | 5 | 10 | 2 | |
| 12 | 6 | 1 | Total | C | H | N | O | P | 0 |
| | | | 39 | 10 | 12 | 5 | 10 | 2 | |
| 12 | 7 | 1 | Total | C | H | N | O | P | 0 |
| | | | 39 | 10 | 12 | 5 | 10 | 2 | |
| 12 | B | 1 | Total | C | H | N | O | P | 0 |
| | | | 39 | 10 | 12 | 5 | 10 | 2 | |
| 12 | D | 1 | Total | C | H | N | O | P | 0 |
| | | | 39 | 10 | 12 | 5 | 10 | 2 | |
| 12 | E | 1 | Total | C | H | N | O | P | 0 |
| | | | 39 | 10 | 12 | 5 | 10 | 2 | |
| 12 | F | 1 | Total | C | H | N | O | P | 0 |
| | | | 39 | 10 | 12 | 5 | 10 | 2 | |

# 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: DNA replication licensing factor MCM2

Chain 2:    5%    62%    9%    28%

MET ALA GLU SER SER GLU SER PHE THR MET ALA SER SER PRO ALA GLN ARG ARG ARG GLY ASN ASP PRO LEU THR SER SER PRO GLY ARG ASP ASP SER SER ARG ARG THR ASP ALA LEU LEU THR SER SER PRO GLY ARG ASP ASP PRO PHE GLU ASP GLU SER GLU GLY LEU LEU GLY THR GLU

GLY PRO LEU GLU GLU GLU GLU GLU ASP GLY GLU GLU LEU ILE GLY ASP MET GLU ARG ASP ASP TYR ARG ALA ILE PRO GLU LEU ASP ALA TYR GLU ALA GLU GLY LEU ALA LEU ASP ASP GLU ASP VAL GLU GLU LEU THR ALA SER GLN ARG ALA ALA ALA GLU ARG ALA MET ARG GLN ARG

ASP ARG GLU ALA GLY ARG GLY LEU GLY ARG MET ARG GLY LEU LEU TYR ASP SER ASP GLU GLU ASP GLU ARG PRO ALA ARG LYS ARG ARG GLN VAL GLU ARG ALA THR GLU ASP GLY GLU GLU ASP GLU GLU MET ILE GLU SER ILE GLU ASN LEU GLU **D176** **S181** **L193**

**R198** V207 **D208** S209 H210 G211 H212 N213 V214 F215 R227 E228 S229 L230 V231 V232 E254 L268 D275 R276 I277 T278 I285 T308 S309 V325 L336 Q356 F361 T368 I369 Y373 L414 N420 N421 S425 **N430** F435 A441

V444 **D448** ASN LYS VAL ALA VAL GLY E455 L456 I464 L467 S468 **K469** I481 L495 A496 L497 G502 K512 V513 R514 G515 D516 I517 D524 I536 T546 **G550 A551 S552 A553** L556 A573 V577 G582 D587 E588 **F589** D590 S599 S610

V617 L620 T625 **V626** I627 I633 N646 F657 L660 V663 R664 D665 **T666** V667 L675 V684 **K691** GLU GLU GLU GLY LEU ALA ASN GLY SER ALA ALA GLU PRO ALA MET PRO ASN THR TYR **G711** **E718** Y723 **Y726** V731 **L735** **D741**

**R751** **A756** **T757** **I760** I771 **R779** **I780** **H781** **L782** R783 **D784** **Y785** V786 I787 E788 S801 T805 **R826** **D827** N828 N829 **E830** L831 L832 L833 **F834** I835 L836 K837 Q838 **L839** V840 A841 E842 **Q843** V844 **T845** Y846 **Q847** **R848** **N849** ARG PHE GLY ALA GLN GLN ASP THR ILE GLU VAL

PRO GLU LYS ASP LEU VAL ASP LYS ALA ARG GLN ILE LEU ASN ILE HIS ASN LEU SER ALA PHE TYR ASP SER GLU GLU LEU PHE ARG MET ASN LYS PHE SER HIS ASP LEU LYS ARG LYS MET ILE LEU GLN GLN PHE

- Molecule 1: DNA replication licensing factor MCM2

Chain A:    7%    62%    12%    26%

MET ALA GLU SER SER GLU SER PHE THR MET ALA SER SER PRO ALA GLN ARG ARG ARG GLY ASN ASP PRO LEU THR SER SER PRO GLY ARG GLY SER SER PRO GLY ALA LEU THR SER SER PRO GLY ARG ASP ASP PRO PHE GLU ASP GLU SER GLU GLY LEU LEU GLY THR GLU

GLY PRO LEU GLU GLU GLU GLU GLU ASP GLY GLU GLU LEU ILE GLY ASP MET GLU ARG ASP ASP TYR ARG ALA ILE PRO GLU LEU ASP ALA TYR GLU ALA GLU GLY LEU ALA LEU ASP ASP GLU ASP VAL GLU GLU LEU THR ALA SER GLN ARG ALA ALA ALA GLU ARG ALA MET ARG GLN ARG

• Molecule 2: DNA replication licensing factor MCM3

Chain 3:    66%    13%    21%

• Molecule 2: DNA replication licensing factor MCM3

Chain B:



• Molecule 3: DNA replication licensing factor MCM4

Chain 4:

ALA LEU ARG ALA LEU ALA ASP ASP PHE LEU THR VAL THR GLY LYS THR VAL ARG LEU LEU

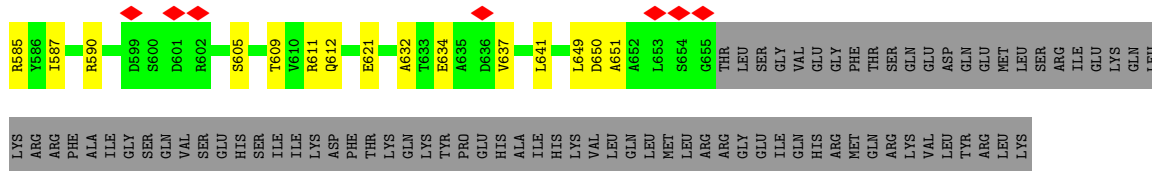• Molecule 3: DNA replication licensing factor MCM4

Chain C:      64%      10%      25%

SER ASN ALA MET SER SER PRO ALA SER THR PRO SER ARG GLY SER ARG GLY ARG ALA THR PRO ALA GLN THR PRO ARG SER GLU ASP ALA ARG SER PRO SER PRO GLN ARG ARG GLY GLU ASP SER THR SER THR GLY GLU LEU GLN PRO MET PRO THR SER PRO GLY VAL

ASP LEU GLN SER PRO ALA ALA GLN ASP VAL LEU PHE SER SER PRO PRO GLN MET HIS SER SER ALA ILE PRO LEU ASP PHE ASP VAL SER PRO LEU THR TYR GLY THR SER SER ARG VAL GLU GLY THR PRO ARG SER GLY **V107 R108 G109** V112 D117 **Q122 K123**

**V127** Q130 SER ASP GLY ALA ALA ALA GLU ASP ILE VAL ALA SER GLU GLN SER LEU GLY GLN K149 W153 N158 Q167 L170 Q171 R172 F173 I174 D175 P176 L177 A178 K179 E180 E181 E182 N183 I186 D187 I188 Y193 L197 E232 V241 I244 D247

D251 E255 M299 A302 F303 C309 M317 I322 S326 V327 L339 I340 R343 S344 L345 Q350 A374 L378 V379 D380 K381 V382 D386 R387 V388 N389 V390 R404 V418 K423 K444 I476 D491 T495 E503 I504 N505 L508

V527 P528 R529 T544 A545 Y546 R554 L558 S566 I570 I573 Q594 T595 L596 S597 I598 G602 C605 T611 S612 V613 S622 Q623 W624 I631 S642 D645 L646 I647 F648 L649 M650 E656 Y670 Y671 Q672 SER GLU GLU GLN ALA GLU GLU

GLU LEU L682 I698 L710 I711 E712 A713 Y714 V715 S723 R724 V727 R732 I738 K746 K752 A755 I756 D757 V758 K762 A768 L769 D775 P776 R777 T778 G779 ILE VAL ASP ILE SER ILE LEU LEU THR GLY MET SER ALA THR SER ARG LYS ARG LYS

GLU GLU LEU ALA GLU ALA LEU LYS LYS LEU ILE LEU SER LYS GLY LYS THR PRO ALA LEU LEU LYS TYR GLN GLN LEU PHE GLU ILE ASP ILE ARG GLY GLN SER ASP ILE ALA ILE THR LYS ASP MET PHE GLU GLU ALA LEU ARG ALA LEU ALA ASP ASP PHE LEU THR VAL THR GLY LYS

THR VAL ARG LEU LEU

• Molecule 4: DNA replication licensing factor MCM5

Chain 5:      70%      14%      15%

MET S2 G17 ASP ALA GLN ALA ASP GLU G24 L39 G45 T46 D47 R48 T49 G50 E67 K90 A103 V110 T111 L128 D131 R138 M145 S146 H147 K150 I155 K164 I168 R173 R176 N177 T178 L179 M184 G187 L188

R195 D200 Q201 A202 G203 R204 D210 D217 L232 V236 M241 D250 R251 Y252 V257 V263 T264 Y269 S270 I271 K272 G275 L276 T277 THR SER ARG GLY R282 D283 R284 I299 Q300 V301 D302 T303 ASP GLY SER GLY ARG SER PHE ALA GLY ALA V314 S315

E318 L325 L328 V331 V334 I339 A340 F341 S342 L356 G360 K363 R372 G373 D374 I375 N376 L377 L378 M379 L380 T385 L391 K392 F393 I400 T404 S410 T415 A416 S417 V418 S423 M429 A433 M434 V435 D438 G439

V442 M450 A457 I458 M462 Q463 E463 Q464 I469 A470 K471 A472 G473 I474 T475 T476 R481 V484 A488 E497 G500 E501 I504 D505 F506 V520 K521 D522 E523 H524 L532 T538 L539 H540 V541 S542 A543 LEU THR GLN THR GLN ALA VAL E551 L574

R585 Y586 I587 R590 D599 S600 D601 R602 S605 T609 V610 R611 Q612 E621 A632 T633 E634 A635 D636 V637 L641 L649 D650 A651 A652 L653 S654 G655 THR LEU SER GLY VAL GLU GLY PHE THR SER GLN GLU ASP GLU GLU MET SER ARG ILE GLU LYS GLN LEU

LYS ARG ARG PHE ALA ILE GLY SER GLN VAL SER GLU GLU SER ILE ILE LYS ASP PHE THR LYS GLN LYS TYR PRO GLU HIS ALA ILE HIS LYS VAL LEU LEU GLN LEU MET LEU ARG ARG GLY GLU ILE GLN HIS ARG MET GLN ARG LYS VAL LEU TYR ARG LEU LYS

## • Molecule 4: DNA replication licensing factor MCM5

Chain D:
     74%      11%      15%

MET S2 G17 ASP ALA GLN ALA ASP GLU G24 R40 T46 D47 R48 T49 G50 L59 H62 W69 I70 L77 L88 E109 L128 M145 S146 H147 L148 I170 C175 R176 N177 T178 L179 C197 N198 T199 D200 R204 Y212 F224 L232

V236 I265 I268 Y269 S270 G275 L276 T277 THR SER ARG GLY ARG ASP R284 R290 I294 L297 G298 I299 Q300 V301 D302 T303 ASP GLY SER GLY ARG SER PHE ALA GLY A313 Q317 E318 E319 E320 E321 R324 L325 L328 I335 S336 K337 S338 I339 A340

K350 S361 R364 N376 L380 T385 F393 S410 A416 V435 E452 V456 A472 R494 W495 D496 E497 T498 K499 G500 E501 D502 N503 I504 D515 V520 E523 H524 V536 I537 A543 LEU THR GLN THR GLN ALA VAL GLU G552 K558

A578 L582 Y586 I587 T588 M589 R594 E597 D601 R602 R603 I608 T609 V610 R611 Q612 L613 E621 V637 L641 Q645 T648 L653 S654 G655 THR LEU SER GLY VAL GLU GLY PHE THR SER GLN GLU ASP GLU GLU MET LEU SER ARG ILE GLU LYS

GLN LEU LYS ARG ARG PHE ALA ILE GLY SER GLN VAL SER GLU GLU HIS SER ILE ILE LYS ASP PHE THR LYS GLN LYS TYR PRO GLU HIS ALA ILE HIS LYS VAL LEU LEU GLN LEU MET LEU ARG ARG GLY GLU ILE GLN HIS ARG MET GLN ARG LYS VAL LEU TYR ARG LEU LYS

## • Molecule 5: DNA replication licensing factor MCM6

Chain 6:
     66%      12%      22%

MET ASP LEU ALA ALA ALA ALA GLU PRO GLY ALA GLY SER GLN HIS L16 E17 V18 F30 L34 I54 L68 I79 E82 V86 R101 K102 E103 I104 P105 L106 F114 L117 P118 T119 L126 T127 S128 L134 I137 V147 H148 G154 Q162

V168 I179 V184 C185 A186 N187 R188 T195 F200 V206 Q212 I220 L224 E225 V226 I227 L228 A232 V233 F244 T245 G246 T247 V254 S255 K256 E277 T278 R295 V303 G312 LYS GLU LEU ARG ASP GLU GLU Q320 I325 K326 M329

K332 E339 D343 Y347 I358 V364 K365 K378 G381 E382 L386 R387 N391 T400 A401 K402 K422 V434 R435 D436 H440 L451 M465 D469 I473 T492 I499 S515 N519 R529 F533 L536 R551

E561 S562 Y567 D570 R573 L577 S587 S590 E591 V595 R602 Q603 R604 D605 G606 SER GLY VAL T610 I616 E622 I656 P662 ASP VAL ASN LEU ASP GLN GLU GLU ILE GLU LEU MET GLU VAL ASP GLY ALA GLY ILE ILE ASN GLY HIS ALA

ASP SER PRO ALA PRO VAL ASN GLY ILE ASN GLY TYR ASN GLU ASP SER ILE GLN GLU LEU ILE SER ALA PRO LYS ALA SER LEU ARG ILE GLY LYS VAL PHE SER GLU TYR CYS ARG ILE LEU ASN LEU THR HIS TYR ASP HIS VAL LEU ILE VAL LEU GLU LEU THR GLN ALA GLY LEU LEU LYS GLY VAL GLU GLY GLU GLY ASP GLY SER ALA LEU LYS LYS GLY ILE ASN GLY HIS ALA

LEU VAL ASN TRP TYR LEU LYS GLU ILE GLU ASN GLY TYR ASN GLU ASP SER ILE GLN GLU LEU ILE SER ALA PRO LYS ALA SER LEU ARG ILE GLY LYS VAL PHE SER GLU TYR GLU GLU

ASP PRO TYR LEU VAL VAL ASN PRO ASN TYR LEU LEU GLU ASP

• Molecule 5: DNA replication licensing factor MCM6

Chain E:

9%

72%      13%      15%



• Molecule 6: DNA replication licensing factor MCM7

Chain 7:

72%      13%      15%

L645 GLY ASP LYS GLY GLN THR ALA ARG THR GLN ARG PRO ALA ASP VAL ILE PHE ALA THR VAL ARG GLU LEU VAL SER GLY ARG SER VAL ARG PHE SER GLU GLU GLN ARG CYS VAL SER ARG GLY PHE THR PRO ALA GLN PHE GLN ALA ALA LEU ASP GLU TYR GLU GLU LEU

ASN VAL TRP GLN VAL ASN ALA SER ARG THR ARG ILE THR PHE VAL

• Molecule 6: DNA replication licensing factor MCM7

Chain F:

74%    12%    14%

MET ALA L3 L17 D24 E25 L26 G27 A56 E57 D58 V63 F77 V81 V93 V94 M108 R114 V119 E135 L136 Y137 R164 Y182 T183 C184 D185 Q186 C187 G188 Q193 C206 P207 S208 R215 R219 L220 T224 F229 E234

T254 V255 L256 I276 G284 F285 R286 Q287 Y297 L298 E299 A300 H301 D311 ASP GLU SER GLY ALA GLY GLU L319 T320 R321 E322 E323 L324 R325 Q326 I327 A328 E329 E330 A337 I340 E343 I344 K351 K352 L355 L356 V362 D363 Q364 R367 G368 M369 K370

I371 R372 G373 N374 G384 K387 D395 R396 L397 S401 T405 G406 R407 T415 A416 A417 R420 D421 S422 V423 S424 L429 L434 V435 F447 M450 D454 I458 V461 Q465 T466 I467 S468 I469 I474 L478 P490 ALA TYR GLY ARG TYR

ASN PRO ARG ARG SER LEU GLU Q503 L507 A510 L511 L512 D516 L517 L518 D523 R524 H536 Q550 I563 R567 M588 K596 ASP ALA THR Y600 A603 L606 L607 A608 I609 L610 R611 L612 S613 T614 A615 L616 L644 L645 GLY ASP LYS GLY GLN THR

ALA ARG THR GLN ARG PRO ALA ASP VAL ILE PHE ALA THR VAL ARG GLU LEU VAL SER GLY GLY ARG SER VAL ARG PHE SER GLU GLU GLN ARG CYS VAL SER ARG GLY PHE THR PRO ALA GLN PHE GLN ALA ALA LEU ALA LEU ASP GLU TYR GLU GLU LEU ASN VAL TRP GLN VAL ASN ALA

SER ARG THR ARG ILE THR PHE VAL

• Molecule 7: DNA (47-MER)

Chain O:

60%    40%

A2 A12 A18 A19 T31 T32 T33 T34 T35 T36 T37 T38 T39 T40 T41 T42 T43 T44 T45 T46 T47 T48

• Molecule 8: DNA (47-MER)

Chain S:

83%    17%

A-48 A-38 T-14 T-13 T-10 T-9 T-5 T-4 T-3 T-2

# 4 Experimental information ⓘ

| Property | Value | Source |
| --- | --- | --- |
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, Not provided | |
| Number of particles used | 100748 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope | FEI TITAN KRIOS | Depositor |
| Voltage (kV) | 300 | Depositor |
| Electron dose $(e^-/\text{Å}^2)$ | 50.96, 49.86 | Depositor |
| Minimum defocus (nm) | 1000 | Depositor |
| Maximum defocus (nm) | 2000 | Depositor |
| Magnification | Not provided | |
| Image detector | GATAN K3 (6k x 4k), GATAN K3 (6k x 4k) | Depositor |
| Maximum map value | 0.603 | Depositor |
| Minimum map value | -0.274 | Depositor |
| Average map value | 0.001 | Depositor |
| Map value standard deviation | 0.018 | Depositor |
| Recommended contour level | 0.1 | Depositor |
| Map size (Å) | 416.0, 416.0, 416.0 | wwPDB |
| Map dimensions | 500, 500, 500 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 0.832, 0.832, 0.832 | Depositor |

# 5 Model quality ⓘ

## 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ATP, ZN, MG, ADP

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 | 2 | 0.25 | 0/5229 | 0.49 | 0/7065 |
| 1 | A | 0.26 | 0/5401 | 0.49 | 0/7295 |
| 2 | 3 | 0.25 | 0/5076 | 0.50 | 0/6854 |
| 2 | B | 0.26 | 0/5179 | 0.50 | 0/6993 |
| 3 | 4 | 0.25 | 0/5252 | 0.50 | 0/7098 |
| 3 | C | 0.25 | 0/5238 | 0.49 | 0/7079 |
| 4 | 5 | 0.26 | 0/4982 | 0.52 | 0/6699 |
| 4 | D | 0.26 | 0/4959 | 0.51 | 0/6669 |
| 5 | 6 | 0.26 | 0/5159 | 0.51 | 0/6961 |
| 5 | E | 0.26 | 0/5663 | 0.51 | 0/7634 |
| 6 | 7 | 0.25 | 0/4950 | 0.51 | 0/6677 |
| 6 | F | 0.25 | 0/5008 | 0.51 | 0/6757 |
| 7 | O | 0.51 | 0/1079 | 1.02 | 0/1663 |
| 8 | S | 0.51 | 0/1081 | 1.02 | 0/1666 |
| All | All | 0.27 | 0/64256 | 0.53 | 0/87110 |

There are no bond length outliers.

There are no bond angle outliers.

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 | 2 | 5134 | 5143 | 5143 | 67 | 0 |
| 1 | A | 5303 | 5302 | 5302 | 74 | 0 |
| 2 | 3 | 5001 | 5018 | 5018 | 78 | 0 |
| 2 | B | 5100 | 5130 | 5130 | 46 | 0 |
| 3 | 4 | 5161 | 5206 | 5206 | 70 | 0 |
| 3 | C | 5147 | 5190 | 5190 | 62 | 0 |
| 4 | 5 | 4905 | 4950 | 4950 | 78 | 0 |
| 4 | D | 4882 | 4932 | 4932 | 58 | 0 |
| 5 | 6 | 5076 | 5099 | 5099 | 64 | 0 |
| 5 | E | 5578 | 5631 | 5631 | 73 | 0 |
| 6 | 7 | 4876 | 4928 | 4928 | 56 | 0 |
| 6 | F | 4933 | 4988 | 4988 | 63 | 0 |
| 7 | O | 963 | 542 | 542 | 17 | 0 |
| 8 | S | 964 | 541 | 541 | 6 | 0 |
| 9 | 2 | 1 | 0 | 0 | 0 | 0 |
| 9 | 4 | 1 | 0 | 0 | 0 | 0 |
| 9 | 5 | 1 | 0 | 0 | 0 | 0 |
| 9 | 6 | 1 | 0 | 0 | 0 | 0 |
| 9 | 7 | 1 | 0 | 0 | 0 | 0 |
| 9 | A | 1 | 0 | 0 | 0 | 0 |
| 9 | C | 1 | 0 | 0 | 0 | 0 |
| 9 | D | 1 | 0 | 0 | 0 | 0 |
| 9 | E | 1 | 0 | 0 | 0 | 0 |
| 9 | F | 1 | 0 | 0 | 0 | 0 |
| 10 | 2 | 1 | 0 | 0 | 0 | 0 |
| 10 | 3 | 1 | 0 | 0 | 0 | 0 |
| 10 | 5 | 1 | 0 | 0 | 0 | 0 |
| 10 | 6 | 1 | 0 | 0 | 0 | 0 |
| 10 | 7 | 1 | 0 | 0 | 0 | 0 |
| 10 | A | 1 | 0 | 0 | 0 | 0 |
| 10 | B | 1 | 0 | 0 | 0 | 0 |
| 10 | D | 1 | 0 | 0 | 0 | 0 |
| 10 | E | 1 | 0 | 0 | 0 | 0 |
| 10 | F | 1 | 0 | 0 | 0 | 0 |
| 11 | 2 | 31 | 12 | 12 | 3 | 0 |
| 11 | A | 31 | 12 | 12 | 1 | 0 |
| 12 | 3 | 27 | 12 | 12 | 1 | 0 |
| 12 | 5 | 27 | 12 | 12 | 2 | 0 |
| 12 | 6 | 27 | 12 | 12 | 1 | 0 |
| 12 | 7 | 27 | 12 | 12 | 0 | 0 |
| 12 | B | 27 | 12 | 12 | 1 | 0 |
| 12 | D | 27 | 12 | 12 | 0 | 0 |
| 12 | E | 27 | 12 | 12 | 1 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|-----|-------|-------|----------|----------|---------|--------------|
| 12 | F | 27 | 12 | 12 | 1 | 0 |
| All | All | 63321 | 62720 | 62720 | 746 | 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 6.

All (746) 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) |
|--------|--------|--------------------------|-------------------|
| 2:3:378:LEU:HD21 | 2:3:422:ILE:HD11 | 1.47 | 0.94 |
| 6:7:340:ILE:HD11 | 6:7:394:ILE:HD11 | 1.50 | 0.93 |
| 3:C:170:LEU:HD21 | 3:C:241:VAL:HG12 | 1.56 | 0.87 |
| 6:F:588:MET:HE1 | 6:F:609:ILE:HD11 | 1.61 | 0.82 |
| 12:3:1002:ADP:O3A | 4:5:611:ARG:NH2 | 2.17 | 0.77 |
| 1:2:573:ALA:HB1 | 1:2:577:VAL:HG21 | 1.66 | 0.75 |
| 5:E:575:TYR:OH | 5:E:634:MET:O | 2.04 | 0.75 |
| 6:F:588:MET:CE | 6:F:609:ILE:HD11 | 2.17 | 0.75 |
| 3:4:302:ALA:HB2 | 3:4:322:ILE:HD13 | 1.69 | 0.74 |
| 1:A:203:LEU:HD12 | 1:A:266:VAL:HG11 | 1.69 | 0.74 |
| 3:C:642:SER:OG | 3:C:732:ARG:NH1 | 2.21 | 0.74 |
| 1:2:502:GLY:O | 1:2:779:ARG:NH1 | 2.20 | 0.74 |
| 1:A:302:LEU:HD22 | 1:A:420:ASN:HB2 | 1.71 | 0.73 |
| 3:4:238:ASP:OD1 | 3:4:260:VAL:HG12 | 1.88 | 0.72 |
| 3:C:232:GLU:OE1 | 3:C:232:GLU:N | 2.22 | 0.71 |
| 4:5:609:THR:N | 4:5:612:GLN:OE1 | 2.23 | 0.71 |
| 3:C:127:VAL:HG21 | 3:C:153:TRP:HE3 | 1.55 | 0.71 |
| 4:5:145:MET:O | 4:5:146:SER:OG | 2.07 | 0.71 |
| 3:C:503:GLU:OE1 | 3:C:594:GLN:NE2 | 2.24 | 0.71 |
| 6:7:585:TYR:HB2 | 6:7:606:LEU:HD23 | 1.73 | 0.70 |
| 3:4:187:ASP:N | 3:4:195:GLN:OE1 | 2.23 | 0.70 |
| 3:4:545:ALA:HB1 | 3:4:558:LEU:HD21 | 1.73 | 0.70 |
| 4:D:335:ILE:O | 4:D:339:ILE:HG23 | 1.90 | 0.70 |
| 1:A:801:SER:O | 1:A:805:THR:HG23 | 1.92 | 0.69 |
| 2:B:40:ILE:HD11 | 2:B:84:VAL:HG13 | 1.74 | 0.69 |
| 4:5:46:THR:O | 4:5:50:GLY:N | 2.25 | 0.69 |
| 6:F:356:LEU:HD13 | 6:F:612:LEU:HD22 | 1.75 | 0.69 |
| 4:5:415:THR:HG21 | 4:5:457:ALA:HB3 | 1.74 | 0.68 |
| 1:A:456:LEU:O | 1:A:456:LEU:HD23 | 1.94 | 0.68 |
| 3:4:241:VAL:HG11 | 3:4:258:ILE:HG21 | 1.77 | 0.67 |
| 1:A:248:LEU:HD21 | 1:A:285:ILE:HG13 | 1.76 | 0.67 |
| 3:C:174:ILE:HD12 | 3:C:174:ILE:O | 1.93 | 0.67 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:2:675:LEU:HD11 | 11:2:1002:ATP:C6 | 2.30 | 0.67 |
| 3:4:387:ARG:NH2 | 3:4:530:GLY:O | 2.27 | 0.67 |
| 4:5:504:ILE:HD12 | 4:5:504:ILE:O | 1.95 | 0.67 |
| 2:B:287:PHE:CE2 | 2:B:295:ILE:HD11 | 2.30 | 0.66 |
| 2:3:281:ILE:HG22 | 2:3:285:LYS:NZ | 2.11 | 0.66 |
| 3:4:271:MET:SD | 3:4:370:VAL:HG11 | 2.36 | 0.66 |
| 5:E:54:ILE:HD13 | 5:E:102:LYS:HZ3 | 1.60 | 0.66 |
| 1:2:723:TYR:OH | 1:2:780:ILE:O | 2.10 | 0.66 |
| 6:7:581:ILE:HG22 | 6:7:606:LEU:HD21 | 1.79 | 0.65 |
| 6:7:36:GLN:O | 6:7:40:LEU:HD12 | 1.97 | 0.65 |
| 4:D:612:GLN:N | 4:D:612:GLN:OE1 | 2.30 | 0.65 |
| 4:D:46:THR:O | 4:D:50:GLY:N | 2.30 | 0.65 |
| 2:3:575:ALA:O | 2:3:578:ILE:HG22 | 1.97 | 0.65 |
| 5:6:68:LEU:HD21 | 5:6:79:ILE:HD12 | 1.79 | 0.65 |
| 4:5:385:THR:HG21 | 4:5:520:VAL:HG12 | 1.78 | 0.65 |
| 2:3:69:ALA:HB2 | 2:3:124:VAL:HG23 | 1.78 | 0.64 |
| 3:4:706:ALA:HB2 | 3:4:754:GLU:HA | 1.79 | 0.64 |
| 5:6:16:LEU:O | 5:6:16:LEU:HD13 | 1.98 | 0.64 |
| 6:F:343:GLU:O | 6:F:536:HIS:NE2 | 2.31 | 0.64 |
| 4:5:439:GLY:N | 4:5:481:ARG:O | 2.31 | 0.64 |
| 7:O:40:DT:H2' | 7:O:41:DT:H72 | 1.80 | 0.64 |
| 3:4:470:ILE:HD13 | 3:4:519:LEU:HD22 | 1.79 | 0.64 |
| 5:E:147:VAL:HG13 | 5:E:233:VAL:HG21 | 1.79 | 0.64 |
| 6:F:56:ALA:HB2 | 6:F:63:VAL:HG21 | 1.80 | 0.64 |
| 7:O:31:DT:H2" | 7:O:32:DT:H72 | 1.78 | 0.64 |
| 6:F:276:ILE:HD13 | 6:F:299:GLU:OE2 | 1.98 | 0.63 |
| 1:2:620:LEU:HD23 | 1:2:620:LEU:H | 1.63 | 0.63 |
| 5:6:54:ILE:HG21 | 5:6:102:LYS:HG2 | 1.81 | 0.63 |
| 4:D:77:LEU:CD2 | 4:D:88:LEU:HD12 | 2.28 | 0.63 |
| 6:F:256:LEU:HD12 | 6:F:297:TYR:CD2 | 2.32 | 0.63 |
| 2:3:304:ALA:O | 2:3:314:LYS:NZ | 2.27 | 0.63 |
| 4:5:385:THR:HG21 | 4:5:520:VAL:CG1 | 2.28 | 0.63 |
| 4:5:415:THR:HG21 | 4:5:457:ALA:CB | 2.28 | 0.63 |
| 5:6:114:PHE:O | 5:6:245:THR:HG21 | 1.99 | 0.62 |
| 4:D:128:LEU:HD12 | 4:D:128:LEU:O | 1.99 | 0.62 |
| 2:3:380:ALA:HB2 | 2:3:442:LEU:HD12 | 1.81 | 0.62 |
| 3:C:302:ALA:HB2 | 3:C:322:ILE:HD13 | 1.80 | 0.62 |
| 3:C:527:VAL:HG11 | 3:C:570:ILE:HD12 | 1.80 | 0.62 |
| 6:F:416:ALA:HB2 | 6:F:478:LEU:HD21 | 1.79 | 0.62 |
| 6:F:415:THR:HG23 | 6:F:467:ILE:HG21 | 1.80 | 0.62 |
| 1:A:177:LEU:O | 1:A:177:LEU:HD12 | 1.99 | 0.62 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 6:7:337:ALA:O | 6:7:340:ILE:HG22 | 2.00 | 0.62 |
| 3:4:580:ASN:OD1 | 3:4:583:THR:HG22 | 1.98 | 0.62 |
| 3:C:386:ASP:OD1 | 3:C:529:ARG:NH1 | 2.33 | 0.61 |
| 2:3:102:LEU:HD12 | 2:3:124:VAL:HG11 | 1.82 | 0.61 |
| 4:5:462:MET:SD | 4:5:484:VAL:HG21 | 2.40 | 0.61 |
| 12:B:1002:ADP:O1B | 4:D:611:ARG:NH2 | 2.33 | 0.61 |
| 2:3:340:ASN:N | 2:3:480:ASP:OD2 | 2.28 | 0.61 |
| 3:C:546:TYR:O | 3:C:558:LEU:HD12 | 1.99 | 0.60 |
| 6:7:581:ILE:CG2 | 6:7:606:LEU:HD21 | 2.31 | 0.60 |
| 1:A:288:LEU:HD12 | 1:A:415:THR:HG23 | 1.84 | 0.60 |
| 1:A:516:ASP:HB3 | 1:A:625:THR:HG22 | 1.84 | 0.60 |
| 2:B:384:THR:OG1 | 8:S:-38:DA:OP1 | 2.13 | 0.60 |
| 3:4:560:THR:CG2 | 5:6:220:ILE:HD11 | 2.31 | 0.60 |
| 4:5:377:LEU:HD23 | 4:5:378:LEU:N | 2.17 | 0.60 |
| 6:7:146:PRO:HA | 6:7:162:THR:HG23 | 1.84 | 0.59 |
| 3:4:280:ASP:N | 3:4:394:TYR:O | 2.32 | 0.59 |
| 5:6:591:GLU:O | 5:6:595:VAL:HG13 | 2.01 | 0.59 |
| 2:3:195:ASP:HB3 | 2:3:226:VAL:HG11 | 1.83 | 0.59 |
| 3:4:388:VAL:HG12 | 3:4:423:LYS:HD2 | 1.84 | 0.59 |
| 3:C:544:THR:HA | 3:C:596:LEU:HD21 | 1.83 | 0.59 |
| 1:2:582:GLY:O | 1:2:625:THR:HG22 | 2.03 | 0.59 |
| 2:B:25:ASP:OD1 | 2:B:31:ILE:N | 2.35 | 0.59 |
| 2:3:342:LEU:HD23 | 2:3:482:LEU:HD13 | 1.83 | 0.59 |
| 1:A:325:VAL:HA | 1:A:368:THR:HG23 | 1.85 | 0.59 |
| 6:F:256:LEU:HD12 | 6:F:297:TYR:CE2 | 2.37 | 0.59 |
| 8:S:-14:DT:H2' | 8:S:-13:DT:H72 | 1.85 | 0.59 |
| 3:4:558:LEU:HD23 | 3:4:559:GLN:N | 2.18 | 0.59 |
| 1:A:222:MET:CE | 1:A:281:ILE:HD12 | 2.32 | 0.59 |
| 6:7:374:ASN:OD1 | 6:7:465:GLN:NE2 | 2.34 | 0.58 |
| 6:F:362:VAL:HG22 | 6:F:614:THR:HG21 | 1.84 | 0.58 |
| 2:3:378:LEU:CD2 | 2:3:422:ILE:HD11 | 2.26 | 0.58 |
| 4:5:404:THR:HG21 | 4:5:433:ALA:HB2 | 1.85 | 0.58 |
| 1:2:633:ILE:HG22 | 1:2:646:ASN:O | 2.03 | 0.58 |
| 2:3:398:MET:SD | 2:3:425:VAL:HG11 | 2.43 | 0.58 |
| 2:3:221:LEU:HD13 | 2:3:225:LEU:O | 2.04 | 0.58 |
| 6:7:452:GLU:O | 6:7:456:THR:HG23 | 2.04 | 0.58 |
| 6:F:395:ASP:O | 6:F:401:SER:OG | 2.14 | 0.57 |
| 2:3:383:THR:HG22 | 2:3:384:THR:H | 1.69 | 0.57 |
| 3:C:756:ILE:HD12 | 3:C:756:ILE:H | 1.69 | 0.57 |
| 3:4:563:LEU:HD13 | 3:4:590:VAL:HG21 | 1.87 | 0.57 |
| 2:3:137:VAL:HG23 | 2:3:137:VAL:O | 2.05 | 0.57 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 3:4:170:LEU:CD1 | 3:4:241:VAL:HG22 | 2.33 | 0.57 |
| 1:A:667:VAL:HG13 | 1:A:667:VAL:O | 2.04 | 0.57 |
| 3:C:505:ASN:N | 3:C:645:ASP:OD1 | 2.33 | 0.57 |
| 3:4:604:ILE:HD11 | 5:6:451:LEU:HD12 | 1.87 | 0.57 |
| 5:6:587:SER:O | 5:6:590:SER:OG | 2.20 | 0.57 |
| 1:A:476:LYS:HE3 | 1:A:715:LEU:HD21 | 1.86 | 0.57 |
| 1:2:684:VAL:HG21 | 5:6:591:GLU:OE2 | 2.04 | 0.57 |
| 4:D:589:MET:CE | 4:D:648:THR:HG21 | 2.35 | 0.57 |
| 5:E:726:LEU:HD11 | 5:E:776:VAL:HG21 | 1.87 | 0.57 |
| 1:2:232:VAL:HG13 | 1:2:285:ILE:HD13 | 1.87 | 0.57 |
| 1:2:573:ALA:HB1 | 1:2:577:VAL:CG2 | 2.34 | 0.57 |
| 4:5:188:LEU:HD13 | 4:5:272:LYS:HE2 | 1.87 | 0.57 |
| 1:A:481:ILE:HD12 | 1:A:496:ALA:HB2 | 1.85 | 0.56 |
| 1:A:432:PHE:CZ | 5:E:227:ILE:HD11 | 2.39 | 0.56 |
| 5:6:30:PHE:O | 5:6:34:LEU:HD12 | 2.06 | 0.56 |
| 3:C:350:GLN:OE1 | 3:C:380:ASP:N | 2.35 | 0.56 |
| 3:C:167:GLN:CG | 3:C:244:ILE:HD11 | 2.36 | 0.56 |
| 3:C:647:ILE:O | 3:C:768:ALA:HB1 | 2.05 | 0.56 |
| 5:E:117:LEU:HD11 | 5:E:134:LEU:HG | 1.87 | 0.56 |
| 5:6:364:VAL:HG21 | 5:6:536:LEU:HD21 | 1.86 | 0.56 |
| 6:F:417:ALA:O | 6:F:429:LEU:HD12 | 2.06 | 0.56 |
| 8:S:-10:DT:H2' | 8:S:-9:DT:H72 | 1.87 | 0.56 |
| 2:3:163:THR:HG23 | 6:7:289:VAL:HG23 | 1.87 | 0.56 |
| 4:5:380:LEU:HD21 | 4:5:506:PHE:HE2 | 1.70 | 0.56 |
| 6:F:182:TYR:OH | 6:F:193:GLN:OE1 | 2.17 | 0.56 |
| 2:3:378:LEU:HD21 | 2:3:422:ILE:CD1 | 2.31 | 0.55 |
| 1:A:222:MET:HE3 | 1:A:281:ILE:HD12 | 1.88 | 0.55 |
| 1:A:426:LEU:HD23 | 1:A:432:PHE:O | 2.06 | 0.55 |
| 4:D:265:ILE:HD13 | 4:D:294:ILE:HG21 | 1.88 | 0.55 |
| 5:E:239:GLY:HA3 | 5:E:451:LEU:HD12 | 1.87 | 0.55 |
| 6:F:135:GLU:OE2 | 6:F:137:TYR:OH | 2.23 | 0.55 |
| 5:6:602:ARG:NH2 | 5:6:616:ILE:O | 2.39 | 0.55 |
| 1:A:849:ASN:CB | 5:E:727:ILE:HD11 | 2.36 | 0.55 |
| 1:2:325:VAL:HA | 1:2:368:THR:HG23 | 1.86 | 0.55 |
| 3:4:187:ASP:O | 3:4:195:GLN:NE2 | 2.38 | 0.55 |
| 1:A:577:VAL:HG21 | 1:A:620:LEU:CD1 | 2.36 | 0.55 |
| 5:6:186:ALA:O | 1:A:356:GLN:NE2 | 2.37 | 0.55 |
| 2:3:355:LEU:HD11 | 2:3:451:ALA:HB2 | 1.88 | 0.55 |
| 1:A:650:THR:HG22 | 1:A:652:PRO:HD2 | 1.88 | 0.55 |
| 4:D:452:GLU:O | 4:D:456:VAL:HG23 | 2.05 | 0.55 |
| 2:3:7:LEU:HD12 | 2:B:154:THR:HG22 | 1.87 | 0.55 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:2:731:VAL:HG21 | 1:2:782:LEU:HG | 1.89 | 0.55 |
| 2:3:307:ILE:O | 2:3:314:LYS:NZ | 2.31 | 0.55 |
| 2:B:128:GLU:OE2 | 2:B:236:GLN:NE2 | 2.40 | 0.55 |
| 4:D:268:ILE:O | 4:D:270:SER:OG | 2.20 | 0.55 |
| 3:4:527:VAL:HG11 | 3:4:570:ILE:HD12 | 1.87 | 0.55 |
| 4:5:257:VAL:HG11 | 4:5:299:ILE:HG21 | 1.89 | 0.54 |
| 3:4:727:VAL:HB | 3:4:769:LEU:HD21 | 1.88 | 0.54 |
| 4:D:170:ILE:HD11 | 4:D:179:LEU:HD23 | 1.88 | 0.54 |
| 5:E:605:ASP:HB2 | 5:E:616:ILE:HD13 | 1.90 | 0.54 |
| 4:D:385:THR:HG21 | 4:D:520:VAL:HG11 | 1.90 | 0.54 |
| 2:3:83:PHE:O | 2:3:87:ILE:HD12 | 2.07 | 0.54 |
| 6:7:617:ALA:N | 6:7:629:ASP:OD2 | 2.41 | 0.54 |
| 1:A:203:LEU:CD1 | 1:A:266:VAL:HG11 | 2.37 | 0.54 |
| 1:A:764:VAL:HG13 | 4:D:536:VAL:HG21 | 1.90 | 0.54 |
| 5:E:284:LEU:HD22 | 5:E:289:VAL:HG21 | 1.90 | 0.54 |
| 2:3:355:LEU:HD11 | 2:3:451:ALA:CB | 2.38 | 0.54 |
| 5:E:254:VAL:O | 5:E:254:VAL:HG13 | 2.06 | 0.54 |
| 1:A:759:SER:HB3 | 1:A:810:VAL:HG11 | 1.90 | 0.54 |
| 2:3:628:HIS:ND1 | 2:3:641:ASP:OD1 | 2.40 | 0.54 |
| 3:4:501:ARG:O | 3:4:739:ARG:NE | 2.36 | 0.54 |
| 5:6:30:PHE:CE2 | 5:6:34:LEU:HD11 | 2.43 | 0.54 |
| 5:6:278:THR:HG23 | 5:6:278:THR:O | 2.07 | 0.54 |
| 1:A:803:ILE:HD12 | 1:A:814:MET:HB3 | 1.89 | 0.54 |
| 2:B:614:THR:O | 2:B:617:THR:N | 2.41 | 0.54 |
| 4:D:380:LEU:HD13 | 4:D:504:ILE:HG22 | 1.90 | 0.54 |
| 3:C:388:VAL:HG12 | 3:C:423:LYS:HD2 | 1.90 | 0.53 |
| 6:F:356:LEU:HD21 | 6:F:616:LEU:HG | 1.90 | 0.53 |
| 2:3:322:LEU:O | 2:3:630:LYS:NZ | 2.38 | 0.53 |
| 4:5:342:SER:O | 4:5:539:LEU:HD11 | 2.07 | 0.53 |
| 2:B:336:ARG:NH2 | 2:B:480:ASP:OD1 | 2.41 | 0.53 |
| 2:3:128:GLU:N | 2:3:128:GLU:OE1 | 2.39 | 0.53 |
| 2:3:495:ARG:HA | 4:5:587:ILE:HD11 | 1.90 | 0.53 |
| 6:F:421:ASP:OD1 | 6:F:422:SER:N | 2.40 | 0.53 |
| 1:2:587:ASP:OD1 | 1:2:588:GLU:N | 2.41 | 0.53 |
| 2:3:431:VAL:HG12 | 2:3:433:ILE:HG23 | 1.89 | 0.53 |
| 4:5:145:MET:CE | 4:5:271:ILE:HG23 | 2.38 | 0.53 |
| 4:5:257:VAL:CG1 | 4:5:299:ILE:HG21 | 2.38 | 0.53 |
| 4:D:339:ILE:O | 4:D:393:PHE:CZ | 2.62 | 0.53 |
| 4:D:339:ILE:HD12 | 4:D:340:ALA:CB | 2.39 | 0.53 |
| 6:F:387:LYS:NZ | 12:F:1002:ADP:O2B | 2.42 | 0.53 |
| 6:F:206:CYS:SG | 6:F:208:SER:OG | 2.62 | 0.53 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:A:414:LEU:HD11 | 1:A:441:ALA:CB | 2.39 | 0.53 |
| 1:A:764:VAL:CG1 | 4:D:536:VAL:HG21 | 2.39 | 0.53 |
| 4:D:148:LEU:HD13 | 4:D:297:LEU:HD12 | 1.91 | 0.53 |
| 1:A:347:VAL:O | 1:A:347:VAL:HG13 | 2.08 | 0.52 |
| 2:B:614:THR:HG22 | 2:B:615:ALA:N | 2.23 | 0.52 |
| 5:E:565:ARG:NH2 | 5:E:569:LEU:HD13 | 2.24 | 0.52 |
| 1:2:801:SER:O | 1:2:805:THR:HG23 | 2.09 | 0.52 |
| 1:2:751:ARG:NH2 | 4:5:522:ASP:O | 2.39 | 0.52 |
| 4:D:416:ALA:HB2 | 4:D:435:VAL:HG11 | 1.90 | 0.52 |
| 3:4:237:PHE:CB | 3:4:260:VAL:HG11 | 2.38 | 0.52 |
| 3:4:693:TYR:HE1 | 3:4:697:THR:HG21 | 1.74 | 0.52 |
| 5:E:494:ASN:OD1 | 5:E:496:ARG:NH2 | 2.42 | 0.52 |
| 5:6:184:VAL:O | 5:6:184:VAL:HG13 | 2.08 | 0.52 |
| 3:C:326:SER:O | 3:C:327:VAL:HG23 | 2.10 | 0.52 |
| 4:D:170:ILE:HD12 | 4:D:212:TYR:CG | 2.45 | 0.52 |
| 1:A:288:LEU:HD12 | 1:A:415:THR:CG2 | 2.39 | 0.52 |
| 3:C:566:SER:O | 3:C:611:THR:HG22 | 2.10 | 0.52 |
| 2:3:155:ILE:HG23 | 2:B:4:THR:HG23 | 1.92 | 0.52 |
| 6:7:574:PRO:HG3 | 6:7:624:VAL:HG13 | 1.91 | 0.52 |
| 4:D:265:ILE:HD12 | 4:D:265:ILE:O | 2.10 | 0.52 |
| 3:4:152:ILE:HD12 | 3:4:157:VAL:HG21 | 1.92 | 0.52 |
| 2:B:526:ILE:HD12 | 2:B:526:ILE:H | 1.75 | 0.52 |
| 3:C:112:VAL:O | 3:C:112:VAL:HG13 | 2.10 | 0.52 |
| 6:F:187:CYS:SG | 6:F:188:GLY:N | 2.83 | 0.52 |
| 1:2:751:ARG:NH2 | 4:5:522:ASP:OD1 | 2.43 | 0.52 |
| 2:B:380:ALA:HB3 | 2:B:433:ILE:HD13 | 1.92 | 0.52 |
| 3:C:476:ILE:HD13 | 3:C:650:MET:CE | 2.39 | 0.52 |
| 3:C:768:ALA:O | 3:C:769:LEU:HD12 | 2.10 | 0.52 |
| 4:D:578:ALA:HB1 | 4:D:637:VAL:HG21 | 1.92 | 0.52 |
| 4:5:275:GLY:C | 4:5:276:LEU:HD23 | 2.30 | 0.51 |
| 4:5:418:VAL:HG12 | 4:5:429:MET:HG2 | 1.92 | 0.51 |
| 4:5:380:LEU:HD21 | 4:5:506:PHE:CE2 | 2.45 | 0.51 |
| 1:A:422:TYR:OH | 1:A:436:ALA:O | 2.16 | 0.51 |
| 3:4:237:PHE:HB2 | 3:4:260:VAL:HG11 | 1.92 | 0.51 |
| 4:5:372:ARG:NH1 | 4:5:374:ASP:O | 2.41 | 0.51 |
| 5:6:604:ARG:NH2 | 5:6:656:ILE:O | 2.43 | 0.51 |
| 6:7:281:LEU:HG | 6:7:283:THR:HG23 | 1.92 | 0.51 |
| 6:7:400:ARG:NH2 | 6:7:436:LEU:O | 2.43 | 0.51 |
| 1:A:585:LEU:HD23 | 1:A:627:ILE:HB | 1.92 | 0.51 |
| 3:C:558:LEU:HD23 | 5:E:220:ILE:HD13 | 1.92 | 0.51 |
| 5:E:726:LEU:HD11 | 5:E:776:VAL:CG2 | 2.40 | 0.51 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:2:495:LEU:HD12 | 1:2:536:ILE:HG13 | 1.93 | 0.51 |
| 3:4:211:ASN:OD1 | 3:4:213:GLU:N | 2.40 | 0.51 |
| 5:E:168:VAL:HG23 | 5:E:168:VAL:O | 2.11 | 0.51 |
| 5:6:134:LEU:HD12 | 5:6:246:GLY:O | 2.10 | 0.51 |
| 5:E:586:ILE:HA | 5:E:640:VAL:HG12 | 1.93 | 0.51 |
| 3:C:170:LEU:HD21 | 3:C:241:VAL:CG1 | 2.35 | 0.51 |
| 3:4:212:CYS:HA | 3:4:215:ILE:HD12 | 1.93 | 0.51 |
| 3:4:706:ALA:HB2 | 3:4:754:GLU:CA | 2.41 | 0.51 |
| 4:5:649:LEU:HD12 | 4:5:649:LEU:O | 2.11 | 0.51 |
| 5:E:68:LEU:HD21 | 5:E:79:ILE:CD1 | 2.40 | 0.51 |
| 5:E:616:ILE:HD12 | 5:E:616:ILE:N | 2.26 | 0.51 |
| 6:F:234:GLU:OE2 | 6:F:254:THR:HG23 | 2.11 | 0.51 |
| 4:5:325:LEU:HD12 | 4:5:328:LEU:HD12 | 1.93 | 0.50 |
| 2:3:195:ASP:OD1 | 6:7:154:ALA:N | 2.38 | 0.50 |
| 3:4:367:PRO:CD | 6:7:478:LEU:HD13 | 2.41 | 0.50 |
| 4:D:645:GLN:HA | 4:D:648:THR:HG22 | 1.93 | 0.50 |
| 2:3:173:VAL:HG22 | 4:D:204:ARG:CZ | 2.42 | 0.50 |
| 1:2:464:ILE:HG23 | 1:2:723:TYR:CD2 | 2.46 | 0.50 |
| 1:2:495:LEU:HD13 | 1:2:627:ILE:HD13 | 1.91 | 0.50 |
| 4:5:110:VAL:HG23 | 4:5:111:THR:HG23 | 1.92 | 0.50 |
| 3:C:386:ASP:OD2 | 5:E:217:ARG:NH2 | 2.44 | 0.50 |
| 3:C:193:TYR:O | 3:C:197:LEU:HD22 | 2.12 | 0.50 |
| 4:D:265:ILE:HG22 | 4:D:299:ILE:HD13 | 1.94 | 0.50 |
| 5:E:68:LEU:HD21 | 5:E:79:ILE:HD12 | 1.94 | 0.50 |
| 6:F:374:ASN:OD1 | 6:F:465:GLN:NE2 | 2.44 | 0.50 |
| 2:3:157:ARG:NH1 | 2:3:158:ARG:O | 2.45 | 0.50 |
| 6:7:18:GLN:OE1 | 6:7:84:LEU:HD21 | 2.12 | 0.50 |
| 1:2:779:ARG:O | 1:2:782:LEU:HD12 | 2.12 | 0.50 |
| 2:3:286:LYS:O | 2:3:290:THR:HG23 | 2.11 | 0.50 |
| 7:O:32:DT:C2' | 7:O:33:DT:H71 | 2.41 | 0.50 |
| 7:O:44:DT:H2' | 7:O:45:DT:H72 | 1.94 | 0.50 |
| 3:C:598:ILE:O | 3:C:598:ILE:HD12 | 2.11 | 0.50 |
| 3:4:560:THR:HG23 | 5:6:220:ILE:HD11 | 1.94 | 0.50 |
| 1:A:203:LEU:HD11 | 1:A:219:ILE:HD11 | 1.93 | 0.50 |
| 6:F:276:ILE:HD12 | 6:F:276:ILE:N | 2.26 | 0.50 |
| 5:6:104:ILE:HD12 | 5:6:105:PRO:O | 2.12 | 0.49 |
| 5:6:188:ARG:NH1 | 1:A:353:PRO:O | 2.41 | 0.49 |
| 4:D:339:ILE:HD12 | 4:D:340:ALA:N | 2.27 | 0.49 |
| 7:O:36:DT:H2' | 7:O:37:DT:H72 | 1.94 | 0.49 |
| 5:6:225:GLU:OE2 | 5:6:295:ARG:NH1 | 2.44 | 0.49 |
| 6:7:280:ILE:HD11 | 6:7:297:TYR:CD2 | 2.47 | 0.49 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 6:7:403:TYR:HE1 | 6:7:405:THR:HG1 | 1.59 | 0.49 |
| 1:A:862:GLU:OE1 | 1:A:881:TYR:OH | 2.19 | 0.49 |
| 2:B:497:ILE:O | 2:B:501:VAL:HG23 | 2.12 | 0.49 |
| 1:2:502:GLY:N | 1:2:515:GLY:O | 2.41 | 0.49 |
| 2:B:336:ARG:NH1 | 2:B:338:ASP:O | 2.44 | 0.49 |
| 3:C:727:VAL:HG21 | 3:C:769:LEU:CD2 | 2.42 | 0.49 |
| 2:3:422:ILE:O | 2:3:422:ILE:HG22 | 2.11 | 0.49 |
| 2:B:223:ASP:N | 2:B:223:ASP:OD1 | 2.45 | 0.49 |
| 2:B:585:GLU:OE1 | 2:B:585:GLU:N | 2.41 | 0.49 |
| 4:D:597:GLU:OE1 | 4:D:603:ARG:NH1 | 2.45 | 0.49 |
| 7:O:45:DT:H2' | 7:O:46:DT:H72 | 1.94 | 0.49 |
| 3:4:282:LEU:CD1 | 3:4:419:ILE:HD12 | 2.42 | 0.49 |
| 4:5:360:GLY:N | 4:5:373:GLY:O | 2.45 | 0.49 |
| 6:7:93:VAL:HG12 | 6:7:95:ASN:H | 1.76 | 0.49 |
| 6:F:405:THR:HG22 | 6:F:406:GLY:H | 1.78 | 0.49 |
| 4:5:138:ARG:NH2 | 4:5:241:MET:O | 2.45 | 0.49 |
| 1:A:676:ALA:HB3 | 5:E:595:VAL:HG23 | 1.95 | 0.49 |
| 6:F:344:ILE:O | 6:F:351:LYS:NZ | 2.40 | 0.49 |
| 1:2:787:ILE:HG22 | 1:2:788:GLU:N | 2.28 | 0.49 |
| 6:7:362:VAL:HG11 | 6:7:571:PRO:HD2 | 1.94 | 0.49 |
| 1:2:481:ILE:HD12 | 1:2:496:ALA:HB2 | 1.94 | 0.49 |
| 2:3:40:ILE:HD11 | 2:3:84:VAL:HG13 | 1.95 | 0.49 |
| 4:D:197:CYS:SG | 4:D:199:THR:HG22 | 2.53 | 0.49 |
| 7:O:46:DT:H2' | 7:O:47:DT:H72 | 1.95 | 0.49 |
| 1:2:467:LEU:HD11 | 1:2:723:TYR:CD2 | 2.47 | 0.48 |
| 4:5:39:LEU:HD23 | 4:5:103:ALA:HA | 1.95 | 0.48 |
| 4:5:418:VAL:HG23 | 4:5:471:LYS:HG3 | 1.95 | 0.48 |
| 2:B:375:GLY:O | 2:B:378:LEU:N | 2.45 | 0.48 |
| 3:C:167:GLN:HG2 | 3:C:244:ILE:HD11 | 1.95 | 0.48 |
| 7:O:43:DT:H2' | 7:O:44:DT:H72 | 1.95 | 0.48 |
| 2:B:51:VAL:HG22 | 2:B:103:GLU:O | 2.13 | 0.48 |
| 2:B:513:GLN:N | 2:B:513:GLN:OE1 | 2.46 | 0.48 |
| 3:C:309:CYS:O | 5:E:18:VAL:HG22 | 2.12 | 0.48 |
| 1:2:675:LEU:HD11 | 11:2:1002:ATP:N6 | 2.27 | 0.48 |
| 6:F:429:LEU:HD11 | 6:F:474:ILE:CD1 | 2.43 | 0.48 |
| 6:F:516:ASP:OD2 | 6:F:611:ARG:NH1 | 2.44 | 0.48 |
| 6:7:18:GLN:CD | 6:7:84:LEU:HD21 | 2.34 | 0.48 |
| 1:A:516:ASP:CB | 1:A:625:THR:HG22 | 2.44 | 0.48 |
| 1:A:577:VAL:HG22 | 1:A:622:ALA:HB2 | 1.94 | 0.48 |
| 5:E:450:MET:HE3 | 5:E:493:LEU:HD22 | 1.94 | 0.48 |
| 6:F:434:LEU:HD12 | 6:F:467:ILE:HD11 | 1.95 | 0.48 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
| --- | --- | --- | --- |
| 2:3:639:LEU:HD23 | 2:3:639:LEU:O | 2.13 | 0.48 |
| 3:4:470:ILE:CD1 | 3:4:519:LEU:HD22 | 2.44 | 0.48 |
| 1:A:576:LEU:O | 1:A:622:ALA:HB1 | 2.14 | 0.48 |
| 5:E:117:LEU:HD12 | 5:E:136:ARG:HB2 | 1.95 | 0.48 |
| 2:3:486:LEU:HD11 | 2:3:655:LYS:HE2 | 1.96 | 0.48 |
| 6:7:588:MET:SD | 6:7:601:THR:OG1 | 2.64 | 0.48 |
| 1:2:617:VAL:HG21 | 2:3:211:GLY:HA2 | 1.94 | 0.48 |
| 4:5:339:ILE:O | 4:5:393:PHE:CZ | 2.67 | 0.48 |
| 2:3:44:GLN:O | 2:3:91:TYR:OH | 2.27 | 0.48 |
| 2:3:422:ILE:HG22 | 2:3:426:MET:HG3 | 1.95 | 0.48 |
| 6:7:56:ALA:HB2 | 6:7:63:VAL:HG21 | 1.95 | 0.48 |
| 2:B:387:GLU:HG3 | 2:B:388:THR:HG23 | 1.96 | 0.48 |
| 7:O:32:DT:H2" | 7:O:33:DT:H71 | 1.95 | 0.48 |
| 4:D:59:LEU:HD21 | 4:D:70:ILE:HD13 | 1.95 | 0.48 |
| 5:E:446:ALA:HB1 | 5:E:450:MET:HB2 | 1.96 | 0.48 |
| 2:3:384:THR:HG23 | 7:O:12:DA:OP1 | 2.14 | 0.47 |
| 4:5:173:ARG:O | 4:5:176:ARG:NH1 | 2.47 | 0.47 |
| 6:7:52:LEU:HD12 | 6:7:141:PRO:HD3 | 1.96 | 0.47 |
| 6:7:372:ARG:NH2 | 6:7:374:ASN:O | 2.46 | 0.47 |
| 2:B:84:VAL:HG11 | 2:B:98:PHE:CZ | 2.49 | 0.47 |
| 3:C:573:ILE:CD1 | 3:C:613:VAL:HG13 | 2.44 | 0.47 |
| 2:3:380:ALA:CB | 2:3:433:ILE:HD13 | 2.44 | 0.47 |
| 2:3:393:LEU:HD12 | 2:3:433:ILE:HD11 | 1.95 | 0.47 |
| 5:E:535:ILE:HG22 | 5:E:537:VAL:HG23 | 1.96 | 0.47 |
| 1:2:731:VAL:HG13 | 1:2:784:ASP:OD1 | 2.13 | 0.47 |
| 4:5:464:GLN:OE1 | 4:5:464:GLN:N | 2.47 | 0.47 |
| 3:C:723:SER:OG | 3:C:776:PRO:O | 2.19 | 0.47 |
| 1:2:524:ASP:OD2 | 1:2:665:ASP:N | 2.39 | 0.47 |
| 1:2:546:THR:HG21 | 1:2:556:LEU:HD11 | 1.95 | 0.47 |
| 3:4:760:GLU:OE2 | 3:4:763:ARG:NH2 | 2.48 | 0.47 |
| 6:7:223:GLN:O | 6:7:227:SER:OG | 2.17 | 0.47 |
| 3:C:732:ARG:NH2 | 12:E:1002:ADP:O2B | 2.44 | 0.47 |
| 1:2:308:THR:HG22 | 1:2:309:SER:N | 2.29 | 0.47 |
| 5:6:228:LEU:HD13 | 5:6:232:ALA:O | 2.15 | 0.47 |
| 2:3:31:ILE:O | 2:3:34:SER:OG | 2.26 | 0.47 |
| 2:3:71:GLU:OE1 | 2:3:71:GLU:N | 2.43 | 0.47 |
| 3:4:512:PRO:O | 6:7:604:ARG:NE | 2.37 | 0.47 |
| 4:5:416:ALA:HB2 | 4:5:435:VAL:HG21 | 1.95 | 0.47 |
| 4:5:504:ILE:HD11 | 4:5:605:SER:HB2 | 1.95 | 0.47 |
| 5:6:244:PHE:HD2 | 5:6:303:VAL:HG22 | 1.79 | 0.47 |
| 2:B:436:ALA:CB | 6:F:417:ALA:HB3 | 2.45 | 0.47 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 3:C:303:PHE:O | 3:C:339:LEU:HD12 | 2.14 | 0.47 |
| 4:D:589:MET:HE1 | 4:D:648:THR:HG21 | 1.97 | 0.47 |
| 5:E:206:VAL:HG22 | 5:E:226:VAL:HG13 | 1.95 | 0.47 |
| 6:7:84:LEU:HD22 | 6:7:88:TYR:HE2 | 1.80 | 0.47 |
| 6:7:220:LEU:HD23 | 6:7:220:LEU:H | 1.78 | 0.47 |
| 1:A:604:MET:CE | 1:A:626:VAL:HG11 | 2.45 | 0.47 |
| 4:D:175:CYS:SG | 4:D:177:ASN:ND2 | 2.88 | 0.47 |
| 2:3:613:VAL:HA | 2:3:617:THR:HG21 | 1.97 | 0.47 |
| 5:E:652:LEU:HD13 | 5:E:652:LEU:O | 2.14 | 0.47 |
| 2:3:383:THR:HG22 | 2:3:384:THR:N | 2.29 | 0.47 |
| 1:A:759:SER:CB | 1:A:810:VAL:HG11 | 2.45 | 0.47 |
| 4:D:62:HIS:ND1 | 4:D:69:TRP:O | 2.48 | 0.47 |
| 11:2:1002:ATP:O3' | 5:6:622:GLU:OE2 | 2.31 | 0.46 |
| 2:B:5:VAL:HG23 | 2:B:5:VAL:O | 2.15 | 0.46 |
| 4:D:340:ALA:O | 4:D:350:LYS:NZ | 2.47 | 0.46 |
| 1:2:723:TYR:OH | 1:2:782:LEU:HD13 | 2.15 | 0.46 |
| 2:B:287:PHE:CZ | 2:B:295:ILE:HD11 | 2.49 | 0.46 |
| 3:C:350:GLN:HB2 | 3:C:379:VAL:HG13 | 1.98 | 0.46 |
| 4:D:40:ARG:NH1 | 4:D:109:GLU:OE1 | 2.48 | 0.46 |
| 1:2:497:LEU:O | 1:2:517:ILE:HD12 | 2.15 | 0.46 |
| 1:2:667:VAL:O | 1:2:667:VAL:HG23 | 2.16 | 0.46 |
| 3:C:158:ASN:OD1 | 3:C:158:ASN:N | 2.43 | 0.46 |
| 5:E:264:ALA:HB2 | 5:E:292:LEU:HD11 | 1.97 | 0.46 |
| 5:E:361:ASN:OD1 | 5:E:536:LEU:HD22 | 2.15 | 0.46 |
| 8:S:-5:DT:H2' | 8:S:-4:DT:H72 | 1.97 | 0.46 |
| 6:7:5:ASP:OD2 | 6:7:8:LEU:HD23 | 2.15 | 0.46 |
| 2:B:393:LEU:HD22 | 2:B:433:ILE:HD11 | 1.98 | 0.46 |
| 5:E:184:VAL:O | 5:E:184:VAL:HG22 | 2.15 | 0.46 |
| 2:3:329:LEU:N | 2:3:329:LEU:HD12 | 2.30 | 0.46 |
| 2:3:369:THR:HG22 | 2:3:370:GLY:N | 2.31 | 0.46 |
| 4:5:282:ARG:NH2 | 5:6:440:HIS:O | 2.48 | 0.46 |
| 6:7:570:GLN:OE1 | 6:7:570:GLN:N | 2.41 | 0.46 |
| 3:C:175:ASP:HB3 | 3:C:178:ALA:HB2 | 1.98 | 0.46 |
| 5:E:302:CYS:SG | 5:E:303:VAL:N | 2.88 | 0.46 |
| 1:2:268:LEU:HD11 | 1:2:275:ASP:HB2 | 1.98 | 0.46 |
| 2:3:70:PHE:O | 2:3:74:VAL:HG23 | 2.15 | 0.46 |
| 3:4:159:VAL:HG13 | 3:4:236:THR:HG22 | 1.96 | 0.46 |
| 5:6:434:VAL:HG12 | 5:6:435:ARG:N | 2.30 | 0.46 |
| 2:B:621:LEU:HD21 | 2:B:649:VAL:HG11 | 1.98 | 0.46 |
| 6:F:119:VAL:HG13 | 6:F:119:VAL:O | 2.16 | 0.46 |
| 2:3:261:ILE:N | 2:3:261:ILE:HD12 | 2.30 | 0.46 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 4:5:257:VAL:HG12 | 4:5:301:VAL:CG2 | 2.46 | 0.46 |
| 1:A:414:LEU:HD11 | 1:A:441:ALA:HB1 | 1.98 | 0.46 |
| 1:2:278:THR:O | 1:2:278:THR:HG22 | 2.16 | 0.46 |
| 4:5:442:VAL:O | 4:5:442:VAL:HG23 | 2.15 | 0.46 |
| 5:6:402:LYS:NZ | 12:6:1002:ADP:O3B | 2.44 | 0.46 |
| 3:C:624:TRP:CZ3 | 3:C:649:LEU:HD22 | 2.51 | 0.46 |
| 6:F:435:VAL:CG2 | 6:F:478:LEU:HD23 | 2.46 | 0.46 |
| 3:4:112:VAL:HG22 | 3:4:257:GLN:HG3 | 1.98 | 0.46 |
| 1:A:392:ARG:NH2 | 5:E:234:GLU:OE2 | 2.43 | 0.46 |
| 3:C:755:ALA:HA | 3:C:758:VAL:HG22 | 1.97 | 0.46 |
| 5:E:753:LEU:HD23 | 5:E:754:LYS:HD2 | 1.98 | 0.46 |
| 1:2:193:LEU:HD23 | 1:2:193:LEU:C | 2.36 | 0.46 |
| 3:4:710:LEU:HD23 | 3:4:758:VAL:HG13 | 1.98 | 0.46 |
| 5:6:82:GLU:O | 5:6:86:VAL:HG22 | 2.15 | 0.46 |
| 5:6:391:ASN:OD1 | 5:6:499:ILE:N | 2.47 | 0.46 |
| 3:C:404:ARG:HE | 7:O:31:DT:P | 2.39 | 0.46 |
| 6:F:77:PHE:O | 6:F:81:VAL:HG23 | 2.15 | 0.46 |
| 6:F:362:VAL:HG23 | 6:F:364:GLN:OE1 | 2.16 | 0.46 |
| 2:3:281:ILE:HG22 | 2:3:285:LYS:HZ2 | 1.78 | 0.45 |
| 2:3:380:ALA:CB | 2:3:442:LEU:HD12 | 2.44 | 0.45 |
| 2:3:494:ASP:OD1 | 4:5:587:ILE:HD13 | 2.15 | 0.45 |
| 3:4:663:ALA:O | 3:4:667:VAL:HG23 | 2.16 | 0.45 |
| 3:4:514:THR:HG22 | 3:4:515:SER:H | 1.81 | 0.45 |
| 4:5:538:THR:O | 4:5:541:VAL:HG22 | 2.15 | 0.45 |
| 6:7:574:PRO:CG | 6:7:624:VAL:HG13 | 2.46 | 0.45 |
| 1:A:491:ILE:HD11 | 1:A:663:VAL:HG22 | 1.98 | 0.45 |
| 5:E:53:LEU:HD21 | 5:E:110:PHE:CD1 | 2.52 | 0.45 |
| 4:5:634:GLU:HA | 4:5:637:VAL:HG12 | 1.97 | 0.45 |
| 4:D:637:VAL:O | 4:D:641:LEU:HD23 | 2.16 | 0.45 |
| 4:5:257:VAL:HG12 | 4:5:301:VAL:HG22 | 1.99 | 0.45 |
| 5:6:465:MET:SD | 5:6:473:ILE:HD12 | 2.56 | 0.45 |
| 5:E:571:ASP:OD1 | 5:E:574:ARG:NH2 | 2.45 | 0.45 |
| 7:O:34:DT:H2' | 7:O:35:DT:H71 | 1.99 | 0.45 |
| 2:3:141:VAL:HG12 | 6:7:292:LEU:HB2 | 1.97 | 0.45 |
| 5:6:378:LYS:O | 5:6:386:LEU:N | 2.50 | 0.45 |
| 2:B:288:SER:O | 2:B:292:SER:OG | 2.33 | 0.45 |
| 3:C:340:ILE:HG21 | 3:C:343:ARG:HG3 | 1.98 | 0.45 |
| 6:F:415:THR:HG22 | 6:F:416:ALA:N | 2.31 | 0.45 |
| 6:F:563:ILE:O | 6:F:567:ARG:HG3 | 2.17 | 0.45 |
| 1:2:783:ARG:O | 1:2:784:ASP:HB2 | 2.16 | 0.45 |
| 2:B:291:ARG:HB2 | 2:B:295:ILE:HD13 | 1.98 | 0.45 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 5:E:179:ILE:O | 5:E:181:ARG:NH2 | 2.43 | 0.45 |
| 1:2:456:LEU:N | 1:2:456:LEU:HD22 | 2.31 | 0.45 |
| 1:2:783:ARG:HD3 | 1:2:787:ILE:HD12 | 1.99 | 0.45 |
| 2:3:621:LEU:HD23 | 2:3:649:VAL:HG21 | 1.97 | 0.45 |
| 4:5:232:LEU:O | 4:5:236:VAL:HG23 | 2.17 | 0.45 |
| 6:7:429:LEU:HD11 | 6:7:474:ILE:HD12 | 1.99 | 0.45 |
| 2:B:291:ARG:O | 2:B:295:ILE:HD13 | 2.16 | 0.45 |
| 3:C:476:ILE:HD13 | 3:C:650:MET:HE3 | 1.98 | 0.45 |
| 6:F:416:ALA:CB | 6:F:478:LEU:HD21 | 2.46 | 0.45 |
| 4:5:363:LYS:NZ | 4:5:621:GLU:OE2 | 2.44 | 0.45 |
| 4:5:574:LEU:HD23 | 4:5:632:ALA:HB3 | 1.99 | 0.45 |
| 1:A:373:TYR:CE1 | 1:A:397:ILE:HG23 | 2.51 | 0.45 |
| 2:B:244:LEU:HD21 | 2:B:259:VAL:HG11 | 1.99 | 0.45 |
| 3:C:508:LEU:HD13 | 3:C:650:MET:HE1 | 1.99 | 0.45 |
| 4:D:232:LEU:O | 4:D:236:VAL:HG23 | 2.15 | 0.45 |
| 5:E:389:ASP:OD2 | 5:E:480:GLN:NE2 | 2.47 | 0.45 |
| 5:E:516:LEU:HD12 | 5:E:614:TRP:CE3 | 2.51 | 0.45 |
| 5:6:154:GLY:O | 5:6:168:VAL:HG12 | 2.17 | 0.45 |
| 1:A:684:VAL:HG22 | 5:E:586:ILE:HB | 1.98 | 0.45 |
| 1:A:721:LYS:O | 1:A:725:ILE:HG12 | 2.17 | 0.45 |
| 6:F:523:ASP:OD1 | 6:F:523:ASP:N | 2.49 | 0.45 |
| 1:2:420:ASN:OD1 | 1:2:435:PHE:HB3 | 2.17 | 0.45 |
| 3:4:682:LEU:CD2 | 3:4:686:VAL:HG13 | 2.46 | 0.45 |
| 12:5:1002:ADP:O1A | 12:5:1002:ADP:O1B | 2.35 | 0.45 |
| 1:2:227:ARG:O | 1:2:228:GLU:HG2 | 2.17 | 0.44 |
| 3:4:367:PRO:HD2 | 6:7:478:LEU:HD13 | 1.98 | 0.44 |
| 3:4:560:THR:HG22 | 5:6:220:ILE:HD11 | 1.98 | 0.44 |
| 5:6:325:ILE:O | 5:6:329:MET:HG3 | 2.17 | 0.44 |
| 1:A:680:VAL:O | 1:A:684:VAL:HG23 | 2.17 | 0.44 |
| 3:C:127:VAL:HG21 | 3:C:153:TRP:CE3 | 2.43 | 0.44 |
| 1:2:513:VAL:O | 1:2:513:VAL:HG23 | 2.16 | 0.44 |
| 3:4:187:ASP:OD1 | 3:4:189:THR:HG22 | 2.17 | 0.44 |
| 3:4:302:ALA:HB1 | 3:4:339:LEU:HD13 | 1.99 | 0.44 |
| 4:5:418:VAL:HG22 | 4:5:469:ILE:HG21 | 1.99 | 0.44 |
| 1:A:203:LEU:C | 1:A:203:LEU:HD13 | 2.38 | 0.44 |
| 2:B:303:LEU:O | 2:B:357:TYR:OH | 2.34 | 0.44 |
| 2:B:417:MET:SD | 6:F:407:ARG:NE | 2.90 | 0.44 |
| 2:B:495:ARG:HG2 | 4:D:587:ILE:HD13 | 1.99 | 0.44 |
| 4:D:275:GLY:C | 4:D:276:LEU:HD23 | 2.38 | 0.44 |
| 5:E:35:GLU:O | 5:E:44:ILE:HD13 | 2.17 | 0.44 |
| 6:F:17:LEU:HD21 | 6:F:81:VAL:HG22 | 1.98 | 0.44 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 3:4:190:GLU:O | 3:4:195:GLN:NE2 | 2.50 | 0.44 |
| 3:4:295:LEU:HD11 | 3:4:379:VAL:CG1 | 2.47 | 0.44 |
| 3:4:402:ASN:HB2 | 3:4:405:VAL:HG22 | 1.98 | 0.44 |
| 6:7:182:TYR:HB2 | 6:7:220:LEU:HD12 | 1.99 | 0.44 |
| 1:A:647:VAL:HG11 | 1:A:654:ILE:HD11 | 1.98 | 0.44 |
| 1:A:848:ARG:NH1 | 5:E:603:GLN:O | 2.50 | 0.44 |
| 2:3:593:GLU:HG2 | 2:3:646:VAL:HG22 | 1.99 | 0.44 |
| 4:5:150:LYS:HE2 | 4:5:264:THR:HG21 | 1.98 | 0.44 |
| 4:5:178:THR:HG22 | 4:5:179:LEU:N | 2.33 | 0.44 |
| 6:7:148:VAL:O | 6:7:151:GLU:N | 2.50 | 0.44 |
| 6:F:184:CYS:SG | 6:F:185:ASP:N | 2.91 | 0.44 |
| 7:O:38:DT:H2" | 7:O:39:DT:C7 | 2.48 | 0.44 |
| 8:S:-4:DT:H2' | 8:S:-3:DT:H72 | 1.99 | 0.44 |
| 5:6:604:ARG:HH21 | 5:6:656:ILE:HG22 | 1.83 | 0.44 |
| 1:A:402:LEU:O | 1:A:405:SER:OG | 2.16 | 0.44 |
| 2:B:6:VAL:HG11 | 2:B:9:ASP:HB2 | 1.99 | 0.44 |
| 2:B:614:THR:HG21 | 6:F:384:GLY:HA3 | 1.99 | 0.44 |
| 3:C:374:ALA:HB1 | 3:C:378:LEU:HB2 | 1.99 | 0.44 |
| 6:F:434:LEU:CD1 | 6:F:467:ILE:HD11 | 2.46 | 0.44 |
| 7:O:18:DA:H2" | 7:O:19:DA:C8 | 2.53 | 0.44 |
| 1:2:827:ASP:OD1 | 1:2:830:GLU:N | 2.39 | 0.44 |
| 6:7:616:LEU:O | 6:7:616:LEU:HD13 | 2.18 | 0.44 |
| 1:A:738:MET:HG3 | 1:A:791:VAL:HG21 | 2.00 | 0.44 |
| 2:B:408:ILE:HG21 | 2:B:414:MET:HE3 | 1.99 | 0.44 |
| 1:2:356:GLN:NE2 | 5:E:186:ALA:O | 2.48 | 0.44 |
| 4:5:474:ILE:HD12 | 4:5:476:THR:CG2 | 2.47 | 0.44 |
| 5:6:573:ARG:O | 5:6:577:LEU:HD23 | 2.16 | 0.44 |
| 2:B:25:ASP:O | 2:B:30:GLY:N | 2.49 | 0.44 |
| 2:B:223:ASP:O | 2:B:224:ASP:OD1 | 2.35 | 0.44 |
| 3:C:698:ILE:HG21 | 3:C:746:LYS:HA | 2.00 | 0.44 |
| 5:E:123:ILE:HD12 | 5:E:210:GLU:HA | 2.00 | 0.44 |
| 6:F:224:THR:HG22 | 6:F:229:PHE:HZ | 1.81 | 0.44 |
| 1:2:215:PHE:CE1 | 1:2:230:LEU:HD21 | 2.53 | 0.44 |
| 6:7:404:THR:HG23 | 6:7:409:SER:HG | 1.82 | 0.44 |
| 3:C:188:ILE:O | 3:C:188:ILE:HG22 | 2.17 | 0.44 |
| 6:F:215:ARG:HE | 6:F:215:ARG:HA | 1.83 | 0.44 |
| 1:2:430:ASN:HB2 | 5:6:254:VAL:HG12 | 1.99 | 0.44 |
| 2:3:593:GLU:HG2 | 2:3:646:VAL:HG13 | 1.99 | 0.44 |
| 4:5:450:MET:SD | 4:5:458:ILE:HD12 | 2.58 | 0.44 |
| 5:6:224:LEU:C | 5:6:224:LEU:HD12 | 2.39 | 0.44 |
| 1:A:807:LYS:O | 1:A:811:MET:N | 2.41 | 0.44 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 2:B:614:THR:HG22 | 2:B:615:ALA:H | 1.82 | 0.44 |
| 5:E:30:PHE:HZ | 5:E:112:VAL:HG11 | 1.82 | 0.44 |
| 5:E:99:LYS:NZ | 5:E:106:LEU:HD13 | 2.33 | 0.44 |
| 7:O:31:DT:H2" | 7:O:32:DT:C7 | 2.47 | 0.44 |
| 1:2:207:VAL:O | 1:2:213:ASN:N | 2.51 | 0.43 |
| 6:F:340:ILE:HD12 | 6:F:355:LEU:HB2 | 2.00 | 0.43 |
| 1:2:336:LEU:HD21 | 1:2:361:PHE:CE1 | 2.53 | 0.43 |
| 3:4:473:HIS:ND1 | 3:4:476:ILE:HD12 | 2.33 | 0.43 |
| 1:A:203:LEU:HD13 | 1:A:203:LEU:O | 2.18 | 0.43 |
| 5:E:16:LEU:N | 5:E:16:LEU:HD23 | 2.32 | 0.43 |
| 1:2:414:LEU:HD12 | 1:2:444:VAL:HG22 | 2.00 | 0.43 |
| 1:2:495:LEU:HD11 | 1:2:627:ILE:HG21 | 2.01 | 0.43 |
| 3:4:263:PHE:HA | 3:4:391:THR:HG21 | 2.01 | 0.43 |
| 3:4:624:TRP:CD1 | 3:4:651:LEU:HD11 | 2.54 | 0.43 |
| 4:5:380:LEU:HD23 | 4:5:488:ALA:HB3 | 2.00 | 0.43 |
| 3:C:622:SER:OG | 6:F:510:ALA:N | 2.51 | 0.43 |
| 5:E:450:MET:CE | 5:E:493:LEU:HD22 | 2.48 | 0.43 |
| 1:2:735:LEU:CD2 | 1:2:771:ILE:HG23 | 2.49 | 0.43 |
| 1:A:849:ASN:HB2 | 5:E:727:ILE:HD11 | 1.99 | 0.43 |
| 2:B:502:LEU:HD21 | 4:D:613:LEU:HD21 | 1.99 | 0.43 |
| 5:E:450:MET:SD | 5:E:482:ILE:HD12 | 2.58 | 0.43 |
| 2:3:369:THR:HG22 | 2:3:370:GLY:H | 1.83 | 0.43 |
| 4:5:356:LEU:HD12 | 4:5:375:ILE:HB | 2.01 | 0.43 |
| 6:7:563:ILE:O | 6:7:567:ARG:HG2 | 2.18 | 0.43 |
| 4:D:339:ILE:HD12 | 4:D:340:ALA:HB2 | 2.01 | 0.43 |
| 6:F:319:LEU:HD22 | 6:F:319:LEU:N | 2.34 | 0.43 |
| 1:2:657:PHE:HB2 | 1:2:660:LEU:HD11 | 1.99 | 0.43 |
| 4:5:146:SER:N | 4:5:269:TYR:O | 2.36 | 0.43 |
| 8:S:-5:DT:C2' | 8:S:-4:DT:H72 | 2.48 | 0.43 |
| 3:4:604:ILE:HD11 | 5:6:451:LEU:CD1 | 2.49 | 0.43 |
| 4:5:650:ASP:OD1 | 4:5:651:ALA:N | 2.51 | 0.43 |
| 1:A:536:ILE:HG21 | 1:A:627:ILE:HD12 | 2.01 | 0.43 |
| 2:B:597:LEU:CD1 | 2:B:613:VAL:HG11 | 2.48 | 0.43 |
| 3:C:598:ILE:HD11 | 3:C:605:CYS:SG | 2.59 | 0.43 |
| 6:F:415:THR:CG2 | 6:F:469:ILE:HD11 | 2.47 | 0.43 |
| 5:6:358:ILE:O | 5:6:365:LYS:NZ | 2.42 | 0.43 |
| 6:7:421:ASP:OD1 | 6:7:422:SER:N | 2.46 | 0.43 |
| 6:7:578:ALA:O | 6:7:582:THR:HG23 | 2.19 | 0.43 |
| 6:7:177:MET:SD | 6:7:180:ALA:HB2 | 2.58 | 0.43 |
| 1:A:787:ILE:HG22 | 1:A:788:GLU:N | 2.34 | 0.43 |
| 3:C:117:ASP:N | 3:C:117:ASP:OD1 | 2.51 | 0.43 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:2:308:THR:HG22 | 1:2:309:SER:H | 1.83 | 0.43 |
| 2:3:340:ASN:C | 2:3:341:ILE:HD12 | 2.39 | 0.43 |
| 4:5:400:ILE:HD13 | 4:5:438:ASP:O | 2.19 | 0.43 |
| 5:6:225:GLU:OE1 | 5:6:225:GLU:N | 2.43 | 0.43 |
| 1:A:292:GLU:O | 1:A:308:THR:HG22 | 2.19 | 0.43 |
| 1:A:458:ASP:OD1 | 1:A:458:ASP:N | 2.50 | 0.43 |
| 3:C:713:ALA:HB2 | 3:C:762:LYS:HD2 | 2.00 | 0.43 |
| 5:E:442:PHE:HB2 | 5:E:489:VAL:HG11 | 2.01 | 0.43 |
| 6:F:58:ASP:OD1 | 6:F:58:ASP:N | 2.52 | 0.43 |
| 7:O:38:DT:H2" | 7:O:39:DT:H72 | 2.00 | 0.43 |
| 5:6:162:GLN:N | 5:6:162:GLN:OE1 | 2.51 | 0.42 |
| 4:D:325:LEU:HD12 | 4:D:328:LEU:HD12 | 2.00 | 0.42 |
| 1:2:425:SER:HG | 1:2:435:PHE:HE1 | 1.65 | 0.42 |
| 2:3:469:ILE:HD13 | 2:3:482:LEU:HD21 | 2.01 | 0.42 |
| 3:4:717:MET:HA | 3:4:720:ILE:HG22 | 2.00 | 0.42 |
| 4:5:339:ILE:HG13 | 4:5:340:ALA:H | 1.84 | 0.42 |
| 5:6:561:GLU:O | 5:6:562:SER:OG | 2.36 | 0.42 |
| 2:B:195:ASP:OD1 | 2:B:195:ASP:N | 2.45 | 0.42 |
| 4:D:524:HIS:CG | 4:D:524:HIS:O | 2.71 | 0.42 |
| 2:3:169:PRO:O | 2:3:173:VAL:HG23 | 2.19 | 0.42 |
| 4:5:128:LEU:HD23 | 4:5:128:LEU:N | 2.33 | 0.42 |
| 5:6:147:VAL:HG13 | 5:6:233:VAL:HG21 | 2.01 | 0.42 |
| 5:6:206:VAL:HG22 | 5:6:226:VAL:HG22 | 2.01 | 0.42 |
| 6:7:326:GLN:OE1 | 6:7:562:TYR:OH | 2.25 | 0.42 |
| 6:7:404:THR:HG23 | 6:7:409:SER:OG | 2.20 | 0.42 |
| 4:D:582:LEU:HD13 | 4:D:582:LEU:C | 2.39 | 0.42 |
| 1:2:546:THR:HG21 | 1:2:556:LEU:CD1 | 2.48 | 0.42 |
| 5:6:68:LEU:HD21 | 5:6:79:ILE:CD1 | 2.48 | 0.42 |
| 5:6:117:LEU:HD22 | 5:6:119:THR:O | 2.20 | 0.42 |
| 5:6:277:GLU:OE1 | 4:D:198:ASN:ND2 | 2.52 | 0.42 |
| 5:6:343:ASP:OD2 | 5:6:567:TYR:OH | 2.36 | 0.42 |
| 3:C:390:VAL:HG23 | 3:C:418:VAL:HG13 | 2.00 | 0.42 |
| 4:D:321:GLU:OE2 | 4:D:558:LYS:NZ | 2.44 | 0.42 |
| 2:3:157:ARG:NH2 | 2:3:170:SER:O | 2.53 | 0.42 |
| 3:4:515:SER:O | 3:4:519:LEU:HD23 | 2.18 | 0.42 |
| 4:5:331:VAL:HA | 4:5:334:VAL:HG12 | 2.01 | 0.42 |
| 6:7:163:VAL:HG12 | 6:7:164:ARG:N | 2.35 | 0.42 |
| 1:A:430:ASN:ND2 | 5:E:437:GLU:O | 2.53 | 0.42 |
| 5:E:452:ALA:O | 5:E:455:GLY:N | 2.49 | 0.42 |
| 1:2:599:SER:HA | 4:5:410:SER:HB2 | 2.02 | 0.42 |
| 3:4:241:VAL:CG1 | 3:4:258:ILE:HG21 | 2.45 | 0.42 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 5:6:387:ARG:NH1 | 5:6:529:ARG:O | 2.45 | 0.42 |
| 5:6:605:ASP:HB2 | 5:6:616:ILE:HD13 | 2.02 | 0.42 |
| 1:A:799:LEU:O | 1:A:800:GLU:C | 2.58 | 0.42 |
| 3:C:170:LEU:CD2 | 3:C:241:VAL:HG12 | 2.38 | 0.42 |
| 3:C:715:VAL:HG21 | 5:E:546:TYR:CE2 | 2.55 | 0.42 |
| 4:D:608:ILE:HD12 | 4:D:608:ILE:N | 2.35 | 0.42 |
| 5:E:786:VAL:HG22 | 5:E:787:LEU:H | 1.85 | 0.42 |
| 1:A:230:LEU:HD23 | 1:A:230:LEU:C | 2.39 | 0.42 |
| 6:F:458:ILE:O | 6:F:461:VAL:HG12 | 2.19 | 0.42 |
| 4:5:217:ASP:OD1 | 4:5:217:ASP:N | 2.52 | 0.42 |
| 5:6:148:HIS:NE2 | 5:6:436:ASP:OD2 | 2.51 | 0.42 |
| 5:6:179:ILE:HD12 | 5:6:188:ARG:CG | 2.50 | 0.42 |
| 2:B:524:VAL:HG13 | 2:B:525:ASP:N | 2.35 | 0.42 |
| 3:4:117:ASP:OD1 | 3:4:117:ASP:N | 2.50 | 0.42 |
| 3:4:386:ASP:OD1 | 3:4:529:ARG:NH1 | 2.53 | 0.42 |
| 3:4:723:SER:OG | 3:4:724:ARG:N | 2.53 | 0.42 |
| 4:D:269:TYR:HA | 4:D:294:ILE:HD13 | 2.01 | 0.42 |
| 6:F:397:LEU:C | 6:F:397:LEU:HD23 | 2.40 | 0.42 |
| 6:F:507:LEU:HG | 6:F:512:LEU:HD11 | 2.02 | 0.42 |
| 1:2:735:LEU:HD21 | 1:2:771:ILE:HG23 | 2.02 | 0.42 |
| 3:4:237:PHE:HB3 | 3:4:260:VAL:HG11 | 2.02 | 0.42 |
| 3:4:608:ASN:OD1 | 5:6:212:GLN:NE2 | 2.53 | 0.42 |
| 4:5:155:ILE:HD11 | 4:5:263:VAL:HG21 | 2.02 | 0.41 |
| 5:E:460:ASP:OD1 | 5:E:461:GLU:N | 2.51 | 0.41 |
| 6:F:362:VAL:HG13 | 6:F:614:THR:CG2 | 2.50 | 0.41 |
| 6:F:420:ARG:NH1 | 6:F:421:ASP:O | 2.53 | 0.41 |
| 1:2:230:LEU:C | 1:2:230:LEU:HD23 | 2.40 | 0.41 |
| 1:2:421:ASN:HB3 | 5:6:195:THR:HG21 | 2.01 | 0.41 |
| 2:3:236:GLN:HB2 | 2:3:534:PHE:CD2 | 2.55 | 0.41 |
| 2:3:385:ASP:O | 2:3:386:GLN:HB3 | 2.20 | 0.41 |
| 3:4:330:ARG:NH1 | 5:6:18:VAL:HG22 | 2.35 | 0.41 |
| 3:4:775:ASP:N | 3:4:775:ASP:OD1 | 2.53 | 0.41 |
| 4:5:380:LEU:HD13 | 4:5:504:ILE:HG22 | 2.01 | 0.41 |
| 4:5:585:ARG:HG3 | 4:5:641:LEU:HD13 | 2.02 | 0.41 |
| 4:5:649:LEU:HD12 | 4:5:649:LEU:C | 2.41 | 0.41 |
| 5:6:570:ASP:OD1 | 5:6:573:ARG:NH1 | 2.53 | 0.41 |
| 6:7:3:LEU:N | 6:7:3:LEU:HD22 | 2.35 | 0.41 |
| 6:7:627:LYS:HA | 6:7:630:VAL:HG12 | 2.02 | 0.41 |
| 1:A:293:GLU:OE2 | 1:A:295:ARG:NH2 | 2.53 | 0.41 |
| 4:D:339:ILE:HD11 | 4:D:350:LYS:HG2 | 2.02 | 0.41 |
| 1:2:590:ASP:N | 1:2:590:ASP:OD1 | 2.53 | 0.41 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 2:3:223:ASP:N | 2:3:223:ASP:OD1 | 2.53 | 0.41 |
| 4:5:67:GLU:O | 4:5:252:TYR:CZ | 2.73 | 0.41 |
| 6:7:397:LEU:O | 6:7:560:ARG:NE | 2.53 | 0.41 |
| 3:C:299:MET:HE3 | 5:E:292:LEU:HD13 | 2.02 | 0.41 |
| 4:D:361:SER:N | 4:D:621:GLU:OE1 | 2.47 | 0.41 |
| 6:F:447:PHE:HE1 | 6:F:458:ILE:HG21 | 1.86 | 0.41 |
| 2:3:393:LEU:N | 2:3:393:LEU:HD22 | 2.35 | 0.41 |
| 3:4:348:ASP:OD1 | 5:6:128:SER:OG | 2.35 | 0.41 |
| 3:4:388:VAL:HG12 | 3:4:423:LYS:CD | 2.49 | 0.41 |
| 4:5:145:MET:HE1 | 4:5:271:ILE:HG23 | 2.00 | 0.41 |
| 5:6:126:LEU:HD11 | 5:6:137:ILE:HG21 | 2.02 | 0.41 |
| 5:6:400:THR:HG21 | 5:6:536:LEU:HB3 | 2.02 | 0.41 |
| 6:7:460:GLU:HG2 | 6:7:466:THR:O | 2.20 | 0.41 |
| 1:A:558:ALA:HB3 | 1:A:611:ILE:HD11 | 2.02 | 0.41 |
| 3:C:382:VAL:O | 3:C:382:VAL:HG23 | 2.19 | 0.41 |
| 3:C:495:THR:HG22 | 5:E:563:ILE:HG13 | 2.02 | 0.41 |
| 3:C:710:LEU:HD13 | 3:C:738:ILE:HG12 | 2.02 | 0.41 |
| 6:F:606:LEU:C | 6:F:606:LEU:HD23 | 2.40 | 0.41 |
| 1:2:414:LEU:HD11 | 1:2:441:ALA:CB | 2.50 | 0.41 |
| 1:2:464:ILE:HG21 | 1:2:726:TYR:CD2 | 2.55 | 0.41 |
| 4:5:532:LEU:HD21 | 12:5:1002:ADP:C6 | 2.56 | 0.41 |
| 1:A:391:PRO:CD | 5:E:493:LEU:HD23 | 2.51 | 0.41 |
| 2:B:424:GLU:OE1 | 6:F:405:THR:HG21 | 2.20 | 0.41 |
| 3:C:712:GLU:HA | 3:C:715:VAL:HG12 | 2.03 | 0.41 |
| 5:E:54:ILE:HG21 | 5:E:102:LYS:HZ3 | 1.86 | 0.41 |
| 5:E:68:LEU:HD22 | 5:E:114:PHE:CE1 | 2.56 | 0.41 |
| 1:2:414:LEU:HD11 | 1:2:441:ALA:HB2 | 2.01 | 0.41 |
| 3:4:167:GLN:HG3 | 3:4:240:ALA:HB1 | 2.02 | 0.41 |
| 1:A:414:LEU:CD1 | 1:A:444:VAL:HG12 | 2.51 | 0.41 |
| 1:A:560:VAL:O | 1:A:560:VAL:HG13 | 2.20 | 0.41 |
| 3:C:167:GLN:HG3 | 3:C:244:ILE:HD11 | 2.03 | 0.41 |
| 6:F:512:LEU:HD12 | 6:F:518:LEU:HD13 | 2.01 | 0.41 |
| 2:3:10:VAL:HG13 | 2:3:11:GLU:N | 2.36 | 0.41 |
| 2:3:412:ASP:HB2 | 2:3:452:ALA:HB1 | 2.03 | 0.41 |
| 2:3:577:ILE:HD12 | 2:3:577:ILE:N | 2.35 | 0.41 |
| 3:4:288:MET:HE2 | 3:4:290:ILE:HD13 | 2.03 | 0.41 |
| 5:6:587:SER:N | 5:6:590:SER:OG | 2.54 | 0.41 |
| 6:7:172:GLU:OE1 | 6:7:172:GLU:N | 2.43 | 0.41 |
| 1:A:535:TYR:CZ | 1:A:539:VAL:HG21 | 2.56 | 0.41 |
| 1:A:789:ASP:OD1 | 1:A:790:ASP:N | 2.54 | 0.41 |
| 3:C:631:ILE:HD11 | 3:C:727:VAL:HG22 | 2.03 | 0.41 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
| --- | --- | --- | --- |
| 4:D:376:ASN:O | 4:D:515:ASP:N | 2.54 | 0.41 |
| 4:D:582:LEU:HD13 | 4:D:582:LEU:O | 2.21 | 0.41 |
| 1:2:254:GLU:OE1 | 1:2:254:GLU:N | 2.43 | 0.41 |
| 1:2:787:ILE:CG2 | 1:2:788:GLU:N | 2.84 | 0.41 |
| 2:3:36:VAL:O | 2:3:40:ILE:HD13 | 2.20 | 0.41 |
| 4:5:168:ILE:HD13 | 4:5:184:MET:HE1 | 2.02 | 0.41 |
| 1:A:609:ILE:HG23 | 4:D:410:SER:HB3 | 2.03 | 0.41 |
| 5:E:546:TYR:O | 5:E:550:ARG:HG3 | 2.20 | 0.41 |
| 2:3:54:LEU:HD12 | 2:3:62:ALA:HA | 2.03 | 0.41 |
| 3:4:453:SER:CB | 3:4:749:LEU:HD12 | 2.51 | 0.41 |
| 4:5:538:THR:O | 4:5:539:LEU:C | 2.59 | 0.41 |
| 5:6:186:ALA:HB3 | 1:A:351:SER:O | 2.20 | 0.41 |
| 6:7:432:GLY:O | 6:7:436:LEU:HG | 2.21 | 0.41 |
| 11:A:1002:ATP:C8 | 5:E:618:VAL:HG11 | 2.56 | 0.41 |
| 2:B:482:LEU:HD23 | 2:B:482:LEU:C | 2.42 | 0.41 |
| 4:D:145:MET:O | 4:D:146:SER:OG | 2.23 | 0.41 |
| 4:D:337:LYS:O | 4:D:337:LYS:HD3 | 2.21 | 0.41 |
| 5:E:94:LEU:HD23 | 5:E:110:PHE:HB3 | 2.02 | 0.41 |
| 5:E:253:ASP:HB2 | 5:E:295:ARG:HG3 | 2.03 | 0.41 |
| 6:F:603:ALA:O | 6:F:607:LEU:HD23 | 2.20 | 0.41 |
| 7:O:33:DT:H2' | 7:O:34:DT:H72 | 2.02 | 0.41 |
| 1:2:373:TYR:OH | 4:5:284:ARG:NH2 | 2.54 | 0.41 |
| 2:3:111:VAL:O | 2:3:127:VAL:HA | 2.20 | 0.41 |
| 2:3:352:SER:O | 2:3:356:ARG:HG2 | 2.21 | 0.41 |
| 3:4:533:THR:HG22 | 3:4:534:SER:N | 2.36 | 0.41 |
| 6:7:445:ASP:OD1 | 6:7:446:GLU:N | 2.54 | 0.41 |
| 2:B:497:ILE:HG21 | 4:D:610:VAL:HG21 | 2.03 | 0.41 |
| 5:E:150:GLU:O | 5:E:201:VAL:N | 2.51 | 0.41 |
| 6:F:337:ALA:HB1 | 6:F:352:LYS:HG3 | 2.03 | 0.41 |
| 6:F:395:ASP:HA | 6:F:401:SER:HB2 | 2.02 | 0.41 |
| 6:F:450:MET:HG2 | 6:F:454:ASP:HB2 | 2.03 | 0.41 |
| 2:3:268:MET:HA | 2:3:534:PHE:CE2 | 2.55 | 0.40 |
| 2:3:270:LYS:HG2 | 2:3:535:SER:O | 2.21 | 0.40 |
| 3:4:640:LEU:HD13 | 3:4:640:LEU:O | 2.20 | 0.40 |
| 6:7:554:LEU:HD22 | 6:7:558:LEU:HD23 | 2.04 | 0.40 |
| 1:A:252:PRO:O | 1:A:256:LEU:HD13 | 2.21 | 0.40 |
| 3:C:646:LEU:HD23 | 3:C:648:PHE:CE2 | 2.56 | 0.40 |
| 1:2:610:SER:O | 4:5:410:SER:O | 2.39 | 0.40 |
| 2:3:54:LEU:O | 2:3:54:LEU:HD13 | 2.21 | 0.40 |
| 3:4:573:ILE:HD13 | 3:4:587:LEU:HD21 | 2.02 | 0.40 |
| 6:7:448:ASP:OD1 | 6:7:448:ASP:N | 2.52 | 0.40 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 4:D:301:VAL:O | 4:D:301:VAL:HG13 | 2.22 | 0.40 |
| 5:E:450:MET:HE1 | 5:E:493:LEU:HD13 | 2.02 | 0.40 |
| 5:E:786:VAL:HG22 | 5:E:787:LEU:N | 2.36 | 0.40 |
| 2:3:488:GLN:O | 4:5:590:ARG:NH2 | 2.54 | 0.40 |
| 4:5:164:LYS:NZ | 4:5:187:GLY:O | 2.48 | 0.40 |
| 1:A:743:VAL:HG21 | 4:D:537:ILE:HD13 | 2.03 | 0.40 |
| 1:A:764:VAL:O | 1:A:767:ILE:HG12 | 2.21 | 0.40 |
| 3:4:107:VAL:HG22 | 3:4:109:GLY:H | 1.86 | 0.40 |
| 4:5:195:ARG:NE | 4:5:210:ASP:OD1 | 2.49 | 0.40 |
| 5:6:515:SER:O | 5:6:519:ASN:ND2 | 2.48 | 0.40 |
| 5:E:45:LYS:O | 5:E:49:LEU:HD23 | 2.21 | 0.40 |
| 6:F:93:VAL:HG12 | 6:F:94:VAL:N | 2.36 | 0.40 |
| 2:3:487:ASP:OD1 | 4:5:590:ARG:NH2 | 2.43 | 0.40 |
| 1:A:677:ARG:NH2 | 5:E:592:ASP:OD1 | 2.50 | 0.40 |
| 4:D:586:TYR:CE2 | 4:D:613:LEU:HD12 | 2.57 | 0.40 |
| 5:E:410:GLU:OE2 | 5:E:458:CYS:HB2 | 2.22 | 0.40 |
| 5:E:723:ILE:O | 5:E:727:ILE:HG23 | 2.21 | 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 | 2 | 643/904 (71%) | 598 (93%) | 45 (7%) | 0 | 100 | 100 |
| 1 | A | 659/904 (73%) | 628 (95%) | 31 (5%) | 0 | 100 | 100 |
| 2 | 3 | 628/810 (78%) | 599 (95%) | 29 (5%) | 0 | 100 | 100 |
| 2 | B | 647/810 (80%) | 622 (96%) | 25 (4%) | 0 | 100 | 100 |
| 3 | 4 | 642/866 (74%) | 608 (95%) | 34 (5%) | 0 | 100 | 100 |
| 3 | C | 640/866 (74%) | 604 (94%) | 36 (6%) | 0 | 100 | 100 |
| 4 | 5 | 617/734 (84%) | 579 (94%) | 38 (6%) | 0 | 100 | 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|-----|-------|----------|----------|---------|----------|-----|-----|
| 4 | D | 615/734 (84%) | 585 (95%) | 30 (5%) | 0 | 100 | 100 |
| 5 | 6 | 631/821 (77%) | 609 (96%) | 22 (4%) | 0 | 100 | 100 |
| 5 | E | 684/821 (83%) | 659 (96%) | 25 (4%) | 0 | 100 | 100 |
| 6 | 7 | 604/719 (84%) | 575 (95%) | 29 (5%) | 0 | 100 | 100 |
| 6 | F | 613/719 (85%) | 577 (94%) | 36 (6%) | 0 | 100 | 100 |
| All | All | 7623/9708 (78%) | 7243 (95%) | 380 (5%) | 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 | 2 | 568/781 (73%) | 558 (98%) | 10 (2%) | 54 | 83 |
| 1 | A | 586/781 (75%) | 576 (98%) | 10 (2%) | 56 | 84 |
| 2 | 3 | 550/708 (78%) | 541 (98%) | 9 (2%) | 58 | 85 |
| 2 | B | 561/708 (79%) | 552 (98%) | 9 (2%) | 58 | 85 |
| 3 | 4 | 572/755 (76%) | 562 (98%) | 10 (2%) | 56 | 84 |
| 3 | C | 570/755 (76%) | 563 (99%) | 7 (1%) | 67 | 89 |
| 4 | 5 | 533/625 (85%) | 523 (98%) | 10 (2%) | 52 | 82 |
| 4 | D | 530/625 (85%) | 526 (99%) | 4 (1%) | 79 | 93 |
| 5 | 6 | 565/724 (78%) | 554 (98%) | 11 (2%) | 52 | 82 |
| 5 | E | 624/724 (86%) | 618 (99%) | 6 (1%) | 73 | 91 |
| 6 | 7 | 535/619 (86%) | 525 (98%) | 10 (2%) | 52 | 82 |
| 6 | F | 541/619 (87%) | 531 (98%) | 10 (2%) | 54 | 83 |
| All | All | 6735/8424 (80%) | 6629 (98%) | 106 (2%) | 58 | 85 |

All (106) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|:---:|:---:|:---:|:---:|
| 1 | 2 | 228 | GLU |
| 1 | 2 | 268 | LEU |
| 1 | 2 | 276 | ARG |
| 1 | 2 | 369 | ILE |
| 1 | 2 | 469 | LYS |
| 1 | 2 | 512 | LYS |
| 1 | 2 | 663 | VAL |
| 1 | 2 | 726 | TYR |
| 1 | 2 | 735 | LEU |
| 1 | 2 | 785 | TYR |
| 2 | 3 | 21 | ASP |
| 2 | 3 | 23 | LEU |
| 2 | 3 | 39 | LEU |
| 2 | 3 | 76 | PHE |
| 2 | 3 | 195 | ASP |
| 2 | 3 | 218 | ASP |
| 2 | 3 | 445 | ARG |
| 2 | 3 | 486 | LEU |
| 2 | 3 | 504 | MET |
| 3 | 4 | 150 | LEU |
| 3 | 4 | 247 | ASP |
| 3 | 4 | 317 | MET |
| 3 | 4 | 354 | LEU |
| 3 | 4 | 475 | ASP |
| 3 | 4 | 489 | ARG |
| 3 | 4 | 640 | LEU |
| 3 | 4 | 643 | ARG |
| 3 | 4 | 658 | TYR |
| 3 | 4 | 751 | ASN |
| 4 | 5 | 90 | LYS |
| 4 | 5 | 128 | LEU |
| 4 | 5 | 147 | HIS |
| 4 | 5 | 184 | MET |
| 4 | 5 | 250 | ASP |
| 4 | 5 | 391 | LEU |
| 4 | 5 | 400 | ILE |
| 4 | 5 | 410 | SER |
| 4 | 5 | 481 | ARG |
| 4 | 5 | 532 | LEU |
| 5 | 6 | 34 | LEU |
| 5 | 6 | 200 | PHE |
| 5 | 6 | 247 | THR |
| 5 | 6 | 326 | LYS |

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| Mol | Chain | Res | Type |
|:---:|:---:|:---:|:---:|
| 5 | 6 | 332 | LYS |
| 5 | 6 | 347 | TYR |
| 5 | 6 | 422 | LYS |
| 5 | 6 | 469 | ASP |
| 5 | 6 | 492 | THR |
| 5 | 6 | 533 | PHE |
| 5 | 6 | 551 | ARG |
| 6 | 7 | 28 | LYS |
| 6 | 7 | 40 | LEU |
| 6 | 7 | 206 | CYS |
| 6 | 7 | 219 | ARG |
| 6 | 7 | 269 | ASP |
| 6 | 7 | 286 | ARG |
| 6 | 7 | 287 | GLN |
| 6 | 7 | 296 | THR |
| 6 | 7 | 331 | ASP |
| 6 | 7 | 520 | LEU |
| 1 | A | 177 | LEU |
| 1 | A | 210 | HIS |
| 1 | A | 270 | MET |
| 1 | A | 395 | ASP |
| 1 | A | 401 | ASP |
| 1 | A | 650 | THR |
| 1 | A | 678 | PHE |
| 1 | A | 755 | MET |
| 1 | A | 808 | PHE |
| 1 | A | 870 | ARG |
| 2 | B | 4 | THR |
| 2 | B | 33 | GLN |
| 2 | B | 70 | PHE |
| 2 | B | 76 | PHE |
| 2 | B | 224 | ASP |
| 2 | B | 293 | LYS |
| 2 | B | 478 | ARG |
| 2 | B | 603 | MET |
| 2 | B | 609 | ARG |
| 3 | C | 170 | LEU |
| 3 | C | 177 | LEU |
| 3 | C | 317 | MET |
| 3 | C | 345 | LEU |
| 3 | C | 645 | ASP |
| 3 | C | 670 | TYR |

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| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 3 | C | 752 | LYS |
| 4 | D | 224 | PHE |
| 4 | D | 276 | LEU |
| 4 | D | 290 | ARG |
| 4 | D | 364 | ARG |
| 5 | E | 133 | LEU |
| 5 | E | 245 | THR |
| 5 | E | 347 | TYR |
| 5 | E | 440 | HIS |
| 5 | E | 593 | PHE |
| 5 | E | 604 | ARG |
| 6 | F | 108 | MET |
| 6 | F | 164 | ARG |
| 6 | F | 206 | CYS |
| 6 | F | 219 | ARG |
| 6 | F | 220 | LEU |
| 6 | F | 301 | HIS |
| 6 | F | 372 | ARG |
| 6 | F | 405 | THR |
| 6 | F | 461 | VAL |
| 6 | F | 524 | ARG |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | 2 | 563 | HIS |
| 1 | 2 | 806 | GLN |

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry (i)

Of 30 ligands modelled in this entry, 20 are monoatomic - leaving 10 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 |
| 12 | ADP | B | 1002 | 10 | 24,29,29 | 0.89 | 0 | 29,45,45 | 1.36 | 3 (10%) |
| 11 | ATP | 2 | 1002 | 10 | 28,33,33 | 0.76 | 0 | 34,52,52 | 0.96 | 1 (2%) |
| 12 | ADP | E | 1002 | 10 | 24,29,29 | 0.88 | 0 | 29,45,45 | 1.24 | 2 (6%) |
| 12 | ADP | 7 | 1002 | 10 | 24,29,29 | 0.86 | 0 | 29,45,45 | 1.25 | 2 (6%) |
| 11 | ATP | A | 1002 | 10 | 28,33,33 | 1.34 | 2 (7%) | 34,52,52 | 1.07 | 3 (8%) |
| 12 | ADP | 3 | 1002 | - | 24,29,29 | 0.87 | 0 | 29,45,45 | 1.26 | 2 (6%) |
| 12 | ADP | 5 | 1002 | 10 | 24,29,29 | 0.92 | 0 | 29,45,45 | 1.19 | 2 (6%) |
| 12 | ADP | 6 | 1002 | 10 | 24,29,29 | 0.88 | 0 | 29,45,45 | 1.22 | 2 (6%) |
| 12 | ADP | D | 1002 | 10 | 24,29,29 | 0.90 | 0 | 29,45,45 | 1.24 | 2 (6%) |
| 12 | ADP | F | 1002 | 10 | 24,29,29 | 0.88 | 0 | 29,45,45 | 1.23 | 2 (6%) |

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 |
|---|---|---|---|---|---|---|---|
| 12 | ADP | B | 1002 | 10 | - | 6/12/32/32 | 0/3/3/3 |
| 11 | ATP | 2 | 1002 | 10 | - | 7/18/38/38 | 0/3/3/3 |
| 12 | ADP | E | 1002 | 10 | - | 2/12/32/32 | 0/3/3/3 |
| 12 | ADP | 7 | 1002 | 10 | - | 1/12/32/32 | 0/3/3/3 |
| 11 | ATP | A | 1002 | 10 | - | 2/18/38/38 | 0/3/3/3 |
| 12 | ADP | 3 | 1002 | - | - | 2/12/32/32 | 0/3/3/3 |
| 12 | ADP | 5 | 1002 | 10 | - | 10/12/32/32 | 0/3/3/3 |
| 12 | ADP | 6 | 1002 | 10 | - | 2/12/32/32 | 0/3/3/3 |
| 12 | ADP | D | 1002 | 10 | - | 2/12/32/32 | 0/3/3/3 |
| 12 | ADP | F | 1002 | 10 | - | 3/12/32/32 | 0/3/3/3 |

All (2) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|-------|-----|-------------|----------|
| 11 | A | 1002 | ATP | PB-O3B | -5.45 | 1.53 | 1.59 |
| 11 | A | 1002 | ATP | PA-O3A | -2.20 | 1.57 | 1.59 |

All (21) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|-----|-------|-----|------|-------|-----|---------------|-------------|
| 12 | F | 1002 | ADP | N3-C2-N1 | -4.29 | 122.85 | 128.67 |
| 12 | B | 1002 | ADP | N3-C2-N1 | -4.27 | 122.88 | 128.67 |
| 12 | E | 1002 | ADP | N3-C2-N1 | -4.26 | 122.90 | 128.67 |
| 12 | 3 | 1002 | ADP | N3-C2-N1 | -4.18 | 122.99 | 128.67 |
| 12 | D | 1002 | ADP | N3-C2-N1 | -4.18 | 123.00 | 128.67 |
| 12 | 5 | 1002 | ADP | N3-C2-N1 | -4.15 | 123.04 | 128.67 |
| 12 | 7 | 1002 | ADP | N3-C2-N1 | -4.08 | 123.14 | 128.67 |
| 12 | 6 | 1002 | ADP | N3-C2-N1 | -3.92 | 123.36 | 128.67 |
| 12 | B | 1002 | ADP | O4'-C1'-N9 | 2.77 | 112.41 | 108.75 |
| 12 | 6 | 1002 | ADP | C4-C5-N7 | -2.70 | 106.48 | 109.34 |
| 12 | B | 1002 | ADP | C4-C5-N7 | -2.54 | 106.65 | 109.34 |
| 12 | D | 1002 | ADP | C4-C5-N7 | -2.54 | 106.65 | 109.34 |
| 12 | 7 | 1002 | ADP | C4-C5-N7 | -2.52 | 106.67 | 109.34 |
| 12 | 3 | 1002 | ADP | C4-C5-N7 | -2.51 | 106.69 | 109.34 |
| 12 | F | 1002 | ADP | C4-C5-N7 | -2.34 | 106.86 | 109.34 |
| 12 | E | 1002 | ADP | C4-C5-N7 | -2.29 | 106.91 | 109.34 |
| 12 | 5 | 1002 | ADP | C4-C5-N7 | -2.27 | 106.94 | 109.34 |
| 11 | A | 1002 | ATP | O3A-PA-O1A | -2.27 | 103.89 | 110.70 |
| 11 | A | 1002 | ATP | C5-C6-N6 | 2.23 | 123.70 | 120.31 |
| 11 | A | 1002 | ATP | O4'-C1'-N9 | -2.17 | 105.87 | 108.75 |
| 11 | 2 | 1002 | ATP | C5-C6-N6 | 2.09 | 123.50 | 120.31 |

There are no chirality outliers.

All (37) torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|-----|-------|-----|------|-------|
| 11 | 2 | 1002 | ATP | C5'-O5'-PA-O1A |
| 12 | 5 | 1002 | ADP | C5'-O5'-PA-O2A |
| 12 | 5 | 1002 | ADP | C5'-O5'-PA-O3A |
| 12 | B | 1002 | ADP | C5'-O5'-PA-O3A |
| 12 | D | 1002 | ADP | C5'-O5'-PA-O2A |
| 12 | D | 1002 | ADP | C5'-O5'-PA-O3A |
| 12 | E | 1002 | ADP | C5'-O5'-PA-O3A |
| 12 | F | 1002 | ADP | C5'-O5'-PA-O2A |
| 12 | F | 1002 | ADP | C5'-O5'-PA-O3A |

*Continued on next page...*

*Continued from previous page...*

| Mol | Chain | Res | Type | Atoms |
|-----|-------|------|------|-------|
| 11 | 2 | 1002 | ATP | O4'-C4'-C5'-O5' |
| 11 | 2 | 1002 | ATP | C3'-C4'-C5'-O5' |
| 12 | 6 | 1002 | ADP | O4'-C4'-C5'-O5' |
| 12 | 6 | 1002 | ADP | C3'-C4'-C5'-O5' |
| 12 | 5 | 1002 | ADP | O4'-C4'-C5'-O5' |
| 11 | A | 1002 | ATP | C3'-C4'-C5'-O5' |
| 12 | 5 | 1002 | ADP | C3'-C4'-C5'-O5' |
| 12 | B | 1002 | ADP | O4'-C4'-C5'-O5' |
| 12 | 5 | 1002 | ADP | PA-O3A-PB-O1B |
| 11 | 2 | 1002 | ATP | PG-O3B-PB-O2B |
| 12 | 3 | 1002 | ADP | PB-O3A-PA-O2A |
| 12 | 5 | 1002 | ADP | PB-O3A-PA-O1A |
| 11 | A | 1002 | ATP | O4'-C4'-C5'-O5' |
| 12 | B | 1002 | ADP | C5'-O5'-PA-O1A |
| 12 | E | 1002 | ADP | C5'-O5'-PA-O1A |
| 12 | F | 1002 | ADP | C5'-O5'-PA-O1A |
| 12 | 5 | 1002 | ADP | C4'-C5'-O5'-PA |
| 12 | 5 | 1002 | ADP | PA-O3A-PB-O2B |
| 12 | 5 | 1002 | ADP | PA-O3A-PB-O3B |
| 12 | B | 1002 | ADP | C3'-C4'-C5'-O5' |
| 11 | 2 | 1002 | ATP | PG-O3B-PB-O1B |
| 11 | 2 | 1002 | ATP | PB-O3A-PA-O1A |
| 11 | 2 | 1002 | ATP | PB-O3A-PA-O2A |
| 12 | 3 | 1002 | ADP | PB-O3A-PA-O1A |
| 12 | B | 1002 | ADP | PB-O3A-PA-O1A |
| 12 | 7 | 1002 | ADP | O4'-C4'-C5'-O5' |
| 12 | 5 | 1002 | ADP | PB-O3A-PA-O2A |
| 12 | B | 1002 | ADP | PB-O3A-PA-O2A |

There are no ring outliers.

8 monomers are involved in 11 short contacts:

| Mol | Chain | Res | Type | Clashes | Symm-Clashes |
|-----|-------|------|------|---------|--------------|
| 12 | B | 1002 | ADP | 1 | 0 |
| 11 | 2 | 1002 | ATP | 3 | 0 |
| 12 | E | 1002 | ADP | 1 | 0 |
| 11 | A | 1002 | ATP | 1 | 0 |
| 12 | 3 | 1002 | ADP | 1 | 0 |
| 12 | 5 | 1002 | ADP | 2 | 0 |
| 12 | 6 | 1002 | ADP | 1 | 0 |
| 12 | F | 1002 | ADP | 1 | 0 |

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

**Ligand ADP B 1002**



Bond lengths

Bond angles

Torsions

Rings

## Ligand ATP 2 1002



Bond lengths



Bond angles



Torsions



Rings

## Ligand ADP E 1002



Bond lengths



Bond angles



Torsions



Rings

## Ligand ADP 7 1002


Bond lengths


Bond angles


Torsions


Rings

## Ligand ATP A 1002


Bond lengths


Bond angles


Torsions


Rings

## Ligand ADP 3 1002


Bond lengths


Bond angles


Torsions


Rings

## Ligand ADP 5 1002


Bond lengths


Bond angles


Torsions


Rings

## Ligand ADP 6 1002


Bond lengths


Bond angles


Torsions


Rings

## Ligand ADP D 1002


Bond lengths


Bond angles


Torsions


Rings

**Ligand ADP F 1002**



Bond lengths

Bond angles

Torsions

Rings

## 5.7 Other polymers ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

# 6 Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-43708. 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 ⓘ
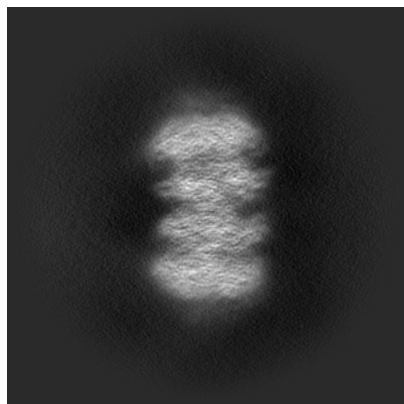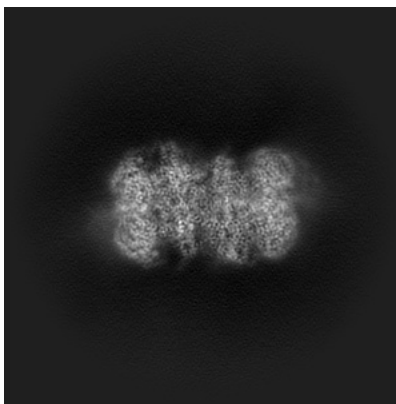
### 6.1.1 Primary map



X                                        Y                                        Z

### 6.1.2 Raw map



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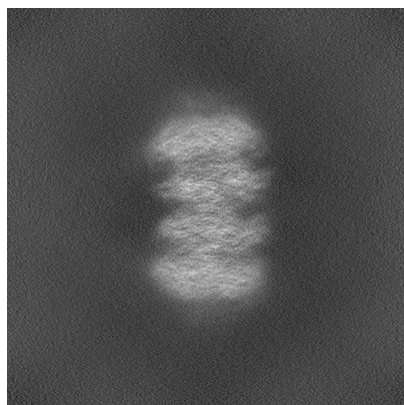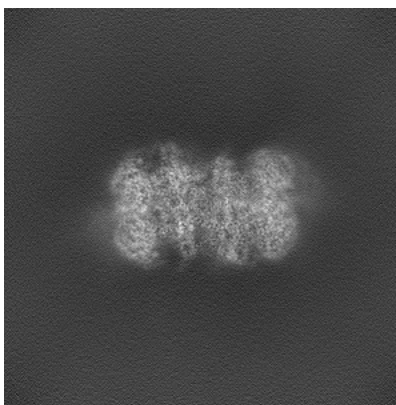
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices ⓘ
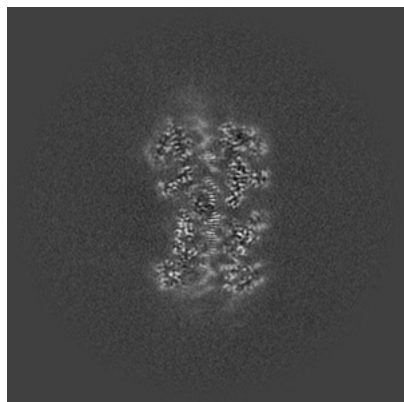
### 6.2.1 Primary map
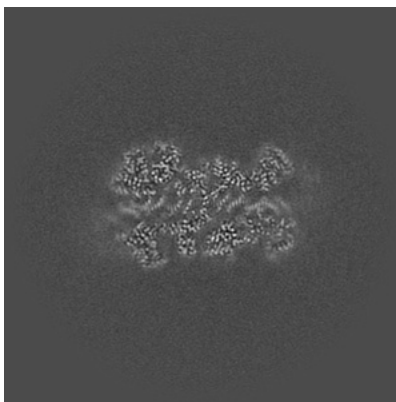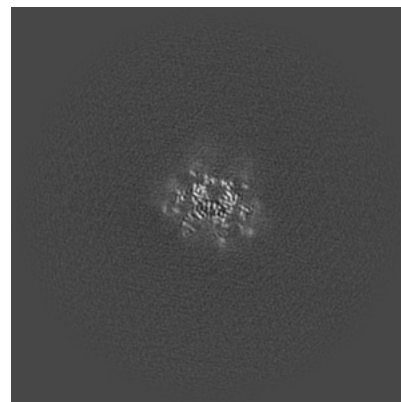


| X Index: 250 | Y Index: 250 | Z Index: 250 |

### 6.2.2 Raw map
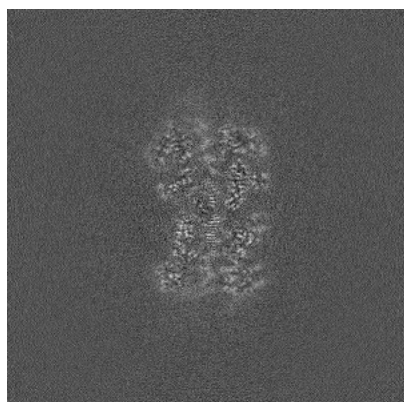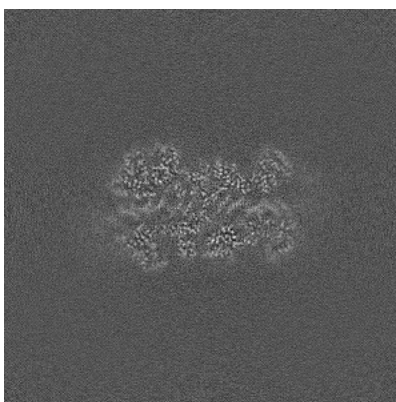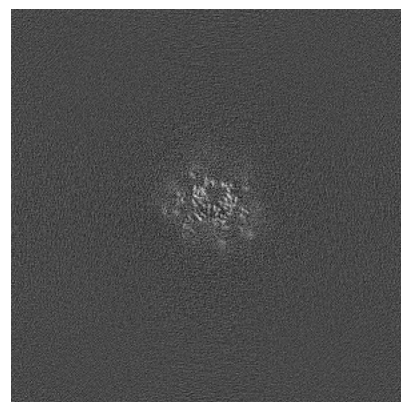


| X Index: 250 | Y Index: 250 | Z Index: 250 |

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

## 6.3   Largest variance slices (i)

### 6.3.1   Primary map
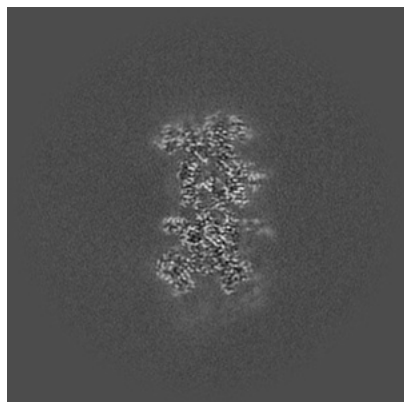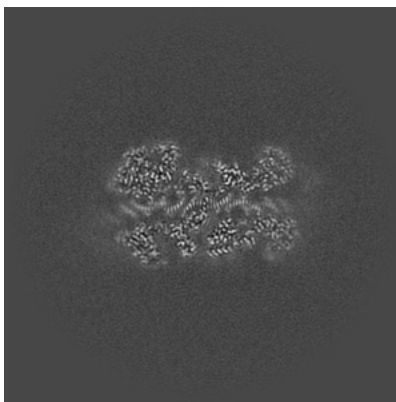


| X Index: 226 | Y Index: 253 | Z Index: 278 |
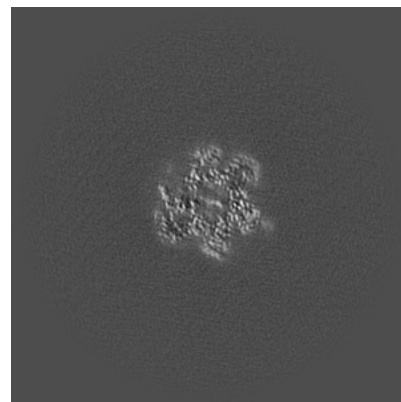
### 6.3.2   Raw map
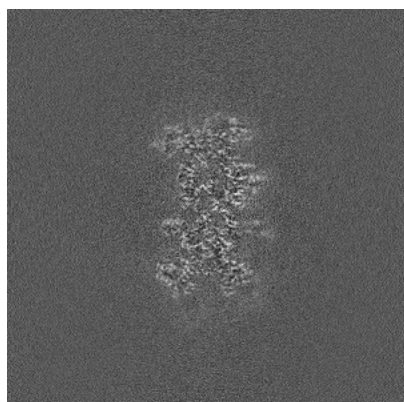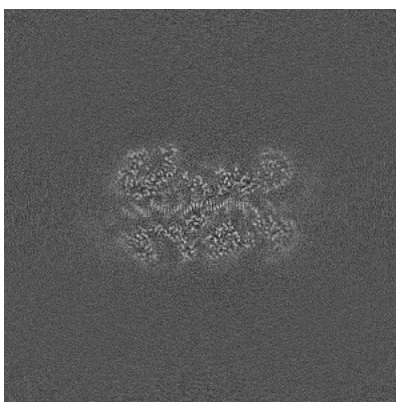


| X Index: 227 | Y Index: 255 | Z Index: 0 |
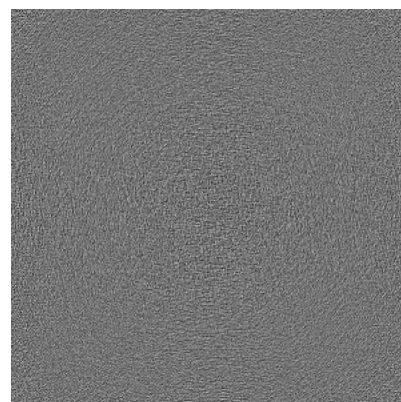
The images above show the largest variance slices of the map in three orthogonal directions.

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

### 6.4.1 Primary map



| | | |
|:---:|:---:|:---:|
| X | Y | Z |

### 6.4.2 Raw map



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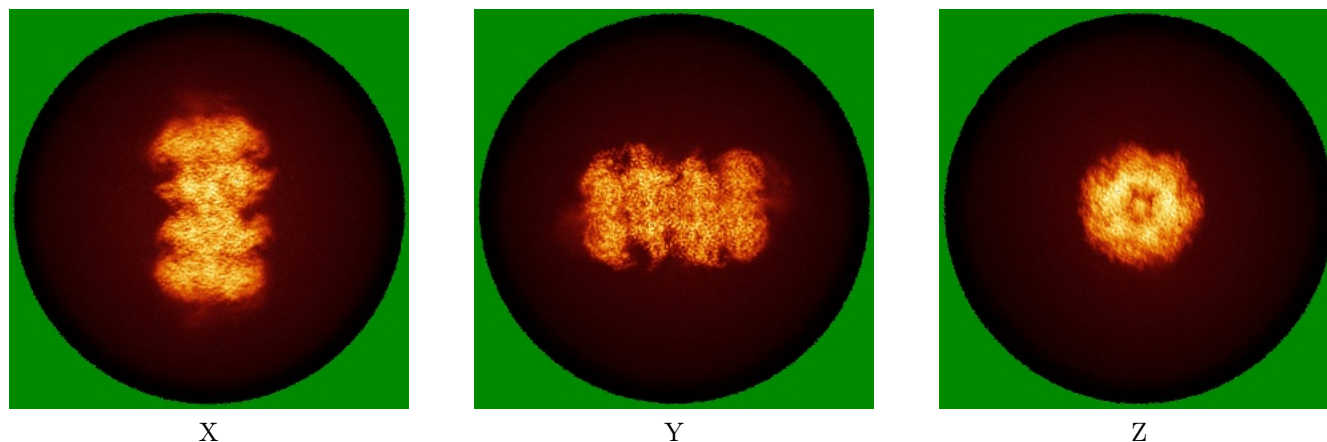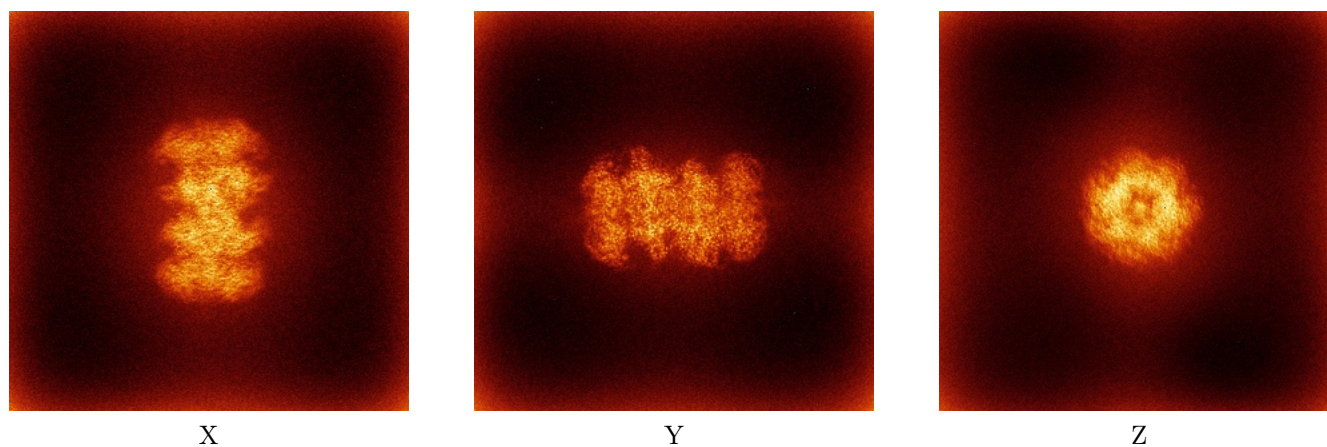
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

## 6.5 Orthogonal surface views (i)

### 6.5.1 Primary map



X        Y        Z
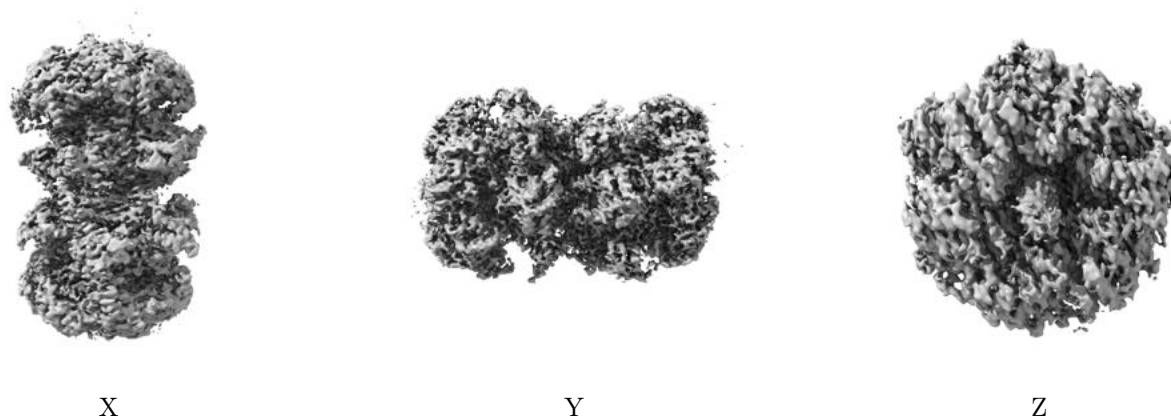
The images above show the 3D surface view of the map at the recommended contour level 0.1. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



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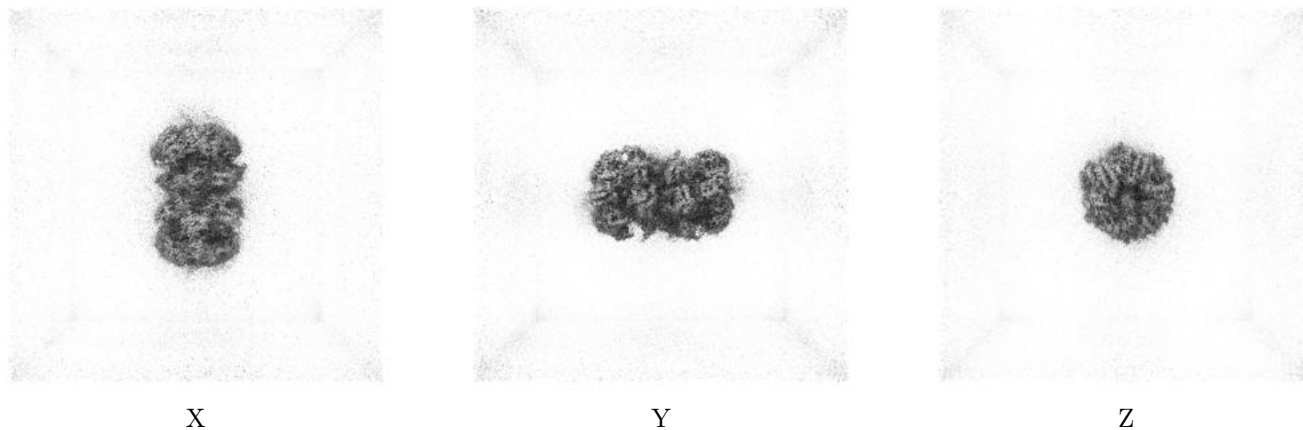
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

## 6.6 Mask visualisation (i)

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

# 7   Map analysis ⓘ

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

## 7.1   Map-value distribution ⓘ
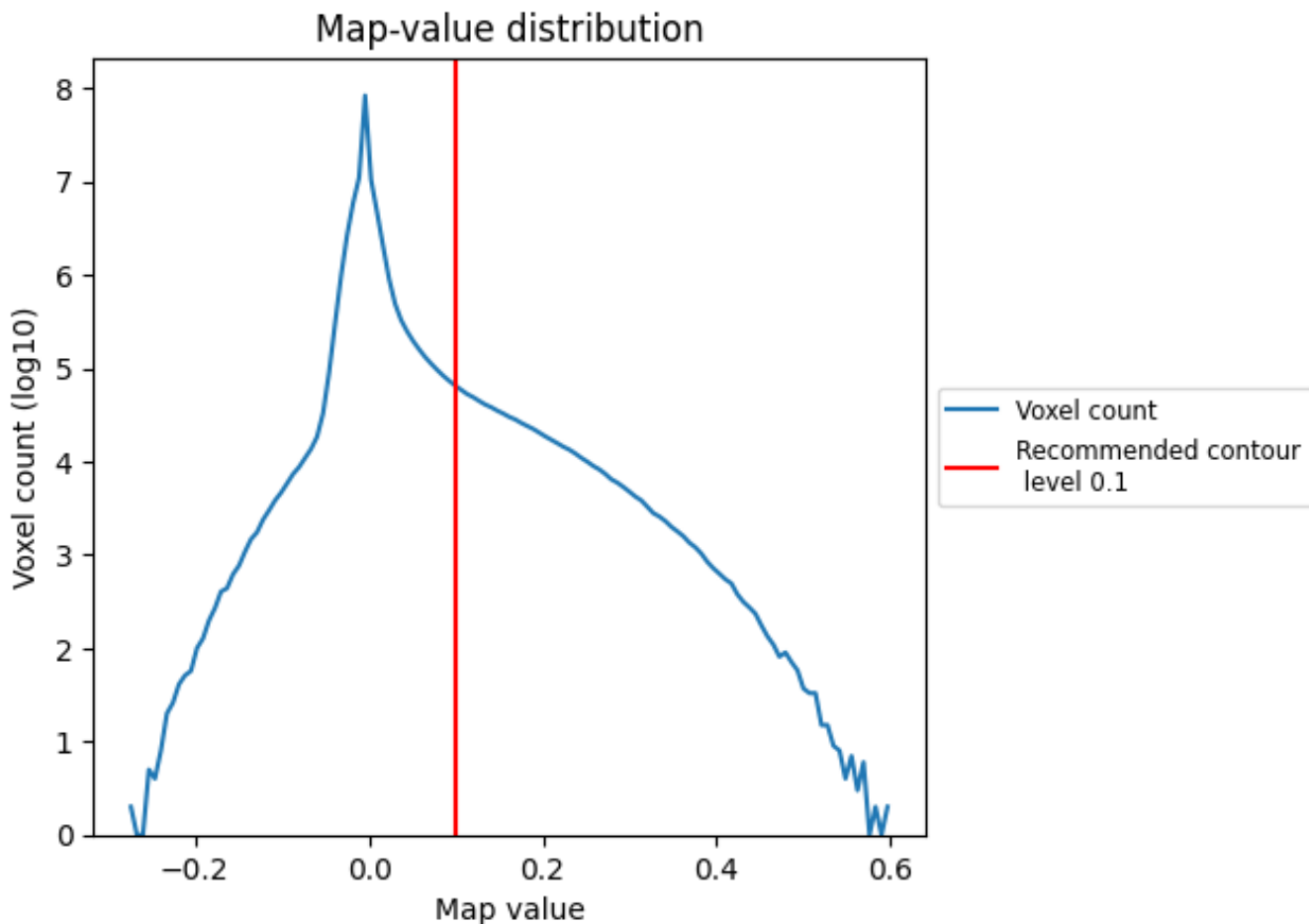


The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

## 7.2 Volume estimate ⓘ
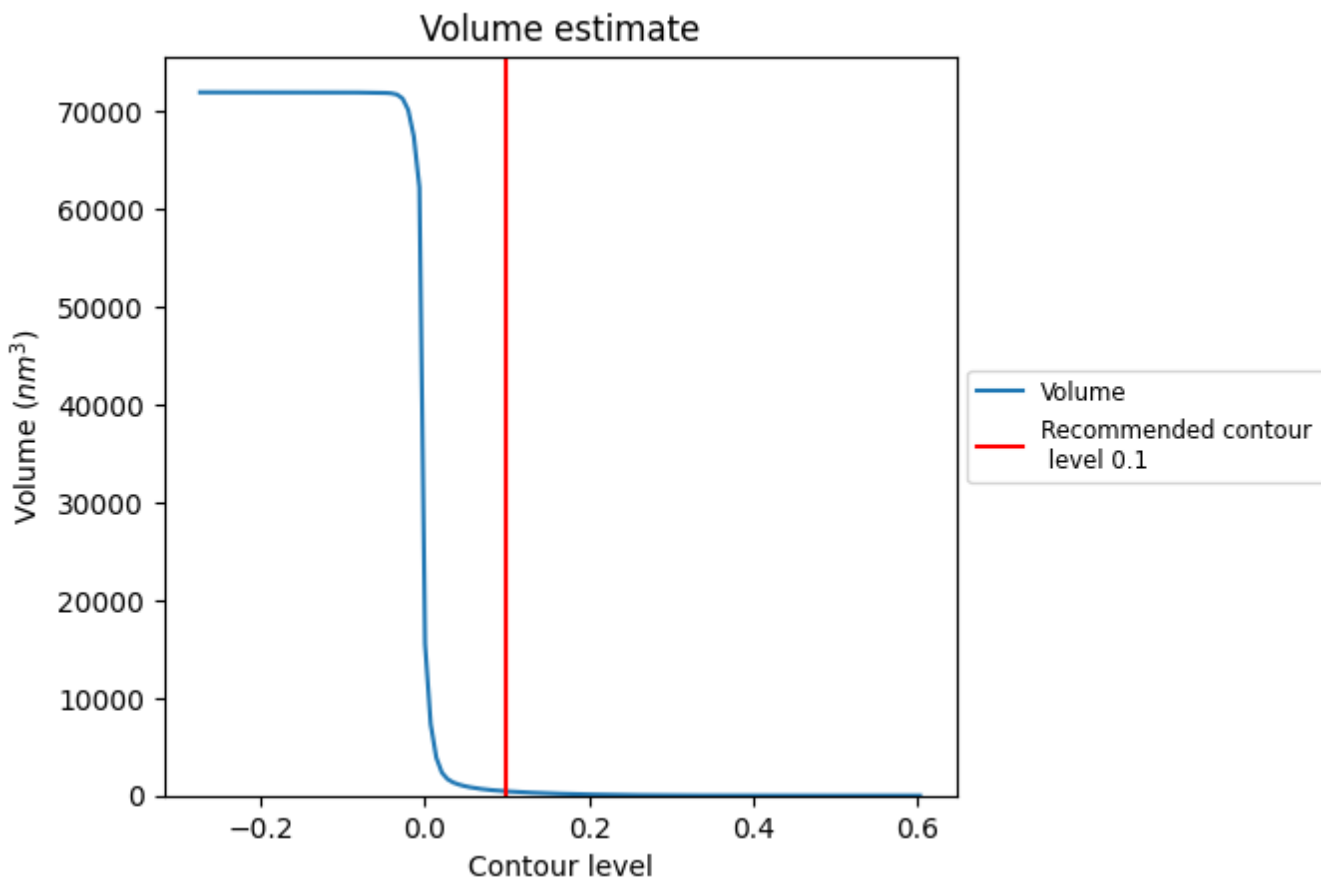


The volume at the recommended contour level is 434 nm$^3$; this corresponds to an approximate mass of 392 kDa.

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 ⓘ
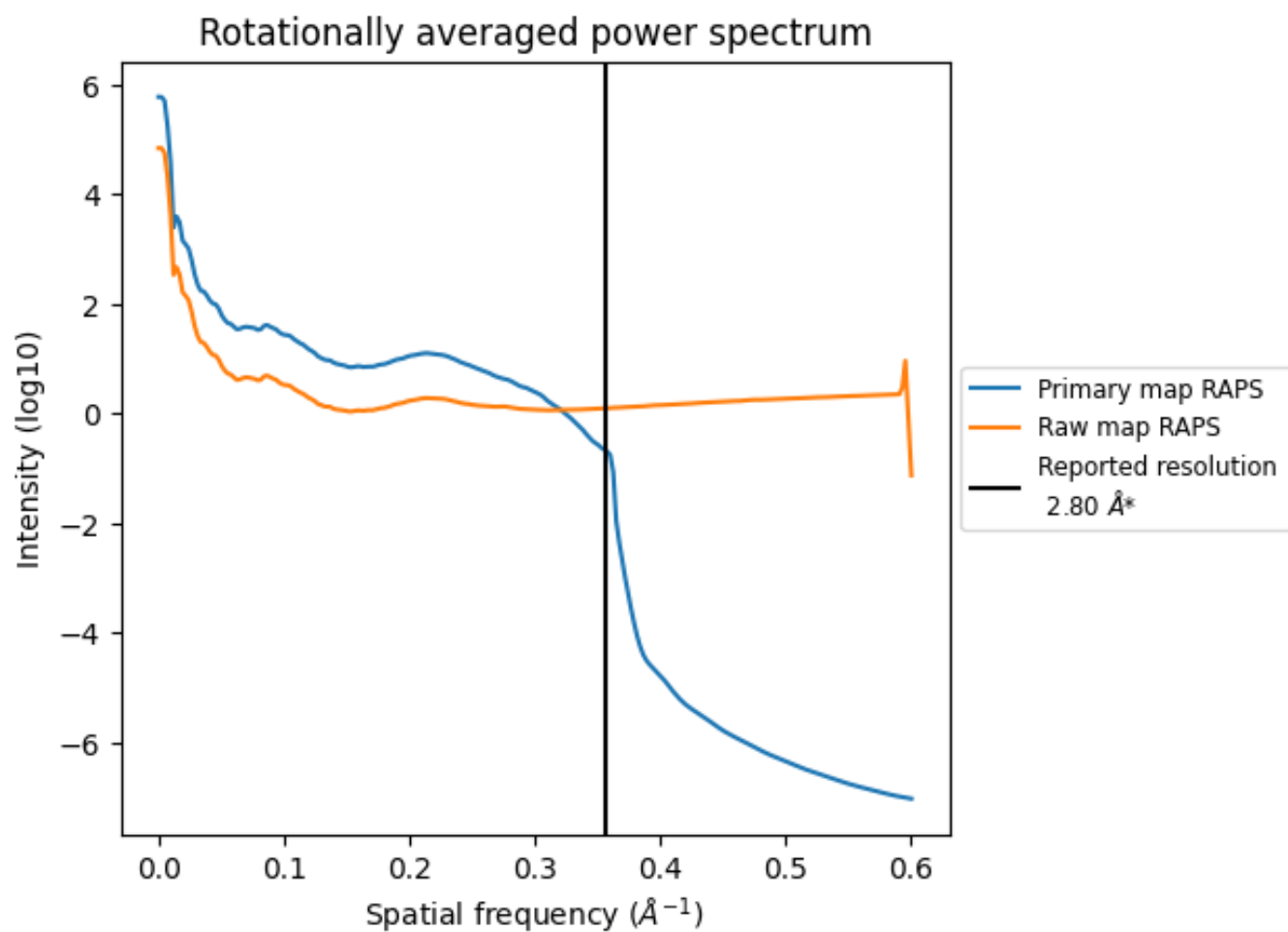


*Reported resolution corresponds to spatial frequency of 0.357 $\text{Å}^{-1}$

# 8　Fourier-Shell correlation ⓘ

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 ⓘ
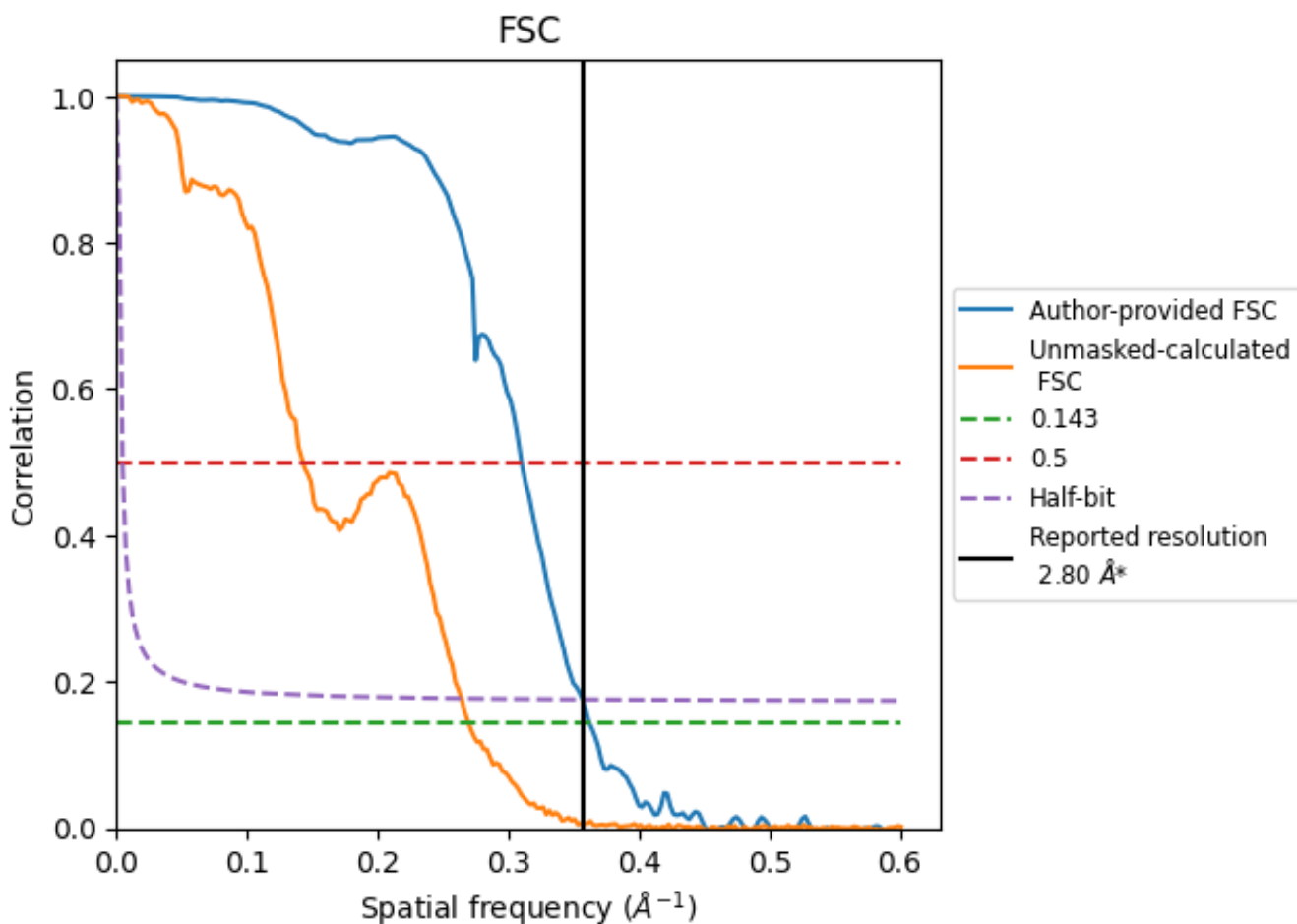


*Reported resolution corresponds to spatial frequency of 0.357 Å$^{-1}$

## 8.2 Resolution estimates (i)

| Resolution estimate (Å) | Estimation criterion (FSC cut-off) | | |
|---|---|---|---|
| | 0.143 | 0.5 | Half-bit |
| Reported by author | 2.80 | - | - |
| Author-provided FSC curve | 2.76 | 3.22 | 2.80 |
| Unmasked-calculated* | 3.71 | 7.00 | 3.78 |

*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 3.71 differs from the reported value 2.8 by more than 10 %

# 9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-43708 and PDB model 8W0F. Per-residue inclusion information can be found in section 3 on page 9.

## 9.1 Map-model overlay ⓘ



X          Y          Z
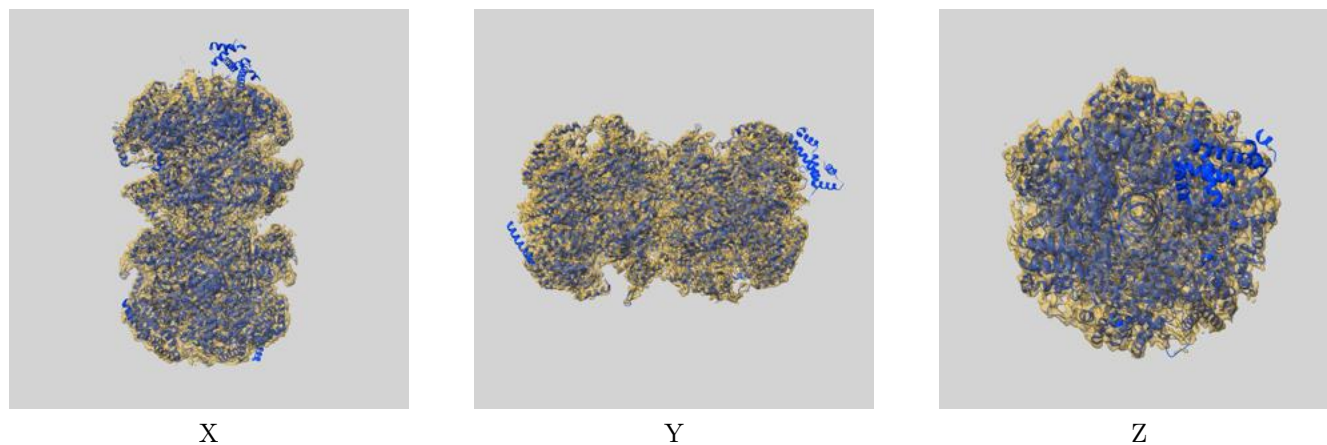
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model ⓘ



X Y Z
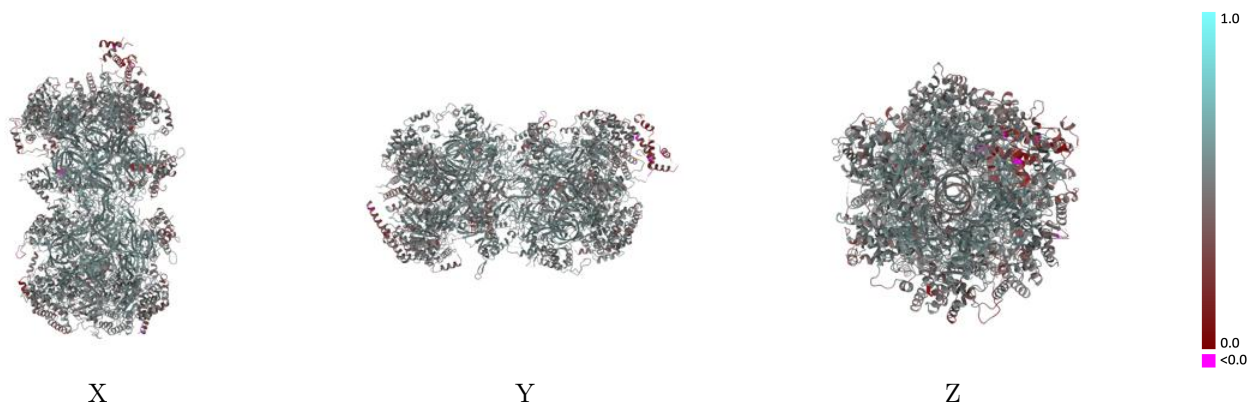
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 ⓘ



X Y Z
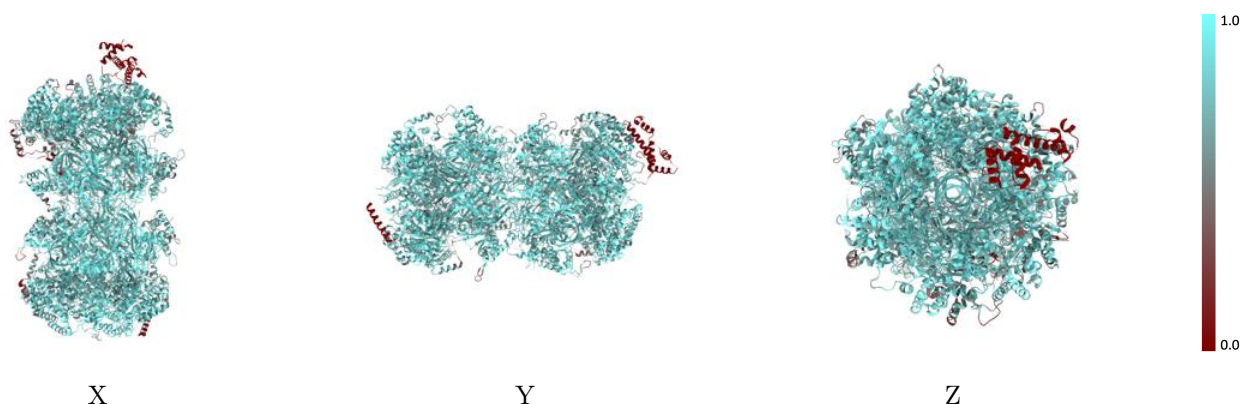
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.1).

## 9.4 Atom inclusion (i)
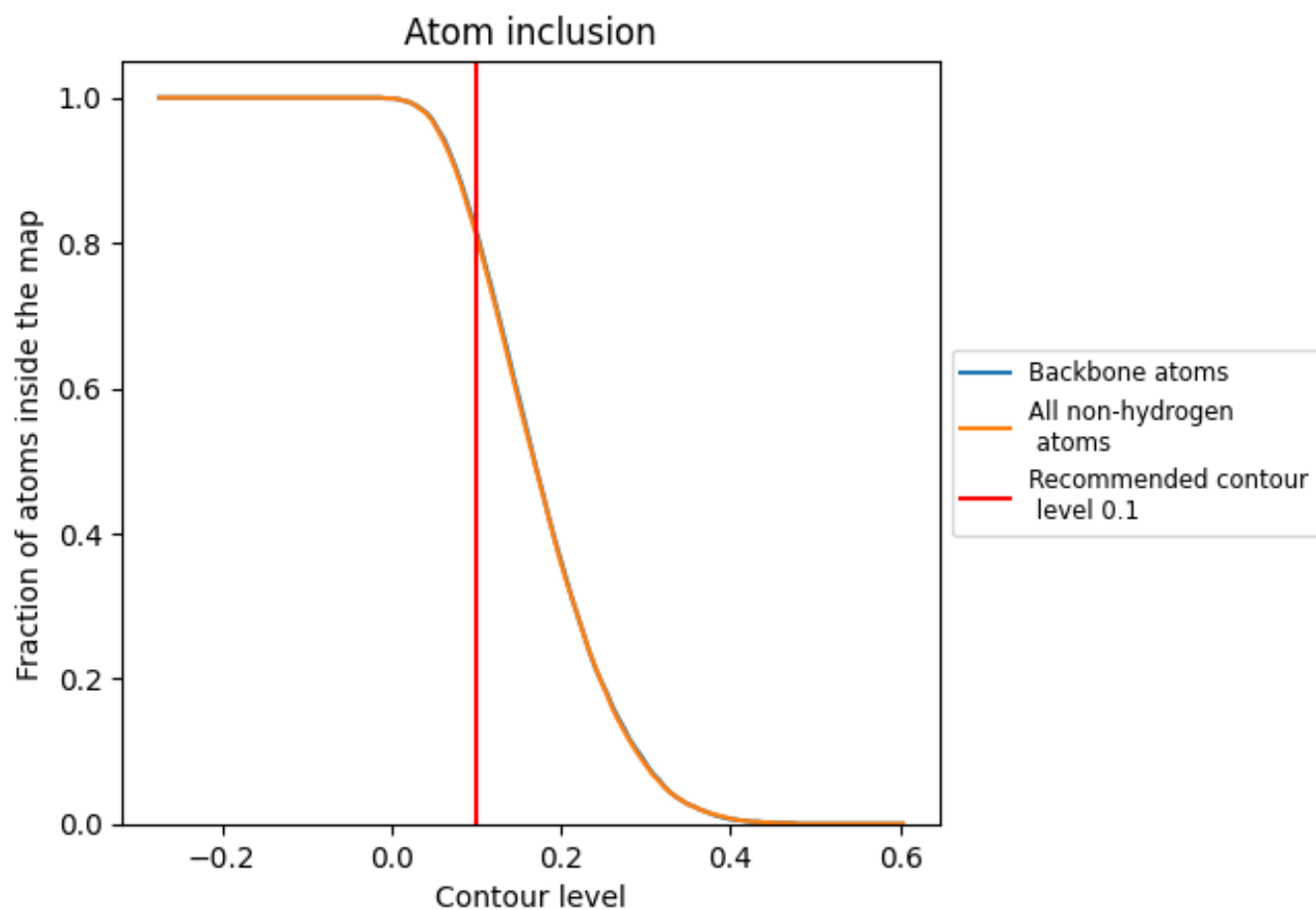


At the recommended contour level, 82% of all backbone atoms, 81% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.1) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion | Q-score |
|:-----:|:--------------:|:-------:|
| All | 0.8120 | 0.5010 |
| 2 | 0.7980 | 0.4760 |
| 3 | 0.8210 | 0.5010 |
| 4 | 0.8500 | 0.5210 |
| 5 | 0.8440 | 0.5070 |
| 6 | 0.8510 | 0.5130 |
| 7 | 0.8410 | 0.5030 |
| A | 0.7610 | 0.4850 |
| B | 0.7810 | 0.4910 |
| C | 0.8380 | 0.5090 |
| D | 0.8310 | 0.5150 |
| E | 0.7580 | 0.4840 |
| F | 0.8320 | 0.5080 |
| O | 0.9010 | 0.4930 |
| S | 0.9100 | 0.4990 |

1.0

0.0
<0.0