



## Full wwPDB EM Validation Report ⓘ

Aug 12, 2024 – 06:15 pm BST

PDB ID : 8S1U  
EMDB ID : EMD-19641  
Title : YlmH bound to stalled 50S subunits with RqcH and PtrRNA  
Authors : Paternoga, H.; Wilson, D.N.  
Deposited on : 2024-02-16  
Resolution : 3.40 Å (reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.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) : 2.37.1

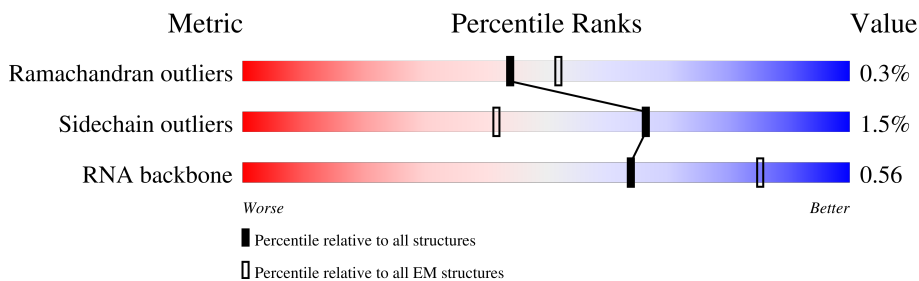
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.40 Å.

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



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

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

Mol	Chain	Length	Quality of chain
1	a	76	
1	c	76	
2	0	59	
3	1	49	
4	2	44	
5	3	66	
6	4	37	
7	6	66	

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Mol	Chain	Length	Quality of chain
8	B	112	43% 76% 22%
9	C	277	22% 95%
10	D	209	33% 97%
11	E	207	43% 99%
12	F	179	95% 99%
13	G	179	79% 97%
14	J	145	27% 98%
15	K	122	42% 98%
16	L	146	39% 99%
17	M	144	19% 92% 6%
18	N	120	29% 97%
19	O	120	68% 100%
20	P	115	44% 95%
21	Q	119	19% 97%
22	R	102	36% 100%
23	S	113	33% 94%
24	T	95	47% 96%
25	U	103	61% 97%
26	V	275	81% 89% 9%
27	W	94	16% 84% 15%
28	X	62	53% 95%
29	Y	66	70% 98%
30	Z	59	31% 95%
31	H	570	91% 91% 9%
32	A	2928	14% 80% 15% 5%

## 2 Entry composition [i](#)

There are 33 unique types of molecules in this entry. The entry contains 93269 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 P-tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	c	66	1413	628	254	465	66	0	0
1	a	69	1477	657	268	483	69	0	0

- Molecule 2 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	0	53	418	258	84	69	7	0	0

- Molecule 3 is a protein called 50S ribosomal protein L33 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	1	49	411	250	82	75	4	0	0

- Molecule 4 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	2	44	368	222	89	55	2	0	0

- Molecule 5 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	3	64	512	321	107	82	2	0	0

- Molecule 6 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	4	37	Total	C	N	O	S	0	0
			297	186	60	46	5		

- Molecule 7 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	6	46	Total	C	N	O	S	0	0
			356	222	63	66	5		

- Molecule 8 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	B	112	Total	C	N	O	P	0	0
			2392	1068	435	778	111		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
9	C	273	Total	C	N	O	S	0	0
			2094	1302	412	374	6		

- Molecule 10 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	D	207	Total	C	N	O	S	0	0
			1575	988	290	292	5		

- Molecule 11 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	E	206	Total	C	N	O	S	0	0
			1567	983	290	292	2		

- Molecule 12 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	F	178	Total	C	N	O	S	0	0
			1405	893	245	260	7		

- Molecule 13 is a protein called Large ribosomal subunit protein uL6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	G	175	1342	835	248	257	2	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	143	1131	714	207	205	5	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	122	921	571	173	173	4	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	146	1082	671	207	202	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	135	1076	690	205	176	5	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	954	583	186	181	4	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	O	120	913	564	176	172	1	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	113	922	588	177	156	1	0	0

- Molecule 21 is a protein called Large ribosomal subunit protein bL20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	Q	118	950	597	191	158	4	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	R	102	795	506	140	148	1	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	S	110	850	530	165	151	4	0	0

- Molecule 24 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	T	91	733	458	135	137	3	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	U	102	770	482	143	141	4	0	0

- Molecule 26 is a protein called Putative RNA-binding protein YlmH.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	V	249	1988	1256	350	376	6	0	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
V	258	GLY	-	expression tag	UNP P71020
V	259	SER	-	expression tag	UNP P71020
V	260	GLY	-	expression tag	UNP P71020
V	261	SER	-	expression tag	UNP P71020
V	262	GLY	-	expression tag	UNP P71020
V	263	SER	-	expression tag	UNP P71020
V	264	GLY	-	expression tag	UNP P71020
V	265	SER	-	expression tag	UNP P71020
V	266	GLY	-	expression tag	UNP P71020
V	267	SER	-	expression tag	UNP P71020
V	268	ASP	-	expression tag	UNP P71020
V	269	TYR	-	expression tag	UNP P71020
V	270	LYS	-	expression tag	UNP P71020
V	271	ASP	-	expression tag	UNP P71020
V	272	ASP	-	expression tag	UNP P71020
V	273	ASP	-	expression tag	UNP P71020
V	274	ASP	-	expression tag	UNP P71020
V	275	LYS	-	expression tag	UNP P71020

- Molecule 27 is a protein called Large ribosomal subunit protein bL27.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
27	W	80	611	378	119	114	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	X	61	468	289	98	79	2	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	Y	65	530	328	102	98	2	0	0

- Molecule 30 is a protein called Large ribosomal subunit protein uL30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	Z	58	456	281	89	85	1	0	0



- Molecule 31 is a protein called Rqc2 homolog RqcH.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
31	H	518	2567	1530	518	519	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
32	A	2789	59910	26733	11076	19313	2788	0	0

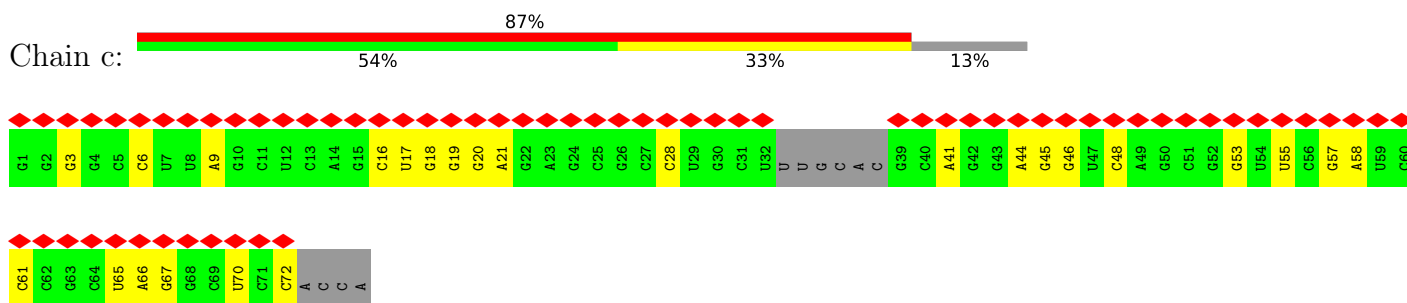
- Molecule 33 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
33	A	15	Total	K	0
			15	15	

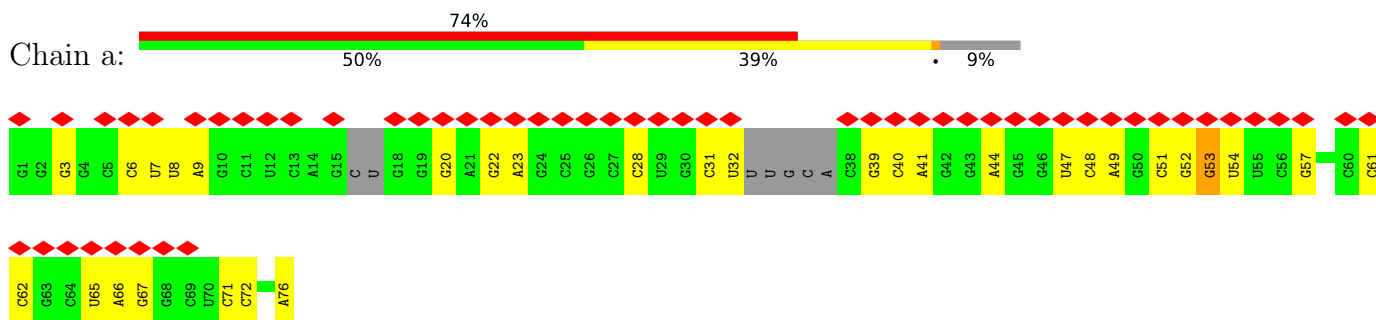
### 3 Residue-property plots [i](#)

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.

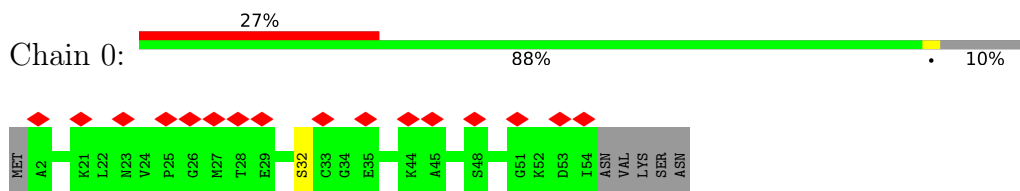
- Molecule 1: P-tRNA



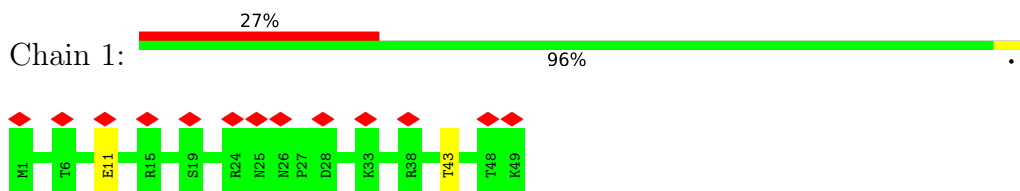
- Molecule 1: P-tRNA



- Molecule 2: 50S ribosomal protein L32



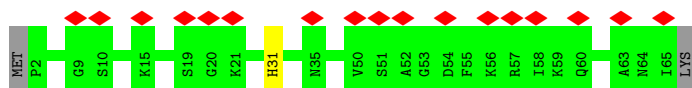
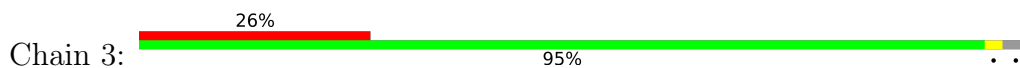
- Molecule 3: 50S ribosomal protein L33 1



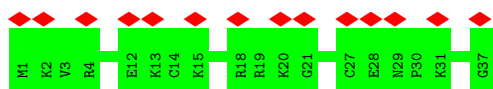
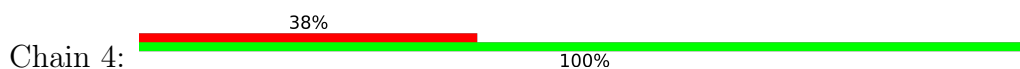
- Molecule 4: 50S ribosomal protein L34



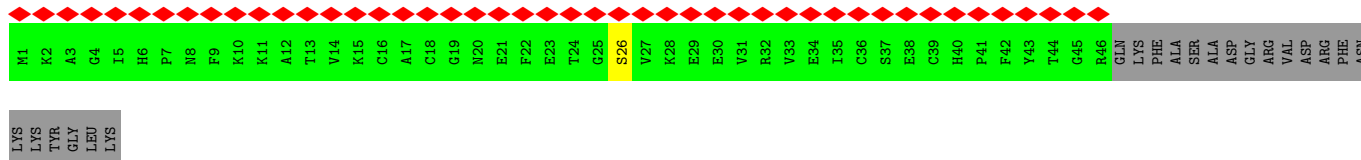
- Molecule 5: 50S ribosomal protein L35



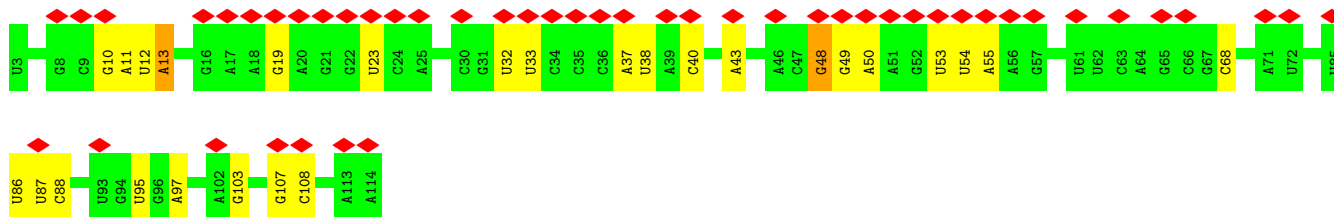
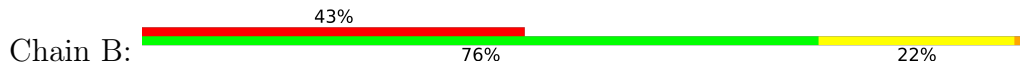
- Molecule 6: 50S ribosomal protein L36



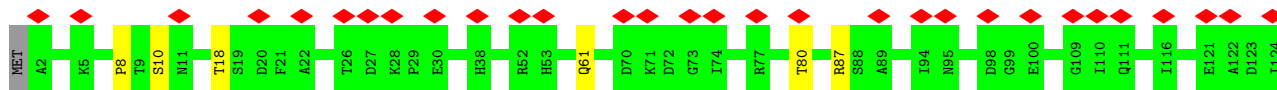
- Molecule 7: 50S ribosomal protein L31

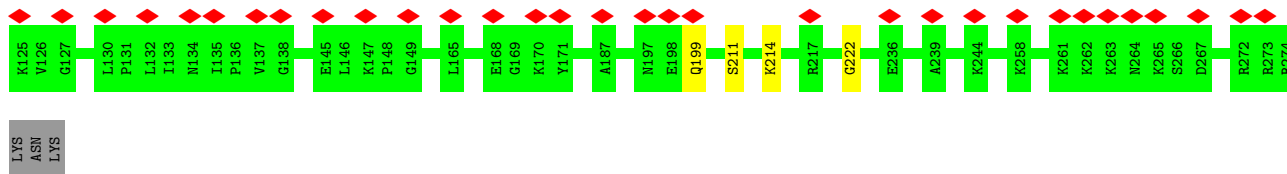


- Molecule 8: 5S rRNA

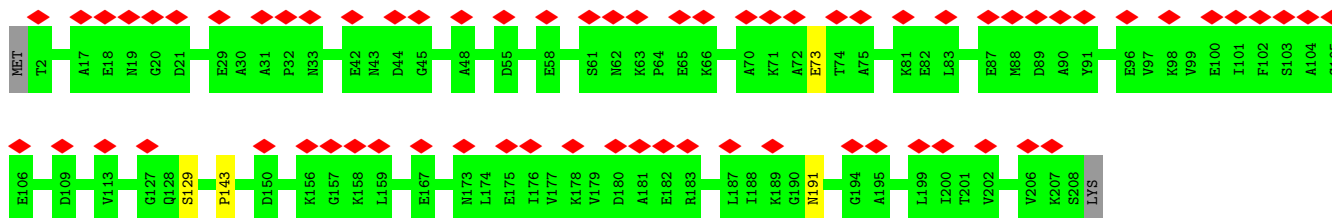


- Molecule 9: 50S ribosomal protein L2

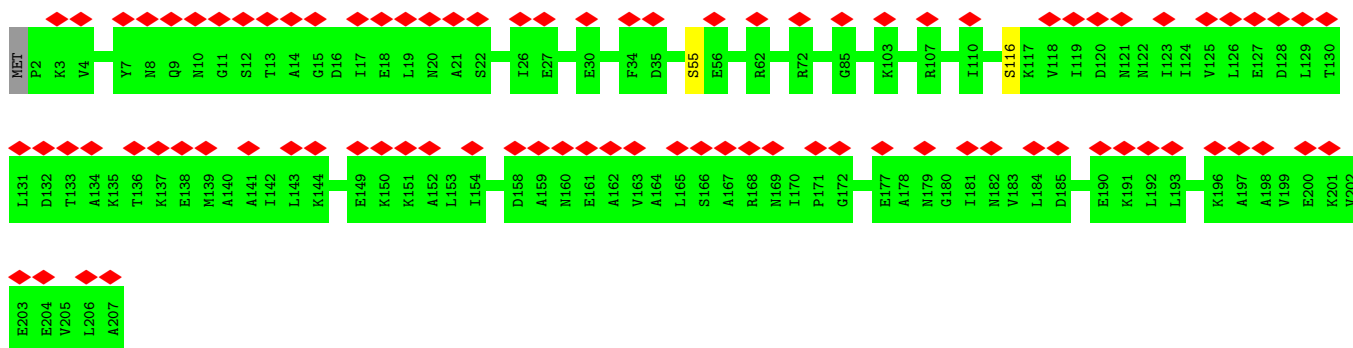
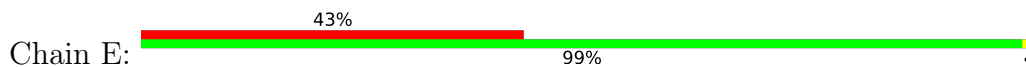




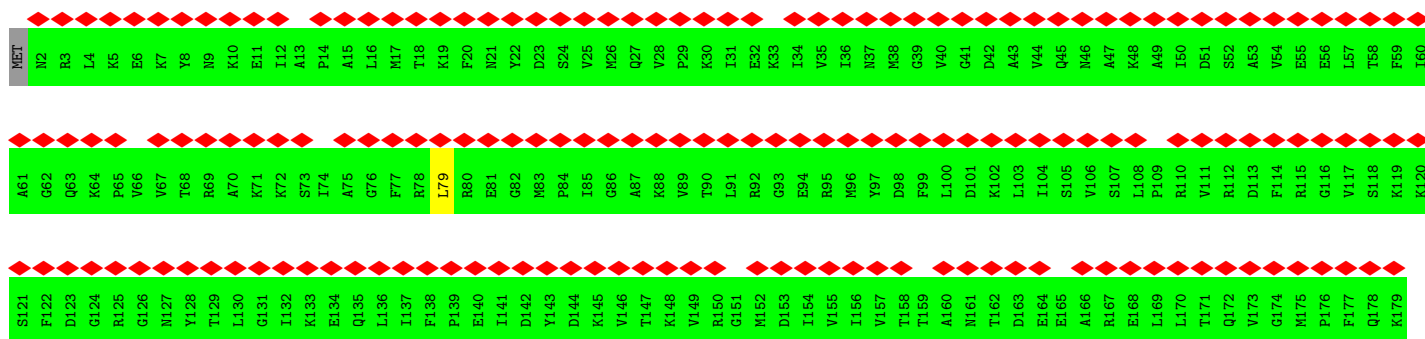
• Molecule 10: 50S ribosomal protein L3



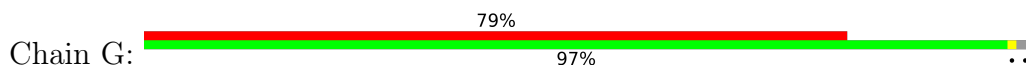
• Molecule 11: 50S ribosomal protein L4

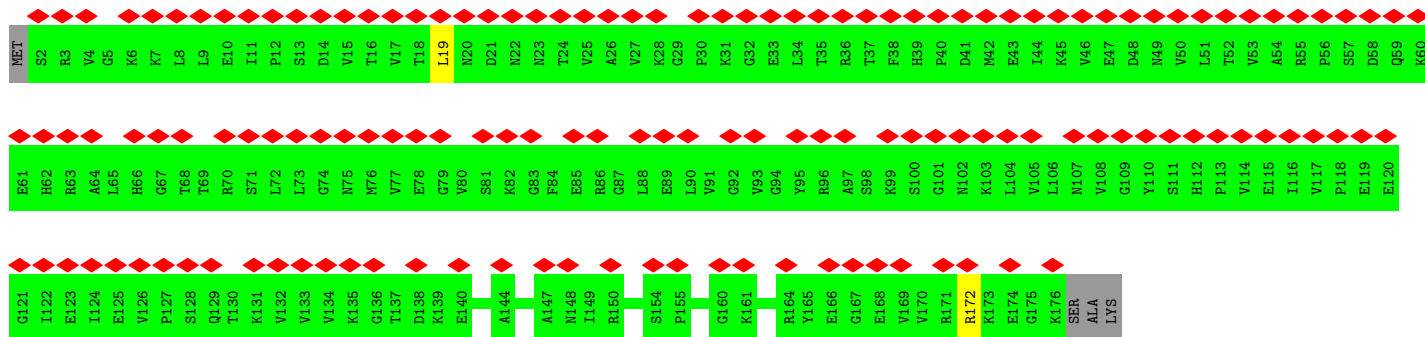


• Molecule 12: 50S ribosomal protein L5

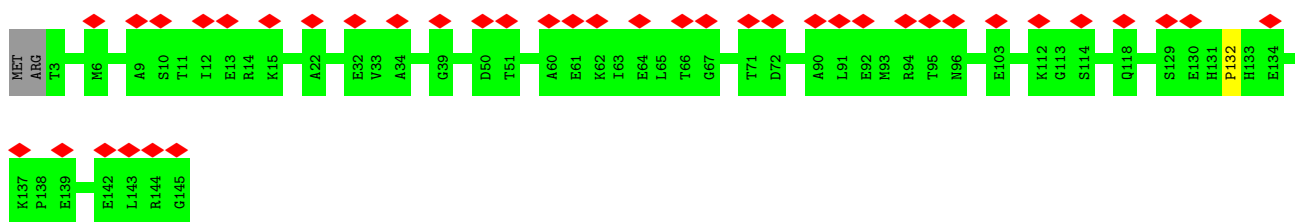


• Molecule 13: Large ribosomal subunit protein uL6

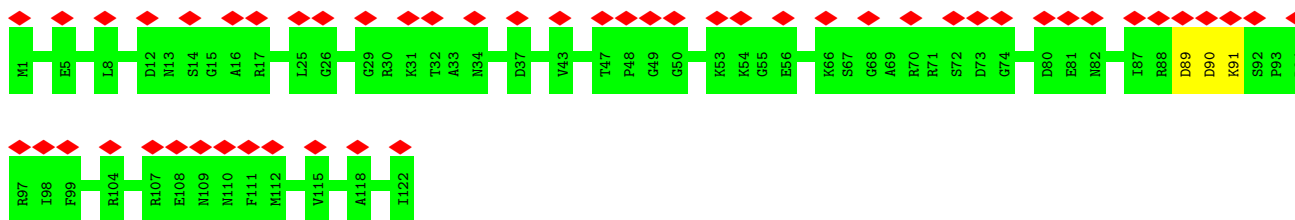
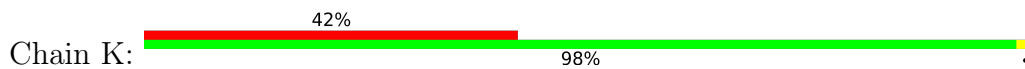




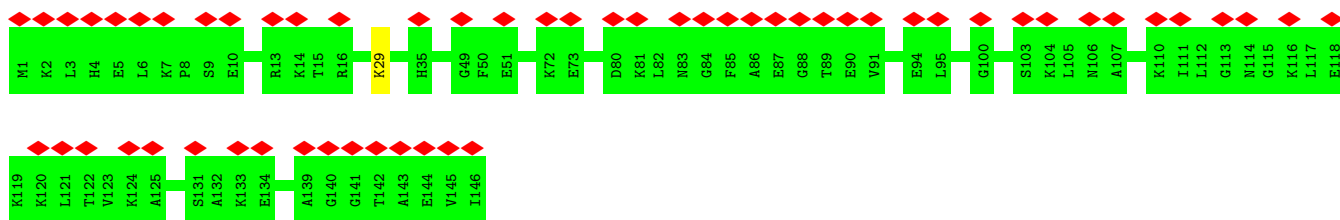
• Molecule 14: 50S ribosomal protein L13



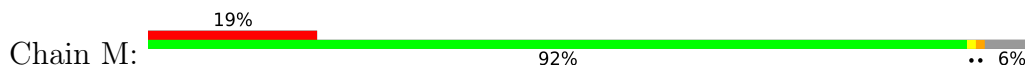
• Molecule 15: 50S ribosomal protein L14

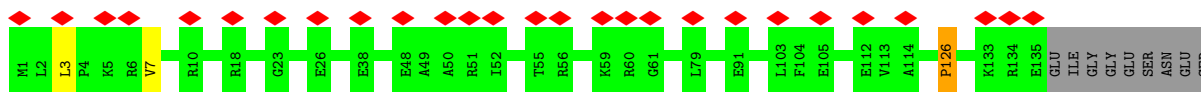


• Molecule 16: 50S ribosomal protein L15

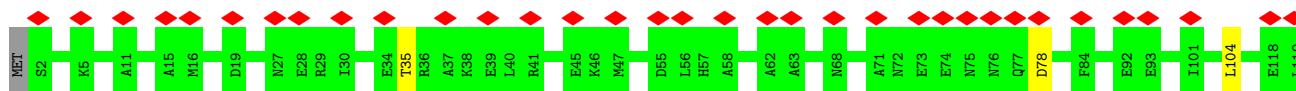


• Molecule 17: 50S ribosomal protein L16

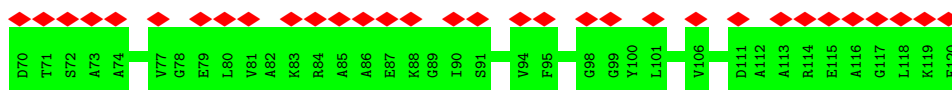
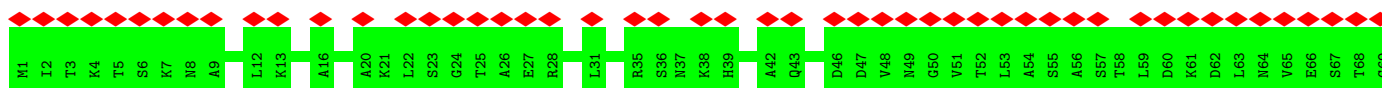




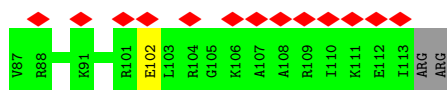
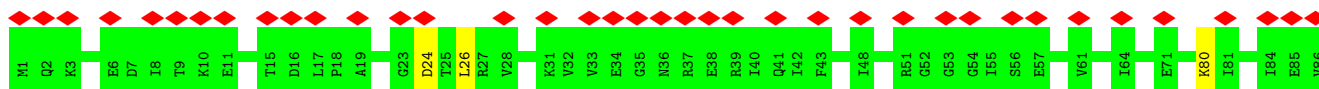
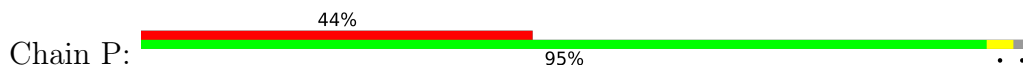
- Molecule 18: 50S ribosomal protein L17



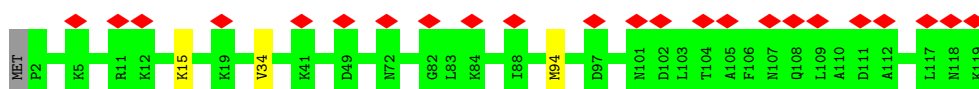
- Molecule 19: 50S ribosomal protein L18



- Molecule 20: 50S ribosomal protein L19

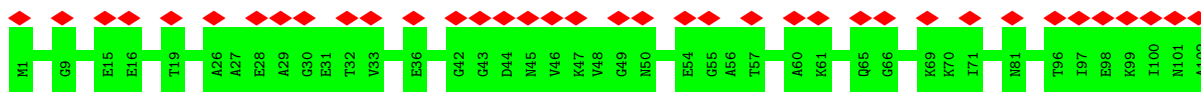


- Molecule 21: Large ribosomal subunit protein bL20

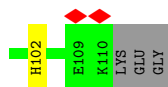
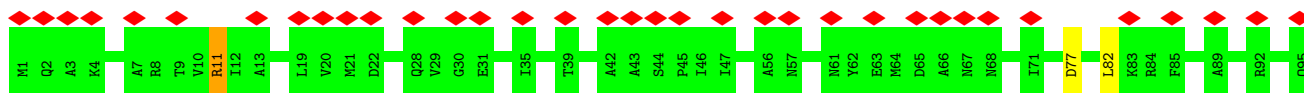
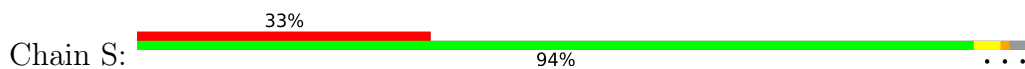


- Molecule 22: 50S ribosomal protein L21

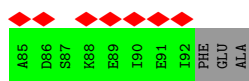
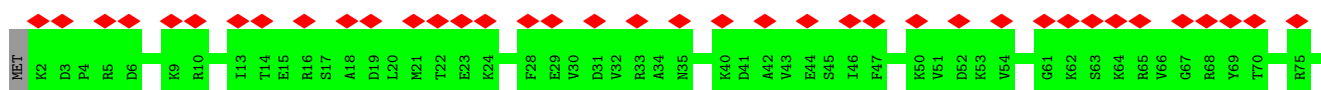




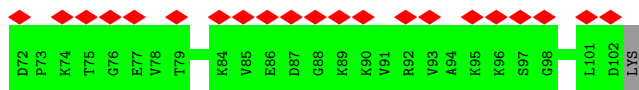
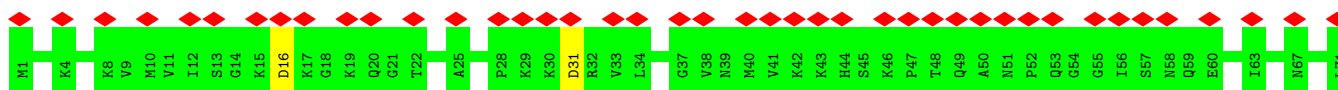
• Molecule 23: 50S ribosomal protein L22



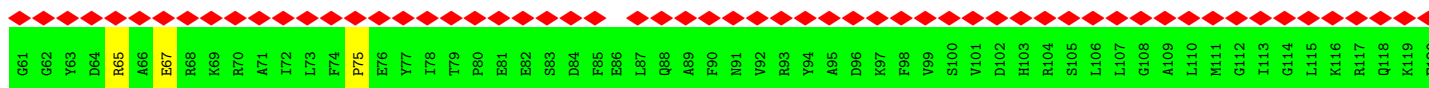
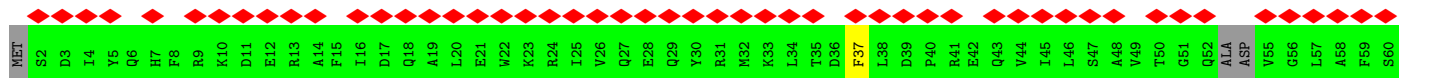
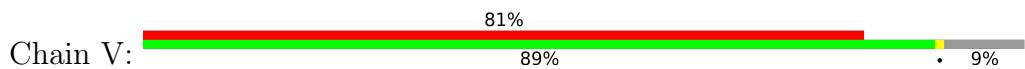
• Molecule 24: Large ribosomal subunit protein uL23

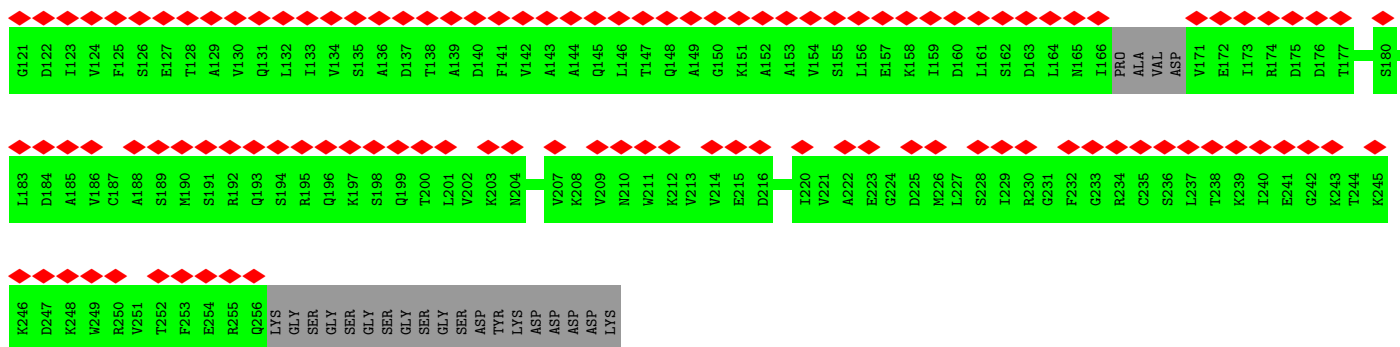


• Molecule 25: 50S ribosomal protein L24

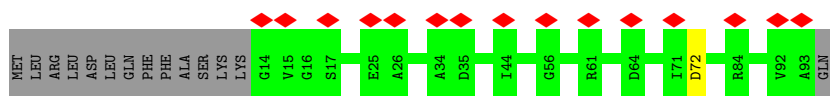
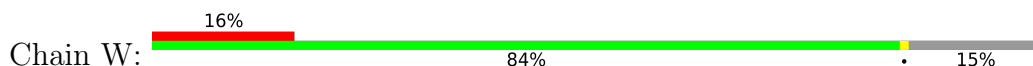


• Molecule 26: Putative RNA-binding protein YlmH

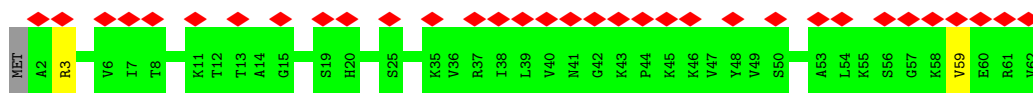




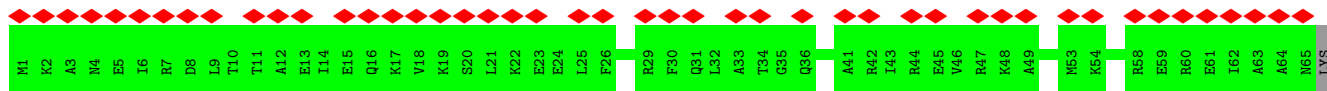
• Molecule 27: Large ribosomal subunit protein bL27



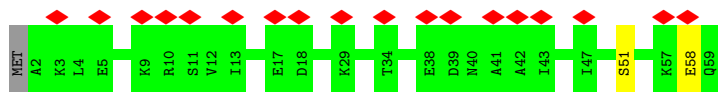
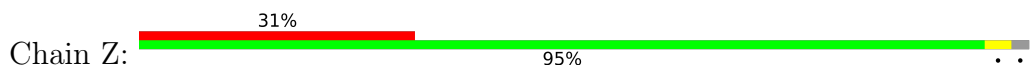
• Molecule 28: 50S ribosomal protein L28



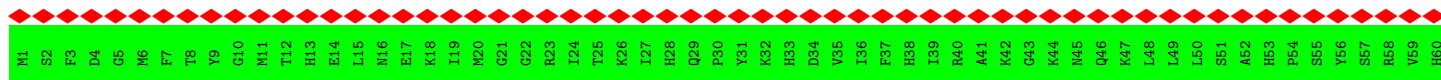
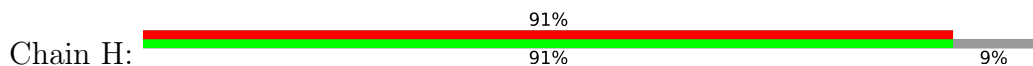
• Molecule 29: 50S ribosomal protein L29



• Molecule 30: Large ribosomal subunit protein uL30



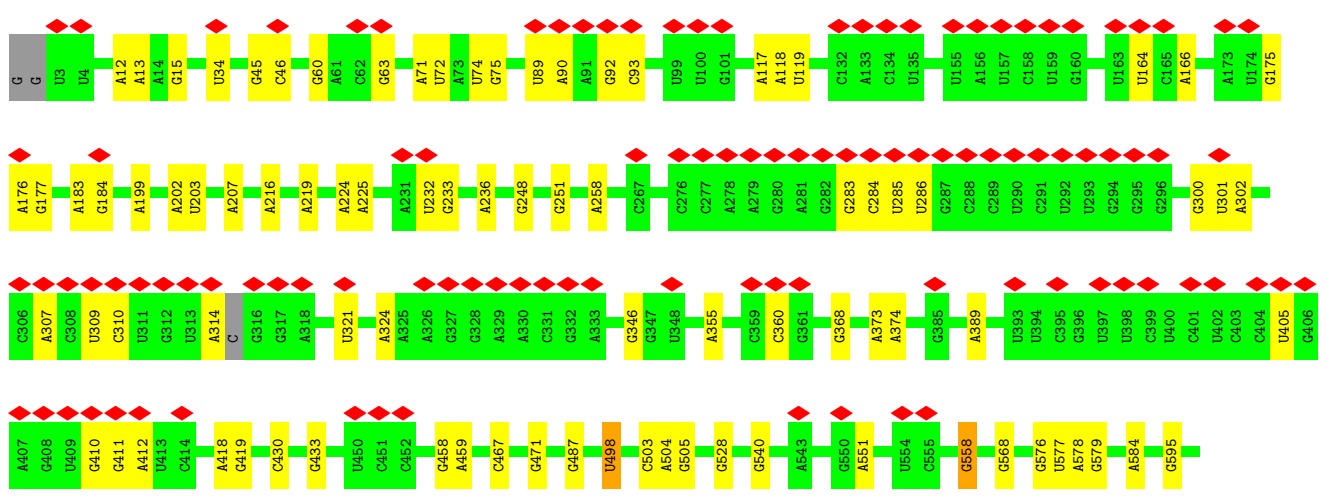
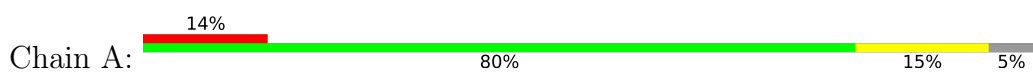
• Molecule 31: Rqc2 homolog RqcH



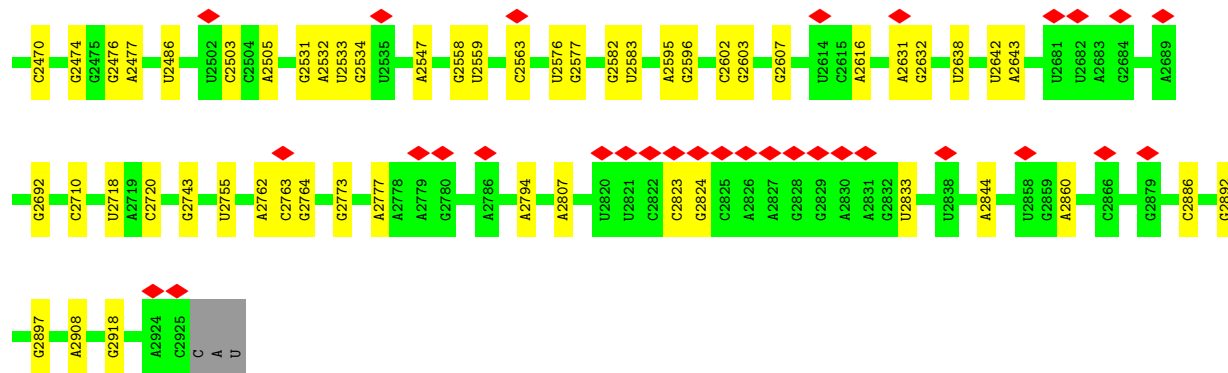




• Molecule 32: 23S rRNA



G599	A600	G607	U615	A616	G617	A618	A619	U620	A630	G631	A647	A658	A659	A673	G680	A683	U691	A692	A699	G	U	A702	G721	A722	A723	A732	U733	U756	C	A	A	G	C	G	U	A	A	A	C	C	A	C	U	U	G	A769	C777	A786										
U794	G795	A811	C812	G822	A829	A830	U831	G832	G833	C834	U837	C838	G852	C859	C872	U873	U874	U875	U892	G906	A913	A922	C923	U924	A925	G926	C927	G928	U929	C	A	C	C	C	U	U	A	C	C	G	G	G	U941	U942	A943	C944	U945	C946	A947	A948								
U949	U950	C951	A952	A957	C961	A962	G963	A964	U972	U973	A974	A987	G988	U989	C990	A991	G992	U1001	U1004	A1005	A1006	G1007	A1020	A1029	G1030	G1031	A1042	U1058	A1059	G1063	G1068	A1072	U1079	G1085	U1086	U1087	G1088	C1089	U1090	U1091	C944	A1092	G1093	A1094	C1095													
A1096	A1097	C1098	C1099	A1100	G1101	G1102	A1103	U1104	G1105	U1106	U1107	G1108	G1109	C1110	U1111	U1112	A1113	G1114	A1115	A1116	G1117	C1118	A1119	G1120	C1121	C1122	A1123	C1124	C1125	A1126	U1127	U1128	U1129	A1130	A1131	A1132	G1133	A1134	G1135	U1136	G1137	C1138	G1139	U1140	A1141	A1142	U1143	A1144	G1146	C1147	C1148	A1149	C1150	U1151	G1152	G1153	U1154	C1155
G1156	A1157	G1158	U1159	G1160	A1161	C1162	U1163	G1164	U1165	A1174	G1177	U1178	A1179	C1180	C1181	G1182	A1188	U1195	U1215	C1216	U	U	G1220	A1221	C1222	C1223	A1260	A1293	G1296	G1311	A1312	A1313	A1314	G1315	A1339	A1340	U1341	G1342	A1360	G1363	C1364	G1367	G1377															
A1388	C1389	U1390	U1391	A1398	A1404	A1417	U1418	A1423	U1429	U1430	U1435	U1448	C1449	C1450	U1451	C1452	A1453	C1454	C1455	A1456	U1457	U1458	U1459	G1460	C1463	A1464	A1465	U1466	A1473	C1474	A1480	G1486	U1489	A1490	U1498	A1499	U1500	U1501	U1505	A1506	U1507	C1508	U1513	C1514														
C1515	A1524	G1525	C1526	U1528	G1529	G1530	U1531	A1532	A1533	A1534	U1535	A1536	G1537	U1538	C1539	A1540	U1543	C1544	C1545	U1548	U1549	C1550	C1551	C1552	A1553	U	A1555	A1556	G1557	U1559	U1560	G1561	A1562	G1563	C1564	U1565	G1566	U1570	C1577	A	A	A	U	U	U	U	U	A	C	U	A	G1589						
U1595	U1602	C1607	A1614	A1617	U1626	A1627	G1628	C1629	G1630	A1631	G1632	U1634	G1635	A1636	G1637	A1638	C1652	A1653	A1654	A1654	A1691	U1692	C1693	G1719	C1728	C1729	U1751	G1752	G1757	U	U1759	G1763	U1764	G1765	G1766	A1767	A1768	G1769	C1770	C1771	C1772	G1773	A1774	G1775	A1776	G1792												
G1793	A1802	U1807	G1810	C1811	A1820	C1829	U1830	A1831	A1845	A1858	C1867	A1877	U1880	G1887	A1888	G1889	C1890	G1891	C1892	G1893	A1900	G1901	G1902	C1903	A1905	A1906	U1909	G1910	C1911	U1915	U1916	C1934	G1935	G1936	C1937	G1938	U	A	U	A	A	A	U	A	G1939													
C	U	A	U	A	A	C1949	G1950	G1951	C1954	G1958	G1959	A1965	A1966	A1967	U1984	C1992	G1993	C1994	A1995	C1996	A1999	A2000	G2001	U2020	G2021	U2022	A2052	A2060	G2061	A2062	U2063	G2064	C2072	C2079	A2080	C2084	G2085	A2089	G2090	G2098	G2099	G2122	A2123	A2124														
U2125	G2126	U2127	U2128	G2129	G2130	U2131	A2132	C	A	G	C	U	U	U	U	U	C	A	U	U	U	U	U	U	U	U	U	A2216	U2217	U2218	G2219	A2220	C2221	C2222	U2223	A2227	G2232	C2233	U2240	A2241	U2242	A2254	G2267	U2268	G2280	A2297	G2308											
G	G	A	G	G	C	A	U	C	U	C	G	A	C	A	C	A	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U							
G2311	C2312	A2316	A2329	A2330	U2331	G2332	G2333	U2334	U2335	G2336	G2337	A2338	A2339	A2340	U2341	C2342	A2343	U2344	G2345	C2346	G2347	C2348	A2349	G2350	A2351	A2356	A2362	C2363	A2364	C2376	C2379	G2382	A2383	G2408	G2412	G2413	C2414	U2431	C2435	C2453	A2454	G2457	G2458	A2459	A2464													



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	3770	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 ( $e^-/\text{\AA}^2$ )	40	Depositor
Minimum defocus (nm)	400	Depositor
Maximum defocus (nm)	900	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.116	Depositor
Minimum map value	-0.075	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.005	Depositor
Recommended contour level	0.0235	Depositor
Map size ( $\text{\AA}$ )	307.2, 307.2, 307.2	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.8, 0.8, 0.8	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: K, 5MU, G7M, PSU, 2MG, OMG, 2MA, H2U

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	a	0.62	0/1648	1.10	3/2564 (0.1%)
1	c	0.62	0/1577	1.03	1/2456 (0.0%)
2	0	0.43	0/425	0.75	0/563
3	1	0.42	0/416	0.83	0/551
4	2	0.51	0/371	0.84	0/483
5	3	0.44	0/519	0.76	0/680
6	4	0.42	0/300	0.77	0/393
7	6	0.40	0/363	0.56	0/485
8	B	0.57	0/2675	1.04	4/4170 (0.1%)
9	C	0.42	0/2131	0.77	0/2859
10	D	0.42	0/1597	0.76	0/2140
11	E	0.36	0/1586	0.70	0/2139
12	F	0.38	0/1424	0.64	0/1910
13	G	0.39	0/1360	0.66	0/1832
14	J	0.45	0/1154	0.72	0/1552
15	K	0.41	0/928	0.76	0/1245
16	L	0.41	0/1094	0.70	0/1457
17	M	0.41	0/1099	0.78	1/1468 (0.1%)
18	N	0.38	0/961	0.73	0/1284
19	O	0.38	0/922	0.71	0/1236
20	P	0.38	0/935	0.73	0/1251
21	Q	0.41	0/962	0.77	1/1277 (0.1%)
22	R	0.39	0/806	0.71	0/1080
23	S	0.39	0/859	0.75	1/1156 (0.1%)
24	T	0.42	0/739	0.78	0/985
25	U	0.38	0/780	0.68	0/1043
26	V	0.39	0/2016	0.67	0/2709
27	W	0.45	0/619	0.77	0/824
28	X	0.39	0/472	0.71	0/627
29	Y	0.35	0/531	0.71	0/707
30	Z	0.38	0/458	0.77	0/613
31	H	0.34	0/2564	0.50	0/3569

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
32	A	0.61	0/66810	1.00	34/104210 (0.0%)
All	All	0.56	0/101101	0.94	45/151518 (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
9	C	0	1
20	P	0	1
23	S	0	1
All	All	0	3

There are no bond length outliers.

All (45) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
32	A	1177	G	O3'-P-O5'	-6.51	91.62	104.00
32	A	207	A	O3'-P-O5'	-6.28	92.08	104.00
1	a	51	C	C2'-C3'-O3'	6.24	123.69	113.70
32	A	795	G	C1'-O4'-C4'	-6.07	105.04	109.90
32	A	2080	A	O3'-P-O5'	-6.01	92.58	104.00
32	A	1398	A	O3'-P-O5'	-5.91	92.77	104.00
32	A	2347	G	O3'-P-O5'	-5.91	92.78	104.00
8	B	86	U	O3'-P-O5'	-5.89	92.81	104.00
32	A	721	G	O3'-P-O5'	-5.83	92.92	104.00
32	A	1417	A	O3'-P-O5'	-5.81	92.95	104.00
1	a	71	C	O3'-P-O5'	-5.71	93.16	104.00
23	S	11	ARG	CG-CD-NE	-5.69	99.85	111.80
32	A	2476	G	OP1-P-O3'	5.68	117.69	105.20
32	A	1810	G	O3'-P-O5'	-5.66	93.25	104.00
32	A	786	A	O3'-P-O5'	-5.65	93.27	104.00
32	A	2090	G	O3'-P-O5'	-5.57	93.41	104.00
32	A	988	G	OP2-P-O3'	5.55	117.42	105.20
32	A	1363	G	O3'-P-O5'	-5.55	93.46	104.00
32	A	2643	A	O3'-P-O5'	-5.52	93.51	104.00
32	A	2710	C	O3'-P-O5'	-5.48	93.58	104.00
32	A	2382	G	O3'-P-O5'	-5.45	93.64	104.00
32	A	1965	A	C1'-O4'-C4'	-5.43	105.56	109.90
8	B	48	G	C2'-C3'-O3'	5.43	122.38	113.70
32	A	2079	C	O3'-P-O5'	-5.42	93.70	104.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
32	A	2616	A	OP2-P-O3'	5.41	117.11	105.20
32	A	872	C	OP1-P-O3'	5.34	116.96	105.20
32	A	2340	A	O3'-P-O5'	-5.33	93.87	104.00
32	A	834	C	O5'-P-OP1	5.32	117.08	110.70
17	M	126	PRO	N-CA-CB	-5.29	96.78	102.60
1	a	53	G	O3'-P-O5'	-5.28	93.98	104.00
1	c	58	A	O3'-P-O5'	-5.21	94.10	104.00
32	A	2844	A	O3'-P-O5'	-5.21	94.10	104.00
8	B	68	C	O3'-P-O5'	-5.18	94.15	104.00
32	A	72	U	C3'-C2'-C1'	-5.18	97.36	101.50
32	A	1807	U	O3'-P-O5'	-5.16	94.20	104.00
32	A	2383	A	O3'-P-O5'	-5.15	94.21	104.00
32	A	498	U	C1'-O4'-C4'	-5.11	105.81	109.90
32	A	723	A	O3'-P-O5'	-5.11	94.30	104.00
21	Q	94	MET	CG-SD-CE	5.10	108.36	100.20
32	A	558	G	O4'-C1'-N9	5.10	112.28	108.20
32	A	1367	G	O3'-P-O5'	-5.09	94.33	104.00
8	B	13	A	C3'-C2'-C1'	-5.05	97.46	101.50
32	A	1934	C	O3'-P-O5'	-5.05	94.41	104.00
32	A	1525	G	C2'-C3'-O3'	5.03	121.74	113.70
32	A	505	G	C3'-C2'-C1'	-5.00	97.50	101.50

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
9	C	80	THR	Peptide
20	P	26	LEU	Peptide
23	S	11	ARG	Sidechain

## 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	
2	0	51/59 (86%)	44 (86%)	6 (12%)	1 (2%)	7	30
3	1	47/49 (96%)	42 (89%)	4 (8%)	1 (2%)	7	30
4	2	42/44 (96%)	40 (95%)	2 (5%)	0	100	100
5	3	62/66 (94%)	56 (90%)	6 (10%)	0	100	100
6	4	35/37 (95%)	33 (94%)	2 (6%)	0	100	100
7	6	44/66 (67%)	44 (100%)	0	0	100	100
9	C	271/277 (98%)	254 (94%)	16 (6%)	1 (0%)	34	67
10	D	205/209 (98%)	187 (91%)	17 (8%)	1 (0%)	29	61
11	E	204/207 (99%)	193 (95%)	11 (5%)	0	100	100
12	F	176/179 (98%)	172 (98%)	4 (2%)	0	100	100
13	G	173/179 (97%)	168 (97%)	5 (3%)	0	100	100
14	J	141/145 (97%)	139 (99%)	2 (1%)	0	100	100
15	K	120/122 (98%)	106 (88%)	13 (11%)	1 (1%)	19	51
16	L	144/146 (99%)	133 (92%)	10 (7%)	1 (1%)	22	55
17	M	133/144 (92%)	120 (90%)	13 (10%)	0	100	100
18	N	117/120 (98%)	108 (92%)	9 (8%)	0	100	100
19	O	118/120 (98%)	113 (96%)	5 (4%)	0	100	100
20	P	111/115 (96%)	104 (94%)	7 (6%)	0	100	100
21	Q	116/119 (98%)	108 (93%)	8 (7%)	0	100	100
22	R	100/102 (98%)	99 (99%)	1 (1%)	0	100	100
23	S	108/113 (96%)	105 (97%)	3 (3%)	0	100	100
24	T	89/95 (94%)	85 (96%)	4 (4%)	0	100	100
25	U	100/103 (97%)	91 (91%)	9 (9%)	0	100	100
26	V	243/275 (88%)	225 (93%)	14 (6%)	4 (2%)	9	34
27	W	78/94 (83%)	73 (94%)	5 (6%)	0	100	100
28	X	59/62 (95%)	54 (92%)	3 (5%)	2 (3%)	3	21
29	Y	63/66 (96%)	62 (98%)	1 (2%)	0	100	100
30	Z	56/59 (95%)	53 (95%)	3 (5%)	0	100	100
31	H	512/570 (90%)	502 (98%)	10 (2%)	0	100	100
All	All	3718/3942 (94%)	3513 (94%)	193 (5%)	12 (0%)	44	72



All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
9	C	222	GLY
10	D	73	GLU
26	V	37	PHE
26	V	65	ARG
2	0	32	SER
26	V	67	GLU
3	1	11	GLU
16	L	29	LYS
28	X	3	ARG
15	K	91	LYS
26	V	75	PRO
28	X	59	VAL

### 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	
2	0	47/53 (89%)	47 (100%)	0	100	100
3	1	47/47 (100%)	46 (98%)	1 (2%)	53	76
4	2	39/39 (100%)	39 (100%)	0	100	100
5	3	54/56 (96%)	53 (98%)	1 (2%)	57	78
6	4	35/35 (100%)	35 (100%)	0	100	100
7	6	39/55 (71%)	38 (97%)	1 (3%)	46	72
9	C	221/225 (98%)	213 (96%)	8 (4%)	35	63
10	D	168/170 (99%)	165 (98%)	3 (2%)	59	79
11	E	169/170 (99%)	167 (99%)	2 (1%)	71	85
12	F	153/154 (99%)	152 (99%)	1 (1%)	84	92
13	G	148/151 (98%)	146 (99%)	2 (1%)	67	83
14	J	121/123 (98%)	120 (99%)	1 (1%)	81	91
15	K	101/101 (100%)	99 (98%)	2 (2%)	55	77
16	L	110/110 (100%)	110 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
17	M	109/116 (94%)	106 (97%)	3 (3%)	43	70
18	N	99/100 (99%)	96 (97%)	3 (3%)	41	68
19	O	93/93 (100%)	93 (100%)	0	100	100
20	P	98/100 (98%)	95 (97%)	3 (3%)	40	68
21	Q	97/98 (99%)	95 (98%)	2 (2%)	53	76
22	R	84/84 (100%)	84 (100%)	0	100	100
23	S	91/93 (98%)	88 (97%)	3 (3%)	38	66
24	T	82/85 (96%)	82 (100%)	0	100	100
25	U	86/87 (99%)	84 (98%)	2 (2%)	50	74
26	V	215/234 (92%)	215 (100%)	0	100	100
27	W	61/74 (82%)	60 (98%)	1 (2%)	62	81
28	X	49/50 (98%)	49 (100%)	0	100	100
29	Y	56/57 (98%)	56 (100%)	0	100	100
30	Z	52/53 (98%)	50 (96%)	2 (4%)	33	61
All	All	2724/2813 (97%)	2683 (98%)	41 (2%)	66	82

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	1	43	THR
5	3	31	HIS
7	6	26	SER
9	C	8	PRO
9	C	10	SER
9	C	18	THR
9	C	61	GLN
9	C	87	ARG
9	C	199	GLN
9	C	211	SER
9	C	214	LYS
10	D	129	SER
10	D	143	PRO
10	D	191	ASN
11	E	55	SER
11	E	116	SER
12	F	79	LEU
13	G	19	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
13	G	172	ARG
14	J	132	PRO
15	K	89	ASP
15	K	90	ASP
17	M	3	LEU
17	M	7	VAL
17	M	126	PRO
18	N	35	THR
18	N	78	ASP
18	N	104	LEU
20	P	24	ASP
20	P	80	LYS
20	P	102	GLU
21	Q	15	LYS
21	Q	34	VAL
23	S	77	ASP
23	S	82	LEU
23	S	102	HIS
25	U	16	ASP
25	U	31	ASP
27	W	72	ASP
30	Z	51	SER
30	Z	58	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	0	40	HIS
5	3	31	HIS
5	3	35	ASN
5	3	60	GLN
9	C	194	GLN
10	D	126	HIS
11	E	49	HIS
14	J	136	GLN
15	K	3	GLN
15	K	4	GLN
15	K	110	ASN
23	S	73	GLN
24	T	58	ASN
25	U	99	GLN
26	V	7	HIS

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Mol	Chain	Res	Type
26	V	52	GLN
26	V	204	ASN
28	X	17	ASN
28	X	23	ASN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	a	66/76 (86%)	29 (43%)	0
1	c	64/76 (84%)	24 (37%)	0
32	A	2778/2928 (94%)	372 (13%)	53 (1%)
8	B	111/112 (99%)	24 (21%)	5 (4%)
All	All	3019/3192 (94%)	449 (14%)	58 (1%)

All (449) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	c	3	G
1	c	6	C
1	c	9	A
1	c	16	C
1	c	17	U
1	c	18	G
1	c	19	G
1	c	20	G
1	c	21	A
1	c	28	C
1	c	41	A
1	c	44	A
1	c	45	G
1	c	46	G
1	c	48	C
1	c	53	G
1	c	55	U
1	c	57	G
1	c	61	C
1	c	65	U
1	c	66	A
1	c	67	G
1	c	70	U
1	c	72	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
8	B	10	G
8	B	11	A
8	B	12	U
8	B	13	A
8	B	19	G
8	B	23	U
8	B	32	U
8	B	33	U
8	B	38	U
8	B	40	C
8	B	43	A
8	B	48	G
8	B	49	G
8	B	50	A
8	B	53	U
8	B	54	U
8	B	55	A
8	B	87	U
8	B	88	C
8	B	95	U
8	B	97	A
8	B	103	G
8	B	107	G
8	B	108	C
1	a	3	G
1	a	6	C
1	a	7	U
1	a	8	U
1	a	9	A
1	a	20	G
1	a	22	G
1	a	23	A
1	a	28	C
1	a	31	C
1	a	32	U
1	a	39	G
1	a	40	C
1	a	41	A
1	a	44	A
1	a	47	U
1	a	48	C
1	a	49	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	a	52	G
1	a	53	G
1	a	54	U
1	a	57	G
1	a	61	C
1	a	62	C
1	a	65	U
1	a	66	A
1	a	67	G
1	a	72	C
1	a	76	A
32	A	12	A
32	A	13	A
32	A	15	G
32	A	34	U
32	A	45	G
32	A	46	C
32	A	60	G
32	A	63	G
32	A	71	A
32	A	74	U
32	A	75	G
32	A	89	U
32	A	90	A
32	A	93	C
32	A	117	A
32	A	118	A
32	A	119	U
32	A	164	U
32	A	166	A
32	A	175	G
32	A	176	A
32	A	177	G
32	A	183	A
32	A	184	G
32	A	199	A
32	A	202	A
32	A	203	U
32	A	216	A
32	A	219	A
32	A	224	A
32	A	225	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	232	U
32	A	233	G
32	A	236	A
32	A	248	G
32	A	251	G
32	A	258	A
32	A	283	G
32	A	284	C
32	A	285	U
32	A	286	U
32	A	300	G
32	A	301	U
32	A	302	A
32	A	307	A
32	A	309	U
32	A	310	C
32	A	314	A
32	A	321	U
32	A	324	A
32	A	346	G
32	A	355	A
32	A	360	C
32	A	368	G
32	A	373	A
32	A	374	A
32	A	405	U
32	A	410	G
32	A	411	G
32	A	412	A
32	A	418	A
32	A	419	G
32	A	430	C
32	A	433	G
32	A	458	G
32	A	459	A
32	A	467	C
32	A	471	G
32	A	487	G
32	A	498	U
32	A	503	C
32	A	504	A
32	A	528	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	540	G
32	A	551	A
32	A	568	G
32	A	576	G
32	A	577	U
32	A	578	A
32	A	579	G
32	A	584	A
32	A	595	G
32	A	600	A
32	A	607	G
32	A	617	G
32	A	619	A
32	A	630	A
32	A	631	G
32	A	647	A
32	A	658	A
32	A	659	A
32	A	673	A
32	A	680	G
32	A	683	A
32	A	691	U
32	A	692	A
32	A	733	U
32	A	777	C
32	A	794	5MU
32	A	811	A
32	A	812	G
32	A	822	G
32	A	829	A
32	A	831	U
32	A	832	G
32	A	837	U
32	A	838	C
32	A	852	G
32	A	859	C
32	A	874	U
32	A	875	U
32	A	892	U
32	A	906	G
32	A	913	A
32	A	943	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	944	C
32	A	947	A
32	A	952	A
32	A	957	A
32	A	961	C
32	A	962	C
32	A	964	A
32	A	973	G
32	A	987	A
32	A	991	A
32	A	992	G
32	A	1004	U
32	A	1005	A
32	A	1007	G
32	A	1020	A
32	A	1029	A
32	A	1030	G
32	A	1031	C
32	A	1042	A
32	A	1058	U
32	A	1059	A
32	A	1068	G
32	A	1072	A
32	A	1079	U
32	A	1091	U
32	A	1092	A
32	A	1093	G
32	A	1096	A
32	A	1102	G
32	A	1104	U
32	A	1105	G
32	A	1107	U
32	A	1108	G
32	A	1110	C
32	A	1112	U
32	A	1113	A
32	A	1114	G
32	A	1115	A
32	A	1116	A
32	A	1119	A
32	A	1123	A
32	A	1124	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	1127	U
32	A	1128	U
32	A	1129	U
32	A	1131	A
32	A	1135	G
32	A	1139	G
32	A	1140	U
32	A	1141	A
32	A	1142	A
32	A	1143	U
32	A	1144	A
32	A	1157	A
32	A	1158	G
32	A	1159	U
32	A	1160	G
32	A	1174	A
32	A	1178	U
32	A	1179	A
32	A	1180	C
32	A	1181	C
32	A	1182	G
32	A	1188	A
32	A	1260	A
32	A	1293	A
32	A	1296	G
32	A	1311	G
32	A	1312	A
32	A	1315	G
32	A	1339	A
32	A	1340	A
32	A	1341	U
32	A	1342	G
32	A	1360	A
32	A	1364	C
32	A	1377	G
32	A	1388	A
32	A	1389	C
32	A	1391	U
32	A	1404	A
32	A	1418	U
32	A	1423	A
32	A	1435	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	1450	C
32	A	1457	U
32	A	1458	U
32	A	1459	U
32	A	1460	G
32	A	1465	A
32	A	1473	A
32	A	1474	C
32	A	1489	U
32	A	1490	A
32	A	1499	A
32	A	1500	U
32	A	1505	U
32	A	1507	U
32	A	1508	C
32	A	1514	C
32	A	1525	G
32	A	1526	G
32	A	1527	C
32	A	1528	U
32	A	1529	G
32	A	1531	G
32	A	1536	A
32	A	1540	A
32	A	1544	C
32	A	1556	A
32	A	1557	G
32	A	1558	G
32	A	1559	C
32	A	1560	U
32	A	1563	G
32	A	1566	G
32	A	1595	U
32	A	1607	C
32	A	1614	A
32	A	1617	A
32	A	1626	U
32	A	1631	A
32	A	1632	G
32	A	1637	G
32	A	1653	A
32	A	1654	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	1691	A
32	A	1693	C
32	A	1719	G
32	A	1752	G
32	A	1757	G
32	A	1768	A
32	A	1776	A
32	A	1792	G
32	A	1793	G
32	A	1802	A
32	A	1811	C
32	A	1820	A
32	A	1829	C
32	A	1830	G
32	A	1831	A
32	A	1845	A
32	A	1858	A
32	A	1867	C
32	A	1877	A
32	A	1899	U
32	A	1900	A
32	A	1901	A
32	A	1911	C
32	A	1935	G
32	A	1936	G
32	A	1958	G
32	A	1959	G
32	A	1966	A
32	A	1967	A
32	A	1984	U
32	A	1992	C
32	A	1994	C
32	A	1996	C
32	A	1999	A
32	A	2000	A
32	A	2001	G
32	A	2020	U
32	A	2022	U
32	A	2052	A
32	A	2060	A
32	A	2061	G
32	A	2062	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	2072	C
32	A	2084	C
32	A	2085	G
32	A	2089	A
32	A	2090	G
32	A	2098	G
32	A	2099	G
32	A	2122	G
32	A	2124	A
32	A	2128	U
32	A	2132	A
32	A	2227	A
32	A	2232	G
32	A	2233	C
32	A	2240	U
32	A	2241	A
32	A	2254	A
32	A	2267	G
32	A	2268	G
32	A	2297	A
32	A	2308	G
32	A	2312	C
32	A	2316	A
32	A	2334	U
32	A	2338	A
32	A	2341	U
32	A	2342	C
32	A	2348	C
32	A	2349	A
32	A	2350	G
32	A	2351	A
32	A	2356	A
32	A	2362	A
32	A	2363	C
32	A	2364	A
32	A	2376	C
32	A	2379	C
32	A	2408	G
32	A	2412	G
32	A	2414	C
32	A	2431	U
32	A	2435	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	2453	C
32	A	2454	A
32	A	2457	G
32	A	2458	G
32	A	2459	A
32	A	2464	A
32	A	2470	C
32	A	2477	A
32	A	2503	C
32	A	2505	A
32	A	2531	G
32	A	2534	G
32	A	2547	A
32	A	2558	G
32	A	2559	U
32	A	2563	C
32	A	2577	G
32	A	2583	U
32	A	2595	A
32	A	2596	G
32	A	2602	C
32	A	2607	G
32	A	2631	A
32	A	2632	G
32	A	2638	U
32	A	2642	U
32	A	2692	G
32	A	2718	U
32	A	2720	C
32	A	2743	G
32	A	2755	U
32	A	2762	A
32	A	2763	C
32	A	2764	G
32	A	2773	G
32	A	2777	A
32	A	2794	A
32	A	2807	A
32	A	2823	C
32	A	2824	G
32	A	2833	U
32	A	2860	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
32	A	2886	C
32	A	2892	G
32	A	2897	G
32	A	2908	A
32	A	2918	G

All (58) RNA pucker outliers are listed below:

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
8	B	32	U
8	B	37	A
8	B	48	G
8	B	49	G
8	B	107	G
32	A	12	A
32	A	92	G
32	A	118	A
32	A	175	G
32	A	183	A
32	A	202	A
32	A	224	A
32	A	389	A
32	A	558	G
32	A	599	G
32	A	615	U
32	A	691	U
32	A	702	A
32	A	732	A
32	A	811	A
32	A	831	U
32	A	837	U
32	A	913	A
32	A	990	C
32	A	1004	U
32	A	1030	G
32	A	1111	U
32	A	1179	A
32	A	1339	A
32	A	1364	C
32	A	1507	U
32	A	1525	G
32	A	1527	C

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Mol	Chain	Res	Type
32	A	1530	G
32	A	1535	U
32	A	1536	A
32	A	1543	U
32	A	1558	G
32	A	1565	U
32	A	1602	U
32	A	1631	A
32	A	1652	C
32	A	1653	A
32	A	1692	U
32	A	1751	U
32	A	2064	G
32	A	2127	U
32	A	2311	G
32	A	2316	A
32	A	2348	C
32	A	2349	A
32	A	2362	A
32	A	2459	A
32	A	2558	G
32	A	2576	U
32	A	2631	A
32	A	2823	C
32	A	2892	G

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

12 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	$\# Z  > 2$
32	H2U	A	2478	32	18,21,22	0.66	0	21,30,33	0.74	0
32	G7M	A	2603	32	20,26,27	0.99	1 (5%)	17,39,42	0.44	0
32	5MU	A	1968	32	19,22,23	0.49	0	28,32,35	0.47	0



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
32	PSU	A	1001	32	18,21,22	0.83	1 (5%)	22,30,33	0.72	0
32	PSU	A	2486	32	18,21,22	0.97	1 (5%)	22,30,33	0.67	0
32	2MA	A	2532	33,32	17,25,26	1.06	2 (11%)	17,37,40	0.98	1 (5%)
32	5MU	A	794	32	19,22,23	0.28	0	28,32,35	0.33	0
32	PSU	A	2533	33,32	18,21,22	1.00	1 (5%)	22,30,33	0.75	0
32	OMG	A	2280	33,1,32	18,26,27	1.14	3 (16%)	19,38,41	0.80	0
32	5MU	A	620	33,32	19,22,23	0.36	0	28,32,35	0.66	2 (7%)
32	2MG	A	2474	32	18,26,27	1.17	3 (16%)	16,38,41	0.77	0
32	OMG	A	2582	32	18,26,27	1.04	3 (16%)	19,38,41	0.69	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
32	H2U	A	2478	32	-	0/7/38/39	0/2/2/2
32	G7M	A	2603	32	-	0/3/25/26	0/3/3/3
32	5MU	A	1968	32	-	0/7/25/26	0/2/2/2
32	PSU	A	1001	32	-	0/7/25/26	0/2/2/2
32	PSU	A	2486	32	-	0/7/25/26	0/2/2/2
32	2MA	A	2532	33,32	-	2/3/25/26	0/3/3/3
32	5MU	A	794	32	-	0/7/25/26	0/2/2/2
32	PSU	A	2533	33,32	-	0/7/25/26	0/2/2/2
32	OMG	A	2280	33,1,32	-	0/5/27/28	0/3/3/3
32	5MU	A	620	33,32	-	0/7/25/26	0/2/2/2
32	2MG	A	2474	32	-	0/5/27/28	0/3/3/3
32	OMG	A	2582	32	-	0/5/27/28	0/3/3/3

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
32	A	2533	PSU	C6-C5	3.82	1.39	1.35
32	A	2486	PSU	C6-C5	3.74	1.39	1.35
32	A	2603	G7M	C8-N9	3.13	1.38	1.33
32	A	1001	PSU	C6-C5	3.11	1.38	1.35
32	A	2280	OMG	C5-C6	-3.04	1.41	1.47
32	A	2474	2MG	C5-C6	-2.77	1.41	1.47
32	A	2532	2MA	C2-N3	2.72	1.37	1.31
32	A	2582	OMG	C5-C6	-2.72	1.41	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
32	A	2280	OMG	C8-N7	-2.42	1.30	1.35
32	A	2474	2MG	C5-C4	-2.40	1.37	1.43
32	A	2532	2MA	C5-C4	-2.30	1.37	1.43
32	A	2474	2MG	C8-N7	-2.17	1.31	1.35
32	A	2582	OMG	C8-N7	-2.13	1.31	1.35
32	A	2280	OMG	C5-C4	-2.09	1.37	1.43
32	A	2582	OMG	C5-C4	-2.01	1.38	1.43

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
32	A	2532	2MA	CM2-C2-N1	2.84	122.54	116.23
32	A	620	5MU	O3'-C3'-C4'	-2.33	104.30	111.05
32	A	620	5MU	O3'-C3'-C2'	2.05	118.44	111.82

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
32	A	2532	2MA	C4'-C5'-O5'-P
32	A	2532	2MA	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 15 ligands modelled in this entry, 15 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](#)

There are no chain breaks in this entry.

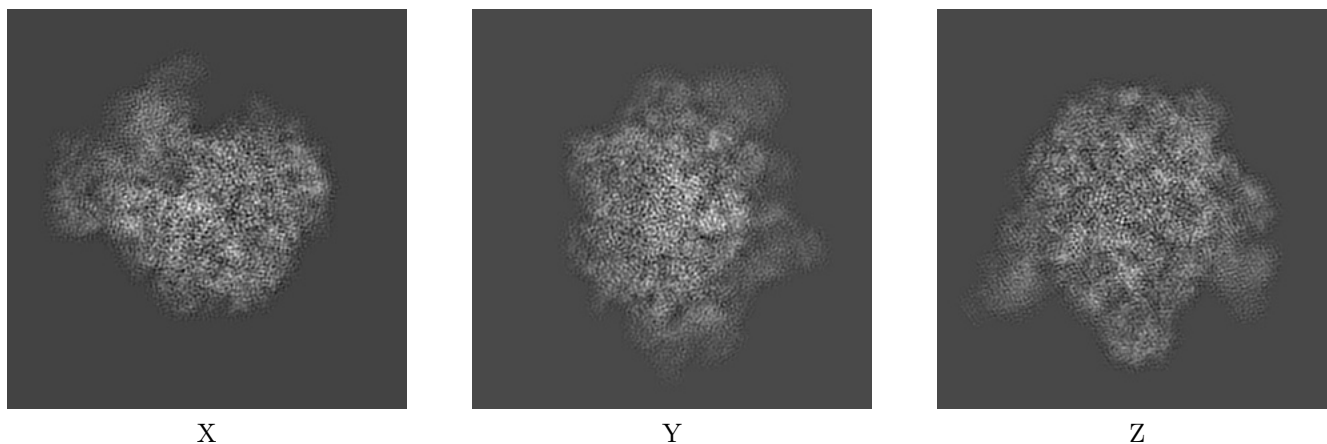
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-19641. These allow visual inspection of the internal detail of the map and identification of artifacts.

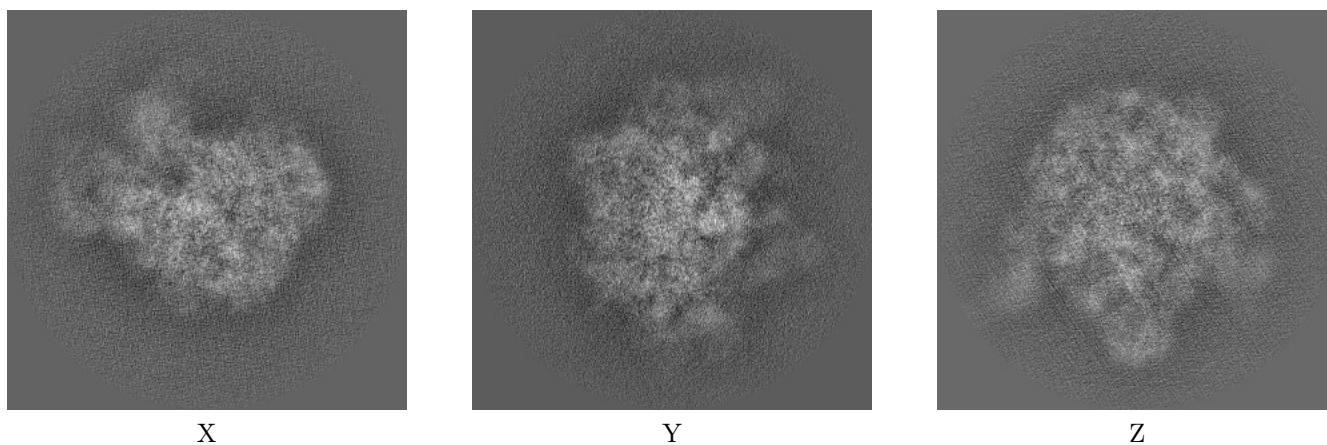
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

#### 6.1.1 Primary map



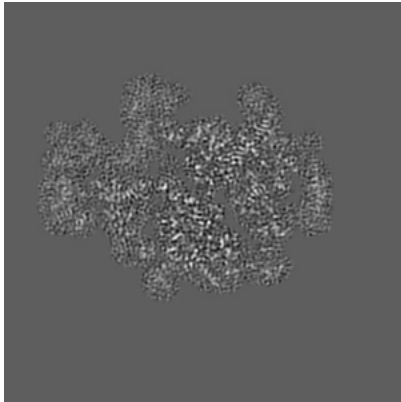
#### 6.1.2 Raw map



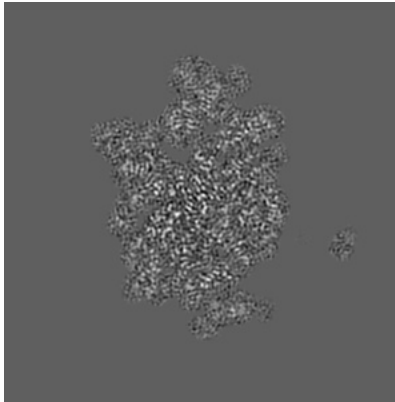
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

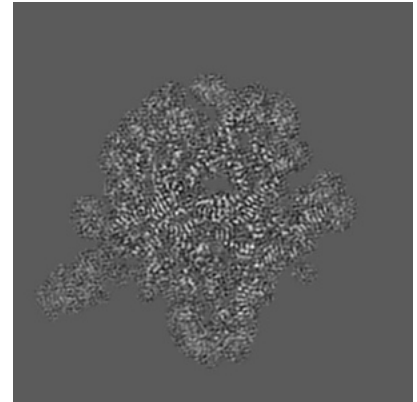
### 6.2.1 Primary map



X Index: 192

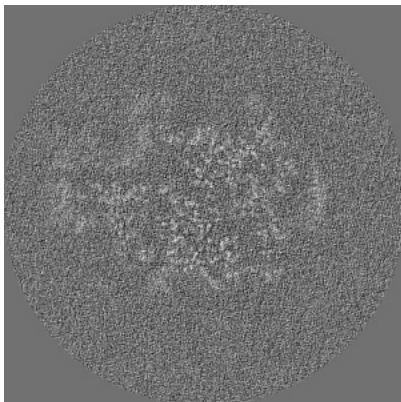


Y Index: 192

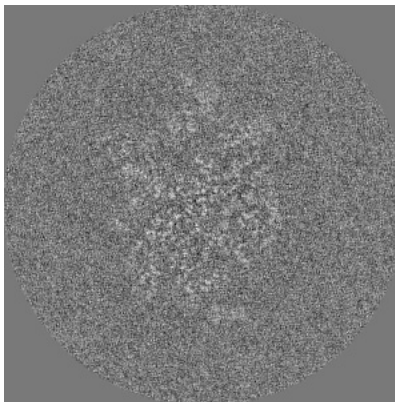


Z Index: 192

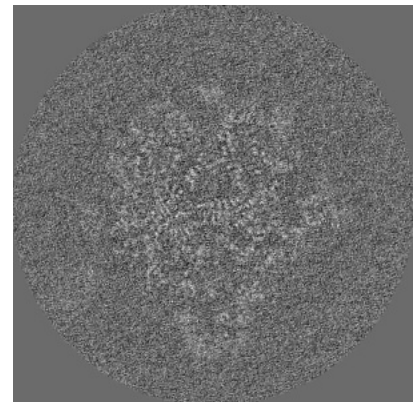
### 6.2.2 Raw map



X Index: 192



Y Index: 192

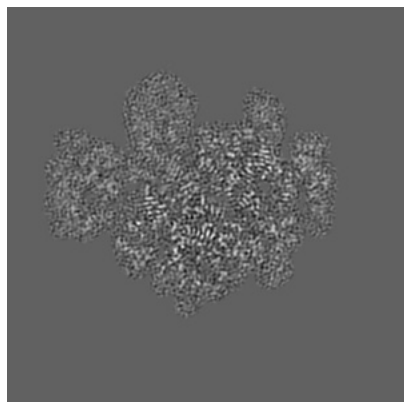


Z Index: 192

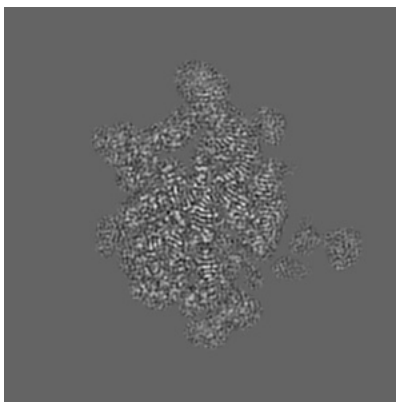
The images above show central slices of the map in three orthogonal directions.

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

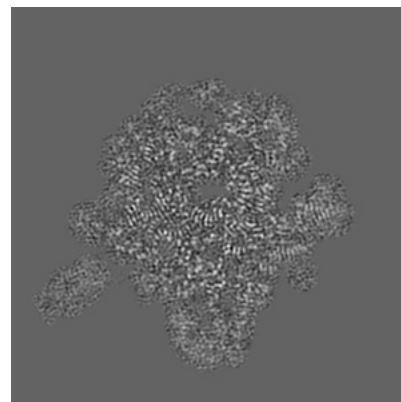
### 6.3.1 Primary map



X Index: 180

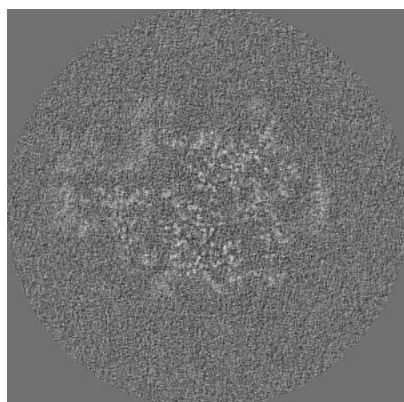


Y Index: 184

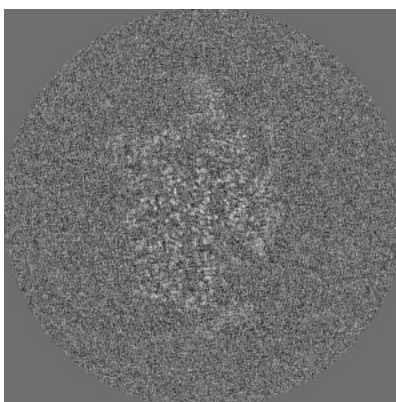


Z Index: 195

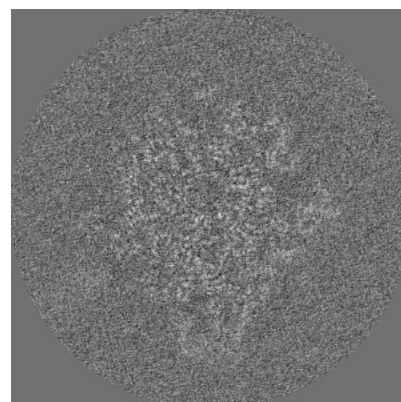
### 6.3.2 Raw map



X Index: 192



Y Index: 184

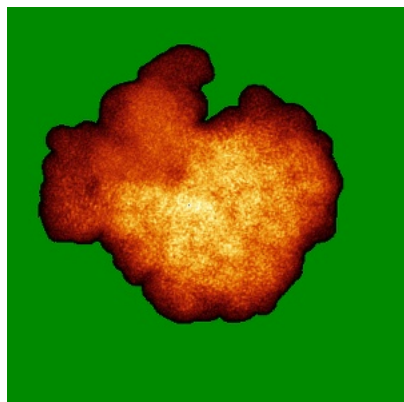


Z Index: 196

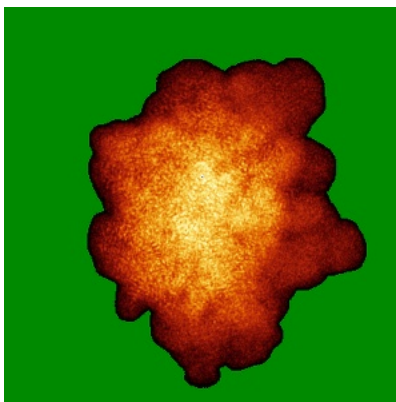
The images above show the largest variance slices of the map in three orthogonal directions.

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

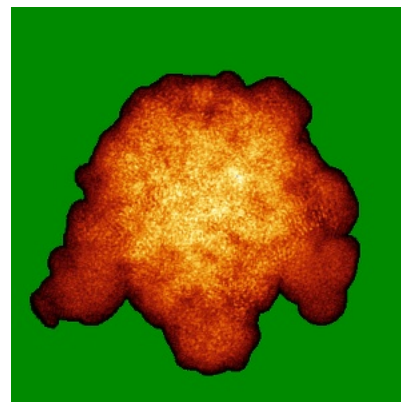
### 6.4.1 Primary map



X

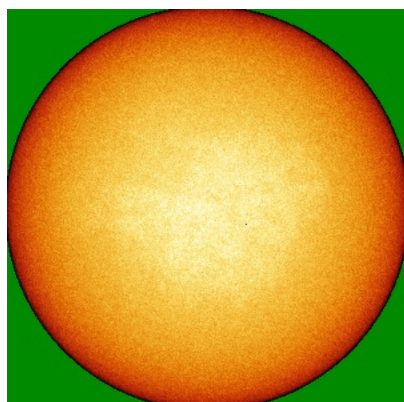


Y

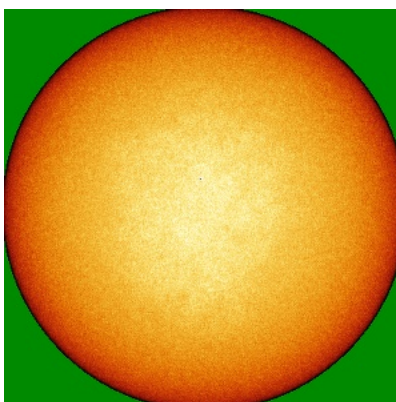


Z

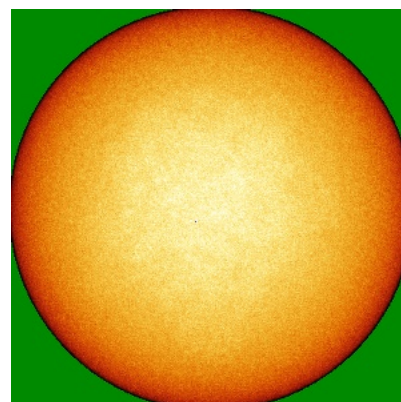
### 6.4.2 Raw map



X



Y

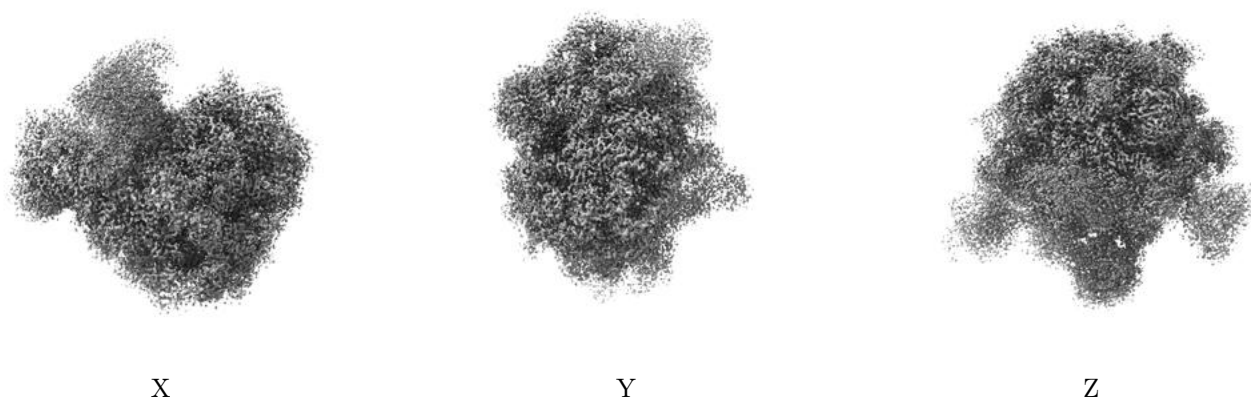


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

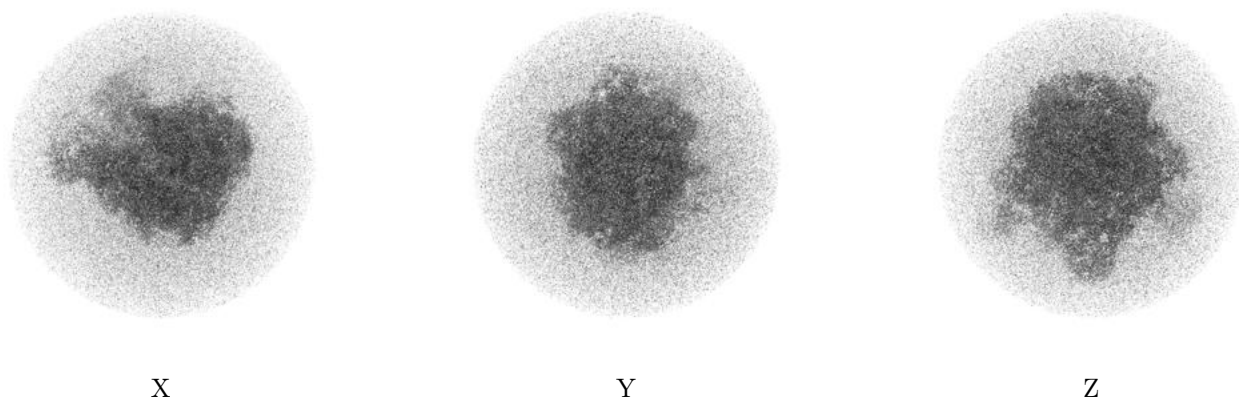
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0235. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.



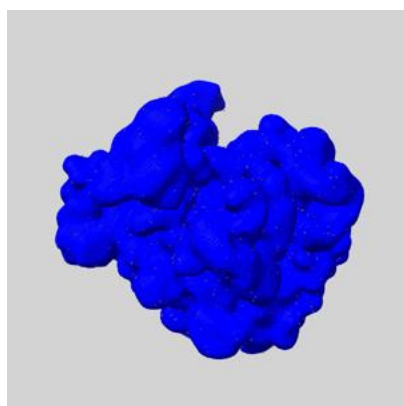
## 6.6 Mask visualisation [i](#)

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

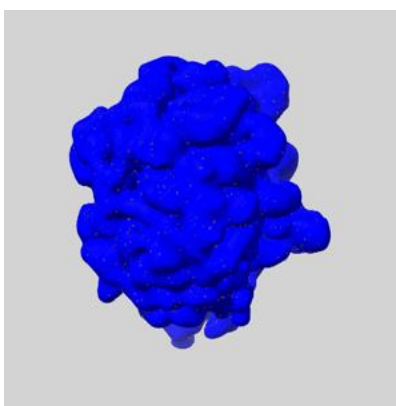
A mask typically either:

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

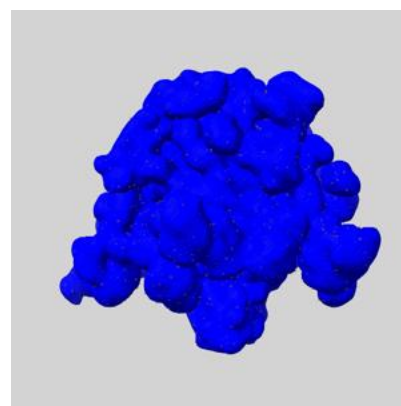
### 6.6.1 emd\_19641\_msk\_1.map [i](#)



X



Y

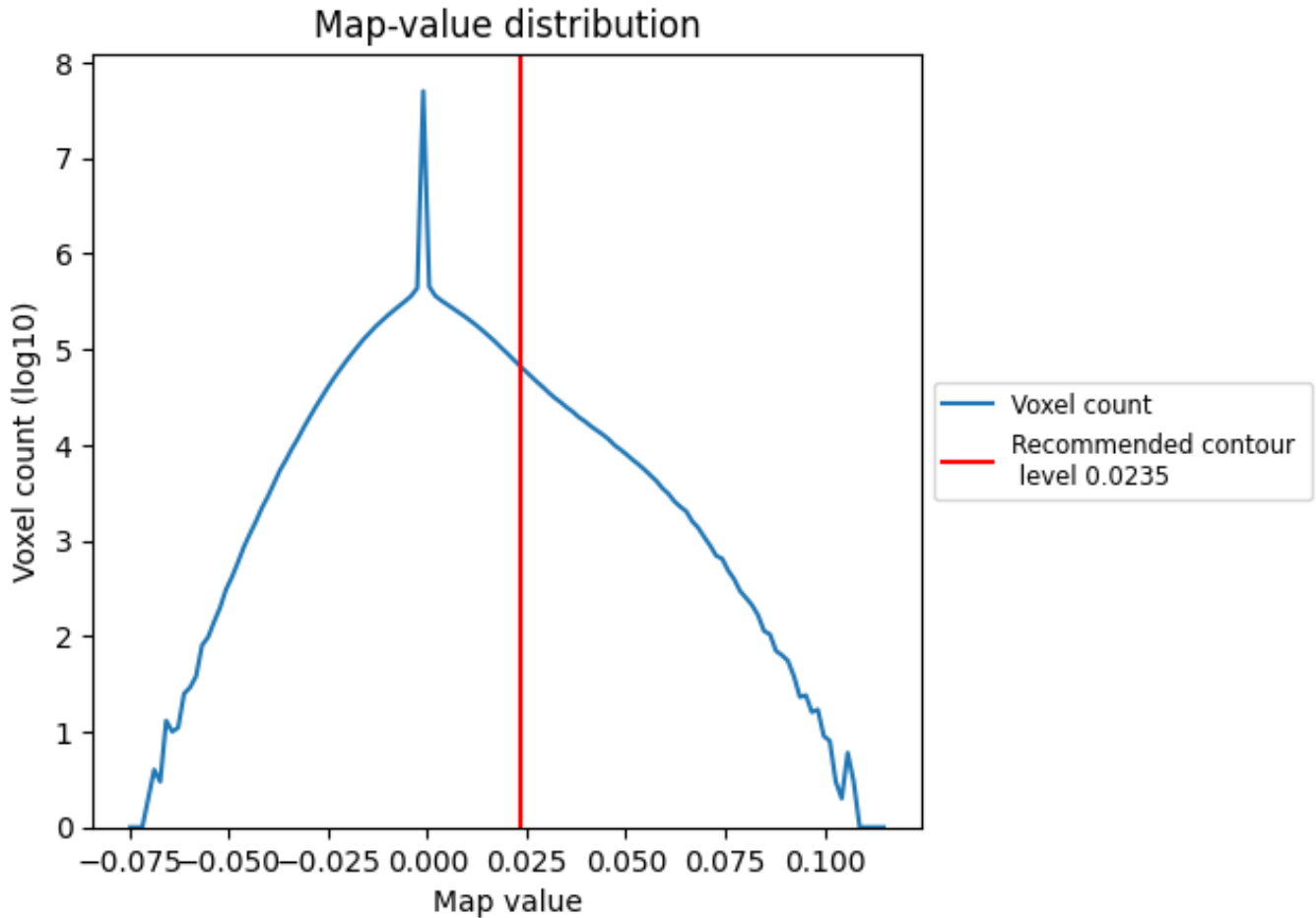


Z

## 7 Map analysis [i](#)

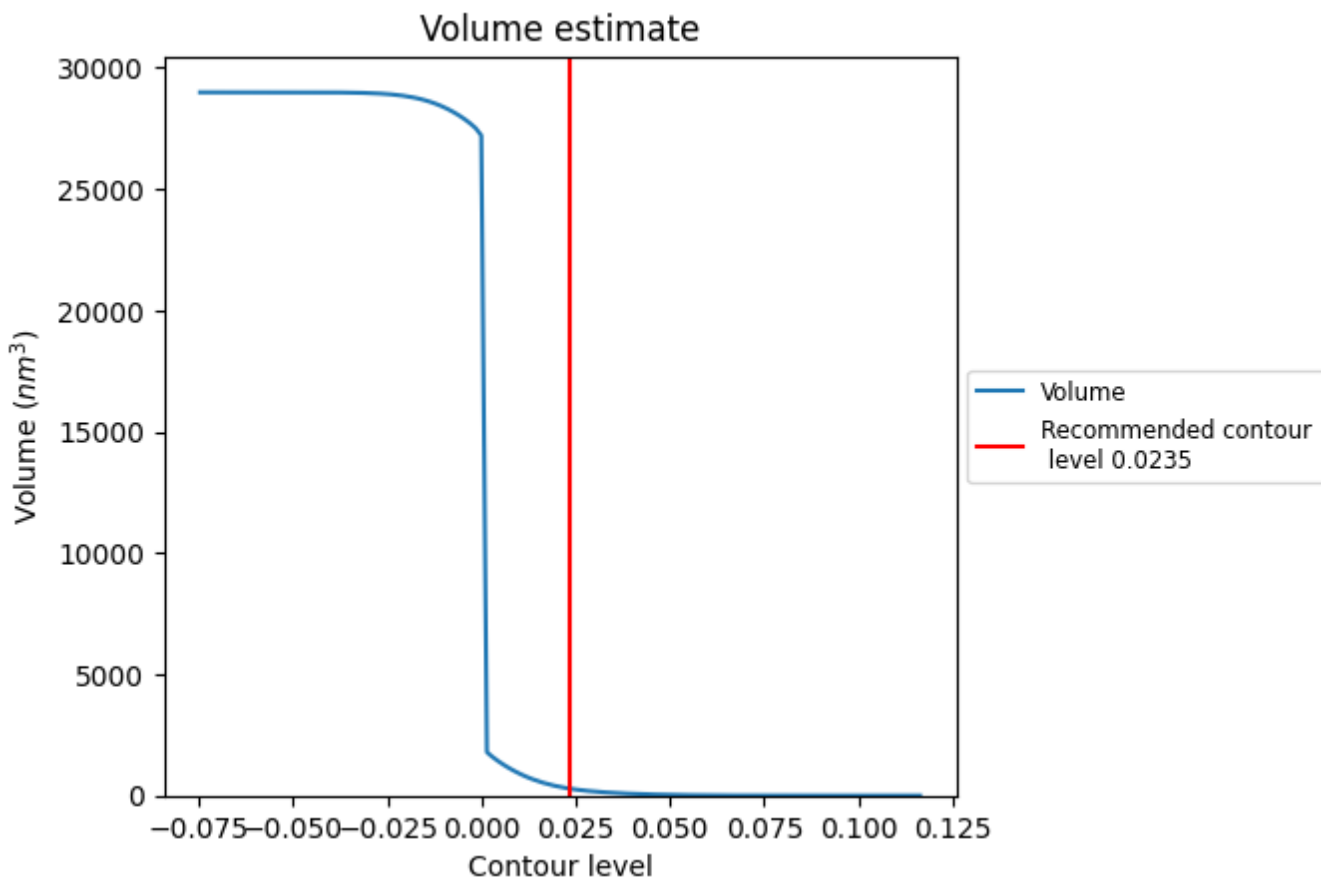
This section contains the results of statistical analysis of the map.

### 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.

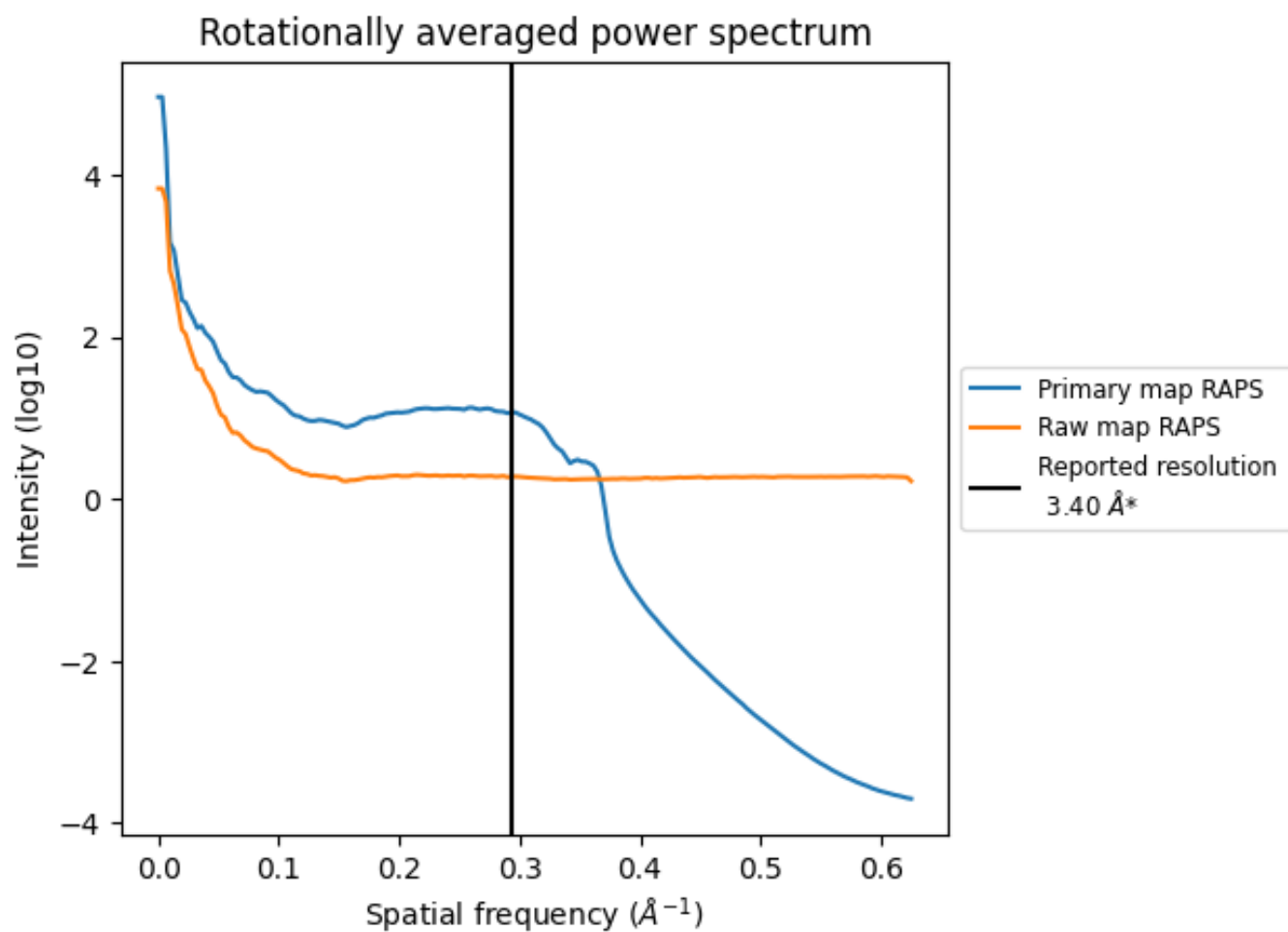
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 284 nm<sup>3</sup>; this corresponds to an approximate mass of 257 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 [\(i\)](#)

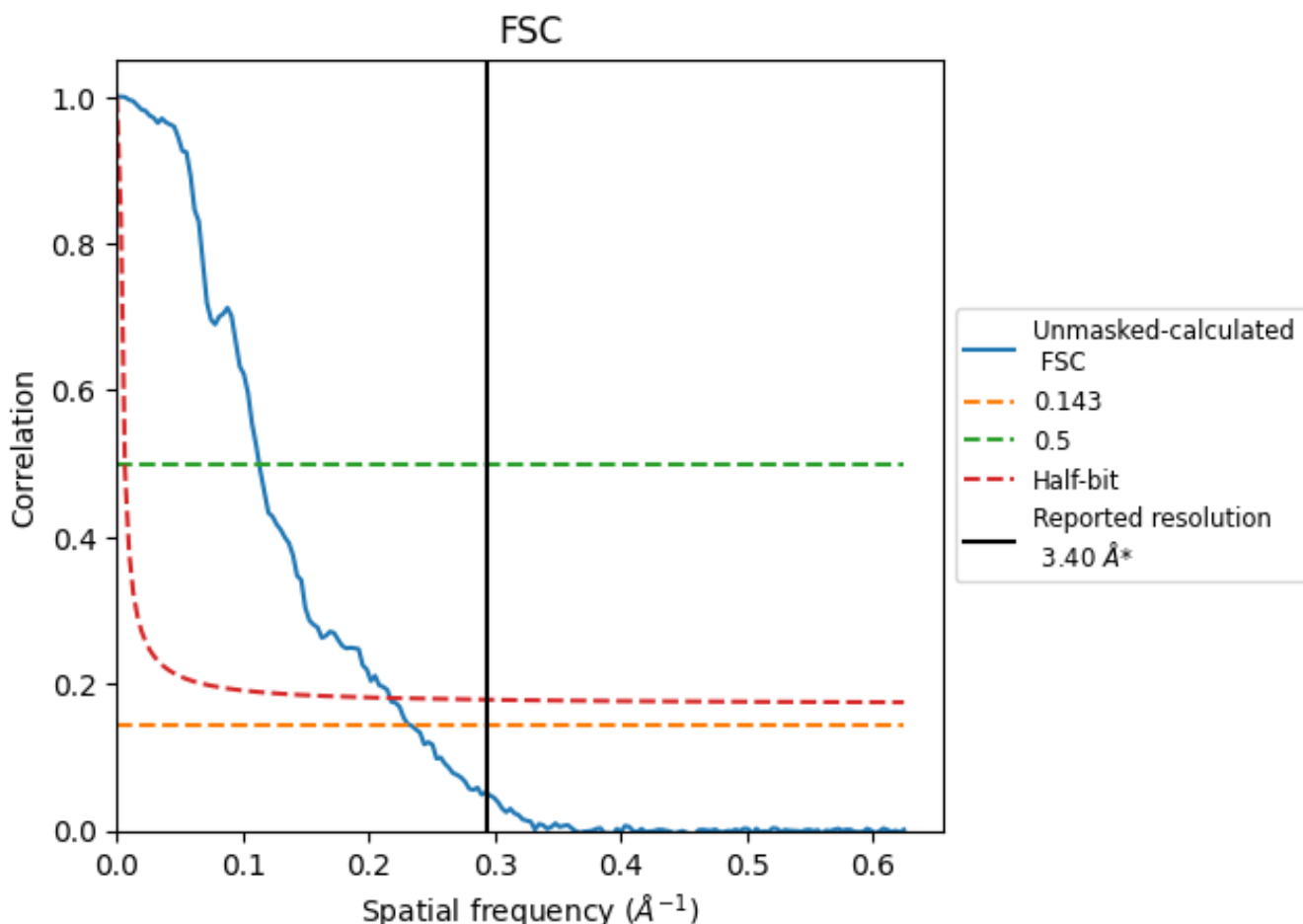


\*Reported resolution corresponds to spatial frequency of 0.294 Å<sup>-1</sup>

## 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 0.294 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

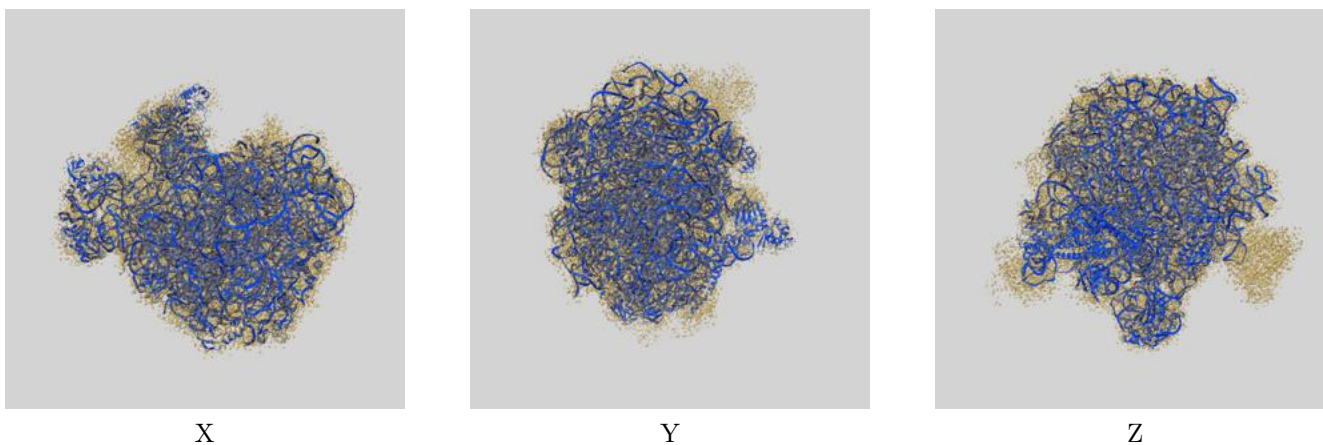
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.28	8.85	4.61

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.28 differs from the reported value 3.4 by more than 10 %

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

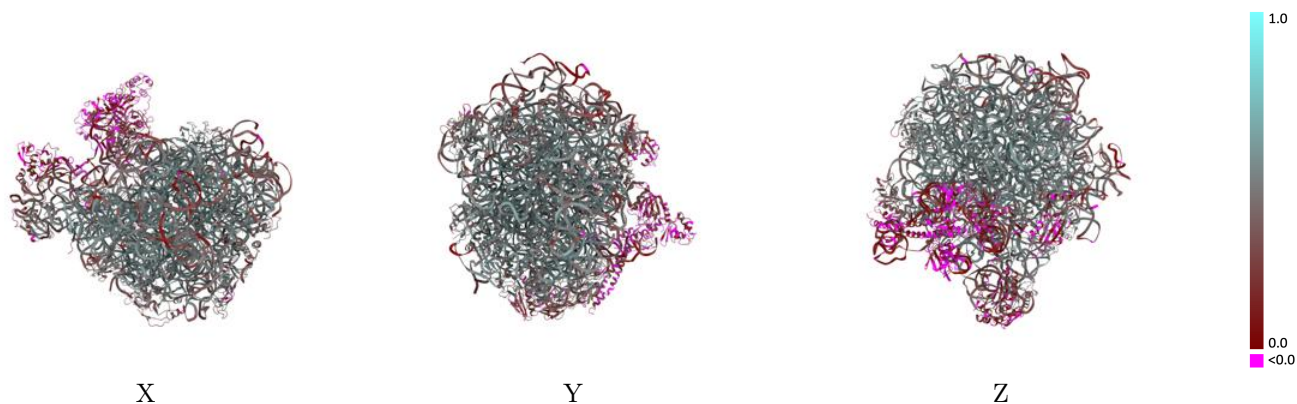
This section contains information regarding the fit between EMDB map EMD-19641 and PDB model 8S1U. Per-residue inclusion information can be found in section 3 on page 10.

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



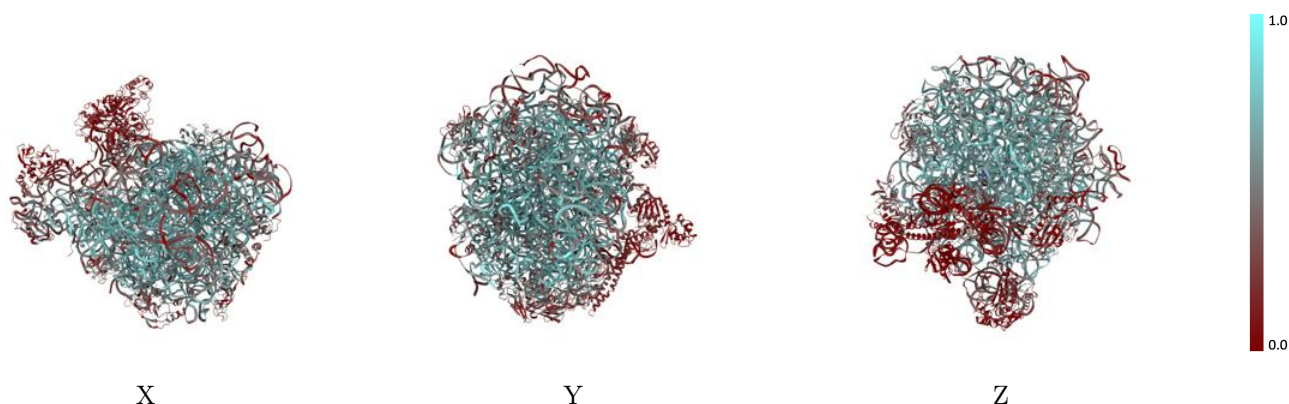
The images above show the 3D surface view of the map at the recommended contour level 0.0235 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

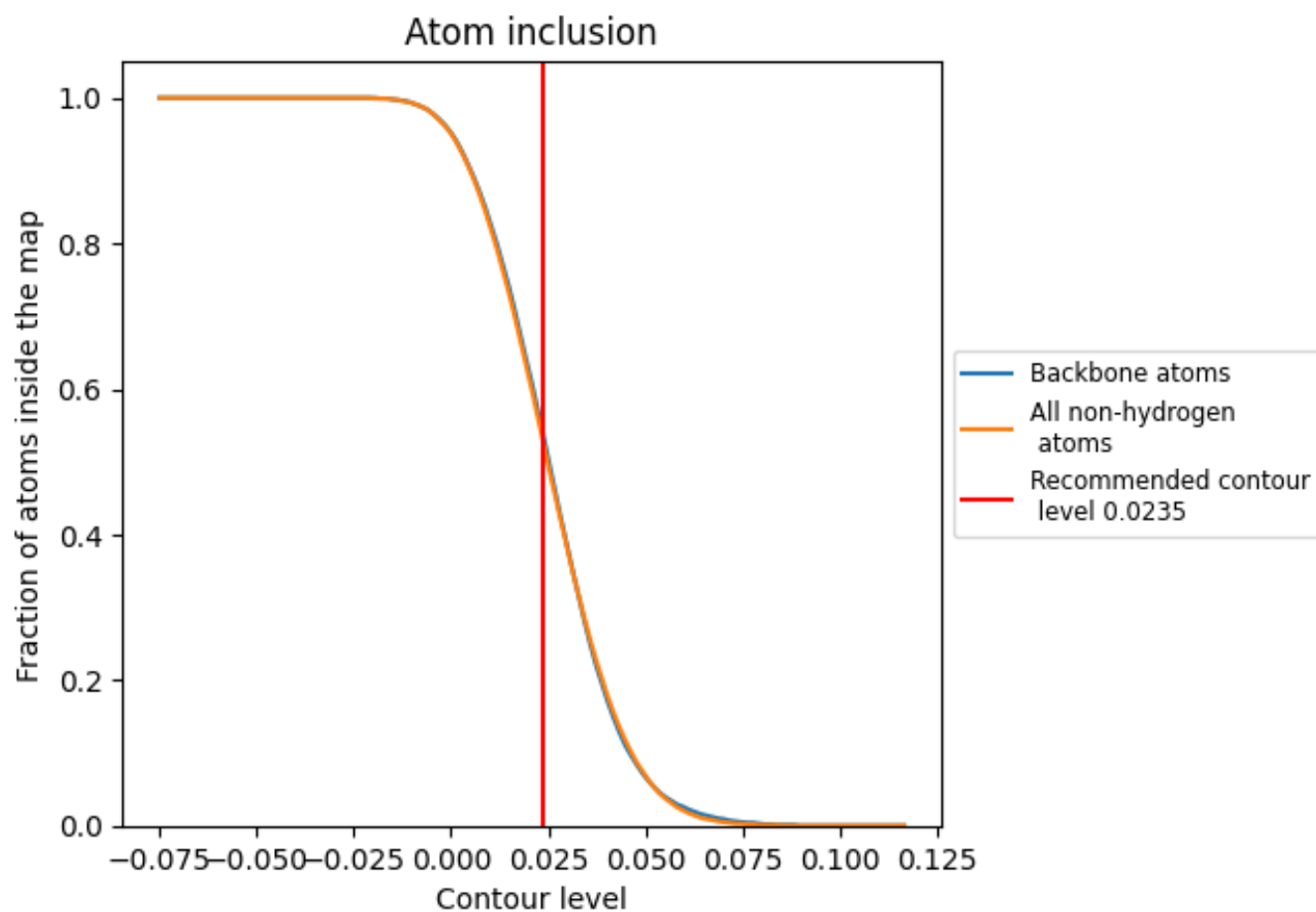
## 9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0235).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 54% of all backbone atoms, 53% 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 (0.0235) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.5340	 0.4480
0	 0.5360	 0.4960
1	 0.5090	 0.4580
2	 0.6530	 0.5460
3	 0.5610	 0.5390
4	 0.4910	 0.5090
6	 0.0170	 0.0400
A	 0.6240	 0.4940
B	 0.4530	 0.4040
C	 0.5440	 0.5060
D	 0.5200	 0.4970
E	 0.4690	 0.4550
F	 0.1080	 0.1600
G	 0.2240	 0.2630
H	 0.0370	 0.0380
J	 0.5510	 0.4940
K	 0.4540	 0.4820
L	 0.4790	 0.4650
M	 0.5360	 0.4880
N	 0.5230	 0.4850
O	 0.3280	 0.3710
P	 0.4280	 0.4350
Q	 0.5880	 0.5220
R	 0.4650	 0.4590
S	 0.5010	 0.5090
T	 0.4130	 0.4250
U	 0.3360	 0.3740
V	 0.1560	 0.1900
W	 0.5640	 0.4970
X	 0.3920	 0.4570
Y	 0.3190	 0.3850
Z	 0.5090	 0.4560
a	 0.2490	 0.2530
c	 0.0570	 0.1180

