



## wwPDB EM Validation Summary Report ⓘ

Nov 16, 2022 – 06:33 PM JST

PDB ID : 7BT6  
EMDB ID : EMD-30170  
Title : Cryo-EM structure of pre-60S ribosome from *Saccharomyces cerevisiae* rpl4delta63-87 strain at 3.12 Angstroms resolution(state R1)  
Authors : Li, Y.; Wilson, D.M.  
Deposited on : 2020-03-31  
Resolution : 3.12 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:

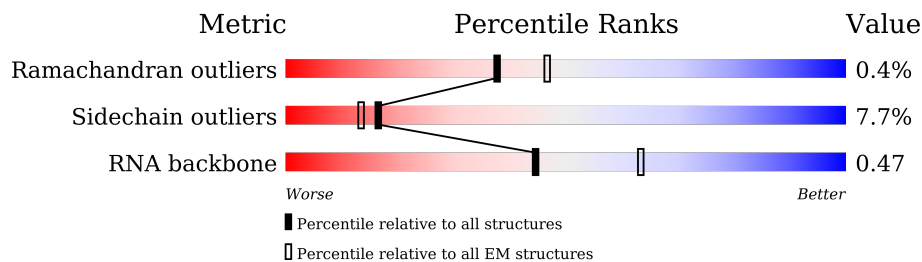
EMDB validation analysis : 0.0.1.dev43  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.2

# 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 3.12 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.



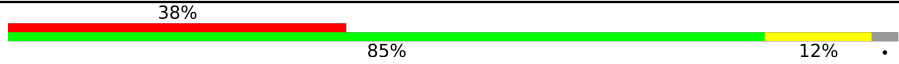
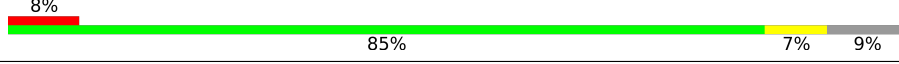
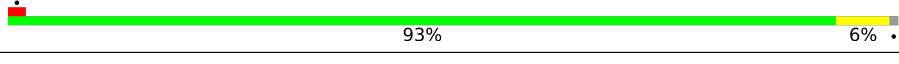

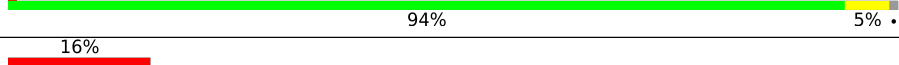
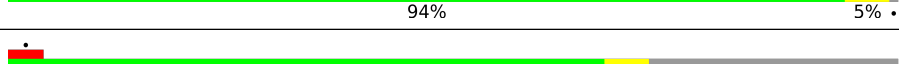
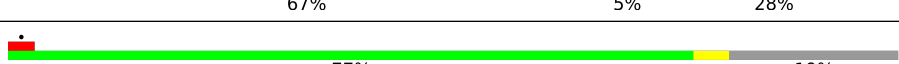
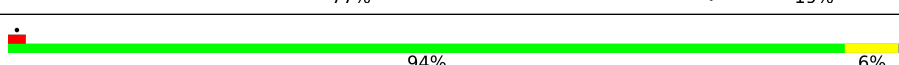
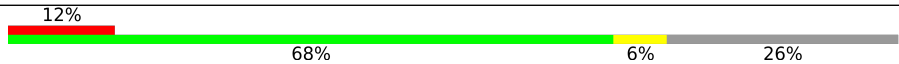

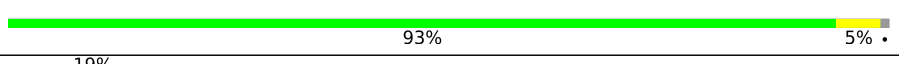
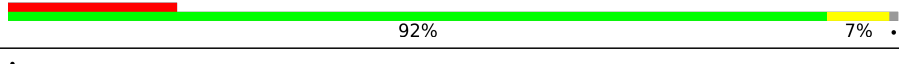
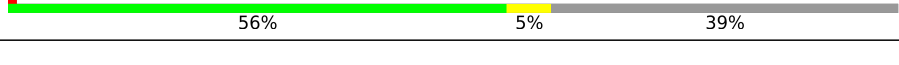
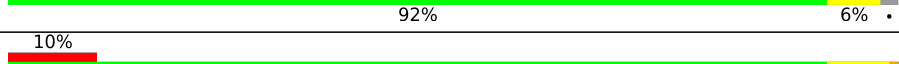
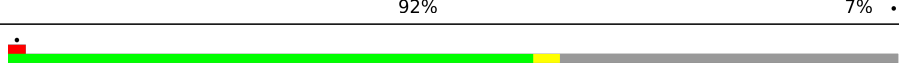



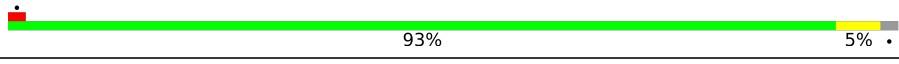
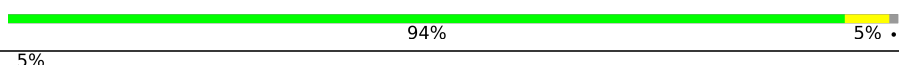

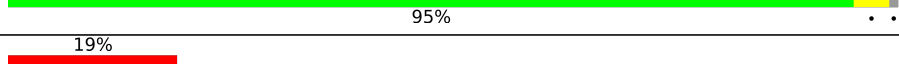
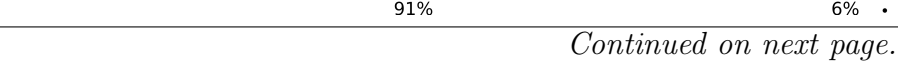


Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	A	254	
2	B	387	
3	C	362	
4	D	297	
5	E	176	
6	F	244	
7	G	256	
8	H	191	

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Mol	Chain	Length	Quality of chain
9	J	174	
10	L	199	
11	M	138	
12	N	204	
13	O	199	
14	P	184	
15	Q	186	
16	R	189	
17	S	172	
18	T	160	
19	U	121	
20	V	137	
21	W	236	
22	X	142	
23	Y	127	
24	Z	136	
25	a	149	
26	b	647	
27	c	105	
28	d	113	
29	e	130	
30	f	107	
31	g	121	
32	h	120	
33	i	100	

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Mol	Chain	Length	Quality of chain
34	j	88	
35	k	78	
36	m	486	
37	p	92	
38	r	261	
39	u	199	
40	v	344	
41	w	203	
42	x	515	
43	y	245	
44	z	106	
45	1	3396	
46	2	158	
47	3	121	

## 2 Entry composition [i](#)

There are 50 unique types of molecules in this entry. The entry contains 133299 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 60S ribosomal protein L2-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
1	A	178	1377	869	269	239	0	0

- Molecule 2 is a protein called 60S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	386	3081	1956	584	533	8	0	0

- Molecule 3 is a protein called 60S ribosomal protein L4-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	334	2559	1619	478	459	3	0	0

- Molecule 4 is a protein called 60S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	271	2176	1376	384	414	2	0	0

- Molecule 5 is a protein called 60S ribosomal protein L6-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	156	1239	800	222	216	1	0	0

- Molecule 6 is a protein called 60S ribosomal protein L7-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	F	222	1784	1151	324	308	1	0	0

- Molecule 7 is a protein called 60S ribosomal protein L8-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	G	162	1249	801	213	233	2	0	0

- Molecule 8 is a protein called 60S ribosomal protein L9-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	H	190	1510	957	273	276	4	0	0

- Molecule 9 is a protein called 60S ribosomal protein L11-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	J	169	1353	847	253	249	4	0	0

- Molecule 10 is a protein called 60S ribosomal protein L13-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
10	L	182	1459	907	300	252	0	0

- Molecule 11 is a protein called 60S ribosomal protein L14-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	M	137	1059	678	200	179	2	0	0

- Molecule 12 is a protein called 60S ribosomal protein L15-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	N	183	1570	984	332	253	1	0	0

- Molecule 13 is a protein called 60S ribosomal protein L16-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	O	197	1555	1003	289	262	1	0	0

- Molecule 14 is a protein called 60S ribosomal protein L17-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
14	P	183	1442	896	287	259	0	0

- Molecule 15 is a protein called 60S ribosomal protein L18-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	Q	134	1035	659	196	179	1	0	0

- Molecule 16 is a protein called 60S ribosomal protein L19-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
16	R	154	1241	772	262	207	0	0

- Molecule 17 is a protein called 60S ribosomal protein L20-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	S	171	1437	925	266	243	3	0	0

- Molecule 18 is a protein called 60S ribosomal protein L21-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	T	119	943	595	180	165	3	0	0

- Molecule 19 is a protein called 60S ribosomal protein L22-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
19	U	102	812	526	134	152	0	0

- Molecule 20 is a protein called 60S ribosomal protein L23-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	V	135	997	625	188	177	7	0	0

- Molecule 21 is a protein called Ribosome assembly factor MRT4.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	W	234	Total	C	N	O	S	0	0
			1885	1194	323	362	6		

- Molecule 22 is a protein called 60S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	X	86	Total	C	N	O	S	0	0
			687	441	114	130	2		

- Molecule 23 is a protein called 60S ribosomal protein L26-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
23	Y	125	Total	C	N	O	0	0
			984	620	191	173		

- Molecule 24 is a protein called 60S ribosomal protein L27-A.

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

- Molecule 25 is a protein called 60S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	a	93	Total	C	N	O	S	0	0
			735	479	130	125	1		

- Molecule 26 is a protein called Nucleolar GTP-binding protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	b	510	Total	C	N	O	S	0	0
			4146	2629	726	773	18		

- Molecule 27 is a protein called 60S ribosomal protein L30.

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

- Molecule 28 is a protein called 60S ribosomal protein L31-A.



Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	d	106	865	549	164	151	1	0	0

- Molecule 29 is a protein called 60S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	e	127	1020	647	205	167	1	0	0

- Molecule 30 is a protein called 60S ribosomal protein L33-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	f	106	850	540	165	144	1	0	0

- Molecule 31 is a protein called 60S ribosomal protein L34-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	g	104	819	509	168	138	4	0	0

- Molecule 32 is a protein called 60S ribosomal protein L35-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	h	119	969	615	186	167	1	0	0

- Molecule 33 is a protein called 60S ribosomal protein L36-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	i	97	750	469	149	130	2	0	0

- Molecule 34 is a protein called 60S ribosomal protein L37-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	j	77	603	365	131	102	5	0	0

- Molecule 35 is a protein called 60S ribosomal protein L38.

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

- Molecule 36 is a protein called Nucleolar GTP-binding protein 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	m	452	3639	2302	655	673	9	0	0

- Molecule 37 is a protein called 60S ribosomal protein L43-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	p	91	694	429	138	121	6	0	0

- Molecule 38 is a protein called Ribosome biogenesis protein NSA2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	r	230	1860	1177	352	324	7	0	0

- Molecule 39 is a protein called Ribosome biogenesis protein RLP24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
39	u	144	1216	763	245	199	9	0	0

- Molecule 40 is a protein called Ribosome biogenesis protein RPF2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
40	v	287	2318	1482	408	412	16	0	0

- Molecule 41 is a protein called Regulator of ribosome biosynthesis.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
41	w	182	1448	911	261	271	5	0	0

- Molecule 42 is a protein called Ribosome assembly protein 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	x	488	Total	C	N	O	S	0	0
			3807	2398	677	711	21		

- Molecule 43 is a protein called Eukaryotic translation initiation factor 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	y	244	Total	C	N	O	S	0	0
			1849	1146	319	377	7		

- Molecule 44 is a protein called UPF0642 protein YBL028C.

Mol	Chain	Residues	Atoms				AltConf	Trace
44	z	55	Total	C	N	O	0	0
			444	273	88	83		

- Molecule 45 is a RNA chain called RDN25-1 rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	1	2962	Total	C	N	O	P	0	0
			63385	28311	11449	20663	2962		

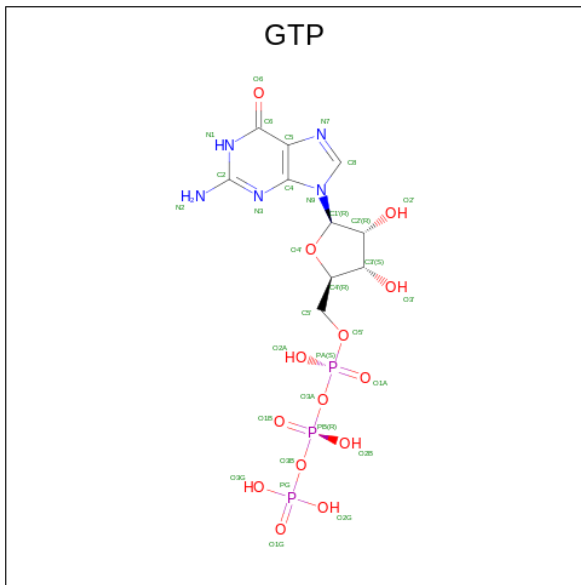
- Molecule 46 is a RNA chain called RDN5.8-1 rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	2	158	Total	C	N	O	P	0	0
			3353	1500	586	1109	158		

- Molecule 47 is a RNA chain called RDN5-2 rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	3	121	Total	C	N	O	P	0	0
			2579	1152	461	845	121		

- Molecule 48 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>14</sub>P<sub>3</sub>).



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

- Molecule 49 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
49	b	1	1	1	0
49	m	1	1	1	0

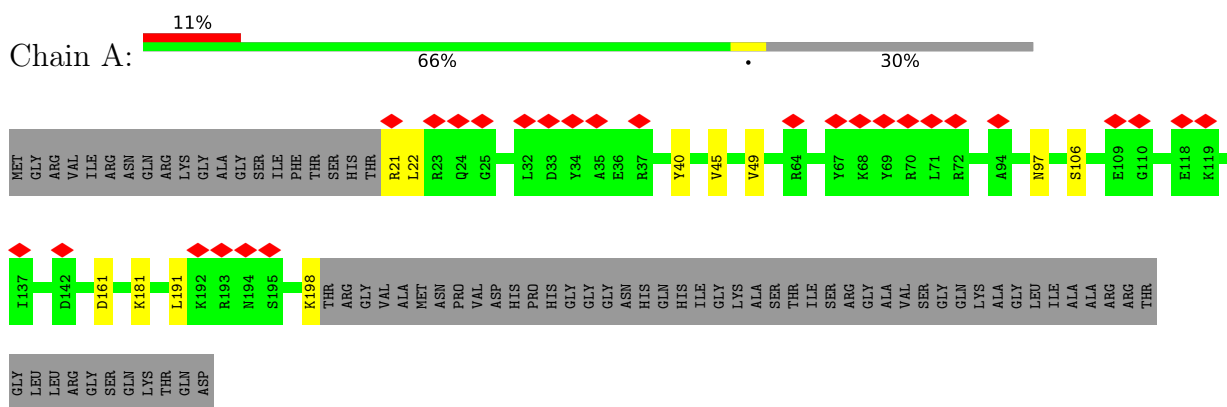
- Molecule 50 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
50	j	1	1	1	0
50	p	1	1	1	0
50	u	1	1	1	0

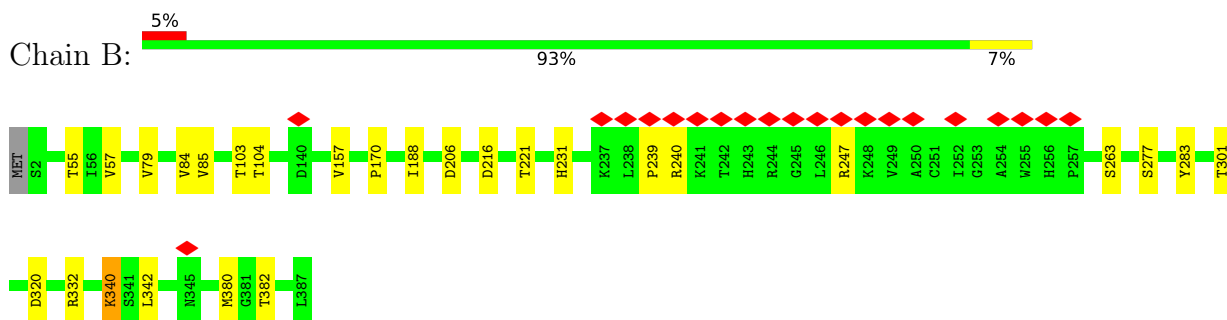
### 3 Residue-property plots i

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.

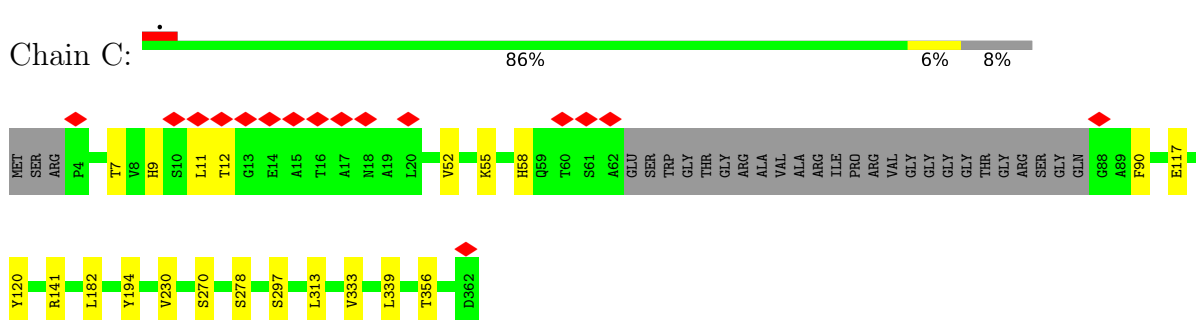
- Molecule 1: 60S ribosomal protein L2-A



- Molecule 2: 60S ribosomal protein L3

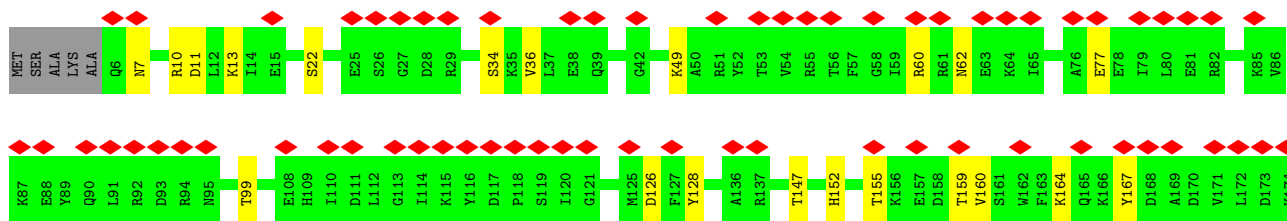


- Molecule 3: 60S ribosomal protein L4-A

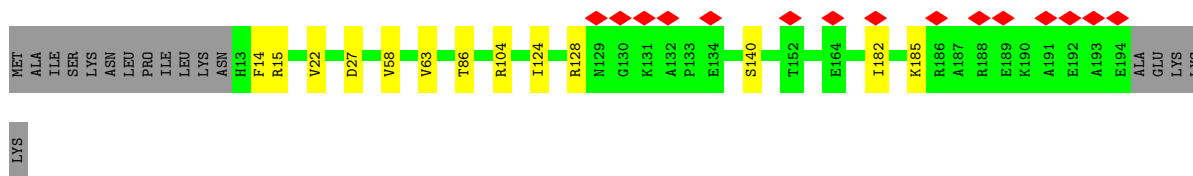
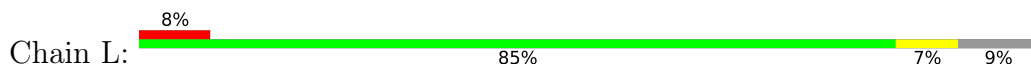


- Molecule 4: 60S ribosomal protein L5

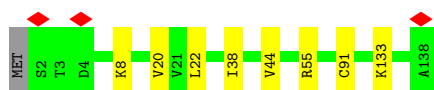




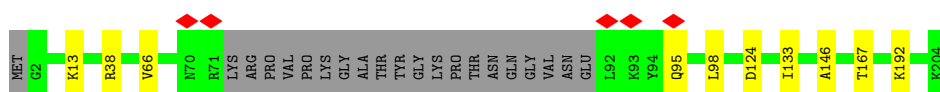
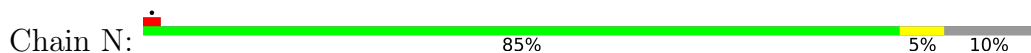
- Molecule 10: 60S ribosomal protein L13-A



- Molecule 11: 60S ribosomal protein L14-A



- Molecule 12: 60S ribosomal protein L15-A



- Molecule 13: 60S ribosomal protein L16-A

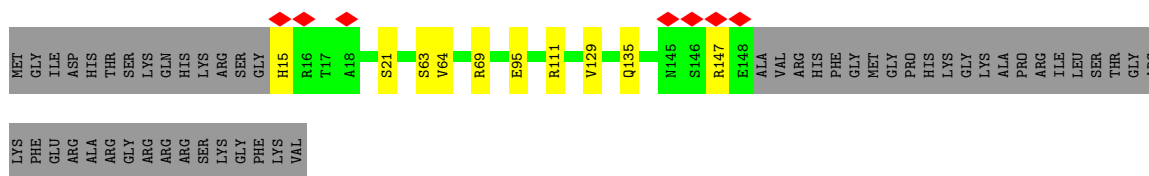


- Molecule 14: 60S ribosomal protein L17-A




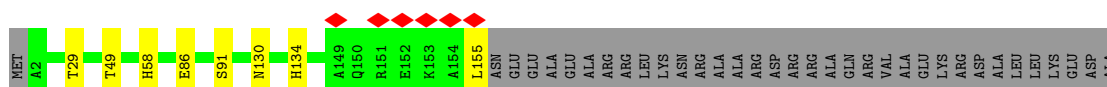
- Molecule 15: 60S ribosomal protein L18-A

Chain Q:  67% 5% 28%



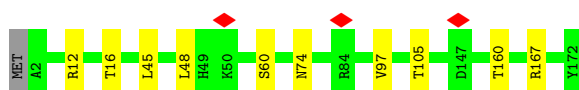
- Molecule 16: 60S ribosomal protein L19-A

Chain R:  77% 19%



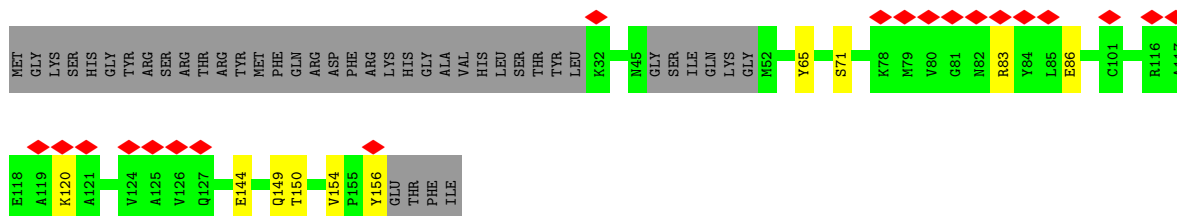
- Molecule 17: 60S ribosomal protein L20-A

Chain S:  94% 6%




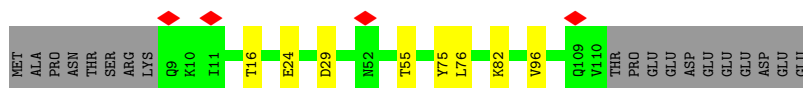
- Molecule 18: 60S ribosomal protein L21-A

Chain T:  12% 68% 6% 26%



- Molecule 19: 60S ribosomal protein L22-A

Chain U:  78% 7% 16%



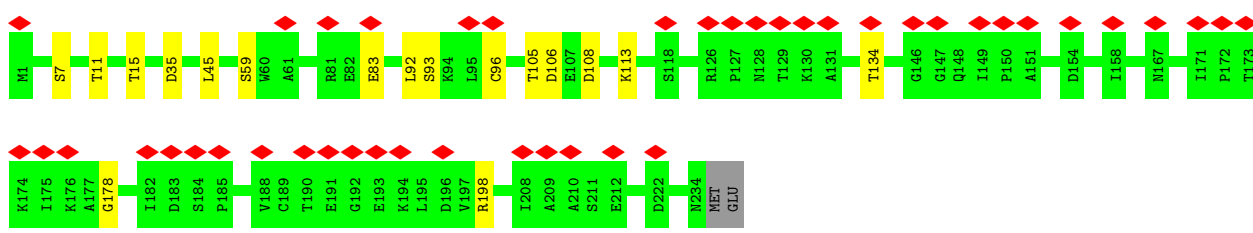
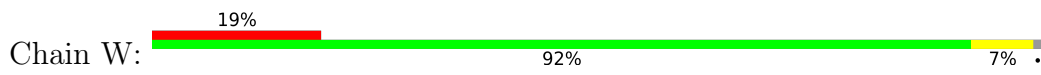
- Molecule 20: 60S ribosomal protein L23-A

Chain V:  93% 5%

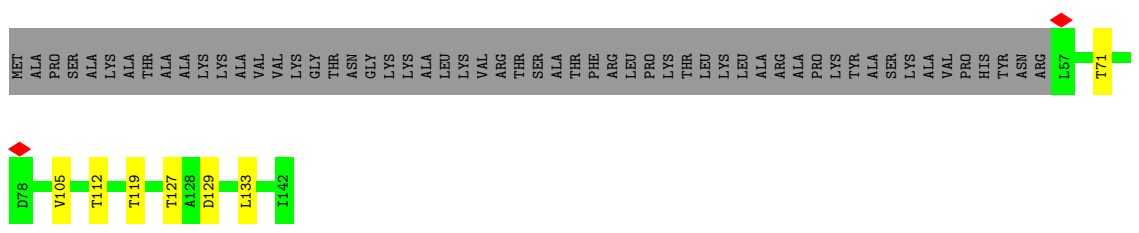


- Molecule 21: Ribosome assembly factor MRT4

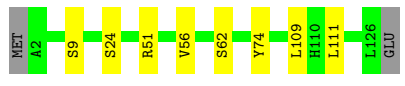
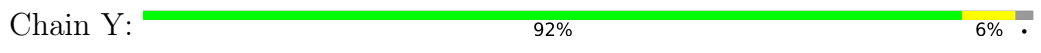




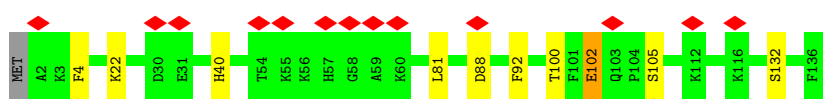
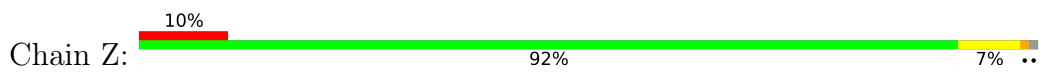
• Molecule 22: 60S ribosomal protein L25



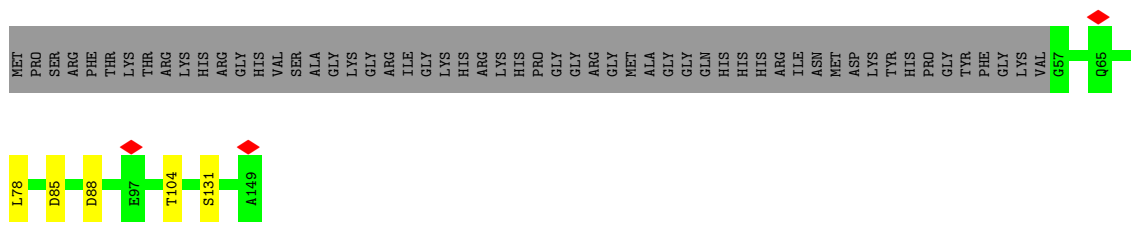
• Molecule 23: 60S ribosomal protein L26-A



• Molecule 24: 60S ribosomal protein L27-A

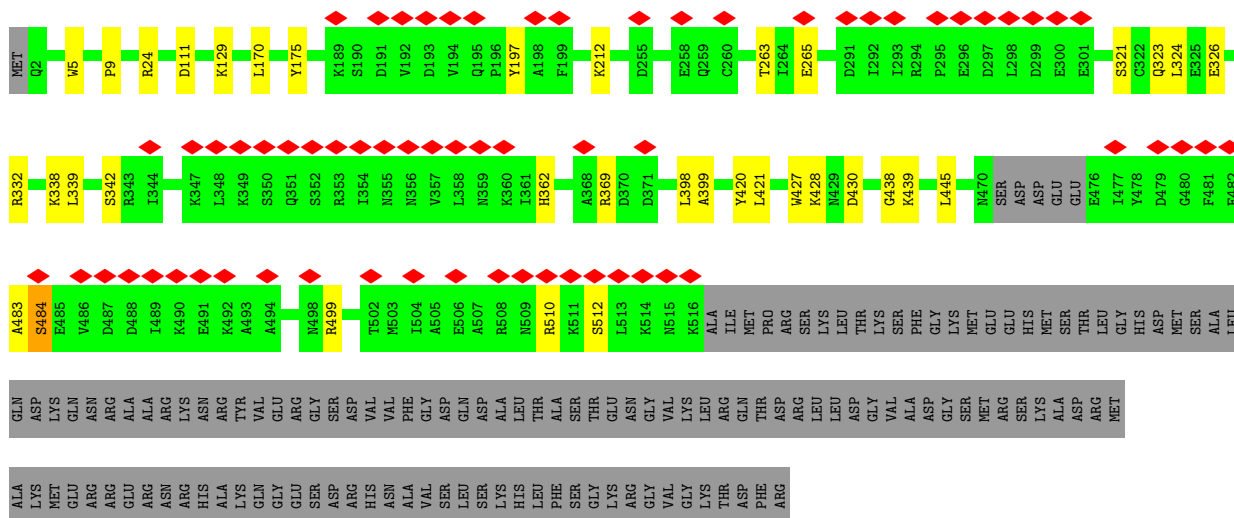


• Molecule 25: 60S ribosomal protein L28

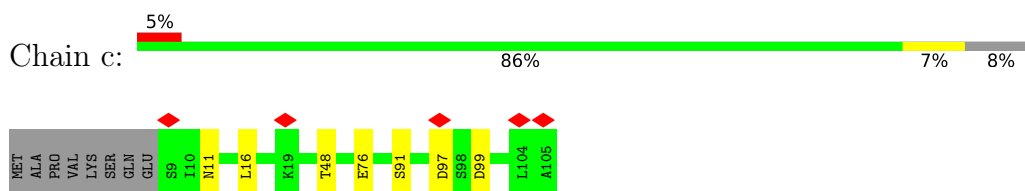


• Molecule 26: Nucleolar GTP-binding protein 1

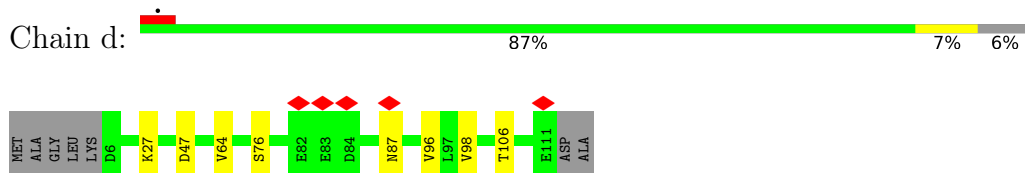




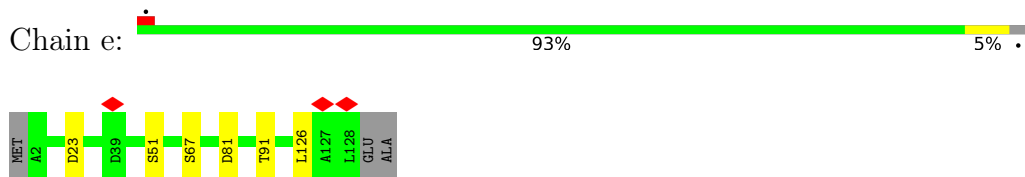
• Molecule 27: 60S ribosomal protein L30



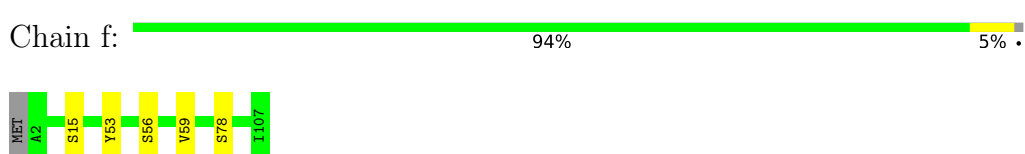
• Molecule 28: 60S ribosomal protein L31-A



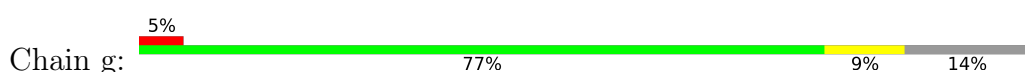
• Molecule 29: 60S ribosomal protein L32

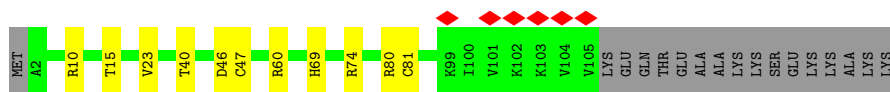


• Molecule 30: 60S ribosomal protein L33-A

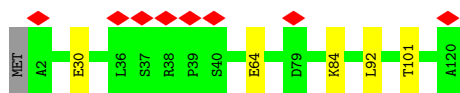


• Molecule 31: 60S ribosomal protein L34-A

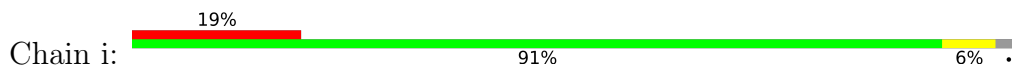




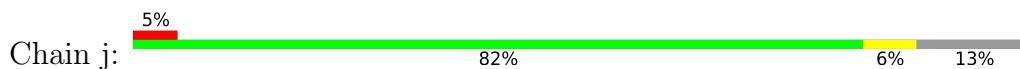
- Molecule 32: 60S ribosomal protein L35-A



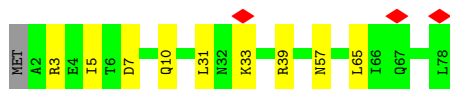
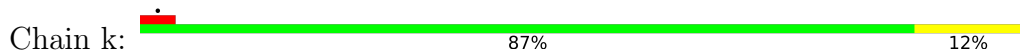
- Molecule 33: 60S ribosomal protein L36-A



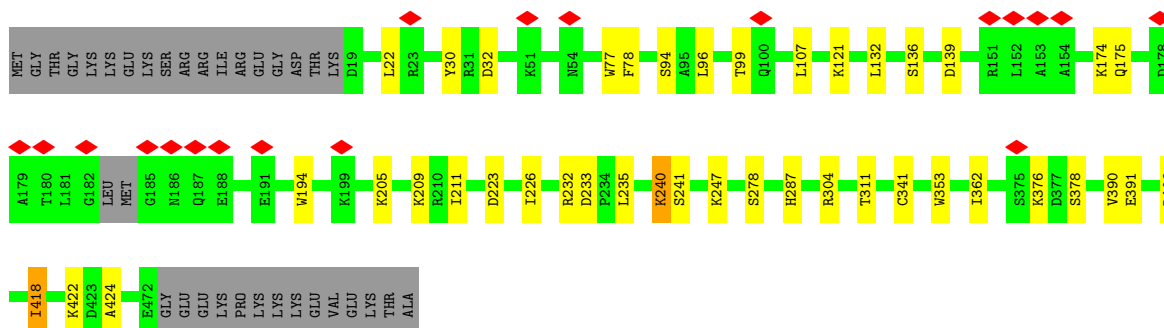
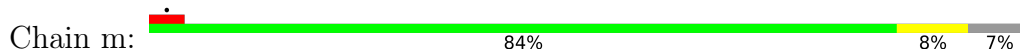
- Molecule 34: 60S ribosomal protein L37-A



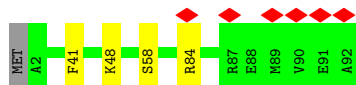
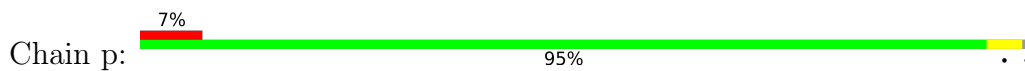
- Molecule 35: 60S ribosomal protein L38



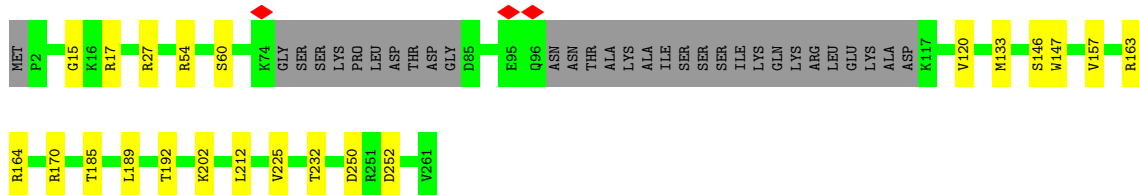
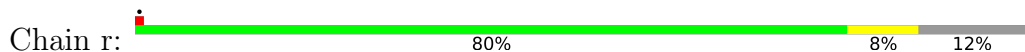
- Molecule 36: Nucleolar GTP-binding protein 2



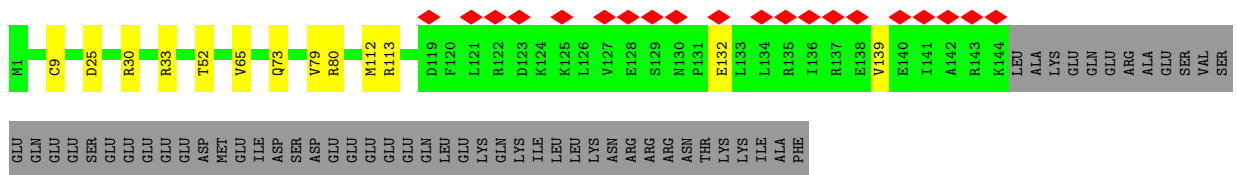
- Molecule 37: 60S ribosomal protein L43-A



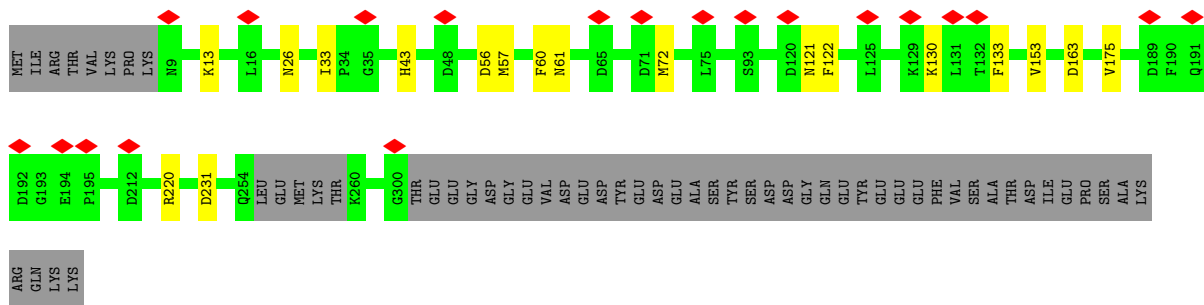
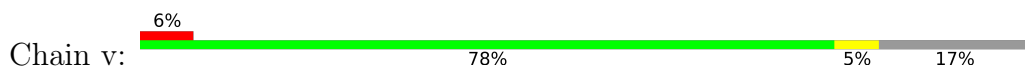
• Molecule 38: Ribosome biogenesis protein NSA2



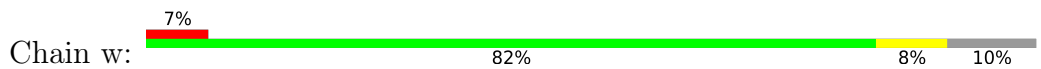
• Molecule 39: Ribosome biogenesis protein RLP24

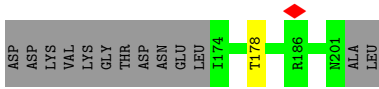


• Molecule 40: Ribosome biogenesis protein RPF2

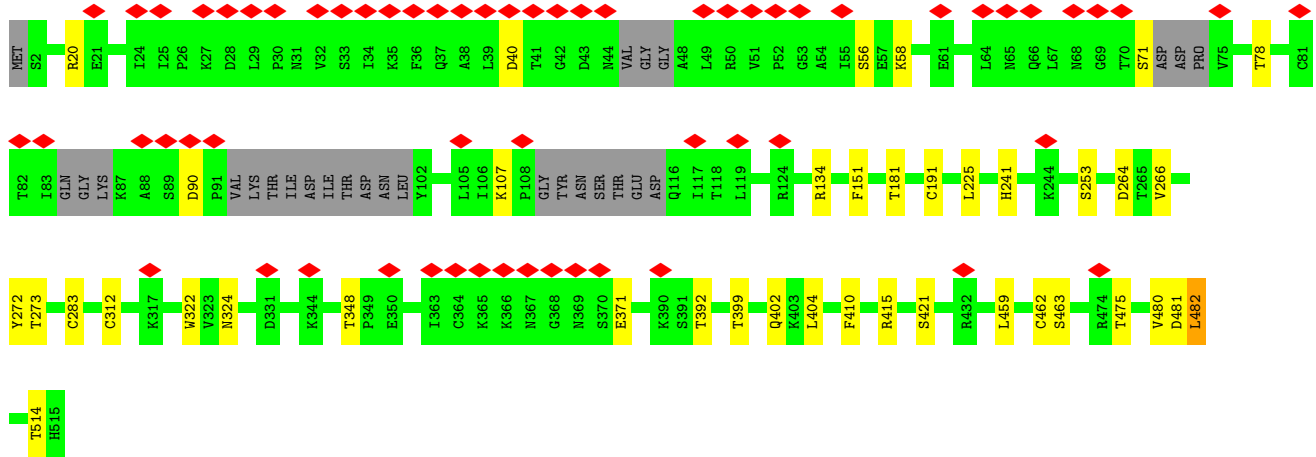
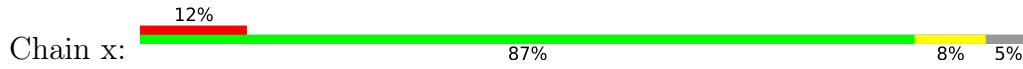


• Molecule 41: Regulator of ribosome biosynthesis

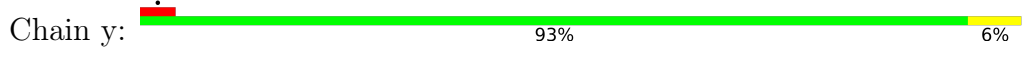




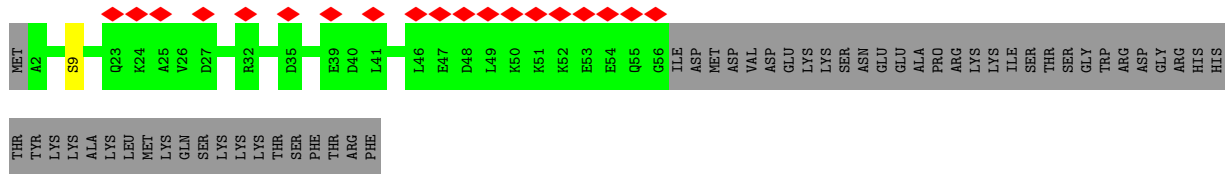
• Molecule 42: Ribosome assembly protein 4



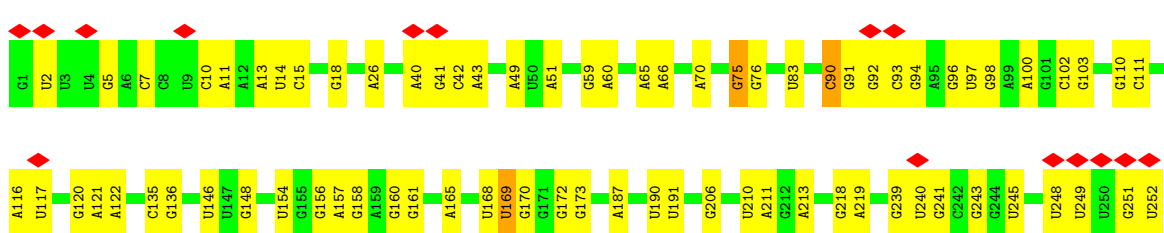
• Molecule 43: Eukaryotic translation initiation factor 6

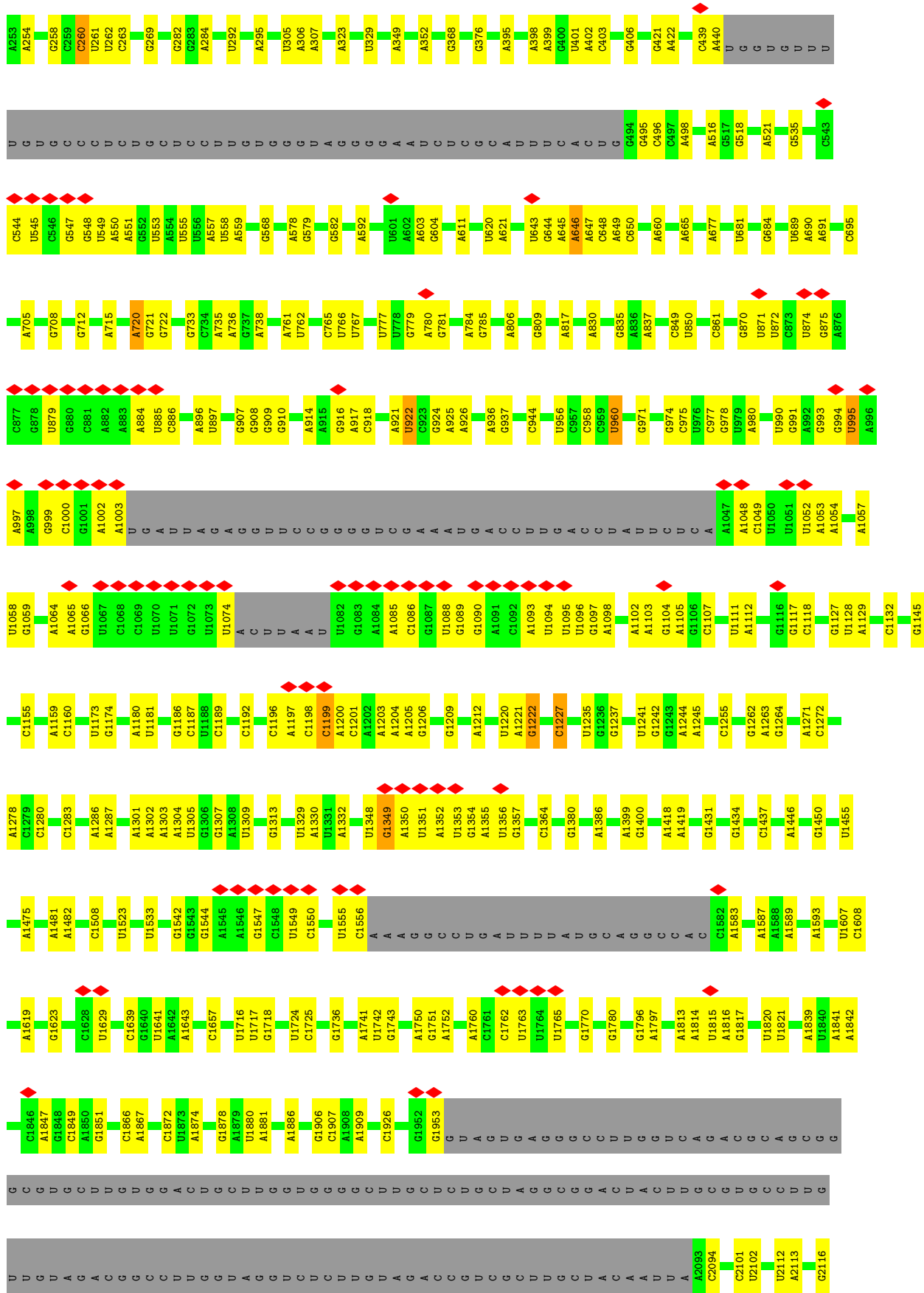


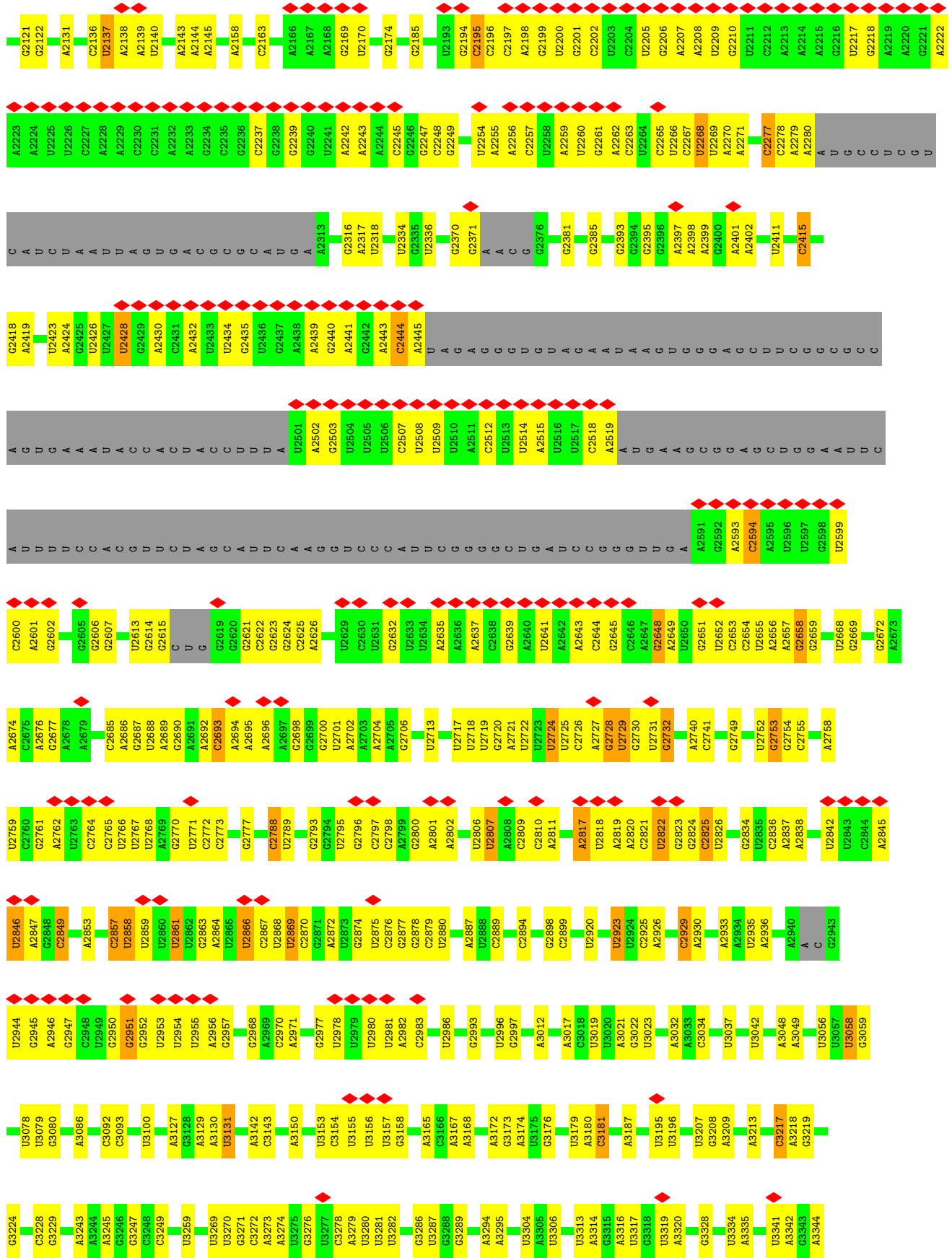
• Molecule 44: UPF0642 protein YBL028C

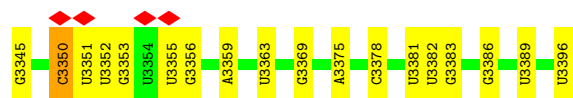


• Molecule 45: RDN25-1 rRNA

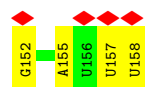
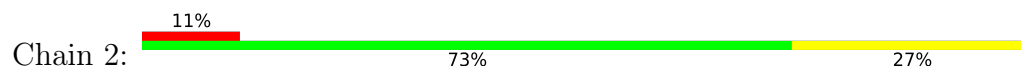




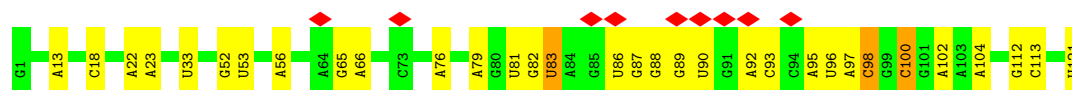
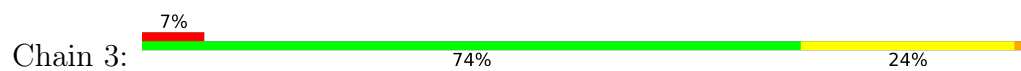




- Molecule 46: RDN5.8-1 rRNA



- Molecule 47: RDN5-2 rRNA





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	103319	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 ( $e^-/\text{\AA}^2$ )	1.9	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.228	Depositor
Minimum map value	-0.107	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.009	Depositor
Recommended contour level	0.025	Depositor
Map size (Å)	412.02, 412.02, 412.02	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.3734, 1.3734, 1.3734	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: MG, GTP, ZN

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.32	0/1403	0.50	0/1887
2	B	0.41	0/3152	0.51	0/4239
3	C	0.36	0/2607	0.53	1/3530 (0.0%)
4	D	0.30	0/2222	0.48	0/2996
5	E	0.34	0/1260	0.48	0/1694
6	F	0.39	0/1821	0.49	0/2451
7	G	0.28	0/1268	0.51	0/1716
8	H	0.38	0/1531	0.49	0/2062
9	J	0.28	0/1374	0.51	0/1842
10	L	0.33	0/1483	0.49	0/1991
11	M	0.35	0/1074	0.48	0/1446
12	N	0.35	0/1602	0.45	0/2142
13	O	0.44	0/1585	0.49	0/2128
14	P	0.38	0/1465	0.50	0/1968
15	Q	0.33	0/1050	0.47	0/1419
16	R	0.38	0/1258	0.48	0/1679
17	S	0.38	0/1473	0.50	0/1980
18	T	0.30	0/957	0.47	0/1285
19	U	0.34	0/828	0.48	0/1121
20	V	0.40	0/1012	0.53	0/1361
21	W	0.29	0/1918	0.49	0/2586
22	X	0.35	0/695	0.45	0/937
23	Y	0.36	0/995	0.48	0/1329
24	Z	0.33	0/1118	0.47	0/1497
25	a	0.31	0/751	0.46	0/1013
26	b	0.35	0/4220	0.49	0/5687
27	c	0.33	0/751	0.46	0/1008
28	d	0.42	0/879	0.53	0/1180
29	e	0.40	0/1041	0.50	0/1394
30	f	0.43	0/868	0.50	0/1168
31	g	0.41	0/829	0.50	0/1109
32	h	0.30	0/978	0.48	0/1301

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
33	i	0.27	0/756	0.45	0/1005
34	j	0.37	0/614	0.49	0/813
35	k	0.30	0/618	0.50	0/826
36	m	0.37	0/3713	0.52	0/5006
37	p	0.40	0/701	0.55	0/934
38	r	0.40	0/1892	0.54	0/2528
39	u	0.37	0/1238	0.45	0/1646
40	v	0.30	0/2361	0.48	0/3153
41	w	0.28	0/1471	0.48	0/1980
42	x	0.31	0/3897	0.52	1/5282 (0.0%)
43	y	0.35	0/1872	0.53	0/2548
44	z	0.27	0/445	0.42	0/585
45	1	0.65	0/70950	0.91	114/110603 (0.1%)
46	2	0.58	0/3746	0.84	0/5832
47	3	0.32	0/2883	0.87	7/4491 (0.2%)
All	All	0.53	0/142625	0.76	123/208378 (0.1%)

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
2	B	0	2
6	F	0	1
24	Z	0	1
26	b	0	1
31	g	0	1
36	m	0	2
38	r	0	1
39	u	0	1
41	w	0	1
42	x	0	1
All	All	0	12

There are no bond length outliers.

The worst 5 of 123 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
47	3	83	U	N3-C2-O2	-9.89	115.28	122.20
45	1	3217	C	N1-C2-O2	8.84	124.20	118.90
45	1	3217	C	C2-N1-C1'	8.12	127.74	118.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
45	1	2923	U	C2-N1-C1'	7.87	127.14	117.70
45	1	2137	U	C2-N1-C1'	7.71	126.96	117.70

There are no chirality outliers.

5 of 12 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	221	THR	Peptide
2	B	340	LYS	Peptide
6	F	158	LYS	Peptide
24	Z	102	GLU	Peptide
26	b	438	GLY	Peptide

## 5.2 Too-close contacts [i](#)

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

## 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	A	176/254 (69%)	164 (93%)	12 (7%)	0	100	100
2	B	384/387 (99%)	332 (86%)	49 (13%)	3 (1%)	19	53
3	C	330/362 (91%)	292 (88%)	37 (11%)	1 (0%)	41	73
4	D	267/297 (90%)	240 (90%)	27 (10%)	0	100	100
5	E	152/176 (86%)	141 (93%)	11 (7%)	0	100	100
6	F	220/244 (90%)	201 (91%)	18 (8%)	1 (0%)	29	63
7	G	160/256 (62%)	140 (88%)	20 (12%)	0	100	100
8	H	188/191 (98%)	167 (89%)	20 (11%)	1 (0%)	29	63
9	J	167/174 (96%)	136 (81%)	31 (19%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
10	L	180/199 (90%)	157 (87%)	22 (12%)	1 (1%)	25	59
11	M	135/138 (98%)	127 (94%)	8 (6%)	0	100	100
12	N	179/204 (88%)	165 (92%)	12 (7%)	2 (1%)	14	45
13	O	195/199 (98%)	187 (96%)	8 (4%)	0	100	100
14	P	181/184 (98%)	166 (92%)	15 (8%)	0	100	100
15	Q	132/186 (71%)	126 (96%)	6 (4%)	0	100	100
16	R	152/189 (80%)	145 (95%)	7 (5%)	0	100	100
17	S	169/172 (98%)	154 (91%)	15 (9%)	0	100	100
18	T	115/160 (72%)	101 (88%)	14 (12%)	0	100	100
19	U	100/121 (83%)	87 (87%)	13 (13%)	0	100	100
20	V	133/137 (97%)	125 (94%)	8 (6%)	0	100	100
21	W	232/236 (98%)	209 (90%)	22 (10%)	1 (0%)	34	68
22	X	84/142 (59%)	78 (93%)	6 (7%)	0	100	100
23	Y	123/127 (97%)	119 (97%)	4 (3%)	0	100	100
24	Z	133/136 (98%)	115 (86%)	17 (13%)	1 (1%)	19	53
25	a	91/149 (61%)	80 (88%)	10 (11%)	1 (1%)	14	45
26	b	506/647 (78%)	437 (86%)	64 (13%)	5 (1%)	15	48
27	c	95/105 (90%)	92 (97%)	3 (3%)	0	100	100
28	d	104/113 (92%)	98 (94%)	6 (6%)	0	100	100
29	e	125/130 (96%)	119 (95%)	6 (5%)	0	100	100
30	f	104/107 (97%)	100 (96%)	4 (4%)	0	100	100
31	g	102/121 (84%)	95 (93%)	7 (7%)	0	100	100
32	h	117/120 (98%)	101 (86%)	15 (13%)	1 (1%)	17	51
33	i	95/100 (95%)	86 (90%)	9 (10%)	0	100	100
34	j	74/88 (84%)	69 (93%)	5 (7%)	0	100	100
35	k	75/78 (96%)	69 (92%)	6 (8%)	0	100	100
36	m	448/486 (92%)	384 (86%)	56 (12%)	8 (2%)	8	33
37	p	89/92 (97%)	83 (93%)	6 (7%)	0	100	100
38	r	224/261 (86%)	186 (83%)	34 (15%)	4 (2%)	8	33
39	u	142/199 (71%)	135 (95%)	7 (5%)	0	100	100
40	v	283/344 (82%)	264 (93%)	19 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
41	w	178/203 (88%)	155 (87%)	23 (13%)	0	100	100
42	x	476/515 (92%)	429 (90%)	47 (10%)	0	100	100
43	y	242/245 (99%)	223 (92%)	19 (8%)	0	100	100
44	z	53/106 (50%)	51 (96%)	2 (4%)	0	100	100
All	All	7910/9080 (87%)	7130 (90%)	750 (10%)	30 (0%)	38	68

5 of 30 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	339	LEU
36	m	209	LYS
36	m	241	SER
10	L	63	VAL
12	N	146	ALA

### 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	A	140/196 (71%)	129 (92%)	11 (8%)	12	39
2	B	322/323 (100%)	299 (93%)	23 (7%)	14	44
3	C	271/289 (94%)	252 (93%)	19 (7%)	15	44
4	D	224/245 (91%)	203 (91%)	21 (9%)	8	32
5	E	134/153 (88%)	125 (93%)	9 (7%)	16	45
6	F	186/205 (91%)	176 (95%)	10 (5%)	22	53
7	G	131/208 (63%)	119 (91%)	12 (9%)	9	32
8	H	170/171 (99%)	162 (95%)	8 (5%)	26	58
9	J	147/150 (98%)	126 (86%)	21 (14%)	3	14
10	L	144/159 (91%)	132 (92%)	12 (8%)	11	37
11	M	108/109 (99%)	100 (93%)	8 (7%)	13	41
12	N	159/176 (90%)	151 (95%)	8 (5%)	24	56

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
13	O	160/162 (99%)	150 (94%)	10 (6%)	18	47
14	P	145/146 (99%)	135 (93%)	10 (7%)	15	44
15	Q	110/151 (73%)	100 (91%)	10 (9%)	9	33
16	R	127/154 (82%)	119 (94%)	8 (6%)	18	47
17	S	155/156 (99%)	145 (94%)	10 (6%)	17	47
18	T	102/137 (74%)	92 (90%)	10 (10%)	8	29
19	U	89/107 (83%)	81 (91%)	8 (9%)	9	33
20	V	103/105 (98%)	96 (93%)	7 (7%)	16	45
21	W	211/213 (99%)	195 (92%)	16 (8%)	13	41
22	X	76/118 (64%)	69 (91%)	7 (9%)	9	32
23	Y	108/110 (98%)	100 (93%)	8 (7%)	13	41
24	Z	115/116 (99%)	106 (92%)	9 (8%)	12	40
25	a	76/119 (64%)	72 (95%)	4 (5%)	22	53
26	b	458/573 (80%)	427 (93%)	31 (7%)	16	45
27	c	81/88 (92%)	74 (91%)	7 (9%)	10	36
28	d	93/97 (96%)	85 (91%)	8 (9%)	10	36
29	e	109/111 (98%)	103 (94%)	6 (6%)	21	52
30	f	90/91 (99%)	85 (94%)	5 (6%)	21	51
31	g	89/103 (86%)	79 (89%)	10 (11%)	6	24
32	h	104/105 (99%)	100 (96%)	4 (4%)	33	65
33	i	79/82 (96%)	73 (92%)	6 (8%)	13	41
34	j	62/71 (87%)	57 (92%)	5 (8%)	11	38
35	k	68/69 (99%)	59 (87%)	9 (13%)	4	17
36	m	399/428 (93%)	365 (92%)	34 (8%)	10	36
37	p	71/72 (99%)	67 (94%)	4 (6%)	21	51
38	r	203/229 (89%)	186 (92%)	17 (8%)	11	37
39	u	128/180 (71%)	116 (91%)	12 (9%)	8	32
40	v	258/309 (84%)	240 (93%)	18 (7%)	15	44
41	w	161/179 (90%)	146 (91%)	15 (9%)	9	32
42	x	428/451 (95%)	389 (91%)	39 (9%)	9	33
43	y	210/211 (100%)	195 (93%)	15 (7%)	14	44

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
44	z	48/95 (50%)	47 (98%)	1 (2%)	53 78
All	All	6852/7722 (89%)	6327 (92%)	525 (8%)	16 40

5 of 525 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
41	w	94	ASP
42	x	107	LYS
41	w	86	VAL
43	y	206	THR
16	R	58	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 97 such sidechains are listed below:

Mol	Chain	Res	Type
29	e	88	HIS
38	r	10	HIS
31	g	52	GLN
34	j	76	ASN
40	v	29	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
45	1	2950/3396 (86%)	795 (26%)	58 (1%)
46	2	157/158 (99%)	41 (26%)	2 (1%)
47	3	120/121 (99%)	29 (24%)	1 (0%)
All	All	3227/3675 (87%)	865 (26%)	61 (1%)

5 of 865 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
45	1	2	U
45	1	5	G
45	1	7	C
45	1	10	C
45	1	11	A

5 of 61 RNA pucker outliers are listed below:



Mol	Chain	Res	Type
45	1	2101	C
45	1	3269	U
45	1	2593	A
45	1	3228	C
46	2	127	U

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

There are no non-standard protein/DNA/RNA residues in this entry.

#### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

#### 5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 5 are monoatomic - leaving 2 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
48	GTP	m	501	49	26,34,34	1.30	2 (7%)	32,54,54	1.60	6 (18%)
48	GTP	b	701	-	26,34,34	1.11	1 (3%)	32,54,54	1.69	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
48	GTP	m	501	49	-	3/18/38/38	0/3/3/3
48	GTP	b	701	-	-	3/18/38/38	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
48	m	501	GTP	C5-C6	-4.44	1.38	1.47
48	b	701	GTP	C5-C6	-3.94	1.39	1.47
48	m	501	GTP	O4'-C4'	-2.01	1.40	1.45

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
48	b	701	GTP	PA-O3A-PB	-4.12	118.69	132.83
48	b	701	GTP	PB-O3B-PG	-3.53	120.72	132.83
48	b	701	GTP	C5-C6-N1	3.37	119.89	113.95
48	m	501	GTP	PA-O3A-PB	-3.34	121.35	132.83
48	m	501	GTP	C5-C6-N1	3.24	119.67	113.95

There are no chirality outliers.

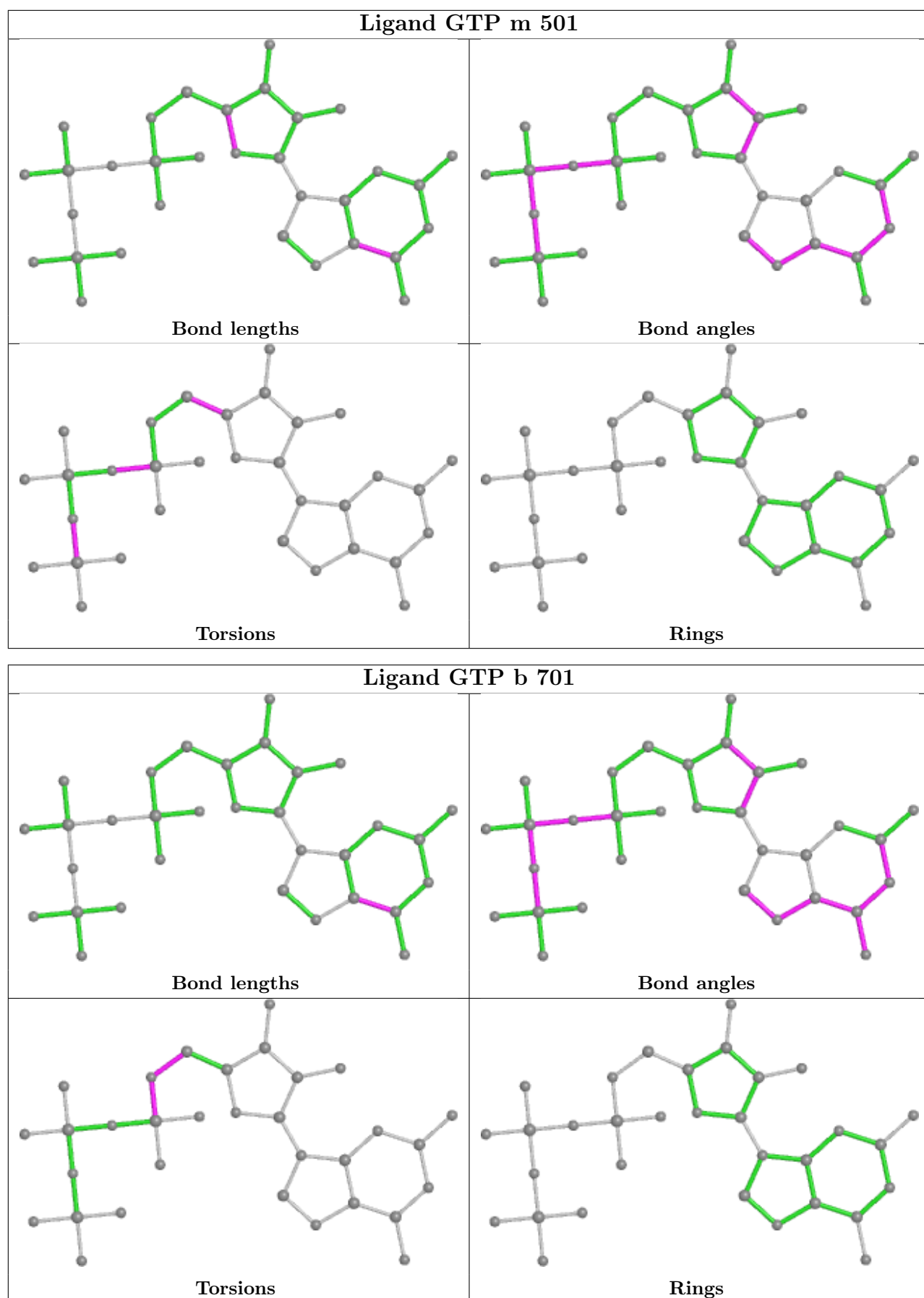
5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
48	b	701	GTP	C5'-O5'-PA-O3A
48	b	701	GTP	C5'-O5'-PA-O1A
48	m	501	GTP	PB-O3B-PG-O2G
48	b	701	GTP	C4'-C5'-O5'-PA
48	m	501	GTP	O4'-C4'-C5'-O5'

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.

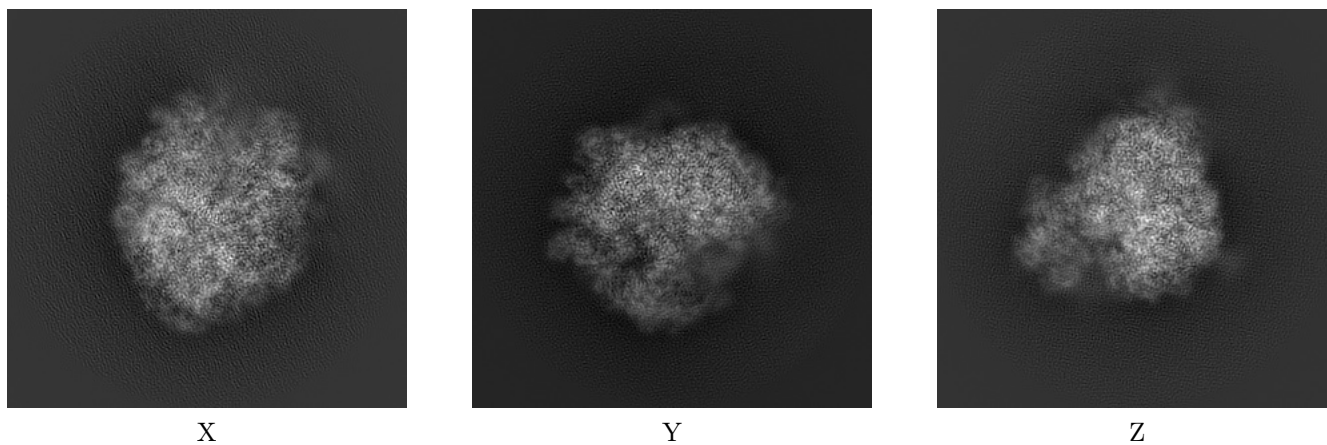
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-30170. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

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

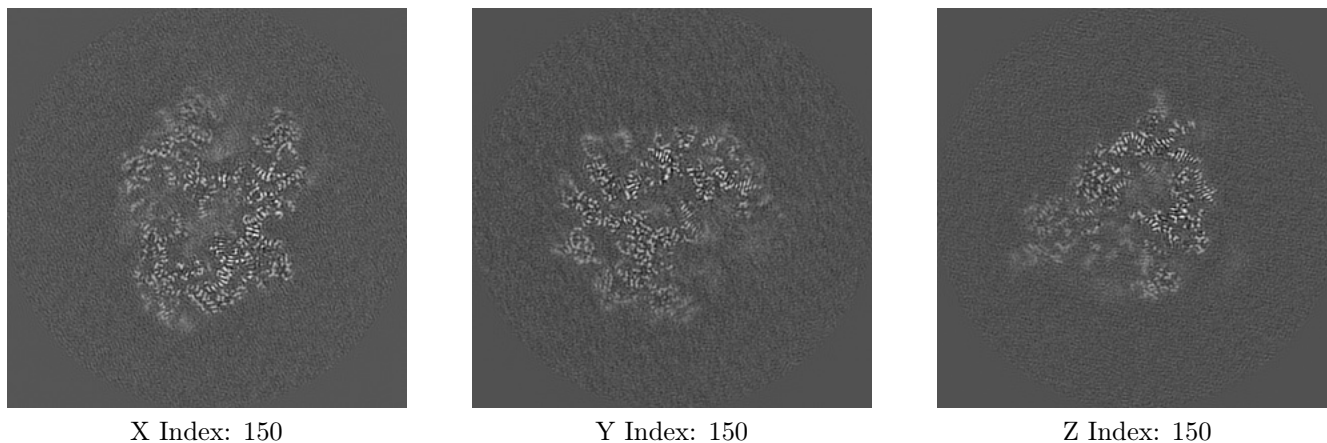
#### 6.1.1 Primary map



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

### 6.2 Central slices [i](#)

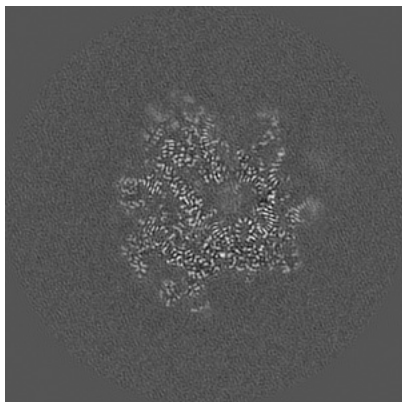
#### 6.2.1 Primary map



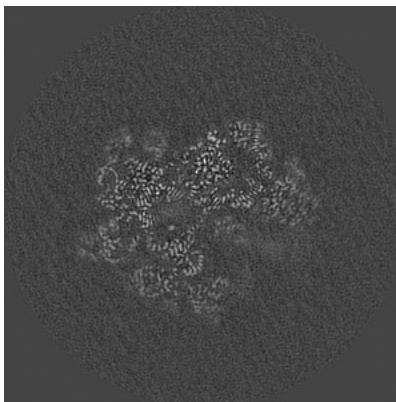
The images above show central slices of the map in three orthogonal directions.

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

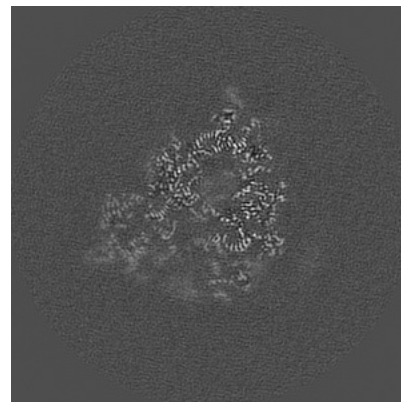
### 6.3.1 Primary map



X Index: 167



Y Index: 143

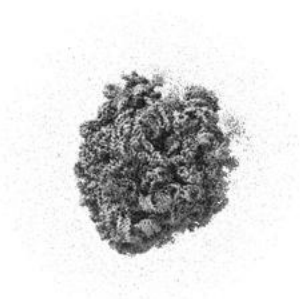


Z Index: 147

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

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

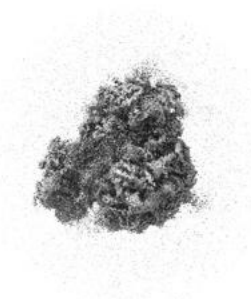
### 6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.025. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

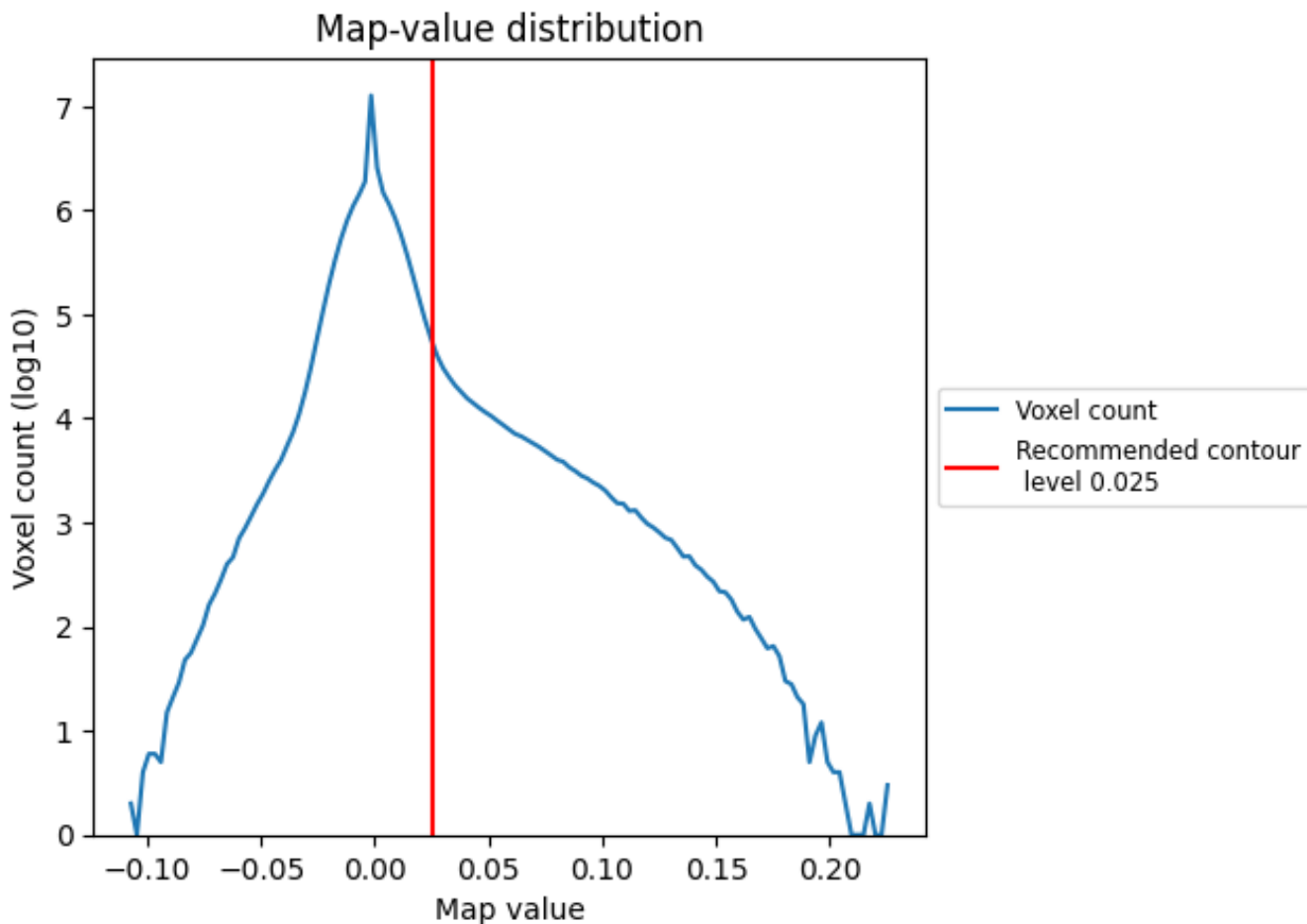
## 6.5 Mask visualisation

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.

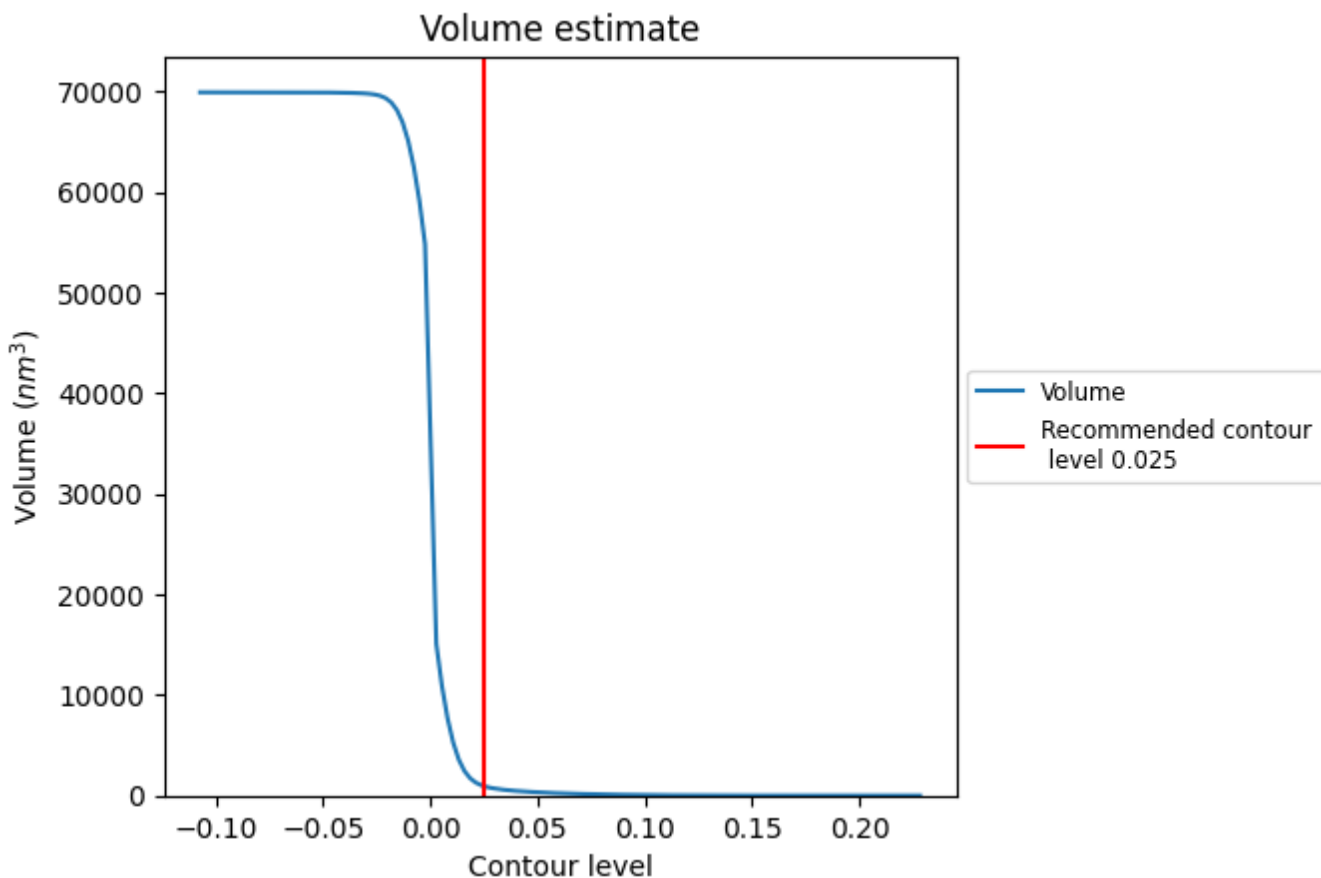
### 7.1 Map-value distribution [i](#)



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.



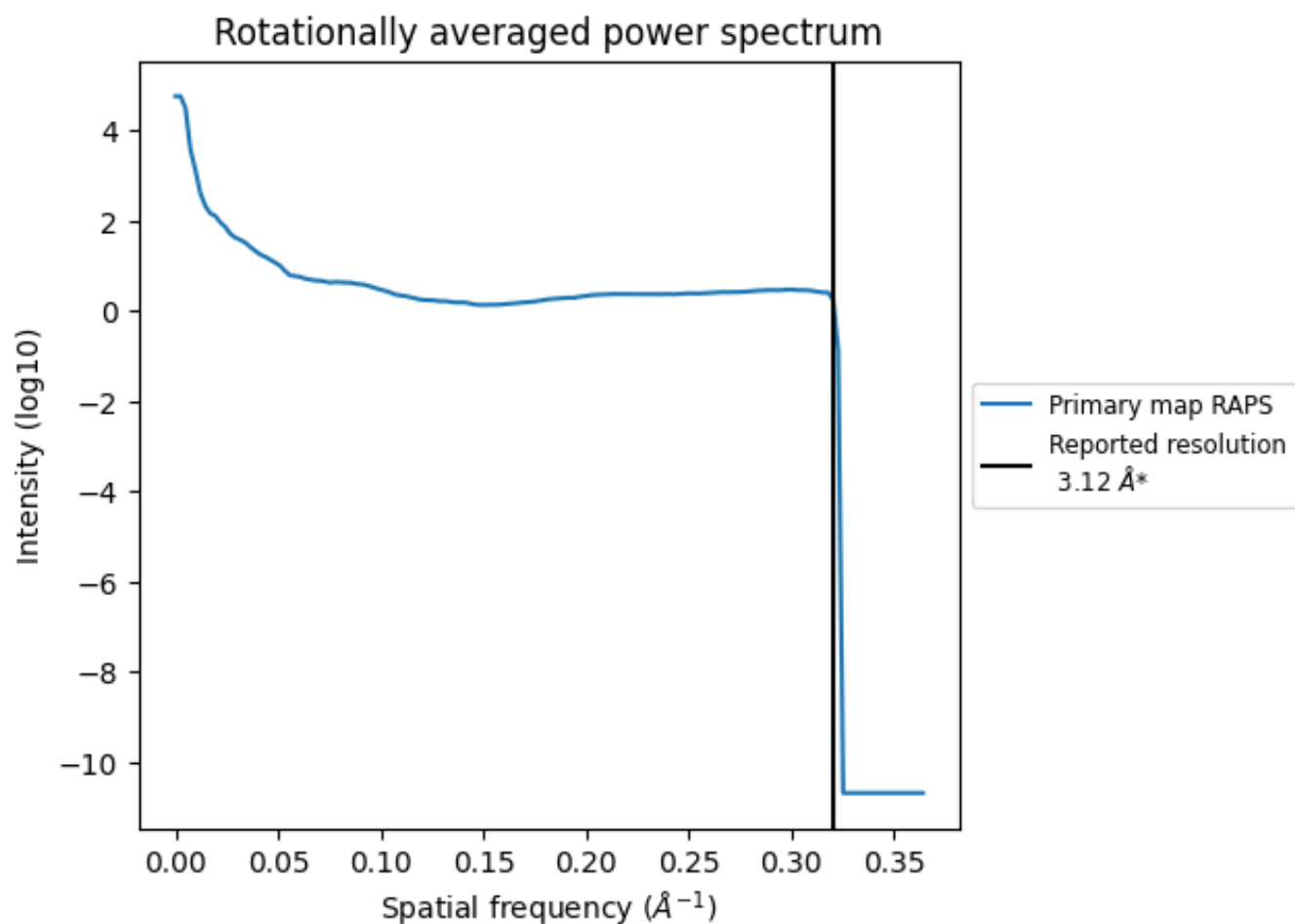
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 945 nm<sup>3</sup>; this corresponds to an approximate mass of 854 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 0.321 Å<sup>-1</sup>

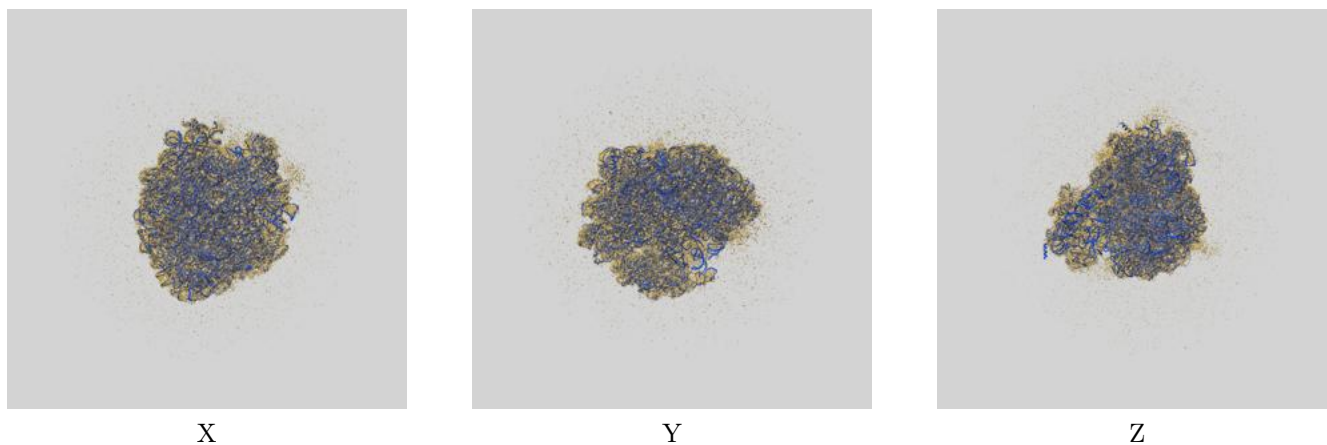
## 8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

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

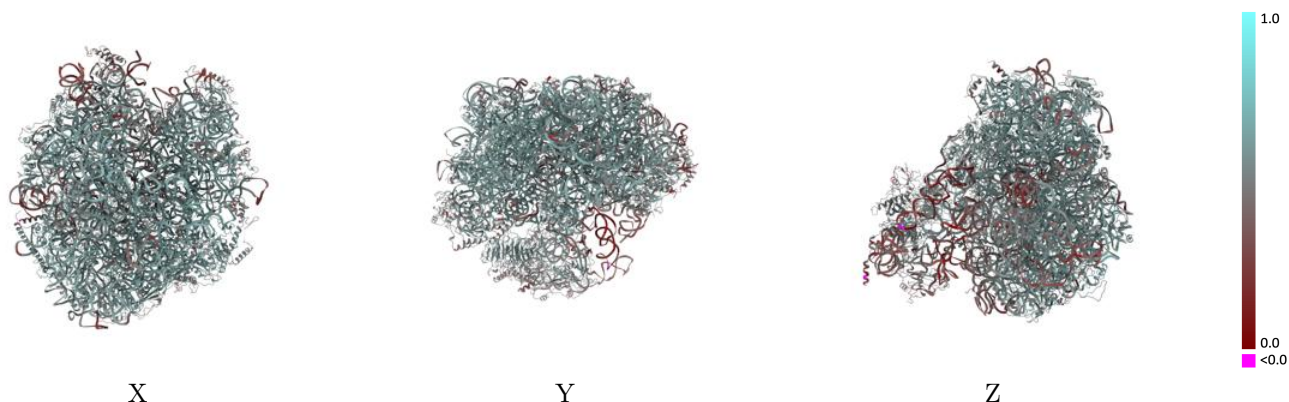
This section contains information regarding the fit between EMDB map EMD-30170 and PDB model 7BT6. Per-residue inclusion information can be found in section 3 on page 13.

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



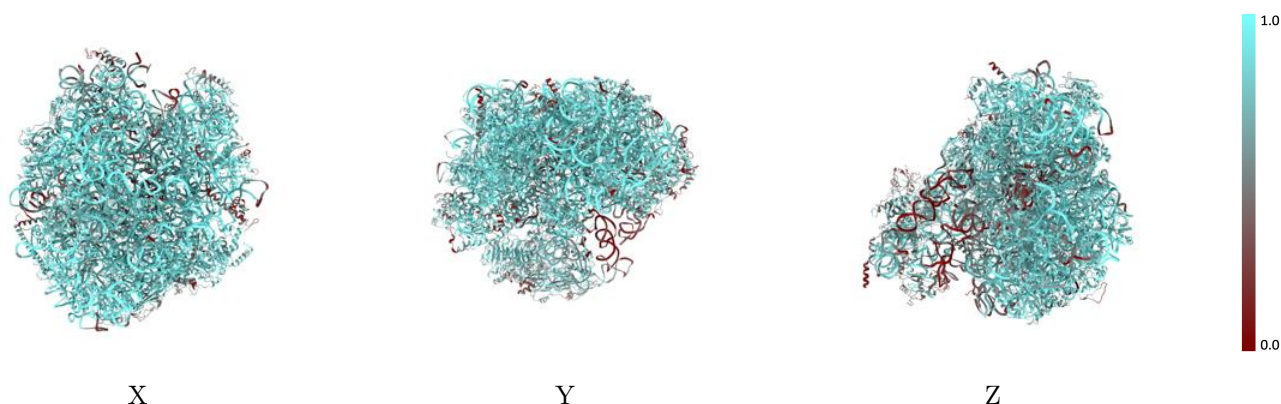
The images above show the 3D surface view of the map at the recommended contour level 0.025 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



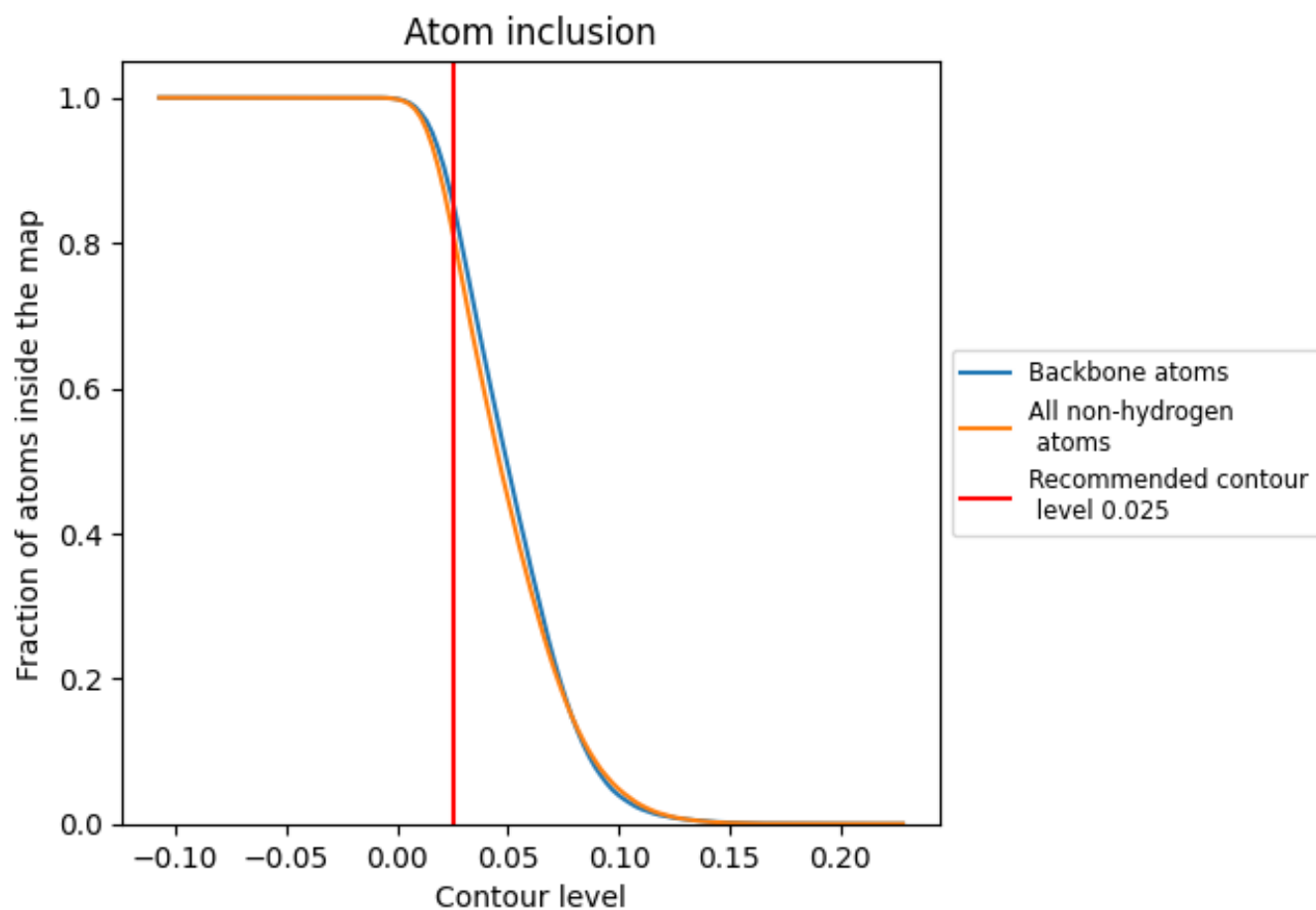
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.025).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 86% of all backbone atoms, 82% 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 (0.025) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8162	 0.5330
1	 0.8473	 0.5240
2	 0.8079	 0.5180
3	 0.7553	 0.3910
A	 0.6924	 0.5150
B	 0.8872	 0.5870
C	 0.8569	 0.5820
D	 0.6582	 0.4750
E	 0.8516	 0.5720
F	 0.8961	 0.5880
G	 0.5727	 0.4510
H	 0.8812	 0.5850
J	 0.4791	 0.4120
L	 0.7855	 0.5430
M	 0.8886	 0.5840
N	 0.8362	 0.5600
O	 0.9267	 0.6060
P	 0.7994	 0.5690
Q	 0.8232	 0.5640
R	 0.8686	 0.5890
S	 0.8501	 0.5680
T	 0.6457	 0.5110
U	 0.7882	 0.5340
V	 0.9126	 0.6060
W	 0.6238	 0.4820
X	 0.8178	 0.5580
Y	 0.8798	 0.5870
Z	 0.7180	 0.5060
a	 0.7819	 0.5450
b	 0.7467	 0.5360
c	 0.7565	 0.5280
d	 0.8868	 0.5940
e	 0.8964	 0.6060
f	 0.9342	 0.6170
g	 0.8570	 0.5820



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Chain	Atom inclusion	Q-score
h	 0.7466	 0.5120
i	 0.6309	 0.4790
j	 0.8983	 0.5950
k	 0.7412	 0.5380
m	 0.8287	 0.5650
p	 0.8373	 0.5690
r	 0.8699	 0.5860
u	 0.7945	 0.5660
v	 0.7223	 0.5300
w	 0.6899	 0.5140
x	 0.7227	 0.5150
y	 0.8465	 0.5740
z	 0.5023	 0.5310