



Full wwPDB EM Validation Report ⓘ

Jun 8, 2024 – 03:09 PM EDT

PDB ID : 8EHF
EMDB ID : EMD-28146
Title : Cryo-EM structure of his-elemental paused elongation complex with an unfolded TL (1)
Authors : Kang, J.Y.; Chen, J.; Llewellyn, E.; Landick, R.; Darst, S.A.
Deposited on : 2022-09-14
Resolution : 3.30 Å(reported)
Based on initial model : 6C6T

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 ⓘ symbol.

The types of validation reports are described at

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

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

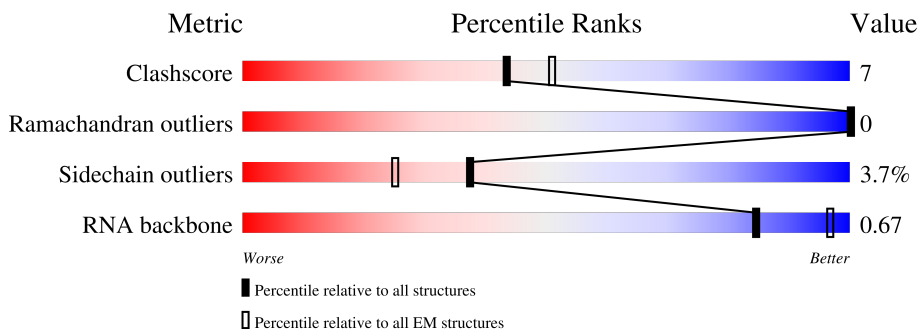
EMDB validation analysis : 0.0.1.dev92
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

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 3.30 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.



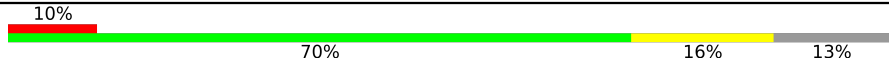
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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 ≥ 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	A	32	
2	B	32	
3	R	19	
4	G	239	
4	H	239	
5	I	1342	
6	J	1407	

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Mol	Chain	Length	Quality of chain
7	K	91	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a red segment on the left labeled '10%', a large green segment labeled '70%', a yellow segment labeled '16%', and a grey segment on the right labeled '13%'.</p>

2 Entry composition i

There are 10 unique types of molecules in this entry. The entry contains 26110 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 DNA chain called non-template DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	A	23	470	225	87	136	22	0	0

- Molecule 2 is a DNA chain called template DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	B	30	608	290	109	179	30	0	0

- Molecule 3 is a RNA chain called RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	R	10	214	95	36	73	10	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	G	218	1679	1051	297	325	6	0	0
4	H	220	1698	1061	299	332	6	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	235	GLU	-	expression tag	UNP P0A7Z6
G	236	VAL	-	expression tag	UNP P0A7Z6
G	237	LEU	-	expression tag	UNP P0A7Z6
G	238	PHE	-	expression tag	UNP P0A7Z6
G	239	GLN	-	expression tag	UNP P0A7Z6
H	235	GLU	-	expression tag	UNP P0A7Z6
H	236	VAL	-	expression tag	UNP P0A7Z6

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Chain	Residue	Modelled	Actual	Comment	Reference
H	237	LEU	-	expression tag	UNP P0A7Z6
H	238	PHE	-	expression tag	UNP P0A7Z6
H	239	GLN	-	expression tag	UNP P0A7Z6

- Molecule 5 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	I	1316	10381	6514	1810	2014	43	0	0

- Molecule 6 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	J	1337	10403	6536	1856	1961	50	0	0

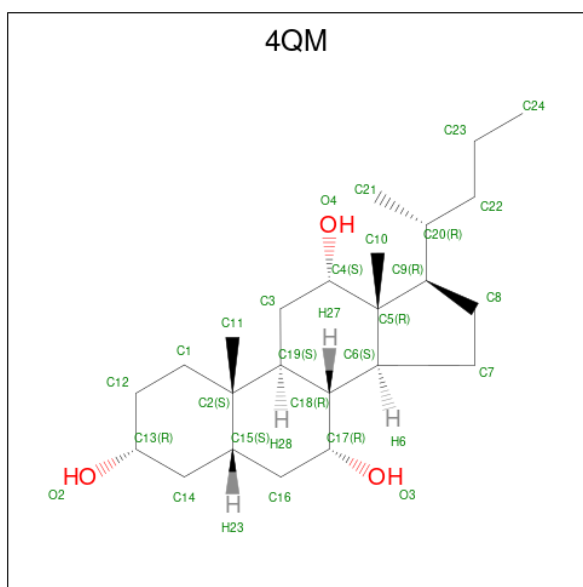
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
J	1	VAL	-	expression tag	UNP C3SIA2

- Molecule 7 is a protein called DNA-directed RNA polymerase subunit omega.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	K	79	627	382	118	126	1	0	0

- Molecule 8 is (3R,5S,7R,8R,9S,10S,12S,13R,14S,17R)-10,13-dimethyl-17-[(2R)-pentan-2-yl]-2,3,4,5,6,7,8,9,11,12,14,15,16,17-tetradecahydro-1H-cyclopenta[a]phenanthrene-3,7,12-triol (three-letter code: 4QM) (formula: C₂₄H₄₂O₃).



Mol	Chain	Residues	Atoms		AltConf
8	I	1	Total	C O	0
			27	24 3	

- Molecule 9 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
9	J	1	Total	Mg	0
			1	1	

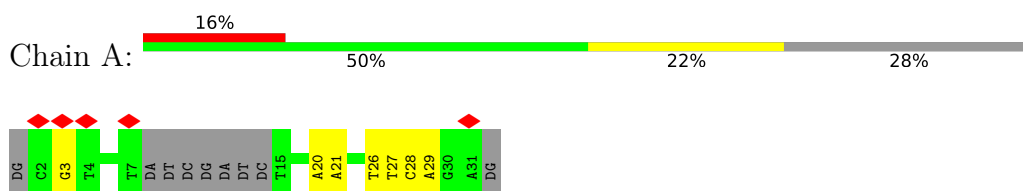
- Molecule 10 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

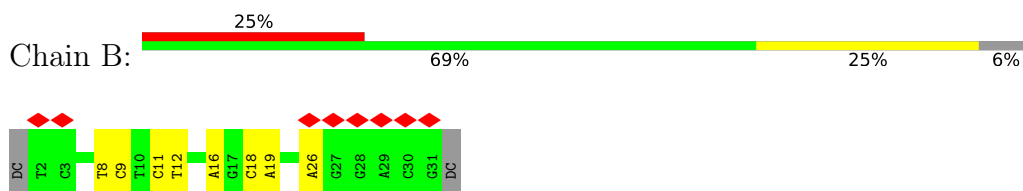
3 Residue-property plots

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.

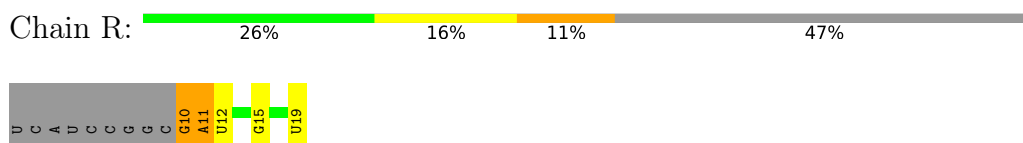
- Molecule 1: non-template DNA



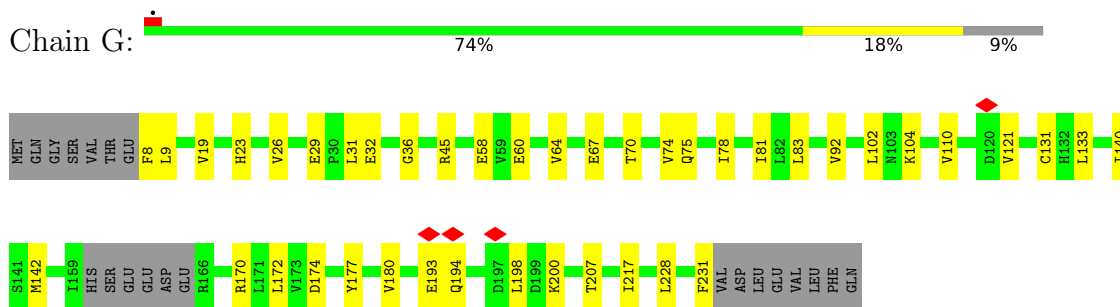
- Molecule 2: template DNA



- Molecule 3: RNA

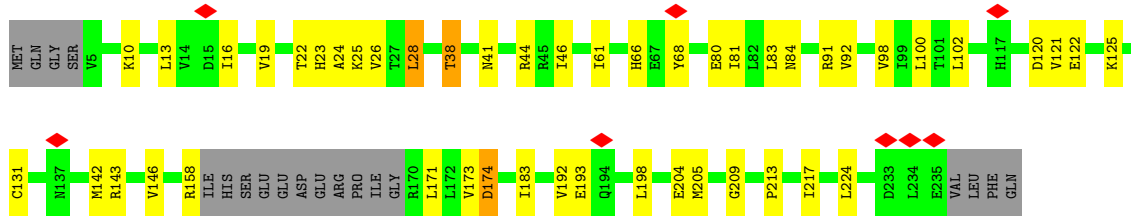


- Molecule 4: DNA-directed RNA polymerase subunit alpha

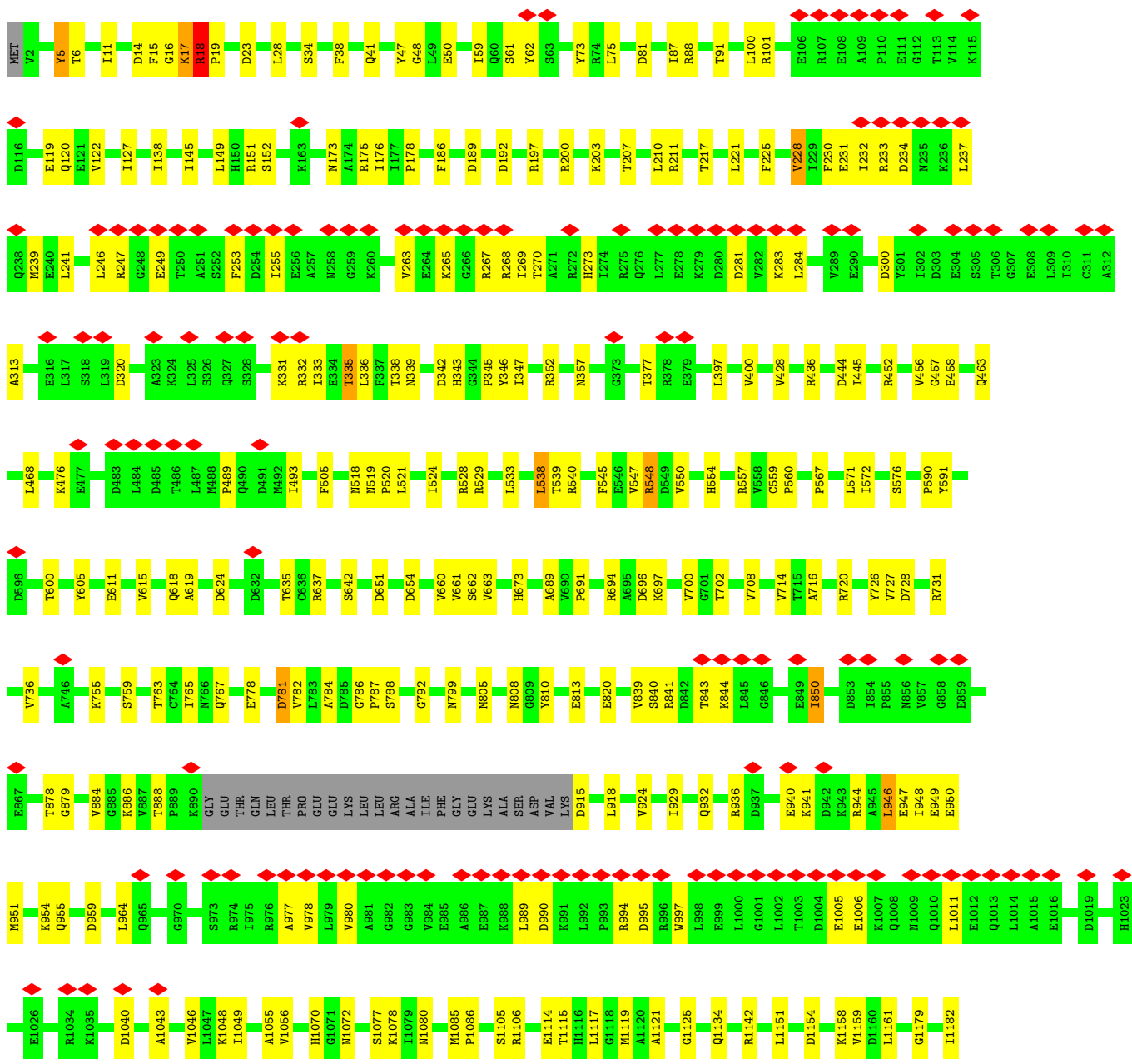
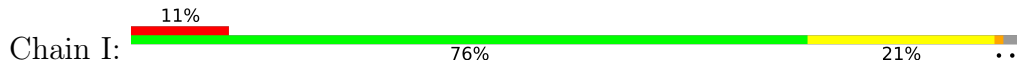


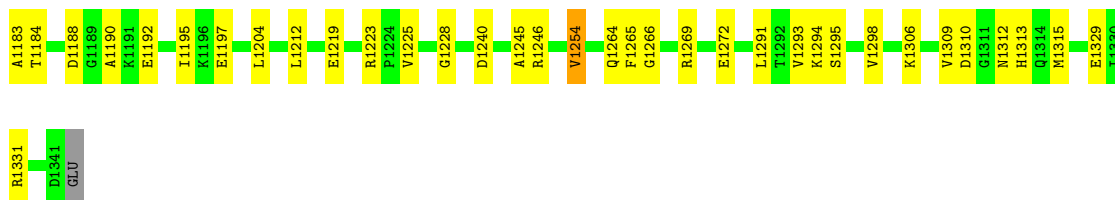
- Molecule 4: DNA-directed RNA polymerase subunit alpha



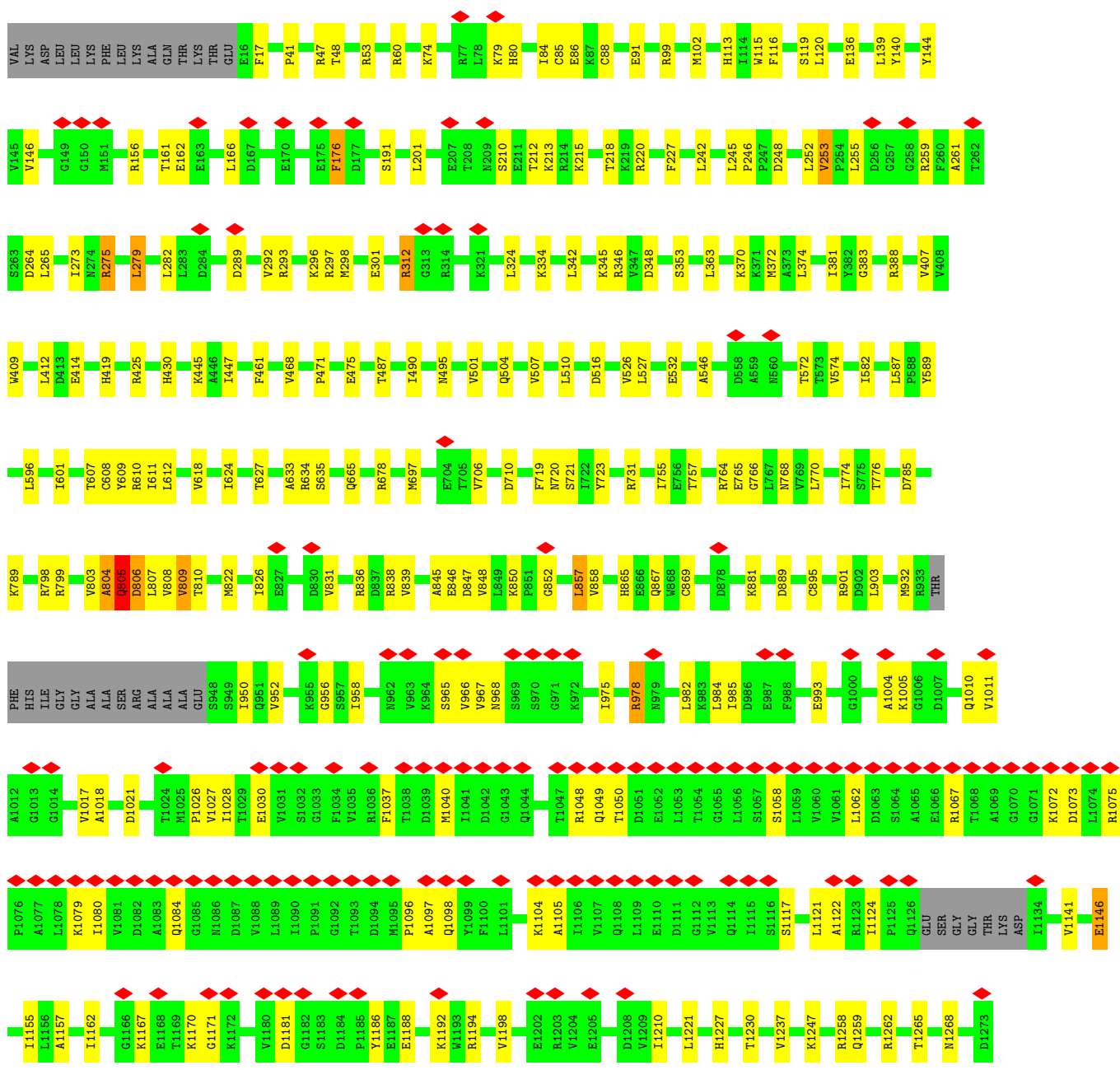
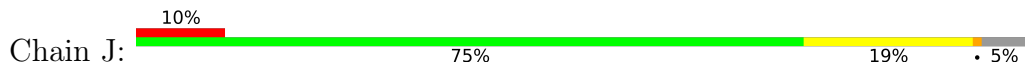


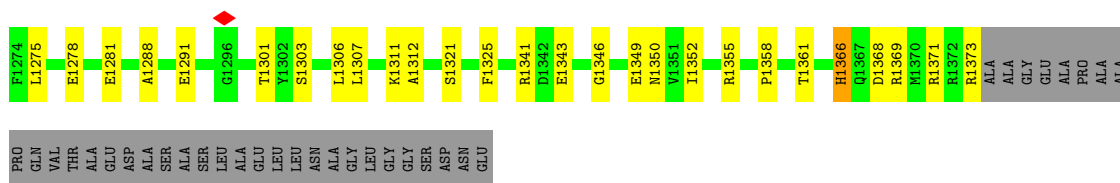
• Molecule 5: DNA-directed RNA polymerase subunit beta



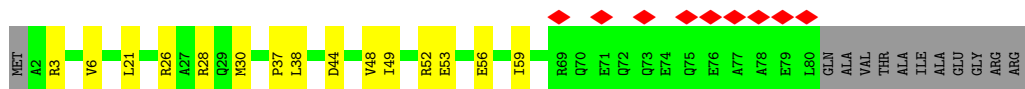


• Molecule 6: DNA-directed RNA polymerase subunit beta'





• Molecule 7: DNA-directed RNA polymerase subunit omega



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	432300	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 ($e^-/\text{\AA}^2$)	47.34	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.260	Depositor
Minimum map value	-0.171	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.026	Depositor
Map size (\AA)	332.8, 332.8, 332.8	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.3, 1.3, 1.3	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: 4QM, 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	A	0.57	0/526	1.00	0/808
2	B	0.61	0/680	0.95	0/1045
3	R	0.40	0/238	0.82	0/369
4	G	0.30	0/1699	0.54	0/2302
4	H	0.28	0/1717	0.53	0/2327
5	I	0.42	10/10547 (0.1%)	0.54	2/14232 (0.0%)
6	J	0.50	28/10560 (0.3%)	0.58	7/14257 (0.0%)
7	K	0.27	0/629	0.54	0/847
All	All	0.45	38/26596 (0.1%)	0.59	9/36187 (0.0%)

All (38) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	I	16	GLY	C-O	-11.03	1.05	1.23
6	J	804	ALA	C-O	-10.22	1.03	1.23
6	J	806	ASP	CB-CG	-9.51	1.31	1.51
6	J	808	VAL	C-O	-9.36	1.05	1.23
6	J	805	GLN	C-O	-9.18	1.05	1.23
5	I	15	PHE	C-O	-9.06	1.06	1.23
6	J	805	GLN	CA-C	-8.57	1.30	1.52
6	J	803	VAL	C-O	-8.39	1.07	1.23
6	J	809	VAL	C-O	-7.74	1.08	1.23
6	J	803	VAL	CB-CG2	-7.60	1.36	1.52
6	J	805	GLN	CD-OE1	-7.59	1.07	1.24
6	J	810	THR	CB-CG2	-7.50	1.27	1.52
6	J	809	VAL	CB-CG1	-7.26	1.37	1.52
6	J	804	ALA	CA-C	-7.23	1.34	1.52
5	I	18	ARG	C-O	-7.13	1.09	1.23
6	J	810	THR	C-O	-7.03	1.10	1.23
5	I	15	PHE	CG-CD2	-6.91	1.28	1.38
6	J	809	VAL	CB-CG2	-6.89	1.38	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	J	805	GLN	CD-NE2	-6.71	1.16	1.32
6	J	808	VAL	CB-CG1	-6.67	1.38	1.52
5	I	15	PHE	CB-CG	-6.63	1.40	1.51
5	I	15	PHE	CG-CD1	-6.63	1.28	1.38
6	J	803	VAL	CB-CG1	-6.47	1.39	1.52
6	J	806	ASP	CA-CB	-6.35	1.40	1.53
6	J	807	LEU	CA-CB	-6.30	1.39	1.53
6	J	810	THR	CA-CB	-5.79	1.38	1.53
6	J	808	VAL	CB-CG2	-5.75	1.40	1.52
6	J	809	VAL	CA-CB	-5.63	1.43	1.54
5	I	18	ARG	CA-CB	-5.62	1.41	1.53
6	J	803	VAL	CA-C	-5.44	1.38	1.52
5	I	15	PHE	CA-CB	-5.41	1.42	1.53
5	I	15	PHE	N-CA	-5.39	1.35	1.46
6	J	806	ASP	C-O	-5.22	1.13	1.23
6	J	804	ALA	N-CA	-5.17	1.36	1.46
6	J	807	LEU	CB-CG	-5.16	1.37	1.52
6	J	806	ASP	CG-OD1	-5.10	1.13	1.25
5	I	17	LYS	C-O	-5.08	1.13	1.23
6	J	807	LEU	C-O	-5.05	1.13	1.23

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	J	803	VAL	CG1-CB-CG2	-11.25	92.89	110.90
6	J	807	LEU	CB-CG-CD2	-8.68	96.24	111.00
6	J	807	LEU	CB-CG-CD1	-8.50	96.55	111.00
6	J	803	VAL	CA-CB-CG1	6.88	121.22	110.90
5	I	18	ARG	C-N-CD	-6.42	106.49	120.60
5	I	18	ARG	CB-CG-CD	-5.93	96.19	111.60
6	J	806	ASP	CB-CG-OD2	5.92	123.63	118.30
6	J	810	THR	CB-CA-C	-5.18	97.62	111.60
6	J	808	VAL	CG1-CB-CG2	-5.10	102.75	110.90

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	A	470	0	262	4	0
2	B	608	0	338	7	0
3	R	214	0	107	4	0
4	G	1679	0	1717	24	0
4	H	1698	0	1731	24	0
5	I	10381	0	10392	166	0
6	J	10403	0	10628	158	0
7	K	627	0	634	9	0
8	I	27	0	0	4	0
9	J	1	0	0	0	0
10	J	2	0	0	0	0
All	All	26110	0	25809	363	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 7.

All (363) 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)
8:I:1401:4QM:C3	8:I:1401:4QM:C19	1.82	1.53
4:G:45:ARG:HE	4:H:38:THR:HG22	1.40	0.86
5:I:888:THR:HG1	5:I:915:ASP:N	1.74	0.85
5:I:400:VAL:HG11	5:I:452:ARG:HD2	1.67	0.76
5:I:1306:LYS:O	5:I:1310:ASP:HB2	1.86	0.74
5:I:839:VAL:HG12	5:I:1049:ILE:HG12	1.70	0.73
8:I:1401:4QM:C3	8:I:1401:4QM:C2	2.63	0.73
8:I:1401:4QM:C3	8:I:1401:4QM:C18	2.68	0.72
1:A:3:DG:H3'	6:J:47:ARG:HH22	1.56	0.71
5:I:528:ARG:NH2	5:I:576:SER:O	2.25	0.70
5:I:18:ARG:HB2	5:I:19:PRO:HD2	1.73	0.69
6:J:984:LEU:HB3	6:J:993:GLU:HB2	1.74	0.69
6:J:279:LEU:HD11	6:J:296:LYS:HG2	1.75	0.68
5:I:1223:ARG:NH2	6:J:719:PHE:O	2.22	0.68
5:I:1246:ARG:NH1	5:I:1265:PHE:O	2.26	0.68
5:I:731:ARG:NH2	5:I:959:ASP:OD1	2.27	0.67
5:I:228:VAL:HG13	5:I:335:THR:HG23	1.77	0.66
6:J:487:THR:HG23	6:J:618:VAL:HG21	1.77	0.66
5:I:1254:VAL:O	6:J:99:ARG:NH2	2.30	0.64
6:J:1079:LYS:HZ3	6:J:1097:ALA:H	1.46	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:J:1157:ALA:HB2	6:J:1210:ILE:HD11	1.79	0.64
5:I:1078:LYS:NZ	5:I:1080:ASN:OD1	2.31	0.64
6:J:805:GLN:HE21	6:J:806:ASP:HB3	1.63	0.64
2:B:16:DA:OP1	6:J:334:LYS:NZ	2.29	0.63
6:J:475:GLU:OE2	7:K:28:ARG:NH2	2.32	0.63
6:J:1155:ILE:HD11	6:J:1194:ARG:HH21	1.63	0.63
5:I:850:ILE:HG13	5:I:1048:LYS:HD2	1.82	0.62
3:R:19:U:O3'	6:J:425:ARG:NH2	2.29	0.62
5:I:940:GLU:HG2	5:I:941:LYS:H	1.61	0.62
6:J:1010:GLN:NE2	6:J:1011:VAL:O	2.32	0.62
6:J:1368:ASP:OD1	6:J:1371:ARG:NH2	2.33	0.62
5:I:941:LYS:HD3	5:I:946:LEU:HB3	1.82	0.61
5:I:936:ARG:NH2	5:I:1043:ALA:O	2.33	0.61
4:G:8:PHE:HD1	4:G:32:GLU:HG3	1.65	0.61
5:I:232:ILE:HA	5:I:237:LEU:HG	1.81	0.61
6:J:956:GLY:HA3	6:J:985:ILE:O	2.00	0.61
6:J:53:ARG:HH12	6:J:60:ARG:HH11	1.47	0.61
5:I:839:VAL:O	5:I:886:LYS:NZ	2.28	0.60
6:J:809:VAL:HG12	6:J:809:VAL:O	2.01	0.60
6:J:1062:LEU:O	6:J:1067:ARG:NH2	2.35	0.60
5:I:18:ARG:HB2	5:I:19:PRO:CD	2.31	0.60
5:I:253:PHE:HA	5:I:265:LYS:HE3	1.82	0.60
6:J:1275:LEU:HB3	6:J:1278:GLU:HB2	1.84	0.60
2:B:26:DA:OP1	6:J:259:ARG:NH2	2.35	0.59
5:I:618:GLN:HE22	6:J:768:ASN:HB3	1.67	0.59
6:J:1005:LYS:HD2	6:J:1011:VAL:HG12	1.83	0.59
4:G:92:VAL:HG12	4:G:121:VAL:HG22	1.84	0.59
5:I:1117:LEU:HD13	5:I:1195:ILE:HG12	1.84	0.59
6:J:388:ARG:NH2	6:J:414:GLU:OE2	2.34	0.59
5:I:81:ASP:OD1	5:I:81:ASP:N	2.34	0.59
6:J:53:ARG:HH12	6:J:60:ARG:HD2	1.68	0.59
5:I:808:ASN:H	6:J:633:ALA:HB2	1.67	0.58
4:H:92:VAL:HG13	4:H:121:VAL:HG22	1.85	0.58
6:J:901:ARG:HG2	6:J:903:LEU:H	1.69	0.58
6:J:965:SER:HB2	6:J:975:ILE:HD12	1.85	0.58
5:I:548:ARG:NH2	5:I:567:PRO:O	2.36	0.58
5:I:560:PRO:HB2	6:J:776:THR:HG21	1.85	0.57
6:J:156:ARG:NH2	6:J:191:SER:OG	2.35	0.57
5:I:557:ARG:NH2	5:I:611:GLU:OE1	2.34	0.57
6:J:665:GLN:OE1	6:J:678:ARG:NH1	2.35	0.57
6:J:1167:LYS:HD2	6:J:1170:LYS:HB2	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:255:ILE:HB	5:I:263:VAL:HB	1.87	0.57
5:I:320:ASP:OD1	5:I:320:ASP:N	2.35	0.56
1:A:28:DC:H2'	1:A:29:DA:C8	2.40	0.56
3:R:10:G:H2'	3:R:11:A:C8	2.40	0.56
5:I:714:VAL:HB	5:I:787:PRO:HD2	1.86	0.56
6:J:144:TYR:OH	6:J:293:ARG:NH2	2.38	0.56
5:I:339:ASN:HB3	5:I:343:HIS:H	1.70	0.56
6:J:510:LEU:HD11	6:J:624:ILE:HG23	1.88	0.56
6:J:1062:LEU:HB2	6:J:1067:ARG:HB3	1.87	0.56
6:J:85:CYS:SG	6:J:86:GLU:N	2.78	0.56
6:J:1026:PRO:HB2	6:J:1028:ILE:HG23	1.88	0.56
5:I:1105:SER:HB2	6:J:731:ARG:HG3	1.88	0.56
5:I:1245:ALA:HB2	6:J:372:MET:HG3	1.88	0.55
5:I:720:ARG:HE	5:I:736:VAL:HG11	1.71	0.55
5:I:1272:GLU:OE2	6:J:798:ARG:NH1	2.39	0.54
5:I:520:PRO:HG3	5:I:714:VAL:HG21	1.87	0.54
5:I:642:SER:HB2	6:J:770:LEU:HD21	1.88	0.54
6:J:848:VAL:HG22	6:J:858:VAL:HG22	1.89	0.54
5:I:246:LEU:HB3	5:I:269:ILE:HG21	1.89	0.54
6:J:1265:THR:OG1	6:J:1303:SER:OG	2.25	0.54
2:B:18:DC:H2'	2:B:19:DA:C8	2.42	0.54
4:H:80:GLU:O	4:H:84:ASN:ND2	2.41	0.54
6:J:60:ARG:NH1	6:J:88:CYS:O	2.41	0.54
6:J:952:VAL:HG13	6:J:984:LEU:HD22	1.89	0.54
6:J:1221:LEU:HD22	6:J:1306:LEU:HB2	1.90	0.54
5:I:1184:THR:HG23	5:I:1190:ALA:H	1.72	0.54
6:J:1037:PHE:HB3	6:J:1040:MET:HB2	1.90	0.54
4:G:110:VAL:HG21	4:G:140:ILE:HD11	1.90	0.53
4:H:205:MET:HE3	4:H:217:ILE:HG13	1.90	0.53
6:J:84:ILE:HG12	6:J:91:GLU:HB3	1.91	0.53
6:J:799:ARG:NH1	6:J:1146:GLU:OE1	2.42	0.53
6:J:836:ARG:HG3	6:J:869:CYS:HB3	1.91	0.53
4:H:22:THR:HG21	4:H:209:GLY:HA2	1.91	0.53
6:J:495:ASN:ND2	6:J:1247:LYS:O	2.42	0.53
4:G:31:LEU:HD13	4:G:36:GLY:HA2	1.91	0.53
4:G:70:THR:HG21	5:I:755:LYS:HE2	1.91	0.53
6:J:253:VAL:HG13	6:J:261:ALA:HB3	1.91	0.53
6:J:798:ARG:NH2	6:J:1325:PHE:O	2.41	0.53
6:J:1346:GLY:O	6:J:1350:ASN:ND2	2.41	0.53
6:J:297:ARG:NH1	6:J:301:GLU:OE2	2.42	0.52
5:I:41:GLN:NE2	5:I:73:TYR:O	2.42	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:714:VAL:O	5:I:767:GLN:NE2	2.41	0.52
2:B:19:DA:OP2	6:J:346:ARG:NH2	2.38	0.52
5:I:1329:GLU:HG2	6:J:245:LEU:HD11	1.91	0.52
5:I:1151:LEU:HD11	5:I:1197:GLU:HG2	1.91	0.52
4:H:102:LEU:HB3	4:H:142:MET:HG2	1.90	0.52
5:I:950:GLU:O	5:I:954:LYS:HG2	2.09	0.52
5:I:810:TYR:O	5:I:1077:SER:OG	2.23	0.52
5:I:1291:LEU:HA	6:J:345:LYS:HD2	1.91	0.52
6:J:1072:LYS:O	6:J:1075:ARG:NH1	2.42	0.52
6:J:74:LYS:NZ	6:J:86:GLU:OE2	2.43	0.52
6:J:210:SER:HB2	6:J:213:LYS:HB2	1.90	0.51
6:J:805:GLN:O	6:J:805:GLN:HG2	2.03	0.51
5:I:660:VAL:HG13	5:I:661:VAL:HG13	1.92	0.51
6:J:527:LEU:HD22	6:J:532:GLU:HG2	1.92	0.51
5:I:75:LEU:HD21	5:I:127:ILE:HD11	1.93	0.51
6:J:804:ALA:HA	6:J:1259:GLN:HG3	1.92	0.51
6:J:822:MET:SD	6:J:838:ARG:NH2	2.83	0.51
6:J:255:LEU:HD11	6:J:259:ARG:HB2	1.92	0.51
6:J:968:ASN:ND2	6:J:1117:SER:O	2.43	0.51
6:J:1021:ASP:OD1	6:J:1021:ASP:N	2.40	0.51
6:J:1227:HIS:HA	6:J:1230:THR:HG22	1.93	0.51
6:J:516:ASP:OD1	6:J:516:ASP:N	2.40	0.51
5:I:18:ARG:HG2	5:I:1188:ASP:OD2	2.10	0.51
5:I:1192:GLU:OE1	6:J:764:ARG:NH1	2.43	0.51
6:J:1361:THR:HB	7:K:21:LEU:HD21	1.93	0.51
6:J:84:ILE:HA	6:J:91:GLU:HA	1.93	0.50
6:J:99:ARG:HB3	6:J:248:ASP:HB2	1.94	0.50
6:J:102:MET:HG2	6:J:246:PRO:HD3	1.93	0.50
5:I:176:ILE:HD11	5:I:428:VAL:HG21	1.92	0.50
5:I:1070:HIS:NE2	5:I:1114:GLU:OE1	2.41	0.50
4:G:83:LEU:HD13	5:I:694:ARG:HH11	1.75	0.50
5:I:1246:ARG:NE	6:J:348:ASP:OD1	2.36	0.50
2:B:18:DC:H2 [?]	2:B:19:DA:H8	1.76	0.50
5:I:1086:PRO:HB2	5:I:1212:LEU:HD13	1.92	0.50
5:I:101:ARG:HG3	5:I:119:GLU:HB3	1.93	0.50
1:A:20:DA:H2 [?]	1:A:21:DA:C8	2.46	0.50
5:I:1219:GLU:OE2	6:J:634:ARG:NH2	2.45	0.50
6:J:1027:VAL:HG22	6:J:1122:ALA:H	1.77	0.49
5:I:463:GLN:HG3	5:I:505:PHE:HB2	1.94	0.49
5:I:1154:ASP:OD1	5:I:1154:ASP:N	2.45	0.49
6:J:1073:ASP:OD1	6:J:1073:ASP:N	2.46	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:J:381:ILE:HD11	6:J:412:LEU:HD13	1.94	0.49
4:H:81:ILE:HD12	4:H:131:CYS:HB3	1.93	0.49
6:J:720:ASN:HB3	6:J:723:TYR:HB3	1.94	0.49
5:I:611:GLU:OE2	5:I:637:ARG:NH1	2.42	0.49
6:J:282:LEU:HB3	6:J:292:VAL:HG12	1.95	0.49
2:B:11:DC:H2"	2:B:12:DT:H71	1.94	0.49
5:I:651:ASP:OD1	5:I:651:ASP:N	2.44	0.49
4:G:102:LEU:HB3	4:G:142:MET:HG2	1.95	0.49
5:I:591:TYR:OH	5:I:637:ARG:NH2	2.37	0.49
5:I:1115:THR:HG23	5:I:1228:GLY:HA3	1.94	0.49
5:I:929:ILE:HD13	5:I:1055:ALA:HB2	1.93	0.49
5:I:1309:VAL:HG23	6:J:383:GLY:HA2	1.95	0.49
6:J:146:VAL:HG13	6:J:176:PHE:HE1	1.78	0.49
6:J:17:PHE:O	6:J:1355:ARG:NH2	2.41	0.48
5:I:178:PRO:HA	5:I:397:LEU:HD23	1.95	0.48
6:J:1141:VAL:HG22	6:J:1237:VAL:HG23	1.95	0.48
6:J:136:GLU:OE2	6:J:312:ARG:NH1	2.46	0.48
5:I:691:PRO:HB3	5:I:788:SER:HB3	1.95	0.48
6:J:1262:ARG:NH2	6:J:1312:ALA:O	2.46	0.48
4:G:180:VAL:HA	4:G:207:THR:HA	1.96	0.48
6:J:607:THR:HA	6:J:610:ARG:HG2	1.94	0.48
6:J:1341:ARG:NH1	6:J:1343:GLU:OE2	2.47	0.48
5:I:152:SER:HB3	5:I:452:ARG:HG3	1.95	0.47
5:I:841:ARG:HG2	5:I:1046:VAL:HG23	1.96	0.47
7:K:3:ARG:HB2	7:K:48:VAL:HG13	1.96	0.47
5:I:241:LEU:HD11	5:I:246:LEU:HD11	1.95	0.47
6:J:546:ALA:HB3	6:J:574:VAL:HG23	1.96	0.47
5:I:990:ASP:OD1	5:I:990:ASP:N	2.37	0.47
5:I:840:SER:HB3	5:I:850:ILE:HD11	1.96	0.47
6:J:1004:ALA:N	6:J:1017:VAL:O	2.45	0.47
5:I:50:GLU:HG2	5:I:73:TYR:HE1	1.80	0.47
5:I:232:ILE:HB	5:I:331:LYS:HA	1.95	0.47
5:I:884:VAL:HB	5:I:918:LEU:HB3	1.96	0.47
6:J:324:LEU:HD23	6:J:324:LEU:H	1.79	0.47
5:I:211:ARG:NH2	5:I:217:THR:OG1	2.41	0.47
6:J:846:GLU:HG2	6:J:881:LYS:HB3	1.96	0.47
5:I:197:ARG:HH21	5:I:203:LYS:HG3	1.79	0.47
5:I:524:ILE:HG21	5:I:708:VAL:HG13	1.96	0.47
5:I:673:HIS:CE1	6:J:766:GLY:H	2.32	0.47
5:I:696:ASP:OD2	5:I:799:ASN:ND2	2.36	0.47
5:I:843:THR:OG1	5:I:844:LYS:N	2.46	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:948:ILE:O	5:I:949:GLU:HB3	2.15	0.47
5:I:6:THR:HG22	5:I:781:ASP:HB2	1.95	0.47
5:I:716:ALA:HB3	5:I:784:ALA:HB3	1.96	0.47
5:I:1223:ARG:NH1	6:J:721:SER:OG	2.48	0.47
6:J:1369:ARG:HG2	6:J:1373:ARG:HH12	1.80	0.47
7:K:26:ARG:HE	7:K:30:MET:HE2	1.80	0.47
5:I:59:ILE:HD11	5:I:476:LYS:HE2	1.97	0.47
5:I:145:ILE:HB	5:I:456:VAL:HG22	1.97	0.47
5:I:995:ASP:OD1	5:I:995:ASP:N	2.47	0.47
6:J:161:THR:OG1	6:J:162:GLU:N	2.48	0.46
6:J:978:ARG:HH22	6:J:1198:VAL:HG23	1.80	0.46
6:J:353:SER:HB3	6:J:447:ILE:HG13	1.98	0.46
3:R:15:G:P	5:I:540:ARG:HH22	2.39	0.46
5:I:5:TYR:CD2	5:I:778:GLU:HG3	2.50	0.46
5:I:192:ASP:OD2	5:I:436:ARG:NH2	2.48	0.46
6:J:611:ILE:HG22	6:J:612:LEU:HD12	1.97	0.46
4:H:98:VAL:HG21	4:H:121:VAL:HG21	1.98	0.46
5:I:1264:GLN:O	5:I:1266:GLY:N	2.49	0.46
5:I:1125:GLY:HA3	5:I:1179:GLY:HA2	1.96	0.46
6:J:1307:LEU:HD23	6:J:1311:LYS:HE2	1.98	0.46
6:J:289:ASP:N	6:J:289:ASP:OD1	2.49	0.46
6:J:1049:GLN:O	6:J:1058:SER:OG	2.34	0.46
4:G:29:GLU:HB2	4:G:200:LYS:HG3	1.96	0.46
5:I:1085:MET:HA	5:I:1085:MET:HE2	1.96	0.46
5:I:545:PHE:HZ	6:J:932:MET:HE3	1.81	0.46
6:J:1186:TYR:OH	6:J:1188:GLU:OE1	2.32	0.46
5:I:452:ARG:NH2	5:I:458:GLU:OE1	2.40	0.45
5:I:518:ASN:OD1	5:I:518:ASN:N	2.49	0.45
5:I:1294:LYS:HB2	6:J:348:ASP:HB2	1.97	0.45
6:J:140:TYR:OH	6:J:312:ARG:NE	2.50	0.45
5:I:175:ARG:HH12	5:I:200:ARG:HD3	1.81	0.45
5:I:813:GLU:HB2	6:J:461:PHE:HD2	1.82	0.45
4:H:66:HIS:CE1	4:H:68:TYR:HB2	2.52	0.45
5:I:120:GLN:HG2	5:I:489:PRO:HD2	1.98	0.45
5:I:951:MET:O	5:I:955:GLN:HG2	2.15	0.45
5:I:533:LEU:HD21	5:I:571:LEU:HD13	1.98	0.45
5:I:767:GLN:HG2	5:I:786:GLY:HA2	1.98	0.45
5:I:878:THR:OG1	5:I:879:GLY:N	2.49	0.45
5:I:1119:MET:HG3	5:I:1204:LEU:HD13	1.98	0.45
4:H:24:ALA:HB3	4:H:213:PRO:HB2	1.98	0.45
7:K:52:ARG:O	7:K:56:GLU:HG2	2.17	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:J:572:THR:HG21	6:J:589:TYR:CE2	2.52	0.45
5:I:247:ARG:NH2	5:I:342:ASP:OD2	2.50	0.45
5:I:249:GLU:OE2	5:I:339:ASN:ND2	2.49	0.45
5:I:268:ARG:HH21	5:I:270:THR:HG22	1.81	0.45
4:G:228:LEU:HD21	4:H:224:LEU:HD23	1.99	0.44
5:I:100:LEU:HD12	5:I:493:ILE:HD11	1.99	0.44
5:I:173:ASN:HA	5:I:186:PHE:O	2.17	0.44
5:I:1142:ARG:NH1	5:I:1161:LEU:O	2.50	0.44
6:J:1080:ILE:HD11	6:J:1121:LEU:HD11	2.00	0.44
4:G:180:VAL:HG12	4:G:207:THR:HG22	1.99	0.44
5:I:619:ALA:HA	5:I:654:ASP:HB2	1.99	0.44
6:J:53:ARG:NH1	6:J:60:ARG:HD2	2.32	0.44
6:J:958:ILE:HD13	6:J:958:ILE:HA	1.88	0.44
6:J:1096:PRO:HB2	6:J:1098:GLN:HE22	1.82	0.44
8:I:1401:4QM:C3	8:I:1401:4QM:C1	2.95	0.44
6:J:1105:ALA:HA	6:J:1124:ILE:HG13	1.99	0.44
5:I:38:PHE:HA	5:I:48:GLY:HA2	1.99	0.44
4:G:74:VAL:HG12	4:G:133:LEU:HD23	2.00	0.44
4:G:104:LYS:HG2	4:G:110:VAL:HG22	1.99	0.44
4:H:16:ILE:HG23	4:H:26:VAL:HG22	1.99	0.44
6:J:1321:SER:OG	6:J:1349:GLU:OE2	2.36	0.44
4:G:67:GLU:H	4:G:67:GLU:HG2	1.60	0.44
4:H:174:ASP:OD1	4:H:174:ASP:N	2.49	0.44
5:I:521:LEU:HA	5:I:524:ILE:HG22	1.98	0.44
5:I:1158:LYS:HE2	5:I:1158:LYS:HB2	1.84	0.44
4:H:13:LEU:HD23	4:H:28:LEU:HB3	2.00	0.44
5:I:782:VAL:HG21	5:I:792:GLY:HA3	2.00	0.44
6:J:275:ARG:HD3	6:J:298:MET:HB3	2.00	0.44
7:K:3:ARG:HH21	7:K:6:VAL:HA	1.83	0.43
4:G:26:VAL:HG21	4:G:217:ILE:HG13	2.00	0.43
6:J:353:SER:OG	6:J:445:LYS:O	2.32	0.43
5:I:444:ASP:OD1	5:I:444:ASP:N	2.51	0.43
5:I:944:ARG:HA	5:I:947:GLU:HG2	2.01	0.43
5:I:1269:ARG:HA	6:J:346:ARG:HA	2.00	0.43
6:J:1181:ASP:OD1	6:J:1181:ASP:N	2.46	0.43
3:R:11:A:H2'	3:R:12:U:C6	2.54	0.43
4:H:46:ILE:HD12	4:H:224:LEU:HB2	1.99	0.43
5:I:529:ARG:HD2	5:I:572:ILE:HG22	2.01	0.43
5:I:978:VAL:HG11	5:I:1011:LEU:HD21	2.00	0.43
6:J:419:HIS:NE2	6:J:471:PRO:O	2.44	0.43
4:G:193:GLU:HG2	4:G:194:GLN:H	1.84	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:I:211:ARG:NH1	5:I:357:ASN:O	2.51	0.43
6:J:1004:ALA:HB3	6:J:1017:VAL:HA	2.00	0.43
5:I:468:LEU:HD23	5:I:468:LEU:HA	1.86	0.43
4:H:61:ILE:HD12	4:H:171:LEU:HD13	2.00	0.43
6:J:201:LEU:HD13	6:J:220:ARG:HG2	2.01	0.43
5:I:207:THR:HA	5:I:210:LEU:HB2	2.01	0.43
5:I:805:MET:HE2	5:I:805:MET:HB2	1.89	0.43
4:G:60:GLU:HG2	4:G:170:ARG:HA	2.00	0.43
4:H:10:LYS:HE2	4:H:10:LYS:HB3	1.88	0.43
5:I:225:PHE:HE2	5:I:347:ILE:HB	1.84	0.43
4:G:9:LEU:HD12	4:G:198:LEU:HD21	2.01	0.42
4:H:83:LEU:HD21	6:J:526:VAL:HG22	2.01	0.42
4:H:125:LYS:HE2	4:H:125:LYS:HB3	1.82	0.42
5:I:700:VAL:HG13	5:I:1117:LEU:HD23	2.01	0.42
6:J:215:LYS:HA	6:J:218:THR:HG22	2.01	0.42
6:J:850:LYS:C	6:J:852:GLY:H	2.21	0.42
6:J:950:ILE:HG21	6:J:982:LEU:HD23	2.00	0.42
6:J:1171:GLY:O	6:J:1192:LYS:NZ	2.52	0.42
4:H:41:ASN:OD1	4:H:44:ARG:NH1	2.52	0.42
5:I:538:LEU:HD11	5:I:547:VAL:HG11	2.00	0.42
5:I:820:GLU:N	5:I:1080:ASN:O	2.52	0.42
5:I:230:PHE:HB2	5:I:333:ILE:HB	2.01	0.42
4:H:25:LYS:HG3	4:H:204:GLU:HG2	2.01	0.42
5:I:759:SER:OG	5:I:763:THR:OG1	2.33	0.42
6:J:370:LYS:HG2	6:J:409:TRP:CZ3	2.55	0.42
5:I:335:THR:OG1	5:I:336:LEU:N	2.50	0.42
6:J:113:HIS:HB3	6:J:116:PHE:HD2	1.84	0.42
5:I:230:PHE:CD2	5:I:239:MET:HB2	2.55	0.42
6:J:950:ILE:HD12	6:J:1018:ALA:HB3	2.01	0.42
6:J:1288:ALA:O	6:J:1291:GLU:HG3	2.19	0.42
4:H:192:VAL:HG12	4:H:193:GLU:H	1.83	0.42
4:G:75:GLN:HG3	5:I:727:VAL:HG12	2.02	0.42
4:H:158:ARG:NH2	4:H:173:VAL:O	2.51	0.42
5:I:34:SER:HB3	5:I:457:GLY:H	1.84	0.42
6:J:264:ASP:HB3	6:J:324:LEU:HB2	2.01	0.42
6:J:1268:ASN:OD1	6:J:1301:THR:OG1	2.22	0.42
4:G:64:VAL:HG11	4:G:78:ILE:HG21	2.02	0.42
6:J:41:PRO:HB3	6:J:273:ILE:HB	2.00	0.42
4:G:58:GLU:HG2	4:G:172:LEU:HD23	2.01	0.42
6:J:587:LEU:HD11	6:J:608:CYS:HA	2.01	0.42
6:J:596:LEU:HB3	6:J:601:ILE:HG23	2.01	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:J:865:HIS:CE1	6:J:867:GLN:HB2	2.55	0.42
6:J:1104:LYS:HE3	6:J:1104:LYS:HB3	1.80	0.42
5:I:151:ARG:HD3	5:I:445:ILE:HG23	2.01	0.41
5:I:559:CYS:HB2	5:I:662:SER:HB3	2.01	0.41
5:I:994:ARG:HA	5:I:997:TRP:CE2	2.55	0.41
5:I:1121:ALA:HB2	5:I:1182:ILE:HD12	2.01	0.41
4:H:91:ARG:HG3	4:H:122:GLU:HB3	2.03	0.41
5:I:267:ARG:HH12	5:I:273:HIS:CE1	2.39	0.41
5:I:1005:GLU:HG3	5:I:1006:GLU:H	1.84	0.41
5:I:1223:ARG:HB2	6:J:635:SER:O	2.19	0.41
6:J:252:LEU:HD23	6:J:252:LEU:HA	1.90	0.41
5:I:91:THR:OG1	5:I:138:ILE:O	2.25	0.41
5:I:14:ASP:HA	5:I:1183:ALA:HB3	2.01	0.41
5:I:61:SER:OG	5:I:62:TYR:N	2.53	0.41
5:I:233:ARG:HH22	5:I:284:LEU:HG	1.85	0.41
5:I:338:THR:HB	5:I:345:PRO:HB3	2.02	0.41
5:I:977:ALA:O	5:I:980:VAL:HG22	2.21	0.41
6:J:966:VAL:HG11	6:J:1030:GLU:HA	2.02	0.41
5:I:192:ASP:HB3	5:I:346:TYR:HD1	1.86	0.41
6:J:582:ILE:HD13	6:J:627:THR:HG21	2.03	0.41
6:J:845:ALA:HB3	6:J:881:LYS:HG2	2.03	0.41
4:G:81:ILE:HG12	4:G:131:CYS:HB3	2.03	0.41
5:I:88:ARG:HH11	5:I:1040:ASP:HB3	1.85	0.41
6:J:120:LEU:HD13	6:J:120:LEU:HA	1.89	0.41
6:J:785:ASP:O	6:J:789:LYS:HB2	2.21	0.41
7:K:38:LEU:N	7:K:53:GLU:OE1	2.47	0.41
1:A:26:DT:H2'	1:A:27:DT:H71	2.02	0.41
2:B:8:DT:H2''	2:B:9:DC:H5'	2.03	0.41
4:G:174:ASP:OD1	4:G:174:ASP:N	2.53	0.41
5:I:87:ILE:HG23	5:I:932:GLN:NE2	2.36	0.41
5:I:524:ILE:HD12	5:I:524:ILE:HA	1.89	0.41
6:J:79:LYS:HG3	6:J:80:HIS:CD2	2.56	0.41
6:J:265:LEU:HD23	6:J:265:LEU:HA	1.89	0.41
6:J:342:LEU:HD13	6:J:1352:ILE:HG23	2.03	0.41
6:J:755:ILE:HD12	6:J:774:ILE:HG23	2.03	0.41
6:J:850:LYS:HE3	6:J:857:LEU:HG	2.02	0.41
6:J:1048:ARG:NH2	6:J:1050:THR:OG1	2.54	0.41
7:K:37:PRO:HB3	7:K:49:ILE:HG21	2.03	0.41
5:I:149:LEU:HD12	5:I:452:ARG:O	2.20	0.41
6:J:353:SER:HB2	6:J:372:MET:HE1	2.02	0.40
5:I:519:ASN:ND2	5:I:689:ALA:O	2.54	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:J:115:TRP:O	6:J:119:SER:HB2	2.21	0.40
6:J:572:THR:HG21	6:J:589:TYR:HE2	1.86	0.40
6:J:1358:PRO:HB3	6:J:1366:HIS:CD2	2.56	0.40
7:K:44:ASP:OD2	7:K:52:ARG:NH1	2.54	0.40
5:I:590:PRO:HG3	5:I:605:TYR:CE2	2.56	0.40
5:I:1312:ASN:OD1	5:I:1313:HIS:N	2.55	0.40
5:I:231:GLU:OE2	5:I:332:ARG:NH1	2.50	0.40
5:I:241:LEU:N	5:I:283:LYS:O	2.44	0.40
5:I:300:ASP:OD2	5:I:313:ALA:N	2.51	0.40
5:I:618:GLN:NE2	6:J:768:ASN:HB3	2.32	0.40
5:I:726:TYR:CE2	5:I:728:ASP:HB2	2.57	0.40
5:I:765:ILE:HA	5:I:787:PRO:HB3	2.04	0.40
5:I:1072:ASN:OD1	5:I:1072:ASN:N	2.55	0.40
5:I:1293:VAL:HG21	5:I:1315:MET:HB2	2.02	0.40
6:J:490:ILE:HD11	6:J:609:TYR:CD1	2.57	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	
4	G	214/239 (90%)	205 (96%)	9 (4%)	0	100	100
4	H	216/239 (90%)	199 (92%)	17 (8%)	0	100	100
5	I	1312/1342 (98%)	1217 (93%)	95 (7%)	0	100	100
6	J	1331/1407 (95%)	1257 (94%)	74 (6%)	0	100	100
7	K	77/91 (85%)	70 (91%)	7 (9%)	0	100	100
All	All	3150/3318 (95%)	2948 (94%)	202 (6%)	0	100	100

There are no Ramachandran outliers to report.

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	
4	G	185/206 (90%)	181 (98%)	4 (2%)	52	74
4	H	188/206 (91%)	177 (94%)	11 (6%)	19	49
5	I	1135/1157 (98%)	1091 (96%)	44 (4%)	32	62
6	J	1122/1168 (96%)	1082 (96%)	40 (4%)	35	63
7	K	67/75 (89%)	66 (98%)	1 (2%)	65	81
All	All	2697/2812 (96%)	2597 (96%)	100 (4%)	37	63

All (100) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	G	19	VAL
4	G	23	HIS
4	G	177	TYR
4	G	231	PHE
4	H	19	VAL
4	H	23	HIS
4	H	28	LEU
4	H	38	THR
4	H	100	LEU
4	H	120	ASP
4	H	143	ARG
4	H	146	VAL
4	H	174	ASP
4	H	183	ILE
4	H	198	LEU
5	I	5	TYR
5	I	11	ILE
5	I	17	LYS
5	I	18	ARG
5	I	23	ASP
5	I	28	LEU
5	I	47	TYR
5	I	122	VAL

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Mol	Chain	Res	Type
5	I	189	ASP
5	I	221	LEU
5	I	228	VAL
5	I	234	ASP
5	I	281	ASP
5	I	335	THR
5	I	352	ARG
5	I	377	THR
5	I	538	LEU
5	I	539	THR
5	I	548	ARG
5	I	550	VAL
5	I	554	HIS
5	I	600	THR
5	I	615	VAL
5	I	624	ASP
5	I	635	THR
5	I	663	VAL
5	I	697	LYS
5	I	702	THR
5	I	781	ASP
5	I	850	ILE
5	I	924	VAL
5	I	946	LEU
5	I	964	LEU
5	I	989	LEU
5	I	1056	VAL
5	I	1106	ARG
5	I	1134	GLN
5	I	1159	VAL
5	I	1225	VAL
5	I	1240	ASP
5	I	1254	VAL
5	I	1295	SER
5	I	1298	VAL
5	I	1331	ARG
6	J	48	THR
6	J	139	LEU
6	J	166	LEU
6	J	176	PHE
6	J	212	THR
6	J	227	PHE

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Mol	Chain	Res	Type
6	J	242	LEU
6	J	253	VAL
6	J	275	ARG
6	J	279	LEU
6	J	312	ARG
6	J	363	LEU
6	J	374	LEU
6	J	407	VAL
6	J	430	HIS
6	J	468	VAL
6	J	501	VAL
6	J	504	GLN
6	J	507	VAL
6	J	697	MET
6	J	706	VAL
6	J	710	ASP
6	J	757	THR
6	J	765	GLU
6	J	805	GLN
6	J	826	ILE
6	J	831	VAL
6	J	839	VAL
6	J	847	ASP
6	J	857	LEU
6	J	889	ASP
6	J	895	CYS
6	J	967	VAL
6	J	978	ARG
6	J	1084	GLN
6	J	1146	GLU
6	J	1162	ILE
6	J	1258	ARG
6	J	1281	GLU
6	J	1366	HIS
7	K	59	ILE

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

Mol	Chain	Res	Type
5	I	618	GLN
6	J	805	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	R	10/19 (52%)	1 (10%)	1 (10%)

All (1) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
3	R	11	A

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
3	R	10	G

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 4 ligands modelled in this entry, 3 are monoatomic - leaving 1 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
8	4QM	I	1401	-	30,30,30	5.04	15 (50%)	47,48,48	2.35	12 (25%)

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
8	4QM	I	1401	-	-	6/7/72/72	1/4/4/4

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	I	1401	4QM	C3-C19	17.23	1.82	1.53
8	I	1401	4QM	C3-C4	11.64	1.72	1.53
8	I	1401	4QM	C5-C4	-9.39	1.39	1.54
8	I	1401	4QM	C2-C19	-8.60	1.40	1.56
8	I	1401	4QM	C8-C7	6.12	1.70	1.54
8	I	1401	4QM	C5-C6	-4.71	1.47	1.55
8	I	1401	4QM	C18-C6	-4.19	1.45	1.53
8	I	1401	4QM	O4-C4	-4.18	1.36	1.43
8	I	1401	4QM	C7-C6	3.22	1.61	1.54
8	I	1401	4QM	C14-C15	-3.11	1.48	1.53
8	I	1401	4QM	C2-C15	2.71	1.59	1.55
8	I	1401	4QM	C5-C9	2.62	1.60	1.55
8	I	1401	4QM	C14-C13	2.43	1.56	1.51
8	I	1401	4QM	O2-C13	-2.21	1.36	1.43
8	I	1401	4QM	C20-C9	-2.05	1.50	1.54

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	I	1401	4QM	C9-C5-C4	-7.96	110.40	117.67
8	I	1401	4QM	C6-C5-C4	6.02	113.01	107.40
8	I	1401	4QM	C7-C6-C18	-5.15	111.14	118.33
8	I	1401	4QM	C19-C3-C4	-4.63	108.19	114.30
8	I	1401	4QM	C5-C9-C20	-4.56	114.05	119.50
8	I	1401	4QM	C3-C19-C2	-4.43	109.16	113.73
8	I	1401	4QM	C14-C15-C2	-3.34	109.11	112.66
8	I	1401	4QM	C21-C20-C9	-2.93	108.44	112.92
8	I	1401	4QM	C3-C19-C18	-2.89	106.65	110.88
8	I	1401	4QM	C9-C5-C6	2.35	102.47	100.09
8	I	1401	4QM	C8-C7-C6	-2.07	101.03	105.13
8	I	1401	4QM	C6-C18-C17	-2.04	109.10	111.81

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	I	1401	4QM	C21-C20-C9-C5
8	I	1401	4QM	C21-C20-C9-C8
8	I	1401	4QM	C22-C20-C9-C8
8	I	1401	4QM	C22-C20-C9-C5
8	I	1401	4QM	C20-C22-C23-C24
8	I	1401	4QM	C21-C20-C22-C23

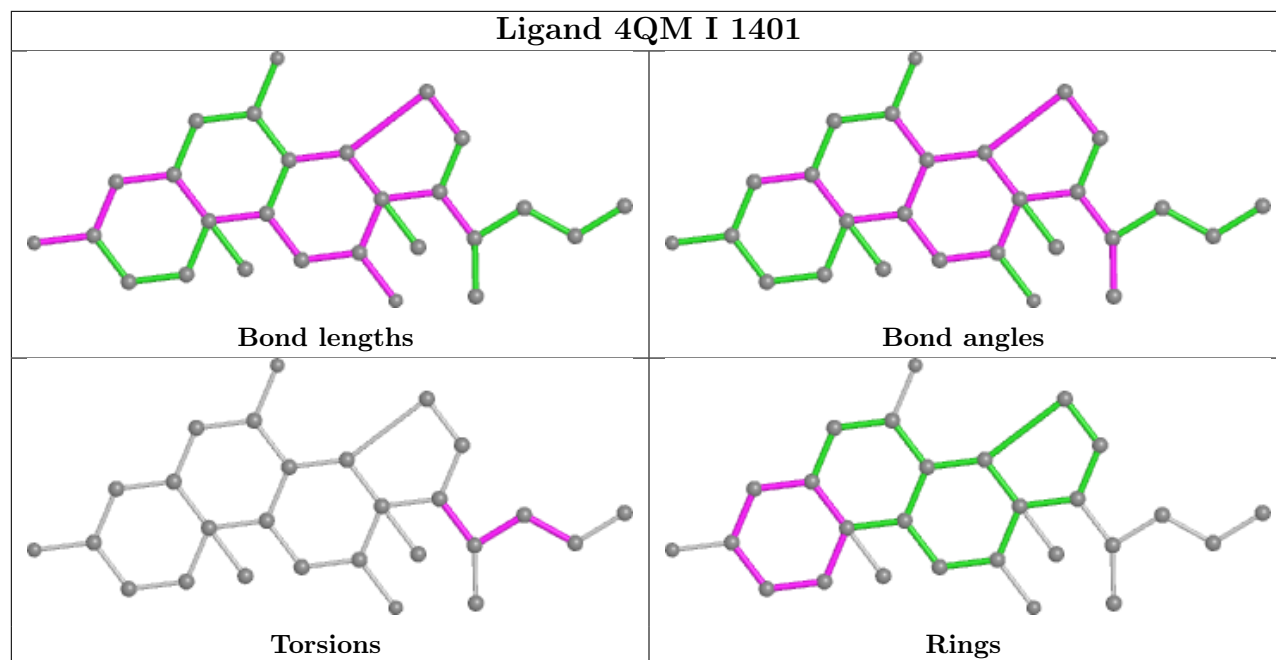
All (1) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	I	1401	4QM	C1-C12-C13-C14-C15-C2

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	I	1401	4QM	4	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 than 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.



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.

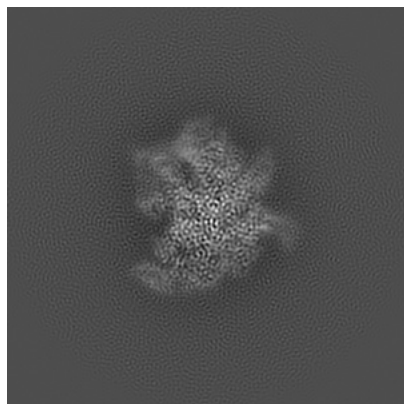
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-28146. These allow visual inspection of the internal detail of the map and identification of artifacts.

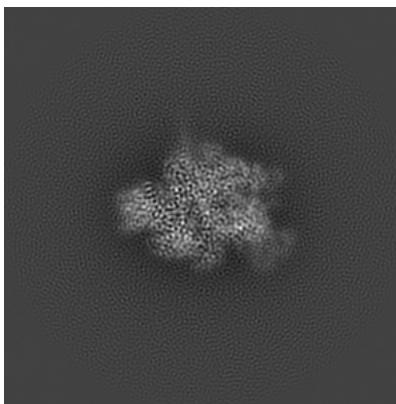
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

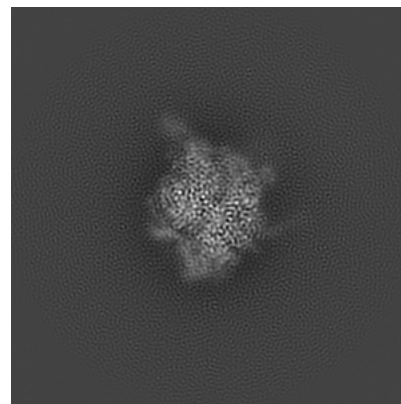
6.1.1 Primary map



X

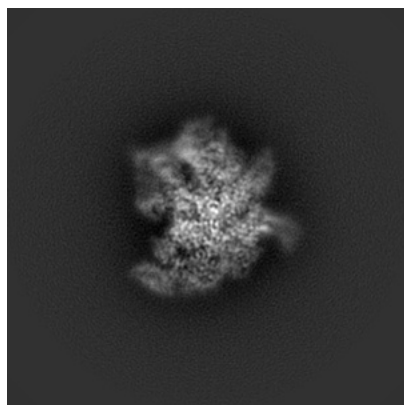


Y

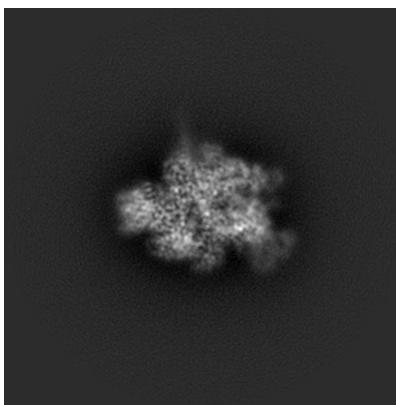


Z

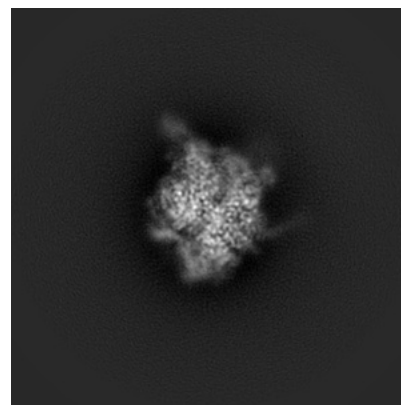
6.1.2 Raw map



X



Y

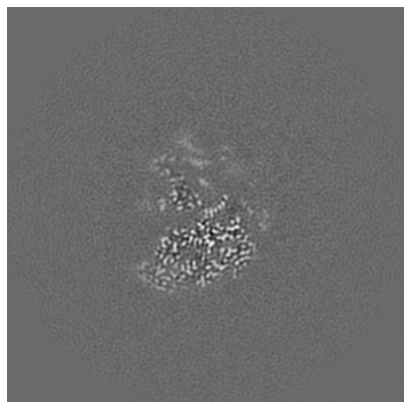


Z

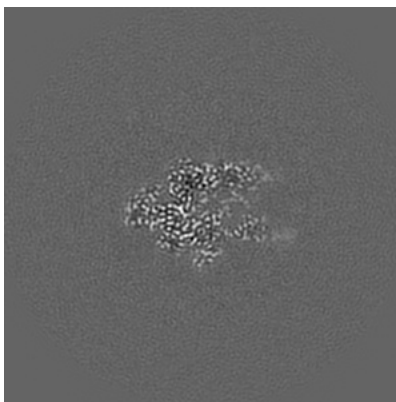
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

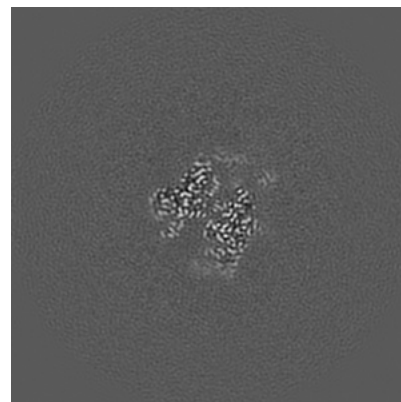
6.2.1 Primary map



X Index: 128

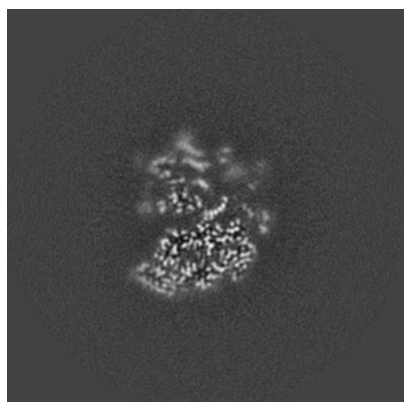


Y Index: 128

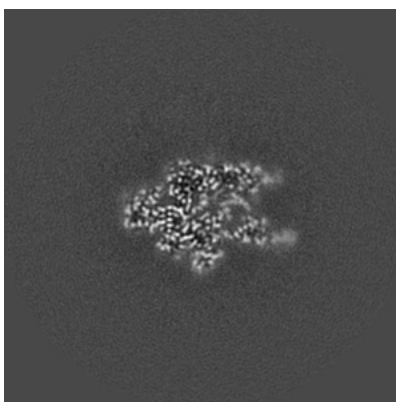


Z Index: 128

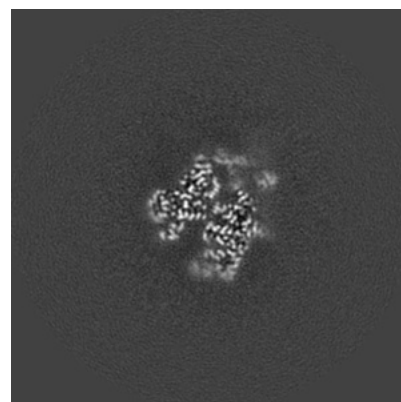
6.2.2 Raw map



X Index: 128



Y Index: 128

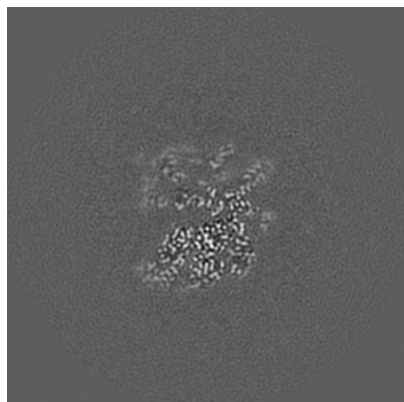


Z Index: 128

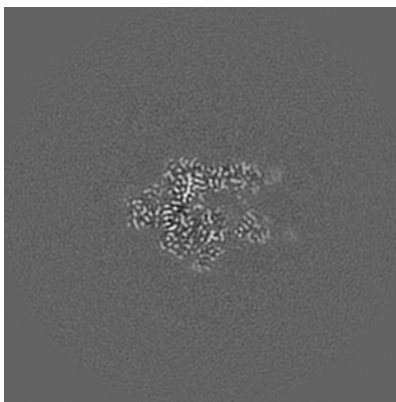
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

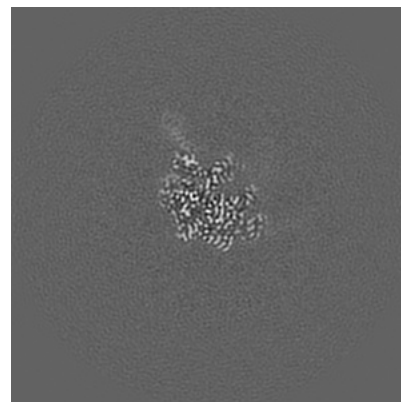
6.3.1 Primary map



X Index: 124

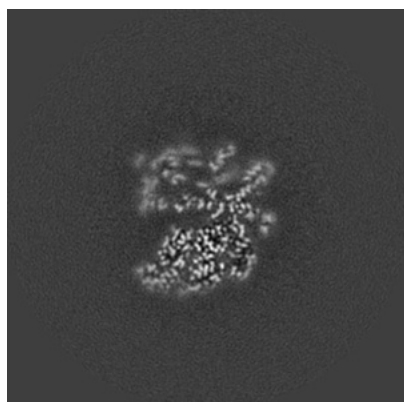


Y Index: 130

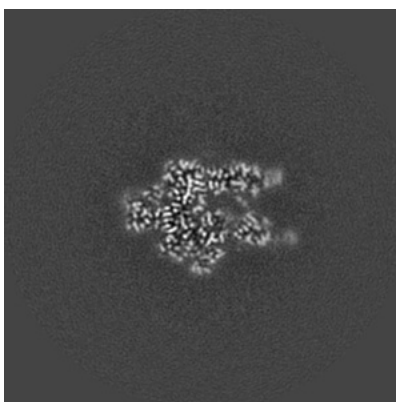


Z Index: 111

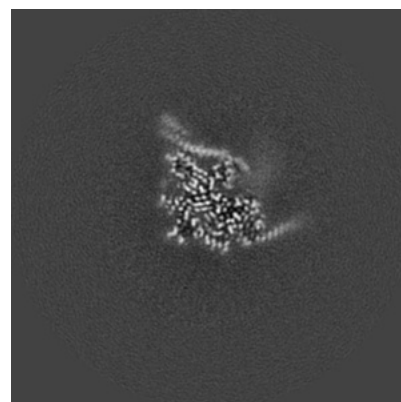
6.3.2 Raw map



X Index: 124



Y Index: 130

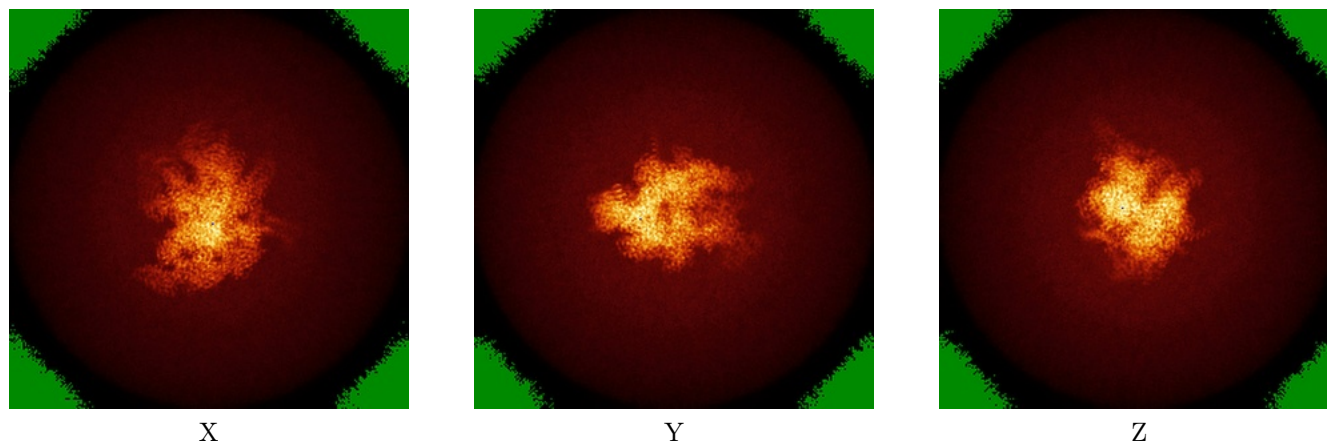


Z Index: 114

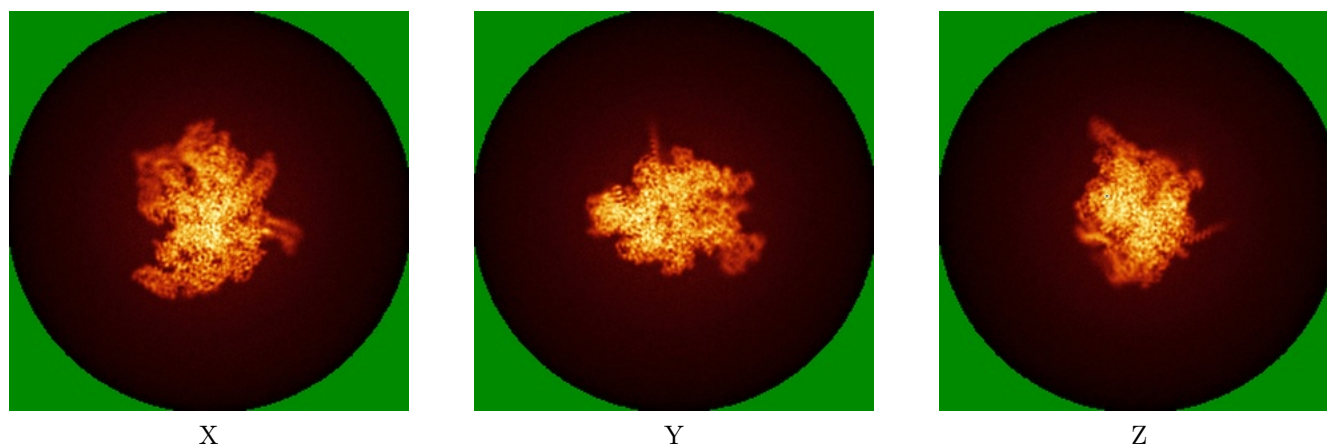
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



6.4.2 Raw map



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.

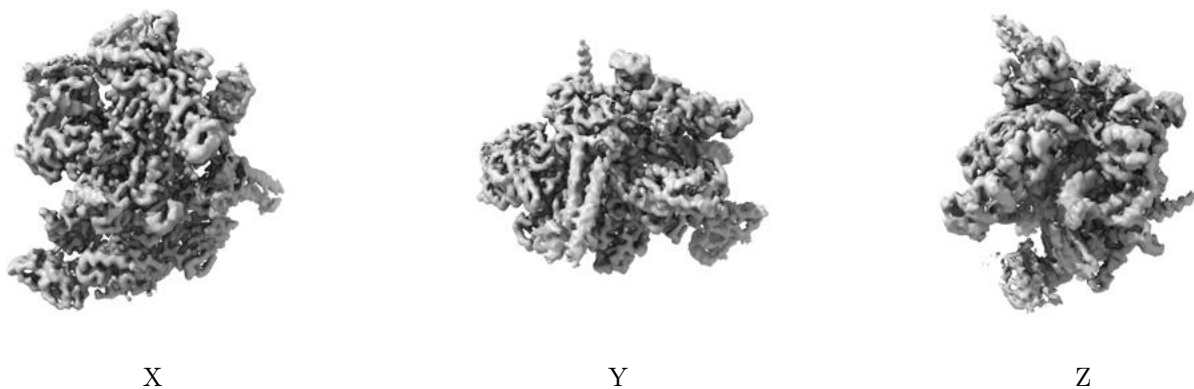
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.026. 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.

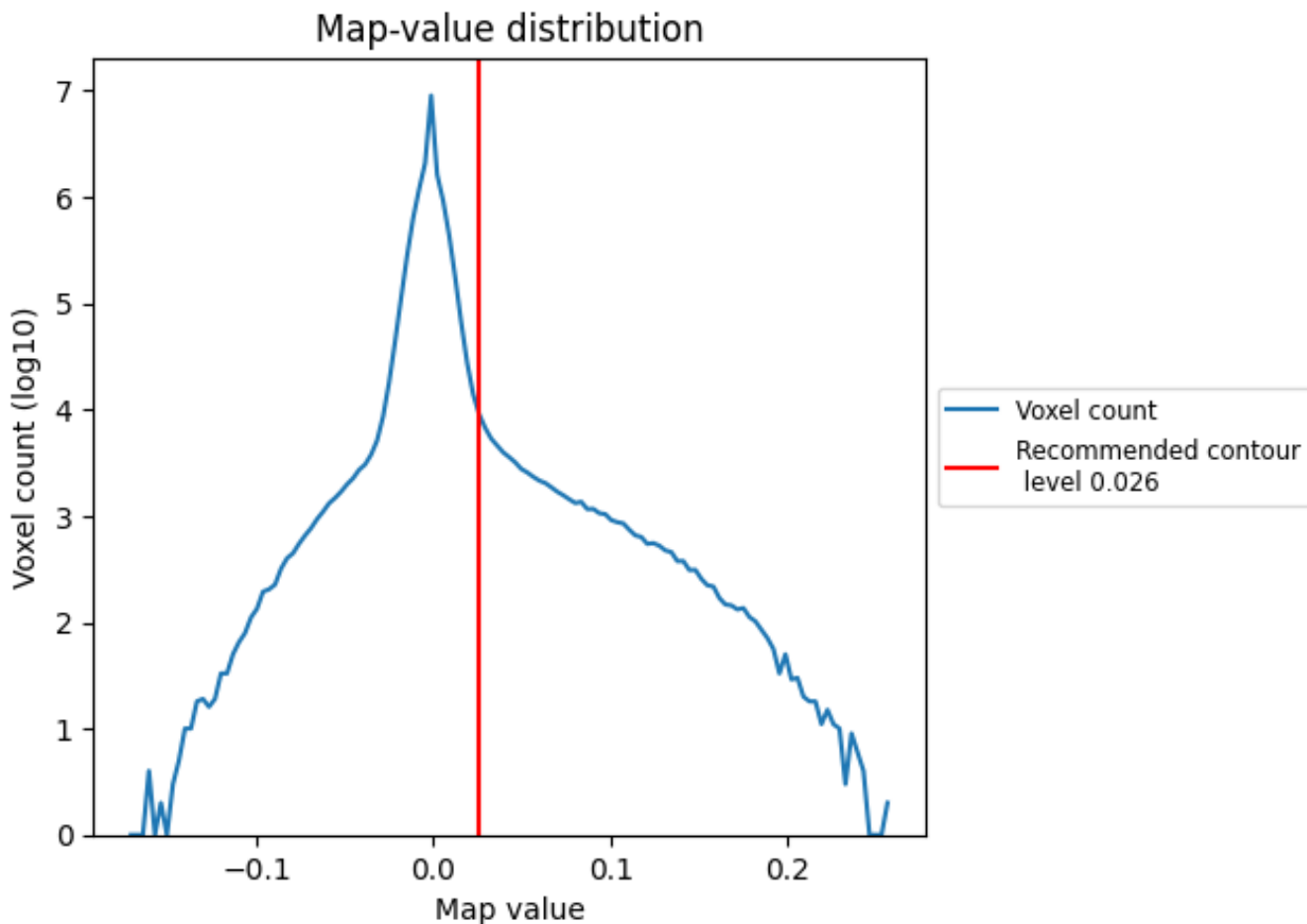
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

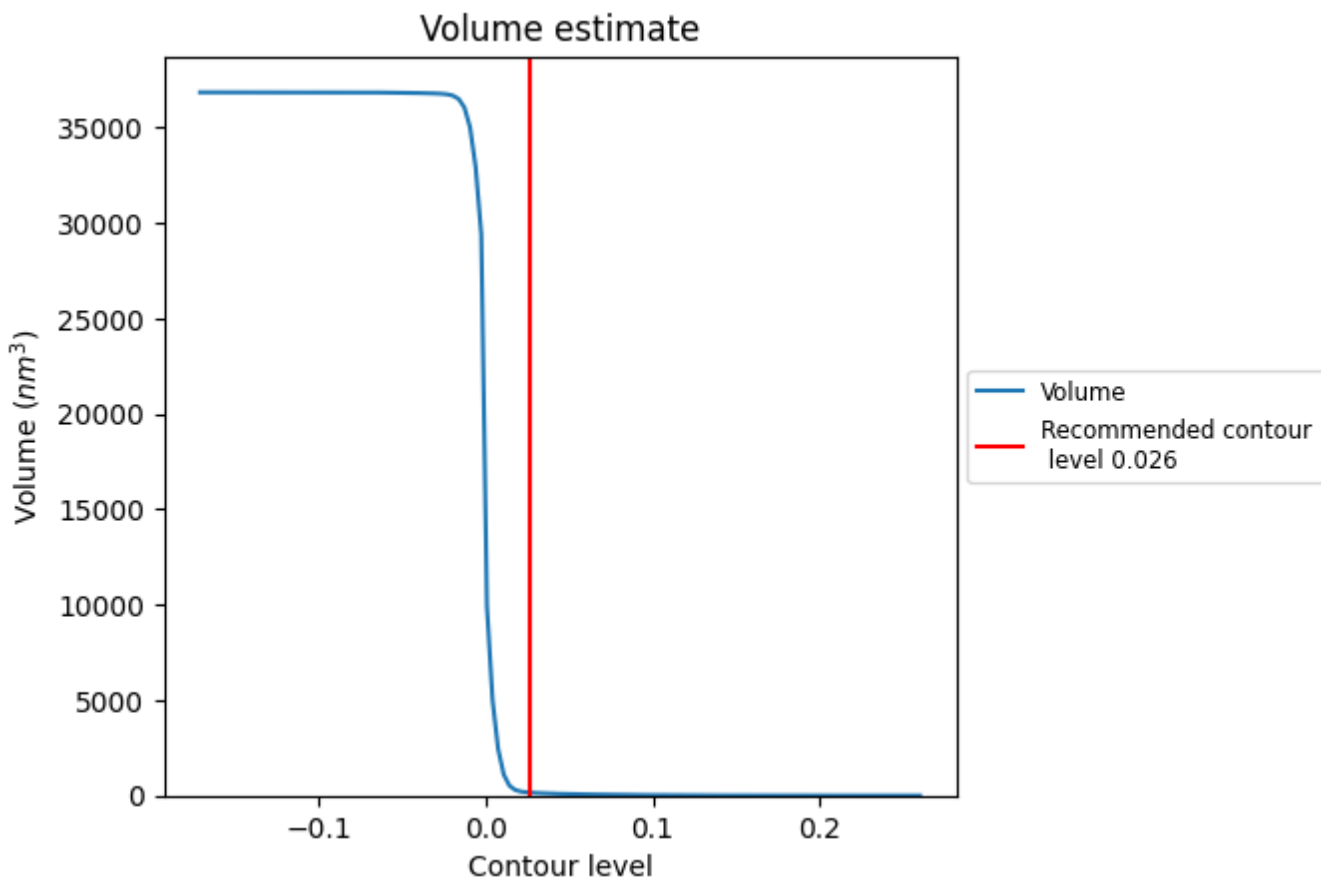
This section contains the results of statistical analysis of the map.

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.

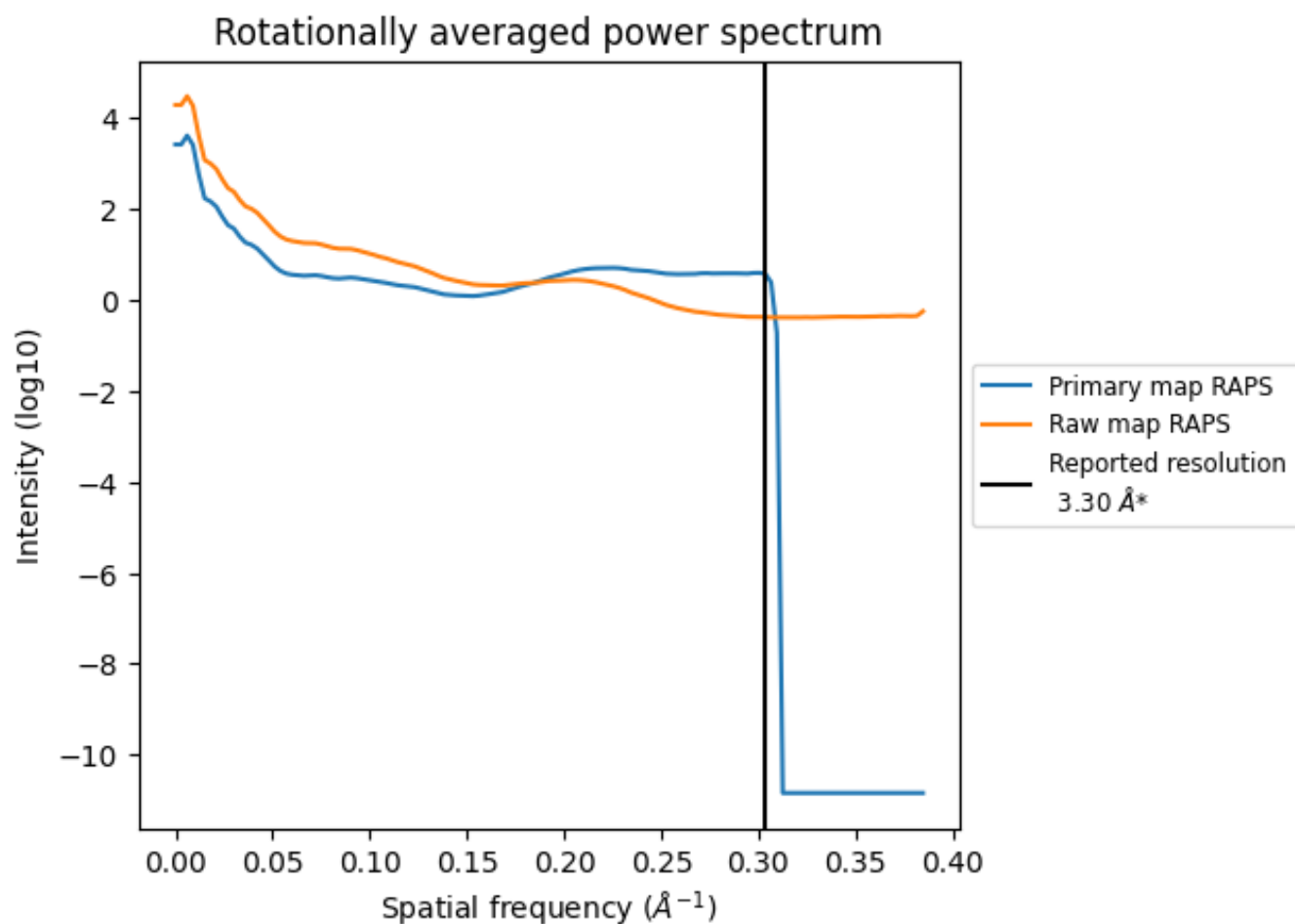
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 160 nm³; this corresponds to an approximate mass of 145 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](#)

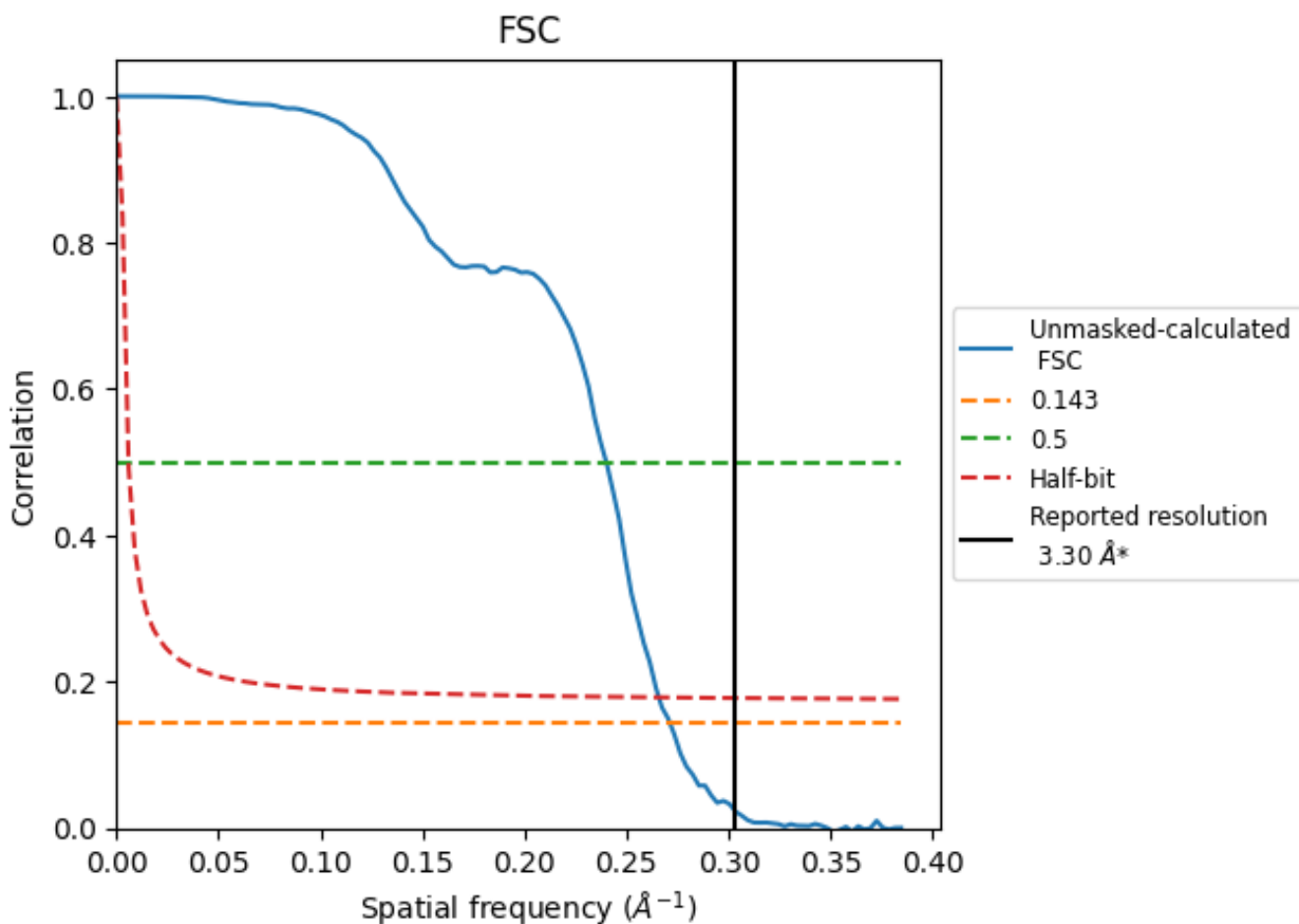


*Reported resolution corresponds to spatial frequency of 0.303 Å⁻¹

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 0.303\AA^{-1}

8.2 Resolution estimates [i](#)

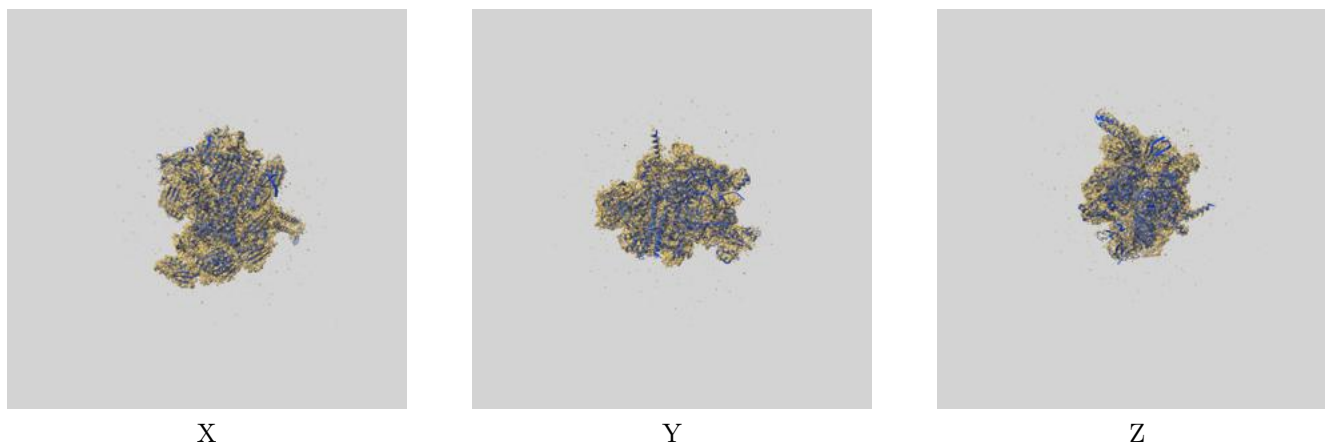
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.30	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.69	4.16	3.76

*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 3.69 differs from the reported value 3.3 by more than 10 %

9 Map-model fit [i](#)

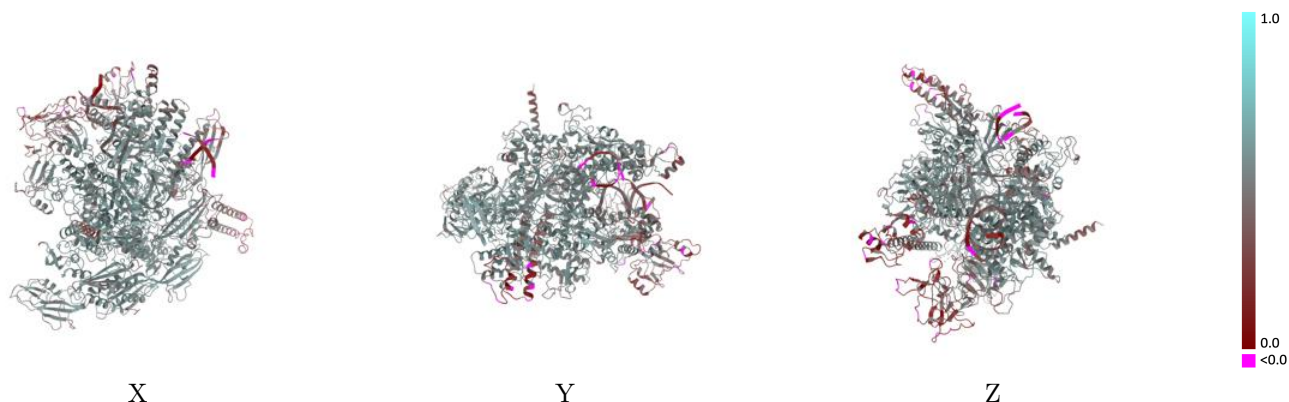
This section contains information regarding the fit between EMDB map EMD-28146 and PDB model 8EHF. Per-residue inclusion information can be found in section 3 on page 7.

9.1 Map-model overlay [i](#)



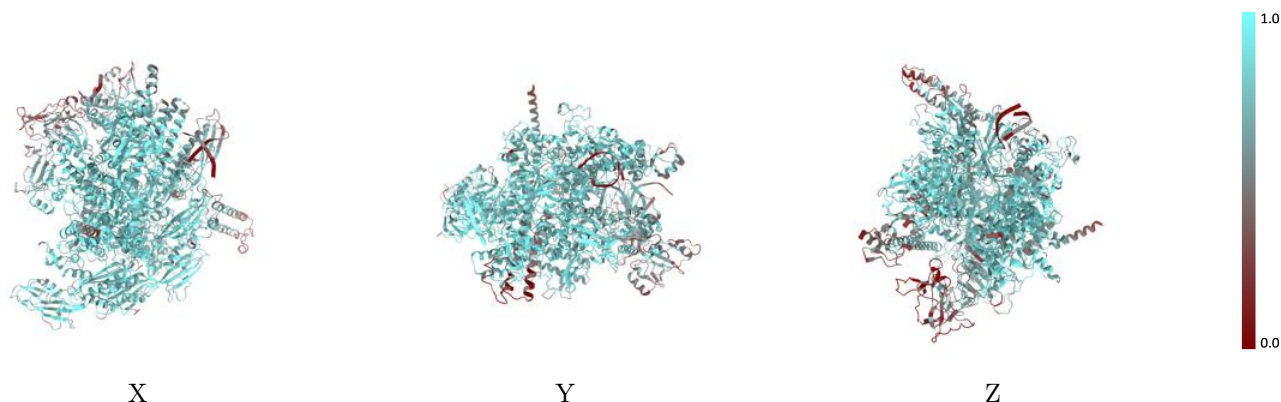
The images above show the 3D surface view of the map at the recommended contour level 0.026 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



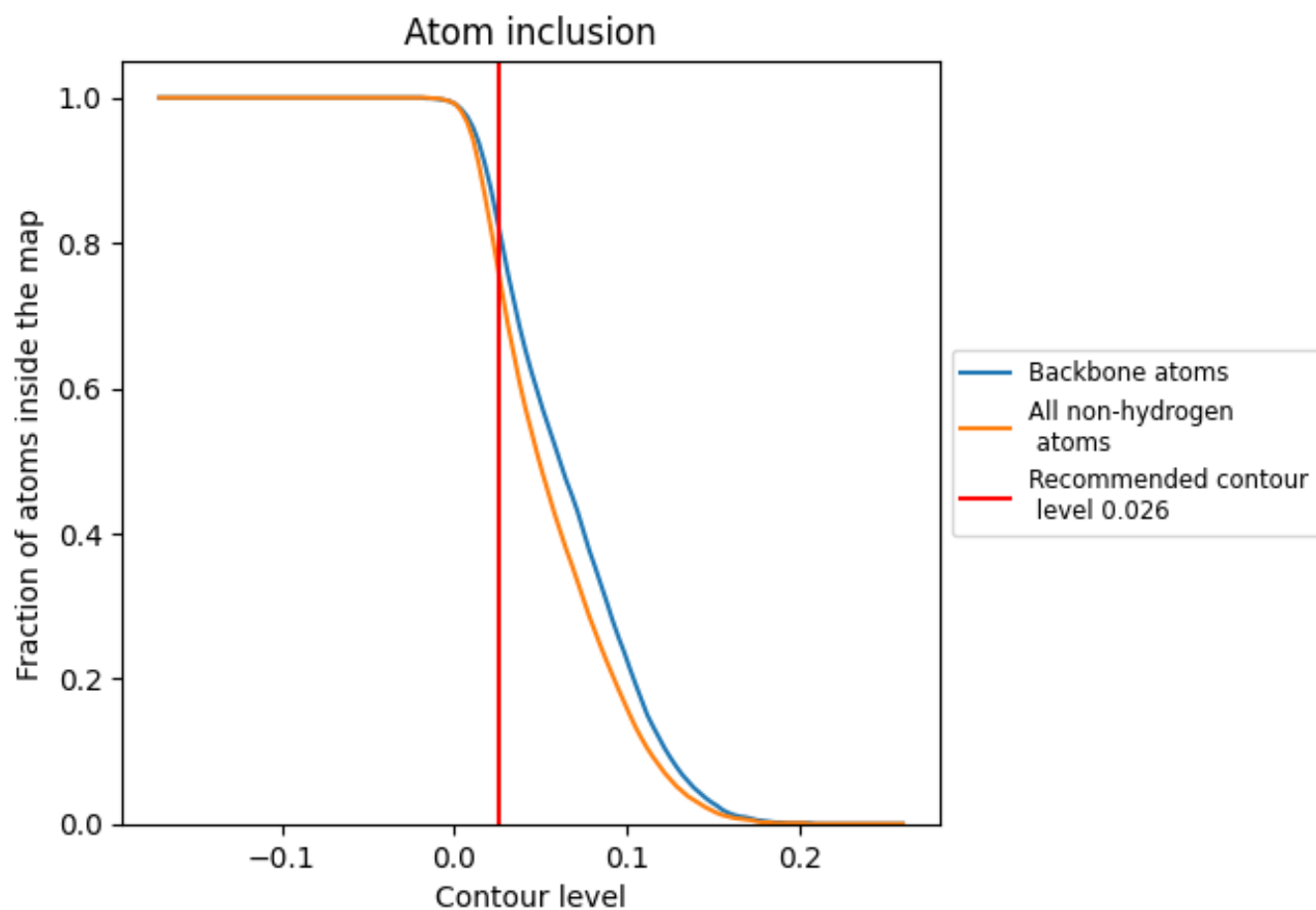
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.026).



















9.4 Atom inclusion [i](#)



At the recommended contour level, 82% of all backbone atoms, 76% 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 (0.026) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7560	 0.4940
A	 0.5600	 0.2720
B	 0.6550	 0.3480
G	 0.8430	 0.5540
H	 0.7790	 0.5160
I	 0.7590	 0.4950
J	 0.7490	 0.4980
K	 0.7140	 0.4980
R	 0.8970	 0.5310

