



Full wwPDB EM Validation Report ⓘ

May 25, 2024 – 11:53 AM EDT

PDB ID : 7R72
EMDB ID : EMD-24290
Title : State E1 nucleolar 60S ribosome biogenesis intermediate - Spb4 local model
Authors : Cruz, V.E.; Sekulski, K.; Peddada, N.; Erzberger, J.P.
Deposited on : 2021-06-24
Resolution : 3.07 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.dev92
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

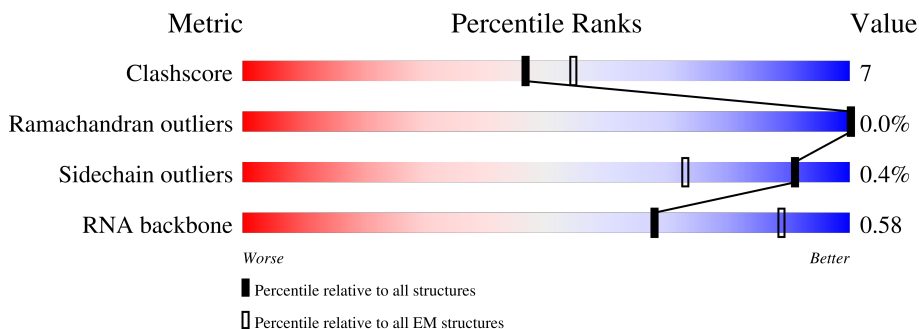
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.07 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	1	641	8% (red), 66% (green), 29% (yellow), . (orange)
2	2	72	. (red), 58% (green), 21% (yellow), . (orange), 18% (grey)
3	8	710	7% (green), . (orange), 92% (grey)
4	B	387	. (red), 98% (grey)
5	G	256	7% (green), . (orange), 93% (grey)
6	I	663	. (red), 44% (green), 6% (yellow), 50% (grey)
7	P	184	. (red), 22% (green), 5% (yellow), 72% (grey)

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Mol	Chain	Length	Quality of chain
8	R	189	
9	U	121	
10	X	142	
11	Z	136	
12	b	647	
13	c	105	
14	d	113	
15	g	121	
16	j	88	
17	k	78	
18	m	429	
19	n	104	
20	p	460	
21	t	322	
22	u	199	
23	w	841	
24	x	606	

2 Entry composition

There are 25 unique types of molecules in this entry. The entry contains 39443 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 RNA chain called 25S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	1	641	13716	6122	2470	4483	641	0	0

- Molecule 2 is a RNA chain called 5.8S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	2	59	1255	560	222	414	59	0	0

- Molecule 3 is a protein called Nucleolar complex protein 2.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	8	58	480	290	103	87	0	0

- Molecule 4 is a protein called 60S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	B	9	72	48	11	12	1	0	0

- Molecule 5 is a protein called 60S ribosomal protein L8-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
5	G	19	175	115	34	26	0	0

- Molecule 6 is a protein called Nucleolar complex-associated protein 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	I	334	2675	1691	467	507	10	0	0

- Molecule 7 is a protein called 60S ribosomal protein L17-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
7	P	51	433	269	92	72	0	0

- Molecule 8 is a protein called 60S ribosomal protein L19-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
8	R	134	1082	679	220	183	0	0

- Molecule 9 is a protein called 60S ribosomal protein L22-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
9	U	102	808	524	132	152	0	0

- Molecule 10 is a protein called 60S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	X	98	786	502	138	144	2	0	0

- Molecule 11 is a protein called 60S ribosomal protein L27-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
11	Z	135	1092	710	202	180	0	0

- Molecule 12 is a protein called Nucleolar GTP-binding protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	b	53	431	267	86	74	4	0	0

- Molecule 13 is a protein called 60S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	c	97	743	479	124	139	1	0	0

- Molecule 14 is a protein called 60S ribosomal protein L31-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	d	72	Total	C	N	O	S	0	0
			593	384	115	93	1		

- Molecule 15 is a protein called 60S ribosomal protein L34-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	g	112	Total	C	N	O	S	0	0
			881	546	179	152	4		

- Molecule 16 is a protein called 60S ribosomal protein L37-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	j	27	Total	C	N	O	S	0	0
			212	127	45	36	4		

- Molecule 17 is a protein called 60S ribosomal protein L38.

Mol	Chain	Residues	Atoms				AltConf	Trace
17	k	77	Total	C	N	O	0	0
			612	391	115	106		

- Molecule 18 is a protein called Ribosome biogenesis protein ERB1.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	m	412	Total	C	N	O	S	0	0
			3302	2123	583	586	10		

- Molecule 19 is a protein called Pescadillo homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	n	103	Total	C	N	O	S	0	0
			861	544	164	148	5		

- Molecule 20 is a protein called Ribosome biogenesis protein YTM1.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	p	337	Total	C	N	O	S	0	0
			2629	1634	470	518	7		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
p	454	ALA	GLY	conflict	UNP A6ZPA9

- Molecule 21 is a protein called Ribosome biogenesis protein RLP7.

Mol	Chain	Residues	Atoms				AltConf	Trace
21	t	26	Total	C	N	O	0	0
			221	132	49	40		

- Molecule 22 is a protein called Ribosome biogenesis protein RLP24.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	u	56	Total	C	N	O	S	0	0
			481	303	98	79	1		

- Molecule 23 is a protein called 27S pre-rRNA (guanosine(2922)-2'-O)-methyltransferase.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	w	189	Total	C	N	O	S	0	0
			1562	957	287	309	9		

- Molecule 24 is a protein called ATP-dependent rRNA helicase SPB4.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	x	539	Total	C	N	O	S	0	0
			4340	2781	744	795	20		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
x	405	ALA	THR	conflict	UNP A7A237

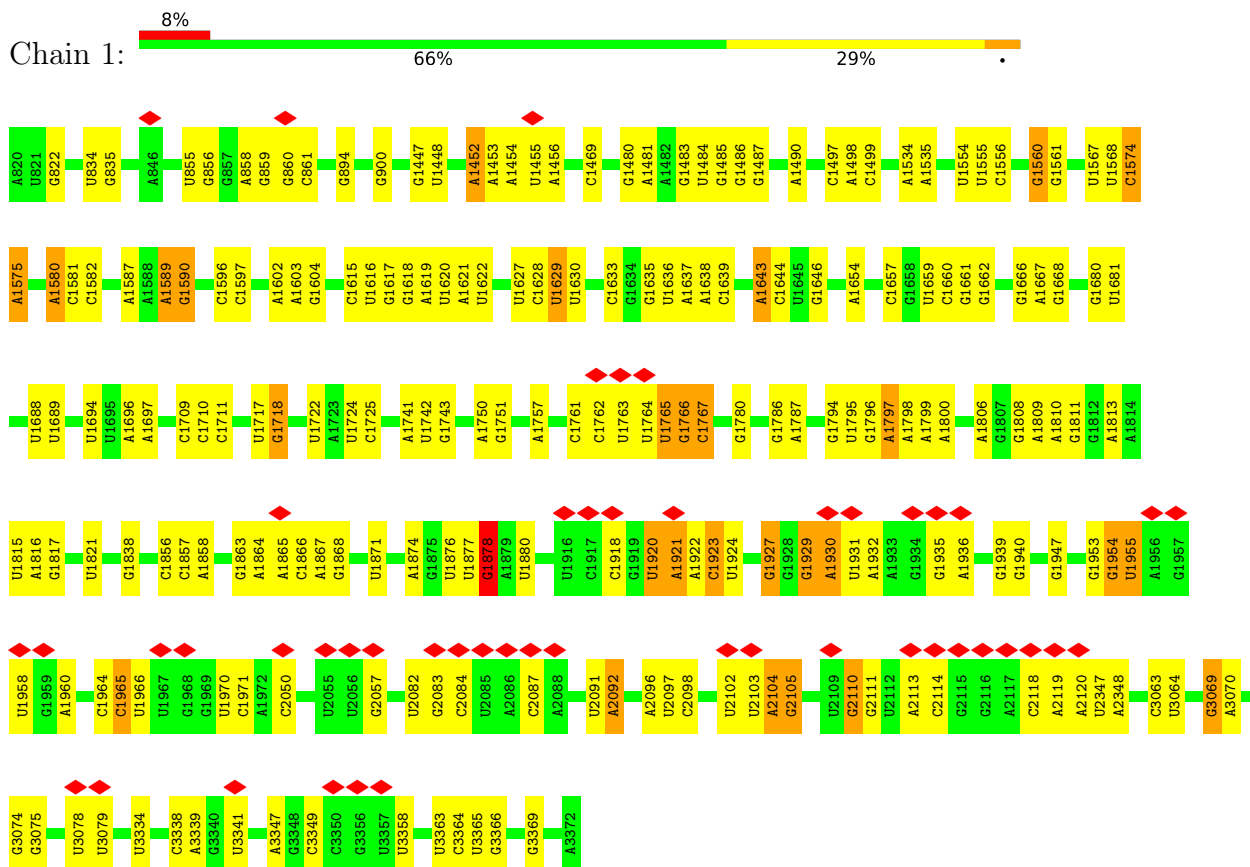
- Molecule 25 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
25	g	1	Total	Zn	0
			1	1	

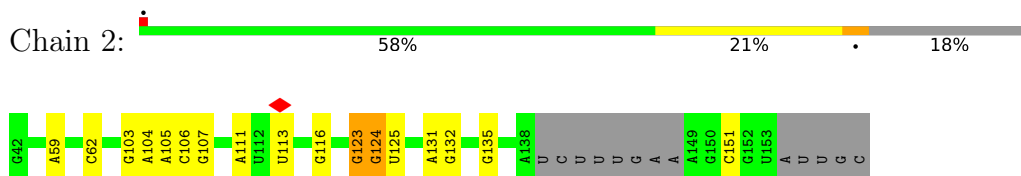
3 Residue-property plots

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

- Molecule 1: 25S rRNA

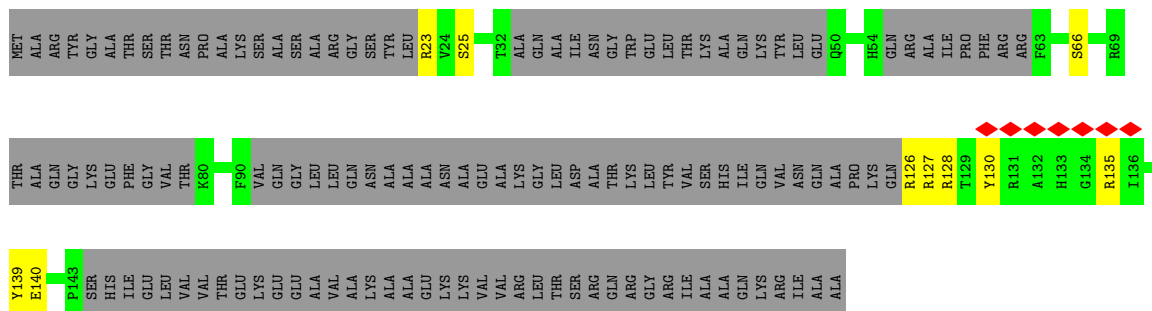


- Molecule 2: 5.8S rRNA

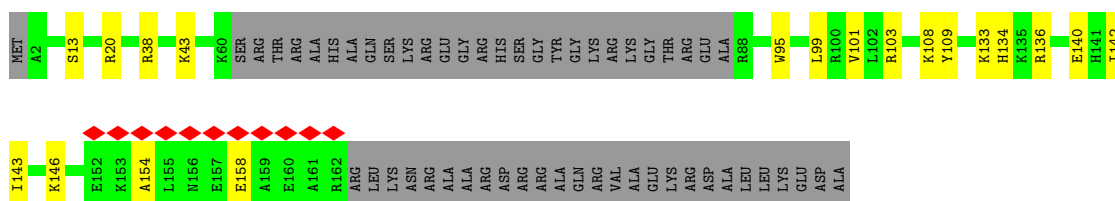


- Molecule 3: Nucleolar complex protein 2





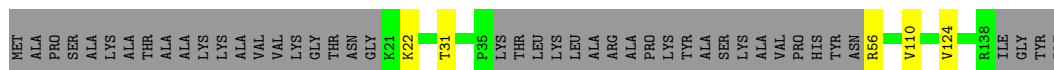
• Molecule 8: 60S ribosomal protein L19-A



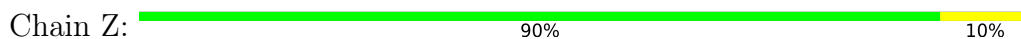
• Molecule 9: 60S ribosomal protein L22-A



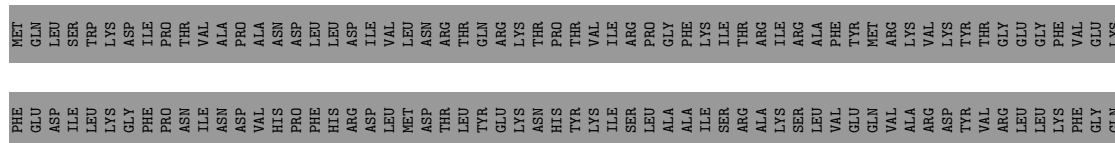
• Molecule 10: 60S ribosomal protein L25

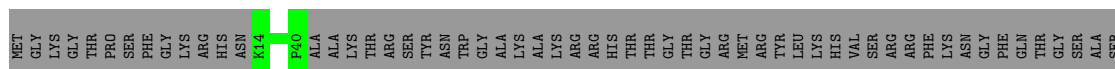


• Molecule 11: 60S ribosomal protein L27-A

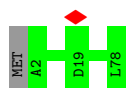


• Molecule 12: Nucleolar GTP-binding protein 1

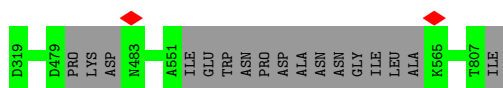




- Molecule 17: 60S ribosomal protein L38



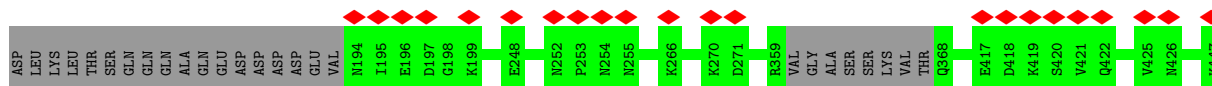
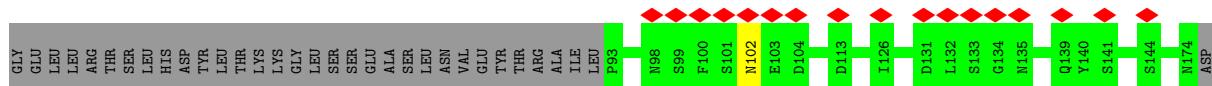
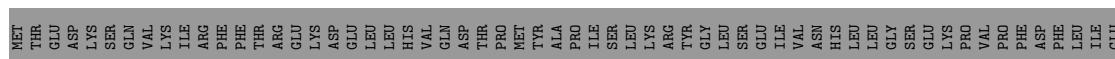
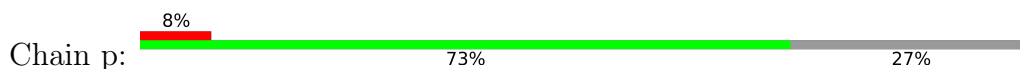
- Molecule 18: Ribosome biogenesis protein ERB1



- Molecule 19: Pescadillo homolog

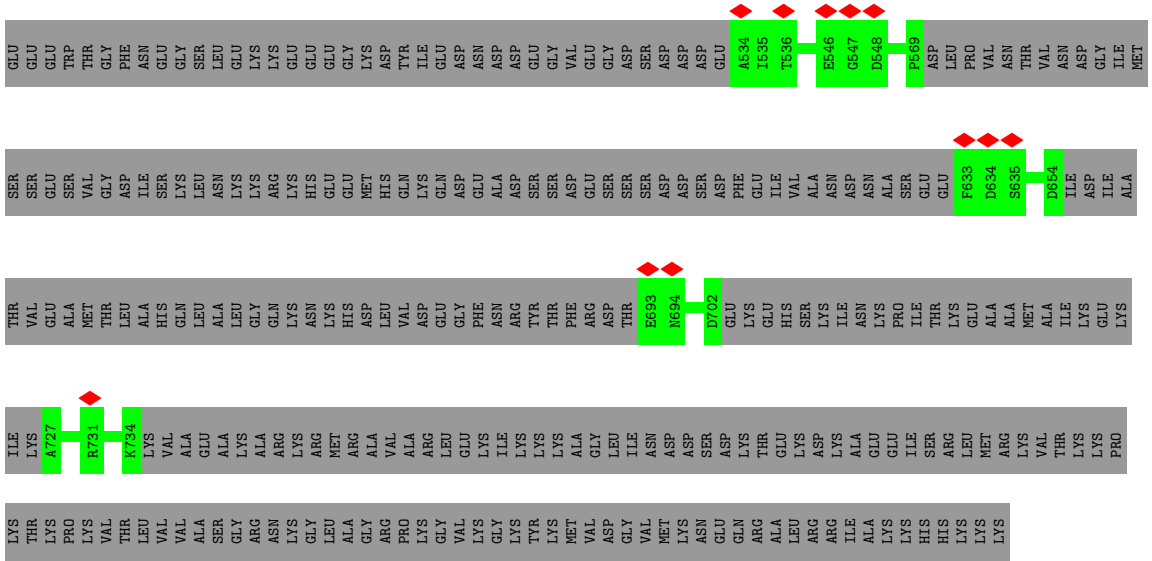


- Molecule 20: Ribosome biogenesis protein YTM1

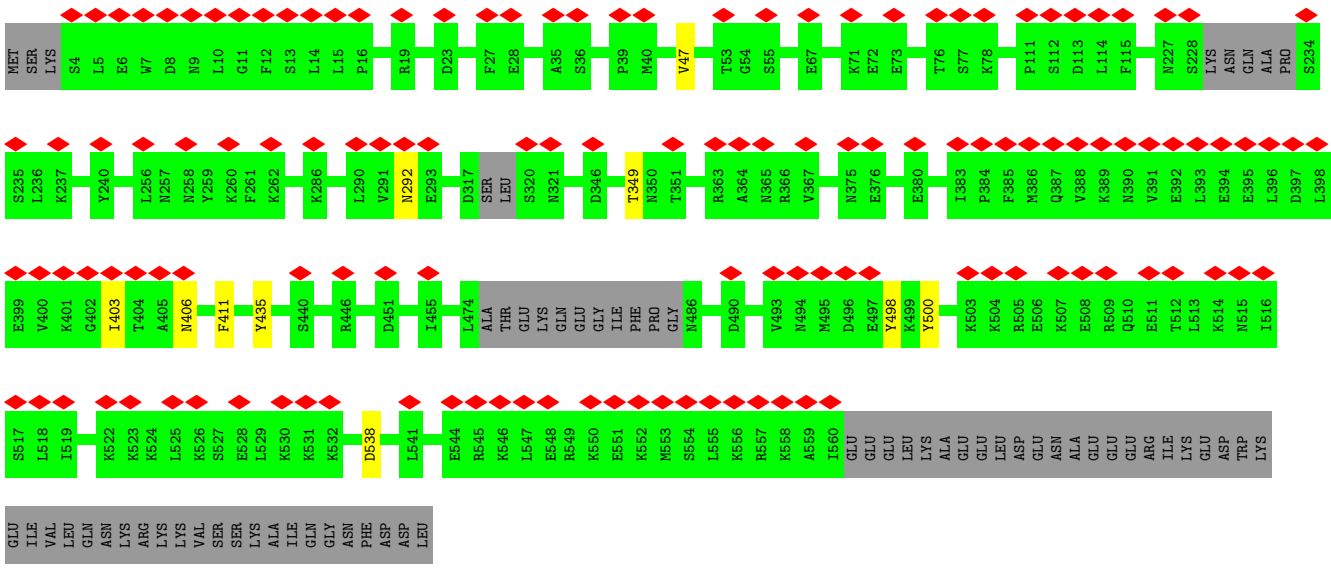
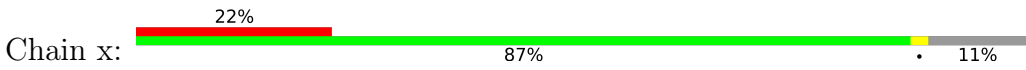


- Molecule 21: Ribosome biogenesis protein RLP7





• Molecule 24: ATP-dependent rRNA helicase SPB4



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	211000	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	1.2	Depositor
Minimum defocus (nm)	900	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.109	Depositor
Minimum map value	-0.056	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.012	Depositor
Map size (\AA)	453.6, 453.6, 453.6	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.08, 1.08, 1.08	Depositor

5 Model quality i

5.1 Standard geometry i

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

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	1	0.29	0/15338	0.78	5/23887 (0.0%)
2	2	0.28	0/1398	0.76	0/2169
3	8	0.23	0/482	0.49	0/630
4	B	0.23	0/72	0.36	0/93
5	G	0.26	0/179	0.53	0/239
6	I	0.25	0/2708	0.49	0/3643
7	P	0.23	0/439	0.57	0/579
8	R	0.26	0/1095	0.51	0/1465
9	U	0.27	0/825	0.48	0/1120
10	X	0.28	0/794	0.49	0/1066
11	Z	0.27	0/1118	0.46	0/1497
12	b	0.23	0/436	0.50	0/575
13	c	0.26	0/751	0.44	0/1008
14	d	0.26	0/603	0.52	0/804
15	g	0.28	0/891	0.54	0/1191
16	j	0.26	0/216	0.58	0/286
17	k	0.26	0/618	0.51	0/826
18	m	0.26	0/3387	0.52	0/4594
19	n	0.27	0/872	0.48	0/1151
20	p	0.26	0/2675	0.53	0/3625
21	t	0.23	0/221	0.62	0/294
22	u	0.24	0/487	0.59	1/641 (0.2%)
23	w	0.24	0/1573	0.48	0/2081
24	x	0.26	0/4419	0.49	0/5958
All	All	0.27	0/41597	0.64	6/59422 (0.0%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	1560	G	C8-N9-C1'	5.27	133.84	127.00
22	u	119	ASP	CB-CG-OD2	5.21	122.99	118.30
1	1	1560	G	C4-N9-C1'	-5.18	119.76	126.50
1	1	1923	C	C2-N1-C1'	5.12	124.43	118.80
1	1	1878	G	C4-N9-C1'	5.03	133.04	126.50
1	1	1920	U	C2-N1-C1'	5.03	123.73	117.70

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	1	13716	0	6905	107	0
2	2	1255	0	640	5	0
3	8	480	0	518	8	0
4	B	72	0	79	0	0
5	G	175	0	188	1	0
6	I	2675	0	2797	31	0
7	P	433	0	434	7	0
8	R	1082	0	1160	16	0
9	U	808	0	822	10	0
10	X	786	0	841	4	0
11	Z	1092	0	1155	9	0
12	b	431	0	460	0	0
13	c	743	0	797	0	0
14	d	593	0	640	0	0
15	g	881	0	945	0	0
16	j	212	0	210	0	0
17	k	612	0	682	0	0
18	m	3302	0	3354	0	0
19	n	861	0	920	0	0
20	p	2629	0	2614	0	0
21	t	221	0	233	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
22	u	481	0	511	0	0
23	w	1562	0	1554	0	0
24	x	4340	0	4468	0	0
25	g	1	0	0	0	0
All	All	39443	0	32927	177	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 (177) 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)
1:1:1924:U:OP1	8:R:136:ARG:NH2	2.01	0.92
7:P:128:ARG:NH1	7:P:130:TYR:CE1	2.53	0.77
1:1:2082:U:H2'	1:1:2083:G:H8	1.54	0.72
1:1:1958:U:H3	1:1:2083:G:H1	1.35	0.72
1:1:1661:G:H2'	1:1:1662:G:C8	2.26	0.70
1:1:1654:A:OP2	6:I:371:LYS:NZ	2.24	0.70
1:1:1574:C:H2'	1:1:1575:A:H8	1.57	0.69
2:2:103:G:OP2	2:2:105:A:O2'	2.12	0.68
6:I:332:SER:OG	6:I:524:LEU:O	2.09	0.67
6:I:335:ASN:HD22	6:I:527:PRO:HG3	1.60	0.66
1:1:1924:U:H1'	1:1:2110:G:N2	2.11	0.66
1:1:1574:C:H2'	1:1:1575:A:C8	2.31	0.65
11:Z:10:VAL:O	11:Z:83:THR:OG1	2.15	0.65
1:1:1554:U:H4'	1:1:1555:U:H5'	1.80	0.63
1:1:3074:G:H2'	1:1:3075:G:H8	1.64	0.62
1:1:1757:A:OP1	9:U:94:ARG:NH2	2.32	0.61
1:1:894:G:OP2	1:1:894:G:N2	2.16	0.60
1:1:1635:G:N2	1:1:1638:A:OP2	2.29	0.60
1:1:1580:A:N6	10:X:31:THR:OG1	2.35	0.60
3:8:22:GLN:O	3:8:26:GLU:HG2	2.02	0.60
9:U:49:ASN:O	9:U:49:ASN:ND2	2.28	0.60
11:Z:23:VAL:HG12	11:Z:45:GLY:HA3	1.84	0.59
1:1:1786:G:H2'	1:1:1787:A:C8	2.37	0.58
1:1:1947:G:OP2	1:1:1947:G:N2	2.26	0.57
3:8:55:GLN:HE22	6:I:350:THR:HG22	1.69	0.57
1:1:1596:C:H2'	1:1:1597:C:C6	2.38	0.57
7:P:128:ARG:NH1	7:P:130:TYR:CD1	2.72	0.57
3:8:12:GLN:HG2	3:8:16:LEU:HD22	1.86	0.57
1:1:1696:A:H2'	1:1:1697:A:C8	2.39	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:G:48:ARG:O	5:G:51:LYS:HG2	2.05	0.57
9:U:37:LEU:O	9:U:41:ILE:HG12	2.05	0.56
6:I:338:LEU:HD12	6:I:435:LYS:HD3	1.87	0.56
1:1:1497:C:O2'	1:1:1602:A:N3	2.33	0.56
1:1:1927:G:OP1	8:R:101:VAL:HG23	2.05	0.56
1:1:1964:C:H3'	1:1:1965:C:H5''	1.88	0.55
8:R:13:SER:OG	8:R:38:ARG:NH2	2.39	0.55
1:1:1615:C:H2'	1:1:1616:U:C6	2.41	0.55
6:I:225:LYS:HB2	6:I:268:PHE:HE2	1.71	0.55
1:1:900:G:H1'	1:1:1589:A:N6	2.21	0.55
1:1:1722:U:OP2	8:R:103:ARG:NH1	2.40	0.55
1:1:3365:U:H2'	1:1:3366:G:C8	2.42	0.55
1:1:1766:G:HO2'	1:1:1767:C:H6	1.56	0.54
1:1:1954:G:O2'	1:1:1955:U:OP1	2.21	0.54
1:1:2104:A:H4'	1:1:2105:G:H4'	1.91	0.53
1:1:1920:U:H3'	1:1:1921:A:H8	1.73	0.53
1:1:1667:A:H2'	1:1:1668:G:H8	1.74	0.52
1:1:1799:A:H2'	1:1:1800:A:H8	1.75	0.52
1:1:1590:G:O2'	1:1:1797:A:N6	2.43	0.52
1:1:2082:U:H2'	1:1:2083:G:C8	2.41	0.52
11:Z:70:PRO:HG3	11:Z:115:LYS:HB2	1.92	0.52
1:1:1447:G:N7	7:P:25:SER:OG	2.44	0.51
1:1:3364:C:H2'	1:1:3365:U:C6	2.46	0.51
3:8:12:GLN:HA	3:8:16:LEU:HB2	1.93	0.51
9:U:21:SER:OG	9:U:22:PRO:HD3	2.10	0.51
1:1:1688:U:H2'	1:1:1689:U:C6	2.45	0.51
1:1:1498:A:H2'	1:1:1499:C:C6	2.46	0.51
1:1:1798:A:H2'	1:1:1799:A:C8	2.47	0.50
11:Z:52:LYS:O	11:Z:65:ARG:NH2	2.42	0.49
1:1:1643:A:H5''	1:1:1644:C:C4	2.47	0.49
1:1:1680:G:OP2	9:U:90:ARG:NH2	2.45	0.49
1:1:1717:U:H2'	1:1:1718:G:C8	2.47	0.49
6:I:179:LEU:HD21	6:I:251:LEU:HD12	1.94	0.49
1:1:3338:C:H2'	1:1:3339:A:H8	1.77	0.49
1:1:3365:U:H2'	1:1:3366:G:H8	1.78	0.48
1:1:1574:C:O2'	1:1:1575:A:O5'	2.28	0.48
1:1:1660:C:H2'	1:1:1661:G:H8	1.77	0.48
1:1:1666:G:H2'	1:1:1667:A:H8	1.79	0.48
1:1:2050:C:O2	1:1:2050:C:H2'	2.12	0.48
6:I:280:ILE:HD11	6:I:294:ILE:HB	1.95	0.48
2:2:131:A:H2'	2:2:132:G:H8	1.78	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:1:1877:U:H4'	1:1:1878:G:C5	2.49	0.48
1:1:1643:A:H2'	1:1:1644:C:C2	2.50	0.47
1:1:1874:A:N7	8:R:20:ARG:NH1	2.62	0.47
2:2:151:C:O2	10:X:22:LYS:NZ	2.32	0.47
9:U:35:LYS:HD2	9:U:38:ILE:HD11	1.96	0.47
1:1:1448:U:H5''	7:P:66:SER:HB3	1.95	0.47
1:1:1717:U:H2'	1:1:1718:G:H8	1.78	0.47
1:1:1856:C:H2'	1:1:1857:C:H6	1.80	0.47
3:8:55:GLN:NE2	6:I:350:THR:HG22	2.28	0.47
2:2:123:G:H2'	2:2:124:G:C8	2.50	0.47
1:1:1657:C:O2'	1:1:1796:G:O2'	2.27	0.47
1:1:3338:C:H2'	1:1:3339:A:C8	2.49	0.47
1:1:1616:U:H2'	1:1:1617:G:C8	2.49	0.47
1:1:1953:G:O4'	1:1:2092:A:N6	2.48	0.46
1:1:3364:C:H2'	1:1:3365:U:H6	1.81	0.46
1:1:1799:A:H2'	1:1:1800:A:C8	2.49	0.46
6:I:334:LEU:HD21	6:I:414:TYR:HE1	1.81	0.46
1:1:1954:G:HO2'	1:1:1955:U:P	2.38	0.46
6:I:166:VAL:HG13	6:I:178:MET:HB2	1.97	0.46
1:1:1629:U:O4	1:1:1813:A:O2'	2.30	0.46
8:R:133:LYS:HG3	8:R:134:HIS:ND1	2.30	0.46
6:I:178:MET:O	6:I:227:TYR:OH	2.30	0.46
1:1:1560:G:O2'	1:1:1561:G:O4'	2.19	0.46
1:1:1667:A:H2'	1:1:1668:G:C8	2.51	0.46
6:I:411:PHE:HE2	6:I:440:ALA:HB2	1.79	0.46
1:1:2347:U:H2'	1:1:2348:A:H8	1.81	0.46
1:1:1620:U:H2'	1:1:1621:A:C8	2.51	0.45
1:1:1936:A:N3	1:1:1936:A:H2'	2.31	0.45
6:I:192:TYR:OH	6:I:217:GLU:OE2	2.30	0.45
8:R:134:HIS:NE2	8:R:136:ARG:HB2	2.32	0.45
1:1:1929:G:OP2	8:R:108:LYS:NZ	2.47	0.45
6:I:292:ILE:HD11	6:I:524:LEU:HD12	1.98	0.45
6:I:347:ASP:O	6:I:350:THR:HG23	2.17	0.45
6:I:157:ALA:O	6:I:161:ARG:HG2	2.16	0.45
6:I:292:ILE:HD12	6:I:525:ALA:HB2	1.98	0.45
1:1:1597:C:H5'	1:1:1696:A:H1'	1.99	0.45
1:1:1953:G:H22	1:1:2092:A:H2'	1.82	0.45
1:1:1680:G:H2'	1:1:1681:U:C6	2.52	0.45
1:1:1618:G:H2'	1:1:1619:A:C8	2.53	0.44
1:1:1765:U:O2'	1:1:1766:G:O4'	2.35	0.44
1:1:1680:G:H2'	1:1:1681:U:H6	1.82	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:1:1810:A:H2'	1:1:1811:G:C8	2.53	0.44
2:2:135:G:OP2	10:X:56:ARG:NH2	2.50	0.44
3:8:24:ARG:O	3:8:28:ILE:HG12	2.18	0.44
1:1:1621:A:H2'	1:1:1622:U:C6	2.53	0.44
3:8:36:ARG:HG3	3:8:37:ARG:H	1.82	0.44
1:1:1636:U:O2'	11:Z:79:HIS:ND1	2.48	0.44
11:Z:27:LYS:HE3	11:Z:27:LYS:HB2	1.80	0.44
8:R:134:HIS:HE2	8:R:136:ARG:HB2	1.82	0.44
1:1:1659:U:H2'	1:1:1660:C:C6	2.52	0.43
1:1:1930:A:H3'	1:1:1931:U:C6	2.53	0.43
9:U:20:SER:O	9:U:24:GLU:HG2	2.18	0.43
1:1:1534:A:H2'	1:1:1535:A:C8	2.53	0.43
6:I:180:ALA:O	6:I:183:PRO:HD2	2.19	0.43
1:1:1480:G:O2'	1:1:1871:U:O4	2.26	0.43
1:1:2096:A:H2'	1:1:2097:U:C6	2.54	0.43
1:1:2097:U:H2'	1:1:2098:C:H6	1.82	0.43
6:I:335:ASN:HA	6:I:338:LEU:HD23	2.01	0.43
7:P:127:ARG:HG2	7:P:139:TYR:O	2.18	0.43
1:1:1637:A:OP1	11:Z:73:LYS:NZ	2.52	0.43
1:1:1666:G:H2'	1:1:1667:A:C8	2.53	0.43
6:I:282:LYS:HD3	6:I:283:PRO:HD2	2.01	0.43
6:I:418:LEU:HD23	6:I:418:LEU:HA	1.92	0.43
6:I:206:VAL:HG23	6:I:206:VAL:O	2.18	0.42
6:I:522:LEU:O	6:I:522:LEU:HD23	2.18	0.42
9:U:41:ILE:O	9:U:75:TYR:OH	2.22	0.42
9:U:49:ASN:HD22	9:U:49:ASN:C	2.15	0.42
1:1:834:U:H2'	1:1:835:G:O4'	2.19	0.42
6:I:434:THR:HG21	6:I:537:VAL:HG21	2.00	0.42
1:1:1711:C:OP1	11:Z:78:ASN:ND2	2.52	0.42
1:1:1930:A:H3'	1:1:1931:U:H6	1.83	0.42
10:X:110:VAL:HG22	10:X:124:VAL:HG22	2.00	0.42
1:1:1709:C:H2'	1:1:1710:C:H6	1.85	0.42
1:1:1953:G:N2	1:1:2092:A:C8	2.88	0.42
1:1:3069:G:C2	1:1:3070:A:C8	3.07	0.42
1:1:1643:A:H5''	1:1:1644:C:C5	2.55	0.42
6:I:524:LEU:H	6:I:524:LEU:HD23	1.84	0.42
8:R:142:ILE:HG22	8:R:146:LYS:HE3	2.02	0.42
1:1:894:G:N1	3:8:39:ASN:OD1	2.53	0.42
1:1:2097:U:H2'	1:1:2098:C:C6	2.54	0.42
7:P:135:ARG:HB2	7:P:135:ARG:CZ	2.50	0.42
1:1:855:U:H2'	1:1:856:G:O4'	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:1:1490:A:H61	1:1:1838:G:H1'	1.85	0.41
1:1:1646:G:H1'	1:1:1809:A:N6	2.35	0.41
1:1:1856:C:H2'	1:1:1857:C:C6	2.54	0.41
6:I:411:PHE:CE2	6:I:440:ALA:HB2	2.55	0.41
1:1:1929:G:N1	8:R:109:TYR:OH	2.40	0.41
1:1:1452:A:H5'	1:1:1453:A:C8	2.56	0.41
1:1:3063:C:H2'	1:1:3064:U:H6	1.85	0.41
11:Z:115:LYS:HE3	11:Z:119:GLU:OE2	2.21	0.41
1:1:1965:C:H2'	1:1:1966:U:O4'	2.20	0.41
1:1:1603:A:OP1	8:R:38:ARG:NH1	2.54	0.41
1:1:1742:U:H2'	1:1:1743:G:H8	1.86	0.41
7:P:126:ARG:HG3	7:P:140:GLU:HG2	2.03	0.41
1:1:1659:U:H2'	1:1:1660:C:H6	1.85	0.40
1:1:1794:G:H2'	1:1:1794:G:N3	2.36	0.40
6:I:280:ILE:HD13	6:I:280:ILE:HA	1.92	0.40
8:R:43:LYS:HE3	8:R:43:LYS:HB2	1.75	0.40
1:1:858:A:H2'	1:1:859:G:C8	2.57	0.40
1:1:2083:G:H2'	1:1:2084:C:C6	2.57	0.40
6:I:147:LYS:HE2	6:I:158:ALA:HB2	2.04	0.40
6:I:214:ARG:O	6:I:218:GLN:HG2	2.22	0.40
6:I:239:SER:O	6:I:239:SER:OG	2.38	0.40
8:R:140:GLU:HA	8:R:143:ILE:HG12	2.04	0.40
8:R:95:TRP:CZ2	8:R:99:LEU:HD22	2.57	0.40
8:R:154:ALA:O	8:R:158:GLU:HG3	2.21	0.40
9:U:35:LYS:HA	9:U:38:ILE:HG12	2.03	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
3	8	56/710 (8%)	56 (100%)	0	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	B	7/387 (2%)	7 (100%)	0	0	100	100
5	G	17/256 (7%)	16 (94%)	1 (6%)	0	100	100
6	I	330/663 (50%)	318 (96%)	12 (4%)	0	100	100
7	P	41/184 (22%)	38 (93%)	3 (7%)	0	100	100
8	R	130/189 (69%)	129 (99%)	1 (1%)	0	100	100
9	U	100/121 (83%)	96 (96%)	4 (4%)	0	100	100
10	X	94/142 (66%)	93 (99%)	1 (1%)	0	100	100
11	Z	133/136 (98%)	129 (97%)	4 (3%)	0	100	100
12	b	51/647 (8%)	49 (96%)	2 (4%)	0	100	100
13	c	95/105 (90%)	94 (99%)	1 (1%)	0	100	100
14	d	66/113 (58%)	62 (94%)	4 (6%)	0	100	100
15	g	110/121 (91%)	109 (99%)	1 (1%)	0	100	100
16	j	25/88 (28%)	25 (100%)	0	0	100	100
17	k	75/78 (96%)	73 (97%)	2 (3%)	0	100	100
18	m	404/429 (94%)	385 (95%)	19 (5%)	0	100	100
19	n	99/104 (95%)	95 (96%)	4 (4%)	0	100	100
20	p	331/460 (72%)	308 (93%)	23 (7%)	0	100	100
21	t	24/322 (8%)	24 (100%)	0	0	100	100
22	u	52/199 (26%)	52 (100%)	0	0	100	100
23	w	175/841 (21%)	171 (98%)	4 (2%)	0	100	100
24	x	531/606 (88%)	508 (96%)	22 (4%)	1 (0%)	47	77
All	All	2946/6901 (43%)	2837 (96%)	108 (4%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
24	x	406	ASN

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	
3	8	52/647 (8%)	52 (100%)	0	100	100
4	B	8/323 (2%)	8 (100%)	0	100	100
5	G	19/208 (9%)	19 (100%)	0	100	100
6	I	306/602 (51%)	306 (100%)	0	100	100
7	P	46/146 (32%)	45 (98%)	1 (2%)	52	76
8	R	112/154 (73%)	112 (100%)	0	100	100
9	U	89/107 (83%)	88 (99%)	1 (1%)	73	88
10	X	87/118 (74%)	87 (100%)	0	100	100
11	Z	115/116 (99%)	115 (100%)	0	100	100
12	b	46/573 (8%)	46 (100%)	0	100	100
13	c	81/88 (92%)	81 (100%)	0	100	100
14	d	62/97 (64%)	62 (100%)	0	100	100
15	g	95/103 (92%)	95 (100%)	0	100	100
16	j	25/71 (35%)	25 (100%)	0	100	100
17	k	68/69 (99%)	68 (100%)	0	100	100
18	m	367/381 (96%)	367 (100%)	0	100	100
19	n	92/93 (99%)	92 (100%)	0	100	100
20	p	300/413 (73%)	299 (100%)	1 (0%)	92	96
21	t	24/287 (8%)	24 (100%)	0	100	100
22	u	49/180 (27%)	49 (100%)	0	100	100
23	w	171/745 (23%)	171 (100%)	0	100	100
24	x	489/548 (89%)	480 (98%)	9 (2%)	59	80
All	All	2703/6069 (44%)	2691 (100%)	12 (0%)	91	95

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
7	P	23	ARG
9	U	49	ASN
20	p	102	ASN
24	x	47	VAL
24	x	292	ASN
24	x	349	THR

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Mol	Chain	Res	Type
24	x	403	ILE
24	x	411	PHE
24	x	435	TYR
24	x	498	TYR
24	x	500	TYR
24	x	538	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
3	8	55	GLN
12	b	500	GLN
20	p	342	ASN
20	p	396	HIS

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	1	629/641 (98%)	107 (17%)	2 (0%)
2	2	55/72 (76%)	10 (18%)	1 (1%)
All	All	684/713 (95%)	117 (17%)	3 (0%)

All (117) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	1	822	G
1	1	860	G
1	1	861	C
1	1	1452	A
1	1	1454	A
1	1	1455	U
1	1	1456	A
1	1	1469	C
1	1	1481	A
1	1	1483	G
1	1	1484	U
1	1	1485	G
1	1	1486	G
1	1	1487	G
1	1	1556	C

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Mol	Chain	Res	Type
1	1	1567	U
1	1	1568	U
1	1	1575	A
1	1	1580	A
1	1	1581	C
1	1	1582	C
1	1	1587	A
1	1	1589	A
1	1	1590	G
1	1	1604	G
1	1	1627	U
1	1	1628	C
1	1	1629	U
1	1	1630	U
1	1	1633	C
1	1	1639	C
1	1	1643	A
1	1	1694	U
1	1	1718	G
1	1	1724	U
1	1	1725	C
1	1	1741	A
1	1	1750	A
1	1	1751	G
1	1	1761	C
1	1	1762	C
1	1	1763	U
1	1	1764	U
1	1	1765	U
1	1	1766	G
1	1	1767	C
1	1	1780	G
1	1	1795	U
1	1	1797	A
1	1	1806	A
1	1	1808	G
1	1	1815	U
1	1	1816	A
1	1	1817	G
1	1	1821	U
1	1	1858	A
1	1	1863	G

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Mol	Chain	Res	Type
1	1	1864	A
1	1	1865	A
1	1	1866	C
1	1	1867	A
1	1	1868	G
1	1	1876	U
1	1	1878	G
1	1	1880	U
1	1	1918	C
1	1	1921	A
1	1	1922	A
1	1	1923	C
1	1	1927	G
1	1	1929	G
1	1	1930	A
1	1	1932	A
1	1	1935	G
1	1	1939	G
1	1	1940	G
1	1	1954	G
1	1	1955	U
1	1	1960	A
1	1	1965	C
1	1	1970	U
1	1	1971	C
1	1	2057	G
1	1	2087	C
1	1	2091	U
1	1	2092	A
1	1	2102	U
1	1	2103	U
1	1	2104	A
1	1	2105	G
1	1	2110	G
1	1	2111	G
1	1	2113	A
1	1	2114	C
1	1	2118	C
1	1	2119	A
1	1	2120	A
1	1	3069	G
1	1	3078	U

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Mol	Chain	Res	Type
1	1	3079	U
1	1	3334	U
1	1	3341	U
1	1	3347	A
1	1	3349	C
1	1	3358	U
1	1	3363	U
1	1	3369	G
2	2	59	A
2	2	62	C
2	2	104	A
2	2	106	C
2	2	107	G
2	2	111	A
2	2	113	U
2	2	116	G
2	2	124	G
2	2	125	U

All (3) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	1	1574	C
1	1	1954	G
2	2	123	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 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	1	12
2	2	2
19	n	1
18	m	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	1	905:U	O3'	1446:A	P	67.43
1	n	70:TYR	C	550:GLU	N	62.35
1	1	2356:A	O3'	3061:G	P	60.76
1	1	1884:A	O3'	1916:U	P	56.47
1	1	2120:A	O3'	2347:U	P	35.66
1	1	864:G	O3'	893:C	P	34.24
1	2	62:C	O3'	98:U	P	20.83
1	1	2058:G	O3'	2080:C	P	18.14
1	1	1541:G	O3'	1552:G	P	18.10
1	2	47:C	O3'	56:G	P	17.79
1	1	3081:C	O3'	3333:G	P	17.16
1	m	330:PRO	C	392:LEU	N	16.93
1	1	1972:A	O3'	2050:C	P	16.91
1	1	3350:C	O3'	3356:G	P	15.54
1	1	1568:U	O3'	1574:C	P	11.27
1	1	1838:G	O3'	1853:U	P	9.55

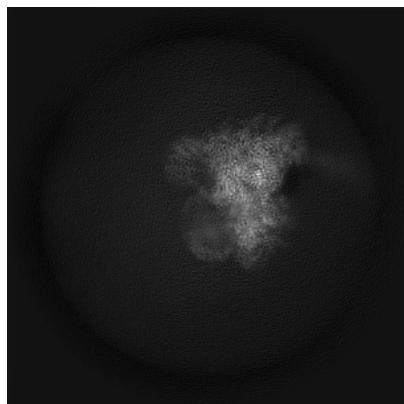
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-24290. These allow visual inspection of the internal detail of the map and identification of artifacts.

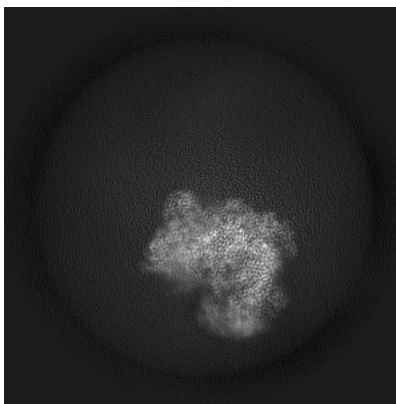
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

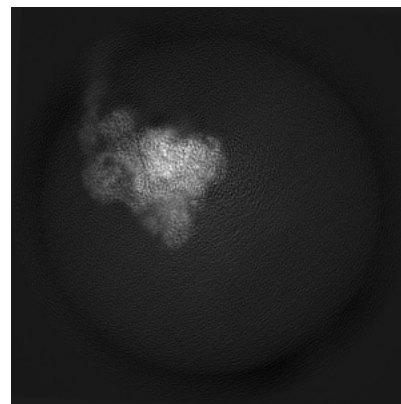
6.1.1 Primary map



X

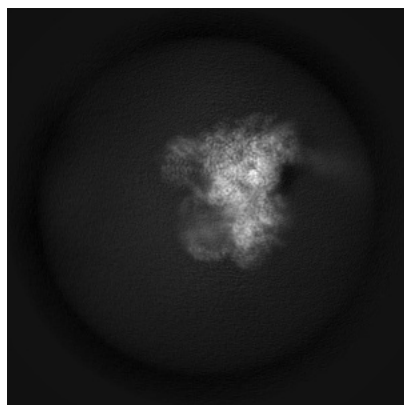


Y

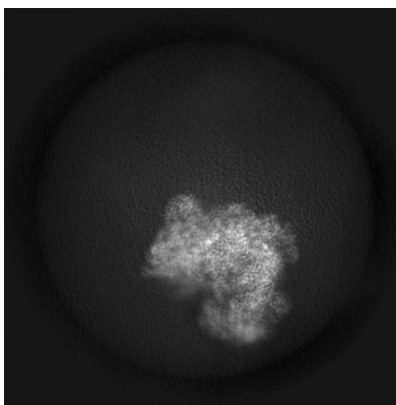


Z

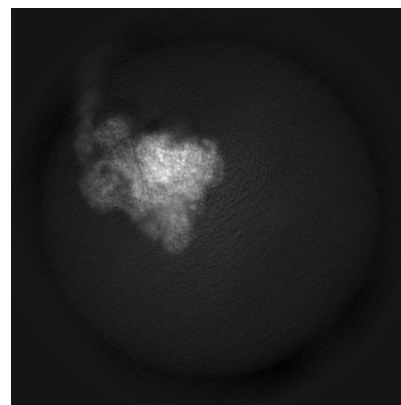
6.1.2 Raw map



X



Y

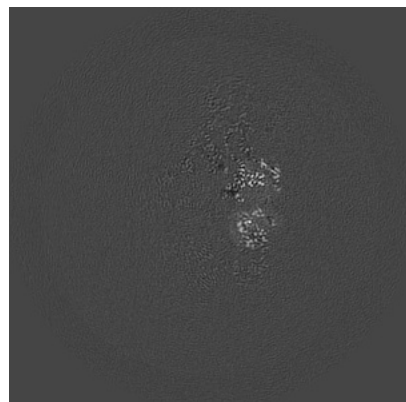


Z

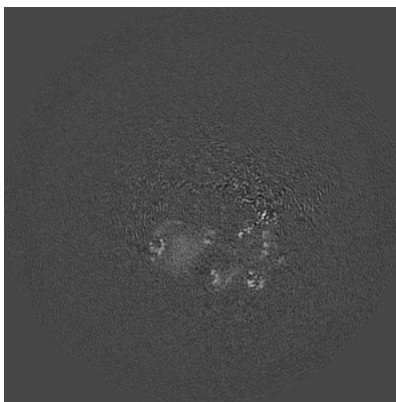
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

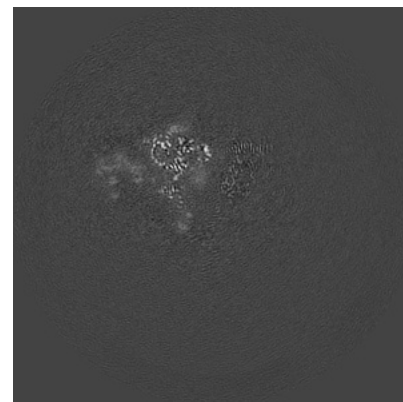
6.2.1 Primary map



X Index: 210

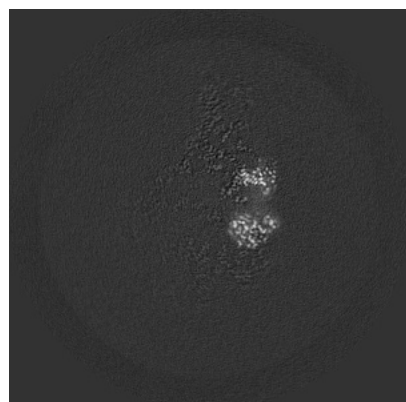


Y Index: 210

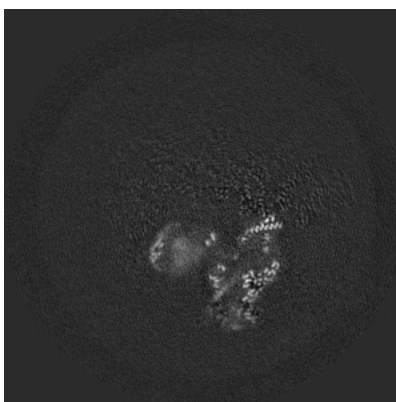


Z Index: 210

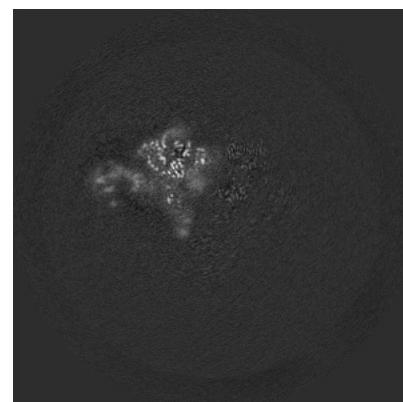
6.2.2 Raw map



X Index: 210



Y Index: 210

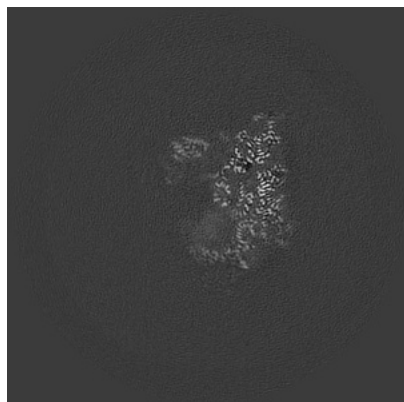


Z Index: 210

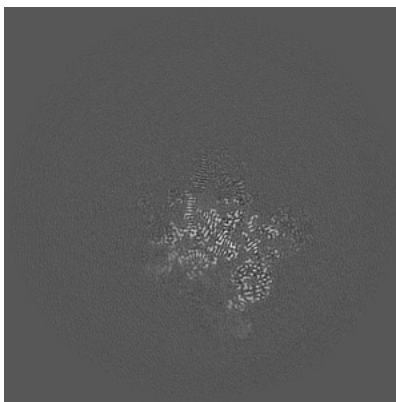
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

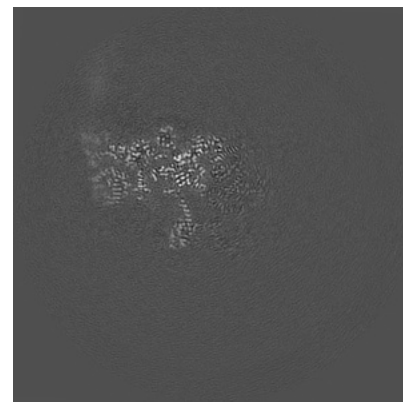
6.3.1 Primary map



X Index: 161

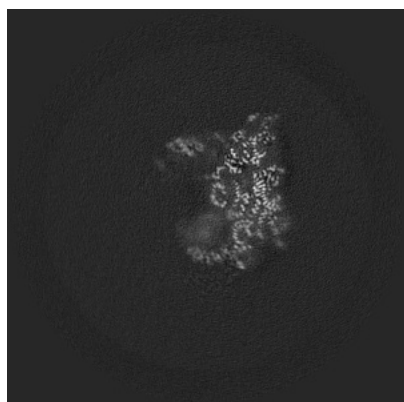


Y Index: 271

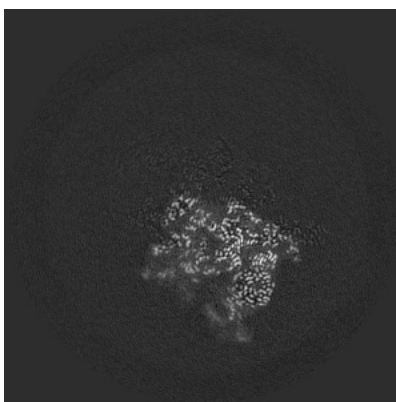


Z Index: 247

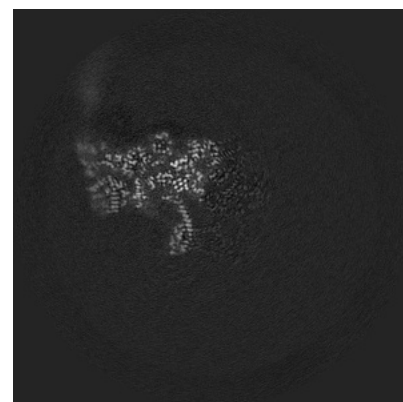
6.3.2 Raw map



X Index: 158



Y Index: 260

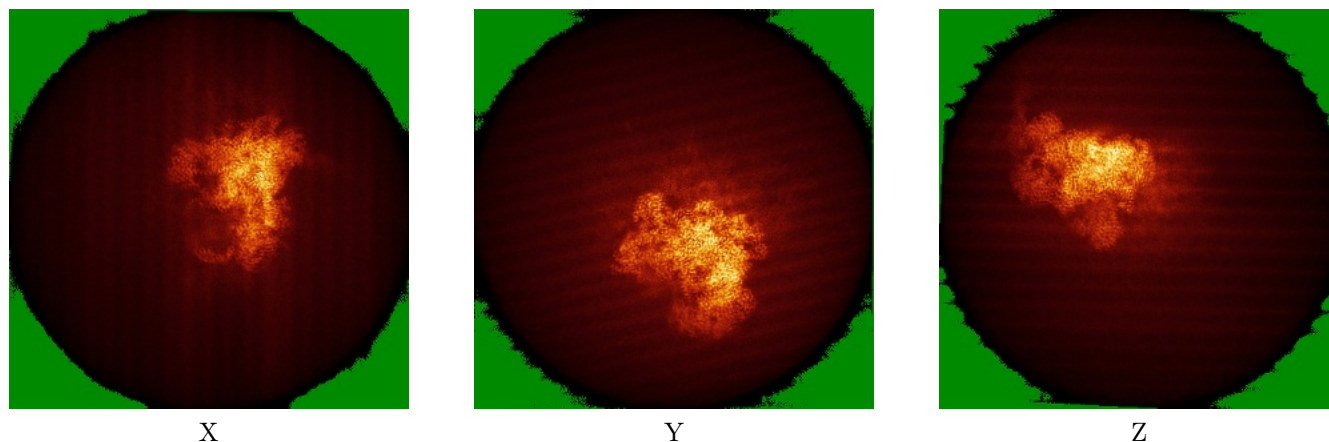


Z Index: 249

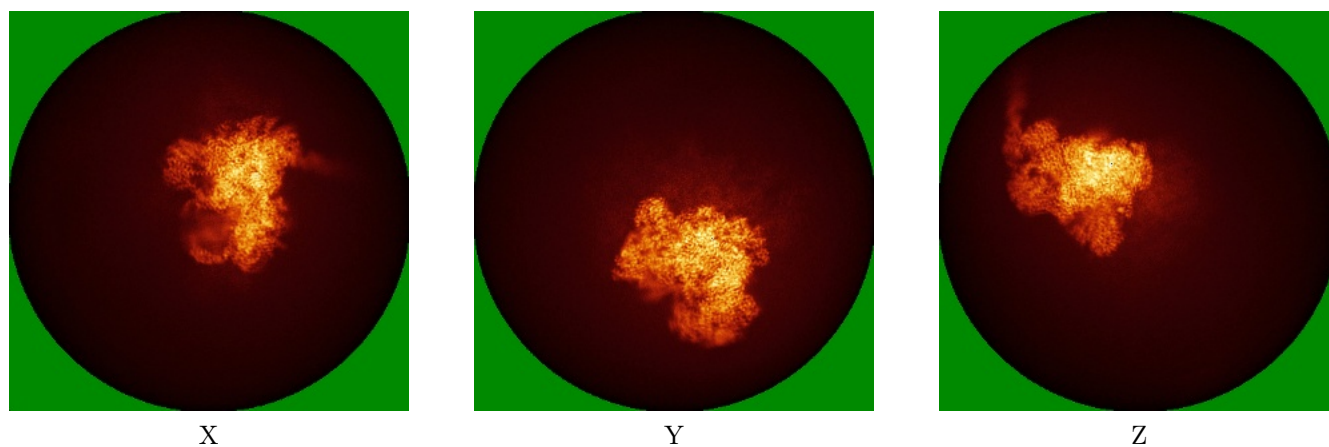
The images above show the largest variance slices of the map in three orthogonal directions.

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.

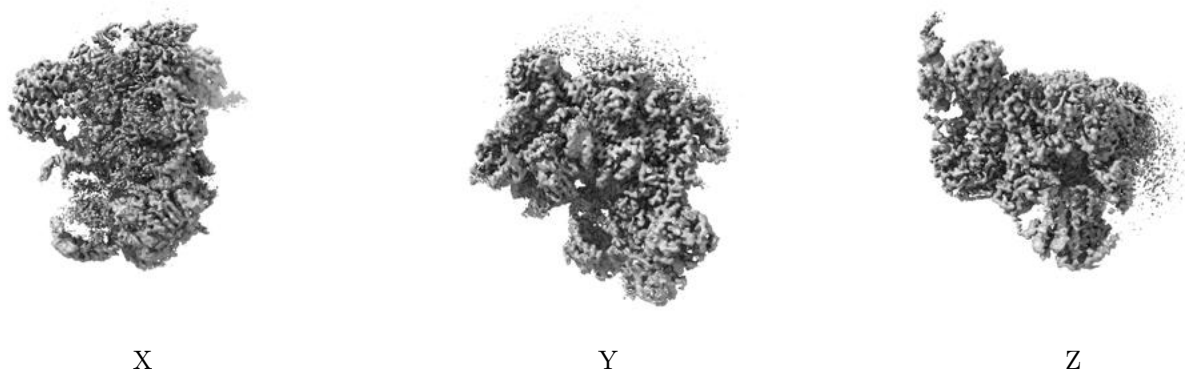
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.012. 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.

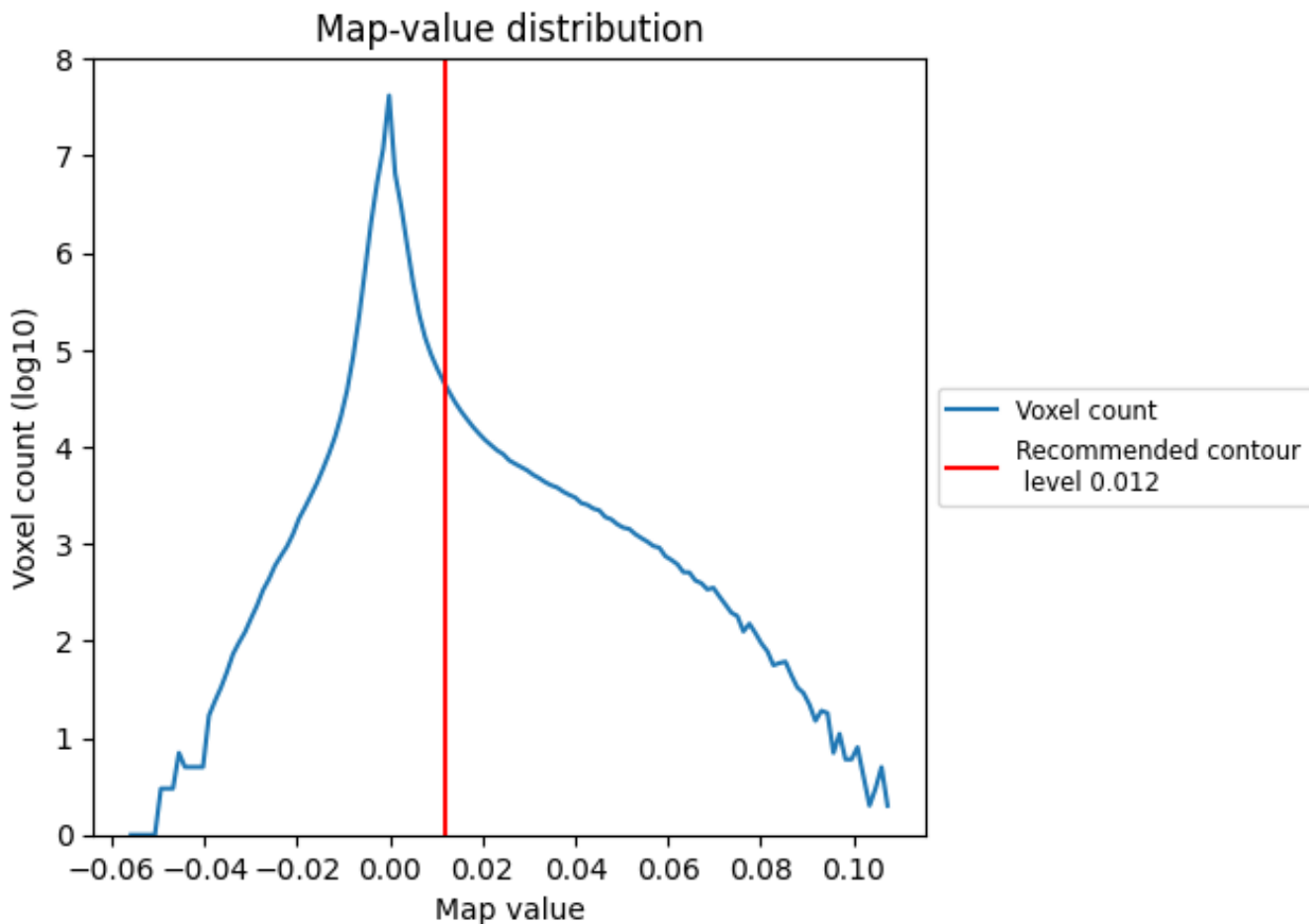
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

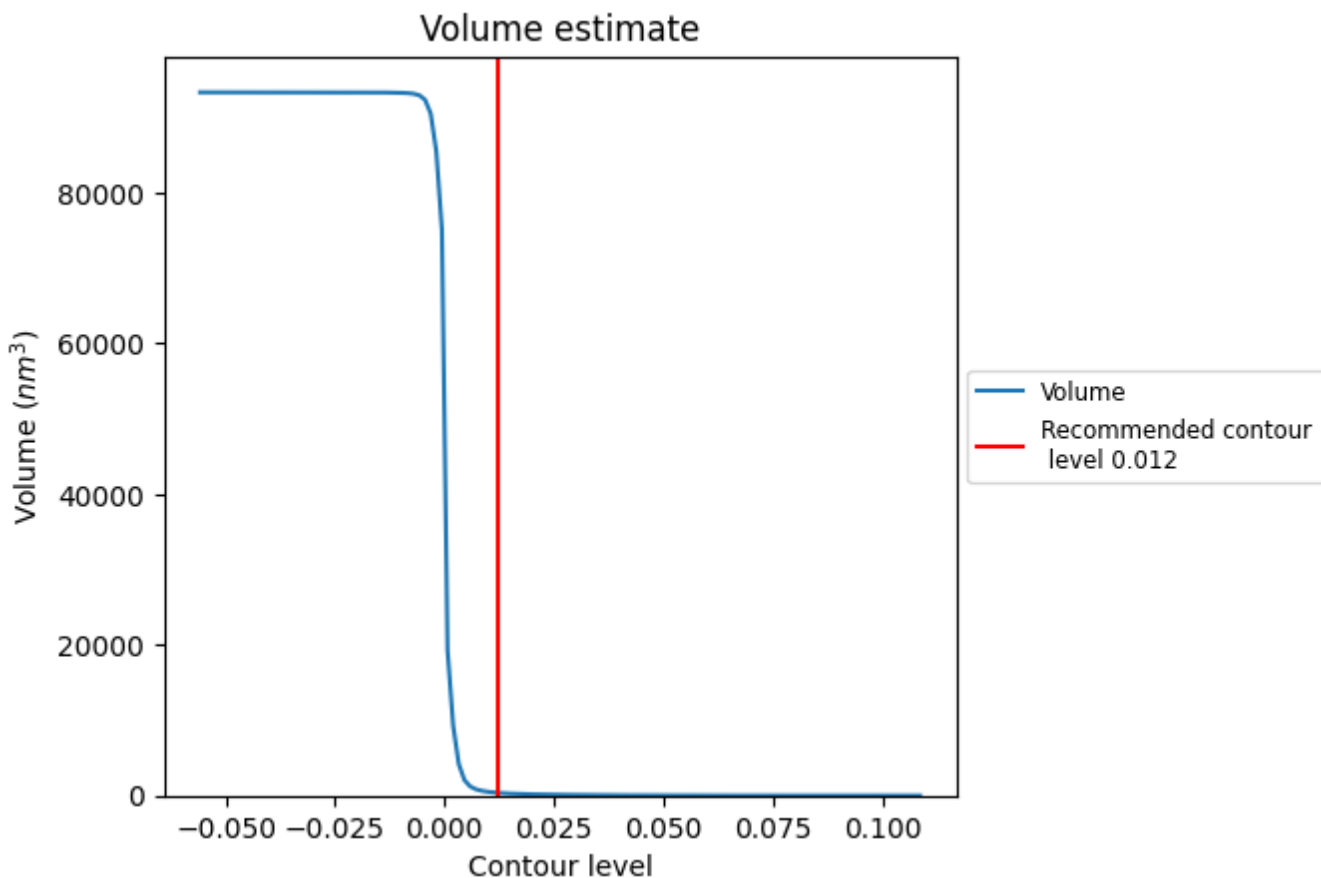
This section contains the results of statistical analysis of the map.

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.

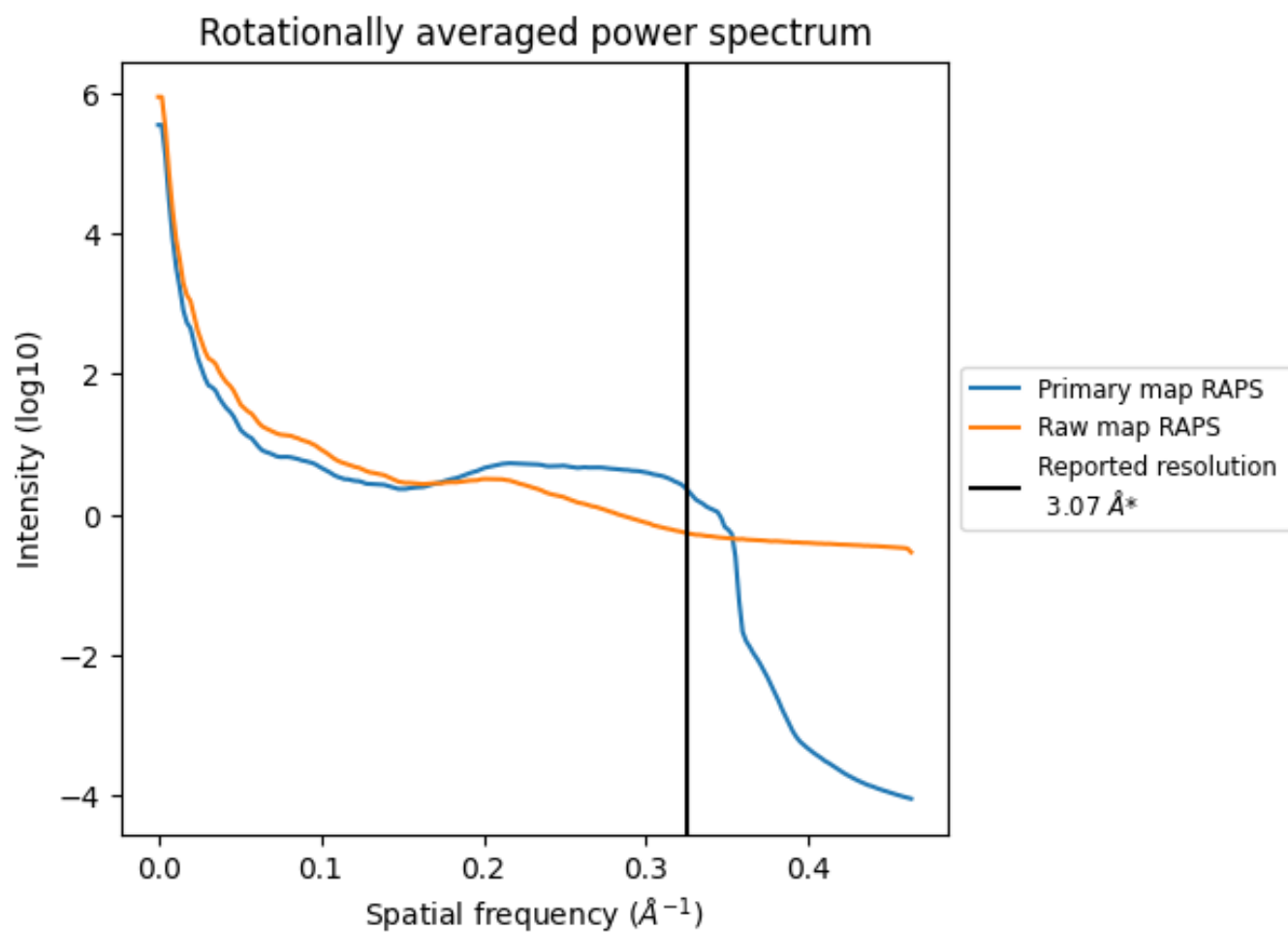
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 369 nm³; this corresponds to an approximate mass of 334 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

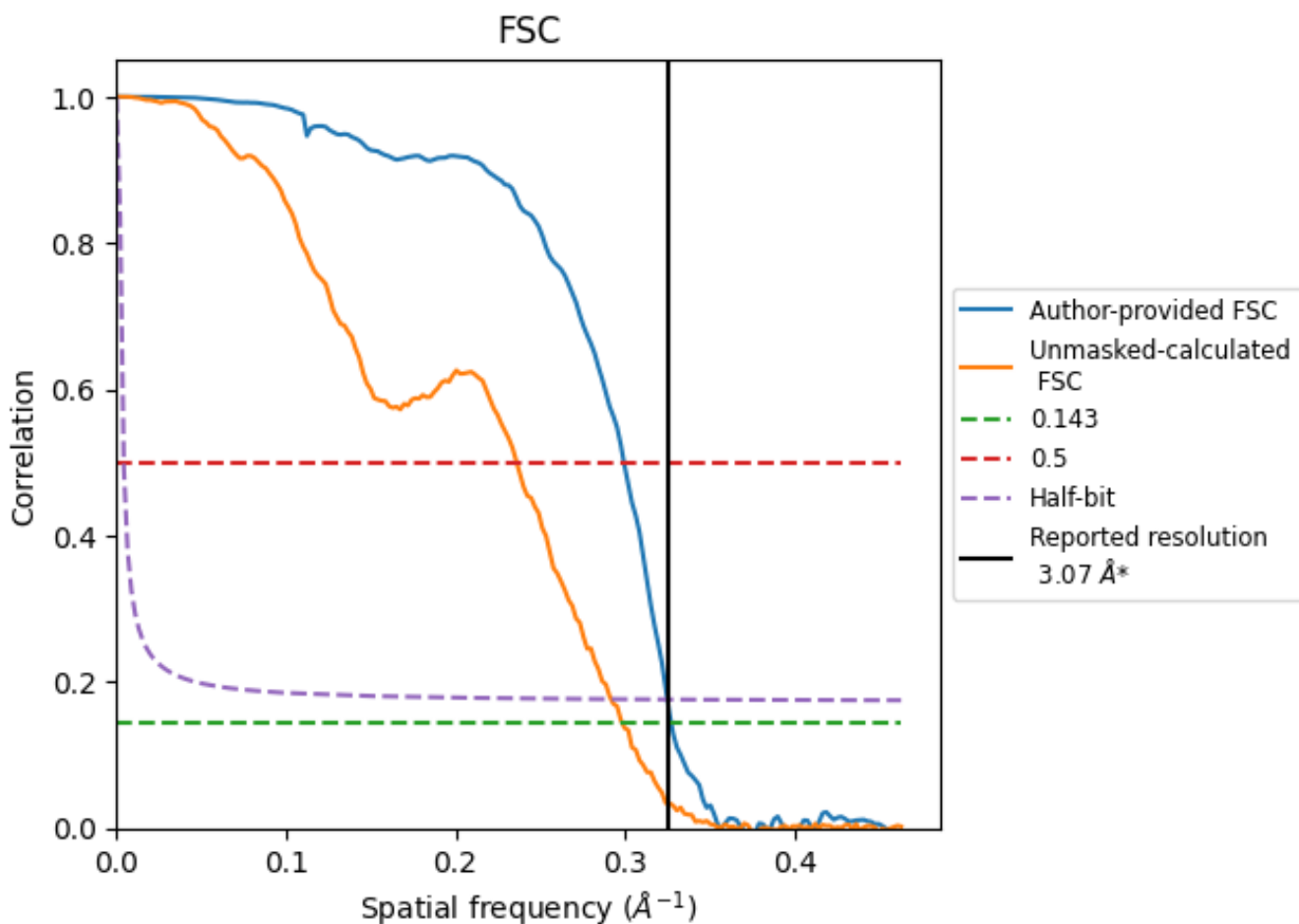


*Reported resolution corresponds to spatial frequency of 0.326 Å⁻¹

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 0.326 Å⁻¹

8.2 Resolution estimates [i](#)

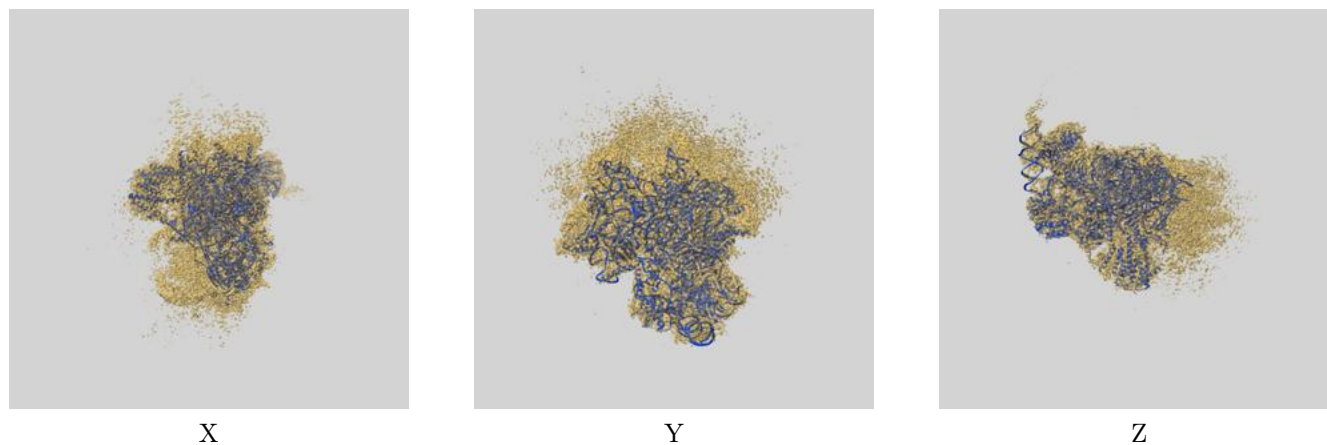
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.07	-	-
Author-provided FSC curve	3.06	3.34	3.08
Unmasked-calculated*	3.35	4.24	3.43

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

9 Map-model fit [i](#)

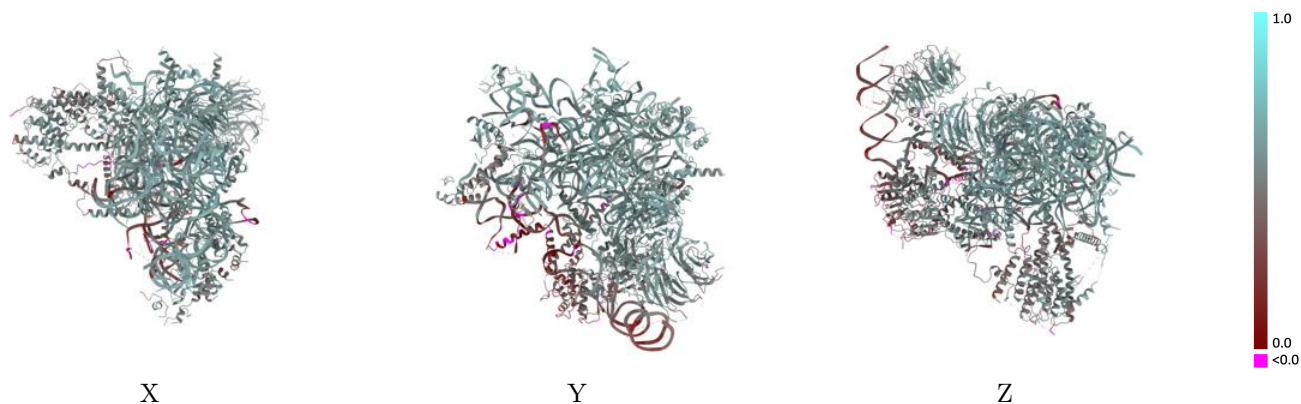
This section contains information regarding the fit between EMDB map EMD-24290 and PDB model 7R72. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.012 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 [\(i\)](#)



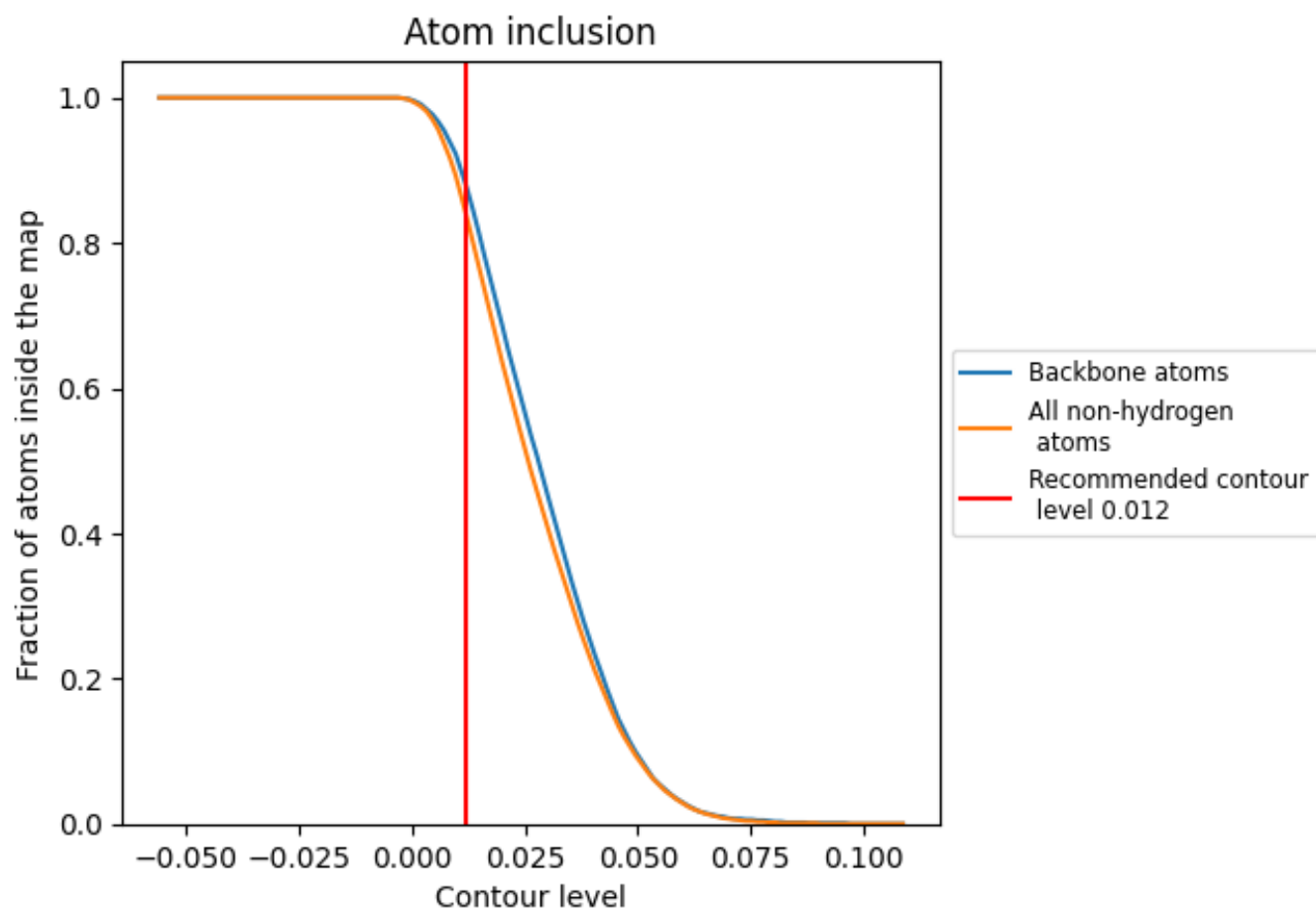
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.012).



















































9.4 Atom inclusion [i](#)



At the recommended contour level, 88% of all backbone atoms, 84% 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 (0.012) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8400	 0.5190
1	 0.8820	 0.5180
2	 0.9450	 0.5870
8	 0.8310	 0.5190
B	 0.8890	 0.4960
G	 0.9220	 0.5630
I	 0.7920	 0.4860
P	 0.8060	 0.5180
R	 0.8630	 0.5490
U	 0.8750	 0.5370
X	 0.9440	 0.5930
Z	 0.9460	 0.6070
b	 0.7740	 0.4770
c	 0.9370	 0.5790
d	 0.8460	 0.5550
g	 0.9540	 0.6010
j	 0.9120	 0.6040
k	 0.9010	 0.5760
m	 0.9490	 0.5980
n	 0.9470	 0.5950
p	 0.7910	 0.5200
t	 0.9090	 0.5980
u	 0.7830	 0.4630
w	 0.6350	 0.4580
x	 0.6010	 0.3860

