



Full wwPDB EM Validation Report ⓘ

Mar 5, 2026 – 06:50 PM UTC

PDB ID : 6EXV / pdb_00006exv
EMDB ID : EMD-3981
Title : Structure of mammalian RNA polymerase II elongation complex inhibited by Alpha-amanitin
Authors : Liu, X.; Farnung, L.; Wigge, C.; Cramer, P.
Deposited on : 2017-11-09
Resolution : 3.60 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

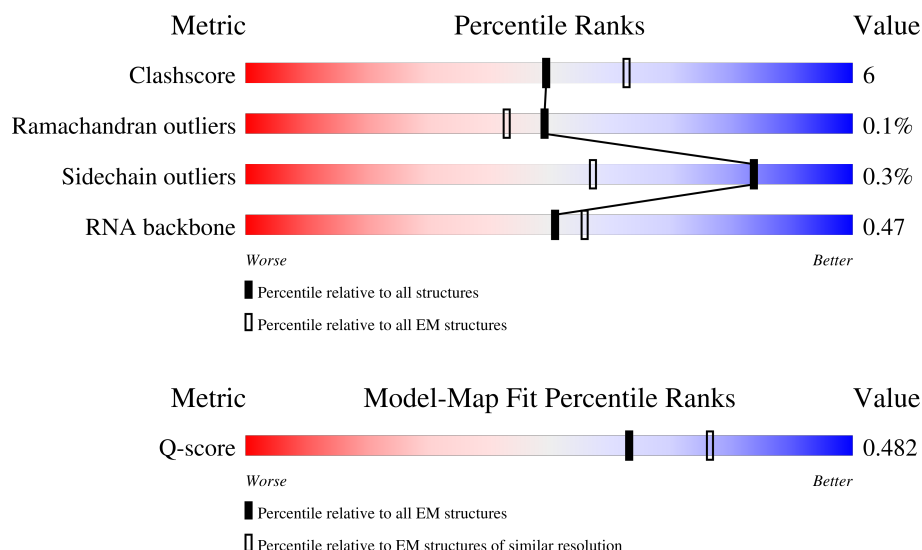
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance

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

The reported resolution of this entry is 3.60 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	12797 (3.10 - 4.10)

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	1970	
2	B	1167	
3	C	275	

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Mol	Chain	Length	Quality of chain
4	D	142	
5	E	210	
6	F	127	
7	G	172	
8	H	150	
9	I	125	
10	J	67	
11	K	117	
12	L	58	
13	M	8	
14	N	43	
15	P	20	
16	T	43	

2 Entry composition

There are 18 unique types of molecules in this entry. The entry contains 32717 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 DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1428	Total	C	N	O	S	0	0
			11317	7120	2025	2100	72		

There are 15 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	526	VAL	-	insertion	UNP I3LJR4
A	527	THR	-	insertion	UNP I3LJR4
A	528	PRO	-	insertion	UNP I3LJR4
A	529	GLN	-	insertion	UNP I3LJR4
A	1299	GLN	-	insertion	UNP I3LJR4
A	1300	GLY	-	insertion	UNP I3LJR4
A	1301	ILE	-	insertion	UNP I3LJR4
A	1302	GLU	-	insertion	UNP I3LJR4
A	1303	GLN	-	insertion	UNP I3LJR4
A	1304	ILE	-	insertion	UNP I3LJR4
A	1305	SER	-	insertion	UNP I3LJR4
A	1308	TYR	SER	conflict	UNP I3LJR4
A	1309	MET	ARG	conflict	UNP I3LJR4
A	1310	HIS	SER	conflict	UNP I3LJR4
A	1313	GLN	ALA	conflict	UNP I3LJR4

- Molecule 2 is a protein called DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	1134	Total	C	N	O	S	0	0
			9062	5732	1595	1671	64		

- Molecule 3 is a protein called DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	257	Total	C	N	O	S	0	0
			2059	1294	351	408	6		

- Molecule 4 is a protein called DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB3.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	128	Total	C	N	O	S	0	0
			1005	632	172	197	4		

- Molecule 5 is a protein called DNA-DIRECTED RNA POLYMERASES I, II, AND III SUB-UNIT RPABC1.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	209	Total	C	N	O	S	0	0
			1720	1089	300	323	8		

- Molecule 6 is a protein called DNA-DIRECTED RNA POLYMERASES I, II, AND III SUB-UNIT RPABC1.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	82	Total	C	N	O	S	0	0
			657	418	113	121	5		

- Molecule 7 is a protein called DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB7.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	171	Total	C	N	O	S	0	0
			1334	867	216	243	8		

- Molecule 8 is a protein called DNA-DIRECTED RNA POLYMERASES I, II, AND III SUB-UNIT RPABC3.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	148	Total	C	N	O	S	0	0
			1186	750	194	237	5		

- Molecule 9 is a protein called DNA-directed RNA polymerase II subunit RPB9.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	114	Total	C	N	O	S	0	0
			927	571	166	179	11		

- Molecule 10 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC5.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	67	Total	C	N	O	S	0	0
			533	345	90	92	6		

- Molecule 11 is a protein called DNA-DIRECTED RNA POLYMERASES I, II, AND III SUBUNIT RPABC4.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	115	Total	C	N	O	S	0	0
			920	593	152	173	2		

- Molecule 12 is a protein called DNA-DIRECTED RNA POLYMERASES I, II, AND III SUBUNIT RPABC4.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	44	Total	C	N	O	S	0	0
			372	231	72	63	6		

- Molecule 13 is a protein called AMATOXIN.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	8	Total	C	N	O	S	0	0
			64	39	10	14	1		

- Molecule 14 is a DNA chain called DNA (25-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	25	Total	C	N	O	P	0	0
			516	247	95	149	25		

- Molecule 15 is a RNA chain called RNA (5'-R(P*CP*AP*UP*AP*AP*AP*GP*AP*CP*CP*AP*GP*GP*C)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
15	P	14	Total	C	N	O	P	0	0
			301	135	59	93	14		

- Molecule 16 is a DNA chain called DNA (36-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
16	T	36	Total	C	N	O	P	0	0
			735	352	131	216	36		

- Molecule 17 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
17	A	2	Total	Zn	0
			2	2	

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Mol	Chain	Residues	Atoms		AltConf
17	B	1	Total 1	Zn 1	0
17	C	1	Total 1	Zn 1	0
17	I	2	Total 2	Zn 2	0
17	J	1	Total 1	Zn 1	0
17	L	1	Total 1	Zn 1	0

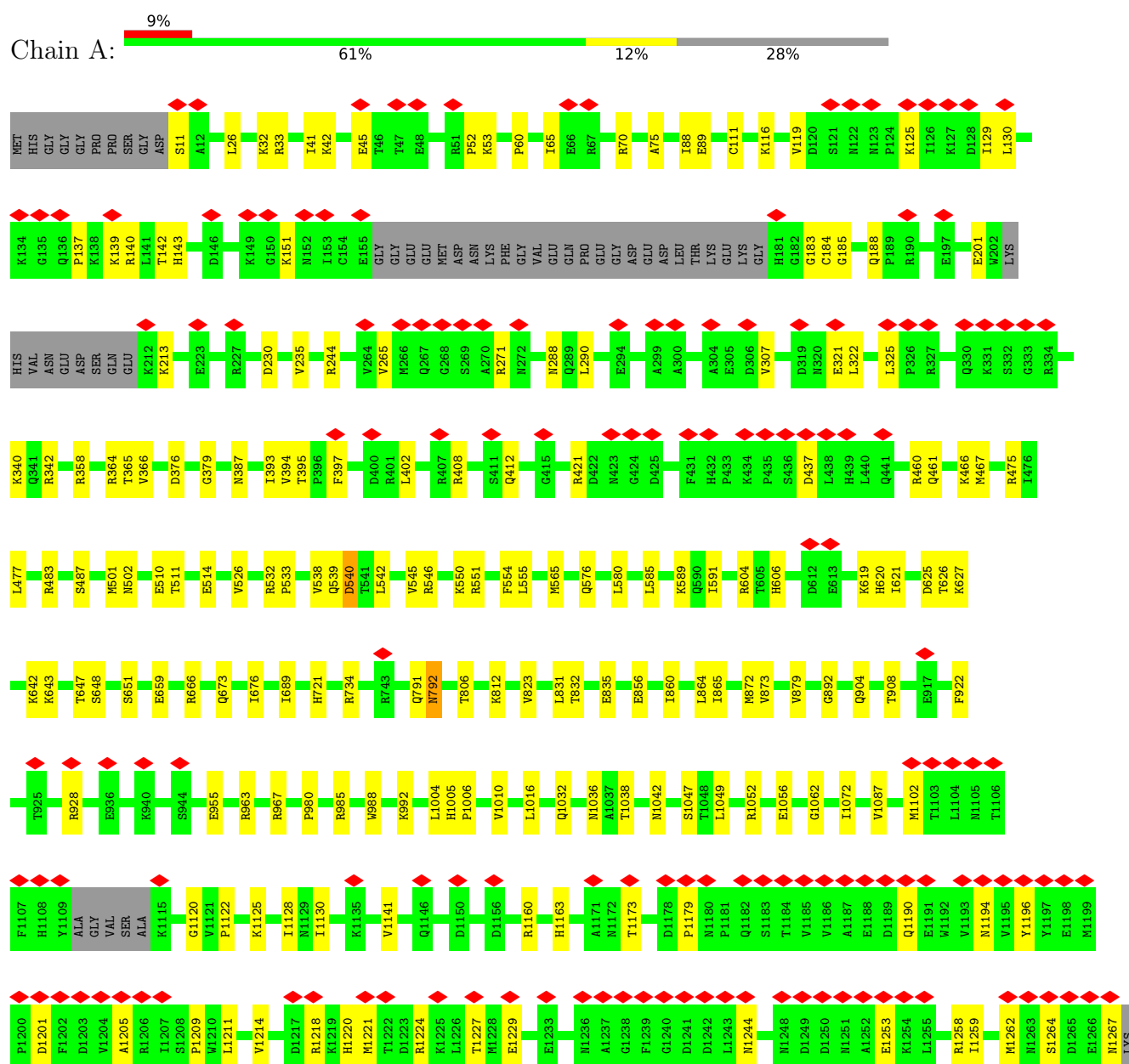
- Molecule 18 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

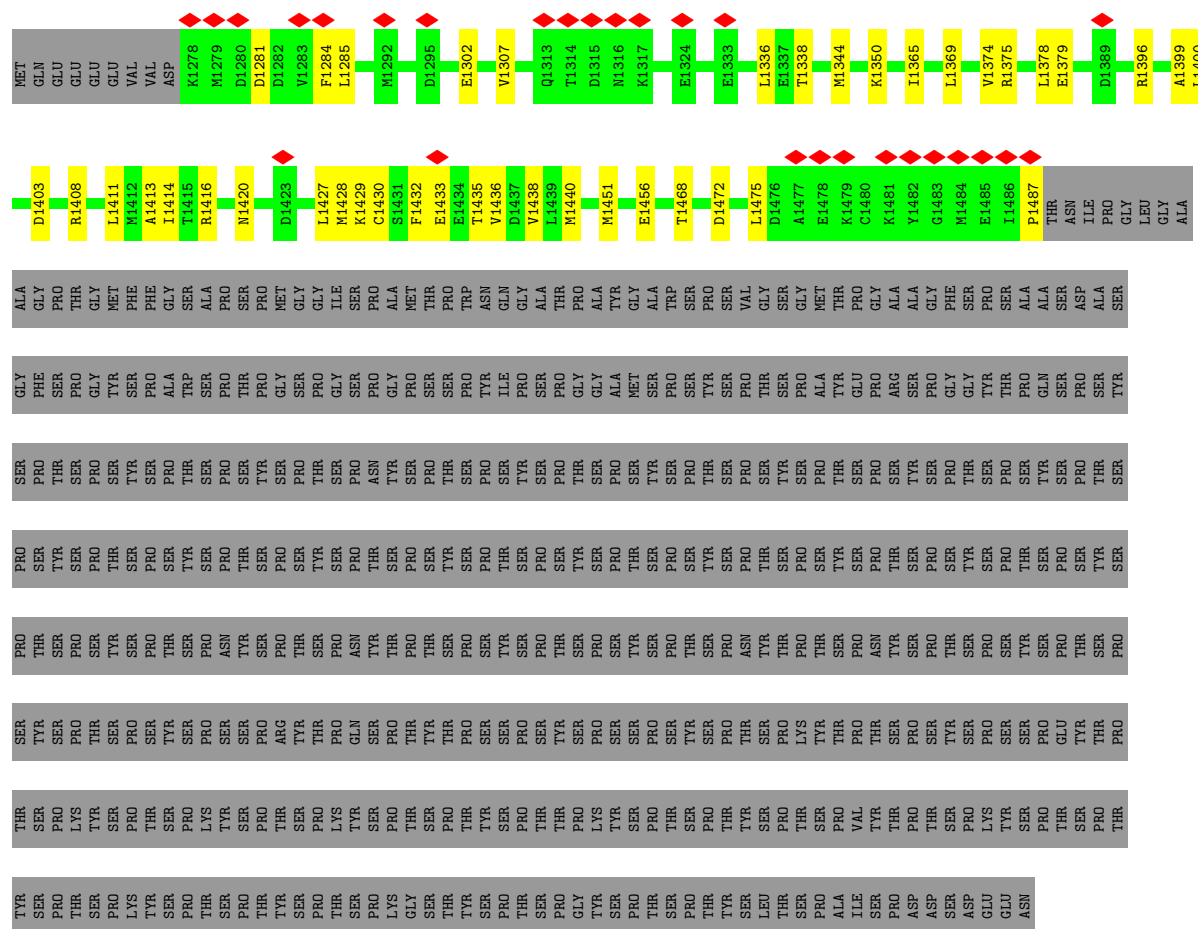
Mol	Chain	Residues	Atoms		AltConf
18	A	1	Total 1	Mg 1	0

3 Residue-property plots

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

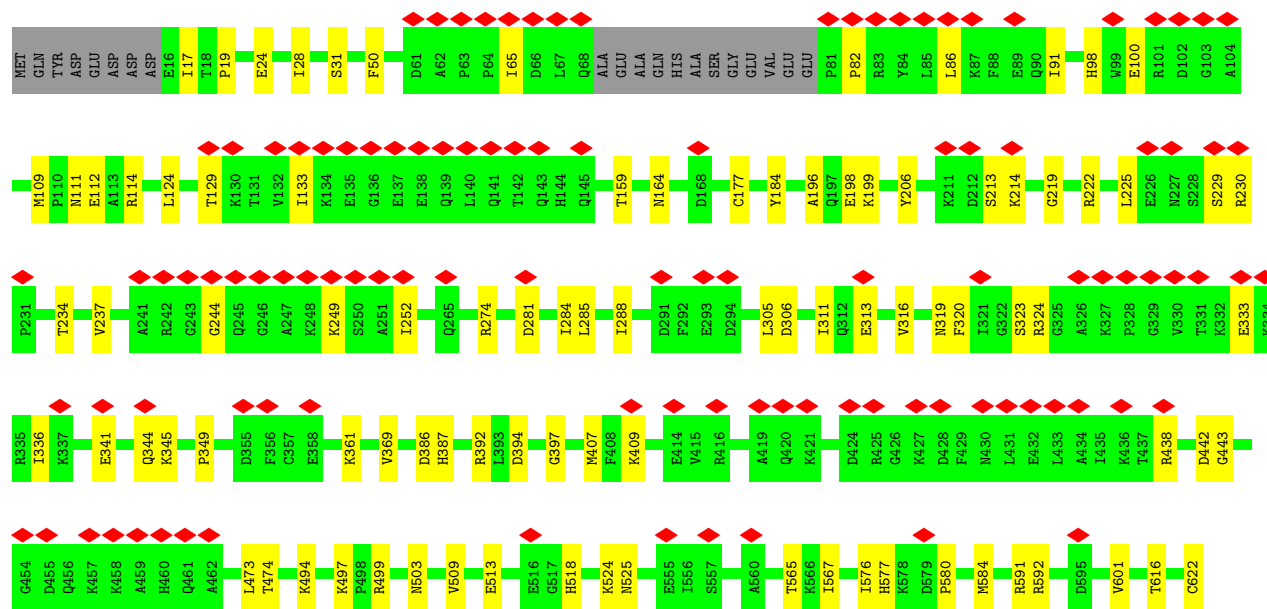
• Molecule 1: DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB1

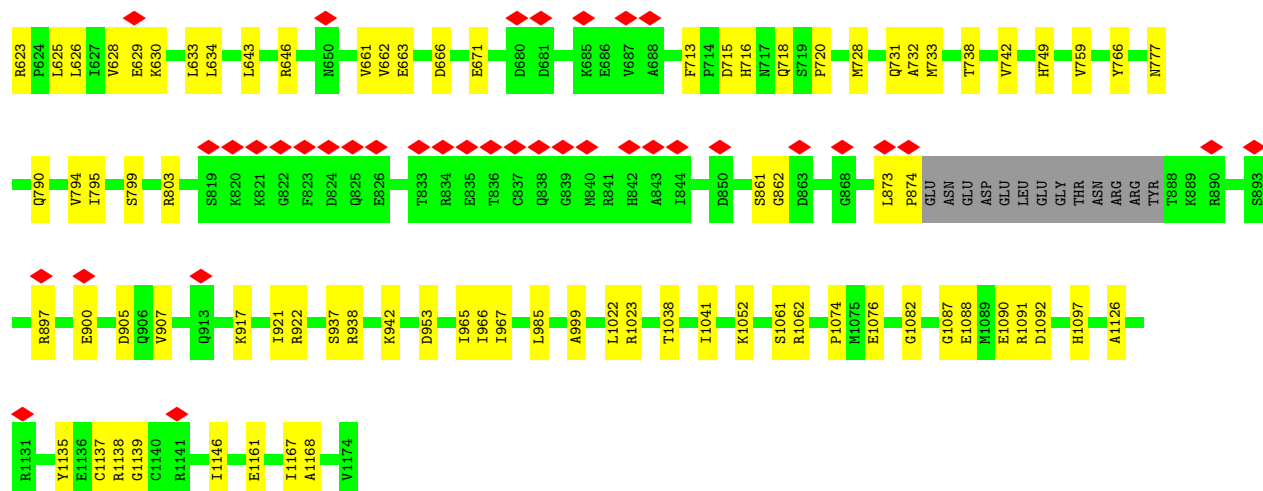




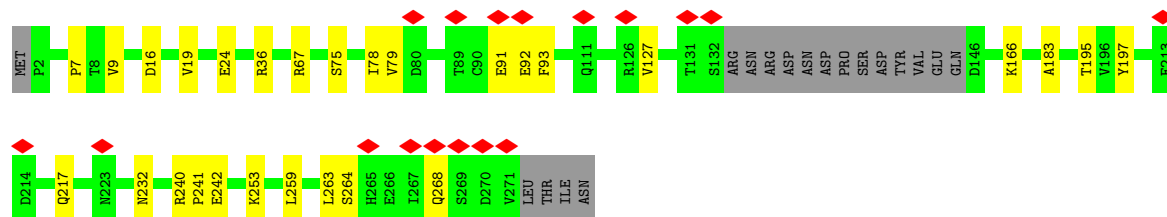
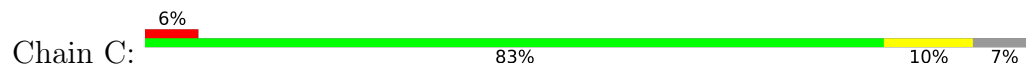
• Molecule 2: DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB2

Chain B: 13% 82% 15% .

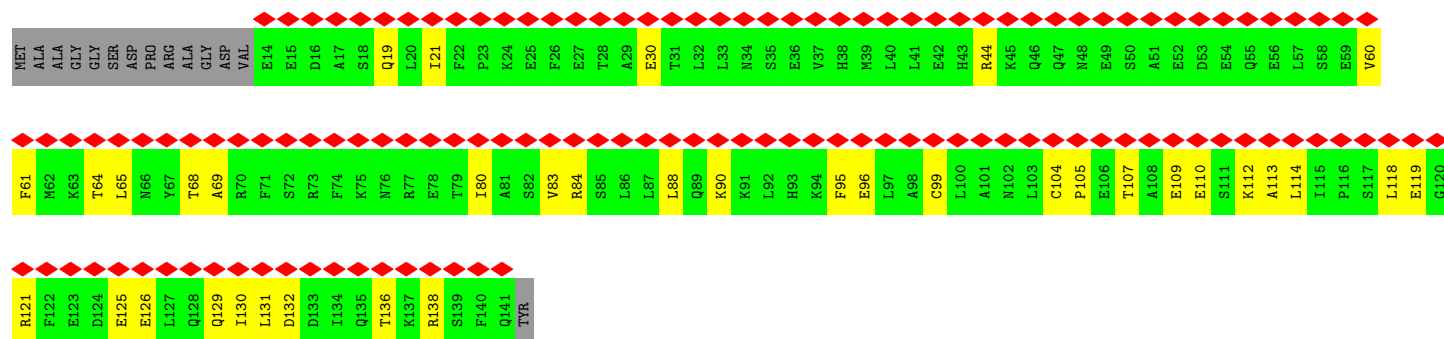




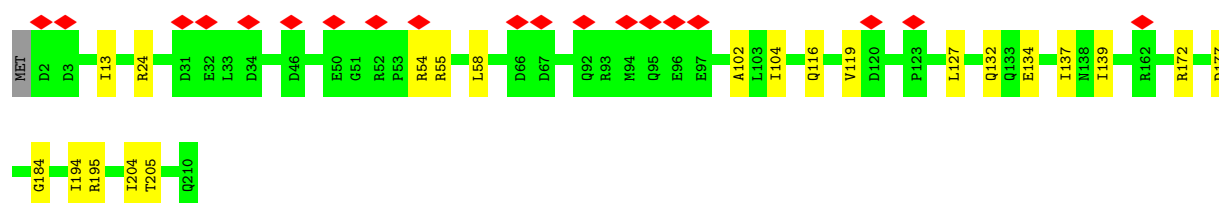
• Molecule 3: DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB3

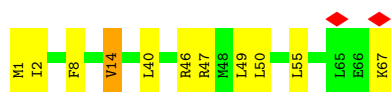
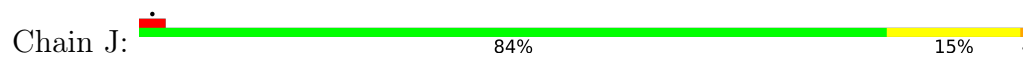


• Molecule 4: DNA-DIRECTED RNA POLYMERASE II SUBUNIT RPB3

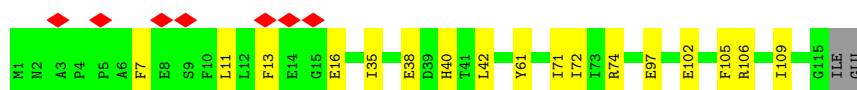
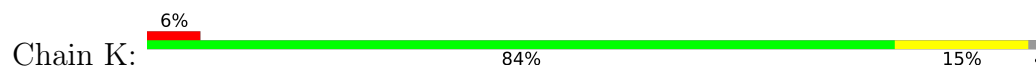


• Molecule 5: DNA-DIRECTED RNA POLYMERASES I, II, AND III SUBUNIT RPABC1





- Molecule 11: DNA-DIRECTED RNA POLYMERASES I, II, AND III SUBUNIT RPABC4



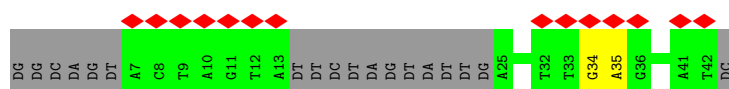
- Molecule 12: DNA-DIRECTED RNA POLYMERASES I, II, AND III SUBUNIT RPABC4



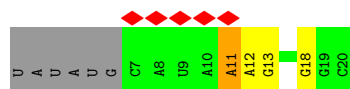
- Molecule 13: AMATOXIN



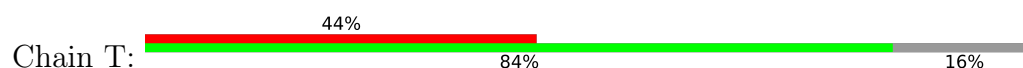
- Molecule 14: DNA (25-MER)

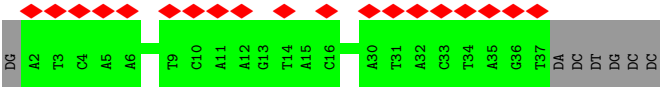


- Molecule 15: RNA (5'-R(P*CP*AP*UP*AP*AP*AP*GP*AP*CP*CP*AP*GP*GP*C)-3')



- Molecule 16: DNA (36-MER)





4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	134512	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 ($e^-/\text{\AA}^2$)	35	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	130000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.447	Depositor
Minimum map value	-0.309	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.013	Depositor
Recommended contour level	0.0577	Depositor
Map size (Å)	273.92, 273.92, 273.92	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.07, 1.07, 1.07	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.36	0/11525	0.68	2/15559 (0.0%)
2	B	0.36	0/9243	0.64	1/12475 (0.0%)
3	C	0.38	0/2102	0.61	0/2857
4	D	0.17	0/1019	0.49	0/1374
5	E	0.30	0/1751	0.61	0/2366
6	F	0.30	0/667	0.59	0/901
7	G	0.21	0/1365	0.56	0/1853
8	H	0.33	0/1207	0.62	0/1628
9	I	0.25	0/948	0.56	0/1284
10	J	0.45	0/542	0.66	0/730
11	K	0.37	0/939	0.64	0/1271
12	L	0.27	0/377	0.60	0/500
13	M	0.41	0/22	0.98	0/26
14	N	0.23	0/578	0.43	0/888
15	P	0.28	0/337	0.40	0/523
16	T	0.31	0/823	0.42	0/1267
All	All	0.34	0/33445	0.63	3/45502 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
5	E	0	1
All	All	0	2

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	812	LYS	CA-C-N	5.73	130.95	122.82
1	A	812	LYS	C-N-CA	5.73	130.95	122.82
2	B	1087	GLY	N-CA-C	5.51	126.24	113.18

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	538	VAL	Peptide
5	E	54	ARG	Peptide

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	A	11317	0	11439	156	0
2	B	9062	0	9109	114	0
3	C	2059	0	2009	23	0
4	D	1005	0	964	27	0
5	E	1720	0	1737	13	0
6	F	657	0	684	7	0
7	G	1334	0	1333	23	0
8	H	1186	0	1147	15	0
9	I	927	0	862	14	0
10	J	533	0	555	8	0
11	K	920	0	942	13	0
12	L	372	0	378	8	0
13	M	64	0	51	3	0
14	N	516	0	285	2	0
15	P	301	0	153	1	0
16	T	735	0	408	0	0
17	A	2	0	0	0	0
17	B	1	0	0	0	0
17	C	1	0	0	0	0
17	I	2	0	0	0	0
17	J	1	0	0	0	0
17	L	1	0	0	0	0
18	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	32717	0	32056	370	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (370) 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)
1:A:792:ASN:N	1:A:792:ASN:HD22	1.62	0.96
2:B:591:ARG:NH2	2:B:663:GLU:OE2	2.02	0.92
4:D:84:ARG:O	4:D:88:LEU:HB2	1.74	0.87
7:G:99:THR:O	7:G:106:CYS:HB3	1.74	0.86
4:D:104:CYS:SG	4:D:138:ARG:NH1	2.47	0.86
7:G:97:LEU:HB2	7:G:108:ILE:O	1.80	0.81
1:A:11:SER:N	2:B:1135:TYR:HH	1.79	0.81
2:B:344:GLN:OE1	2:B:345:LYS:NZ	2.14	0.80
1:A:540:ASP:HB2	2:B:790:GLN:HE21	1.52	0.75
1:A:321:GLU:OE2	1:A:340:LYS:NZ	2.20	0.75
3:C:36:ARG:HH12	11:K:40:HIS:HB2	1.50	0.75
3:C:253:LYS:NZ	11:K:102:GLU:OE1	2.20	0.74
1:A:358:ARG:HH12	2:B:1076:GLU:HG2	1.53	0.72
7:G:6:SER:HB3	7:G:71:LYS:HZ3	1.54	0.71
1:A:792:ASN:N	1:A:792:ASN:ND2	2.33	0.71
1:A:792:ASN:HD22	1:A:792:ASN:H	1.37	0.69
4:D:95:PHE:O	4:D:99:CYS:HB2	1.92	0.69
4:D:65:LEU:O	4:D:69:ALA:HB3	1.93	0.68
1:A:532:ARG:NH1	1:A:647:THR:OG1	2.27	0.68
1:A:1190:GLN:O	1:A:1194:ASN:HB2	1.93	0.68
1:A:230:ASP:OD1	1:A:244:ARG:NH1	2.27	0.68
8:H:71:ASP:N	8:H:71:ASP:OD1	2.24	0.68
1:A:546:ARG:HH12	1:A:550:LYS:NZ	1.93	0.67
2:B:1088:GLU:HB2	2:B:1091:ARG:NH1	2.10	0.67
7:G:6:SER:HB3	7:G:71:LYS:NZ	2.10	0.66
2:B:718:GLN:HG2	2:B:720:PRO:HD2	1.78	0.66
1:A:1416:ARG:NH1	1:A:1433:GLU:OE2	2.29	0.65
2:B:592:ARG:NE	2:B:663:GLU:OE1	2.30	0.65
8:H:71:ASP:OD2	8:H:142:TYR:OH	2.07	0.65
1:A:659:GLU:OE2	1:A:985:ARG:NH1	2.29	0.65
1:A:546:ARG:HH12	1:A:550:LYS:HZ1	1.45	0.64
1:A:1211:LEU:HD11	1:A:1258:ARG:HE	1.63	0.64
4:D:105:PRO:HG2	4:D:131:LEU:HD21	1.80	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:H:30:CYS:HB2	8:H:39:LEU:HB3	1.78	0.64
1:A:125:LYS:O	1:A:129:ILE:HB	1.98	0.64
7:G:44:PHE:HB2	7:G:77:PHE:HB3	1.78	0.63
1:A:395:THR:HG23	1:A:397:PHE:H	1.62	0.62
2:B:803:ARG:NH1	10:J:8:PHE:O	2.31	0.62
1:A:358:ARG:NH1	2:B:1076:GLU:HG2	2.15	0.61
1:A:1399:ALA:O	1:A:1403:ASP:HB2	2.00	0.61
1:A:1487:PRO:HG2	6:F:78:PRO:HA	1.82	0.61
1:A:1375:ARG:NH1	1:A:1379:GLU:OE1	2.33	0.60
1:A:379:GLY:HA2	1:A:475:ARG:O	2.00	0.60
1:A:864:LEU:HD23	1:A:1414:ILE:HG21	1.84	0.60
1:A:487:SER:OG	1:A:673:GLN:NE2	2.35	0.60
11:K:7:PHE:HB2	11:K:11:LEU:HD13	1.83	0.60
1:A:111:CYS:SG	1:A:188:GLN:NE2	2.74	0.60
1:A:620:HIS:CE1	8:H:98:ARG:HH12	2.20	0.60
2:B:387:HIS:NE2	2:B:671:GLU:OE2	2.33	0.60
1:A:460:ARG:HB2	1:A:501:MET:HE3	1.85	0.59
7:G:106:CYS:SG	7:G:107:PHE:N	2.76	0.59
2:B:237:VAL:HG11	2:B:369:VAL:HG22	1.84	0.58
7:G:11:ILE:HD11	7:G:30:LEU:HD23	1.84	0.58
5:E:13:ILE:HD11	5:E:132:GLN:HG3	1.85	0.58
1:A:904:GLN:NE2	1:A:980:PRO:O	2.37	0.58
12:L:16:ILE:HD11	12:L:25:GLU:HB3	1.83	0.58
2:B:17:ILE:HG23	2:B:19:PRO:HD3	1.86	0.58
2:B:1038:THR:HA	3:C:195:THR:HA	1.84	0.58
1:A:1430:CYS:HB2	1:A:1435:THR:HG23	1.85	0.58
1:A:1244:ASN:O	1:A:1259:ILE:HA	2.03	0.57
2:B:313:GLU:HB3	2:B:316:VAL:HG12	1.87	0.57
1:A:526:VAL:HA	1:A:533:PRO:HA	1.87	0.57
1:A:1038:THR:O	1:A:1042:ASN:ND2	2.38	0.57
1:A:421:ARG:NH2	1:A:437:ASP:OD2	2.38	0.56
1:A:791:GLN:HG3	13:M:1:ILX:HA	1.86	0.56
1:A:1130:ILE:HG12	1:A:1413:ALA:HB2	1.87	0.56
2:B:907:VAL:HG22	2:B:921:ILE:HG12	1.87	0.56
7:G:101:ILE:HG23	7:G:104:MET:HB3	1.87	0.56
2:B:65:ILE:HD11	2:B:86:LEU:HG	1.87	0.56
2:B:320:PHE:O	2:B:324:ARG:NH1	2.38	0.56
1:A:265:VAL:HG22	1:A:271:ARG:HG2	1.88	0.56
1:A:1130:ILE:HG21	1:A:1411:LEU:HB3	1.87	0.56
7:G:127:CYS:SG	7:G:128:TYR:N	2.77	0.56
2:B:713:PHE:HB3	2:B:716:HIS:HD2	1.71	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:L:36:CYS:SG	12:L:37:ARG:N	2.78	0.56
1:A:376:ASP:HB2	1:A:666:ARG:HD2	1.87	0.56
4:D:96:GLU:OE2	4:D:121:ARG:NH1	2.39	0.56
11:K:35:ILE:HB	11:K:71:ILE:HG22	1.89	0.55
1:A:1428:MET:HB2	1:A:1456:GLU:OE2	2.05	0.55
3:C:36:ARG:NH1	11:K:40:HIS:HB2	2.20	0.55
9:I:68:ILE:HG13	9:I:122:ARG:HD2	1.87	0.55
7:G:89:VAL:HA	7:G:99:THR:HA	1.87	0.55
2:B:274:ARG:NH2	2:B:281:ASP:OD1	2.40	0.55
4:D:95:PHE:O	4:D:99:CYS:CB	2.55	0.54
2:B:953:ASP:OD1	3:C:36:ARG:NH2	2.41	0.54
1:A:1475:LEU:HB2	7:G:59:ILE:HD11	1.89	0.54
2:B:623:ARG:NH1	2:B:625:LEU:HD21	2.22	0.54
4:D:125:GLU:O	4:D:129:GLN:HB2	2.08	0.54
1:A:1173:THR:HG22	1:A:1214:VAL:HG22	1.90	0.54
2:B:50:PHE:HB2	2:B:397:GLY:HA2	1.90	0.53
1:A:358:ARG:NH1	2:B:1076:GLU:HA	2.22	0.53
8:H:32:SER:HB3	8:H:37:MET:H	1.73	0.53
1:A:689:ILE:HD11	2:B:985:LEU:HD22	1.91	0.53
5:E:195:ARG:HH12	5:E:205:THR:HG21	1.72	0.53
2:B:285:LEU:HA	2:B:288:ILE:HG22	1.90	0.53
2:B:1022:LEU:HD12	2:B:1023:ARG:HG2	1.91	0.53
1:A:1408:ARG:O	5:E:172:ARG:NH1	2.41	0.53
2:B:795:ILE:HB	2:B:966:ILE:HB	1.90	0.53
2:B:1062:ARG:HH12	2:B:1074:PRO:HB3	1.73	0.53
4:D:65:LEU:O	4:D:69:ALA:CB	2.57	0.53
5:E:24:ARG:HH12	5:E:184:GLY:HA3	1.74	0.53
9:I:15:ARG:HB3	9:I:24:LEU:HD12	1.91	0.53
8:H:32:SER:OG	8:H:33:GLU:N	2.41	0.53
8:H:128:ASP:OD1	8:H:131:ASN:ND2	2.42	0.53
7:G:12:LEU:HD23	7:G:67:LEU:HB3	1.90	0.52
12:L:19:CYS:SG	12:L:20:GLY:N	2.81	0.52
2:B:111:ASN:HD21	2:B:742:VAL:HG11	1.74	0.52
1:A:342:ARG:NE	2:B:1161:GLU:OE2	2.42	0.52
1:A:340:LYS:HG3	1:A:1436:VAL:HG11	1.90	0.52
1:A:873:VAL:HG22	1:A:879:VAL:HG22	1.92	0.52
1:A:1436:VAL:HG22	1:A:1440:MET:HE2	1.92	0.52
2:B:230:ARG:HH11	2:B:409:LYS:HD2	1.75	0.52
4:D:90:LYS:HE2	4:D:130:ILE:HD11	1.90	0.52
1:A:32:LYS:HE3	1:A:89:GLU:OE2	2.10	0.52
1:A:955:GLU:OE2	1:A:1010:VAL:HG22	2.09	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:319:ASN:O	2:B:323:SER:HB2	2.10	0.52
2:B:733:MET:HE3	2:B:749:HIS:HB3	1.91	0.52
4:D:61:PHE:O	4:D:65:LEU:HB2	2.10	0.52
2:B:728:MET:HE1	2:B:942:LYS:HE2	1.92	0.51
4:D:107:THR:HG23	4:D:110:GLU:H	1.75	0.51
6:F:61:GLU:OE2	6:F:108:ARG:NH1	2.44	0.51
1:A:576:GLN:HE21	1:A:580:LEU:HD21	1.76	0.51
1:A:721:HIS:HD2	9:I:110:LEU:HD13	1.74	0.51
1:A:1016:LEU:HD11	1:A:1072:ILE:HB	1.92	0.51
1:A:1281:ASP:HA	1:A:1284:PHE:HB3	1.93	0.51
3:C:78:ILE:HD11	3:C:127:VAL:HG23	1.91	0.51
10:J:14:VAL:HG13	10:J:49:LEU:HD12	1.92	0.51
1:A:606:HIS:HB3	1:A:626:THR:HG23	1.92	0.51
2:B:114:ARG:NH2	2:B:184:TYR:OH	2.43	0.51
1:A:137:PRO:HA	1:A:140:ARG:HE	1.75	0.51
1:A:1472:ASP:N	1:A:1472:ASP:OD1	2.43	0.51
1:A:1374:VAL:O	1:A:1378:LEU:HB2	2.10	0.51
1:A:619:LYS:NZ	1:A:627:LYS:HE3	2.26	0.50
1:A:129:ILE:HD11	1:A:143:HIS:HB3	1.93	0.50
1:A:511:THR:HA	1:A:514:GLU:HG2	1.94	0.50
1:A:546:ARG:NH1	1:A:550:LYS:NZ	2.59	0.50
1:A:864:LEU:HD21	1:A:1128:ILE:HD12	1.94	0.50
9:I:81:THR:HG22	9:I:83:ASP:H	1.76	0.50
1:A:322:LEU:HD22	1:A:325:LEU:HD12	1.93	0.50
2:B:1062:ARG:NH1	2:B:1074:PRO:HB3	2.27	0.50
7:G:90:THR:HA	7:G:139:GLN:HE22	1.77	0.50
2:B:438:ARG:O	2:B:442:ASP:HB2	2.11	0.50
1:A:116:LYS:HZ1	1:A:183:GLY:H	1.59	0.49
3:C:264:SER:O	3:C:268:GLN:HB2	2.11	0.49
4:D:132:ASP:O	4:D:136:THR:CB	2.60	0.49
2:B:196:ALA:HA	2:B:394:ASP:O	2.12	0.49
4:D:84:ARG:O	4:D:88:LEU:CB	2.54	0.49
4:D:114:LEU:HD22	7:G:84:VAL:HG21	1.94	0.49
1:A:1102:MET:HE2	1:A:1120:GLY:HA2	1.94	0.49
1:A:394:VAL:HG22	1:A:402:LEU:HD13	1.94	0.49
9:I:14:ILE:HD11	9:I:23:MET:HE1	1.93	0.49
1:A:65:ILE:CG2	1:A:271:ARG:HH12	2.26	0.49
1:A:832:THR:OG1	1:A:835:GLU:OE1	2.30	0.49
2:B:198:GLU:OE2	2:B:524:LYS:NZ	2.41	0.49
2:B:580:PRO:O	2:B:584:MET:HB2	2.12	0.49
1:A:1344:MET:HE2	5:E:134:GLU:HA	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:341:GLU:O	2:B:345:LYS:HB2	2.12	0.49
9:I:80:ARG:HB3	9:I:93:GLU:OE2	2.13	0.49
1:A:922:PHE:HB2	1:A:1052:ARG:HB2	1.94	0.49
3:C:259:LEU:HD11	11:K:42:LEU:HD21	1.95	0.49
1:A:554:PHE:HB3	1:A:585:LEU:HD23	1.95	0.48
1:A:1122:PRO:HA	1:A:1125:LYS:HG2	1.95	0.48
2:B:917:LYS:NZ	12:L:34:ILE:HD11	2.28	0.48
3:C:259:LEU:O	3:C:263:LEU:HB3	2.13	0.48
2:B:628:VAL:HG22	2:B:633:LEU:HD23	1.95	0.48
1:A:604:ARG:HH21	1:A:643:LYS:HE2	1.77	0.48
3:C:197:TYR:HD2	3:C:217:GLN:HE21	1.60	0.48
1:A:860:ILE:HD11	1:A:1125:LYS:HB3	1.96	0.48
1:A:1365:ILE:HG23	1:A:1369:LEU:HD12	1.95	0.48
1:A:1416:ARG:O	1:A:1420:ASN:HB2	2.12	0.48
4:D:60:VAL:O	4:D:64:THR:OG1	2.31	0.48
1:A:137:PRO:HB3	1:A:140:ARG:HH21	1.79	0.48
1:A:555:LEU:HD12	1:A:591:ILE:HG13	1.95	0.48
1:A:856:GLU:HG3	2:B:494:LYS:HZ3	1.78	0.48
3:C:7:PRO:HA	3:C:24:GLU:O	2.13	0.48
2:B:306:ASP:OD1	9:I:25:TYR:OH	2.29	0.48
4:D:64:THR:O	4:D:68:THR:OG1	2.29	0.48
1:A:466:LYS:HG3	1:A:467:MET:HE2	1.95	0.48
1:A:1468:THR:HG23	6:F:64:ARG:HB2	1.96	0.48
2:B:623:ARG:HH12	2:B:625:LEU:HD21	1.79	0.48
2:B:794:VAL:HG22	2:B:967:ILE:HG22	1.96	0.48
4:D:132:ASP:O	4:D:136:THR:HB	2.14	0.48
2:B:159:THR:HA	2:B:164:ASN:HD22	1.78	0.47
12:L:18:ILE:HD11	12:L:47:LYS:NZ	2.30	0.47
2:B:225:LEU:HB3	2:B:349:PRO:HB2	1.96	0.47
3:C:9:VAL:HG11	11:K:105:PHE:HD1	1.78	0.47
1:A:823:VAL:HG22	1:A:835:GLU:HG3	1.96	0.47
4:D:19:GLN:HG3	4:D:21:ILE:HG12	1.96	0.47
1:A:648:SER:OG	1:A:651:SER:OG	2.32	0.47
2:B:344:GLN:O	2:B:361:LYS:NZ	2.47	0.47
1:A:1220:HIS:HB3	1:A:1224:ARG:HH12	1.79	0.47
7:G:59:ILE:HG12	7:G:66:VAL:HG22	1.96	0.47
1:A:11:SER:N	2:B:1135:TYR:OH	2.43	0.47
1:A:466:LYS:HE3	2:B:1097:HIS:CD2	2.49	0.47
2:B:311:ILE:HG23	2:B:316:VAL:HG13	1.95	0.47
4:D:60:VAL:O	4:D:64:THR:CB	2.63	0.47
4:D:109:GLU:O	4:D:113:ALA:HB2	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:E:55:ARG:HA	5:E:58:LEU:HD12	1.97	0.47
1:A:865:ILE:HG12	2:B:1092:ASP:OD2	2.14	0.47
4:D:44:ARG:NH2	7:G:35:GLU:OE2	2.48	0.47
1:A:1032:GLN:OE1	1:A:1036:ASN:ND2	2.48	0.47
5:E:24:ARG:NH1	5:E:184:GLY:HA3	2.30	0.47
14:N:35:DA:OP2	14:N:35:DA:H8	1.98	0.47
1:A:1205:ALA:HB1	1:A:1267:ASN:HB2	1.97	0.47
7:G:1:MET:N	7:G:78:ARG:O	2.44	0.47
1:A:201:GLU:HG3	1:A:213:LYS:HG2	1.97	0.46
1:A:1440:MET:HG2	2:B:1167:ILE:HD11	1.98	0.46
1:A:130:LEU:HD21	1:A:235:VAL:HG12	1.96	0.46
1:A:364:ARG:NH1	1:A:502:ASN:OD1	2.45	0.46
7:G:151:ARG:HH11	7:G:158:PHE:HE1	1.63	0.46
1:A:1307:VAL:HG22	1:A:1338:THR:HG22	1.98	0.46
2:B:759:VAL:HG12	2:B:999:ALA:HB2	1.97	0.46
7:G:11:ILE:O	7:G:67:LEU:HA	2.14	0.46
3:C:93:PHE:HE1	3:C:166:LYS:HZ1	1.62	0.46
7:G:112:SER:HB3	7:G:163:LEU:H	1.81	0.46
1:A:477:LEU:HB2	1:A:483:ARG:HH21	1.81	0.46
1:A:387:ASN:ND2	2:B:1061:SER:OG	2.47	0.46
1:A:922:PHE:HA	1:A:1052:ARG:HD3	1.98	0.46
2:B:474:THR:OG1	2:B:732:ALA:O	2.33	0.46
10:J:1:MET:HA	10:J:55:LEU:HB2	1.97	0.46
11:K:38:GLU:OE2	11:K:42:LEU:HD13	2.16	0.46
1:A:545:VAL:HG23	1:A:676:ILE:HG21	1.98	0.46
1:A:1004:LEU:HD13	1:A:1062:GLY:HA2	1.98	0.46
1:A:1281:ASP:O	1:A:1285:LEU:HB2	2.15	0.45
1:A:1218:ARG:HA	1:A:1221:MET:HB2	1.98	0.45
1:A:1218:ARG:NH2	1:A:1253:GLU:OE1	2.41	0.45
9:I:25:TYR:O	9:I:37:TYR:HA	2.16	0.45
1:A:621:ILE:HD11	8:H:124:ARG:HB2	1.97	0.45
2:B:473:LEU:HD13	2:B:731:GLN:HA	1.98	0.45
1:A:393:ILE:HD11	6:F:74:ALA:HB1	1.98	0.45
2:B:206:TYR:O	2:B:219:GLY:HA2	2.16	0.45
1:A:510:GLU:OE2	6:F:71:LEU:HD13	2.17	0.45
1:A:620:HIS:HB2	8:H:115:TYR:HE2	1.82	0.45
2:B:509:VAL:HG11	2:B:524:LYS:HD2	1.96	0.45
2:B:567:ILE:HD11	2:B:577:HIS:HB2	1.98	0.45
1:A:33:ARG:HE	2:B:1139:GLY:HA2	1.82	0.45
4:D:118:LEU:HD23	4:D:121:ARG:HG3	1.99	0.45
15:P:11:A:H8	15:P:11:A:OP2	2.00	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:183:ALA:HB3	3:C:232:ASN:HB3	1.99	0.45
1:A:542:LEU:HD21	1:A:642:LYS:HB3	1.98	0.45
2:B:643:LEU:O	2:B:646:ARG:NH1	2.50	0.45
9:I:69:ILE:HG22	9:I:71:ASP:H	1.81	0.45
2:B:499:ARG:NH2	2:B:518:HIS:O	2.50	0.44
2:B:794:VAL:HG13	2:B:965:ILE:HG23	1.98	0.44
6:F:114:SER:OG	6:F:115:TYR:N	2.50	0.44
11:K:106:ARG:HA	11:K:109:ILE:HG22	1.99	0.44
12:L:36:CYS:HB2	12:L:44:MET:HE1	1.99	0.44
1:A:585:LEU:HD22	8:H:47:ILE:HD11	1.98	0.44
2:B:473:LEU:HD11	2:B:1052:LYS:HD3	1.98	0.44
11:K:13:PHE:N	11:K:16:GLU:OE2	2.49	0.44
1:A:908:THR:OG1	1:A:1047:SER:OG	2.31	0.44
2:B:31:SER:OG	2:B:766:TYR:OH	2.26	0.44
2:B:109:MET:HB2	2:B:112:GLU:HG2	1.99	0.44
9:I:96:PHE:HD2	9:I:110:LEU:HD11	1.83	0.44
1:A:1160:ARG:NH2	1:A:1350:LYS:O	2.50	0.44
1:A:1196:TYR:OH	1:A:1201:ASP:O	2.35	0.44
2:B:91:ILE:HD11	2:B:124:LEU:HD21	1.99	0.44
5:E:104:ILE:HD11	5:E:127:LEU:HD23	1.99	0.44
1:A:1087:VAL:HG12	1:A:1400:LEU:HD22	2.00	0.44
1:A:1141:VAL:HB	1:A:1336:LEU:HB2	1.98	0.44
10:J:46:ARG:O	10:J:50:LEU:CB	2.66	0.44
11:K:61:TYR:HA	11:K:72:ILE:O	2.17	0.44
1:A:70:ARG:HD2	1:A:75:ALA:HB1	2.00	0.44
3:C:264:SER:O	3:C:268:GLN:CB	2.66	0.44
1:A:45:GLU:HB3	1:A:53:LYS:HE2	1.99	0.44
2:B:897:ARG:HB2	2:B:900:GLU:OE2	2.17	0.44
3:C:91:GLU:CD	3:C:92:GLU:H	2.26	0.44
1:A:119:VAL:HG22	1:A:151:LYS:NZ	2.33	0.43
1:A:1179:PRO:HA	1:A:1209:PRO:HB3	2.00	0.43
2:B:861:SER:OG	2:B:862:GLY:N	2.51	0.43
3:C:16:ASP:OD1	3:C:240:ARG:NE	2.51	0.43
3:C:240:ARG:NH2	3:C:242:GLU:OE2	2.51	0.43
3:C:7:PRO:HG3	11:K:97:GLU:OE2	2.17	0.43
14:N:34:DG:OP2	14:N:34:DG:H2'	2.18	0.43
2:B:438:ARG:HD3	2:B:442:ASP:OD2	2.18	0.43
2:B:565:THR:O	2:B:576:ILE:HA	2.18	0.43
2:B:1092:ASP:N	2:B:1092:ASP:OD1	2.43	0.43
1:A:1374:VAL:O	1:A:1378:LEU:CB	2.65	0.43
2:B:222:ARG:HG2	2:B:234:THR:HG22	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:333:GLU:HA	2:B:336:ILE:HG22	1.99	0.43
2:B:98:HIS:NE2	2:B:100:GLU:OE1	2.41	0.43
10:J:40:LEU:O	10:J:46:ARG:NH1	2.51	0.43
1:A:42:LYS:O	1:A:288:ASN:ND2	2.46	0.43
1:A:620:HIS:CE1	8:H:98:ARG:NH1	2.86	0.43
1:A:1416:ARG:HA	1:A:1432:PHE:HE2	1.83	0.43
2:B:777:ASN:O	10:J:47:ARG:NH1	2.52	0.43
1:A:589:LYS:NZ	1:A:625:ASP:OD2	2.40	0.43
2:B:284:ILE:HD13	2:B:284:ILE:HG21	1.84	0.43
2:B:873:LEU:HD12	2:B:874:PRO:HD2	2.00	0.43
1:A:26:LEU:HG	2:B:1168:ALA:HB2	2.01	0.43
1:A:1262:MET:HE3	1:A:1264:SER:HB2	2.00	0.43
3:C:19:VAL:HG23	3:C:241:PRO:HB2	2.00	0.43
3:C:75:SER:HB3	3:C:79:VAL:HG11	2.01	0.43
10:J:67:LYS:NZ	12:L:23:HIS:CE1	2.87	0.43
2:B:715:ASP:OD1	2:B:715:ASP:N	2.48	0.42
4:D:112:LYS:HD2	4:D:119:GLU:HG2	2.00	0.42
9:I:110:LEU:HD12	9:I:110:LEU:HA	1.88	0.42
1:A:1163:HIS:CE1	1:A:1302:GLU:HG3	2.54	0.42
2:B:513:GLU:HG2	2:B:525:ASN:HD22	1.85	0.42
1:A:831:LEU:H	2:B:715:ASP:HB2	1.85	0.42
2:B:1062:ARG:HH11	2:B:1082:GLY:C	2.27	0.42
12:L:17:TYR:HB3	12:L:44:MET:HB3	2.00	0.42
13:M:6:CSX:HB2	13:M:7:ASN:H	1.43	0.42
2:B:601:VAL:HG12	2:B:616:THR:HG23	2.01	0.42
2:B:626:LEU:HD23	2:B:662:VAL:HG12	2.01	0.42
1:A:466:LYS:HE3	2:B:1097:HIS:HD2	1.83	0.42
1:A:963:ARG:NH2	1:A:967:ARG:HH21	2.18	0.42
1:A:988:TRP:HE1	1:A:992:LYS:HZ1	1.67	0.42
1:A:1227:THR:HG23	1:A:1229:GLU:H	1.84	0.42
2:B:24:GLU:O	2:B:28:ILE:HB	2.19	0.42
2:B:249:LYS:HA	2:B:252:ILE:HB	2.00	0.42
5:E:116:GLN:HA	5:E:119:VAL:HG22	2.02	0.42
5:E:139:ILE:H	5:E:139:ILE:HG13	1.67	0.42
8:H:37:MET:HE3	8:H:127:GLY:HA3	2.00	0.42
1:A:358:ARG:HH12	2:B:1076:GLU:HA	1.83	0.42
2:B:629:GLU:HB3	2:B:630:LYS:H	1.64	0.42
1:A:1429:LYS:HB2	1:A:1438:VAL:HG11	2.00	0.42
2:B:285:LEU:HD11	2:B:305:LEU:HD11	2.00	0.42
4:D:30:GLU:O	7:G:4:HIS:N	2.47	0.42
1:A:721:HIS:CD2	9:I:110:LEU:HD13	2.55	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:734:ARG:NH1	9:I:108:MET:HG3	2.35	0.42
1:A:823:VAL:HG13	1:A:835:GLU:OE2	2.20	0.42
2:B:199:LYS:HZ3	2:B:392:ARG:HB2	1.84	0.42
1:A:551:ARG:HH12	8:H:27:ARG:HH21	1.67	0.42
2:B:622:CYS:HB3	2:B:666:ASP:HB3	2.02	0.42
1:A:565:MET:HE1	11:K:74:ARG:HB2	2.02	0.41
1:A:1005:HIS:HA	1:A:1006:PRO:HD3	1.90	0.41
1:A:872:MET:HE3	1:A:872:MET:HB2	1.92	0.41
6:F:125:ILE:HG22	6:F:127:ASP:H	1.85	0.41
7:G:137:ILE:HG23	7:G:141:ASP:OD2	2.20	0.41
1:A:184:CYS:SG	1:A:185:GLY:N	2.93	0.41
2:B:86:LEU:HA	2:B:129:THR:O	2.20	0.41
9:I:86:CYS:SG	9:I:87:GLN:N	2.93	0.41
1:A:461:GLN:NE2	2:B:1090:GLU:OE2	2.54	0.41
1:A:928:ARG:HE	8:H:106:THR:HB	1.86	0.41
2:B:177:CYS:SG	2:B:738:THR:OG1	2.64	0.41
2:B:937:SER:OG	2:B:938:ARG:N	2.53	0.41
3:C:259:LEU:O	3:C:263:LEU:CB	2.69	0.41
1:A:365:THR:OG1	1:A:366:VAL:N	2.53	0.41
2:B:82:PRO:HA	2:B:133:ILE:O	2.21	0.41
2:B:213:SER:OG	2:B:214:LYS:N	2.53	0.41
2:B:1088:GLU:HB2	2:B:1091:ARG:HH12	1.84	0.41
1:A:792:ASN:HD21	13:M:8:HYP:HA	1.85	0.41
1:A:892:GLY:HA3	1:A:1396:ARG:HH11	1.85	0.41
2:B:905:ASP:OD2	2:B:922:ARG:NH2	2.25	0.41
2:B:1126:ALA:HB3	2:B:1146:ILE:HD11	2.03	0.41
1:A:139:LYS:HA	1:A:142:THR:HG22	2.03	0.41
4:D:132:ASP:O	4:D:136:THR:OG1	2.34	0.41
5:E:177:ASP:OD1	5:E:177:ASP:N	2.54	0.41
5:E:194:ILE:HG12	5:E:204:ILE:HG12	2.02	0.41
8:H:20:LYS:NZ	8:H:45:ILE:HD12	2.35	0.41
1:A:408:ARG:HH21	1:A:412:GLN:HB3	1.86	0.41
1:A:1052:ARG:NE	1:A:1056:GLU:OE1	2.49	0.41
1:A:1427:LEU:HD12	1:A:1451:MET:HE1	2.03	0.41
5:E:102:ALA:HB3	5:E:127:LEU:HG	2.03	0.41
7:G:60:GLN:HE22	7:G:65:PHE:HB2	1.86	0.41
1:A:41:ILE:HB	1:A:88:ILE:HG12	2.03	0.41
1:A:546:ARG:NH1	1:A:550:LYS:HZ3	2.18	0.41
2:B:244:GLY:H	2:B:249:LYS:NZ	2.19	0.41
3:C:67:ARG:NH1	10:J:2:ILE:HG23	2.35	0.41
2:B:799:SER:O	2:B:803:ARG:NH1	2.54	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:52:PRO:HB2	1:A:60:PRO:HD3	2.04	0.40
2:B:225:LEU:HD23	2:B:229:SER:HB3	2.03	0.40
1:A:290:LEU:HD11	1:A:307:VAL:HG22	2.04	0.40
4:D:80:ILE:HA	4:D:83:VAL:HG12	2.04	0.40
1:A:806:THR:O	2:B:503:ASN:ND2	2.54	0.40
2:B:386:ASP:OD2	2:B:497:LYS:HG3	2.21	0.40
2:B:634:LEU:HB3	2:B:661:VAL:HG12	2.03	0.40
2:B:1137:CYS:SG	2:B:1138:ARG:N	2.94	0.40
2:B:407:MET:SD	2:B:443:GLY:HA3	2.61	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	1418/1970 (72%)	1287 (91%)	129 (9%)	2 (0%)	48	79
2	B	1128/1167 (97%)	1027 (91%)	101 (9%)	0	100	100
3	C	253/275 (92%)	227 (90%)	26 (10%)	0	100	100
4	D	126/142 (89%)	114 (90%)	12 (10%)	0	100	100
5	E	207/210 (99%)	194 (94%)	13 (6%)	0	100	100
6	F	80/127 (63%)	77 (96%)	3 (4%)	0	100	100
7	G	169/172 (98%)	154 (91%)	15 (9%)	0	100	100
8	H	146/150 (97%)	136 (93%)	10 (7%)	0	100	100
9	I	112/125 (90%)	93 (83%)	19 (17%)	0	100	100
10	J	65/67 (97%)	58 (89%)	7 (11%)	0	100	100
11	K	113/117 (97%)	108 (96%)	5 (4%)	0	100	100
12	L	42/58 (72%)	40 (95%)	2 (5%)	0	100	100
13	M	4/8 (50%)	3 (75%)	1 (25%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	3863/4588 (84%)	3518 (91%)	343 (9%)	2 (0%)	49 79

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	539	GLN
1	A	540	ASP

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	1258/1749 (72%)	1256 (100%)	2 (0%)	87 85
2	B	993/1021 (97%)	992 (100%)	1 (0%)	88 87
3	C	234/252 (93%)	234 (100%)	0	100 100
4	D	106/126 (84%)	105 (99%)	1 (1%)	70 76
5	E	191/192 (100%)	190 (100%)	1 (0%)	81 80
6	F	71/111 (64%)	70 (99%)	1 (1%)	59 71
7	G	147/153 (96%)	146 (99%)	1 (1%)	76 78
8	H	129/131 (98%)	128 (99%)	1 (1%)	73 77
9	I	103/112 (92%)	103 (100%)	0	100 100
10	J	56/56 (100%)	55 (98%)	1 (2%)	51 68
11	K	104/106 (98%)	104 (100%)	0	100 100
12	L	41/55 (74%)	40 (98%)	1 (2%)	43 63
13	M	2/2 (100%)	2 (100%)	0	100 100
All	All	3435/4066 (84%)	3425 (100%)	10 (0%)	84 83

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	792	ASN

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Mol	Chain	Res	Type
1	A	1049	LEU
2	B	1041	ILE
4	D	126	GLU
5	E	137	ILE
6	F	53	THR
7	G	22	LEU
8	H	71	ASP
10	J	14	VAL
12	L	54	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (43) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	22	GLN
1	A	278	HIS
1	A	353	ASN
1	A	387	ASN
1	A	410	ASN
1	A	504	HIS
1	A	507	GLN
1	A	576	GLN
1	A	620	HIS
1	A	673	GLN
1	A	731	ASN
1	A	792	ASN
1	A	1005	HIS
1	A	1230	GLN
1	A	1310	HIS
2	B	111	ASN
2	B	197	GLN
2	B	410	ASN
2	B	481	HIS
2	B	639	HIS
2	B	717	ASN
2	B	725	GLN
2	B	741	HIS
2	B	790	GLN
2	B	825	GLN
2	B	939	HIS
2	B	970	HIS
2	B	980	HIS
2	B	1117	HIS

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Mol	Chain	Res	Type
3	C	217	GLN
3	C	268	GLN
4	D	128	GLN
4	D	129	GLN
5	E	92	GLN
5	E	138	ASN
5	E	148	HIS
6	F	72	GLN
7	G	139	GLN
9	I	45	GLN
9	I	98	GLN
10	J	26	GLN
10	J	52	HIS
11	K	49	GLN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
15	P	13/20 (65%)	3 (23%)	1 (7%)

All (3) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
15	P	11	A
15	P	13	G
15	P	18	G

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
15	P	12	A

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

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

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the

expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
13	TRX	M	2	13	15,16,17	1.12	1 (6%)	17,22,24	0.98	0
13	ILX	M	1	13	8,9,10	0.62	0	8,11,13	1.42	1 (12%)
13	HYP	M	8	13	7,8,9	0.83	0	5,10,12	2.38	2 (40%)
13	CSX	M	6	13	3,6,7	1.05	0	1,6,8	2.15	1 (100%)

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
13	TRX	M	2	13	-	2/5/6/8	0/2/2/2
13	ILX	M	1	13	-	7/11/12/14	-
13	HYP	M	8	13	-	0/0/11/13	0/1/1/1
13	CSX	M	6	13	-	2/2/5/7	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	M	2	TRX	CD2-CE2	2.35	1.44	1.41

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
13	M	8	HYP	CB-CG-CD	3.53	107.08	103.16
13	M	8	HYP	O-C-CA	-3.35	116.16	124.77
13	M	1	ILX	OD1-CD1-CG1	-3.05	104.75	111.16
13	M	6	CSX	CA-CB-SG	2.15	118.24	113.17

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
13	M	1	ILX	C-CA-CB-CG2
13	M	1	ILX	OD1-CD1-CG1-CB
13	M	1	ILX	OD1-CD1-CG1-OG1
13	M	6	CSX	N-CA-CB-SG

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Mol	Chain	Res	Type	Atoms
13	M	6	CSX	C-CA-CB-SG
13	M	2	TRX	CA-CB-CG-CD2
13	M	2	TRX	CA-CB-CG-CD1
13	M	1	ILX	C-CA-CB-CG1
13	M	1	ILX	N-CA-CB-CG2
13	M	1	ILX	CG2-CB-CG1-CD1
13	M	1	ILX	CG2-CB-CG1-OG1

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
13	M	1	ILX	1	0
13	M	8	HYP	1	0
13	M	6	CSX	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 9 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

There are no chain breaks in this entry.

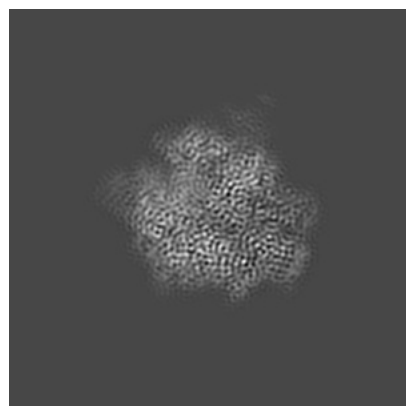
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-3981. These allow visual inspection of the internal detail of the map and identification of artifacts.

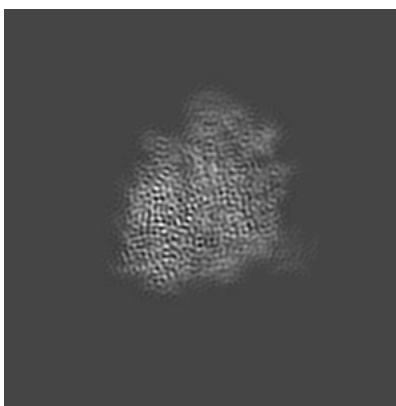
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

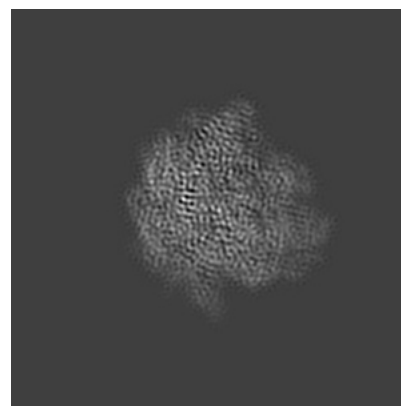
6.1.1 Primary map



X

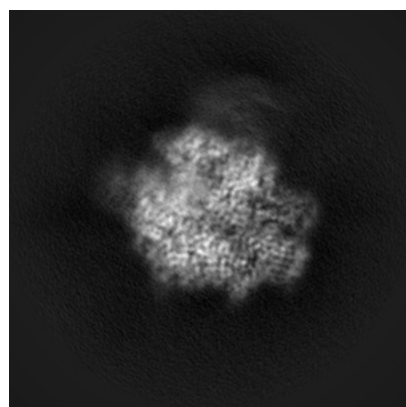


Y

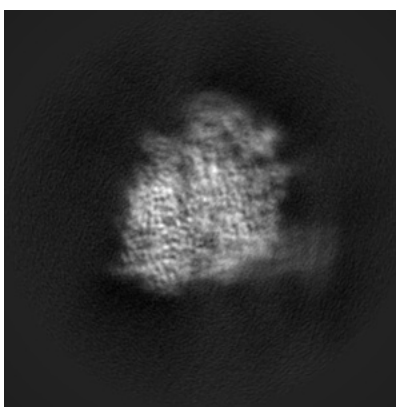


Z

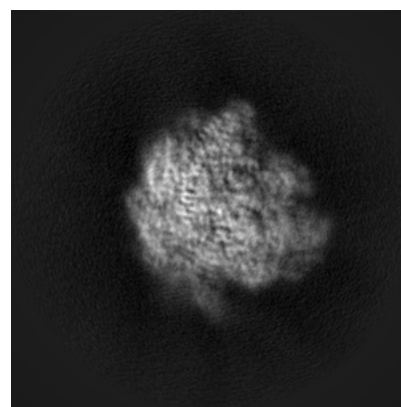
6.1.2 Raw map



X



Y

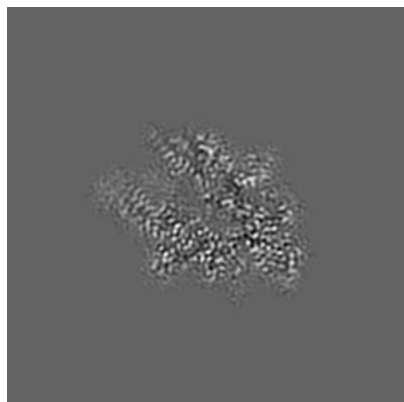


Z

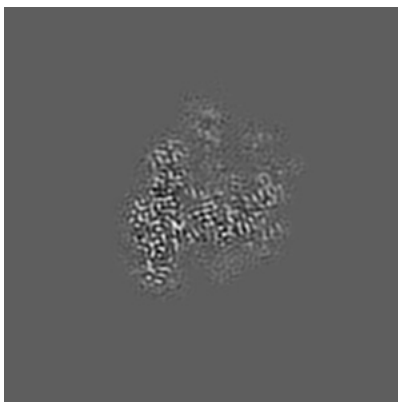
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

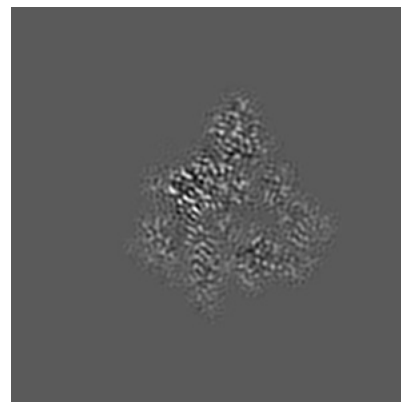
6.2.1 Primary map



X Index: 128

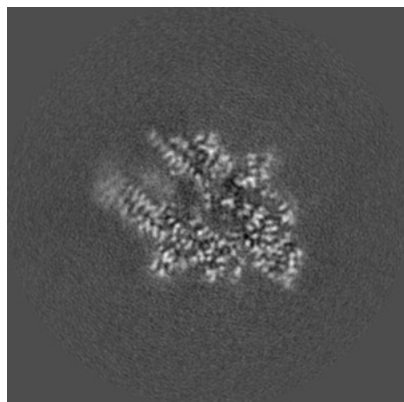


Y Index: 128

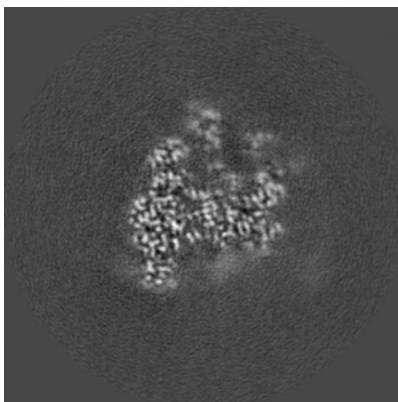


Z Index: 128

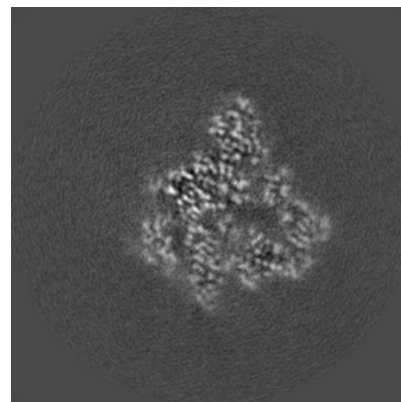
6.2.2 Raw map



X Index: 128



Y Index: 128

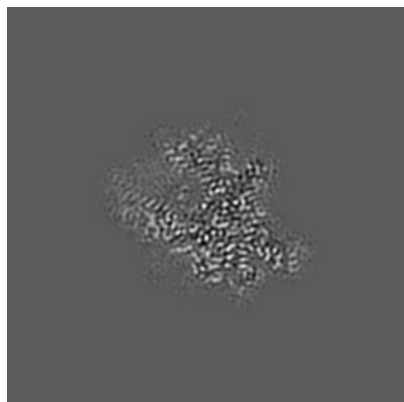


Z Index: 128

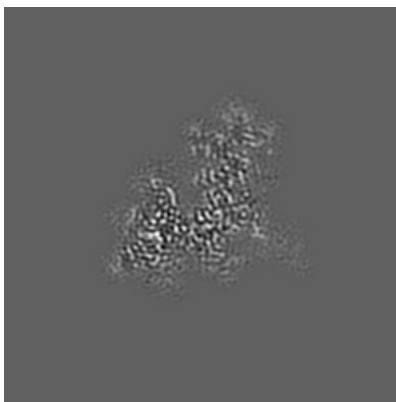
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

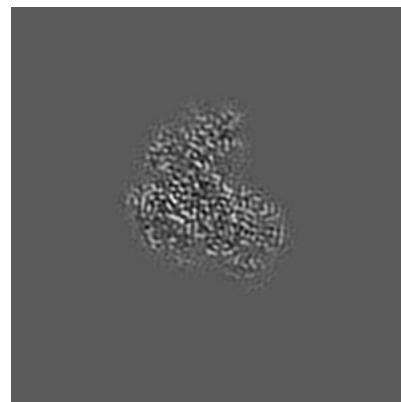
6.3.1 Primary map



X Index: 118

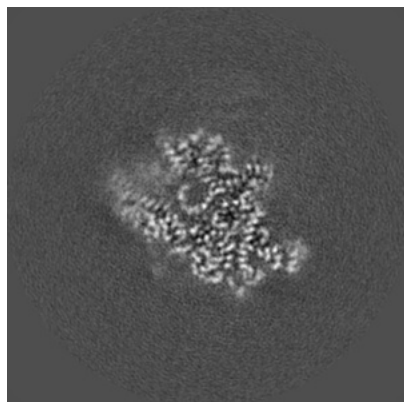


Y Index: 142

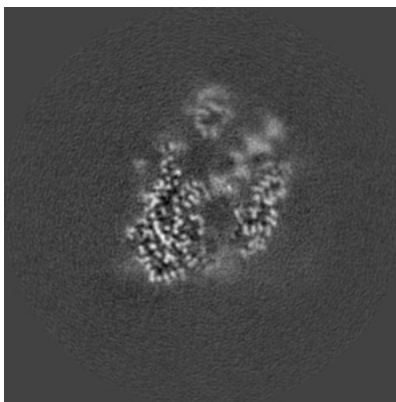


Z Index: 101

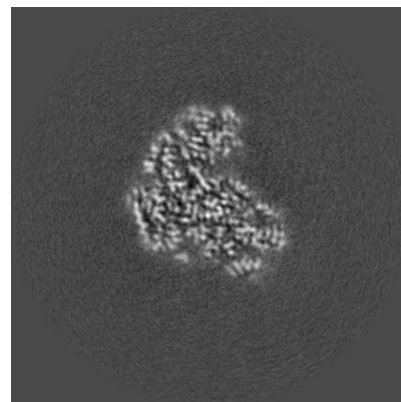
6.3.2 Raw map



X Index: 118



Y Index: 119

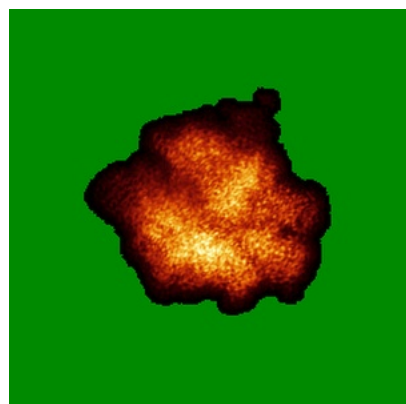


Z Index: 99

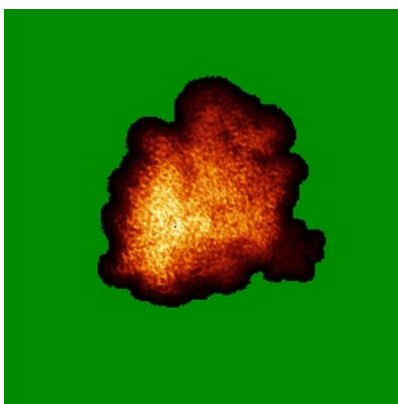
The images above show the largest variance slices of the map in three orthogonal directions.

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

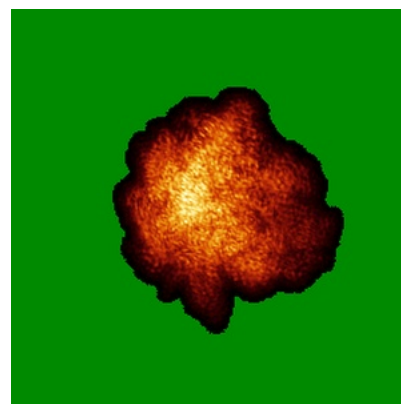
6.4.1 Primary map



X

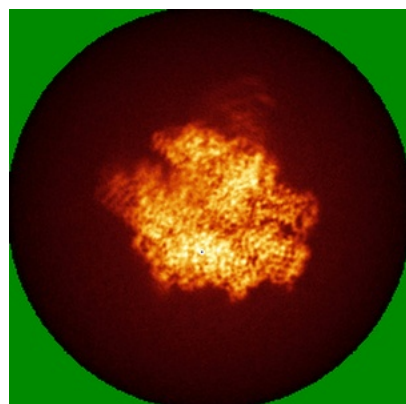


Y

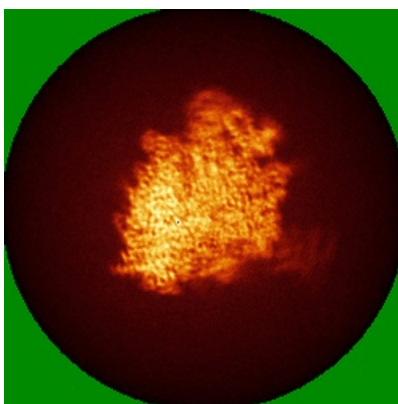


Z

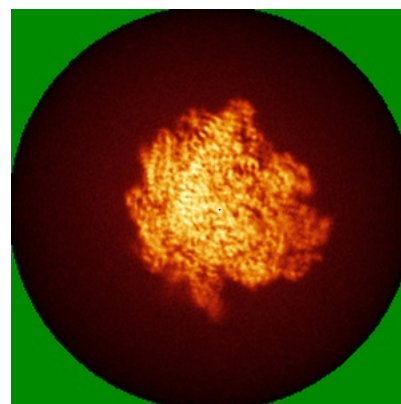
6.4.2 Raw map



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.

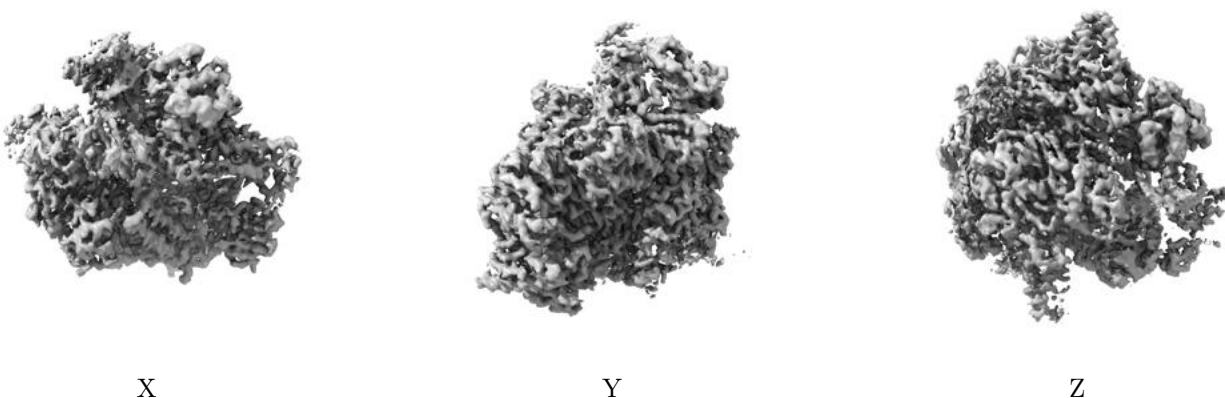
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0577. 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.

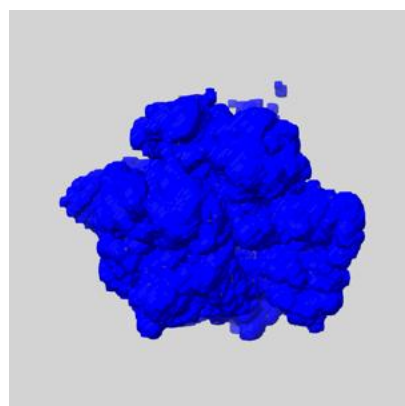
6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

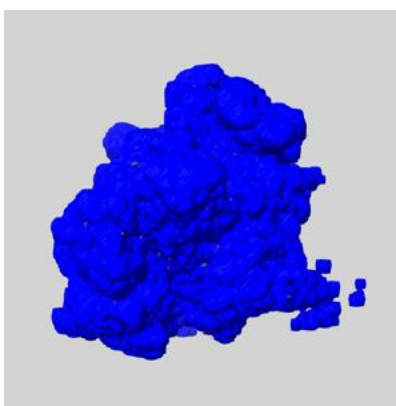
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

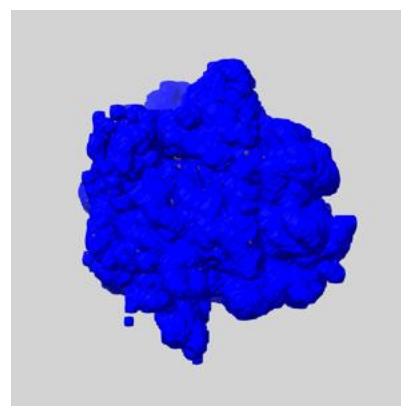
6.6.1 emd_3981_msk_1.map [i](#)



X



Y

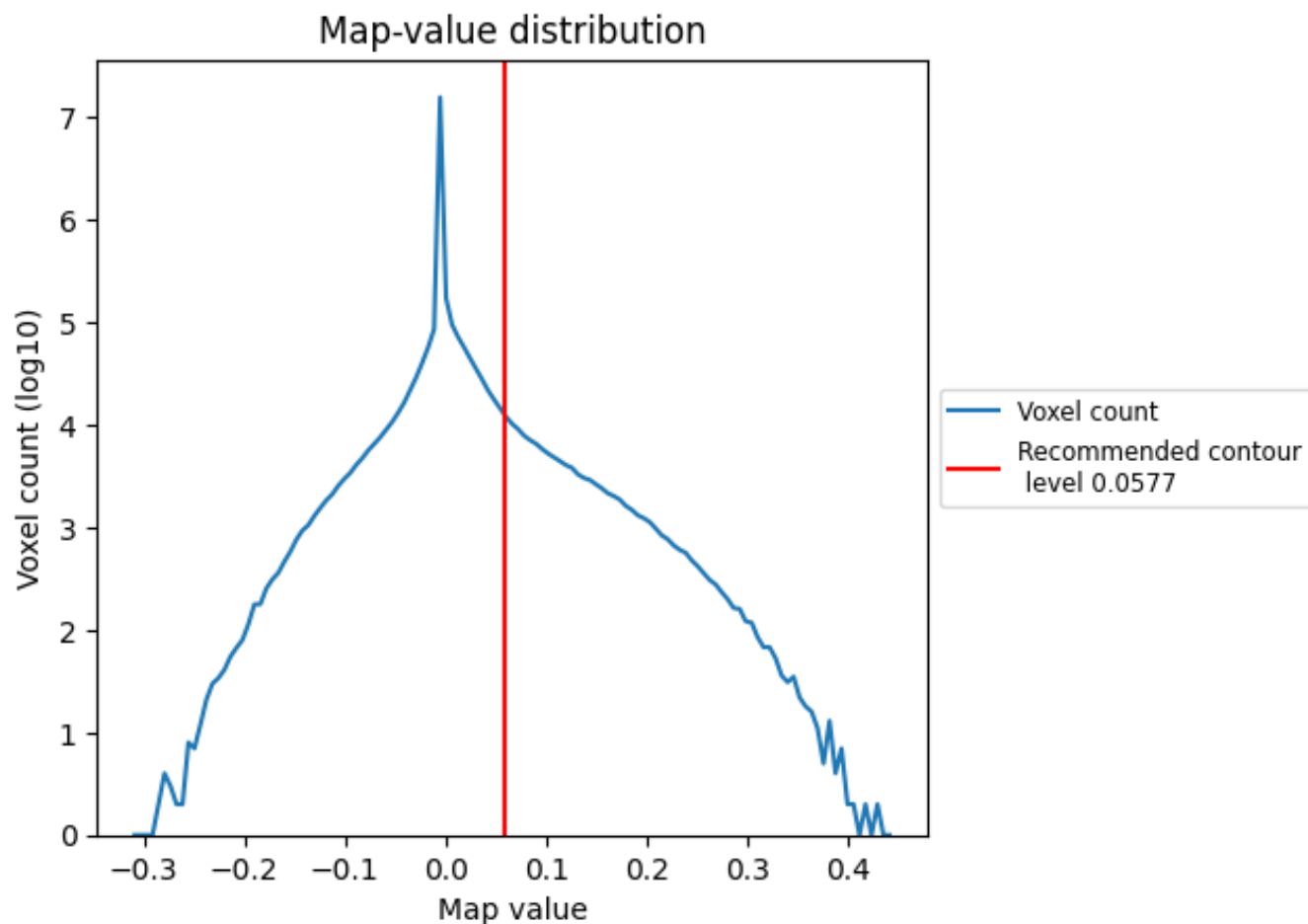


Z

7 Map analysis [i](#)

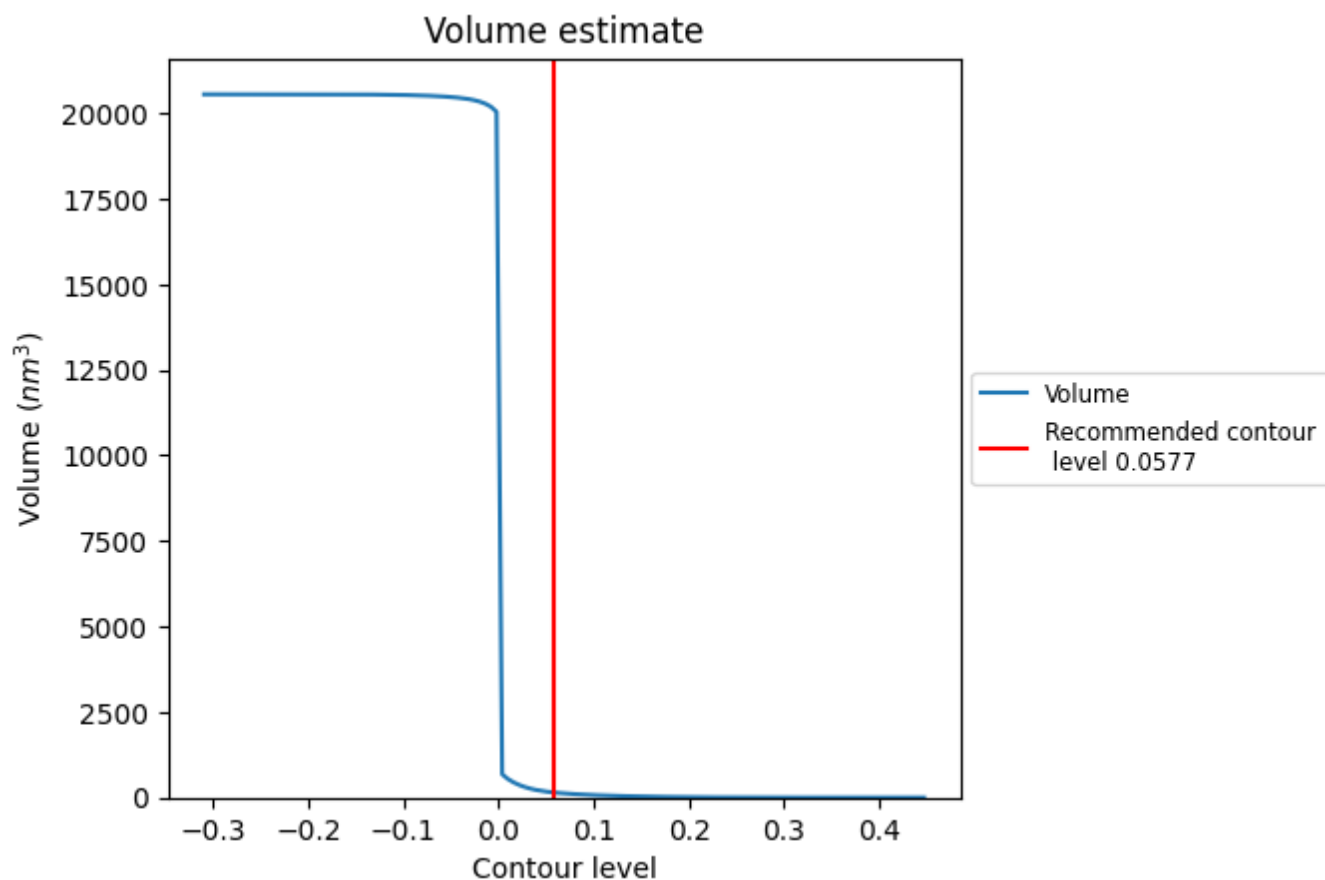
This section contains the results of statistical analysis of the map.

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.

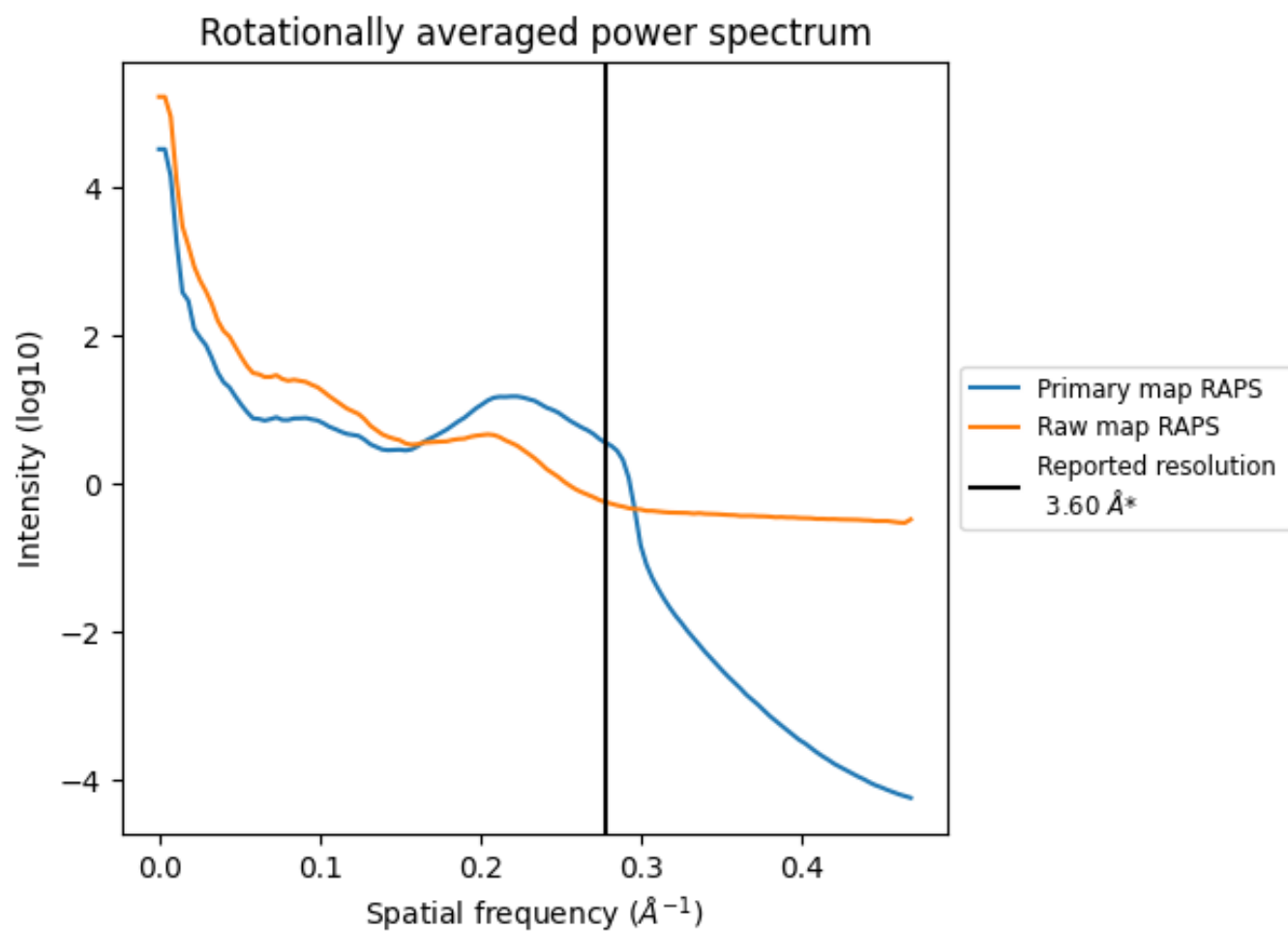
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 149 nm³; this corresponds to an approximate mass of 134 kDa.

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

7.3 Rotationally averaged power spectrum ⓘ

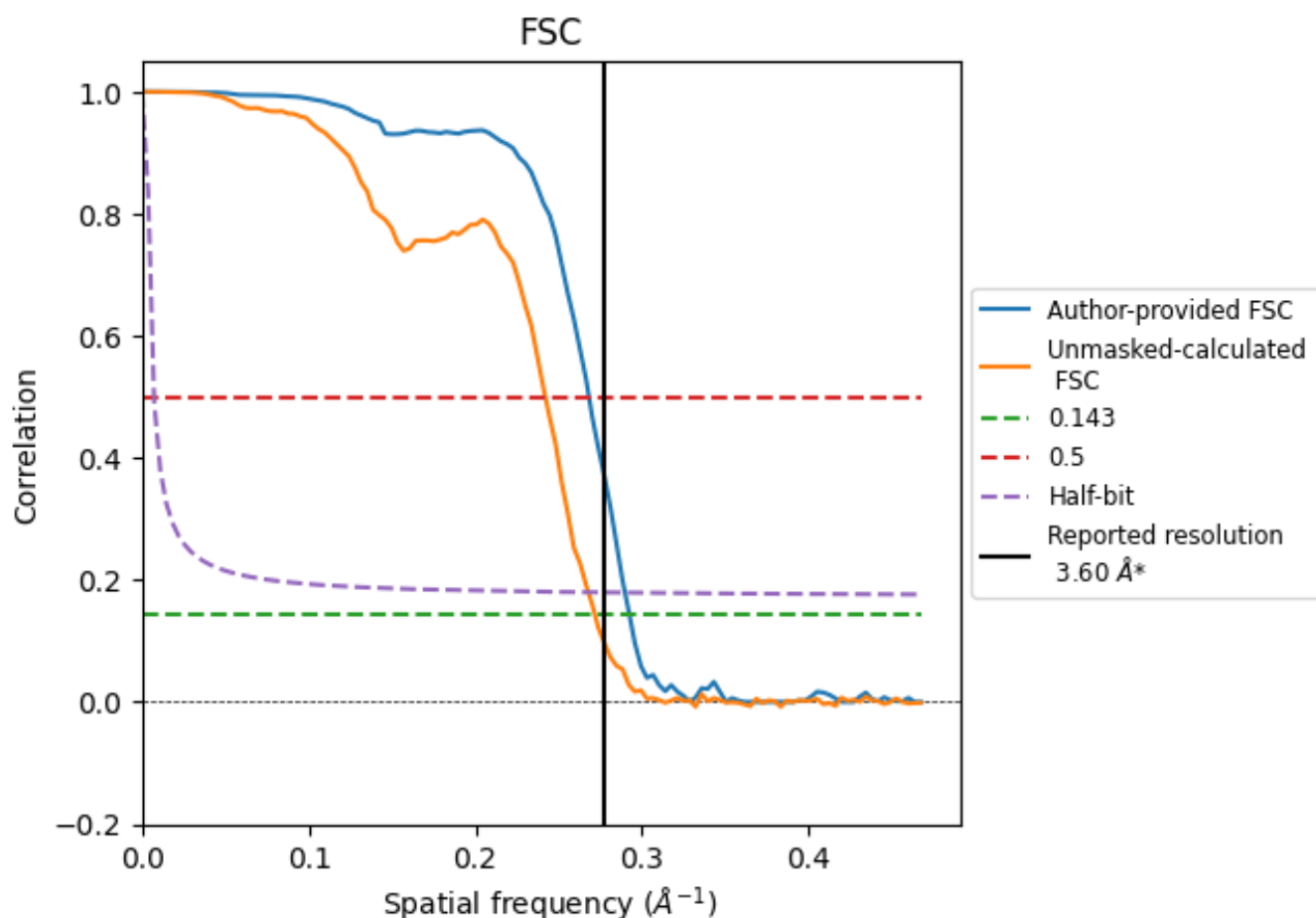


*Reported resolution corresponds to spatial frequency of 0.278 Å⁻¹

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 0.278 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

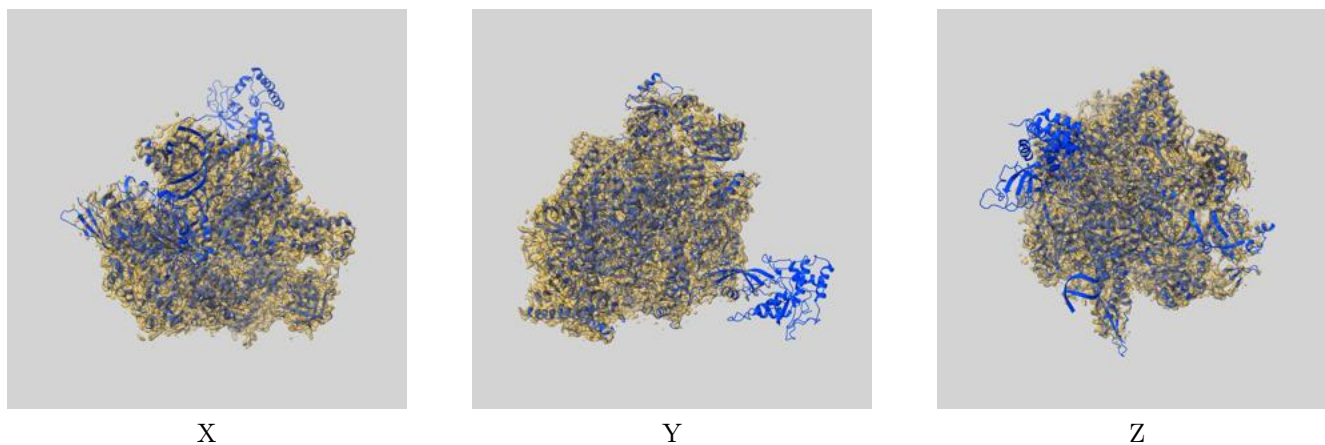
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.60	-	-
Author-provided FSC curve	3.42	3.73	3.45
Unmasked-calculated*	3.68	4.13	3.73

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

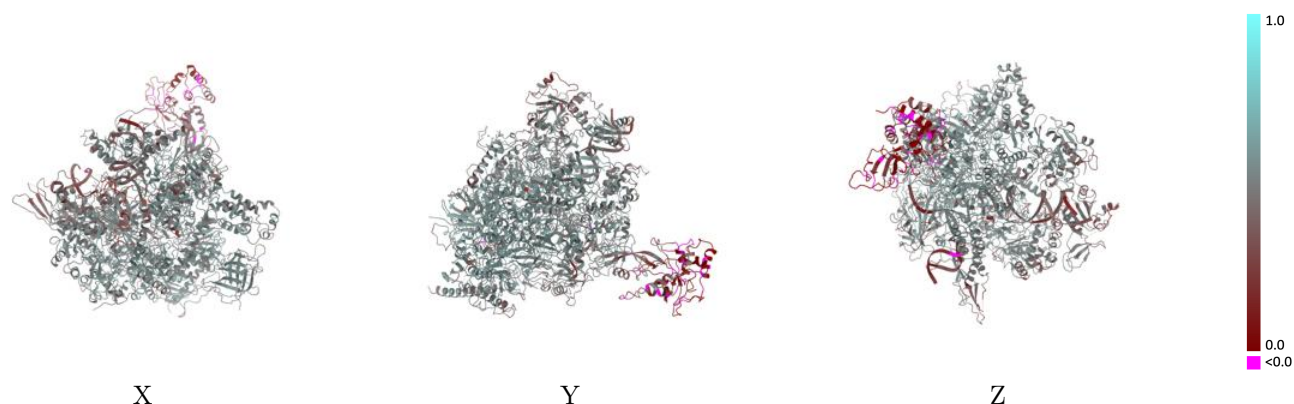
This section contains information regarding the fit between EMDB map EMD-3981 and PDB model 6EXV. Per-residue inclusion information can be found in section [3](#) on page [8](#).

9.1 Map-model overlay [i](#)



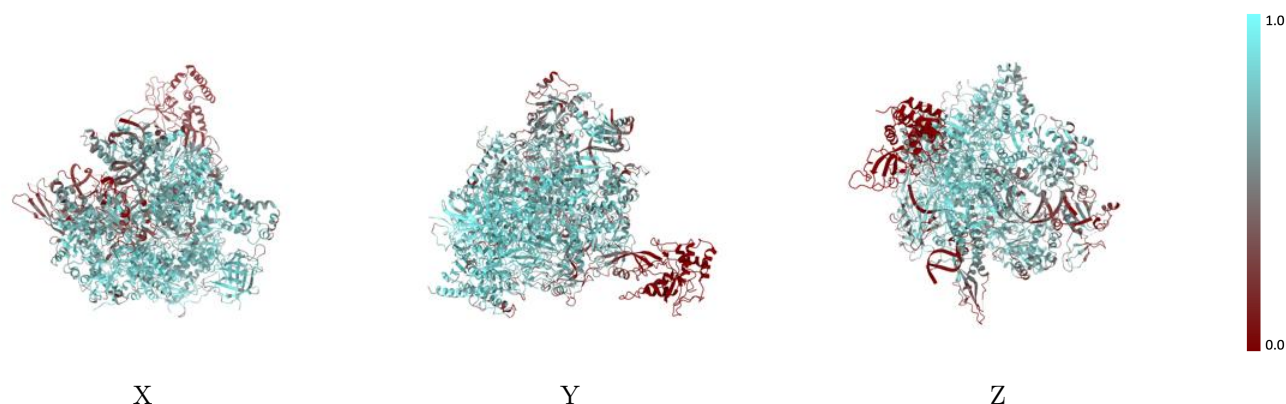
The images above show the 3D surface view of the map at the recommended contour level 0.0577 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



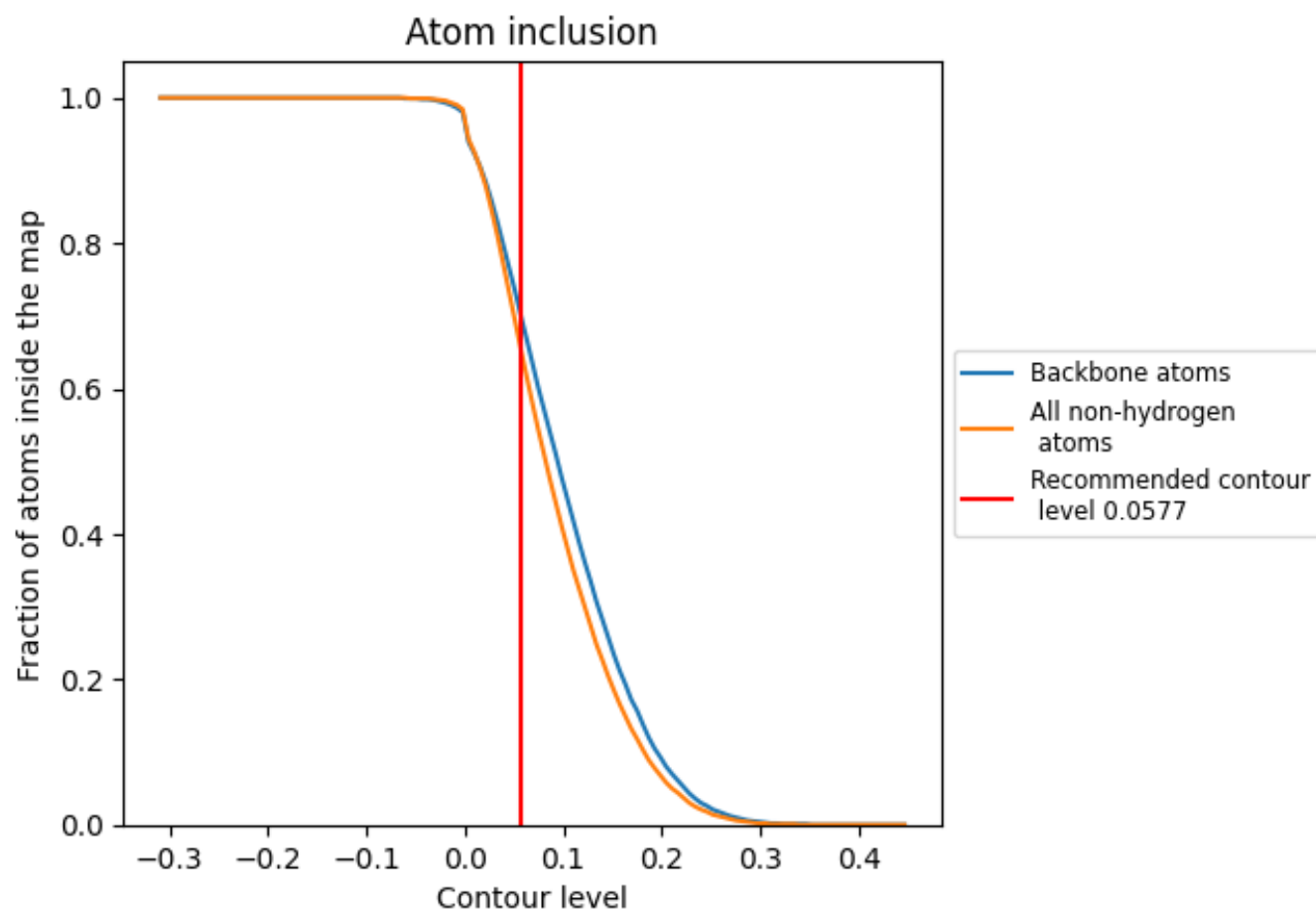
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0577).

9.4 Atom inclusion [i](#)



At the recommended contour level, 70% of all backbone atoms, 65% 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 (0.0577) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6490	 0.4820
A	 0.6970	 0.5100
B	 0.7260	 0.5150
C	 0.7670	 0.5280
D	 0.0020	 0.1280
E	 0.6930	 0.4950
F	 0.6520	 0.5010
G	 0.0990	 0.2170
H	 0.7140	 0.5060
I	 0.5290	 0.4660
J	 0.8270	 0.5500
K	 0.7550	 0.5230
L	 0.6520	 0.4980
M	 0.9190	 0.5860
N	 0.3000	 0.3230
P	 0.6110	 0.4400
T	 0.4440	 0.4140

