



wwPDB EM Validation Summary Report ⓘ

Jun 23, 2026 – 04:33 PM JST

PDB ID : 8IPD / pdb_00008ipd
EMDB ID : EMD-35639
Title : human nuclear pre-60S ribosomal particle - State C
Authors : Zhang, Y.; Gao, N.
Deposited on : 2023-03-14
Resolution : 3.20 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:

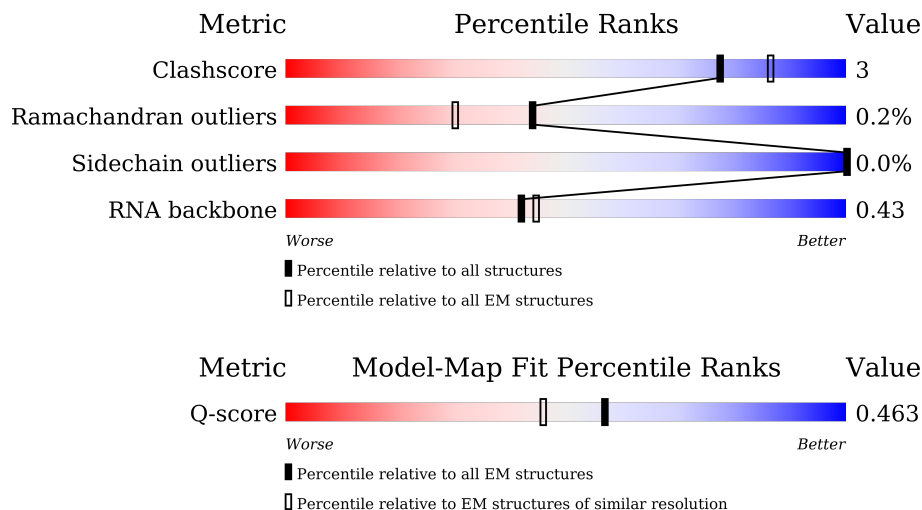
EMDB validation analysis : 0.0.1.dev132
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using 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 3.20 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	15020 (2.70 - 3.70)

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	6	245	
2	7	163	
3	8	156	



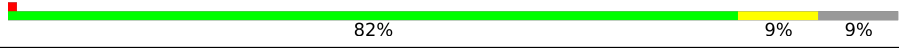




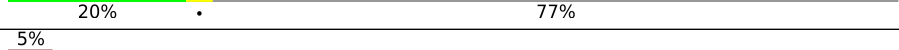
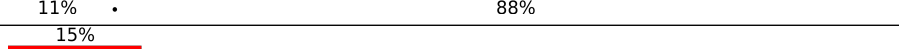

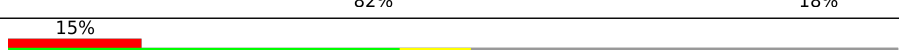
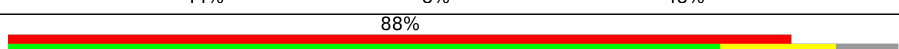


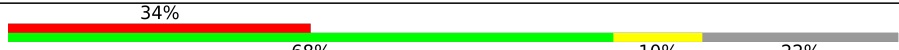


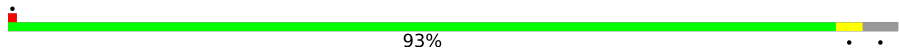


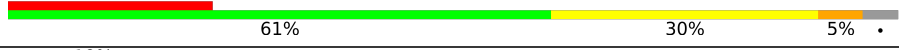

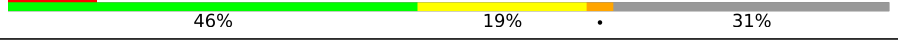

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Mol	Chain	Length	Quality of chain
4	9	134	57% 51% 13% 36%
5	A	159	13% 24% 72%
6	B	403	91% 9%
7	D	427	77% 7% 16%
8	E	115	57% 77% 8% 15%
9	F	117	15% 87% 6% 7%
10	G	266	24% 79% 11% 9%
11	H	123	91% 8%
12	I	192	87% 12%
13	J	260	6% 78% 5% 17%
14	K	105	10% 91% 6%
15	L	148	74% 24%
16	M	97	82% 6% 11%
17	O	70	34% 87% 11%
18	P	51	88% 10%
19	Q	211	10% 91% 9%
20	S	215	55% 8% 37%
21	U	204	8% 96%
22	V	203	90% 8%
23	X	92	36% 88% 11%
24	Z	188	72% 8% 20%
25	a	196	15% 69% 6% 24%
26	b	176	88% 12%
27	e	140	79% 14% 6%
28	g	156	69% 5% 25%

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Mol	Chain	Length	Quality of chain
29	h	145	
30	i	136	
31	l	137	
32	m	257	
33	n	110	
34	o	288	
35	p	248	
36	r	360	
37	u	549	
38	w	731	
39	y	165	
40	z	129	
41	C	178	
42	R	297	
43	W	485	
44	T	160	
45	4	634	
46	Y	184	
47	k	135	
48	j	125	
49	d	128	
50	3	120	
51	v	239	
52	2	5054	

2 Entry composition

There are 54 unique types of molecules in this entry. The entry contains 149878 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Eukaryotic translation initiation factor 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	6	244	1852	1149	318	372	13	0	0

- Molecule 2 is a protein called Probable ribosome biogenesis protein RLP24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	7	135	1159	737	225	187	10	0	0

- Molecule 3 is a RNA chain called 5.8S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	8	156	3315	1481	585	1094	155	0	0

- Molecule 4 is a protein called Zinc finger protein 593.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	9	86	711	433	154	121	3	0	0

- Molecule 5 is a protein called 60S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	A	45	352	221	76	52	3	0	0

- Molecule 6 is a protein called 60S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	B	402	3244	2065	609	556	14	1	0

- Molecule 7 is a protein called 60S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	D	358	2853	1797	570	473	13	0	0

- Molecule 8 is a protein called 60S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	E	98	764	485	135	138	6	0	0

- Molecule 9 is a protein called 60S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	F	109	868	544	179	139	6	0	0

- Molecule 10 is a protein called 60S ribosomal protein L7a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	G	241	1927	1228	371	324	4	0	0

- Molecule 11 is a protein called 60S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	H	122	1015	641	205	168	1	0	0

- Molecule 12 is a protein called 60S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	I	190	1518	956	284	272	6	0	0

- Molecule 13 is a protein called Ribosome biogenesis protein NSA2 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	J	217	1772	1134	334	296	8	0	0

- Molecule 14 is a protein called 60S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	K	102	Total	C	N	O	S	0	0
			832	521	177	129	5		

- Molecule 15 is a protein called 60S ribosomal protein L27a.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	L	112	Total	C	N	O	S	0	0
			877	557	172	145	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
16	M	86	Total	C	N	O	S	0	0
			705	434	155	111	5		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
17	O	69	Total	C	N	O	S	0	0
			569	366	103	99	1		

- Molecule 18 is a protein called 60S ribosomal protein L39.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	P	50	Total	C	N	O	S	0	0
			444	281	98	64	1		

- Molecule 19 is a protein called 60S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	Q	210	Total	C	N	O	S	0	0
			1701	1064	352	281	4		

- Molecule 20 is a protein called 60S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	S	135	Total	C	N	O	S	0	0
			1111	713	213	178	7		

- Molecule 21 is a protein called 60S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	U	203	1701	1072	359	266	4	0	0

- Molecule 22 is a protein called 60S ribosomal protein L13a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	V	201	1650	1063	321	261	5	0	0

- Molecule 23 is a protein called 60S ribosomal protein L37a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	X	91	708	445	136	120	7	0	0

- Molecule 24 is a protein called 60S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	Z	151	1223	768	247	203	5	0	0

- Molecule 25 is a protein called 60S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	a	148	1239	772	266	192	9	0	0

- Molecule 26 is a protein called 60S ribosomal protein L18a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	b	176	1461	930	284	236	11	0	0

- Molecule 27 is a protein called 60S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	e	131	979	618	184	172	5	0	0

- Molecule 28 is a protein called 60S ribosomal protein L23a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	g	117	958	612	179	166	1	0	0

- Molecule 29 is a protein called 60S ribosomal protein L26.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	h	134	1115	700	226	186	3	0	0

- Molecule 30 is a protein called 60S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	i	135	1107	714	208	182	3	0	0

- Molecule 31 is a protein called 60S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	l	125	1002	622	207	168	5	0	0

- Molecule 32 is a protein called 60S ribosomal protein L8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	m	248	1898	1189	389	314	6	0	0

- Molecule 33 is a protein called 60S ribosomal protein L35a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	n	109	876	555	174	144	3	0	0

- Molecule 34 is a protein called 60S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	o	235	1897	1217	360	316	4	0	0

- Molecule 35 is a protein called 60S ribosomal protein L7.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	p	225	Total	C	N	O	S	1	0
			1878	1207	361	301	9		

- Molecule 36 is a protein called Coiled-coil domain-containing protein 86.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	r	82	Total	C	N	O	S	0	0
			723	442	158	121	2		

- Molecule 37 is a protein called Guanine nucleotide-binding protein-like 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	u	68	Total	C	N	O	S	0	0
			578	362	121	92	3		

- Molecule 38 is a protein called G Protein Nucleolar 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	w	433	Total	C	N	O	S	0	0
			3472	2201	615	643	13		

- Molecule 39 is a protein called 60S ribosomal protein L12.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	y	165	Total	C	N	O	S	0	0
			1250	779	232	234	5		

- Molecule 40 is a protein called Protein LLP homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	z	67	Total	C	N	O	S	0	0
			581	363	128	88	2		

- Molecule 41 is a protein called 60S ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	C	165	Total	C	N	O	S	0	0
			1319	836	245	233	5		

- Molecule 42 is a protein called 60S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
42	R	293	2382	1507	434	427	14	0	0

- Molecule 43 is a protein called Notchless protein homolog 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
43	W	388	3018	1889	556	562	11	0	0

- Molecule 44 is a protein called 60S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
44	T	124	1001	632	194	171	4	0	0

- Molecule 45 is a protein called GTP-binding protein 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
45	4	611	5016	3151	918	920	27	0	0

- Molecule 46 is a protein called 60S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
46	Y	167	1355	848	260	238	9	0	0

- Molecule 47 is a protein called 60S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
47	k	129	1064	673	220	166	5	0	0

- Molecule 48 is a protein called 60S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
48	j	111	918	578	178	160	2	0	0

- Molecule 49 is a protein called 60S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	d	104	Total	C	N	O	S	0	0
			850	542	149	157	2		

- Molecule 50 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	3	115	Total	C	N	O	P	0	0
			2453	1093	437	808	115		

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
3	92	C	G	conflict	GB NR_023363
3	93	G	C	conflict	GB NR_023363
3	95	C	U	conflict	GB NR_023363
3	96	U	G	conflict	GB NR_023363

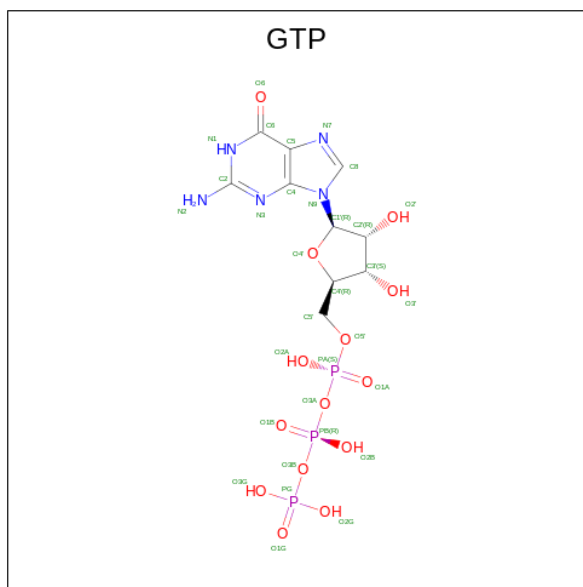
- Molecule 51 is a protein called mRNA turnover protein 4 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	v	217	Total	C	N	O	S	0	0
			1771	1129	311	320	11		

- Molecule 52 is a RNA chain called 28S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	2	3485	Total	C	N	O	P	0	0
			74813	33355	13677	24297	3484		

- Molecule 53 is GUANOSINE-5'-TRIPHOSPHATE (CCD ID: GTP) (formula: C₁₀H₁₆N₅O₁₄P₃).



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

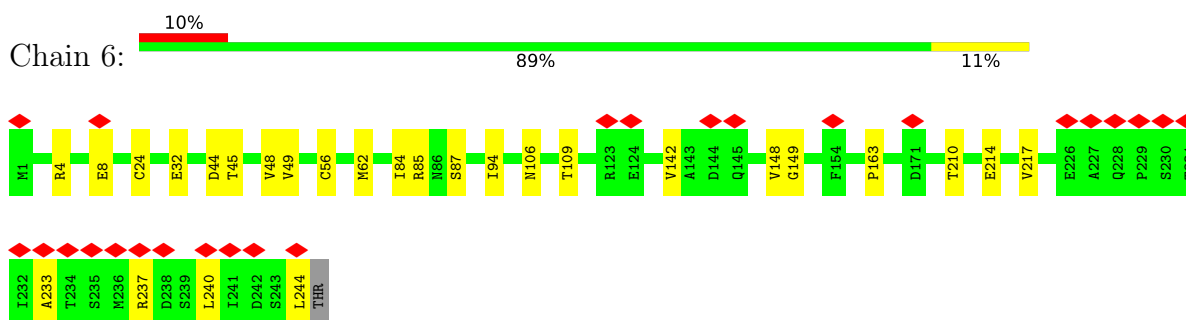
- Molecule 54 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
54	w	1	1	1	0

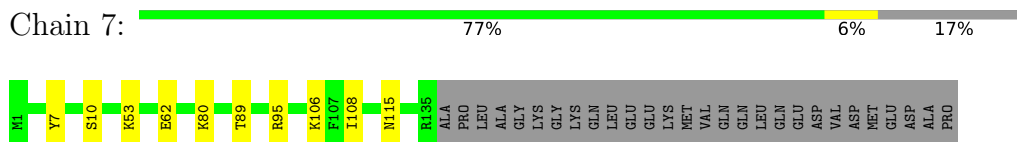
3 Residue-property plots [i](#)

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.

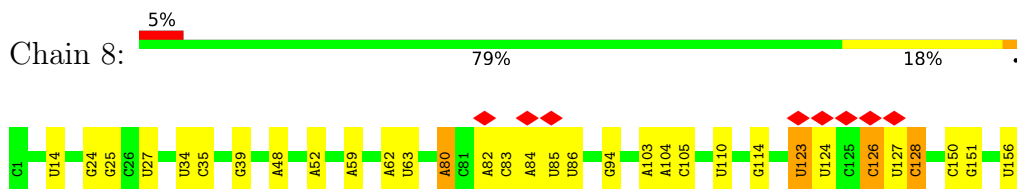
- Molecule 1: Eukaryotic translation initiation factor 6



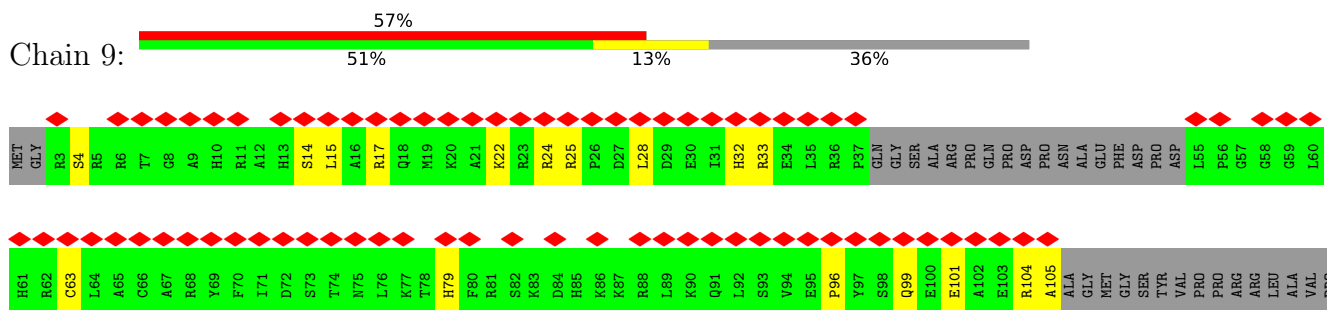
- Molecule 2: Probable ribosome biogenesis protein RLP24



- Molecule 3: 5.8S rRNA

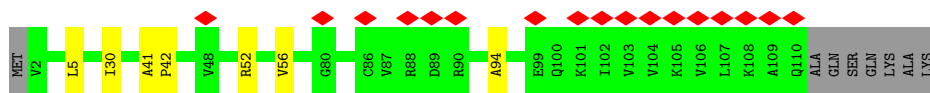
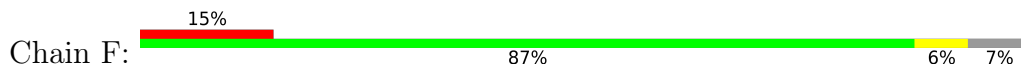


- Molecule 4: Zinc finger protein 593

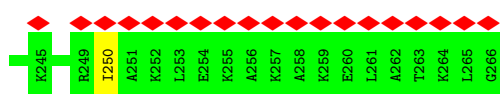
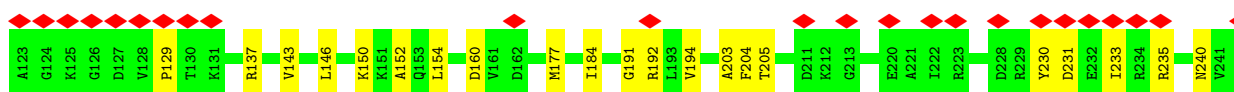
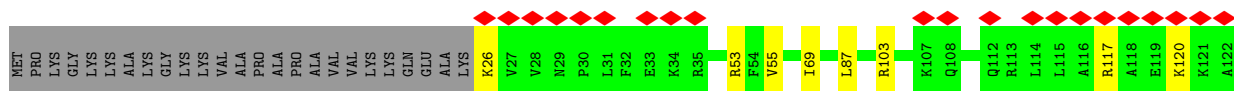
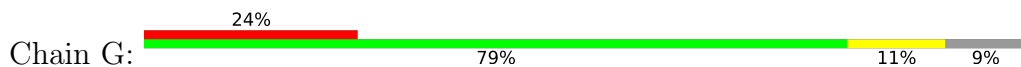




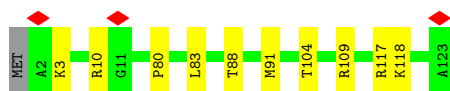
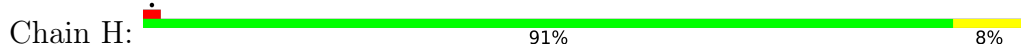
• Molecule 9: 60S ribosomal protein L34



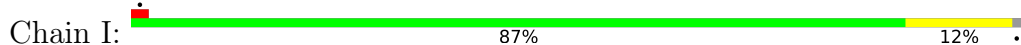
• Molecule 10: 60S ribosomal protein L7a



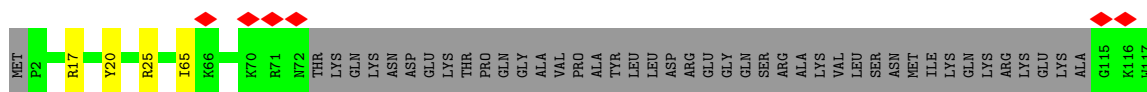
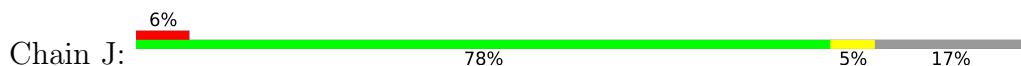
• Molecule 11: 60S ribosomal protein L35

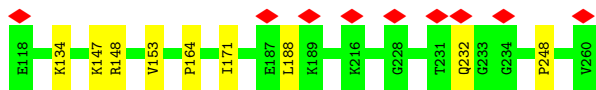


• Molecule 12: 60S ribosomal protein L9

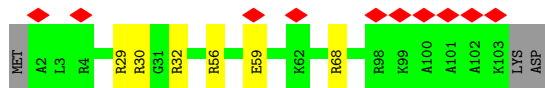
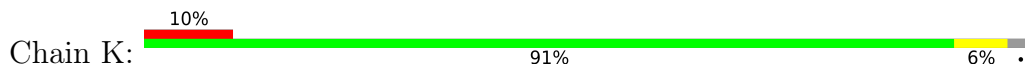


• Molecule 13: Ribosome biogenesis protein NSA2 homolog

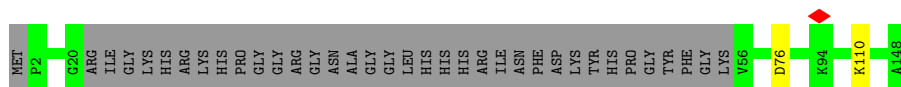
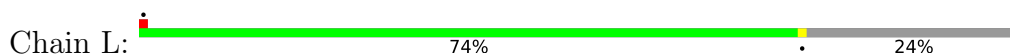




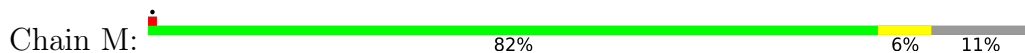
- Molecule 14: 60S ribosomal protein L36



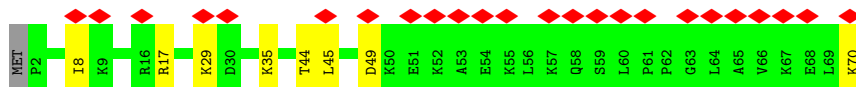
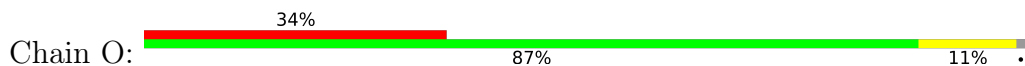
- Molecule 15: 60S ribosomal protein L27a



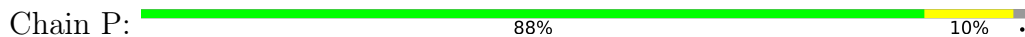
- Molecule 16: 60S ribosomal protein L37



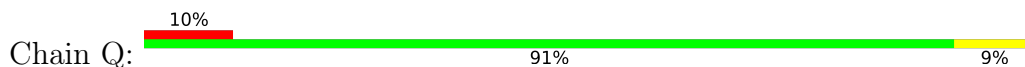
- Molecule 17: 60S ribosomal protein L38



- Molecule 18: 60S ribosomal protein L39



- Molecule 19: 60S ribosomal protein L13

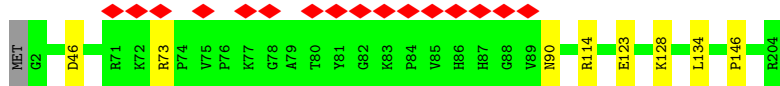




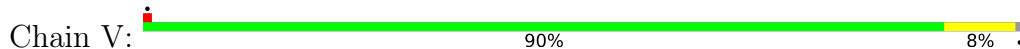
• Molecule 20: 60S ribosomal protein L14



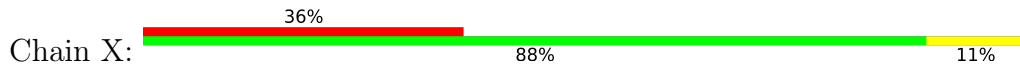
• Molecule 21: 60S ribosomal protein L15



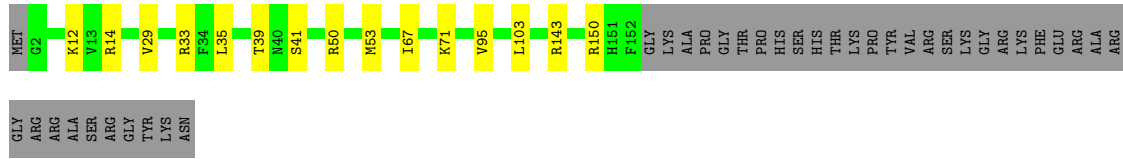
• Molecule 22: 60S ribosomal protein L13a



• Molecule 23: 60S ribosomal protein L37a

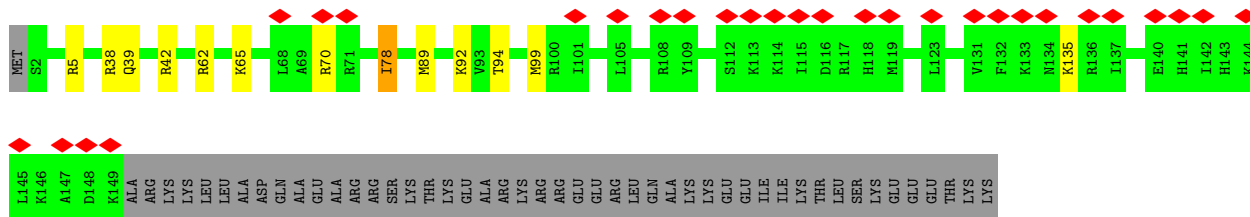


• Molecule 24: 60S ribosomal protein L18

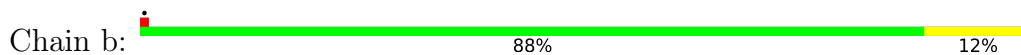


• Molecule 25: 60S ribosomal protein L19

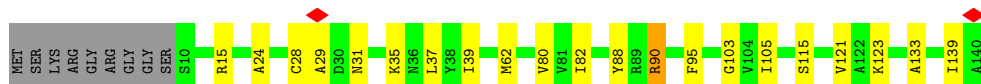
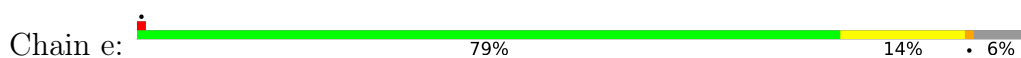




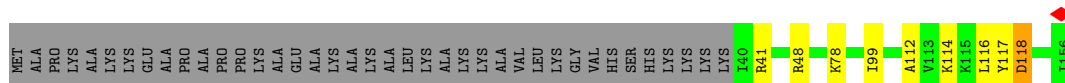
• Molecule 26: 60S ribosomal protein L18a



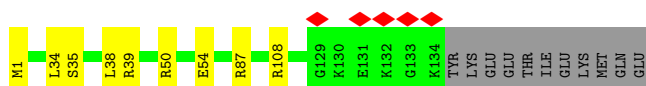
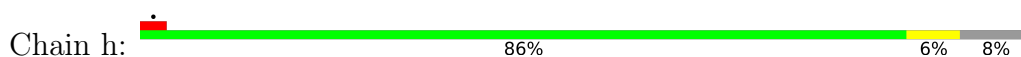
• Molecule 27: 60S ribosomal protein L23



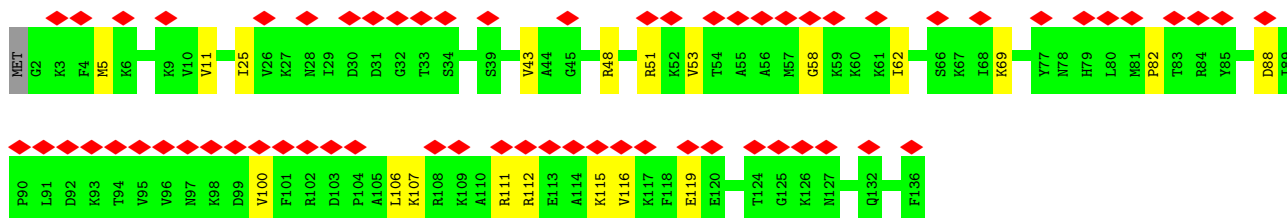
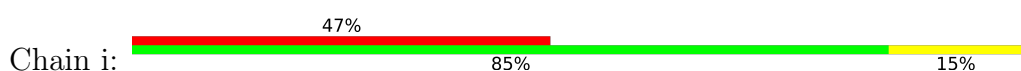
• Molecule 28: 60S ribosomal protein L23a



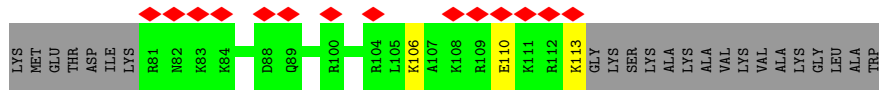
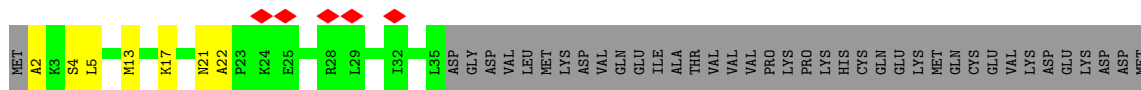
• Molecule 29: 60S ribosomal protein L26



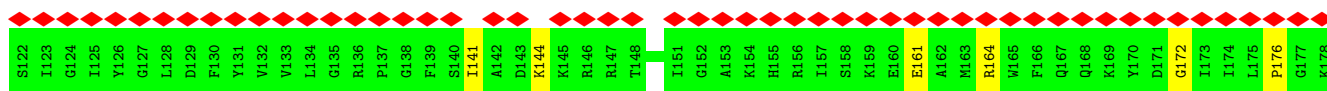
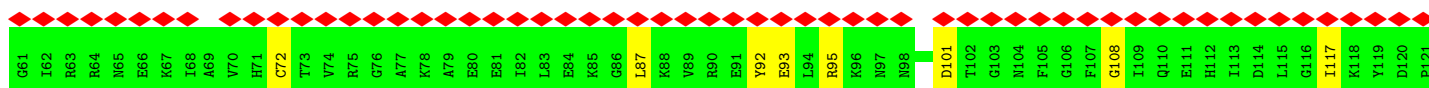
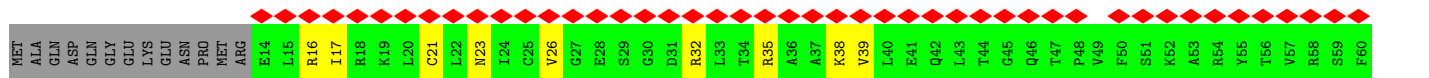
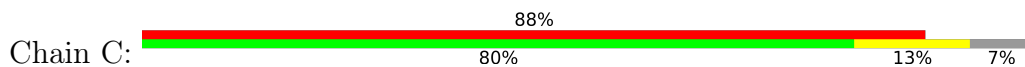
• Molecule 30: 60S ribosomal protein L27



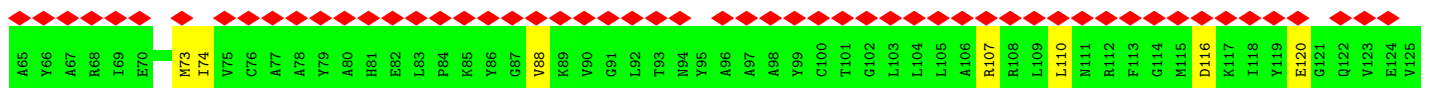
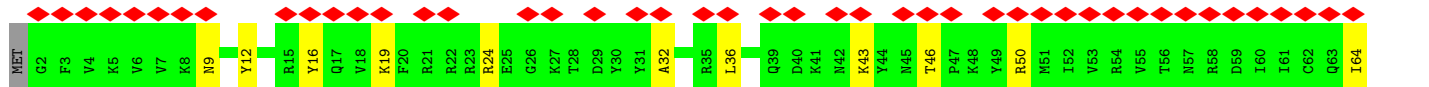
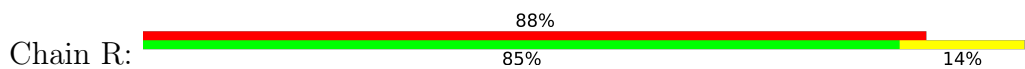
• Molecule 31: 60S ribosomal protein L28

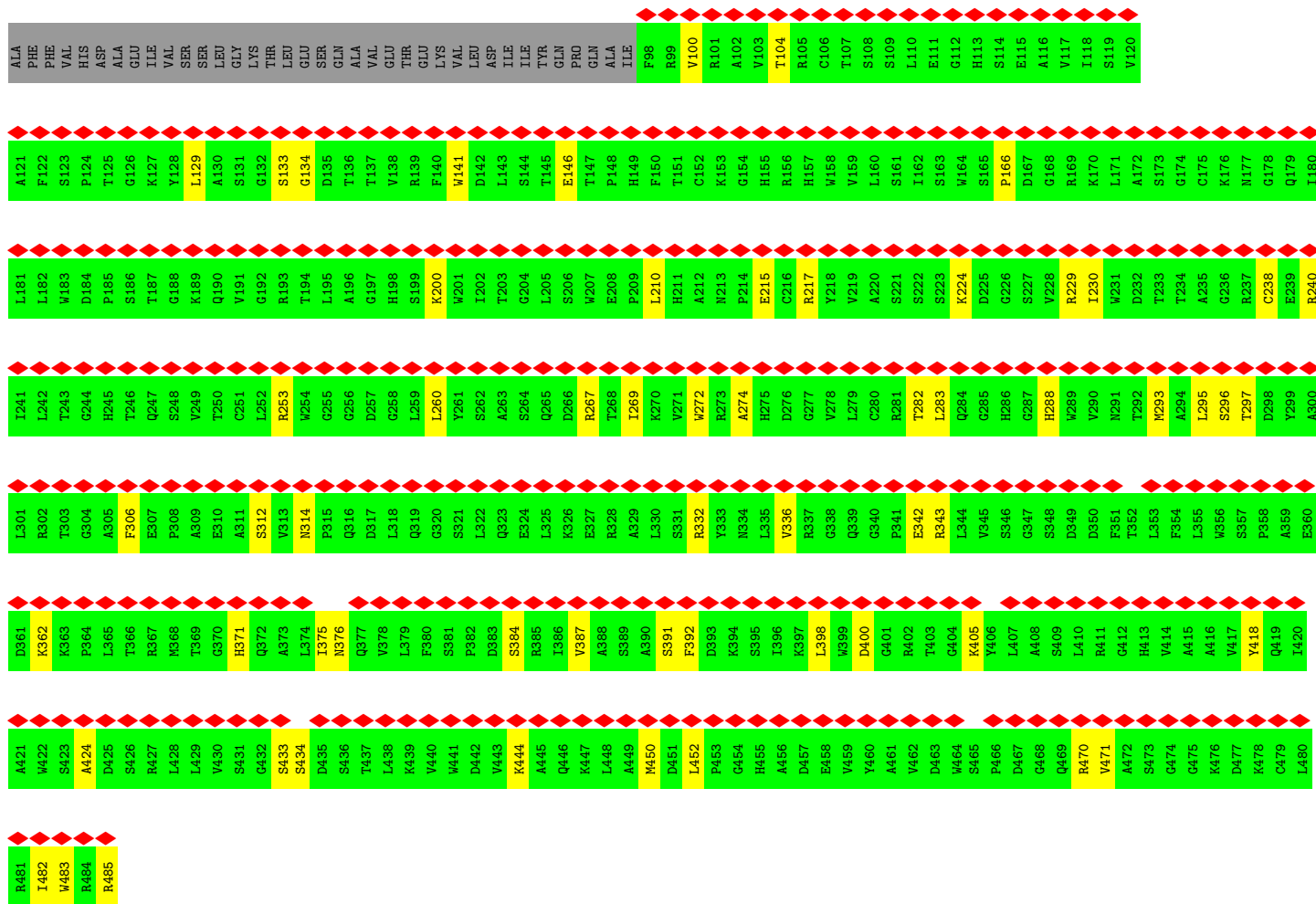


• Molecule 41: 60S ribosomal protein L11

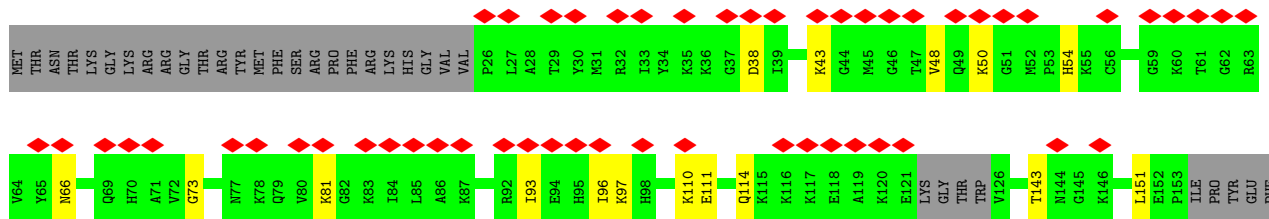


• Molecule 42: 60S ribosomal protein L5

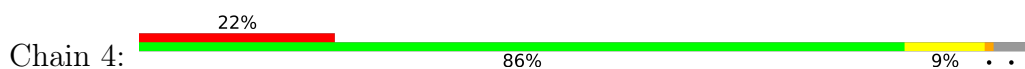


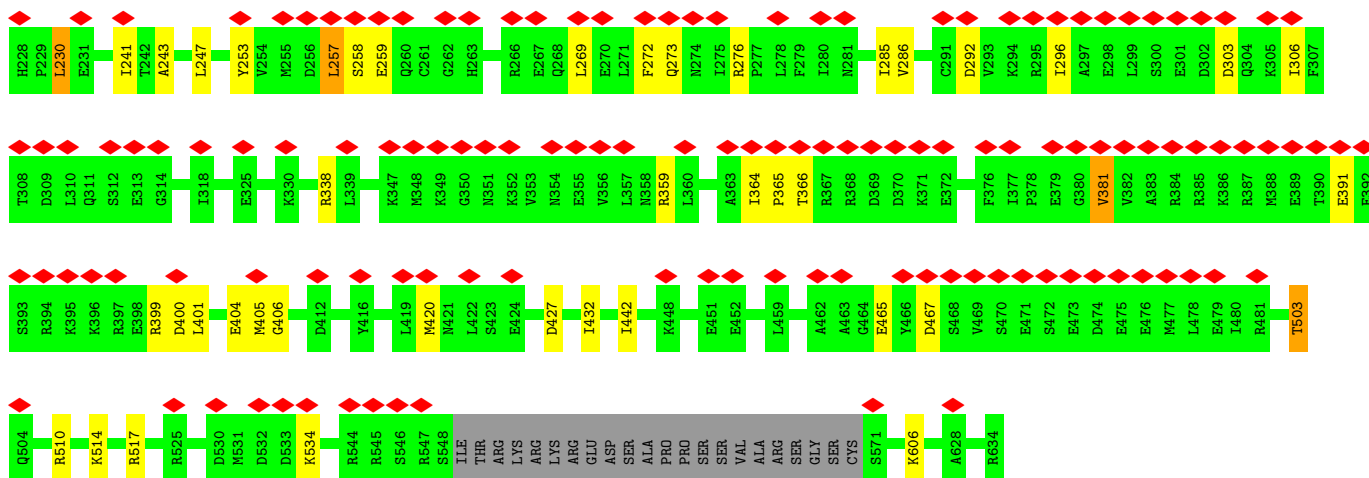


• Molecule 44: 60S ribosomal protein L21

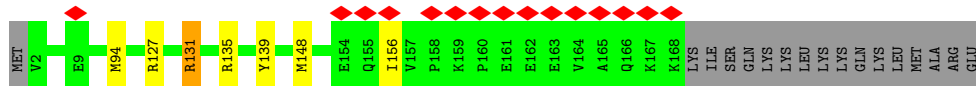
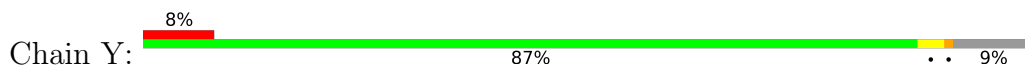


• Molecule 45: GTP-binding protein 4

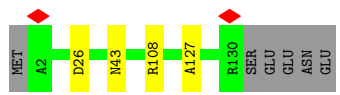




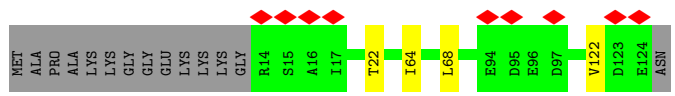
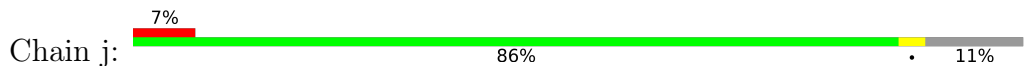
• Molecule 46: 60S ribosomal protein L17



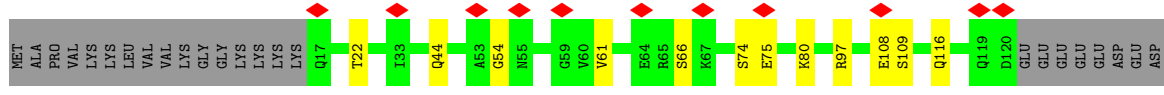
• Molecule 47: 60S ribosomal protein L32



• Molecule 48: 60S ribosomal protein L31

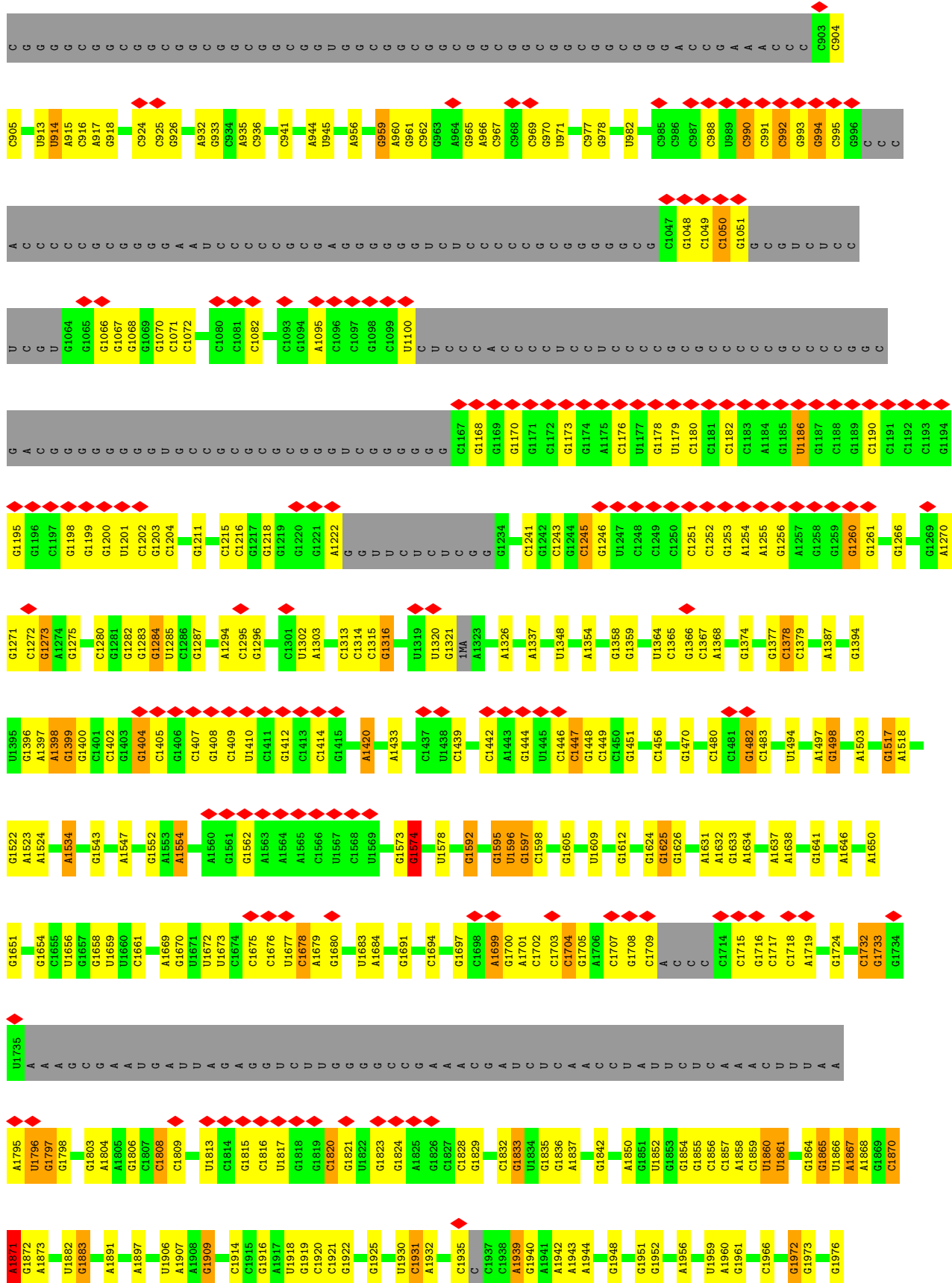


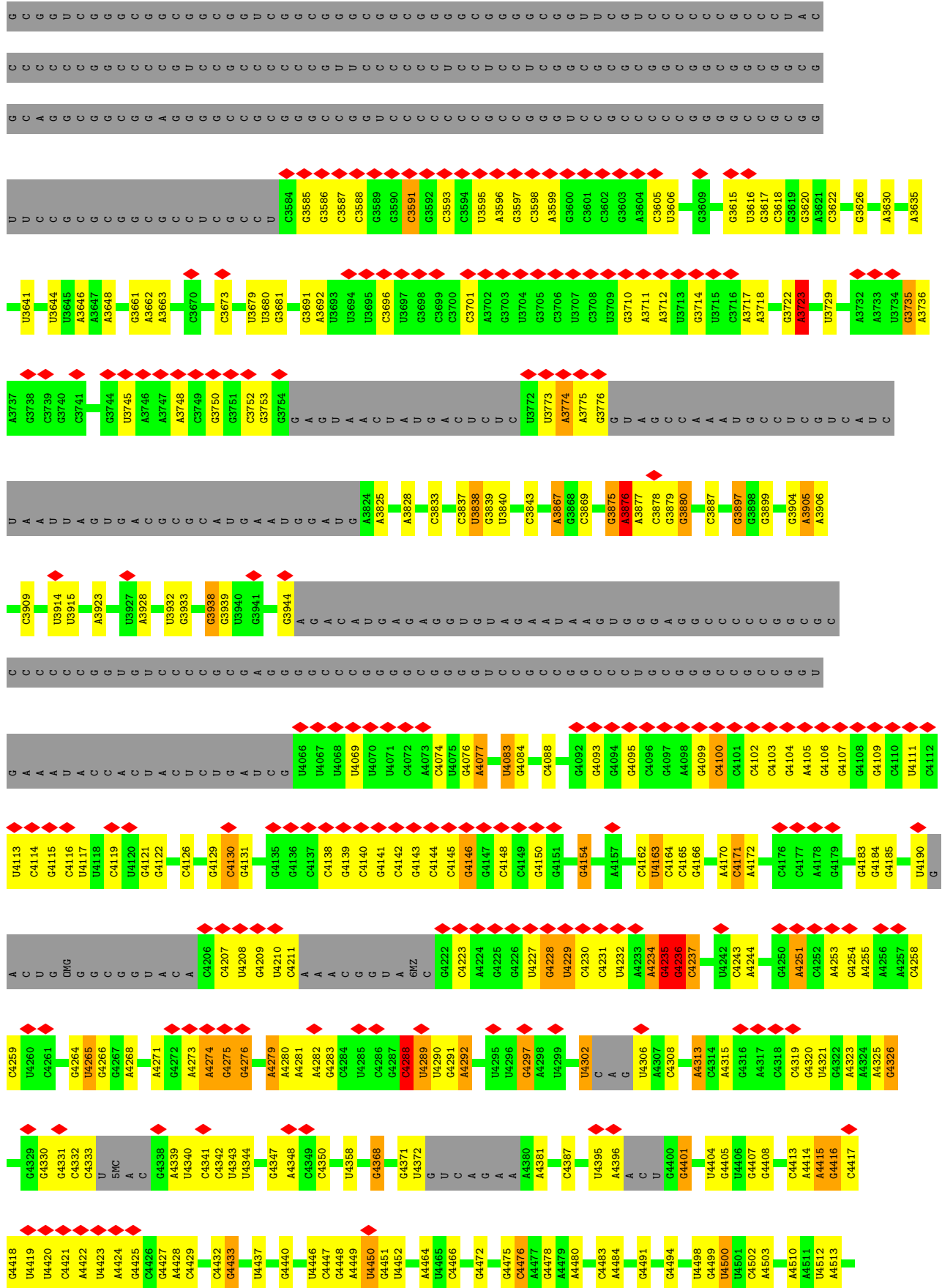
• Molecule 49: 60S ribosomal protein L22



• Molecule 50: 5S rRNA







4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	31498	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	1.8	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.211	Depositor
Minimum map value	-0.071	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.006	Depositor
Recommended contour level	0.037	Depositor
Map size (\AA)	548.0, 548.0, 548.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.37, 1.37, 1.37	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: B8W, A2M, P4U, I4U, P7G, 7MG, B8Q, B8T, MG, M7A, 5MU, GTP, OMU, B9B, 2MG, B8K, OMC, B9H, E7G, UR3, OMG, BGH

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	6	0.29	0/1877	0.68	0/2554
2	7	0.35	0/1181	0.76	2/1563 (0.1%)
3	8	0.29	0/3679	0.44	0/5732
4	9	0.29	0/723	0.71	0/961
5	A	0.25	0/354	0.69	0/465
6	B	0.31	0/3315	0.69	4/4435 (0.1%)
7	D	0.34	0/2907	0.67	3/3905 (0.1%)
8	E	0.29	0/774	0.68	0/1038
9	F	0.29	0/878	0.65	0/1170
10	G	0.32	0/1960	0.71	2/2637 (0.1%)
11	H	0.31	0/1023	0.62	0/1351
12	I	0.36	0/1537	0.74	0/2066
13	J	0.26	0/1808	0.60	0/2414
14	K	0.34	0/843	0.77	0/1115
15	L	0.28	0/893	0.58	0/1193
16	M	0.32	0/720	0.69	0/952
17	O	0.28	0/575	0.65	0/761
18	P	0.29	0/454	0.53	0/599
19	Q	0.30	0/1732	0.62	0/2315
20	S	0.37	0/1133	0.78	2/1516 (0.1%)
21	U	0.29	0/1746	0.58	0/2338
22	V	0.34	0/1682	0.62	1/2250 (0.0%)
23	X	0.31	0/718	0.71	0/953
24	Z	0.33	0/1239	0.59	0/1658
25	a	0.31	0/1255	0.72	3/1662 (0.2%)
26	b	0.29	0/1501	0.56	0/2013
27	e	0.31	0/993	0.67	1/1332 (0.1%)
28	g	0.31	0/975	0.65	3/1312 (0.2%)
29	h	0.32	0/1132	0.64	0/1504
30	i	0.31	0/1130	0.72	0/1507
31	l	0.30	0/1017	0.63	2/1364 (0.1%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
32	m	0.31	0/1936	0.71	0/2596
33	n	0.30	0/895	0.66	3/1198 (0.3%)
34	o	0.32	0/1935	0.74	2/2596 (0.1%)
35	p	0.36	0/1916	0.69	1/2553 (0.0%)
36	r	0.39	0/732	0.90	0/960
37	u	0.33	0/585	0.85	3/767 (0.4%)
38	w	0.29	0/3541	0.66	3/4775 (0.1%)
39	y	0.37	0/1269	0.85	1/1712 (0.1%)
40	z	0.37	1/587 (0.2%)	0.74	0/767
41	C	0.32	0/1341	0.75	0/1793
42	R	0.33	0/2428	0.81	4/3252 (0.1%)
43	W	0.24	0/3093	0.65	0/4196
44	T	0.34	0/1018	0.84	3/1357 (0.2%)
45	4	0.33	0/5099	0.83	12/6840 (0.2%)
46	Y	0.31	0/1383	0.64	0/1856
47	k	0.29	0/1082	0.63	0/1443
48	j	0.34	0/933	0.69	0/1256
49	d	0.37	0/864	0.93	6/1160 (0.5%)
50	3	0.25	0/2739	0.51	3/4266 (0.1%)
51	v	0.30	0/1806	0.71	1/2420 (0.0%)
52	2	0.28	2/81897 (0.0%)	0.48	27/127676 (0.0%)
All	All	0.30	3/158833 (0.0%)	0.58	92/232074 (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
6	B	0	1
12	I	0	1
22	V	0	1
33	n	0	1
37	u	0	1
39	y	0	1
43	W	0	1
45	4	0	1
46	Y	0	1
52	2	0	1
All	All	0	10

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
52	2	3876	A	N9-C4	7.08	1.52	1.37
40	z	22	ALA	C-N	5.71	1.40	1.34
52	2	3876	A	C1'-N9	5.60	1.55	1.47

The worst 5 of 92 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
52	2	1871	A2M	OP2-P-O3'	-16.24	69.48	105.20
52	2	1871	A2M	OP1-P-O3'	14.28	136.61	105.20
52	2	1872	G	OP1-P-OP2	-13.28	79.77	119.60
52	2	1872	G	O5'-P-OP1	-9.41	79.76	108.00
25	a	78	ILE	N-CA-C	-8.93	104.78	113.53

There are no chirality outliers.

5 of 10 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	B	241	PRO	Peptide
12	I	106	GLN	Peptide
22	V	110	PRO	Peptide
33	n	106	TYR	Peptide
37	u	54	ALA	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	6	1852	0	1828	18	0
2	7	1159	0	1224	9	0
3	8	3315	0	1685	6	0
4	9	711	0	724	11	0
5	A	352	0	398	5	0
6	B	3244	0	3389	21	0
7	D	2853	0	3028	19	0
8	E	764	0	804	5	0
9	F	868	0	963	4	0
10	G	1927	0	2074	18	0
11	H	1015	0	1148	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
12	I	1518	0	1601	12	0
13	J	1772	0	1892	10	0
14	K	832	0	917	5	0
15	L	877	0	938	2	0
16	M	705	0	741	6	0
17	O	569	0	637	6	0
18	P	444	0	483	5	0
19	Q	1701	0	1818	14	0
20	S	1111	0	1174	11	0
21	U	1701	0	1749	6	0
22	V	1650	0	1794	11	0
23	X	708	0	760	8	0
24	Z	1223	0	1330	10	0
25	a	1239	0	1363	12	0
26	b	1461	0	1502	15	0
27	e	979	0	1039	15	0
28	g	958	0	1027	5	0
29	h	1115	0	1205	6	0
30	i	1107	0	1182	15	0
31	l	1002	0	1068	9	0
32	m	1898	0	1993	22	0
33	n	876	0	912	9	0
34	o	1897	0	2046	16	0
35	p	1878	0	2009	9	0
36	r	723	0	770	6	0
37	u	578	0	643	5	0
38	w	3472	0	3529	31	0
39	y	1250	0	1305	16	0
40	z	581	0	656	7	0
41	C	1319	0	1358	16	0
42	R	2382	0	2410	36	0
43	W	3018	0	2959	34	0
44	T	1001	0	1064	8	0
45	4	5016	0	5153	40	0
46	Y	1355	0	1389	6	0
47	k	1064	0	1160	3	0
48	j	918	0	964	2	0
49	d	850	0	868	6	0
50	3	2453	0	1243	19	0
51	v	1771	0	1810	15	0
52	2	74813	0	37644	276	0
53	w	32	0	12	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
54	w	1	0	0	0	0
All	All	149878	0	113382	714	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 3.

The worst 5 of 714 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)
52:2:4083:5MU:C5	52:2:4083:5MU:C4	1.79	1.71
52:2:1976:G:H1	52:2:1991:A:H62	1.17	0.93
52:2:4344:U:H3	52:2:4368:G:H1	1.16	0.92
52:2:2007:G:H21	52:2:2012:A:H62	1.26	0.81
42:R:268:ARG:C	42:R:270:LYS:H	1.89	0.78

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	
1	6	242/245 (99%)	227 (94%)	15 (6%)	0	100	100
2	7	133/163 (82%)	129 (97%)	4 (3%)	0	100	100
4	9	82/134 (61%)	73 (89%)	8 (10%)	1 (1%)	10	42
5	A	41/159 (26%)	41 (100%)	0	0	100	100
6	B	401/403 (100%)	378 (94%)	23 (6%)	0	100	100
7	D	356/427 (83%)	333 (94%)	23 (6%)	0	100	100
8	E	96/115 (84%)	93 (97%)	3 (3%)	0	100	100
9	F	107/117 (92%)	105 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
10	G	239/266 (90%)	227 (95%)	12 (5%)	0	100	100
11	H	120/123 (98%)	119 (99%)	1 (1%)	0	100	100
12	I	188/192 (98%)	180 (96%)	8 (4%)	0	100	100
13	J	213/260 (82%)	206 (97%)	7 (3%)	0	100	100
14	K	100/105 (95%)	95 (95%)	5 (5%)	0	100	100
15	L	108/148 (73%)	100 (93%)	8 (7%)	0	100	100
16	M	84/97 (87%)	78 (93%)	6 (7%)	0	100	100
17	O	67/70 (96%)	63 (94%)	4 (6%)	0	100	100
18	P	48/51 (94%)	45 (94%)	3 (6%)	0	100	100
19	Q	208/211 (99%)	193 (93%)	15 (7%)	0	100	100
20	S	133/215 (62%)	128 (96%)	5 (4%)	0	100	100
21	U	201/204 (98%)	190 (94%)	11 (6%)	0	100	100
22	V	199/203 (98%)	191 (96%)	8 (4%)	0	100	100
23	X	89/92 (97%)	86 (97%)	3 (3%)	0	100	100
24	Z	149/188 (79%)	145 (97%)	4 (3%)	0	100	100
25	a	146/196 (74%)	140 (96%)	6 (4%)	0	100	100
26	b	174/176 (99%)	168 (97%)	6 (3%)	0	100	100
27	e	129/140 (92%)	120 (93%)	9 (7%)	0	100	100
28	g	115/156 (74%)	109 (95%)	6 (5%)	0	100	100
29	h	132/145 (91%)	128 (97%)	4 (3%)	0	100	100
30	i	133/136 (98%)	126 (95%)	7 (5%)	0	100	100
31	l	123/137 (90%)	117 (95%)	6 (5%)	0	100	100
32	m	246/257 (96%)	217 (88%)	29 (12%)	0	100	100
33	n	107/110 (97%)	103 (96%)	4 (4%)	0	100	100
34	o	231/288 (80%)	212 (92%)	19 (8%)	0	100	100
35	p	224/248 (90%)	217 (97%)	7 (3%)	0	100	100
36	r	80/360 (22%)	76 (95%)	4 (5%)	0	100	100
37	u	64/549 (12%)	58 (91%)	4 (6%)	2 (3%)	3	22
38	w	427/731 (58%)	406 (95%)	17 (4%)	4 (1%)	14	47
39	y	163/165 (99%)	158 (97%)	5 (3%)	0	100	100
40	z	63/129 (49%)	61 (97%)	2 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
41	C	163/178 (92%)	146 (90%)	17 (10%)	0	100	100
42	R	291/297 (98%)	272 (94%)	18 (6%)	1 (0%)	36	68
43	W	386/485 (80%)	364 (94%)	22 (6%)	0	100	100
44	T	120/160 (75%)	109 (91%)	10 (8%)	1 (1%)	16	50
45	4	607/634 (96%)	553 (91%)	50 (8%)	4 (1%)	18	52
46	Y	165/184 (90%)	157 (95%)	8 (5%)	0	100	100
47	k	127/135 (94%)	119 (94%)	8 (6%)	0	100	100
48	j	109/125 (87%)	105 (96%)	4 (4%)	0	100	100
49	d	102/128 (80%)	91 (89%)	11 (11%)	0	100	100
51	v	215/239 (90%)	203 (94%)	12 (6%)	0	100	100
All	All	8446/10676 (79%)	7960 (94%)	473 (6%)	13 (0%)	44	73

5 of 13 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
37	u	55	PRO
4	9	99	GLN
37	u	14	THR
38	w	27	ALA
45	4	88	ASP

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	6	212/213 (100%)	212 (100%)	0	100	100
2	7	126/149 (85%)	126 (100%)	0	100	100
4	9	74/114 (65%)	74 (100%)	0	100	100
5	A	34/126 (27%)	34 (100%)	0	100	100
6	B	349/349 (100%)	349 (100%)	0	100	100
7	D	298/348 (86%)	298 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
8	E	83/97 (86%)	83 (100%)	0	100	100
9	F	94/100 (94%)	94 (100%)	0	100	100
10	G	203/223 (91%)	202 (100%)	1 (0%)	81	85
11	H	109/110 (99%)	109 (100%)	0	100	100
12	I	169/171 (99%)	169 (100%)	0	100	100
13	J	191/228 (84%)	191 (100%)	0	100	100
14	K	86/89 (97%)	86 (100%)	0	100	100
15	L	94/121 (78%)	94 (100%)	0	100	100
16	M	73/80 (91%)	73 (100%)	0	100	100
17	O	64/65 (98%)	64 (100%)	0	100	100
18	P	47/48 (98%)	47 (100%)	0	100	100
19	Q	176/177 (99%)	176 (100%)	0	100	100
20	S	115/161 (71%)	115 (100%)	0	100	100
21	U	171/172 (99%)	171 (100%)	0	100	100
22	V	173/174 (99%)	173 (100%)	0	100	100
23	X	74/75 (99%)	74 (100%)	0	100	100
24	Z	136/165 (82%)	136 (100%)	0	100	100
25	a	133/175 (76%)	133 (100%)	0	100	100
26	b	157/157 (100%)	156 (99%)	1 (1%)	78	84
27	e	101/107 (94%)	101 (100%)	0	100	100
28	g	105/133 (79%)	105 (100%)	0	100	100
29	h	124/135 (92%)	124 (100%)	0	100	100
30	i	117/118 (99%)	117 (100%)	0	100	100
31	l	109/121 (90%)	109 (100%)	0	100	100
32	m	190/199 (96%)	190 (100%)	0	100	100
33	n	88/89 (99%)	88 (100%)	0	100	100
34	o	208/252 (82%)	208 (100%)	0	100	100
35	p	195/215 (91%)	195 (100%)	0	100	100
36	r	76/312 (24%)	75 (99%)	1 (1%)	61	78
37	u	62/485 (13%)	62 (100%)	0	100	100
38	w	385/654 (59%)	385 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
39	y	137/137 (100%)	137 (100%)	0	100	100
40	z	61/115 (53%)	61 (100%)	0	100	100
41	C	138/149 (93%)	138 (100%)	0	100	100
42	R	246/250 (98%)	246 (100%)	0	100	100
43	W	322/404 (80%)	322 (100%)	0	100	100
44	T	109/140 (78%)	109 (100%)	0	100	100
45	4	554/574 (96%)	554 (100%)	0	100	100
46	Y	147/163 (90%)	147 (100%)	0	100	100
47	k	115/121 (95%)	115 (100%)	0	100	100
48	j	101/110 (92%)	101 (100%)	0	100	100
49	d	94/115 (82%)	94 (100%)	0	100	100
51	v	194/214 (91%)	194 (100%)	0	100	100
All	All	7419/9199 (81%)	7416 (100%)	3 (0%)	100	100

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
10	G	240	ASN
26	b	77	ASN
36	r	259	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 74 such sidechains are listed below:

Mol	Chain	Res	Type
43	W	376	ASN
51	v	88	ASN
45	4	64	GLN
45	4	620	HIS
18	P	33	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	8	155/156 (99%)	28 (18%)	0
50	3	113/120 (94%)	21 (18%)	2 (1%)

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
52	2	3462/5054 (68%)	883 (25%)	24 (0%)
All	All	3730/5330 (69%)	932 (24%)	26 (0%)

5 of 932 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
3	8	24	G
3	8	25	G
3	8	34	U
3	8	35	C
3	8	39	G

5 of 26 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
52	2	3596	A
52	2	3905	A
52	2	4699	U
52	2	3774	A
52	2	4235	G

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

68 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
52	B8T	2	4671	52	19,22,23	3.49	8 (42%)	26,31,34	1.02	1 (3%)
52	A2M	2	3825	52	22,25,26	3.18	9 (40%)	31,36,39	2.85	11 (35%)
52	B8Q	2	1456	52	17,22,23	2.88	5 (29%)	22,32,35	2.32	6 (27%)
52	OMC	2	3701	52	19,22,23	3.04	8 (42%)	26,31,34	0.77	0
52	OMC	2	2804	52	19,22,23	2.86	8 (42%)	26,31,34	0.78	0
52	BGH	2	3899	52	25,29,30	4.54	17 (68%)	31,43,46	2.59	11 (35%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
52	A2M	2	2401	52	22,25,26	3.20	10 (45%)	31,36,39	3.04	11 (35%)
52	OMC	2	2861	52	19,22,23	3.04	8 (42%)	26,31,34	1.11	2 (7%)
52	2MG	2	729	52	23,26,27	2.92	8 (34%)	32,38,41	2.25	9 (28%)
52	7MG	2	1605	52	22,26,27	3.83	10 (45%)	29,39,42	1.99	9 (31%)
52	B9B	2	2754	52	25,28,29	1.74	6 (24%)	35,40,43	5.14	11 (31%)
52	OMG	2	2050	52	23,26,27	2.62	9 (39%)	33,38,41	2.68	10 (30%)
52	2MG	2	978	52	23,26,27	2.96	9 (39%)	32,38,41	2.26	10 (31%)
52	A2M	2	3723	52	22,25,26	3.16	9 (40%)	31,36,39	3.02	10 (32%)
52	OMG	2	4637	52	23,26,27	2.63	8 (34%)	33,38,41	2.77	10 (30%)
52	OMG	2	1316	52	23,26,27	2.60	8 (34%)	33,38,41	2.74	12 (36%)
52	OMC	2	3887	52	19,22,23	3.03	8 (42%)	26,31,34	1.09	1 (3%)
52	B8W	2	4129	52	23,26,27	2.76	6 (26%)	33,38,41	2.72	11 (33%)
52	I4U	2	1659	52	21,24,25	3.46	9 (42%)	27,34,37	1.18	1 (3%)
52	A2M	2	4523	52	22,25,26	3.17	9 (40%)	31,36,39	3.03	11 (35%)
52	B8T	2	4483	52	19,22,23	3.56	8 (42%)	26,31,34	1.32	4 (15%)
52	OMU	2	4620	52	19,22,23	2.91	8 (42%)	26,31,34	1.72	5 (19%)
52	A2M	2	4571	52	22,25,26	3.21	10 (45%)	31,36,39	2.90	10 (32%)
52	A2M	2	2363	52	22,25,26	3.23	9 (40%)	31,36,39	3.02	11 (35%)
52	B8K	2	3897	52	24,28,29	3.39	11 (45%)	30,42,45	2.59	11 (36%)
52	OMC	2	3869	52	19,22,23	2.94	8 (42%)	26,31,34	0.95	2 (7%)
52	OMG	2	373	52	23,26,27	2.61	9 (39%)	33,38,41	2.68	15 (45%)
52	A2M	2	1524	52	22,25,26	3.21	10 (45%)	31,36,39	3.15	15 (48%)
52	OMG	2	2364	52	23,26,27	2.60	9 (39%)	33,38,41	2.63	12 (36%)
52	B8K	2	4690	52	24,28,29	3.14	12 (50%)	30,42,45	2.67	12 (40%)
52	OMG	2	4623	52	23,26,27	2.59	9 (39%)	33,38,41	2.77	12 (36%)
52	OMG	2	4494	52	23,26,27	2.69	8 (34%)	33,38,41	2.87	11 (33%)
52	A2M	2	398	52	22,25,26	3.20	10 (45%)	31,36,39	2.95	10 (32%)
52	OMG	2	1522	52	23,26,27	2.62	8 (34%)	33,38,41	2.72	13 (39%)
52	OMG	2	2773	52	23,26,27	2.70	8 (34%)	33,38,41	2.67	9 (27%)
52	B9B	2	237	52	25,28,29	1.77	6 (24%)	35,40,43	5.26	12 (34%)
52	A2M	2	3867	52	22,25,26	3.19	9 (40%)	31,36,39	3.02	11 (35%)
52	B8W	2	4529	52	23,26,27	2.79	5 (21%)	33,38,41	2.54	14 (42%)
52	A2M	2	1534	52	22,25,26	3.19	10 (45%)	31,36,39	3.09	10 (32%)
52	OMC	2	4536	52	19,22,23	2.95	8 (42%)	26,31,34	0.75	0
52	UR3	2	4597	52	19,22,23	2.73	7 (36%)	26,32,35	2.06	5 (19%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	OMU	8	14	52,3	19,22,23	2.86	8 (42%)	26,31,34	1.84	6 (23%)
52	P4U	2	1348	52	21,24,25	3.37	8 (38%)	27,33,36	1.04	1 (3%)
52	B8W	2	2380	52	23,26,27	2.72	5 (21%)	33,38,41	2.63	16 (48%)
52	B8W	2	4185	52	23,26,27	2.73	5 (21%)	33,38,41	2.56	12 (36%)
52	E7G	2	2297	52	24,27,28	3.72	11 (45%)	30,40,43	2.09	7 (23%)
52	OMG	2	2424	52	23,26,27	2.67	8 (34%)	33,38,41	2.78	9 (27%)
52	OMC	2	2422	52	19,22,23	2.92	8 (42%)	26,31,34	1.08	1 (3%)
52	7MG	2	2522	52	22,26,27	3.57	10 (45%)	29,39,42	1.98	9 (31%)
52	OMG	2	1625	52	23,26,27	2.73	8 (34%)	33,38,41	2.95	9 (27%)
52	A2M	2	3718	52	22,25,26	3.18	9 (40%)	31,36,39	2.88	10 (32%)
52	P7G	2	3880	52	24,28,29	3.95	11 (45%)	27,41,44	1.44	2 (7%)
52	OMG	2	4870	52	23,26,27	2.66	9 (39%)	33,38,41	2.90	11 (33%)
52	B9B	2	1574	52	25,28,29	1.75	6 (24%)	35,40,43	5.33	10 (28%)
52	A2M	2	1871	52	22,25,26	3.20	10 (45%)	31,36,39	3.02	11 (35%)
52	M7A	2	4564	52	20,25,26	1.98	3 (15%)	28,37,40	3.91	7 (25%)
52	P7G	2	1909	52	24,28,29	3.87	11 (45%)	27,41,44	1.66	3 (11%)
52	2MG	2	4872	52	23,26,27	2.79	9 (39%)	32,38,41	2.35	9 (28%)
52	7MG	2	4550	52	22,26,27	3.87	10 (45%)	29,39,42	2.00	9 (31%)
52	OMC	2	3909	52	19,22,23	3.15	8 (42%)	26,31,34	1.83	7 (26%)
52	UR3	2	4530	52	19,22,23	2.84	6 (31%)	26,32,35	1.28	2 (7%)
52	5MU	2	4083	52	19,22,23	7.22	8 (42%)	28,32,35	3.39	10 (35%)
52	B8W	2	4472	52	23,26,27	2.79	5 (21%)	33,38,41	2.46	14 (42%)
52	B9H	2	2786	52	20,25,26	3.19	3 (15%)	22,35,38	2.53	7 (31%)
52	2MG	2	1517	52	23,26,27	2.92	7 (30%)	32,38,41	2.68	7 (21%)
52	OMC	2	2365	52	19,22,23	2.89	8 (42%)	26,31,34	0.80	0
52	A2M	2	1326	52	22,25,26	3.22	9 (40%)	31,36,39	2.92	10 (32%)
52	OMG	2	1883	52	23,26,27	2.66	9 (39%)	33,38,41	2.68	11 (33%)

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
52	B8T	2	4671	52	-	0/7/27/28	0/2/2/2
52	A2M	2	3825	52	-	0/9/27/28	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
52	B8Q	2	1456	52	-	0/7/42/43	0/2/2/2
52	OMC	2	3701	52	-	4/9/27/28	0/2/2/2
52	OMC	2	2804	52	-	0/9/27/28	0/2/2/2
52	BGH	2	3899	52	-	0/13/43/44	0/3/3/3
52	A2M	2	2401	52	-	2/9/27/28	0/3/3/3
52	OMC	2	2861	52	-	0/9/27/28	0/2/2/2
52	2MG	2	729	52	-	2/9/27/28	0/3/3/3
52	7MG	2	1605	52	-	1/7/37/38	0/3/3/3
52	B9B	2	2754	52	-	3/11/29/30	0/3/3/3
52	OMG	2	2050	52	-	0/9/27/28	0/3/3/3
52	2MG	2	978	52	-	0/9/27/28	0/3/3/3
52	A2M	2	3723	52	-	2/9/27/28	0/3/3/3
52	OMG	2	4637	52	-	3/9/27/28	0/3/3/3
52	OMG	2	1316	52	-	2/9/27/28	0/3/3/3
52	OMC	2	3887	52	-	1/9/27/28	0/2/2/2
52	B8W	2	4129	52	-	4/9/27/28	0/3/3/3
52	I4U	2	1659	52	-	2/9/29/30	0/2/2/2
52	A2M	2	4523	52	-	4/9/27/28	0/3/3/3
52	B8T	2	4483	52	-	0/7/27/28	0/2/2/2
52	OMU	2	4620	52	-	0/9/27/28	0/2/2/2
52	A2M	2	4571	52	-	0/9/27/28	0/3/3/3
52	A2M	2	2363	52	-	0/9/27/28	0/3/3/3
52	B8K	2	3897	52	-	3/11/41/42	0/3/3/3
52	OMC	2	3869	52	-	0/9/27/28	0/2/2/2
52	OMG	2	373	52	-	1/9/27/28	0/3/3/3
52	A2M	2	1524	52	-	2/9/27/28	0/3/3/3
52	OMG	2	2364	52	-	2/9/27/28	0/3/3/3
52	B8K	2	4690	52	-	0/11/41/42	0/3/3/3
52	OMG	2	4623	52	-	0/9/27/28	0/3/3/3
52	OMG	2	4494	52	-	0/9/27/28	0/3/3/3
52	A2M	2	398	52	-	2/9/27/28	0/3/3/3
52	OMG	2	1522	52	-	1/9/27/28	0/3/3/3
52	OMG	2	2773	52	-	2/9/27/28	0/3/3/3
52	B9B	2	237	52	-	4/11/29/30	0/3/3/3
52	A2M	2	3867	52	-	2/9/27/28	0/3/3/3
52	B8W	2	4529	52	-	2/9/27/28	0/3/3/3
52	A2M	2	1534	52	-	2/9/27/28	0/3/3/3
52	OMC	2	4536	52	-	0/9/27/28	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
52	UR3	2	4597	52	-	0/7/25/26	0/2/2/2
3	OMU	8	14	52,3	-	1/9/27/28	0/2/2/2
52	P4U	2	1348	52	-	1/10/29/30	0/2/2/2
52	B8W	2	2380	52	-	2/9/27/28	0/3/3/3
52	B8W	2	4185	52	-	2/9/27/28	0/3/3/3
52	E7G	2	2297	52	-	1/9/39/40	0/3/3/3
52	OMG	2	2424	52	-	2/9/27/28	0/3/3/3
52	OMC	2	2422	52	-	1/9/27/28	0/2/2/2
52	7MG	2	2522	52	-	0/7/37/38	0/3/3/3
52	OMG	2	1625	52	-	3/9/27/28	0/3/3/3
52	A2M	2	3718	52	-	0/9/27/28	0/3/3/3
52	P7G	2	3880	52	-	4/10/40/41	0/3/3/3
52	OMG	2	4870	52	-	3/9/27/28	0/3/3/3
52	B9B	2	1574	52	-	2/11/29/30	0/3/3/3
52	A2M	2	1871	52	-	2/9/27/28	0/3/3/3
52	M7A	2	4564	52	-	0/7/37/38	0/3/3/3
52	P7G	2	1909	52	-	2/10/40/41	0/3/3/3
52	2MG	2	4872	52	-	2/9/27/28	0/3/3/3
52	7MG	2	4550	52	-	2/7/37/38	0/3/3/3
52	OMC	2	3909	52	-	2/9/27/28	0/2/2/2
52	UR3	2	4530	52	-	0/7/25/26	0/2/2/2
52	5MU	2	4083	52	-	0/7/25/26	0/2/2/2
52	B8W	2	4472	52	-	2/9/27/28	0/3/3/3
52	B9H	2	2786	52	-	3/12/47/48	0/2/2/2
52	2MG	2	1517	52	-	1/9/27/28	0/3/3/3
52	OMC	2	2365	52	-	0/9/27/28	0/2/2/2
52	A2M	2	1326	52	-	0/9/27/28	0/3/3/3
52	OMG	2	1883	52	-	2/9/27/28	0/3/3/3

The worst 5 of 566 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
52	2	4083	5MU	C4-C5	20.94	1.79	1.44
52	2	4083	5MU	C6-N1	15.82	1.65	1.38
52	2	4083	5MU	C6-C5	-11.44	1.15	1.34
52	2	4083	5MU	C4-N3	-11.01	1.18	1.38
52	2	1659	I4U	C4-N3	10.46	1.44	1.31

The worst 5 of 561 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
52	2	1574	B9B	O6-C6-C5	22.09	144.54	116.57
52	2	237	B9B	O6-C6-C5	21.40	143.66	116.57
52	2	2754	B9B	O6-C6-C5	21.26	143.49	116.57
52	2	1574	B9B	O6-C6-N1	-18.96	93.58	120.00
52	2	237	B9B	O6-C6-N1	-18.35	94.44	120.00

There are no chirality outliers.

5 of 93 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	8	14	OMU	C1'-C2'-O2'-CM2
52	2	237	B9B	C5-C6-O6-C61
52	2	237	B9B	N1-C6-O6-C61
52	2	237	B9B	C3'-C4'-C5'-O5'
52	2	237	B9B	O4'-C4'-C5'-O5'

There are no ring outliers.

13 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
52	2	729	2MG	1	0
52	2	2754	B9B	1	0
52	2	3723	A2M	1	0
52	2	1316	OMG	2	0
52	2	4620	OMU	2	0
52	2	4571	A2M	1	0
52	2	2363	A2M	1	0
52	2	4536	OMC	1	0
52	2	2522	7MG	1	0
52	2	1574	B9B	1	0
52	2	1871	A2M	1	0
52	2	4872	2MG	1	0
52	2	4083	5MU	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
53	GTP	w	801	54	30,34,34	0.55	0	46,54,54	0.59	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
53	GTP	w	801	54	-	1/22/38/38	0/3/3/3

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
53	w	801	GTP	C5'-O5'-PA-O1A

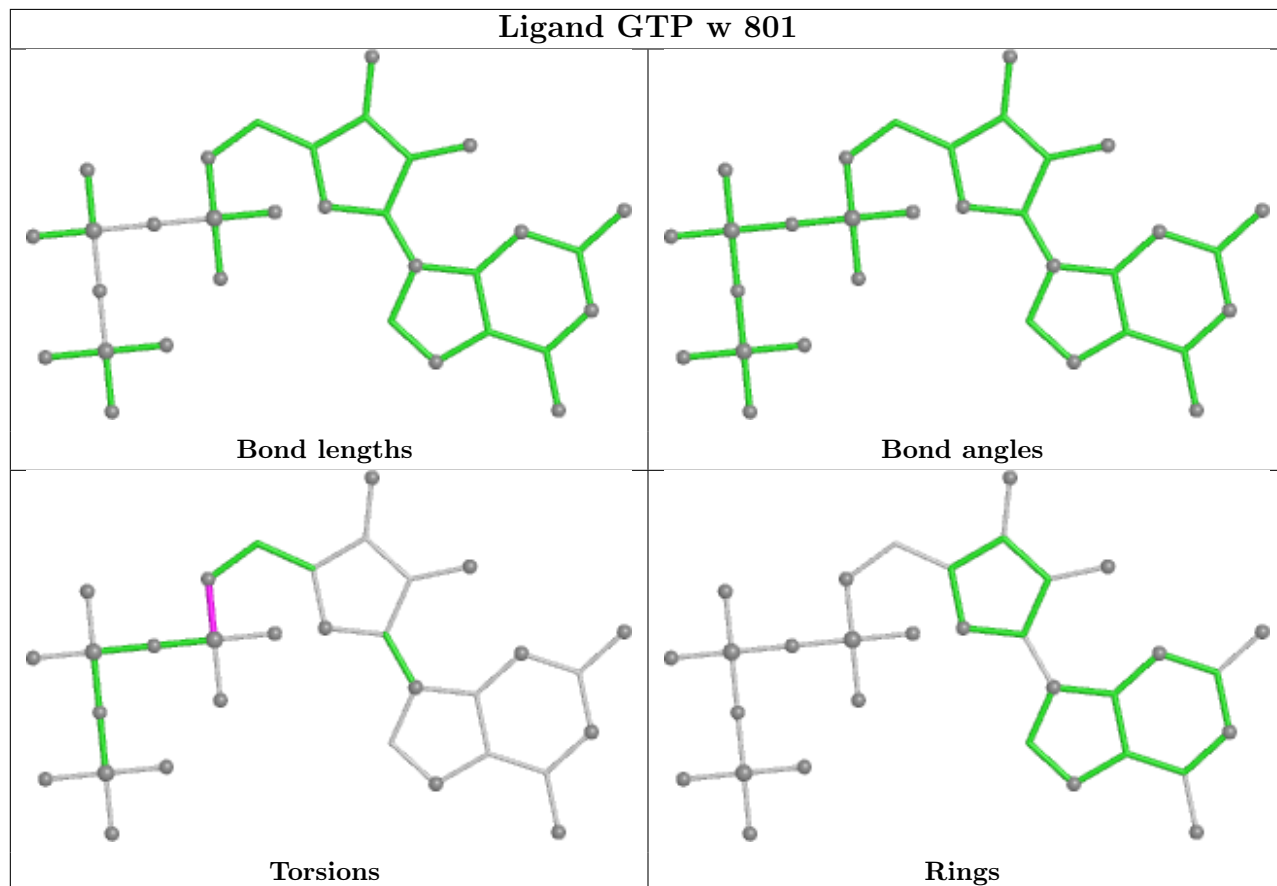
There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
53	w	801	GTP	3	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.

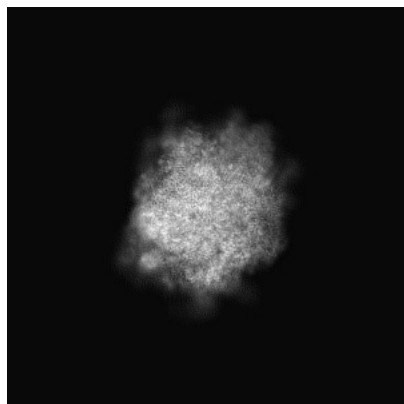
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-35639. These allow visual inspection of the internal detail of the map and identification of artifacts.

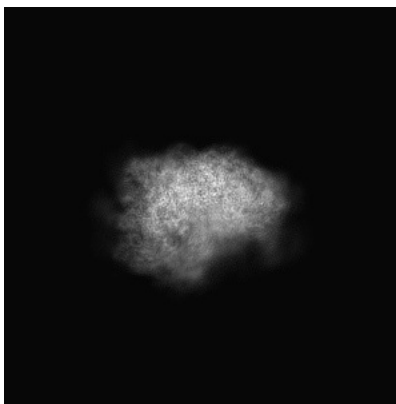
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

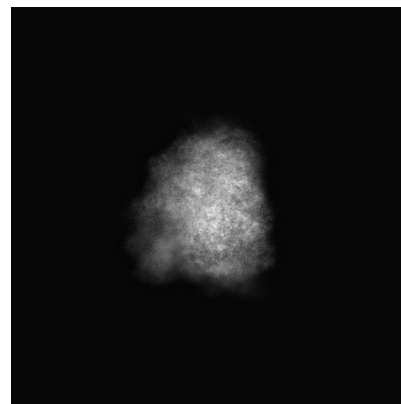
6.1.1 Primary map



X

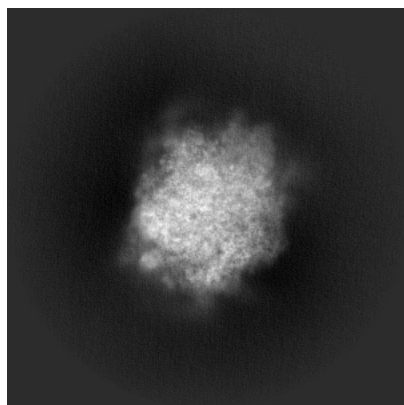


Y

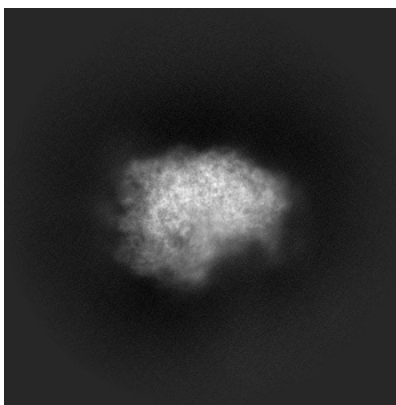


Z

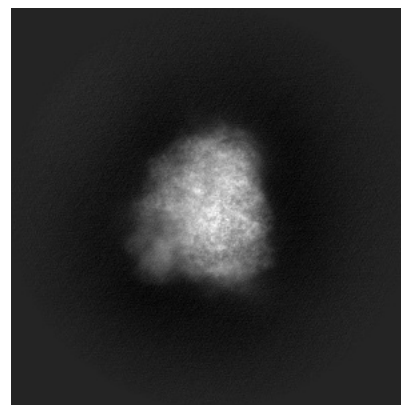
6.1.2 Raw map



X



Y

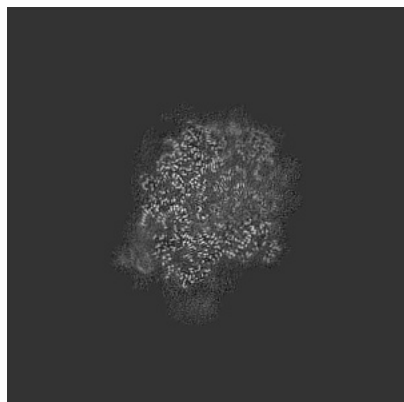


Z

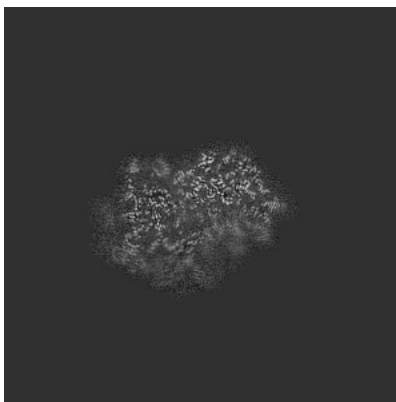
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

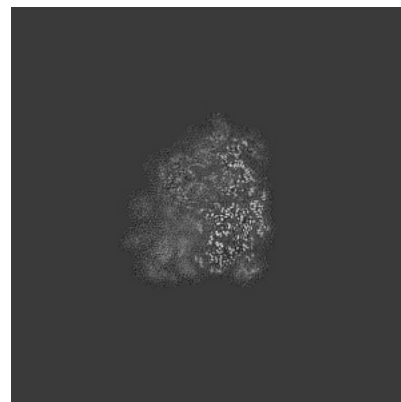
6.2.1 Primary map



X Index: 200

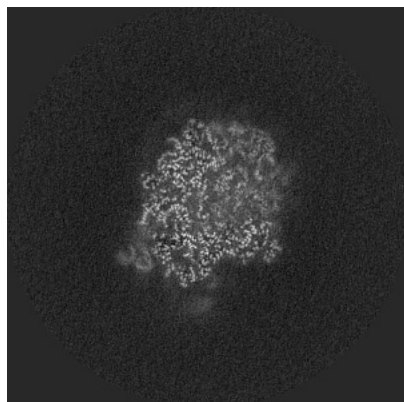


Y Index: 200

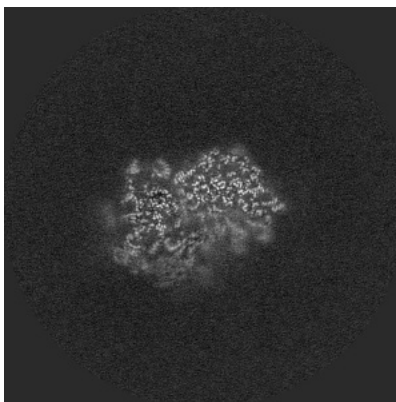


Z Index: 200

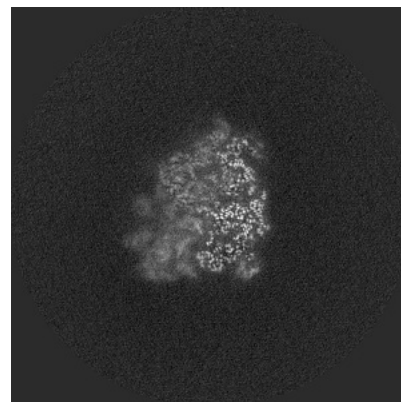
6.2.2 Raw map



X Index: 200



Y Index: 200

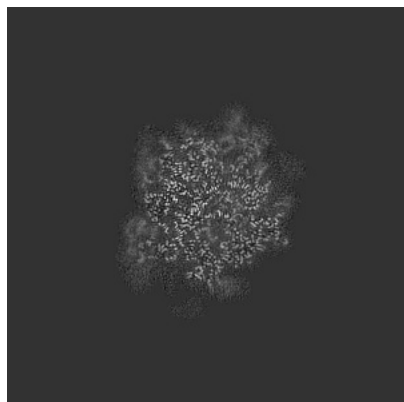


Z Index: 200

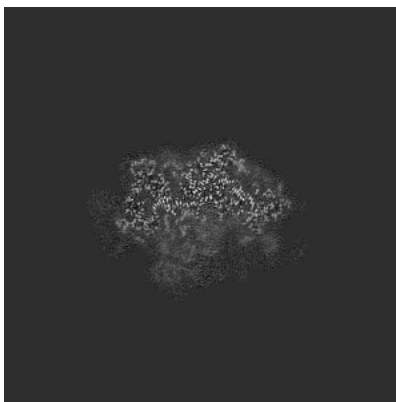
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

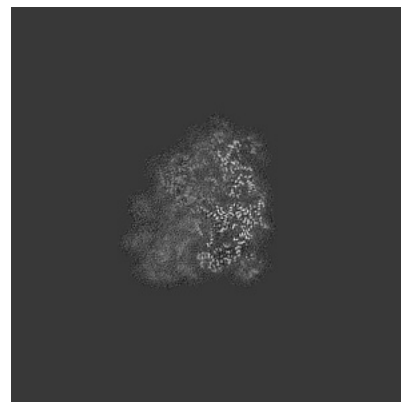
6.3.1 Primary map



X Index: 214

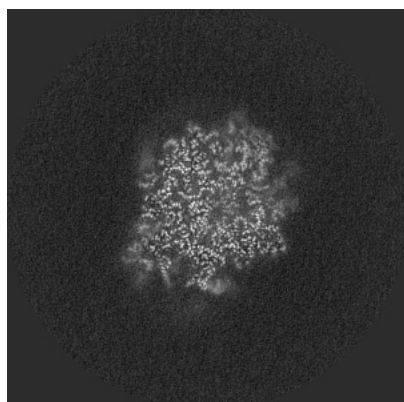


Y Index: 181

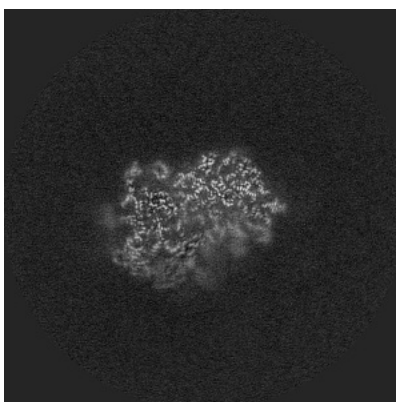


Z Index: 198

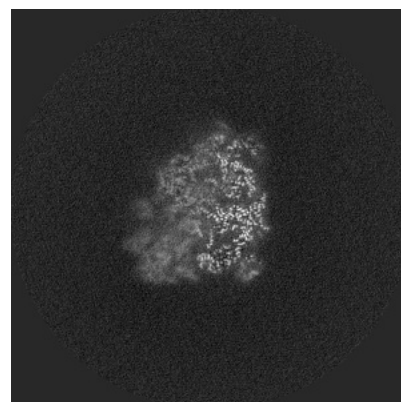
6.3.2 Raw map



X Index: 207



Y Index: 201

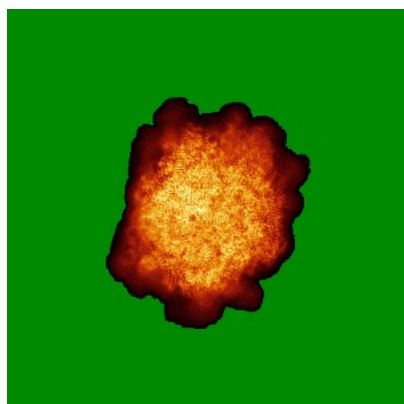


Z Index: 199

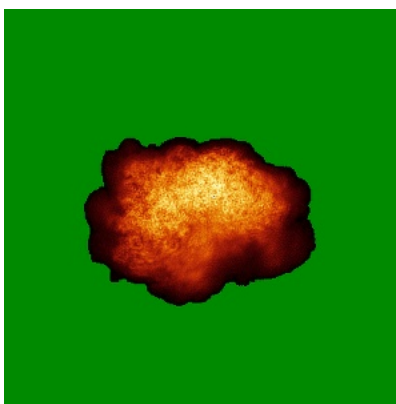
The images above show the largest variance slices of the map in three orthogonal directions.

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

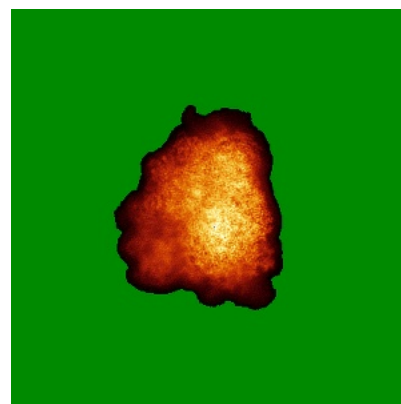
6.4.1 Primary map



X

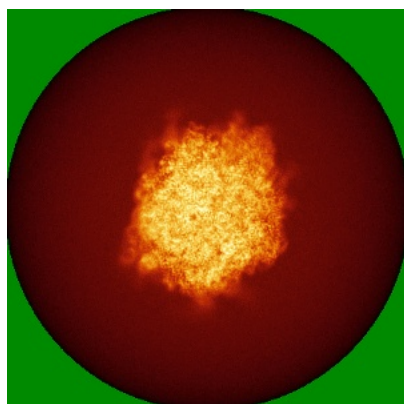


Y

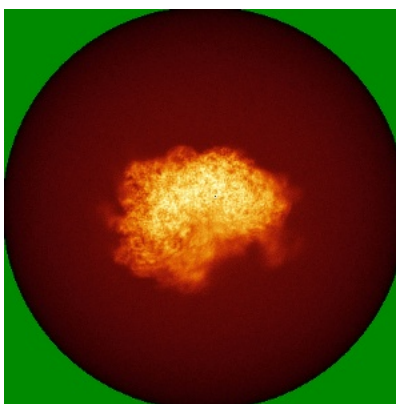


Z

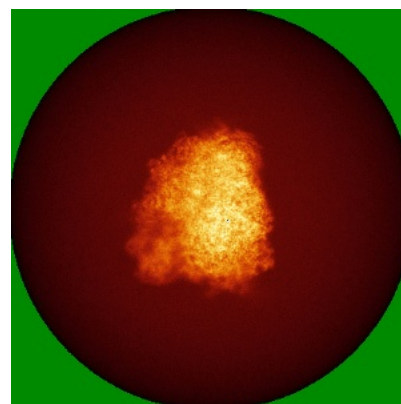
6.4.2 Raw map



X



Y

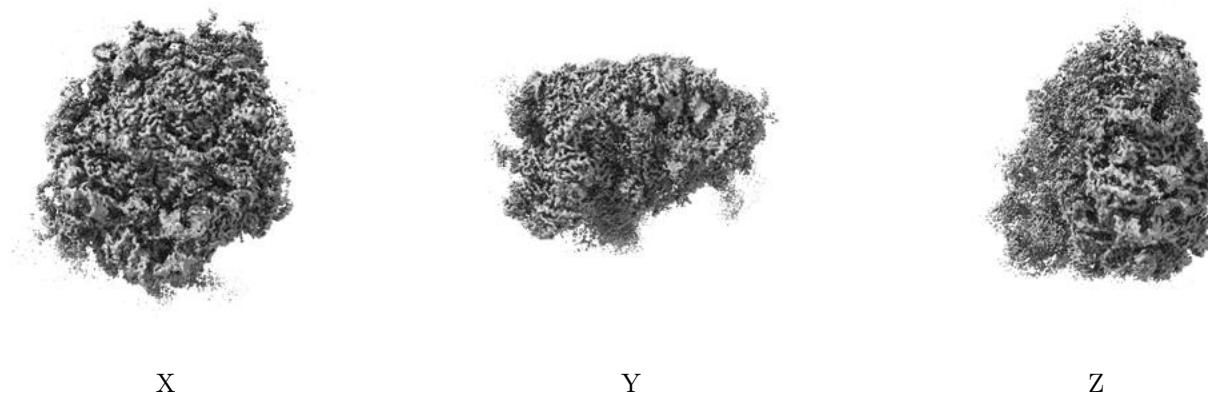


Z

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.

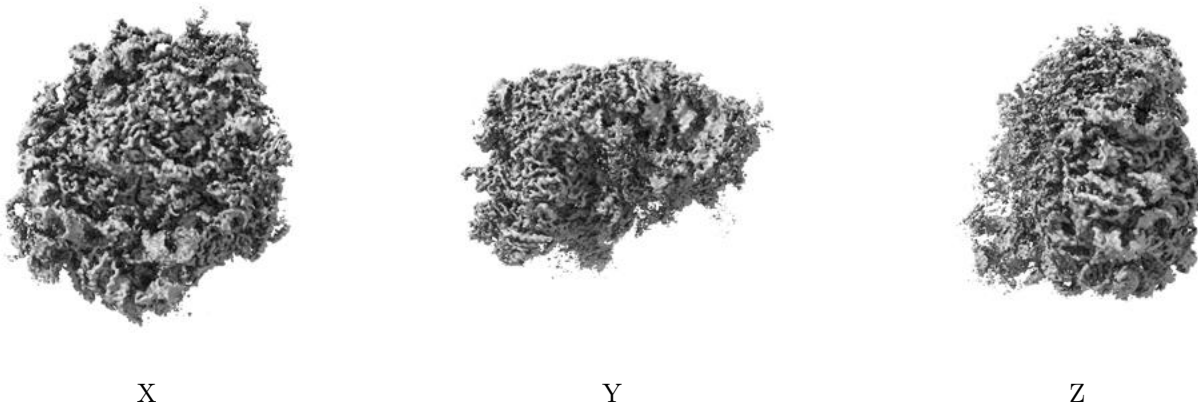
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.037. 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.

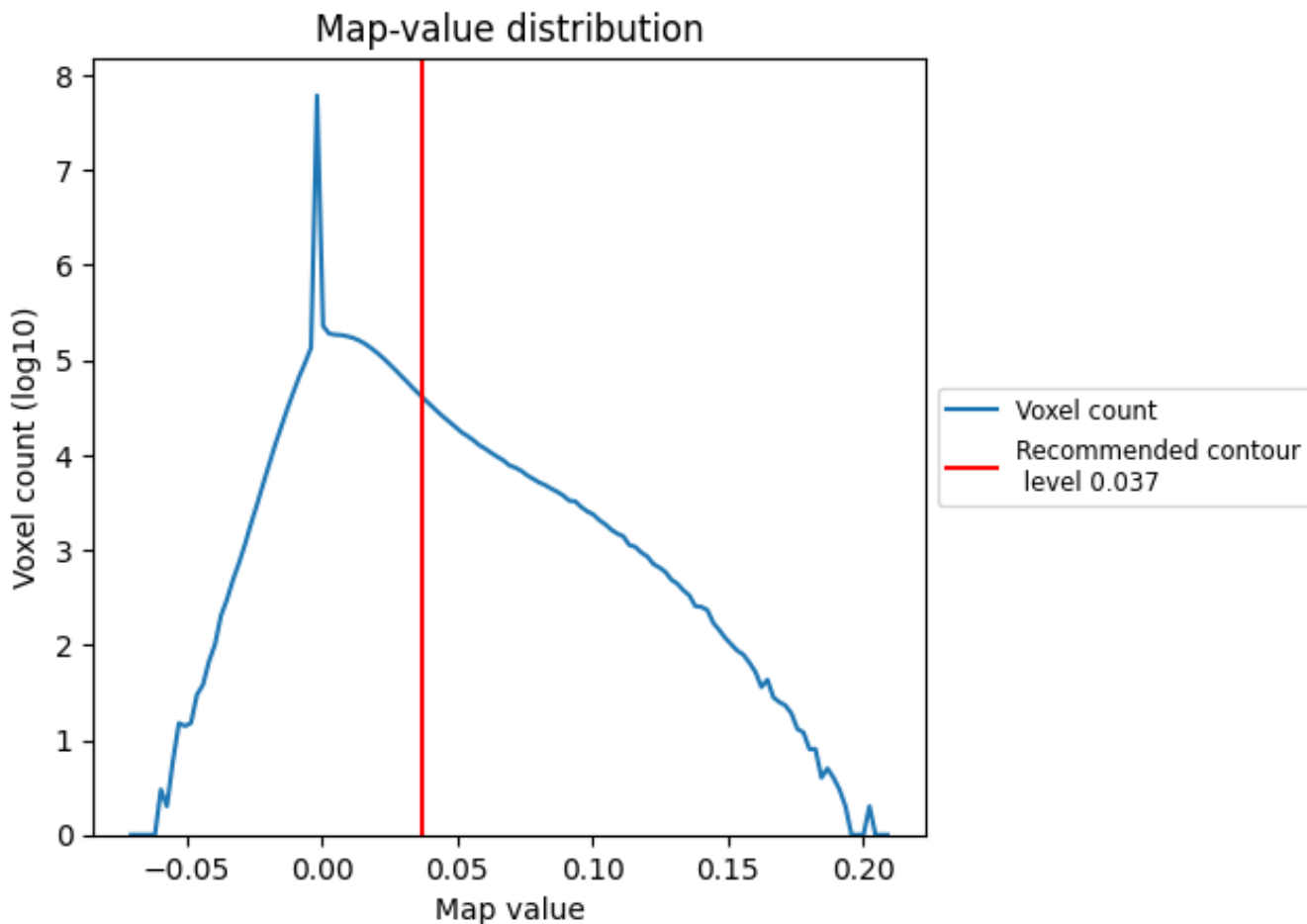
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

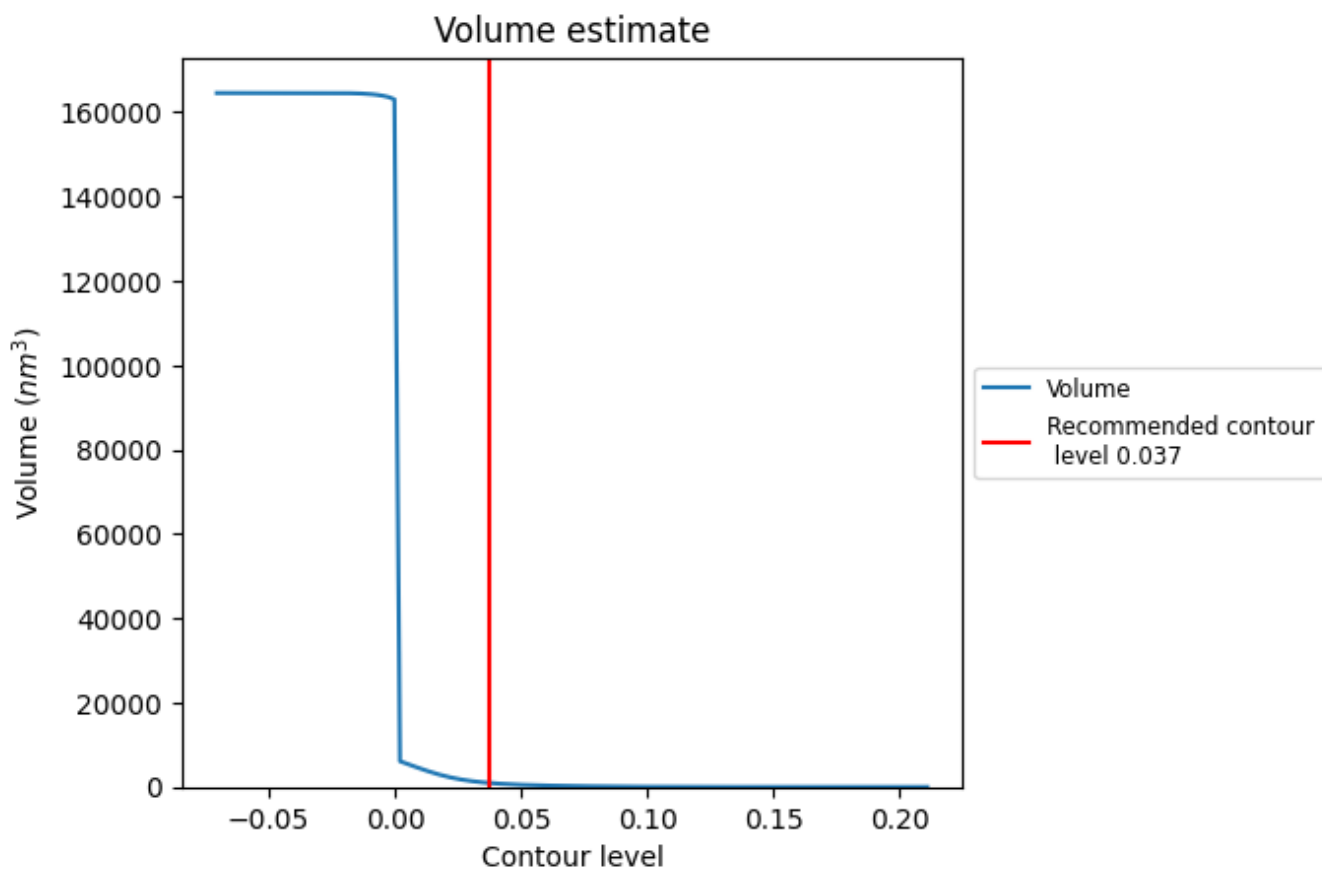
This section contains the results of statistical analysis of the map.

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.

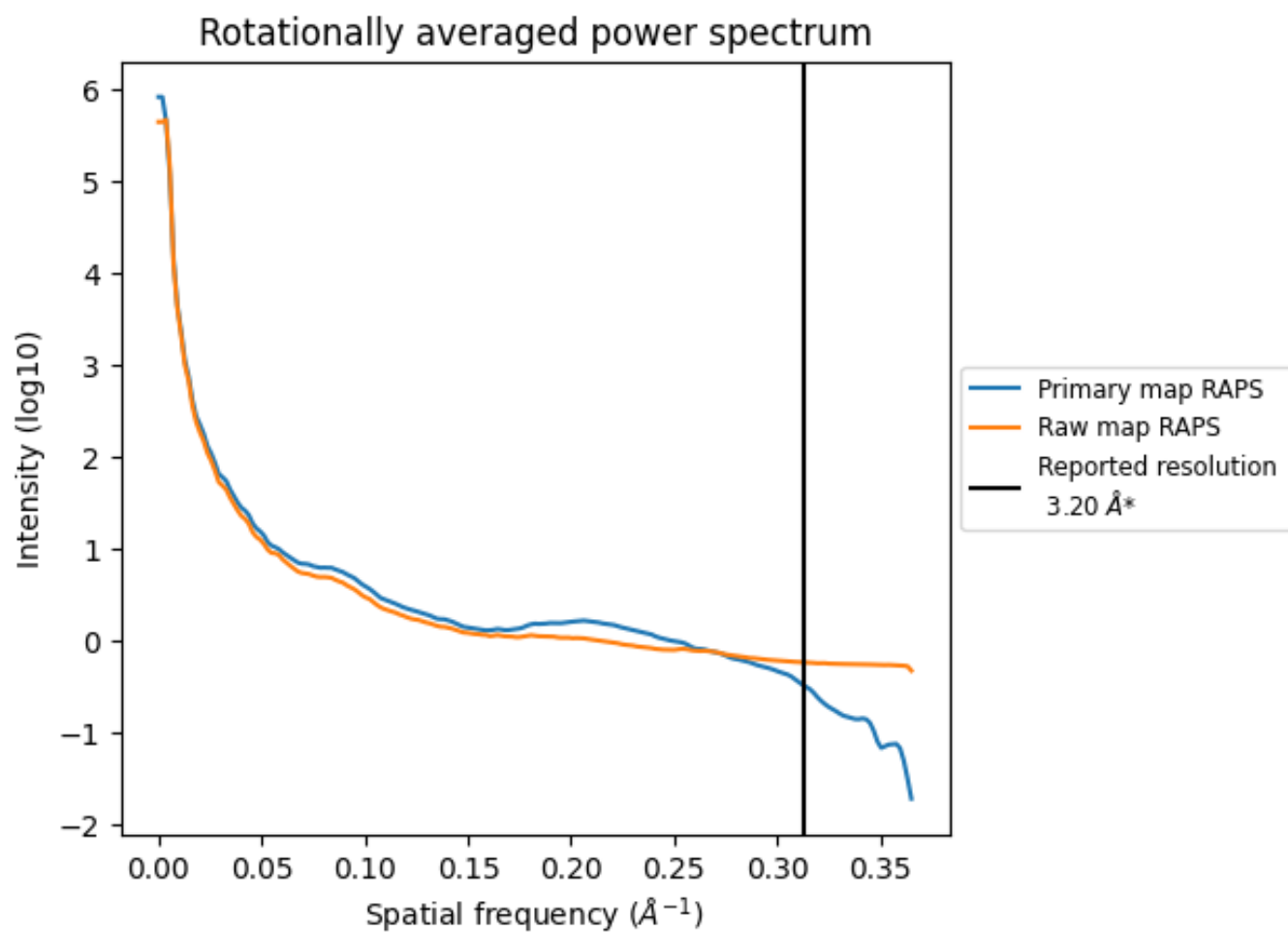
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 969 nm^3 ; this corresponds to an approximate mass of 876 kDa.

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

7.3 Rotationally averaged power spectrum i

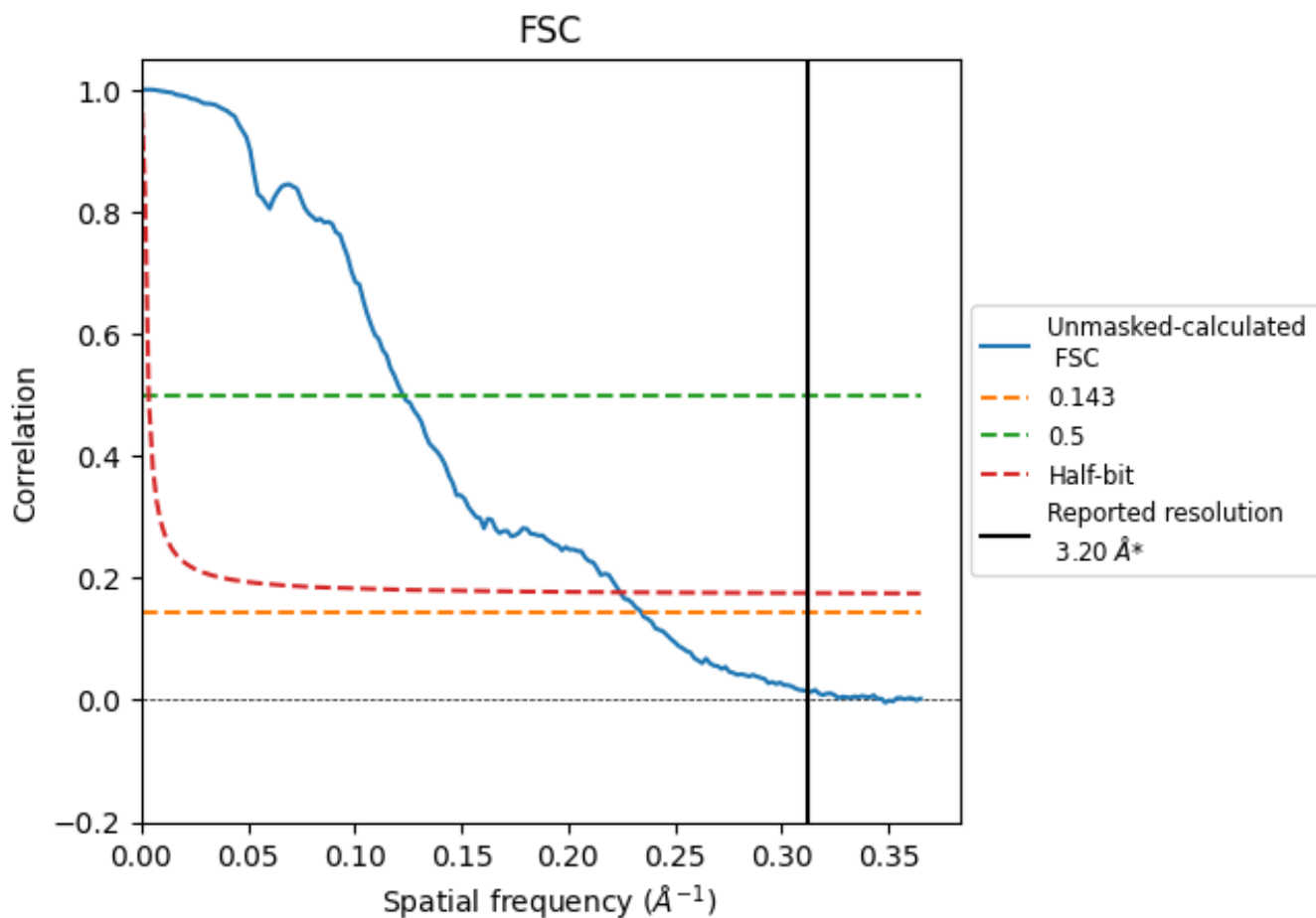


*Reported resolution corresponds to spatial frequency of 0.312 Å⁻¹

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 0.312 \AA^{-1}

8.2 Resolution estimates [i](#)

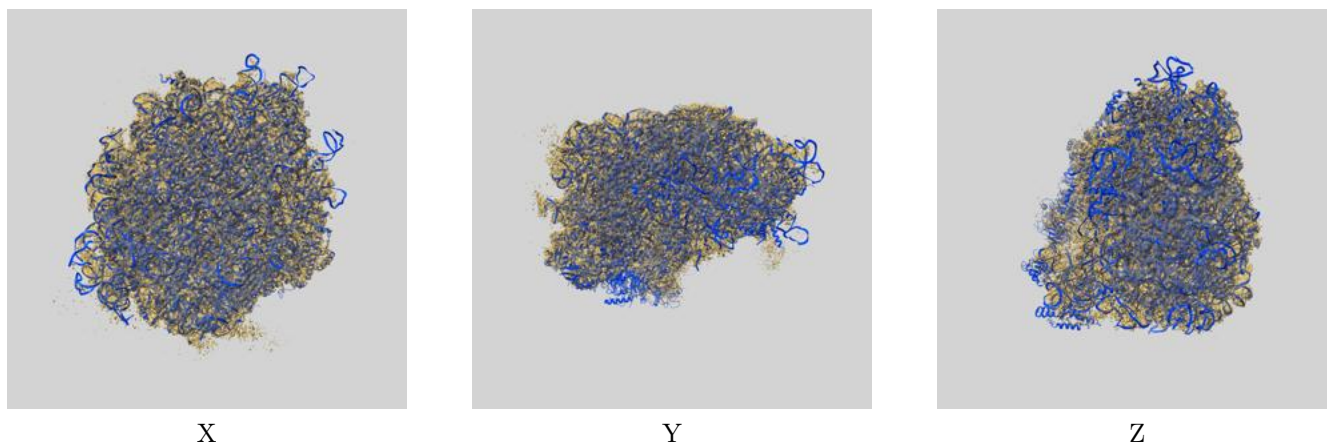
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.27	8.16	4.45

*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 4.27 differs from the reported value 3.2 by more than 10 %

9 Map-model fit [i](#)

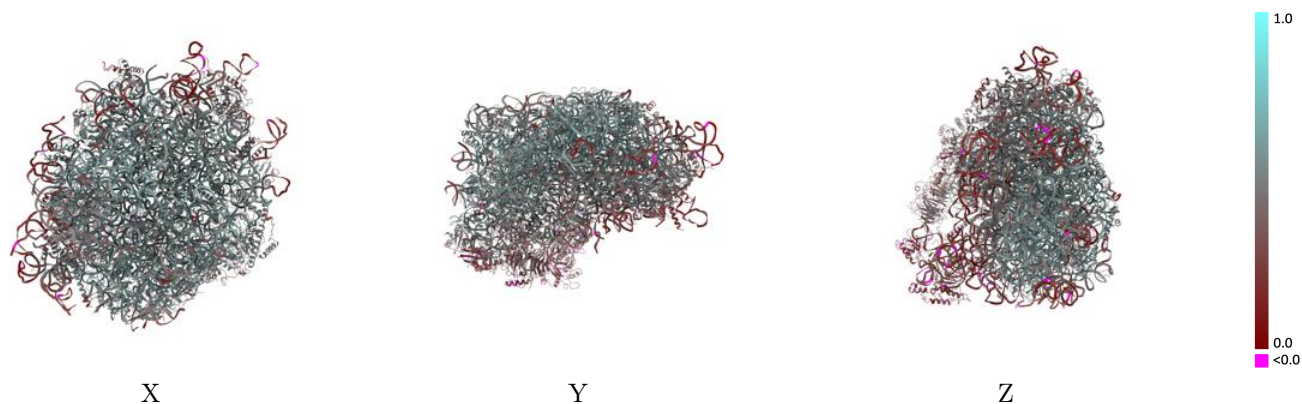
This section contains information regarding the fit between EMDB map EMD-35639 and PDB model 8IPD. Per-residue inclusion information can be found in section 3 on page 14.

9.1 Map-model overlay [i](#)



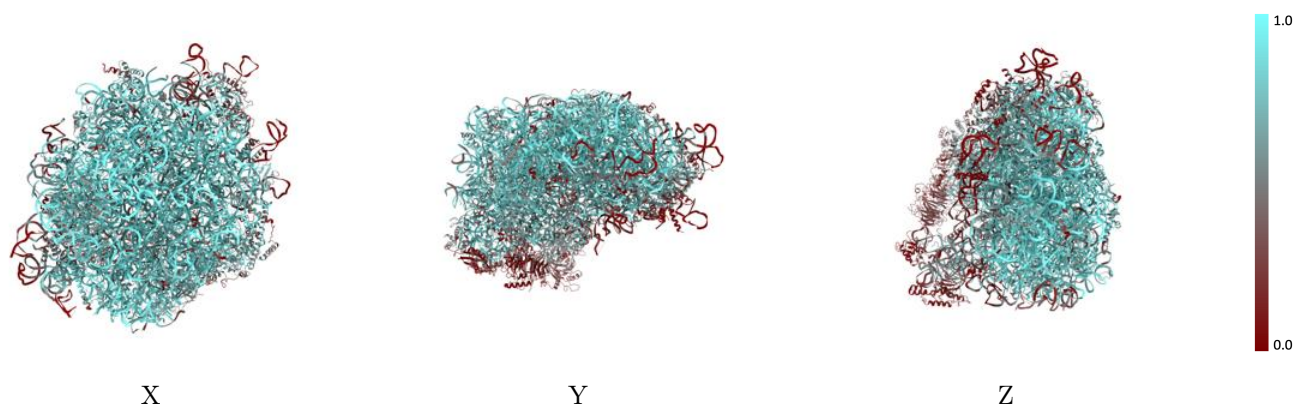
The images above show the 3D surface view of the map at the recommended contour level 0.037 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



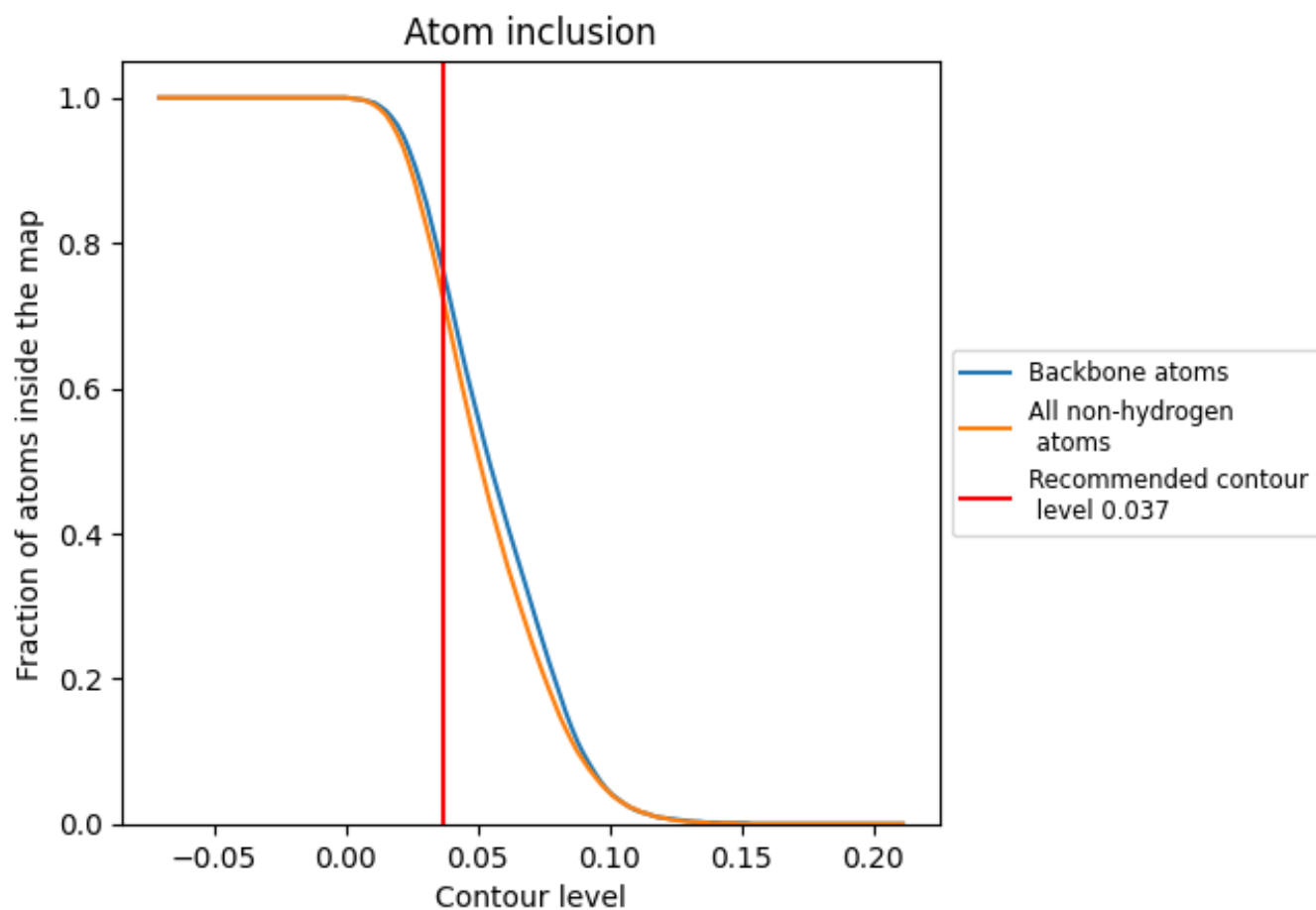
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.037).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 76% of all backbone atoms, 72% 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 (0.037) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7210	 0.4630
2	 0.7860	 0.4560
3	 0.5870	 0.2880
4	 0.6030	 0.4480
6	 0.6490	 0.4870
7	 0.7730	 0.5300
8	 0.9230	 0.5260
9	 0.1560	 0.3750
A	 0.3840	 0.3890
B	 0.8250	 0.5510
C	 0.0850	 0.1950
D	 0.9130	 0.5740
E	 0.2850	 0.3890
F	 0.6900	 0.4830
G	 0.5870	 0.4400
H	 0.8070	 0.5400
I	 0.8000	 0.5440
J	 0.7430	 0.4850
K	 0.7190	 0.4800
L	 0.8810	 0.5580
M	 0.9090	 0.5580
O	 0.5210	 0.4350
P	 0.9460	 0.5740
Q	 0.7590	 0.5170
R	 0.1370	 0.2210
S	 0.8800	 0.5610
T	 0.4600	 0.3250
U	 0.8470	 0.5440
V	 0.8740	 0.5600
W	 0.0720	 0.3170
X	 0.5060	 0.4370
Y	 0.8190	 0.5400
Z	 0.9000	 0.5780
a	 0.6530	 0.4840
b	 0.8580	 0.5640



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Chain	Atom inclusion	Q-score
d	 0.6970	 0.5000
e	 0.8120	 0.5360
g	 0.8370	 0.5410
h	 0.8360	 0.5490
i	 0.4050	 0.3930
j	 0.8190	 0.5350
k	 0.8950	 0.5770
l	 0.8820	 0.5650
m	 0.5190	 0.4350
n	 0.9240	 0.5840
o	 0.7140	 0.5020
p	 0.8420	 0.5460
r	 0.3580	 0.3760
u	 0.4600	 0.4160
v	 0.5640	 0.4590
w	 0.5720	 0.4320
y	 0.2460	 0.3250
z	 0.5590	 0.4700