



wwPDB EM Validation Summary Report ⓘ

Aug 24, 2026 – 11:22 AM EDT

PDB ID : 9EC3 / pdb_00009ec3
EMDB ID : EMD-47899
Title : Cryo-EM structure of the ribosome-tunnel occluding hibernation factor bound to the Mycobacterium tuberculosis C- 70S ribosome carrying fMet-tRNA(fMet) and deacylated tRNA at ribosome P and E sites.
Authors : Majumdar, S.; Ojha, A.K.; Agrawal, R.K.
Deposited on : 2024-11-13
Resolution : 3.29 Å (reported)
Based on initial model : 7MT7

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:

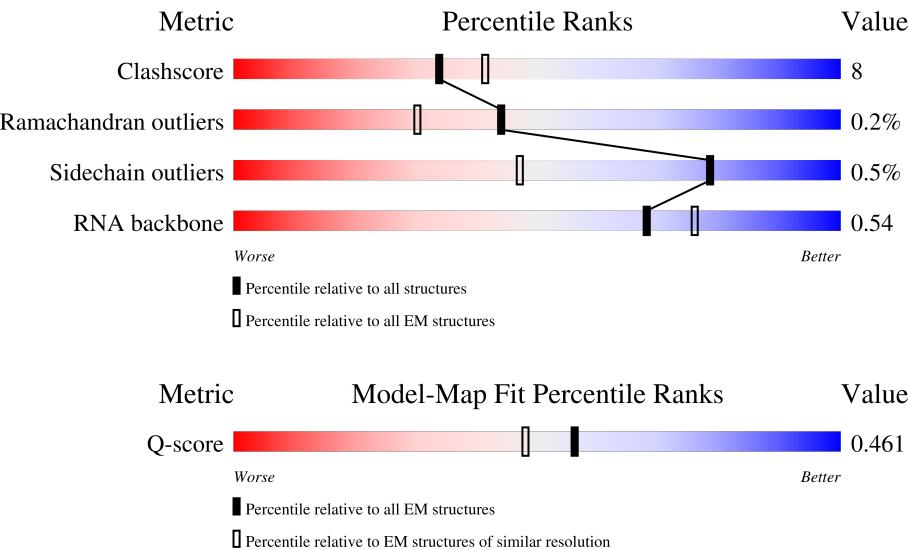
EMDB validation analysis : 0.0.1.dev133
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

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 3.29 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	14466 (2.79 - 3.79)

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	n	77	
1	u	77	
2	1	62	

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Mol	Chain	Length	Quality of chain
3	0	57	
4	2	47	
5	3	64	
6	4	37	
7	6	80	
8	I	3138	
9	B	115	
10	C	280	
11	D	217	
12	E	223	
13	F	187	
14	G	179	
15	H	152	
16	J	195	
17	K	122	
18	L	146	
19	M	138	
20	N	180	
21	O	122	
22	P	113	
23	Q	129	
24	R	104	
25	S	197	
26	T	100	
27	U	105	

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Mol	Chain	Length	Quality of chain
28	V	215	
29	W	86	
30	Y	77	
31	Z	65	
32	a	1537	
33	c	274	
34	d	201	
35	e	220	
36	f	96	
37	g	156	
38	h	132	
39	i	151	
40	j	101	
41	k	139	
42	l	124	
43	m	124	
44	o	89	
45	p	162	
46	q	135	
47	s	93	
48	t	86	
49	x	33	
50	r	88	
51	9	101	
52	b	54	

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Mol	Chain	Length	Quality of chain
53	y	78	78% 21%
54	X	20	30% 70%

2 Entry composition

There are 54 unique types of molecules in this entry. The entry contains 147854 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 E-tRNA, fMet-tRNA(fMet).

Mol	Chain	Residues	Atoms					AltConf	Trace
1	n	77	Total	C	N	O	P	0	0
			1643	732	297	537	77		
1	u	76	Total	C	N	O	P	0	0
			1623	723	294	530	76		

- Molecule 2 is a protein called DUF5302 domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	1	51	Total	C	N	O	S	0	0
			395	231	87	76	1		

- Molecule 3 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms				AltConf	Trace
3	0	53	Total	C	N	O	0	0
			421	262	93	66		

- Molecule 4 is a protein called 50S ribosomal protein bL34.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	2	42	Total	C	N	O	S	0	0
			358	212	94	51	1		

- Molecule 5 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms				AltConf	Trace
5	3	62	Total	C	N	O	0	0
			494	298	112	84		

- Molecule 6 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	4	37	Total	C	N	O	S	0	0
			300	182	66	47	5		

- Molecule 7 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	6	45	Total	C	N	O	S	0	0
			345	214	60	66	5		

- Molecule 8 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	I	3118	Total	C	N	O	P	0	0
			66956	29845	12340	21653	3118		

- Molecule 9 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	B	115	Total	C	N	O	P	0	0
			2458	1097	456	790	115		

- Molecule 10 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	C	272	Total	C	N	O	S	0	0
			2088	1277	437	369	5		

- Molecule 11 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	D	213	Total	C	N	O	S	0	0
			1590	985	307	292	6		

- Molecule 12 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	E	207	Total	C	N	O	S	0	0
			1552	958	303	289	2		

- Molecule 13 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	F	170	Total	C	N	O	S	0	0
			1335	834	254	242	5		

- Molecule 14 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	G	174	Total	C	N	O	S	0	0
			1330	836	249	244	1		

- Molecule 15 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	H	47	Total	C	N	O	S	0	0
			350	220	64	65	1		

- Molecule 16 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	J	146	Total	C	N	O	S	0	0
			1143	724	217	199	3		

- Molecule 17 is a protein called Large ribosomal subunit protein uL14.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	K	121	Total	C	N	O	S	0	0
			934	585	179	168	2		

- Molecule 18 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	L	142	Total	C	N	O	S	0	0
			1060	656	215	187	2		

- Molecule 19 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	M	134	Total	C	N	O	S	0	0
			1072	679	215	177	1		

- Molecule 20 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	N	116	Total	C	N	O	S	0	0
			908	574	175	158	1		

- Molecule 21 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	O	116	Total	C	N	O		0	0
			886	541	188	157			

- Molecule 22 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	P	112	Total	C	N	O	S	0	0
			907	573	174	159	1		

- Molecule 23 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	Q	122	Total	C	N	O		0	0
			980	608	205	167			

- Molecule 24 is a protein called Large ribosomal subunit protein bL21.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	R	98	Total	C	N	O		0	0
			742	472	136	134			

- Molecule 25 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	S	113	Total	C	N	O		0	0
			860	533	178	149			

- Molecule 26 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	T	95	Total	C	N	O		0	0
			741	469	138	134			

- Molecule 27 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	U	90	Total	C	N	O	S	0	0
			699	430	138	129	2		

- Molecule 28 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	V	177	Total	C	N	O		0	0
			1319	822	243	254			

- Molecule 29 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	W	74	Total	C	N	O		0	0
			546	336	111	99			

- Molecule 30 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	Y	65	Total	C	N	O	S	0	0
			541	331	106	103	1		

- Molecule 31 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	Z	59	Total	C	N	O		0	0
			476	293	101	82			

- Molecule 32 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	a	1519	Total	C	N	O	P	0	0
			32610	14525	5961	10605	1519		

- Molecule 33 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	c	207	Total	C	N	O	S	0	0
			1654	1030	322	298	4		

- Molecule 34 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	d	201	Total	C	N	O	S	0	0
			1658	1041	317	297	3		

- Molecule 35 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	e	160	Total	C	N	O	S	0	0
			1149	726	214	206	3		

- Molecule 36 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	f	95	Total	C	N	O	S	0	0
			757	480	133	141	3		

- Molecule 37 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	g	152	Total	C	N	O	S	0	0
			1193	742	234	215	2		

- Molecule 38 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	h	130	Total	C	N	O	S	0	0
			999	627	187	184	1		

- Molecule 39 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	i	126	Total	C	N	O	S	0	0
			981	622	191	168			

- Molecule 40 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	j	99	Total	C	N	O	S	0	0
			789	496	146	144	3		

- Molecule 41 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms				AltConf	Trace
41	k	117	Total	C	N	O	0	0
			873	540	175	158		

- Molecule 42 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	l	123	Total	C	N	O	S	0	0
			967	599	198	167	3		

- Molecule 43 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	m	113	Total	C	N	O	S	0	0
			919	562	190	164	3		

- Molecule 44 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms				AltConf	Trace
44	o	87	Total	C	N	O	0	0
			718	449	144	125		

- Molecule 45 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	p	85	Total	C	N	O	S	0	0
			688	438	130	119	1		

- Molecule 46 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	q	94	Total	C	N	O	S	0	0
			752	471	146	132	3		

- Molecule 47 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	s	81	Total	C	N	O	S	0	0
			657	421	123	112	1		

- Molecule 48 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms				AltConf	Trace
48	t	82	Total	C	N	O	0	0
			631	381	137	113		

- Molecule 49 is a protein called Mitochondrial domain of uncharacterized function (DUF1713).

Mol	Chain	Residues	Atoms					AltConf	Trace
49	x	31	Total	C	N	O	S	0	0
			272	167	69	35	1		

- Molecule 50 is a protein called Small ribosomal subunit protein bS18.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	r	71	Total	C	N	O	S	0	0
			560	345	110	104	1		

- Molecule 51 is a protein called Small ribosomal subunit protein uS14.

Mol	Chain	Residues	Atoms				AltConf	Trace
51	9	100	Total	C	N	O	0	0
			798	484	181	133		

- Molecule 52 is a protein called Large ribosomal subunit protein bL33.

Mol	Chain	Residues	Atoms				AltConf	Trace
52	b	48	Total	C	N	O	0	0
			416	257	88	71		

- Molecule 53 is a protein called Large ribosomal subunit protein bL28.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	y	77	Total	C	N	O	S	0	0
			630	383	142	104	1		

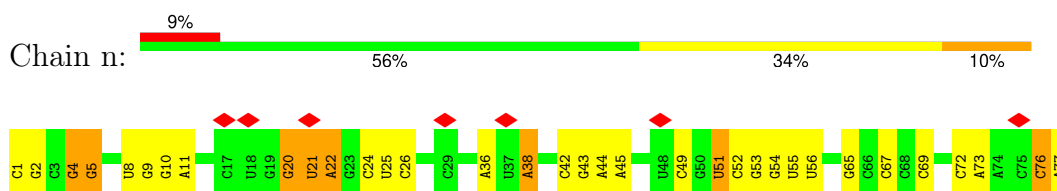
- Molecule 54 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	X	6	Total	C	N	O	P	0	0
			131	59	27	39	6		

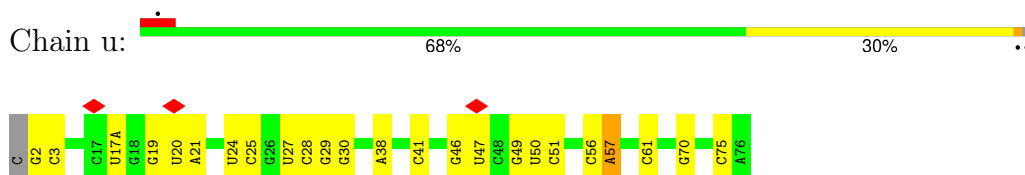
3 Residue-property plots [i](#)

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.

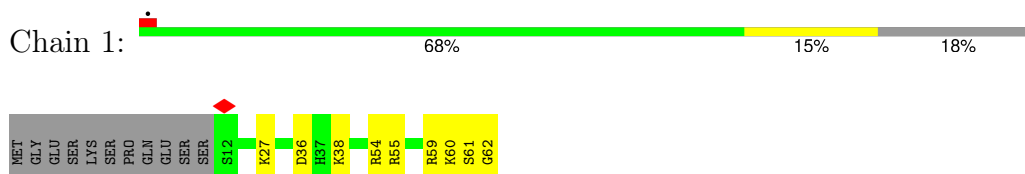
- Molecule 1: E-tRNA, fMet-tRNA(fMet)



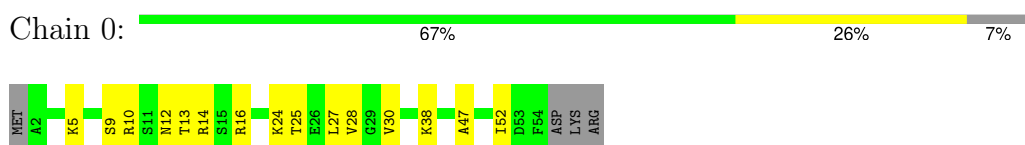
- Molecule 1: E-tRNA, fMet-tRNA(fMet)



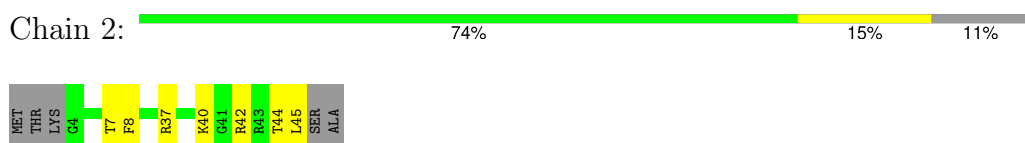
- Molecule 2: DUF5302 domain-containing protein



- Molecule 3: 50S ribosomal protein L32

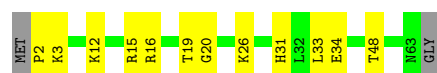


- Molecule 4: 50S ribosomal protein bL34



- Molecule 5: 50S ribosomal protein L35

Chain 3:  78% 19%

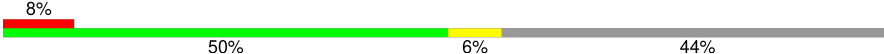


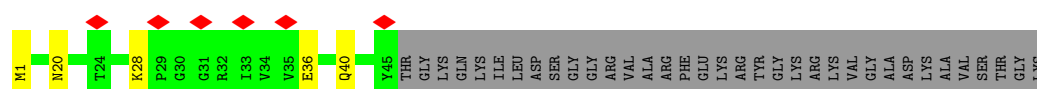
- Molecule 6: 50S ribosomal protein L36

Chain 4:  78% 19%



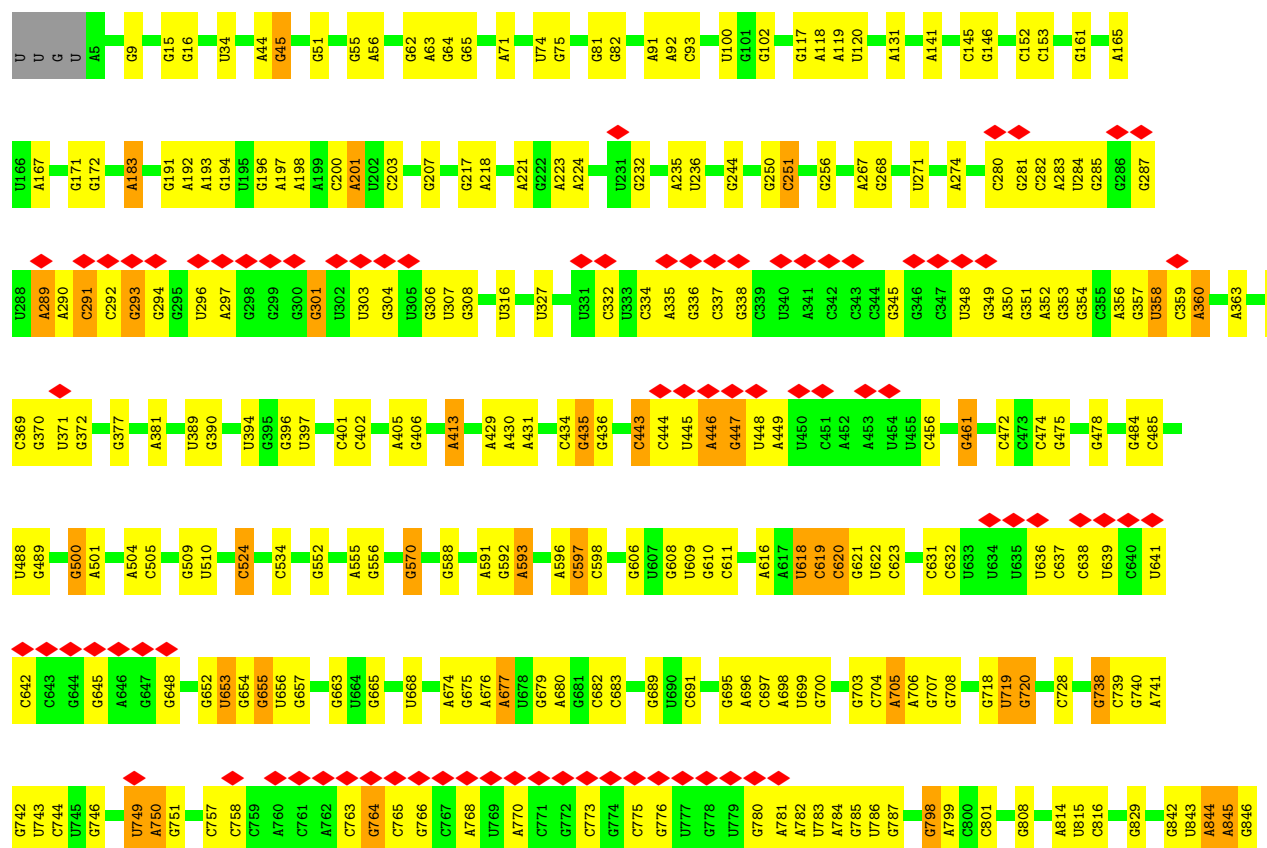
- Molecule 7: 50S ribosomal protein L31

Chain 6:  8% 50% 6% 44%

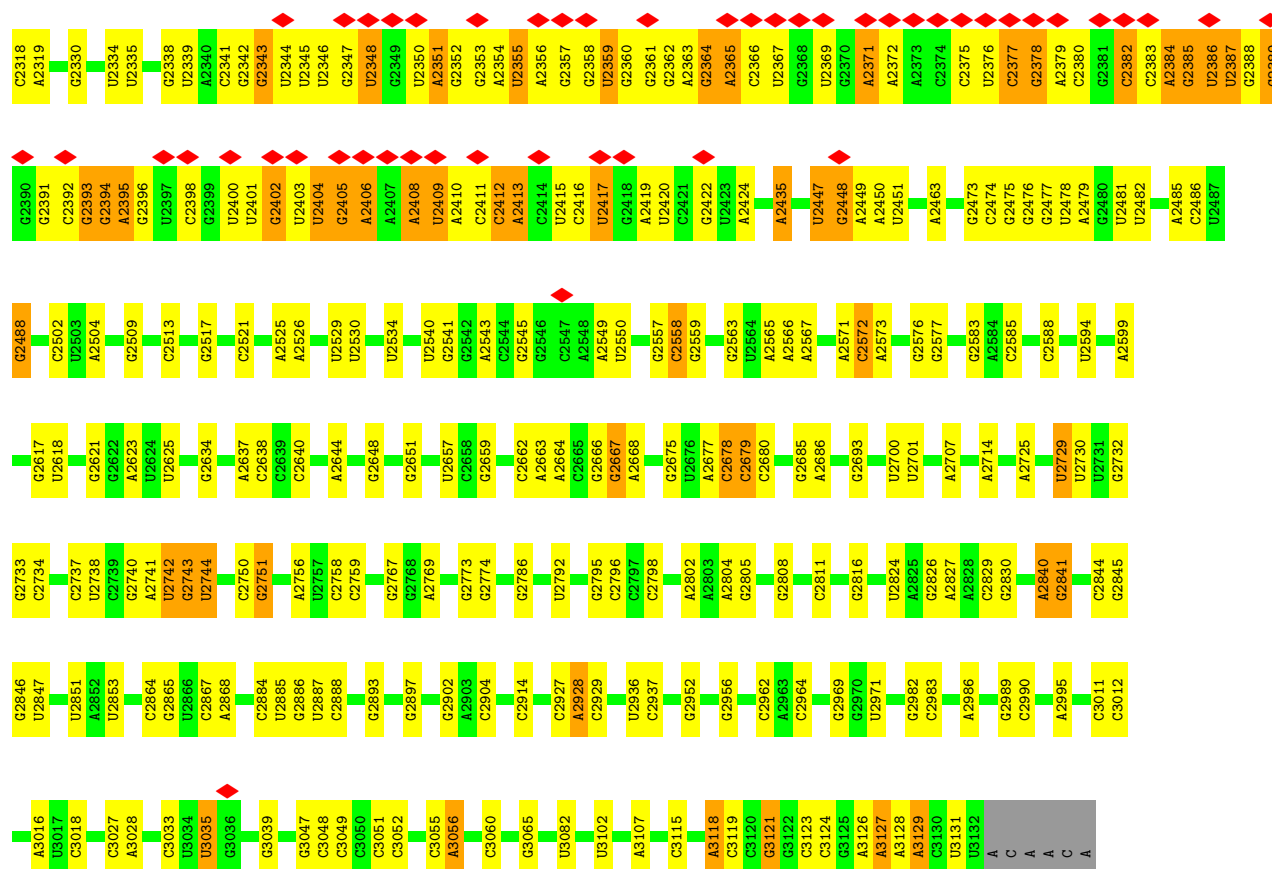


- Molecule 8: 23S ribosomal RNA

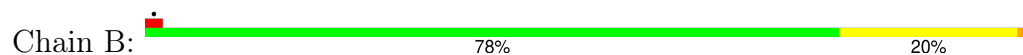
Chain I:  10% 66% 28% 5%



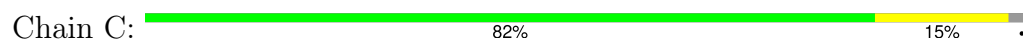




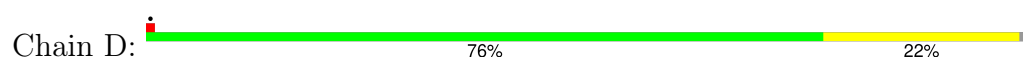
• Molecule 9: 5S ribosomal RNA



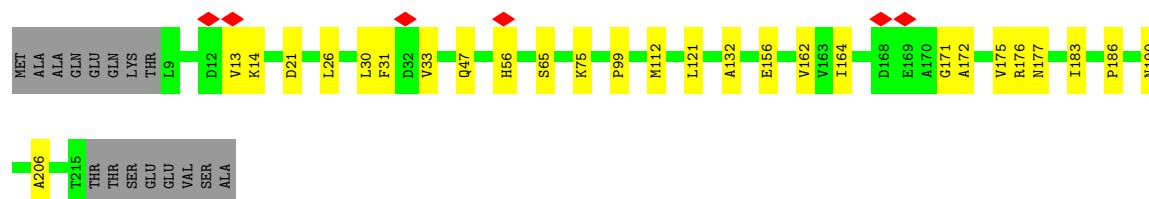
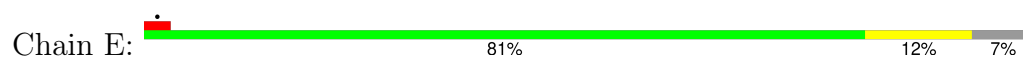
• Molecule 10: 50S ribosomal protein L2



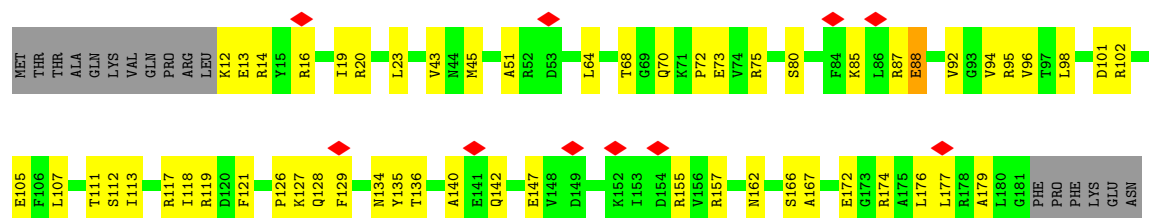
• Molecule 11: 50S ribosomal protein L3



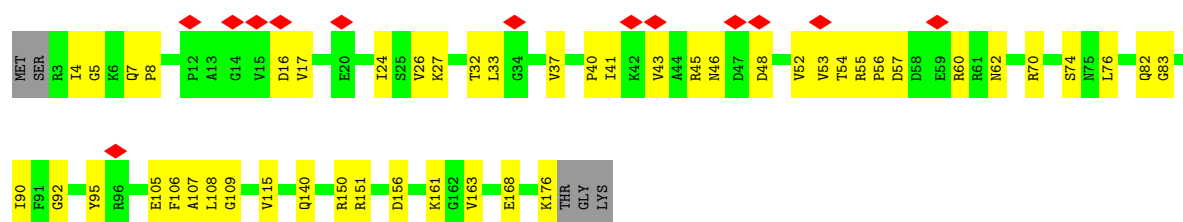
- Molecule 12: 50S ribosomal protein L4



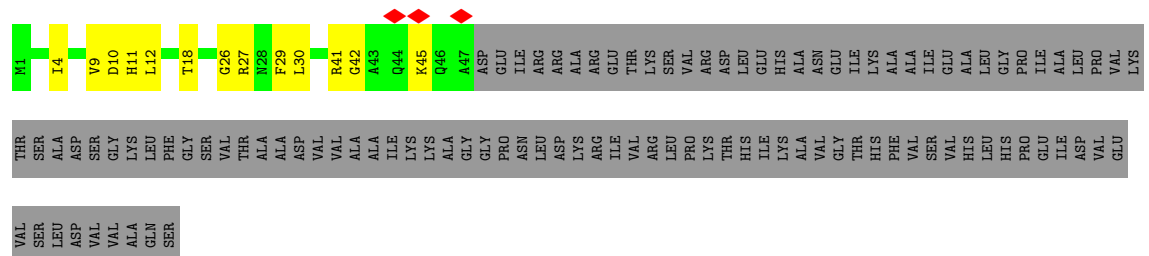
- Molecule 13: 50S ribosomal protein L5



- Molecule 14: 50S ribosomal protein L6



- Molecule 15: 50S ribosomal protein L9



- Molecule 16: 50S ribosomal protein L13

Chain P:  77% 22%



- Molecule 23: 50S ribosomal protein L20

Chain Q:  86% 9% 5%



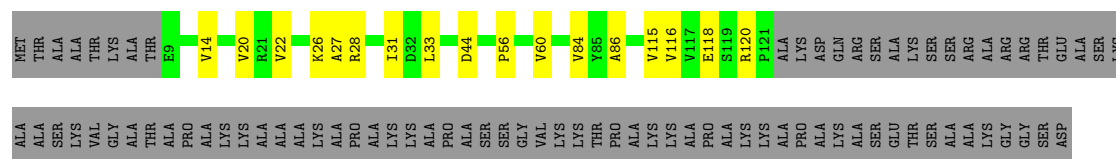
- Molecule 24: Large ribosomal subunit protein bL21

Chain R:  85% 10% 6%



- Molecule 25: 50S ribosomal protein L22

Chain S:  49% 9% 43%



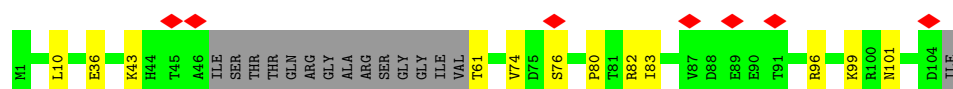
- Molecule 26: 50S ribosomal protein L23

Chain T:  86% 9% 5%



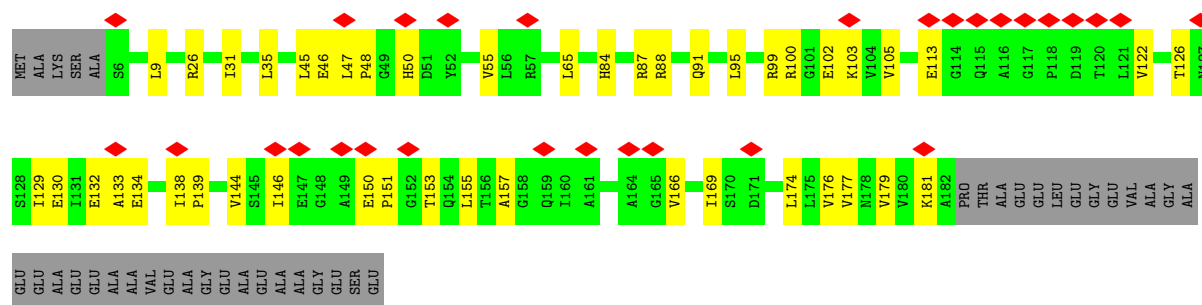
- Molecule 27: 50S ribosomal protein L24

Chain U:  7% 74% 11% 14%



- Molecule 28: 50S ribosomal protein L25

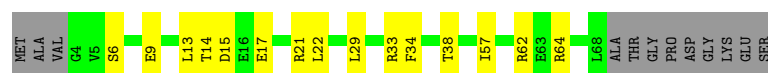
Chain V:  13% 61% 21% 18%



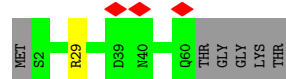
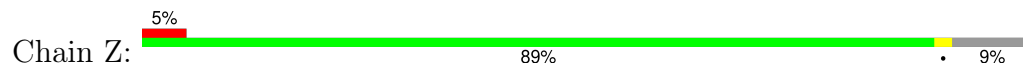
- Molecule 29: 50S ribosomal protein L27



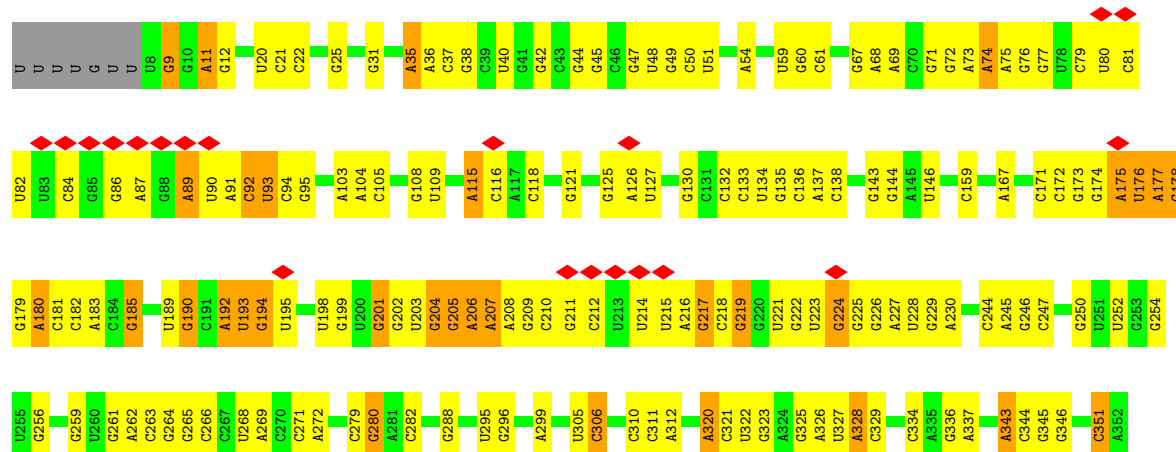
- Molecule 30: 50S ribosomal protein L29

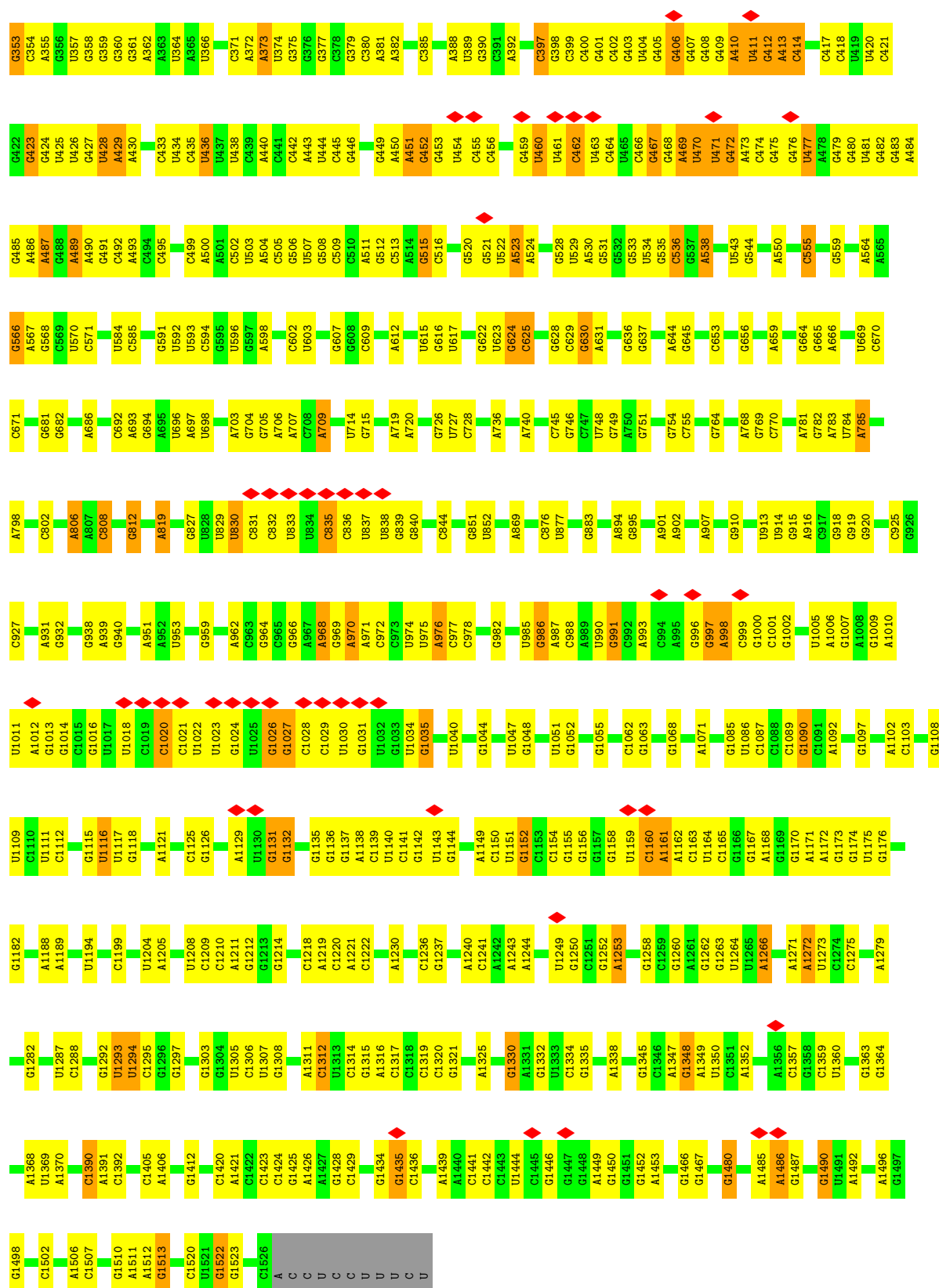


- Molecule 31: 50S ribosomal protein L30

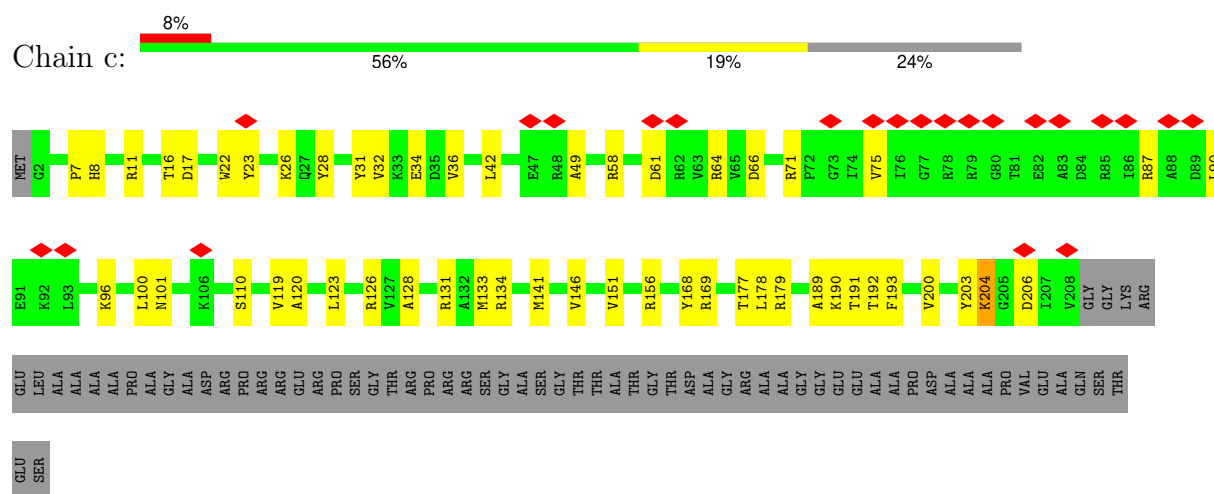


- Molecule 32: 16S ribosomal RNA





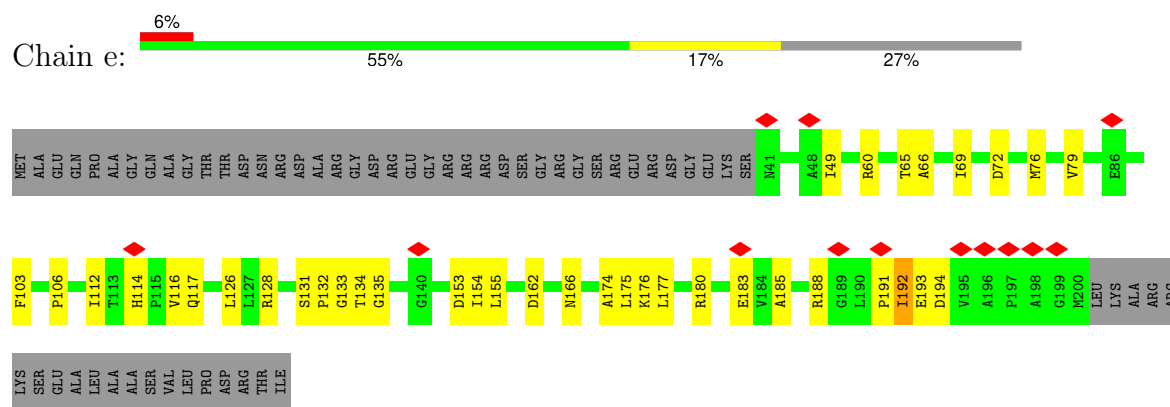
• Molecule 33: 30S ribosomal protein S3



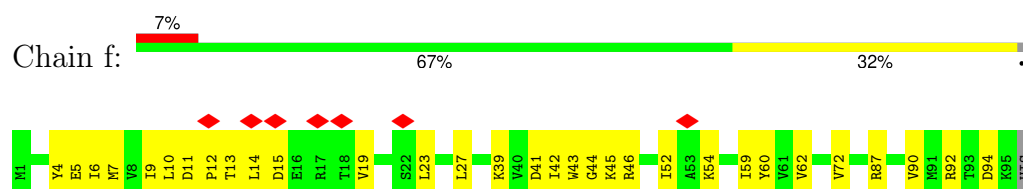
- Molecule 34: 30S ribosomal protein S4



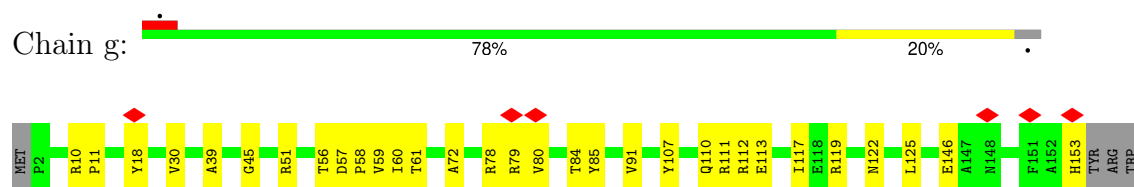
- Molecule 35: 30S ribosomal protein S5



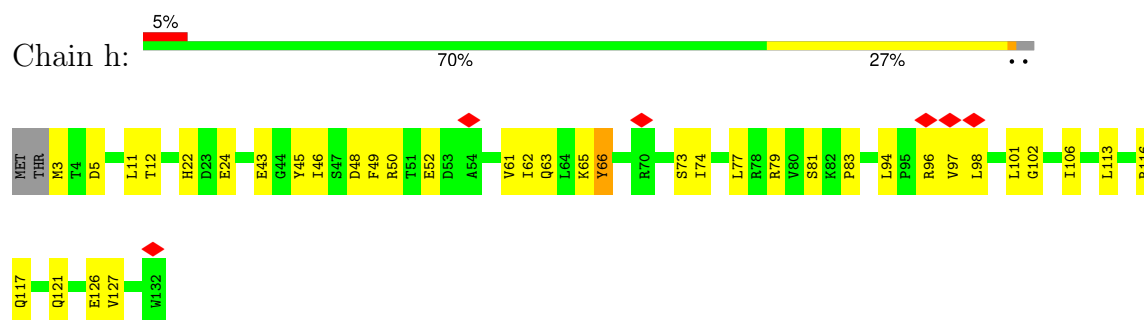
- Molecule 36: 30S ribosomal protein S6



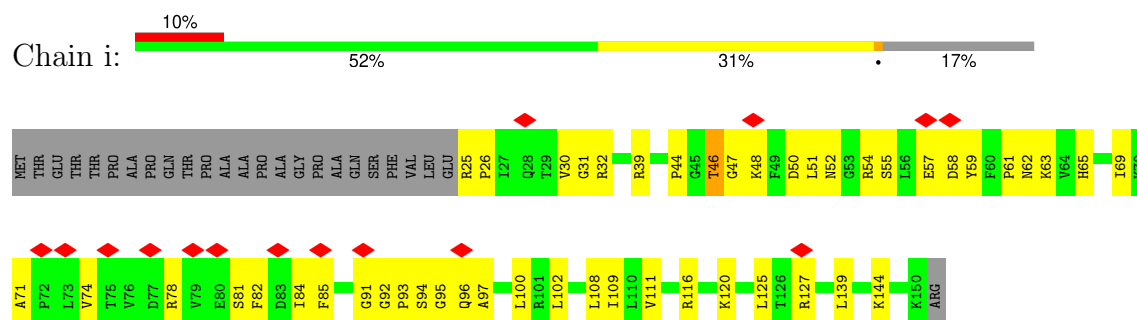
- Molecule 37: 30S ribosomal protein S7



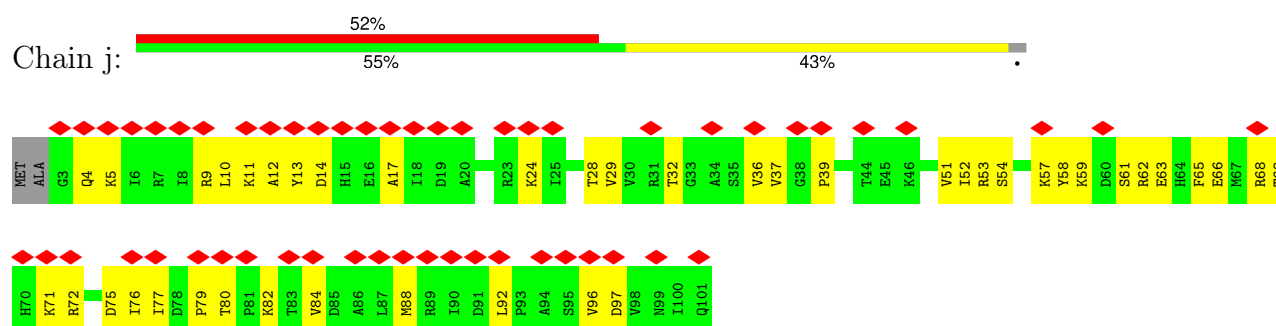
- Molecule 38: 30S ribosomal protein S8



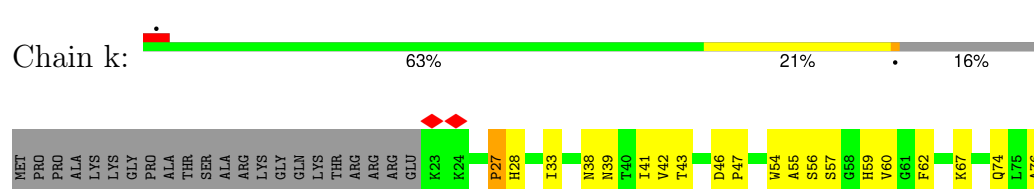
- Molecule 39: 30S ribosomal protein S9



- Molecule 40: 30S ribosomal protein S10

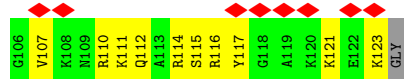


- Molecule 41: 30S ribosomal protein S11

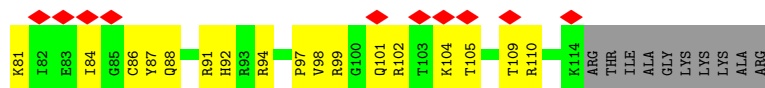
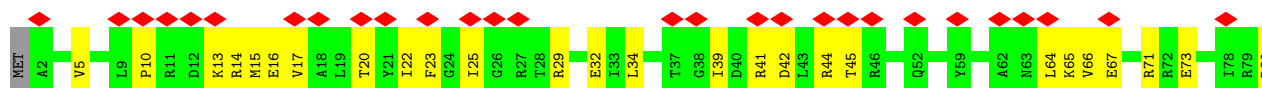




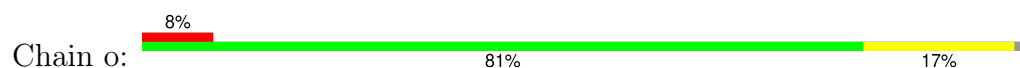
- Molecule 42: 30S ribosomal protein S12



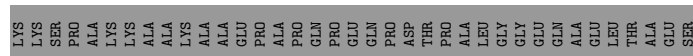
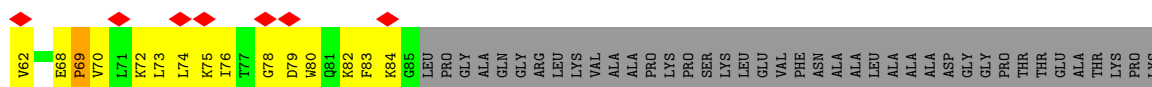
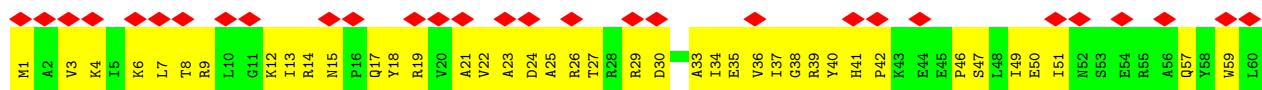
- Molecule 43: 30S ribosomal protein S13



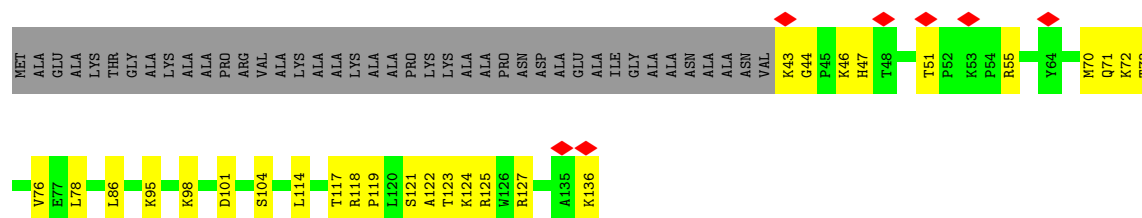
- Molecule 44: 30S ribosomal protein S15



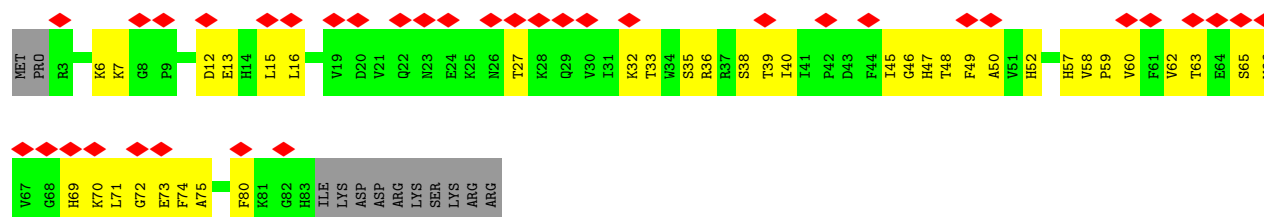
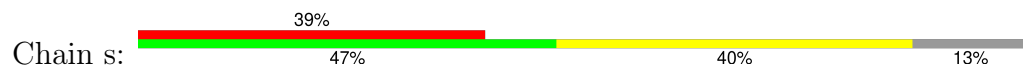
- Molecule 45: 30S ribosomal protein S16



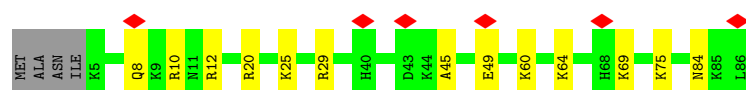
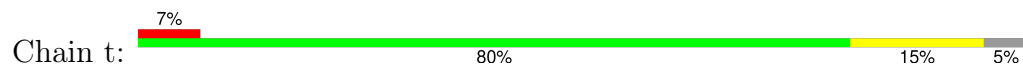
- Molecule 46: 30S ribosomal protein S17



- Molecule 47: 30S ribosomal protein S19



- Molecule 48: 30S ribosomal protein S20



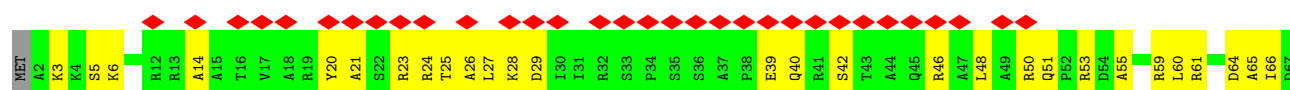
- Molecule 49: Mitochondrial domain of uncharacterized function (DUF1713)

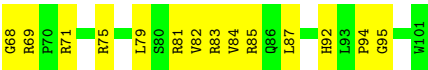


- Molecule 50: Small ribosomal subunit protein bS18

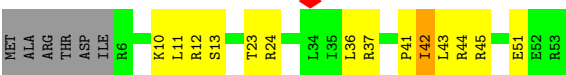


- Molecule 51: Small ribosomal subunit protein uS14

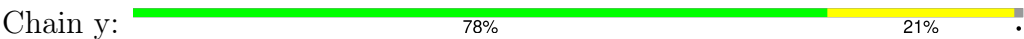




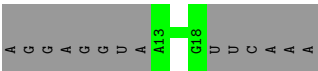
- Molecule 52: Large ribosomal subunit protein bL33



- Molecule 53: Large ribosomal subunit protein bL28



- Molecule 54: mRNA



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	81757	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 ($e^-/\text{\AA}^2$)	51.65	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	105000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	1.920	Depositor
Minimum map value	-1.414	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.074	Depositor
Recommended contour level	0.15	Depositor
Map size (Å)	422.15, 422.15, 422.15	wwPDB
Map dimensions	500, 500, 500	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8443, 0.8443, 0.8443	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	n	0.10	0/1835	0.24	0/2859
1	u	0.14	0/1813	0.30	0/2825
2	1	0.16	0/399	0.43	0/522
3	0	0.27	0/427	0.53	0/570
4	2	0.22	0/361	0.42	0/473
5	3	0.20	0/499	0.39	0/664
6	4	0.73	1/304 (0.3%)	0.70	0/402
7	6	0.18	0/353	0.45	0/478
8	I	0.20	0/74973	0.30	0/116979
9	B	0.15	0/2749	0.27	0/4284
10	C	0.22	0/2129	0.39	0/2861
11	D	0.24	0/1613	0.45	0/2174
12	E	0.22	0/1575	0.46	0/2129
13	F	0.19	0/1352	0.47	0/1817
14	G	0.20	0/1351	0.47	0/1824
15	H	0.19	0/353	0.45	0/474
16	J	0.21	0/1170	0.36	0/1584
17	K	0.23	0/944	0.43	0/1268
18	L	0.20	0/1073	0.38	0/1432
19	M	0.21	0/1098	0.42	0/1481
20	N	0.22	0/925	0.39	0/1242
21	O	0.18	0/895	0.41	0/1202
22	P	0.24	0/922	0.54	1/1236 (0.1%)
23	Q	0.23	0/992	0.42	0/1329
24	R	0.20	0/751	0.34	0/1009
25	S	0.23	0/874	0.39	0/1186
26	T	0.21	0/751	0.36	0/1012
27	U	0.20	0/705	0.46	0/941
28	V	0.22	0/1336	0.53	1/1820 (0.1%)
29	W	0.24	0/551	0.54	0/735
30	Y	0.19	0/544	0.37	0/727
31	Z	0.21	0/480	0.40	0/645
32	a	0.16	0/36501	0.30	0/56956
33	c	0.17	0/1678	0.40	0/2254

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
34	d	0.21	0/1691	0.48	0/2279
35	e	0.27	0/1165	0.52	1/1578 (0.1%)
36	f	0.18	0/767	0.45	0/1036
37	g	0.16	0/1210	0.38	0/1631
38	h	0.21	0/1014	0.45	0/1369
39	i	0.23	0/999	0.63	0/1342
40	j	0.20	0/803	0.45	0/1086
41	k	0.23	0/891	0.46	1/1204 (0.1%)
42	l	0.21	0/978	0.49	0/1306
43	m	0.17	0/927	0.43	0/1239
44	o	0.18	0/727	0.41	0/973
45	p	0.39	1/701 (0.1%)	0.80	2/944 (0.2%)
46	q	0.18	0/763	0.47	0/1020
47	s	0.18	0/674	0.43	0/906
48	t	0.17	0/633	0.42	0/838
49	x	0.48	0/272	0.74	1/350 (0.3%)
50	r	0.17	0/564	0.40	0/755
51	9	0.15	0/810	0.37	0/1083
52	b	0.20	0/423	0.65	0/567
53	y	0.40	1/640 (0.2%)	0.57	2/856 (0.2%)
54	X	0.15	0/147	0.17	0/227
All	All	0.19	3/161075 (0.0%)	0.34	9/241983 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
34	d	0	1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
53	y	4	HIS	C-O	-5.57	1.17	1.23
45	p	69	PRO	CG-CD	-5.50	1.32	1.50
6	4	2	LYS	C-O	-5.02	1.18	1.24

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
45	p	69	PRO	CA-N-CD	-13.00	93.80	112.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
45	p	69	PRO	N-CD-CG	-8.62	90.27	103.20
22	P	10	PRO	CA-N-CD	-8.44	100.19	112.00
53	y	3	ALA	N-CA-C	7.95	122.47	111.74
41	k	27	PRO	CA-N-CD	-6.52	102.87	112.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
34	d	31	TYR	Peptide

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	n	1643	0	836	22	0
1	u	1623	0	825	8	0
2	1	395	0	389	10	0
3	0	421	0	461	17	0
4	2	358	0	390	5	0
5	3	494	0	533	8	0
6	4	300	0	326	6	0
7	6	345	0	332	4	0
8	I	66956	0	33720	566	0
9	B	2458	0	1253	13	0
10	C	2088	0	2123	29	0
11	D	1590	0	1633	32	0
12	E	1552	0	1593	20	0
13	F	1335	0	1372	49	0
14	G	1330	0	1390	42	0
15	H	350	0	367	9	0
16	J	1143	0	1173	14	0
17	K	934	0	993	11	0
18	L	1060	0	1119	21	0
19	M	1072	0	1115	17	0
20	N	908	0	956	12	0
21	O	886	0	924	18	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
22	P	907	0	947	17	0
23	Q	980	0	1028	10	0
24	R	742	0	799	6	0
25	S	860	0	903	11	0
26	T	741	0	792	7	0
27	U	699	0	738	7	0
28	V	1319	0	1365	29	0
29	W	546	0	567	20	0
30	Y	541	0	551	11	0
31	Z	476	0	509	1	0
32	a	32610	0	16406	519	0
33	c	1654	0	1694	41	0
34	d	1658	0	1683	82	0
35	e	1149	0	1207	33	0
36	f	757	0	796	26	0
37	g	1193	0	1256	21	0
38	h	999	0	1034	28	0
39	i	981	0	1039	38	0
40	j	789	0	821	43	0
41	k	873	0	887	17	0
42	l	967	0	1056	38	0
43	m	919	0	961	54	0
44	o	718	0	760	12	0
45	p	688	0	726	69	0
46	q	752	0	808	25	0
47	s	657	0	671	40	0
48	t	631	0	681	11	0
49	x	272	0	331	20	0
50	r	560	0	588	11	0
51	9	798	0	845	42	0
52	b	416	0	431	14	0
53	y	630	0	651	11	0
54	X	131	0	66	0	0
All	All	147854	0	97420	1975	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 8.

The worst 5 of 1975 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:I:1495:G:OP2	53:y:2:SER:CB	1.96	1.14
32:a:77:G:H1	32:a:91:A:N6	1.47	1.12
8:I:1582:A:N6	8:I:1622:G:H21	1.48	1.11
32:a:1435:G:H1	32:a:1453:A:N6	1.52	1.06
8:I:1686:A:H62	8:I:1698:C:N4	1.55	1.05

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	1	49/62 (79%)	45 (92%)	4 (8%)	0	100	100
3	0	51/57 (90%)	46 (90%)	4 (8%)	1 (2%)	6	27
4	2	40/47 (85%)	38 (95%)	2 (5%)	0	100	100
5	3	60/64 (94%)	56 (93%)	4 (7%)	0	100	100
6	4	35/37 (95%)	34 (97%)	1 (3%)	0	100	100
7	6	43/80 (54%)	33 (77%)	10 (23%)	0	100	100
10	C	270/280 (96%)	253 (94%)	17 (6%)	0	100	100
11	D	211/217 (97%)	187 (89%)	24 (11%)	0	100	100
12	E	205/223 (92%)	194 (95%)	11 (5%)	0	100	100
13	F	168/187 (90%)	147 (88%)	20 (12%)	1 (1%)	21	52
14	G	172/179 (96%)	156 (91%)	16 (9%)	0	100	100
15	H	45/152 (30%)	41 (91%)	4 (9%)	0	100	100
16	J	144/195 (74%)	136 (94%)	8 (6%)	0	100	100
17	K	119/122 (98%)	112 (94%)	7 (6%)	0	100	100
18	L	140/146 (96%)	133 (95%)	7 (5%)	0	100	100
19	M	132/138 (96%)	123 (93%)	7 (5%)	2 (2%)	8	32

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
20	N	114/180 (63%)	104 (91%)	10 (9%)	0	100	100
21	O	114/122 (93%)	100 (88%)	13 (11%)	1 (1%)	14	43
22	P	110/113 (97%)	97 (88%)	13 (12%)	0	100	100
23	Q	120/129 (93%)	115 (96%)	5 (4%)	0	100	100
24	R	96/104 (92%)	91 (95%)	5 (5%)	0	100	100
25	S	111/197 (56%)	109 (98%)	2 (2%)	0	100	100
26	T	93/100 (93%)	84 (90%)	9 (10%)	0	100	100
27	U	86/105 (82%)	74 (86%)	12 (14%)	0	100	100
28	V	175/215 (81%)	150 (86%)	25 (14%)	0	100	100
29	W	72/86 (84%)	62 (86%)	10 (14%)	0	100	100
30	Y	63/77 (82%)	60 (95%)	3 (5%)	0	100	100
31	Z	57/65 (88%)	50 (88%)	7 (12%)	0	100	100
33	c	205/274 (75%)	195 (95%)	10 (5%)	0	100	100
34	d	199/201 (99%)	180 (90%)	19 (10%)	0	100	100
35	e	158/220 (72%)	139 (88%)	18 (11%)	1 (1%)	21	52
36	f	93/96 (97%)	84 (90%)	9 (10%)	0	100	100
37	g	150/156 (96%)	140 (93%)	10 (7%)	0	100	100
38	h	128/132 (97%)	115 (90%)	13 (10%)	0	100	100
39	i	124/151 (82%)	92 (74%)	30 (24%)	2 (2%)	7	31
40	j	97/101 (96%)	90 (93%)	7 (7%)	0	100	100
41	k	115/139 (83%)	106 (92%)	9 (8%)	0	100	100
42	l	121/124 (98%)	93 (77%)	28 (23%)	0	100	100
43	m	111/124 (90%)	100 (90%)	11 (10%)	0	100	100
44	o	85/89 (96%)	77 (91%)	7 (8%)	1 (1%)	10	37
45	p	83/162 (51%)	72 (87%)	11 (13%)	0	100	100
46	q	92/135 (68%)	79 (86%)	13 (14%)	0	100	100
47	s	79/93 (85%)	68 (86%)	11 (14%)	0	100	100
48	t	80/86 (93%)	76 (95%)	4 (5%)	0	100	100
49	x	29/33 (88%)	27 (93%)	1 (3%)	1 (3%)	3	18
50	r	69/88 (78%)	63 (91%)	6 (9%)	0	100	100
51	9	98/101 (97%)	89 (91%)	9 (9%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
52	b	46/54 (85%)	32 (70%)	13 (28%)	1 (2%)	5	26
53	y	75/78 (96%)	73 (97%)	2 (3%)	0	100	100
All	All	5332/6316 (84%)	4820 (90%)	501 (9%)	11 (0%)	44	71

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
19	M	87	LYS
44	o	47	LYS
49	x	27	GLN
52	b	42	ILE
13	F	88	GLU

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	1	40/50 (80%)	40 (100%)	0	100	100
3	0	43/47 (92%)	43 (100%)	0	100	100
4	2	36/40 (90%)	35 (97%)	1 (3%)	38	62
5	3	53/54 (98%)	53 (100%)	0	100	100
6	4	35/35 (100%)	34 (97%)	1 (3%)	37	62
7	6	40/66 (61%)	40 (100%)	0	100	100
10	C	212/219 (97%)	211 (100%)	1 (0%)	81	83
11	D	163/166 (98%)	163 (100%)	0	100	100
12	E	159/172 (92%)	158 (99%)	1 (1%)	78	81
13	F	139/155 (90%)	138 (99%)	1 (1%)	76	80
14	G	143/147 (97%)	143 (100%)	0	100	100
15	H	36/121 (30%)	36 (100%)	0	100	100
16	J	120/161 (74%)	119 (99%)	1 (1%)	73	79
17	K	100/101 (99%)	100 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
18	L	106/110 (96%)	105 (99%)	1 (1%)	70	78
19	M	110/114 (96%)	110 (100%)	0	100	100
20	N	94/139 (68%)	93 (99%)	1 (1%)	65	76
21	O	88/93 (95%)	88 (100%)	0	100	100
22	P	98/99 (99%)	98 (100%)	0	100	100
23	Q	95/99 (96%)	95 (100%)	0	100	100
24	R	79/83 (95%)	78 (99%)	1 (1%)	61	74
25	S	87/140 (62%)	87 (100%)	0	100	100
26	T	81/83 (98%)	81 (100%)	0	100	100
27	U	77/88 (88%)	76 (99%)	1 (1%)	61	74
28	V	142/164 (87%)	142 (100%)	0	100	100
29	W	54/62 (87%)	54 (100%)	0	100	100
30	Y	58/66 (88%)	58 (100%)	0	100	100
31	Z	51/55 (93%)	51 (100%)	0	100	100
33	c	170/210 (81%)	168 (99%)	2 (1%)	63	75
34	d	177/177 (100%)	177 (100%)	0	100	100
35	e	114/159 (72%)	114 (100%)	0	100	100
36	f	84/85 (99%)	84 (100%)	0	100	100
37	g	127/131 (97%)	126 (99%)	1 (1%)	73	79
38	h	106/108 (98%)	105 (99%)	1 (1%)	70	78
39	i	101/120 (84%)	101 (100%)	0	100	100
40	j	89/90 (99%)	89 (100%)	0	100	100
41	k	90/107 (84%)	89 (99%)	1 (1%)	65	76
42	l	105/105 (100%)	103 (98%)	2 (2%)	50	68
43	m	96/104 (92%)	96 (100%)	0	100	100
44	o	77/79 (98%)	77 (100%)	0	100	100
45	p	72/125 (58%)	72 (100%)	0	100	100
46	q	82/105 (78%)	82 (100%)	0	100	100
47	s	73/85 (86%)	73 (100%)	0	100	100
48	t	62/65 (95%)	62 (100%)	0	100	100
49	x	29/31 (94%)	26 (90%)	3 (10%)	7	25

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
50	r	60/71 (84%)	60 (100%)	0	100	100
51	9	81/82 (99%)	81 (100%)	0	100	100
52	b	45/50 (90%)	45 (100%)	0	100	100
53	y	66/68 (97%)	65 (98%)	1 (2%)	57	72
All	All	4445/5086 (87%)	4424 (100%)	21 (0%)	78	83

5 of 21 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
41	k	124	THR
49	x	11	ARG
53	y	37	THR
49	x	24	THR
42	l	49	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 25 such sidechains are listed below:

Mol	Chain	Res	Type
34	d	95	ASN
35	e	169	HIS
51	9	92	HIS
35	e	114	HIS
36	f	55	HIS

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	n	76/77 (98%)	16 (21%)	0
1	u	75/77 (97%)	12 (16%)	0
32	a	1518/1537 (98%)	258 (16%)	0
54	X	5/20 (25%)	0	0
8	I	3116/3138 (99%)	448 (14%)	12 (0%)
9	B	114/115 (99%)	7 (6%)	0
All	All	4904/4964 (98%)	741 (15%)	12 (0%)

5 of 741 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	n	4	G
1	n	5	G
1	n	8	U
1	n	9	G
1	n	20	G

5 of 12 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
8	I	1624	C
8	I	2364	G
8	I	2840	A
8	I	2447	U
8	I	913	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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.

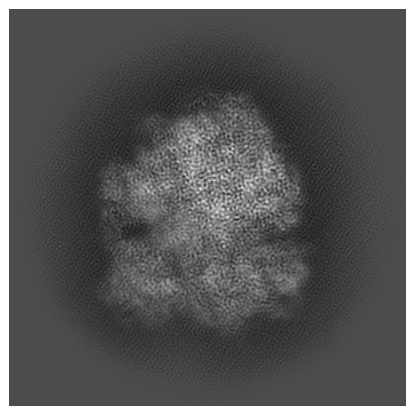
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-47899. These allow visual inspection of the internal detail of the map and identification of artifacts.

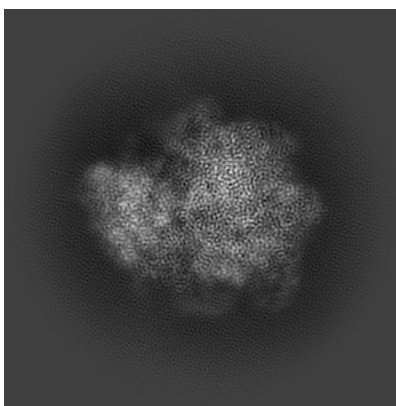
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

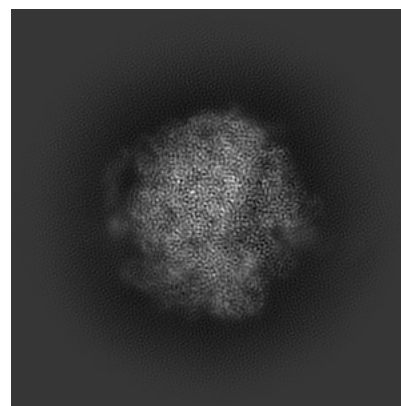
6.1.1 Primary map



X

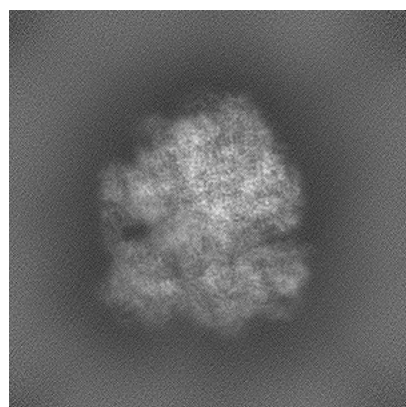


Y

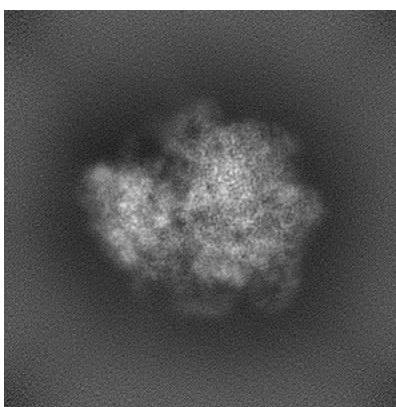


Z

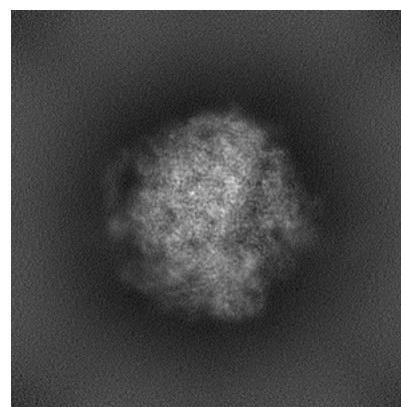
6.1.2 Raw map



X



Y

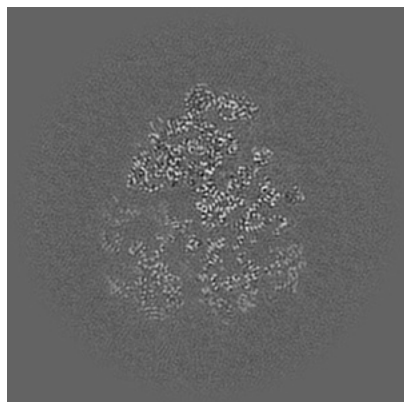


Z

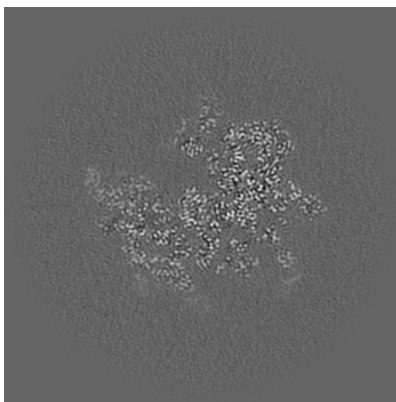
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

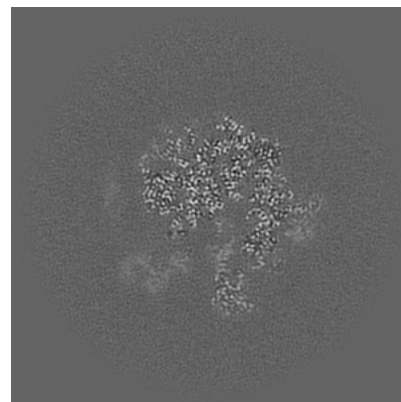
6.2.1 Primary map



X Index: 250

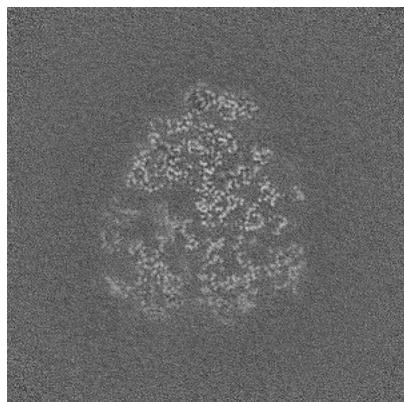


Y Index: 250

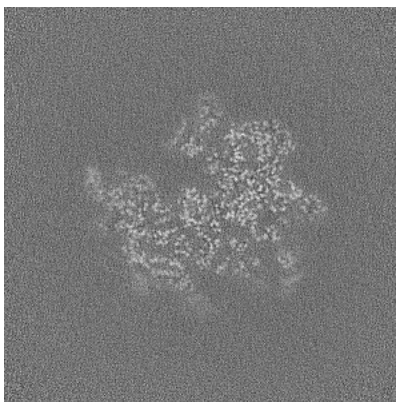


Z Index: 250

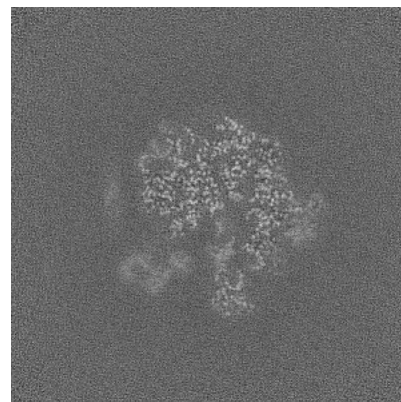
6.2.2 Raw map



X Index: 250



Y Index: 250

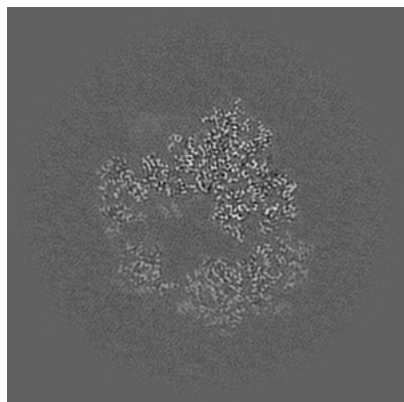


Z Index: 250

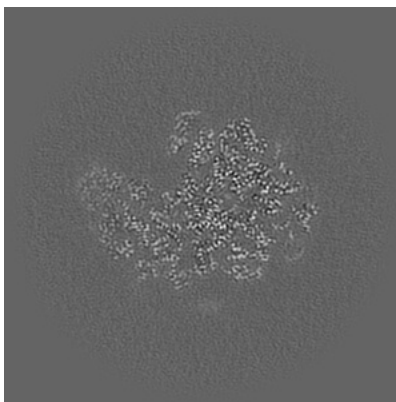
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

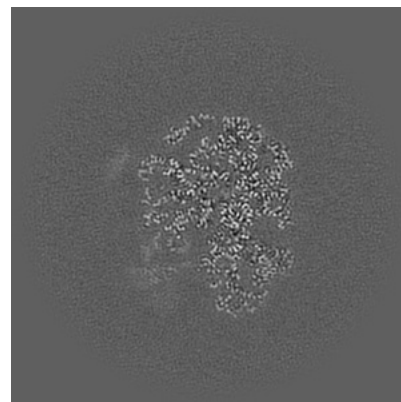
6.3.1 Primary map



X Index: 277

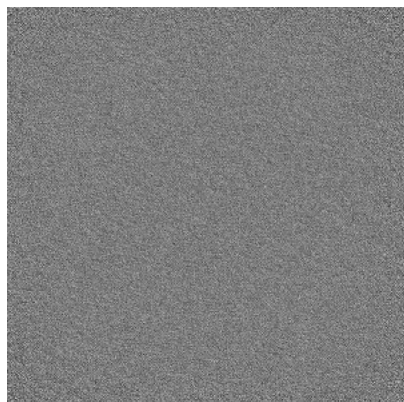


Y Index: 270

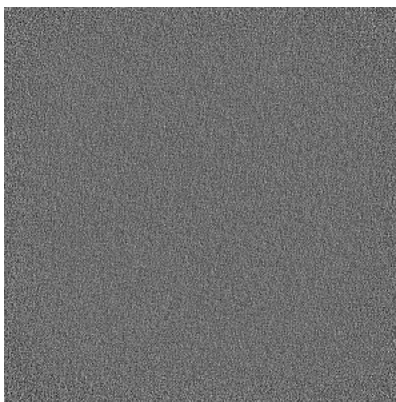


Z Index: 276

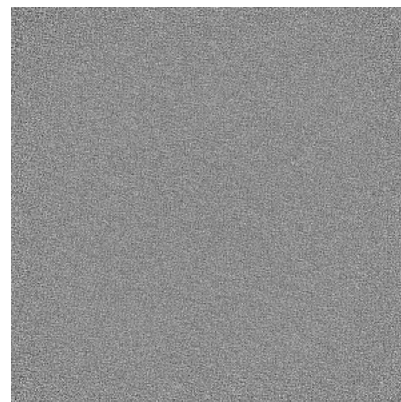
6.3.2 Raw map



X Index: 0



Y Index: 0

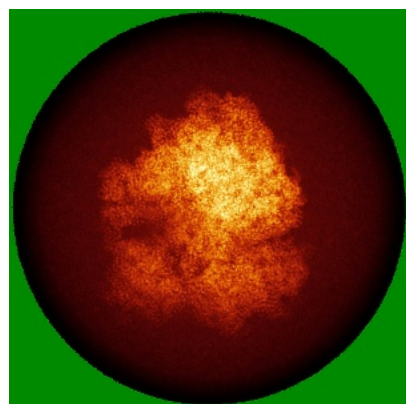


Z Index: 0

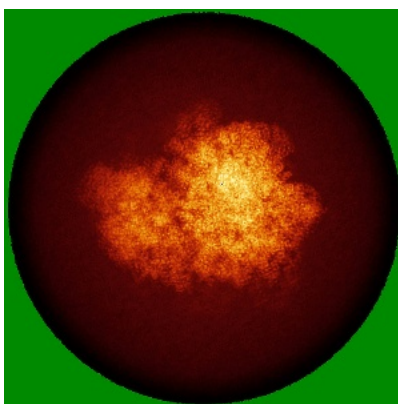
The images above show the largest variance slices of the map in three orthogonal directions.

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

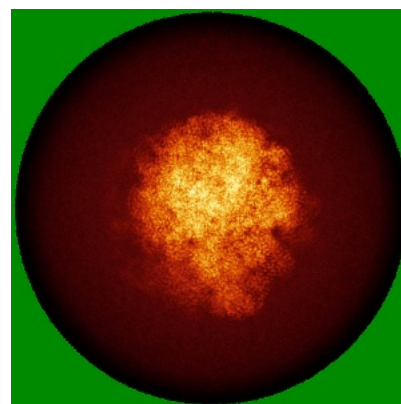
6.4.1 Primary map



X

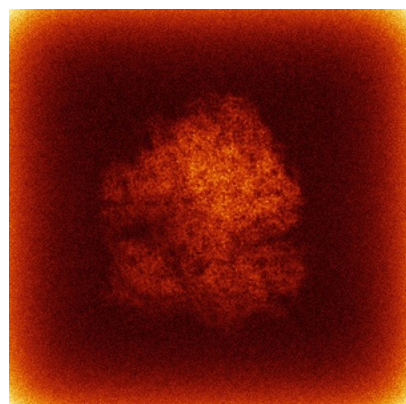


Y

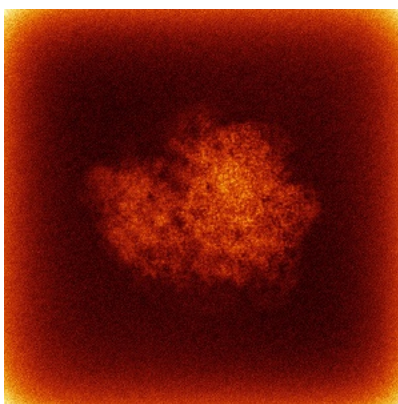


Z

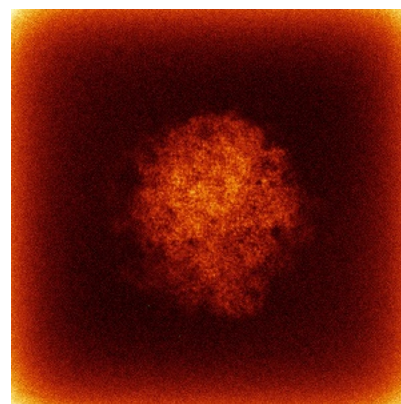
6.4.2 Raw map



X



Y

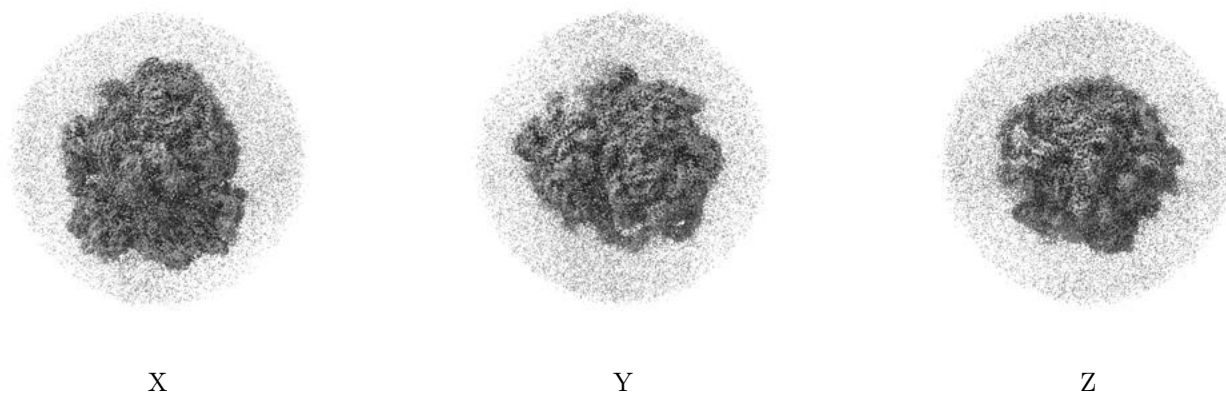


Z

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.

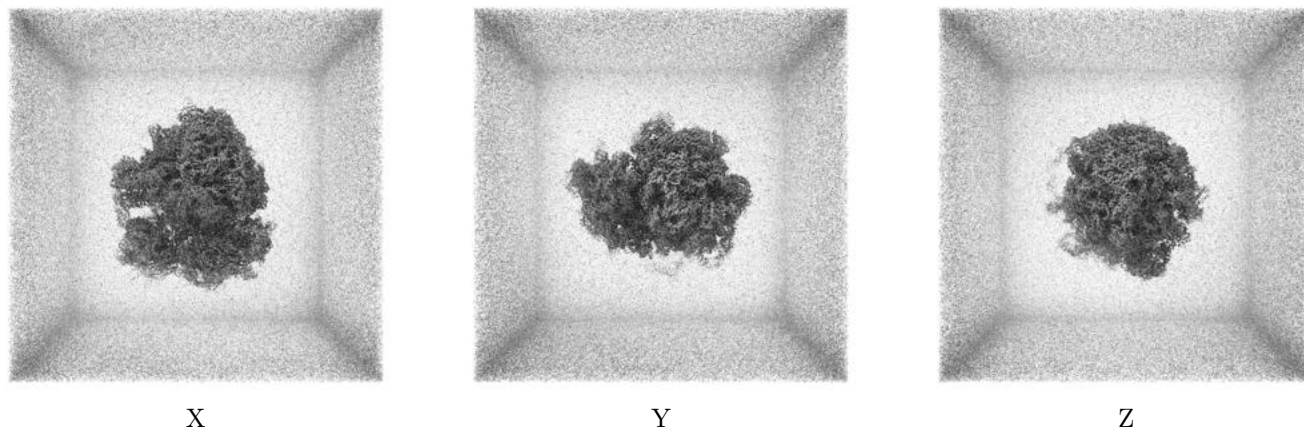
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.15. 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.

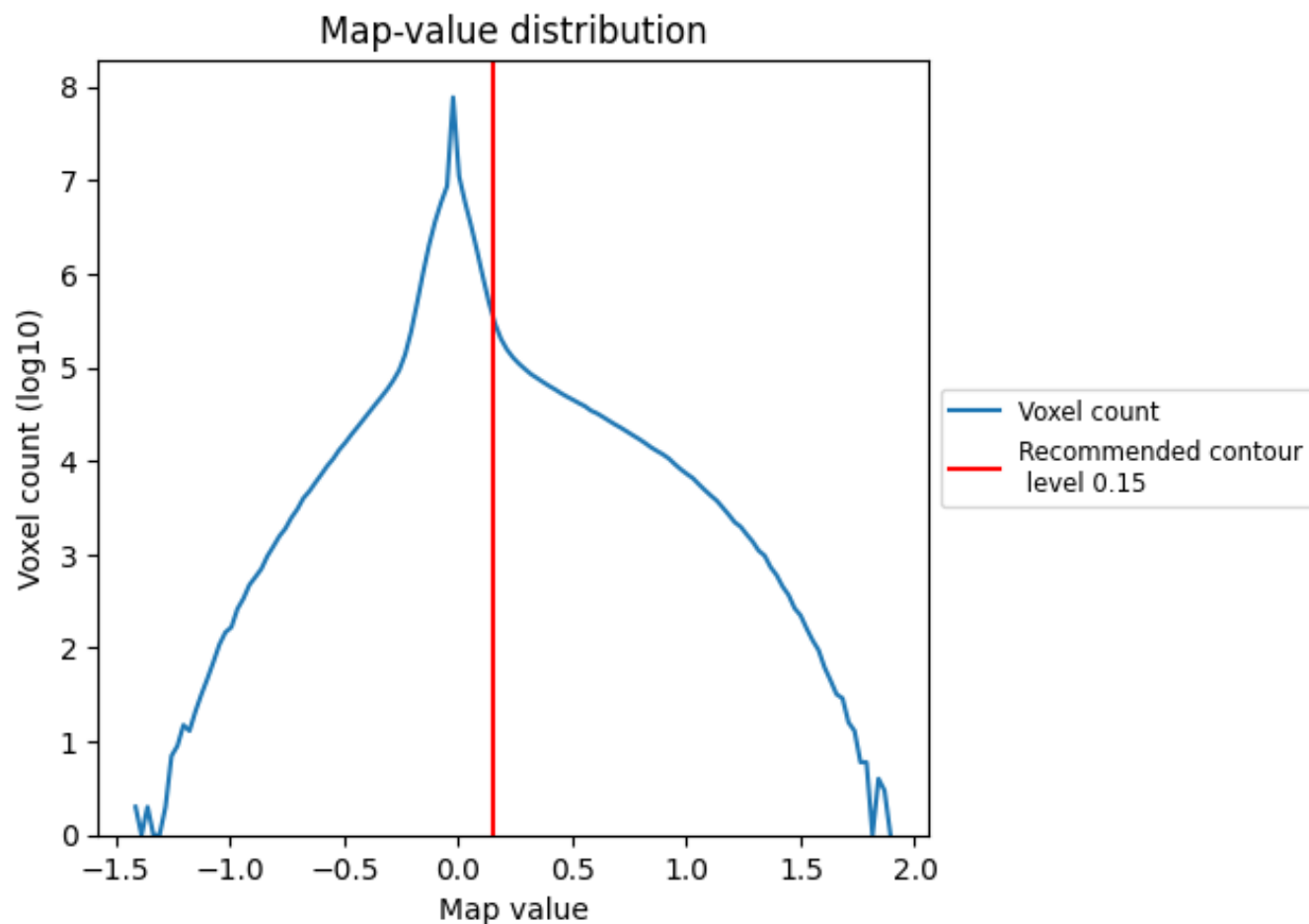
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

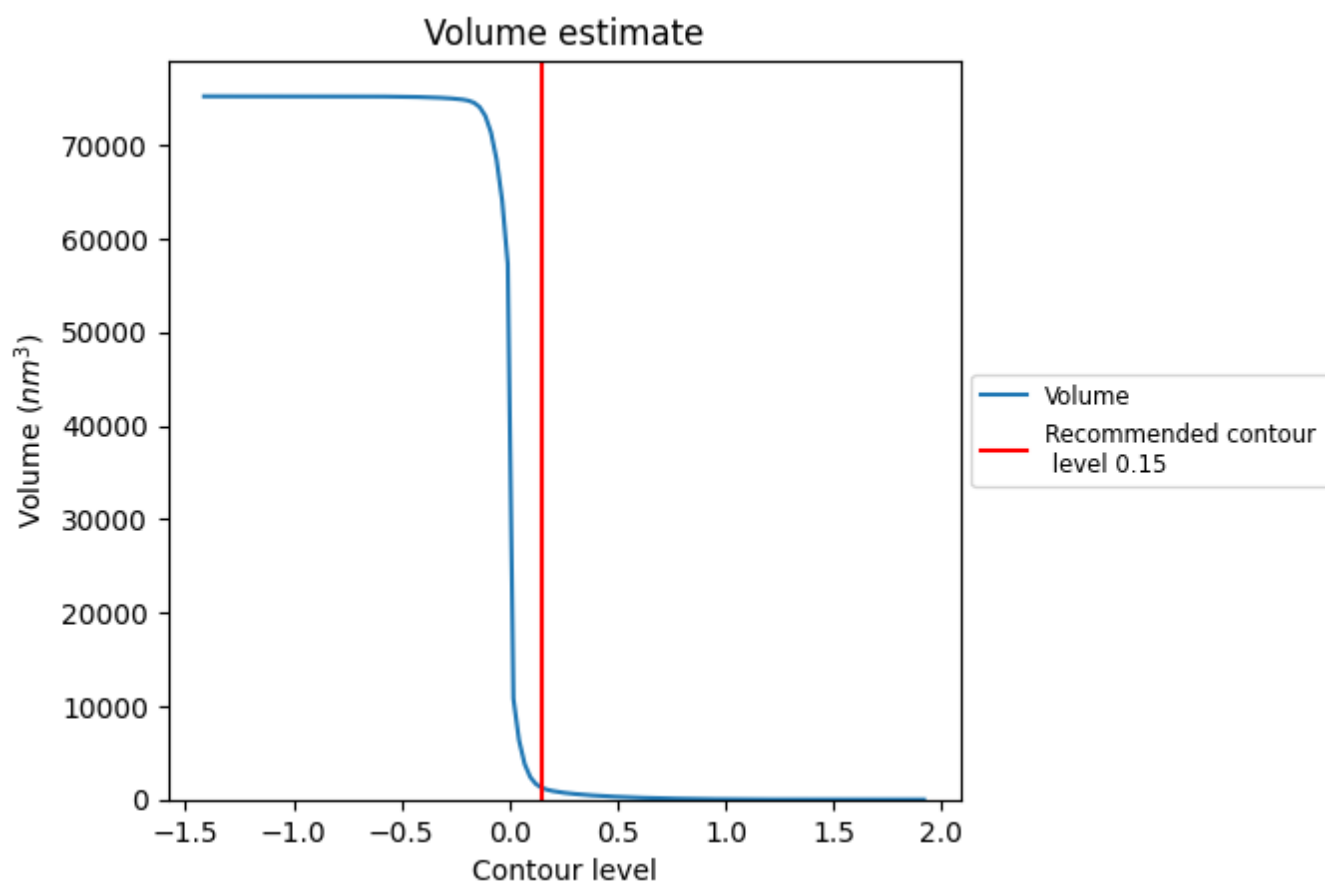
This section contains the results of statistical analysis of the map.

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.

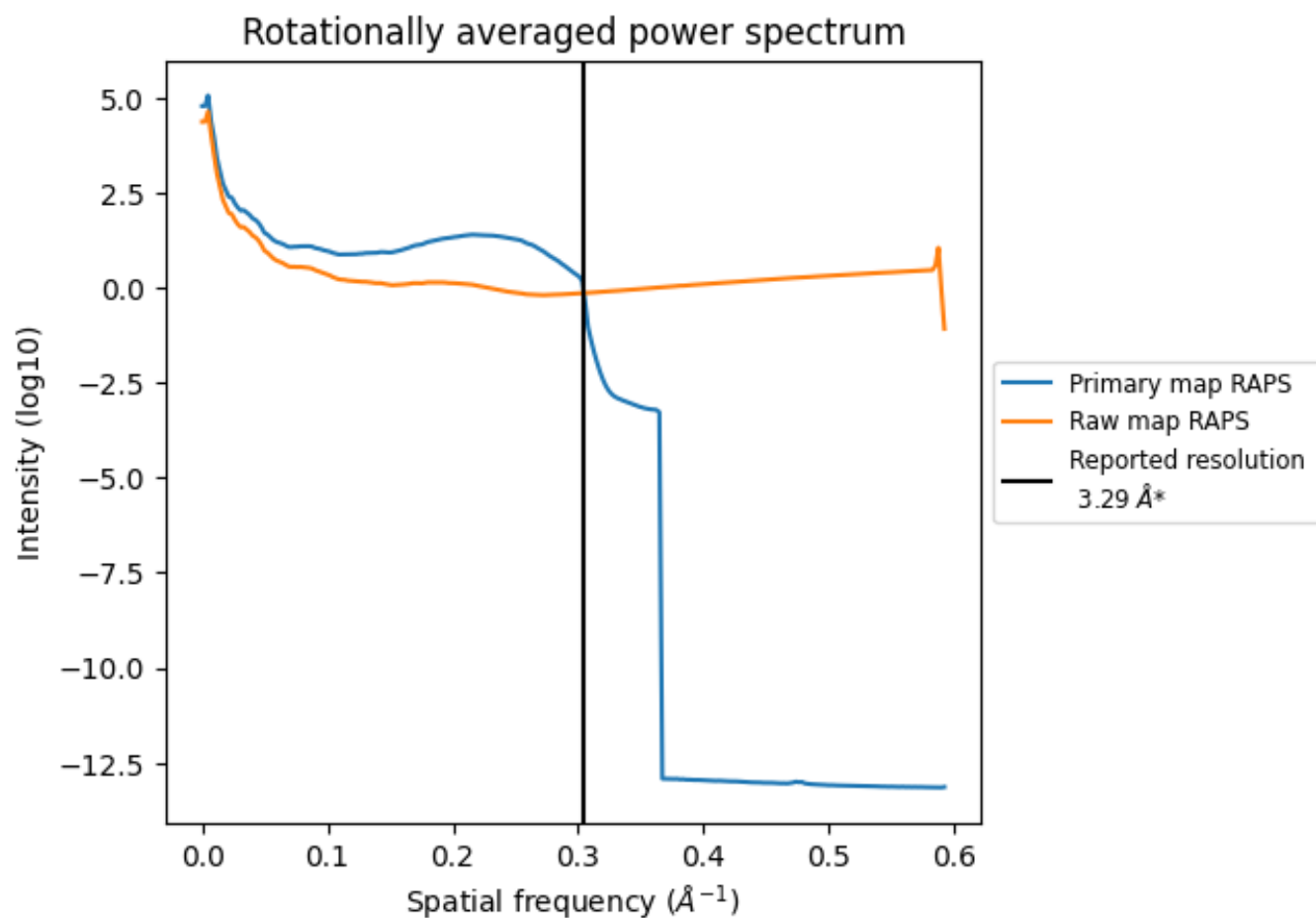
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1266 nm³; this corresponds to an approximate mass of 1144 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 ⓘ

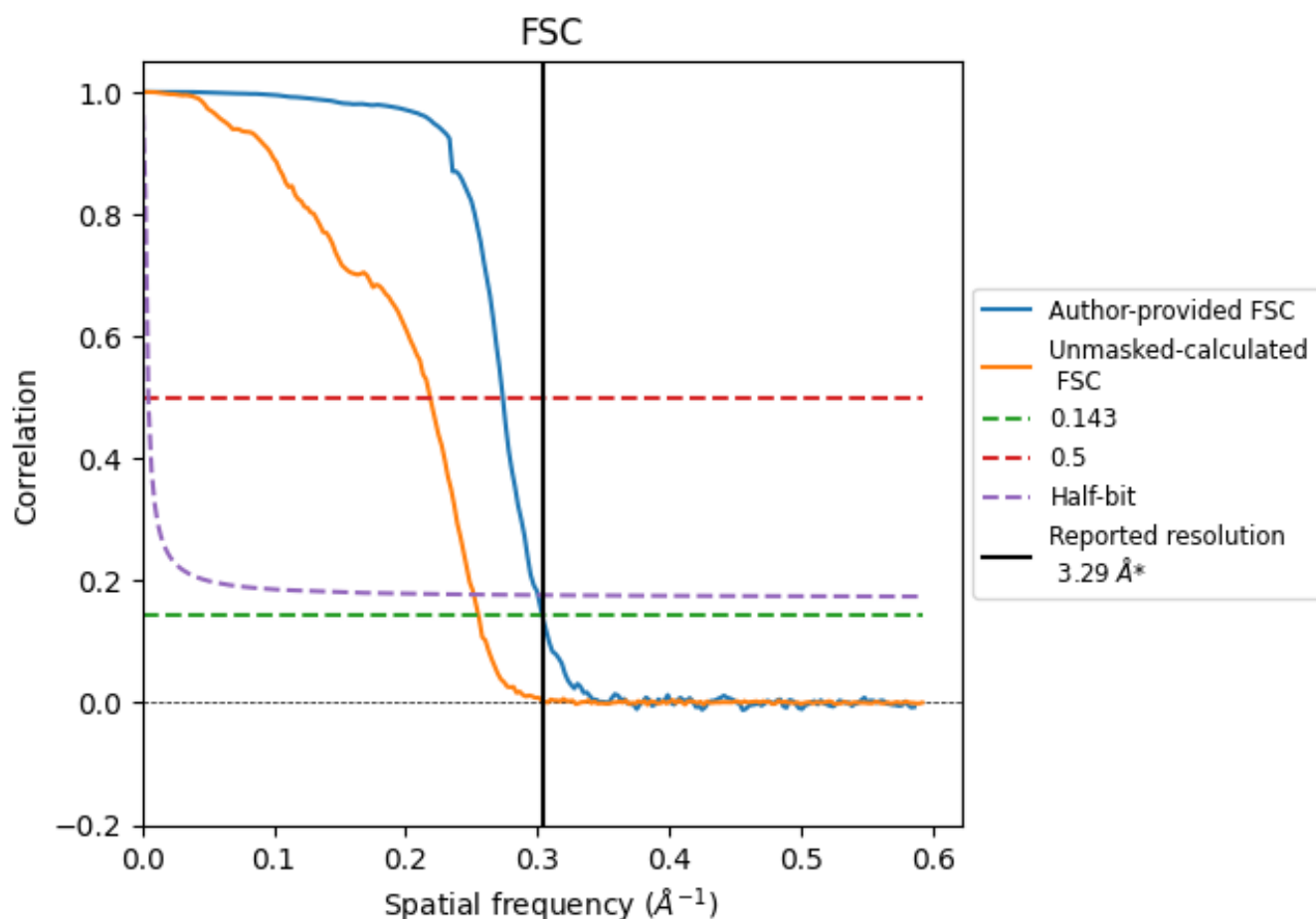


*Reported resolution corresponds to spatial frequency of 0.304 Å⁻¹

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 0.304 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

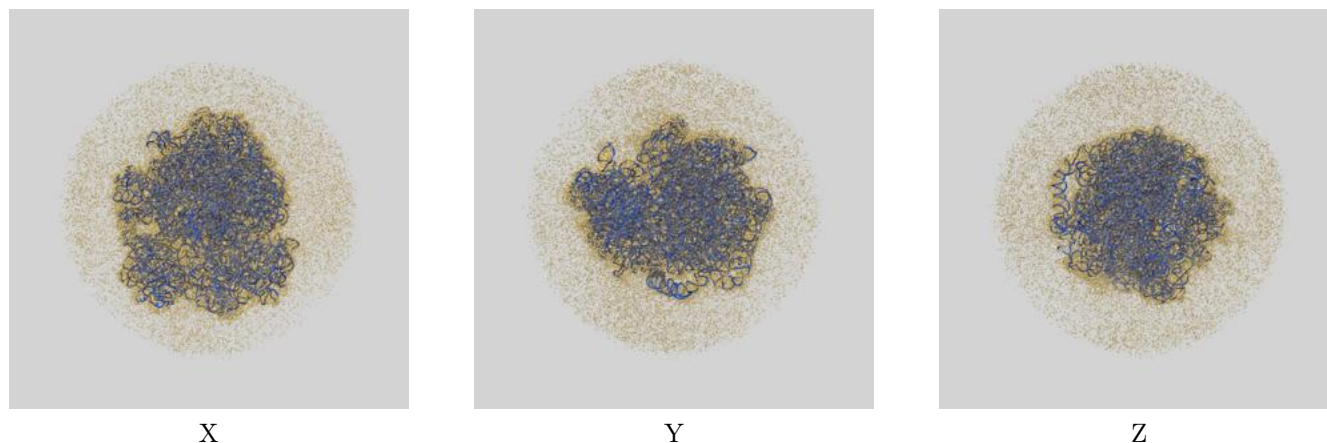
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.29	-	-
Author-provided FSC curve	3.29	3.65	3.33
Unmasked-calculated*	3.92	4.58	3.97

*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 3.92 differs from the reported value 3.29 by more than 10 %

9 Map-model fit [i](#)

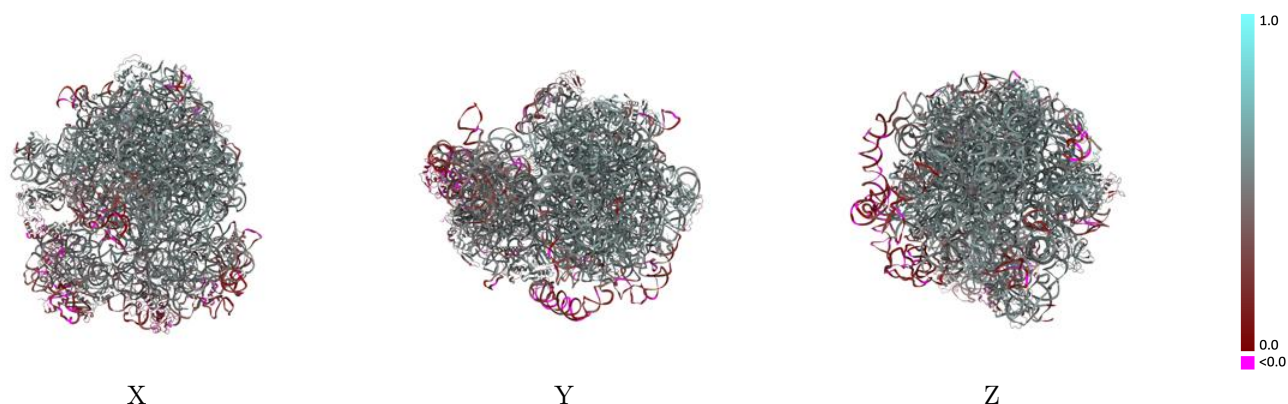
This section contains information regarding the fit between EMDB map EMD-47899 and PDB model 9EC3. Per-residue inclusion information can be found in section [3](#) on page [14](#).

9.1 Map-model overlay [i](#)



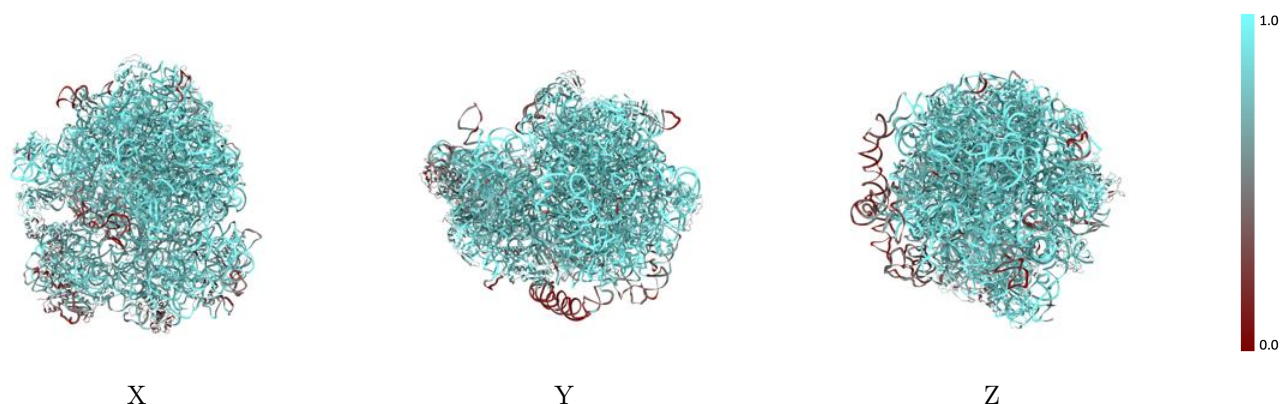
The images above show the 3D surface view of the map at the recommended contour level 0.15 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



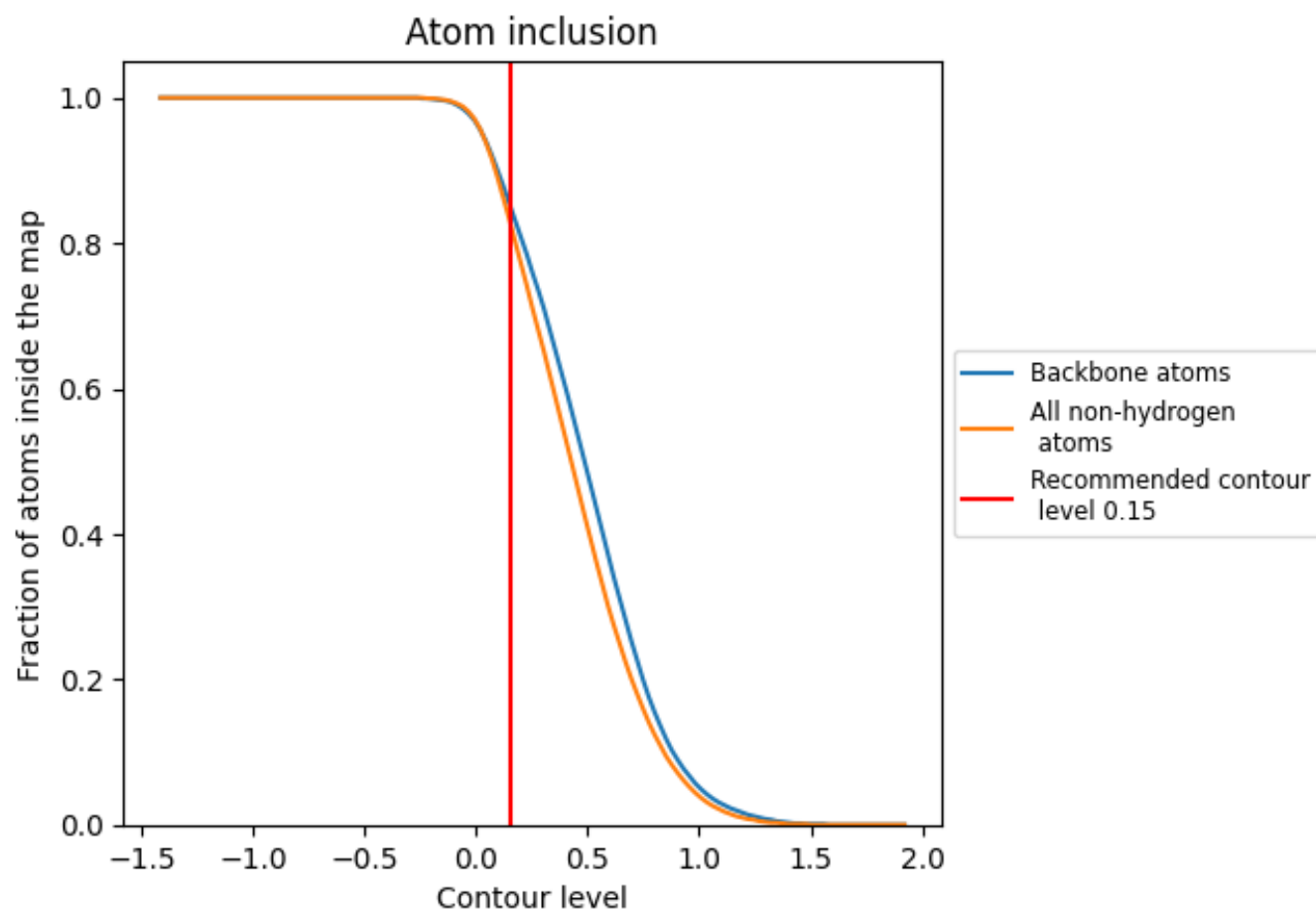
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.15).

9.4 Atom inclusion [i](#)



At the recommended contour level, 85% of all backbone atoms, 83% 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 (0.15) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8320	 0.4610
0	 0.9150	 0.5450
1	 0.7760	 0.4560
2	 0.9210	 0.5570
3	 0.9220	 0.5570
4	 0.9130	 0.5510
6	 0.6750	 0.3660
9	 0.5780	 0.3560
B	 0.9010	 0.4850
C	 0.9080	 0.5600
D	 0.9020	 0.5470
E	 0.8670	 0.5340
F	 0.7680	 0.4510
G	 0.7710	 0.4410
H	 0.7730	 0.4850
I	 0.8480	 0.4680
J	 0.9090	 0.5540
K	 0.9050	 0.5580
L	 0.9110	 0.5640
M	 0.8960	 0.5470
N	 0.9220	 0.5580
O	 0.8610	 0.5040
P	 0.8860	 0.5450
Q	 0.9080	 0.5540
R	 0.8850	 0.5580
S	 0.9140	 0.5600
T	 0.8990	 0.5420
U	 0.7960	 0.4640
V	 0.6700	 0.4680
W	 0.8810	 0.5250
X	 0.9470	 0.5320
Y	 0.8460	 0.5120
Z	 0.8550	 0.5230
a	 0.8540	 0.4470
b	 0.8110	 0.4650



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Chain	Atom inclusion	Q-score
c	 0.7160	 0.4440
d	 0.5020	 0.2050
e	 0.7960	 0.4500
f	 0.7570	 0.4480
g	 0.7920	 0.4660
h	 0.7910	 0.4470
i	 0.7030	 0.4140
j	 0.4050	 0.1550
k	 0.8150	 0.4950
l	 0.7150	 0.3940
m	 0.5260	 0.2100
n	 0.6940	 0.3430
o	 0.7770	 0.4310
p	 0.4810	 0.1570
q	 0.7560	 0.4250
r	 0.7750	 0.4830
s	 0.4810	 0.1960
t	 0.7600	 0.4050
u	 0.8630	 0.4730
x	 0.8270	 0.4900
y	 0.9180	 0.5540