



wwPDB EM Validation Summary Report ⓘ

Jun 17, 2026 – 03:30 pm BST

PDB ID : 9FY0 / pdb_00009fy0
EMDB ID : EMD-50854
Title : Cryo-EM structure of *Saccharolobus solfataricus* 30S initiation complex bound to Ss-aIF2beta leaderless mRNA
Authors : Bourgeois, G.; Coureux, P.D.; Mechulam, Y.; Schmitt, E.
Deposited on : 2024-07-02
Resolution : 2.90 Å(reported)

This is a wwPDB EM Validation Summary 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 : 1.8.4, CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
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

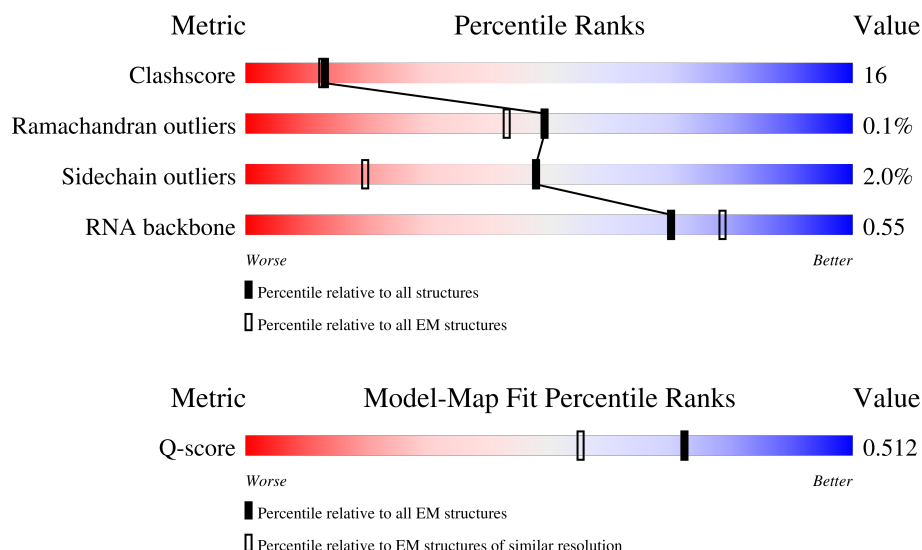
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.90 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	13054 (2.40 - 3.40)

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	2	1497	
2	A	208	
3	B	231	

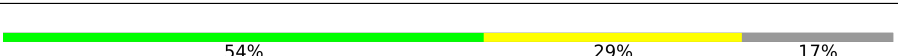
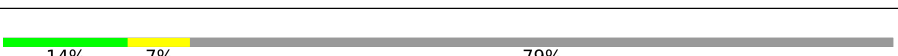
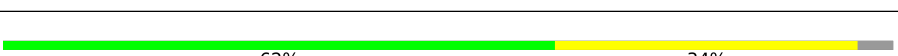
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Mol	Chain	Length	Quality of chain
4	C	65	
5	D	181	
6	E	239	
7	F	214	
8	G	214	
9	H	193	
10	I	133	
11	J	133	
12	K	137	
13	L	102	
14	M	132	
15	N	147	
16	O	165	
17	P	54	
18	Q	152	
19	R	114	
20	S	79	
21	T	140	
22	U	158	
23	V	120	
24	W	66	
25	X	83	
26	Y	75	
27	Z	229	
28	3	127	

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Mol	Chain	Length	Quality of chain
29	a	72	
30	c	110	
31	d	72	
32	e	52	
33	4	77	
34	5	14	
35	b	95	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
36	SPM	2	1533	-	-	X	-
36	SPM	2	1540	-	-	X	-

2 Entry composition

There are 40 unique types of molecules in this entry. The entry contains 66880 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 rRNA 16S.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	2	1494	Total	C	N	O	P	0	0
			32141	14332	5936	10379	1494		

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
2	843	4AC	C	modified residue	GB AE006641.1
2	930	C4J	U	modified residue	GB AE006641.1
2	1466	4AC	C	modified residue	GB AE006641.1
2	1467	4AC	C	modified residue	GB AE006641.1
2	1477	4AC	C	modified residue	GB AE006641.1
2	1478	4AC	C	modified residue	GB AE006641.1
2	1496	C	A	conflict	GB AE006641.1

- Molecule 2 is a protein called Small ribosomal subunit protein eS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	186	Total	C	N	O	S	0	0
			1515	974	261	278	2		

- Molecule 3 is a protein called Small ribosomal subunit protein uS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	B	215	Total	C	N	O	S	0	0
			1698	1092	291	312	3		

- Molecule 4 is a protein called Small zinc finger protein HVO-2753-like zinc-binding pocket domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	C	58	Total	C	N	O	S	0	0
			455	282	84	81	8		

- Molecule 5 is a protein called Small ribosomal subunit protein uS4.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	D	166	Total	C	N	O	S	0	0
			1354	864	249	240	1		

- Molecule 6 is a protein called Small ribosomal subunit protein eS4.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	E	238	Total	C	N	O	S	0	0
			1930	1238	342	344	6		

- Molecule 7 is a protein called Small ribosomal subunit protein uS5.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	F	210	Total	C	N	O	S	0	0
			1625	1041	275	303	6		

- Molecule 8 is a protein called Small ribosomal subunit protein eS6.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	G	213	Total	C	N	O	S	0	0
			1661	1052	292	315	2		

- Molecule 9 is a protein called Small ribosomal subunit protein uS7.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	H	191	Total	C	N	O	S	0	0
			1534	977	281	273	3		

- Molecule 10 is a protein called Small ribosomal subunit protein uS8.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	I	132	Total	C	N	O	S	0	0
			1050	675	187	182	6		

- Molecule 11 is a protein called Small ribosomal subunit protein eS8.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	J	127	Total	C	N	O		0	0
			982	617	186	179			

- Molecule 12 is a protein called Small ribosomal subunit protein uS9.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	K	133	Total	C	N	O	S	0	0
			1068	675	201	185	7		

- Molecule 13 is a protein called Small ribosomal subunit protein uS10.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	L	101	Total	C	N	O	S	0	0
			840	536	157	142	5		

- Molecule 14 is a protein called Small ribosomal subunit protein uS11.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	M	127	Total	C	N	O	S	0	0
			944	587	184	170	3		

- Molecule 15 is a protein called Small ribosomal subunit protein uS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	N	146	Total	C	N	O	S	0	0
			1140	723	220	193	4		

- Molecule 16 is a protein called Small ribosomal subunit protein uS13.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	O	140	Total	C	N	O	S	0	0
			1124	708	210	202	4		

- Molecule 17 is a protein called Small ribosomal subunit protein uS14.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	P	53	Total	C	N	O	S	0	0
			440	282	80	74	4		

- Molecule 18 is a protein called Small ribosomal subunit protein uS15.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	Q	145	Total	C	N	O	S	0	0
			1185	753	224	205	3		

- Molecule 19 is a protein called Small ribosomal subunit protein uS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	R	113	Total	C	N	O	S	0	0
			901	570	166	161	4		

- Molecule 20 is a protein called Small ribosomal subunit protein eS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	S	66	Total	C	N	O	S	0	0
			571	364	101	105	1		

- Molecule 21 is a protein called Small ribosomal subunit protein uS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	T	128	Total	C	N	O	S	0	0
			1064	684	192	184	4		

- Molecule 22 is a protein called Small ribosomal subunit protein eS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	U	154	Total	C	N	O	S	0	0
			1247	805	223	217	2		

- Molecule 23 is a protein called Small ribosomal subunit protein eS24.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	V	107	Total	C	N	O	S	0	0
			836	524	154	156	2		

- Molecule 24 is a protein called Small ribosomal subunit protein eS27.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	W	65	Total	C	N	O	S	0	0
			503	319	93	84	7		

- Molecule 25 is a protein called Small ribosomal subunit protein eS28.

Mol	Chain	Residues	Atoms				AltConf	Trace
25	X	67	Total	C	N	O	0	0
			535	335	103	97		

- Molecule 26 is a protein called Small ribosomal subunit protein eS31.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	Y	49	Total	C	N	O	S	0	0
			395	252	73	65	5		

- Molecule 27 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	Z	196	Total	C	N	O	S	0	0
			1561	1009	274	272	6		

- Molecule 28 is a protein called Large ribosomal subunit protein eL8.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	3	117	Total	C	N	O	S	0	0
			893	567	149	175	2		

- Molecule 29 is a protein called aS34.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	a	71	Total	C	N	O	S	0	0
			562	361	98	96	7		

- Molecule 30 is a protein called Small ribosomal subunit protein eS25.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	c	109	Total	C	N	O	S	0	0
			856	539	152	164	1		

- Molecule 31 is a protein called aS33.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	d	68	Total	C	N	O	S	0	0
			557	362	90	103	2		

- Molecule 32 is a protein called LSU ribosomal protein S30E (Rps30E).

Mol	Chain	Residues	Atoms				AltConf	Trace
32	e	43	Total	C	N	O	0	0
			354	220	74	60		

- Molecule 33 is a RNA chain called tRNA met initiator.

Mol	Chain	Residues	Atoms						AltConf	Trace
33	4	77	Total	C	N	O	P	S	0	0
			1645	734	296	537	77	1		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
4	1	A	C	engineered mutation	GB 1334604293
4	72	U	A	engineered mutation	GB 1334604293

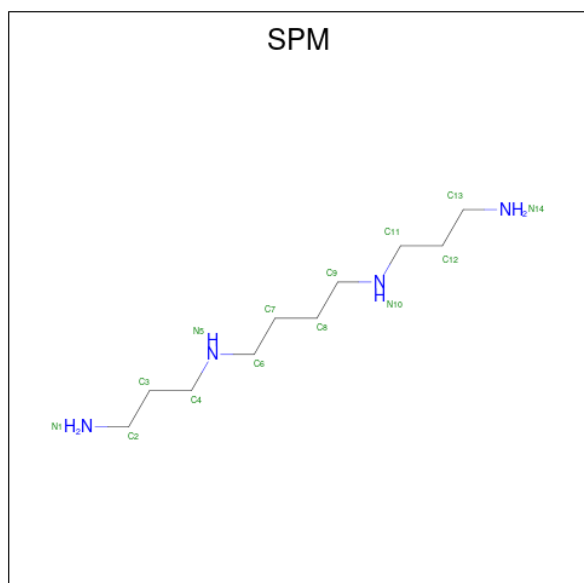
- Molecule 34 is a RNA chain called Ss_aIF2beta mRNA.

Mol	Chain	Residues	Atoms						AltConf	Trace
34	5	3	Total	C	N	O	P		0	0
			47	19	7	18	3			

- Molecule 35 is a protein called LSU ribosomal protein S26E (Rps26E).

Mol	Chain	Residues	Atoms						AltConf	Trace
35	b	91	Total	C	N	O	S		0	0
			704	437	134	126	7			

- Molecule 36 is SPERMINE (CCD ID: SPM) (formula: C₁₀H₂₆N₄).



Mol	Chain	Residues	Atoms			AltConf
36	2	1	Total	C	N	0
			14	10	4	

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Mol	Chain	Residues	Atoms			AltConf
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	

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Mol	Chain	Residues	Atoms			AltConf
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	2	1	Total	C	N	0
			14	10	4	
36	E	1	Total	C	N	0
			14	10	4	

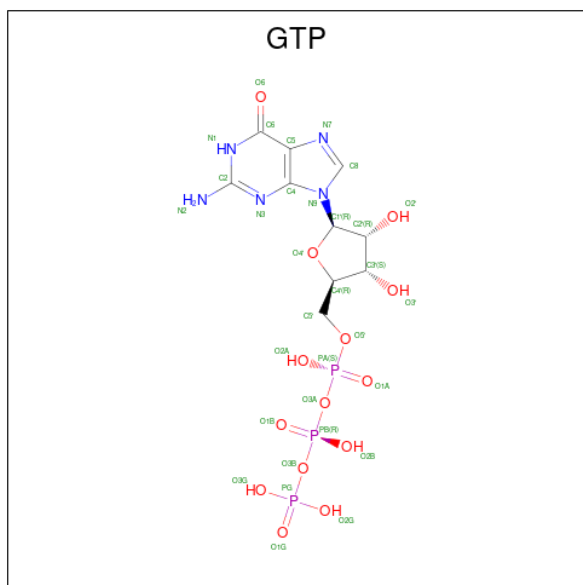
- Molecule 37 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
37	2	46	Total 46	Mg 46	0
37	5	1	Total 1	Mg 1	0

- Molecule 38 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
38	C	2	Total 2	Zn 2	0
38	F	1	Total 1	Zn 1	0
38	P	1	Total 1	Zn 1	0
38	R	1	Total 1	Zn 1	0
38	W	1	Total 1	Zn 1	0
38	a	2	Total 2	Zn 2	0
38	b	1	Total 1	Zn 1	0

- Molecule 39 is GUANOSINE-5'-TRIPHOSPHATE (CCD ID: GTP) (formula: C₁₀H₁₆N₅O₁₄P₃).



Mol	Chain	Residues	Atoms					AltConf
39	5	1	Total	C	N	O	P	0
			32	10	5	14	3	

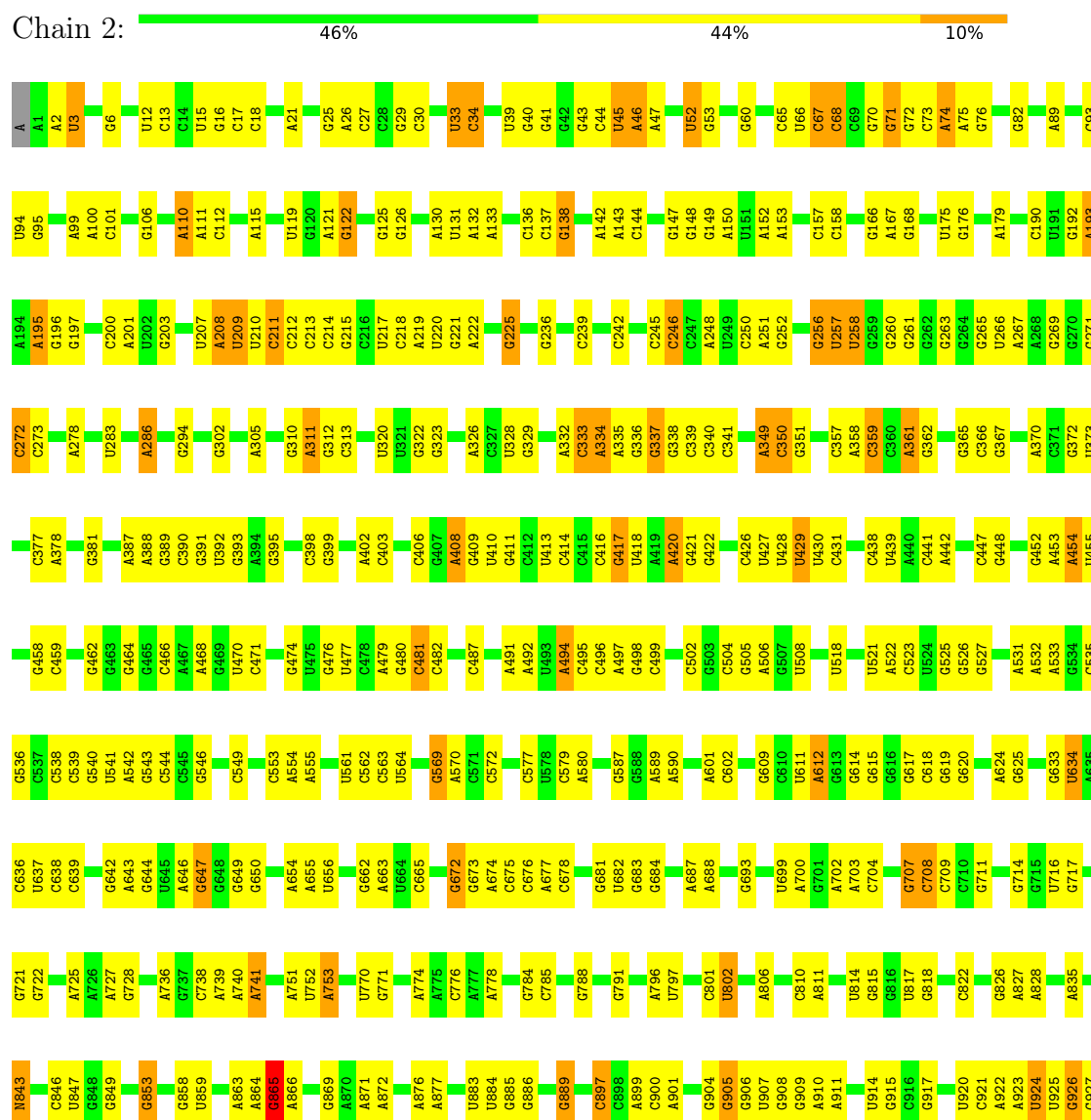
- Molecule 40 is water.

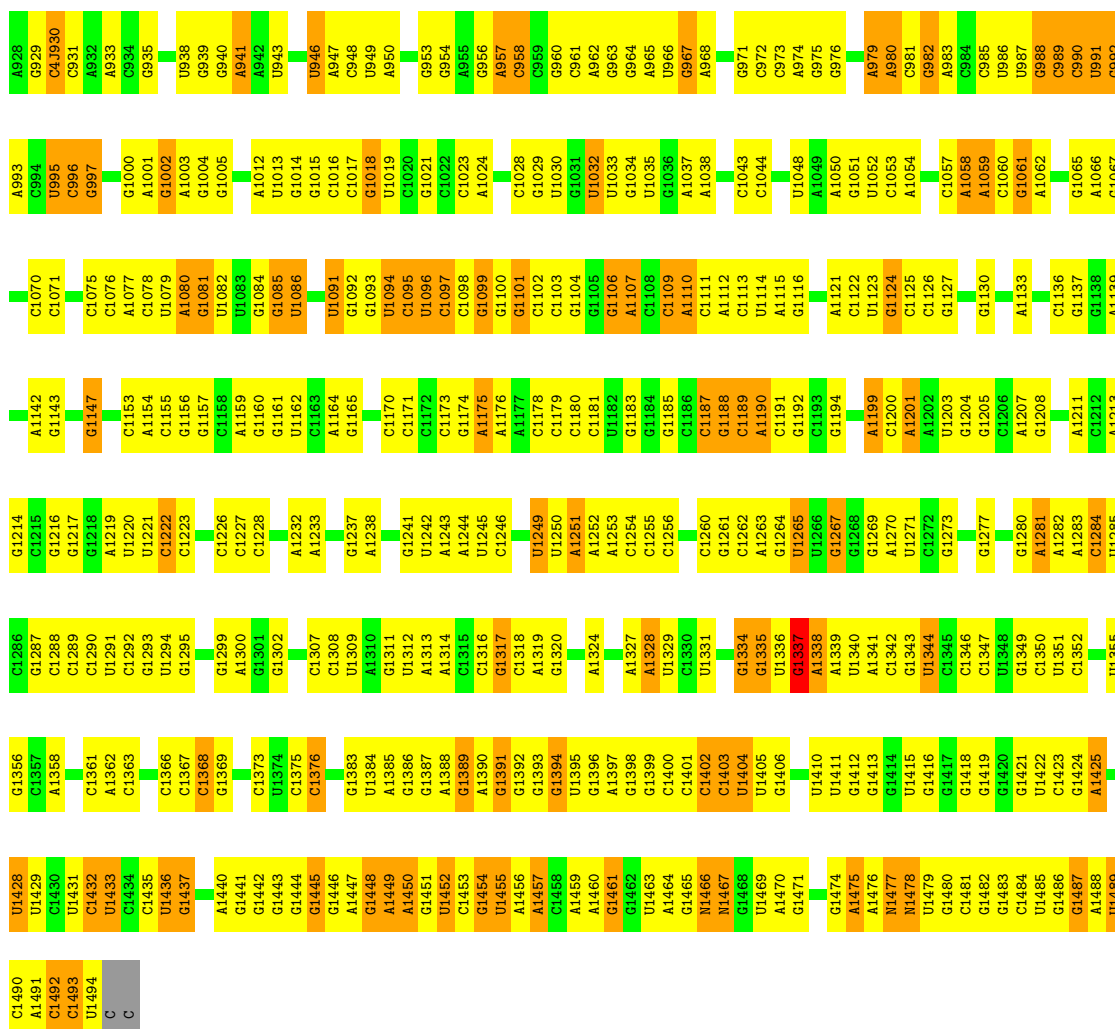
Mol	Chain	Residues	Atoms		AltConf
40	2	240	Total	O	0
			240	240	
40	E	3	Total	O	0
			3	3	
40	F	6	Total	O	0
			6	6	
40	H	1	Total	O	0
			1	1	
40	I	2	Total	O	0
			2	2	
40	J	1	Total	O	0
			1	1	
40	K	5	Total	O	0
			5	5	
40	L	2	Total	O	0
			2	2	
40	O	1	Total	O	0
			1	1	
40	Q	1	Total	O	0
			1	1	
40	R	1	Total	O	0
			1	1	
40	V	1	Total	O	0
			1	1	
40	W	1	Total	O	0
			1	1	
40	4	2	Total	O	0
			2	2	
40	5	3	Total	O	0
			3	3	
40	b	3	Total	O	0
			3	3	

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.

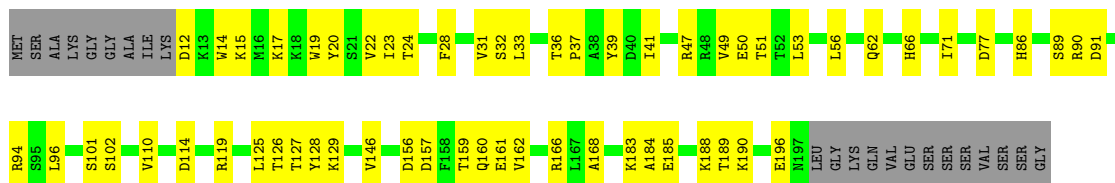
• Molecule 1: rRNA 16S





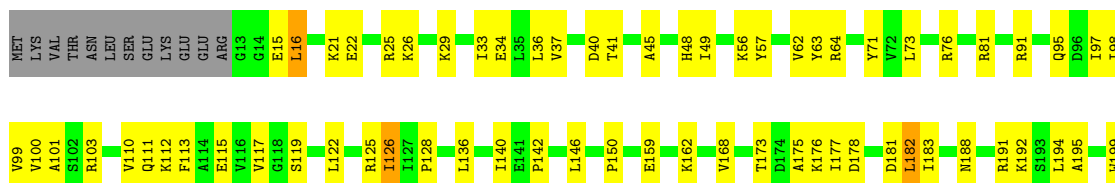
• Molecule 2: Small ribosomal subunit protein eS1

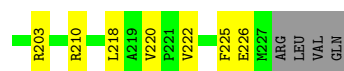
Chain A: 61% 28% 11%



• Molecule 3: Small ribosomal subunit protein uS2

Chain B: 61% 30% 7%

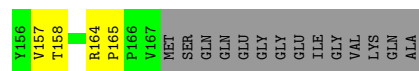




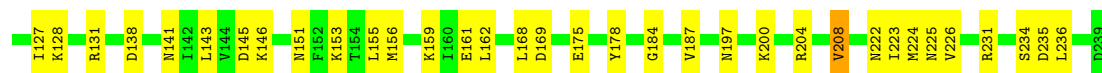
- Molecule 4: Small zinc finger protein HVO-2753-like zinc-binding pocket domain-containing protein



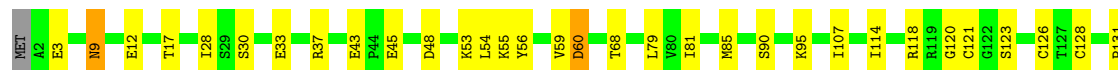
- Molecule 5: Small ribosomal subunit protein uS4



- Molecule 6: Small ribosomal subunit protein eS4

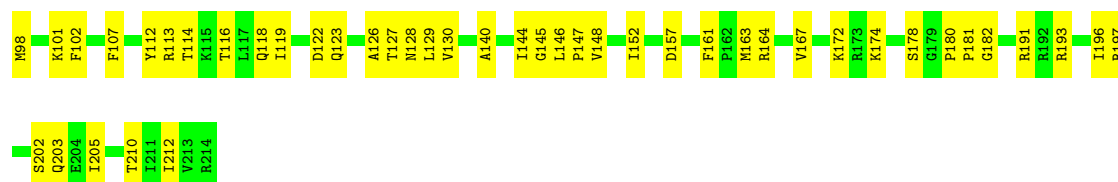


- Molecule 7: Small ribosomal subunit protein uS5

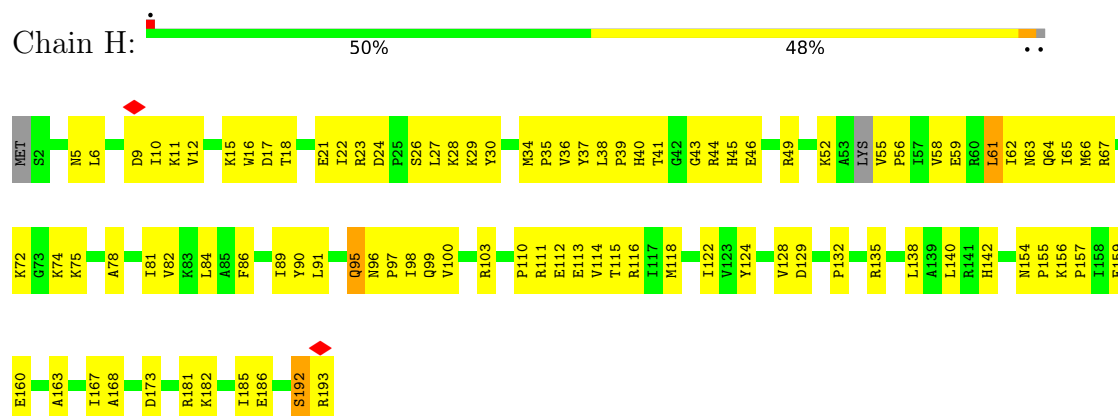


- Molecule 8: Small ribosomal subunit protein eS6

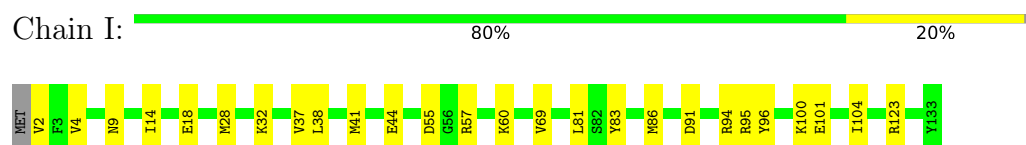




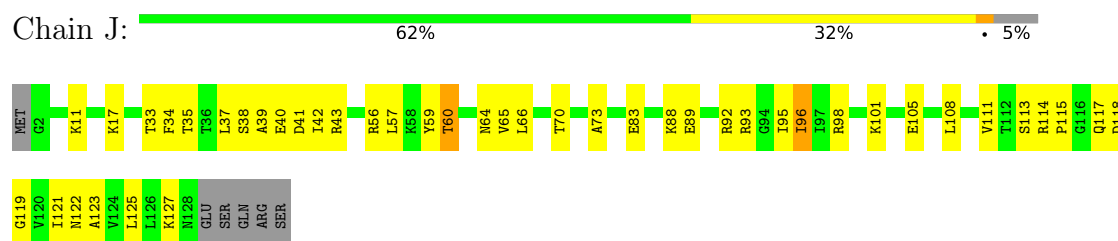
- Molecule 9: Small ribosomal subunit protein uS7



- Molecule 10: Small ribosomal subunit protein uS8



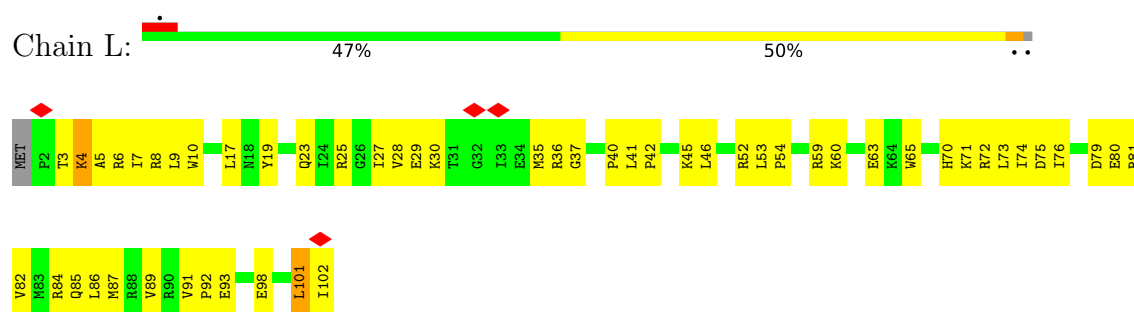
- Molecule 11: Small ribosomal subunit protein eS8



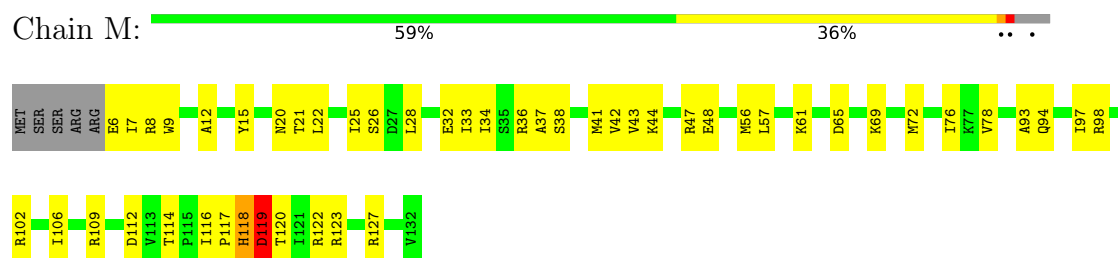
- Molecule 12: Small ribosomal subunit protein uS9



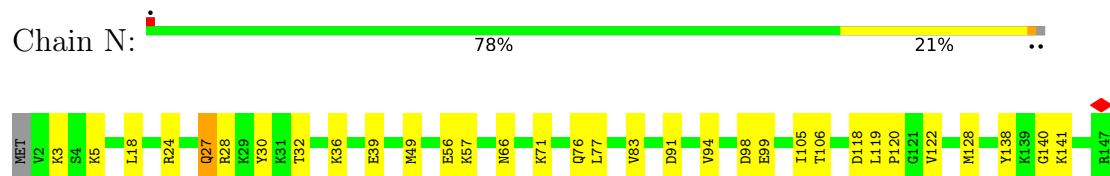
- Molecule 13: Small ribosomal subunit protein uS10



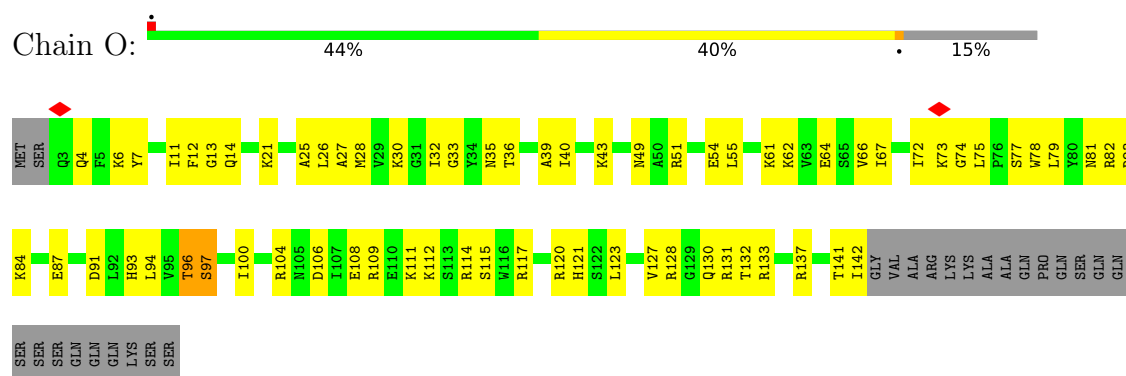
- Molecule 14: Small ribosomal subunit protein uS11



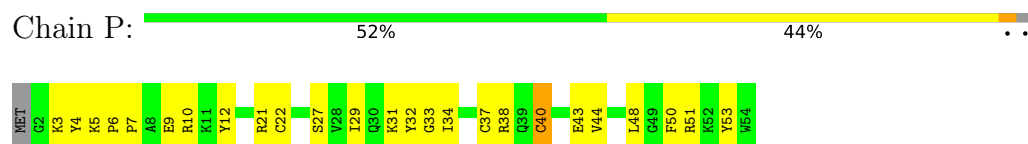
- Molecule 15: Small ribosomal subunit protein uS12



- Molecule 16: Small ribosomal subunit protein uS13

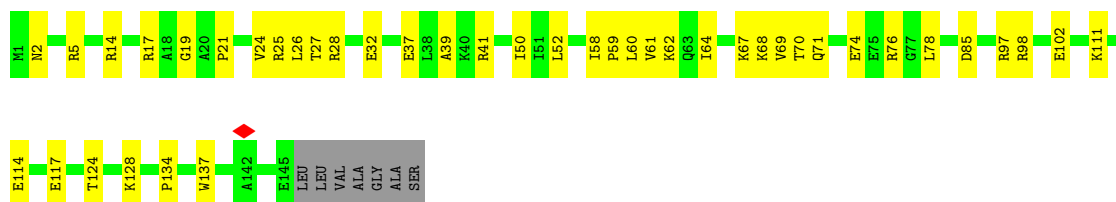


- Molecule 17: Small ribosomal subunit protein uS14

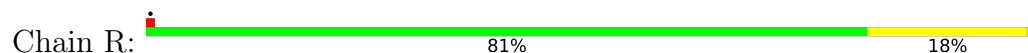


- Molecule 18: Small ribosomal subunit protein uS15





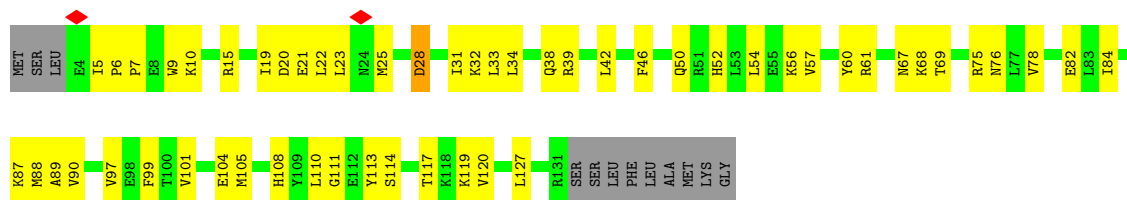
- Molecule 19: Small ribosomal subunit protein uS17



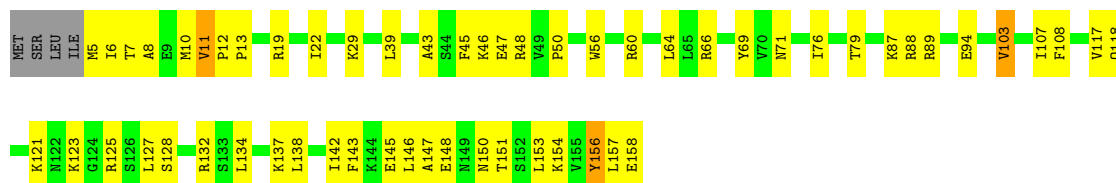
- Molecule 20: Small ribosomal subunit protein eS17



- Molecule 21: Small ribosomal subunit protein uS19

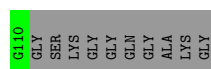


- Molecule 22: Small ribosomal subunit protein eS19



- Molecule 23: Small ribosomal subunit protein eS24



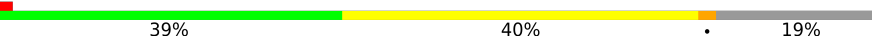


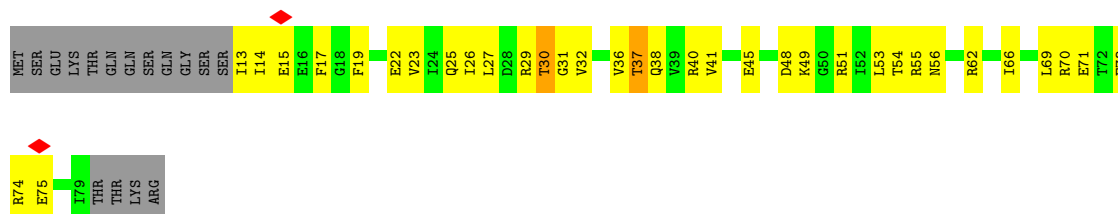
- Molecule 24: Small ribosomal subunit protein eS27

Chain W:  80% 17% ..

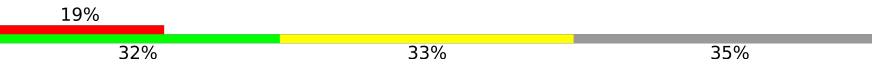


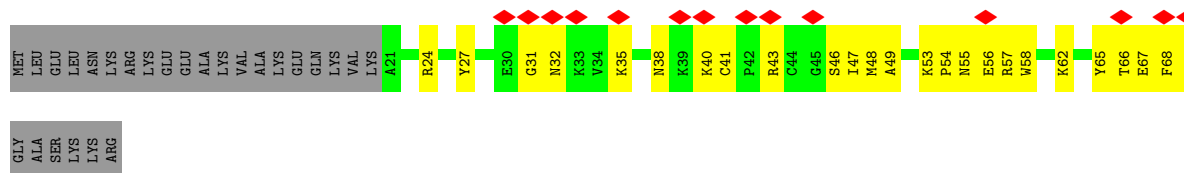
- Molecule 25: Small ribosomal subunit protein eS28

Chain X:  39% 40% 19%



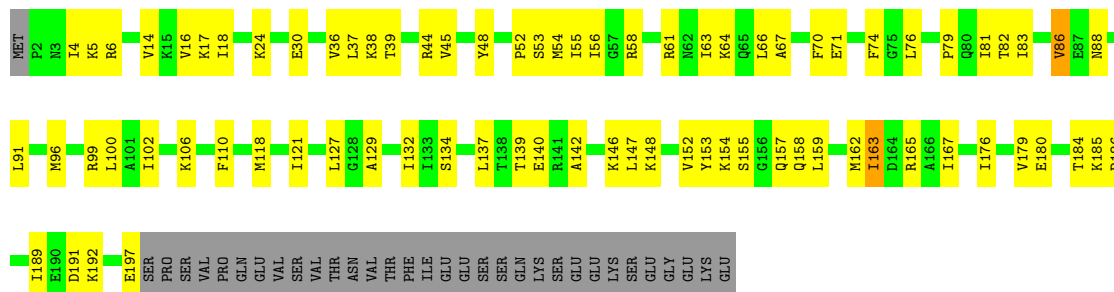
- Molecule 26: Small ribosomal subunit protein eS31

Chain Y:  19% 32% 33% 35%



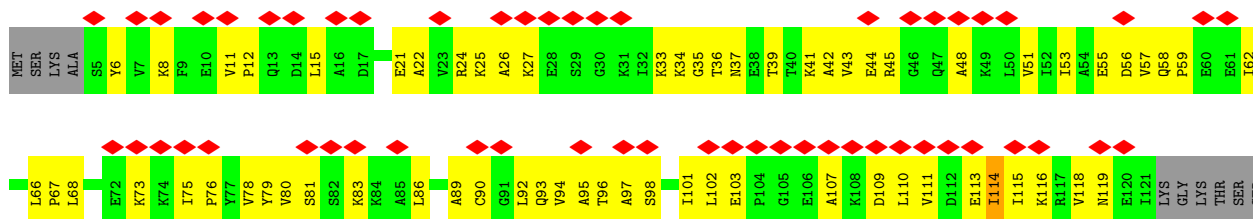
- Molecule 27: Small ribosomal subunit protein uS3

Chain Z:  52% 33% 14%



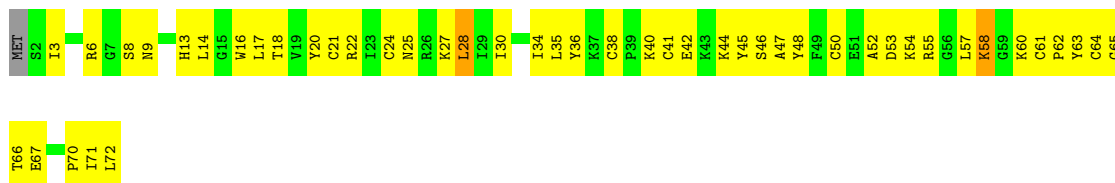
- Molecule 28: Large ribosomal subunit protein eL8

Chain 3:  43% 41% 50% 8%



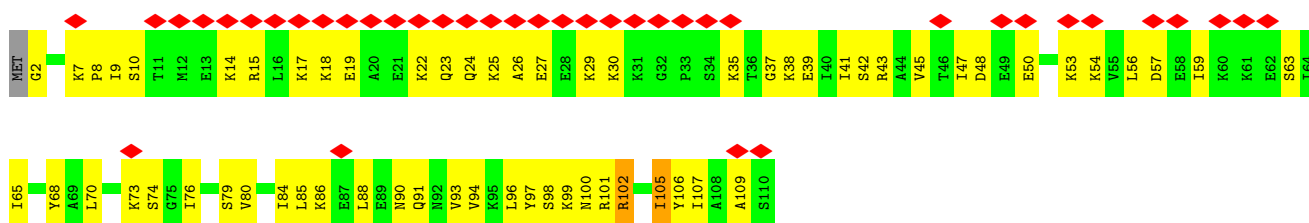
- Molecule 29: aS34

Chain a: 33% 62% ..



- Molecule 30: Small ribosomal subunit protein eS25

Chain c: 36% 43% 55% ..



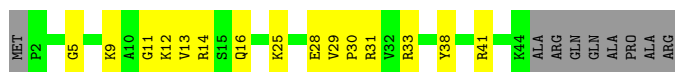
- Molecule 31: aS33

Chain d: 7% 50% 43% 6%



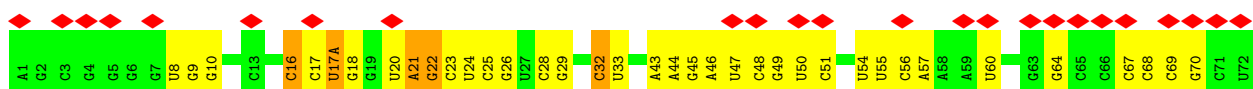
- Molecule 32: LSU ribosomal protein S30E (Rps30E)

Chain e: 54% 29% 17%



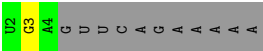
- Molecule 33: tRNA met initiator

Chain 4: 36% 49% 42% 9%





● Molecule 34: Ss_aIF2beta mRNA



● Molecule 35: LSU ribosomal protein S26E (Rps26E)



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	43812	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.045	Depositor
Minimum map value	-0.012	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.004	Depositor
Map size (Å)	361.19998, 361.19998, 361.19998	wwPDB
Map dimensions	516, 516, 516	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.7, 0.7, 0.7	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: PSU, H2U, 4AC, 5MU, ZN, A2M, 6MZ, MA6, OMC, GTP, 4SU, OMG, SPM, OMU, MG, C4J, 5MC

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	2	0.28	1/35139 (0.0%)	0.30	1/54824 (0.0%)
2	A	0.22	0/1543	0.35	0/2077
3	B	0.18	0/1731	0.35	0/2349
4	C	0.25	0/466	0.47	0/625
5	D	0.26	0/1380	0.34	0/1859
6	E	0.25	0/1965	0.32	0/2644
7	F	0.26	0/1654	0.36	0/2240
8	G	0.17	0/1684	0.32	0/2265
9	H	0.19	0/1561	0.46	0/2102
10	I	0.27	0/1070	0.34	0/1444
11	J	0.25	0/994	0.40	0/1337
12	K	0.20	0/1084	0.44	0/1450
13	L	0.21	0/856	0.49	0/1154
14	M	0.30	0/960	0.75	5/1294 (0.4%)
15	N	0.26	0/1155	0.40	0/1540
16	O	0.20	0/1142	0.50	1/1532 (0.1%)
17	P	0.23	0/451	0.39	0/600
18	Q	0.22	0/1206	0.34	0/1618
19	R	0.26	0/918	0.33	0/1236
20	S	0.20	0/578	0.44	0/770
21	T	0.18	0/1087	0.40	0/1456
22	U	0.18	0/1270	0.41	0/1710
23	V	0.21	0/843	0.34	0/1124
24	W	0.26	0/511	0.50	0/684
25	X	0.17	0/538	0.41	0/722
26	Y	0.22	0/404	0.57	0/540
27	Z	0.20	0/1584	0.41	0/2124
28	3	0.17	0/902	0.40	0/1216
29	a	0.20	0/574	0.52	0/770
30	c	0.19	0/861	0.49	0/1143
31	d	0.17	0/568	0.47	0/769

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
32	e	0.19	0/360	0.49	0/477
33	4	0.18	0/1725	0.25	0/2687
34	5	0.32	0/51	0.48	0/78
35	b	0.28	0/713	0.67	1/951 (0.1%)
All	All	0.25	1/69528 (0.0%)	0.36	8/101411 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	2	1337	G	O3'-P	5.70	1.69	1.61

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	2	1109	C	C5'-C4'-O4'	-15.04	86.53	109.10
14	M	116	ILE	O-C-N	-13.77	109.59	121.57
14	M	118	HIS	CA-C-N	6.62	134.18	121.54
14	M	118	HIS	C-N-CA	6.62	134.18	121.54
35	b	22	SER	CA-CB-OG	-6.28	98.55	111.10

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	2	32141	0	16256	766	0
2	A	1515	0	1565	52	0
3	B	1698	0	1753	54	0
4	C	455	0	437	29	0
5	D	1354	0	1419	32	0
6	E	1930	0	2013	43	0
7	F	1625	0	1689	42	0
8	G	1661	0	1737	55	0
9	H	1534	0	1597	110	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
10	I	1050	0	1100	19	0
11	J	982	0	1046	40	0
12	K	1068	0	1125	65	0
13	L	840	0	893	54	0
14	M	944	0	978	54	0
15	N	1140	0	1244	26	0
16	O	1124	0	1162	92	0
17	P	440	0	435	28	0
18	Q	1185	0	1260	29	0
19	R	901	0	935	18	0
20	S	571	0	598	26	0
21	T	1064	0	1107	52	0
22	U	1247	0	1329	51	0
23	V	836	0	894	24	0
24	W	503	0	532	9	0
25	X	535	0	572	31	0
26	Y	395	0	405	32	0
27	Z	1561	0	1667	81	0
28	3	893	0	940	58	0
29	a	562	0	575	52	0
30	c	856	0	939	82	0
31	d	557	0	576	48	0
32	e	354	0	386	20	0
33	4	1645	0	840	31	0
34	5	47	0	21	0	0
35	b	704	0	732	50	0
36	2	588	0	1092	93	0
36	E	14	0	26	1	0
37	2	46	0	0	0	0
37	5	1	0	0	0	0
38	C	2	0	0	0	0
38	F	1	0	0	0	0
38	P	1	0	0	0	0
38	R	1	0	0	0	0
38	W	1	0	0	0	0
38	a	2	0	0	0	0
38	b	1	0	0	0	0
39	5	32	0	11	2	0
40	2	240	0	0	16	0
40	4	2	0	0	0	0
40	5	3	0	0	0	0
40	E	3	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
40	F	6	0	0	3	0
40	H	1	0	0	0	0
40	I	2	0	0	0	0
40	J	1	0	0	0	0
40	K	5	0	0	0	0
40	L	2	0	0	0	0
40	O	1	0	0	1	0
40	Q	1	0	0	0	0
40	R	1	0	0	0	0
40	V	1	0	0	1	0
40	W	1	0	0	0	0
40	b	3	0	0	0	0
All	All	66880	0	51886	1926	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 16.

The worst 5 of 1926 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)
1:2:1189:C:N3	16:O:133:ARG:HA	1.06	1.37
1:2:1189:C:N3	16:O:133:ARG:CA	1.88	1.36
1:2:1337:G:N7	12:K:15:LYS:NZ	1.75	1.33
1:2:1189:C:C2	16:O:133:ARG:HA	1.65	1.32
1:2:1337:G:P	12:K:76:MET:HG3	1.68	1.31

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	
2	A	184/208 (88%)	178 (97%)	6 (3%)	0	100	100
3	B	213/231 (92%)	207 (97%)	6 (3%)	0	100	100
4	C	56/65 (86%)	54 (96%)	2 (4%)	0	100	100
5	D	164/181 (91%)	163 (99%)	1 (1%)	0	100	100
6	E	236/239 (99%)	228 (97%)	8 (3%)	0	100	100
7	F	208/214 (97%)	202 (97%)	6 (3%)	0	100	100
8	G	211/214 (99%)	204 (97%)	7 (3%)	0	100	100
9	H	187/193 (97%)	176 (94%)	11 (6%)	0	100	100
10	I	130/133 (98%)	127 (98%)	3 (2%)	0	100	100
11	J	125/133 (94%)	124 (99%)	1 (1%)	0	100	100
12	K	131/137 (96%)	122 (93%)	9 (7%)	0	100	100
13	L	99/102 (97%)	95 (96%)	4 (4%)	0	100	100
14	M	125/132 (95%)	117 (94%)	7 (6%)	1 (1%)	16	44
15	N	144/147 (98%)	135 (94%)	9 (6%)	0	100	100
16	O	138/165 (84%)	131 (95%)	7 (5%)	0	100	100
17	P	51/54 (94%)	49 (96%)	2 (4%)	0	100	100
18	Q	143/152 (94%)	143 (100%)	0	0	100	100
19	R	111/114 (97%)	110 (99%)	1 (1%)	0	100	100
20	S	64/79 (81%)	63 (98%)	1 (2%)	0	100	100
21	T	126/140 (90%)	123 (98%)	3 (2%)	0	100	100
22	U	152/158 (96%)	145 (95%)	7 (5%)	0	100	100
23	V	105/120 (88%)	102 (97%)	3 (3%)	0	100	100
24	W	63/66 (96%)	57 (90%)	6 (10%)	0	100	100
25	X	65/83 (78%)	54 (83%)	11 (17%)	0	100	100
26	Y	47/75 (63%)	39 (83%)	8 (17%)	0	100	100
27	Z	194/229 (85%)	189 (97%)	5 (3%)	0	100	100
28	3	115/127 (91%)	104 (90%)	11 (10%)	0	100	100
29	a	69/72 (96%)	63 (91%)	6 (9%)	0	100	100
30	c	107/110 (97%)	96 (90%)	10 (9%)	1 (1%)	14	41
31	d	66/72 (92%)	63 (96%)	3 (4%)	0	100	100
32	e	41/52 (79%)	40 (98%)	1 (2%)	0	100	100
35	b	89/95 (94%)	89 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	3959/4292 (92%)	3792 (96%)	165 (4%)	2 (0%)	49 77

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
14	M	119	ASP
30	c	102	ARG

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
2	A	168/184 (91%)	166 (99%)	2 (1%)	63 86
3	B	182/198 (92%)	178 (98%)	4 (2%)	45 77
4	C	51/58 (88%)	51 (100%)	0	100 100
5	D	147/158 (93%)	146 (99%)	1 (1%)	76 92
6	E	214/215 (100%)	209 (98%)	5 (2%)	44 76
7	F	180/184 (98%)	178 (99%)	2 (1%)	65 88
8	G	186/187 (100%)	185 (100%)	1 (0%)	81 93
9	H	165/167 (99%)	160 (97%)	5 (3%)	36 70
10	I	113/114 (99%)	113 (100%)	0	100 100
11	J	104/110 (94%)	101 (97%)	3 (3%)	37 71
12	K	109/113 (96%)	106 (97%)	3 (3%)	38 72
13	L	93/94 (99%)	90 (97%)	3 (3%)	34 68
14	M	93/98 (95%)	91 (98%)	2 (2%)	45 77
15	N	122/123 (99%)	120 (98%)	2 (2%)	55 83
16	O	121/142 (85%)	120 (99%)	1 (1%)	73 90
17	P	45/46 (98%)	44 (98%)	1 (2%)	45 77
18	Q	125/129 (97%)	125 (100%)	0	100 100
19	R	101/102 (99%)	99 (98%)	2 (2%)	48 78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
20	S	63/75 (84%)	61 (97%)	2 (3%)	34	68
21	T	116/126 (92%)	113 (97%)	3 (3%)	40	73
22	U	134/138 (97%)	129 (96%)	5 (4%)	30	64
23	V	92/99 (93%)	90 (98%)	2 (2%)	45	77
24	W	57/58 (98%)	54 (95%)	3 (5%)	20	52
25	X	58/73 (80%)	55 (95%)	3 (5%)	21	52
26	Y	43/65 (66%)	43 (100%)	0	100	100
27	Z	163/195 (84%)	159 (98%)	4 (2%)	42	74
28	3	97/105 (92%)	95 (98%)	2 (2%)	47	77
29	a	61/62 (98%)	58 (95%)	3 (5%)	22	54
30	c	95/96 (99%)	92 (97%)	3 (3%)	34	68
31	d	62/65 (95%)	61 (98%)	1 (2%)	55	83
32	e	40/46 (87%)	40 (100%)	0	100	100
35	b	75/79 (95%)	73 (97%)	2 (3%)	39	73
All	All	3475/3704 (94%)	3405 (98%)	70 (2%)	48	78

5 of 70 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
27	Z	86	VAL
28	3	96	THR
30	c	79	SER
12	K	63	LYS
12	K	30	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 23 such sidechains are listed below:

Mol	Chain	Res	Type
22	U	104	ASN
27	Z	62	ASN
26	Y	50	HIS
30	c	100	ASN
9	H	99	GLN

5.3.3 RNA

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	2	1493/1497 (99%)	266 (17%)	7 (0%)
33	4	76/77 (98%)	12 (15%)	1 (1%)
34	5	1/14 (7%)	1 (100%)	0
All	All	1570/1588 (98%)	279 (17%)	8 (0%)

5 of 279 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	2	3	U
1	2	33	U
1	2	34	C
1	2	43	G
1	2	44	C

5 of 8 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
33	4	74	C
1	2	1443	G
1	2	1188	G
1	2	1187	C
1	2	1436	U

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

38 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	$\# Z > 2$
1	OMG	2	672	1	23,26,27	1.23	3 (13%)	33,38,41	1.92	6 (18%)
1	OMC	2	1060	1	19,22,23	0.84	0	26,31,34	0.78	0
1	OMC	2	113	1	19,22,23	0.84	0	26,31,34	0.84	0
1	OMC	2	481	1	19,22,23	0.87	0	26,31,34	1.16	4 (15%)
33	5MU	4	54	33	19,22,23	1.38	6 (31%)	28,32,35	2.04	7 (25%)
1	OMG	2	337	1	23,26,27	1.23	4 (17%)	33,38,41	1.98	7 (21%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	OMG	2	546	1	23,26,27	1.21	3 (13%)	33,38,41	1.93	6 (18%)
1	OMG	2	399	1	23,26,27	1.23	3 (13%)	33,38,41	1.92	6 (18%)
1	C4J	2	930	1	24,29,30	0.65	1 (4%)	29,42,45	0.53	0
1	OMG	2	865	1	23,26,27	1.24	3 (13%)	33,38,41	1.94	6 (18%)
1	4AC	2	1477	1	21,24,25	1.03	2 (9%)	29,34,37	1.69	5 (17%)
1	OMG	2	1194	1	23,26,27	1.23	3 (13%)	33,38,41	1.95	5 (15%)
1	4AC	2	1467	1	21,24,25	1.00	2 (9%)	29,34,37	1.29	4 (13%)
33	OMC	4	32	33	19,22,23	0.85	0	26,31,34	1.11	2 (7%)
1	OMC	2	538	1	19,22,23	0.85	0	26,31,34	0.82	0
1	OMG	2	926	1	23,26,27	1.22	3 (13%)	33,38,41	1.96	6 (18%)
33	H2U	4	20	33	18,21,22	0.32	0	21,30,33	0.44	0
1	4AC	2	1478	1	21,24,25	1.00	2 (9%)	29,34,37	1.31	4 (13%)
1	MA6	2	1475	1	23,26,27	1.45	5 (21%)	34,38,41	2.10	10 (29%)
1	OMG	2	1061	1	23,26,27	1.22	3 (13%)	33,38,41	1.94	6 (18%)
1	6MZ	2	1457	1	22,25,26	1.45	4 (18%)	30,36,39	2.21	10 (33%)
33	PSU	4	55	33	18,21,22	1.31	2 (11%)	22,30,33	1.89	3 (13%)
1	OMU	2	15	1	19,22,23	1.34	3 (15%)	26,31,34	1.77	4 (15%)
1	OMG	2	1018	1	23,26,27	1.24	3 (13%)	33,38,41	1.93	6 (18%)
33	4SU	4	8	33	18,21,22	0.28	0	26,30,33	0.34	0
1	OMC	2	710	1	19,22,23	0.84	0	26,31,34	0.82	0
1	OMU	2	1032	1	19,22,23	1.29	3 (15%)	26,31,34	1.75	5 (19%)
1	OMU	2	1344	1	19,22,23	1.22	3 (15%)	26,31,34	1.71	5 (19%)
1	5MC	2	1368	1	18,22,23	0.89	2 (11%)	26,32,35	1.07	3 (11%)
1	4AC	2	843	1	21,24,25	1.07	2 (9%)	29,34,37	1.34	4 (13%)
1	OMC	2	512	1	19,22,23	0.83	0	26,31,34	0.79	0
1	OMU	2	52	1	19,22,23	1.25	3 (15%)	26,31,34	1.75	5 (19%)
1	OMC	2	1366	1	19,22,23	0.82	0	26,31,34	0.76	0
1	4AC	2	1466	1	21,24,25	1.02	2 (9%)	29,34,37	1.30	4 (13%)
1	OMC	2	313	1	19,22,23	0.86	1 (5%)	26,31,34	0.97	1 (3%)
1	OMC	2	246	1	19,22,23	0.87	0	26,31,34	1.03	1 (3%)
1	OMG	2	905	1	23,26,27	1.21	3 (13%)	33,38,41	1.95	6 (18%)
1	A2M	2	494	1	22,25,26	1.43	5 (22%)	31,36,39	2.08	9 (29%)

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
1	OMG	2	672	1	-	0/9/27/28	0/3/3/3
1	OMC	2	1060	1	-	0/9/27/28	0/2/2/2
1	OMC	2	113	1	-	0/9/27/28	0/2/2/2
1	OMC	2	481	1	-	0/9/27/28	0/2/2/2
33	5MU	4	54	33	-	0/7/25/26	0/2/2/2
1	OMG	2	337	1	-	1/9/27/28	0/3/3/3
1	OMG	2	546	1	-	0/9/27/28	0/3/3/3
1	OMG	2	399	1	-	0/9/27/28	0/3/3/3
1	C4J	2	930	1	-	6/16/34/35	0/2/2/2
1	OMG	2	865	1	-	3/9/27/28	0/3/3/3
1	4AC	2	1477	1	-	2/11/29/30	0/2/2/2
1	OMG	2	1194	1	-	0/9/27/28	0/3/3/3
1	4AC	2	1467	1	-	0/11/29/30	0/2/2/2
33	OMC	4	32	33	-	2/9/27/28	0/2/2/2
1	OMC	2	538	1	-	0/9/27/28	0/2/2/2
1	OMG	2	926	1	-	1/9/27/28	0/3/3/3
33	H2U	4	20	33	-	3/7/38/39	0/2/2/2
1	4AC	2	1478	1	-	0/11/29/30	0/2/2/2
1	MA6	2	1475	1	-	0/11/29/30	0/3/3/3
1	OMG	2	1061	1	-	0/9/27/28	0/3/3/3
1	6MZ	2	1457	1	-	0/9/27/28	0/3/3/3
33	PSU	4	55	33	-	0/7/25/26	0/2/2/2
1	OMU	2	15	1	-	0/9/27/28	0/2/2/2
1	OMG	2	1018	1	-	0/9/27/28	0/3/3/3
33	4SU	4	8	33	-	0/7/25/26	0/2/2/2
1	OMC	2	710	1	-	0/9/27/28	0/2/2/2
1	OMU	2	1032	1	-	0/9/27/28	0/2/2/2
1	OMU	2	1344	1	-	0/9/27/28	0/2/2/2
1	5MC	2	1368	1	-	0/7/25/26	0/2/2/2
1	4AC	2	843	1	-	0/11/29/30	0/2/2/2
1	OMC	2	512	1	-	0/9/27/28	0/2/2/2
1	OMU	2	52	1	-	0/9/27/28	0/2/2/2
1	OMC	2	1366	1	-	0/9/27/28	0/2/2/2
1	4AC	2	1466	1	-	0/11/29/30	0/2/2/2
1	OMC	2	313	1	-	1/9/27/28	0/2/2/2
1	OMC	2	246	1	-	3/9/27/28	0/2/2/2
1	OMG	2	905	1	-	0/9/27/28	0/3/3/3
1	A2M	2	494	1	-	0/9/27/28	0/3/3/3

The worst 5 of 79 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	2	1475	MA6	C5-C4	4.40	1.47	1.39
1	2	1457	6MZ	C5-C4	4.38	1.47	1.39
1	2	494	A2M	C5-C4	4.13	1.46	1.39
33	4	55	PSU	C6-C5	3.10	1.38	1.35
1	2	15	OMU	C4-N3	-3.07	1.33	1.38

The worst 5 of 150 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	2	865	OMG	C5-C4-N3	-6.28	118.28	128.46
1	2	926	OMG	C5-C4-N3	-6.19	118.42	128.46
1	2	1194	OMG	C5-C4-N3	-6.19	118.42	128.46
1	2	1061	OMG	C5-C4-N3	-6.18	118.44	128.46
1	2	1018	OMG	C5-C4-N3	-6.14	118.49	128.46

There are no chirality outliers.

5 of 22 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	2	246	OMC	C3'-C4'-C5'-O5'
1	2	246	OMC	O4'-C4'-C5'-O5'
33	4	20	H2U	O4'-C1'-N1-C6
1	2	930	C4J	C4'-C5'-O5'-P
33	4	20	H2U	O4'-C1'-N1-C2

There are no ring outliers.

24 monomers are involved in 32 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	2	672	OMG	1	0
1	2	1060	OMC	1	0
1	2	481	OMC	1	0
1	2	337	OMG	2	0
1	2	865	OMG	2	0
1	2	1477	4AC	1	0
1	2	1467	4AC	1	0
33	4	32	OMC	1	0
1	2	538	OMC	1	0
1	2	926	OMG	3	0
1	2	1478	4AC	1	0
1	2	1475	MA6	1	0
1	2	1061	OMG	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	2	1457	6MZ	1	0
1	2	1018	OMG	1	0
1	2	1032	OMU	2	0
1	2	1344	OMU	3	0
1	2	1368	5MC	1	0
1	2	843	4AC	2	0
1	2	52	OMU	1	0
1	2	1366	OMC	1	0
1	2	1466	4AC	2	0
1	2	905	OMG	1	0
1	2	494	A2M	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 100 ligands modelled in this entry, 56 are monoatomic - leaving 44 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
36	SPM	2	1520	-	13,13,13	0.11	0	12,12,12	0.07	0
39	GTP	5	102	34	30,34,34	0.83	1 (3%)	46,54,54	1.73	11 (23%)
36	SPM	2	1506	-	13,13,13	0.09	0	12,12,12	0.07	0
36	SPM	2	1542	-	13,13,13	0.10	0	12,12,12	0.06	0
36	SPM	2	1505	-	13,13,13	0.06	0	12,12,12	0.14	0
36	SPM	2	1538	-	13,13,13	0.11	0	12,12,12	0.09	0
36	SPM	2	1539	-	13,13,13	0.13	0	12,12,12	0.11	0
36	SPM	2	1540	-	13,13,13	0.11	0	12,12,12	0.10	0
36	SPM	2	1530	-	13,13,13	0.10	0	12,12,12	0.08	0
36	SPM	2	1528	-	13,13,13	0.12	0	12,12,12	0.06	0
36	SPM	2	1532	-	13,13,13	0.11	0	12,12,12	0.08	0
36	SPM	2	1513	-	13,13,13	0.10	0	12,12,12	0.07	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
36	SPM	2	1516	-	13,13,13	0.07	0	12,12,12	0.14	0
36	SPM	2	1514	-	13,13,13	0.09	0	12,12,12	0.09	0
36	SPM	2	1510	-	13,13,13	0.08	0	12,12,12	0.10	0
36	SPM	2	1515	-	13,13,13	0.07	0	12,12,12	0.14	0
36	SPM	2	1522	-	13,13,13	0.07	0	12,12,12	0.13	0
36	SPM	2	1507	-	13,13,13	0.10	0	12,12,12	0.08	0
36	SPM	2	1535	-	13,13,13	0.10	0	12,12,12	0.08	0
36	SPM	2	1541	-	13,13,13	0.10	0	12,12,12	0.16	0
36	SPM	2	1509	-	13,13,13	0.06	0	12,12,12	0.11	0
36	SPM	2	1521	-	13,13,13	0.11	0	12,12,12	0.08	0
36	SPM	2	1537	-	13,13,13	0.10	0	12,12,12	0.11	0
36	SPM	2	1526	-	13,13,13	0.09	0	12,12,12	0.09	0
36	SPM	E	301	-	13,13,13	0.08	0	12,12,12	0.09	0
36	SPM	2	1508	-	13,13,13	0.07	0	12,12,12	0.10	0
36	SPM	2	1518	-	13,13,13	0.11	0	12,12,12	0.08	0
36	SPM	2	1512	-	13,13,13	0.10	0	12,12,12	0.12	0
36	SPM	2	1536	-	13,13,13	0.11	0	12,12,12	0.09	0
36	SPM	2	1517	-	13,13,13	0.08	0	12,12,12	0.17	0
36	SPM	2	1529	-	13,13,13	0.11	0	12,12,12	0.07	0
36	SPM	2	1523	-	13,13,13	0.11	0	12,12,12	0.10	0
36	SPM	2	1524	-	13,13,13	0.10	0	12,12,12	0.10	0
36	SPM	2	1511	-	13,13,13	0.12	0	12,12,12	0.14	0
36	SPM	2	1534	-	13,13,13	0.12	0	12,12,12	0.06	0
36	SPM	2	1501	-	13,13,13	0.08	0	12,12,12	0.11	0
36	SPM	2	1519	-	13,13,13	0.11	0	12,12,12	0.10	0
36	SPM	2	1525	-	13,13,13	0.11	0	12,12,12	0.14	0
36	SPM	2	1533	-	13,13,13	0.11	0	12,12,12	0.07	0
36	SPM	2	1531	-	13,13,13	0.11	0	12,12,12	0.07	0
36	SPM	2	1527	-	13,13,13	0.12	0	12,12,12	0.10	0
36	SPM	2	1503	-	13,13,13	0.09	0	12,12,12	0.11	0
36	SPM	2	1504	-	13,13,13	0.09	0	12,12,12	0.08	0
36	SPM	2	1502	-	13,13,13	0.12	0	12,12,12	0.07	0

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
36	SPM	2	1520	-	-	8/11/11/11	-
39	GTP	5	102	34	-	6/22/38/38	0/3/3/3
36	SPM	2	1506	-	-	4/11/11/11	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
36	SPM	2	1542	-	-	3/11/11/11	-
36	SPM	2	1505	-	-	2/11/11/11	-
36	SPM	2	1538	-	-	1/11/11/11	-
36	SPM	2	1539	-	-	2/11/11/11	-
36	SPM	2	1540	-	-	5/11/11/11	-
36	SPM	2	1530	-	-	3/11/11/11	-
36	SPM	2	1528	-	-	6/11/11/11	-
36	SPM	2	1532	-	-	2/11/11/11	-
36	SPM	2	1513	-	-	3/11/11/11	-
36	SPM	2	1516	-	-	5/11/11/11	-
36	SPM	2	1514	-	-	2/11/11/11	-
36	SPM	2	1510	-	-	3/11/11/11	-
36	SPM	2	1515	-	-	2/11/11/11	-
36	SPM	2	1522	-	-	4/11/11/11	-
36	SPM	2	1507	-	-	2/11/11/11	-
36	SPM	2	1535	-	-	3/11/11/11	-
36	SPM	2	1541	-	-	4/11/11/11	-
36	SPM	2	1509	-	-	2/11/11/11	-
36	SPM	2	1521	-	-	2/11/11/11	-
36	SPM	2	1537	-	-	2/11/11/11	-
36	SPM	2	1526	-	-	4/11/11/11	-
36	SPM	E	301	-	-	2/11/11/11	-
36	SPM	2	1508	-	-	3/11/11/11	-
36	SPM	2	1518	-	-	1/11/11/11	-
36	SPM	2	1512	-	-	1/11/11/11	-
36	SPM	2	1536	-	-	1/11/11/11	-
36	SPM	2	1517	-	-	4/11/11/11	-
36	SPM	2	1529	-	-	4/11/11/11	-
36	SPM	2	1523	-	-	3/11/11/11	-
36	SPM	2	1524	-	-	2/11/11/11	-
36	SPM	2	1511	-	-	4/11/11/11	-
36	SPM	2	1534	-	-	7/11/11/11	-
36	SPM	2	1501	-	-	2/11/11/11	-
36	SPM	2	1519	-	-	5/11/11/11	-
36	SPM	2	1525	-	-	1/11/11/11	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
36	SPM	2	1533	-	-	4/11/11/11	-
36	SPM	2	1531	-	-	9/11/11/11	-
36	SPM	2	1527	-	-	2/11/11/11	-
36	SPM	2	1503	-	-	4/11/11/11	-
36	SPM	2	1504	-	-	2/11/11/11	-
36	SPM	2	1502	-	-	9/11/11/11	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
39	5	102	GTP	C2-N3	2.20	1.38	1.33

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
39	5	102	GTP	C5-C4-N3	-4.91	120.50	128.46
39	5	102	GTP	C2-N3-C4	4.44	120.21	112.30
39	5	102	GTP	PB-O3B-PG	-3.30	121.51	132.83
39	5	102	GTP	PA-O3A-PB	-3.25	121.68	132.83
39	5	102	GTP	N9-C4-N3	3.20	132.35	125.94

There are no chirality outliers.

5 of 150 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
36	2	1509	SPM	C12-C11-N10-C9
36	2	1517	SPM	C7-C6-N5-C4
36	2	1520	SPM	C11-C12-C13-N14
36	2	1523	SPM	C3-C4-N5-C6
36	2	1525	SPM	C3-C4-N5-C6

There are no ring outliers.

33 monomers are involved in 96 short contacts:

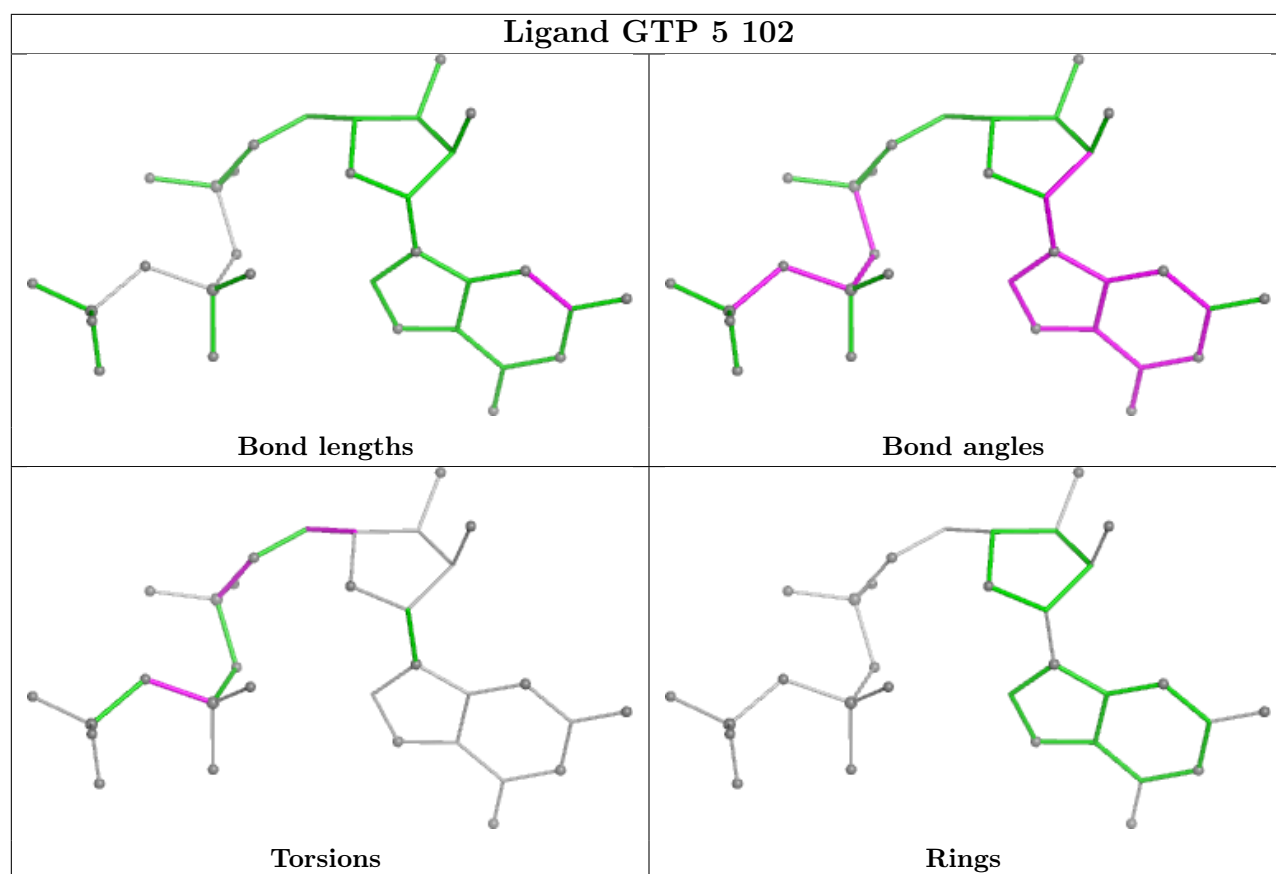
Mol	Chain	Res	Type	Clashes	Symm-Clashes
36	2	1520	SPM	4	0
39	5	102	GTP	2	0
36	2	1506	SPM	1	0
36	2	1542	SPM	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
36	2	1539	SPM	2	0
36	2	1540	SPM	11	0
36	2	1530	SPM	1	0
36	2	1528	SPM	7	0
36	2	1532	SPM	1	0
36	2	1513	SPM	2	0
36	2	1516	SPM	4	0
36	2	1514	SPM	4	0
36	2	1510	SPM	1	0
36	2	1515	SPM	4	0
36	2	1522	SPM	2	0
36	2	1507	SPM	1	0
36	2	1541	SPM	1	0
36	2	1509	SPM	3	0
36	2	1521	SPM	1	0
36	2	1526	SPM	1	0
36	E	301	SPM	1	0
36	2	1512	SPM	2	0
36	2	1536	SPM	1	0
36	2	1517	SPM	2	0
36	2	1523	SPM	1	0
36	2	1524	SPM	5	0
36	2	1534	SPM	1	0
36	2	1501	SPM	2	0
36	2	1525	SPM	1	0
36	2	1533	SPM	9	0
36	2	1531	SPM	7	0
36	2	1527	SPM	2	0
36	2	1502	SPM	7	0

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



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

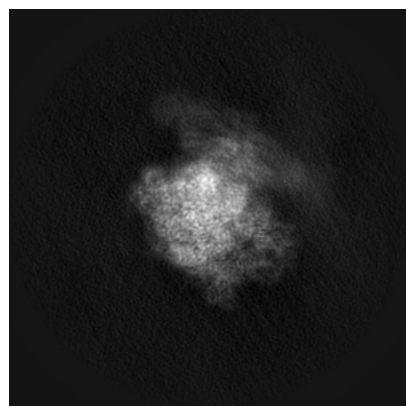
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-50854. These allow visual inspection of the internal detail of the map and identification of artifacts.

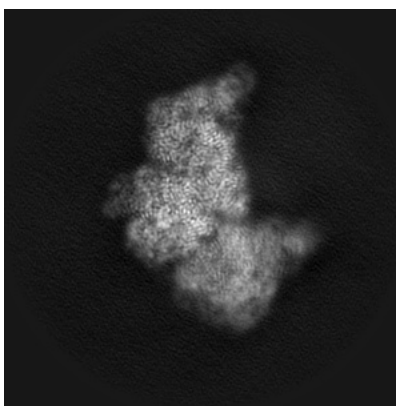
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

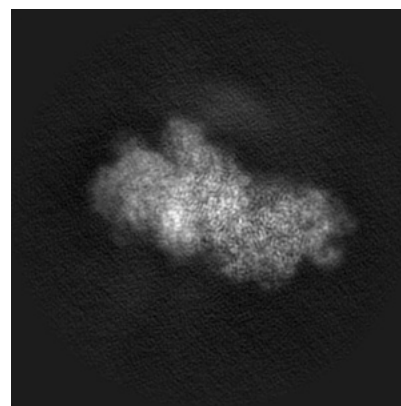
6.1.1 Primary map



X

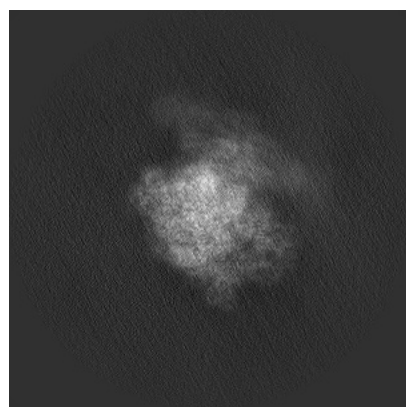


Y

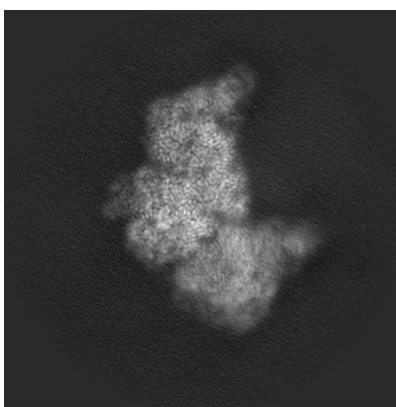


Z

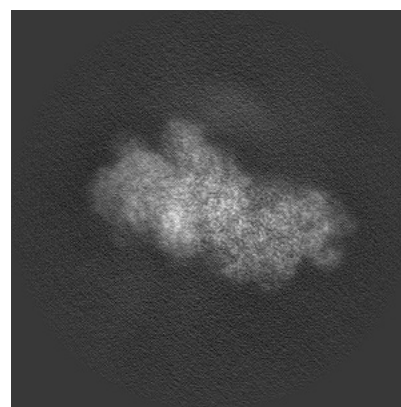
6.1.2 Raw map



X



Y

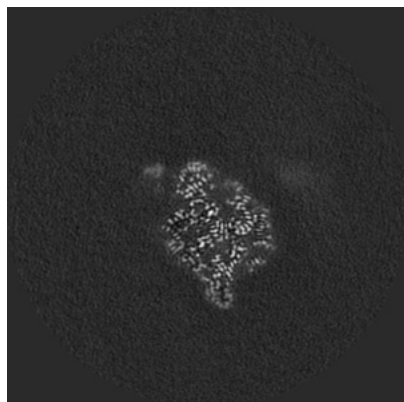


Z

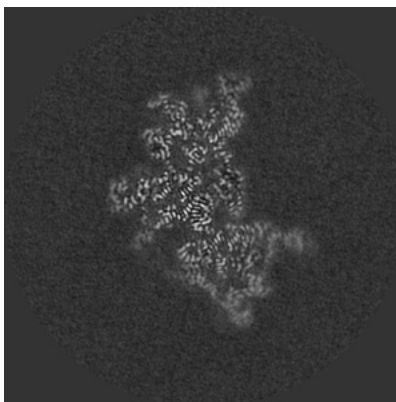
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

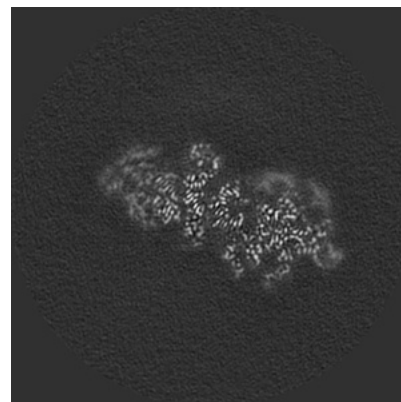
6.2.1 Primary map



X Index: 258

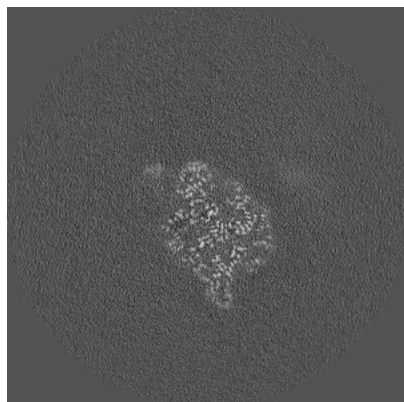


Y Index: 258

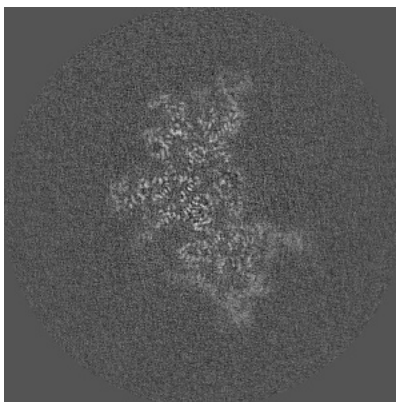


Z Index: 258

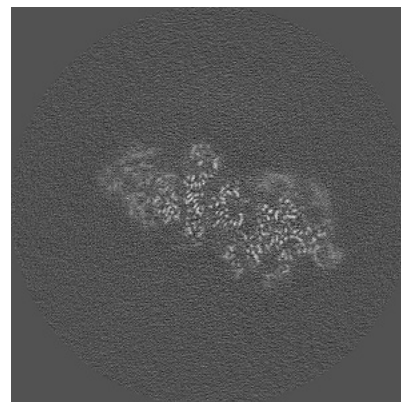
6.2.2 Raw map



X Index: 258



Y Index: 258

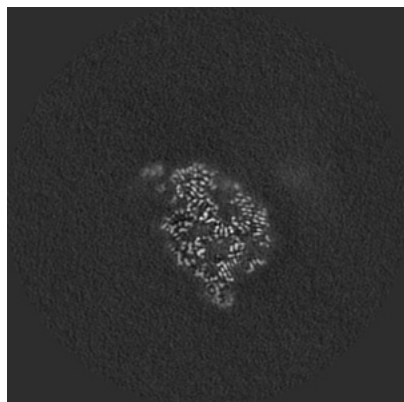


Z Index: 258

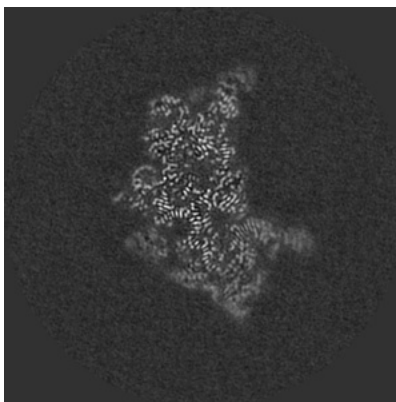
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

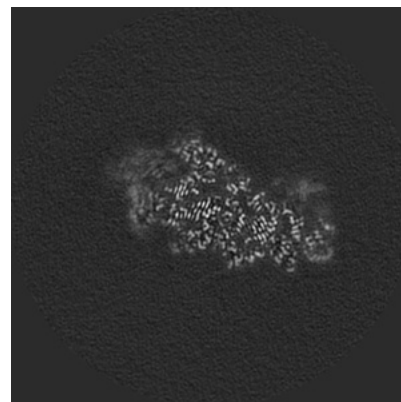
6.3.1 Primary map



X Index: 261

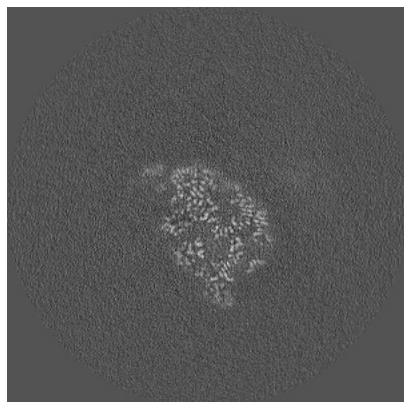


Y Index: 251

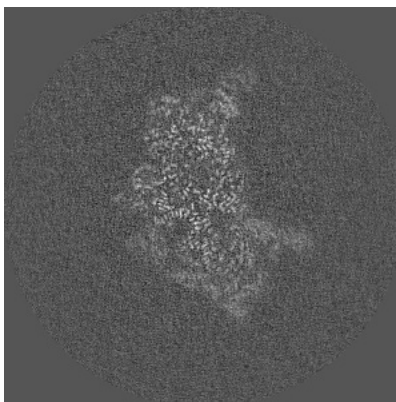


Z Index: 244

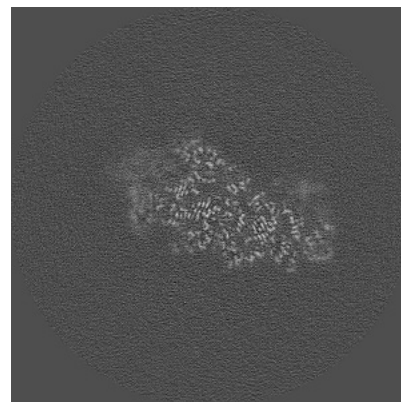
6.3.2 Raw map



X Index: 262



Y Index: 251

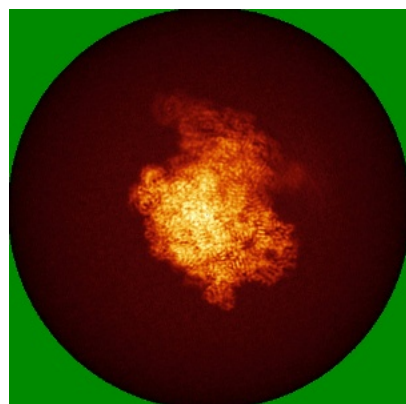


Z Index: 244

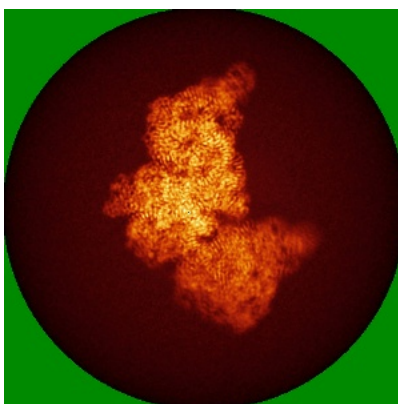
The images above show the largest variance slices of the map in three orthogonal directions.

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

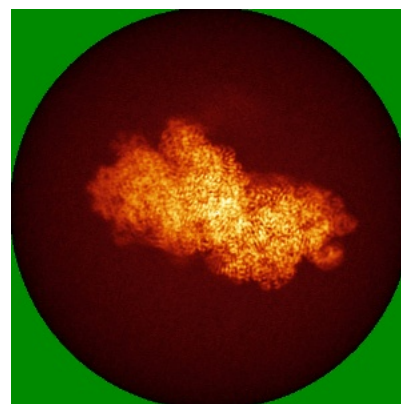
6.4.1 Primary map



X

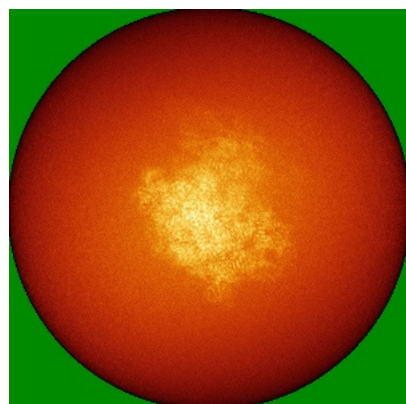


Y

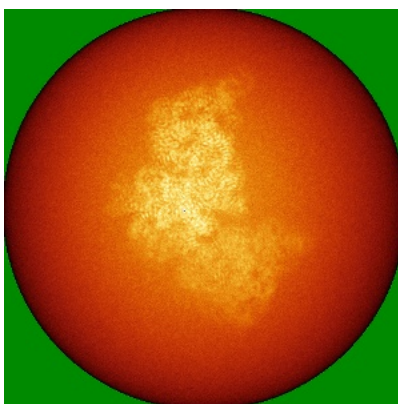


Z

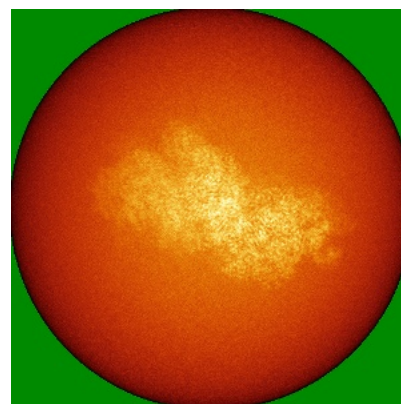
6.4.2 Raw map



X



Y

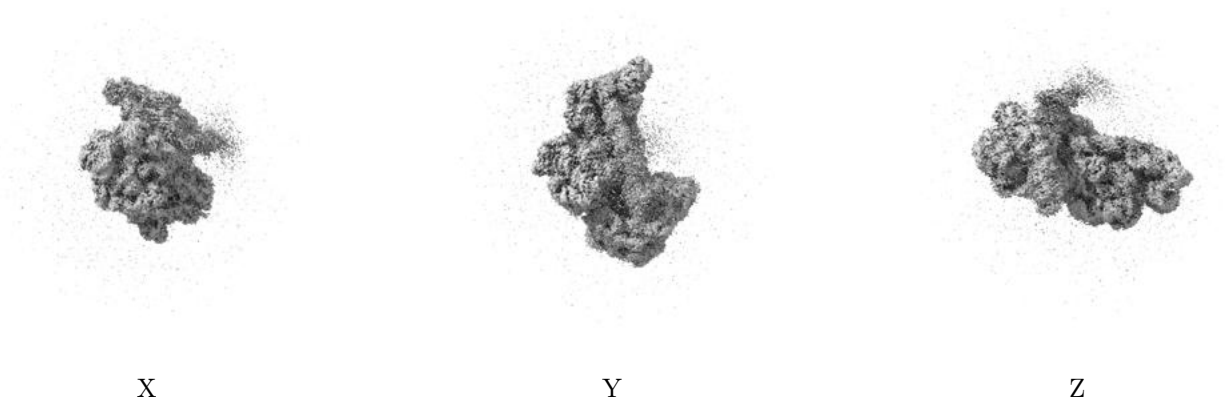


Z

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.

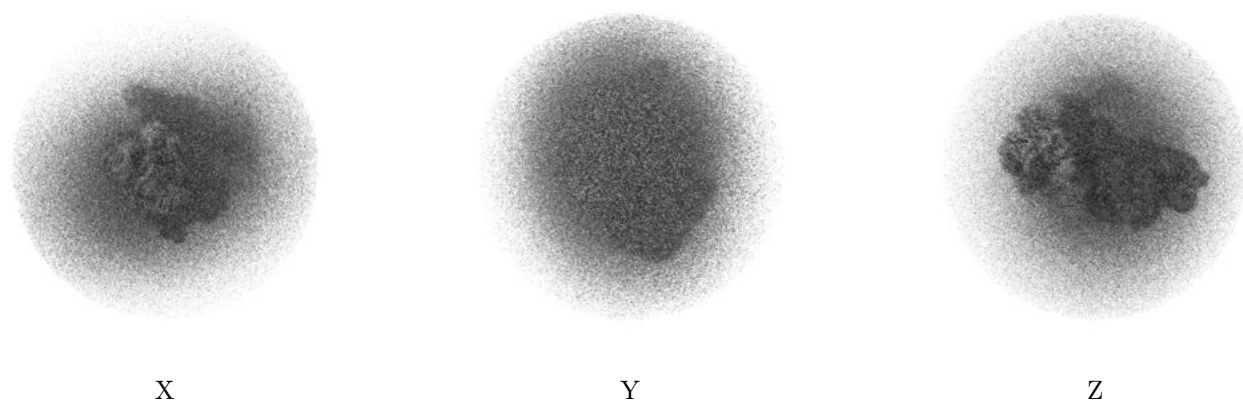
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.004. 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.

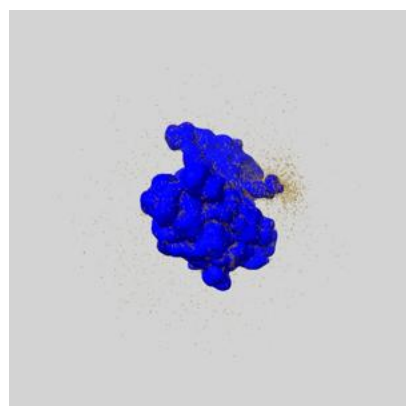
6.6 Mask visualisation [i](#)

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

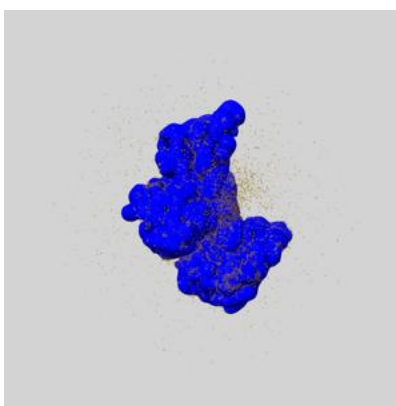
A mask typically either:

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

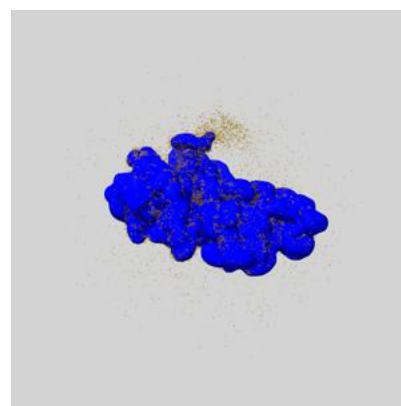
6.6.1 emd_50854_msk_1.map [i](#)



X



Y

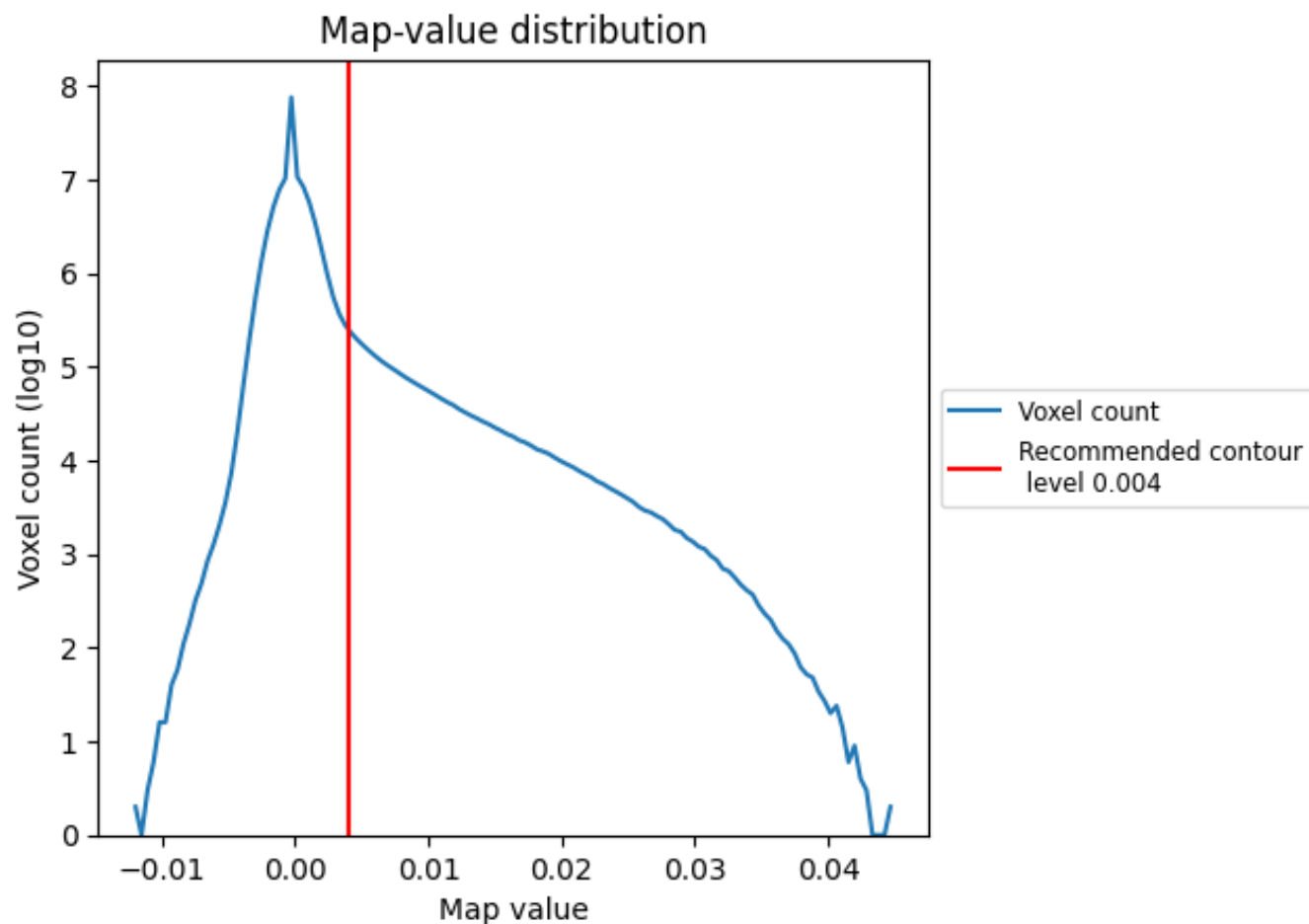


Z

7 Map analysis [i](#)

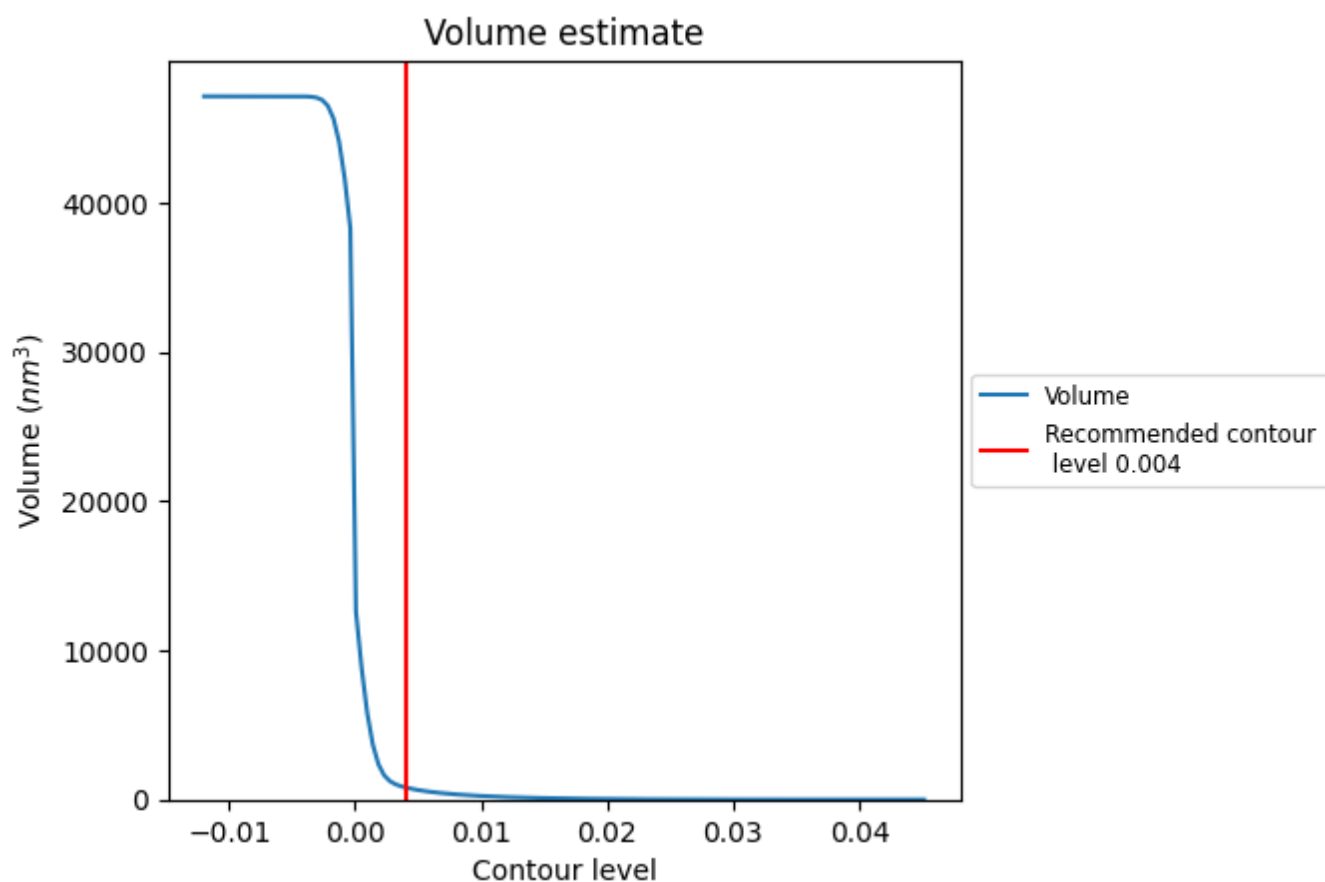
This section contains the results of statistical analysis of the map.

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.

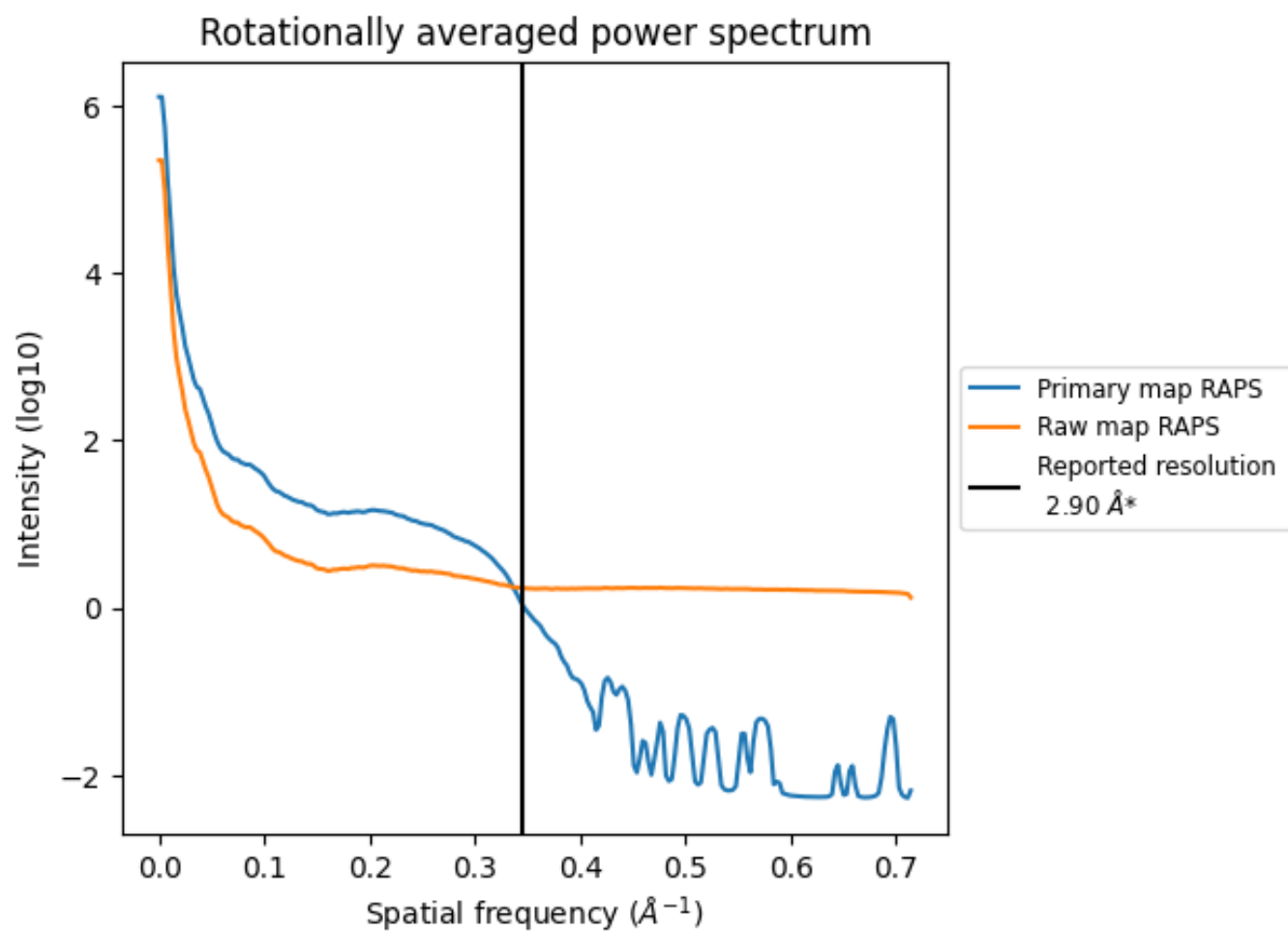
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 810 nm³; this corresponds to an approximate mass of 732 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 ⓘ

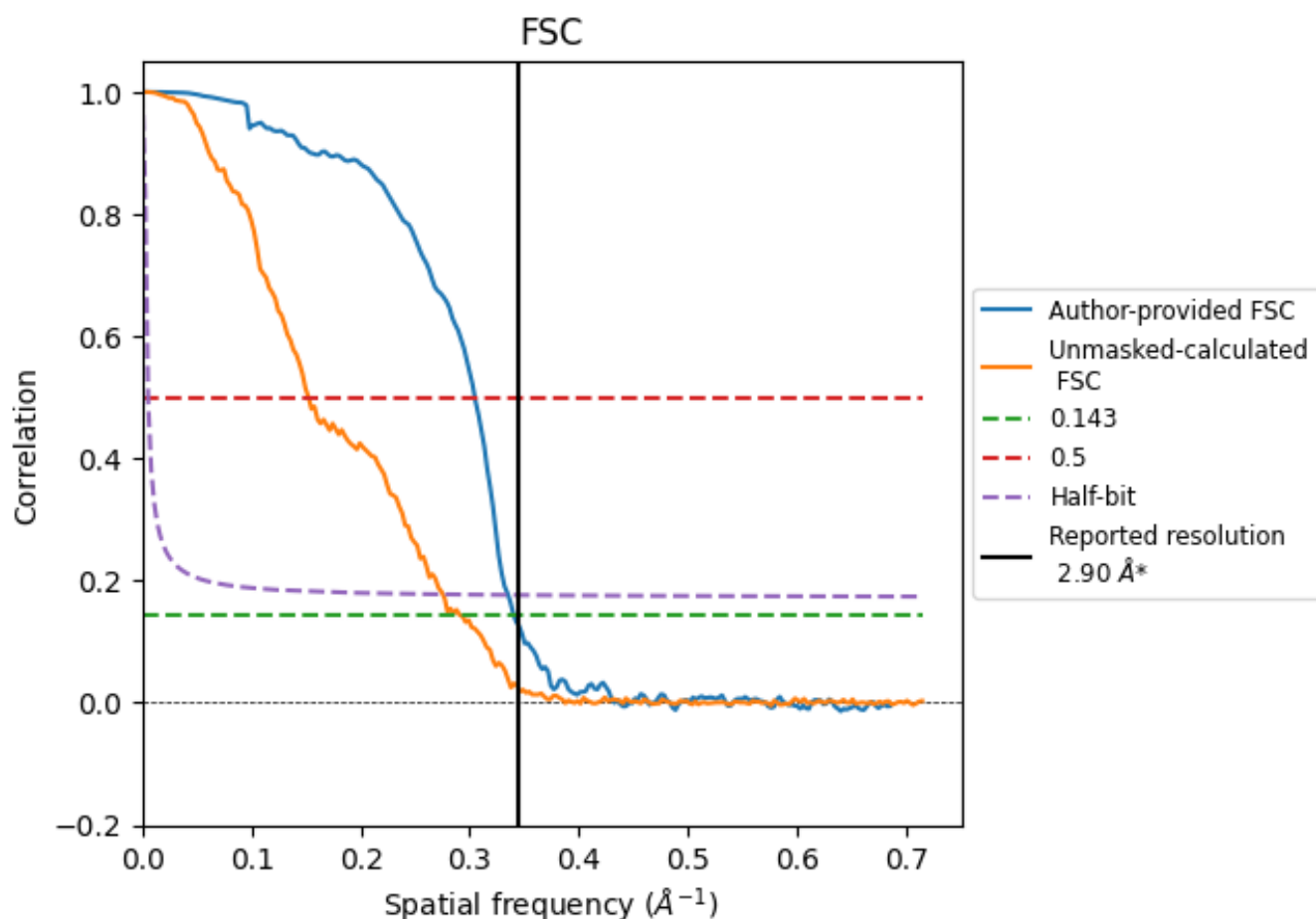


*Reported resolution corresponds to spatial frequency of 0.345 Å⁻¹

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 0.345 Å⁻¹

8.2 Resolution estimates [i](#)

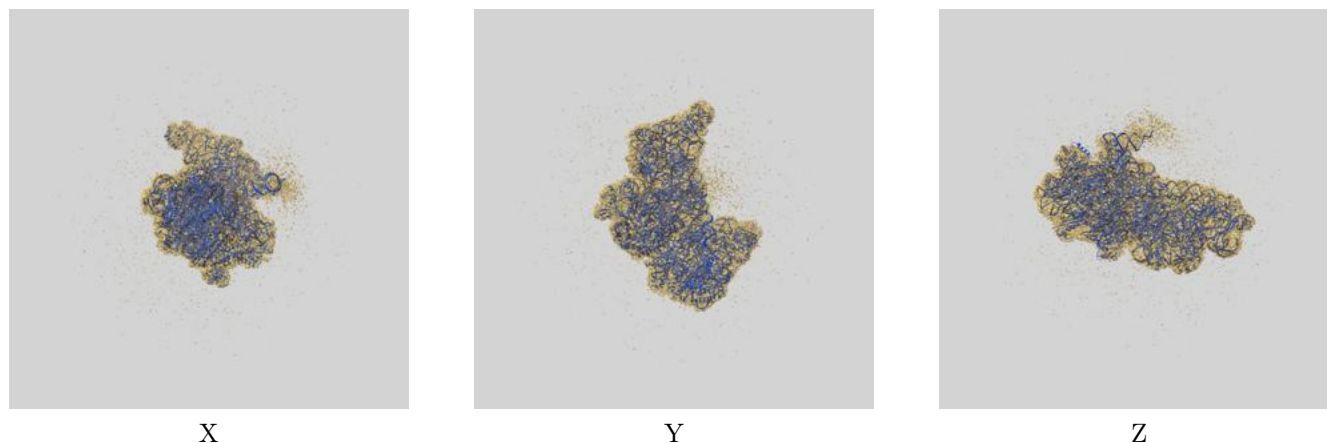
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.90	-	-
Author-provided FSC curve	2.94	3.28	2.98
Unmasked-calculated*	3.43	6.57	3.63

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.43 differs from the reported value 2.9 by more than 10 %

9 Map-model fit [i](#)

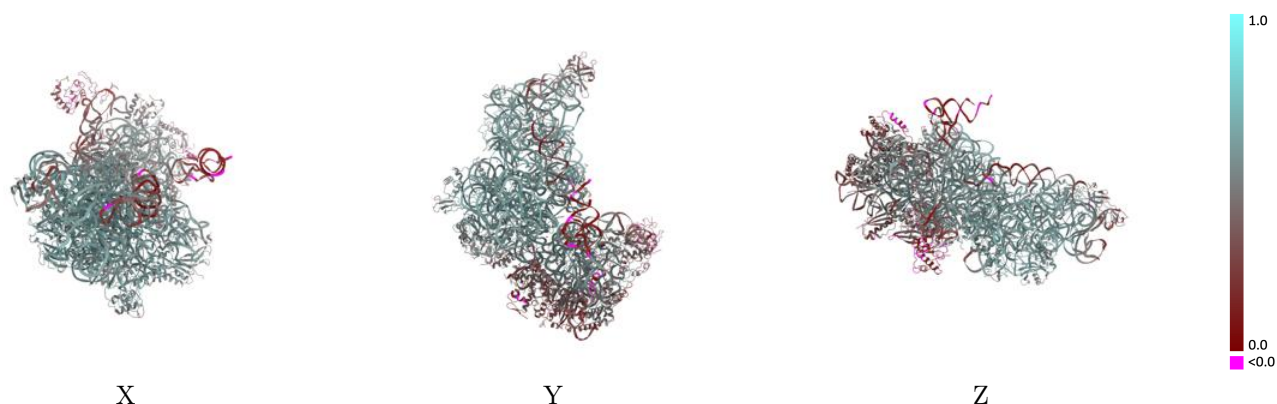
This section contains information regarding the fit between EMDB map EMD-50854 and PDB model 9FY0. Per-residue inclusion information can be found in section [3](#) on page [15](#).

9.1 Map-model overlay [i](#)



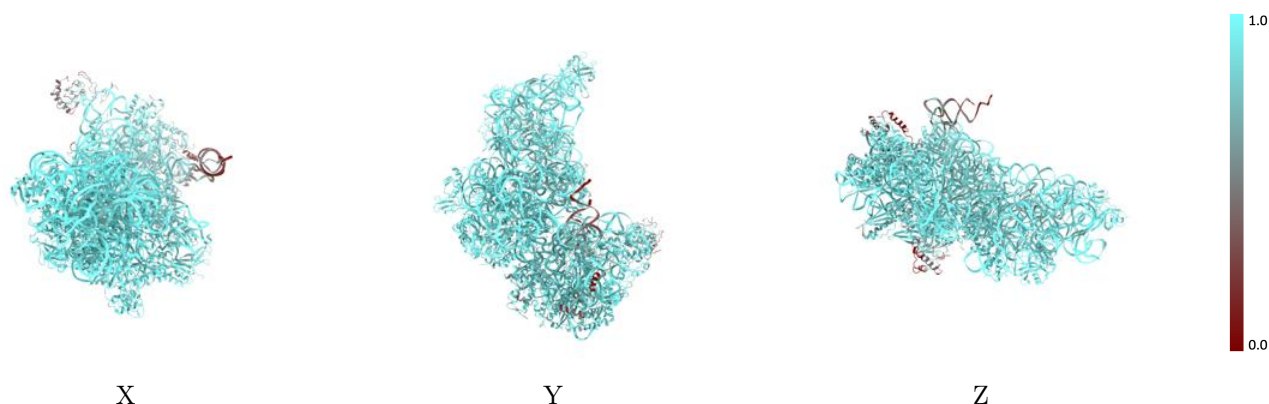
The images above show the 3D surface view of the map at the recommended contour level 0.004 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



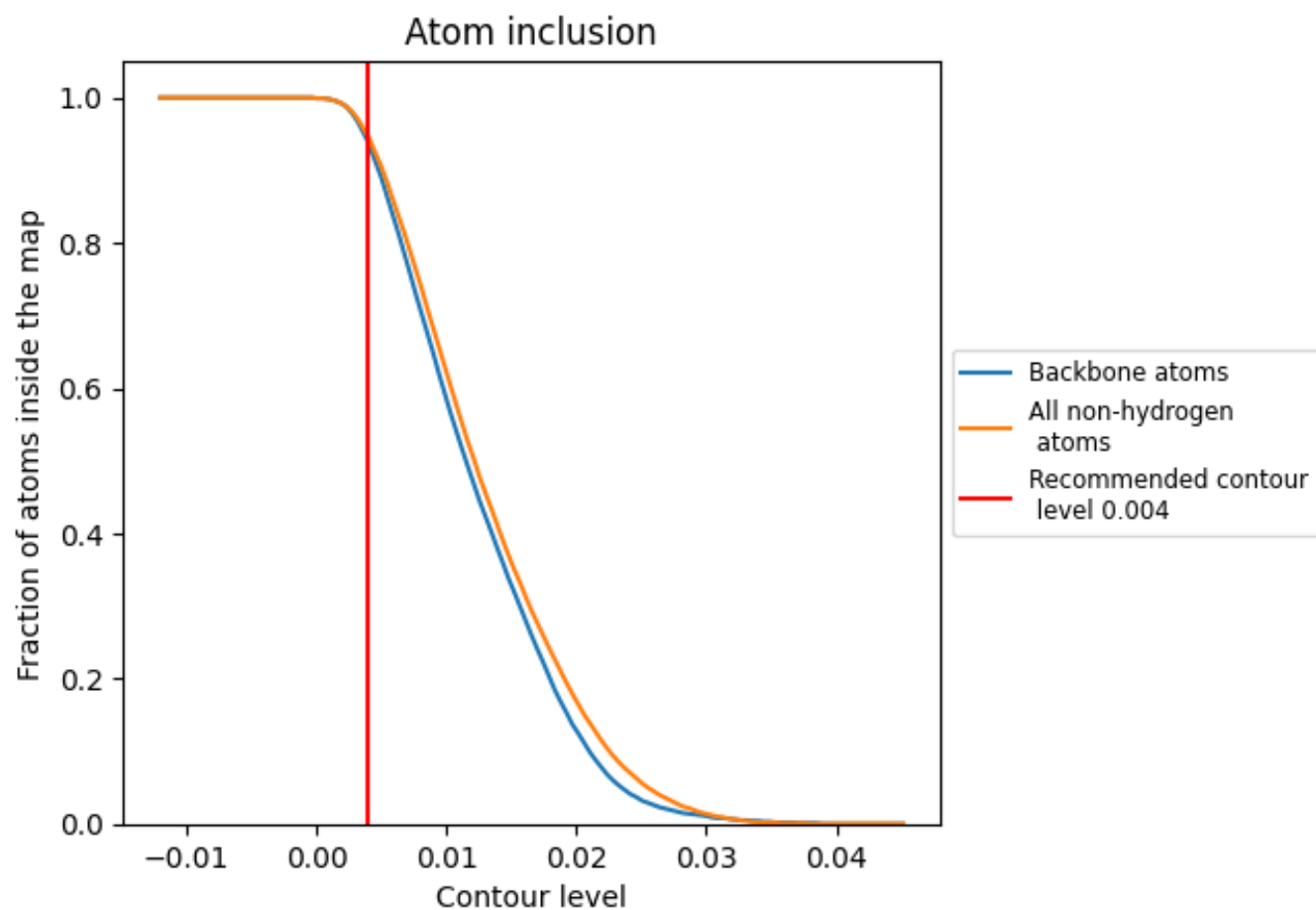
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.004).

9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 95% 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 (0.004) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9470	 0.5120
2	 0.9930	 0.5590
3	 0.4600	 0.1420
4	 0.5790	 0.2150
5	 0.9880	 0.5630
A	 0.9640	 0.5270
B	 0.9210	 0.4740
C	 0.9800	 0.5530
D	 0.9770	 0.5840
E	 0.9890	 0.5980
F	 0.9780	 0.5900
G	 0.9290	 0.4400
H	 0.8850	 0.3660
I	 0.9860	 0.6070
J	 0.9830	 0.5700
K	 0.9500	 0.4130
L	 0.8900	 0.3850
M	 0.9780	 0.5340
N	 0.9790	 0.5810
O	 0.9280	 0.4380
P	 0.9910	 0.5320
Q	 0.9680	 0.5640
R	 0.9870	 0.6080
S	 0.9440	 0.4120
T	 0.9090	 0.4180
U	 0.9440	 0.4360
V	 0.9560	 0.5580
W	 0.9760	 0.5510
X	 0.8720	 0.3290
Y	 0.5380	 0.1730
Z	 0.9490	 0.4610
a	 0.9510	 0.4220
b	 0.9450	 0.5400
c	 0.5280	 0.2520
d	 0.8440	 0.2650
e	 0.8830	 0.5270

