



wwPDB EM Validation Summary Report ⓘ

Apr 16, 2024 – 01:44 am BST

PDB ID : 6Q98
EMDB ID : EMD-4477
Title : Structure of tmRNA SmpB bound in P site of E. coli 70S ribosome
Authors : Rae, C.D.
Deposited on : 2018-12-17
Resolution : 4.30 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:

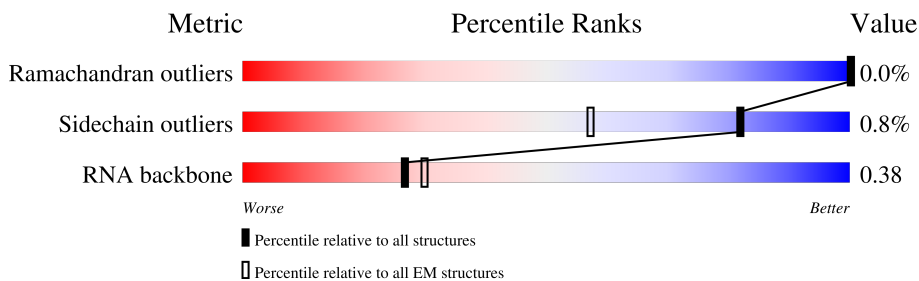
EMDB validation analysis : 0.0.1.dev92
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

1 Overall quality at a glance

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

The reported resolution of this entry is 4.30 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 ≥ 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	2904	
2	2	1535	
3	3	120	
4	5	160	
5	6	22	
6	B	273	
7	C	209	
8	D	201	

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Mol	Chain	Length	Quality of chain
9	E	179	49% 98%
10	F	177	36% 98%
11	G	149	75% 100%
12	H	165	63% 78% 21%
13	I	142	80% 90% 5% 5%
14	J	142	20% 100%
15	K	123	24% 98%
16	L	144	22% 99%
17	M	136	22% 99%
18	N	127	16% 93% 6%
19	O	117	43% 98%
20	P	115	32% 97%
21	Q	118	11% 99%
22	R	103	25% 99%
23	S	110	19% 98%
24	T	100	33% 94% 6%
25	U	104	31% 97%
26	V	94	28% 100%
27	W	85	18% 88% 11%
28	X	78	19% 97%
29	Y	63	37% 97%
30	Z	59	19% 98%
31	a	70	64% 84% 16%
32	b	57	18% 93% 5%
33	c	55	40% 95% 5%

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Mol	Chain	Length	Quality of chain
34	d	46	26% 100%
35	e	65	20% 97%
36	f	38	21% 100%
37	g	241	75% 93% 7%
38	h	233	64% 89% 11%
39	i	206	61% 99%
40	j	167	30% 91% 7%
41	k	135	27% 76% 23%
42	l	179	69% 84% 16%
43	m	130	32% 98%
44	n	130	82% 96%
45	o	103	83% 94%
46	p	129	34% 90% 9%
47	q	124	35% 94%
48	r	118	82% 92% 5%
49	s	101	77% 99%
50	t	89	45% 98%
51	u	82	32% 98%
52	v	84	36% 94% 5%
53	w	75	32% 87% 12%
54	x	92	70% 89% 10%
55	y	87	44% 99%
56	z	71	56% 99%
57	4	363	79% 20% 44% 36%

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
1	6MZ	1	1618	X	-	-	-
1	PSU	1	1911	X	-	-	-
1	3TD	1	1915	X	-	-	-
1	PSU	1	1917	X	-	-	-
1	6MZ	1	2030	X	-	-	-
1	G7M	1	2069	X	-	-	-
1	OMG	1	2251	X	-	-	-
1	PSU	1	2457	X	-	-	-
1	OMC	1	2498	X	-	-	-
1	2MA	1	2503	X	-	-	-
1	PSU	1	2504	X	-	-	-
1	OMU	1	2552	X	-	-	-
1	PSU	1	2580	X	-	-	-
1	PSU	1	2605	X	-	-	-

2 Entry composition [i](#)

There are 60 unique types of molecules in this entry. The entry contains 153878 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	1	2903	62336	27816	11470	20147	2903	0	0

- Molecule 2 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	2	1534	32929	14693	6041	10661	1534	0	0

- Molecule 3 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	3	120	2569	1144	468	837	120	0	0

- Molecule 4 is a protein called SsrA-binding protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	5	150	1209	763	226	216	4	0	0

- Molecule 5 is a protein called Nascent peptide.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
5	6	22	110	66	22	22	0	0

- Molecule 6 is a protein called 50S ribosomal protein L2.

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

- Molecule 7 is a protein called 50S ribosomal protein L3.

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

- Molecule 8 is a protein called 50S ribosomal protein L4.

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

- Molecule 9 is a protein called 50S ribosomal protein L5.

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

- Molecule 10 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	F	175	1313	826	241	244	2	0	0

- Molecule 11 is a protein called 50S ribosomal protein L9.

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

- Molecule 12 is a protein called 50S ribosomal protein L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	H	130	980	620	174	182	4	0	0

- Molecule 13 is a protein called 50S ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	I	135	984	622	171	185	6	0	0

- Molecule 14 is a protein called 50S ribosomal protein L13.

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

- Molecule 15 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	K	123	946	593	181	166	6	0	0

- Molecule 16 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	L	144	1053	654	207	190	2	0	0

- Molecule 17 is a protein called 50S ribosomal protein L16.

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

- Molecule 18 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	N	119	951	588	195	163	5	0	0

- Molecule 19 is a protein called 50S ribosomal protein L18.

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

- Molecule 20 is a protein called 50S ribosomal protein L19.

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

- Molecule 21 is a protein called 50S ribosomal protein L20.

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

- Molecule 22 is a protein called 50S ribosomal protein L21.

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

- Molecule 23 is a protein called 50S ribosomal protein L22.

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

- Molecule 24 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	T	94	Total	C	N	O	S	0	0
			746	470	140	134	2		

- Molecule 25 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms				AltConf	Trace
25	U	103	Total	C	N	O	0	0
			788	498	148	142		

- Molecule 26 is a protein called 50S ribosomal protein L25.

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

- Molecule 27 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	W	76	Total	C	N	O	S	0	0
			582	360	117	104	1		

- Molecule 28 is a protein called 50S ribosomal protein L28.

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

- Molecule 29 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	Y	62	Total	C	N	O	S	0	0
			501	308	98	94	1		

- Molecule 30 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	Z	58	Total	C	N	O	S	0	0
			448	281	87	78	2		

- Molecule 31 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	a	59	Total	C	N	O	S	0	0
			472	293	89	84	6		

- Molecule 32 is a protein called 50S ribosomal protein L32.

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

- Molecule 33 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms				AltConf	Trace
33	c	52	Total	C	N	O	0	0
			426	275	78	73		

- Molecule 34 is a protein called 50S ribosomal protein L34.

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

- Molecule 35 is a protein called 50S ribosomal protein L35.

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

- Molecule 36 is a protein called 50S ribosomal protein L36.

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

- Molecule 37 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	g	225	Total	C	N	O	S	0	0
			1760	1113	316	323	8		

- Molecule 38 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	h	208	Total	C	N	O	S	0	0
			1636	1036	307	290	3		

- Molecule 39 is a protein called 30S ribosomal protein S4.

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

- Molecule 40 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	j	156	Total	C	N	O	S	0	0
			1152	717	217	212	6		

- Molecule 41 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	k	104	Total	C	N	O	S	0	0
			848	536	153	152	7		

- Molecule 42 is a protein called 30S ribosomal protein S7.

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

- Molecule 43 is a protein called 30S ribosomal protein S8.

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

- Molecule 44 is a protein called 30S ribosomal protein S9.

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

- Molecule 45 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	o	99	Total	C	N	O	S	0	0
			790	495	151	143	1		

- Molecule 46 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	p	117	Total	C	N	O	S	0	0
			877	540	174	160	3		

- Molecule 47 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	q	122	Total	C	N	O	S	0	0
			951	588	195	163	5		

- Molecule 48 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	r	112	Total	C	N	O	S	0	0
			867	535	175	154	3		

- Molecule 49 is a protein called 30S ribosomal protein S14.

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

- Molecule 50 is a protein called 30S ribosomal protein S15.

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

- Molecule 51 is a protein called 30S ribosomal protein S16.

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

- Molecule 52 is a protein called 30S ribosomal protein S17.

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

- Molecule 53 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	w	66	Total	C	N	O	S	0	0
			544	344	102	97	1		

- Molecule 54 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	x	83	Total	C	N	O	S	0	0
			663	424	126	111	2		

- Molecule 55 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
55	y	86	Total	C	N	O	S	0	0
			669	414	138	114	3		

- Molecule 56 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
56	z	70	Total	C	N	O	S	0	0
			589	366	125	97	1		

- Molecule 57 is a RNA chain called transfer-messenger RNA (tmRNA).

Mol	Chain	Residues	Atoms					AltConf	Trace
57	4	363	Total	C	N	O	P	0	0
			7758	3465	1410	2520	363		

- Molecule 58 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
58	1	283	Total	Mg	0
			283	283	
58	2	126	Total	Mg	0
			126	126	
58	3	8	Total	Mg	0
			8	8	
58	B	2	Total	Mg	0
			2	2	
58	C	1	Total	Mg	0
			1	1	
58	L	2	Total	Mg	0
			2	2	
58	N	1	Total	Mg	0
			1	1	
58	U	1	Total	Mg	0
			1	1	
58	f	1	Total	Mg	0
			1	1	
58	i	1	Total	Mg	0
			1	1	
58	r	2	Total	Mg	0
			2	2	
58	4	1	Total	Mg	0
			1	1	

- Molecule 59 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
59	a	1	Total	Zn	0
			1	1	

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Mol	Chain	Residues	Atoms		AltConf
59	f	1	Total	Zn	0
			1	1	

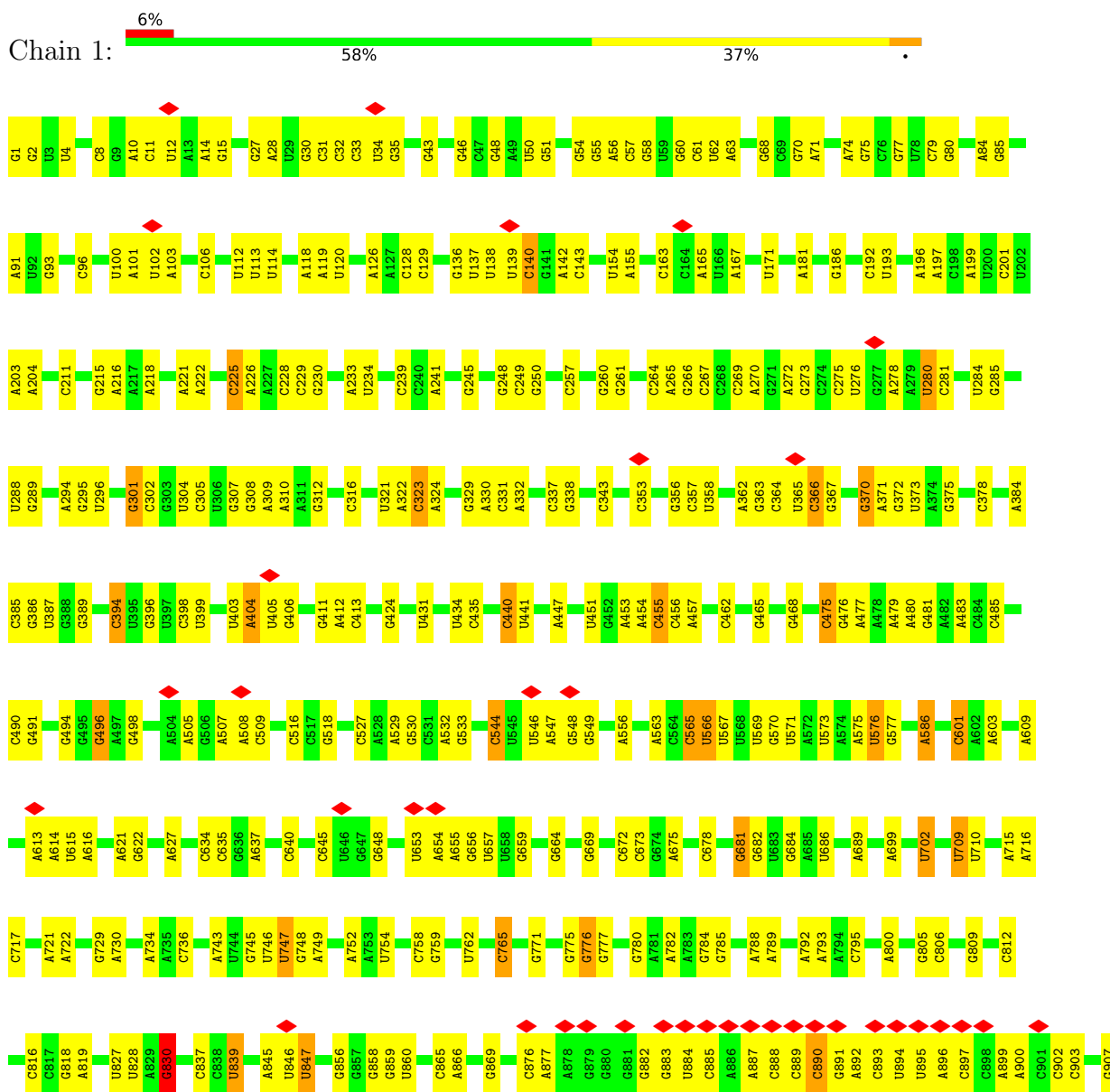
- Molecule 60 is water.

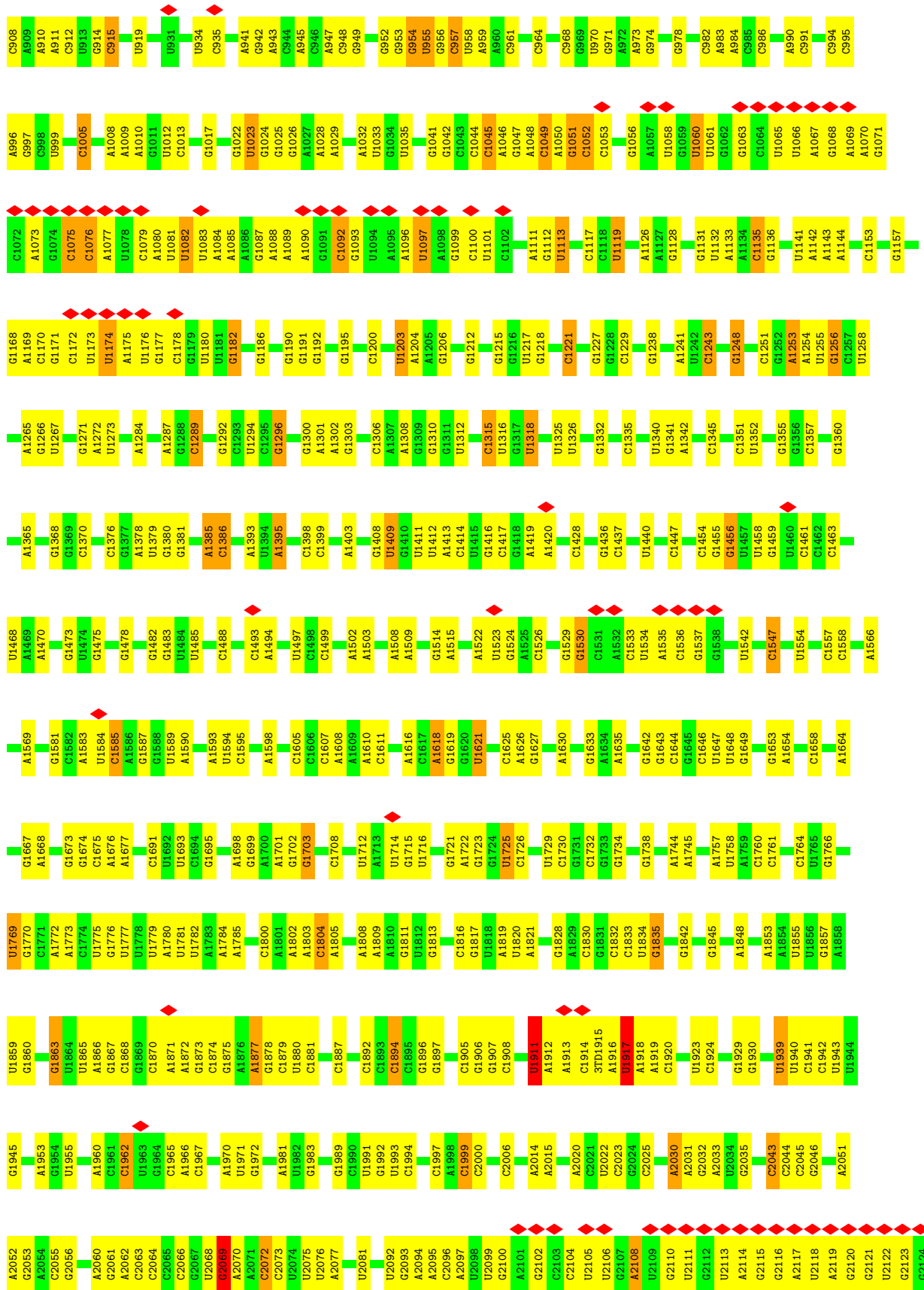
Mol	Chain	Residues	Atoms		AltConf
60	B	2	Total	O	0
			2	2	

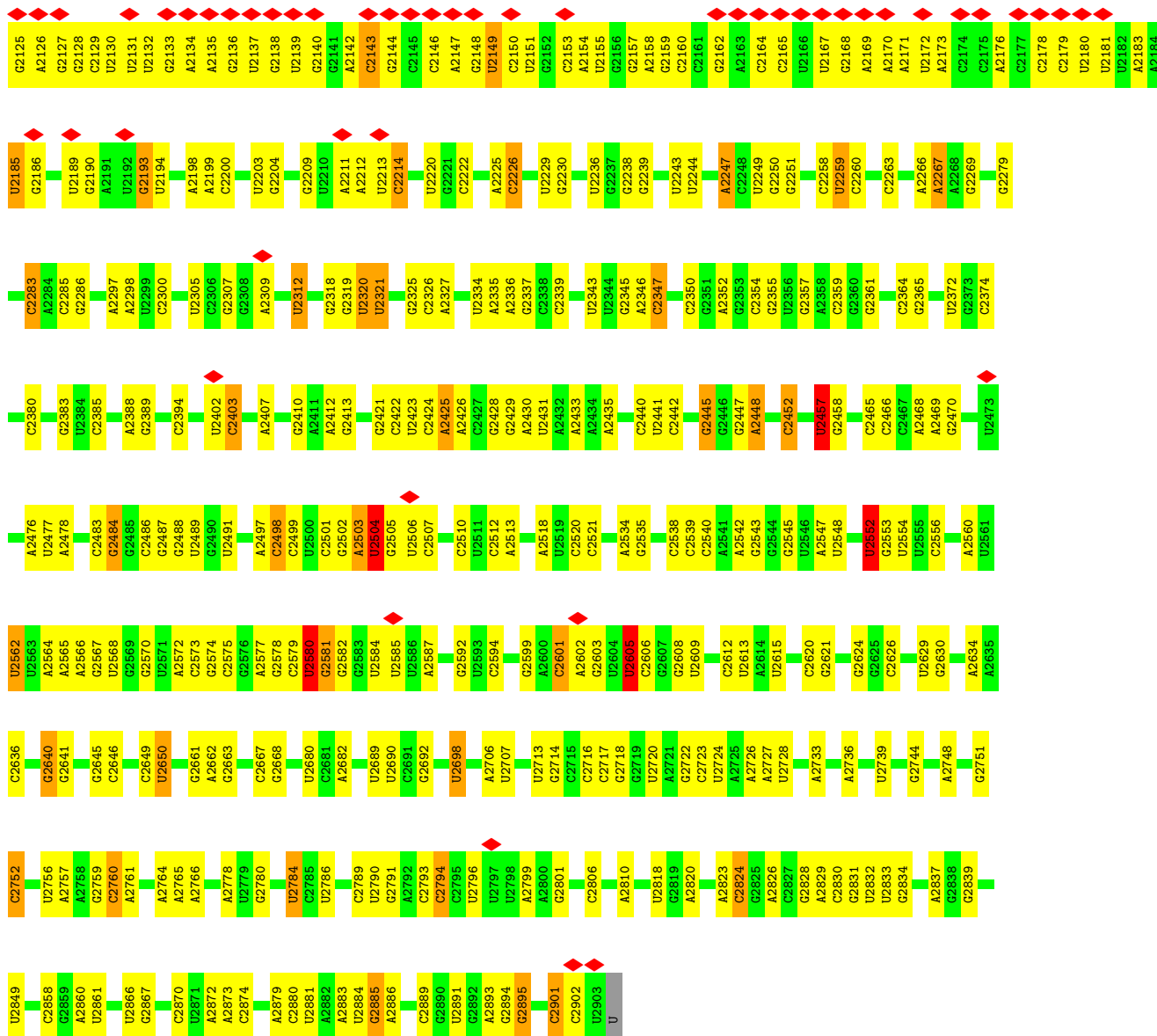
3 Residue-property plots

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.

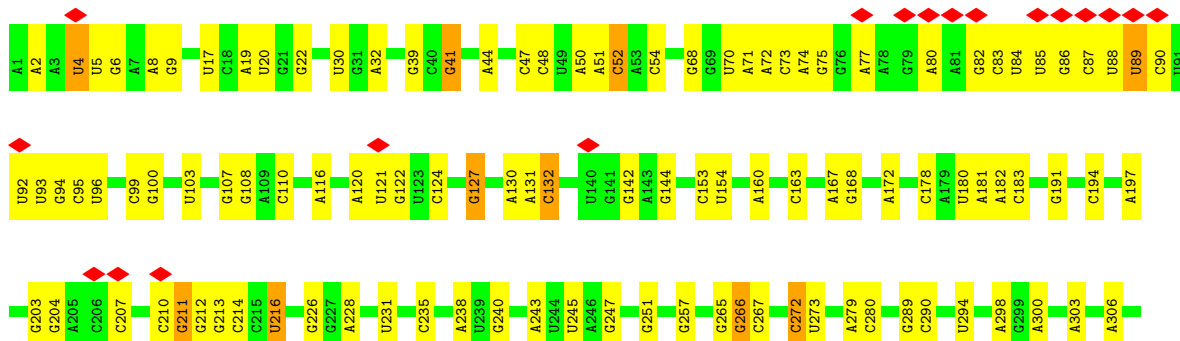
- Molecule 1: 23S ribosomal RNA

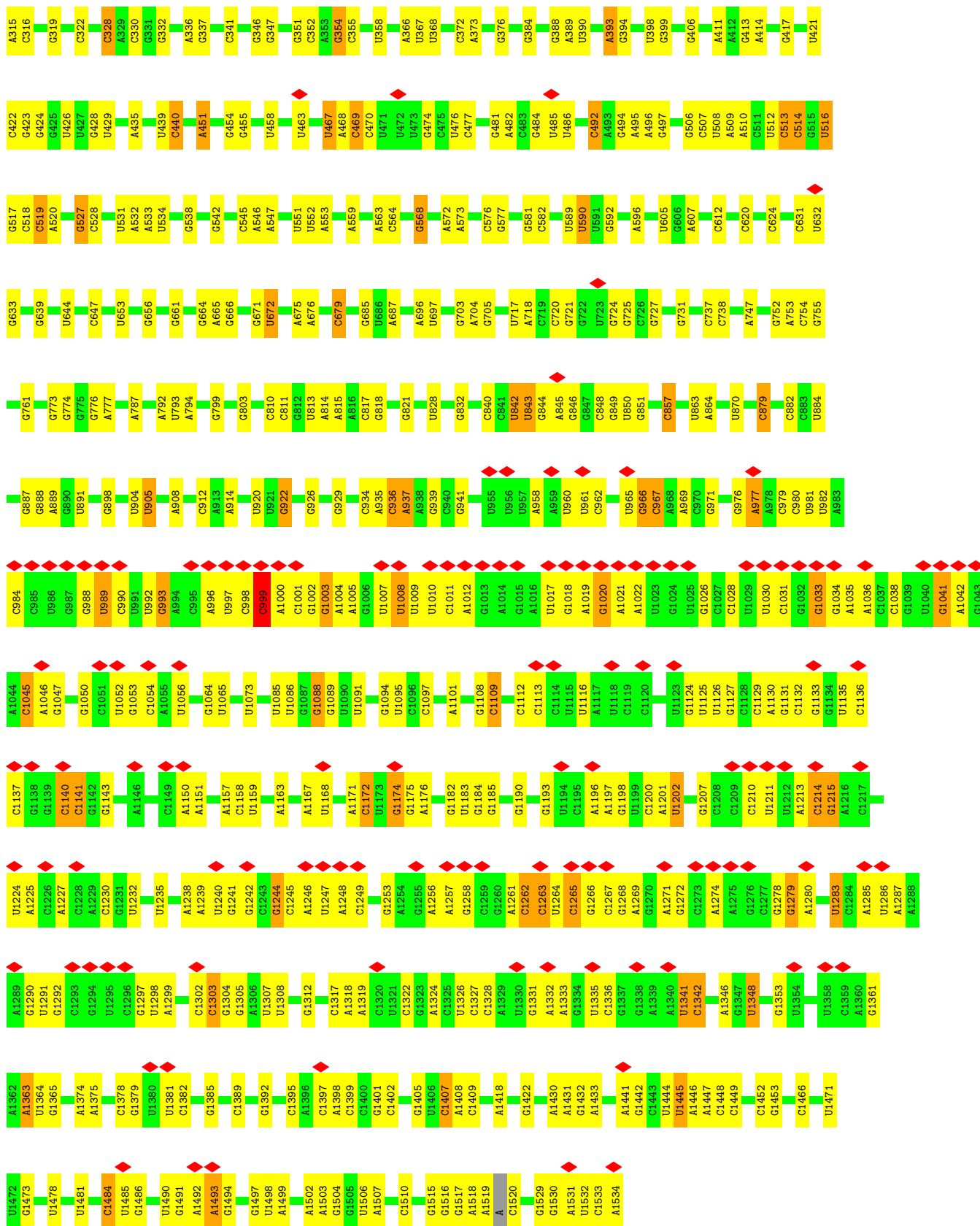


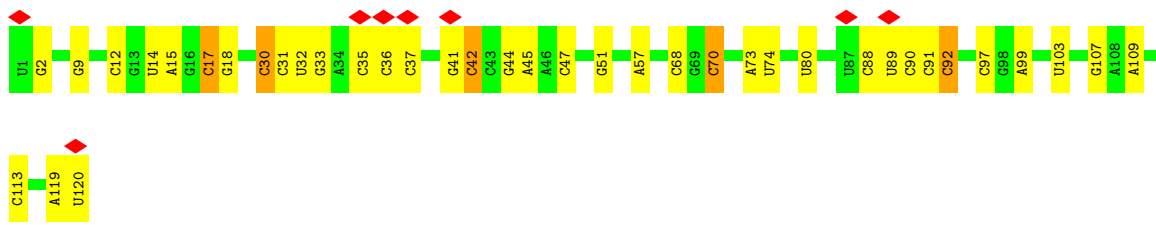




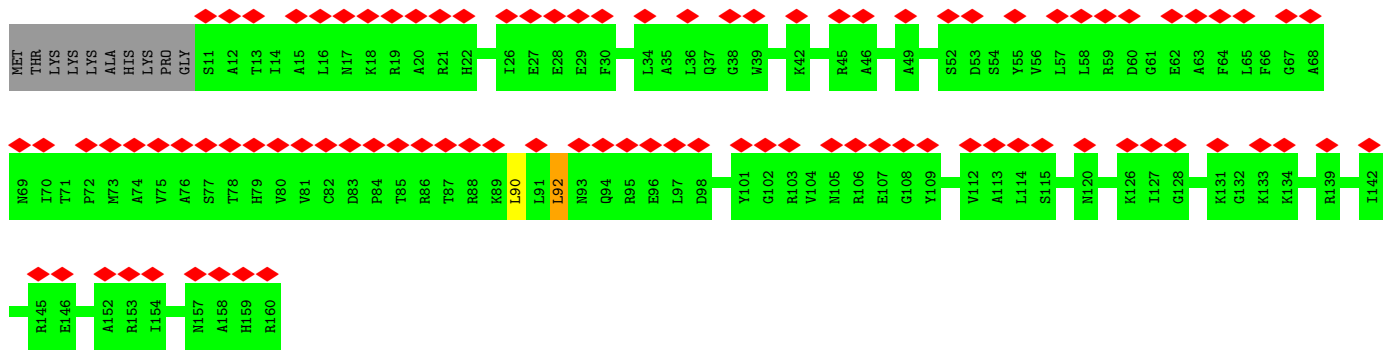
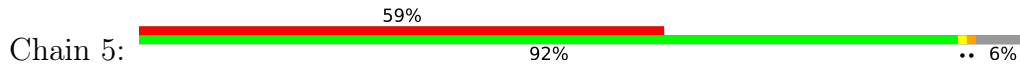
• Molecule 2: 16S ribosomal RNA



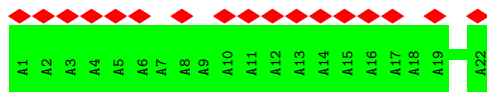
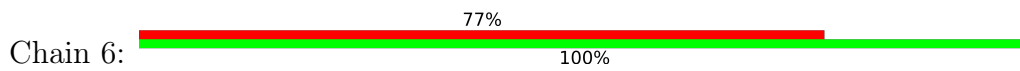




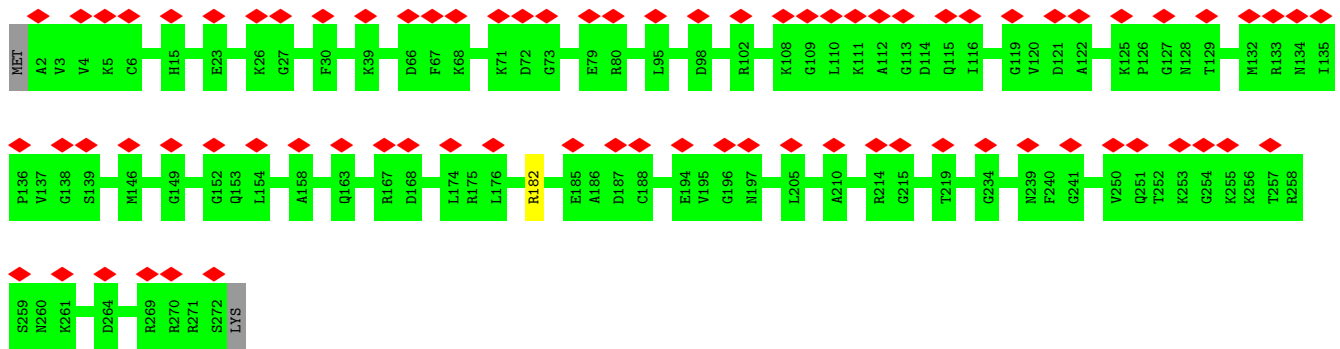
• Molecule 4: SsrA-binding protein



• Molecule 5: Nascent peptide

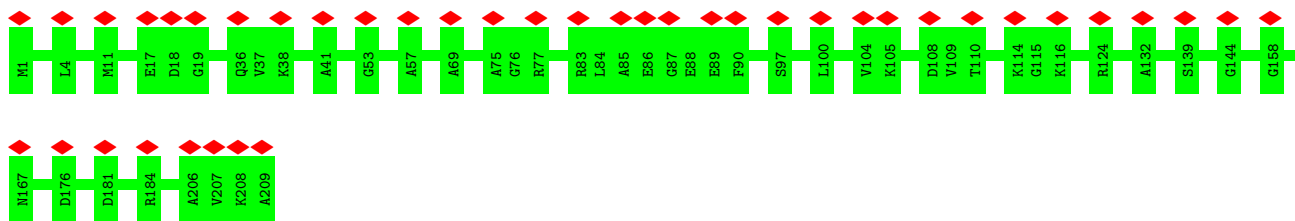


• Molecule 6: 50S ribosomal protein L2

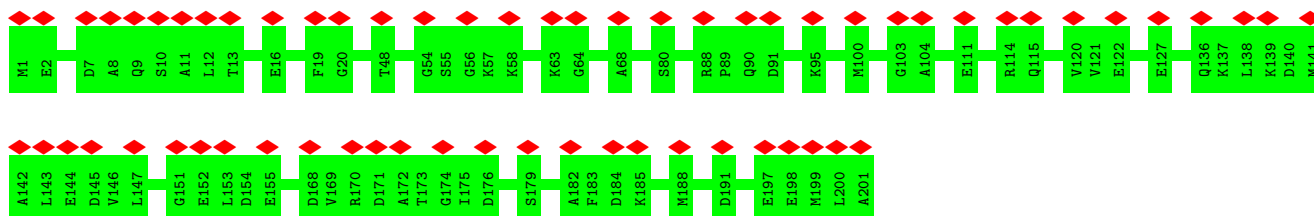


• Molecule 7: 50S ribosomal protein L3

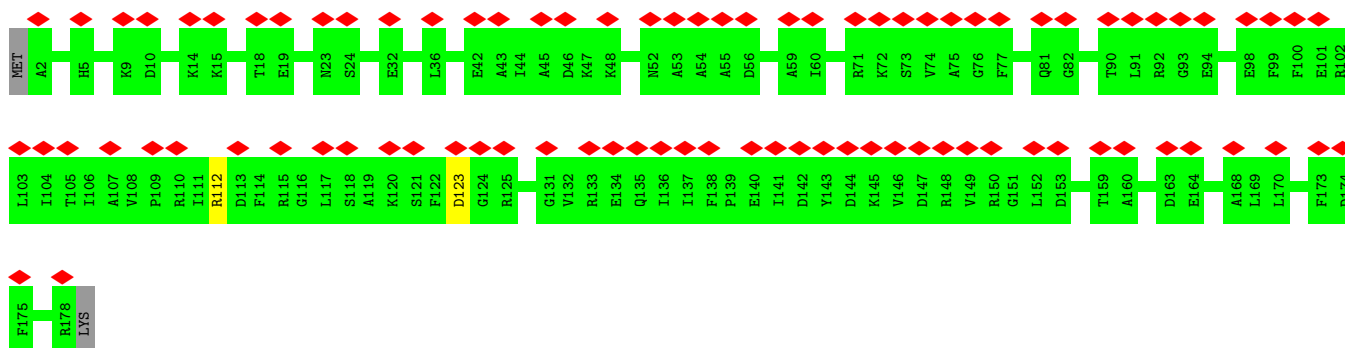




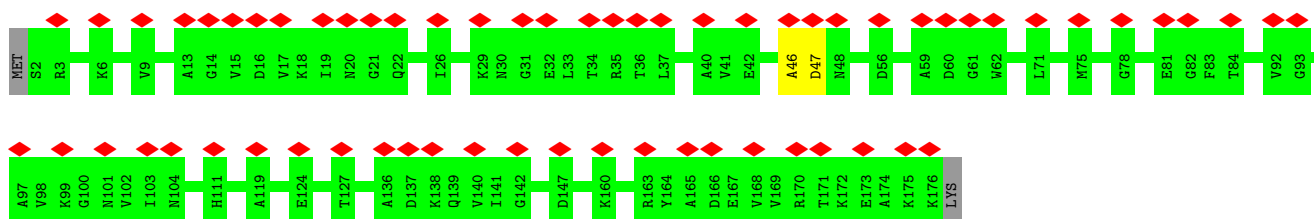
- Molecule 8: 50S ribosomal protein L4



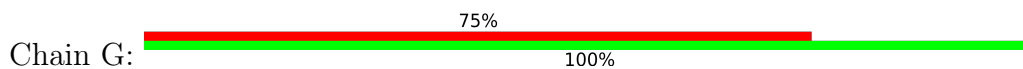
- Molecule 9: 50S ribosomal protein L5

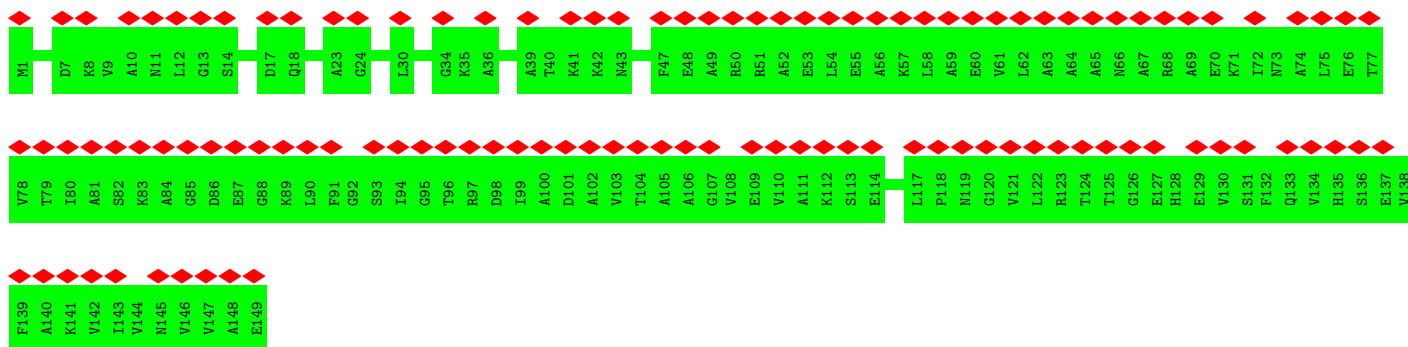


- Molecule 10: 50S ribosomal protein L6

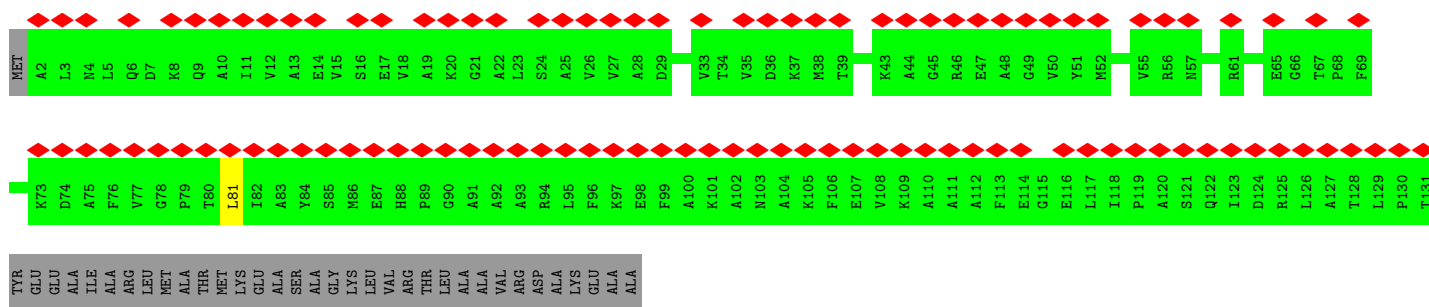
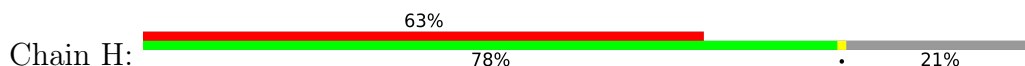


- Molecule 11: 50S ribosomal protein L9

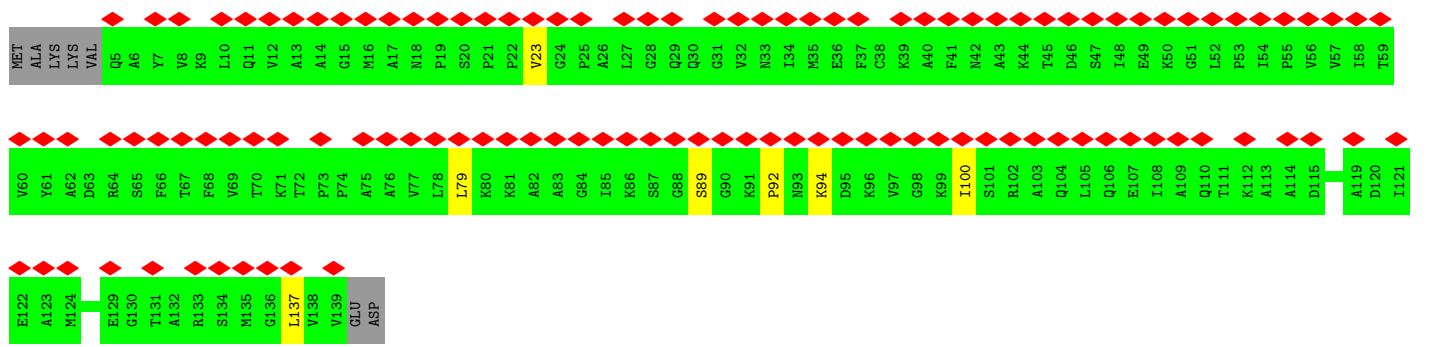
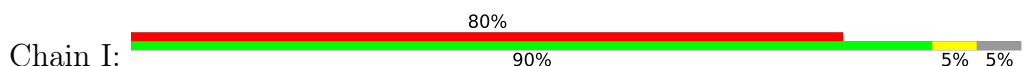




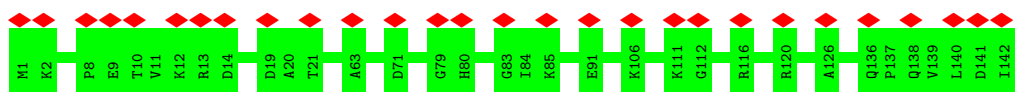
• Molecule 12: 50S ribosomal protein L10



• Molecule 13: 50S ribosomal protein L11

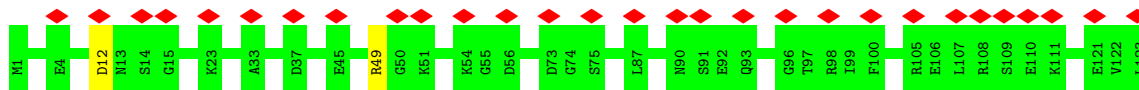


• Molecule 14: 50S ribosomal protein L13

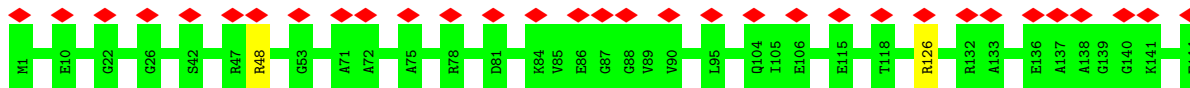


• Molecule 15: 50S ribosomal protein L14

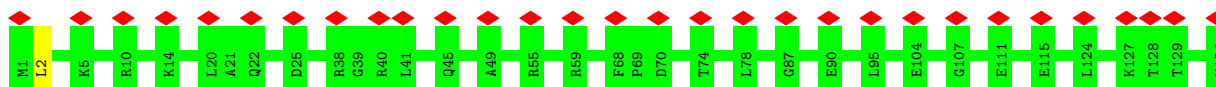




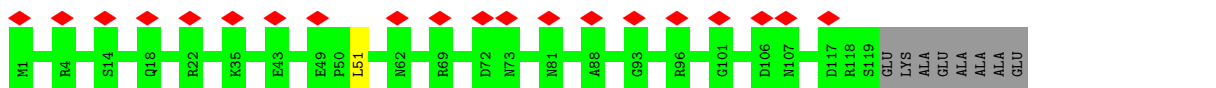
- Molecule 16: 50S ribosomal protein L15



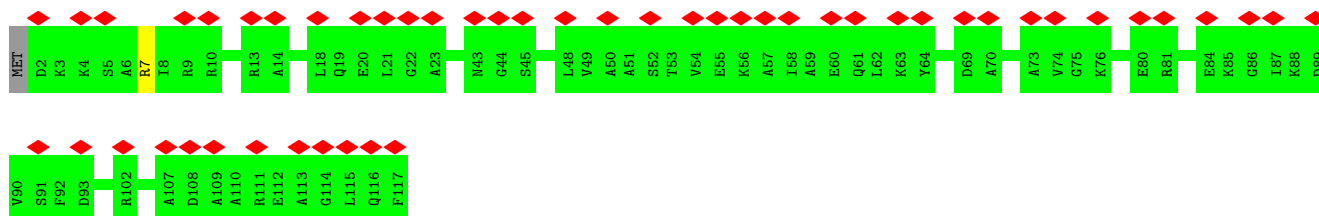
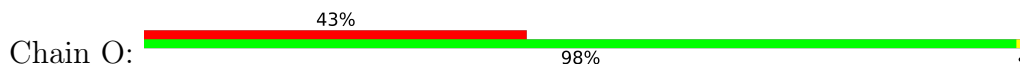
- Molecule 17: 50S ribosomal protein L16



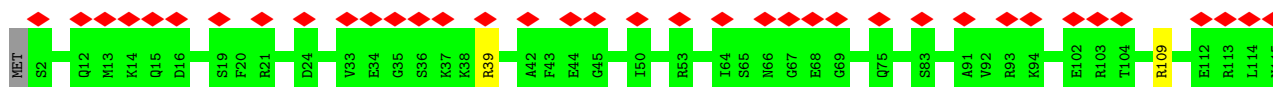
- Molecule 18: 50S ribosomal protein L17



- Molecule 19: 50S ribosomal protein L18

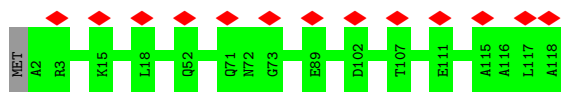


- Molecule 20: 50S ribosomal protein L19

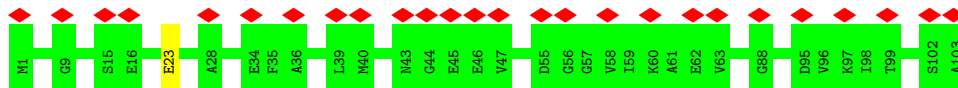


- Molecule 21: 50S ribosomal protein L20

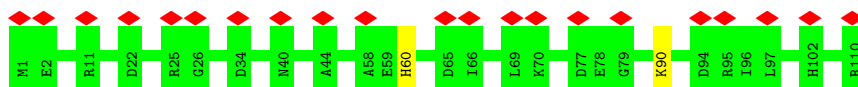




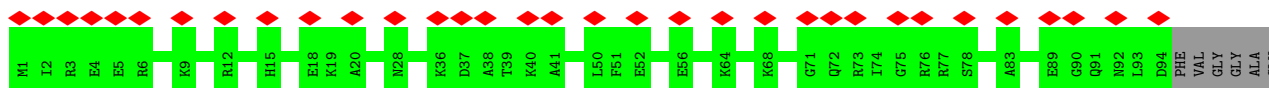
- Molecule 22: 50S ribosomal protein L21



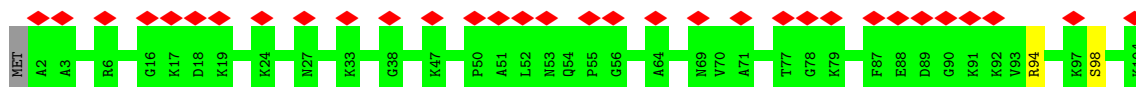
- Molecule 23: 50S ribosomal protein L22



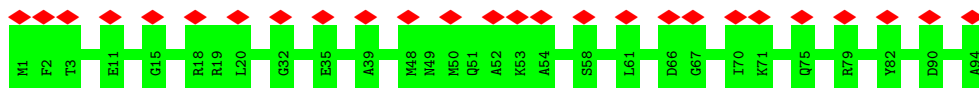
- Molecule 24: 50S ribosomal protein L23



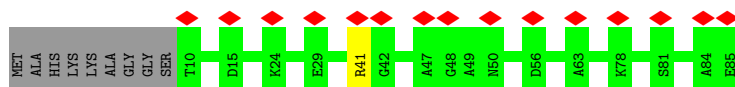
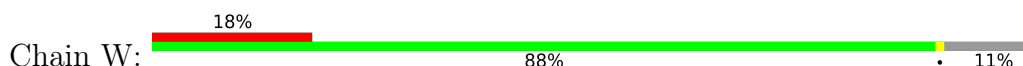
- Molecule 25: 50S ribosomal protein L24



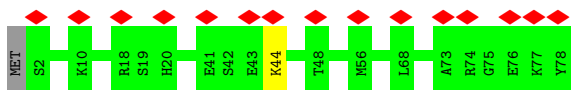
- Molecule 26: 50S ribosomal protein L25



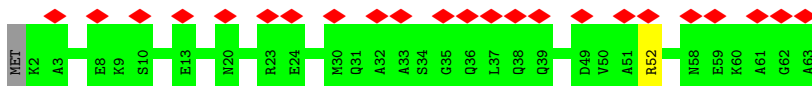
- Molecule 27: 50S ribosomal protein L27



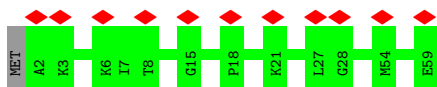
- Molecule 28: 50S ribosomal protein L28



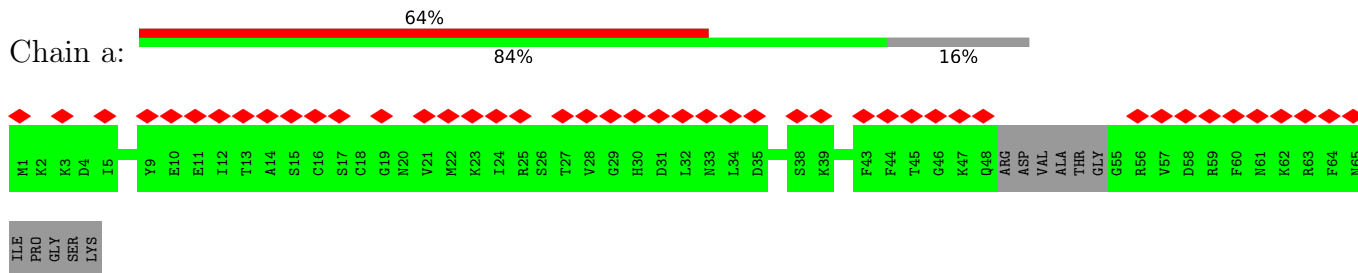
- Molecule 29: 50S ribosomal protein L29



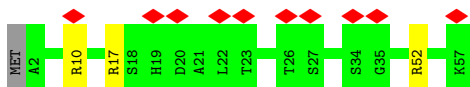
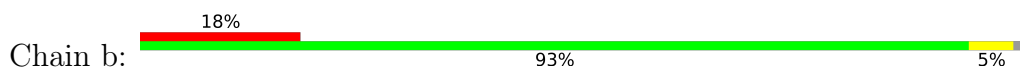
- Molecule 30: 50S ribosomal protein L30



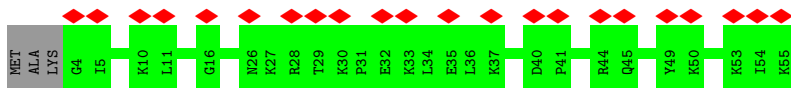
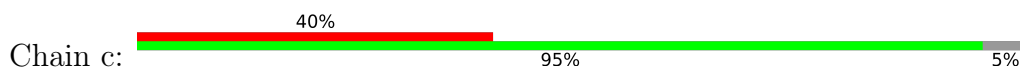
- Molecule 31: 50S ribosomal protein L31



- Molecule 32: 50S ribosomal protein L32

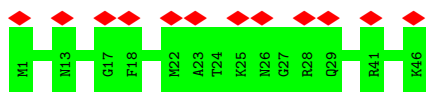


- Molecule 33: 50S ribosomal protein L33



- Molecule 34: 50S ribosomal protein L34

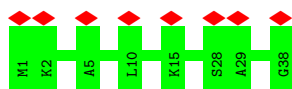




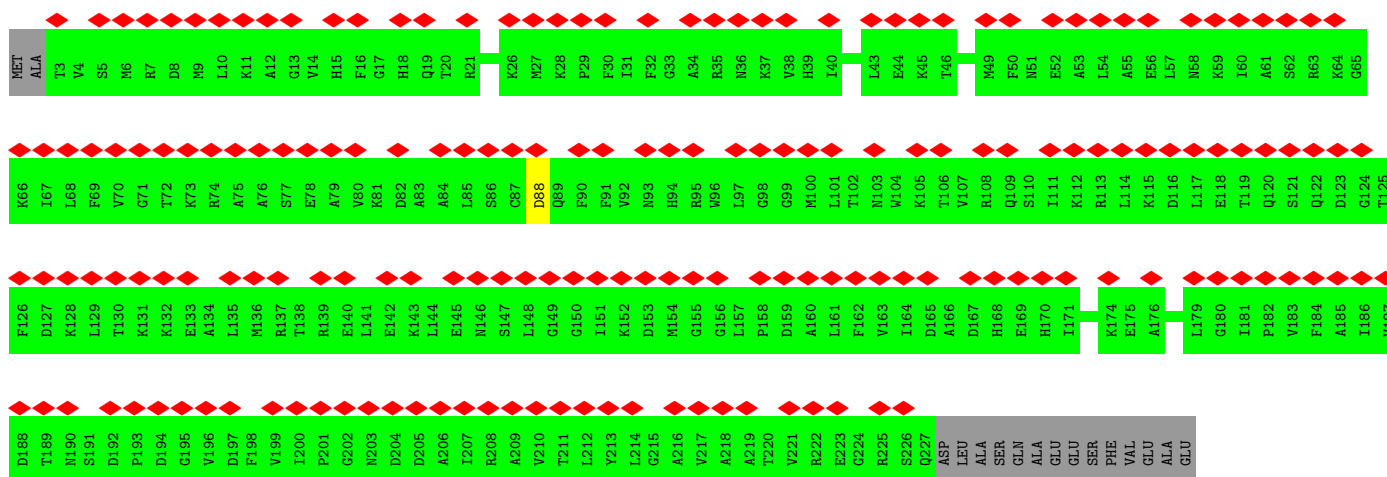
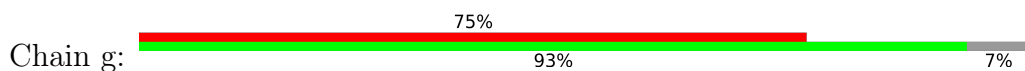
- Molecule 35: 50S ribosomal protein L35



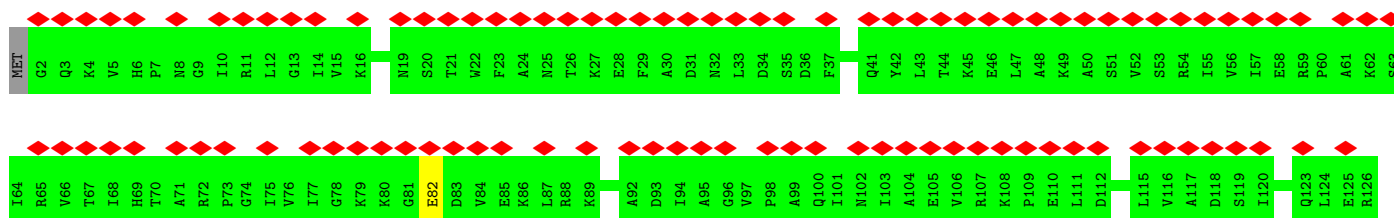
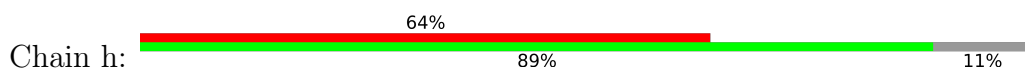
- Molecule 36: 50S ribosomal protein L36

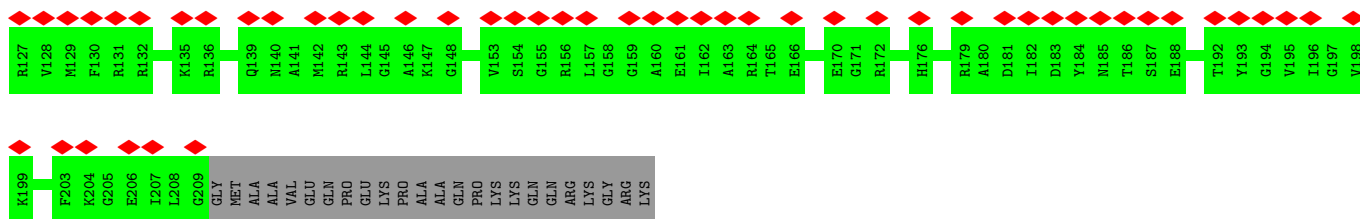


- Molecule 37: 30S ribosomal protein S2

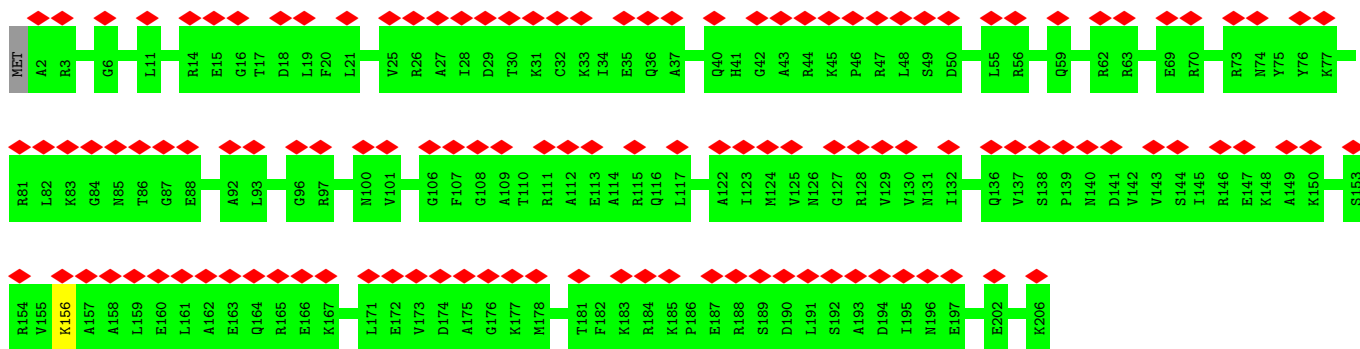


- Molecule 38: 30S ribosomal protein S3

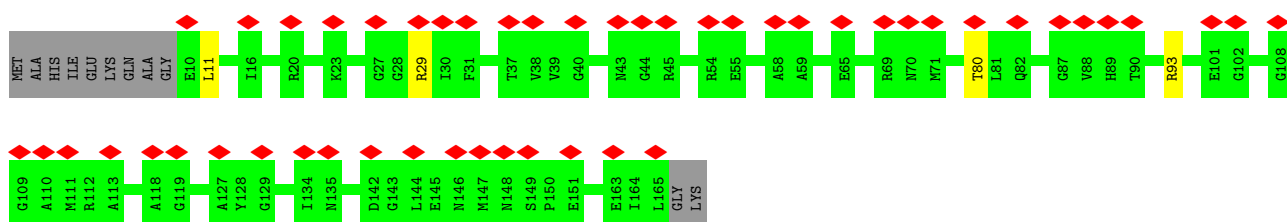
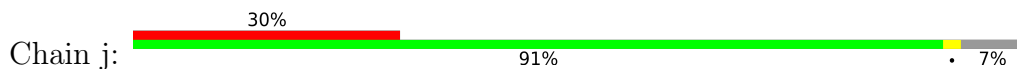




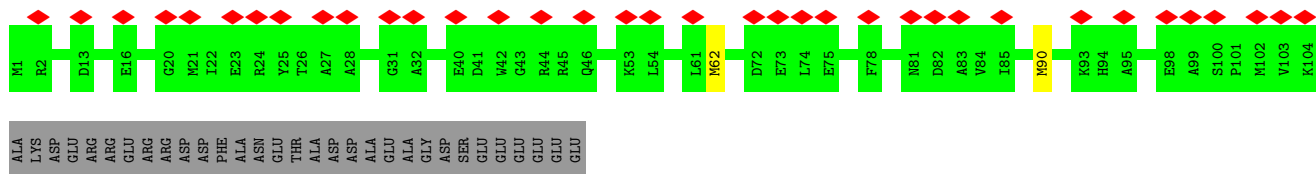
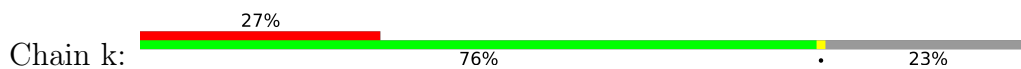
• Molecule 39: 30S ribosomal protein S4



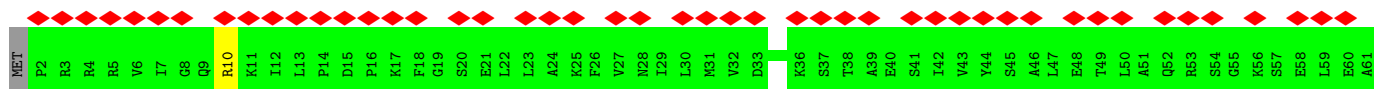
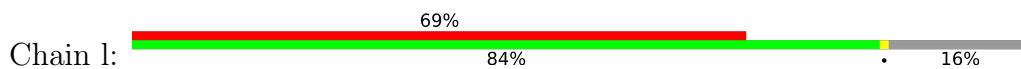
• Molecule 40: 30S ribosomal protein S5

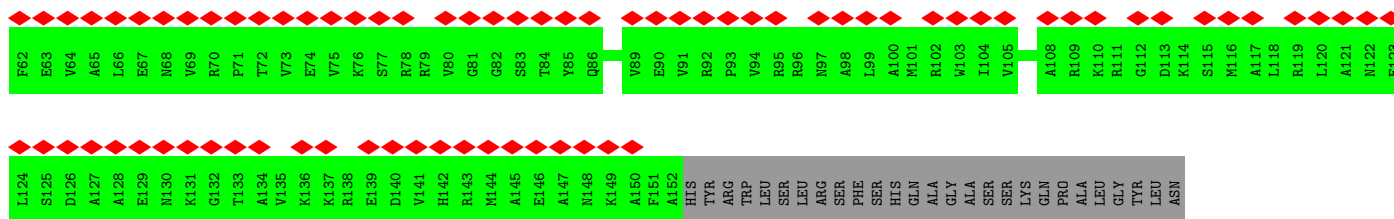


• Molecule 41: 30S ribosomal protein S6

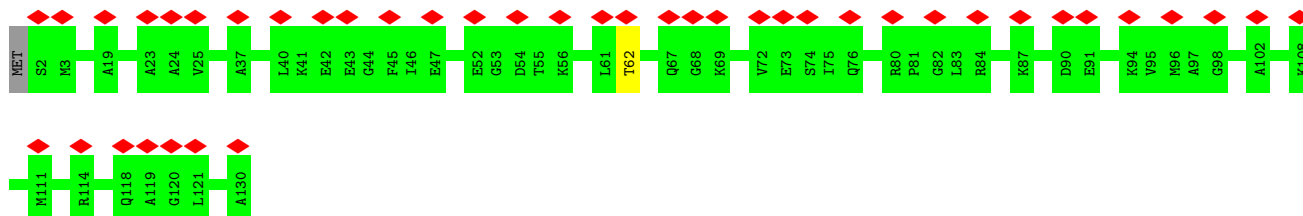


• Molecule 42: 30S ribosomal protein S7

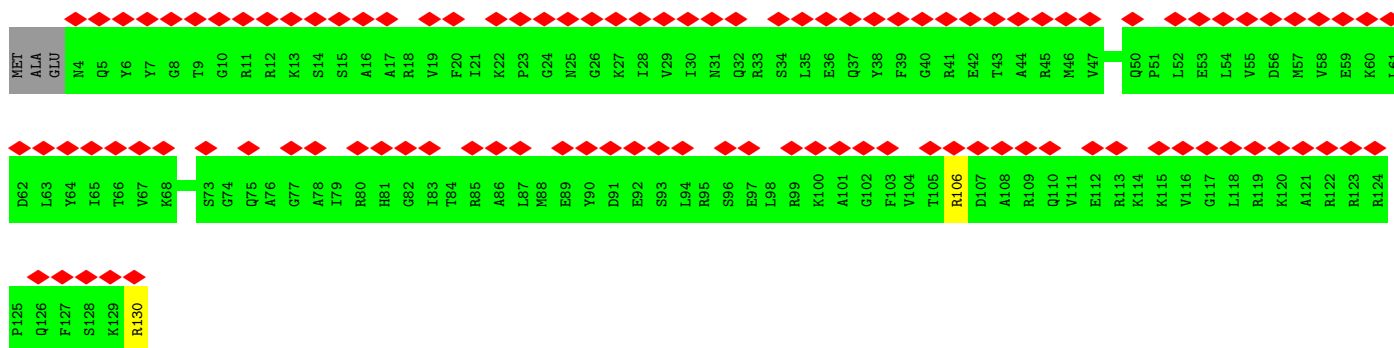
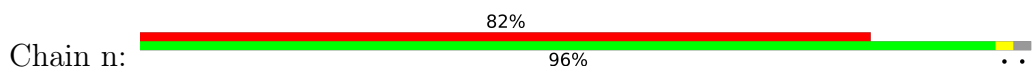




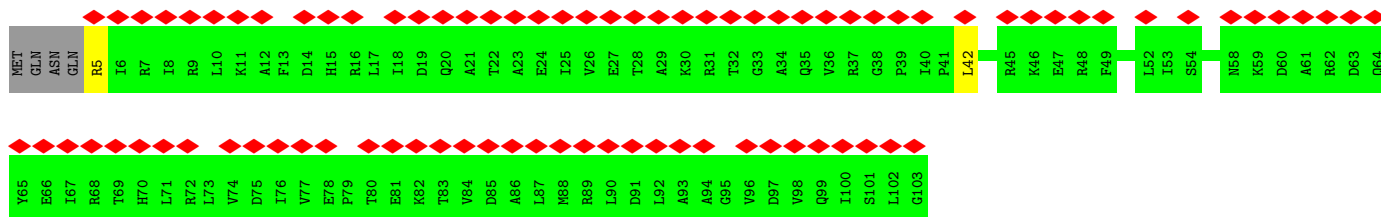
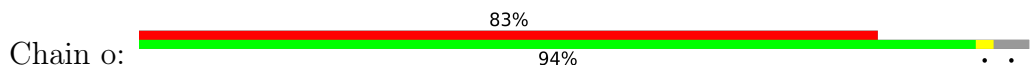
• Molecule 43: 30S ribosomal protein S8



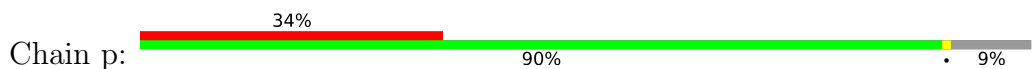
• Molecule 44: 30S ribosomal protein S9

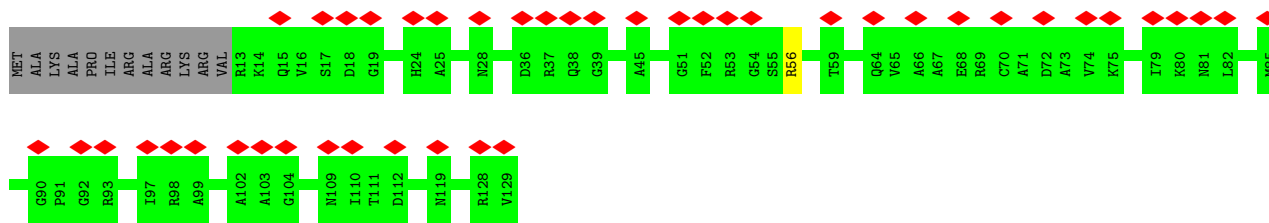


• Molecule 45: 30S ribosomal protein S10

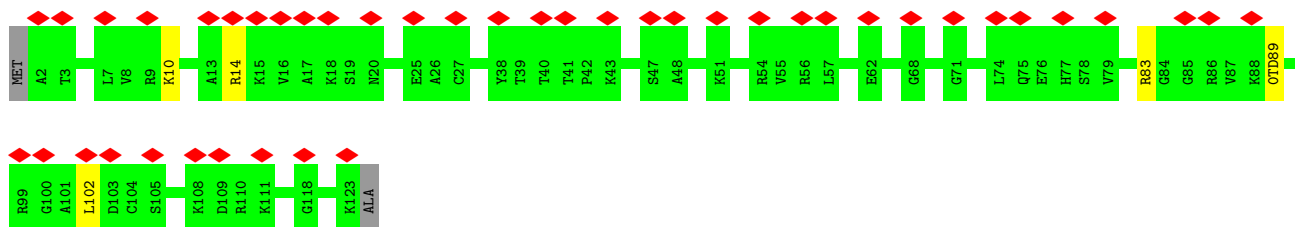
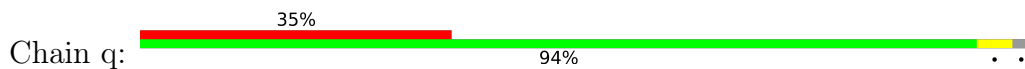


• Molecule 46: 30S ribosomal protein S11

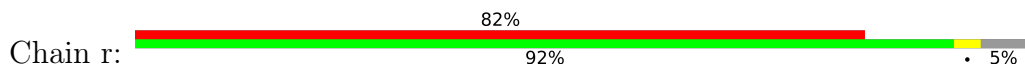




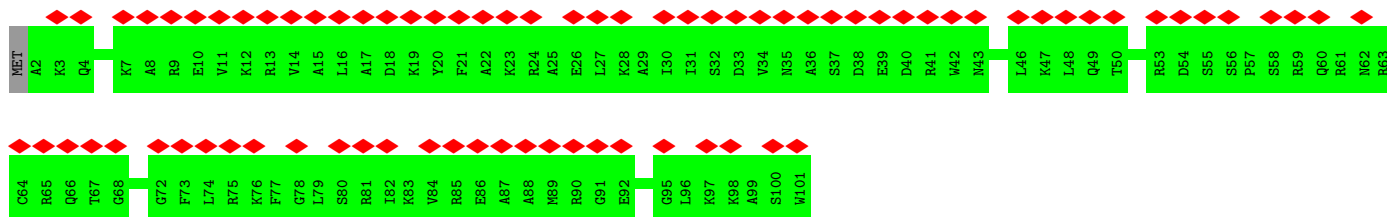
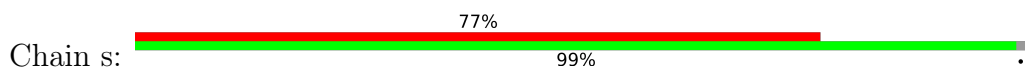
• Molecule 47: 30S ribosomal protein S12



• Molecule 48: 30S ribosomal protein S13

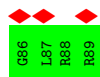


• Molecule 49: 30S ribosomal protein S14

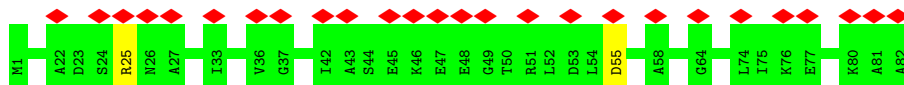


• Molecule 50: 30S ribosomal protein S15

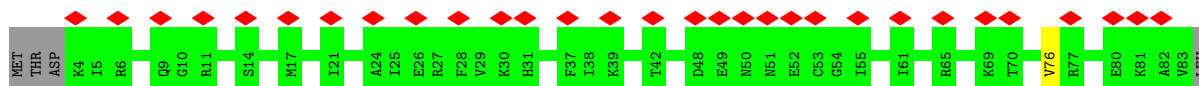




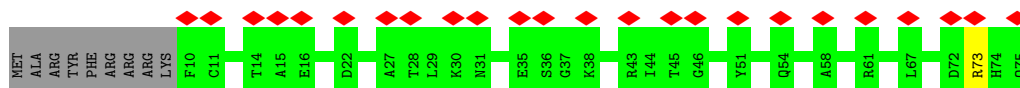
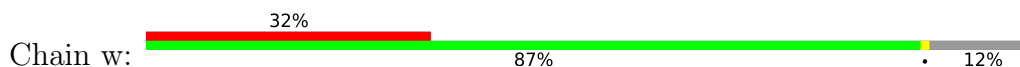
- Molecule 51: 30S ribosomal protein S16



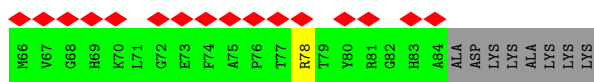
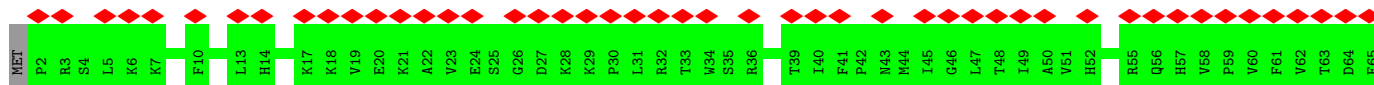
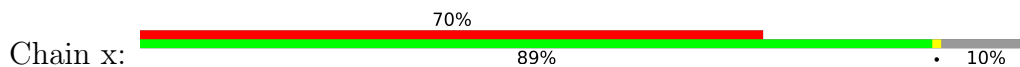
- Molecule 52: 30S ribosomal protein S17



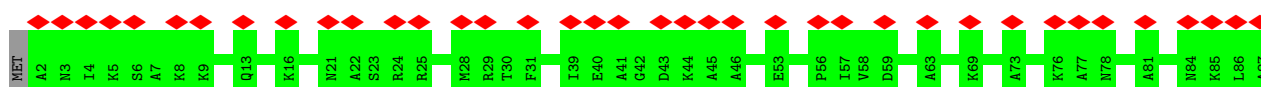
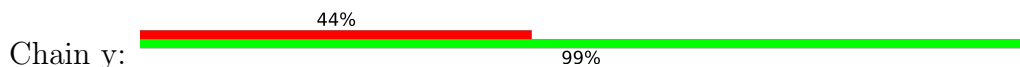
- Molecule 53: 30S ribosomal protein S18



- Molecule 54: 30S ribosomal protein S19

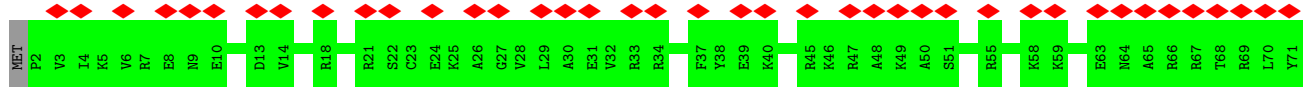


- Molecule 55: 30S ribosomal protein S20

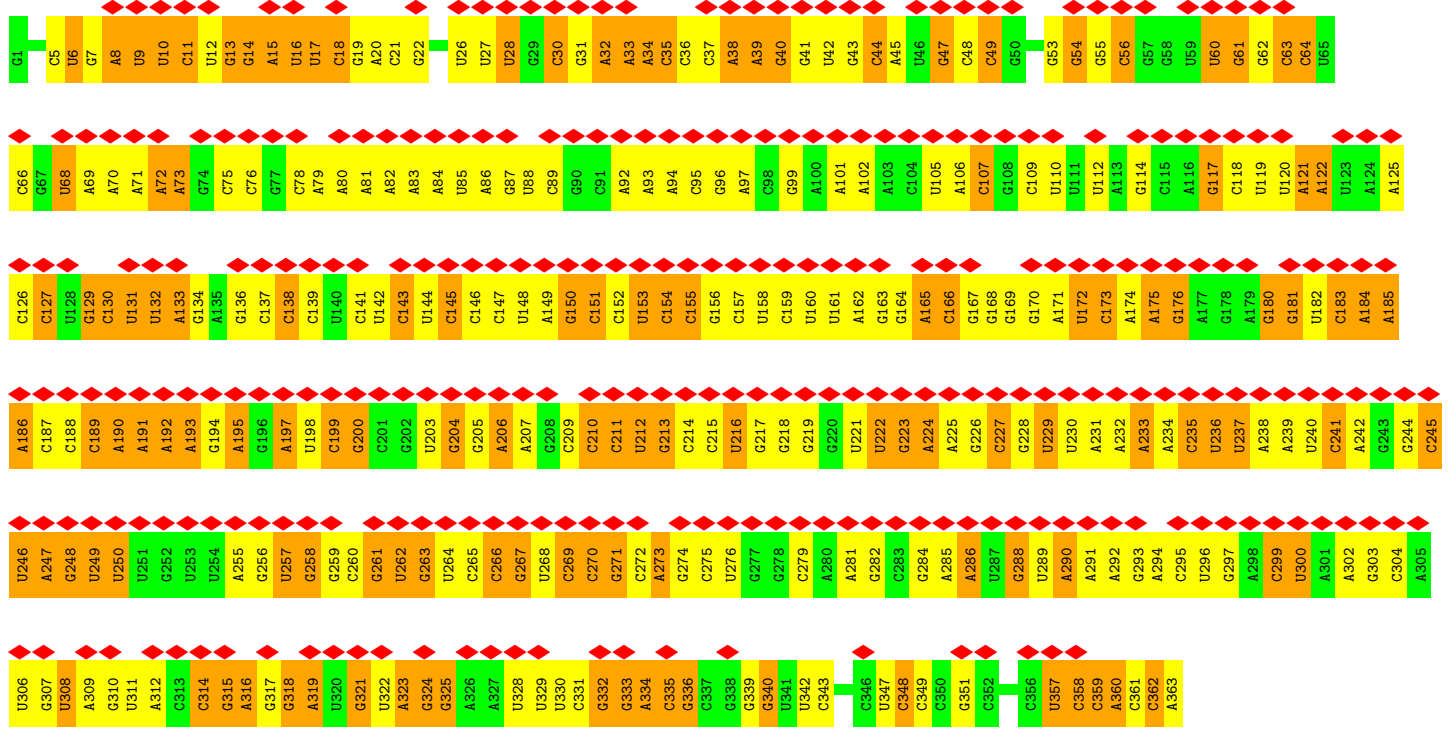
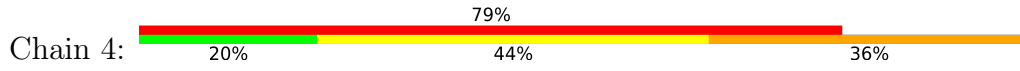


- Molecule 56: 30S ribosomal protein S21





• Molecule 57: transfer-messenger RNA (tmRNA)



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	18018	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 ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	0.407	Depositor
Minimum map value	-0.269	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.018	Depositor
Recommended contour level	0.0934	Depositor
Map size (Å)	437.0, 437.0, 437.0	wwPDB
Map dimensions	380, 380, 380	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.15, 1.15, 1.15	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: 4OC, 5MU, G7M, MG, ZN, OMC, 6MZ, 1MG, 5MC, OMG, 0TD, 2MG, 7MG, OMU, 2MA, UR3, 3TD, PSU, MA6

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	0.91	8/69285 (0.0%)	1.33	664/108083 (0.6%)
2	2	0.74	0/36587	1.28	306/57062 (0.5%)
3	3	0.73	0/2872	1.22	19/4478 (0.4%)
4	5	0.42	0/1231	0.67	0/1655
5	6	0.30	0/109	0.70	0/151
6	B	0.43	0/2121	0.62	0/2852
7	C	0.42	0/1586	0.63	0/2134
8	D	0.41	0/1571	0.59	0/2113
9	E	0.37	0/1434	0.62	0/1926
10	F	0.35	0/1333	0.59	0/1805
11	G	0.32	0/1122	0.59	0/1515
12	H	0.39	0/993	0.75	1/1340 (0.1%)
13	I	0.31	0/998	0.69	3/1348 (0.2%)
14	J	0.43	0/1152	0.57	0/1551
15	K	0.42	0/955	0.62	1/1279 (0.1%)
16	L	0.38	0/1062	0.61	0/1413
17	M	0.51	1/1093 (0.1%)	0.59	0/1460
18	N	0.43	0/964	0.69	2/1289 (0.2%)
19	O	0.35	0/902	0.53	0/1209
20	P	0.42	0/929	0.59	0/1242
21	Q	0.48	0/960	0.55	0/1278
22	R	0.45	0/829	0.60	0/1107
23	S	0.42	0/864	0.61	0/1156
24	T	0.37	0/752	0.55	0/1005
25	U	0.39	0/796	0.60	1/1062 (0.1%)
26	V	0.38	0/766	0.57	0/1025
27	W	0.42	0/589	0.59	0/779
28	X	0.40	0/635	0.57	0/848
29	Y	0.33	0/502	0.52	0/667
30	Z	0.36	0/452	0.59	0/605
31	a	0.31	0/480	0.52	0/638

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
32	b	0.42	0/450	0.66	0/599
33	c	0.38	0/433	0.61	0/576
34	d	0.39	0/380	0.62	0/498
35	e	0.42	0/513	0.67	0/676
36	f	0.44	0/303	0.62	0/397
37	g	0.33	0/1791	0.61	1/2413 (0.0%)
38	h	0.34	0/1663	0.59	0/2241
39	i	0.35	0/1665	0.53	0/2227
40	j	0.39	0/1165	0.64	0/1568
41	k	0.36	0/867	0.61	0/1171
42	l	0.31	0/1195	0.58	0/1602
43	m	0.39	0/989	0.62	0/1326
44	n	0.32	0/1034	0.60	0/1375
45	o	0.32	0/800	0.65	1/1082 (0.1%)
46	p	0.35	0/893	0.60	0/1205
47	q	0.40	0/954	0.68	0/1279
48	r	0.32	0/875	0.68	0/1170
49	s	0.31	0/817	0.52	0/1088
50	t	0.35	0/722	0.60	0/964
51	u	0.36	0/659	0.62	1/884 (0.1%)
52	v	0.38	0/657	0.62	0/881
53	w	0.36	0/553	0.50	0/743
54	x	0.32	0/680	0.56	0/915
55	y	0.30	0/675	0.50	0/895
56	z	0.35	0/597	0.53	0/792
57	4	0.80	3/8680 (0.0%)	2.16	591/13528 (4.4%)
All	All	0.74	12/165934 (0.0%)	1.23	1591/248170 (0.6%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	1	26	1
2	2	0	1
4	5	0	1
10	F	0	1
13	I	0	2
22	R	0	1
23	S	0	1
35	e	0	1

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Mol	Chain	#Chirality outliers	#Planarity outliers
38	h	0	1
43	m	0	1
47	q	0	1
53	w	0	1
All	All	26	13

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	M	2	LEU	C-N	-9.15	1.13	1.34
57	4	335	C	N1-C2	6.53	1.46	1.40
1	1	1253	A	N9-C4	-6.17	1.34	1.37
1	1	586	A	N9-C4	-6.08	1.34	1.37
57	4	237	U	N1-C2	6.07	1.44	1.38

The worst 5 of 1591 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
57	4	335	C	N1-C2-O2	20.18	131.01	118.90
57	4	335	C	N3-C2-O2	-19.68	108.12	121.90
57	4	335	C	C6-N1-C2	-15.59	114.06	120.30
57	4	173	C	N1-C2-O2	15.35	128.11	118.90
57	4	30	C	C6-N1-C2	-15.28	114.19	120.30

5 of 26 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	1	1618	6MZ	C2',C3'
1	1	1911	PSU	C4',C3'
1	1	1915	3TD	C3'
1	1	1917	PSU	C4',C3'
1	1	2030	6MZ	C2',C3'

5 of 13 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	1	830	G	Sidechain
2	2	999	C	Sidechain
4	5	90	LEU	Mainchain
10	F	46	ALA	Peptide
13	I	89	SER	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	
4	5	148/160 (92%)	127 (86%)	20 (14%)	1 (1%)	22	62
5	6	20/22 (91%)	12 (60%)	8 (40%)	0	100	100
6	B	269/273 (98%)	236 (88%)	33 (12%)	0	100	100
7	C	207/209 (99%)	183 (88%)	24 (12%)	0	100	100
8	D	199/201 (99%)	177 (89%)	22 (11%)	0	100	100
9	E	175/179 (98%)	152 (87%)	23 (13%)	0	100	100
10	F	173/177 (98%)	154 (89%)	18 (10%)	1 (1%)	25	65
11	G	147/149 (99%)	128 (87%)	19 (13%)	0	100	100
12	H	128/165 (78%)	94 (73%)	34 (27%)	0	100	100
13	I	133/142 (94%)	104 (78%)	28 (21%)	1 (1%)	19	60
14	J	140/142 (99%)	125 (89%)	15 (11%)	0	100	100
15	K	121/123 (98%)	109 (90%)	12 (10%)	0	100	100
16	L	142/144 (99%)	122 (86%)	20 (14%)	0	100	100
17	M	134/136 (98%)	116 (87%)	18 (13%)	0	100	100
18	N	117/127 (92%)	106 (91%)	11 (9%)	0	100	100
19	O	114/117 (97%)	98 (86%)	16 (14%)	0	100	100
20	P	112/115 (97%)	103 (92%)	9 (8%)	0	100	100
21	Q	115/118 (98%)	108 (94%)	7 (6%)	0	100	100
22	R	101/103 (98%)	86 (85%)	15 (15%)	0	100	100
23	S	108/110 (98%)	97 (90%)	11 (10%)	0	100	100
24	T	92/100 (92%)	84 (91%)	8 (9%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
25	U	101/104 (97%)	90 (89%)	11 (11%)	0	100	100
26	V	92/94 (98%)	83 (90%)	9 (10%)	0	100	100
27	W	74/85 (87%)	63 (85%)	11 (15%)	0	100	100
28	X	75/78 (96%)	71 (95%)	4 (5%)	0	100	100
29	Y	60/63 (95%)	56 (93%)	4 (7%)	0	100	100
30	Z	56/59 (95%)	50 (89%)	6 (11%)	0	100	100
31	a	55/70 (79%)	47 (86%)	8 (14%)	0	100	100
32	b	54/57 (95%)	45 (83%)	9 (17%)	0	100	100
33	c	50/55 (91%)	44 (88%)	6 (12%)	0	100	100
34	d	44/46 (96%)	41 (93%)	3 (7%)	0	100	100
35	e	62/65 (95%)	52 (84%)	10 (16%)	0	100	100
36	f	36/38 (95%)	32 (89%)	4 (11%)	0	100	100
37	g	223/241 (92%)	195 (87%)	28 (13%)	0	100	100
38	h	206/233 (88%)	179 (87%)	27 (13%)	0	100	100
39	i	203/206 (98%)	185 (91%)	18 (9%)	0	100	100
40	j	154/167 (92%)	135 (88%)	19 (12%)	0	100	100
41	k	102/135 (76%)	97 (95%)	5 (5%)	0	100	100
42	l	149/179 (83%)	135 (91%)	14 (9%)	0	100	100
43	m	127/130 (98%)	113 (89%)	14 (11%)	0	100	100
44	n	125/130 (96%)	110 (88%)	15 (12%)	0	100	100
45	o	97/103 (94%)	88 (91%)	9 (9%)	0	100	100
46	p	115/129 (89%)	102 (89%)	13 (11%)	0	100	100
47	q	119/124 (96%)	99 (83%)	20 (17%)	0	100	100
48	r	110/118 (93%)	89 (81%)	21 (19%)	0	100	100
49	s	98/101 (97%)	90 (92%)	8 (8%)	0	100	100
50	t	86/89 (97%)	77 (90%)	9 (10%)	0	100	100
51	u	80/82 (98%)	71 (89%)	9 (11%)	0	100	100
52	v	78/84 (93%)	67 (86%)	11 (14%)	0	100	100
53	w	64/75 (85%)	61 (95%)	3 (5%)	0	100	100
54	x	81/92 (88%)	66 (82%)	15 (18%)	0	100	100
55	y	84/87 (97%)	83 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
56	z	68/71 (96%)	60 (88%)	8 (12%)	0	100	100
All	All	6023/6402 (94%)	5297 (88%)	723 (12%)	3 (0%)	100	100

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
10	F	47	ASP
4	5	92	LEU
13	I	92	PRO

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	
4	5	125/133 (94%)	124 (99%)	1 (1%)	81	89
6	B	216/218 (99%)	215 (100%)	1 (0%)	88	93
7	C	164/164 (100%)	164 (100%)	0	100	100
8	D	165/165 (100%)	165 (100%)	0	100	100
9	E	148/150 (99%)	146 (99%)	2 (1%)	67	81
10	F	136/138 (99%)	136 (100%)	0	100	100
11	G	114/114 (100%)	114 (100%)	0	100	100
12	H	99/123 (80%)	99 (100%)	0	100	100
13	I	104/110 (94%)	103 (99%)	1 (1%)	76	86
14	J	116/116 (100%)	116 (100%)	0	100	100
15	K	104/104 (100%)	103 (99%)	1 (1%)	76	86
16	L	103/103 (100%)	101 (98%)	2 (2%)	57	75
17	M	109/109 (100%)	109 (100%)	0	100	100
18	N	99/103 (96%)	99 (100%)	0	100	100
19	O	86/87 (99%)	85 (99%)	1 (1%)	71	84
20	P	99/100 (99%)	97 (98%)	2 (2%)	55	73

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
21	Q	89/90 (99%)	89 (100%)	0	100	100
22	R	84/84 (100%)	84 (100%)	0	100	100
23	S	93/93 (100%)	92 (99%)	1 (1%)	73	85
24	T	81/84 (96%)	81 (100%)	0	100	100
25	U	84/85 (99%)	83 (99%)	1 (1%)	71	84
26	V	78/78 (100%)	78 (100%)	0	100	100
27	W	58/63 (92%)	57 (98%)	1 (2%)	60	78
28	X	67/68 (98%)	66 (98%)	1 (2%)	65	80
29	Y	54/55 (98%)	53 (98%)	1 (2%)	57	75
30	Z	48/49 (98%)	48 (100%)	0	100	100
31	a	54/62 (87%)	54 (100%)	0	100	100
32	b	47/48 (98%)	44 (94%)	3 (6%)	17	44
33	c	47/49 (96%)	47 (100%)	0	100	100
34	d	38/38 (100%)	38 (100%)	0	100	100
35	e	51/52 (98%)	51 (100%)	0	100	100
36	f	34/34 (100%)	34 (100%)	0	100	100
37	g	187/199 (94%)	187 (100%)	0	100	100
38	h	171/190 (90%)	171 (100%)	0	100	100
39	i	172/173 (99%)	171 (99%)	1 (1%)	86	92
40	j	119/126 (94%)	115 (97%)	4 (3%)	37	61
41	k	91/116 (78%)	89 (98%)	2 (2%)	52	71
42	l	124/147 (84%)	123 (99%)	1 (1%)	81	89
43	m	104/105 (99%)	104 (100%)	0	100	100
44	n	105/107 (98%)	103 (98%)	2 (2%)	57	75
45	o	86/90 (96%)	85 (99%)	1 (1%)	71	84
46	p	90/99 (91%)	89 (99%)	1 (1%)	73	85
47	q	102/103 (99%)	99 (97%)	3 (3%)	42	64
48	r	90/96 (94%)	87 (97%)	3 (3%)	38	62
49	s	83/84 (99%)	83 (100%)	0	100	100
50	t	76/77 (99%)	75 (99%)	1 (1%)	69	82
51	u	65/65 (100%)	64 (98%)	1 (2%)	65	80

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
52	v	74/78 (95%)	73 (99%)	1 (1%)	67	81
53	w	57/65 (88%)	57 (100%)	0	100	100
54	x	72/79 (91%)	71 (99%)	1 (1%)	67	81
55	y	65/66 (98%)	65 (100%)	0	100	100
56	z	60/61 (98%)	60 (100%)	0	100	100
All	All	4987/5195 (96%)	4946 (99%)	41 (1%)	82	89

5 of 41 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
44	n	130	ARG
48	r	30	SER
45	o	5	ARG
47	q	14	ARG
50	t	77	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 55 such sidechains are listed below:

Mol	Chain	Res	Type
31	a	41	HIS
37	g	109	GLN
55	y	68	HIS
49	s	71	HIS
31	a	61	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	1	2897/2904 (99%)	989 (34%)	22 (0%)
2	2	1526/1535 (99%)	495 (32%)	7 (0%)
3	3	119/120 (99%)	35 (29%)	0
57	4	361/363 (99%)	211 (58%)	31 (8%)
All	All	4903/4922 (99%)	1730 (35%)	60 (1%)

5 of 1730 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	1	2	G

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Mol	Chain	Res	Type
1	1	4	U
1	1	10	A
1	1	11	C
1	1	12	U

5 of 60 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	2	1214	C
57	4	290	A
57	4	19	G
57	4	261	G
57	4	333	G

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

34 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
1	PSU	1	955	1	18,21,22	1.43	3 (16%)	22,30,33	2.08	5 (22%)
1	PSU	1	2504	1	18,21,22	2.05	6 (33%)	22,30,33	2.15	5 (22%)
1	5MU	1	1939	58,1	19,22,23	1.41	4 (21%)	28,32,35	2.35	7 (25%)
1	3TD	1	1915	1	18,22,23	2.71	7 (38%)	22,32,35	1.45	1 (4%)
1	5MU	1	747	1	19,22,23	1.41	5 (26%)	28,32,35	2.17	7 (25%)
1	5MC	1	1962	1	18,22,23	2.08	3 (16%)	26,32,35	1.59	2 (7%)
1	PSU	1	2457	1	18,21,22	1.96	5 (27%)	22,30,33	2.30	5 (22%)
2	5MC	2	1407	2	18,22,23	2.13	3 (16%)	26,32,35	1.40	3 (11%)
2	2MG	2	1207	2	18,26,27	2.95	5 (27%)	16,38,41	1.29	4 (25%)
1	2MG	1	2445	1	18,26,27	2.98	6 (33%)	16,38,41	1.53	3 (18%)
1	PSU	1	1911	1	18,21,22	1.96	5 (27%)	22,30,33	2.14	4 (18%)
1	PSU	1	746	1	18,21,22	1.40	2 (11%)	22,30,33	2.23	6 (27%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	OMU	1	2552	1	19,22,23	2.60	7 (36%)	26,31,34	2.09	7 (26%)
2	MA6	2	1518	2	18,26,27	0.85	0	19,38,41	1.59	4 (21%)
2	MA6	2	1519	2	18,26,27	0.90	0	19,38,41	1.44	2 (10%)
2	4OC	2	1402	2	20,23,24	0.83	1 (5%)	26,32,35	1.33	4 (15%)
47	0TD	q	89	47	7,9,10	1.40	1 (14%)	6,11,13	2.63	3 (50%)
1	OMG	1	2251	1,57	18,26,27	3.02	7 (38%)	19,38,41	1.50	4 (21%)
1	1MG	1	745	1	18,26,27	0.99	0	19,39,42	1.28	2 (10%)
2	2MG	2	1516	2	18,26,27	2.93	5 (27%)	16,38,41	1.33	3 (18%)
1	OMC	1	2498	58,1	19,22,23	1.86	6 (31%)	26,31,34	2.16	6 (23%)
2	5MC	2	967	2	18,22,23	2.07	3 (16%)	26,32,35	1.43	4 (15%)
2	UR3	2	1498	58,2	19,22,23	2.76	6 (31%)	26,32,35	1.23	2 (7%)
2	PSU	2	516	58,2	18,21,22	1.44	3 (16%)	22,30,33	2.14	5 (22%)
1	PSU	1	2580	1	18,21,22	2.07	5 (27%)	22,30,33	2.35	6 (27%)
1	6MZ	1	1618	1	18,25,26	1.92	1 (5%)	16,36,39	2.53	4 (25%)
1	PSU	1	1917	58,1	18,21,22	2.00	5 (27%)	22,30,33	1.95	5 (22%)
1	6MZ	1	2030	1	18,25,26	1.92	2 (11%)	16,36,39	3.37	5 (31%)
2	7MG	2	527	2	22,26,27	1.37	4 (18%)	29,39,42	2.59	8 (27%)
1	G7M	1	2069	1	20,26,27	1.19	2 (10%)	17,39,42	0.94	1 (5%)
1	PSU	1	2605	1	18,21,22	1.93	5 (27%)	22,30,33	2.09	3 (13%)
1	2MA	1	2503	58,1	17,25,26	1.63	3 (17%)	17,37,40	1.38	2 (11%)
1	2MG	1	1835	1	18,26,27	2.88	6 (33%)	16,38,41	1.60	4 (25%)
2	2MG	2	966	2	18,26,27	2.87	5 (27%)	16,38,41	1.42	3 (18%)

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
1	PSU	1	955	1	-	3/7/25/26	0/2/2/2
1	PSU	1	2504	1	2/2/5/5	4/7/25/26	0/2/2/2
1	5MU	1	1939	58,1	-	0/7/25/26	0/2/2/2
1	3TD	1	1915	1	1/1/5/5	4/7/25/26	0/2/2/2
1	5MU	1	747	1	-	0/7/25/26	0/2/2/2
1	5MC	1	1962	1	-	2/7/25/26	0/2/2/2
1	PSU	1	2457	1	2/2/5/5	0/7/25/26	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	5MC	2	1407	2	-	2/7/25/26	0/2/2/2
2	2MG	2	1207	2	-	2/5/27/28	0/3/3/3
1	2MG	1	2445	1	-	4/5/27/28	0/3/3/3
1	PSU	1	1911	1	2/2/5/5	3/7/25/26	0/2/2/2
1	OMU	1	2552	1	2/2/5/5	3/9/27/28	0/2/2/2
1	PSU	1	746	1	-	2/7/25/26	0/2/2/2
2	MA6	2	1518	2	-	3/7/29/30	0/3/3/3
2	MA6	2	1519	2	-	3/7/29/30	0/3/3/3
2	4OC	2	1402	2	-	3/9/29/30	0/2/2/2
47	0TD	q	89	47	-	2/7/12/14	-
1	OMG	1	2251	1,57	1/1/5/5	2/5/27/28	0/3/3/3
1	1MG	1	745	1	-	0/3/25/26	0/3/3/3
2	2MG	2	1516	2	-	1/5/27/28	0/3/3/3
1	OMC	1	2498	58,1	1/1/5/5	5/9/27/28	0/2/2/2
2	5MC	2	967	2	-	3/7/25/26	0/2/2/2
2	UR3	2	1498	58,2	-	6/7/25/26	0/2/2/2
2	PSU	2	516	58,2	-	3/7/25/26	0/2/2/2
1	PSU	1	2580	1	2/2/5/5	2/7/25/26	0/2/2/2
1	6MZ	1	1618	1	2/2/5/6	5/5/27/28	0/3/3/3
1	PSU	1	1917	58,1	2/2/5/5	1/7/25/26	0/2/2/2
1	6MZ	1	2030	1	2/2/5/6	4/5/27/28	0/3/3/3
2	7MG	2	527	2	-	2/7/37/38	0/3/3/3
1	G7M	1	2069	1	3/3/5/5	2/3/25/26	0/3/3/3
1	PSU	1	2605	1	2/2/5/5	3/7/25/26	0/2/2/2
1	2MA	1	2503	58,1	2/2/5/5	3/3/25/26	0/3/3/3
1	2MG	1	1835	1	-	3/5/27/28	0/3/3/3
2	2MG	2	966	2	-	0/5/27/28	0/3/3/3

The worst 5 of 131 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	2	966	2MG	O6-C6	8.97	1.41	1.23
2	2	1207	2MG	O6-C6	8.83	1.41	1.23
1	1	2251	OMG	O6-C6	8.78	1.41	1.23
2	2	1516	2MG	O6-C6	8.70	1.41	1.23
1	1	2445	2MG	O6-C6	8.54	1.40	1.23

The worst 5 of 139 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	2030	6MZ	C9-N6-C6	-9.62	114.59	122.87
2	2	527	7MG	N9-C4-N3	8.69	138.46	125.47
1	1	2498	OMC	O2-C2-N3	-6.85	111.18	122.33
1	1	2457	PSU	N1-C2-N3	6.77	122.80	115.13
2	2	516	PSU	N1-C2-N3	6.77	122.80	115.13

5 of 26 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	1	1618	6MZ	C2'
1	1	1618	6MZ	C3'
1	1	1911	PSU	C4'
1	1	1911	PSU	C3'
1	1	1915	3TD	C3'

5 of 85 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	1	955	PSU	C2'-C1'-C5-C4
1	1	955	PSU	C4'-C5'-O5'-P
1	1	1618	6MZ	C5-C6-N6-C9
1	1	1618	6MZ	N1-C6-N6-C9
1	1	1618	6MZ	O4'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 431 ligands modelled in this entry, 431 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	2	3
57	4	1
1	1	1
17	M	1

The worst 5 of 6 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	4	342:U	O3'	343:C	P	3.61
1	2	1276:G	O3'	1277:C	P	3.26
1	1	2314:A	O3'	2315:G	P	3.25
1	2	147:G	O3'	148:G	P	3.25
1	2	1383:C	O3'	1384:C	P	3.17

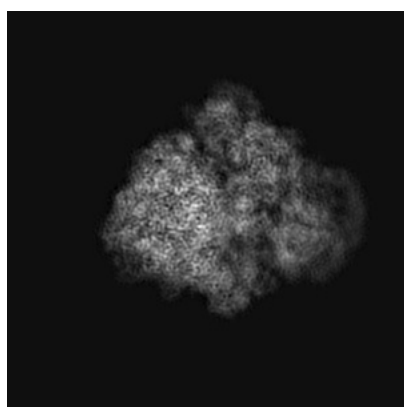
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-4477. These allow visual inspection of the internal detail of the map and identification of artifacts.

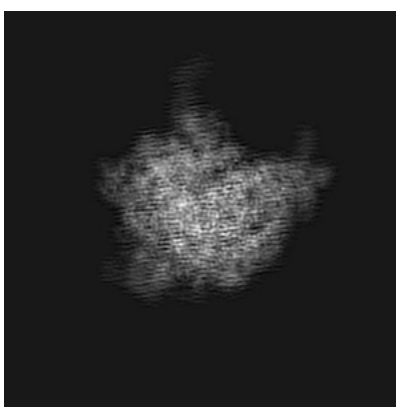
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

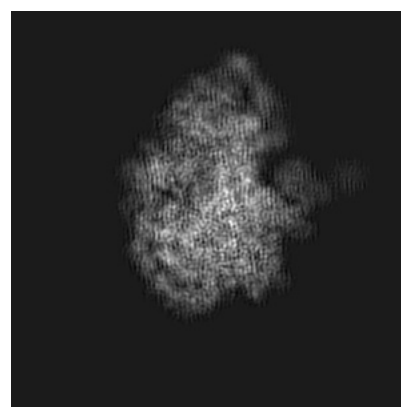
6.1.1 Primary map



X



Y

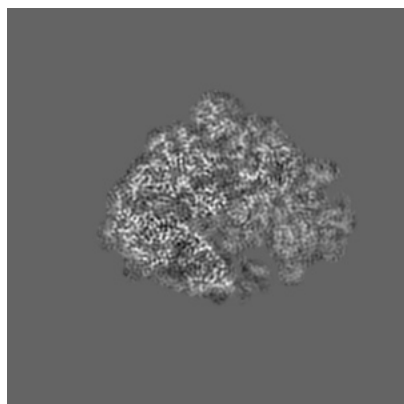


Z

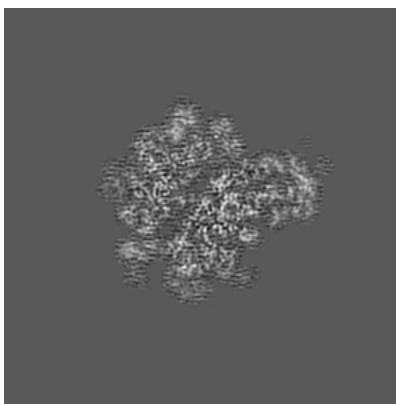
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

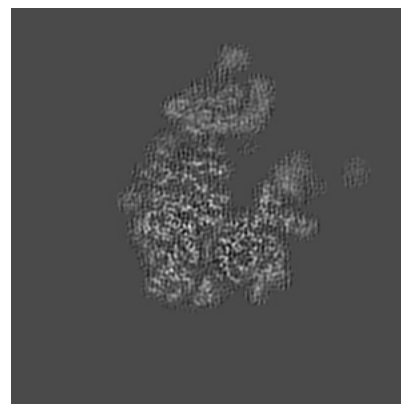
6.2.1 Primary map



X Index: 190



Y Index: 190

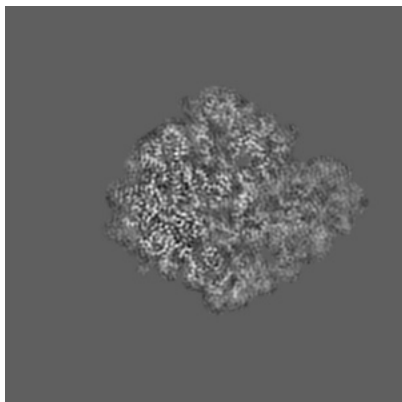


Z Index: 190

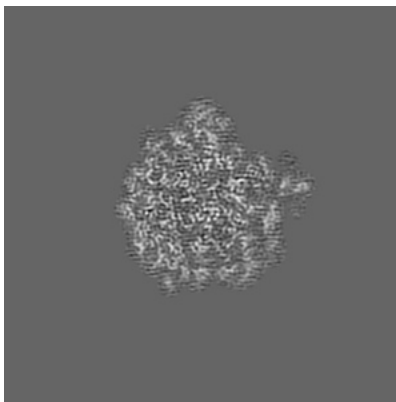
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

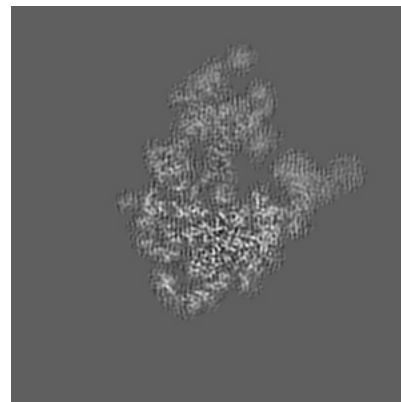
6.3.1 Primary map



X Index: 199



Y Index: 176

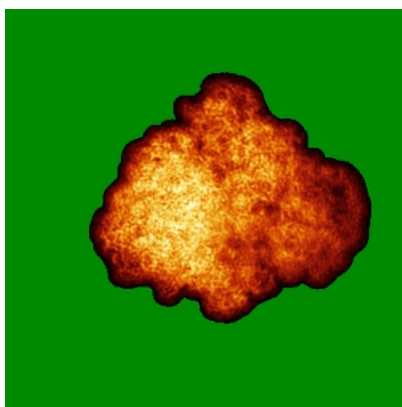


Z Index: 174

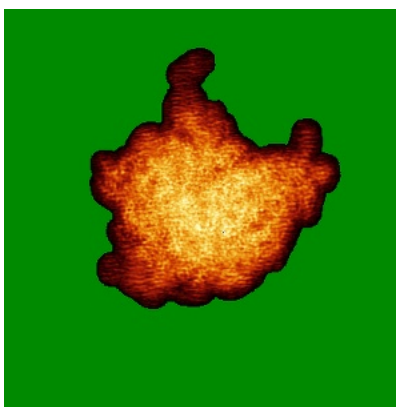
The images above show the largest variance slices of the map in three orthogonal directions.

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

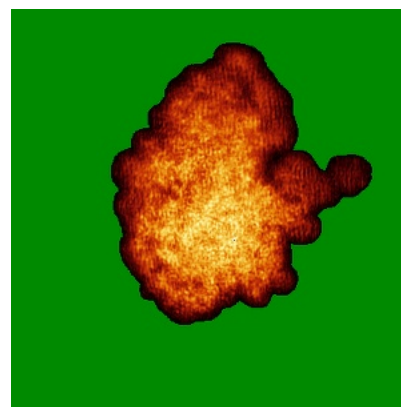
6.4.1 Primary map



X



Y

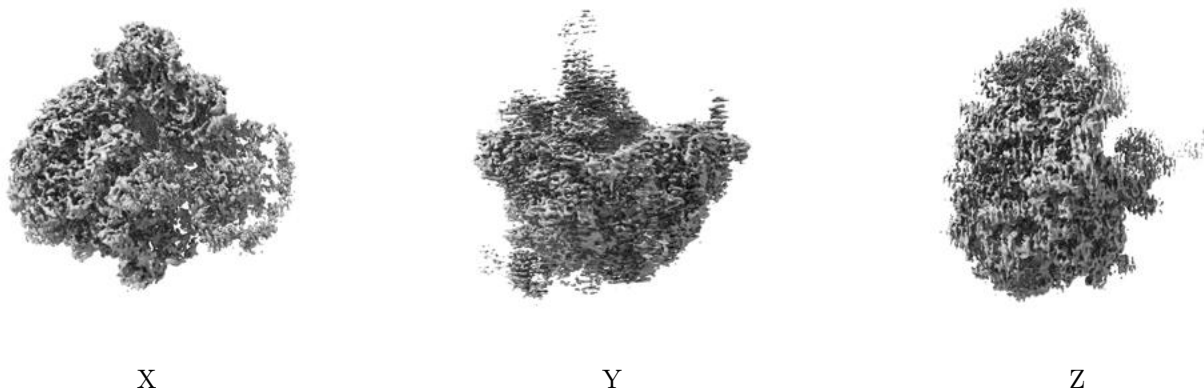


Z

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 0.0934. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

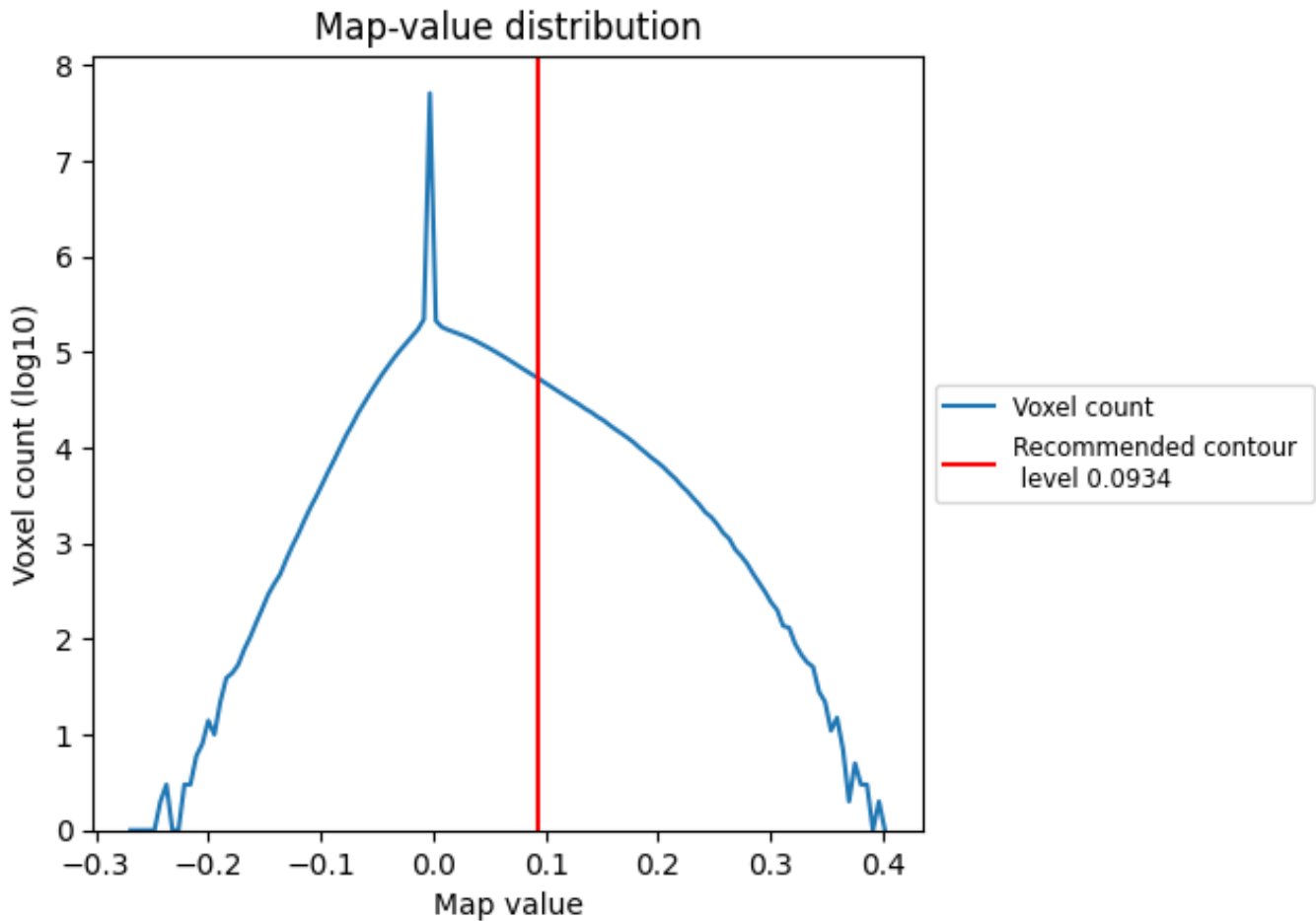
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

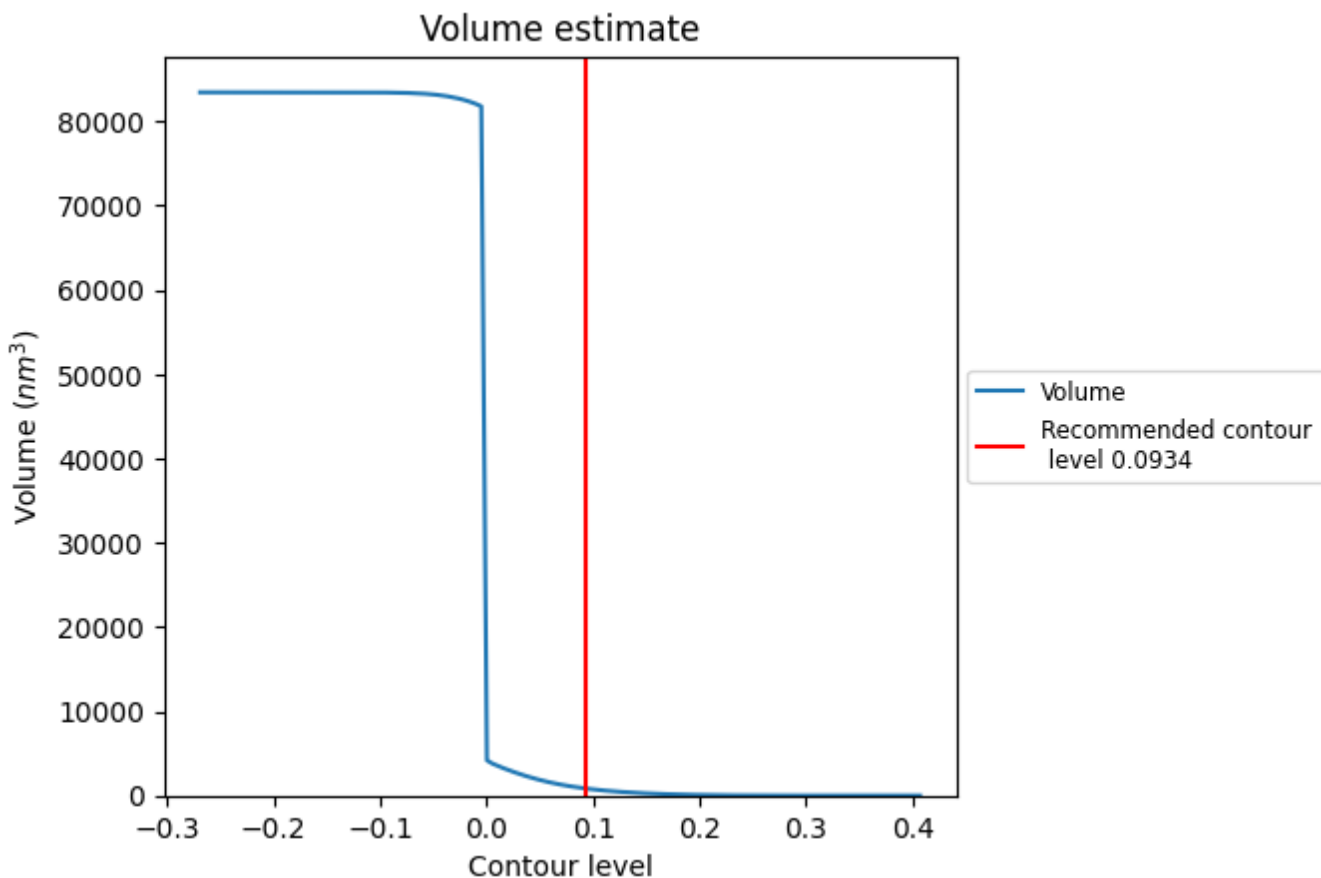
This section contains the results of statistical analysis of the map.

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.

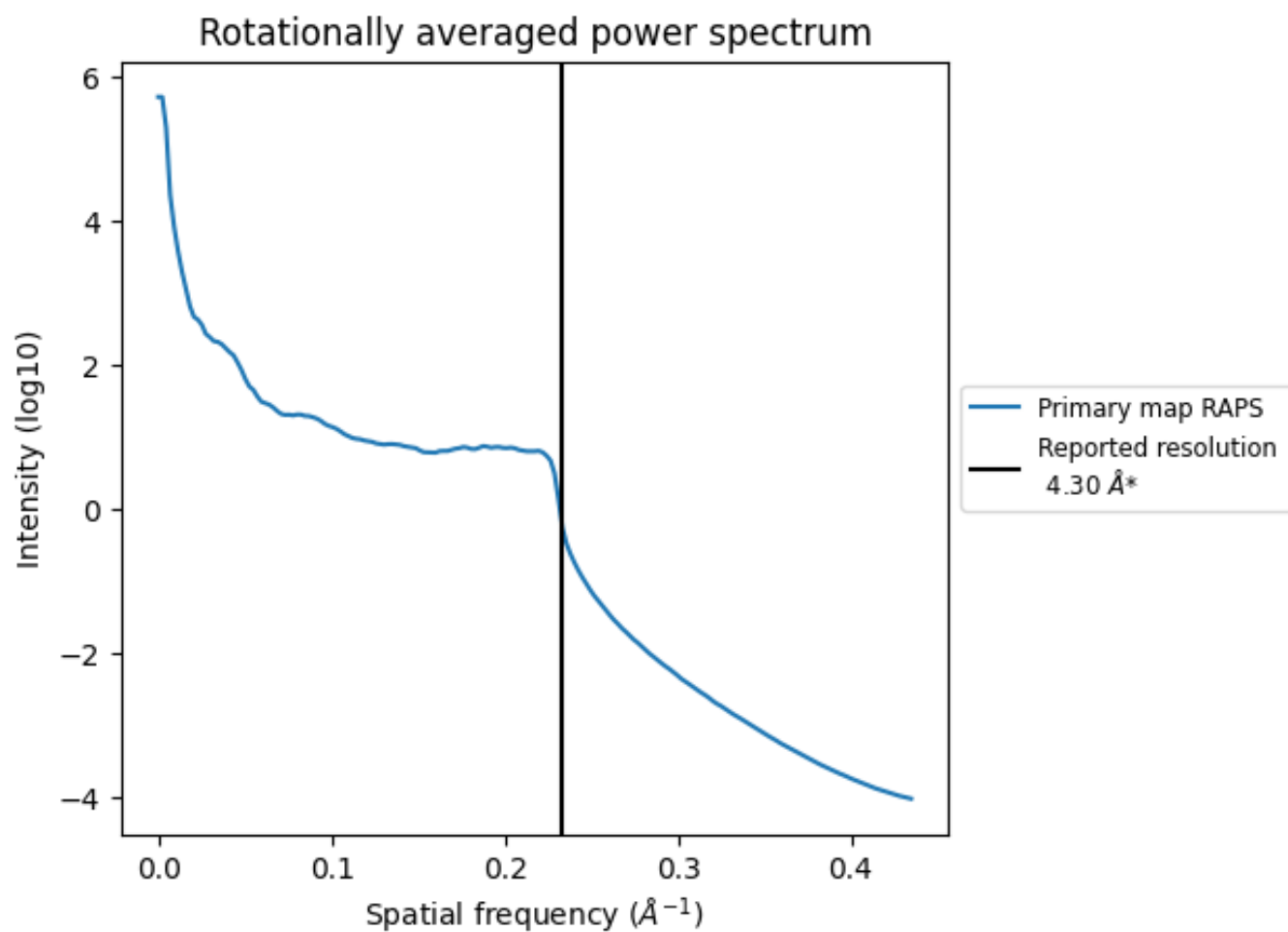
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 836 nm³; this corresponds to an approximate mass of 755 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 0.233\AA^{-1}

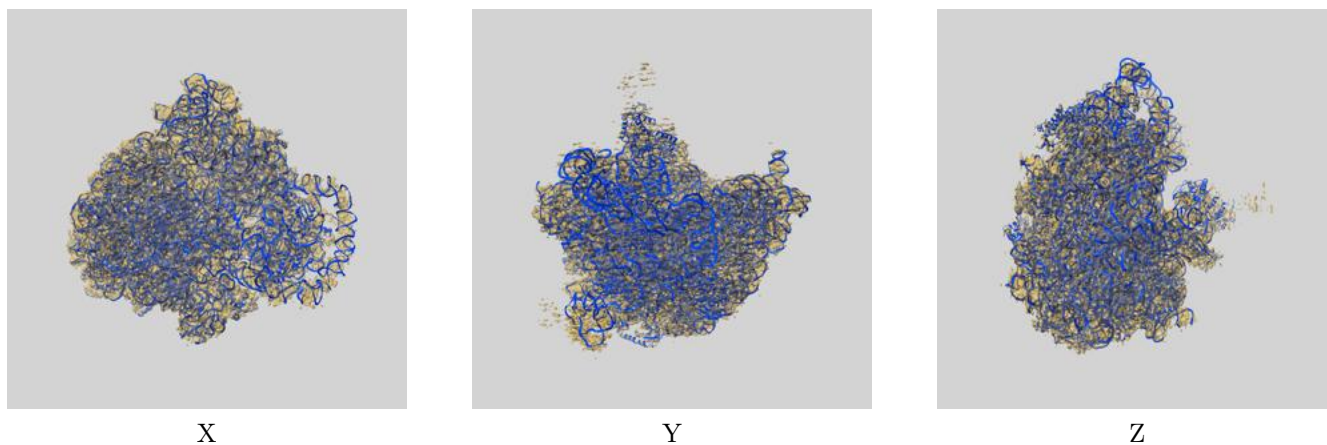
8 Fourier-Shell correlation

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-4477 and PDB model 6Q98. Per-residue inclusion information can be found in section 3 on page 16.

9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.0934 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.

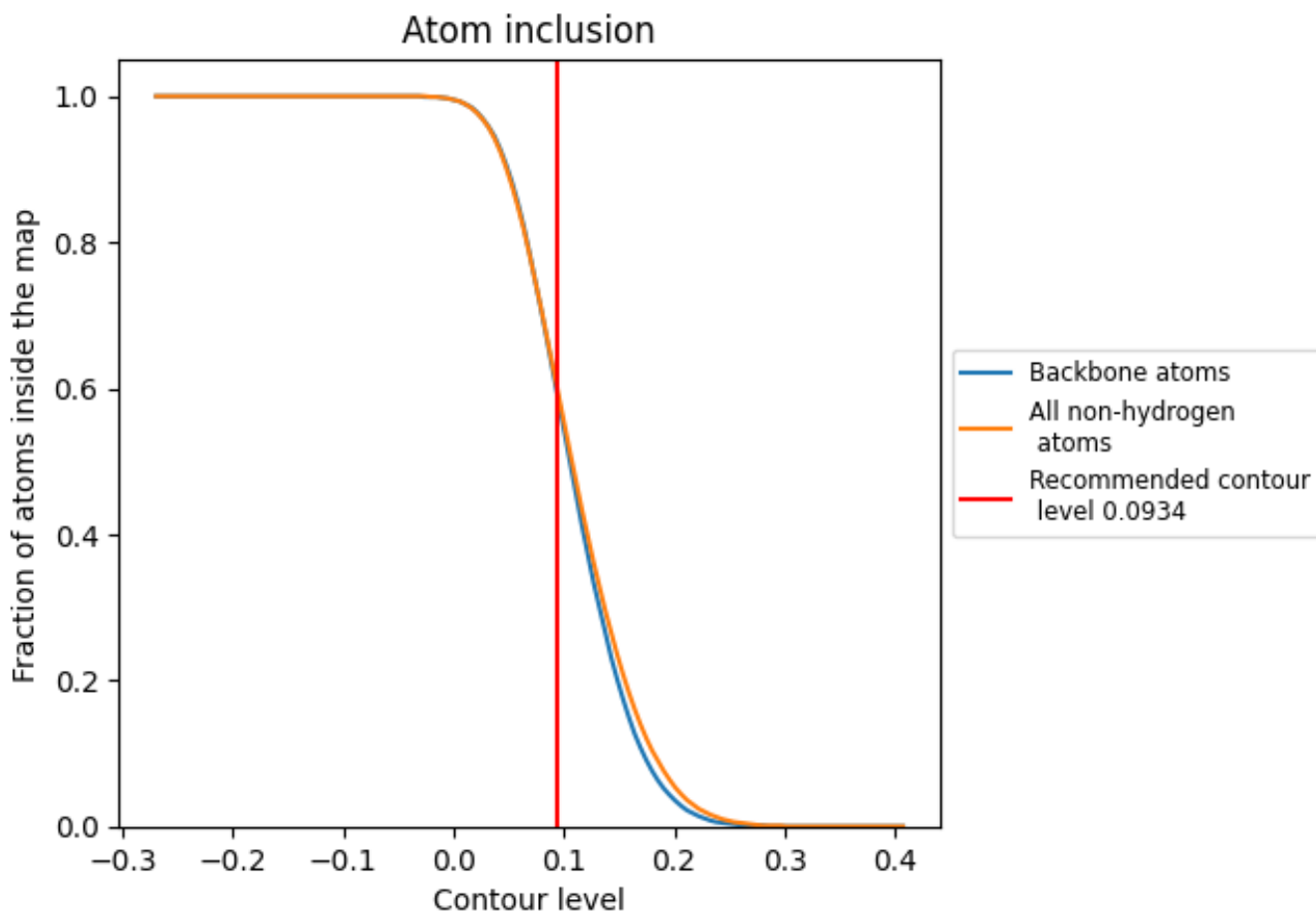
9.2 Q-score mapped to coordinate model [i](#)

This section was not generated.

9.3 Atom inclusion mapped to coordinate model [i](#)

This section was not generated.




































9.4 Atom inclusion [i](#)



At the recommended contour level, 60% of all backbone atoms, 60% 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 (0.0934) and Q-score for the entire model and for each chain.

Chain	Atom inclusion
All	 0.6050
1	 0.7470
2	 0.6730
3	 0.7410
4	 0.2510
5	 0.3400
6	 0.1910
B	 0.5360
C	 0.5700
D	 0.5280
E	 0.3970
F	 0.4770
G	 0.2300
H	 0.1950
I	 0.1690
J	 0.5620
K	 0.5360
L	 0.5580
M	 0.5440
N	 0.5940
O	 0.4770
P	 0.4830
Q	 0.6410
R	 0.5480
S	 0.5730
T	 0.5000
U	 0.5020
V	 0.5470
W	 0.5620
X	 0.5440
Y	 0.4930
Z	 0.5620
a	 0.2390
b	 0.5940
c	 0.4330



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Chain	Atom inclusion
d	 0.5630
e	 0.5930
f	 0.5750
g	 0.2340
h	 0.2910
i	 0.3530
j	 0.4890
k	 0.4870
l	 0.2300
m	 0.4980
n	 0.2160
o	 0.1920
p	 0.4850
q	 0.4700
r	 0.1890
s	 0.2520
t	 0.4940
u	 0.4880
v	 0.4710
w	 0.4910
x	 0.2100
y	 0.4680
z	 0.3790