



Full wwPDB EM Validation Report ⓘ

Oct 8, 2022 – 05:19 pm BST

PDB ID : 7PAR
EMDB ID : EMD-13281
Title : 70S ribosome with EF-G, ap/P- and pe/E-site tRNAs in Mycoplasma pneumoniae cells
Authors : Xue, L.; Lenz, S.; Rappsilber, J.; Mahamid, J.
Deposited on : 2021-07-30
Resolution : 8.20 Å (reported)
Based on initial models : 7OOC, 4V7D, 4V7C, 7OOD

This is a Full wwPDB EM Validation 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:

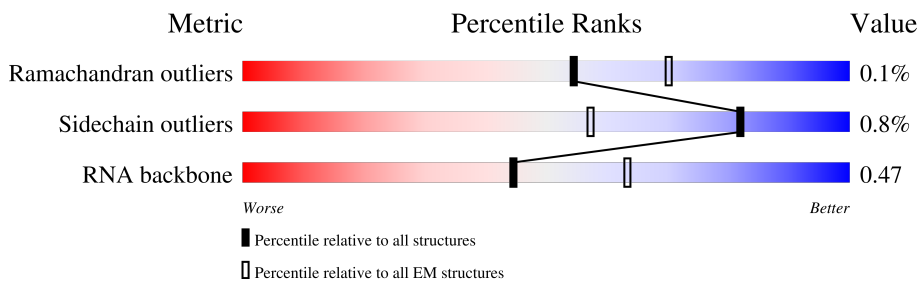
EMDB validation analysis : 0.0.1.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

1 Overall quality at a glance

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

The reported resolution of this entry is 8.20 Å.

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



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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 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	0	48	
2	1	59	
3	2	37	
4	9	688	
5	A	294	
6	B	273	
7	C	205	
8	D	219	

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Mol	Chain	Length	Quality of chain
9	E	215	41% 77% 22%
10	F	155	86% 98% ..
11	G	142	22% 99% .
12	H	132	64% 95% ..
13	I	108	48% 94% 6%
14	J	121	50% 93% . 6%
15	K	139	28% 92% 6% .
16	L	124	72% 94% . 5%
17	M	61	7% 98% .
18	N	86	21% 97% .
19	O	94	11% 85% 15%
20	P	85	29% 98% .
21	Q	104	26% 62% 38%
22	R	87	33% 93%
23	S	87	. 87% . 11%
24	T	60	30% 88% 12%
25	W	122	55% 57% 43%
26	a	287	13% 99% .
27	b	287	11% 79% 20%
28	c	212	15% 99% .
29	d	180	19% 96% ..
30	e	184	28% 96% .
31	f	149	71% 97% .
32	g	161	36% 70% 7% . 22%
33	h	137	43% 93% 7%

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Mol	Chain	Length	Quality of chain
34	i	146	12% 98% ..
35	j	122	20% 99% .
36	k	151	15% 97% ..
37	l	139	14% 96% ...
38	m	124	7% 94% . .
39	n	116	13% 96% ..
40	o	119	16% 97% .
41	p	127	. 90% 10%
42	q	100	16% 98% ..
43	r	159	9% 87% . 13%
44	s	237	5% 39% 61%
45	t	111	31% 100%
46	u	104	14% 83% 17%
47	v	65	22% 97% .
48	w	111	10% 90% 10%
49	x	97	18% 44% . 55%
50	y	57	18% 91% 7% .
51	z	53	23% 94% 6%
52	3	2907	. 69% 30% .
53	4	108	. 61% 35% ..
54	5	1520	. 72% 26% .
55	7	76	. 68% 30% .
55	8	76	18% 68% 30% .

2 Entry composition

There are 55 unique types of molecules in this entry. The entry contains 151980 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 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	0	47	380	236	81	61	2	0	0

- Molecule 2 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	1	59	477	300	99	77	1	0	0

- Molecule 3 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	2	37	304	189	65	46	4	0	0

- Molecule 4 is a protein called Elongation factor G.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	9	682	5326	3369	911	1021	25	0	0

- Molecule 5 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	A	240	1921	1226	334	352	9	0	0

- Molecule 6 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	B	215	1698	1073	313	307	5	0	0

- Molecule 7 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	C	203	1660	1051	314	290	5	0	0

- Molecule 8 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	D	153	1173	742	226	202	3	0	0

- Molecule 9 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	E	167	1362	857	240	263	2	0	0

- Molecule 10 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	F	154	1246	785	239	216	6	0	0

- Molecule 11 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	G	141	1110	723	193	192	2	0	0

- Molecule 12 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	H	128	1028	655	191	181	1	0	0

- Molecule 13 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	I	101	809	523	142	143	1	0	0

- Molecule 14 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	J	114	Total	C	N	O	S	0	0
			829	514	153	156	6		

- Molecule 15 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	K	136	Total	C	N	O	S	0	0
			1076	680	213	181	2		

- Molecule 16 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	L	118	Total	C	N	O	S	0	0
			951	594	191	166			

- Molecule 17 is a protein called 30S ribosomal protein S14 type Z.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	M	60	Total	C	N	O	S	0	0
			474	302	96	72	4		

- Molecule 18 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	N	83	Total	C	N	O	S	0	0
			673	428	125	120			

- Molecule 19 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	O	80	Total	C	N	O	S	0	0
			646	414	119	111	2		

- Molecule 20 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	P	83	Total	C	N	O	S	0	0
			675	425	135	115			

- Molecule 21 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	Q	65	Total	C	N	O	S	0	0
			535	342	103	86	4		

- Molecule 22 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	R	84	Total	C	N	O	S	0	0
			682	435	127	118	2		

- Molecule 23 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms				AltConf	Trace
23	S	77	Total	C	N	O	0	0
			629	383	135	111		

- Molecule 24 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	T	53	Total	C	N	O	S	0	0
			471	295	103	72	1		

- Molecule 25 is a protein called 50S ribosomal protein L7/L12.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	W	69	Total	C	N	O	S	0	0
			534	342	87	103	2		

- Molecule 26 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	a	285	Total	C	N	O	S	0	0
			2225	1385	437	397	6		

- Molecule 27 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	b	229	Total	C	N	O	S	0	0
			1762	1119	318	318	7		

- Molecule 28 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	c	210	Total	C	N	O	S	0	0
			1644	1047	297	297	3		

- Molecule 29 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	d	175	Total	C	N	O	S	0	0
			1388	893	245	246	4		

- Molecule 30 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms				AltConf	Trace
30	e	176	Total	C	N	O	0	0
			1396	899	247	250		

- Molecule 31 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	f	145	Total	C	N	O	S	0	0
			1160	746	204	207	3		

- Molecule 32 is a protein called 50S ribosomal protein L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	g	126	Total	C	N	O	S	0	0
			960	612	167	178	3		

- Molecule 33 is a protein called 50S ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	h	128	Total	C	N	O	S	0	0
			959	616	160	177	6		

- Molecule 34 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	i	144	Total	C	N	O	S	0	0
			1164	737	213	209	5		

- Molecule 35 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	j	122	944	595	178	167	4	0	0

- Molecule 36 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	k	148	1153	731	226	196		0	0

- Molecule 37 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	l	136	1079	694	196	182	7	0	0

- Molecule 38 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	m	119	958	609	175	171	3	0	0

- Molecule 39 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
39	n	112	889	557	175	155	2	0	0

- Molecule 40 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
40	o	115	938	592	180	165	1	0	0

- Molecule 41 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
41	p	114	947	603	188	154	2	0	0

- Molecule 42 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
42	q	99	811	525	148	134	4	0	0

- Molecule 43 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
43	r	139	1068	663	207	191	7	0	0

- Molecule 44 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
44	s	92	720	475	122	122	1	0	0

- Molecule 45 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
45	t	111	872	550	166	153	3	0	0

- Molecule 46 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
46	u	86	657	409	130	117	1	0	0

- Molecule 47 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
47	v	63	513	317	108	87	1	0	0

- Molecule 48 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
48	w	100	818	517	153	148	0	0

- Molecule 49 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	x	44	Total	C	N	O	S	0	0
			344	221	55	64	4		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
50	y	56	Total	C	N	O	S	0	0
			452	274	98	75	5		

- Molecule 51 is a protein called 50S ribosomal protein L33 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	z	50	Total	C	N	O	S	0	0
			408	255	81	68	4		

- Molecule 52 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	3	2878	Total	C	N	O	P	0	0
			61664	27558	11236	19995	2875		

- Molecule 53 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	4	105	Total	C	N	O	P	0	0
			2239	1003	409	724	103		

- Molecule 54 is a RNA chain called 16S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	5	1493	Total	C	N	O	P	0	0
			31943	14279	5792	10382	1490		

- Molecule 55 is a RNA chain called tRNA-Phe.

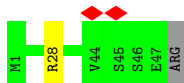
Mol	Chain	Residues	Atoms					AltConf	Trace
55	7	76	Total	C	N	O	P	0	0
			1618	723	289	531	75		
55	8	76	Total	C	N	O	P	0	0
			1618	723	289	531	75		

3 Residue-property plots [i](#)

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

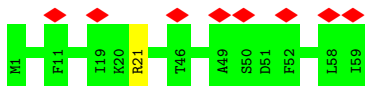
- Molecule 1: 50S ribosomal protein L34

Chain 0:  96%



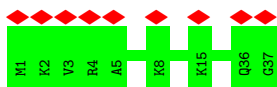
- Molecule 2: 50S ribosomal protein L35

Chain 1:  14% 98%



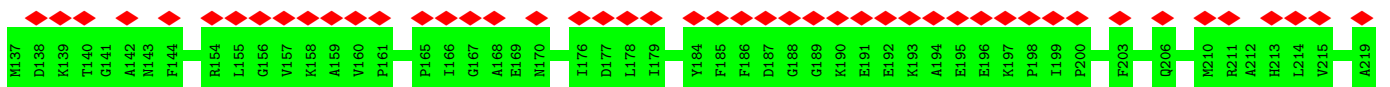
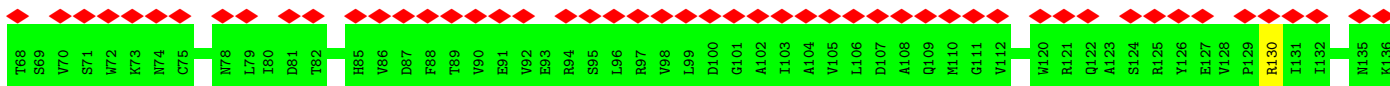
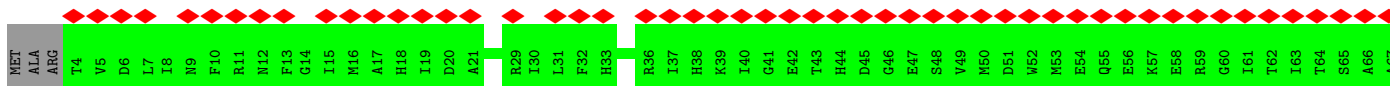
- Molecule 3: 50S ribosomal protein L36

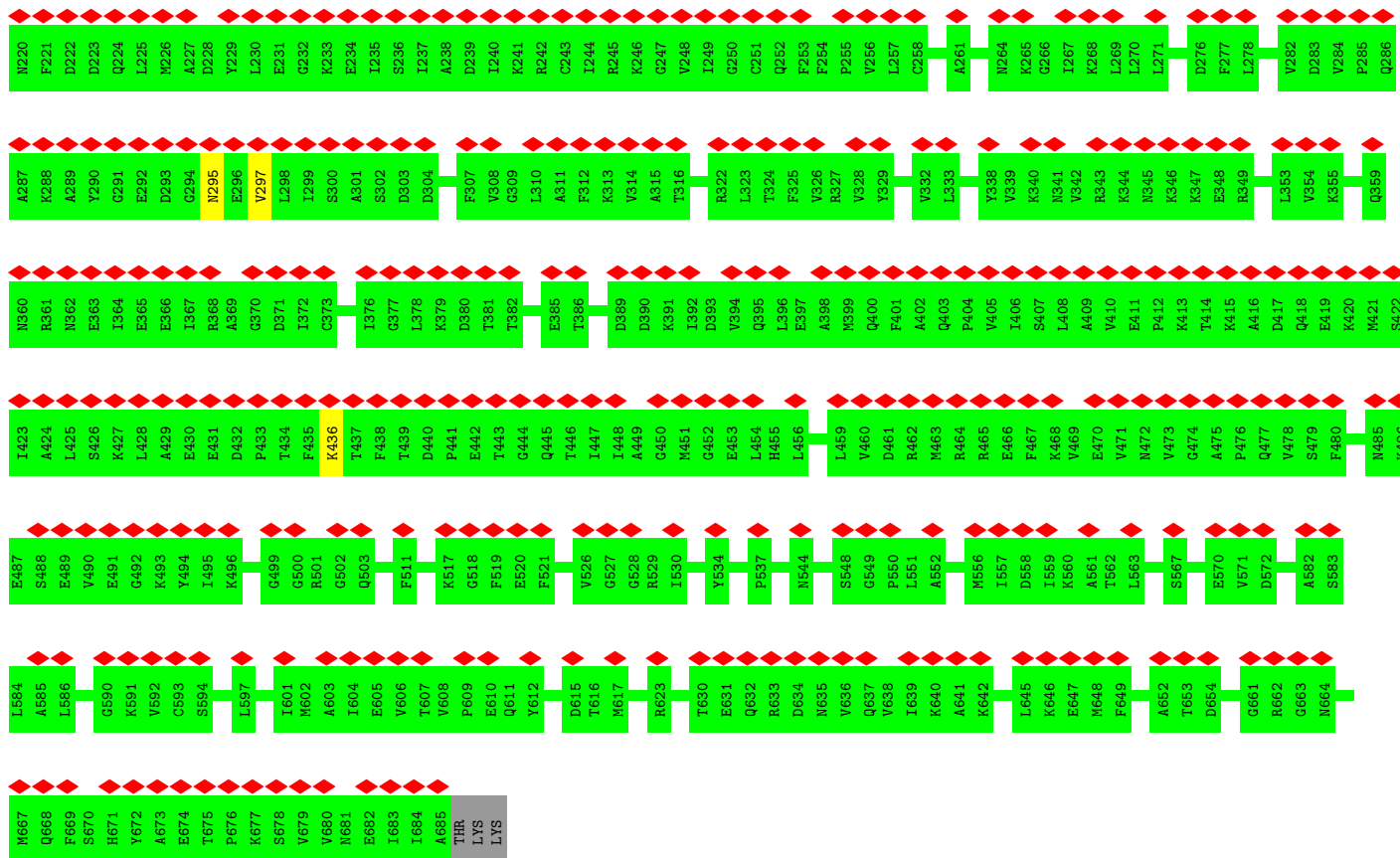
Chain 2:  24% 100%



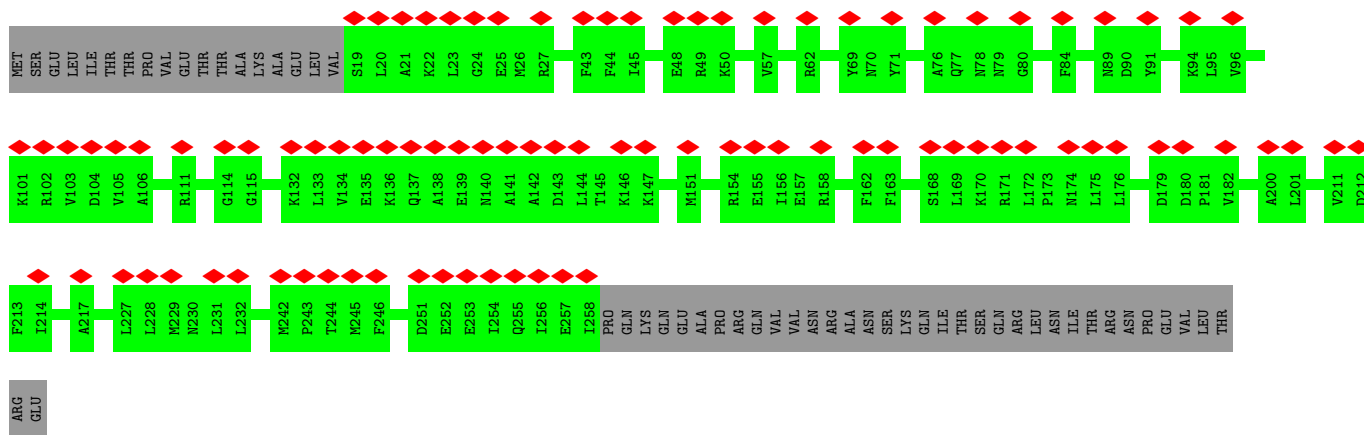
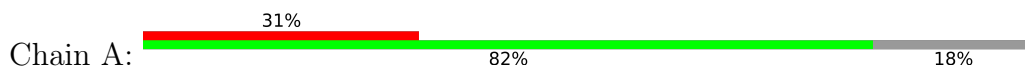
- Molecule 4: Elongation factor G

Chain 9:  67% 99%

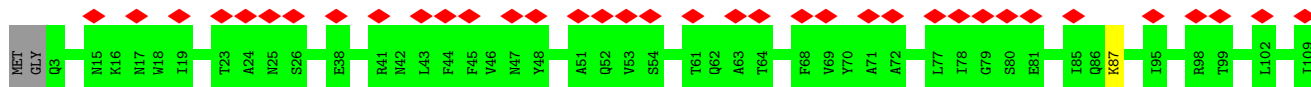
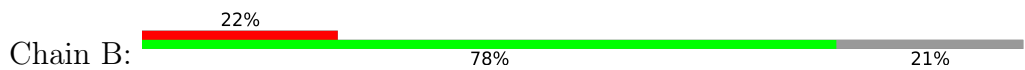


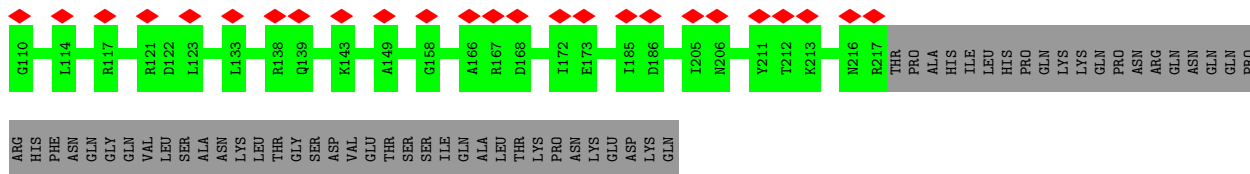


• Molecule 5: 30S ribosomal protein S2

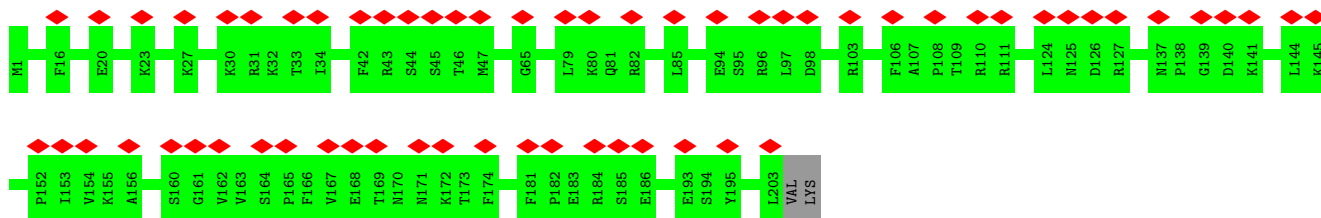


• Molecule 6: 30S ribosomal protein S3

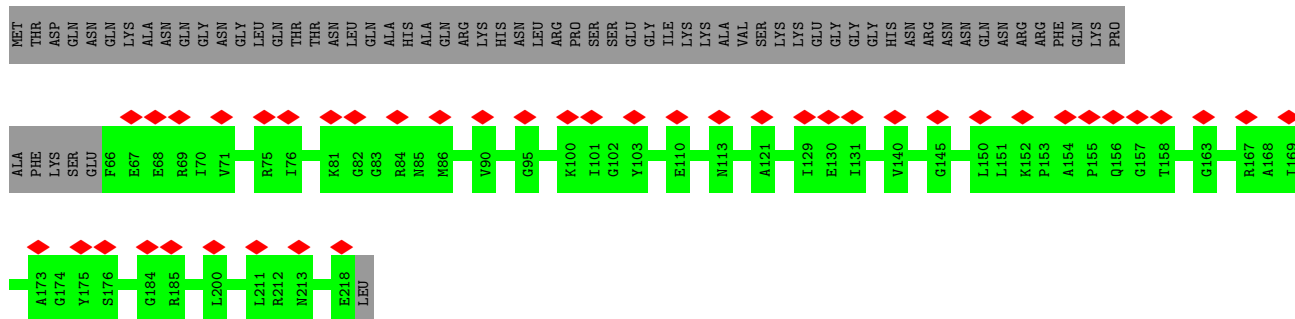




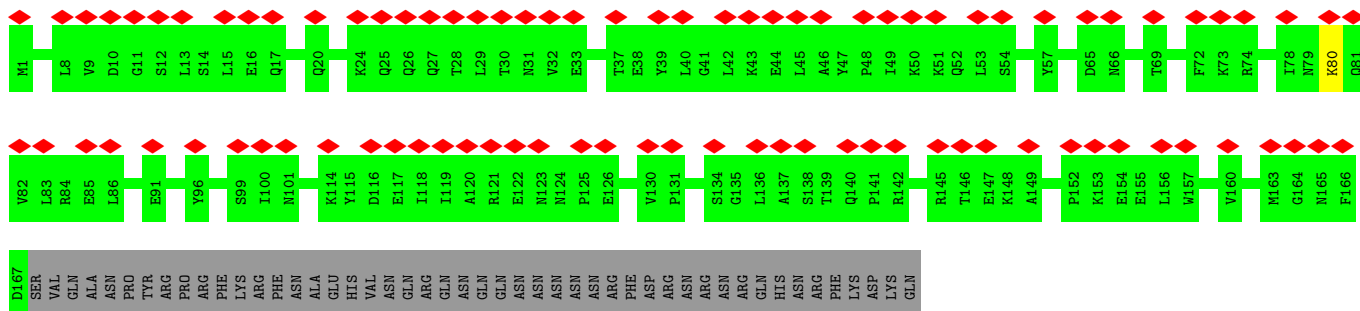
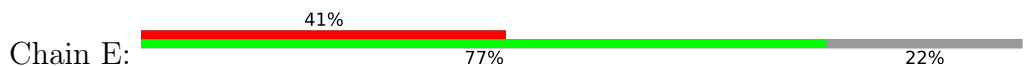
• Molecule 7: 30S ribosomal protein S4



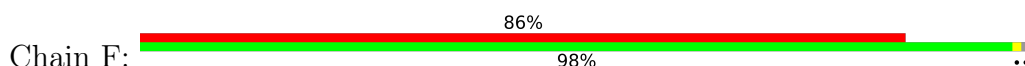
• Molecule 8: 30S ribosomal protein S5

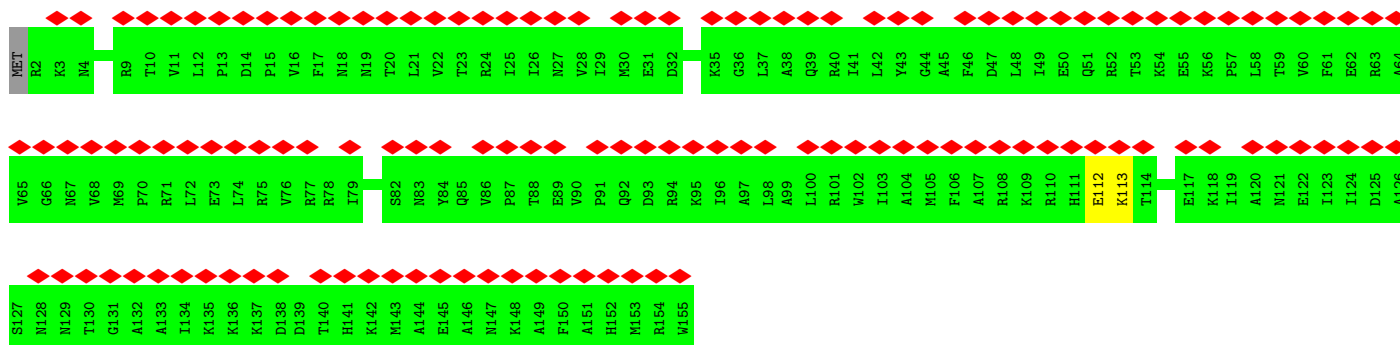


• Molecule 9: 30S ribosomal protein S6

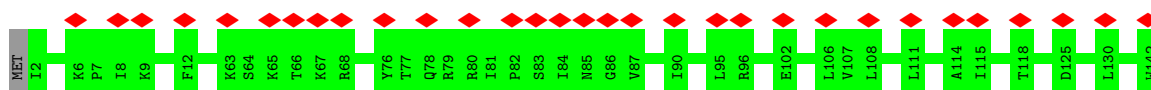


• Molecule 10: 30S ribosomal protein S7

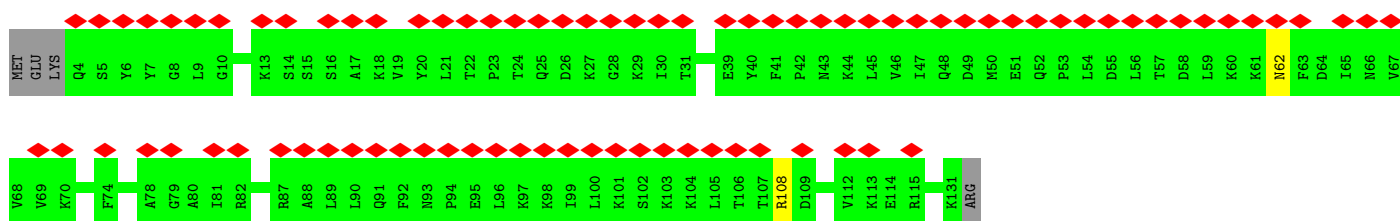




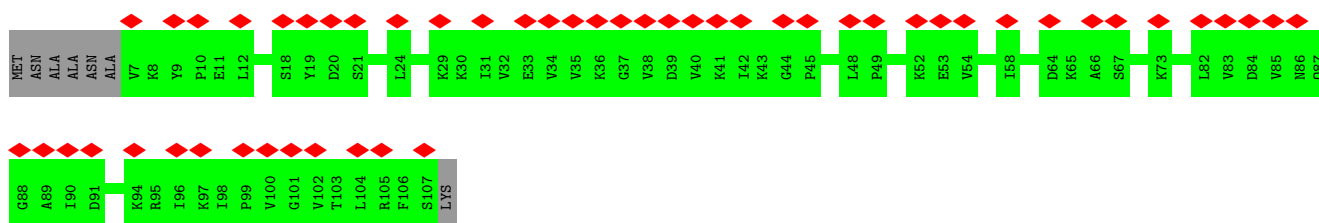
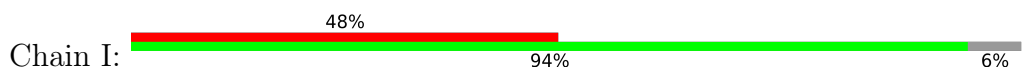
• Molecule 11: 30S ribosomal protein S8



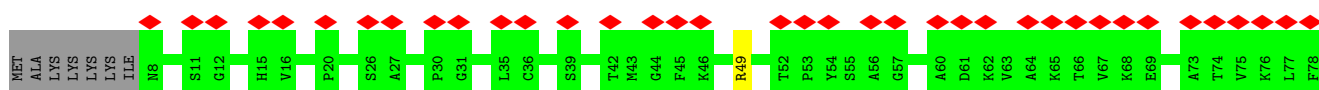
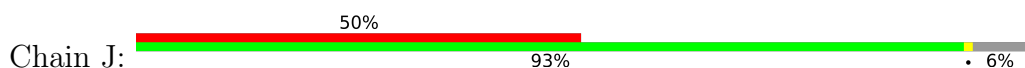
• Molecule 12: 30S ribosomal protein S9

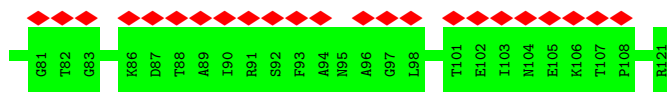


• Molecule 13: 30S ribosomal protein S10

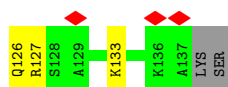
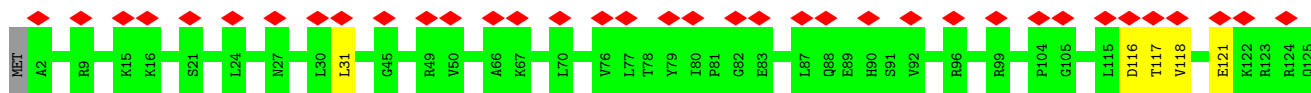
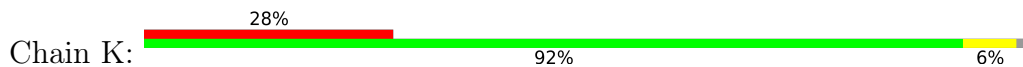


• Molecule 14: 30S ribosomal protein S11

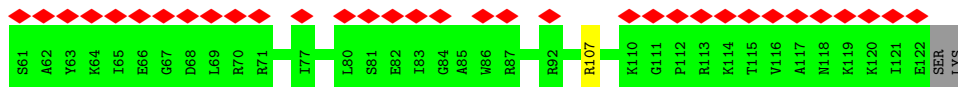
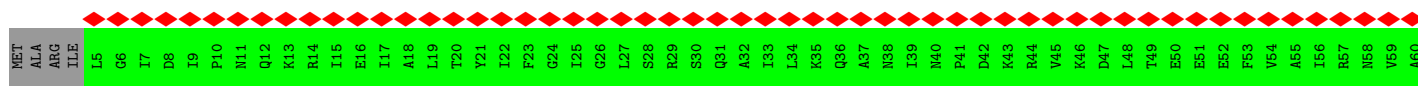
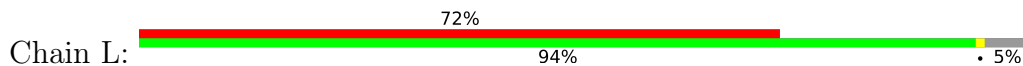




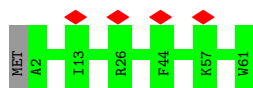
- Molecule 15: 30S ribosomal protein S12



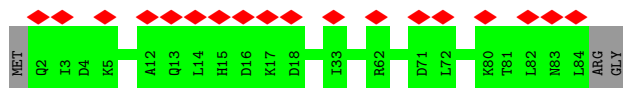
- Molecule 16: 30S ribosomal protein S13



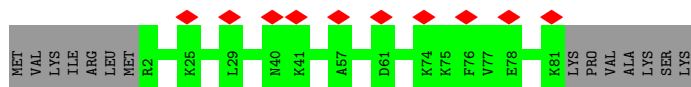
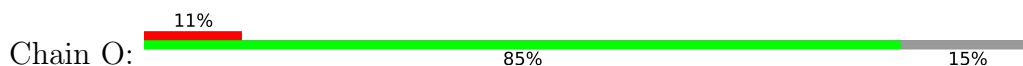
- Molecule 17: 30S ribosomal protein S14 type Z



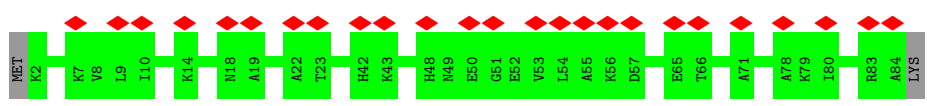
- Molecule 18: 30S ribosomal protein S15



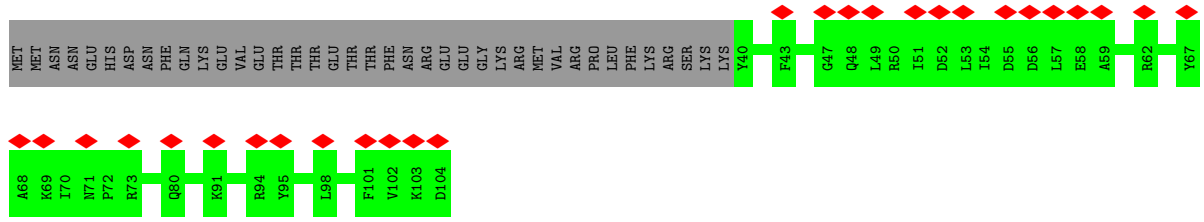
- Molecule 19: 30S ribosomal protein S16



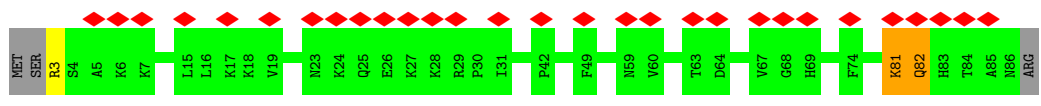
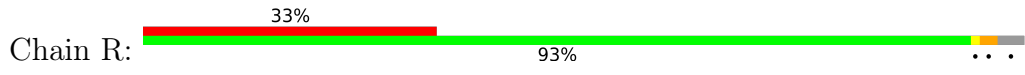
- Molecule 20: 30S ribosomal protein S17



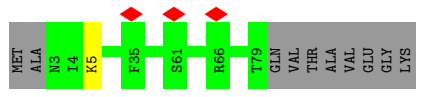
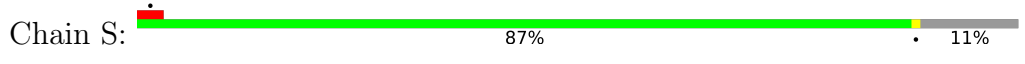
- Molecule 21: 30S ribosomal protein S18



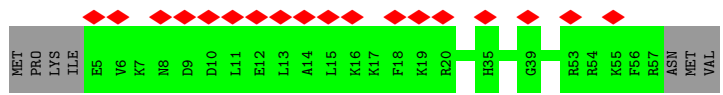
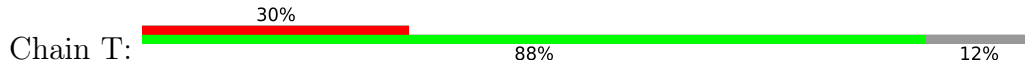
- Molecule 22: 30S ribosomal protein S19



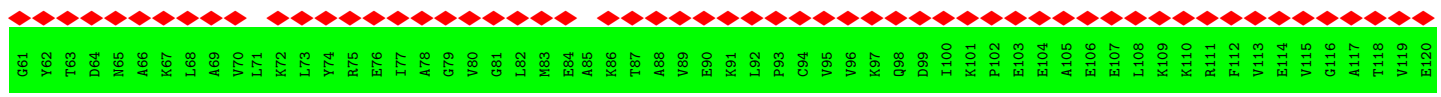
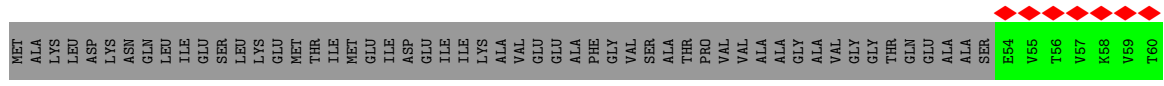
- Molecule 23: 30S ribosomal protein S20



- Molecule 24: 30S ribosomal protein S21

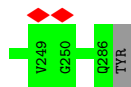
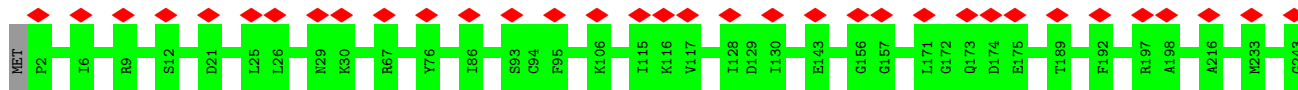


- Molecule 25: 50S ribosomal protein L7/L12

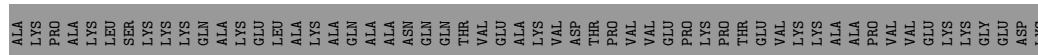
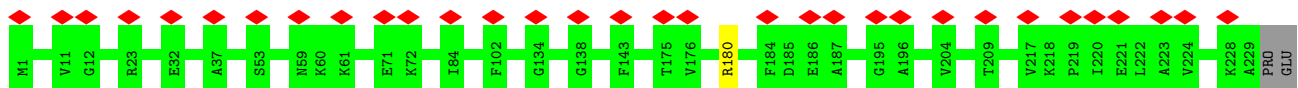
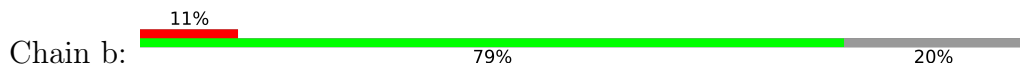




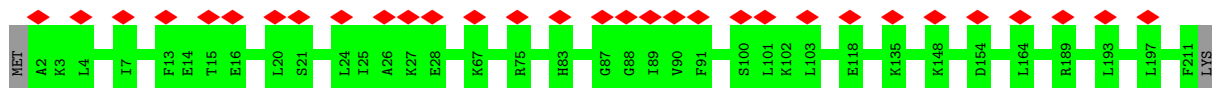
• Molecule 26: 50S ribosomal protein L2



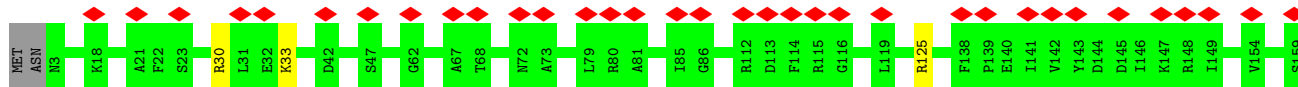
• Molecule 27: 50S ribosomal protein L3



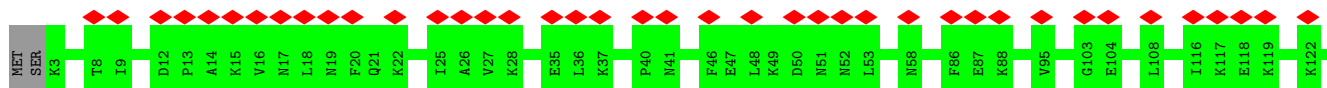
• Molecule 28: 50S ribosomal protein L4

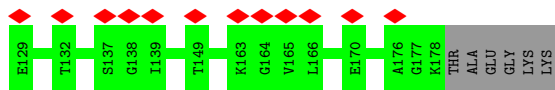


• Molecule 29: 50S ribosomal protein L5

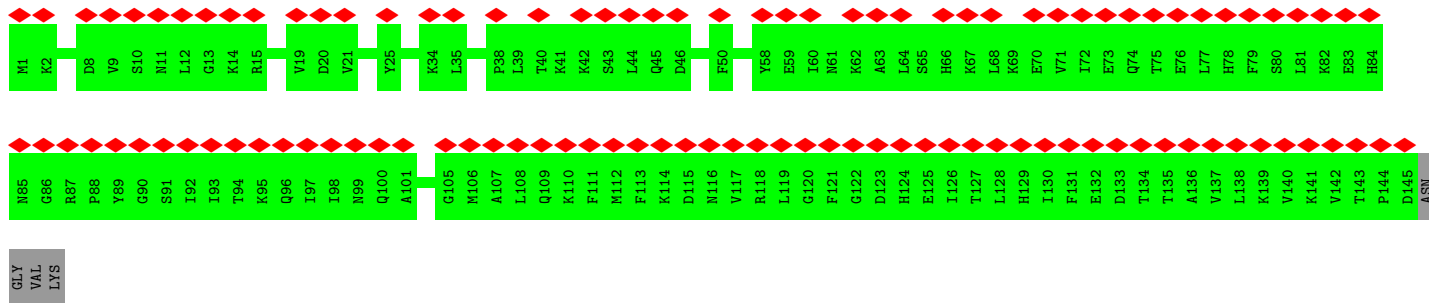


• Molecule 30: 50S ribosomal protein L6

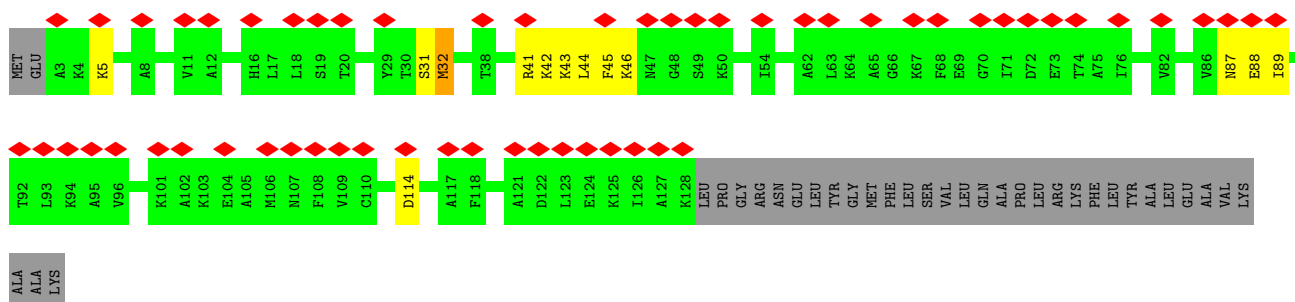




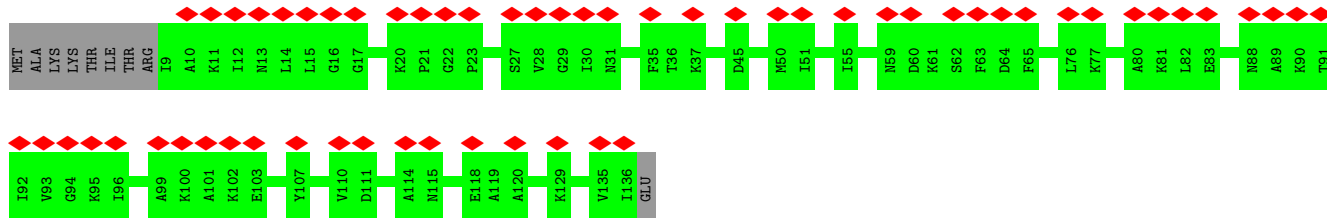
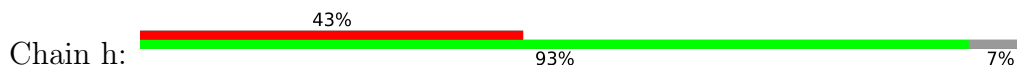
• Molecule 31: 50S ribosomal protein L9



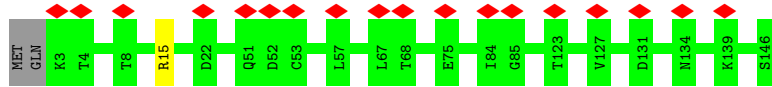
• Molecule 32: 50S ribosomal protein L10



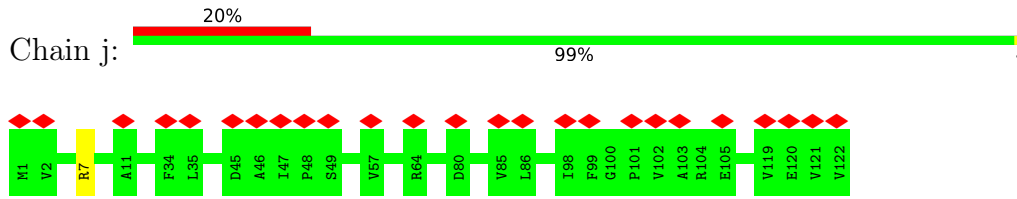
• Molecule 33: 50S ribosomal protein L11



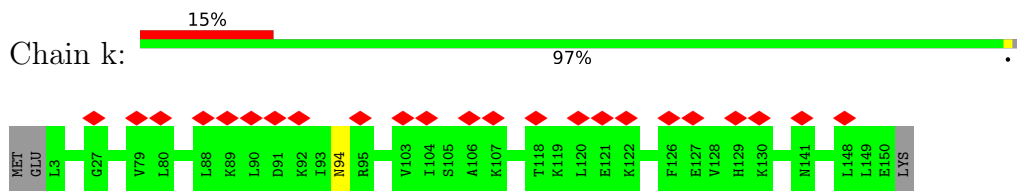
• Molecule 34: 50S ribosomal protein L13



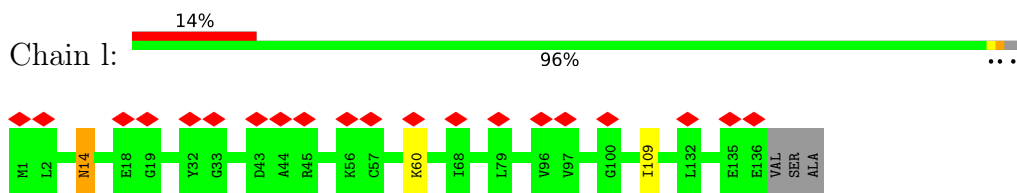
- Molecule 35: 50S ribosomal protein L14



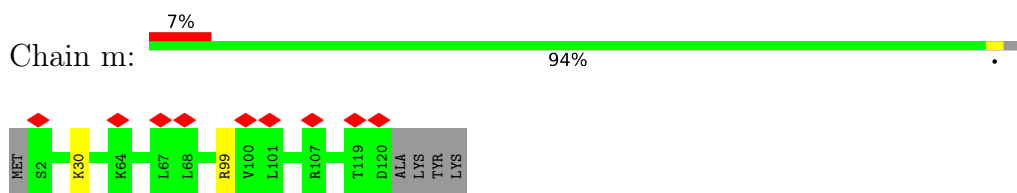
- Molecule 36: 50S ribosomal protein L15



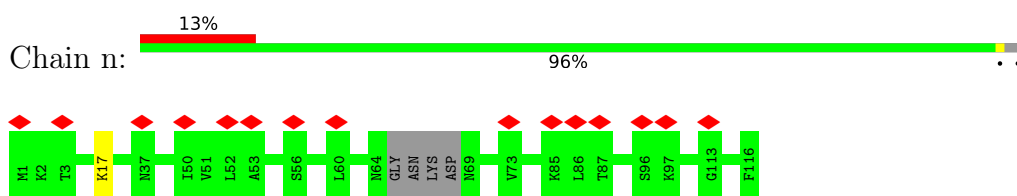
- Molecule 37: 50S ribosomal protein L16



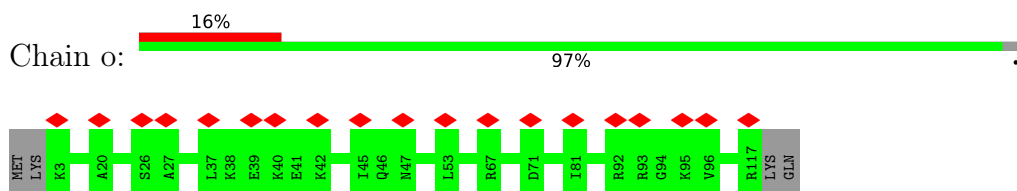
- Molecule 38: 50S ribosomal protein L17



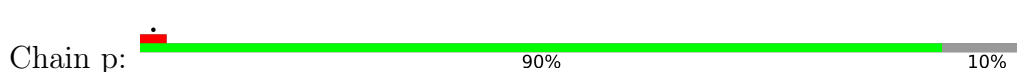
- Molecule 39: 50S ribosomal protein L18

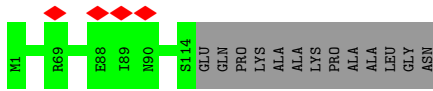


- Molecule 40: 50S ribosomal protein L19

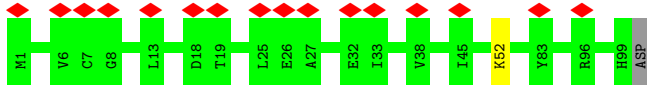


- Molecule 41: 50S ribosomal protein L20

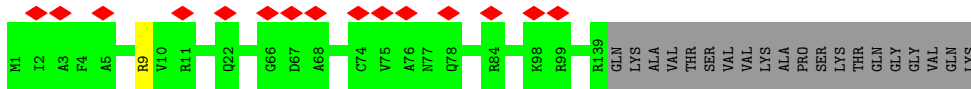
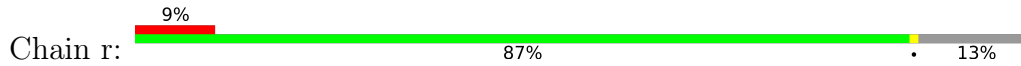




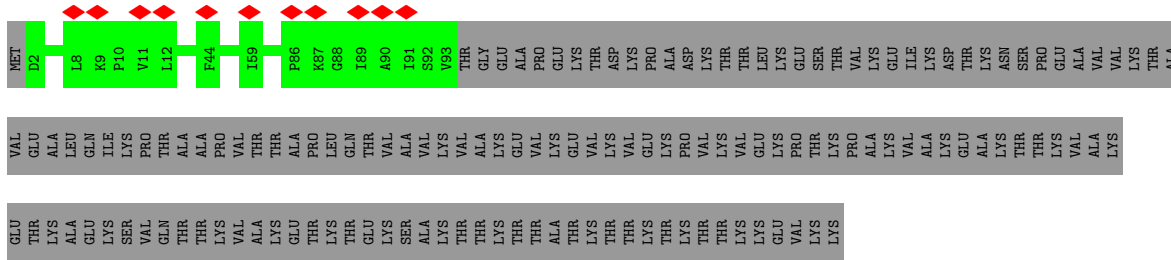
• Molecule 42: 50S ribosomal protein L21



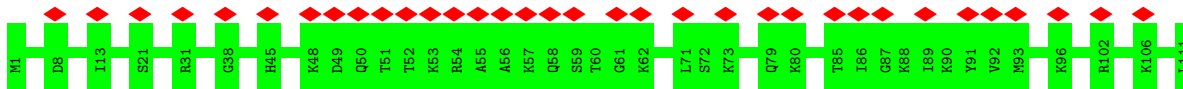
• Molecule 43: 50S ribosomal protein L22



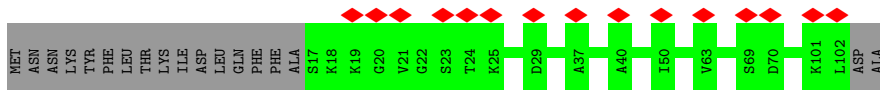
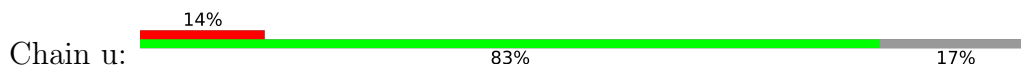
• Molecule 44: 50S ribosomal protein L23



• Molecule 45: 50S ribosomal protein L24

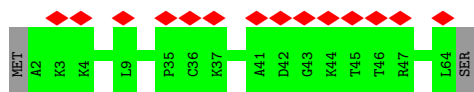


• Molecule 46: 50S ribosomal protein L27

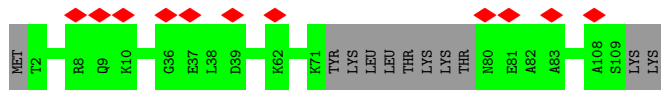
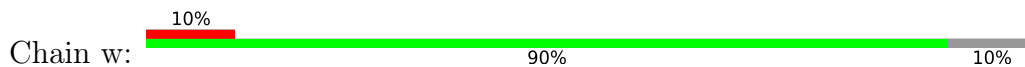


• Molecule 47: 50S ribosomal protein L28

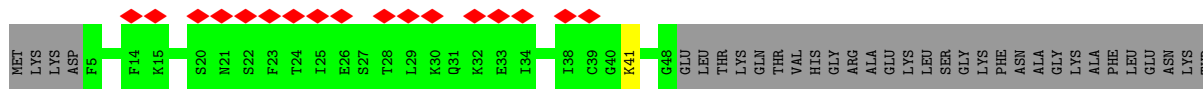
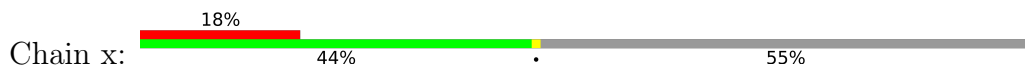




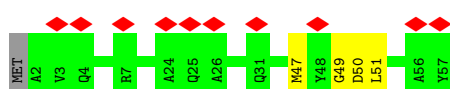
• Molecule 48: 50S ribosomal protein L29



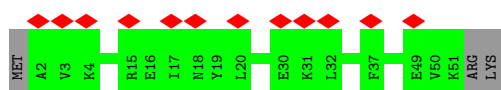
• Molecule 49: 50S ribosomal protein L31



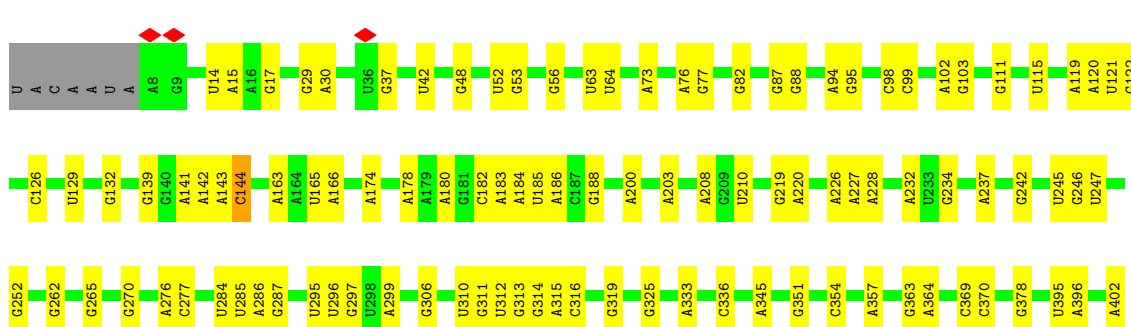
• Molecule 50: 50S ribosomal protein L32



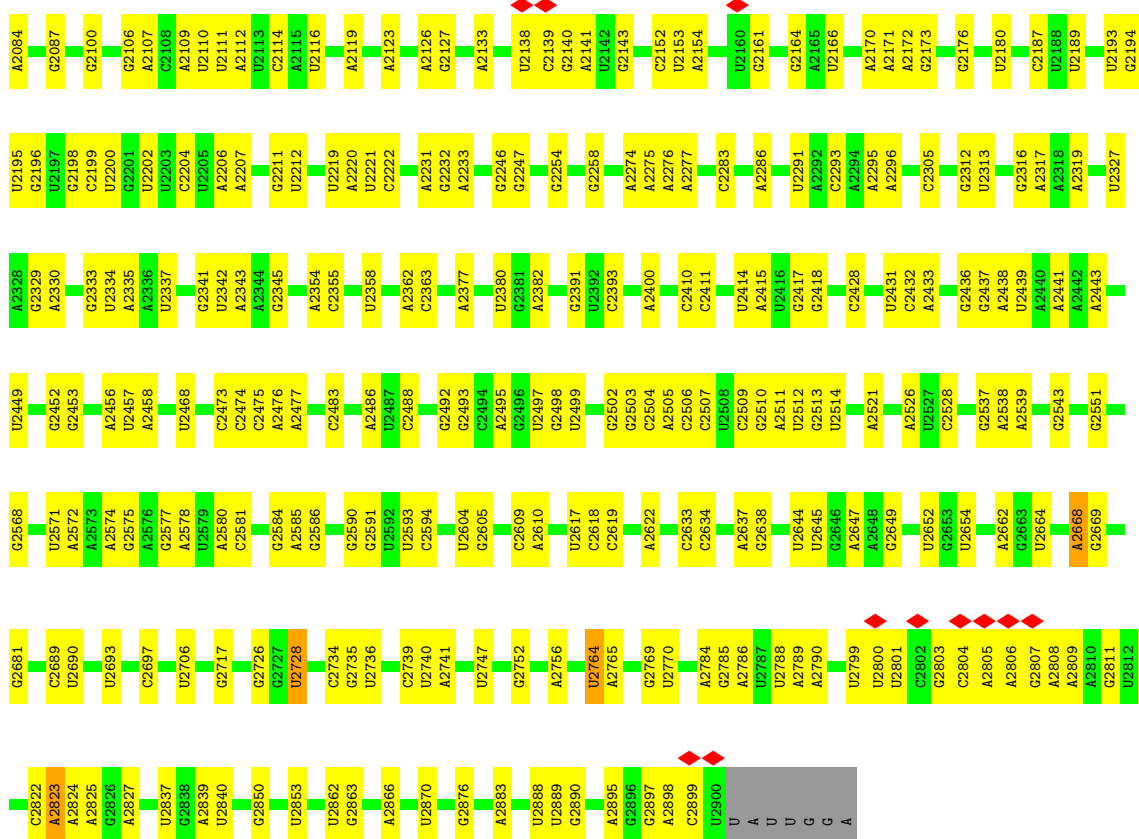
• Molecule 51: 50S ribosomal protein L33 1



• Molecule 52: 23S ribosomal RNA



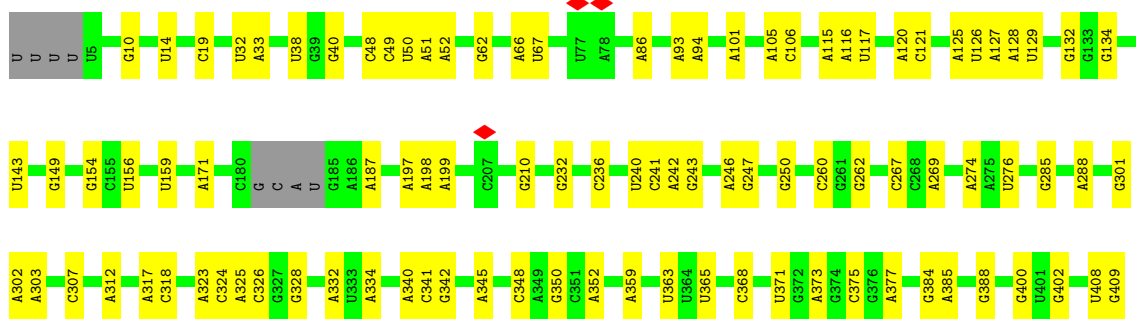
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U1974	A1821	A1699	G1580	U1467	G1354	U1234	G1109	U999	A884	C752	G620	A502	G408
A1977	A1822	G1700	G1583	A1479	C1355	U1235	A1112	U1000	A884	G761	A623	G504	A409
U1978	U1823	G1701	U1584	A1480	U1360	G1236	U1113	C1001	G894	A762	G637	G509	G410
G1979	G1824	A1702	A1585	U1481	U1361	G1242	C1114	U1008	U902	G763	A638	G510	U411
A1984	U1827	A1703	U1586	U1482	U1361	G1242	G1115	A1009	A903	A764	A639	G512	A112
A1988	A1836	C1706	U1587	U1486	U1369	G1251	U1116	G1010	C904	A765	A638	G514	G413
U1989	A1837	G1707	A1588	U1487	A1370	G1252	A1119	A1011	U905	C775	A644	A514	G418
C1990	G1842	G1708	A1589	U1487	G1371	G1253	A1120	G1012	G906	U782	C645	A515	A421
U1998	C1850	C1709	G1594	U1488	U1372	U1254	A1121	G1013	A907	U782	A646	A516	A422
G1999	U1859	C1717	A1600	U1489	C1373	G1257	G1122	A1016	G914	G792	G647	A517	A423
G2005	U1859	C1718	A1601	U1494	C1376	G1258	A1123	A1019	G917	U797	G648	A518	G424
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A2010	U1872	C1720	G1615	U1506	C1380	G1265	U1129	C1021	A799	U799	G654	C520	U426
A2020	A1873	U1727	G1616	G1507	U1388	U1268	A1130	G1025	C922	G810	G656	C522	G432
C2025	U1889	A1734	U1617	G1508	A1393	U1268	A1131	A1026	A	G811	A657	A525	A437
G2028	U1890	G1737	A1618	U1509	A1396	A1274	C1132	U1027	C	U662	A663	A531	A438
U2029	A1891	U1748	A1619	A1510	G1403	U1279	G1147	A1032	U	U662	A663	A531	U439
A2030	C1902	A1749	A1637	A1513	G1403	G1280	U1151	A1035	G928	U820	A667	A534	C440
A2037	A1903	A1750	G1642	U1514	A1406	G1282	U1154	U1035	G929	U820	A667	U534	C442
A2038	A1907	A1751	A1643	C1523	A1407	A1283	G1157	A1045	G930	A823	A673	A538	G447
G2039	A1908	A1752	A1644	C1523	G1408	A1283	G1158	A1048	G931	A824	G674	A539	A448
A2040	A1909	G1753	A1648	A1532	A1412	U1285	C1158	U1049	U932	U825	U675	A542	G460
A2041	G1910	U1754	A1648	U1533	A1413	G1286	C1159	U1049	C934	G827	A681	A543	C461
C2043	G1913	C1758	C1651	A1534	C1414	A1292	U1186	A1055	C941	G827	A682	A544	C462
G2050	A1920	A1762	A1652	A1537	U1415	A1295	G1186	A1061	U944	U835	U688	A553	A465
A2055	C1921	G1763	G1653	A1541	U1419	G1296	A1167	G1066	A947	U835	U689	A553	A466
A2056	A1934	U1764	G1654	U1546	A1423	U1297	A1168	A1067	A948	G840	U690	C559	A466
C2057	A1935	G1765	U1655	G1547	U1424	A1298	A1169	U1068	C949	C841	G691	C562	C469
G2058	G1936	A1766	A1656	A1548	U1425	G1301	G1170	A1075	U950	U842	G704	C565	U473
G2059	G1937	A1770	G1662	U1549	U1425	U1303	U1176	G1075	U952	G943	A705	C566	G476
G2060	A1944	C1771	G1668	G1550	A1431	U1303	A1177	A1080	C951	C947	C706	U567	U477
A2061	A1945	A1780	A1674	G1555	A1436	A1312	A1186	A1081	U968	G850	A710	G565	G478
C2062	U1946	U1784	A1674	G1555	C1436	G1313	A1186	A1082	U971	A854	A711	G566	A479
G2063	U1947	U1784	A1674	A1558	U1439	U1315	A1191	A1088	U971	A854	A712	G566	C480
A2067	U1950	A1787	U1679	A1559	C1444	A1322	A1203	A1089	A977	U862	U718	G584	G482
A2068	A1951	A1788	A1680	U	U1445	A1322	G1203	U1095	G977	U863	G721	U595	A483
A2069	G1952	C1789	G1681	G	U1445	A1323	A1204	C1099	G978	A865	C722	C596	U484
C2070	U1958	U1790	C1683	A	G1449	A1324	A1208	U1100	U979	A865	G725	C596	C487
C2071	U1958	A1791	G1687	U	U1449	U1328	A1209	U1101	G982	A865	G725	U601	C488
C2072	U1962	A1794	A1688	A	A1457	U1329	U1210	A1102	G982	A870	A728	A605	A489
U2075	C1807	C1807	A1694	U	A1457	U1340	G1211	G1103	G990	G873	U729	G606	A490
G2076	C1807	C1807	A1694	C	G1463	U1341	G1212	A1104	G991	G873	G730	U607	A491
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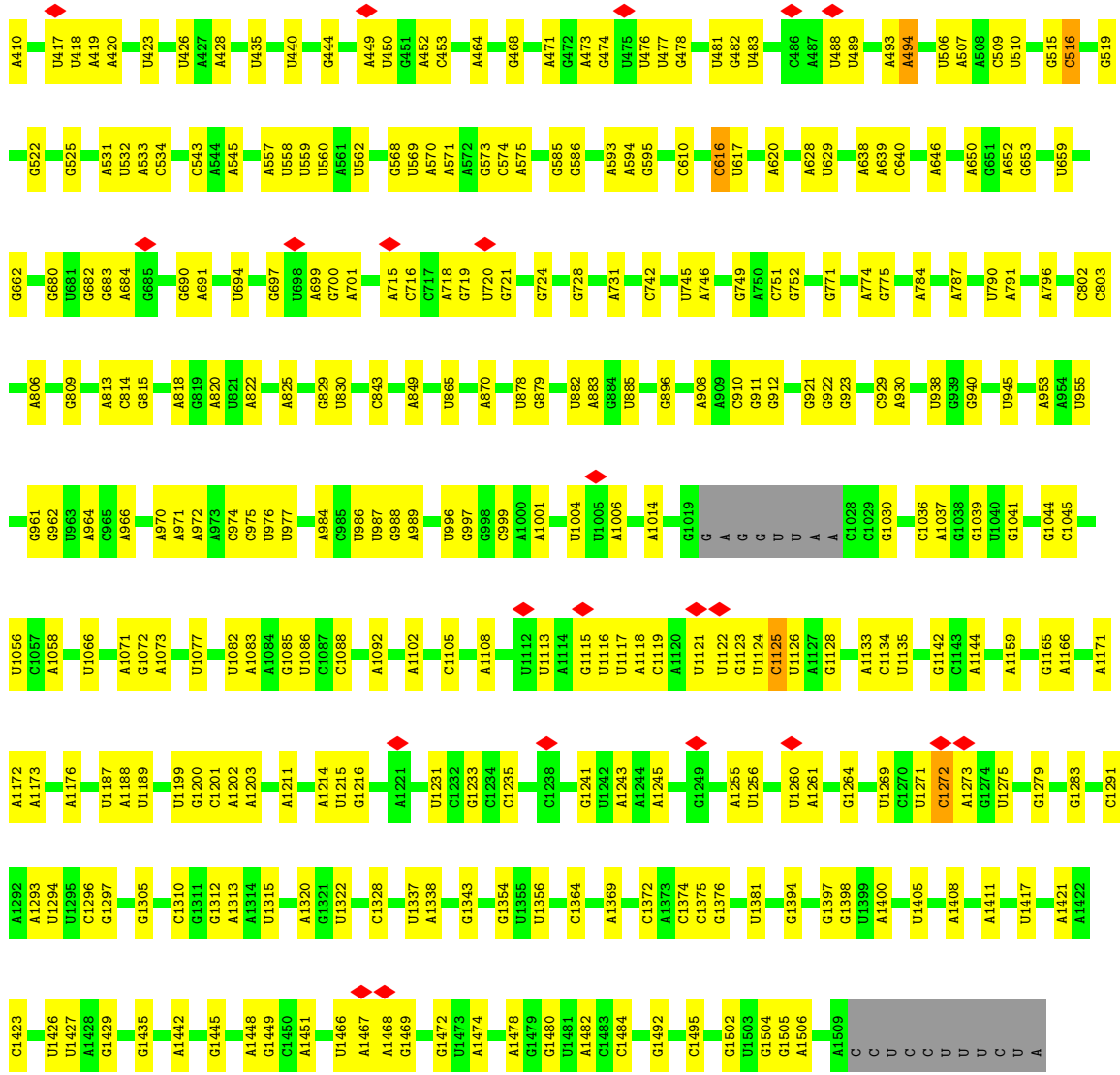


• Molecule 53: 5S ribosomal RNA

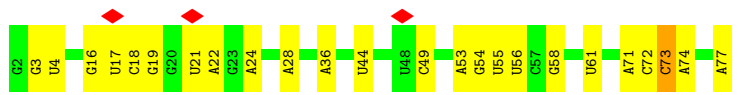


• Molecule 54: 16S ribosomal RNA

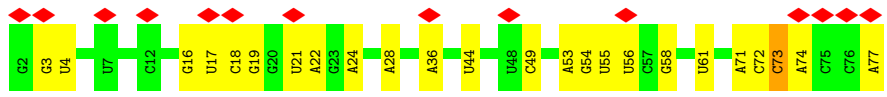




• Molecule 55: tRNA-Phe



• Molecule 55: tRNA-Phe



4 Experimental information

Property	Value	Source
EM reconstruction method	SUBTOMOGRAM AVERAGING	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of subtomograms used	3324	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	3.2	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3750	Depositor
Magnification	81000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	1.470	Depositor
Minimum map value	-0.452	Depositor
Average map value	0.026	Depositor
Map value standard deviation	0.123	Depositor
Recommended contour level	0.5	Depositor
Map size (Å)	435.328, 435.328, 435.328	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.7005, 1.7005, 1.7005	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0	0.23	0/383	0.41	0/504
2	1	0.25	0/484	0.46	0/637
3	2	0.23	0/306	0.46	0/401
4	9	0.25	0/5419	0.48	0/7307
5	A	0.25	0/1954	0.44	0/2642
6	B	0.24	0/1721	0.49	0/2323
7	C	0.25	0/1691	0.47	0/2267
8	D	0.24	0/1188	0.47	0/1593
9	E	0.26	0/1384	0.45	0/1867
10	F	0.29	0/1266	0.50	0/1700
11	G	0.24	0/1126	0.50	0/1517
12	H	0.24	0/1044	0.48	0/1395
13	I	0.24	0/820	0.47	0/1103
14	J	0.25	0/844	0.43	0/1136
15	K	0.29	0/1094	0.53	1/1468 (0.1%)
16	L	0.23	0/962	0.45	0/1289
17	M	0.25	0/483	0.43	0/643
18	N	0.23	0/679	0.44	0/907
19	O	0.24	0/659	0.41	0/885
20	P	0.24	0/684	0.47	0/913
21	Q	0.23	0/545	0.43	0/730
22	R	0.25	0/698	0.49	0/936
23	S	0.23	0/631	0.44	0/838
24	T	0.22	0/475	0.39	0/621
25	W	0.25	0/538	0.46	0/722
26	a	0.24	0/2267	0.45	0/3044
27	b	0.25	0/1795	0.49	0/2412
28	c	0.24	0/1671	0.44	0/2246
29	d	0.24	0/1409	0.46	0/1894
30	e	0.26	0/1420	0.47	0/1912
31	f	0.25	0/1183	0.47	0/1587
32	g	0.34	0/969	0.54	0/1295
33	h	0.25	0/968	0.44	0/1298
34	i	0.24	0/1186	0.46	0/1592

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
35	j	0.25	0/953	0.48	0/1275
36	k	0.24	0/1170	0.45	0/1559
37	l	0.26	0/1104	0.50	0/1481
38	m	0.24	0/973	0.46	0/1309
39	n	0.24	0/897	0.46	0/1198
40	o	0.25	0/948	0.48	0/1262
41	p	0.25	0/961	0.41	0/1278
42	q	0.25	0/828	0.48	0/1111
43	r	0.24	0/1077	0.43	0/1441
44	s	0.26	0/732	0.51	0/988
45	t	0.24	0/879	0.46	0/1165
46	u	0.24	0/665	0.45	0/884
47	v	0.23	0/519	0.50	0/695
48	w	0.23	0/826	0.43	0/1104
49	x	0.25	0/353	0.48	0/474
50	y	0.30	0/457	0.51	0/601
51	z	0.24	0/412	0.46	0/547
52	3	0.21	0/69073	0.83	55/107710 (0.1%)
53	4	0.22	0/2505	0.83	2/3902 (0.1%)
54	5	0.20	0/35768	0.81	33/55764 (0.1%)
55	7	0.23	0/1808	0.89	3/2817 (0.1%)
55	8	0.23	0/1808	0.90	5/2817 (0.2%)
All	All	0.22	0/164662	0.74	99/245006 (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
4	9	0	2
10	F	0	1
12	H	0	1
15	K	0	2
22	R	0	2
32	g	0	1
37	l	0	1
All	All	0	10

There are no bond length outliers.

All (99) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
54	5	843	C	N3-C2-O2	-9.03	115.58	121.90
52	3	559	C	N3-C2-O2	-8.59	115.89	121.90
54	5	974	C	C2-N1-C1'	8.30	127.92	118.80
54	5	975	C	N1-C2-O2	8.25	123.85	118.90
54	5	975	C	C2-N1-C1'	8.10	127.71	118.80
52	3	370	C	N3-C2-O2	-8.04	116.27	121.90
54	5	974	C	N1-C2-O2	7.94	123.66	118.90
52	3	1159	C	N3-C2-O2	-7.89	116.38	121.90
54	5	751	C	C2-N1-C1'	7.87	127.46	118.80
52	3	144	C	N3-C2-O2	-7.80	116.44	121.90
52	3	99	C	N3-C2-O2	-7.70	116.51	121.90
52	3	1341	U	C2-N1-C1'	7.50	126.71	117.70
54	5	616	C	N1-C2-O2	7.30	123.28	118.90
52	3	1902	C	N3-C2-O2	-7.28	116.81	121.90
55	8	73	C	N3-C2-O2	-7.26	116.82	121.90
52	3	144	C	N1-C2-O2	7.25	123.25	118.90
54	5	975	C	N3-C2-O2	-7.24	116.83	121.90
54	5	1088	C	N3-C2-O2	-7.20	116.86	121.90
55	7	73	C	N3-C2-O2	-7.17	116.88	121.90
54	5	975	C	C6-N1-C2	-7.16	117.44	120.30
52	3	1341	U	N1-C2-O2	7.16	127.81	122.80
52	3	98	C	N1-C2-O2	7.13	123.18	118.90
52	3	426	U	C2-N1-C1'	7.00	126.10	117.70
54	5	1484	C	N3-C2-O2	-6.96	117.03	121.90
54	5	843	C	N1-C2-O2	6.94	123.06	118.90
52	3	1921	C	N1-C2-O2	6.92	123.05	118.90
52	3	1720	C	N3-C2-O2	-6.90	117.07	121.90
52	3	2474	C	N3-C2-O2	-6.83	117.12	121.90
52	3	2728	U	N1-C2-O2	6.72	127.51	122.80
52	3	2634	C	N3-C2-O2	-6.62	117.27	121.90
52	3	1303	U	C2-N1-C1'	6.60	125.62	117.70
52	3	1341	U	N3-C2-O2	-6.58	117.59	122.20
54	5	616	C	C2-N1-C1'	6.55	126.01	118.80
54	5	974	C	N3-C2-O2	-6.54	117.32	121.90
52	3	1303	U	N1-C2-O2	6.52	127.36	122.80
52	3	1697	C	N3-C2-O2	-6.51	117.34	121.90
52	3	2728	U	C2-N1-C1'	6.48	125.48	117.70
52	3	1718	C	N3-C2-O2	-6.48	117.36	121.90
54	5	803	C	N3-C2-O2	-6.46	117.38	121.90
54	5	1272	C	N1-C2-O2	6.45	122.77	118.90
54	5	1105	C	N3-C2-O2	-6.43	117.40	121.90
52	3	2728	U	N3-C2-O2	-6.43	117.70	122.20
52	3	1507	G	O4'-C1'-N9	6.40	113.32	108.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
54	5	751	C	N1-C2-O2	6.38	122.72	118.90
52	3	88	G	N1-C6-O6	-6.31	116.11	119.90
52	3	98	C	N3-C2-O2	-6.30	117.49	121.90
52	3	1717	C	N1-C2-O2	6.28	122.67	118.90
52	3	2072	C	C2-N1-C1'	6.08	125.49	118.80
52	3	1921	C	C2-N1-C1'	6.06	125.46	118.80
52	3	1159	C	C6-N1-C2	-6.04	117.88	120.30
54	5	616	C	N3-C2-O2	-5.94	117.74	121.90
54	5	1426	U	C5-C4-O4	-5.84	122.39	125.90
55	7	56	U	C2-N1-C1'	5.84	124.71	117.70
52	3	2473	C	N1-C2-O2	5.80	122.38	118.90
55	8	73	C	N1-C2-O2	5.79	122.38	118.90
52	3	1303	U	N3-C2-O2	-5.75	118.18	122.20
55	8	56	U	C2-N1-C1'	5.73	124.58	117.70
54	5	1125	C	N3-C2-O2	-5.73	117.89	121.90
54	5	1272	C	N3-C2-O2	-5.73	117.89	121.90
55	7	73	C	N1-C2-O2	5.69	122.31	118.90
54	5	751	C	C6-N1-C1'	-5.67	114.00	120.80
54	5	974	C	C6-N1-C1'	-5.67	114.00	120.80
53	4	58	C	N3-C2-O2	-5.66	117.94	121.90
52	3	2823	A	OP1-P-O3'	5.64	117.60	105.20
52	3	2633	C	N1-C2-O2	5.64	122.28	118.90
52	3	370	C	C6-N1-C2	-5.58	118.07	120.30
54	5	974	C	C6-N1-C2	-5.57	118.07	120.30
52	3	1718	C	C6-N1-C2	-5.54	118.08	120.30
52	3	1720	C	C6-N1-C2	-5.48	118.11	120.30
15	K	31	LEU	CA-CB-CG	5.47	127.89	115.30
54	5	975	C	C5-C6-N1	5.47	123.74	121.00
52	3	2493	G	N1-C6-O6	-5.42	116.65	119.90
52	3	1235	U	C2-N1-C1'	5.42	124.20	117.70
52	3	559	C	N1-C2-O2	5.42	122.15	118.90
52	3	88	G	C5-C6-O6	5.42	131.85	128.60
52	3	1921	C	N3-C2-O2	-5.39	118.13	121.90
54	5	516	C	C2-N1-C1'	5.38	124.71	118.80
52	3	843	G	N1-C6-O6	-5.33	116.70	119.90
52	3	1066	G	N1-C6-O6	-5.32	116.71	119.90
52	3	2739	C	N3-C2-O2	-5.32	118.18	121.90
52	3	2668	A	P-O3'-C3'	5.29	126.04	119.70
52	3	2668	A	OP1-P-O3'	5.27	116.79	105.20
52	3	88	G	N1-C2-N2	-5.25	111.48	116.20
54	5	1105	C	C6-N1-C2	-5.22	118.21	120.30
52	3	2009	U	C2-N1-C1'	5.21	123.96	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
54	5	428	A	N1-C6-N6	-5.15	115.51	118.60
52	3	2493	G	C5-C6-O6	5.15	131.69	128.60
52	3	2005	G	N1-C6-O6	-5.12	116.83	119.90
55	8	56	U	N3-C2-O2	-5.09	118.63	122.20
54	5	975	C	C6-N1-C1'	-5.07	114.72	120.80
52	3	1486	U	C2-N1-C1'	5.05	123.76	117.70
52	3	1719	C	N1-C2-O2	5.05	121.93	118.90
53	4	54	U	P-O3'-C3'	5.05	125.76	119.70
55	8	56	U	N1-C2-O2	5.05	126.33	122.80
54	5	1502	G	C5-C6-O6	5.04	131.62	128.60
54	5	751	C	N3-C2-O2	-5.02	118.39	121.90
52	3	2764	U	C5-C4-O4	-5.02	122.89	125.90
52	3	2473	C	N3-C2-O2	-5.02	118.39	121.90
54	5	494	A	O4'-C1'-N9	5.00	112.20	108.20

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	9	295	ASN	Peptide
4	9	297	VAL	Peptide
10	F	112	GLU	Peptide
12	H	62	ASN	Peptide
15	K	126	GLN	Peptide
15	K	127	ARG	Peptide
22	R	81	LYS	Peptide
22	R	82	GLN	Peptide
32	g	114	ASP	Peptide
37	l	14	ASN	Peptide

5.2 Too-close contacts [i](#)

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

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	0	45/48 (94%)	42 (93%)	3 (7%)	0	100	100
2	1	57/59 (97%)	49 (86%)	8 (14%)	0	100	100
3	2	35/37 (95%)	34 (97%)	1 (3%)	0	100	100
4	9	680/688 (99%)	628 (92%)	52 (8%)	0	100	100
5	A	238/294 (81%)	222 (93%)	16 (7%)	0	100	100
6	B	213/273 (78%)	196 (92%)	17 (8%)	0	100	100
7	C	201/205 (98%)	185 (92%)	16 (8%)	0	100	100
8	D	151/219 (69%)	137 (91%)	14 (9%)	0	100	100
9	E	165/215 (77%)	145 (88%)	20 (12%)	0	100	100
10	F	152/155 (98%)	140 (92%)	12 (8%)	0	100	100
11	G	139/142 (98%)	121 (87%)	18 (13%)	0	100	100
12	H	126/132 (96%)	113 (90%)	13 (10%)	0	100	100
13	I	99/108 (92%)	91 (92%)	8 (8%)	0	100	100
14	J	112/121 (93%)	106 (95%)	6 (5%)	0	100	100
15	K	134/139 (96%)	114 (85%)	20 (15%)	0	100	100
16	L	116/124 (94%)	106 (91%)	10 (9%)	0	100	100
17	M	58/61 (95%)	54 (93%)	4 (7%)	0	100	100
18	N	81/86 (94%)	79 (98%)	2 (2%)	0	100	100
19	O	78/94 (83%)	72 (92%)	6 (8%)	0	100	100
20	P	81/85 (95%)	76 (94%)	5 (6%)	0	100	100
21	Q	63/104 (61%)	54 (86%)	9 (14%)	0	100	100
22	R	82/87 (94%)	74 (90%)	6 (7%)	2 (2%)	6	33
23	S	75/87 (86%)	74 (99%)	1 (1%)	0	100	100
24	T	51/60 (85%)	49 (96%)	2 (4%)	0	100	100
25	W	67/122 (55%)	63 (94%)	4 (6%)	0	100	100
26	a	283/287 (99%)	268 (95%)	15 (5%)	0	100	100
27	b	227/287 (79%)	215 (95%)	12 (5%)	0	100	100
28	c	208/212 (98%)	193 (93%)	15 (7%)	0	100	100
29	d	173/180 (96%)	160 (92%)	13 (8%)	0	100	100
30	e	174/184 (95%)	162 (93%)	12 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
31	f	143/149 (96%)	129 (90%)	14 (10%)	0	100	100
32	g	124/161 (77%)	111 (90%)	12 (10%)	1 (1%)	19	60
33	h	126/137 (92%)	118 (94%)	8 (6%)	0	100	100
34	i	142/146 (97%)	134 (94%)	8 (6%)	0	100	100
35	j	120/122 (98%)	115 (96%)	5 (4%)	0	100	100
36	k	146/151 (97%)	136 (93%)	10 (7%)	0	100	100
37	l	134/139 (96%)	120 (90%)	12 (9%)	2 (2%)	10	46
38	m	117/124 (94%)	112 (96%)	5 (4%)	0	100	100
39	n	108/116 (93%)	96 (89%)	12 (11%)	0	100	100
40	o	113/119 (95%)	104 (92%)	9 (8%)	0	100	100
41	p	112/127 (88%)	111 (99%)	1 (1%)	0	100	100
42	q	97/100 (97%)	89 (92%)	8 (8%)	0	100	100
43	r	137/159 (86%)	128 (93%)	9 (7%)	0	100	100
44	s	90/237 (38%)	76 (84%)	14 (16%)	0	100	100
45	t	109/111 (98%)	101 (93%)	8 (7%)	0	100	100
46	u	84/104 (81%)	82 (98%)	2 (2%)	0	100	100
47	v	61/65 (94%)	59 (97%)	2 (3%)	0	100	100
48	w	96/111 (86%)	91 (95%)	5 (5%)	0	100	100
49	x	42/97 (43%)	31 (74%)	11 (26%)	0	100	100
50	y	54/57 (95%)	52 (96%)	1 (2%)	1 (2%)	8	38
51	z	48/53 (91%)	45 (94%)	3 (6%)	0	100	100
All	All	6567/7480 (88%)	6062 (92%)	499 (8%)	6 (0%)	54	86

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
22	R	81	LYS
22	R	82	GLN
32	g	32	MET
50	y	49	GLY
37	l	14	ASN
37	l	109	ILE

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	0	40/41 (98%)	39 (98%)	1 (2%)	47	68
2	1	51/51 (100%)	50 (98%)	1 (2%)	55	74
3	2	35/35 (100%)	35 (100%)	0	100	100
4	9	579/584 (99%)	577 (100%)	2 (0%)	92	95
5	A	212/262 (81%)	212 (100%)	0	100	100
6	B	180/232 (78%)	179 (99%)	1 (1%)	86	92
7	C	181/183 (99%)	181 (100%)	0	100	100
8	D	123/178 (69%)	123 (100%)	0	100	100
9	E	150/196 (76%)	149 (99%)	1 (1%)	84	90
10	F	131/132 (99%)	130 (99%)	1 (1%)	81	89
11	G	123/124 (99%)	123 (100%)	0	100	100
12	H	111/115 (96%)	110 (99%)	1 (1%)	78	87
13	I	95/99 (96%)	95 (100%)	0	100	100
14	J	91/97 (94%)	90 (99%)	1 (1%)	73	84
15	K	117/120 (98%)	112 (96%)	5 (4%)	29	53
16	L	100/105 (95%)	99 (99%)	1 (1%)	76	86
17	M	47/48 (98%)	47 (100%)	0	100	100
18	N	76/78 (97%)	76 (100%)	0	100	100
19	O	69/82 (84%)	69 (100%)	0	100	100
20	P	73/75 (97%)	73 (100%)	0	100	100
21	Q	56/94 (60%)	56 (100%)	0	100	100
22	R	74/77 (96%)	73 (99%)	1 (1%)	67	80
23	S	70/77 (91%)	69 (99%)	1 (1%)	67	80
24	T	49/56 (88%)	49 (100%)	0	100	100
25	W	58/98 (59%)	58 (100%)	0	100	100
26	a	241/243 (99%)	241 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
27	b	186/233 (80%)	185 (100%)	1 (0%)	88	93
28	c	182/184 (99%)	182 (100%)	0	100	100
29	d	150/154 (97%)	147 (98%)	3 (2%)	55	74
30	e	153/159 (96%)	153 (100%)	0	100	100
31	f	123/134 (92%)	123 (100%)	0	100	100
32	g	101/129 (78%)	89 (88%)	12 (12%)	5	20
33	h	102/110 (93%)	102 (100%)	0	100	100
34	i	126/128 (98%)	125 (99%)	1 (1%)	81	89
35	j	103/103 (100%)	102 (99%)	1 (1%)	76	86
36	k	123/126 (98%)	122 (99%)	1 (1%)	81	89
37	l	113/115 (98%)	112 (99%)	1 (1%)	78	87
38	m	105/109 (96%)	103 (98%)	2 (2%)	57	75
39	n	96/99 (97%)	95 (99%)	1 (1%)	76	86
40	o	101/105 (96%)	101 (100%)	0	100	100
41	p	100/108 (93%)	100 (100%)	0	100	100
42	q	90/91 (99%)	89 (99%)	1 (1%)	73	84
43	r	116/132 (88%)	115 (99%)	1 (1%)	78	87
44	s	82/208 (39%)	82 (100%)	0	100	100
45	t	96/96 (100%)	96 (100%)	0	100	100
46	u	69/85 (81%)	69 (100%)	0	100	100
47	v	58/60 (97%)	58 (100%)	0	100	100
48	w	87/98 (89%)	87 (100%)	0	100	100
49	x	41/86 (48%)	40 (98%)	1 (2%)	49	69
50	y	48/49 (98%)	45 (94%)	3 (6%)	18	43
51	z	47/50 (94%)	47 (100%)	0	100	100
All	All	5730/6433 (89%)	5684 (99%)	46 (1%)	82	89

All (46) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	0	28	ARG
2	1	21	ARG
4	9	130	ARG

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Mol	Chain	Res	Type
4	9	436	LYS
6	B	87	LYS
9	E	80	LYS
10	F	113	LYS
12	H	108	ARG
14	J	49	ARG
15	K	116	ASP
15	K	117	THR
15	K	118	VAL
15	K	121	GLU
15	K	133	LYS
16	L	107	ARG
22	R	3	ARG
23	S	5	LYS
27	b	180	ARG
29	d	30	ARG
29	d	33	LYS
29	d	125	ARG
32	g	5	LYS
32	g	31	SER
32	g	32	MET
32	g	41	ARG
32	g	42	LYS
32	g	43	LYS
32	g	44	LEU
32	g	45	PHE
32	g	46	LYS
32	g	87	ASN
32	g	88	GLU
32	g	89	ILE
34	i	15	ARG
35	j	7	ARG
36	k	94	ASN
37	l	60	LYS
38	m	30	LYS
38	m	99	ARG
39	n	17	LYS
42	q	52	LYS
43	r	9	ARG
49	x	41	LYS
50	y	47	MET
50	y	50	ASP

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Mol	Chain	Res	Type
50	y	51	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (34) such sidechains are listed below:

Mol	Chain	Res	Type
2	1	18	GLN
4	9	18	HIS
4	9	135	ASN
4	9	395	GLN
4	9	455	HIS
4	9	503	GLN
4	9	506	HIS
5	A	61	GLN
5	A	66	GLN
9	E	56	HIS
10	F	19	ASN
18	N	35	GLN
18	N	70	ASN
20	P	25	GLN
20	P	42	HIS
22	R	79	ASN
23	S	13	GLN
26	a	126	HIS
26	a	153	HIS
26	a	240	HIS
27	b	95	GLN
28	c	130	GLN
28	c	134	ASN
28	c	165	ASN
28	c	167	ASN
30	e	131	ASN
31	f	84	HIS
32	g	47	ASN
32	g	87	ASN
38	m	59	ASN
40	o	80	GLN
43	r	7	GLN
43	r	61	ASN
46	u	54	GLN

5.3.3 RNA

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
52	3	2875/2907 (98%)	844 (29%)	36 (1%)
53	4	103/108 (95%)	38 (36%)	3 (2%)
54	5	1490/1520 (98%)	392 (26%)	4 (0%)
55	7	75/76 (98%)	22 (29%)	3 (4%)
55	8	75/76 (98%)	22 (29%)	3 (4%)
All	All	4618/4687 (98%)	1318 (28%)	49 (1%)

All (1318) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
52	3	14	U
52	3	15	A
52	3	17	G
52	3	29	G
52	3	30	A
52	3	37	G
52	3	42	U
52	3	48	G
52	3	52	U
52	3	53	G
52	3	56	G
52	3	63	U
52	3	64	U
52	3	73	A
52	3	76	A
52	3	77	G
52	3	82	G
52	3	87	G
52	3	94	A
52	3	95	G
52	3	102	A
52	3	103	G
52	3	111	G
52	3	115	U
52	3	119	A
52	3	120	A
52	3	121	U
52	3	122	G
52	3	126	C
52	3	129	U
52	3	132	G
52	3	139	G
52	3	141	A

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Mol	Chain	Res	Type
52	3	142	A
52	3	143	A
52	3	144	C
52	3	163	A
52	3	165	U
52	3	166	A
52	3	174	A
52	3	178	A
52	3	180	A
52	3	182	C
52	3	183	A
52	3	184	A
52	3	185	U
52	3	186	A
52	3	188	G
52	3	200	A
52	3	203	A
52	3	208	A
52	3	210	U
52	3	219	G
52	3	220	A
52	3	226	A
52	3	227	A
52	3	228	A
52	3	232	A
52	3	234	G
52	3	237	A
52	3	242	G
52	3	245	U
52	3	246	G
52	3	247	U
52	3	252	G
52	3	262	G
52	3	265	G
52	3	270	G
52	3	276	A
52	3	277	C
52	3	284	U
52	3	285	U
52	3	286	A
52	3	287	G
52	3	295	U

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Mol	Chain	Res	Type
52	3	296	U
52	3	297	G
52	3	299	A
52	3	306	G
52	3	310	U
52	3	311	G
52	3	312	U
52	3	313	G
52	3	314	G
52	3	315	A
52	3	316	C
52	3	319	G
52	3	325	G
52	3	333	A
52	3	336	C
52	3	345	A
52	3	351	G
52	3	354	C
52	3	357	A
52	3	363	G
52	3	364	A
52	3	369	C
52	3	378	G
52	3	395	U
52	3	396	A
52	3	402	A
52	3	403	U
52	3	404	C
52	3	408	G
52	3	409	A
52	3	410	G
52	3	411	U
52	3	413	G
52	3	418	G
52	3	421	A
52	3	422	A
52	3	424	G
52	3	425	U
52	3	426	U
52	3	432	G
52	3	437	A
52	3	439	U

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Mol	Chain	Res	Type
52	3	440	C
52	3	441	U
52	3	442	G
52	3	447	G
52	3	448	A
52	3	460	G
52	3	462	C
52	3	465	A
52	3	466	A
52	3	469	C
52	3	473	U
52	3	476	G
52	3	478	G
52	3	479	A
52	3	480	C
52	3	482	G
52	3	483	A
52	3	484	U
52	3	487	C
52	3	488	G
52	3	489	A
52	3	490	A
52	3	491	A
52	3	495	U
52	3	501	G
52	3	502	A
52	3	504	G
52	3	509	G
52	3	511	U
52	3	514	A
52	3	515	A
52	3	517	G
52	3	519	A
52	3	520	C
52	3	522	C
52	3	525	A
52	3	531	G
52	3	533	G
52	3	534	U
52	3	538	A
52	3	539	U
52	3	542	A

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Mol	Chain	Res	Type
52	3	543	U
52	3	544	U
52	3	553	A
52	3	562	C
52	3	565	C
52	3	566	G
52	3	567	U
52	3	581	A
52	3	583	U
52	3	584	G
52	3	595	U
52	3	596	G
52	3	601	U
52	3	605	A
52	3	606	G
52	3	607	U
52	3	608	A
52	3	610	G
52	3	620	G
52	3	623	A
52	3	638	A
52	3	639	G
52	3	644	C
52	3	646	A
52	3	648	G
52	3	653	G
52	3	654	G
52	3	656	G
52	3	657	A
52	3	663	A
52	3	667	A
52	3	673	A
52	3	675	U
52	3	681	A
52	3	682	A
52	3	683	G
52	3	689	U
52	3	690	U
52	3	691	G
52	3	704	G
52	3	705	A
52	3	706	C

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Mol	Chain	Res	Type
52	3	710	A
52	3	712	A
52	3	718	U
52	3	721	G
52	3	722	C
52	3	725	G
52	3	728	A
52	3	730	G
52	3	739	G
52	3	740	A
52	3	752	C
52	3	761	G
52	3	763	G
52	3	765	A
52	3	775	C
52	3	782	U
52	3	792	G
52	3	797	U
52	3	799	A
52	3	810	G
52	3	811	G
52	3	817	A
52	3	819	U
52	3	820	U
52	3	823	A
52	3	824	A
52	3	825	U
52	3	827	G
52	3	828	A
52	3	829	A
52	3	835	U
52	3	840	G
52	3	841	C
52	3	842	U
52	3	847	C
52	3	850	G
52	3	854	A
52	3	862	U
52	3	863	U
52	3	865	A
52	3	866	G
52	3	870	A

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Mol	Chain	Res	Type
52	3	873	G
52	3	881	A
52	3	882	C
52	3	883	A
52	3	884	A
52	3	894	G
52	3	902	U
52	3	904	C
52	3	906	G
52	3	907	A
52	3	914	G
52	3	917	G
52	3	918	G
52	3	930	C
52	3	931	G
52	3	932	U
52	3	933	A
52	3	934	C
52	3	941	C
52	3	944	U
52	3	947	A
52	3	949	C
52	3	951	C
52	3	953	G
52	3	968	U
52	3	971	U
52	3	977	A
52	3	979	U
52	3	982	G
52	3	989	G
52	3	990	G
52	3	992	G
52	3	993	A
52	3	995	A
52	3	999	U
52	3	1001	C
52	3	1008	A
52	3	1009	A
52	3	1011	A
52	3	1013	G
52	3	1016	A
52	3	1019	A

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Mol	Chain	Res	Type
52	3	1020	G
52	3	1021	C
52	3	1025	G
52	3	1026	A
52	3	1027	U
52	3	1032	A
52	3	1035	U
52	3	1045	A
52	3	1048	A
52	3	1049	U
52	3	1055	A
52	3	1061	A
52	3	1068	U
52	3	1075	G
52	3	1080	A
52	3	1081	A
52	3	1082	A
52	3	1088	A
52	3	1089	A
52	3	1095	U
52	3	1099	C
52	3	1100	U
52	3	1101	U
52	3	1102	A
52	3	1103	G
52	3	1104	A
52	3	1105	A
52	3	1106	G
52	3	1107	C
52	3	1109	G
52	3	1112	A
52	3	1113	U
52	3	1115	G
52	3	1116	U
52	3	1119	A
52	3	1121	A
52	3	1123	A
52	3	1125	U
52	3	1129	U
52	3	1130	A
52	3	1131	A
52	3	1132	C

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Mol	Chain	Res	Type
52	3	1147	G
52	3	1151	U
52	3	1154	U
52	3	1157	G
52	3	1158	C
52	3	1165	U
52	3	1167	U
52	3	1168	A
52	3	1170	C
52	3	1171	G
52	3	1176	U
52	3	1177	A
52	3	1178	A
52	3	1186	A
52	3	1191	A
52	3	1202	A
52	3	1203	G
52	3	1204	A
52	3	1208	A
52	3	1209	U
52	3	1210	A
52	3	1212	C
52	3	1215	G
52	3	1216	U
52	3	1217	G
52	3	1234	U
52	3	1235	U
52	3	1236	G
52	3	1242	G
52	3	1251	G
52	3	1253	G
52	3	1254	U
52	3	1257	G
52	3	1259	A
52	3	1265	G
52	3	1268	U
52	3	1274	A
52	3	1279	U
52	3	1281	A
52	3	1282	G
52	3	1283	A
52	3	1284	A

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Mol	Chain	Res	Type
52	3	1285	U
52	3	1286	G
52	3	1292	A
52	3	1295	A
52	3	1297	U
52	3	1298	A
52	3	1301	G
52	3	1312	A
52	3	1314	A
52	3	1315	A
52	3	1316	U
52	3	1322	A
52	3	1324	A
52	3	1328	A
52	3	1329	U
52	3	1340	U
52	3	1342	C
52	3	1343	C
52	3	1353	G
52	3	1355	C
52	3	1360	U
52	3	1361	U
52	3	1369	U
52	3	1370	A
52	3	1371	G
52	3	1372	U
52	3	1373	C
52	3	1378	C
52	3	1380	U
52	3	1388	G
52	3	1393	A
52	3	1396	A
52	3	1403	G
52	3	1406	A
52	3	1407	U
52	3	1408	G
52	3	1412	A
52	3	1413	A
52	3	1415	A
52	3	1419	U
52	3	1423	A
52	3	1424	U

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Mol	Chain	Res	Type
52	3	1425	U
52	3	1431	A
52	3	1435	A
52	3	1436	C
52	3	1439	U
52	3	1444	C
52	3	1445	U
52	3	1448	U
52	3	1449	G
52	3	1456	C
52	3	1457	A
52	3	1463	G
52	3	1465	U
52	3	1466	U
52	3	1467	U
52	3	1479	A
52	3	1480	A
52	3	1481	U
52	3	1482	U
52	3	1483	G
52	3	1486	U
52	3	1487	U
52	3	1489	G
52	3	1493	A
52	3	1494	U
52	3	1502	A
52	3	1506	U
52	3	1507	G
52	3	1508	G
52	3	1510	A
52	3	1513	A
52	3	1514	U
52	3	1523	C
52	3	1532	A
52	3	1533	U
52	3	1534	A
52	3	1537	A
52	3	1541	A
52	3	1546	U
52	3	1548	A
52	3	1550	G
52	3	1554	A

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Mol	Chain	Res	Type
52	3	1555	G
52	3	1558	A
52	3	1559	A
52	3	1571	G
52	3	1580	G
52	3	1584	U
52	3	1585	A
52	3	1587	U
52	3	1588	A
52	3	1589	A
52	3	1594	G
52	3	1600	A
52	3	1601	A
52	3	1612	U
52	3	1615	G
52	3	1616	G
52	3	1618	U
52	3	1619	A
52	3	1637	A
52	3	1642	G
52	3	1643	A
52	3	1644	A
52	3	1648	A
52	3	1651	C
52	3	1652	A
52	3	1654	G
52	3	1656	A
52	3	1661	A
52	3	1663	G
52	3	1668	G
52	3	1674	A
52	3	1679	U
52	3	1680	A
52	3	1681	G
52	3	1682	C
52	3	1683	G
52	3	1687	G
52	3	1688	A
52	3	1694	A
52	3	1695	G
52	3	1698	A
52	3	1699	A

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Mol	Chain	Res	Type
52	3	1701	G
52	3	1702	A
52	3	1703	A
52	3	1706	C
52	3	1707	U
52	3	1708	G
52	3	1709	C
52	3	1720	C
52	3	1727	U
52	3	1728	A
52	3	1734	A
52	3	1737	G
52	3	1748	U
52	3	1749	A
52	3	1751	A
52	3	1752	A
52	3	1754	U
52	3	1758	C
52	3	1762	A
52	3	1763	G
52	3	1764	U
52	3	1765	G
52	3	1766	A
52	3	1769	A
52	3	1770	A
52	3	1771	C
52	3	1780	A
52	3	1784	U
52	3	1787	A
52	3	1788	A
52	3	1789	C
52	3	1791	A
52	3	1794	A
52	3	1807	C
52	3	1816	A
52	3	1821	G
52	3	1822	A
52	3	1823	U
52	3	1824	G
52	3	1827	U
52	3	1836	A
52	3	1842	G

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Mol	Chain	Res	Type
52	3	1850	C
52	3	1859	U
52	3	1865	A
52	3	1872	U
52	3	1873	A
52	3	1889	U
52	3	1890	U
52	3	1891	A
52	3	1903	A
52	3	1907	A
52	3	1908	A
52	3	1910	G
52	3	1913	G
52	3	1920	A
52	3	1921	C
52	3	1934	A
52	3	1936	G
52	3	1937	G
52	3	1944	A
52	3	1945	A
52	3	1946	U
52	3	1947	U
52	3	1950	U
52	3	1952	G
52	3	1958	U
52	3	1962	U
52	3	1970	C
52	3	1971	G
52	3	1972	C
52	3	1974	U
52	3	1977	A
52	3	1978	U
52	3	1979	G
52	3	1984	A
52	3	1988	A
52	3	1990	C
52	3	1998	U
52	3	1999	G
52	3	2009	U
52	3	2010	A
52	3	2020	A
52	3	2025	C

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Mol	Chain	Res	Type
52	3	2028	G
52	3	2030	A
52	3	2037	A
52	3	2038	A
52	3	2040	A
52	3	2041	C
52	3	2043	C
52	3	2050	G
52	3	2055	A
52	3	2056	A
52	3	2057	C
52	3	2058	G
52	3	2059	G
52	3	2060	G
52	3	2061	A
52	3	2062	C
52	3	2063	G
52	3	2067	A
52	3	2068	G
52	3	2069	A
52	3	2070	C
52	3	2075	U
52	3	2076	G
52	3	2084	A
52	3	2087	G
52	3	2100	G
52	3	2106	G
52	3	2107	A
52	3	2109	A
52	3	2110	U
52	3	2111	U
52	3	2112	A
52	3	2114	C
52	3	2116	U
52	3	2119	A
52	3	2123	A
52	3	2126	A
52	3	2127	G
52	3	2133	A
52	3	2138	U
52	3	2139	C
52	3	2140	G

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Mol	Chain	Res	Type
52	3	2141	A
52	3	2143	G
52	3	2152	C
52	3	2153	U
52	3	2154	A
52	3	2161	G
52	3	2164	G
52	3	2166	U
52	3	2170	A
52	3	2171	A
52	3	2172	A
52	3	2173	G
52	3	2176	G
52	3	2180	U
52	3	2187	C
52	3	2189	U
52	3	2193	U
52	3	2194	G
52	3	2195	U
52	3	2196	G
52	3	2198	G
52	3	2199	C
52	3	2200	U
52	3	2202	U
52	3	2204	C
52	3	2206	A
52	3	2207	A
52	3	2211	G
52	3	2212	U
52	3	2219	U
52	3	2220	A
52	3	2221	U
52	3	2222	C
52	3	2231	A
52	3	2232	G
52	3	2233	A
52	3	2246	G
52	3	2247	G
52	3	2254	G
52	3	2258	G
52	3	2274	A
52	3	2275	A

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Mol	Chain	Res	Type
52	3	2276	A
52	3	2277	A
52	3	2283	C
52	3	2286	A
52	3	2291	U
52	3	2293	C
52	3	2295	A
52	3	2296	A
52	3	2305	C
52	3	2312	G
52	3	2313	U
52	3	2316	G
52	3	2317	A
52	3	2319	A
52	3	2327	U
52	3	2329	G
52	3	2330	A
52	3	2333	G
52	3	2334	U
52	3	2335	A
52	3	2337	U
52	3	2341	G
52	3	2342	U
52	3	2343	A
52	3	2345	G
52	3	2354	A
52	3	2355	C
52	3	2358	U
52	3	2362	A
52	3	2363	C
52	3	2377	A
52	3	2380	U
52	3	2382	A
52	3	2391	G
52	3	2393	C
52	3	2400	A
52	3	2410	C
52	3	2411	C
52	3	2414	U
52	3	2415	A
52	3	2417	G
52	3	2418	G

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Mol	Chain	Res	Type
52	3	2428	C
52	3	2431	U
52	3	2432	C
52	3	2433	A
52	3	2436	G
52	3	2437	G
52	3	2438	A
52	3	2439	U
52	3	2441	A
52	3	2443	A
52	3	2449	U
52	3	2452	G
52	3	2453	G
52	3	2456	A
52	3	2457	U
52	3	2458	A
52	3	2468	U
52	3	2475	C
52	3	2476	A
52	3	2477	A
52	3	2483	C
52	3	2486	A
52	3	2488	C
52	3	2492	G
52	3	2495	A
52	3	2497	U
52	3	2498	G
52	3	2499	U
52	3	2502	G
52	3	2503	G
52	3	2505	A
52	3	2507	C
52	3	2509	C
52	3	2510	G
52	3	2511	A
52	3	2512	U
52	3	2513	G
52	3	2514	U
52	3	2521	A
52	3	2526	A
52	3	2528	C
52	3	2537	G

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Mol	Chain	Res	Type
52	3	2538	A
52	3	2539	A
52	3	2543	G
52	3	2551	G
52	3	2568	G
52	3	2571	U
52	3	2572	A
52	3	2574	A
52	3	2575	G
52	3	2577	G
52	3	2578	A
52	3	2580	A
52	3	2581	C
52	3	2584	G
52	3	2585	A
52	3	2586	G
52	3	2590	G
52	3	2591	G
52	3	2593	U
52	3	2594	C
52	3	2604	U
52	3	2605	G
52	3	2609	C
52	3	2610	A
52	3	2617	U
52	3	2618	C
52	3	2619	C
52	3	2622	A
52	3	2637	A
52	3	2638	G
52	3	2644	U
52	3	2645	U
52	3	2647	A
52	3	2649	G
52	3	2652	U
52	3	2654	U
52	3	2662	A
52	3	2664	U
52	3	2668	A
52	3	2669	G
52	3	2681	G
52	3	2689	C

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Mol	Chain	Res	Type
52	3	2690	U
52	3	2693	U
52	3	2697	C
52	3	2706	U
52	3	2717	G
52	3	2726	G
52	3	2728	U
52	3	2734	C
52	3	2735	G
52	3	2736	U
52	3	2740	U
52	3	2741	A
52	3	2747	U
52	3	2752	G
52	3	2756	A
52	3	2765	A
52	3	2769	G
52	3	2770	U
52	3	2784	A
52	3	2785	G
52	3	2786	A
52	3	2788	U
52	3	2789	A
52	3	2790	A
52	3	2799	U
52	3	2801	U
52	3	2803	G
52	3	2804	C
52	3	2805	A
52	3	2806	A
52	3	2807	G
52	3	2808	A
52	3	2809	A
52	3	2811	G
52	3	2813	A
52	3	2822	C
52	3	2824	A
52	3	2825	A
52	3	2827	A
52	3	2837	U
52	3	2839	A
52	3	2840	U

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Mol	Chain	Res	Type
52	3	2850	G
52	3	2853	U
52	3	2863	G
52	3	2866	A
52	3	2870	U
52	3	2876	G
52	3	2883	A
52	3	2888	U
52	3	2890	G
52	3	2895	A
52	3	2897	G
52	3	2898	A
52	3	2899	C
53	4	7	G
53	4	10	C
53	4	11	A
53	4	12	U
53	4	13	G
53	4	19	G
53	4	23	A
53	4	28	C
53	4	30	U
53	4	31	G
53	4	33	U
53	4	35	C
53	4	38	U
53	4	39	U
53	4	40	U
53	4	41	C
53	4	42	G
53	4	46	C
53	4	47	C
53	4	48	A
53	4	49	G
53	4	50	C
53	4	51	A
53	4	54	U
53	4	55	A
53	4	59	A
53	4	60	C
53	4	65	G
53	4	73	U

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Mol	Chain	Res	Type
53	4	78	C
53	4	80	G
53	4	88	G
53	4	89	A
53	4	95	G
53	4	99	A
53	4	101	C
53	4	102	A
53	4	103	C
54	5	10	G
54	5	14	U
54	5	19	C
54	5	32	U
54	5	33	A
54	5	38	U
54	5	40	G
54	5	48	C
54	5	49	C
54	5	50	U
54	5	51	A
54	5	52	A
54	5	62	G
54	5	66	A
54	5	67	U
54	5	86	A
54	5	93	A
54	5	94	A
54	5	101	A
54	5	105	A
54	5	106	C
54	5	115	A
54	5	116	A
54	5	117	U
54	5	120	A
54	5	121	C
54	5	125	A
54	5	126	U
54	5	127	A
54	5	128	A
54	5	129	U
54	5	132	G
54	5	134	G

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Mol	Chain	Res	Type
54	5	143	U
54	5	149	G
54	5	154	G
54	5	156	U
54	5	159	U
54	5	171	A
54	5	187	A
54	5	197	A
54	5	198	A
54	5	199	A
54	5	210	G
54	5	232	G
54	5	236	C
54	5	240	U
54	5	241	C
54	5	242	A
54	5	243	G
54	5	246	A
54	5	247	G
54	5	250	G
54	5	260	C
54	5	262	G
54	5	267	C
54	5	269	A
54	5	274	A
54	5	276	U
54	5	285	G
54	5	288	A
54	5	301	G
54	5	302	A
54	5	303	A
54	5	307	C
54	5	312	A
54	5	317	A
54	5	318	C
54	5	323	A
54	5	324	C
54	5	325	A
54	5	326	C
54	5	328	G
54	5	332	A
54	5	334	A

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Mol	Chain	Res	Type
54	5	340	A
54	5	341	C
54	5	342	G
54	5	345	A
54	5	348	C
54	5	350	G
54	5	352	A
54	5	359	A
54	5	363	U
54	5	365	U
54	5	368	C
54	5	371	U
54	5	373	A
54	5	375	C
54	5	377	A
54	5	385	A
54	5	388	G
54	5	400	G
54	5	402	G
54	5	408	U
54	5	409	G
54	5	410	A
54	5	417	U
54	5	418	U
54	5	419	A
54	5	420	A
54	5	423	U
54	5	426	U
54	5	435	U
54	5	440	U
54	5	444	G
54	5	449	A
54	5	450	U
54	5	452	A
54	5	453	C
54	5	464	A
54	5	468	G
54	5	471	A
54	5	474	G
54	5	476	U
54	5	477	U
54	5	478	G

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Mol	Chain	Res	Type
54	5	481	U
54	5	482	G
54	5	483	U
54	5	488	U
54	5	489	U
54	5	493	A
54	5	494	A
54	5	506	U
54	5	507	A
54	5	509	C
54	5	510	U
54	5	515	G
54	5	516	C
54	5	519	G
54	5	522	G
54	5	525	G
54	5	531	A
54	5	532	U
54	5	533	A
54	5	534	C
54	5	543	C
54	5	545	A
54	5	557	A
54	5	558	U
54	5	559	U
54	5	560	U
54	5	562	U
54	5	568	G
54	5	569	U
54	5	570	A
54	5	571	A
54	5	573	G
54	5	574	C
54	5	575	A
54	5	585	G
54	5	586	G
54	5	593	A
54	5	594	A
54	5	595	G
54	5	610	C
54	5	616	C
54	5	617	U

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Mol	Chain	Res	Type
54	5	620	A
54	5	628	A
54	5	629	U
54	5	638	A
54	5	639	A
54	5	640	C
54	5	646	A
54	5	650	A
54	5	652	A
54	5	653	G
54	5	659	U
54	5	662	G
54	5	680	G
54	5	682	G
54	5	683	G
54	5	684	A
54	5	690	G
54	5	691	A
54	5	694	U
54	5	697	G
54	5	699	A
54	5	700	G
54	5	701	A
54	5	715	A
54	5	716	C
54	5	718	A
54	5	719	G
54	5	720	U
54	5	721	G
54	5	724	G
54	5	728	G
54	5	731	A
54	5	742	C
54	5	745	U
54	5	746	A
54	5	749	G
54	5	752	G
54	5	771	G
54	5	774	A
54	5	775	G
54	5	784	A
54	5	787	A

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Mol	Chain	Res	Type
54	5	790	U
54	5	791	A
54	5	796	A
54	5	802	C
54	5	806	A
54	5	809	G
54	5	813	A
54	5	814	C
54	5	815	G
54	5	818	A
54	5	820	A
54	5	822	A
54	5	825	A
54	5	829	G
54	5	830	U
54	5	849	A
54	5	865	U
54	5	870	A
54	5	878	U
54	5	879	G
54	5	882	U
54	5	883	A
54	5	885	U
54	5	896	G
54	5	908	A
54	5	910	C
54	5	911	G
54	5	912	G
54	5	921	G
54	5	922	G
54	5	923	G
54	5	929	C
54	5	930	A
54	5	938	U
54	5	940	G
54	5	945	U
54	5	953	A
54	5	955	U
54	5	961	G
54	5	962	G
54	5	964	A
54	5	966	A

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Mol	Chain	Res	Type
54	5	970	A
54	5	971	A
54	5	972	A
54	5	976	U
54	5	977	U
54	5	984	A
54	5	986	U
54	5	987	U
54	5	988	G
54	5	989	A
54	5	996	U
54	5	997	G
54	5	999	C
54	5	1001	A
54	5	1004	U
54	5	1006	A
54	5	1014	A
54	5	1030	G
54	5	1036	C
54	5	1037	A
54	5	1039	G
54	5	1041	G
54	5	1044	G
54	5	1045	C
54	5	1056	U
54	5	1058	A
54	5	1066	U
54	5	1071	A
54	5	1072	G
54	5	1073	A
54	5	1077	U
54	5	1082	U
54	5	1083	A
54	5	1085	G
54	5	1086	U
54	5	1092	A
54	5	1102	A
54	5	1108	A
54	5	1113	U
54	5	1115	G
54	5	1116	U
54	5	1117	U

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Mol	Chain	Res	Type
54	5	1118	A
54	5	1119	C
54	5	1121	U
54	5	1122	U
54	5	1123	G
54	5	1124	U
54	5	1125	C
54	5	1126	U
54	5	1128	G
54	5	1134	C
54	5	1135	U
54	5	1142	G
54	5	1144	A
54	5	1159	A
54	5	1165	G
54	5	1166	A
54	5	1171	A
54	5	1172	A
54	5	1173	A
54	5	1176	A
54	5	1187	U
54	5	1188	A
54	5	1189	U
54	5	1199	U
54	5	1200	G
54	5	1201	C
54	5	1202	A
54	5	1203	A
54	5	1211	A
54	5	1214	A
54	5	1215	U
54	5	1216	G
54	5	1231	U
54	5	1233	G
54	5	1235	C
54	5	1241	G
54	5	1243	A
54	5	1245	A
54	5	1255	A
54	5	1256	U
54	5	1260	U
54	5	1261	A

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Mol	Chain	Res	Type
54	5	1264	G
54	5	1269	U
54	5	1271	U
54	5	1272	C
54	5	1273	A
54	5	1275	U
54	5	1279	G
54	5	1283	G
54	5	1291	C
54	5	1293	A
54	5	1294	U
54	5	1296	C
54	5	1297	G
54	5	1305	G
54	5	1310	C
54	5	1312	G
54	5	1313	A
54	5	1315	U
54	5	1320	A
54	5	1322	U
54	5	1328	C
54	5	1337	U
54	5	1338	A
54	5	1343	G
54	5	1354	G
54	5	1356	U
54	5	1364	C
54	5	1369	A
54	5	1372	C
54	5	1374	C
54	5	1375	C
54	5	1376	G
54	5	1381	U
54	5	1394	G
54	5	1397	G
54	5	1398	G
54	5	1400	A
54	5	1405	U
54	5	1408	A
54	5	1411	A
54	5	1417	U
54	5	1421	A

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Mol	Chain	Res	Type
54	5	1423	C
54	5	1427	U
54	5	1429	G
54	5	1435	G
54	5	1442	A
54	5	1445	G
54	5	1448	A
54	5	1449	G
54	5	1451	A
54	5	1466	U
54	5	1467	A
54	5	1468	A
54	5	1469	G
54	5	1472	G
54	5	1474	A
54	5	1478	A
54	5	1480	G
54	5	1482	A
54	5	1492	G
54	5	1495	C
54	5	1504	G
54	5	1505	G
54	5	1506	A
55	7	3	G
55	7	4	U
55	7	17	U
55	7	18	C
55	7	19	G
55	7	21	U
55	7	22	A
55	7	24	A
55	7	28	A
55	7	36	A
55	7	44	U
55	7	49	C
55	7	53	A
55	7	54	G
55	7	55	U
55	7	58	G
55	7	61	U
55	7	71	A
55	7	72	C

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Mol	Chain	Res	Type
55	7	73	C
55	7	74	A
55	7	77	A
55	8	3	G
55	8	4	U
55	8	17	U
55	8	18	C
55	8	19	G
55	8	21	U
55	8	22	A
55	8	24	A
55	8	28	A
55	8	36	A
55	8	44	U
55	8	49	C
55	8	53	A
55	8	54	G
55	8	55	U
55	8	58	G
55	8	61	U
55	8	71	A
55	8	72	C
55	8	73	C
55	8	74	A
55	8	77	A

All (49) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
52	3	184	A
52	3	296	U
52	3	410	G
52	3	425	U
52	3	500	U
52	3	513	A
52	3	662	U
52	3	688	U
52	3	880	C
52	3	881	A
52	3	903	A
52	3	933	A
52	3	952	U

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Mol	Chain	Res	Type
52	3	1048	A
52	3	1209	U
52	3	1211	U
52	3	1297	U
52	3	1507	G
52	3	1583	G
52	3	1588	A
52	3	1618	U
52	3	1706	C
52	3	1820	U
52	3	2140	G
52	3	2504	C
52	3	2506	C
52	3	2513	G
52	3	2604	U
52	3	2668	A
52	3	2764	U
52	3	2800	U
52	3	2808	A
52	3	2823	A
52	3	2862	U
52	3	2889	U
52	3	2897	G
53	4	50	C
53	4	54	U
53	4	59	A
54	5	384	G
54	5	473	A
54	5	482	G
54	5	1133	A
55	7	16	G
55	7	71	A
55	7	74	A
55	8	16	G
55	8	71	A
55	8	74	A

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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.

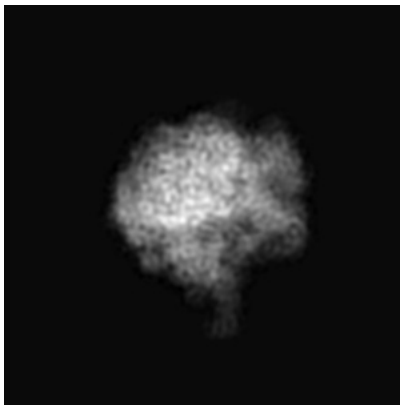
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-13281. These allow visual inspection of the internal detail of the map and identification of artifacts.

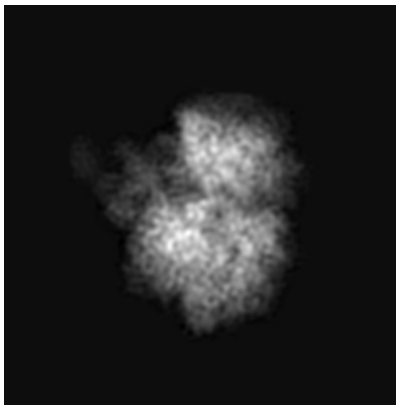
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

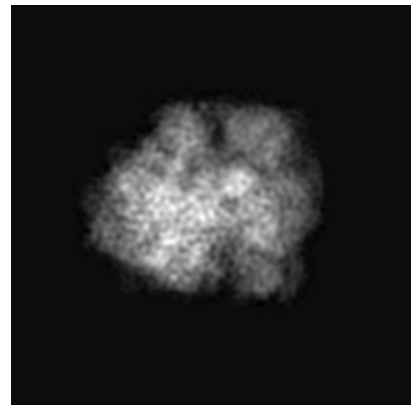
6.1.1 Primary map



X

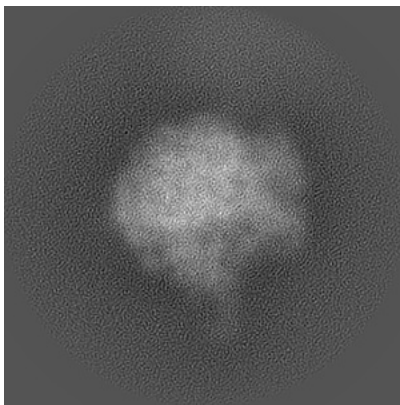


Y

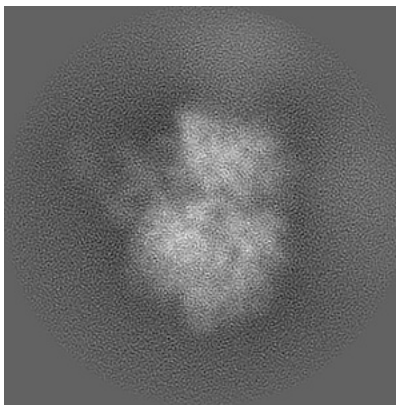


Z

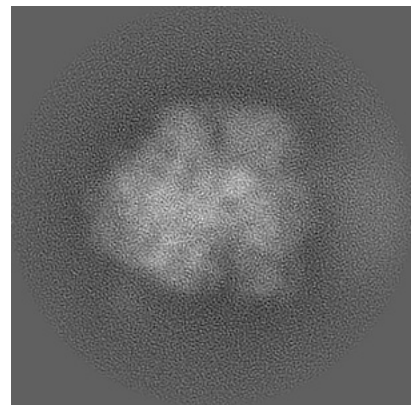
6.1.2 Raw map



X



Y

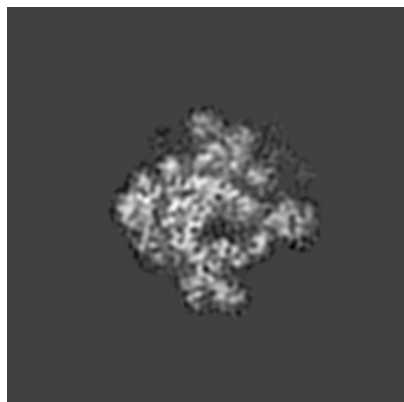


Z

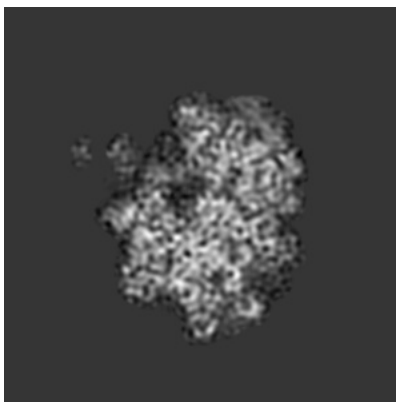
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

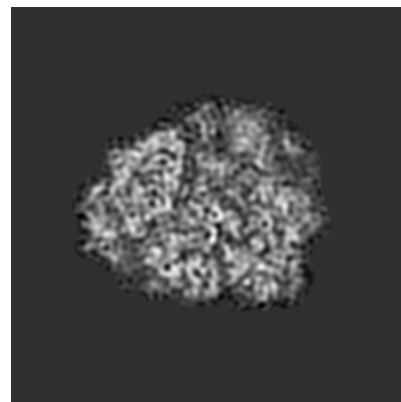
6.2.1 Primary map



X Index: 128

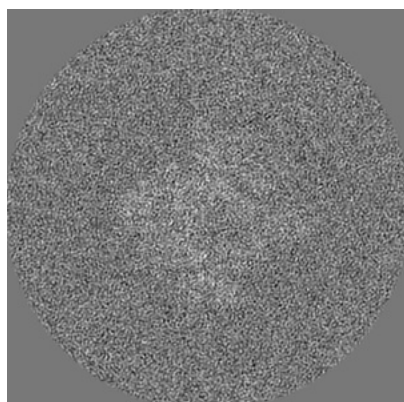


Y Index: 128

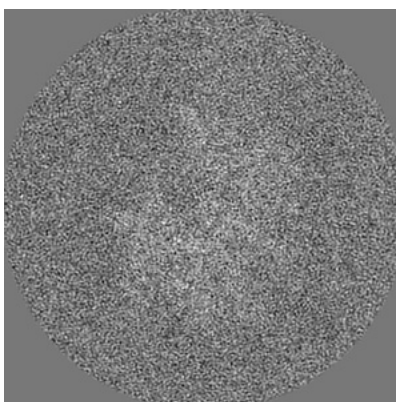


Z Index: 128

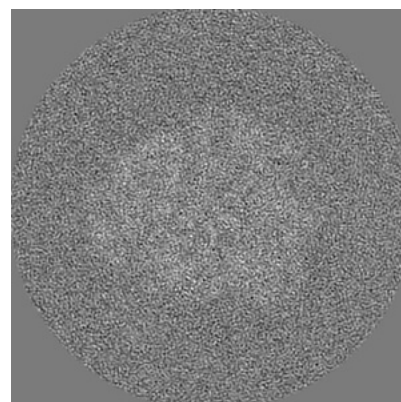
6.2.2 Raw map



X Index: 128



Y Index: 128

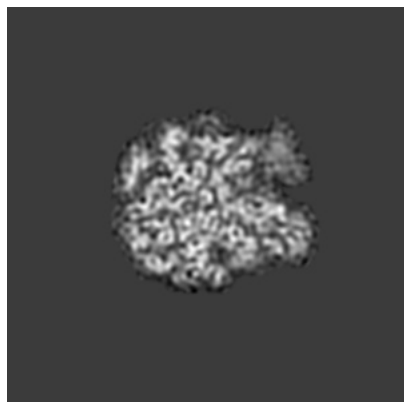


Z Index: 128

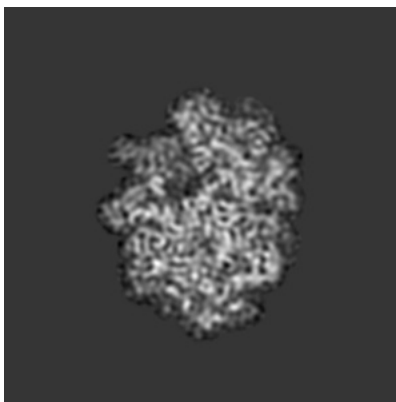
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

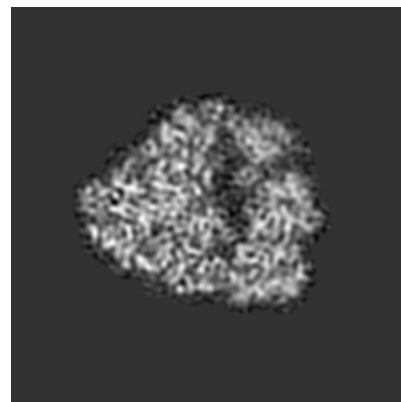
6.3.1 Primary map



X Index: 104

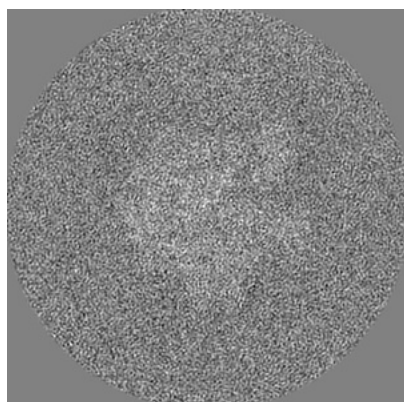


Y Index: 120

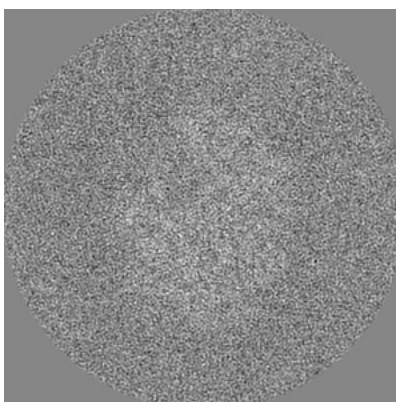


Z Index: 122

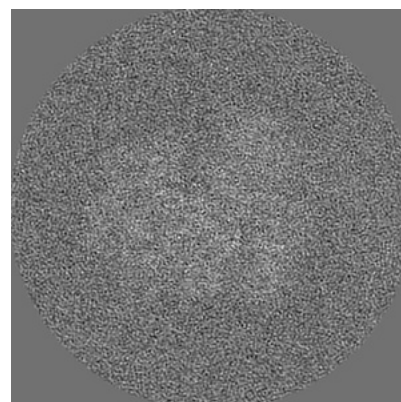
6.3.2 Raw map



X Index: 120



Y Index: 122

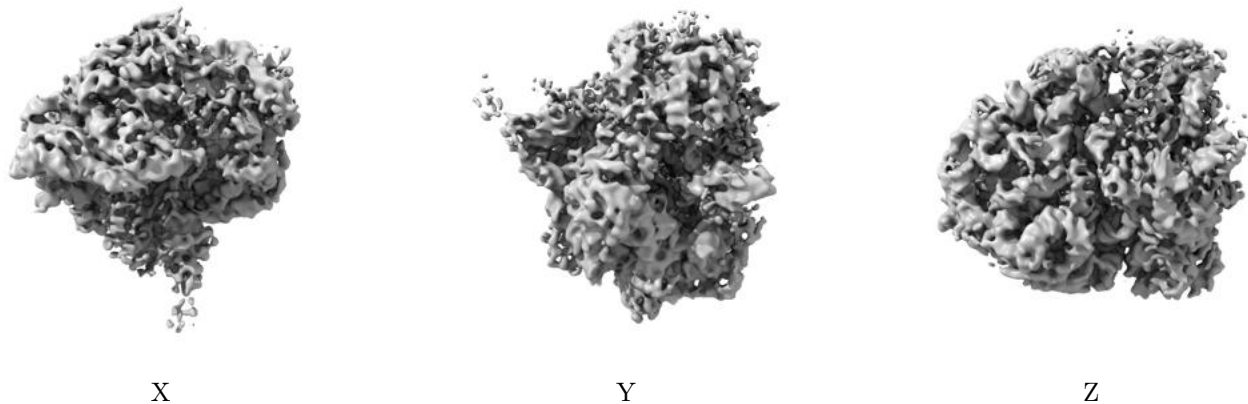


Z Index: 133

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

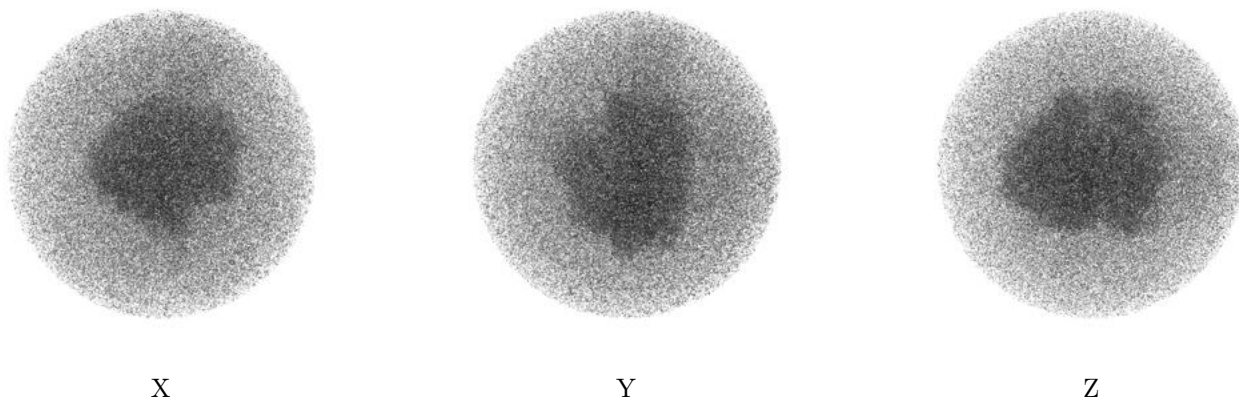
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.5. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 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.

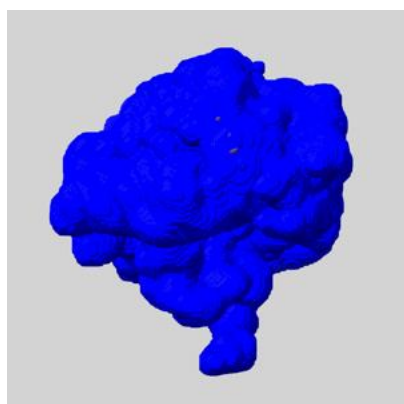
6.5 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

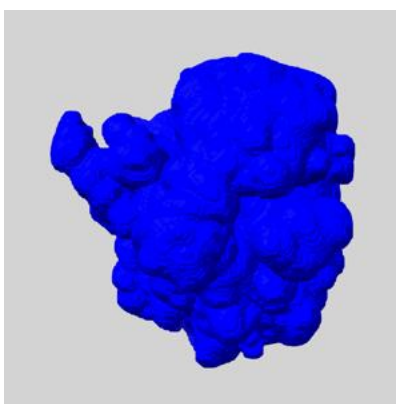
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

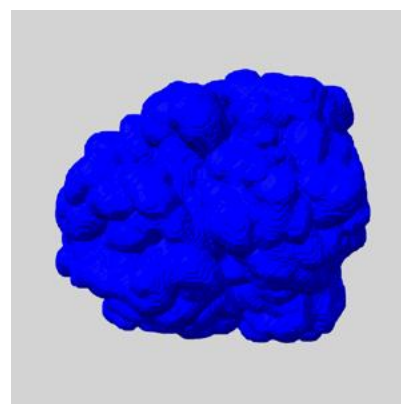
6.5.1 emd_13281_msk_1.map [i](#)



X



Y

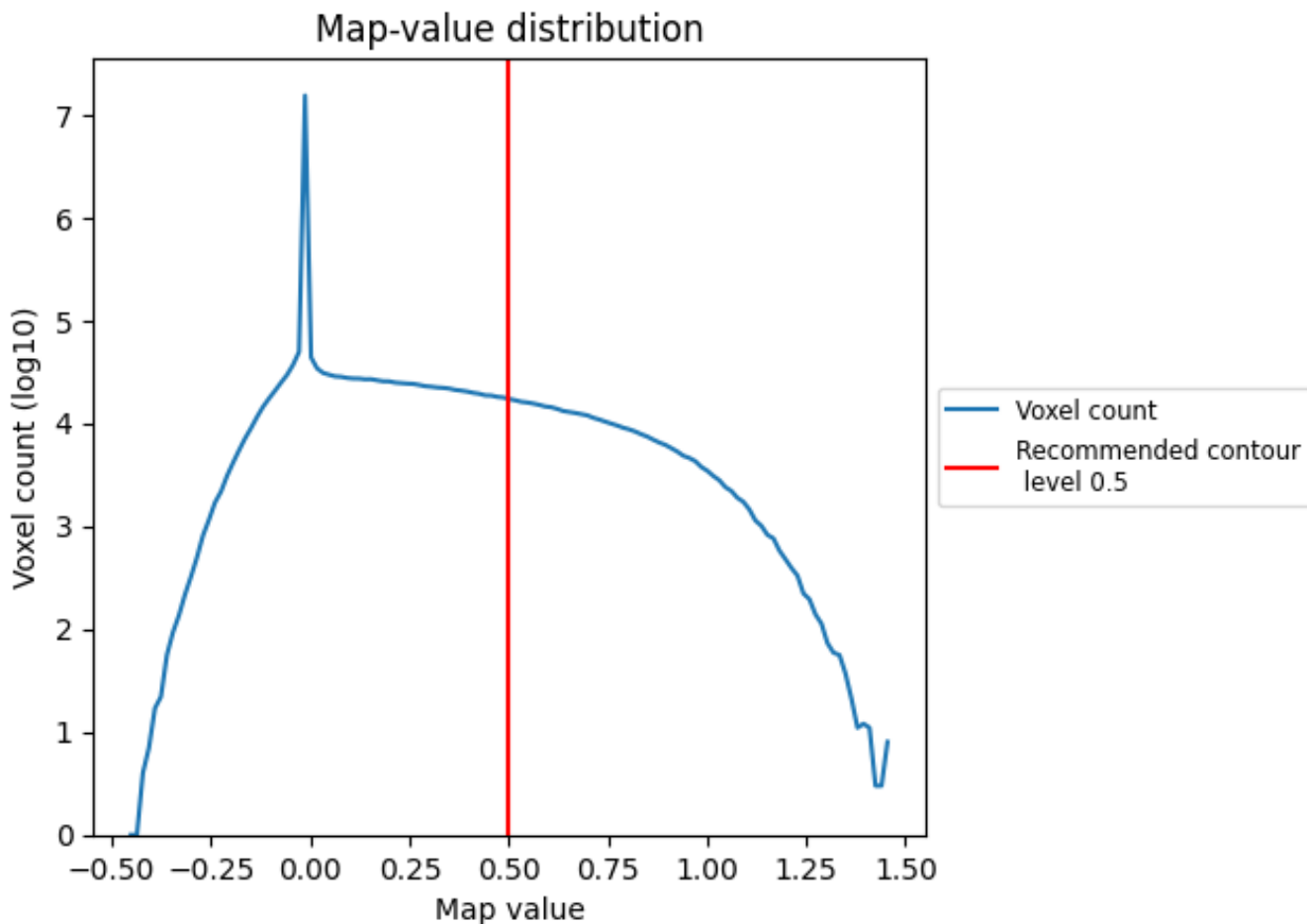


Z

7 Map analysis [i](#)

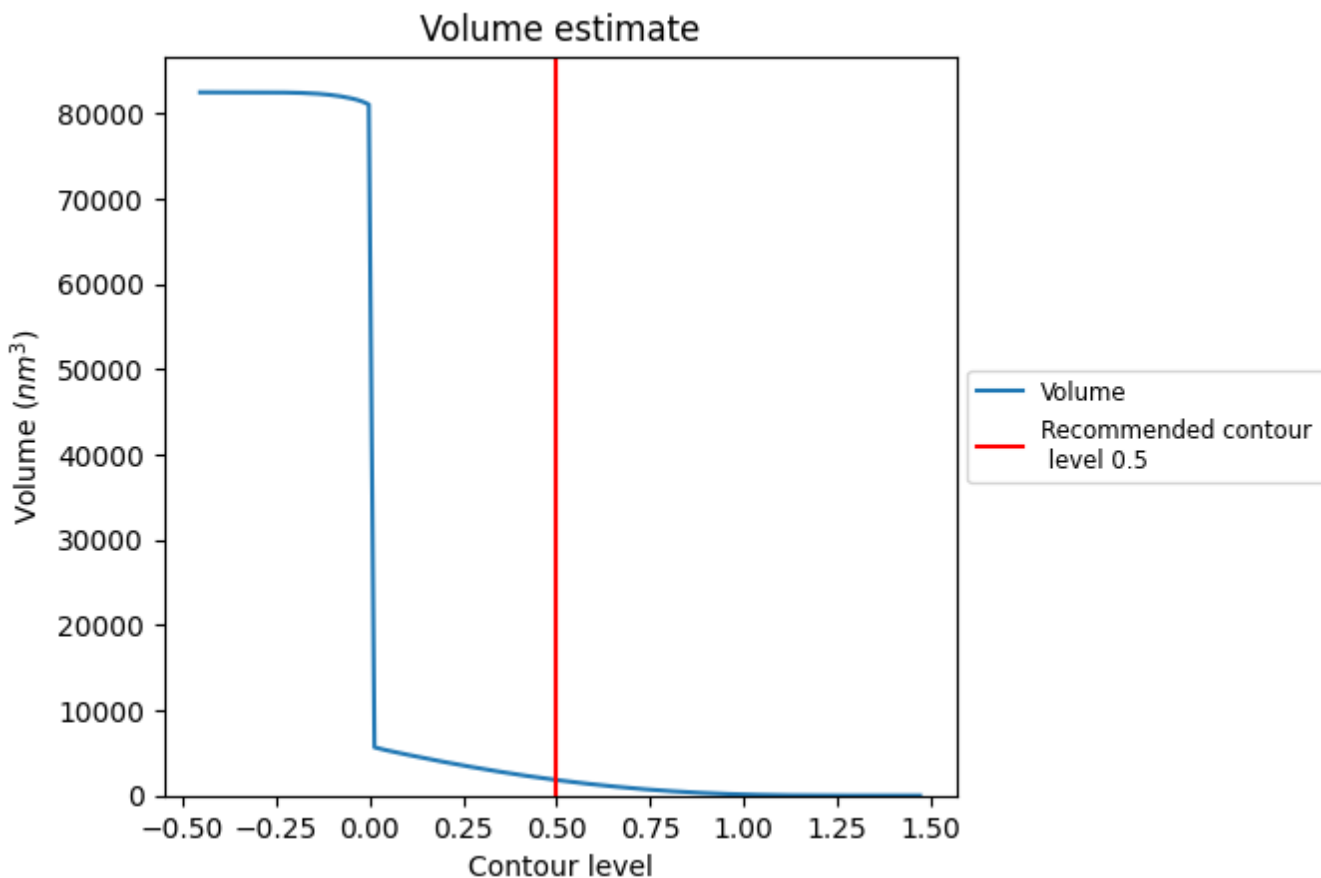
This section contains the results of statistical analysis of the map.

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.

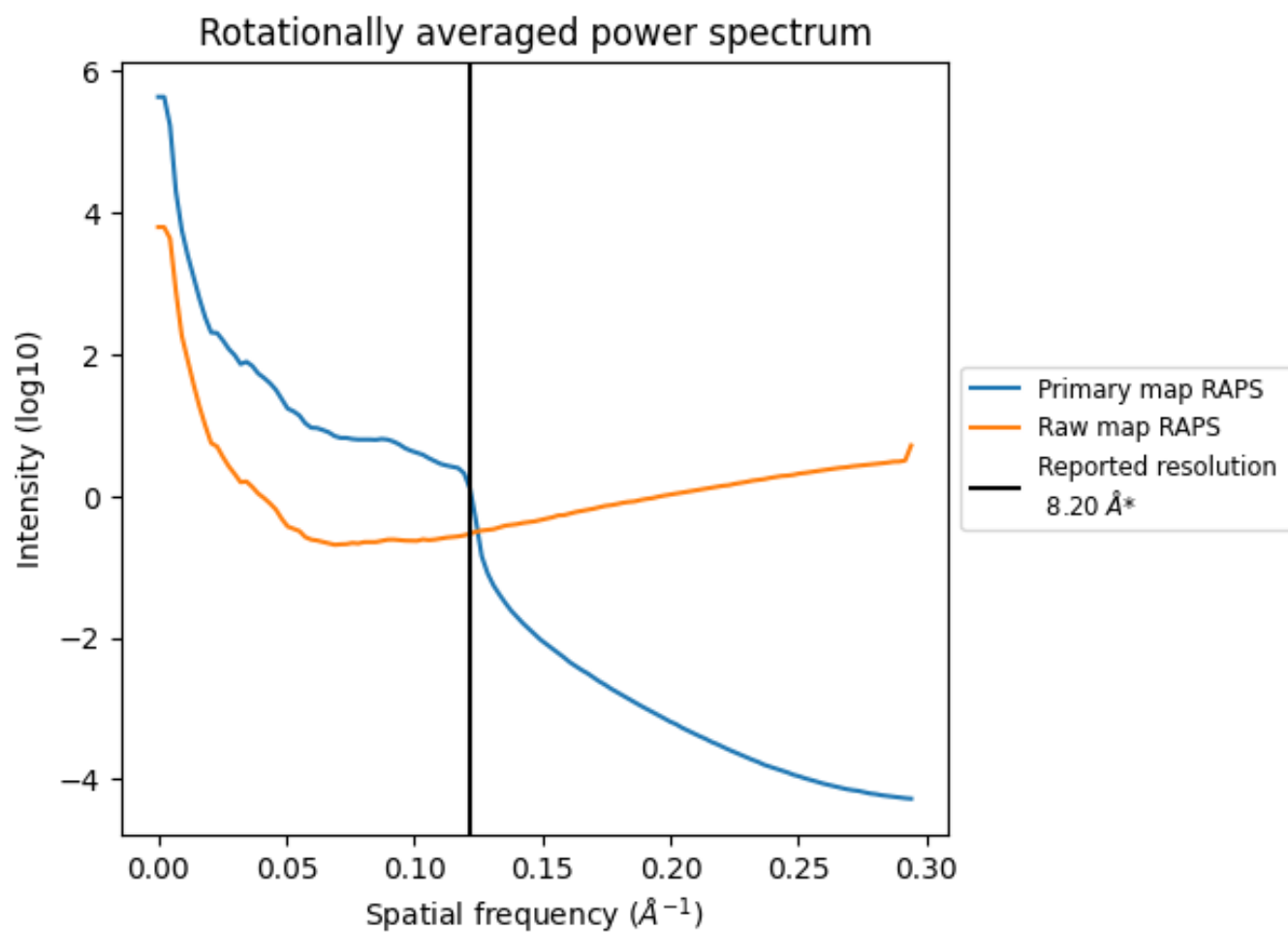
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1826 nm³; this corresponds to an approximate mass of 1649 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

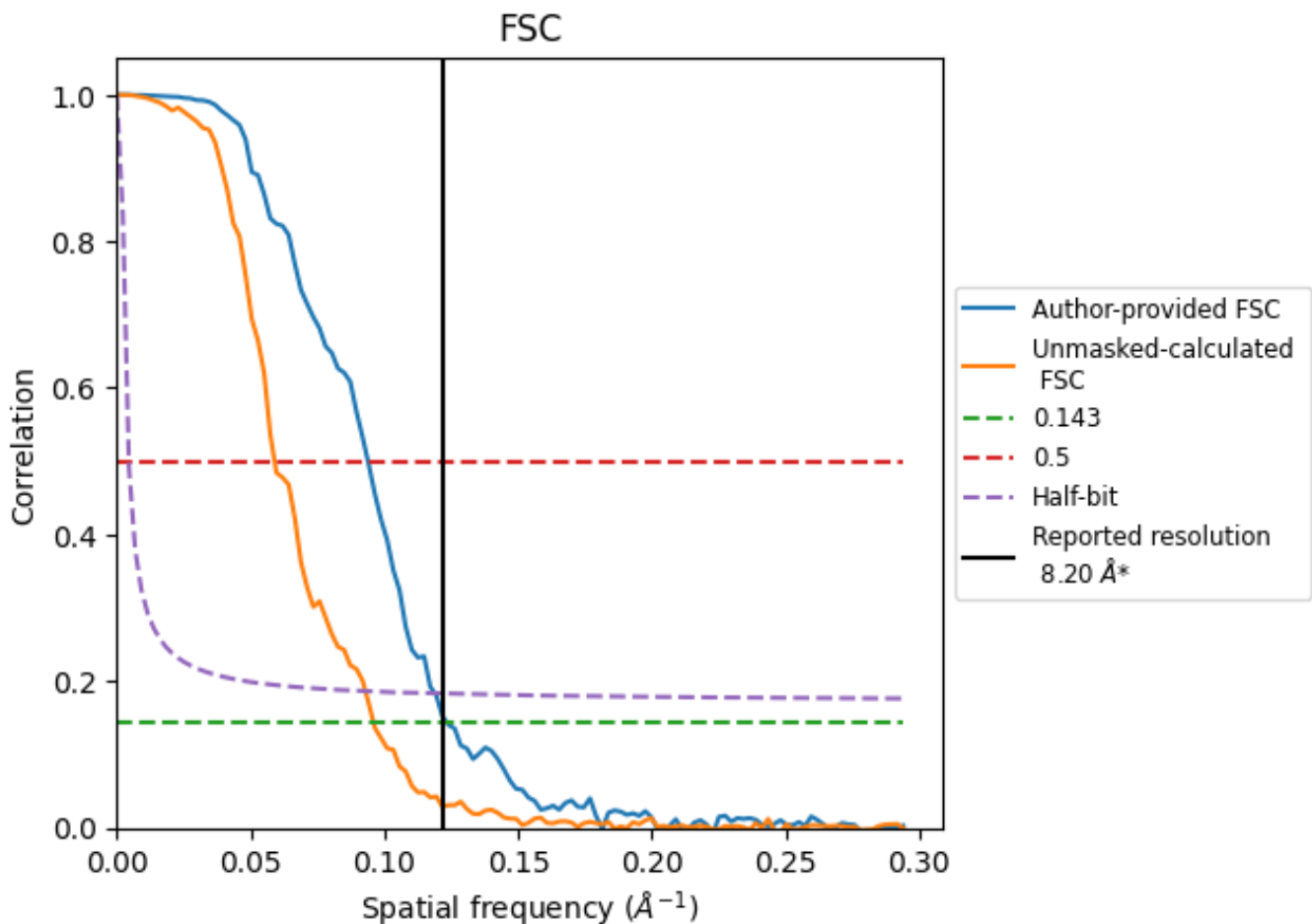


*Reported resolution corresponds to spatial frequency of 0.122 Å⁻¹

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.122 Å⁻¹

8.2 Resolution estimates [i](#)

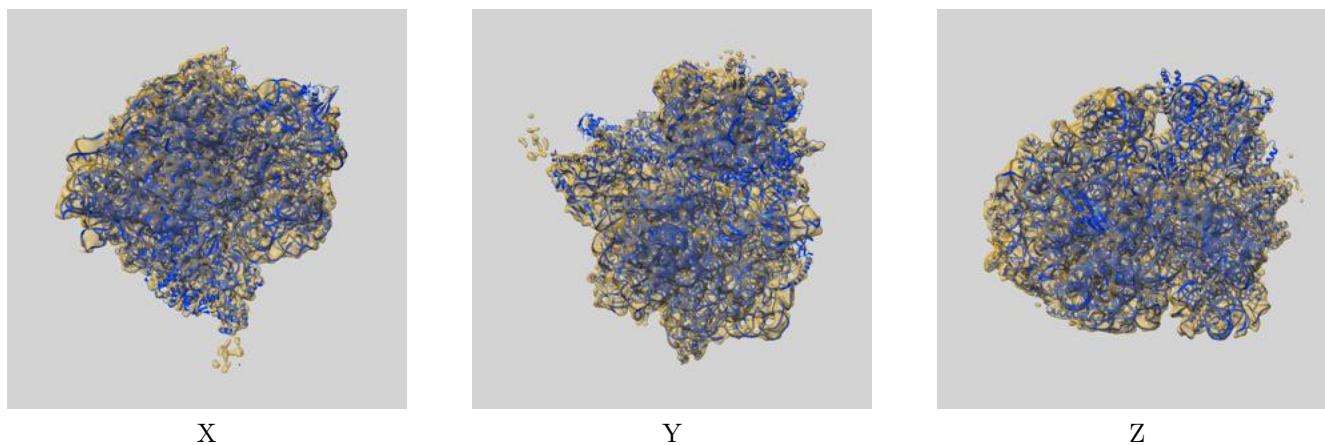
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	8.20	-	-
Author-provided FSC curve	8.10	10.65	8.40
Unmasked-calculated*	10.42	16.95	10.75

*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 10.42 differs from the reported value 8.2 by more than 10 %

9 Map-model fit [i](#)

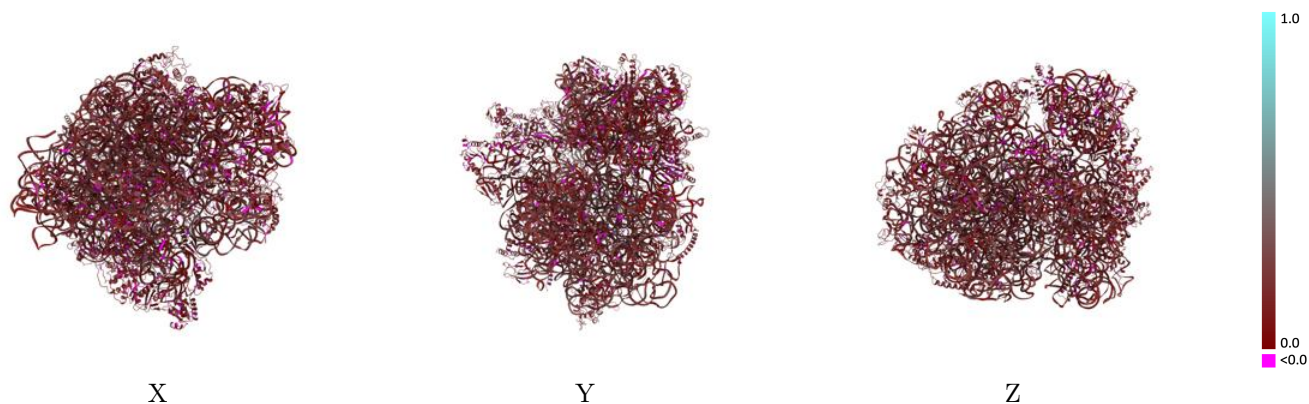
This section contains information regarding the fit between EMDB map EMD-13281 and PDB model 7PAR. Per-residue inclusion information can be found in section 3 on page 13.

9.1 Map-model overlay [i](#)



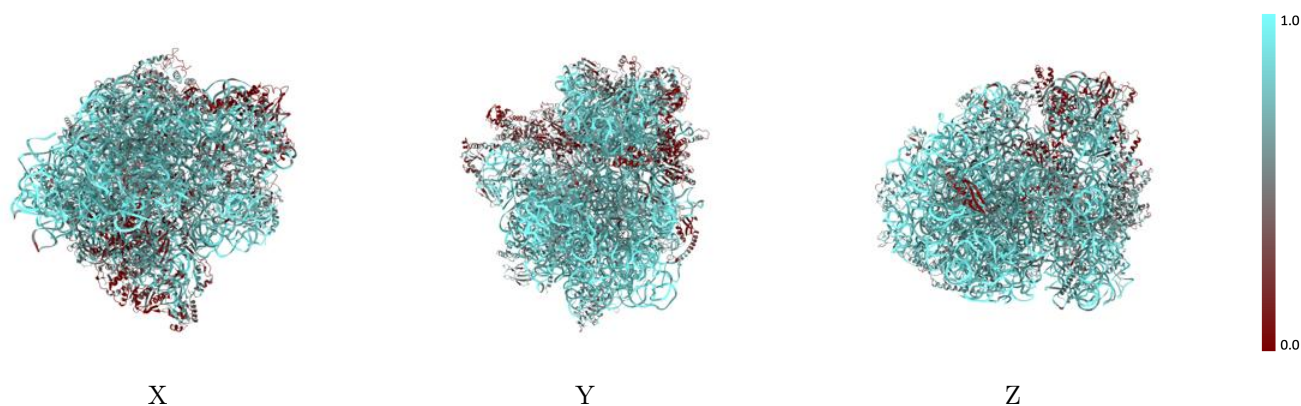
The images above show the 3D surface view of the map at the recommended contour level 0.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



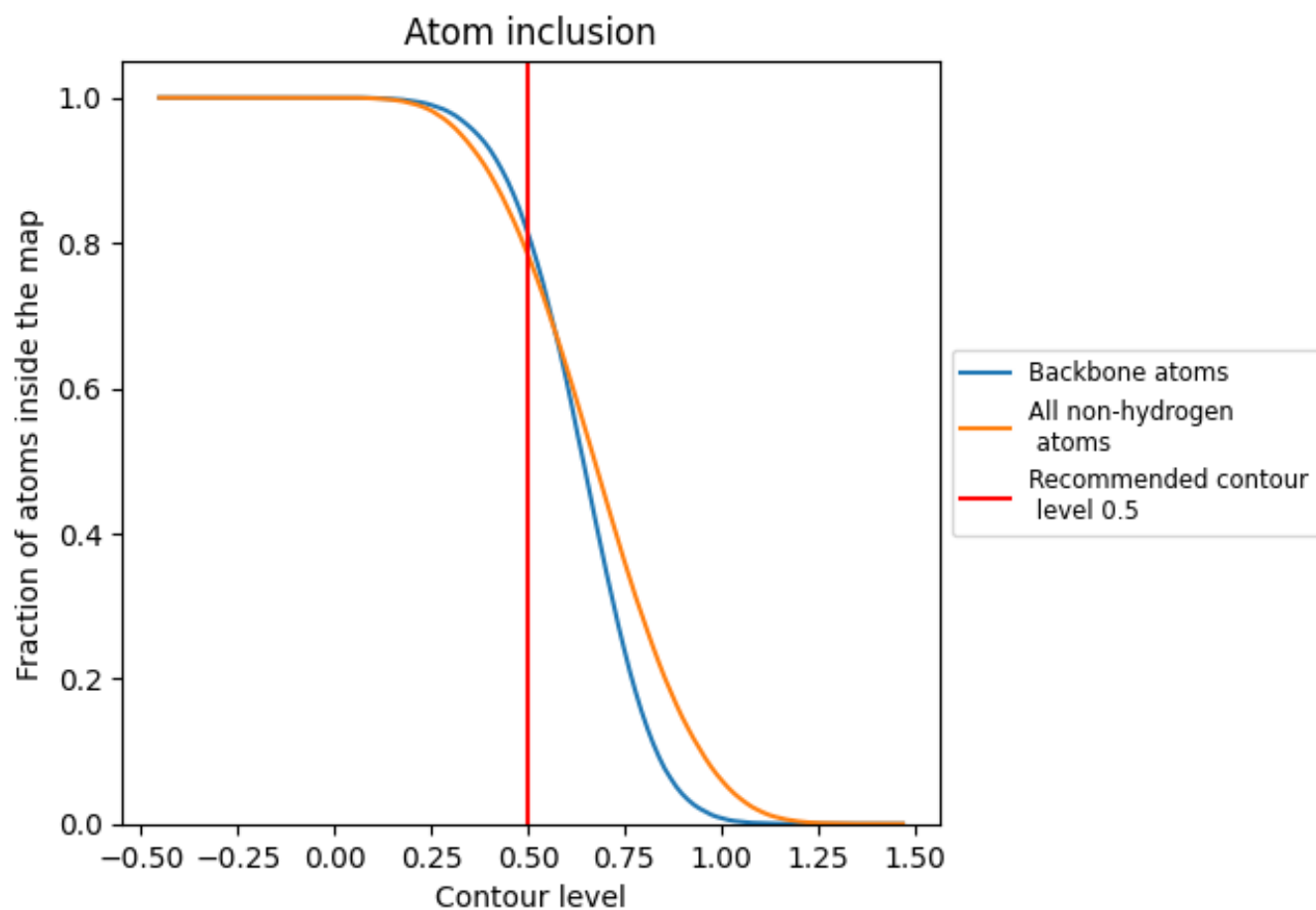
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.5).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 81% of all backbone atoms, 78% 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 (0.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7846	 0.1740
0	 0.7507	 0.1490
1	 0.7103	 0.1560
2	 0.6149	 0.1280
3	 0.9389	 0.1920
4	 0.9393	 0.1940
5	 0.8976	 0.1750
7	 0.8504	 0.1720
8	 0.6724	 0.1280
9	 0.2755	 0.1460
A	 0.4865	 0.1740
B	 0.5507	 0.1620
C	 0.5657	 0.1500
D	 0.5659	 0.1550
E	 0.3952	 0.1580
F	 0.1322	 0.1380
G	 0.5628	 0.1500
H	 0.3027	 0.1210
I	 0.4390	 0.1390
J	 0.4027	 0.1040
K	 0.5728	 0.1570
L	 0.2309	 0.1350
M	 0.7473	 0.1130
N	 0.6057	 0.1710
O	 0.7075	 0.1660
P	 0.5951	 0.1440
Q	 0.5252	 0.1320
R	 0.5403	 0.1240
S	 0.6852	 0.1650
T	 0.5357	 0.1690
W	 0.0473	 0.1360
a	 0.6827	 0.1460
b	 0.6331	 0.1510
c	 0.6542	 0.1660
d	 0.6134	 0.1600



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Chain	Atom inclusion	Q-score
e	 0.5422	 0.1710
f	 0.2324	 0.1580
g	 0.4484	 0.1460
h	 0.4326	 0.1560
i	 0.6661	 0.1640
j	 0.5511	 0.1670
k	 0.6911	 0.1610
l	 0.6730	 0.1550
m	 0.6741	 0.1570
n	 0.6597	 0.1590
o	 0.6323	 0.1850
p	 0.6995	 0.1420
q	 0.6471	 0.1610
r	 0.6902	 0.1610
s	 0.6333	 0.1670
t	 0.5494	 0.1470
u	 0.6578	 0.1380
v	 0.6485	 0.1260
w	 0.6454	 0.1860
x	 0.5160	 0.1510
y	 0.6567	 0.1430
z	 0.6121	 0.1600