



wwPDB EM Validation Summary Report ⓘ

Mar 17, 2026 – 10:56 PM UTC

PDB ID : 9NLH / pdb_00009nlh
EMDB ID : EMD-29405
Title : E.coli Initiation complex with YheS-EQ2
Authors : Singh, S.; Hunt, J.F.
Deposited on : 2025-03-03
Resolution : 3.10 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

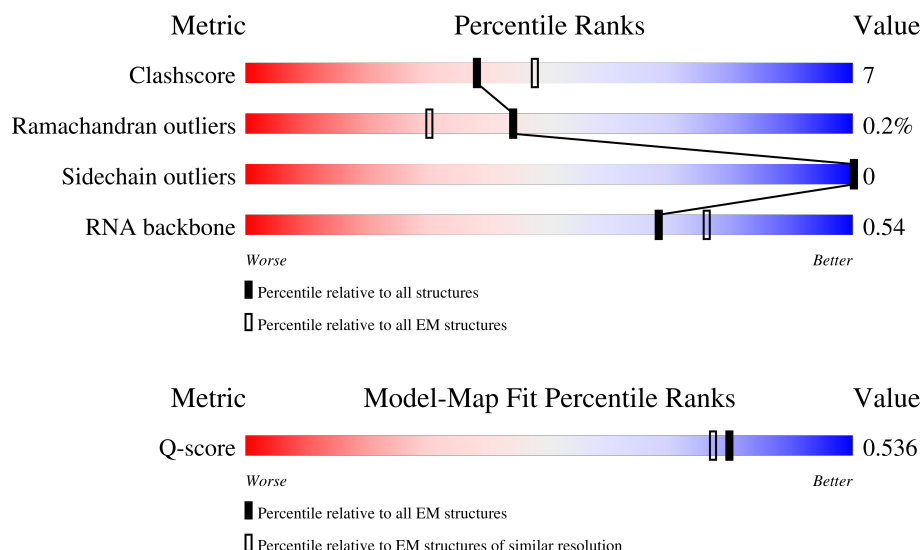
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.10 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



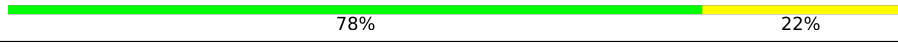
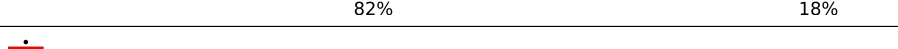
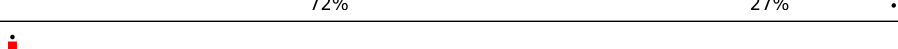
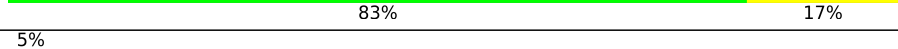
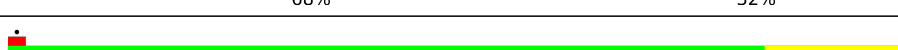
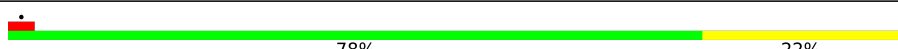
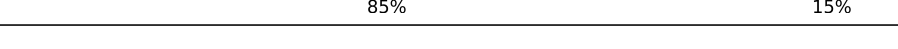
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	14724 (2.60 - 3.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	1	220	45% 82% 18%
2	13	142	83% 17%
3	14	122	81% 19%

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Mol	Chain	Length	Quality of chain
4	15	143	
5	16	136	
6	17	120	
7	18	116	
8	19	114	
9	2	271	
10	20	117	
11	21	103	
12	22	110	
13	23	93	
14	24	102	
15	25	94	
16	27	75	
17	28	77	
18	29	63	
19	3	209	
20	30	58	
21	32	56	
22	33	50	
23	34	46	
24	35	64	
25	36	38	
26	4	201	
27	5	177	
28	6	176	

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Mol	Chain	Length	Quality of chain
29	9	149	 77% 22%
30	H	526	 12% 73% 27%
31	M	9	 100%
32	R1	2903	 67% 27% 6%
33	R2	119	 61% 33% 7%
34	R3	1539	 58% 36% 6%
35	T	78	 62% 23% 10% 5%
36	sb	218	 9% 68% 32%
37	sc	206	 78% 22%
38	sd	205	 75% 25%
39	se	157	 79% 20%
40	sf	100	 24% 65% 35%
41	sg	151	 11% 81% 19%
42	sh	129	 80% 20%
43	si	127	 13% 76% 24%
44	sj	98	 22% 70% 30%
45	sk	116	 8% 80% 20%
46	sl	123	 78% 21%
47	sm	114	 24% 81% 19%
48	sn	100	 8% 70% 29%
49	so	88	 73% 27%
50	sp	82	 9% 77% 23%
51	sq	80	 81% 19%
52	sr	65	 12% 82% 18%
53	ss	79	 22% 67% 33%

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Mol	Chain	Length	Quality of chain
54	st	85	
55	su	65	

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
35	H2U	T	20	X	-	-	-
35	4OC	T	32	X	-	-	-
35	5MU	T	54	X	-	-	-
35	PSU	T	55	X	-	-	-
35	4SU	T	8	X	-	-	-

2 Entry composition [i](#)

There are 58 unique types of molecules in this entry. The entry contains 149471 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 Large ribosomal subunit protein uL1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	1	220	Total	C	N	O	S	0	0
			1353	804	270	277	2		

- Molecule 2 is a protein called Large ribosomal subunit protein uL13.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	13	142	Total	C	N	O	S	0	0
			1129	714	212	199	4		

- Molecule 3 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	14	122	Total	C	N	O	S	0	0
			938	587	180	165	6		

- Molecule 4 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	15	143	Total	C	N	O	S	0	0
			1045	649	206	189	1		

- Molecule 5 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	16	136	Total	C	N	O	S	0	0
			1074	686	205	177	6		

- Molecule 6 is a protein called Large ribosomal subunit protein bL17.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	17	120	Total	C	N	O	S	0	0
			960	593	196	166	5		

- Molecule 7 is a protein called Large ribosomal subunit protein uL18.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	18	116	Total	C	N	O	0	0
			892	552	178	162		

- Molecule 8 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	19	114	Total	C	N	O	S	0	0
			917	574	179	163	1		

- Molecule 9 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	2	271	Total	C	N	O	S	0	0
			2082	1288	423	364	7		

- Molecule 10 is a protein called Large ribosomal subunit protein bL20.

Mol	Chain	Residues	Atoms				AltConf	Trace
10	20	117	Total	C	N	O	0	0
			947	604	192	151		

- Molecule 11 is a protein called Large ribosomal subunit protein bL21.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	21	103	Total	C	N	O	S	0	0
			816	516	153	145	2		

- Molecule 12 is a protein called Large ribosomal subunit protein uL22.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	22	110	Total	C	N	O	S	0	0
			857	532	166	156	3		

- Molecule 13 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	23	93	Total	C	N	O	S	0	0
			738	466	139	131	2		

- Molecule 14 is a protein called Large ribosomal subunit protein uL24.

Mol	Chain	Residues	Atoms				AltConf	Trace
14	24	102	Total	C	N	O		
			779	492	146	141	0	0

- Molecule 15 is a protein called Large ribosomal subunit protein bL25.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	25	94	Total	C	N	O	S		
			753	479	137	134	3	0	0

- Molecule 16 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	27	75	Total	C	N	O	S		
			575	356	116	102	1	0	0

- Molecule 17 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	28	77	Total	C	N	O	S		
			625	388	129	106	2	0	0

- Molecule 18 is a protein called Large ribosomal subunit protein uL29.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	29	63	Total	C	N	O	S		
			509	313	99	95	2	0	0

- Molecule 19 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	3	209	Total	C	N	O	S		
			1565	979	288	294	4	0	0

- Molecule 20 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	30	58	Total	C	N	O	S		
			449	281	87	79	2	0	0

- Molecule 21 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	32	56	Total	C	N	O	S	0	0
			444	269	94	80	1		

- Molecule 22 is a protein called Large ribosomal subunit protein bL33.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	33	50	Total	C	N	O		0	0
			409	263	75	71			

- Molecule 23 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	34	46	Total	C	N	O	S	0	0
			377	228	90	57	2		

- Molecule 24 is a protein called Large ribosomal subunit protein bL35.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	35	64	Total	C	N	O	S	0	0
			504	323	105	74	2		

- Molecule 25 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	36	38	Total	C	N	O	S	0	0
			302	185	65	48	4		

- Molecule 26 is a protein called Large ribosomal subunit protein uL4.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	4	201	Total	C	N	O	S	0	0
			1552	974	283	290	5		

- Molecule 27 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	5	177	Total	C	N	O	S	0	0
			1410	899	249	256	6		

- Molecule 28 is a protein called Large ribosomal subunit protein uL6.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	6	176	Total	C	N	O	S	0	0
			1323	832	243	246	2		

- Molecule 29 is a protein called Large ribosomal subunit protein bL9.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	9	149	Total	C	N	O	S	0	0
			1111	699	197	214	1		

- Molecule 30 is a protein called YheS.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	H	526	Total	C	N	O	S	0	0
			4173	2638	748	777	10		

- Molecule 31 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	M	9	Total	C	N	O	P	0	0
			195	88	40	58	9		

- Molecule 32 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	R1	2903	Total	C	N	O	P	0	0
			62318	27801	11467	20148	2902		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R1	1847	G	A	conflict	GB 2019144442

- Molecule 33 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	R2	119	Total	C	N	O	P	0	0
			2546	1135	466	827	118		

- Molecule 34 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	R3	1539	Total	C	N	O	P	0	0
			33012	14725	6052	10697	1538		

- Molecule 35 is a RNA chain called tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	T	78	Total	C	N	O	P	S	
			1649	740	295	536	76	2	
								0	0

- Molecule 36 is a protein called Small ribosomal subunit protein uS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	sb	218	Total	C	N	O	S		
			1704	1081	305	311	7		
								0	0

- Molecule 37 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	sc	206	Total	C	N	O	S		
			1624	1028	305	288	3		
								0	0

- Molecule 38 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	sd	205	Total	C	N	O	S		
			1643	1026	315	298	4		
								0	0

- Molecule 39 is a protein called Small ribosomal subunit protein uS5.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	se	157	Total	C	N	O	S		
			1156	719	218	213	6		
								0	0

- Molecule 40 is a protein called 30S ribosomal protein S6, non-modified isoform.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	sf	100	Total	C	N	O	S		
			817	515	148	148	6		
								0	0

- Molecule 41 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	sg	151	Total	C	N	O	S		
			1181	735	227	215	4		
								0	0

- Molecule 42 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	sh	129	Total	C	N	O	S	0	0
			979	616	173	184	6		

- Molecule 43 is a protein called Small ribosomal subunit protein uS9.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	si	127	Total	C	N	O	S	0	0
			1022	634	206	179	3		

- Molecule 44 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	sj	98	Total	C	N	O	S	0	0
			786	493	150	142	1		

- Molecule 45 is a protein called Small ribosomal subunit protein uS11.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	sk	116	Total	C	N	O	S	0	0
			869	535	173	158	3		

- Molecule 46 is a protein called Small ribosomal subunit protein uS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	sl	123	Total	C	N	O	S	0	0
			955	590	196	165	4		

- Molecule 47 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	sm	114	Total	C	N	O	S	0	0
			883	546	178	156	3		

- Molecule 48 is a protein called Small ribosomal subunit protein uS14.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	sn	100	Total	C	N	O	S	0	0
			805	499	164	139	3		

- Molecule 49 is a protein called Small ribosomal subunit protein uS15.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	so	88	Total	C	N	O	S	0	0
			714	439	144	130	1		

- Molecule 50 is a protein called Small ribosomal subunit protein bS16.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	sp	82	Total	C	N	O	S	0	0
			649	406	128	114	1		

- Molecule 51 is a protein called Small ribosomal subunit protein uS17.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	sq	80	Total	C	N	O	S	0	0
			648	411	121	113	3		

- Molecule 52 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	sr	65	Total	C	N	O	S	0	0
			535	339	100	95	1		

- Molecule 53 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	ss	79	Total	C	N	O	S	0	0
			637	408	120	107	2		

- Molecule 54 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	st	85	Total	C	N	O	S	0	0
			665	411	137	114	3		

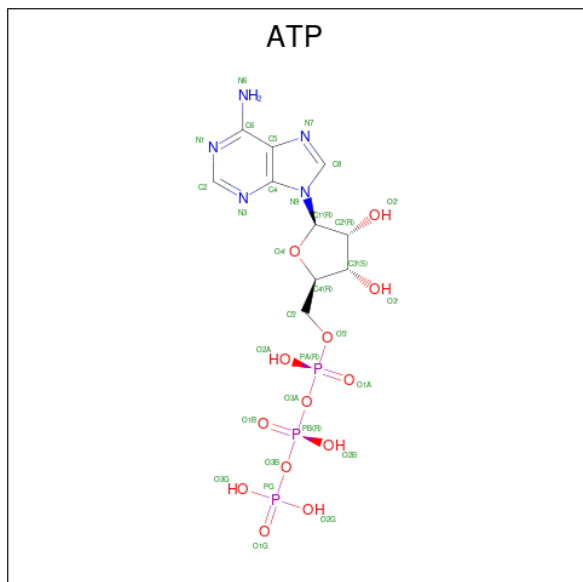
- Molecule 55 is a protein called Small ribosomal subunit protein bS21.

Mol	Chain	Residues	Atoms					AltConf	Trace
55	su	65	Total	C	N	O	S	0	0
			544	335	117	91	1		

- Molecule 56 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
56	17	1	Total	Mg	0
			1	1	
56	2	2	Total	Mg	0
			2	2	
56	3	1	Total	Mg	0
			1	1	
56	M	1	Total	Mg	0
			1	1	
56	R1	188	Total	Mg	0
			188	188	
56	R3	70	Total	Mg	0
			70	70	

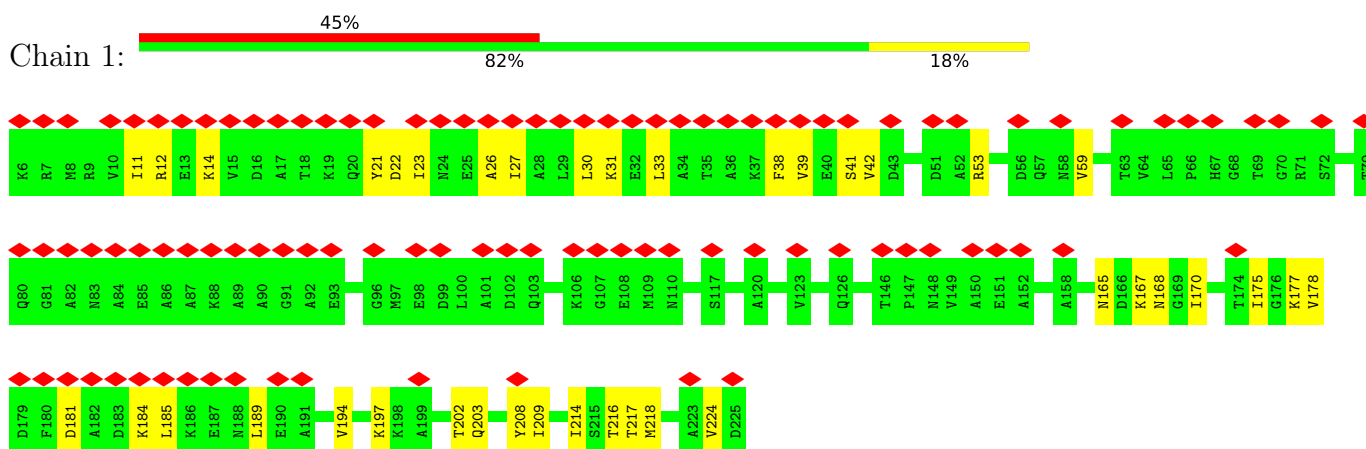
- Molecule 57 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



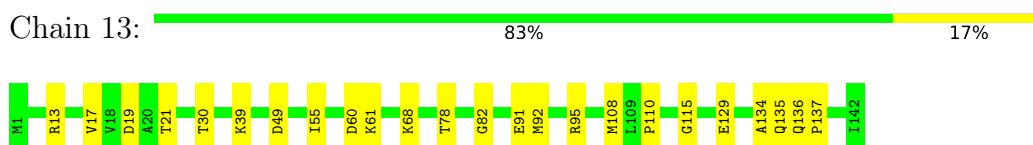
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

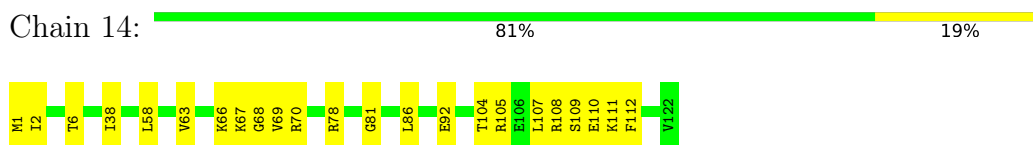
- Molecule 1: Large ribosomal subunit protein uL1



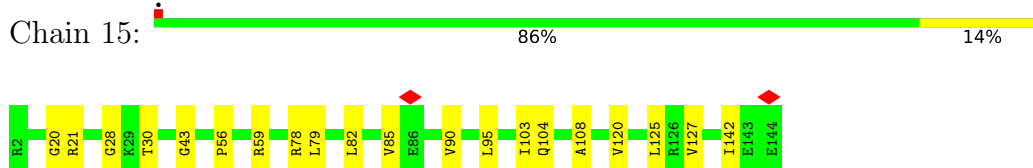
- Molecule 2: Large ribosomal subunit protein uL13



- Molecule 3: 50S ribosomal protein L14

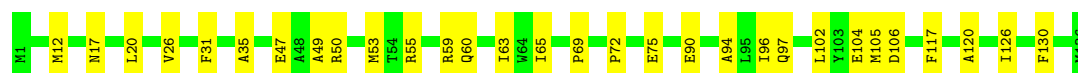


- Molecule 4: 50S ribosomal protein L15



- Molecule 5: 50S ribosomal protein L16

Chain 16:  78% 22%



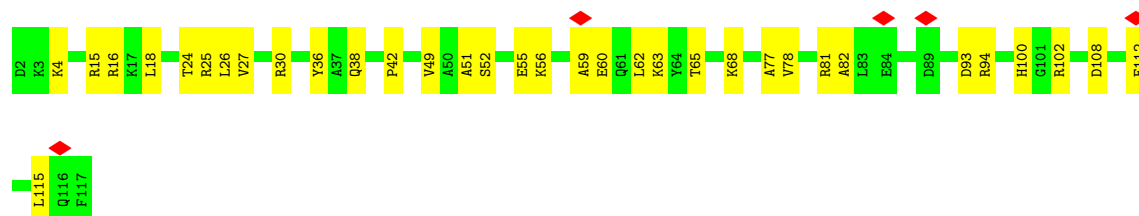
- Molecule 6: Large ribosomal subunit protein bL17

Chain 17:  82% 18%



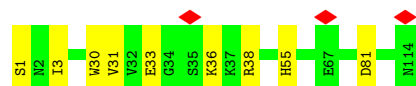
- Molecule 7: Large ribosomal subunit protein uL18

Chain 18:  71% 29%



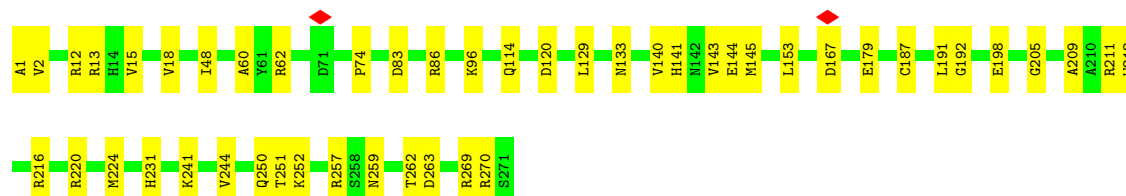
- Molecule 8: 50S ribosomal protein L19

Chain 19:  92% 8%



- Molecule 9: 50S ribosomal protein L2

Chain 2:  82% 18%



- Molecule 10: Large ribosomal subunit protein bL20

Chain 20:  87% 13%



- Molecule 11: Large ribosomal subunit protein bL21

Chain 21:  78% 21%



- Molecule 12: Large ribosomal subunit protein uL22

Chain 22:  72% 27%



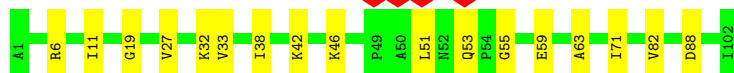
- Molecule 13: Large ribosomal subunit protein uL23

Chain 23:  80% 20%



- Molecule 14: Large ribosomal subunit protein uL24

Chain 24:  83% 17%



- Molecule 15: Large ribosomal subunit protein bL25

Chain 25:  9% 80% 20%



- Molecule 16: 50S ribosomal protein L27

Chain 27:  88% 12%

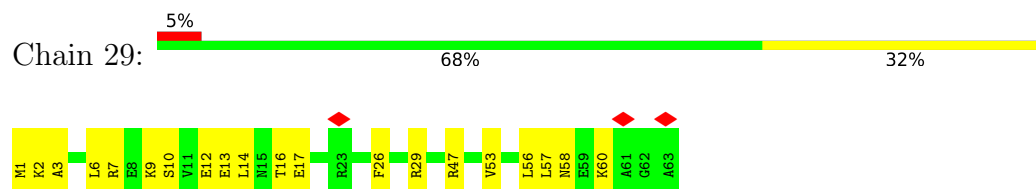


- Molecule 17: 50S ribosomal protein L28

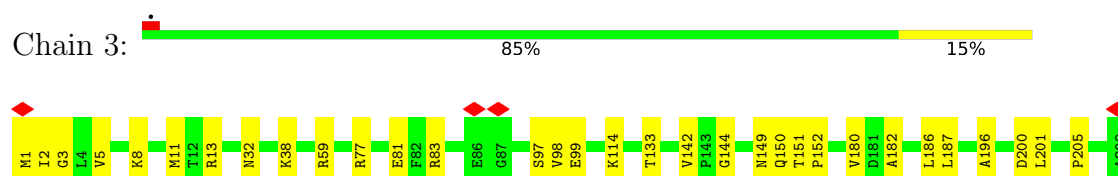
Chain 28:  83% 17%



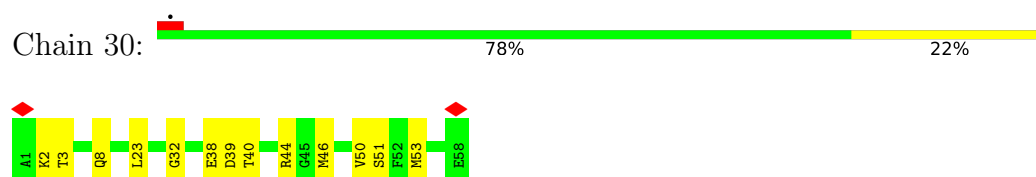
- Molecule 18: Large ribosomal subunit protein uL29



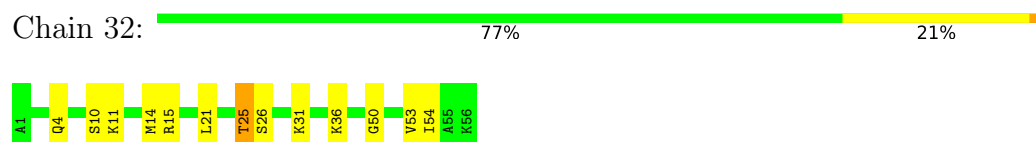
- Molecule 19: 50S ribosomal protein L3



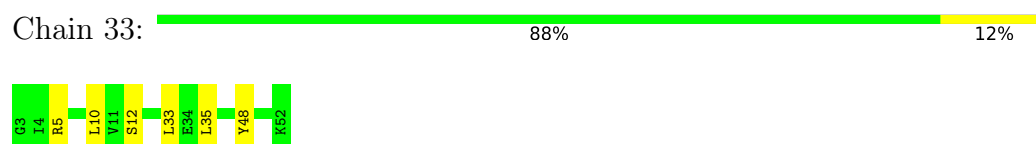
- Molecule 20: 50S ribosomal protein L30



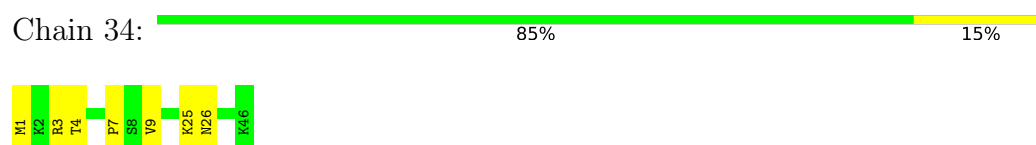
- Molecule 21: 50S ribosomal protein L32



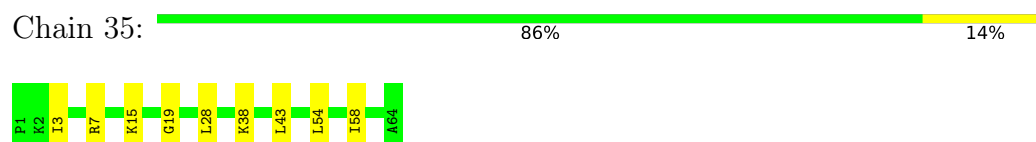
- Molecule 22: Large ribosomal subunit protein bL33



- Molecule 23: 50S ribosomal protein L34

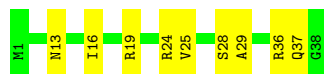


- Molecule 24: Large ribosomal subunit protein bL35



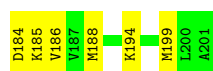
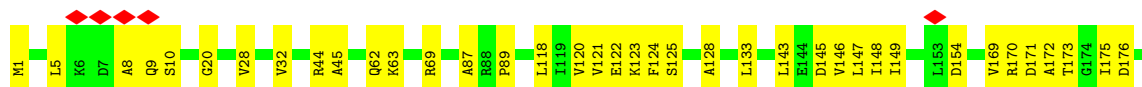
- Molecule 25: 50S ribosomal protein L36

Chain 36:  76% 24%



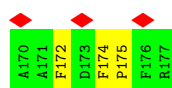
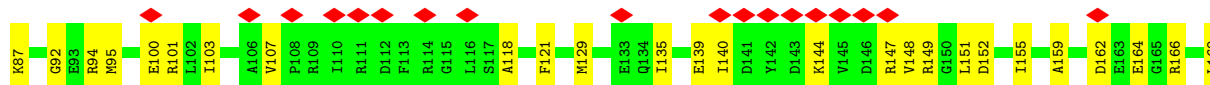
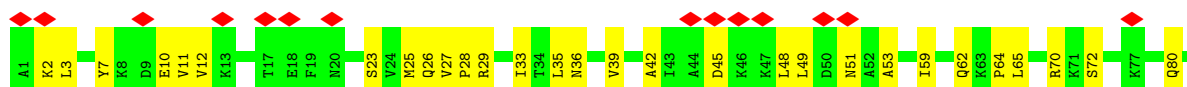
- Molecule 26: Large ribosomal subunit protein uL4

Chain 4:  78% 22%



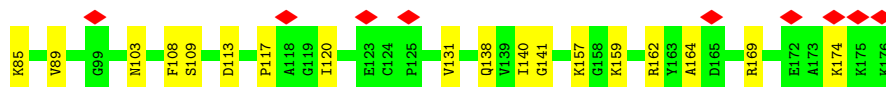
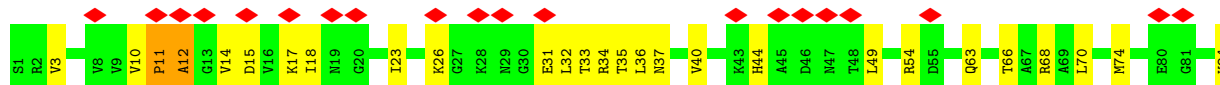
- Molecule 27: 50S ribosomal protein L5

Chain 5:  20% 67% 33%



- Molecule 28: Large ribosomal subunit protein uL6

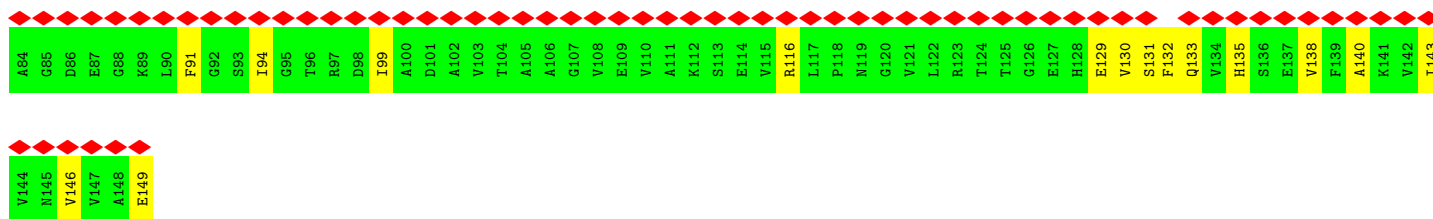
Chain 6:  16% 74% 24%



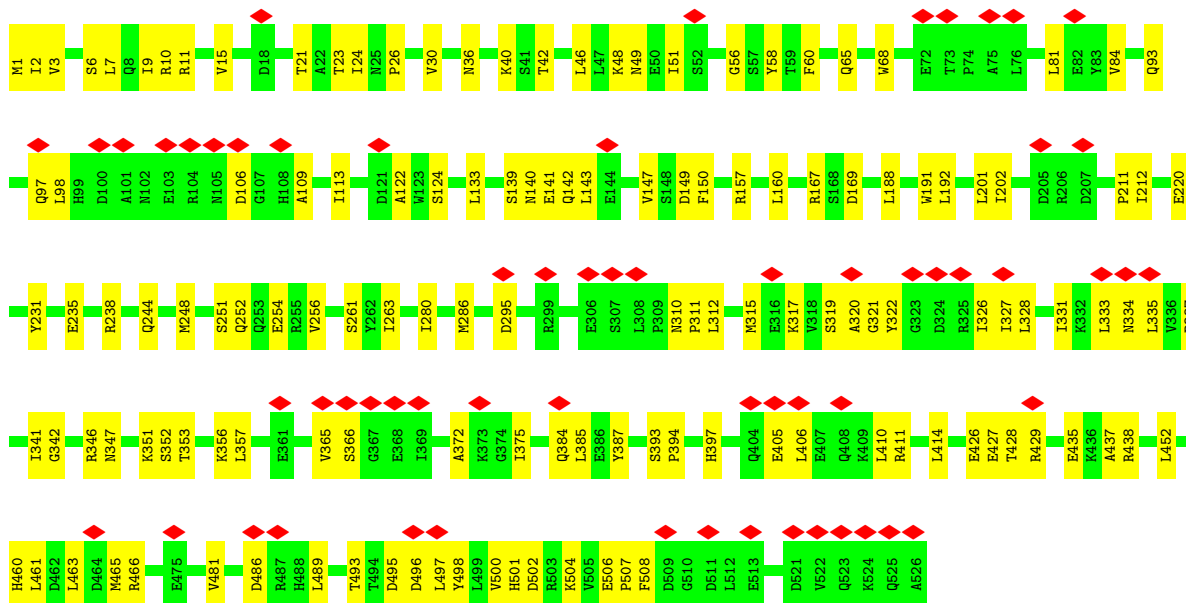
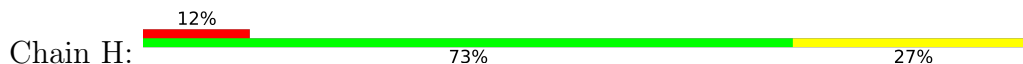
- Molecule 29: Large ribosomal subunit protein bL9

Chain 9:  77% 77% 22%





• Molecule 30: YheS

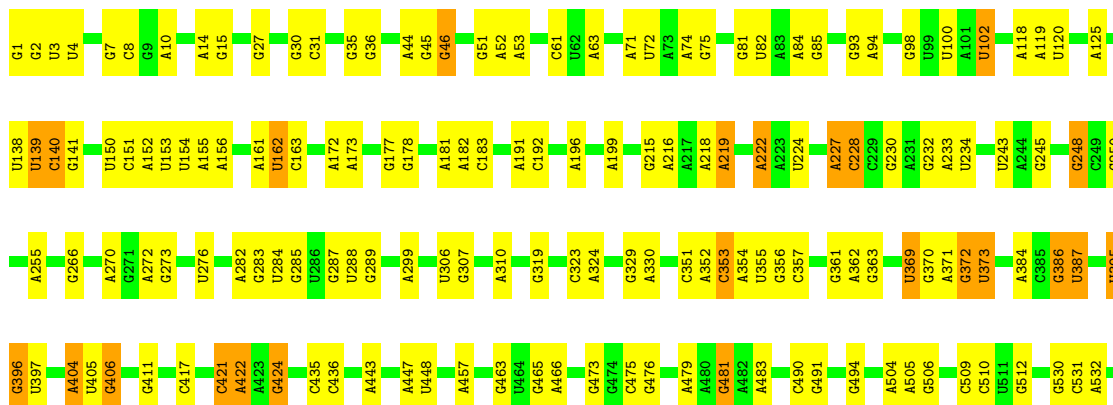


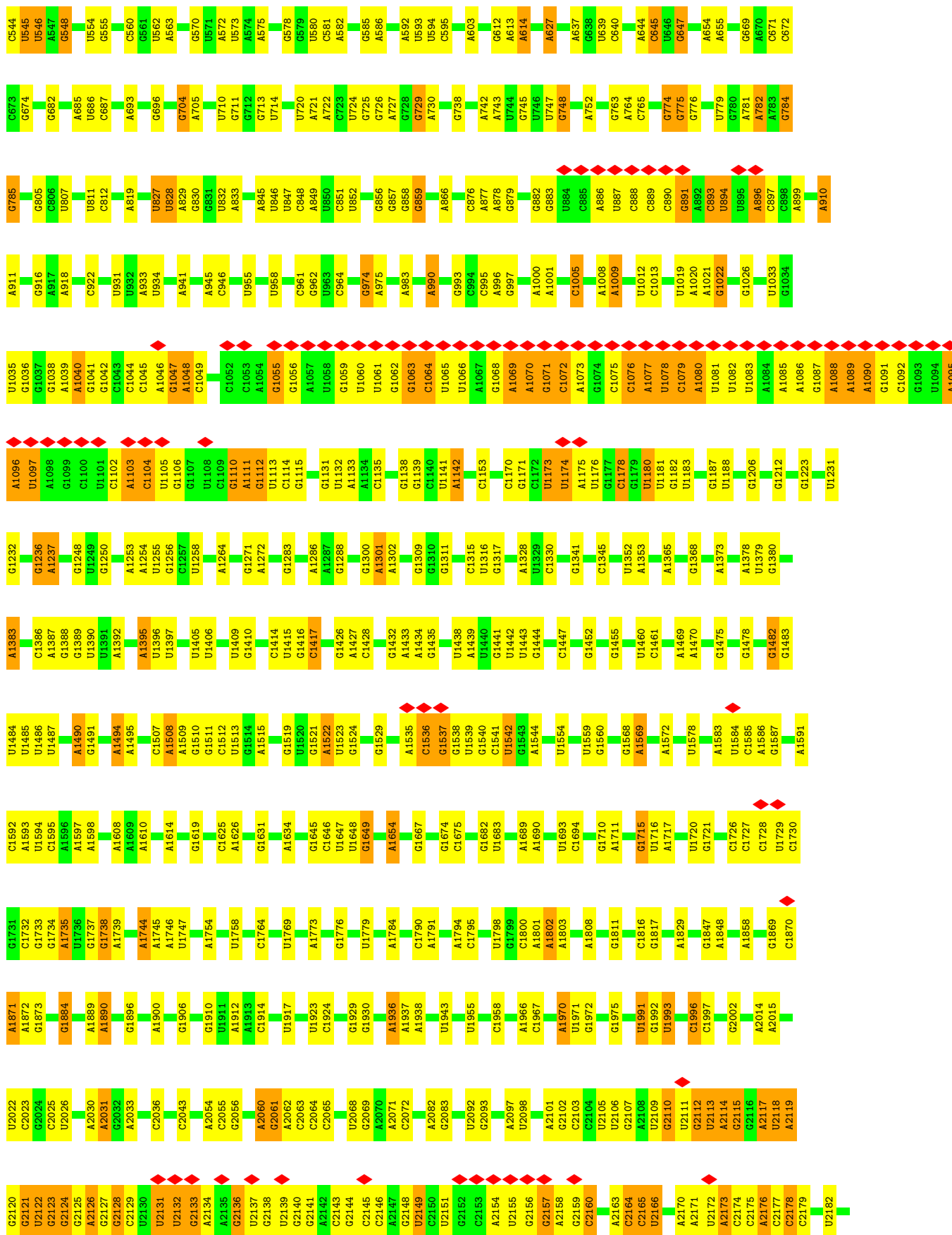
• Molecule 31: mRNA

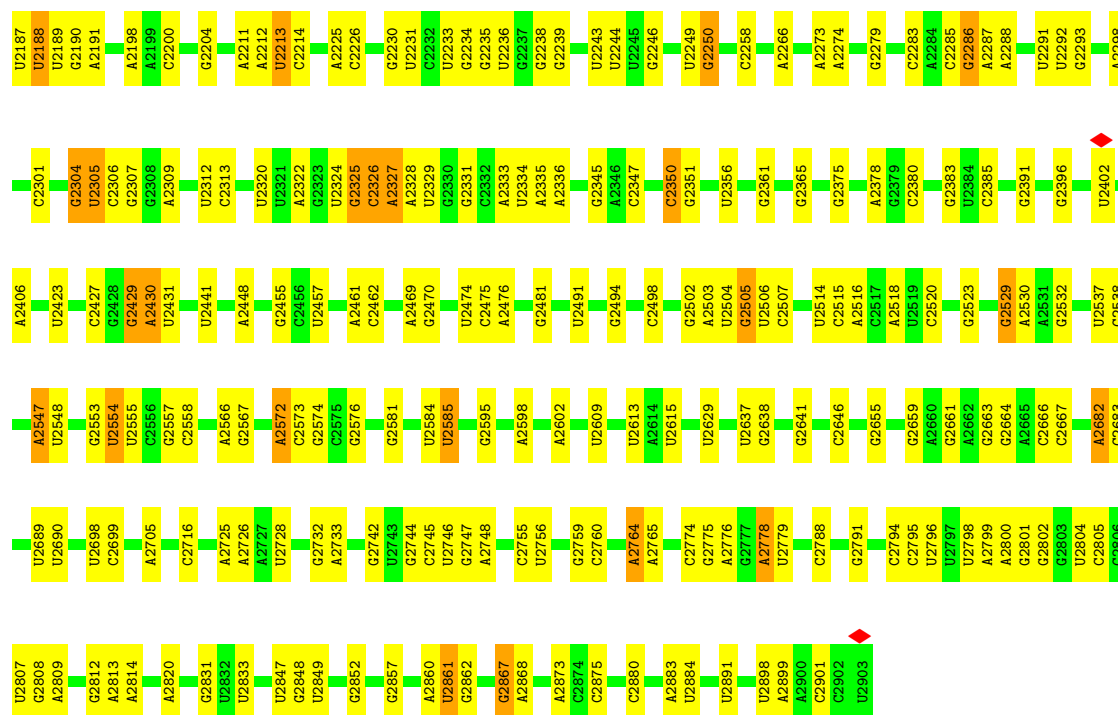


There are no outlier residues recorded for this chain.

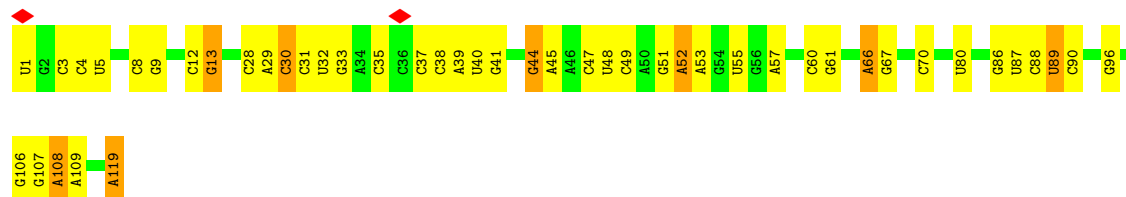
• Molecule 32: 23S ribosomal RNA



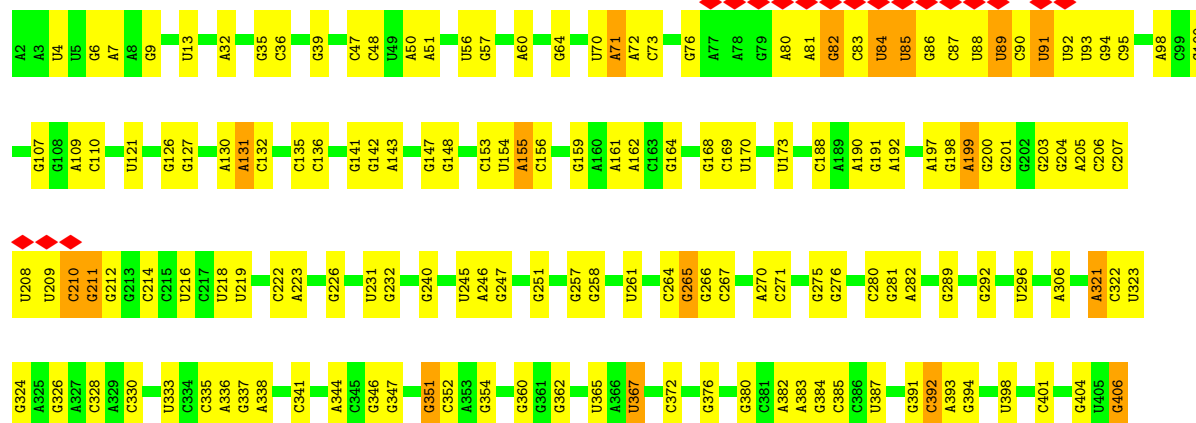


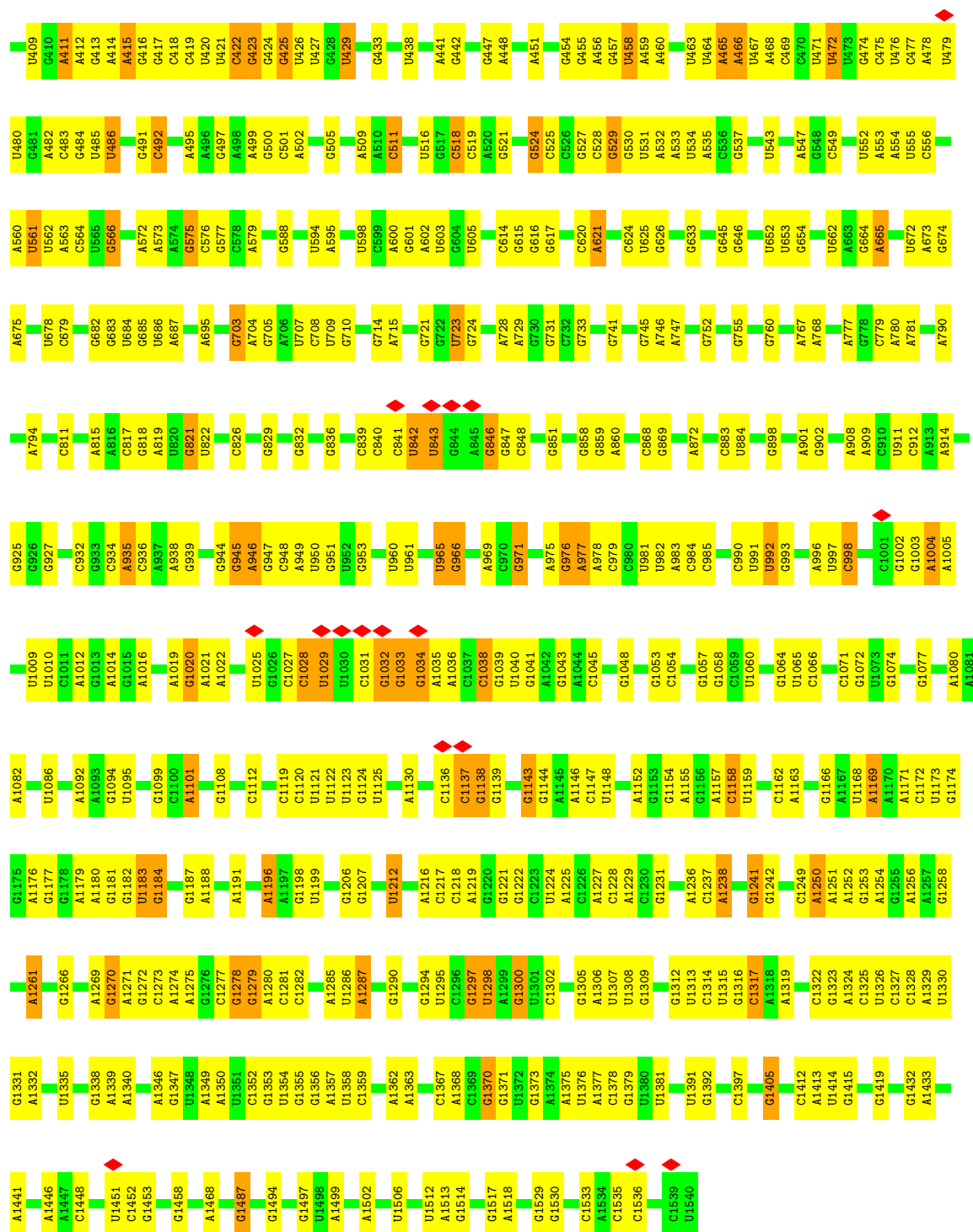


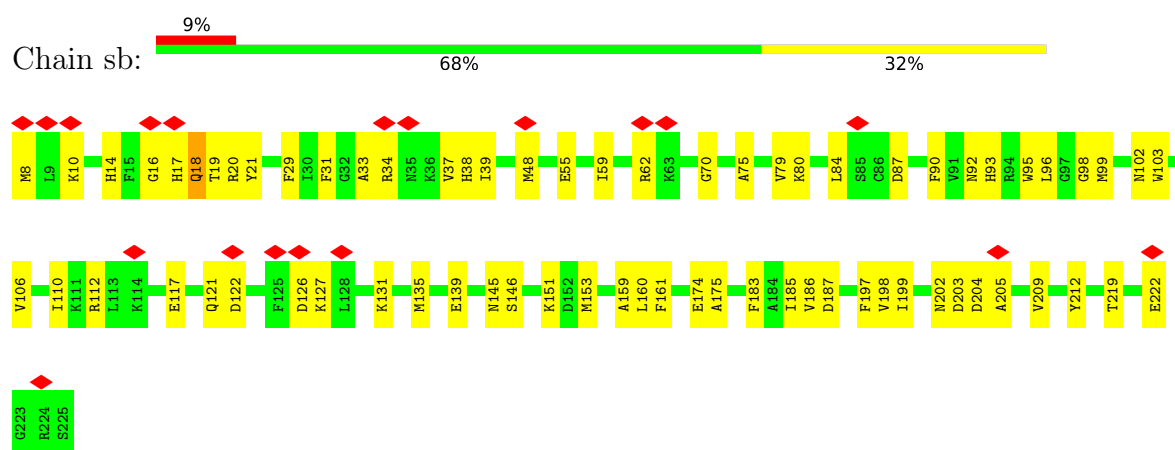
• Molecule 33: 5S ribosomal RNA



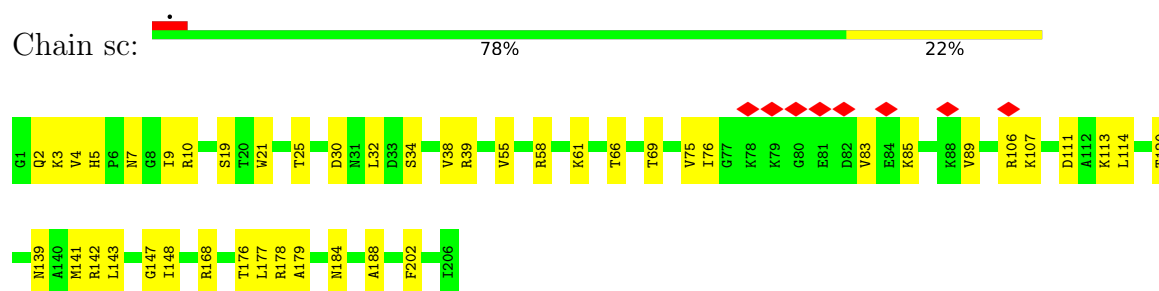
• Molecule 34: 16S ribosomal RNA



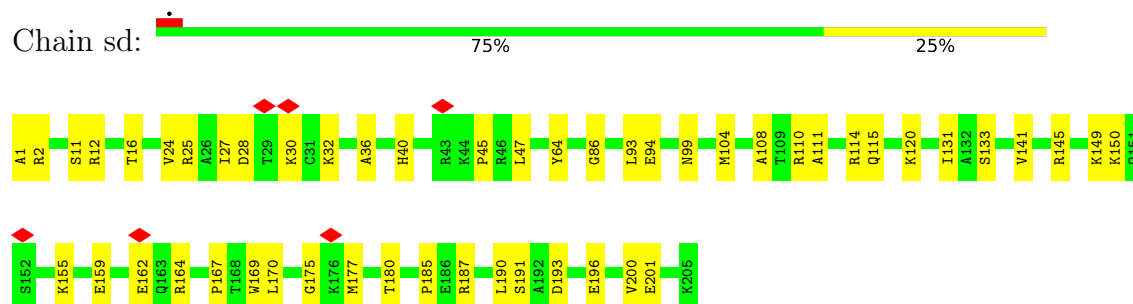




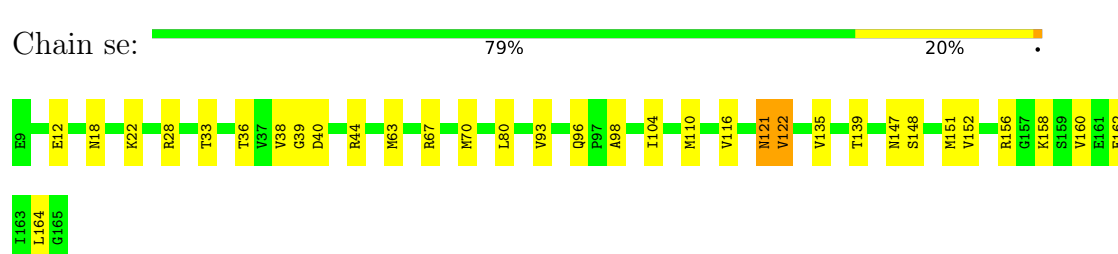
- Molecule 37: Small ribosomal subunit protein uS3



- Molecule 38: 30S ribosomal protein S4

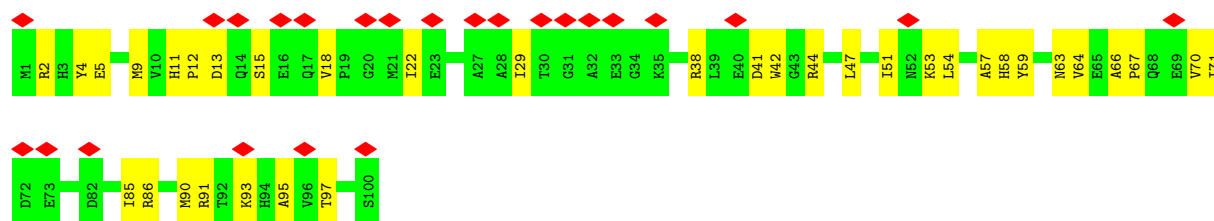


- Molecule 39: Small ribosomal subunit protein uS5

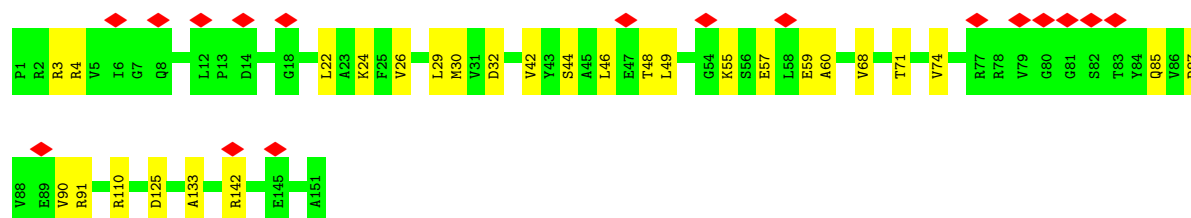
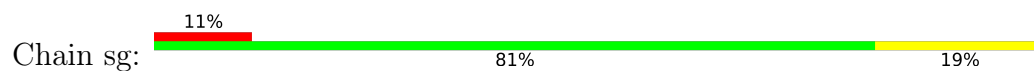


- Molecule 40: 30S ribosomal protein S6, non-modified isoform

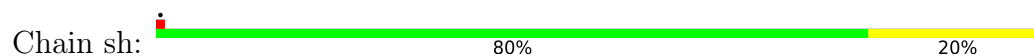




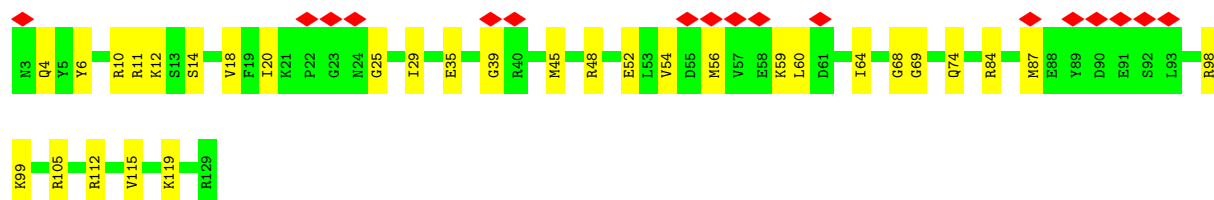
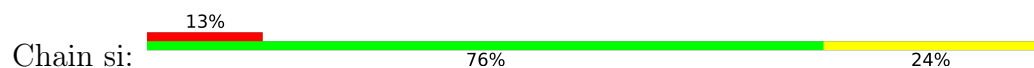
- Molecule 41: 30S ribosomal protein S7



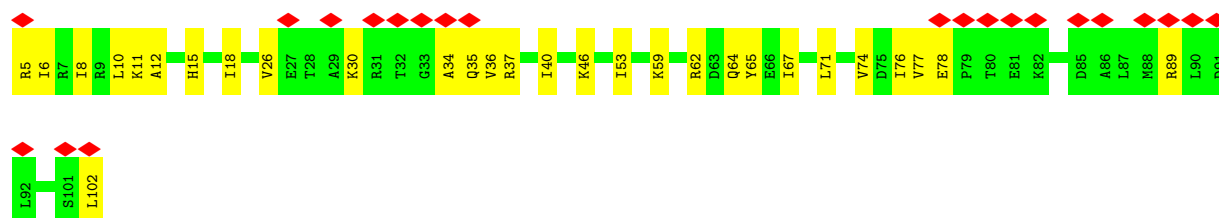
- Molecule 42: 30S ribosomal protein S8



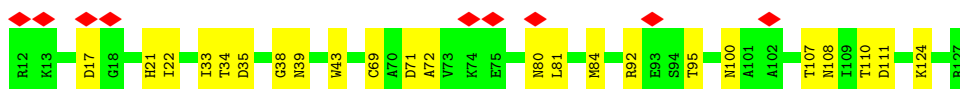
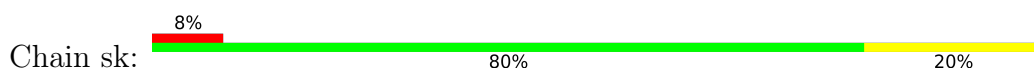
- Molecule 43: Small ribosomal subunit protein uS9



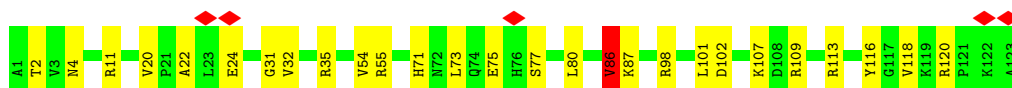
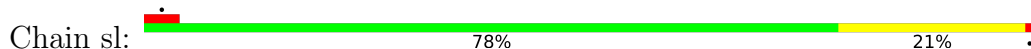
- Molecule 44: 30S ribosomal protein S10



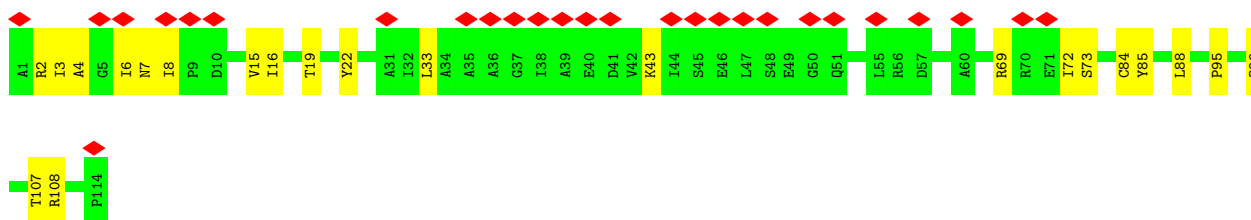
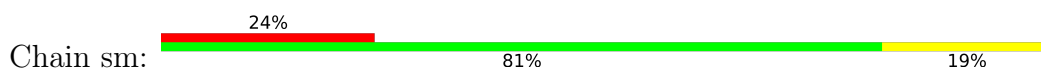
- Molecule 45: Small ribosomal subunit protein uS11



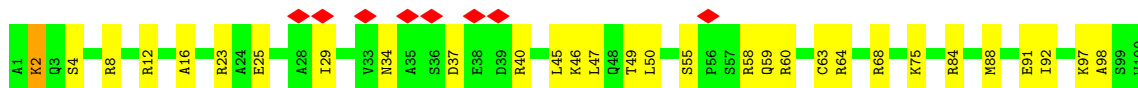
- Molecule 46: Small ribosomal subunit protein uS12



- Molecule 47: 30S ribosomal protein S13



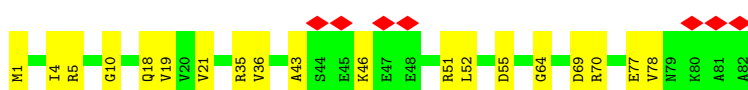
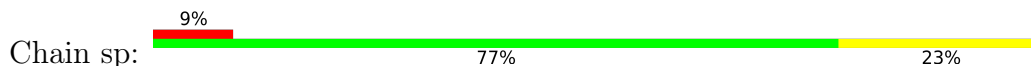
- Molecule 48: Small ribosomal subunit protein uS14



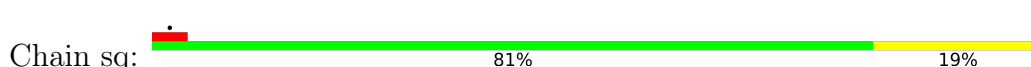
- Molecule 49: Small ribosomal subunit protein uS15

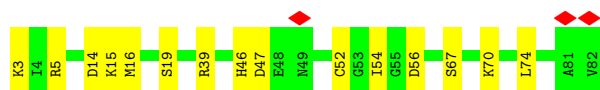


- Molecule 50: Small ribosomal subunit protein bS16

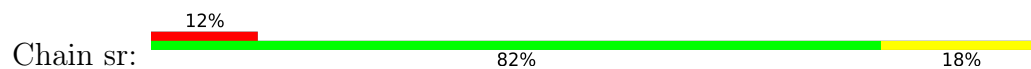


- Molecule 51: Small ribosomal subunit protein uS17

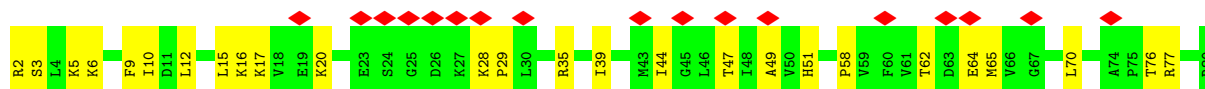




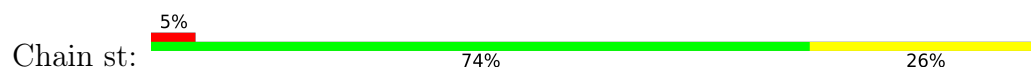
- Molecule 52: 30S ribosomal protein S18



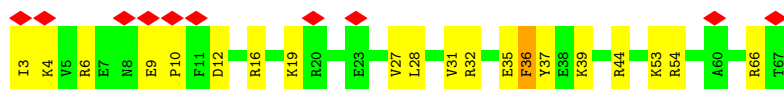
- Molecule 53: 30S ribosomal protein S19



- Molecule 54: 30S ribosomal protein S20



- Molecule 55: Small ribosomal subunit protein bS21



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	78096	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	64	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	4.474	Depositor
Minimum map value	-1.478	Depositor
Average map value	0.089	Depositor
Map value standard deviation	0.244	Depositor
Recommended contour level	0.8	Depositor
Map size (Å)	380.0, 380.0, 380.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.95, 0.95, 0.95	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: NA, 5MU, 4SU, H2U, 4OC, MG, PSU, FME, ATP

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	1	0.12	0/1361	0.31	0/1796
2	13	0.21	0/1152	0.29	0/1551
3	14	0.22	0/947	0.36	0/1268
4	15	0.24	0/1054	0.31	0/1403
5	16	0.23	0/1093	0.41	0/1460
6	17	0.24	0/973	0.39	0/1301
7	18	0.18	0/902	0.35	0/1209
8	19	0.22	0/929	0.32	0/1242
9	2	0.23	0/2121	0.32	0/2852
10	20	0.26	0/960	0.35	0/1278
11	21	0.23	0/829	0.44	0/1107
12	22	0.22	0/864	0.35	0/1156
13	23	0.21	0/744	0.40	0/994
14	24	0.19	0/787	0.34	0/1051
15	25	0.18	0/766	0.32	0/1025
16	27	0.23	0/582	0.29	0/769
17	28	0.22	0/635	0.34	0/848
18	29	0.20	0/510	0.41	0/677
19	3	0.23	0/1586	0.36	0/2134
20	30	0.20	0/453	0.31	0/605
21	32	0.22	0/450	0.30	0/599
22	33	0.20	0/416	0.35	0/554
23	34	0.25	0/380	0.27	0/498
24	35	0.24	0/513	0.33	0/676
25	36	0.20	0/303	0.23	0/397
26	4	0.22	0/1571	0.34	0/2113
27	5	0.15	0/1434	0.35	0/1926
28	6	0.68	3/1343 (0.2%)	0.92	4/1816 (0.2%)
29	9	0.16	0/1122	0.43	0/1515
30	H	0.18	0/4253	0.39	1/5752 (0.0%)
31	M	0.17	0/219	0.18	0/339
32	R1	0.25	0/69797	0.29	0/108890

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
33	R2	0.19	0/2847	0.29	0/4440
34	R3	0.20	0/36963	0.27	0/57662
35	T	0.22	0/1716	0.28	0/2672
36	sb	0.15	0/1735	0.38	0/2338
37	sc	0.17	0/1651	0.33	0/2225
38	sd	0.17	0/1665	0.36	0/2227
39	se	0.21	0/1169	0.48	0/1573
40	sf	0.17	0/835	0.42	0/1128
41	sg	0.17	0/1195	0.37	0/1602
42	sh	0.18	0/989	0.38	0/1326
43	si	0.17	0/1034	0.42	0/1375
44	sj	0.17	0/796	0.40	0/1077
45	sk	0.16	0/885	0.30	0/1195
46	sl	0.19	0/969	0.43	0/1300
47	sm	0.13	0/892	0.34	0/1193
48	sn	0.17	0/817	0.45	0/1088
49	so	0.18	0/722	0.36	0/964
50	sp	0.19	0/659	0.35	0/884
51	sq	0.19	0/657	0.34	0/881
52	sr	0.14	0/544	0.25	0/731
53	ss	0.13	0/652	0.31	0/877
54	st	0.19	0/671	0.38	0/888
55	su	0.17	0/550	0.43	0/728
All	All	0.23	3/161662 (0.0%)	0.32	5/241175 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
11	21	0	1
28	6	0	1
29	9	0	1
35	T	8	0
39	se	0	1
46	sl	0	1
All	All	8	5

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
28	6	11	PRO	N-CD	19.82	1.75	1.47
28	6	11	PRO	CB-CG	-11.25	0.93	1.49
28	6	11	PRO	CG-CD	-7.40	1.25	1.50

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
28	6	11	PRO	CB-CG-CD	21.67	175.45	106.10
28	6	11	PRO	N-CD-CG	-19.69	73.67	103.20
28	6	11	PRO	CA-CB-CG	-15.03	75.94	104.50
28	6	11	PRO	CA-N-CD	-14.26	92.03	112.00
30	H	261	SER	N-CA-C	-5.34	106.07	113.18

5 of 8 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
35	T	8	4SU	C3',C2'
35	T	20	H2U	C3',C2'
35	T	32	4OC	C1',C2'
35	T	54	5MU	C4'
35	T	55	PSU	C4'

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
11	21	51	VAL	Peptide
28	6	12	ALA	Peptide
29	9	8	LYS	Peptide
39	se	121	ASN	Peptide
46	sl	86	VAL	Peptide

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	1	1353	0	1159	26	0
2	13	1129	0	1162	19	0
3	14	938	0	1012	16	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	15	1045	0	1117	14	0
5	16	1074	0	1157	19	0
6	17	960	0	1000	13	0
7	18	892	0	923	26	0
8	19	917	0	965	9	0
9	2	2082	0	2157	34	0
10	20	947	0	1022	16	0
11	21	816	0	839	18	0
12	22	857	0	922	22	0
13	23	738	0	807	15	0
14	24	779	0	834	10	0
15	25	753	0	780	12	0
16	27	575	0	592	8	0
17	28	625	0	655	8	0
18	29	509	0	543	15	0
19	3	1565	0	1616	23	0
20	30	449	0	491	8	0
21	32	444	0	461	11	0
22	33	409	0	440	5	0
23	34	377	0	418	7	0
24	35	504	0	574	7	0
25	36	302	0	343	7	0
26	4	1552	0	1619	29	0
27	5	1410	0	1447	43	0
28	6	1323	0	1374	33	0
29	9	1111	0	1148	26	0
30	H	4173	0	4184	113	0
31	M	195	0	99	0	0
32	R1	62318	0	31345	518	0
33	R2	2546	0	1292	40	0
34	R3	33012	0	16617	368	0
35	T	1649	0	853	16	0
36	sb	1704	0	1732	59	0
37	sc	1624	0	1699	33	0
38	sd	1643	0	1710	42	0
39	se	1156	0	1199	32	0
40	sf	817	0	808	24	0
41	sg	1181	0	1240	21	0
42	sh	979	0	1034	21	0
43	si	1022	0	1070	42	0
44	sj	786	0	828	21	0
45	sk	869	0	878	22	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
46	sl	955	0	1019	20	0
47	sm	883	0	944	17	0
48	sn	805	0	847	26	0
49	so	714	0	737	20	0
50	sp	649	0	666	16	0
51	sq	648	0	691	16	0
52	sr	535	0	552	9	0
53	ss	637	0	665	21	0
54	st	665	0	714	15	0
55	su	544	0	579	23	0
56	17	1	0	0	0	0
56	2	2	0	0	0	0
56	3	1	0	0	0	0
56	M	1	0	0	0	0
56	R1	188	0	0	0	0
56	R3	70	0	0	0	0
57	H	62	0	24	4	0
58	H	2	0	0	0	0
All	All	149471	0	101603	1833	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

The worst 5 of 1833 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
34:R3:1307:U:H5'	47:sm:107:THR:HG21	1.47	0.97
43:si:11:ARG:HH11	43:si:12:LYS:HB2	1.26	0.97
32:R1:1040:A:H61	32:R1:1115:G:H1	1.03	0.95
34:R3:509:A:H8	34:R3:543:U:HO2'	1.01	0.94
49:so:55:LEU:HA	49:so:58:MET:HE2	1.51	0.91

There are no symmetry-related clashes.

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	1	218/220 (99%)	196 (90%)	22 (10%)	0	100	100
2	13	140/142 (99%)	135 (96%)	5 (4%)	0	100	100
3	14	120/122 (98%)	106 (88%)	13 (11%)	1 (1%)	16	47
4	15	141/143 (99%)	131 (93%)	10 (7%)	0	100	100
5	16	134/136 (98%)	125 (93%)	9 (7%)	0	100	100
6	17	118/120 (98%)	109 (92%)	9 (8%)	0	100	100
7	18	114/116 (98%)	108 (95%)	6 (5%)	0	100	100
8	19	112/114 (98%)	105 (94%)	7 (6%)	0	100	100
9	2	269/271 (99%)	247 (92%)	22 (8%)	0	100	100
10	20	115/117 (98%)	113 (98%)	2 (2%)	0	100	100
11	21	101/103 (98%)	91 (90%)	9 (9%)	1 (1%)	12	41
12	22	108/110 (98%)	100 (93%)	7 (6%)	1 (1%)	14	44
13	23	91/93 (98%)	78 (86%)	13 (14%)	0	100	100
14	24	100/102 (98%)	92 (92%)	7 (7%)	1 (1%)	12	41
15	25	92/94 (98%)	92 (100%)	0	0	100	100
16	27	73/75 (97%)	71 (97%)	2 (3%)	0	100	100
17	28	75/77 (97%)	73 (97%)	2 (3%)	0	100	100
18	29	61/63 (97%)	55 (90%)	6 (10%)	0	100	100
19	3	207/209 (99%)	193 (93%)	14 (7%)	0	100	100
20	30	56/58 (97%)	52 (93%)	4 (7%)	0	100	100
21	32	54/56 (96%)	49 (91%)	4 (7%)	1 (2%)	6	27
22	33	48/50 (96%)	43 (90%)	5 (10%)	0	100	100
23	34	44/46 (96%)	44 (100%)	0	0	100	100
24	35	62/64 (97%)	58 (94%)	4 (6%)	0	100	100
25	36	36/38 (95%)	34 (94%)	2 (6%)	0	100	100
26	4	199/201 (99%)	188 (94%)	11 (6%)	0	100	100
27	5	175/177 (99%)	166 (95%)	9 (5%)	0	100	100
28	6	174/176 (99%)	160 (92%)	14 (8%)	0	100	100
29	9	147/149 (99%)	122 (83%)	24 (16%)	1 (1%)	18	49
30	H	524/526 (100%)	454 (87%)	69 (13%)	1 (0%)	43	73

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
36	sb	216/218 (99%)	194 (90%)	21 (10%)	1 (0%)	24	57
37	sc	204/206 (99%)	195 (96%)	9 (4%)	0	100	100
38	sd	203/205 (99%)	177 (87%)	26 (13%)	0	100	100
39	se	155/157 (99%)	132 (85%)	21 (14%)	2 (1%)	9	35
40	sf	98/100 (98%)	85 (87%)	13 (13%)	0	100	100
41	sg	149/151 (99%)	138 (93%)	11 (7%)	0	100	100
42	sh	127/129 (98%)	122 (96%)	5 (4%)	0	100	100
43	si	125/127 (98%)	106 (85%)	19 (15%)	0	100	100
44	sj	96/98 (98%)	89 (93%)	7 (7%)	0	100	100
45	sk	114/116 (98%)	102 (90%)	12 (10%)	0	100	100
46	sl	121/123 (98%)	91 (75%)	29 (24%)	1 (1%)	16	47
47	sm	112/114 (98%)	100 (89%)	12 (11%)	0	100	100
48	sn	98/100 (98%)	87 (89%)	10 (10%)	1 (1%)	12	41
49	so	86/88 (98%)	80 (93%)	6 (7%)	0	100	100
50	sp	80/82 (98%)	71 (89%)	9 (11%)	0	100	100
51	sq	78/80 (98%)	70 (90%)	8 (10%)	0	100	100
52	sr	63/65 (97%)	58 (92%)	5 (8%)	0	100	100
53	ss	77/79 (98%)	68 (88%)	9 (12%)	0	100	100
54	st	83/85 (98%)	82 (99%)	1 (1%)	0	100	100
55	su	63/65 (97%)	51 (81%)	11 (18%)	1 (2%)	7	30
All	All	6256/6356 (98%)	5688 (91%)	555 (9%)	13 (0%)	44	73

5 of 13 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	14	110	GLU
55	su	36	PHE
36	sb	18	GLN
39	se	121	ASN
39	se	122	VAL

5.3.2 Protein sidechains ⓘ

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

entries.

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	1	106/171 (62%)	106 (100%)	0	100	100
2	13	116/116 (100%)	116 (100%)	0	100	100
3	14	103/103 (100%)	103 (100%)	0	100	100
4	15	102/102 (100%)	102 (100%)	0	100	100
5	16	109/109 (100%)	109 (100%)	0	100	100
6	17	100/100 (100%)	100 (100%)	0	100	100
7	18	86/86 (100%)	86 (100%)	0	100	100
8	19	99/99 (100%)	99 (100%)	0	100	100
9	2	216/216 (100%)	216 (100%)	0	100	100
10	20	89/89 (100%)	89 (100%)	0	100	100
11	21	84/84 (100%)	84 (100%)	0	100	100
12	22	93/93 (100%)	93 (100%)	0	100	100
13	23	80/80 (100%)	80 (100%)	0	100	100
14	24	83/83 (100%)	83 (100%)	0	100	100
15	25	78/78 (100%)	78 (100%)	0	100	100
16	27	57/57 (100%)	57 (100%)	0	100	100
17	28	67/67 (100%)	67 (100%)	0	100	100
18	29	55/55 (100%)	55 (100%)	0	100	100
19	3	164/164 (100%)	164 (100%)	0	100	100
20	30	48/48 (100%)	48 (100%)	0	100	100
21	32	47/47 (100%)	47 (100%)	0	100	100
22	33	45/45 (100%)	45 (100%)	0	100	100
23	34	38/38 (100%)	38 (100%)	0	100	100
24	35	51/51 (100%)	51 (100%)	0	100	100
25	36	34/34 (100%)	34 (100%)	0	100	100
26	4	165/165 (100%)	165 (100%)	0	100	100
27	5	148/148 (100%)	148 (100%)	0	100	100
28	6	137/137 (100%)	137 (100%)	0	100	100
29	9	114/114 (100%)	114 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
30	H	443/443 (100%)	443 (100%)	0	100	100
36	sb	180/180 (100%)	180 (100%)	0	100	100
37	sc	170/170 (100%)	170 (100%)	0	100	100
38	sd	172/172 (100%)	172 (100%)	0	100	100
39	se	119/119 (100%)	119 (100%)	0	100	100
40	sf	87/87 (100%)	87 (100%)	0	100	100
41	sg	124/124 (100%)	124 (100%)	0	100	100
42	sh	104/104 (100%)	104 (100%)	0	100	100
43	si	105/105 (100%)	105 (100%)	0	100	100
44	sj	86/86 (100%)	86 (100%)	0	100	100
45	sk	89/89 (100%)	89 (100%)	0	100	100
46	sl	103/103 (100%)	103 (100%)	0	100	100
47	sm	92/92 (100%)	92 (100%)	0	100	100
48	sn	83/83 (100%)	83 (100%)	0	100	100
49	so	76/76 (100%)	76 (100%)	0	100	100
50	sp	65/65 (100%)	65 (100%)	0	100	100
51	sq	74/74 (100%)	74 (100%)	0	100	100
52	sr	56/56 (100%)	56 (100%)	0	100	100
53	ss	70/70 (100%)	70 (100%)	0	100	100
54	st	65/65 (100%)	65 (100%)	0	100	100
55	su	55/55 (100%)	55 (100%)	0	100	100
All	All	5132/5197 (99%)	5132 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 36 such sidechains are listed below:

Mol	Chain	Res	Type
41	sg	96	ASN
54	st	20	ASN
42	sh	17	GLN
49	so	49	HIS
20	30	19	HIS

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
31	M	8/9 (88%)	0	0
32	R1	2902/2903 (99%)	454 (15%)	13 (0%)
33	R2	118/119 (99%)	17 (14%)	1 (0%)
34	R3	1538/1539 (99%)	272 (17%)	5 (0%)
35	T	76/78 (97%)	20 (26%)	4 (5%)
All	All	4642/4648 (99%)	763 (16%)	23 (0%)

5 of 763 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
32	R1	10	A
32	R1	14	A
32	R1	15	G
32	R1	35	G
32	R1	36	G

5 of 23 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
34	R3	391	G
34	R3	1183	U
34	R3	1168	U
34	R3	1297	G
32	R1	1020	A

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

6 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	$\# Z > 2$
35	5MU	T	54	35	19,22,23	2.18	8 (42%)	27,32,35	2.26	6 (22%)
35	FME	T	101	35	8,9,10	0.97	0	8,9,11	0.85	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
35	H2U	T	20	35	18,21,22	4.46	5 (27%)	19,30,33	3.90	6 (31%)
35	4SU	T	8	35	18,21,22	3.89	6 (33%)	25,30,33	2.31	7 (28%)
35	4OC	T	32	35	20,23,24	2.59	5 (25%)	25,32,35	1.69	6 (24%)
35	PSU	T	55	35	18,21,22	2.27	7 (38%)	21,30,33	1.75	4 (19%)

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
35	5MU	T	54	35	1/1/5/5	3/7/25/26	0/2/2/2
35	FME	T	101	35	-	3/7/9/11	-
35	H2U	T	20	35	2/2/8/9	3/7/38/39	0/2/2/2
35	4SU	T	8	35	2/2/5/5	3/7/25/26	0/2/2/2
35	4OC	T	32	35	2/2/5/6	4/9/29/30	0/2/2/2
35	PSU	T	55	35	1/1/5/5	1/7/25/26	0/2/2/2

The worst 5 of 31 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
35	T	20	H2U	O4-C4	10.35	1.43	1.23
35	T	8	4SU	O2-C2	10.20	1.41	1.23
35	T	8	4SU	C4-S4	9.62	1.86	1.68
35	T	20	H2U	C2-N1	9.50	1.48	1.35
35	T	32	4OC	O2-C2	8.87	1.40	1.23

The worst 5 of 29 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
35	T	20	H2U	O2-C2-N1	-10.88	110.02	123.10
35	T	20	H2U	O4-C4-N3	-7.66	108.50	120.30
35	T	20	H2U	O4-C4-C5	-6.61	108.67	122.20
35	T	8	4SU	C4-N3-C2	-6.04	121.52	127.31
35	T	20	H2U	O2-C2-N3	-6.04	110.35	121.49

5 of 8 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
35	T	8	4SU	C3'

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Mol	Chain	Res	Type	Atom
35	T	8	4SU	C2'
35	T	20	H2U	C3'
35	T	20	H2U	C2'
35	T	32	4OC	C1'

5 of 17 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
35	T	20	H2U	O4'-C1'-N1-C2
35	T	20	H2U	O4'-C1'-N1-C6
35	T	54	5MU	C4'-C5'-O5'-P
35	T	101	FME	O1-CN-N-CA
35	T	101	FME	O-C-CA-CB

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
35	T	54	5MU	2	0
35	T	20	H2U	2	0
35	T	8	4SU	1	0
35	T	55	PSU	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 267 ligands modelled in this entry, 265 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	$\# Z > 2$
57	ATP	H	602	58	32,33,33	0.52	0	48,52,52	0.30	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
57	ATP	H	601	58	32,33,33	0.43	0	48,52,52	0.28	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
57	ATP	H	602	58	-	1/22/38/38	0/3/3/3
57	ATP	H	601	58	-	3/22/38/38	0/3/3/3

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
57	H	601	ATP	PB-O3B-PG-O2G
57	H	602	ATP	PG-O3B-PB-O2B
57	H	601	ATP	PB-O3B-PG-O3G
57	H	601	ATP	PA-O3A-PB-O2B

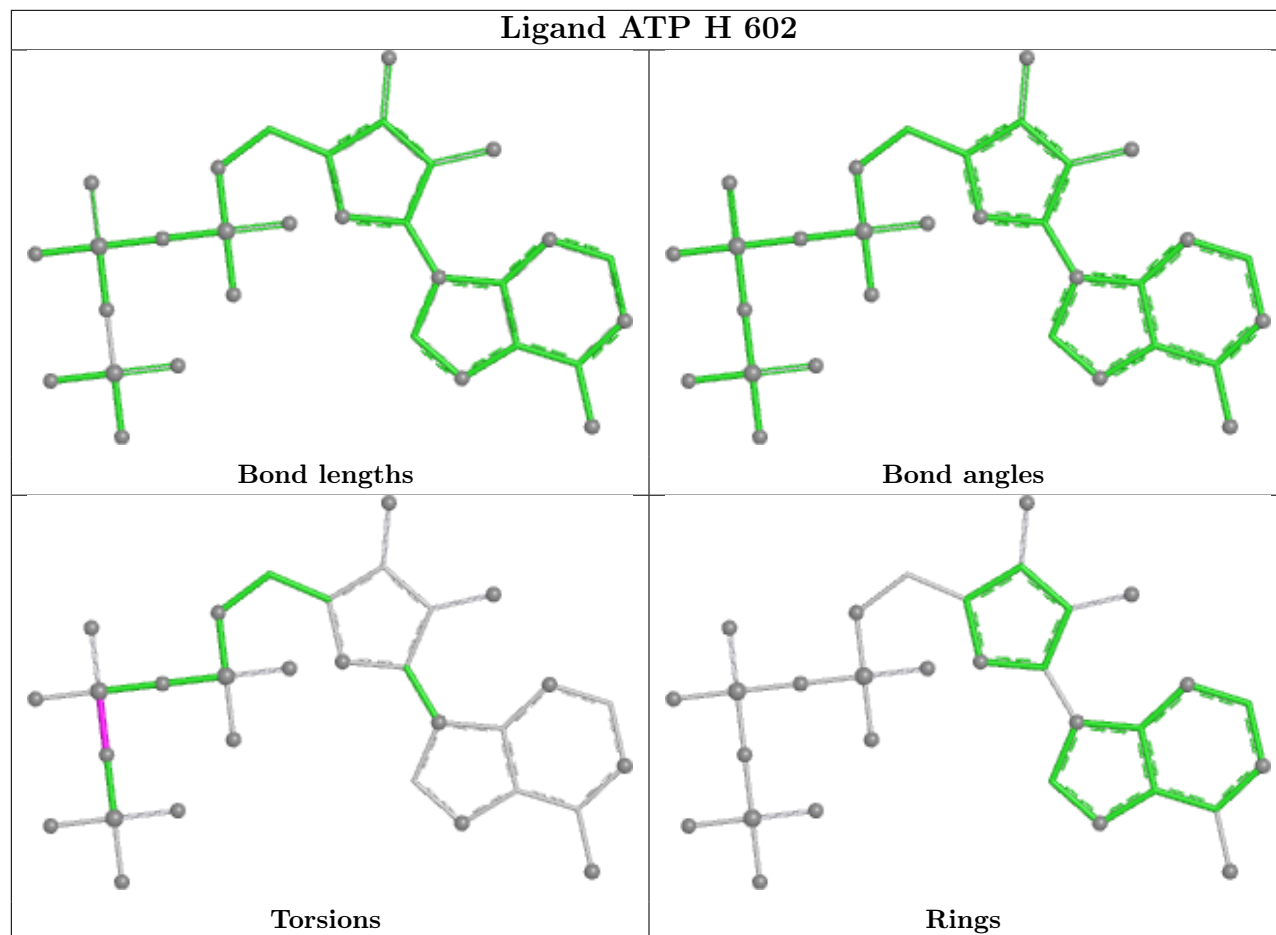
There are no ring outliers.

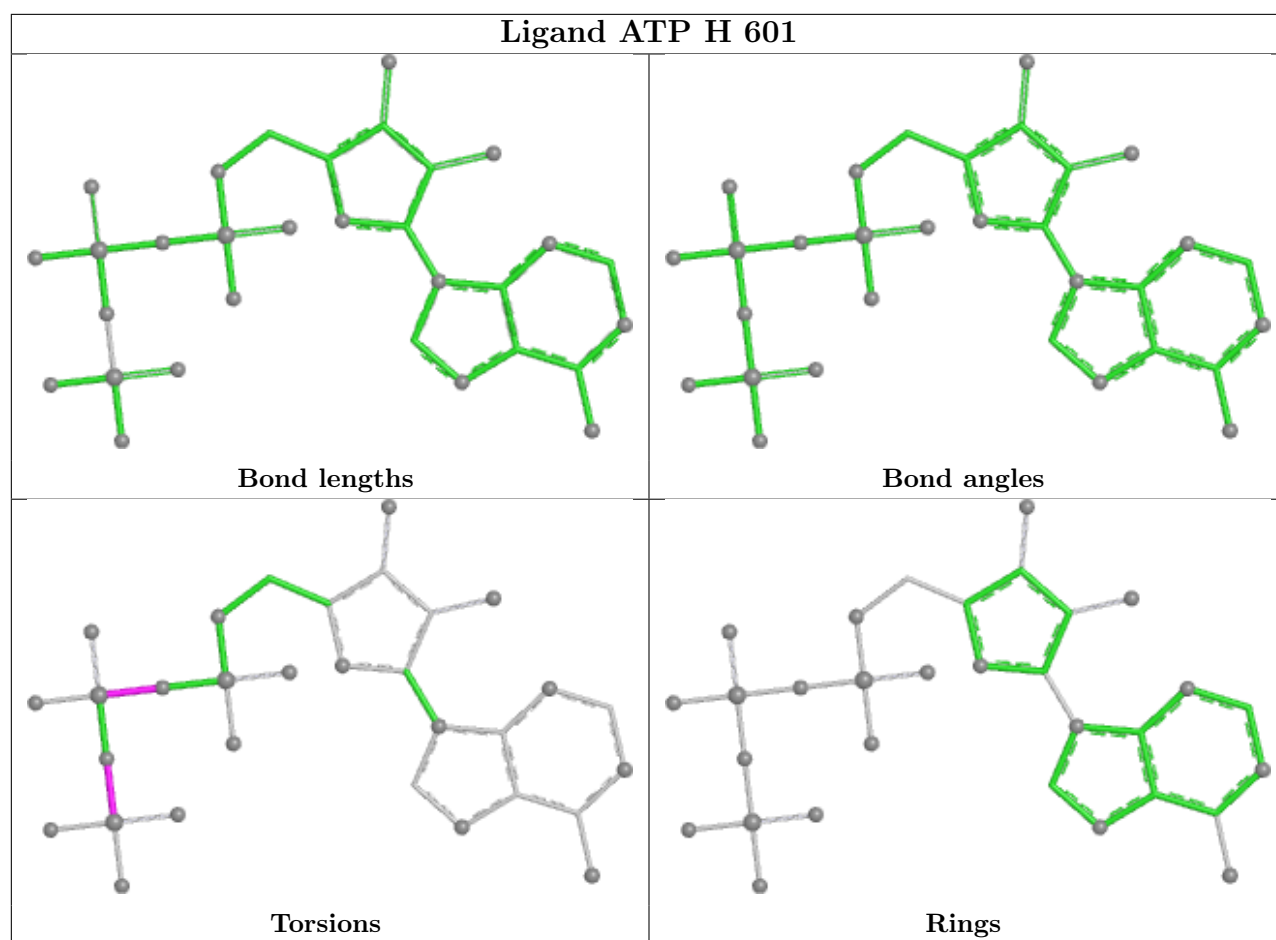
2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
57	H	602	ATP	1	0
57	H	601	ATP	3	0

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

equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

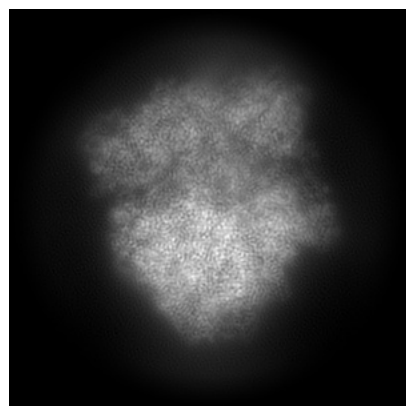
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-29405. These allow visual inspection of the internal detail of the map and identification of artifacts.

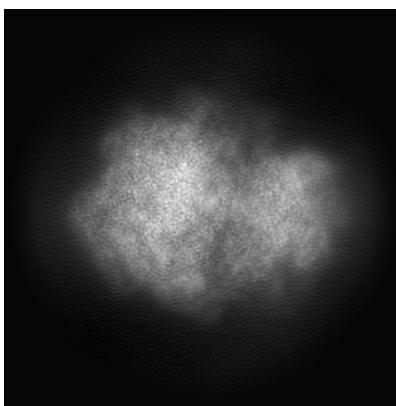
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

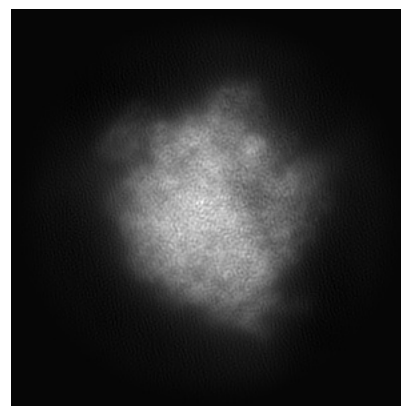
6.1.1 Primary map



X

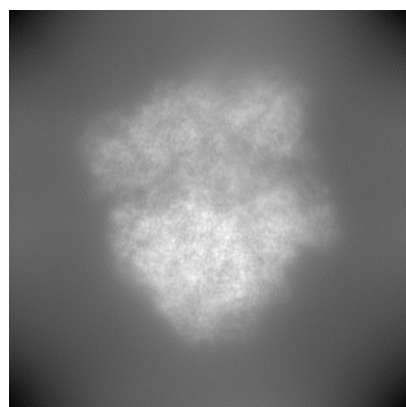


Y

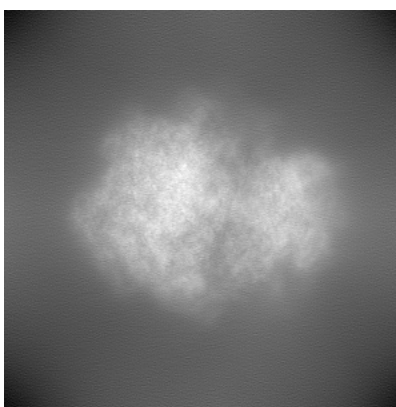


Z

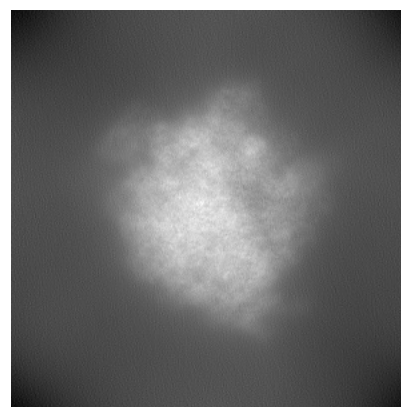
6.1.2 Raw map



X



Y

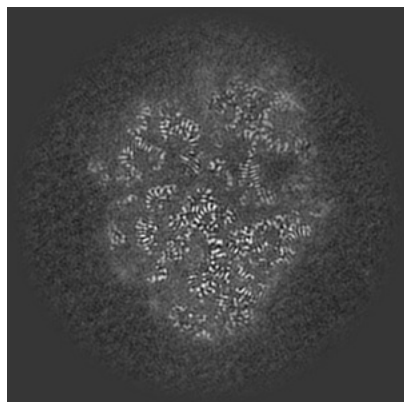


Z

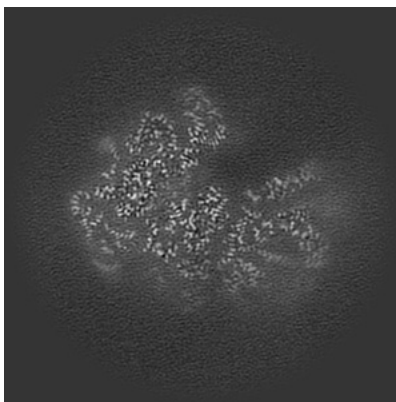
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

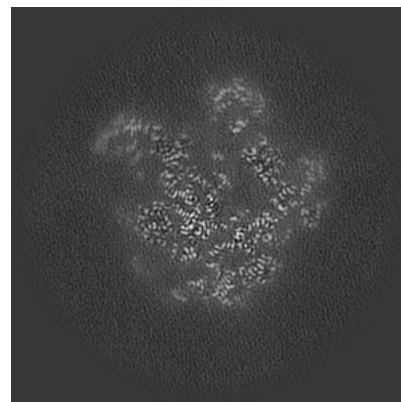
6.2.1 Primary map



X Index: 200

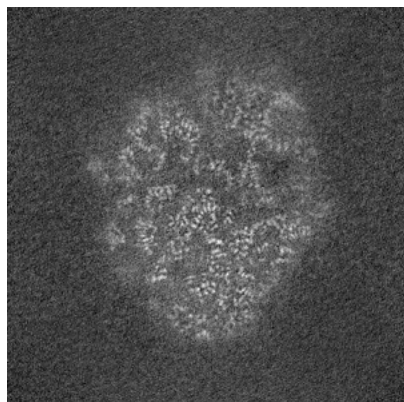


Y Index: 200

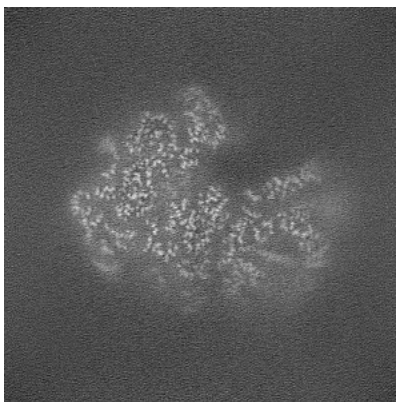


Z Index: 200

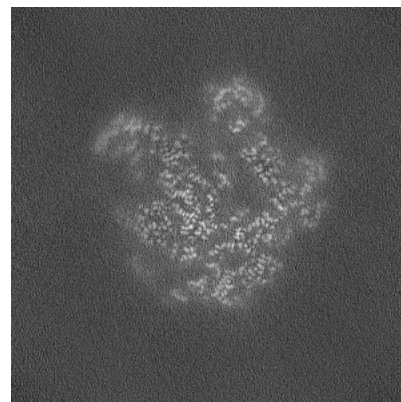
6.2.2 Raw map



X Index: 200



Y Index: 200

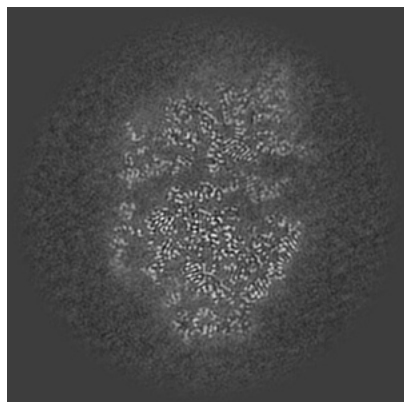


Z Index: 200

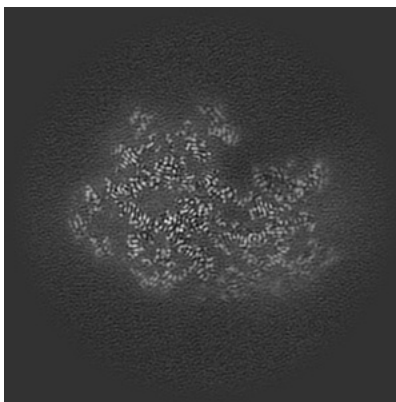
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

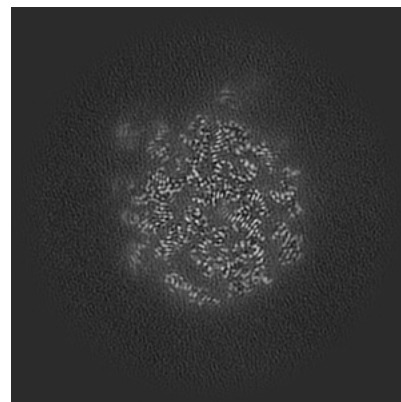
6.3.1 Primary map



X Index: 190

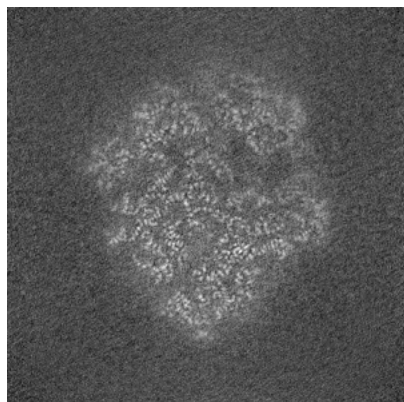


Y Index: 185

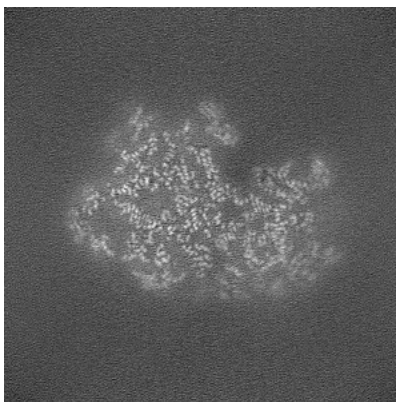


Z Index: 161

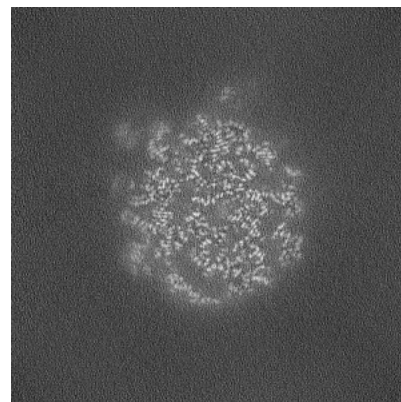
6.3.2 Raw map



X Index: 208



Y Index: 183

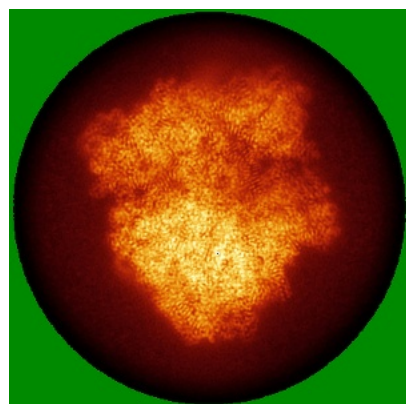


Z Index: 160

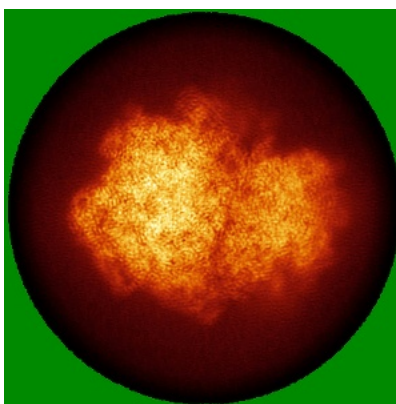
The images above show the largest variance slices of the map in three orthogonal directions.

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

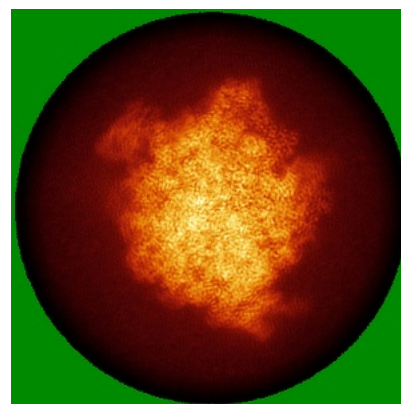
6.4.1 Primary map



X

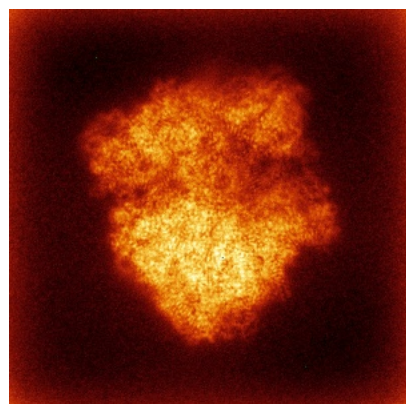


Y

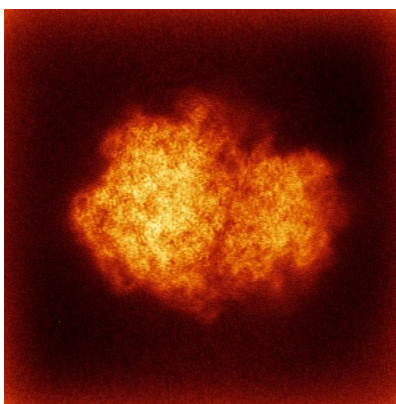


Z

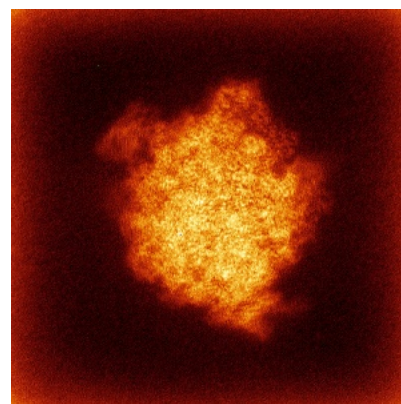
6.4.2 Raw map



X



Y

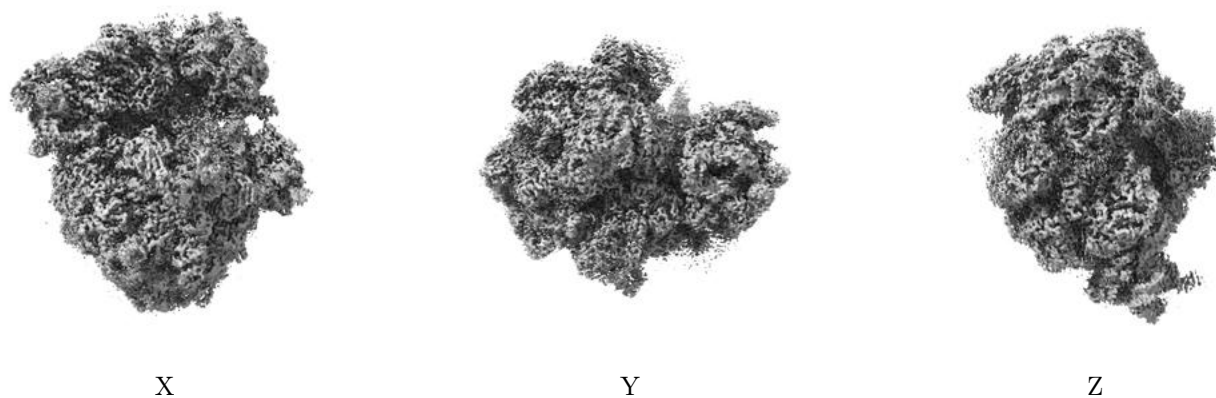


Z

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.

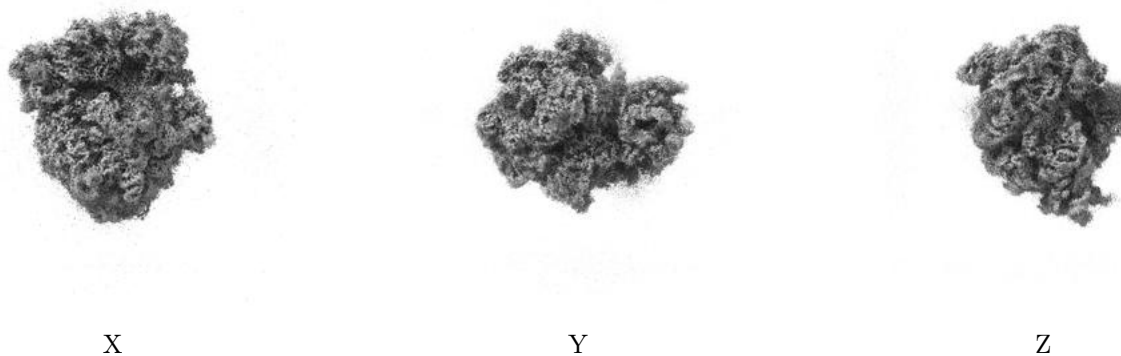
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.8. 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.

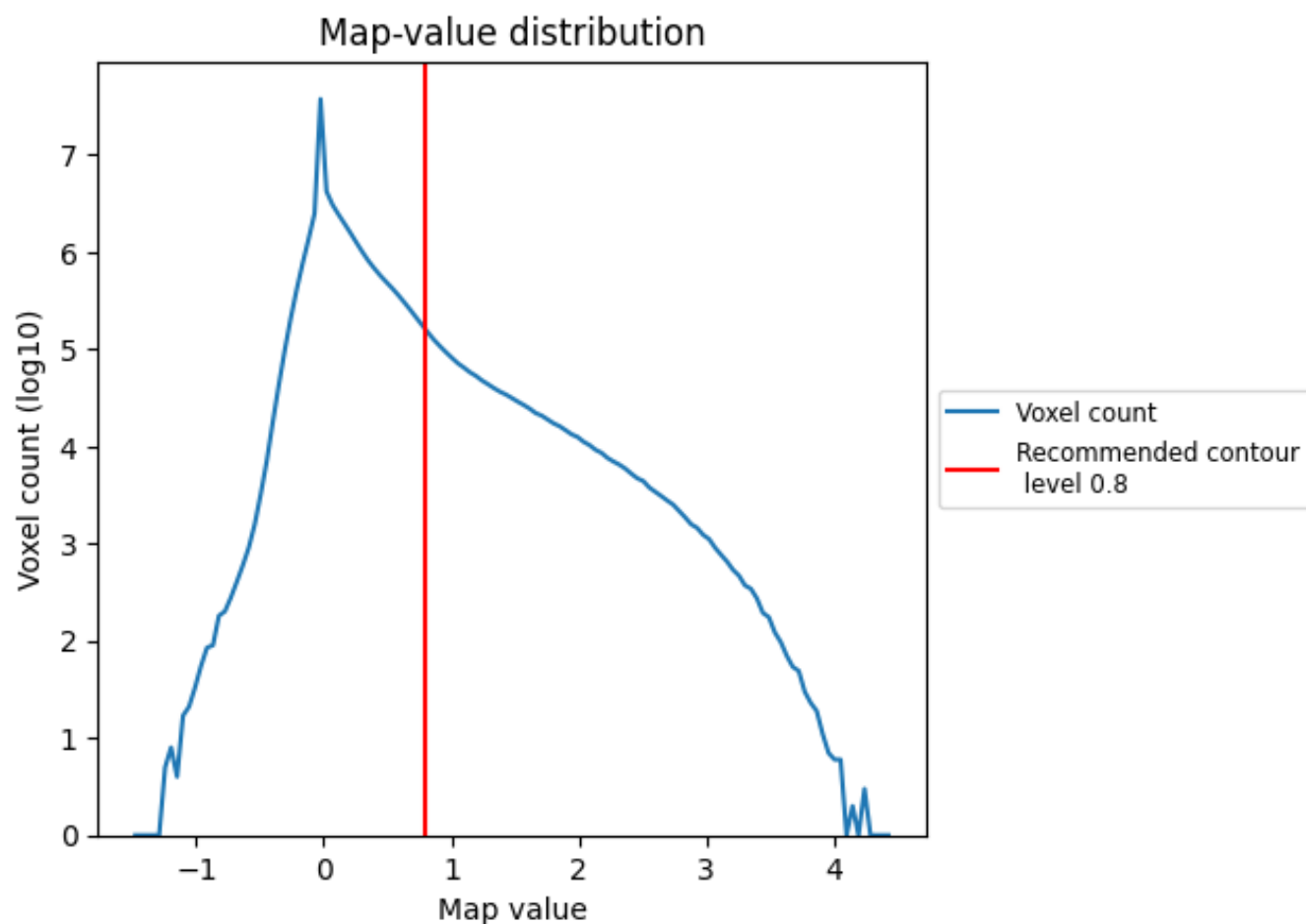
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

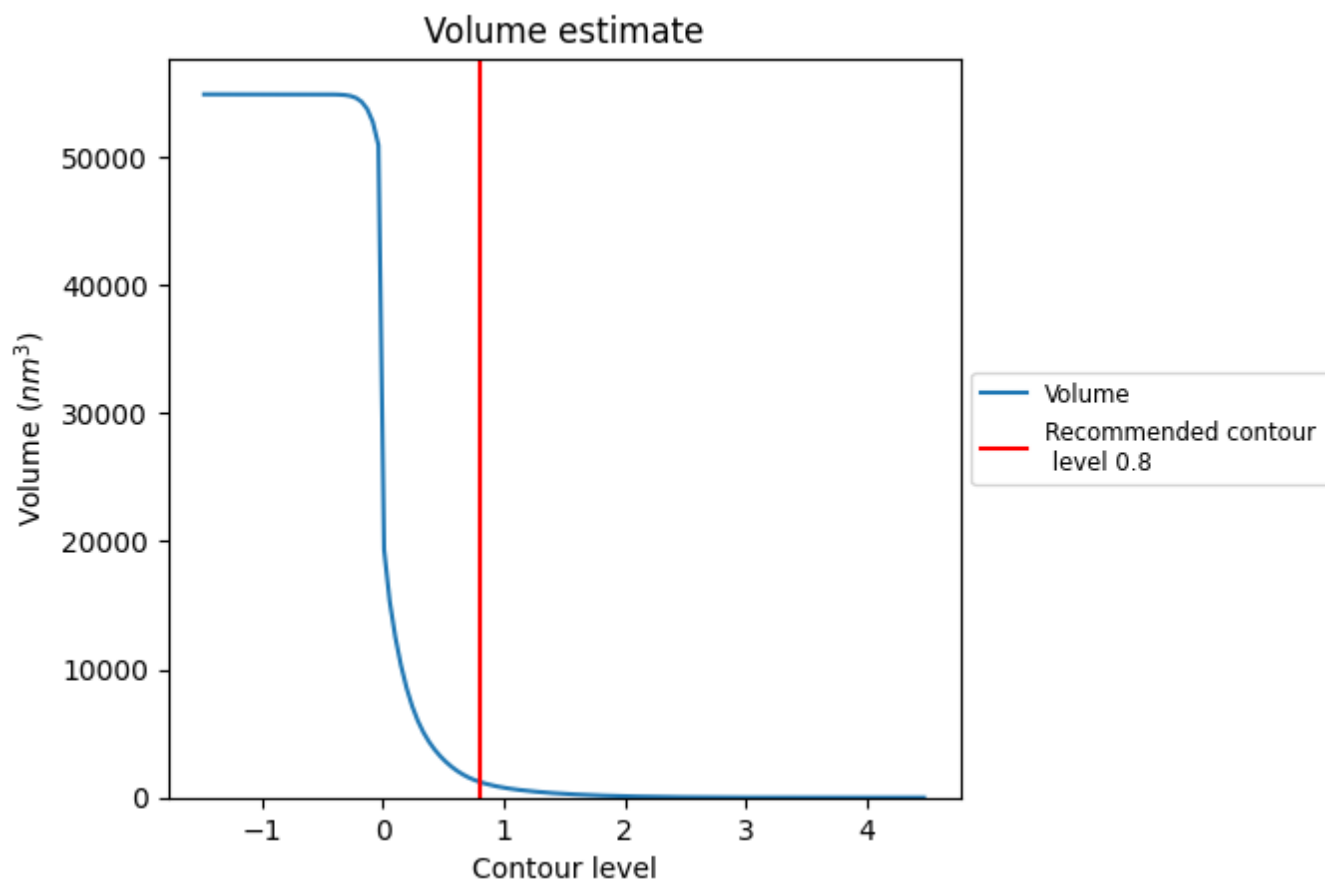
This section contains the results of statistical analysis of the map.

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.

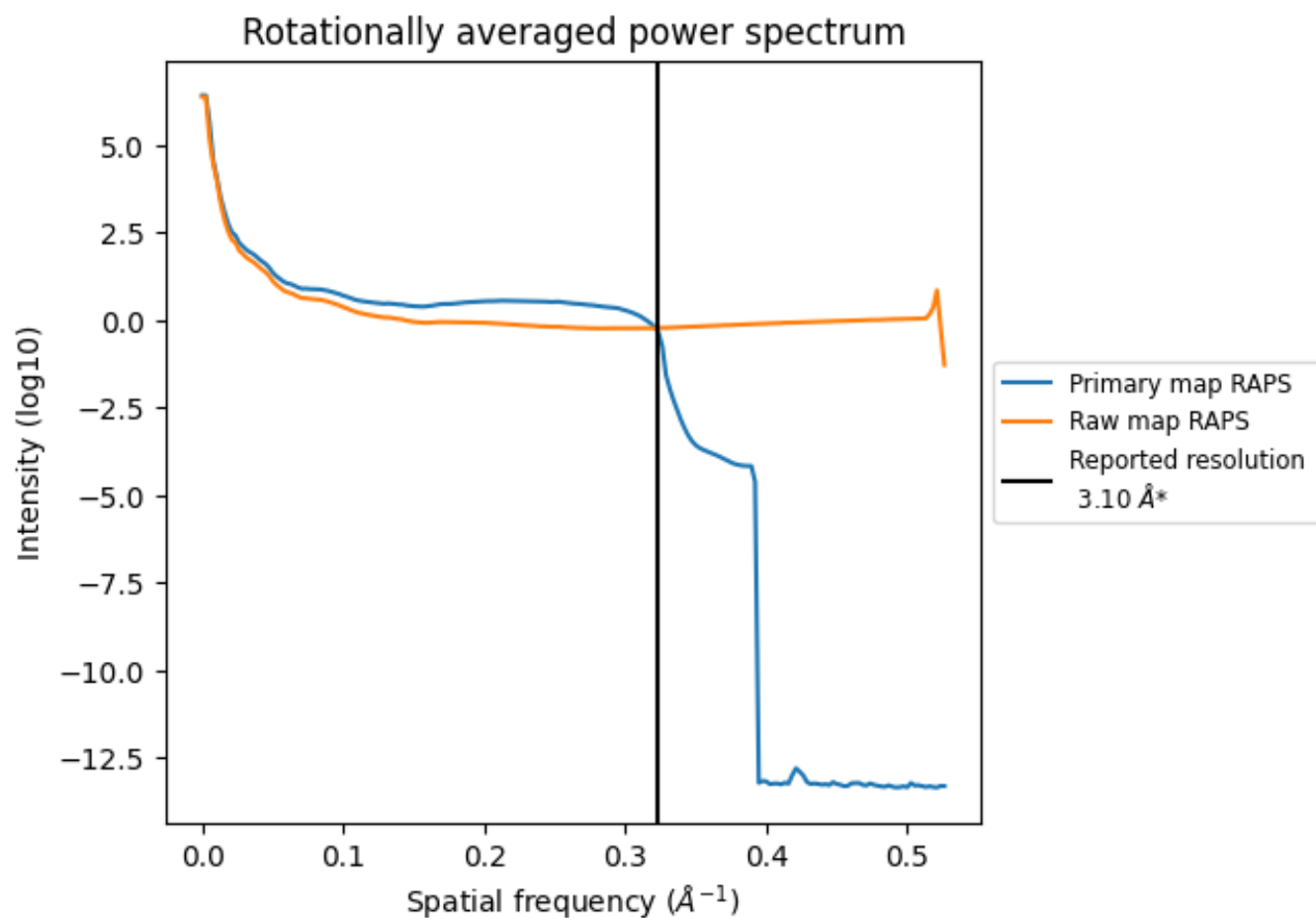
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1223 nm³; this corresponds to an approximate mass of 1105 kDa.

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

7.3 Rotationally averaged power spectrum ⓘ

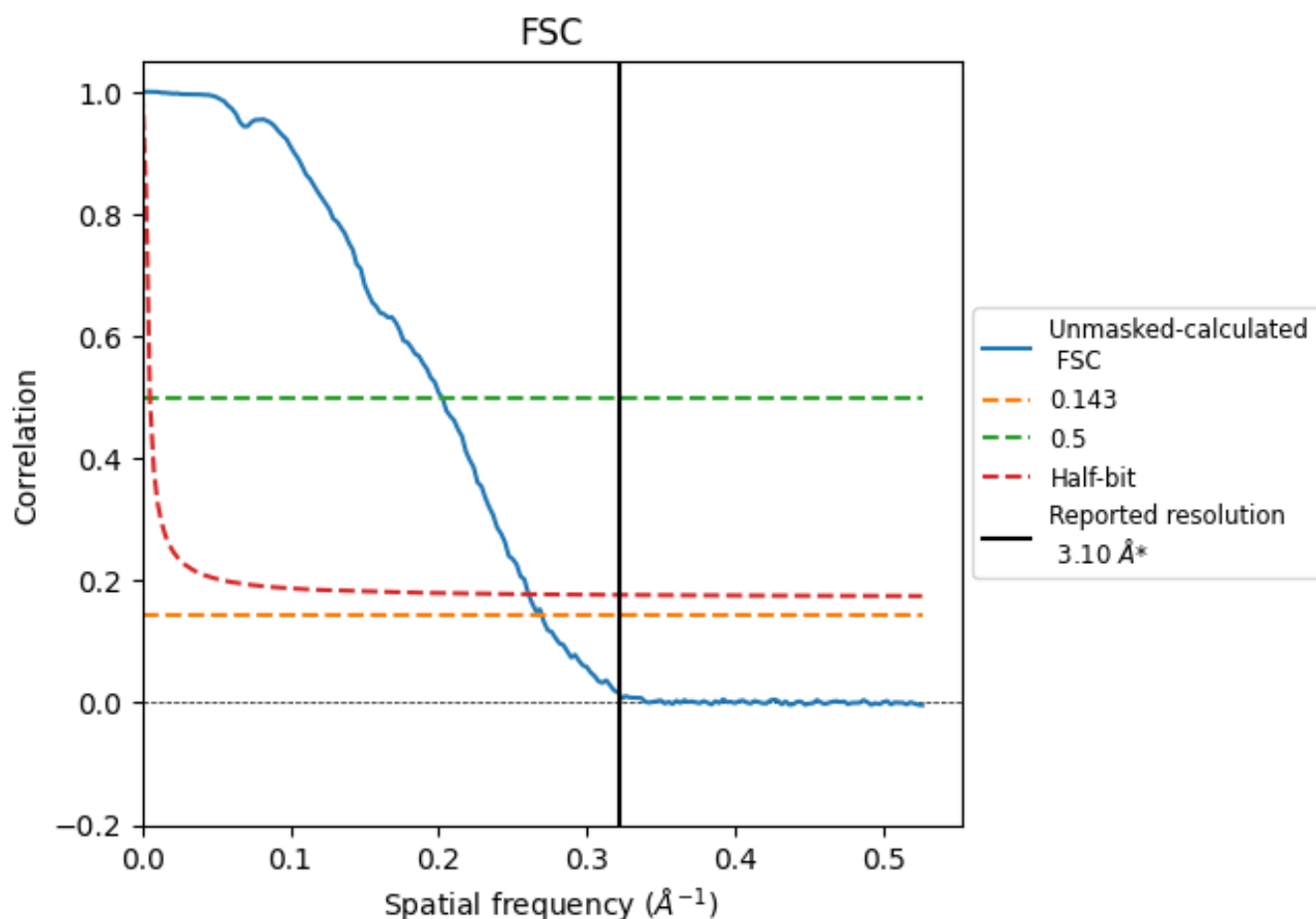


*Reported resolution corresponds to spatial frequency of 0.323 $\text{\AA}^{-1}$

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 0.323 Å⁻¹

8.2 Resolution estimates [i](#)

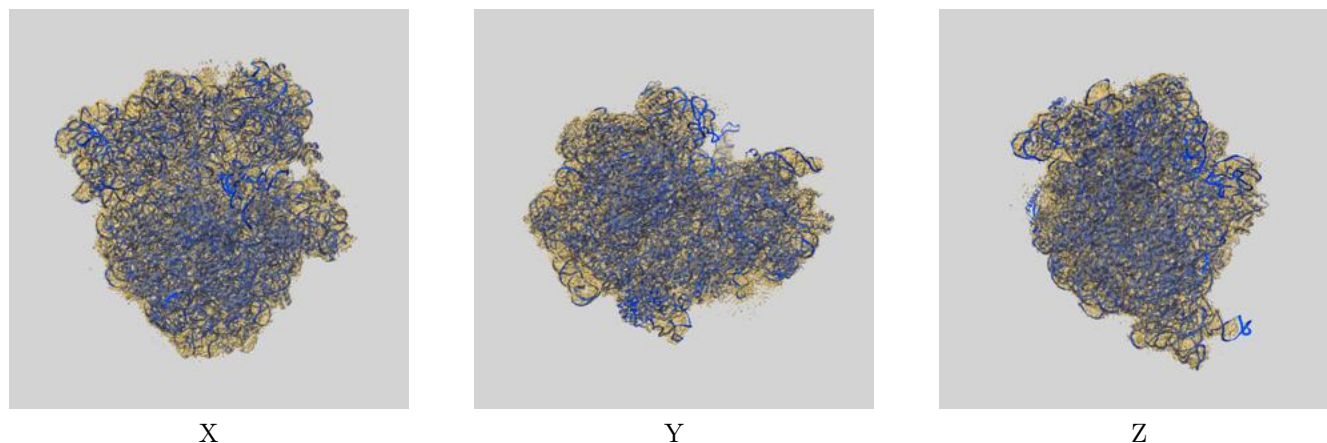
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.71	4.94	3.84

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.71 differs from the reported value 3.1 by more than 10 %

9 Map-model fit [i](#)

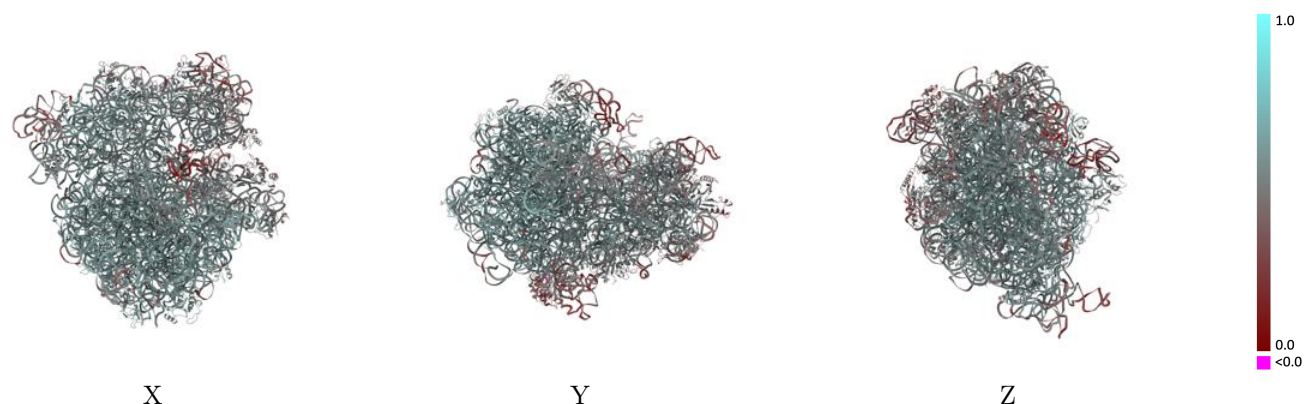
This section contains information regarding the fit between EMDB map EMD-29405 and PDB model 9NLH. Per-residue inclusion information can be found in section 3 on page 15.

9.1 Map-model overlay [i](#)



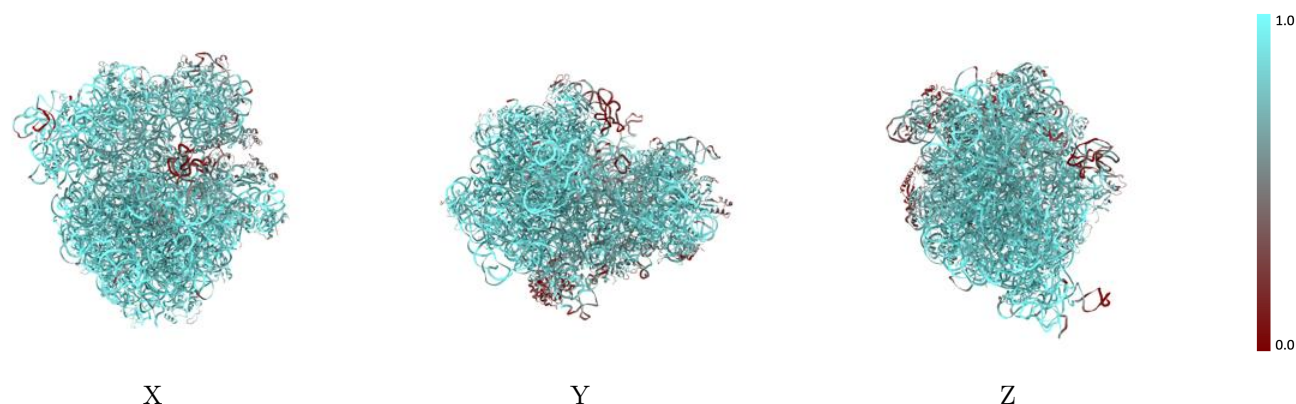
The images above show the 3D surface view of the map at the recommended contour level 0.8 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



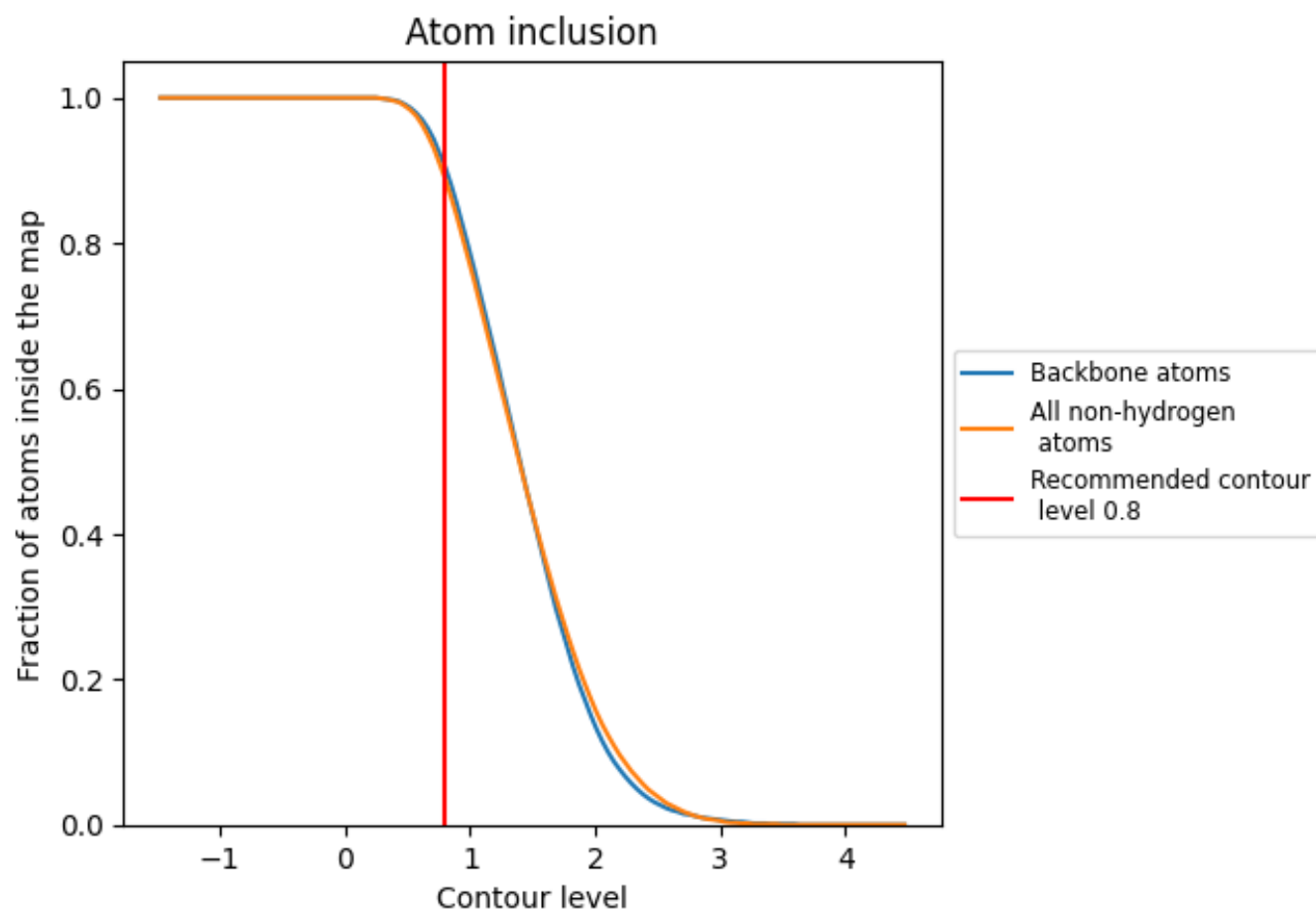
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.8).

9.4 Atom inclusion [i](#)



At the recommended contour level, 90% of all backbone atoms, 89% 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 (0.8) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8880	 0.5360
1	 0.4490	 0.3840
13	 0.9300	 0.5790
14	 0.8690	 0.5810
15	 0.9260	 0.5880
16	 0.8940	 0.5810
17	 0.9560	 0.5740
18	 0.8150	 0.5170
19	 0.8750	 0.5720
2	 0.9190	 0.5890
20	 0.9440	 0.5900
21	 0.8700	 0.5650
22	 0.9350	 0.5760
23	 0.9070	 0.5490
24	 0.9000	 0.5480
25	 0.7940	 0.5430
27	 0.9500	 0.5900
28	 0.9350	 0.5860
29	 0.8550	 0.5280
3	 0.9080	 0.5780
30	 0.8860	 0.5650
32	 0.9440	 0.5840
33	 0.9180	 0.5820
34	 0.9940	 0.6130
35	 0.9780	 0.6050
36	 0.9010	 0.5860
4	 0.8930	 0.5600
5	 0.6320	 0.4620
6	 0.6550	 0.4870
9	 0.2370	 0.3890
H	 0.7200	 0.5220
M	 0.9080	 0.5260
R1	 0.9400	 0.5540
R2	 0.9350	 0.5210
R3	 0.9250	 0.5200



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Chain	Atom inclusion	Q-score
T	 0.9020	 0.5370
sb	 0.7040	 0.4240
sc	 0.8000	 0.5070
sd	 0.8320	 0.5160
se	 0.8910	 0.5350
sf	 0.6180	 0.4620
sg	 0.6700	 0.4810
sh	 0.8910	 0.5440
si	 0.7370	 0.4750
sj	 0.6730	 0.4420
sk	 0.7470	 0.5220
sl	 0.8000	 0.5480
sm	 0.6060	 0.4630
sn	 0.8190	 0.4810
so	 0.8010	 0.5160
sp	 0.8660	 0.5300
sq	 0.8480	 0.5230
sr	 0.7300	 0.4940
ss	 0.6220	 0.4410
st	 0.8370	 0.5290
su	 0.6360	 0.4330