



# Full wwPDB EM Validation Report ⓘ

Apr 18, 2024 – 02:43 pm BST

PDB ID : 8PIM  
EMDB ID : EMD-17686  
Title : fully recruited RfaH bound to E. coli transcription complex paused at ops site  
(not complementary scaffold)  
Authors : Zuber, P.K.; Said, N.; Hilal, T.; Loll, B.; Wahl, M.C.; Knauer, S.H.  
Deposited on : 2023-06-22  
Resolution : 3.40 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

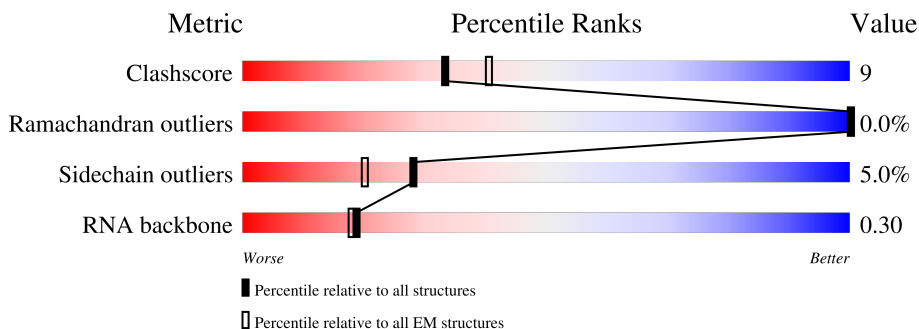
EMDB validation analysis : 0.0.1.dev92  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

# 1 Overall quality at a glance i

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

The reported resolution of this entry is 3.40 Å.

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





Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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

Mol	Chain	Length	Quality of chain
1	P	164	10% (red), 68% (green), 26% (yellow), 5% (orange), 0% (grey)
2	I	1342	0% (red), 77% (green), 20% (yellow), 0% (orange), 0% (grey)
3	J	1416	0% (red), 71% (green), 23% (yellow), 0% (orange), 5% (grey)
4	K	91	10% (red), 65% (green), 23% (yellow), 0% (orange), 8% (grey)
5	R	17	18% (red), 41% (green), 65% (yellow), 18% (orange), 0% (grey)
6	A	40	15% (red), 58% (green), 30% (yellow), 0% (orange), 12% (grey)
7	B	40	12% (red), 35% (green), 52% (yellow), 0% (orange), 12% (grey)

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Mol	Chain	Length	Quality of chain
8	G	329	
8	H	329	

## 2 Entry composition i

There are 10 unique types of molecules in this entry. The entry contains 28232 atoms, of which 0 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 Transcription antitermination protein RfaH.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	P	162	1294	833	223	233	5	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
P	-1	GLY	-	expression tag	UNP P0AFW0
P	0	HIS	-	expression tag	UNP P0AFW0

- Molecule 2 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	I	1321	10439	6549	1822	2024	44	2	0

- Molecule 3 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	J	1343	10449	6565	1862	1972	50	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
J	1	VAL	-	expression tag	UNP P0A8T7
J	1408	LEU	-	expression tag	UNP P0A8T7
J	1409	GLU	-	expression tag	UNP P0A8T7
J	1410	VAL	-	expression tag	UNP P0A8T7
J	1411	HIS	-	expression tag	UNP P0A8T7
J	1412	HIS	-	expression tag	UNP P0A8T7
J	1413	HIS	-	expression tag	UNP P0A8T7
J	1414	HIS	-	expression tag	UNP P0A8T7
J	1415	HIS	-	expression tag	UNP P0A8T7

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Chain	Residue	Modelled	Actual	Comment	Reference
J	1416	HIS	-	expression tag	UNP P0A8T7

- Molecule 4 is a protein called DNA-directed RNA polymerase subunit omega.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	K	84	663	404	124	133	2	0	0

- Molecule 5 is a RNA chain called RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
5	R	17	355	160	58	121	16	0	0

- Molecule 6 is a DNA chain called non-template DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
6	A	35	712	339	120	218	35	0	0

- Molecule 7 is a DNA chain called template DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
7	B	35	722	341	148	199	34	0	0

- Molecule 8 is a protein called DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	G	233	1811	1127	323	355	6	1	0
8	H	231	1784	1110	315	353	6	0	0

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

Mol	Chain	Residues	Atoms		AltConf
9	J	2	Total	Zn	0
			2	2	

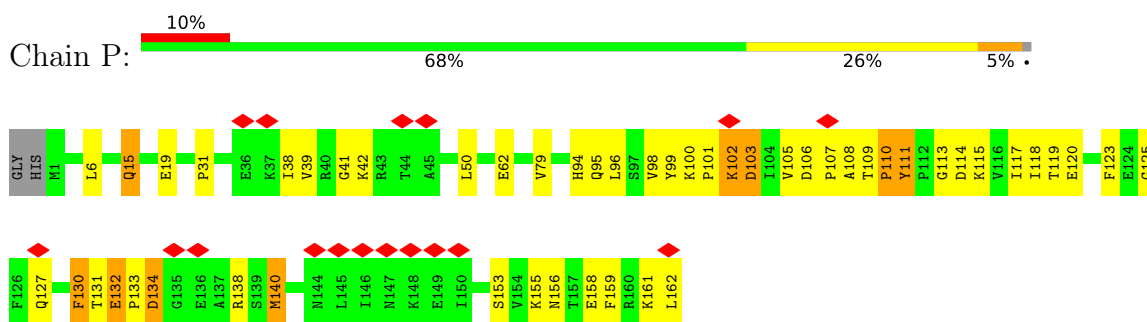
- Molecule 10 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>AltConf</b>
10	J	1	Total	Mg	0
			1	1	

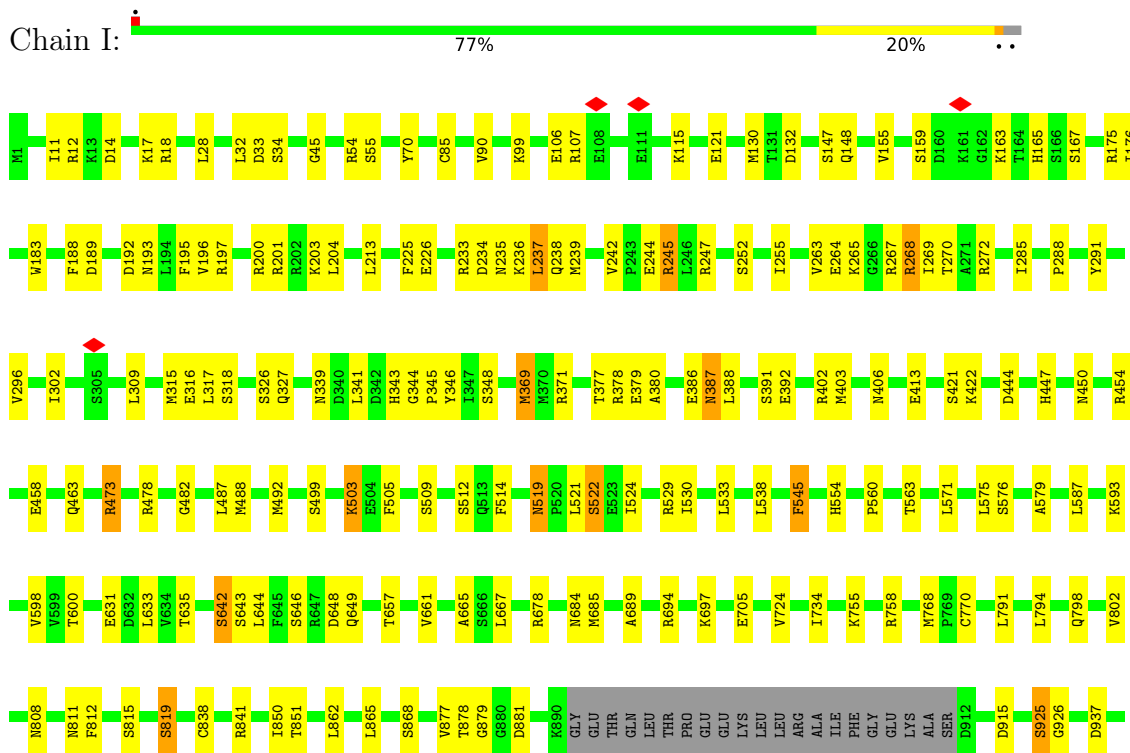
### 3 Residue-property plots

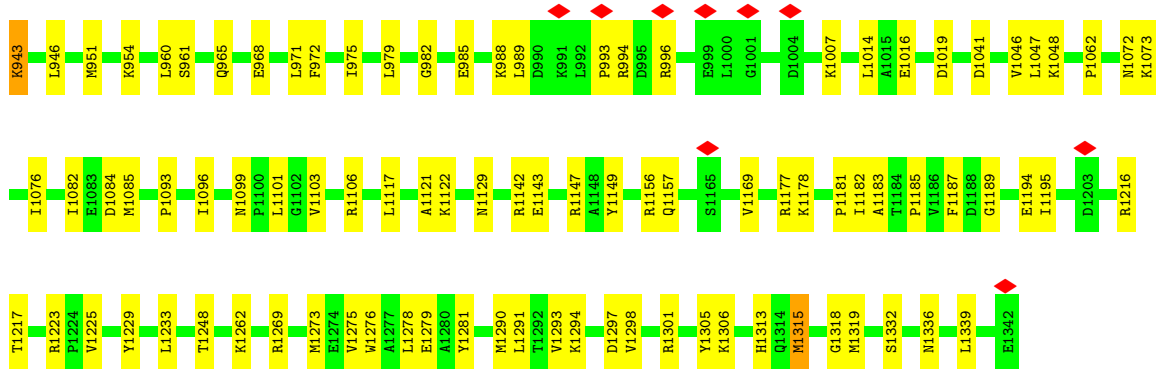
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Transcription antitermination protein RfaH

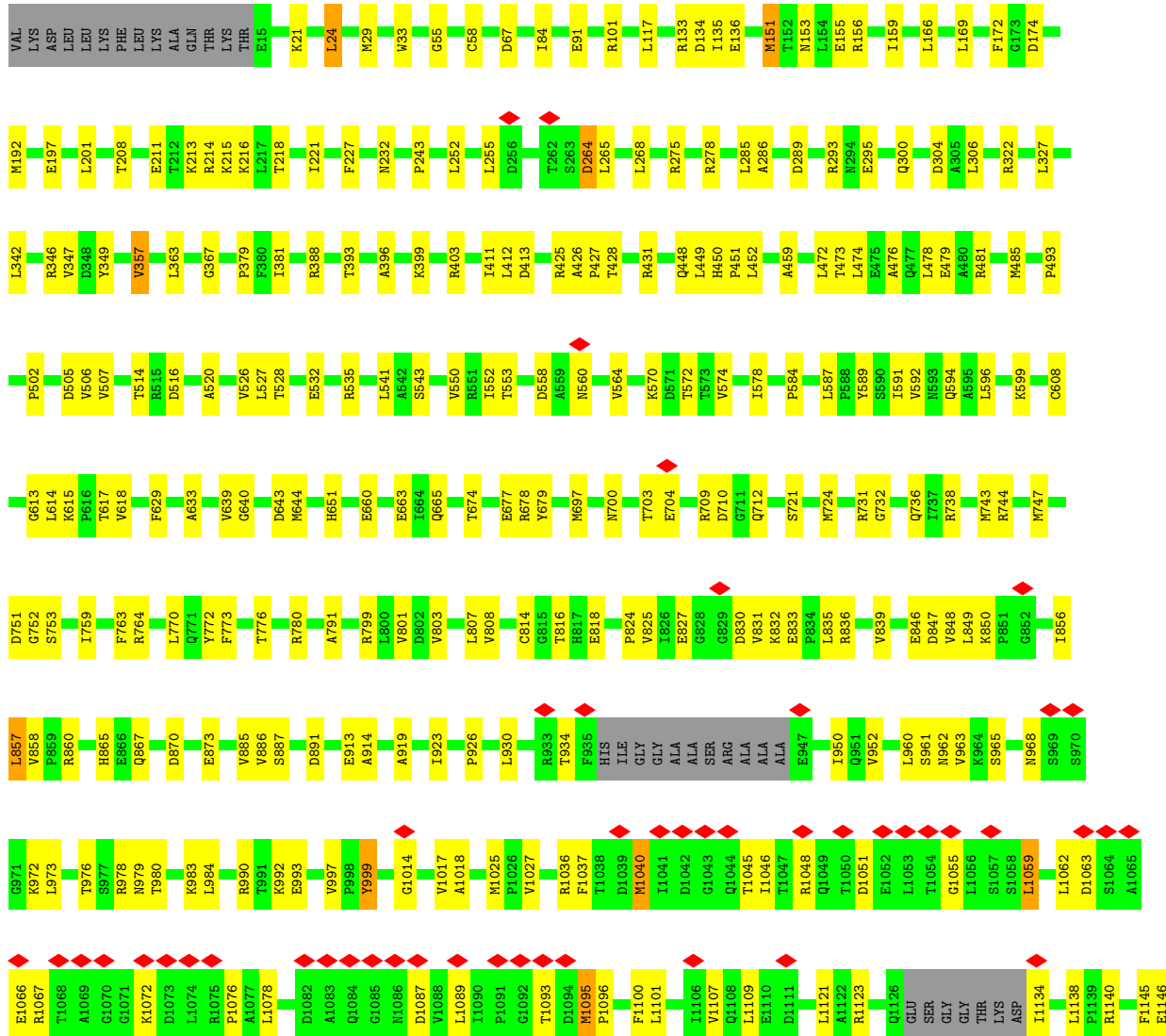


- Molecule 2: DNA-directed RNA polymerase subunit beta

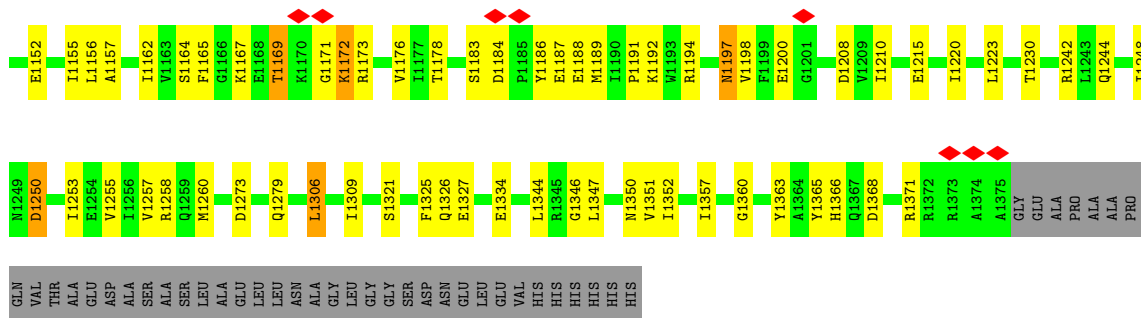




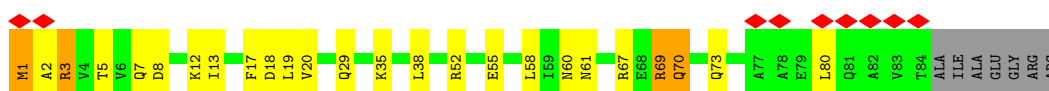
• Molecule 3: DNA-directed RNA polymerase subunit beta'



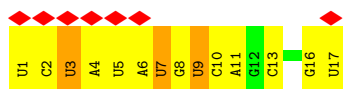




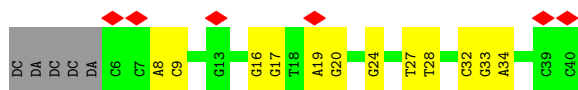
• Molecule 4: DNA-directed RNA polymerase subunit omega



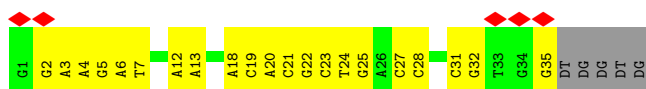
• Molecule 5: RNA



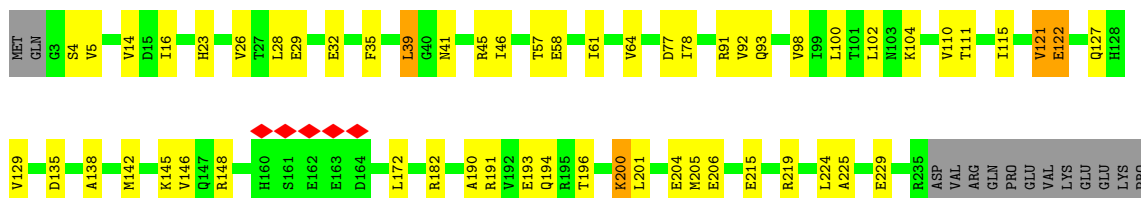
• Molecule 6: non-template DNA



• Molecule 7: template DNA



• Molecule 8: DNA-directed RNA polymerase subunit alpha



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

ALA SER ARG GLY LEU SER LEU MET ARG LEU ASP LEU ASN TRP PRO THR ALA SER ILE ALA ASP GLU

● Molecule 8: DNA-directed RNA polymerase subunit alpha



MET GLN S3 S4 V14 D15 S20 S21 T22 H23 T27 L28 E29 F30 T38 V56 V64 L65 H66 S67 Y68 S69 V74 V75 E76 D77 I81 L82 L83 K95 L102 N103 K104 V110 I115 D120 V121 Q127 H132 L133 N137 I144

R150 G151 Y152 V153 P154 T157 R158 I159 H160 S161 E162 E163 D164 E165 R166 L172 V173 C176 R182 Y185 A190 R191 V192 E193 R195 T196 D197 K200 E204 L224 L228 F231 V232 D233 LEU ARG ASP VAL ARG GLN PRO GLU VAL VAL ASP ARG LEU LEU LYS THR PRO ASN LEU LYS SER THR ILE LYS ASP VAL LEU

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

ALA SER ARG GLY LEU SER LEU MET ARG LEU ASP LEU ASN TRP PRO THR ALA SER ILE ALA ASP GLU

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	51791	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 ( $e^-/\text{\AA}^2$ )	42	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	96000	Depositor
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	1.468	Depositor
Minimum map value	0.000	Depositor
Average map value	0.008	Depositor
Map value standard deviation	0.047	Depositor
Recommended contour level	0.25	Depositor
Map size (Å)	319.488, 319.488, 319.488	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.832, 0.832, 0.832	Depositor

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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

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	P	0.88	2/1325 (0.2%)	1.19	6/1796 (0.3%)
2	I	0.24	0/10611	0.49	0/14314
3	J	0.24	0/10607	0.51	1/14321 (0.0%)
4	K	0.29	0/665	0.66	0/896
5	R	0.19	0/395	0.81	0/613
6	A	0.51	0/794	0.97	0/1223
7	B	0.50	0/814	0.81	0/1255
8	G	0.24	0/1836	0.53	1/2487 (0.0%)
8	H	0.25	0/1806	0.53	0/2448
All	All	0.32	2/28853 (0.0%)	0.59	8/39353 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	P	133	PRO	CG-CD	-26.27	0.64	1.50
1	P	133	PRO	CB-CG	14.21	2.21	1.50

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	P	133	PRO	N-CD-CG	-34.73	51.10	103.20
1	P	133	PRO	CA-CB-CG	-22.46	61.32	104.00
1	P	133	PRO	CA-N-CD	-8.86	99.09	111.50
1	P	110	PRO	CA-N-CD	-8.44	99.68	111.50
1	P	133	PRO	CB-CG-CD	-7.99	75.34	106.50
1	P	133	PRO	N-CA-CB	-6.02	95.98	102.60
3	J	413	ASP	CB-CG-OD2	5.72	123.44	118.30
8	G	39	LEU	CA-CB-CG	5.04	126.88	115.30

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts [i](#)

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	P	1294	0	1315	39	0
2	I	10439	0	10462	164	0
3	J	10449	0	10666	213	0
4	K	663	0	675	22	0
5	R	355	0	182	8	0
6	A	712	0	397	12	0
7	B	722	0	390	26	0
8	G	1811	0	1843	38	0
8	H	1784	0	1806	35	0
9	J	2	0	0	0	0
10	J	1	0	0	0	0
All	All	28232	0	27736	511	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 9.

All (511) 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:I:255:ILE:HD11	2:I:263:VAL:H	1.51	0.75
8:G:45:ARG:HD3	8:H:38:THR:HG22	1.68	0.74
8:G:93:GLN:N	8:G:93:GLN:OE1	2.22	0.72
2:I:264:GLU:HG3	2:I:267:ARG:HG2	1.72	0.70
3:J:502:PRO:HB3	3:J:506:VAL:HB	1.72	0.70
3:J:502:PRO:HB2	3:J:507:VAL:HG13	1.75	0.69
2:I:979:LEU:HD22	2:I:989:LEU:HD11	1.75	0.69
2:I:808:ASN:H	3:J:633:ALA:HB2	1.56	0.69
3:J:584:PRO:HG2	3:J:587:LEU:HD23	1.75	0.69
1:P:100:LYS:O	1:P:102:LYS:NZ	2.23	0.68
7:B:21:DC:H2'	7:B:22:DG:H8	1.57	0.68
8:H:204:GLU:OE2	8:H:204:GLU:N	2.27	0.68
8:G:127:GLN:OE1	8:G:127:GLN:N	2.22	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:371:ARG:NH1	6:A:20:DG:OP2	2.28	0.67
2:I:533:LEU:HD21	2:I:571:LEU:HD13	1.76	0.67
3:J:1368:ASP:HA	3:J:1371:ARG:HD3	1.77	0.66
1:P:106:ASP:O	1:P:109:THR:OG1	2.12	0.66
4:K:67:ARG:HD3	4:K:70:GLN:HE21	1.60	0.66
3:J:978:ARG:HH12	3:J:1198:VAL:HG23	1.61	0.66
1:P:38:ILE:HD13	1:P:108:ALA:HA	1.79	0.65
2:I:1084:ASP:OD1	8:G:45:ARG:NH2	2.29	0.65
2:I:975:ILE:HG22	2:I:1014:LEU:HD13	1.78	0.65
2:I:189:ASP:HB3	2:I:193:ASN:HB2	1.79	0.64
1:P:42:LYS:HD3	7:B:35:DG:H5''	1.78	0.64
3:J:201:LEU:HB2	3:J:221:ILE:HD11	1.80	0.64
4:K:3:ARG:CZ	4:K:3:ARG:HA	2.27	0.64
3:J:322:ARG:NH2	5:R:9:U:O2'	2.31	0.63
3:J:848:VAL:HB	3:J:858:VAL:HG22	1.79	0.63
8:H:158:ARG:NH2	8:H:173:VAL:O	2.32	0.62
2:I:244:GLU:HG3	2:I:247:ARG:HH22	1.63	0.62
3:J:388:ARG:HE	3:J:411:ILE:HD11	1.65	0.62
3:J:926:PRO:HG2	3:J:1248:ILE:HD11	1.82	0.62
1:P:102:LYS:HE2	1:P:102:LYS:N	2.15	0.62
8:G:5:VAL:O	8:H:150:ARG:NH1	2.33	0.62
1:P:117:ILE:HD13	1:P:162:LEU:HB2	1.81	0.61
1:P:31:PRO:HG3	1:P:96:LEU:HD21	1.81	0.61
3:J:527:LEU:HB2	3:J:550:VAL:HG12	1.83	0.61
3:J:514:THR:HG21	3:J:596:LEU:HD12	1.82	0.61
2:I:478:ARG:O	2:I:478:ARG:NH1	2.34	0.61
8:H:190:ALA:HB2	8:H:200:LYS:HB3	1.82	0.61
2:I:1269:ARG:NH1	7:B:20:DA:OP1	2.35	0.60
8:G:190:ALA:HB2	8:G:200:LYS:HB3	1.84	0.60
3:J:67:ASP:N	3:J:67:ASP:OD2	2.34	0.59
3:J:1152:GLU:OE2	3:J:1194:ARG:NH2	2.34	0.59
4:K:18:ASP:OD1	4:K:18:ASP:N	2.36	0.59
8:G:102:LEU:HD12	8:G:115:ILE:HG12	1.85	0.59
8:H:191:ARG:HB2	8:H:196:THR:HG23	1.84	0.59
2:I:197:ARG:HD3	2:I:200:ARG:HA	1.84	0.59
1:P:119:THR:HA	1:P:125:GLY:H	1.67	0.59
7:B:24:DT:H2'	7:B:25:DG:C8	2.38	0.59
7:B:24:DT:H2'	7:B:25:DG:H8	1.68	0.58
3:J:587:LEU:HD21	3:J:608:CYS:HA	1.84	0.58
2:I:1223:ARG:NH2	3:J:721:SER:OG	2.36	0.58
3:J:572:THR:HG21	3:J:589:TYR:HE2	1.68	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:P:131:THR:HG22	1:P:132:GLU:HG3	1.85	0.58
2:I:1217:THR:O	8:G:41:ASN:ND2	2.36	0.58
2:I:213:LEU:HD22	2:I:422:LYS:HG2	1.86	0.58
3:J:1257:VAL:HA	3:J:1260:MET:HG3	1.86	0.58
3:J:381:ILE:HD11	3:J:412:LEU:HD13	1.86	0.58
3:J:807:LEU:HD23	3:J:1255:VAL:HG13	1.86	0.58
3:J:824:PRO:HD3	3:J:835:LEU:HB2	1.85	0.58
3:J:1051:ASP:HB2	3:J:1055:GLY:H	1.69	0.58
8:G:61:ILE:HG12	8:G:142:MET:HG2	1.84	0.58
3:J:978:ARG:HH22	3:J:1198:VAL:HA	1.70	0.57
4:K:69:ARG:HH22	4:K:73:GLN:NE2	2.02	0.57
3:J:803:VAL:HG11	3:J:1309:ILE:HD12	1.84	0.57
8:G:224:LEU:HD23	8:H:228:LEU:HD11	1.86	0.57
8:H:95:LYS:NZ	8:H:120:ASP:OD2	2.36	0.57
2:I:1290:MET:HA	2:I:1294:LYS:HD3	1.86	0.57
8:G:111:THR:HG22	8:G:129:VAL:HA	1.87	0.57
2:I:386:GLU:OE1	2:I:387:ASN:ND2	2.38	0.57
2:I:1129:ASN:OD1	2:I:1177:ARG:NH1	2.37	0.57
2:I:233:ARG:HG3	2:I:238:GLN:HB2	1.86	0.57
3:J:431:ARG:HD3	3:J:493:PRO:HG3	1.87	0.57
1:P:140:MET:HA	1:P:153:SER:HA	1.88	0.56
3:J:1176:VAL:HG13	3:J:1187:GLU:HG3	1.87	0.56
3:J:709:ARG:HH11	3:J:712:GLN:HG2	1.69	0.56
3:J:968:ASN:OD1	3:J:972:LYS:N	2.38	0.56
3:J:151:MET:HE3	3:J:151:MET:H	1.70	0.56
7:B:19:DC:H2'	7:B:20:DA:H8	1.70	0.56
8:H:29:GLU:HB2	8:H:200:LYS:HB2	1.87	0.56
1:P:118:ILE:HD13	1:P:159:PHE:HB3	1.87	0.56
3:J:197:GLU:O	3:J:201:LEU:HG	2.06	0.56
8:H:74:VAL:HG21	8:H:81:ILE:HD11	1.88	0.56
3:J:984:LEU:HB3	3:J:993:GLU:HB2	1.87	0.56
7:B:21:DC:H2'	7:B:22:DG:C8	2.38	0.56
1:P:113:GLY:N	1:P:130:PHE:O	2.37	0.55
2:I:487:LEU:HD23	2:I:487:LEU:H	1.71	0.55
2:I:255:ILE:HB	2:I:285:ILE:HD11	1.87	0.55
2:I:288:PRO:HG2	2:I:291:TYR:HB2	1.87	0.55
7:B:19:DC:H2'	7:B:20:DA:C8	2.41	0.55
6:A:16:DG:H1'	6:A:19:DA:H61	1.70	0.55
8:G:64:VAL:HG11	8:G:78:ILE:HG21	1.89	0.55
2:I:925:SER:OG	2:I:926:GLY:N	2.39	0.55
1:P:155:LYS:HB3	1:P:158:GLU:HG2	1.88	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:K:1:MET:SD	4:K:3:ARG:NH1	2.73	0.55
8:H:102:LEU:HB2	8:H:115:ILE:HD13	1.89	0.55
7:B:27:DC:H2''	7:B:28:DC:H5'	1.89	0.54
8:H:163:GLU:HA	8:H:166:ARG:HE	1.72	0.54
3:J:808:VAL:HG12	3:J:914:ALA:HA	1.88	0.54
3:J:1156:LEU:HD23	3:J:1223:LEU:HD12	1.89	0.54
8:G:35:PHE:O	8:G:39:LEU:HD23	2.07	0.54
8:H:64:VAL:HG13	8:H:69:SER:HB2	1.88	0.54
2:I:689:ALA:HB2	2:I:1233:LEU:HD23	1.90	0.54
2:I:937:ASP:N	2:I:937:ASP:OD1	2.40	0.54
3:J:830:ASP:OD1	3:J:831:VAL:N	2.40	0.54
4:K:52:ARG:HA	4:K:55:GLU:HG3	1.90	0.54
2:I:499:SER:O	2:I:503:LYS:HG2	2.07	0.54
2:I:339:ASN:HB3	2:I:343:HIS:H	1.72	0.54
2:I:1269:ARG:HA	3:J:346:ARG:HA	1.90	0.54
6:A:32:DC:H2''	6:A:33:DG:C8	2.43	0.54
2:I:196:VAL:N	2:I:204:LEU:O	2.39	0.54
3:J:930:LEU:HA	3:J:1244:GLN:HG3	1.90	0.54
8:G:91:ARG:NH1	8:G:122:GLU:OE2	2.40	0.54
1:P:41:GLY:HA3	1:P:156:ASN:HB3	1.91	0.53
2:I:646:SER:HB3	2:I:649:GLN:HG3	1.90	0.53
2:I:1073:LYS:NZ	5:R:16:G:OP1	2.33	0.53
3:J:816:THR:HG22	3:J:818:GLU:H	1.72	0.53
8:G:104:LYS:HG2	8:G:110:VAL:HG22	1.90	0.53
2:I:28:LEU:HD21	2:I:524:ILE:HD13	1.89	0.53
3:J:827:GLU:OE1	3:J:832:LYS:NZ	2.41	0.53
3:J:1048:ARG:HE	3:J:1059:LEU:HB3	1.73	0.53
3:J:1157:ALA:HB2	3:J:1210:ILE:HD11	1.89	0.53
4:K:1:MET:HE1	4:K:3:ARG:H	1.73	0.53
2:I:1185:PRO:HD2	2:I:1189:GLY:HA2	1.89	0.53
3:J:1230:THR:HG23	3:J:1257:VAL:HG11	1.90	0.53
3:J:363:LEU:HD23	3:J:618:VAL:HG12	1.90	0.53
3:J:1076:PRO:HB2	3:J:1101:LEU:HD23	1.91	0.53
2:I:155:VAL:HG23	2:I:176:ILE:HG12	1.91	0.53
3:J:84:ILE:HG13	3:J:91:GLU:HG3	1.91	0.53
2:I:868:SER:HB2	2:I:943:LYS:HD3	1.89	0.53
5:R:7:U:H2'	5:R:8:G:C8	2.44	0.53
8:G:58:GLU:HG2	8:G:172:LEU:HD23	1.90	0.53
3:J:151:MET:H	3:J:151:MET:CE	2.21	0.53
5:R:1:U:O2'	5:R:3:U:OP2	2.21	0.53
8:G:57:THR:HG22	8:G:58:GLU:HG3	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:615:LYS:HG2	4:K:5:THR:HG21	1.89	0.53
1:P:105:VAL:HG13	1:P:107:PRO:HD2	1.91	0.52
2:I:812:PHE:O	2:I:1099:ASN:ND2	2.36	0.52
3:J:55:GLY:H	3:J:58:CYS:HB2	1.74	0.52
8:H:14:VAL:HG13	8:H:28:LEU:HG	1.91	0.52
2:I:478:ARG:HH12	2:I:482:GLY:HA3	1.74	0.52
2:I:877:VAL:HG13	2:I:881:ASP:HB2	1.92	0.52
3:J:976:THR:HA	3:J:999:TYR:HE1	1.74	0.52
2:I:473:ARG:HG2	6:A:17:DG:H5''	1.91	0.52
3:J:1087:ASP:OD1	3:J:1087:ASP:N	2.42	0.52
3:J:117:LEU:HD21	3:J:135:ILE:HG21	1.91	0.52
7:B:3:DA:H2''	7:B:4:DA:C8	2.44	0.52
8:G:29:GLU:HB3	8:G:200:LYS:HB2	1.91	0.52
3:J:1078:LEU:HD12	3:J:1121:LEU:HD13	1.92	0.52
2:I:14:ASP:HA	2:I:1183:ALA:HB3	1.91	0.52
3:J:846:GLU:HA	3:J:860:ARG:HG3	1.92	0.52
6:A:8:DA:H2''	6:A:9:DC:H5'	1.92	0.52
3:J:552:ILE:HD11	3:J:570:LYS:HG3	1.91	0.52
2:I:1275:VAL:O	2:I:1279:GLU:HG3	2.10	0.51
3:J:393:THR:HG23	3:J:396:ALA:H	1.74	0.51
3:J:1093:THR:HG22	3:J:1095:MET:H	1.75	0.51
4:K:60:ASN:OD1	4:K:61:ASN:N	2.42	0.51
2:I:1117:LEU:HD13	2:I:1195:ILE:HG12	1.92	0.51
2:I:633:LEU:HB3	2:I:644:LEU:HD12	1.93	0.51
3:J:1134:ILE:HG12	3:J:1140:ARG:NH2	2.26	0.51
2:I:961:SER:OG	2:I:965:GLN:OE1	2.29	0.51
3:J:674:THR:OG1	3:J:677:GLU:OE1	2.29	0.51
3:J:791:ALA:HA	7:B:18:DA:C8	2.45	0.51
2:I:985:GLU:HB3	2:I:988:LYS:HD2	1.93	0.50
6:A:16:DG:H1'	6:A:19:DA:N6	2.26	0.50
7:B:18:DA:H2'	7:B:19:DC:H6	1.76	0.50
8:G:14:VAL:HG11	8:G:29:GLU:HG3	1.92	0.50
2:I:1332:SER:HA	3:J:243:PRO:HB2	1.93	0.50
8:H:127:GLN:H	8:H:127:GLN:CD	2.15	0.50
1:P:6:LEU:HD23	1:P:79:VAL:HG11	1.93	0.50
3:J:91:GLU:OE1	3:J:101:ARG:NH2	2.39	0.50
2:I:106:GLU:HA	2:I:115:LYS:HE2	1.92	0.50
3:J:1089:LEU:HA	3:J:1096:PRO:HA	1.94	0.50
2:I:378:ARG:NH1	2:I:379:GLU:OE2	2.43	0.50
8:G:215:GLU:OE2	8:G:219[B]:ARG:NH2	2.45	0.50
2:I:268:ARG:HH21	2:I:270:THR:HG22	1.76	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:943:LYS:HA	2:I:946:LEU:HD12	1.93	0.50
7:B:5:DG:H4'	7:B:6:DA:OP1	2.12	0.50
2:I:705:GLU:HB3	2:I:794:LEU:H	1.76	0.49
3:J:961:SER:OG	3:J:983:LYS:NZ	2.43	0.49
8:H:15:ASP:OD1	8:H:27:THR:HB	2.12	0.49
2:I:642:SER:HB2	3:J:770:LEU:HD21	1.94	0.49
4:K:12:LYS:NZ	4:K:55:GLU:O	2.45	0.49
2:I:45:GLY:HA3	2:I:54:ARG:HD2	1.93	0.49
2:I:1103:VAL:HG21	3:J:639:VAL:HG21	1.95	0.49
3:J:278:ARG:NH2	3:J:295:GLU:OE2	2.41	0.49
1:P:15:GLN:O	1:P:19:GLU:HG2	2.13	0.49
1:P:113:GLY:H	1:P:131:THR:HA	1.76	0.49
2:I:12:ARG:HG3	2:I:1181:PRO:HB2	1.95	0.49
2:I:32:LEU:HA	2:I:130:MET:HE1	1.94	0.49
3:J:1172:LYS:HE3	3:J:1189:MET:SD	2.53	0.49
8:G:191:ARG:HH12	8:G:196:THR:HA	1.77	0.49
3:J:978:ARG:HH12	3:J:1198:VAL:HA	1.76	0.49
3:J:1172:LYS:HB3	3:J:1191:PRO:HA	1.95	0.48
8:H:162:GLU:HG2	8:H:165:GLU:HB2	1.95	0.48
2:I:302:ILE:HA	2:I:309:LEU:HA	1.95	0.48
2:I:1293:VAL:HG21	2:I:1315:MET:HG3	1.95	0.48
3:J:709:ARG:NH1	3:J:710:ASP:O	2.46	0.48
3:J:850:LYS:HB2	3:J:857:LEU:HD23	1.95	0.48
2:I:444:ASP:O	2:I:450:ASN:ND2	2.46	0.48
3:J:1273:ASP:OD1	3:J:1273:ASP:N	2.36	0.48
3:J:1346:GLY:O	3:J:1350:ASN:ND2	2.38	0.48
1:P:155:LYS:HZ3	1:P:156:ASN:H	1.62	0.48
2:I:657:THR:HB	2:I:1187:PHE:HB2	1.94	0.48
3:J:300:GLN:NE2	3:J:304:ASP:OD2	2.47	0.48
3:J:572:THR:HG21	3:J:589:TYR:CE2	2.48	0.48
3:J:1025:MET:HE2	3:J:1025:MET:HA	1.95	0.48
2:I:242:VAL:HB	2:I:245:ARG:HG3	1.95	0.48
3:J:1326:GLN:HG3	3:J:1327:GLU:HG3	1.95	0.48
3:J:255:LEU:HD11	7:B:28:DC:C4	2.48	0.48
2:I:225:PHE:HZ	2:I:345:PRO:HA	1.79	0.48
3:J:1140:ARG:O	3:J:1140:ARG:HD3	2.13	0.48
4:K:8:ASP:OD1	4:K:8:ASP:N	2.46	0.48
2:I:560:PRO:HA	3:J:780:ARG:HH21	1.79	0.48
3:J:24:LEU:HD23	3:J:24:LEU:H	1.79	0.48
3:J:153:ASN:OD1	3:J:153:ASN:N	2.47	0.48
1:P:38:ILE:O	1:P:42:LYS:N	2.47	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:878:THR:OG1	2:I:879:GLY:N	2.47	0.48
3:J:833:GLU:OE2	3:J:1242:ARG:NE	2.36	0.48
8:H:154:PRO:HG2	8:H:157:THR:HG23	1.96	0.48
8:H:194:GLN:OE1	8:H:194:GLN:HA	2.14	0.48
2:I:1101:LEU:HD12	3:J:731:ARG:HB2	1.95	0.47
3:J:984:LEU:HD23	3:J:992:LYS:HB3	1.96	0.47
2:I:263:VAL:HG11	2:I:269:ILE:HG13	1.95	0.47
6:A:33:DG:H2''	6:A:34:DA:C8	2.49	0.47
8:H:30:PRO:HG3	8:H:192:VAL:HG11	1.95	0.47
1:P:62:GLU:HA	1:P:62:GLU:OE2	2.15	0.47
3:J:962:ASN:HB3	3:J:979:ASN:O	2.15	0.47
3:J:978:ARG:NH2	3:J:1197:ASN:O	2.47	0.47
2:I:1121:ALA:HB2	2:I:1182:ILE:HD12	1.96	0.47
3:J:1183:SER:OG	3:J:1184:ASP:N	2.48	0.47
2:I:233:ARG:H	2:I:237:LEU:HA	1.80	0.47
3:J:450:HIS:HE1	3:J:452:LEU:HD12	1.80	0.47
3:J:1078:LEU:HG	3:J:1101:LEU:HD21	1.95	0.47
8:H:164:ASP:OD1	8:H:164:ASP:N	2.48	0.47
2:I:444:ASP:HB3	2:I:447:HIS:HB2	1.97	0.47
2:I:850:ILE:HD13	2:I:1048:LYS:HD2	1.96	0.47
2:I:972:PHE:O	2:I:975:ILE:HG13	2.14	0.47
3:J:591:ILE:HG13	3:J:592:VAL:HG13	1.97	0.47
3:J:665:GLN:OE1	3:J:678:ARG:NH2	2.48	0.47
3:J:1173:ARG:NH1	3:J:1192:LYS:O	2.48	0.47
7:B:6:DA:H2''	7:B:7:DT:H71	1.97	0.47
3:J:1059:LEU:HD23	3:J:1059:LEU:H	1.80	0.47
8:H:104:LYS:HG2	8:H:110:VAL:HG22	1.97	0.47
3:J:174:ASP:OD1	3:J:174:ASP:N	2.38	0.47
3:J:1145:PHE:O	3:J:1309:ILE:HG12	2.15	0.47
6:A:19:DA:H1'	6:A:20:DG:O4'	2.15	0.47
2:I:296:VAL:HG22	2:I:316:GLU:HA	1.96	0.47
2:I:593:LYS:O	2:I:600:THR:OG1	2.32	0.47
3:J:516:ASP:OD1	3:J:516:ASP:N	2.42	0.47
3:J:849:LEU:HD23	3:J:856:ILE:HA	1.97	0.47
3:J:1134:ILE:HG12	3:J:1140:ARG:HH21	1.79	0.47
1:P:99:TYR:OH	3:J:286:ALA:O	2.28	0.46
2:I:235:ASN:O	2:I:236:LYS:HG2	2.14	0.46
3:J:744:ARG:HB2	3:J:759:ILE:HB	1.96	0.46
4:K:38:LEU:HB3	4:K:58:LEU:HD23	1.97	0.46
1:P:94:HIS:O	1:P:98:VAL:HG23	2.15	0.46
1:P:134:ASP:OD1	1:P:134:ASP:N	2.48	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:18:ARG:O	2:I:1156:ARG:NH1	2.45	0.46
8:G:16:ILE:HD12	8:G:26:VAL:HG22	1.97	0.46
1:P:101:PRO:HB2	1:P:103:ASP:OD2	2.16	0.46
3:J:275:ARG:HA	3:J:275:ARG:HD3	1.65	0.46
8:G:102:LEU:HD22	8:G:142:MET:HE2	1.97	0.46
8:H:66:HIS:ND1	8:H:69:SER:OG	2.48	0.46
8:G:28:LEU:HD13	8:G:201:LEU:HD23	1.96	0.46
3:J:644:MET:HG3	3:J:764:ARG:HD2	1.97	0.46
8:G:98:VAL:HB	8:G:146:VAL:HG13	1.96	0.46
8:G:135:ASP:HB3	8:G:138:ALA:HB2	1.98	0.46
2:I:189:ASP:O	2:I:192:ASP:N	2.48	0.46
3:J:1045:THR:HG22	3:J:1067:ARG:HE	1.80	0.46
3:J:426:ALA:HB3	3:J:427:PRO:HD3	1.98	0.46
3:J:836:ARG:NH1	3:J:870:ASP:OD1	2.49	0.46
3:J:1027:VAL:HB	3:J:1121:LEU:HB2	1.97	0.46
4:K:13:ILE:HG13	4:K:19:LEU:HD23	1.97	0.46
8:H:56:VAL:HG13	8:H:144:ILE:HG23	1.97	0.46
3:J:950:ILE:HG12	3:J:1018:ALA:HB3	1.98	0.46
3:J:1027:VAL:H	3:J:1123:ARG:HH21	1.63	0.46
3:J:1063:ASP:OD1	3:J:1063:ASP:N	2.46	0.46
2:I:661:VAL:HB	2:I:665:ALA:HB3	1.96	0.46
3:J:891:ASP:OD1	3:J:891:ASP:N	2.38	0.46
3:J:1100:PHE:HB2	3:J:1200:GLU:HB2	1.97	0.46
3:J:1162:ILE:HG22	3:J:1178:THR:HB	1.97	0.45
8:H:193:GLU:CD	8:H:194:GLN:H	2.19	0.45
2:I:463:GLN:HG3	2:I:505:PHE:HB2	1.97	0.45
2:I:1298:VAL:HG12	2:I:1301:ARG:NH2	2.31	0.45
3:J:934:THR:O	3:J:934:THR:OG1	2.34	0.45
3:J:1169:THR:HG22	3:J:1172:LYS:O	2.17	0.45
2:I:17:LYS:NZ	2:I:1194:GLU:OE2	2.50	0.45
2:I:201:ARG:HB2	2:I:369:MET:HE1	1.99	0.45
3:J:156:ARG:HH22	3:J:192:MET:HB3	1.81	0.45
6:A:27:DT:H2'	6:A:28:DT:H71	1.98	0.45
8:G:23:HIS:CE1	8:G:204:GLU:HG3	2.52	0.45
7:B:23:DC:H2'	7:B:24:DT:H6	1.81	0.45
2:I:954:LYS:HB3	2:I:954:LYS:HE3	1.74	0.45
2:I:1142:ARG:HG3	2:I:1169:VAL:HG11	1.97	0.45
3:J:399:LYS:HB3	3:J:403:ARG:HH21	1.81	0.45
3:J:660:GLU:O	3:J:663:GLU:HG3	2.17	0.45
5:R:7:U:H2'	5:R:8:G:H8	1.81	0.45
2:I:850:ILE:N	2:I:850:ILE:HD12	2.32	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:268:LEU:HD13	3:J:306:LEU:HA	1.99	0.45
3:J:574:VAL:O	3:J:578:ILE:HG12	2.16	0.45
3:J:724:MET:HE3	3:J:724:MET:HB3	1.88	0.45
3:J:1250:ASP:OD1	3:J:1250:ASP:N	2.49	0.45
3:J:1360:GLY:O	3:J:1363:TYR:HB3	2.17	0.45
2:I:344:GLY:HA3	2:I:346:TYR:CZ	2.52	0.45
2:I:454:ARG:HG2	2:I:458:GLU:HB3	1.99	0.45
3:J:1347:LEU:HD13	3:J:1357:ILE:HB	1.98	0.45
1:P:117:ILE:HG22	1:P:119:THR:HG22	1.99	0.45
3:J:213:LYS:HA	3:J:216:LYS:NZ	2.32	0.45
3:J:885:VAL:HG11	3:J:1255:VAL:HG22	1.99	0.45
2:I:576:SER:HB2	2:I:579:ALA:HB2	1.99	0.45
2:I:841:ARG:HA	2:I:1046:VAL:HA	1.99	0.45
3:J:264:ASP:OD1	3:J:264:ASP:N	2.48	0.45
3:J:1334:GLU:OE2	3:J:1334:GLU:HA	2.17	0.45
2:I:521:LEU:HD13	2:I:667:LEU:HD12	2.00	0.44
3:J:357:VAL:HG23	3:J:451:PRO:HG3	2.00	0.44
7:B:31:DC:H2"	7:B:32:DG:N7	2.31	0.44
8:G:46:ILE:HD11	8:G:224:LEU:HD13	1.99	0.44
8:G:205:MET:HE3	8:G:205:MET:HB3	1.89	0.44
2:I:979:LEU:HD21	2:I:985:GLU:HB2	1.98	0.44
2:I:1290:MET:HG3	3:J:347:VAL:HG11	1.98	0.44
3:J:535:ARG:NH1	8:H:176:CYS:SG	2.91	0.44
2:I:236:LYS:HZ3	2:I:238:GLN:HG3	1.82	0.44
2:I:1276:TRP:CE2	3:J:801:VAL:HG11	2.52	0.44
3:J:349:TYR:HE1	3:J:379:PRO:HG2	1.82	0.44
2:I:538:LEU:HD21	6:A:24:DG:C4	2.52	0.44
2:I:1313:HIS:HB2	3:J:474:LEU:HG	1.98	0.44
3:J:211:GLU:O	3:J:215:LYS:HG2	2.16	0.44
2:I:791:LEU:HD23	2:I:791:LEU:HA	1.84	0.44
3:J:731:ARG:HD2	3:J:731:ARG:HA	1.62	0.44
3:J:773:PHE:O	3:J:776:THR:OG1	2.33	0.44
3:J:1191:PRO:HD2	3:J:1194:ARG:HG3	2.00	0.44
2:I:371:ARG:HA	2:I:371:ARG:HD3	1.78	0.44
3:J:481:ARG:NH1	4:K:2:ALA:O	2.51	0.44
3:J:950:ILE:HD11	3:J:1017:VAL:HB	2.00	0.44
4:K:1:MET:HE2	4:K:2:ALA:N	2.33	0.44
8:G:100:LEU:HD21	8:G:121:VAL:HG11	1.99	0.44
3:J:215:LYS:O	3:J:218:THR:HG22	2.18	0.44
2:I:148:GLN:OE1	2:I:454:ARG:NH2	2.46	0.44
3:J:732:GLY:HA2	3:J:736:GLN:OE1	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:1067:ARG:O	3:J:1072:LYS:NZ	2.51	0.44
3:J:1157:ALA:HB3	3:J:1208:ASP:H	1.83	0.44
8:G:182:ARG:HB3	8:G:206:GLU:HB3	2.00	0.44
2:I:107:ARG:NE	2:I:107:ARG:O	2.51	0.43
2:I:631:GLU:OE1	2:I:631:GLU:N	2.50	0.43
3:J:367:GLY:HA3	3:J:448:GLN:HB2	2.00	0.43
3:J:978:ARG:NH2	3:J:1198:VAL:HA	2.32	0.43
3:J:1309:ILE:HD13	3:J:1309:ILE:HA	1.88	0.43
1:P:161:LYS:HD3	1:P:162:LEU:N	2.33	0.43
2:I:1305:TYR:HB2	5:R:1:U:H5'	1.99	0.43
3:J:505:ASP:HB2	3:J:629:PHE:HE1	1.83	0.43
3:J:700:ASN:O	3:J:704:GLU:HB2	2.18	0.43
3:J:1169:THR:HG23	3:J:1171:GLY:H	1.82	0.43
3:J:1173:ARG:HB3	3:J:1192:LYS:HE2	1.99	0.43
8:G:61:ILE:HB	8:G:64:VAL:HB	1.99	0.43
2:I:1082:ILE:HD11	2:I:1093:PRO:HG2	2.00	0.43
2:I:1122:LYS:HG2	2:I:1229:TYR:CE1	2.53	0.43
7:B:23:DC:H2'	7:B:24:DT:C6	2.52	0.43
1:P:110:PRO:HA	1:P:114:ASP:OD2	2.18	0.43
1:P:118:ILE:HG23	1:P:123:PHE:O	2.18	0.43
3:J:134:ASP:HB3	3:J:159:ILE:HG13	1.99	0.43
3:J:520:ALA:HB1	3:J:543:SER:HB3	2.00	0.43
7:B:22:DG:H2'	7:B:23:DC:H6	1.83	0.43
2:I:1216:ARG:HA	8:G:45:ARG:HH21	1.82	0.43
3:J:799:ARG:HG2	3:J:1325:PHE:HZ	1.84	0.43
3:J:1155:ILE:HD12	3:J:1155:ILE:H	1.83	0.43
3:J:1172:LYS:HG2	3:J:1191:PRO:HA	1.99	0.43
2:I:519:ASN:OD1	2:I:522:SER:HB3	2.18	0.43
2:I:802:VAL:HG12	2:I:1096:ILE:HB	1.99	0.43
2:I:1273:MET:HB2	3:J:428:THR:HB	1.99	0.43
2:I:1306:LYS:HE2	2:I:1306:LYS:HB2	1.87	0.43
3:J:265:LEU:HD11	3:J:327:LEU:HG	2.00	0.43
3:J:847:ASP:HB3	3:J:856:ILE:HG22	2.00	0.43
2:I:201:ARG:HB2	2:I:369:MET:CE	2.48	0.43
2:I:678:ARG:CZ	2:I:1106:ARG:HG2	2.48	0.43
2:I:755:LYS:HE3	2:I:755:LYS:HB3	1.71	0.43
2:I:1047:LEU:H	2:I:1047:LEU:HD23	1.84	0.43
2:I:1297:ASP:OD2	2:I:1318:GLY:HA3	2.19	0.43
3:J:479:GLU:HG3	4:K:20:VAL:HG11	2.00	0.43
3:J:532:GLU:OE2	8:H:152:TYR:OH	2.25	0.43
3:J:1344:LEU:H	3:J:1344:LEU:HD22	1.84	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:195:PHE:CG	2:I:203:LYS:HE2	2.54	0.43
3:J:208:THR:HG23	3:J:214:ARG:HG2	1.99	0.43
3:J:703:THR:O	3:J:703:THR:OG1	2.35	0.43
3:J:919:ALA:O	3:J:923:ILE:HG12	2.19	0.43
2:I:406:ASN:ND2	2:I:413:GLU:O	2.51	0.43
2:I:1336:ASN:HA	3:J:33:TRP:HH2	1.84	0.43
3:J:807:LEU:HD12	3:J:807:LEU:HA	1.83	0.43
3:J:1040:MET:HB2	3:J:1046:ILE:HG12	2.01	0.43
3:J:1172:LYS:HB2	3:J:1189:MET:SD	2.58	0.43
8:H:76:GLU:OE1	8:H:132:HIS:N	2.47	0.43
2:I:233:ARG:HE	2:I:233:ARG:HB3	1.64	0.43
2:I:971:LEU:O	2:I:975:ILE:HG23	2.19	0.43
3:J:613:GLY:O	3:J:617:THR:OG1	2.28	0.43
8:H:182:ARG:HA	8:H:182:ARG:HD2	1.89	0.43
2:I:545:PHE:HD1	2:I:545:PHE:O	2.02	0.42
1:P:95:GLN:O	1:P:99:TYR:HB2	2.19	0.42
1:P:115:LYS:HD2	1:P:127:GLN:HB3	2.01	0.42
3:J:751:ASP:OD1	3:J:752:GLY:N	2.52	0.42
3:J:886:VAL:HA	3:J:1258:ARG:HB2	2.01	0.42
8:G:32:GLU:HB2	8:G:35:PHE:HD1	1.83	0.42
1:P:100:LYS:HA	1:P:100:LYS:HD3	1.88	0.42
2:I:1062:PRO:HA	2:I:1076:ILE:HB	2.02	0.42
3:J:697:MET:HE3	3:J:738:ARG:HA	2.02	0.42
3:J:1037:PHE:HB3	3:J:1040:MET:SD	2.59	0.42
2:I:326:SER:OG	2:I:327:GLN:OE1	2.37	0.42
2:I:648:ASP:N	2:I:648:ASP:OD1	2.36	0.42
3:J:913:GLU:HG2	4:K:17:PHE:HE2	1.84	0.42
7:B:18:DA:H2'	7:B:19:DC:C6	2.54	0.42
1:P:120:GLU:HB3	1:P:158:GLU:HB3	2.00	0.42
2:I:575:LEU:HD11	2:I:587:LEU:HD21	2.01	0.42
1:P:134:ASP:N	1:P:138:ARG:O	2.53	0.42
2:I:1248:THR:HG21	5:R:1:U:H5'	2.01	0.42
3:J:252:LEU:HD23	3:J:252:LEU:HA	1.74	0.42
2:I:85:CYS:HA	2:I:90:VAL:HG22	2.02	0.42
2:I:1041:ASP:OD1	2:I:1041:ASP:N	2.40	0.42
3:J:1062:LEU:HD23	3:J:1066:GLU:HB3	2.00	0.42
5:R:10:C:H2'	5:R:11:A:C8	2.54	0.42
2:I:255:ILE:H	2:I:255:ILE:HG13	1.64	0.42
3:J:255:LEU:HD11	7:B:28:DC:N3	2.35	0.42
3:J:289:ASP:OD2	3:J:293:ARG:HD3	2.19	0.42
3:J:425:ARG:HD2	3:J:459:ALA:HB2	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:473:THR:HG23	3:J:476:ALA:H	1.85	0.42
3:J:1173:ARG:HG2	3:J:1192:LYS:HD3	2.01	0.42
8:G:225:ALA:O	8:G:229:GLU:HG2	2.19	0.42
2:I:545:PHE:CD1	2:I:545:PHE:C	2.94	0.42
2:I:862:LEU:HD22	2:I:865:LEU:HD12	2.01	0.42
8:H:137:ASN:OD1	8:H:137:ASN:N	2.46	0.42
4:K:67:ARG:HA	4:K:70:GLN:HG3	2.02	0.41
6:A:33:DG:H2''	6:A:34:DA:H8	1.84	0.41
8:H:158:ARG:HH12	8:H:172:LEU:HD12	1.84	0.41
2:I:183:TRP:N	2:I:183:TRP:CD1	2.88	0.41
2:I:236:LYS:O	2:I:237:LEU:HD12	2.20	0.41
2:I:982:GLY:HA2	2:I:1007:LYS:HZ3	1.84	0.41
3:J:1095:MET:HA	3:J:1096:PRO:HD3	1.93	0.41
8:H:224:LEU:HD12	8:H:224:LEU:HA	1.88	0.41
1:P:106:ASP:HB2	1:P:107:PRO:HD3	2.03	0.41
1:P:110:PRO:O	1:P:110:PRO:HD2	2.20	0.41
2:I:317:LEU:HD23	2:I:317:LEU:HA	1.88	0.41
2:I:519:ASN:OD1	2:I:519:ASN:N	2.53	0.41
3:J:117:LEU:HD11	3:J:136:GLU:OE2	2.20	0.41
3:J:528:THR:HA	8:H:83:LEU:HD21	2.01	0.41
7:B:2:DG:H2''	7:B:3:DA:C8	2.55	0.41
3:J:1306:LEU:HD22	3:J:1306:LEU:HA	1.83	0.41
2:I:14:ASP:HB3	2:I:1157:GLN:HB2	2.03	0.41
2:I:1273:MET:H	2:I:1273:MET:HG2	1.53	0.41
3:J:541:LEU:HD21	8:H:154:PRO:HD3	2.03	0.41
3:J:678:ARG:HG3	3:J:679:TYR:N	2.35	0.41
1:P:117:ILE:HG13	1:P:127:GLN:HG3	2.02	0.41
2:I:11:ILE:O	2:I:1149:TYR:OH	2.27	0.41
2:I:99:LYS:HD3	2:I:121:GLU:HG2	2.03	0.41
2:I:388:LEU:HD12	2:I:388:LEU:HA	1.86	0.41
2:I:402:ARG:HA	2:I:402:ARG:HD3	1.79	0.41
2:I:960:LEU:HD23	2:I:960:LEU:HA	1.94	0.41
2:I:968:GLU:OE2	2:I:994:ARG:NH2	2.53	0.41
3:J:216:LYS:NZ	3:J:216:LYS:HB2	2.36	0.41
3:J:342:LEU:HD13	3:J:1352:ILE:HG23	2.03	0.41
3:J:640:GLY:N	3:J:643:ASP:OD2	2.52	0.41
3:J:865:HIS:CE1	3:J:867:GLN:HB2	2.55	0.41
7:B:12:DA:H2''	7:B:13:DA:H8	1.85	0.41
2:I:192:ASP:HB3	2:I:346:TYR:HD1	1.85	0.41
2:I:377:THR:HB	2:I:380:ALA:HB3	2.03	0.41
3:J:166:LEU:HD23	3:J:169:LEU:HD21	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:965:SER:HB2	3:J:973:LEU:HG	2.02	0.41
2:I:694:ARG:O	2:I:798:GLN:NE2	2.53	0.41
2:I:1291:LEU:HD11	3:J:1351:VAL:HG13	2.02	0.41
3:J:213:LYS:HA	3:J:216:LYS:HZ3	1.86	0.41
3:J:265:LEU:HD12	3:J:265:LEU:HA	1.85	0.41
3:J:1059:LEU:HG	3:J:1107:VAL:HB	2.03	0.41
4:K:73:GLN:OE1	4:K:73:GLN:HA	2.20	0.41
6:A:32:DC:H2 <sup>7</sup>	6:A:33:DG:N7	2.35	0.41
2:I:915:ASP:OD1	2:I:915:ASP:N	2.52	0.41
2:I:1143:GLU:OE1	2:I:1147:ARG:NH1	2.54	0.41
3:J:1215:GLU:HB3	3:J:1220:ILE:HD11	2.03	0.41
4:K:29:GLN:HG2	4:K:35:LYS:HG3	2.03	0.41
1:P:31:PRO:HB2	1:P:50:LEU:HB2	2.03	0.40
2:I:685:MET:SD	2:I:1073:LYS:HD3	2.61	0.40
2:I:724:VAL:HA	2:I:734:ILE:HG12	2.03	0.40
2:I:1016:GLU:HA	2:I:1019:ASP:OD2	2.21	0.40
3:J:285:LEU:HD12	3:J:285:LEU:HA	1.92	0.40
3:J:870:ASP:O	3:J:873:GLU:HG3	2.22	0.40
3:J:960:LEU:HB3	3:J:963:VAL:HG11	2.03	0.40
3:J:980:THR:HB	3:J:997:VAL:HG22	2.03	0.40
4:K:80:LEU:HD23	4:K:80:LEU:HA	1.91	0.40
8:G:193:GLU:CD	8:G:194:GLN:H	2.23	0.40
2:I:165:HIS:CD2	2:I:167:SER:HB2	2.56	0.40
2:I:530:ILE:HD11	2:I:575:LEU:HD13	2.03	0.40
2:I:563:THR:O	2:I:684:ASN:ND2	2.41	0.40
3:J:478:LEU:HD13	3:J:478:LEU:HA	1.98	0.40
3:J:591:ILE:O	3:J:594:GLN:NE2	2.50	0.40
3:J:596:LEU:HD23	3:J:596:LEU:HA	1.85	0.40
3:J:614:LEU:HD23	4:K:7:GLN:HB2	2.04	0.40
3:J:952:VAL:O	3:J:1014:GLY:N	2.39	0.40
7:B:31:DC:H2 <sup>7</sup>	7:B:32:DG:C8	2.56	0.40
1:P:111:TYR:CE2	1:P:114:ASP:HB3	2.56	0.40
2:I:488:MET:O	2:I:492:MET:HG2	2.22	0.40
2:I:492:MET:HG2	2:I:492:MET:H	1.72	0.40
3:J:526:VAL:HG22	8:H:83:LEU:HD12	2.04	0.40
3:J:1253:ILE:H	3:J:1253:ILE:HG12	1.69	0.40
2:I:33:ASP:OD1	2:I:34:SER:N	2.53	0.40
2:I:819:SER:HB2	2:I:1085:MET:HG3	2.04	0.40
2:I:1278:LEU:HD23	2:I:1278:LEU:HA	1.84	0.40
3:J:346:ARG:NH1	7:B:21:DC:OP1	2.48	0.40
3:J:799:ARG:NH1	3:J:1146:GLU:OE2	2.48	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:978:ARG:NH1	3:J:1198:VAL:HA	2.37	0.40
2:I:993:PRO:HG2	2:I:996:ARG:HE	1.85	0.40
2:I:1072:ASN:OD1	2:I:1072:ASN:N	2.48	0.40
2:I:1216:ARG:HA	8:G:45:ARG:HE	1.86	0.40
2:I:1262:LYS:N	7:B:22:DG:OP1	2.54	0.40
8:G:92:VAL:O	8:G:148:ARG:NH2	2.39	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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	P	160/164 (98%)	153 (96%)	6 (4%)	1 (1%)	25	57
2	I	1319/1342 (98%)	1286 (98%)	33 (2%)	0	100	100
3	J	1337/1416 (94%)	1307 (98%)	30 (2%)	0	100	100
4	K	82/91 (90%)	77 (94%)	5 (6%)	0	100	100
8	G	232/329 (70%)	227 (98%)	5 (2%)	0	100	100
8	H	229/329 (70%)	225 (98%)	4 (2%)	0	100	100
All	All	3359/3671 (92%)	3275 (98%)	83 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	P	39	VAL

### 5.3.2 Protein sidechains [i](#)

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	P	142/143 (99%)	134 (94%)	8 (6%)	21	51
2	I	1142/1157 (99%)	1082 (95%)	60 (5%)	22	52
3	J	1126/1177 (96%)	1074 (95%)	52 (5%)	27	57
4	K	71/75 (95%)	67 (94%)	4 (6%)	21	51
8	G	201/286 (70%)	195 (97%)	6 (3%)	41	68
8	H	198/286 (69%)	184 (93%)	14 (7%)	14	44
All	All	2880/3124 (92%)	2736 (95%)	144 (5%)	28	54

All (144) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	P	15	GLN
1	P	102	LYS
1	P	103	ASP
1	P	111	TYR
1	P	130	PHE
1	P	132	GLU
1	P	134	ASP
1	P	140	MET
2	I	55	SER
2	I	70	TYR
2	I	132	ASP
2	I	147	SER
2	I	159	SER
2	I	163	LYS
2	I	175	ARG
2	I	188	PHE
2	I	226	GLU
2	I	234	ASP
2	I	237	LEU
2	I	239	MET
2	I	245	ARG
2	I	252	SER
2	I	265	LYS
2	I	268	ARG
2	I	272	ARG
2	I	315	MET

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	I	318	SER
2	I	341	LEU
2	I	348	SER
2	I	369	MET
2	I	387	ASN
2	I	391	SER
2	I	392	GLU
2	I	403	MET
2	I	421	SER
2	I	473	ARG
2	I	503	LYS
2	I	509	SER
2	I	512	SER
2	I	514	PHE
2	I	519	ASN
2	I	522	SER
2	I	529[A]	ARG
2	I	529[B]	ARG
2	I	545	PHE
2	I	554	HIS
2	I	598	VAL
2	I	635	THR
2	I	642	SER
2	I	643	SER
2	I	697	LYS
2	I	758	ARG
2	I	768	MET
2	I	770	CYS
2	I	811	ASN
2	I	815	SER
2	I	819	SER
2	I	838	CYS
2	I	851	THR
2	I	925	SER
2	I	943	LYS
2	I	951	MET
2	I	1178	LYS
2	I	1225	VAL
2	I	1281	TYR
2	I	1315	MET
2	I	1319	MET
2	I	1339	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	J	21	LYS
3	J	24	LEU
3	J	29	MET
3	J	133	ARG
3	J	151	MET
3	J	155	GLU
3	J	172	PHE
3	J	227	PHE
3	J	232	ASN
3	J	264	ASP
3	J	357	VAL
3	J	449	LEU
3	J	472	LEU
3	J	485	MET
3	J	553	THR
3	J	558	ASP
3	J	560	ASN
3	J	564	VAL
3	J	599	LYS
3	J	651	HIS
3	J	743	MET
3	J	747	MET
3	J	753	SER
3	J	763	PHE
3	J	772	TYR
3	J	814	CYS
3	J	825	VAL
3	J	839	VAL
3	J	857	LEU
3	J	887	SER
3	J	990	ARG
3	J	999	TYR
3	J	1036	ARG
3	J	1040	MET
3	J	1059	LEU
3	J	1095	MET
3	J	1109	LEU
3	J	1138	LEU
3	J	1164	SER
3	J	1165	PHE
3	J	1167	LYS
3	J	1169	THR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	J	1172	LYS
3	J	1186	TYR
3	J	1188	GLU
3	J	1197	ASN
3	J	1250	ASP
3	J	1279	GLN
3	J	1306	LEU
3	J	1321	SER
3	J	1365	TYR
3	J	1366	HIS
4	K	1	MET
4	K	3	ARG
4	K	69	ARG
4	K	70	GLN
8	G	4	SER
8	G	77	ASP
8	G	121	VAL
8	G	122	GLU
8	G	145	LYS
8	G	200	LYS
8	H	4	SER
8	H	20	SER
8	H	21	SER
8	H	22	THR
8	H	23	HIS
8	H	65	LEU
8	H	68	TYR
8	H	77	ASP
8	H	121	VAL
8	H	133	LEU
8	H	185	TYR
8	H	192	VAL
8	H	200	LYS
8	H	231	PHE

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

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	I	1116	HIS
8	H	127	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
5	R	16/17 (94%)	9 (56%)	1 (6%)

All (9) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
5	R	2	C
5	R	3	U
5	R	4	A
5	R	5	U
5	R	6	A
5	R	7	U
5	R	9	U
5	R	13	C
5	R	17	U

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
5	R	2	C

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 3 ligands modelled in this entry, 3 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.



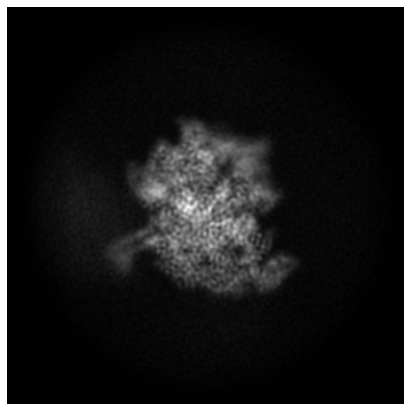
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-17686. These allow visual inspection of the internal detail of the map and identification of artifacts.

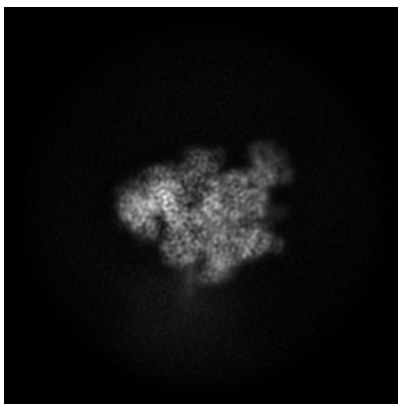
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

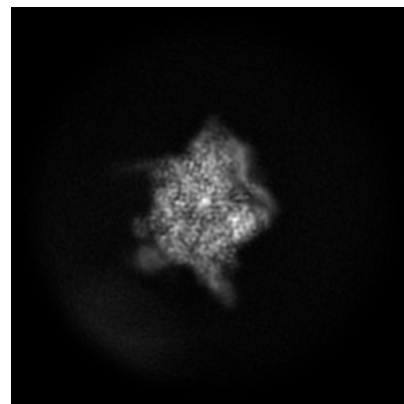
#### 6.1.1 Primary map



X

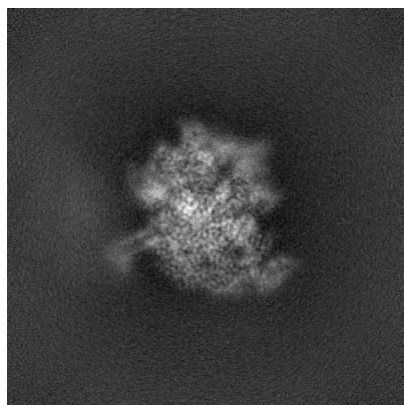


Y

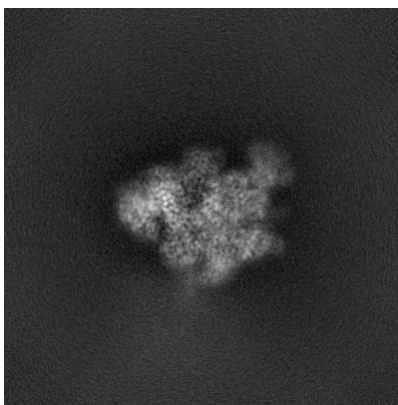


Z

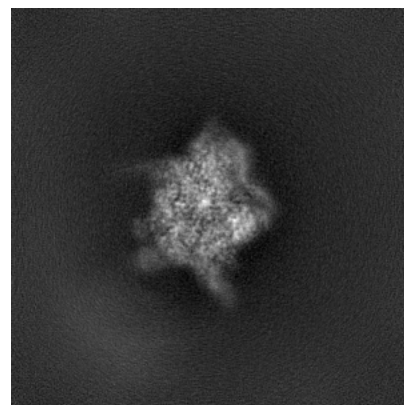
#### 6.1.2 Raw map



X



Y

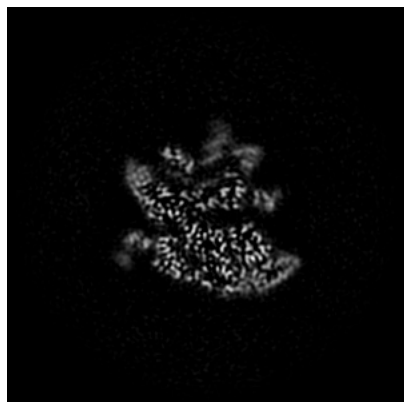


Z

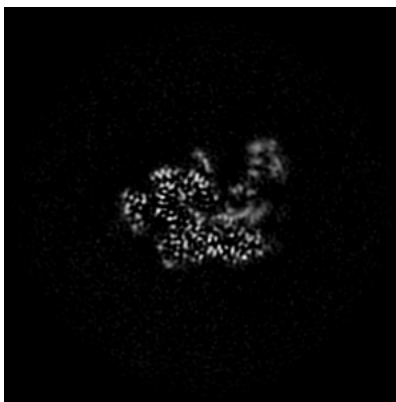
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

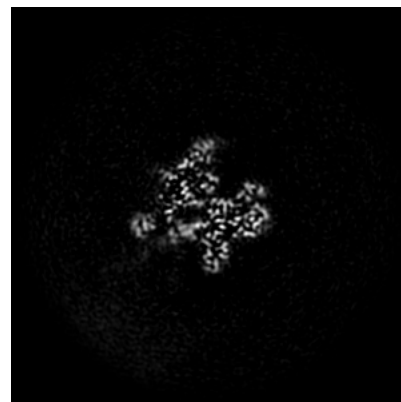
### 6.2.1 Primary map



X Index: 192

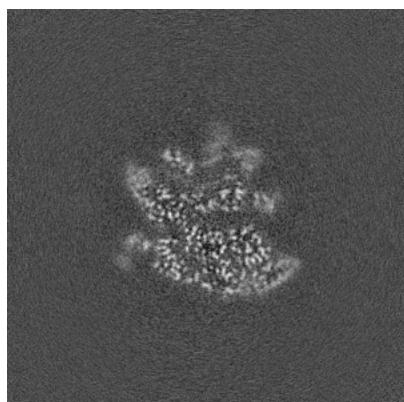


Y Index: 192

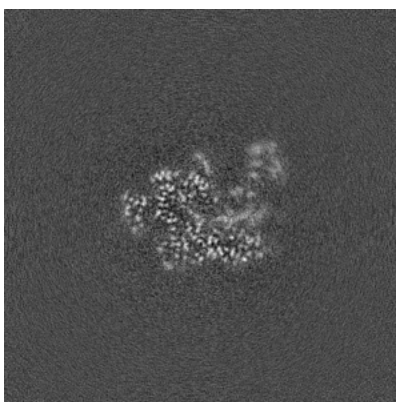


Z Index: 192

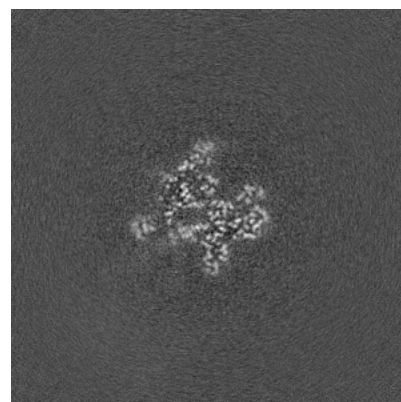
### 6.2.2 Raw map



X Index: 192



Y Index: 192

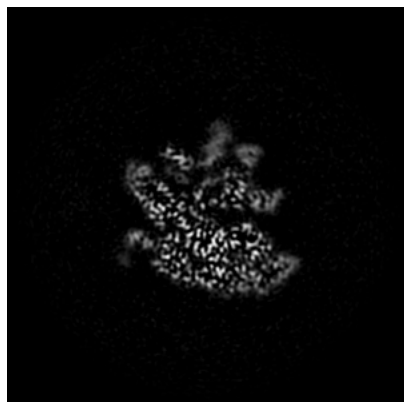


Z Index: 192

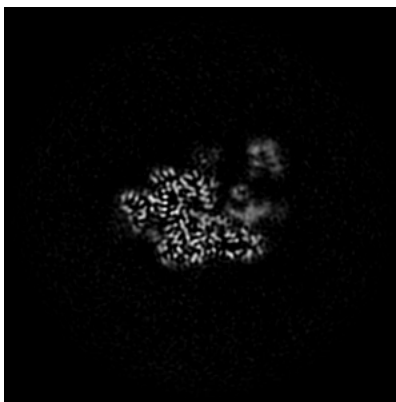
The images above show central slices of the map in three orthogonal directions.

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

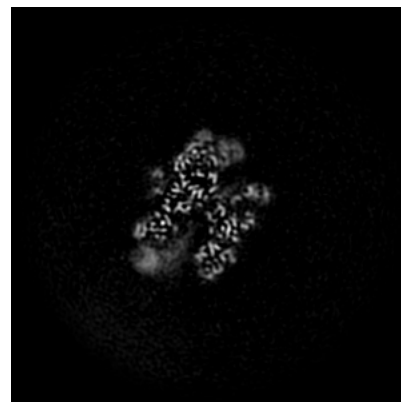
### 6.3.1 Primary map



X Index: 190

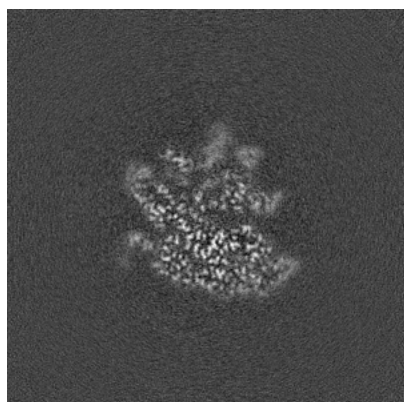


Y Index: 195

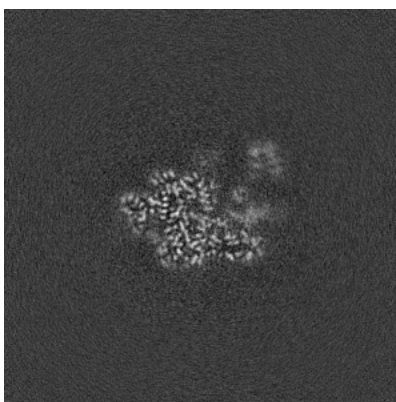


Z Index: 203

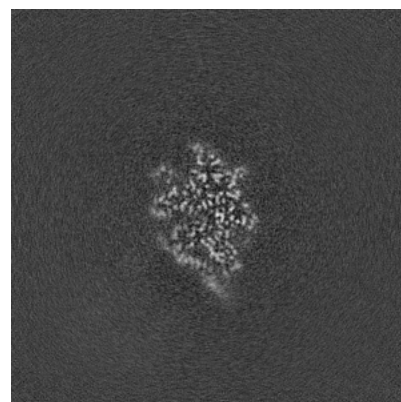
### 6.3.2 Raw map



X Index: 190



Y Index: 195

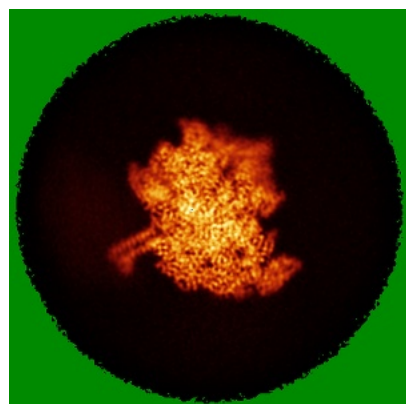


Z Index: 161

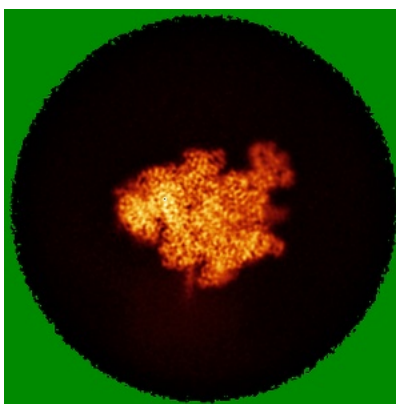
The images above show the largest variance slices of the map in three orthogonal directions.

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

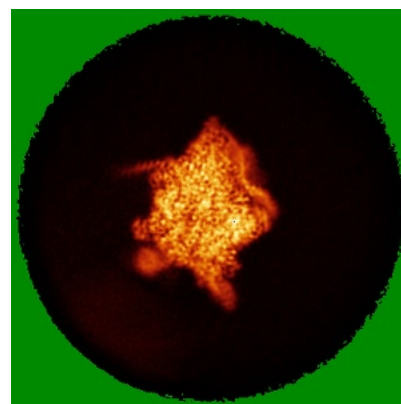
### 6.4.1 Primary map



X

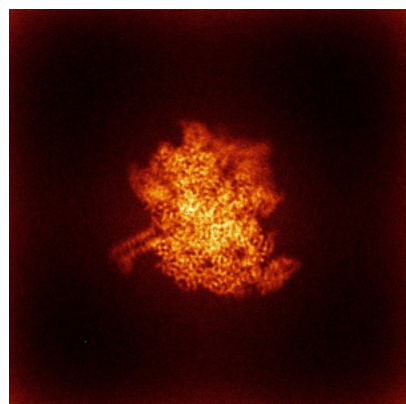


Y

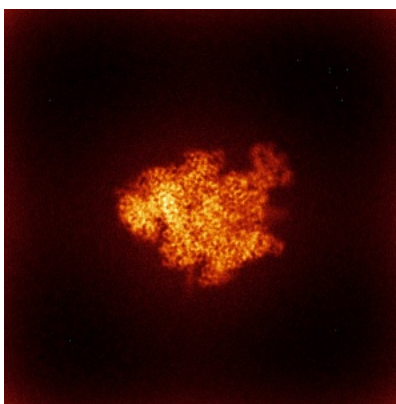


Z

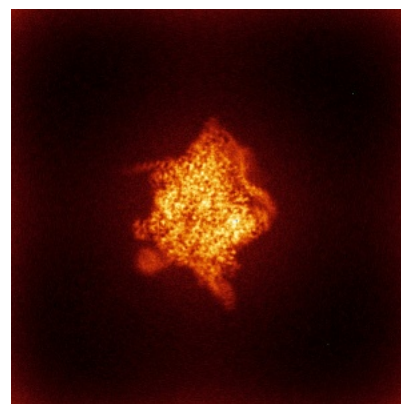
### 6.4.2 Raw map



X



Y

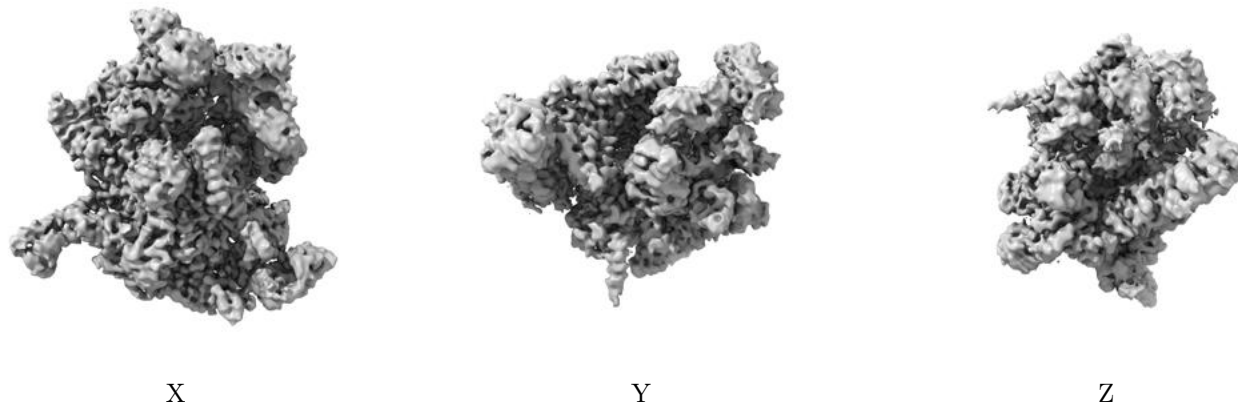


Z

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

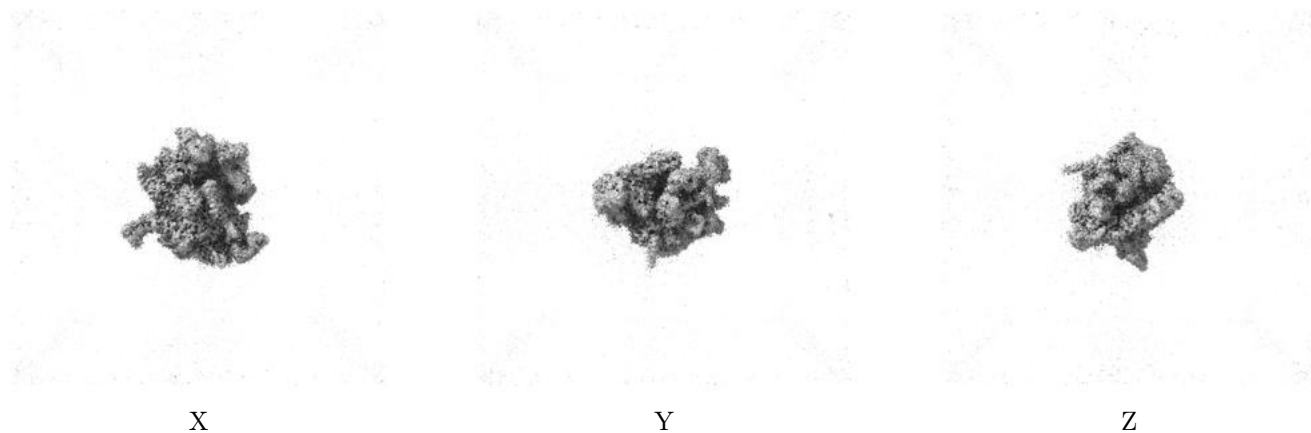
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.25. 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



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

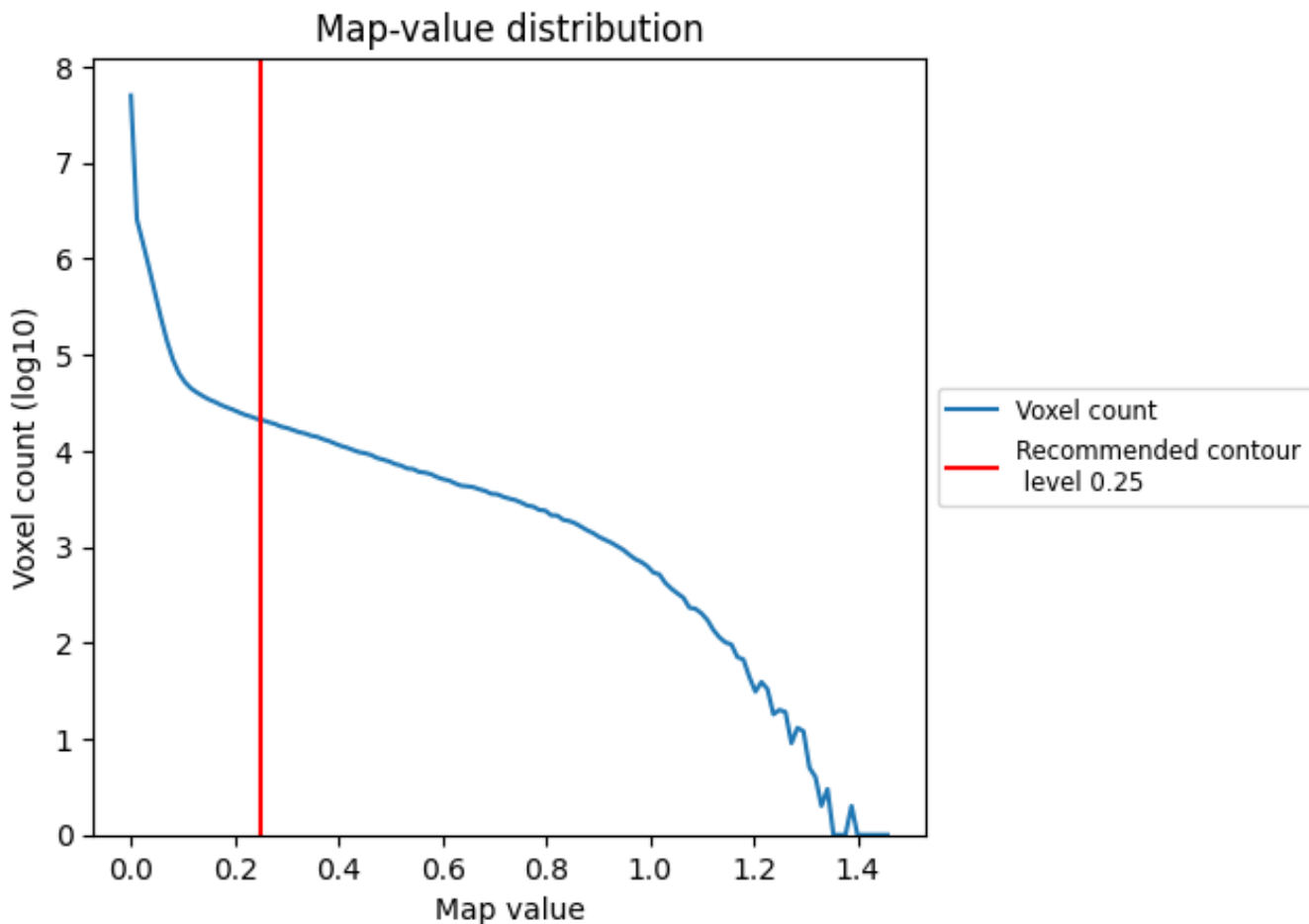
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

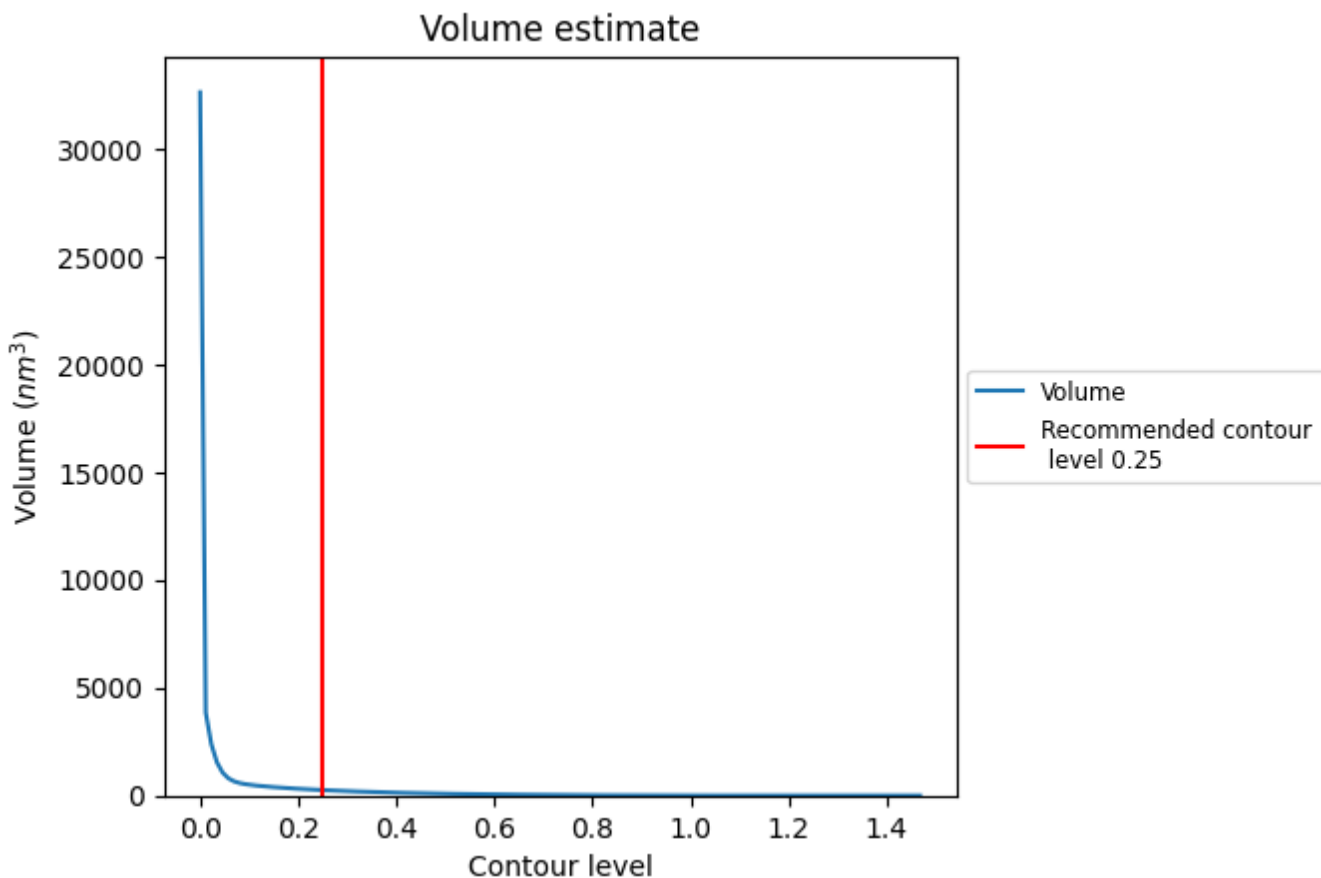
This section contains the results of statistical analysis of the map.

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



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

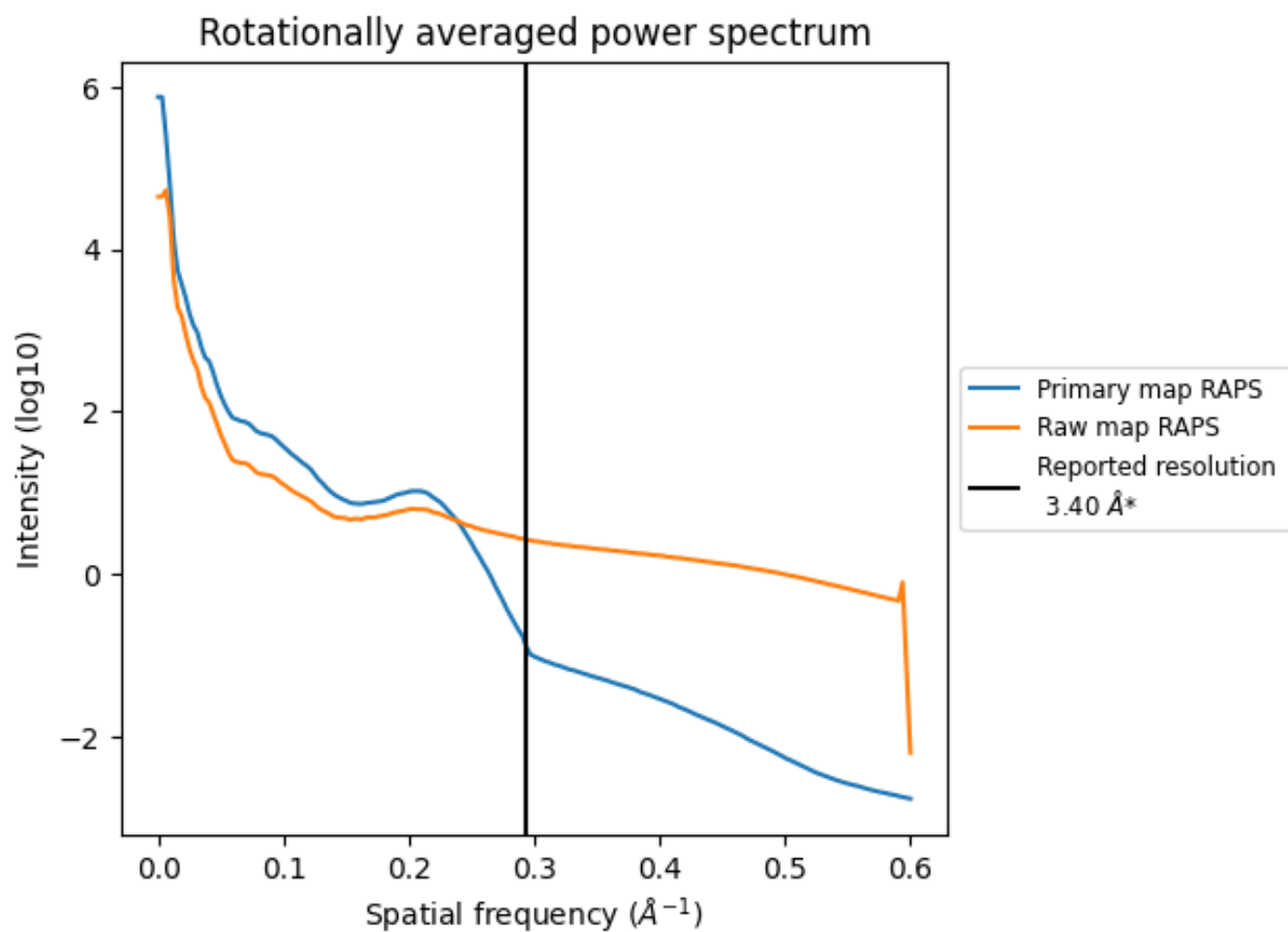
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 254 nm<sup>3</sup>; this corresponds to an approximate mass of 230 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 i



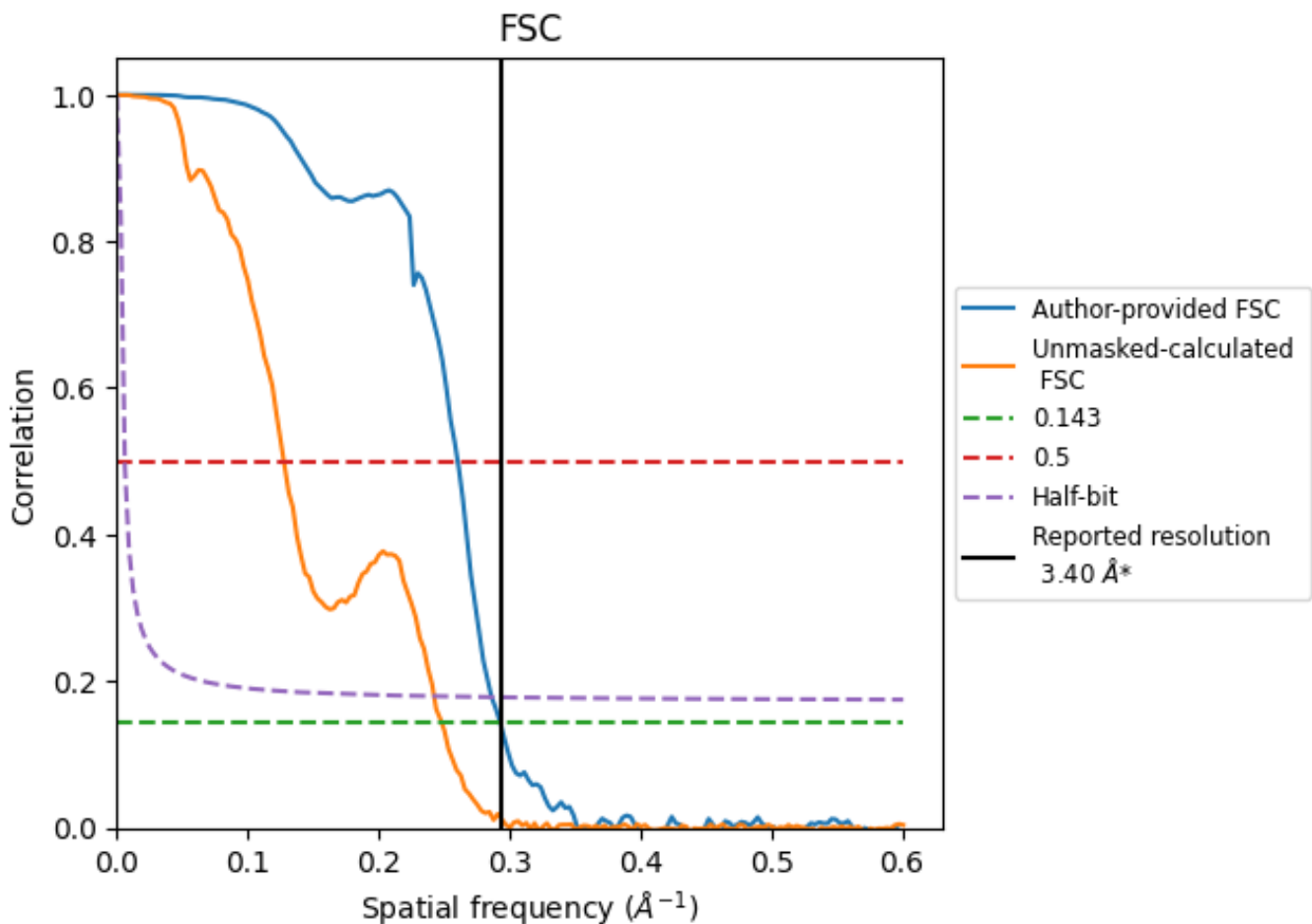
\*Reported resolution corresponds to spatial frequency of  $0.294 \text{ \AA}^{-1}$



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

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.294 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

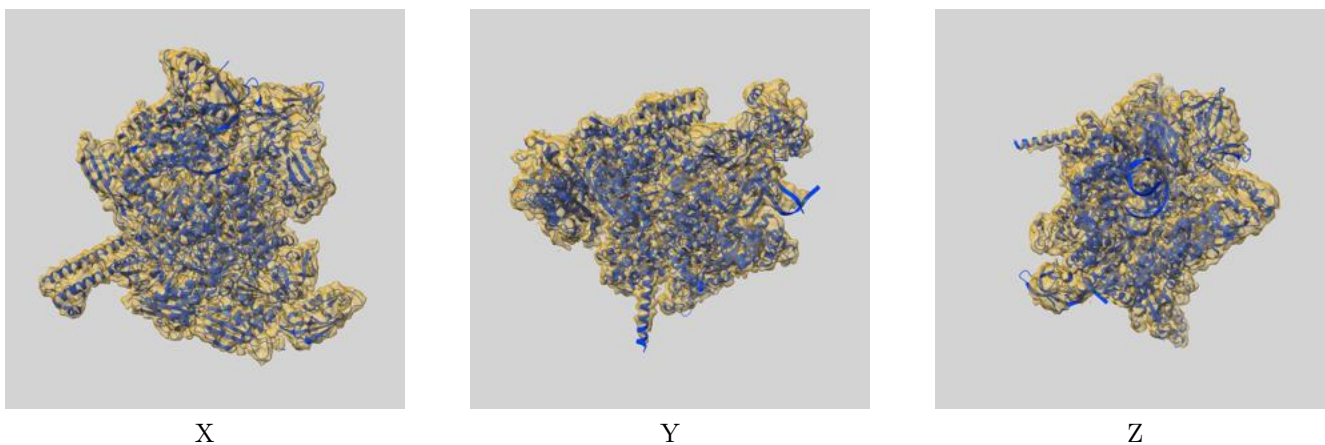
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	3.41	3.84	3.49
Unmasked-calculated*	4.03	7.83	4.12

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.03 differs from the reported value 3.4 by more than 10 %

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

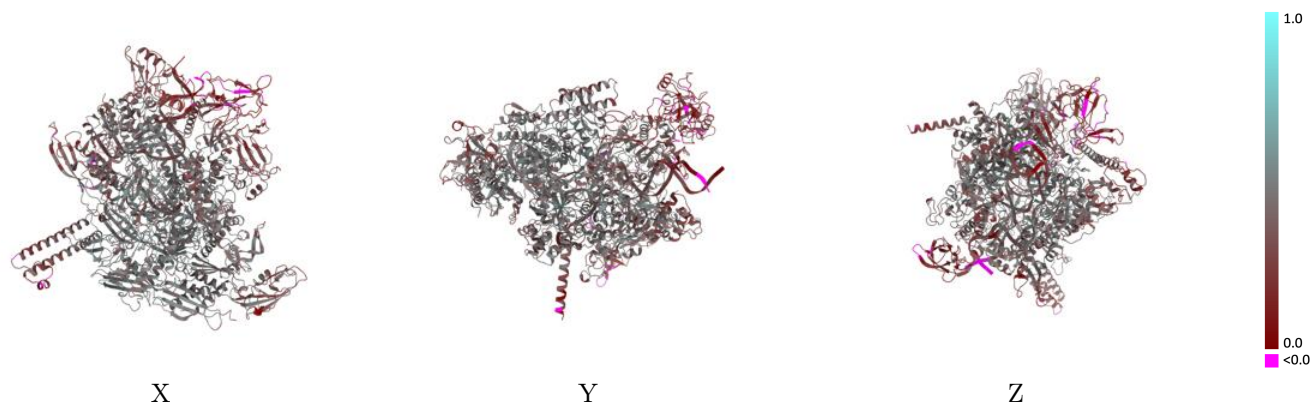
This section contains information regarding the fit between EMDB map EMD-17686 and PDB model 8PIM. Per-residue inclusion information can be found in section 3 on page 7.

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



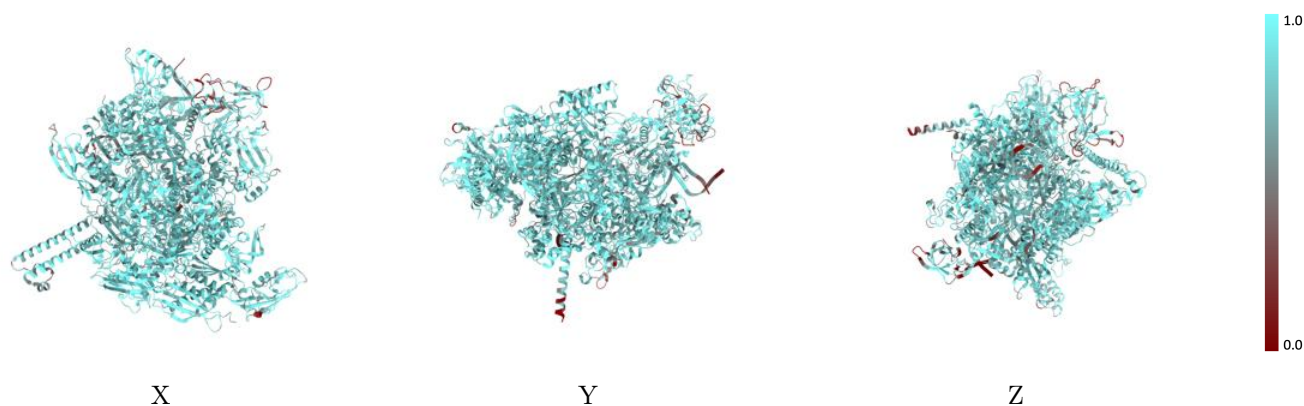
The images above show the 3D surface view of the map at the recommended contour level 0.25 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



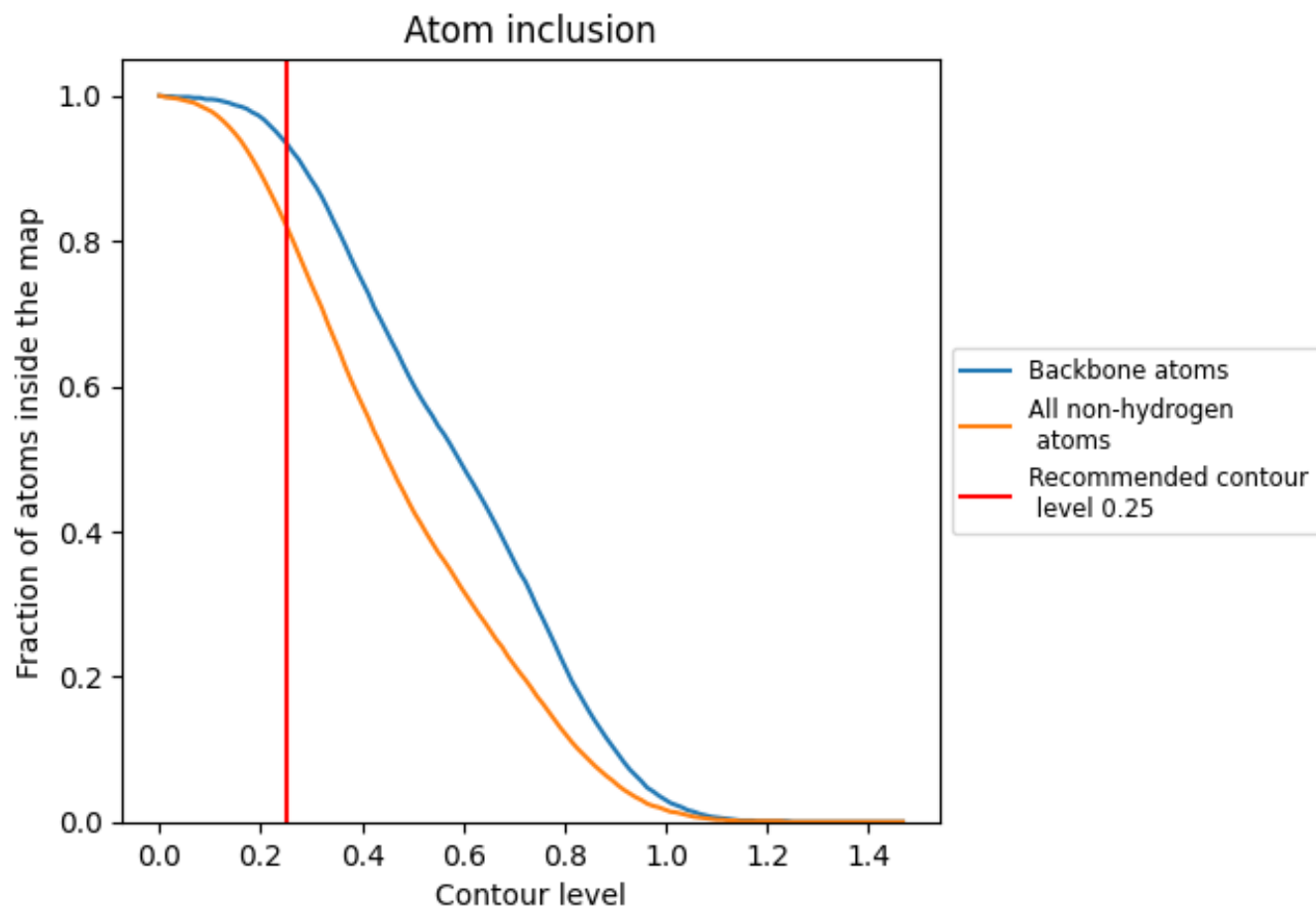
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.25).





















## 9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 82% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.25) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8220	 0.3950
A	 0.6260	 0.2510
B	 0.7590	 0.2880
G	 0.8600	 0.4520
H	 0.8360	 0.3880
I	 0.8480	 0.4240
J	 0.8230	 0.3910
K	 0.7770	 0.3750
P	 0.7530	 0.2960
R	 0.6280	 0.2840

