



# wwPDB EM Validation Summary Report ⓘ

Nov 6, 2023 – 11:17 AM JST

PDB ID : 8IPY  
EMDB ID : EMD-35651  
Title : human nuclear pre-60S ribosomal particle - State D'  
Authors : Zhang, Y.; Gao, N.  
Deposited on : 2023-03-15  
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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

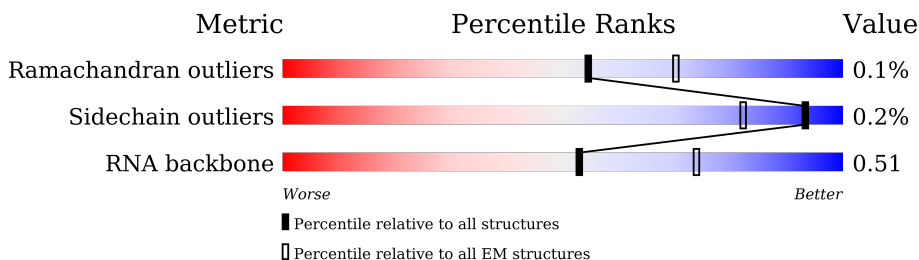
EMDB validation analysis : 0.0.1.dev70  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

# 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 3.20 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)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	687	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>43%</p> </div> <div style="text-align: center;"> <p>48%</p> </div> <div style="text-align: center;"> <p>52%</p> </div> </div>
2	2	5054	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>6%</p> </div> <div style="text-align: center;"> <p>44%</p> </div> <div style="text-align: center;"> <p>22%</p> </div> <div style="text-align: center;"> <p>31%</p> </div> </div>
3	6	245	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>7%</p> </div> <div style="text-align: center;"> <p>100%</p> </div> </div>
4	7	163	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>83%</p> </div> <div style="text-align: center;"> <p>17%</p> </div> </div>
5	8	156	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>66%</p> </div> <div style="text-align: center;"> <p>30%</p> </div> </div>
6	9	134	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>13%</p> </div> <div style="text-align: center;"> <p>63%</p> </div> <div style="text-align: center;"> <p>36%</p> </div> </div>
7	A	159	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>10%</p> </div> <div style="text-align: center;"> <p>28%</p> </div> <div style="text-align: center;"> <p>72%</p> </div> </div>
8	B	403	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>99%</p> </div> </div>


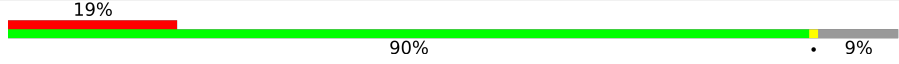
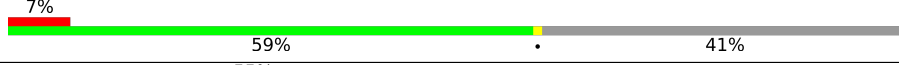
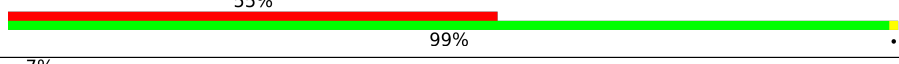

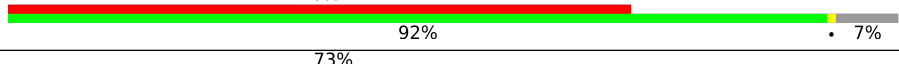
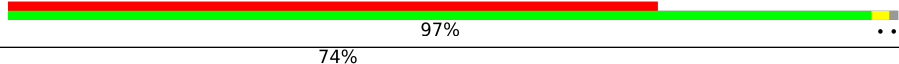

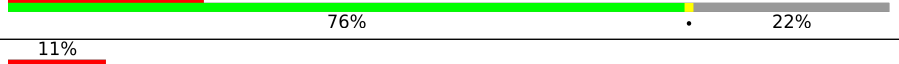
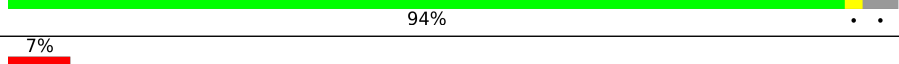
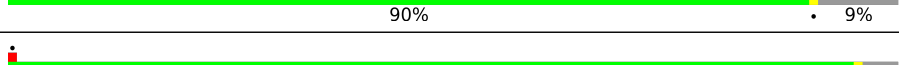
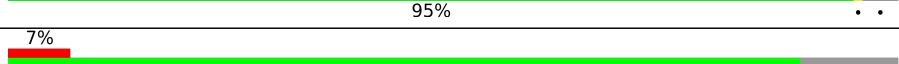


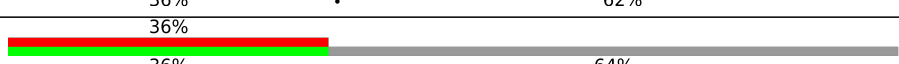
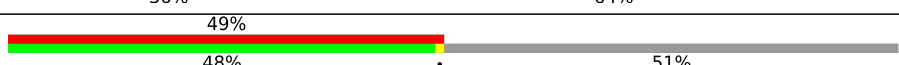

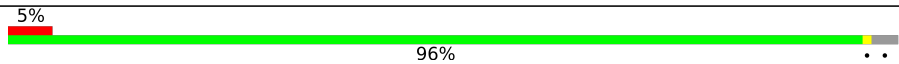
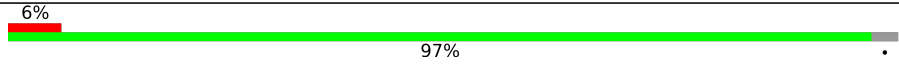
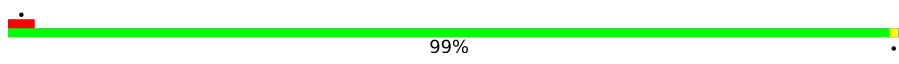
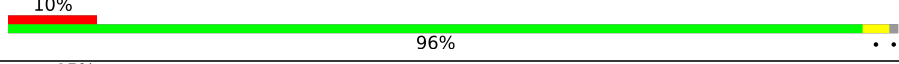
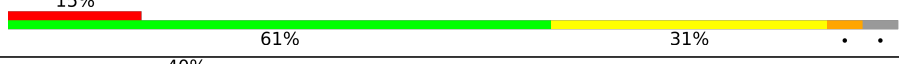
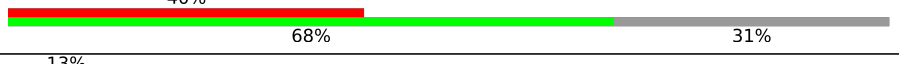
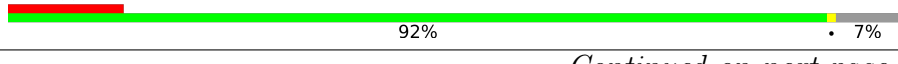

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Mol	Chain	Length	Quality of chain
9	D	427	83% 16%
10	E	115	14% 83% 15%
11	G	266	14% 89% 9%
12	H	123	98% ..
13	I	192	98% ..
14	J	260	83% 17%
15	L	148	75% 24%
16	M	97	89% 11%
17	P	51	98% .
18	Q	211	6% 99%
19	S	215	61% 37%
20	U	204	99%
21	V	203	98% ..
22	X	92	8% 99% .
23	Z	188	80% 20%
24	a	196	74% 24%
25	b	176	100%
26	e	140	94% 6%
27	h	145	92% 8%
28	l	137	91% 9%
29	m	257	96% .
30	n	110	95% ..
31	o	288	7% 81% 18%
32	p	248	91% 9%
33	r	360	15% 22% 77%


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Mol	Chain	Length	Quality of chain
34	u	549	
35	v	239	
36	w	731	
37	y	165	
38	z	129	
39	C	178	
40	R	297	
41	W	485	
42	T	160	
43	4	634	
44	Y	184	
45	k	135	
46	j	125	
47	d	128	
48	t	293	
49	x	160	
50	c	490	
51	1	255	
52	K	105	
53	F	117	
54	i	136	
55	O	70	
56	3	120	
57	q	588	
58	g	156	

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Mol	Chain	Length	Quality of chain
59	f	478	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into three segments: a red segment on the left labeled '32%', a green segment in the middle labeled '53%', and a grey segment on the right labeled '46%'. A small black dot is located at the end of the green segment.</p>

## 2 Entry composition [i](#)

There are 61 unique types of molecules in this entry. The entry contains 163715 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 Protein SDA1 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	N	332	2719	1762	461	475	21	0	0

- Molecule 2 is a RNA chain called 28S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	2	3485	74812	33355	13680	24293	3484	0	0

- Molecule 3 is a protein called Eukaryotic translation initiation factor 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	6	244	1852	1149	318	372	13	0	0

- Molecule 4 is a protein called Probable ribosome biogenesis protein RLP24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	7	135	1159	737	225	187	10	0	0

- Molecule 5 is a RNA chain called 5.8S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
5	8	156	3315	1481	585	1094	155	0	0

- Molecule 6 is a protein called Zinc finger protein 593.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	9	86	711	433	154	121	3	0	0

- Molecule 7 is a protein called 60S ribosomal protein L29.

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

- Molecule 8 is a protein called 60S ribosomal protein L3.

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

- Molecule 9 is a protein called 60S ribosomal protein L4.

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

- Molecule 10 is a protein called 60S ribosomal protein L30.

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

- Molecule 11 is a protein called 60S ribosomal protein L7a.

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

- Molecule 12 is a protein called 60S ribosomal protein L35.

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

- Molecule 13 is a protein called 60S ribosomal protein L9.

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

- Molecule 14 is a protein called Ribosome biogenesis protein NSA2 homolog.

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

- 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 L39.

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

- Molecule 18 is a protein called 60S ribosomal protein L13.

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

- Molecule 19 is a protein called 60S ribosomal protein L14.

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

- Molecule 20 is a protein called 60S ribosomal protein L15.

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

- Molecule 21 is a protein called 60S ribosomal protein L13a.



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

- Molecule 22 is a protein called 60S ribosomal protein L37a.

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

- Molecule 23 is a protein called 60S ribosomal protein L18.

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

- Molecule 24 is a protein called 60S ribosomal protein L19.

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

- Molecule 25 is a protein called 60S ribosomal protein L18a.

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

- Molecule 26 is a protein called 60S ribosomal protein L23.

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

- Molecule 27 is a protein called 60S ribosomal protein L26.

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

- Molecule 28 is a protein called 60S ribosomal protein L28.

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

- Molecule 29 is a protein called 60S ribosomal protein L8.

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

- Molecule 30 is a protein called 60S ribosomal protein L35a.

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

- Molecule 31 is a protein called 60S ribosomal protein L6.

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

- Molecule 32 is a protein called 60S ribosomal protein L7.

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

- Molecule 33 is a protein called Coiled-coil domain-containing protein 86.

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

- Molecule 34 is a protein called Guanine nucleotide-binding protein-like 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	u	67	Total	C	N	O	S	0	0
			569	357	119	90	3		

- Molecule 35 is a protein called mRNA turnover protein 4 homolog.

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

- Molecule 36 is a protein called G Protein Nucleolar 2.

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

- Molecule 37 is a protein called 60S ribosomal protein L12.

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

- Molecule 38 is a protein called Protein LLP homolog.

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

- Molecule 39 is a protein called 60S ribosomal protein L11.

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

- Molecule 40 is a protein called 60S ribosomal protein L5.

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

- Molecule 41 is a protein called Notchless protein homolog 1.

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

- Molecule 42 is a protein called 60S ribosomal protein L21.

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

- Molecule 43 is a protein called GTP-binding protein 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	4	611	Total	C	N	O	S	0	0
			5016	3151	918	920	27		

- Molecule 44 is a protein called 60S ribosomal protein L17.

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

- Molecule 45 is a protein called 60S ribosomal protein L32.

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

- Molecule 46 is a protein called 60S ribosomal protein L31.

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

- Molecule 47 is a protein called 60S ribosomal protein L22.

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

- Molecule 48 is a protein called MKI67 FHA domain-interacting nucleolar phosphoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	t	111	Total	C	N	O	S	0	0
			928	601	157	167	3		

- Molecule 49 is a RNA chain called ITS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	x	57	Total	C	N	O	P	0	0
			684	285	1	341	57		

- Molecule 50 is a protein called Ribosomal L1 domain-containing protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	c	239	Total	C	N	O	S	0	0
			1924	1232	338	348	6		

- Molecule 51 is a protein called 60S ribosomal protein L7-like 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	1	230	Total	C	N	O	S	0	0
			1897	1226	357	310	4		

- Molecule 52 is a protein called 60S ribosomal protein L36.

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

- Molecule 53 is a protein called 60S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	F	113	Total	C	N	O	S	0	0
			897	560	185	146	6		

- Molecule 54 is a protein called 60S ribosomal protein L27.

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

- Molecule 55 is a protein called 60S ribosomal protein L38.

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

- Molecule 56 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
56	3	115	2453	1093	437	808	115	0	0

- Molecule 57 is a protein called Pescadillo homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
57	q	404	3317	2140	582	582	13	0	0

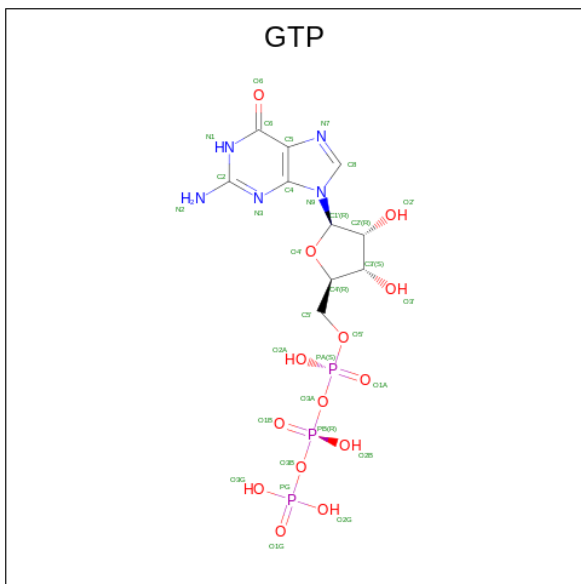
- Molecule 58 is a protein called 60S ribosomal protein L23a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
58	g	145	1170	750	222	197	1	0	0

- Molecule 59 is a protein called Ribosome biogenesis protein NOP53.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
59	f	258	2137	1326	427	382	2	0	0

- Molecule 60 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula:  $C_{10}H_{16}N_5O_{14}P_3$ ).



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

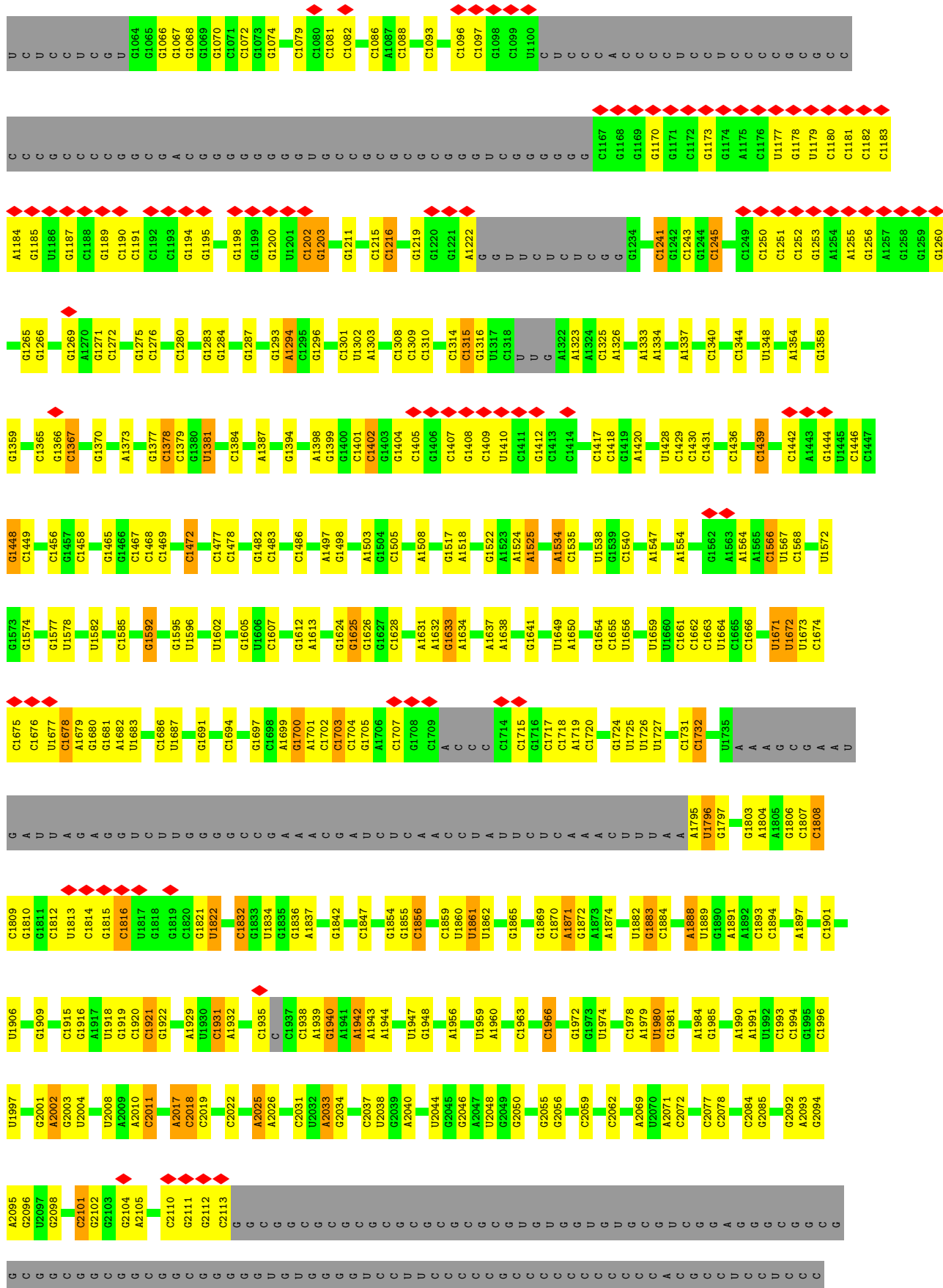
- Molecule 61 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

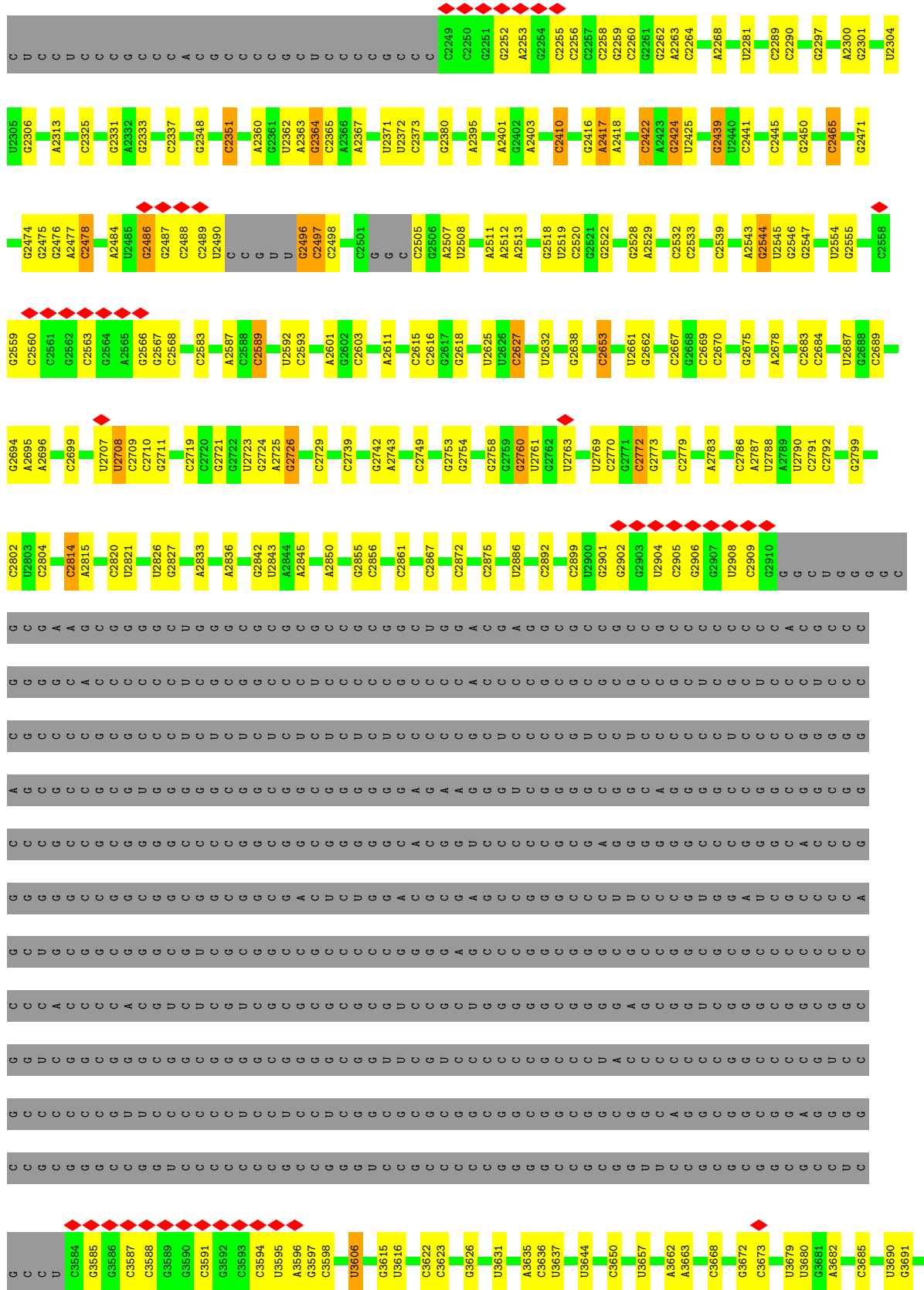
Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
61	w	1	1	1	0

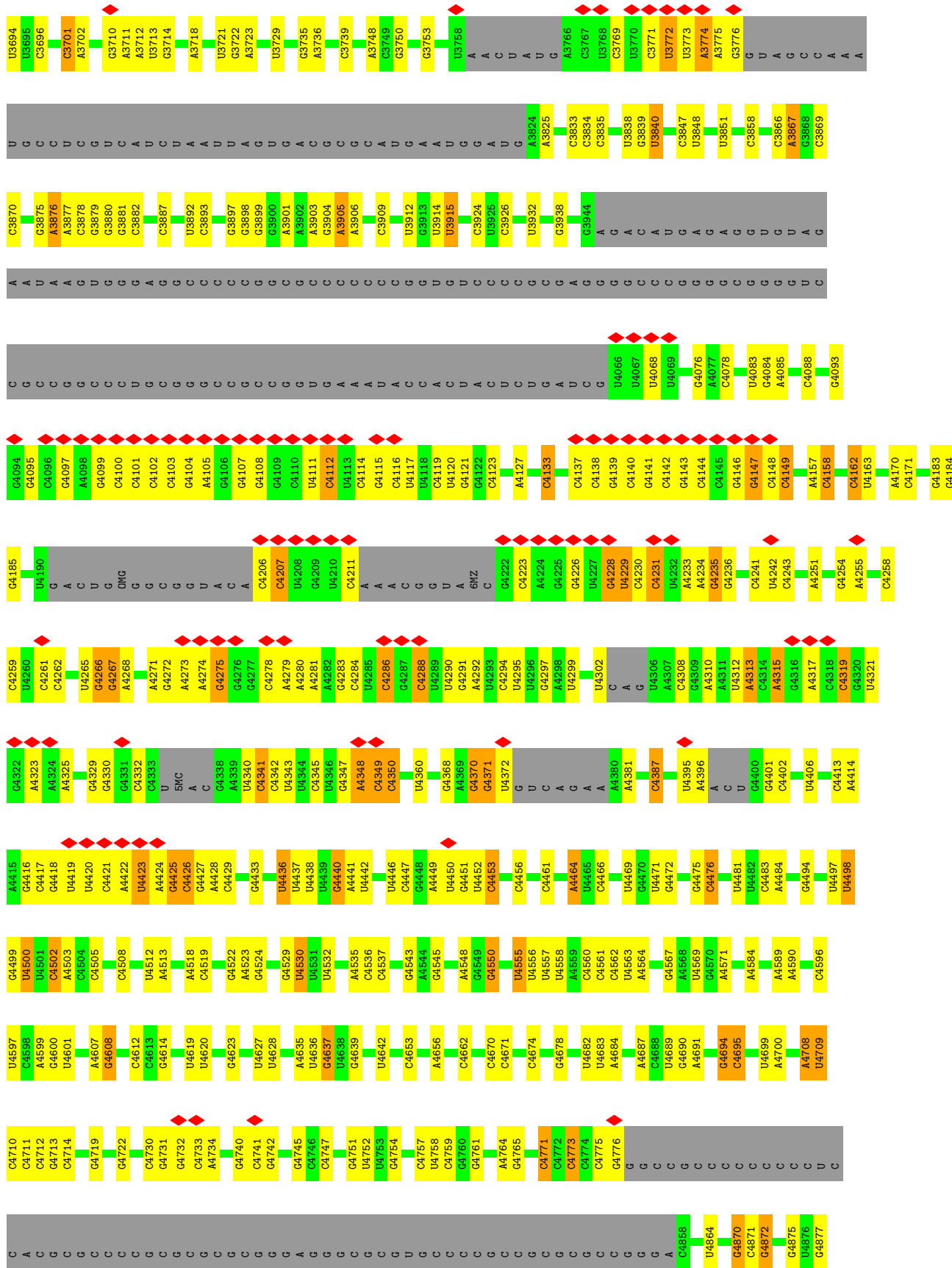


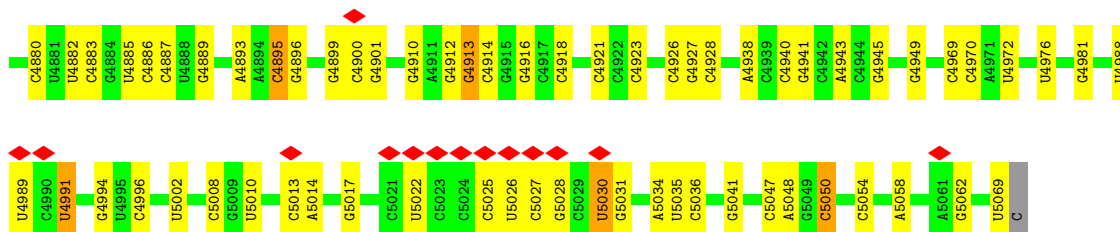




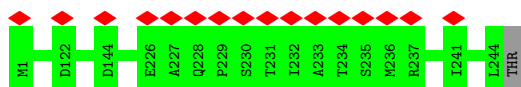




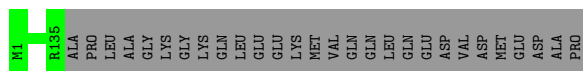
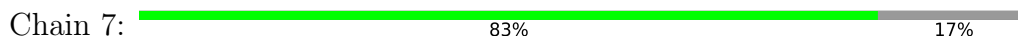




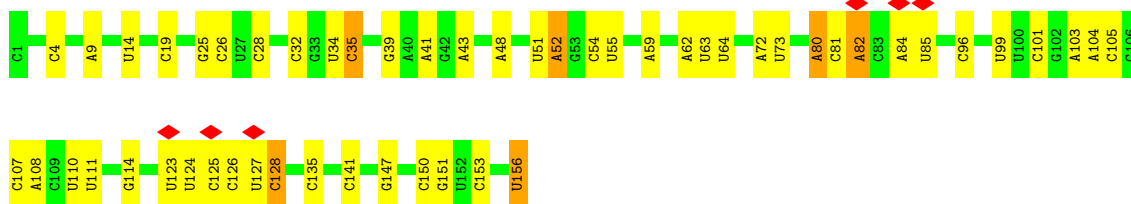
• Molecule 3: Eukaryotic translation initiation factor 6



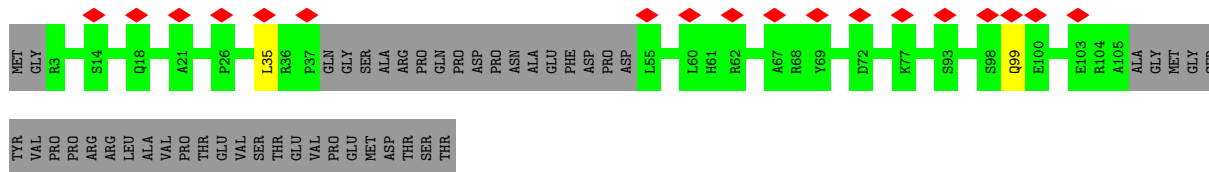
• Molecule 4: Probable ribosome biogenesis protein RLP24



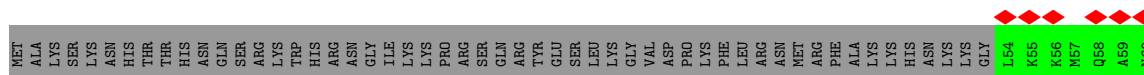
• Molecule 5: 5.8S rRNA

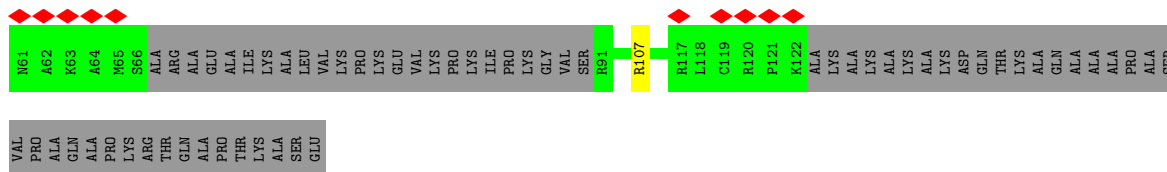


• Molecule 6: Zinc finger protein 593

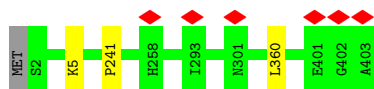


• Molecule 7: 60S ribosomal protein L29

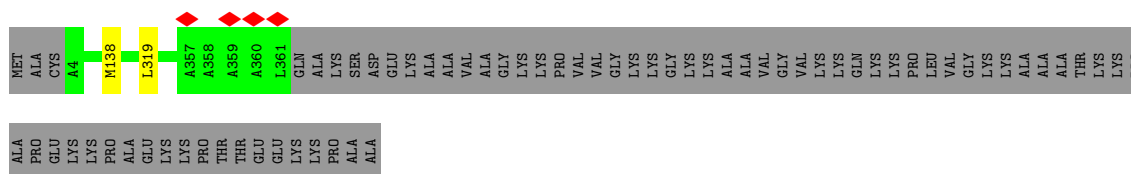
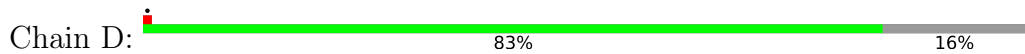




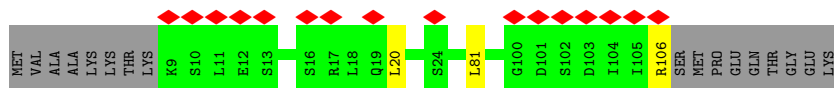
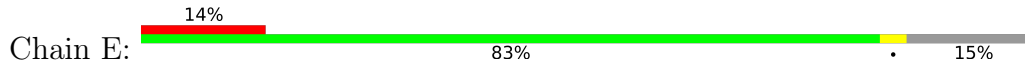
- Molecule 8: 60S ribosomal protein L3



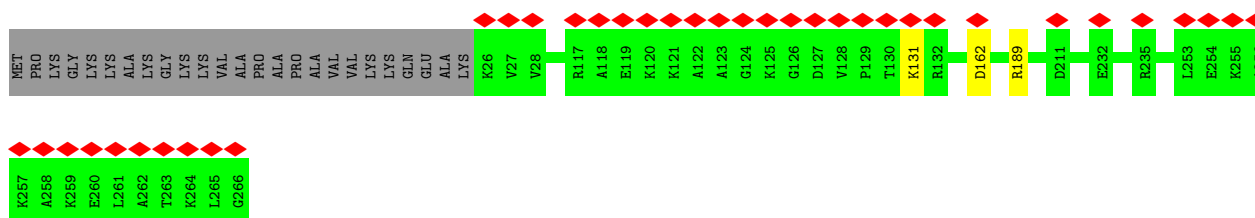
- Molecule 9: 60S ribosomal protein L4



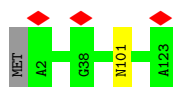
- Molecule 10: 60S ribosomal protein L30



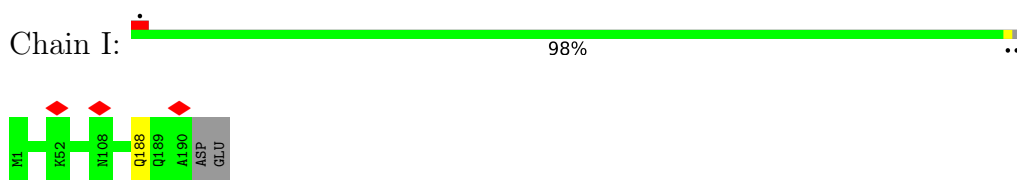
- Molecule 11: 60S ribosomal protein L7a



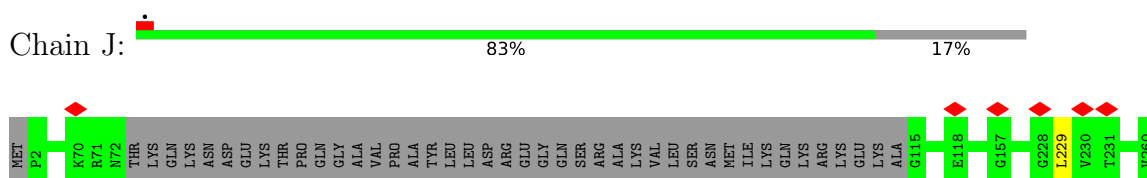
- Molecule 12: 60S ribosomal protein L35



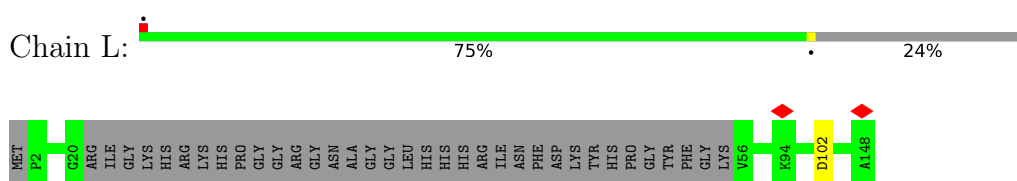
- Molecule 13: 60S ribosomal protein L9



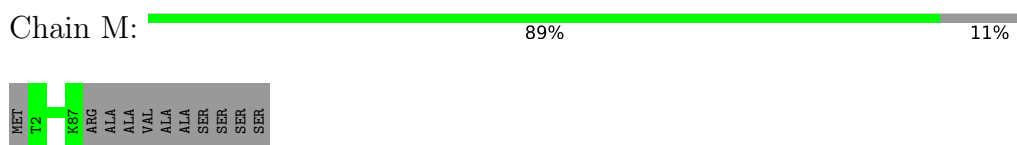
- Molecule 14: Ribosome biogenesis protein NSA2 homolog



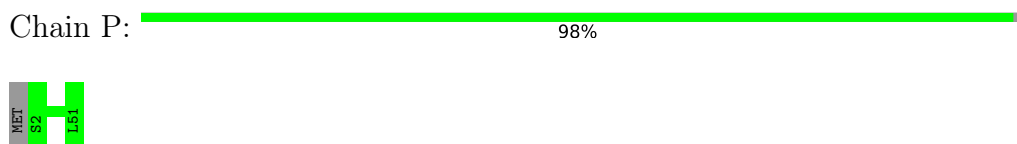
- Molecule 15: 60S ribosomal protein L27a



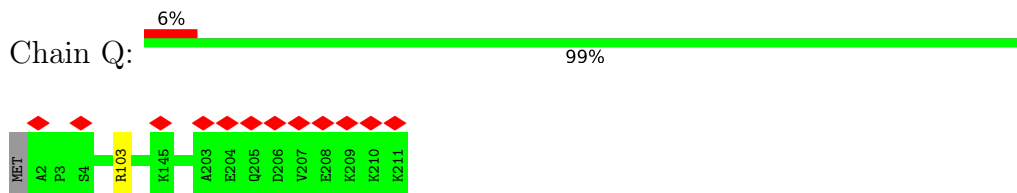
- Molecule 16: 60S ribosomal protein L37



- Molecule 17: 60S ribosomal protein L39



- Molecule 18: 60S ribosomal protein L13

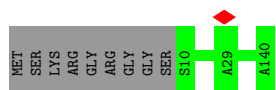


- Molecule 19: 60S ribosomal protein L14

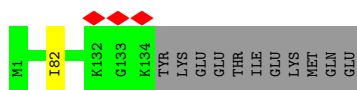
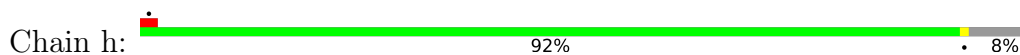




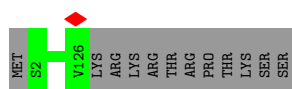
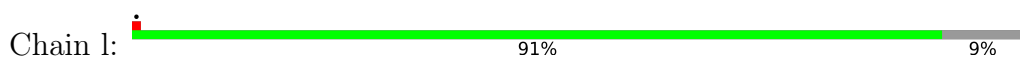




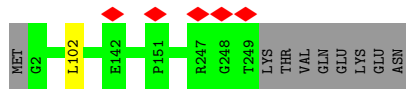
- Molecule 27: 60S ribosomal protein L26



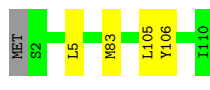
- Molecule 28: 60S ribosomal protein L28



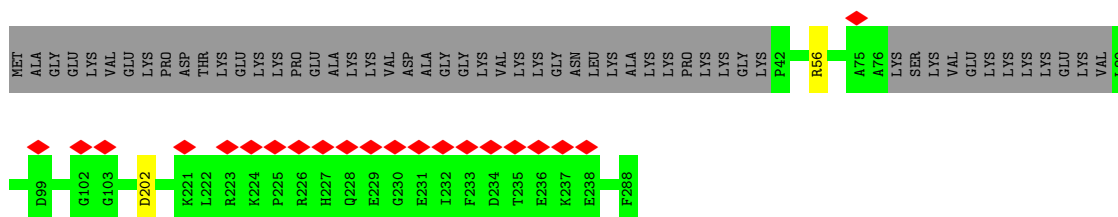
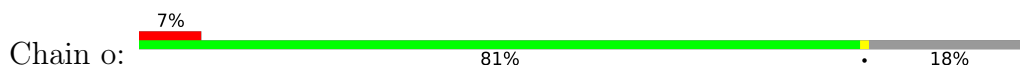
- Molecule 29: 60S ribosomal protein L8



- Molecule 30: 60S ribosomal protein L35a



- Molecule 31: 60S ribosomal protein L6

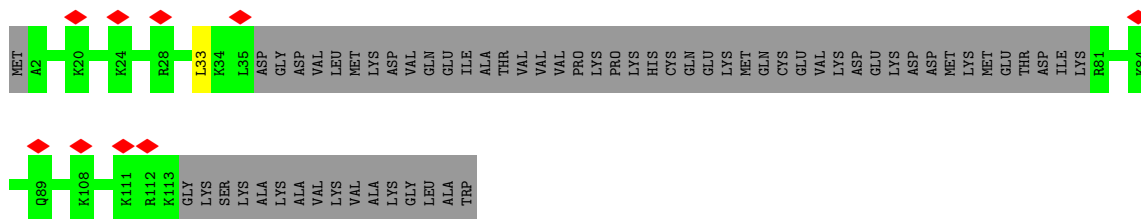


- Molecule 32: 60S ribosomal protein L7

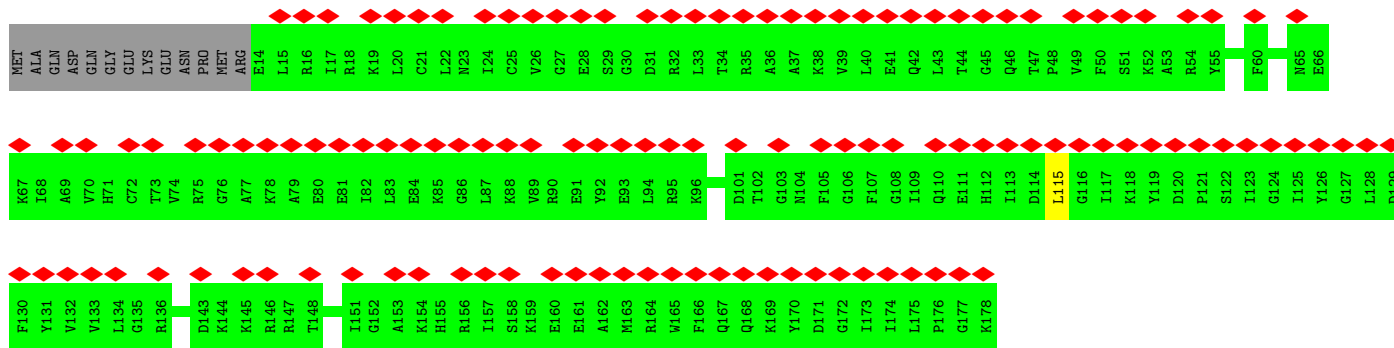
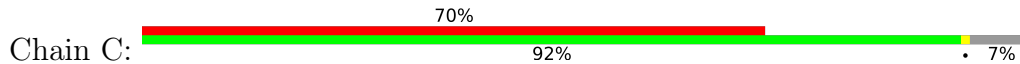




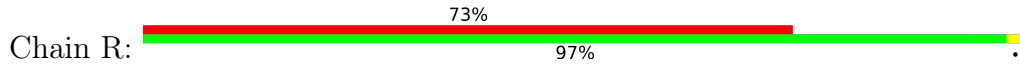




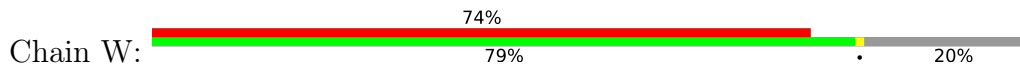
• Molecule 39: 60S ribosomal protein L11

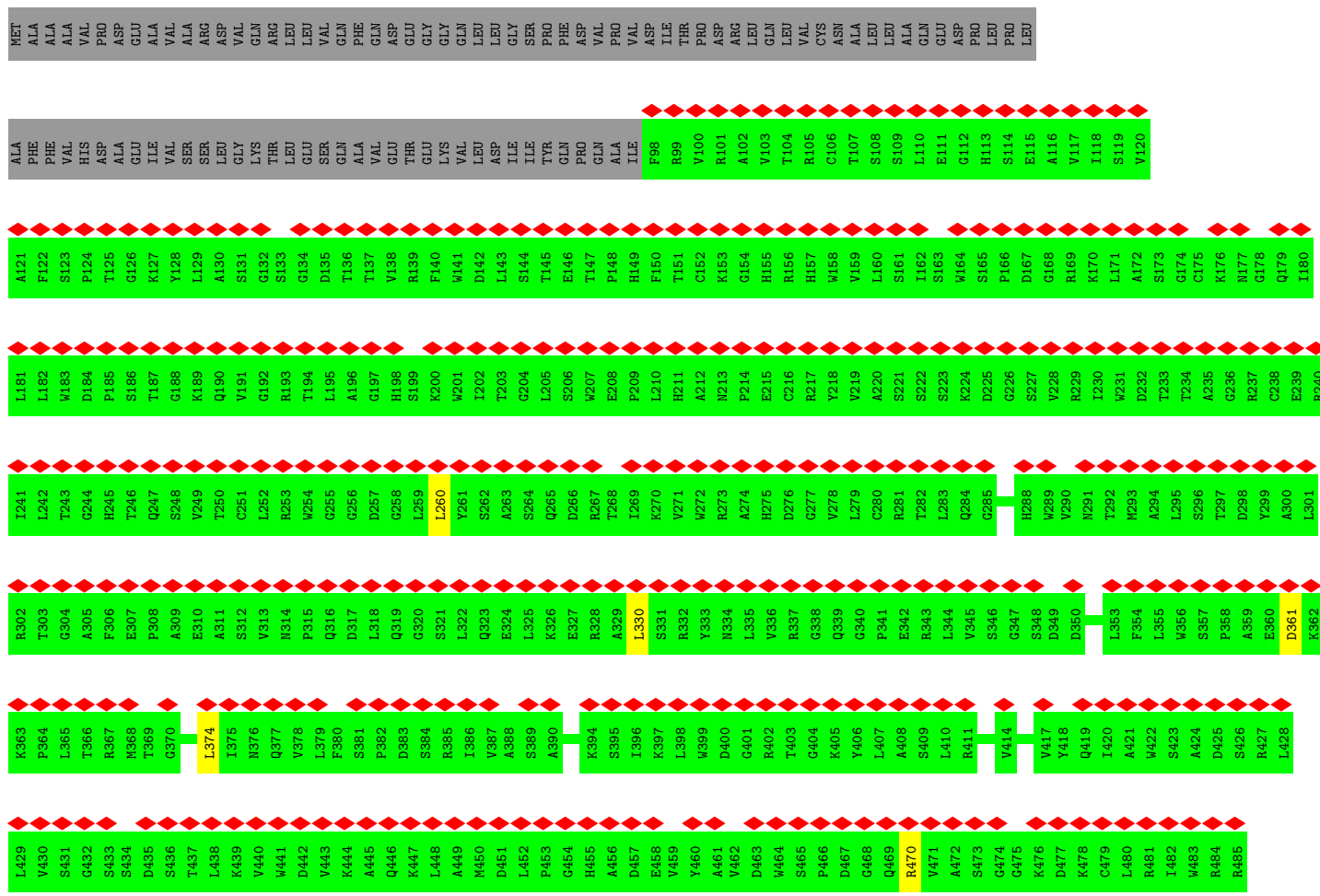


• Molecule 40: 60S ribosomal protein L5

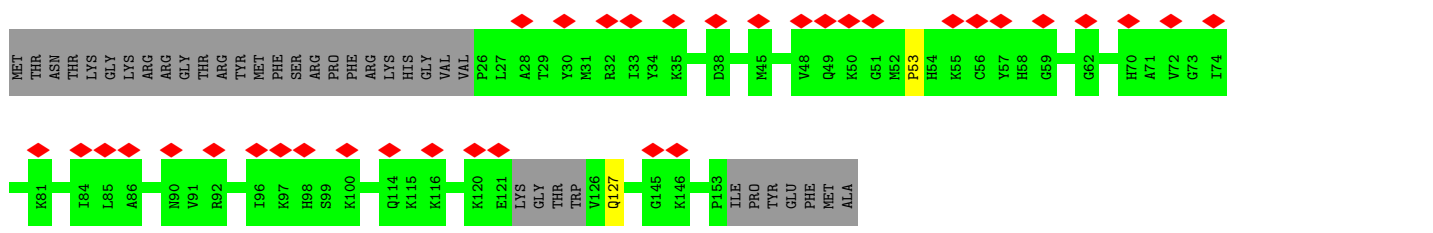
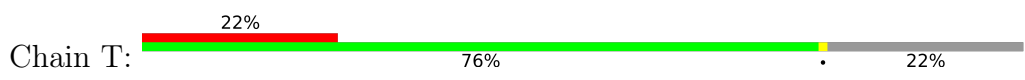


• Molecule 41: Notchless protein homolog 1

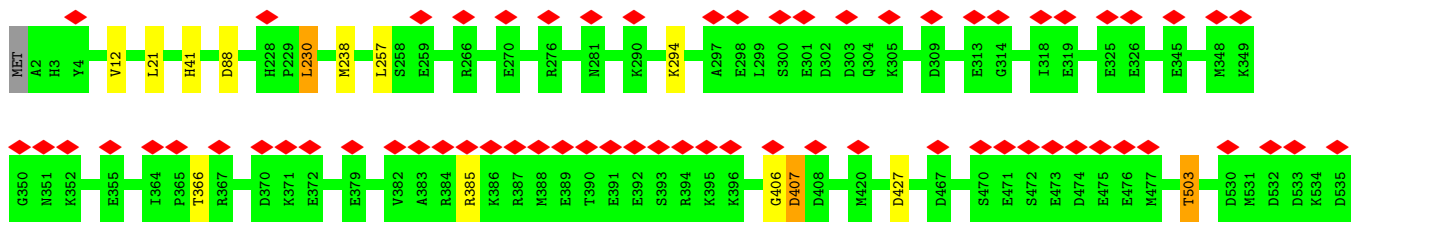
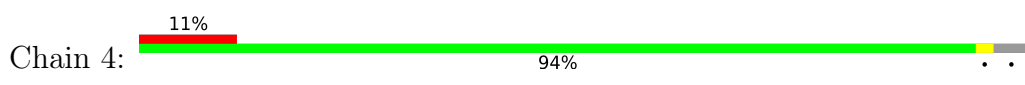


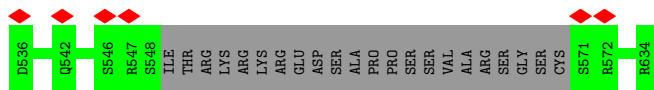


• Molecule 42: 60S ribosomal protein L21

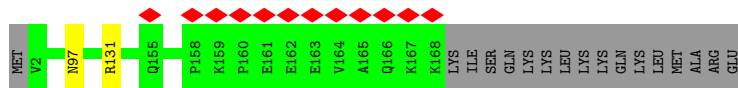
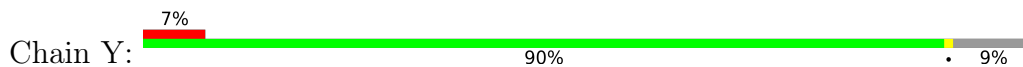


• Molecule 43: GTP-binding protein 4

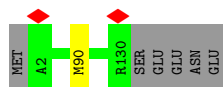




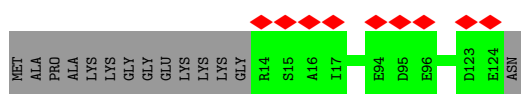
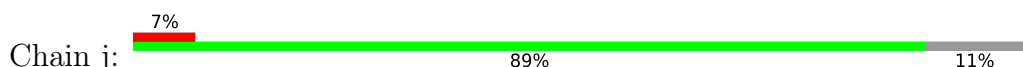
• Molecule 44: 60S ribosomal protein L17



• Molecule 45: 60S ribosomal protein L32



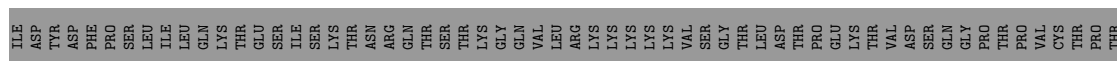
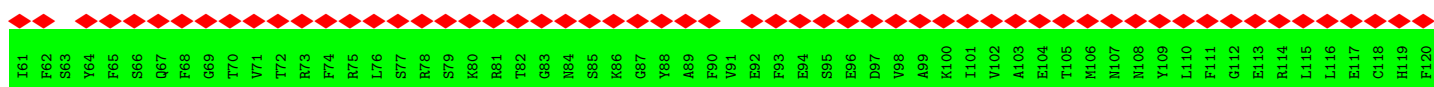
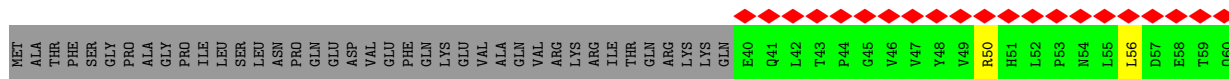
• Molecule 46: 60S ribosomal protein L31



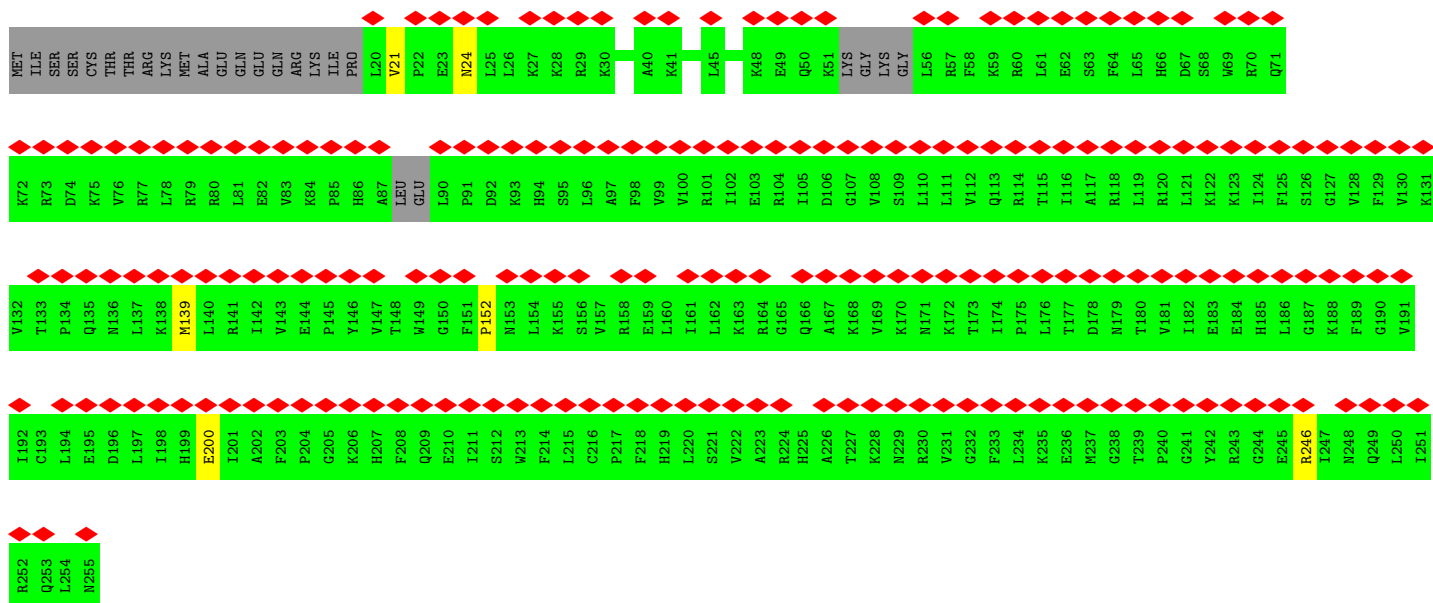
• Molecule 47: 60S ribosomal protein L22



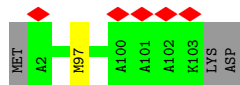
• Molecule 48: MKI67 FHA domain-interacting nucleolar phosphoprotein



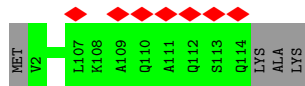




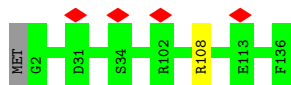
- Molecule 52: 60S ribosomal protein L36



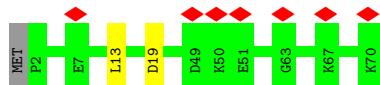
- Molecule 53: 60S ribosomal protein L34



- Molecule 54: 60S ribosomal protein L27



- Molecule 55: 60S ribosomal protein L38



- Molecule 56: 5S rRNA







## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	26584	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	-0.074	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.006	Depositor
Recommended contour level	0.032	Depositor
Map size (Å)	548.0, 548.0, 548.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.37, 1.37, 1.37	Depositor

## 5 Model quality i

### 5.1 Standard geometry i

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

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	0.38	0/2772	0.73	4/3738 (0.1%)
2	2	0.43	3/81923 (0.0%)	1.38	1241/127714 (1.0%)
3	6	0.31	0/1877	0.67	0/2554
4	7	0.36	0/1181	0.64	0/1563
5	8	0.43	0/3679	1.37	51/5732 (0.9%)
6	9	0.31	0/723	0.83	2/961 (0.2%)
7	A	0.27	0/354	0.74	0/465
8	B	0.32	0/3315	0.67	1/4435 (0.0%)
9	D	0.29	0/2907	0.68	2/3905 (0.1%)
10	E	0.32	0/774	0.77	2/1038 (0.2%)
11	G	0.34	0/1960	0.69	1/2637 (0.0%)
12	H	0.30	0/1023	0.62	0/1351
13	I	0.34	0/1537	0.72	1/2066 (0.0%)
14	J	0.29	0/1808	0.58	1/2414 (0.0%)
15	L	0.29	0/893	0.68	1/1193 (0.1%)
16	M	0.31	0/720	0.69	0/952
17	P	0.30	0/454	0.65	0/599
18	Q	0.31	0/1732	0.67	0/2315
19	S	0.37	0/1133	0.70	3/1516 (0.2%)
20	U	0.29	0/1746	0.67	1/2338 (0.0%)
21	V	0.33	0/1682	0.67	2/2250 (0.1%)
22	X	0.32	0/718	0.72	0/953
23	Z	0.31	0/1239	0.67	0/1658
24	a	0.30	0/1255	0.73	2/1662 (0.1%)
25	b	0.32	0/1501	0.62	0/2013
26	e	0.31	0/993	0.69	0/1332
27	h	0.31	0/1132	0.67	1/1504 (0.1%)
28	l	0.29	0/1017	0.68	0/1364
29	m	0.32	0/1936	0.72	1/2596 (0.0%)
30	n	0.33	0/895	0.77	3/1198 (0.3%)
31	o	0.31	0/1935	0.72	1/2596 (0.0%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
32	p	0.33	0/1916	0.63	0/2553
33	r	0.38	0/732	0.86	1/960 (0.1%)
34	u	0.35	0/576	0.72	1/755 (0.1%)
35	v	0.33	0/1806	0.70	2/2420 (0.1%)
36	w	0.33	0/3541	0.63	3/4775 (0.1%)
37	y	0.32	0/1269	0.72	1/1712 (0.1%)
38	z	0.32	0/587	0.81	1/767 (0.1%)
39	C	0.35	0/1341	0.72	1/1793 (0.1%)
40	R	0.35	0/2428	0.77	6/3252 (0.2%)
41	W	0.31	0/3093	0.72	4/4196 (0.1%)
42	T	0.33	0/1018	0.71	1/1357 (0.1%)
43	4	0.34	0/5099	0.75	9/6840 (0.1%)
44	Y	0.29	0/1383	0.61	0/1856
45	k	0.29	0/1082	0.70	2/1443 (0.1%)
46	j	0.30	0/933	0.66	0/1256
47	d	0.34	0/864	0.79	3/1160 (0.3%)
48	t	0.37	0/955	0.73	2/1290 (0.2%)
50	c	0.31	0/1956	0.65	3/2631 (0.1%)
51	l	0.35	1/1933 (0.1%)	0.70	3/2591 (0.1%)
52	K	0.34	0/843	0.77	1/1115 (0.1%)
53	F	0.28	0/907	0.69	0/1209
54	i	0.35	0/1130	0.67	0/1507
55	O	0.37	0/575	0.85	2/761 (0.3%)
56	3	0.46	0/2739	1.49	59/4266 (1.4%)
57	q	0.35	0/3395	0.67	1/4578 (0.0%)
58	g	0.32	0/1191	0.67	1/1595 (0.1%)
59	f	0.32	0/2169	0.74	3/2902 (0.1%)
All	All	0.38	4/172275 (0.0%)	1.13	1431/250152 (0.6%)

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
7	A	0	1
8	B	0	1
11	G	0	2
30	n	0	1
33	r	0	1
34	u	0	1
42	T	0	1

*Continued on next page...*

Continued from previous page...

Mol	Chain	#Chirality outliers	#Planarity outliers
43	4	0	2
44	Y	0	1
48	t	0	1
51	1	0	1
59	f	0	1
All	All	0	14

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	2	3876	A	N9-C4	6.60	1.41	1.37
2	2	1795	A	N9-C4	6.39	1.41	1.37
51	1	152	PRO	CG-CD	-5.41	1.32	1.50
2	2	1929	A	N9-C4	5.16	1.41	1.37

The worst 5 of 1431 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	2	1872	G	OP1-P-OP2	-27.26	78.71	119.60
2	2	1872	G	O5'-P-OP1	-25.34	80.30	110.70
2	2	1871	A2M	OP2-P-O3'	-15.92	70.18	105.20
2	2	1872	G	O5'-P-OP2	14.97	128.67	110.70
2	2	1871	A2M	OP1-P-O3'	14.70	137.55	105.20

There are no chirality outliers.

5 of 14 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
7	A	107	ARG	Sidechain
8	B	241	PRO	Peptide
11	G	162	ASP	Peptide
11	G	189	ARG	Sidechain
30	n	106	TYR	Peptide

## 5.2 Too-close contacts

Due to software issues we are unable to calculate clashes - this section is therefore empty.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	N	324/687 (47%)	309 (95%)	15 (5%)	0	100	100
3	6	242/245 (99%)	227 (94%)	15 (6%)	0	100	100
4	7	133/163 (82%)	128 (96%)	5 (4%)	0	100	100
6	9	82/134 (61%)	71 (87%)	11 (13%)	0	100	100
7	A	41/159 (26%)	39 (95%)	2 (5%)	0	100	100
8	B	401/403 (100%)	382 (95%)	18 (4%)	1 (0%)	47	79
9	D	356/427 (83%)	334 (94%)	22 (6%)	0	100	100
10	E	96/115 (84%)	91 (95%)	5 (5%)	0	100	100
11	G	239/266 (90%)	225 (94%)	14 (6%)	0	100	100
12	H	120/123 (98%)	117 (98%)	3 (2%)	0	100	100
13	I	188/192 (98%)	179 (95%)	9 (5%)	0	100	100
14	J	213/260 (82%)	207 (97%)	6 (3%)	0	100	100
15	L	108/148 (73%)	101 (94%)	7 (6%)	0	100	100
16	M	84/97 (87%)	80 (95%)	4 (5%)	0	100	100
17	P	48/51 (94%)	46 (96%)	2 (4%)	0	100	100
18	Q	208/211 (99%)	200 (96%)	8 (4%)	0	100	100
19	S	133/215 (62%)	127 (96%)	6 (4%)	0	100	100
20	U	201/204 (98%)	191 (95%)	10 (5%)	0	100	100
21	V	199/203 (98%)	192 (96%)	7 (4%)	0	100	100
22	X	89/92 (97%)	85 (96%)	4 (4%)	0	100	100
23	Z	149/188 (79%)	147 (99%)	2 (1%)	0	100	100
24	a	146/196 (74%)	142 (97%)	4 (3%)	0	100	100
25	b	174/176 (99%)	170 (98%)	4 (2%)	0	100	100
26	e	129/140 (92%)	118 (92%)	11 (8%)	0	100	100
27	h	132/145 (91%)	126 (96%)	6 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
28	l	123/137 (90%)	115 (94%)	8 (6%)	0	100	100
29	m	246/257 (96%)	221 (90%)	25 (10%)	0	100	100
30	n	107/110 (97%)	102 (95%)	5 (5%)	0	100	100
31	o	231/288 (80%)	220 (95%)	11 (5%)	0	100	100
32	p	224/248 (90%)	216 (96%)	8 (4%)	0	100	100
33	r	80/360 (22%)	77 (96%)	3 (4%)	0	100	100
34	u	63/549 (12%)	58 (92%)	4 (6%)	1 (2%)	9	43
35	v	215/239 (90%)	206 (96%)	9 (4%)	0	100	100
36	w	427/731 (58%)	406 (95%)	19 (4%)	2 (0%)	29	67
37	y	163/165 (99%)	155 (95%)	8 (5%)	0	100	100
38	z	63/129 (49%)	60 (95%)	3 (5%)	0	100	100
39	C	163/178 (92%)	145 (89%)	18 (11%)	0	100	100
40	R	291/297 (98%)	273 (94%)	17 (6%)	1 (0%)	41	74
41	W	386/485 (80%)	365 (95%)	21 (5%)	0	100	100
42	T	120/160 (75%)	112 (93%)	8 (7%)	0	100	100
43	4	607/634 (96%)	555 (91%)	47 (8%)	5 (1%)	19	58
44	Y	165/184 (90%)	158 (96%)	7 (4%)	0	100	100
45	k	127/135 (94%)	120 (94%)	7 (6%)	0	100	100
46	j	109/125 (87%)	103 (94%)	6 (6%)	0	100	100
47	d	102/128 (80%)	95 (93%)	7 (7%)	0	100	100
48	t	109/293 (37%)	105 (96%)	4 (4%)	0	100	100
50	c	237/490 (48%)	231 (98%)	6 (2%)	0	100	100
51	l	224/255 (88%)	216 (96%)	7 (3%)	1 (0%)	34	69
52	K	100/105 (95%)	96 (96%)	4 (4%)	0	100	100
53	F	111/117 (95%)	109 (98%)	2 (2%)	0	100	100
54	i	133/136 (98%)	126 (95%)	7 (5%)	0	100	100
55	O	67/70 (96%)	61 (91%)	6 (9%)	0	100	100
57	q	398/588 (68%)	382 (96%)	16 (4%)	0	100	100
58	g	143/156 (92%)	135 (94%)	8 (6%)	0	100	100
59	f	254/478 (53%)	236 (93%)	17 (7%)	1 (0%)	34	69
All	All	10023/13467 (74%)	9493 (95%)	518 (5%)	12 (0%)	54	83



5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
34	u	55	PRO
51	1	24	ASN
59	f	203	ASP
40	R	270	LYS
43	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	N	308/629 (49%)	308 (100%)	0	100	100
3	6	212/213 (100%)	212 (100%)	0	100	100
4	7	126/149 (85%)	126 (100%)	0	100	100
6	9	74/114 (65%)	74 (100%)	0	100	100
7	A	34/126 (27%)	34 (100%)	0	100	100
8	B	349/349 (100%)	349 (100%)	0	100	100
9	D	298/348 (86%)	298 (100%)	0	100	100
10	E	83/97 (86%)	82 (99%)	1 (1%)	71	88
11	G	203/223 (91%)	203 (100%)	0	100	100
12	H	109/110 (99%)	108 (99%)	1 (1%)	78	91
13	I	169/171 (99%)	169 (100%)	0	100	100
14	J	191/228 (84%)	191 (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	P	47/48 (98%)	47 (100%)	0	100	100
18	Q	176/177 (99%)	175 (99%)	1 (1%)	86	94
19	S	115/161 (71%)	115 (100%)	0	100	100
20	U	171/172 (99%)	171 (100%)	0	100	100
21	V	173/174 (99%)	172 (99%)	1 (1%)	86	94

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
22	X	74/75 (99%)	74 (100%)	0	100	100
23	Z	136/165 (82%)	136 (100%)	0	100	100
24	a	133/175 (76%)	133 (100%)	0	100	100
25	b	157/157 (100%)	157 (100%)	0	100	100
26	e	101/107 (94%)	101 (100%)	0	100	100
27	h	124/135 (92%)	124 (100%)	0	100	100
28	l	109/121 (90%)	109 (100%)	0	100	100
29	m	190/199 (96%)	190 (100%)	0	100	100
30	n	88/89 (99%)	88 (100%)	0	100	100
31	o	208/252 (82%)	207 (100%)	1 (0%)	88	95
32	p	195/215 (91%)	195 (100%)	0	100	100
33	r	76/312 (24%)	76 (100%)	0	100	100
34	u	61/485 (13%)	61 (100%)	0	100	100
35	v	194/214 (91%)	194 (100%)	0	100	100
36	w	385/654 (59%)	385 (100%)	0	100	100
37	y	137/137 (100%)	137 (100%)	0	100	100
38	z	61/115 (53%)	61 (100%)	0	100	100
39	C	138/149 (93%)	138 (100%)	0	100	100
40	R	246/250 (98%)	246 (100%)	0	100	100
41	W	322/404 (80%)	321 (100%)	1 (0%)	92	96
42	T	109/140 (78%)	109 (100%)	0	100	100
43	4	554/574 (96%)	553 (100%)	1 (0%)	93	98
44	Y	147/163 (90%)	146 (99%)	1 (1%)	84	94
45	k	115/121 (95%)	115 (100%)	0	100	100
46	j	101/110 (92%)	101 (100%)	0	100	100
47	d	94/115 (82%)	94 (100%)	0	100	100
48	t	103/274 (38%)	101 (98%)	2 (2%)	57	81
50	c	222/437 (51%)	222 (100%)	0	100	100
51	l	206/228 (90%)	205 (100%)	1 (0%)	88	95
52	K	86/89 (97%)	86 (100%)	0	100	100
53	F	97/100 (97%)	97 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
54	i	117/118 (99%)	116 (99%)	1 (1%)	78	91
55	O	64/65 (98%)	64 (100%)	0	100	100
57	q	359/509 (70%)	358 (100%)	1 (0%)	92	96
58	g	126/133 (95%)	126 (100%)	0	100	100
59	f	222/402 (55%)	221 (100%)	1 (0%)	88	95
All	All	8862/11678 (76%)	8848 (100%)	14 (0%)	93	98

5 of 14 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
44	Y	97	ASN
48	t	50	ARG
59	f	362	ARG
54	i	108	ARG
57	q	111	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
57	q	422	HIS
35	v	186	GLN
19	S	20	HIS
13	I	8	GLN
33	r	256	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	2	3441/5054 (68%)	817 (23%)	21 (0%)
49	x	0/160	-	-
5	8	155/156 (99%)	29 (18%)	0
56	3	113/120 (94%)	23 (20%)	2 (1%)
All	All	3709/5490 (67%)	869 (23%)	23 (0%)

5 of 869 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	2	25	A

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Mol	Chain	Res	Type
2	2	39	A
2	2	42	A
2	2	44	A
2	2	48	G

5 of 23 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	2	3774	A
2	2	4228	G
2	2	3905	A
2	2	4555	U
2	2	1931	C

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

67 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$
2	B9B	2	237	2	21,28,29	1.99	3 (14%)	23,40,43	6.42	5 (21%)
2	5MU	2	4083	2	19,22,23	7.22	8 (42%)	28,32,35	3.37	10 (35%)
2	B8T	2	4671	2	19,22,23	3.61	8 (42%)	26,31,34	0.93	1 (3%)
2	A2M	2	4571	2	18,25,26	3.57	8 (44%)	18,36,39	3.40	4 (22%)
2	B8W	2	4472	2	18,26,27	2.08	2 (11%)	21,38,41	2.41	7 (33%)
2	B8K	2	4690	2	24,28,29	3.30	12 (50%)	30,42,45	2.67	11 (36%)
2	OMG	2	1522	2	18,26,27	2.86	8 (44%)	19,38,41	1.49	4 (21%)
2	OMC	2	3701	2	19,22,23	3.01	8 (42%)	26,31,34	0.74	0
2	E7G	2	2297	2	24,27,28	4.04	11 (45%)	30,40,43	2.12	9 (30%)
2	A2M	2	3723	2	18,25,26	3.57	8 (44%)	18,36,39	3.42	4 (22%)
2	B8K	2	3897	2	24,28,29	3.44	11 (45%)	30,42,45	2.53	11 (36%)
2	OMG	2	2773	2	18,26,27	2.90	8 (44%)	19,38,41	1.46	4 (21%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	B8T	2	4483	2	19,22,23	3.66	8 (42%)	26,31,34	1.37	6 (23%)
2	OMG	2	2364	2	18,26,27	2.84	8 (44%)	19,38,41	1.49	5 (26%)
2	2MG	2	1517	2	18,26,27	2.73	6 (33%)	16,38,41	1.49	3 (18%)
2	7MG	2	4550	2	22,26,27	3.85	10 (45%)	29,39,42	1.98	7 (24%)
2	OMG	2	1316	2	18,26,27	2.88	8 (44%)	19,38,41	1.52	5 (26%)
2	OMG	2	2050	2	18,26,27	2.83	8 (44%)	19,38,41	1.48	5 (26%)
2	OMG	2	4623	2	18,26,27	2.88	8 (44%)	19,38,41	1.57	5 (26%)
2	A2M	2	1326	2	18,25,26	3.60	8 (44%)	18,36,39	3.39	4 (22%)
2	P4U	2	1348	2	21,24,25	3.61	8 (38%)	27,33,36	1.06	2 (7%)
2	OMG	2	4637	2	18,26,27	2.85	8 (44%)	19,38,41	1.55	5 (26%)
2	A2M	2	2363	2	18,25,26	3.59	8 (44%)	18,36,39	3.43	4 (22%)
2	B8W	2	4185	2	18,26,27	2.14	2 (11%)	21,38,41	2.48	7 (33%)
2	2MG	2	729	2	18,26,27	2.69	6 (33%)	16,38,41	1.38	3 (18%)
2	UR3	2	4530	2	19,22,23	2.89	6 (31%)	26,32,35	1.26	2 (7%)
2	I4U	2	1659	2	21,24,25	3.56	9 (42%)	27,34,37	1.11	2 (7%)
2	B8Q	2	1456	2	17,22,23	2.96	5 (29%)	22,32,35	2.21	6 (27%)
2	7MG	2	2522	2	22,26,27	3.76	10 (45%)	29,39,42	1.97	10 (34%)
2	OMC	2	3887	2	19,22,23	3.05	8 (42%)	26,31,34	1.01	1 (3%)
2	OMG	2	4870	2	18,26,27	2.90	8 (44%)	19,38,41	1.49	4 (21%)
2	P7G	2	3880	2	24,28,29	4.19	11 (45%)	27,41,44	1.37	2 (7%)
2	OMC	2	3909	2	19,22,23	3.13	8 (42%)	26,31,34	1.85	7 (26%)
2	B9B	2	2754	2	21,28,29	2.03	3 (14%)	23,40,43	6.50	5 (21%)
2	A2M	2	1871	2	18,25,26	3.57	9 (50%)	18,36,39	3.47	3 (16%)
2	OMC	2	2365	2	19,22,23	2.99	8 (42%)	26,31,34	0.74	0
2	7MG	2	1605	2	22,26,27	3.87	10 (45%)	29,39,42	2.00	8 (27%)
2	OMC	2	2422	2,44	19,22,23	3.03	8 (42%)	26,31,34	1.00	2 (7%)
2	A2M	2	3718	2	18,25,26	3.60	8 (44%)	18,36,39	3.37	4 (22%)
2	A2M	2	3867	2	18,25,26	3.61	8 (44%)	18,36,39	3.42	4 (22%)
2	B8W	2	4529	2	18,26,27	2.13	2 (11%)	21,38,41	2.53	8 (38%)
2	M7A	2	4564	2	20,25,26	2.02	3 (15%)	28,37,40	3.91	7 (25%)
2	OMG	2	1883	2	18,26,27	2.91	8 (44%)	19,38,41	1.54	4 (21%)
2	OMC	2	2861	2	19,22,23	3.04	8 (42%)	26,31,34	1.10	3 (11%)
2	A2M	2	1534	2	18,25,26	3.58	8 (44%)	18,36,39	3.48	3 (16%)
2	2MG	2	4872	2	18,26,27	2.67	6 (33%)	16,38,41	1.61	4 (25%)
2	OMC	2	4536	2	19,22,23	3.04	8 (42%)	26,31,34	1.12	3 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	B9B	2	1574	2	21,28,29	2.00	3 (14%)	23,40,43	6.40	5 (21%)
2	A2M	2	1524	2	18,25,26	3.61	8 (44%)	18,36,39	3.42	4 (22%)
2	OMU	2	4620	2	19,22,23	2.97	8 (42%)	26,31,34	1.74	5 (19%)
2	A2M	2	4523	2	18,25,26	3.56	8 (44%)	18,36,39	3.43	4 (22%)
2	A2M	2	3825	2	18,25,26	3.59	8 (44%)	18,36,39	3.43	4 (22%)
2	P7G	2	1909	2	24,28,29	4.09	11 (45%)	27,41,44	1.55	3 (11%)
2	OMC	2	3869	2	19,22,23	3.02	8 (42%)	26,31,34	0.90	1 (3%)
2	OMG	2	4494	2	18,26,27	2.89	8 (44%)	19,38,41	1.46	4 (21%)
2	2MG	2	978	2	18,26,27	2.74	6 (33%)	16,38,41	1.41	3 (18%)
2	OMC	2	2804	2	19,22,23	2.98	8 (42%)	26,31,34	0.76	0
2	UR3	2	4597	2	19,22,23	2.82	6 (31%)	26,32,35	1.88	3 (11%)
2	OMG	2	2424	2	18,26,27	2.91	8 (44%)	19,38,41	1.48	4 (21%)
2	B9H	2	2786	2	20,25,26	3.24	3 (15%)	22,35,38	1.95	5 (22%)
5	OMU	8	14	5,2	19,22,23	2.96	8 (42%)	26,31,34	1.79	6 (23%)
2	A2M	2	398	2	18,25,26	3.61	8 (44%)	18,36,39	3.41	3 (16%)
2	A2M	2	2401	2	18,25,26	3.60	8 (44%)	18,36,39	3.39	3 (16%)
2	BGH	2	3899	2	25,29,30	4.60	17 (68%)	31,43,46	2.58	11 (35%)
2	OMG	2	1625	2	18,26,27	2.92	8 (44%)	19,38,41	1.46	4 (21%)
2	B8W	2	2380	2	18,26,27	2.10	2 (11%)	21,38,41	2.47	7 (33%)
2	OMG	2	373	2	18,26,27	2.88	8 (44%)	19,38,41	1.61	5 (26%)

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
2	B9B	2	237	2	-	6/7/29/30	0/3/3/3
2	5MU	2	4083	2	-	0/7/25/26	0/2/2/2
2	B8T	2	4671	2	-	0/7/27/28	0/2/2/2
2	A2M	2	4571	2	-	0/5/27/28	0/3/3/3
2	B8W	2	4472	2	-	2/5/27/28	0/3/3/3
2	B8K	2	4690	2	-	0/11/41/42	0/3/3/3
2	OMG	2	1522	2	-	0/5/27/28	0/3/3/3
2	OMC	2	3701	2	-	2/9/27/28	0/2/2/2
2	E7G	2	2297	2	-	1/9/39/40	0/3/3/3
2	A2M	2	3723	2	-	0/5/27/28	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	B8K	2	3897	2	-	3/11/41/42	0/3/3/3
2	OMG	2	2773	2	-	0/5/27/28	0/3/3/3
2	B8T	2	4483	2	-	0/7/27/28	0/2/2/2
2	OMG	2	2364	2	-	3/5/27/28	0/3/3/3
2	2MG	2	1517	2	-	1/5/27/28	0/3/3/3
2	7MG	2	4550	2	-	2/7/37/38	0/3/3/3
2	OMG	2	1316	2	-	0/5/27/28	0/3/3/3
2	OMG	2	2050	2	-	0/5/27/28	0/3/3/3
2	OMG	2	4623	2	-	0/5/27/28	0/3/3/3
2	A2M	2	1326	2	-	0/5/27/28	0/3/3/3
2	P4U	2	1348	2	-	1/10/29/30	0/2/2/2
2	OMG	2	4637	2	-	4/5/27/28	0/3/3/3
2	A2M	2	2363	2	-	0/5/27/28	0/3/3/3
2	B8W	2	4185	2	-	2/5/27/28	0/3/3/3
2	2MG	2	729	2	-	1/5/27/28	0/3/3/3
2	UR3	2	4530	2	-	0/7/25/26	0/2/2/2
2	I4U	2	1659	2	-	1/9/29/30	0/2/2/2
2	B8Q	2	1456	2	-	0/7/42/43	0/2/2/2
2	7MG	2	2522	2	-	0/7/37/38	0/3/3/3
2	OMC	2	3887	2	-	1/9/27/28	0/2/2/2
2	OMG	2	4870	2	-	3/5/27/28	0/3/3/3
2	P7G	2	3880	2	-	2/10/40/41	0/3/3/3
2	OMC	2	3909	2	-	2/9/27/28	0/2/2/2
2	B9B	2	2754	2	-	4/7/29/30	0/3/3/3
2	A2M	2	1871	2	-	2/5/27/28	0/3/3/3
2	OMC	2	2365	2	-	0/9/27/28	0/2/2/2
2	7MG	2	1605	2	-	0/7/37/38	0/3/3/3
2	OMC	2	2422	2,44	-	1/9/27/28	0/2/2/2
2	A2M	2	3718	2	-	0/5/27/28	0/3/3/3
2	A2M	2	3867	2	-	3/5/27/28	0/3/3/3
2	B8W	2	4529	2	-	2/5/27/28	0/3/3/3
2	M7A	2	4564	2	-	0/7/37/38	0/3/3/3
2	OMG	2	1883	2	-	2/5/27/28	0/3/3/3
2	OMC	2	2861	2	-	0/9/27/28	0/2/2/2
2	A2M	2	1534	2	-	2/5/27/28	0/3/3/3
2	2MG	2	4872	2	-	2/5/27/28	0/3/3/3
2	OMC	2	4536	2	-	0/9/27/28	0/2/2/2
2	B9B	2	1574	2	-	3/7/29/30	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	A2M	2	1524	2	-	0/5/27/28	0/3/3/3
2	OMU	2	4620	2	-	0/9/27/28	0/2/2/2
2	A2M	2	4523	2	-	1/5/27/28	0/3/3/3
2	A2M	2	3825	2	-	0/5/27/28	0/3/3/3
2	P7G	2	1909	2	-	3/10/40/41	0/3/3/3
2	OMC	2	3869	2	-	0/9/27/28	0/2/2/2
2	OMG	2	4494	2	-	0/5/27/28	0/3/3/3
2	2MG	2	978	2	-	0/5/27/28	0/3/3/3
2	OMC	2	2804	2	-	0/9/27/28	0/2/2/2
2	UR3	2	4597	2	-	0/7/25/26	0/2/2/2
2	OMG	2	2424	2	-	2/5/27/28	0/3/3/3
2	B9H	2	2786	2	-	1/12/47/48	0/2/2/2
5	OMU	8	14	5,2	-	1/9/27/28	0/2/2/2
2	A2M	2	398	2	-	2/5/27/28	0/3/3/3
2	A2M	2	2401	2	-	0/5/27/28	0/3/3/3
2	BGH	2	3899	2	-	1/13/43/44	0/3/3/3
2	OMG	2	1625	2	-	3/5/27/28	0/3/3/3
2	B8W	2	2380	2	-	2/5/27/28	0/3/3/3
2	OMG	2	373	2	-	1/5/27/28	0/3/3/3

The worst 5 of 505 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	2	4083	5MU	C4-C5	20.78	1.79	1.44
2	2	4083	5MU	C6-N1	16.00	1.65	1.38
2	2	4083	5MU	C6-C5	-11.45	1.15	1.34
2	2	4083	5MU	C4-N3	-11.05	1.18	1.38
2	2	1659	I4U	C4-N3	10.65	1.45	1.31

The worst 5 of 307 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	2	2754	B9B	O6-C6-N1	-29.66	94.52	120.12
2	2	1574	B9B	O6-C6-N1	-29.32	94.82	120.12
2	2	237	B9B	O6-C6-N1	-29.25	94.87	120.12
2	2	4564	M7A	C5-C6-N6	13.86	147.40	123.74
2	2	4564	M7A	N6-C6-N1	-11.73	92.66	118.35

There are no chirality outliers.

5 of 75 torsion outliers are listed below:



Mol	Chain	Res	Type	Atoms
5	8	14	OMU	C1'-C2'-O2'-CM2
2	2	237	B9B	C5-C6-O6-C61
2	2	237	B9B	N1-C6-O6-C61
2	2	237	B9B	C3'-C4'-C5'-O5'
2	2	237	B9B	O4'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides 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$
60	GTP	w	801	61,36	26,34,34	1.13	2 (7%)	32,54,54	1.56	7 (21%)

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
60	GTP	w	801	61,36	-	5/18/38/38	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
60	w	801	GTP	C5-C6	-3.97	1.39	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
60	w	801	GTP	C2-N3	2.11	1.38	1.33

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
60	w	801	GTP	PA-O3A-PB	-3.29	121.53	132.83
60	w	801	GTP	C5-C6-N1	3.29	119.76	113.95
60	w	801	GTP	C8-N7-C5	3.07	108.83	102.99
60	w	801	GTP	C2-N1-C6	-2.92	119.73	125.10
60	w	801	GTP	C3'-C2'-C1'	2.82	105.23	100.98

There are no chirality outliers.

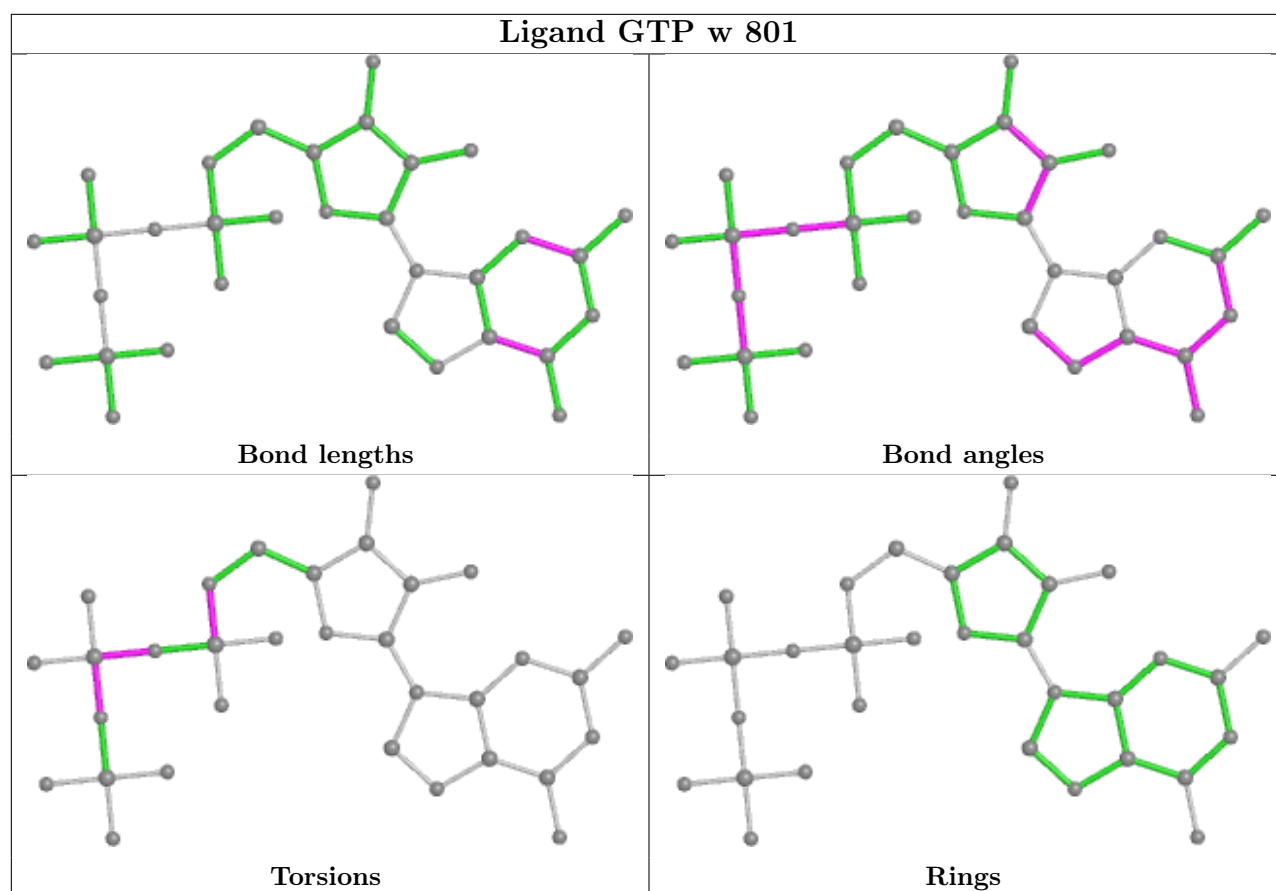
All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
60	w	801	GTP	C5'-O5'-PA-O3A
60	w	801	GTP	PA-O3A-PB-O1B
60	w	801	GTP	C5'-O5'-PA-O2A
60	w	801	GTP	PG-O3B-PB-O3A
60	w	801	GTP	PG-O3B-PB-O2B

There are no ring outliers.

No monomer is involved in short contacts.

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.

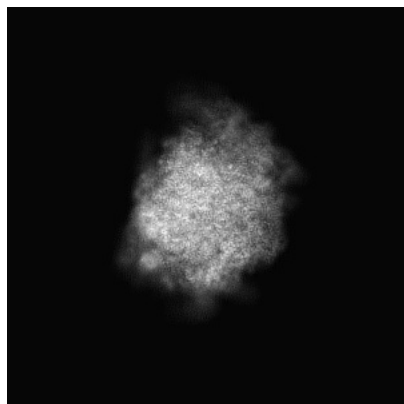
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-35651. These allow visual inspection of the internal detail of the map and identification of artifacts.

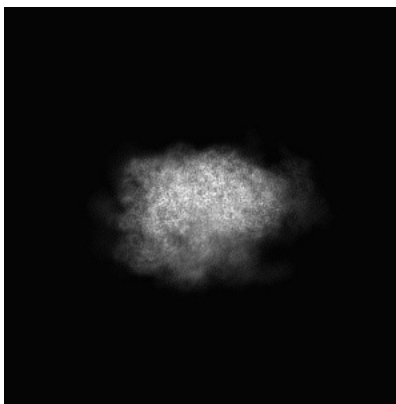
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

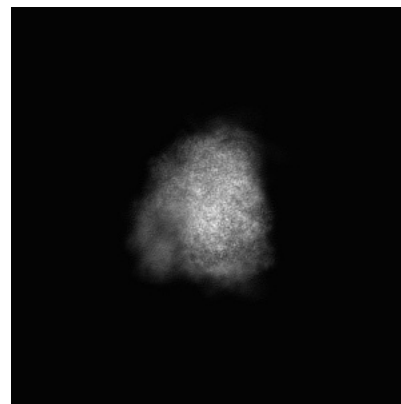
#### 6.1.1 Primary map



X

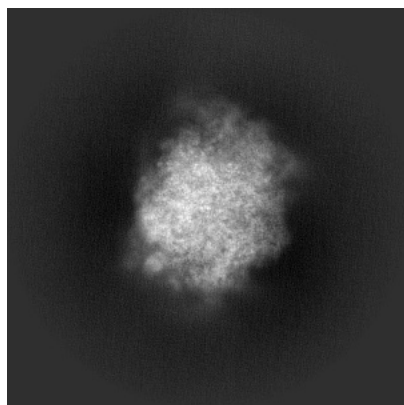


Y

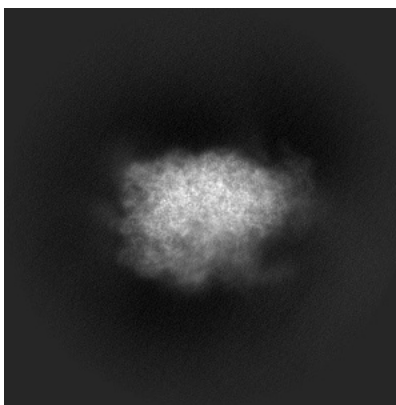


Z

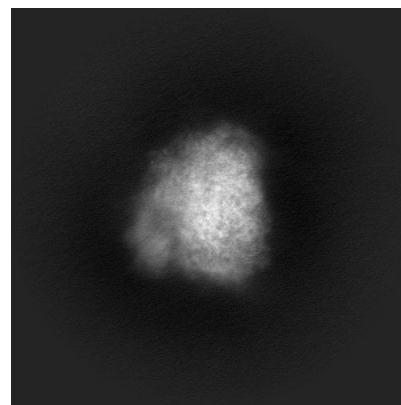
#### 6.1.2 Raw map



X



Y

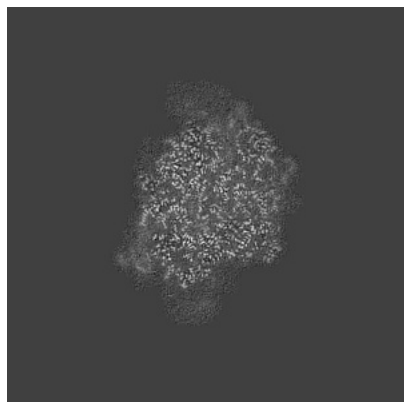


Z

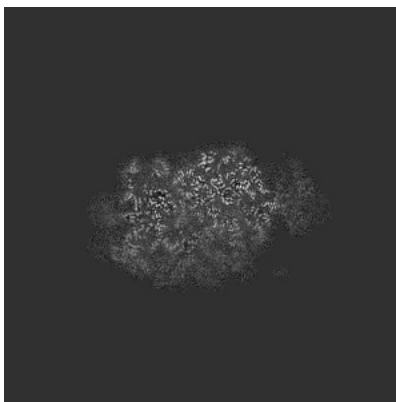
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

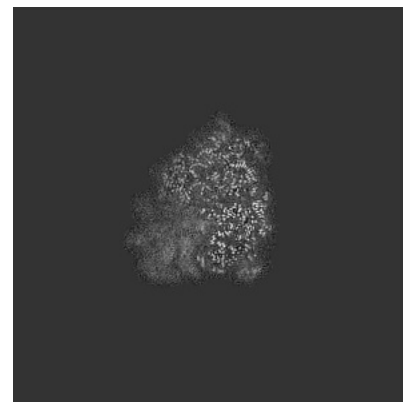
### 6.2.1 Primary map



X Index: 200

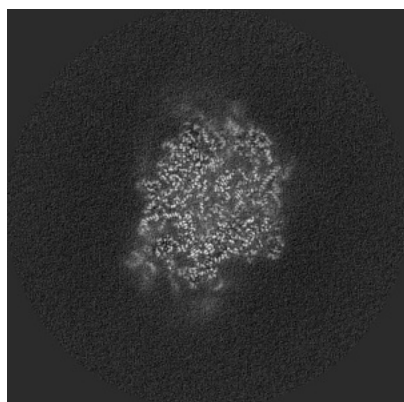


Y Index: 200

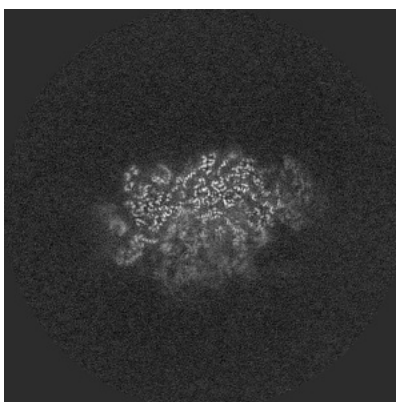


Z Index: 200

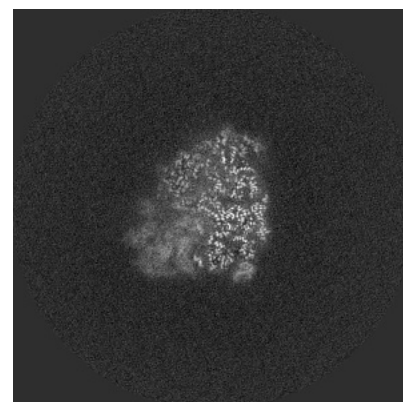
### 6.2.2 Raw map



X Index: 200



Y Index: 200

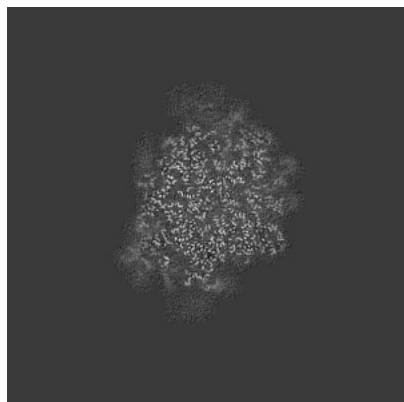


Z Index: 200

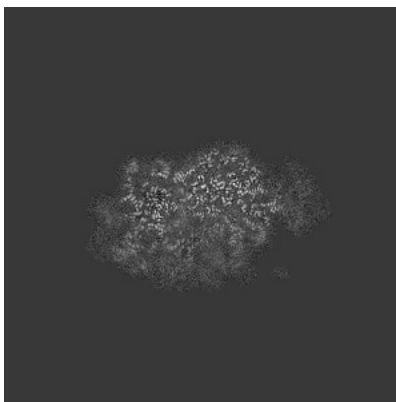
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

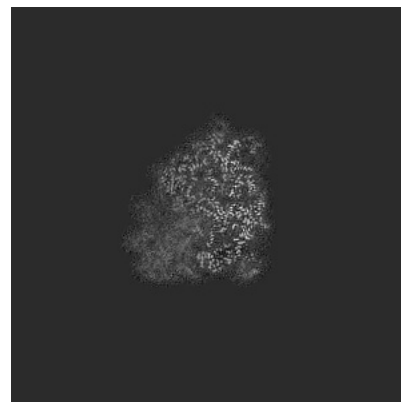
### 6.3.1 Primary map



X Index: 206

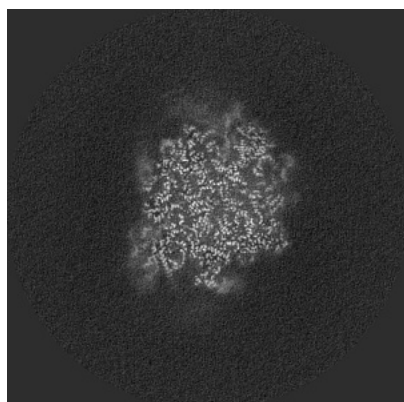


Y Index: 199

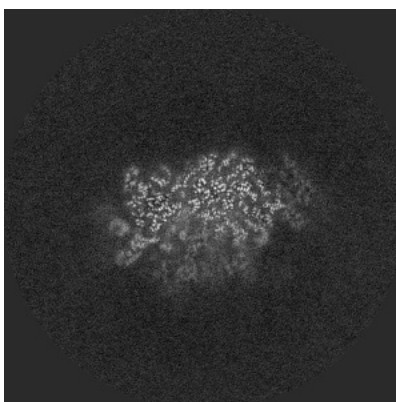


Z Index: 198

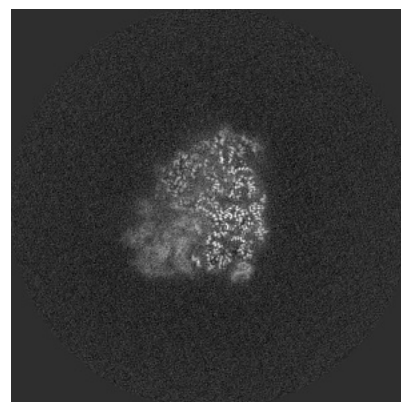
### 6.3.2 Raw map



X Index: 206



Y Index: 199

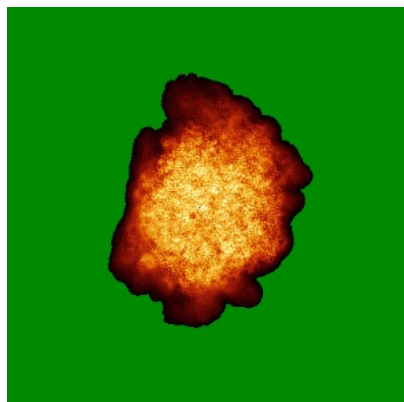


Z Index: 200

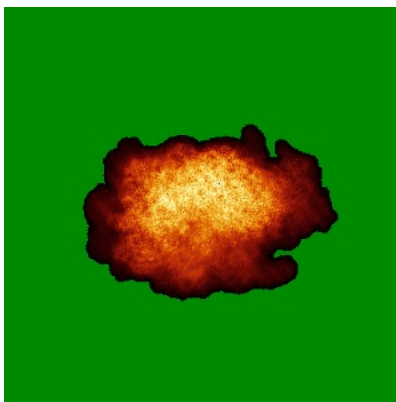
The images above show the largest variance slices of the map in three orthogonal directions.

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

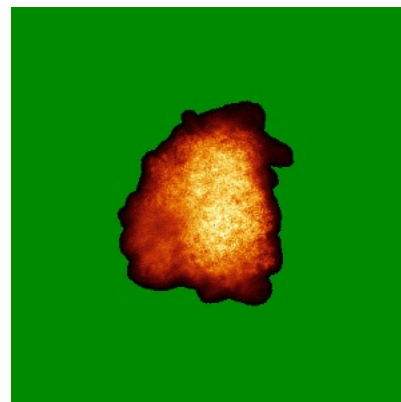
### 6.4.1 Primary map



X

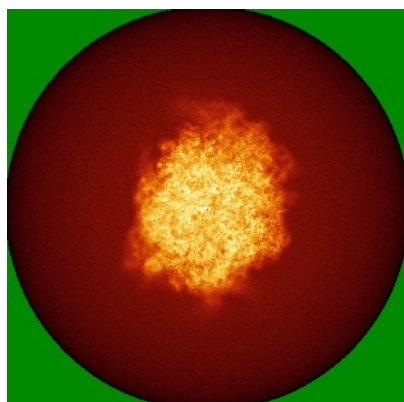


Y

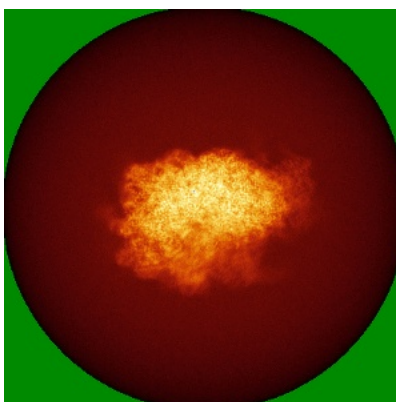


Z

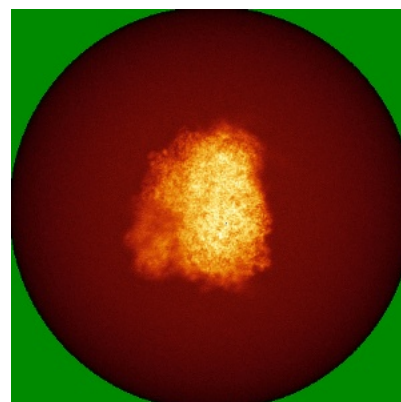
### 6.4.2 Raw map



X



Y



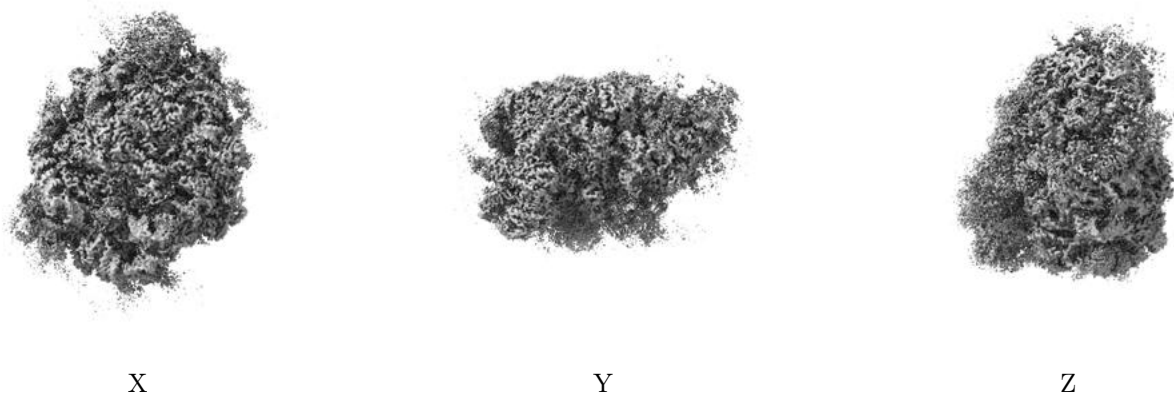
Z

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.



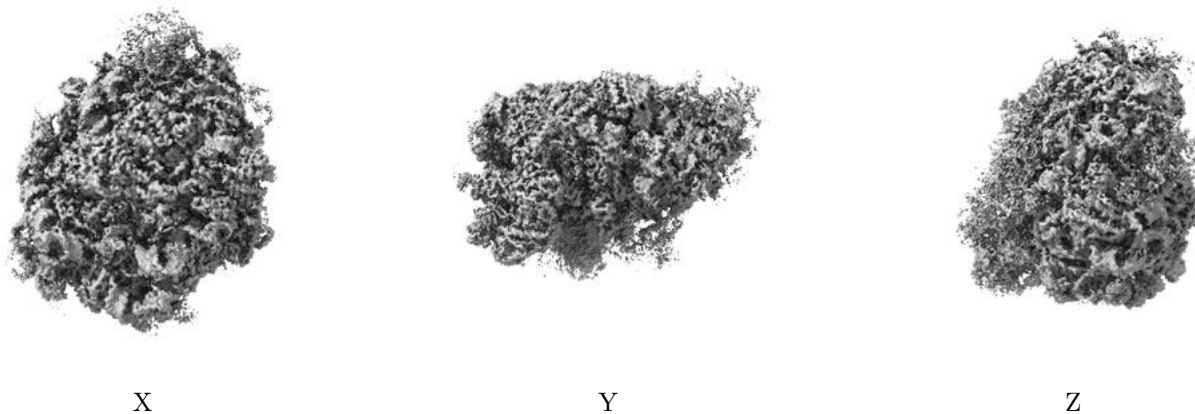
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.032. 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](#)

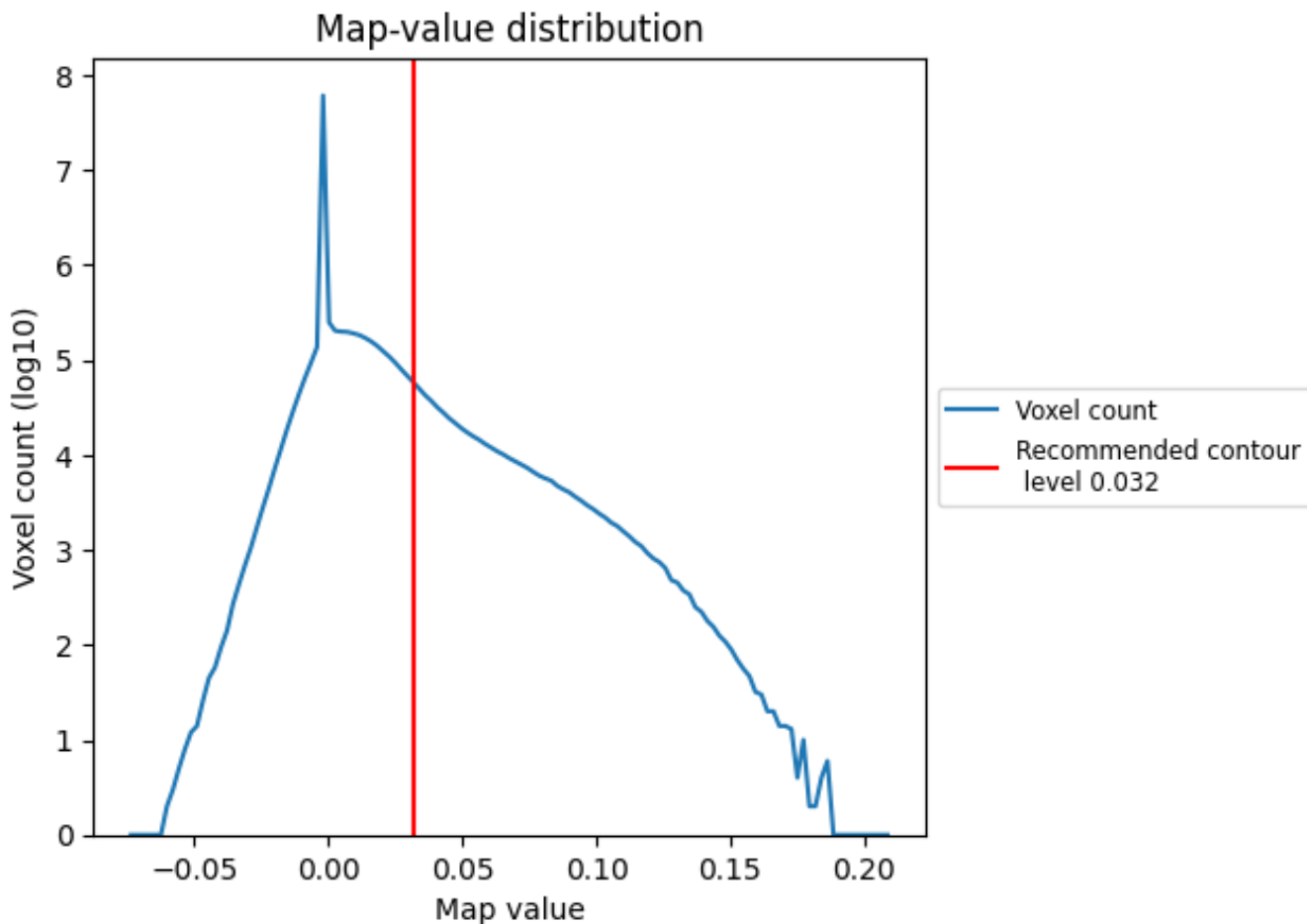
This section was not generated. No masks/segmentation were deposited.



## 7 Map analysis [i](#)

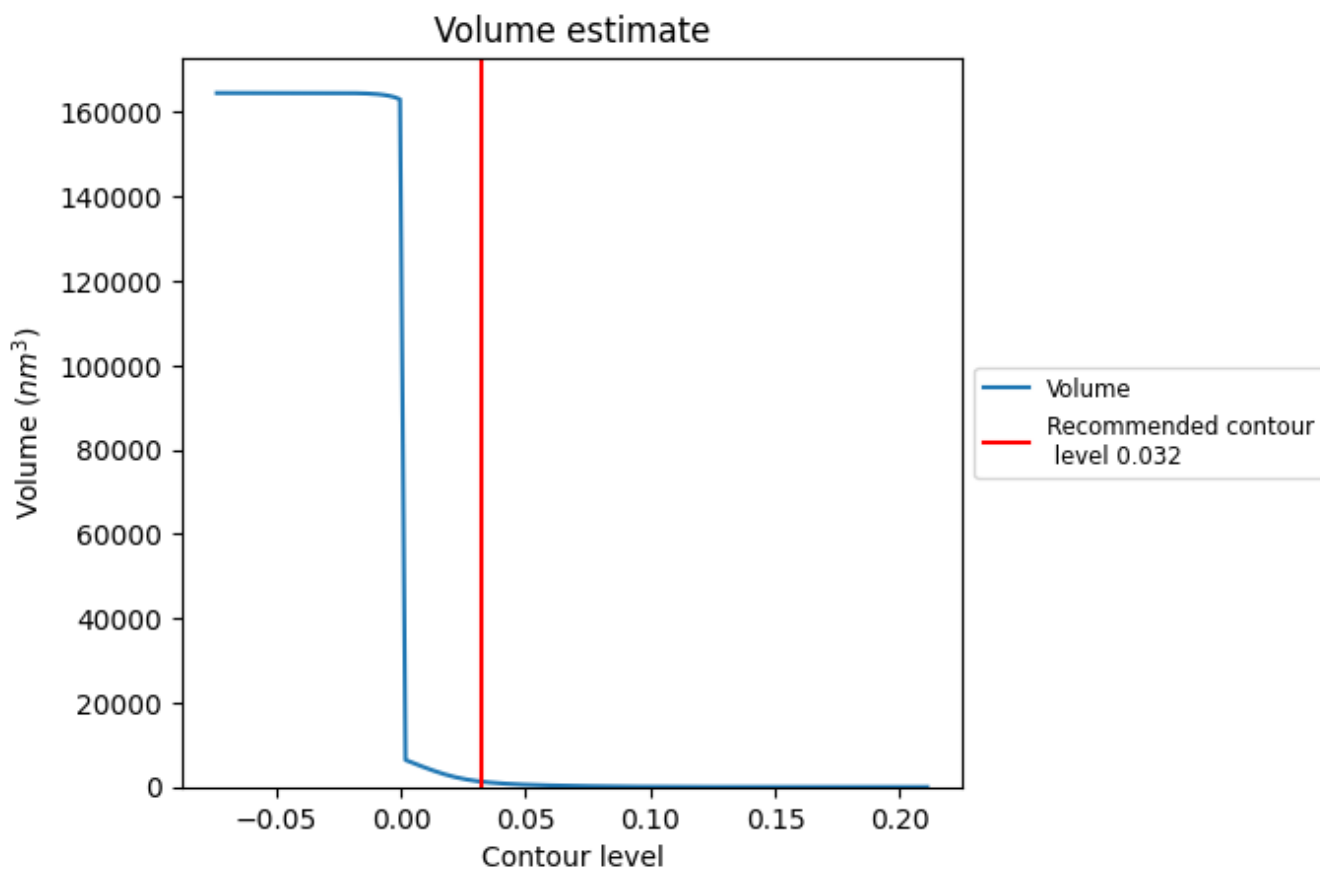
This section contains the results of statistical analysis of the map.

### 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.

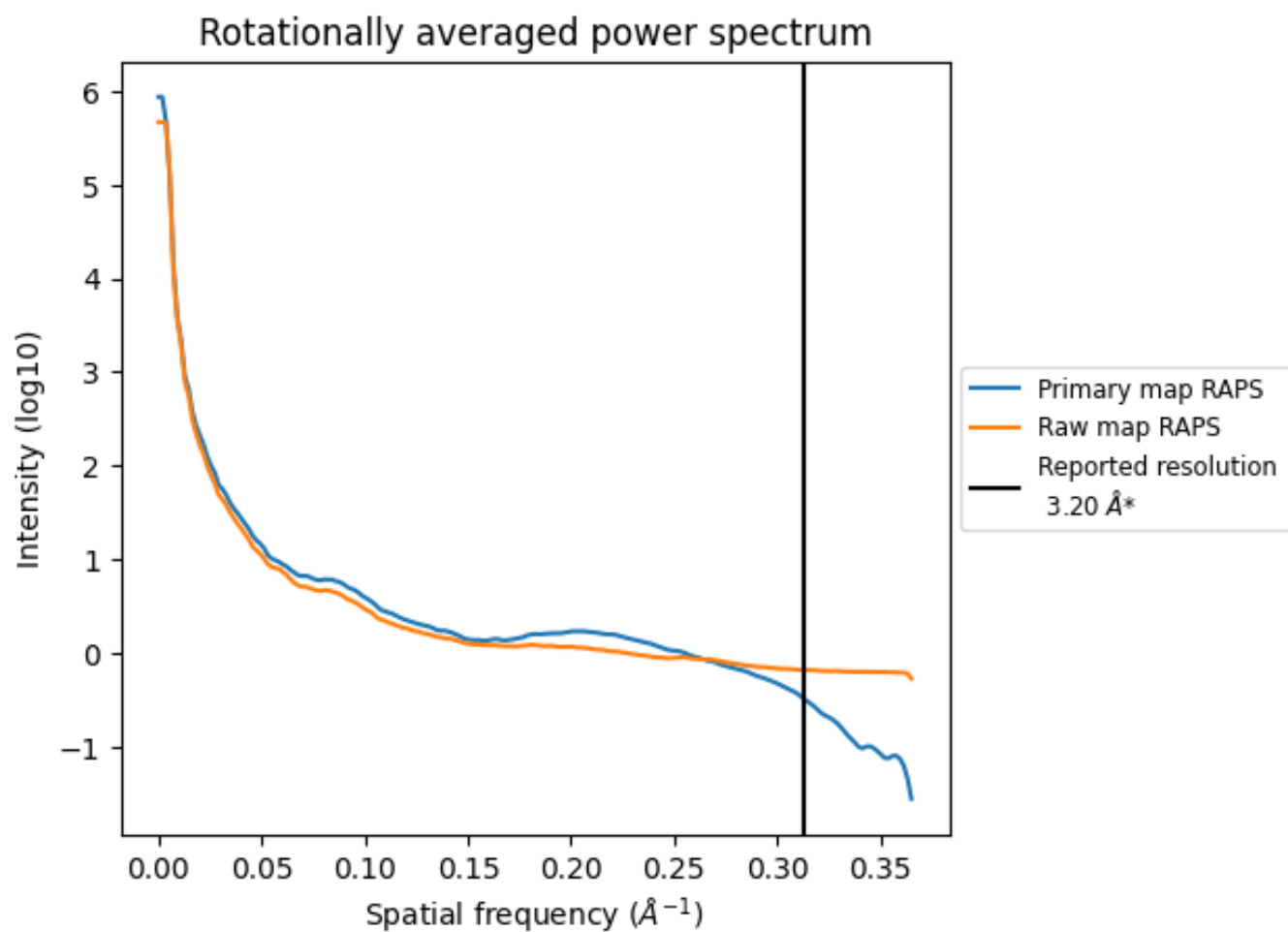
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1286 nm<sup>3</sup>; this corresponds to an approximate mass of 1162 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

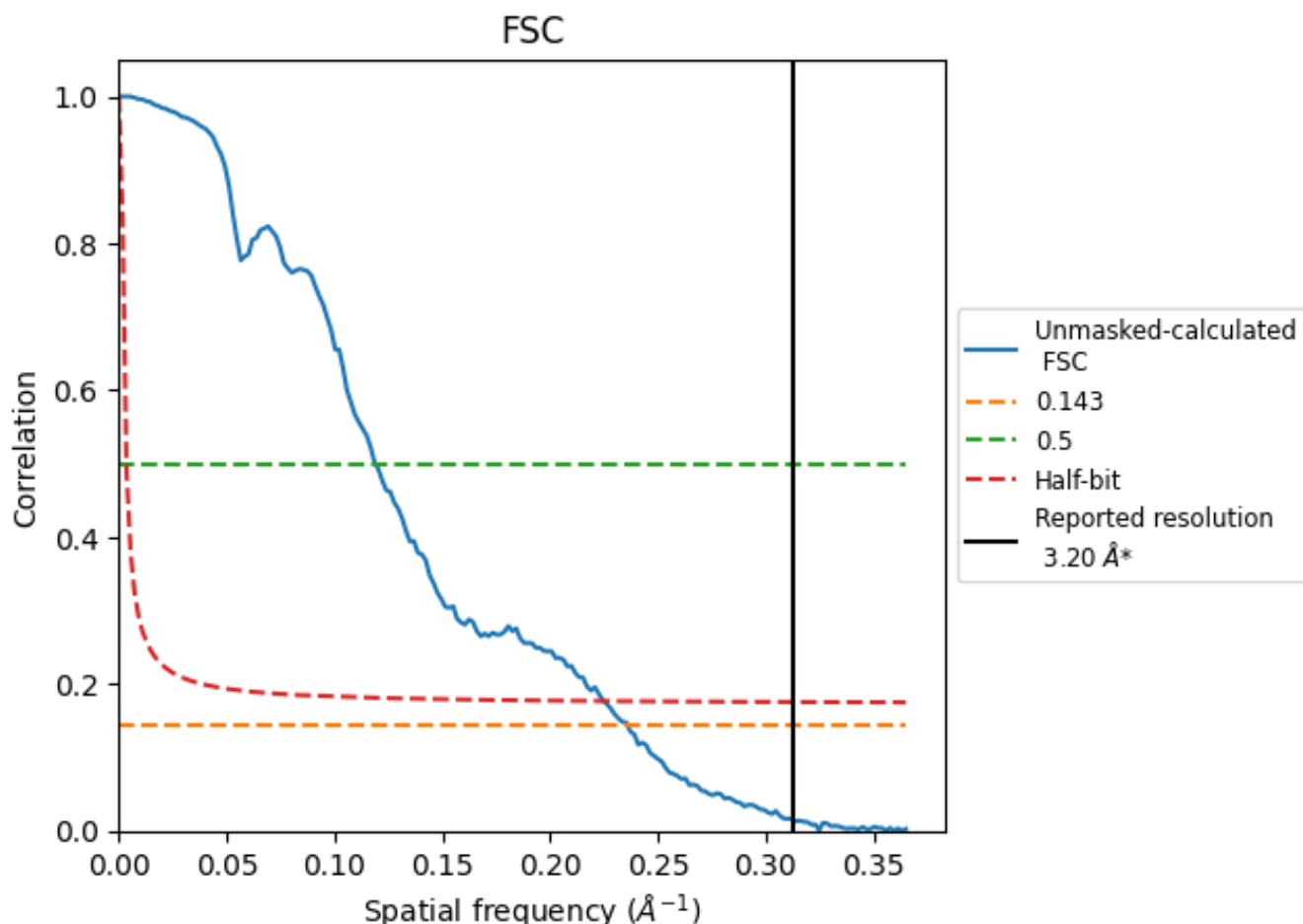


\*Reported resolution corresponds to spatial frequency of  $0.312 \text{ \AA}^{-1}$

## 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 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

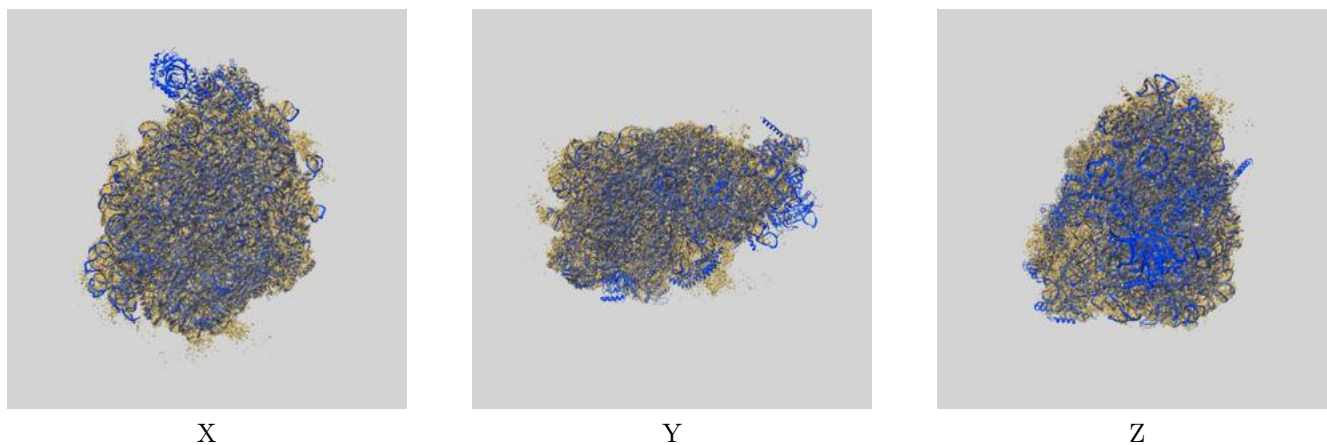
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.24	8.41	4.45

\*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 4.24 differs from the reported value 3.2 by more than 10 %

## 9 Map-model fit [i](#)

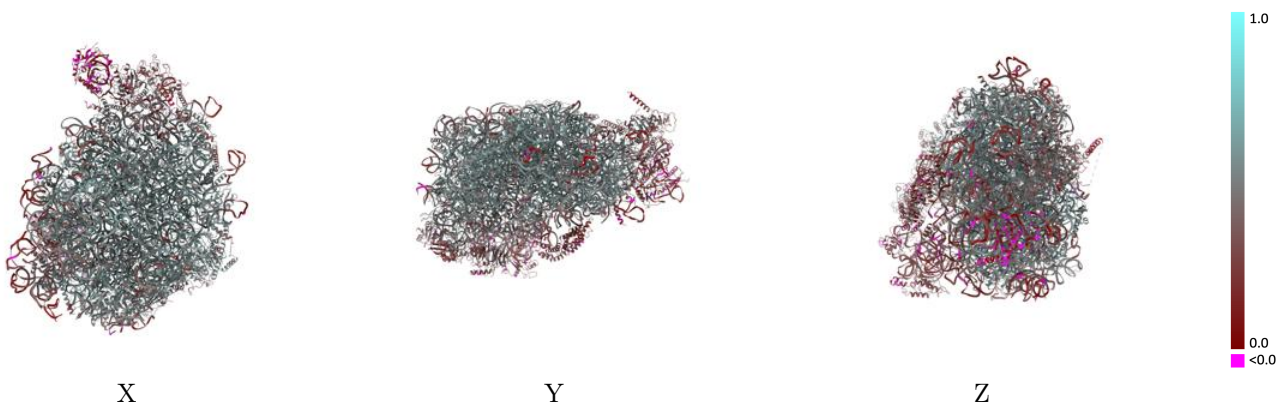
This section contains information regarding the fit between EMDB map EMD-35651 and PDB model 8IPY. Per-residue inclusion information can be found in section 3 on page 16.

### 9.1 Map-model overlay [i](#)



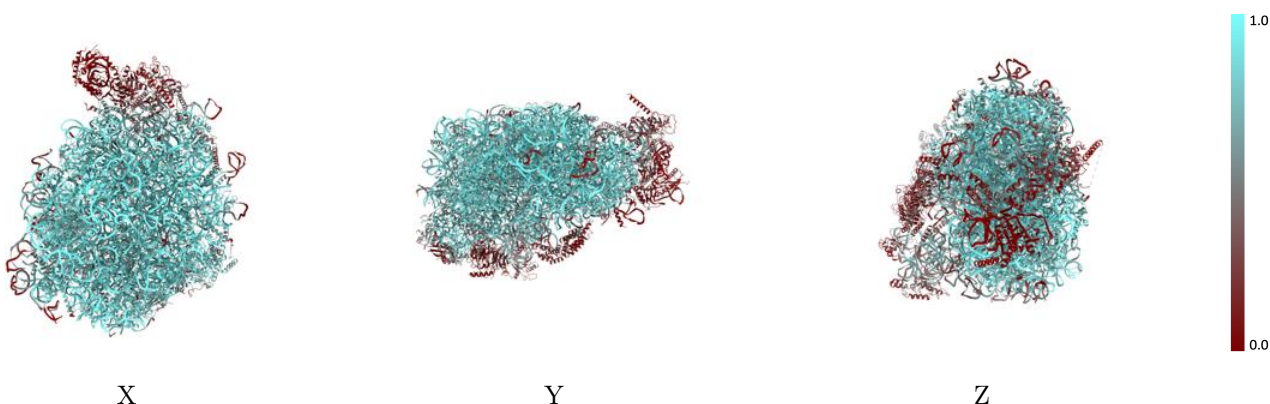
The images above show the 3D surface view of the map at the recommended contour level 0.032 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



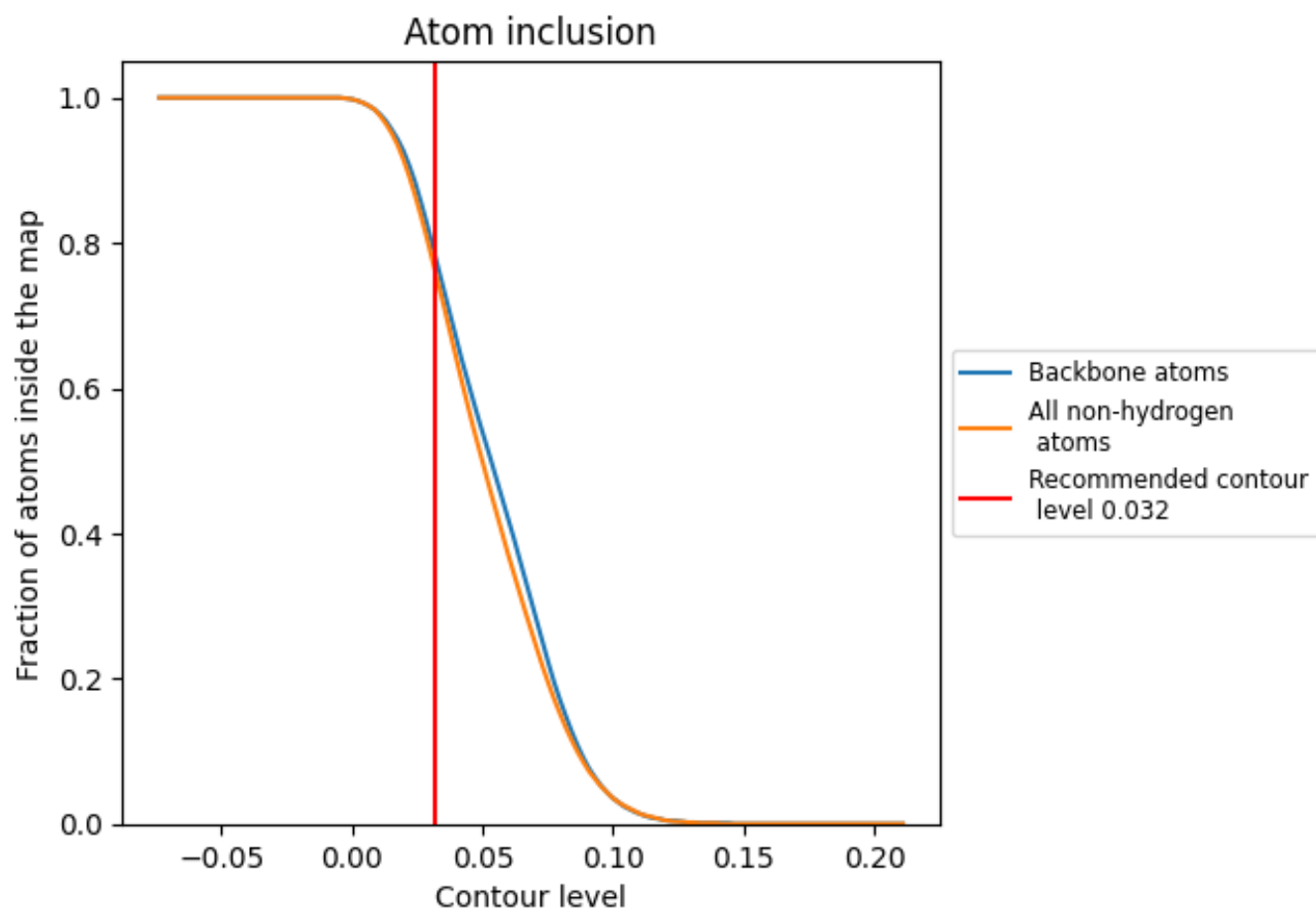
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.032).

## 9.4 Atom inclusion [i](#)









































































At the recommended contour level, 78% of all backbone atoms, 76% 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 (0.032) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7590	 0.4550
1	 0.1910	 0.3760
2	 0.8690	 0.4650
3	 0.7220	 0.2860
4	 0.7210	 0.4550
6	 0.7640	 0.4940
7	 0.8360	 0.5340
8	 0.9400	 0.5330
9	 0.6160	 0.4430
A	 0.5310	 0.3820
B	 0.9000	 0.5510
C	 0.2390	 0.2200
D	 0.9190	 0.5520
E	 0.6830	 0.4780
F	 0.8660	 0.5320
G	 0.7080	 0.4640
H	 0.8610	 0.5290
I	 0.8250	 0.5220
J	 0.7560	 0.4930
K	 0.8250	 0.4970
L	 0.8970	 0.5490
M	 0.9570	 0.5650
N	 0.1680	 0.2300
O	 0.7180	 0.5040
P	 0.9720	 0.5700
Q	 0.8290	 0.5100
R	 0.2500	 0.2090
S	 0.8860	 0.5270
T	 0.5770	 0.3150
U	 0.8960	 0.5420
V	 0.8970	 0.5380
W	 0.1220	 0.3400
X	 0.7960	 0.5140
Y	 0.8650	 0.5350
Z	 0.9280	 0.5600



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Chain	Atom inclusion	Q-score
a	 0.8740	 0.5190
b	 0.9190	 0.5480
c	 0.0030	 0.1510
d	 0.7750	 0.5030
e	 0.9050	 0.5430
f	 0.3610	 0.3410
g	 0.7730	 0.4970
h	 0.8790	 0.5370
i	 0.7890	 0.4960
j	 0.8370	 0.5250
k	 0.9470	 0.5680
l	 0.9280	 0.5570
m	 0.8640	 0.5280
n	 0.9510	 0.5670
o	 0.7930	 0.4870
p	 0.9040	 0.5370
q	 0.3710	 0.4000
r	 0.3250	 0.3040
t	 0.0870	 0.2720
u	 0.4560	 0.3610
v	 0.5690	 0.4210
w	 0.7280	 0.4680
x	 0.0020	 0.1540
y	 0.3500	 0.3070
z	 0.6580	 0.4570