



## wwPDB EM Validation Summary Report ⓘ

May 18, 2025 – 12:14 AM EDT

PDB ID : 9BSL / pdb\_00009bsl  
EMDB ID : EMD-44869  
Title : 45SRbgA particle in complex with RbgA and YphC. Class A  
Authors : Arpin, D.; Ortega, J.  
Deposited on : 2024-05-13  
Resolution : 3.10 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](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>.

---

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

EMDB validation analysis : 0.0.1.dev118  
Mogul : 2022.3.0, CSD as543be (2022)  
MolProbity : 4-5-2 with Phenix2.0rc1  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.43.1

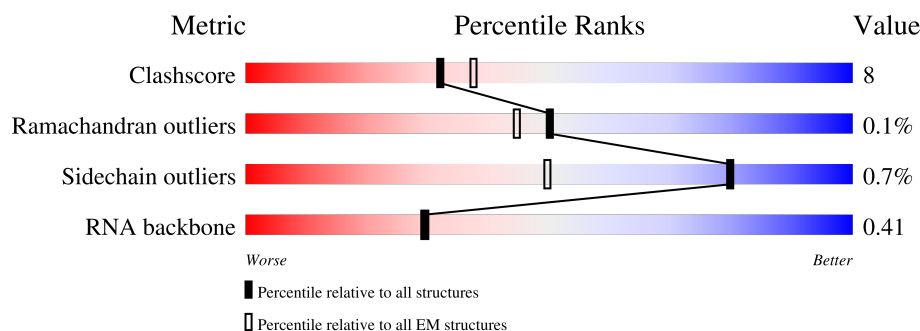
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.10 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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	2927	<div> <div>9%</div> <div>45%</div> <div>26%</div> <div>12%</div> <div>18%</div> </div>
2	C	277	<div> <div>5%</div> <div>81%</div> <div>8%</div> <div>11%</div> </div>
3	D	209	<div> <div>90%</div> <div>9%</div> </div>
4	E	207	<div> <div>8%</div> <div>90%</div> <div>6%</div> </div>
5	F	179	<div> <div>95%</div> <div>66%</div> <div>31%</div> </div>
6	G	145	<div> <div>97%</div> </div>
7	H	122	<div> <div>13%</div> <div>93%</div> <div>7%</div> </div>

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
8	I	146	
9	J	120	
10	K	115	
11	L	118	
12	M	102	
13	N	113	
14	O	95	
15	P	103	
16	R	66	
17	S	59	
18	T	59	
19	U	44	
20	V	282	
21	W	436	
22	Y	232	

## 2 Entry composition

There are 23 unique types of molecules in this entry. The entry contains 75353 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	2414	Total	C	N	O	P	0	0
			51839	23125	9565	16735	2414		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1558	C	G	conflict	GB 467326

- Molecule 2 is a protein called Large ribosomal subunit protein uL2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	246	Total	C	N	O	S	0	0
			1895	1177	373	340	5		

- Molecule 3 is a protein called Large ribosomal subunit protein uL3.

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

- Molecule 4 is a protein called Large ribosomal subunit protein uL4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	200	Total	C	N	O	S	0	0
			1511	951	278	280	2		

- Molecule 5 is a protein called Large ribosomal subunit protein uL6.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	F	175	Total	C	N	O	S	0	0
			1285	793	237	254	1		

- Molecule 6 is a protein called Large ribosomal subunit protein uL13.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	142	Total	C	N	O	S	0	0
			1123	710	206	202	5		

- Molecule 7 is a protein called Large ribosomal subunit protein uL14.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	H	122	Total	C	N	O	S	0	0
			920	571	173	172	4		

- Molecule 8 is a protein called Large ribosomal subunit protein uL15.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	I	108	Total	C	N	O	S	0	0
			753	461	146	145	1		

- Molecule 9 is a protein called Large ribosomal subunit protein bL17.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	J	119	Total	C	N	O	S	0	0
			953	583	186	180	4		

- Molecule 10 is a protein called Large ribosomal subunit protein bL19.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	K	113	Total	C	N	O	S	0	0
			925	589	180	156			

- Molecule 11 is a protein called Large ribosomal subunit protein bL20.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	L	117	Total	C	N	O	S	0	0
			934	588	186	156	4		

- Molecule 12 is a protein called Large ribosomal subunit protein bL21.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	M	101	Total	C	N	O	S	0	0
			786	501	139	146			

- Molecule 13 is a protein called Large ribosomal subunit protein uL22.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	N	109	Total	C	N	O	S	0	0
			842	525	164	150	3		

- Molecule 14 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	O	92	Total	C	N	O	S	0	0
			741	464	136	138	3		

- Molecule 15 is a protein called Large ribosomal subunit protein uL24.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	P	98	Total	C	N	O	S	0	0
			737	463	137	133	4		

- Molecule 16 is a protein called Large ribosomal subunit protein uL29.

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

- Molecule 17 is a protein called Large ribosomal subunit protein uL30.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	S	58	Total	C	N	O	S	0	0
			455	281	89	84	1		

- Molecule 18 is a protein called Large ribosomal subunit protein bL32.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	T	54	Total	C	N	O	S	0	0
			394	241	80	68	5		

- Molecule 19 is a protein called Large ribosomal subunit protein bL34.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	U	44	Total	C	N	O	S	0	0
			367	222	89	54	2		

- Molecule 20 is a protein called Ribosome biogenesis GTPase A.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	V	267	Total	C	N	O	S	0	0
			2119	1349	378	387	5		

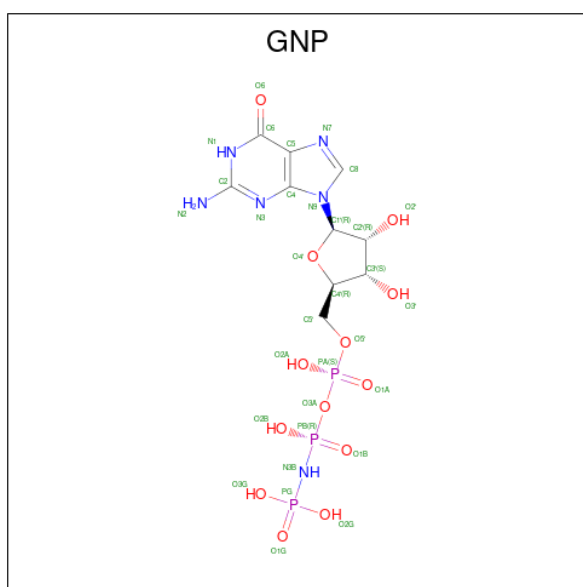
- Molecule 21 is a protein called GTPase Der.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	W	417	Total	C	N	O	S	0	0
			3239	2056	559	615	9		

- Molecule 22 is a protein called Large ribosomal subunit protein uL1.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	Y	178	Total	C	N	O	S	0	0
			1334	853	223	254	4		

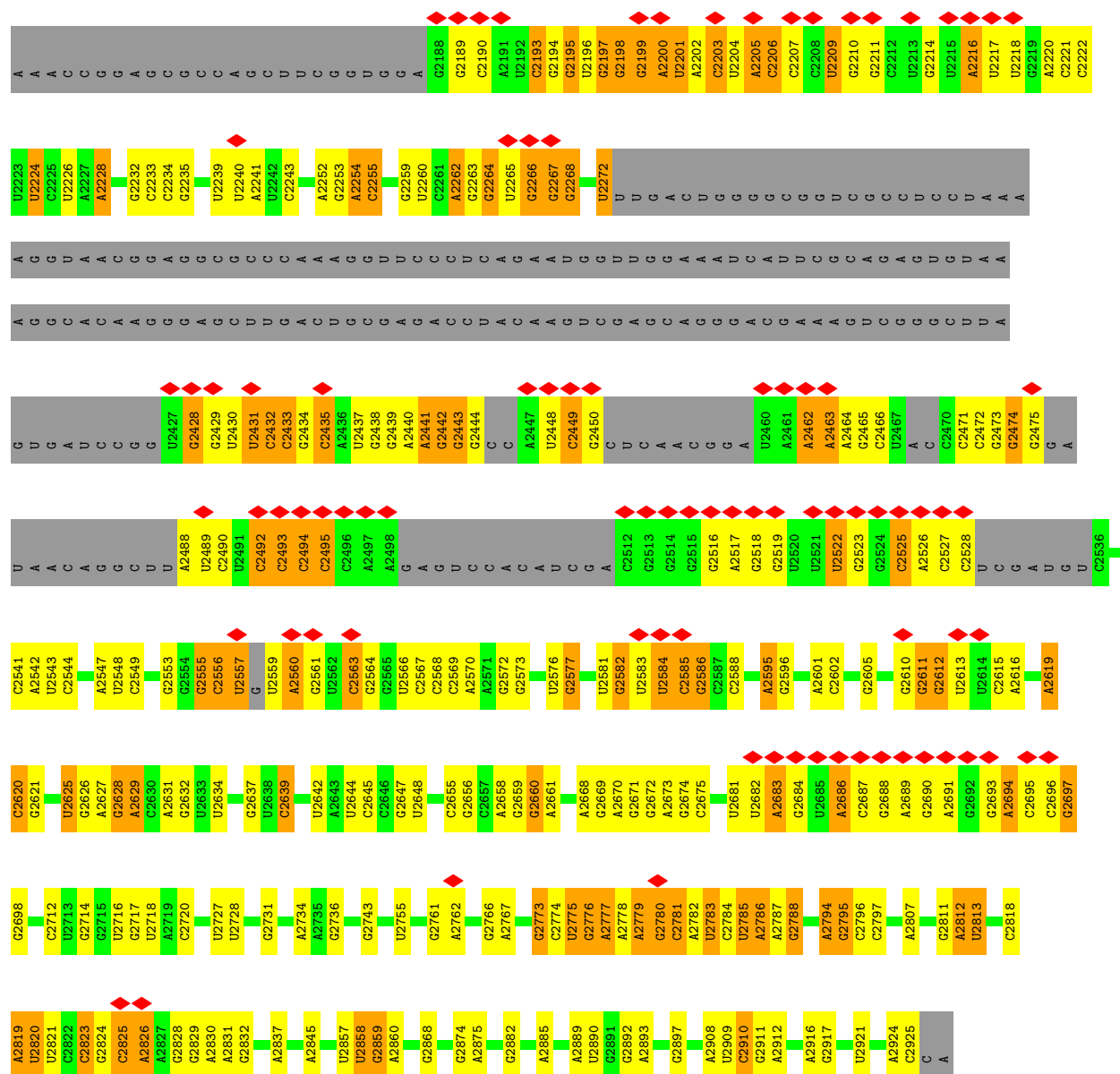
- Molecule 23 is PHOSPHOAMINOPHOSPHONIC ACID-GUANYLATE ESTER (CCD ID: GNP) (formula:  $C_{10}H_{17}N_6O_{13}P_3$ ).



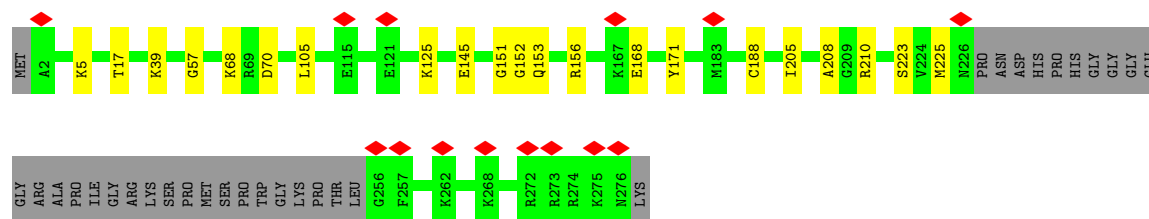
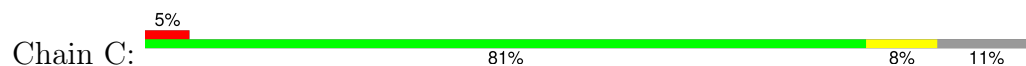




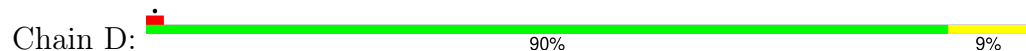
C2102	A1789	U1684	C1577	U1505	A1426	C1310	U1187	U1064
U2103	U1790	A1685	G1578	A1506	G1427	G1311	A1188	U1065
U2104	A1791	A1690	A1579	C1508	G1428	A1312	G1192	G1068
U2105	G1792	A1691	A1580	G1512	A1434	A1313	G1209	U1069
A2106	G1793	U1692	A	U1513	U1435	A1314	A1210	G1070
C2107	A1802	C1693	U	C1514	C1437	U1436	C1211	A1071
C2005	A1802	G1694	A	C1515	U1438	G1315	U1212	A1072
A2010	U1808	A1695	U	A1516	U1439	C1328	G1213	A1073
C2014	A1809	A1697	A	A1517	C1444	C1334	A1075	A1074
A2018	G1810	G1712	G	G1518	A1445	A1335	U1215	G1076
C2111	A1811	A1713	U1587	C1519	A1446	A1339	C1216	G1077
U2114	A1812	A1714	G1589	A1820	C1447	A1340	U1217	A1078
G2115	C1819	C1715	U1595	G1521	U1448	U1342	U1218	A999
A2117	A1820	G1719	U1596	A1524	C1449	C1343	C1219	G1079
U2022	C1824	C1728	C1597	G1525	C1450	U1344	U1219	U1079
C2023	U1825	C1729	U1598	G1526	U1451	U1345	A	G1080
U2024	G1825	C1728	C1599	G1527	C1452	A1346	G1220	U1081
A2025	C1829	U1733	G1600	U1528	C1455	A1347	A1221	G1082
C2026	A1830	A1734	A1606	G1529	C1456	G1348	G	A1083
U2020	A1831	A1735	C1607	A1533	U1457	G1349	C	A1084
G2021	G1832	G1745	A1608	A1534	U1458	U1351	C	G1085
C2022	C1833	A1745	A1614	U1543	U1459	U1352	A	U1086
U2029	G1834	U1756	U1626	U1547	G1460	A1360	C1150	U1087
A2030	A1837	U1757	G1630	C1550	A1473	A1375	U1151	G1088
C2031	G1852	G1757	A1631	C1551	C1474	G1376	U1152	C1089
G2032	C1855	U1758	G1632	C1552	G1475	U1380	G1153	C1010
C2034	G1858	A1760	U1633	A1553	A1477	A1388	U1154	C1011
U2035	A1860	C1761	A1638	U1554	G1478	U1391	G1155	U1091
A2039	C1861	G	G1651	A1555	A1481	G1394	A1161	A1092
C2041	U1862	C1773	C1652	A1556	G1482	C1395	C1162	G1015
U2059	U1863	G1774	A1653	G1557	A1483	C1396	U1163	U1016
A2060	C	A1774	A1654	C1558	U1484	G1397	C1164	C1017
G2061	C	G1775	A1655	C1559	A1491	A1404	U1165	A1094
U2062	C	A1776	C1656	U1560	G1494	A1405	G1166	A1096
G2064	C	G1777	C1657	G1561	A1495	U1406	C1167	A1097
C2072	C	G1779	A1667	G1562	G1496	G1407	U1159	A1098
A2076	C	G1782	G1671	G1563	U1497	A1293	A1161	C1098
G2077	C	C1783	A1677	U1565	U1498	U1295	C1162	A1026
C2085	C	U1784	G1678	G1566	A1499	G1296	U1163	A1027
A2088	C	G1785	U1786	G1567	U1500	A1418	C1164	C1028
G2090	C	U1787	A1788	G1568	U1501	A1423	A1172	A1029
C2092	C	A1788	U1681	G1570	A1502	A1424	A1173	G1041
C2093	C	A	U1681	G1571	G1503	G1425	A1174	A1042
C2094	C	A	U1681	G1572	A1504		A1175	A1046
C2095	C	A	U1681	G1573			A1176	A1047
C2096	C	A	U1681	G1574			U1177	G1048
U2097	C	A	U1681	G1575			U1178	G1049
C2098	C	A	U1681	G1576			A1179	U1060
U2102	C	A	U1681	G1577			C1180	C1051
C2103	C	A	U1681	G1578			C1181	A1064
U2104	C	A	U1681	G1579			G1185	A1055
U2105	C	A	U1681	G1580			C1186	A1056
A2106	C	A	U1681	G1581			C	G1057
C2107	C	A	U1681	G1582			C	U1058
G2109	C	A	U1681	G1583			C	A1059
U2110	C	A	U1681	G1584			C	G1063
C2111	C	A	U1681	G1585			C	
C2112	C	A	U1681	G1586			C	
C2113	C	A	U1681	G1587			C	
C2114	C	A	U1681	G1588			C	
U2115	C	A	U1681	G1589			C	
G2116	C	A	U1681	G1590			C	
A2117	C	A	U1681	G1591			C	
U2118	C	A	U1681	G1592			C	
C2119	C	A	U1681	G1593			C	
U2120	C	A	U1681	G1594			C	
U2121	C	A	U1681	G1595			C	
C2122	C	A	U1681	G1596			C	
A2123	C	A	U1681	G1597			C	
U2124	C	A	U1681	G1598			C	
U2125	C	A	U1681	G1599			C	
C2126	C	A	U1681	G1600			C	
U2127	C	A	U1681	G1601			C	
U2128	C	A	U1681	G1602			C	
C2129	C	A	U1681	G1603			C	
U2130	C	A	U1681	G1604			C	
U2131	C	A	U1681	G1605			C	
C2132	C	A	U1681	G1606			C	
C2133	C	A	U1681	G1607			C	
A2134	C	A	U1681	G1608			C	
U2137	C	A	U1681	G1609			C	
U2138	C	A	U1681	G1610			C	
C2139	C	A	U1681	G1611			C	
U2140	C	A	U1681	G1612			C	
A2141	C	A	U1681	G1613			C	
C2142	C	A	U1681	G1614			C	
A2143	C	A	U1681	G1615			C	
C2144	C	A	U1681	G1616			C	
G2145	C	A	U1681	G1617			C	
A2146	C	A	U1681	G1618			C	
U2147	C	A	U1681	G1619			C	
A2148	C	A	U1681	G1620			C	
G2149	C	A	U1681	G1621			C	
C2150	C	A	U1681	G1622			C	
U2151	C	A	U1681	G1623			C	
A2152	C	A	U1681	G1624			C	
C2153	C	A	U1681	G1625			C	
G2154	C	A	U1681	G1626			C	
A2155	C	A	U1681	G1627			C	
C2156	C	A	U1681	G1628			C	
C2157	C	A	U1681	G1629			C	
U2158	C	A	U1681	G1630			C	
U2159	C	A	U1681	G1631			C	
C	C	A	U1681	G1632			C	

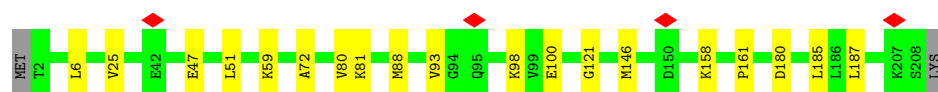


• Molecule 2: Large ribosomal subunit protein uL2

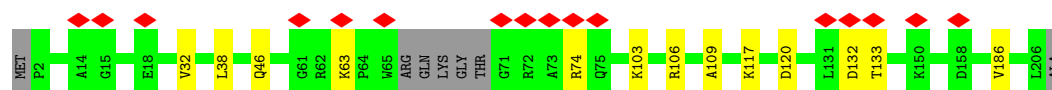
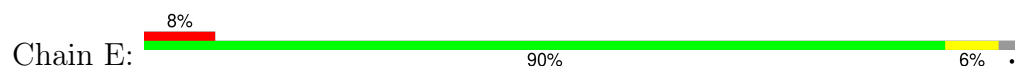


• Molecule 3: Large ribosomal subunit protein uL3

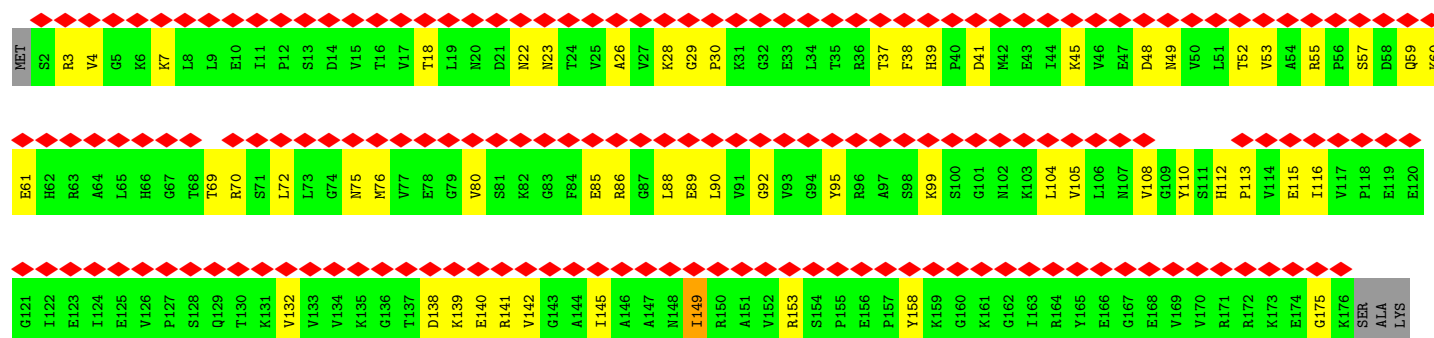




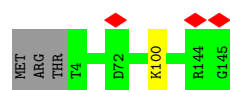
- Molecule 4: Large ribosomal subunit protein uL4



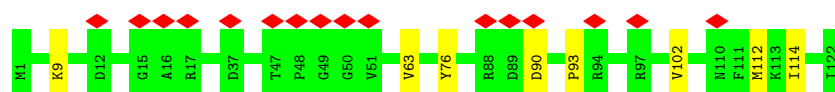
- Molecule 5: Large ribosomal subunit protein uL6



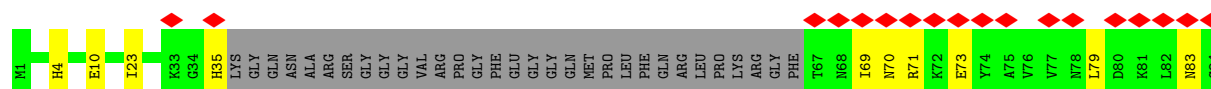
- Molecule 6: Large ribosomal subunit protein uL13

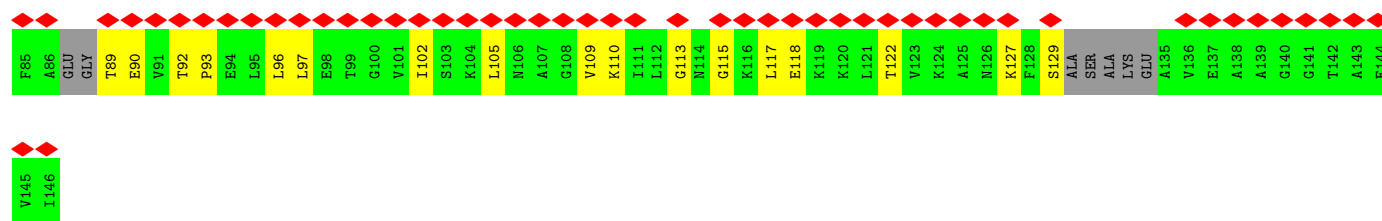


- Molecule 7: Large ribosomal subunit protein uL14



- Molecule 8: Large ribosomal subunit protein uL15





- Molecule 9: Large ribosomal subunit protein bL17

Chain J: 92% 8%



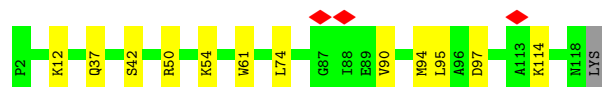
- Molecule 10: Large ribosomal subunit protein bL19

Chain K: 15% 85% 13%



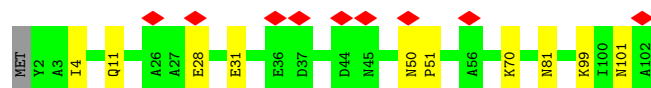
- Molecule 11: Large ribosomal subunit protein bL20

Chain L: 89% 10%



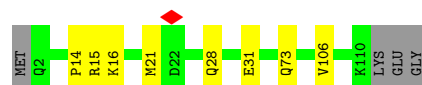
- Molecule 12: Large ribosomal subunit protein bL21

Chain M: 9% 89% 10%



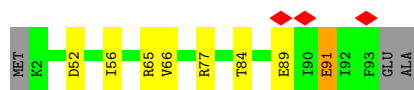
- Molecule 13: Large ribosomal subunit protein uL22

Chain N: 89% 7%

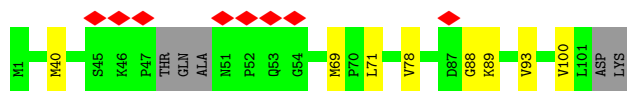
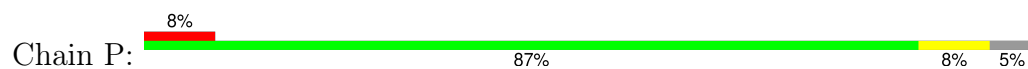


- Molecule 14: Large ribosomal subunit protein uL23

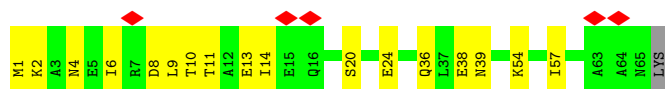
Chain O: 88% 7%



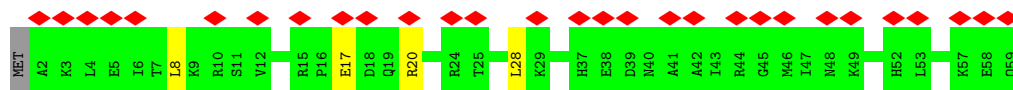
- Molecule 15: Large ribosomal subunit protein uL24



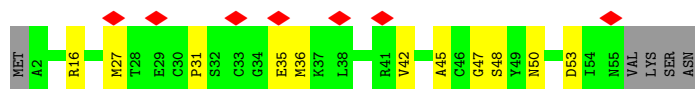
- Molecule 16: Large ribosomal subunit protein uL29



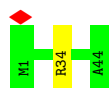
- Molecule 17: Large ribosomal subunit protein uL30



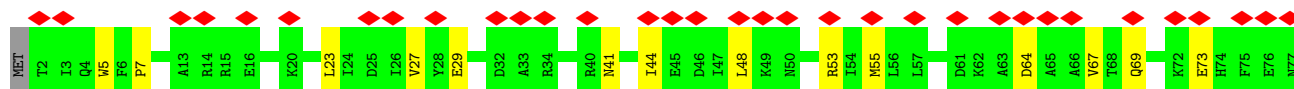
- Molecule 18: Large ribosomal subunit protein bL32

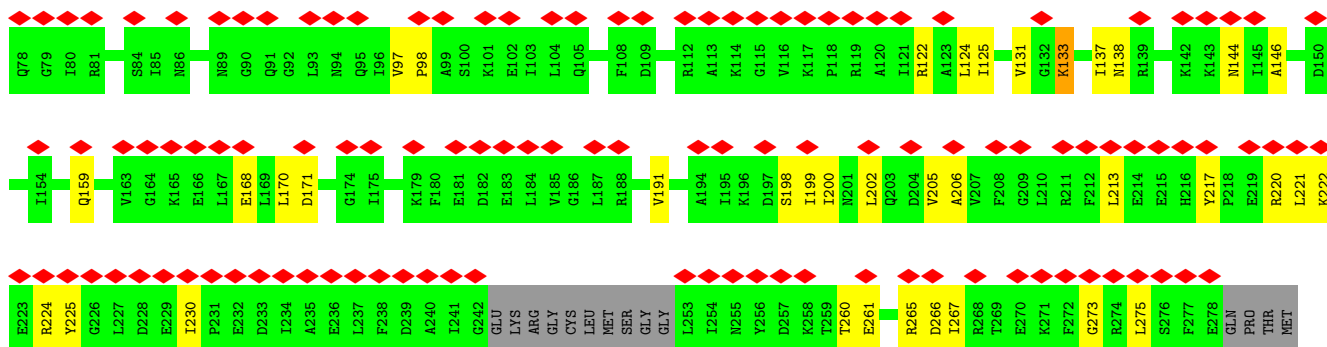


- Molecule 19: Large ribosomal subunit protein bL34

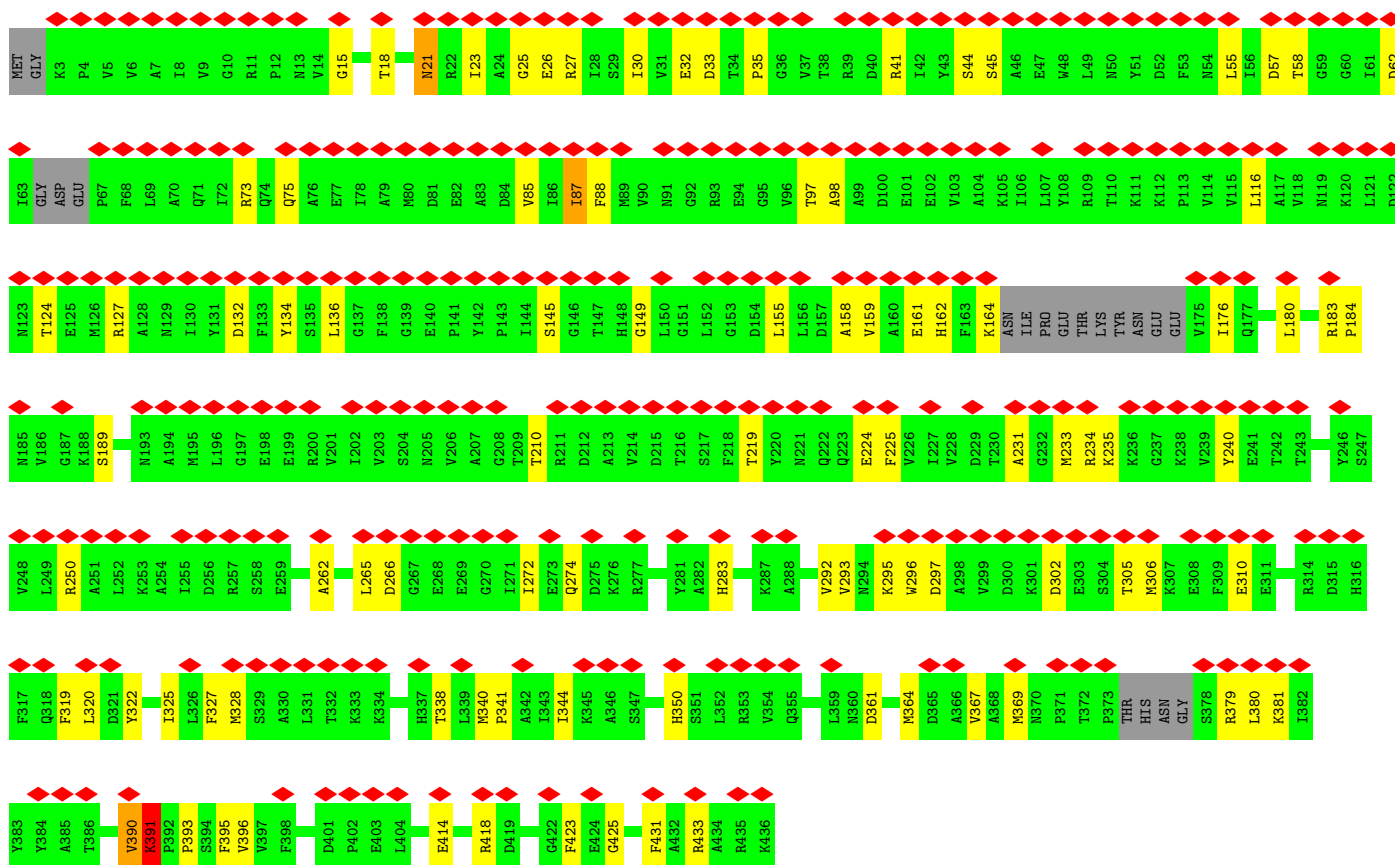


- Molecule 20: Ribosome biogenesis GTPase A

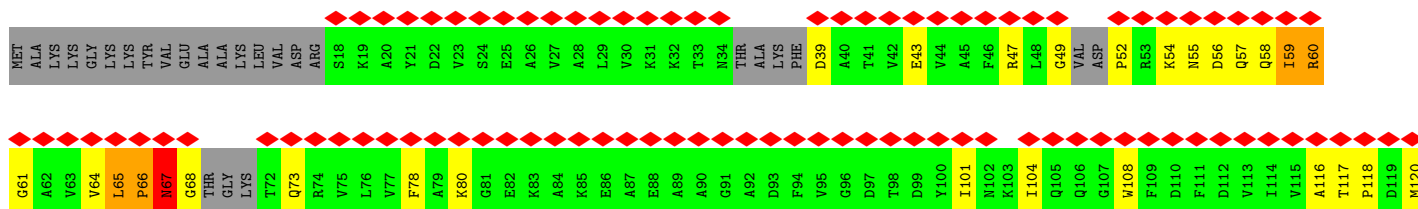
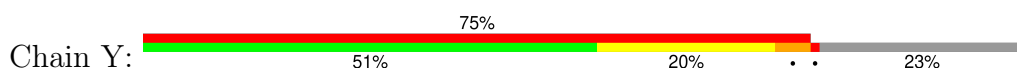




• Molecule 21: GTPase Der



• Molecule 22: Large ribosomal subunit protein uL1



E181	D182	E183	K184	L185	V186	E187	N188	F189	T190	T191	M192	Y193	D194	T195	I196	L197	K198	A199	K200	P201	A202	A203	A204	K205	G206	V207	Y208	V209	K210	N211	V212	A213	V214	THR	SER	THR	MET	GLY	PRO	GLY	VAL	LYS	VAL	ASP	SER	SER	THR	PHE	ASN	VAL	LYS								
M121	G122	E123	V124	G125	K126	I127	G128	R129	V130	L131	G132	P133	K134	G135	L136	M137	P138	N139	P140	K141	T142	G143	T144	V145	T146	F147	E148	V149	E150	K151	A152	I153	G154	E155	I156	K157	ALA	GLY	LYS	VAL	GLU	TYR	ARG	VAL	ASP	LYS	A168	G169	N170	I171	H172	V173	P174	I175	G176	K177	V178	S179	F180

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	40501	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)	1000	Depositor
Maximum defocus (nm)	2750	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.576	Depositor
Minimum map value	-0.191	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.028	Depositor
Recommended contour level	0.142	Depositor
Map size ( $\text{\AA}$ )	383.04, 383.04, 383.04	wwPDB
Map dimensions	448, 448, 448	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	0.855, 0.855, 0.855	Depositor



## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GNP

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	0.17	0/58047	0.32	0/90517
2	C	0.17	0/1921	0.42	3/2570 (0.1%)
3	D	0.16	0/1597	0.35	0/2140
4	E	0.15	0/1529	0.30	0/2064
5	F	0.16	0/1303	0.46	1/1760 (0.1%)
6	G	0.16	0/1146	0.29	0/1542
7	H	0.16	0/927	0.32	0/1245
8	I	0.18	0/754	0.50	0/1007
9	J	0.17	0/960	0.31	0/1284
10	K	0.15	0/938	0.35	0/1255
11	L	0.20	0/946	0.35	0/1259
12	M	0.18	0/797	0.39	0/1070
13	N	0.18	0/851	0.36	0/1146
14	O	0.19	0/748	0.45	1/997 (0.1%)
15	P	0.16	0/746	0.38	0/996
16	R	0.19	0/531	0.49	0/707
17	S	0.17	0/457	0.40	0/613
18	T	0.18	0/400	0.51	0/536
19	U	0.15	0/370	0.25	0/483
20	V	0.15	0/2152	0.41	0/2902
21	W	0.15	0/3295	0.49	6/4463 (0.1%)
22	Y	0.42	1/1352 (0.1%)	0.90	7/1822 (0.4%)
All	All	0.18	1/81767 (0.0%)	0.36	18/122378 (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
21	W	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
22	Y	129	ARG	CA-C	5.50	1.61	1.52

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
21	W	23	ILE	N-CA-C	-9.64	101.16	110.42
22	Y	54	LYS	N-CA-CB	-8.80	98.42	110.56
22	Y	198	LYS	N-CA-C	-8.61	100.91	111.33
22	Y	54	LYS	N-CA-C	8.46	122.41	112.93
22	Y	61	GLY	N-CA-C	8.07	123.78	110.55

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
21	W	391	LYS	Peptide

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

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	51839	0	26098	661	0
2	C	1895	0	1985	12	0
3	D	1575	0	1642	15	0
4	E	1511	0	1585	9	0
5	F	1285	0	1246	45	0
6	G	1123	0	1162	1	0
7	H	920	0	977	6	0
8	I	753	0	754	23	0
9	J	953	0	983	7	0
10	K	925	0	995	10	0
11	L	934	0	994	10	0
12	M	786	0	826	8	0
13	N	842	0	899	6	0
14	O	741	0	781	6	0
15	P	737	0	789	5	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
16	R	530	0	568	12	0
17	S	455	0	491	2	0
18	T	394	0	373	7	0
19	U	367	0	410	1	0
20	V	2119	0	2190	32	0
21	W	3239	0	3203	109	0
22	Y	1334	0	1351	126	0
23	V	32	0	13	1	0
23	W	64	0	26	5	0
All	All	75353	0	50341	1020	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

The worst 5 of 1020 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
21:W:132:ASP:HA	22:Y:137:MET:CE	1.21	1.59
21:W:132:ASP:CA	22:Y:137:MET:HE1	1.56	1.35
21:W:98:ALA:N	22:Y:52:PRO:HD3	1.48	1.26
21:W:98:ALA:H	22:Y:52:PRO:CD	1.46	1.26
21:W:132:ASP:CA	22:Y:137:MET:CE	2.16	1.17

There are no symmetry-related clashes.

## 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	C	242/277 (87%)	234 (97%)	8 (3%)	0	100	100
3	D	205/209 (98%)	198 (97%)	7 (3%)	0	100	100

*Continued on next page...*

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	E	196/207 (95%)	188 (96%)	8 (4%)	0	100	100
5	F	173/179 (97%)	159 (92%)	14 (8%)	0	100	100
6	G	140/145 (97%)	134 (96%)	6 (4%)	0	100	100
7	H	120/122 (98%)	117 (98%)	3 (2%)	0	100	100
8	I	100/146 (68%)	94 (94%)	6 (6%)	0	100	100
9	J	117/120 (98%)	113 (97%)	4 (3%)	0	100	100
10	K	111/115 (96%)	109 (98%)	2 (2%)	0	100	100
11	L	115/118 (98%)	107 (93%)	8 (7%)	0	100	100
12	M	99/102 (97%)	93 (94%)	6 (6%)	0	100	100
13	N	107/113 (95%)	102 (95%)	5 (5%)	0	100	100
14	O	90/95 (95%)	87 (97%)	3 (3%)	0	100	100
15	P	94/103 (91%)	89 (95%)	5 (5%)	0	100	100
16	R	63/66 (96%)	57 (90%)	6 (10%)	0	100	100
17	S	56/59 (95%)	55 (98%)	1 (2%)	0	100	100
18	T	52/59 (88%)	49 (94%)	3 (6%)	0	100	100
19	U	42/44 (96%)	41 (98%)	1 (2%)	0	100	100
20	V	263/282 (93%)	253 (96%)	10 (4%)	0	100	100
21	W	409/436 (94%)	392 (96%)	17 (4%)	0	100	100
22	Y	168/232 (72%)	148 (88%)	17 (10%)	3 (2%)	7	29
All	All	2962/3229 (92%)	2819 (95%)	140 (5%)	3 (0%)	50	79

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
22	Y	66	PRO
22	Y	67	ASN
22	Y	130	VAL

### 5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	200/225 (89%)	200 (100%)	0	100	100
3	D	168/170 (99%)	168 (100%)	0	100	100
4	E	162/170 (95%)	162 (100%)	0	100	100
5	F	131/151 (87%)	131 (100%)	0	100	100
6	G	120/123 (98%)	120 (100%)	0	100	100
7	H	101/101 (100%)	101 (100%)	0	100	100
8	I	71/110 (64%)	71 (100%)	0	100	100
9	J	99/100 (99%)	99 (100%)	0	100	100
10	K	98/100 (98%)	98 (100%)	0	100	100
11	L	95/97 (98%)	95 (100%)	0	100	100
12	M	83/84 (99%)	83 (100%)	0	100	100
13	N	90/93 (97%)	90 (100%)	0	100	100
14	O	82/85 (96%)	82 (100%)	0	100	100
15	P	82/87 (94%)	82 (100%)	0	100	100
16	R	56/57 (98%)	56 (100%)	0	100	100
17	S	52/53 (98%)	52 (100%)	0	100	100
18	T	38/53 (72%)	37 (97%)	1 (3%)	41	68
19	U	39/39 (100%)	39 (100%)	0	100	100
20	V	227/244 (93%)	226 (100%)	1 (0%)	89	94
21	W	343/371 (92%)	341 (99%)	2 (1%)	84	91
22	Y	138/185 (75%)	124 (90%)	14 (10%)	6	23
All	All	2475/2698 (92%)	2457 (99%)	18 (1%)	80	90

5 of 18 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
22	Y	198	LYS
22	Y	207	VAL
22	Y	205	LYS
22	Y	65	LEU
22	Y	130	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
21	W	357	ASN
22	Y	67	ASN
22	Y	188	ASN
22	Y	106	GLN
12	M	18	GLN

### 5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	2396/2927 (81%)	711 (29%)	53 (2%)

5 of 711 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	10	A
1	A	28	A
1	A	34	U
1	A	36	G
1	A	39	C

5 of 53 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	1250	G
1	A	1478	G
1	A	2779	A
1	A	1339	A
1	A	1434	A

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

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

## 5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

3 ligands 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	$\# Z  > 2$
23	GNP	V	301	-	29,34,34	1.56	7 (24%)	33,54,54	2.20	5 (15%)
23	GNP	W	502	-	29,34,34	1.65	7 (24%)	33,54,54	2.22	6 (18%)
23	GNP	W	501	-	29,34,34	1.62	7 (24%)	33,54,54	2.20	5 (15%)

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
23	GNP	V	301	-	-	6/14/38/38	0/3/3/3
23	GNP	W	502	-	-	5/14/38/38	0/3/3/3
23	GNP	W	501	-	-	6/14/38/38	0/3/3/3

The worst 5 of 21 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
23	W	502	GNP	PB-O3A	4.72	1.64	1.59
23	W	501	GNP	PB-O3A	4.49	1.64	1.59
23	V	301	GNP	PB-O3A	4.05	1.64	1.59
23	W	502	GNP	PB-O1B	3.22	1.51	1.46
23	W	501	GNP	PB-O1B	3.11	1.50	1.46

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
23	W	501	GNP	C5-C6-N1	-8.60	111.92	123.42
23	W	502	GNP	C5-C6-N1	-8.60	111.93	123.42
23	V	301	GNP	C5-C6-N1	-8.55	111.98	123.42
23	W	501	GNP	C2-N1-C6	6.64	125.20	115.96
23	W	502	GNP	C2-N1-C6	6.64	125.19	115.96

There are no chirality outliers.

5 of 17 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
23	V	301	GNP	PB-N3B-PG-O1G
23	V	301	GNP	PG-N3B-PB-O1B
23	V	301	GNP	PA-O3A-PB-O2B
23	V	301	GNP	C5'-O5'-PA-O3A
23	W	501	GNP	PG-N3B-PB-O1B

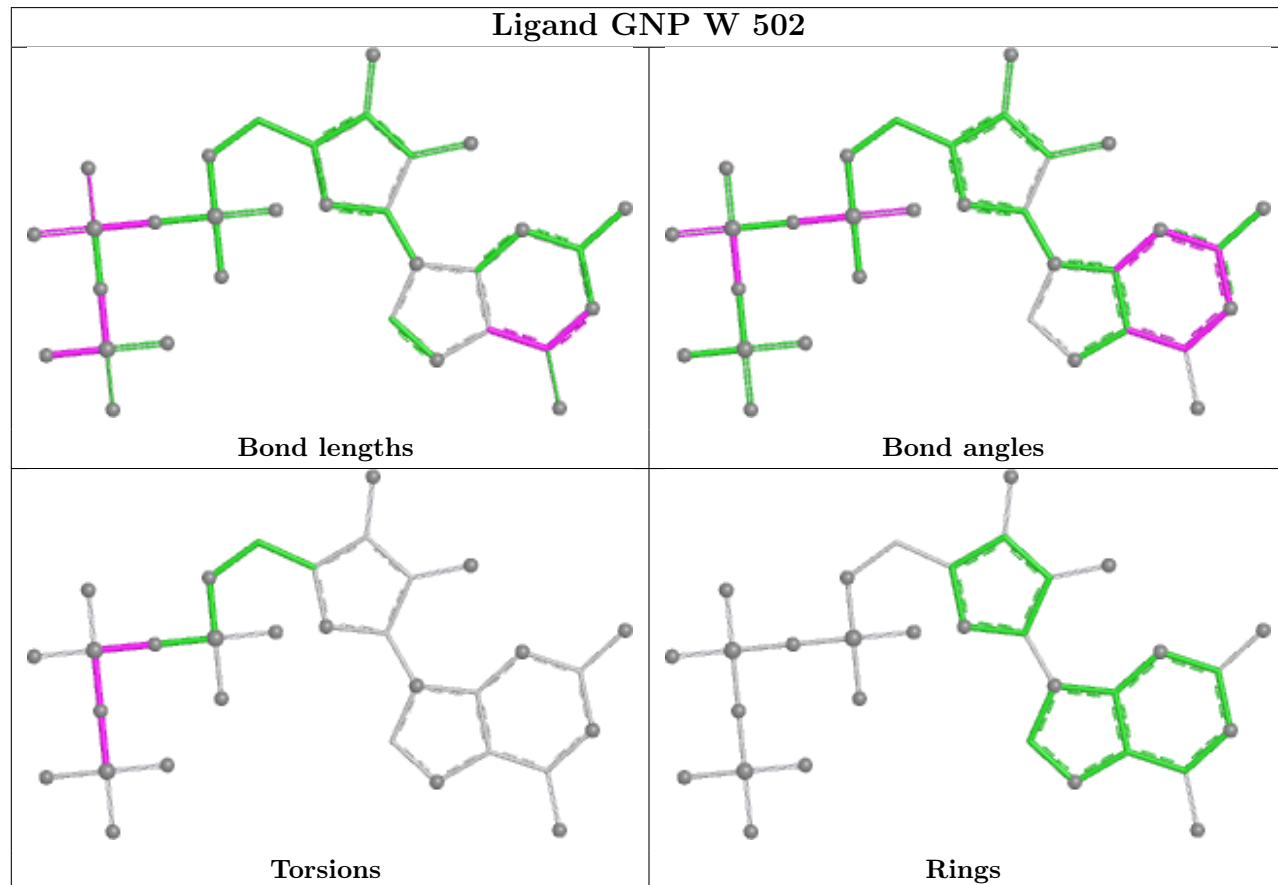
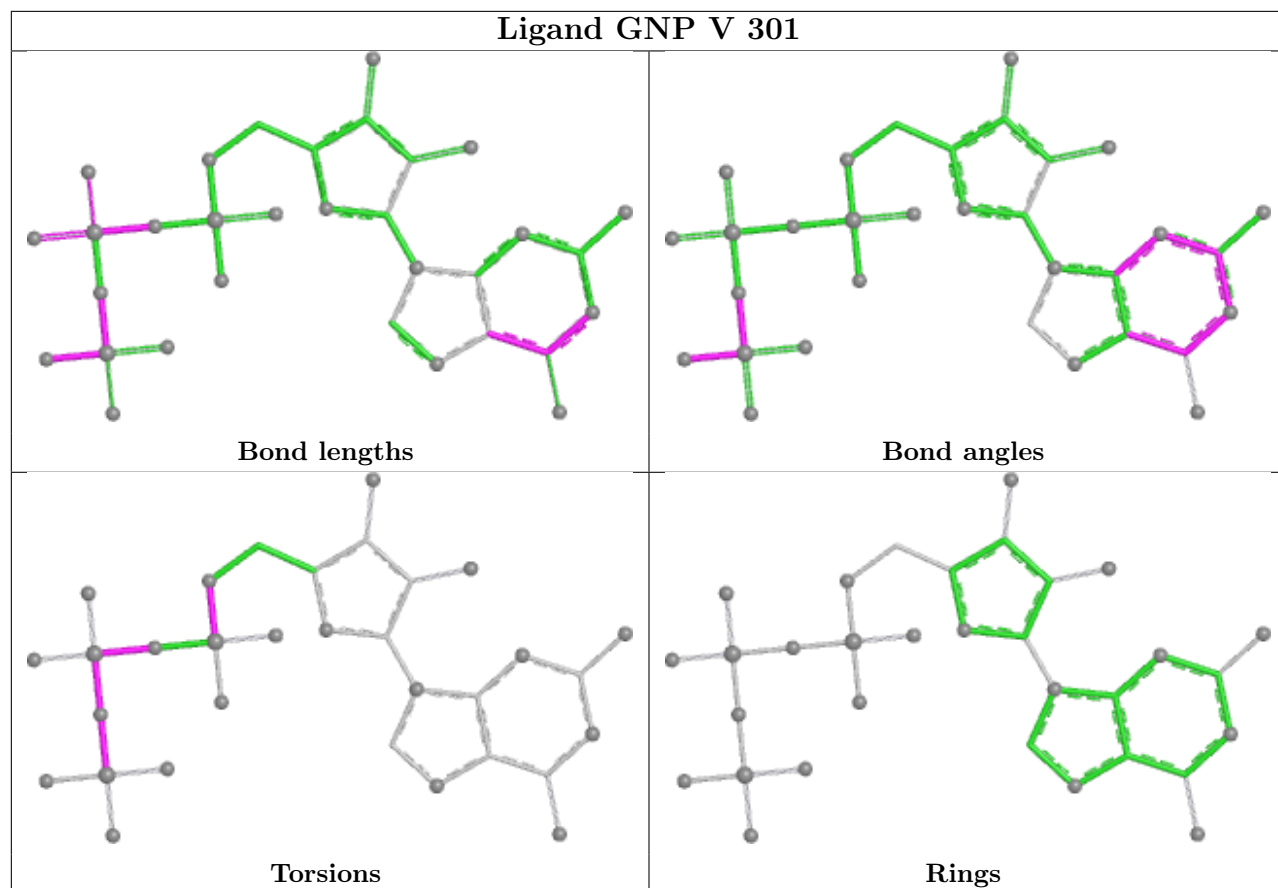
There are no ring outliers.

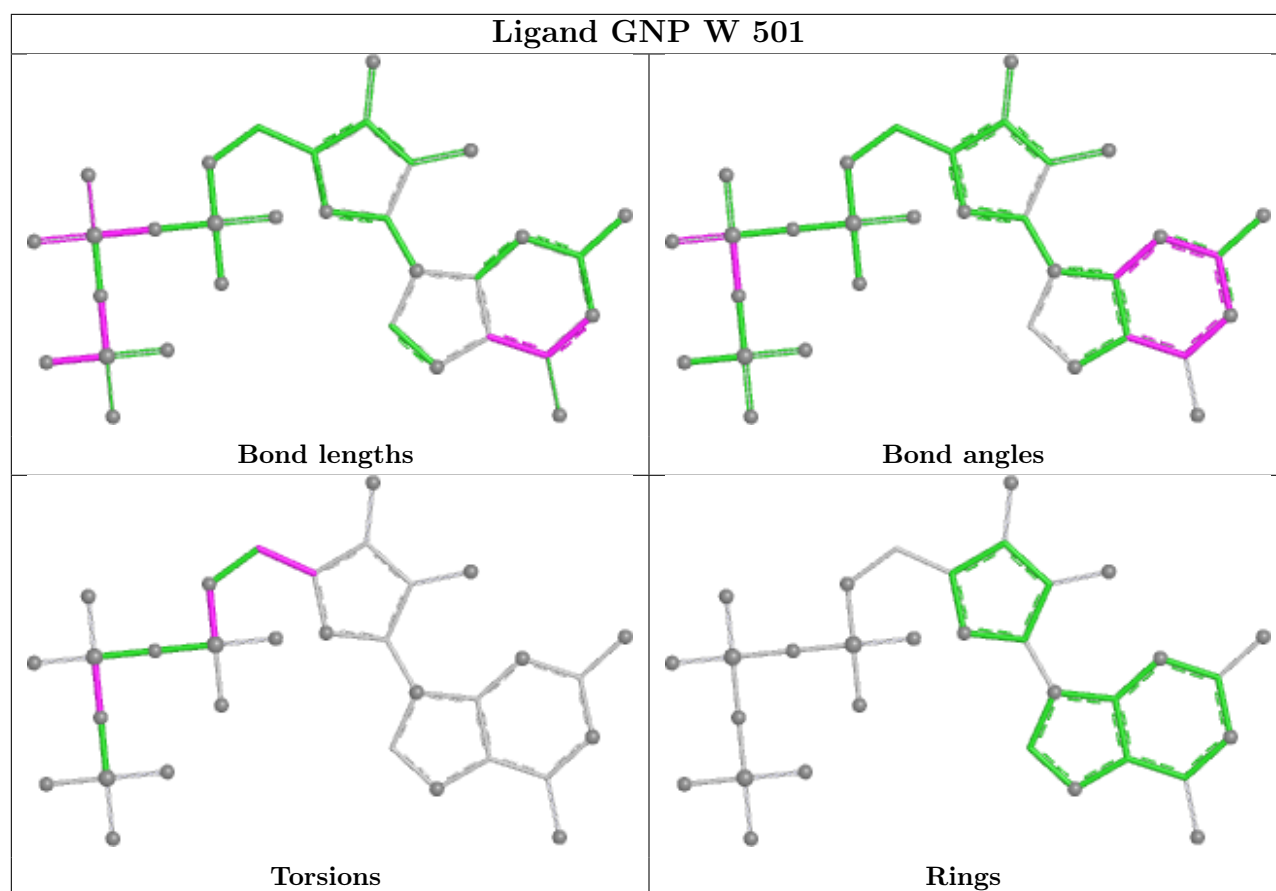
3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
23	V	301	GNP	1	0
23	W	502	GNP	2	0
23	W	501	GNP	3	0

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







## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

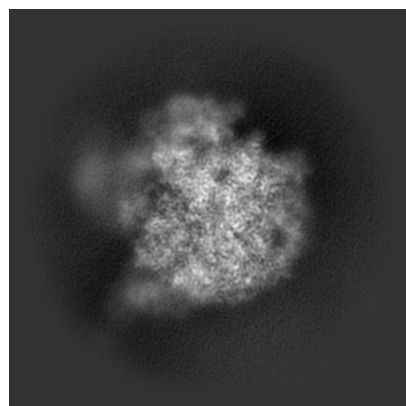
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-44869. These allow visual inspection of the internal detail of the map and identification of artifacts.

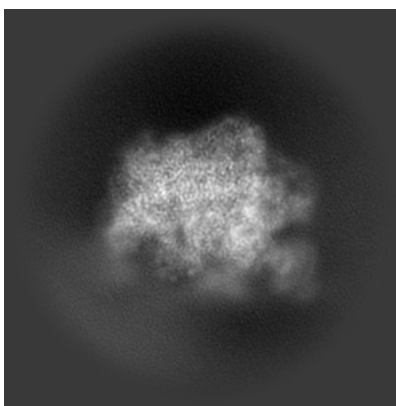
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

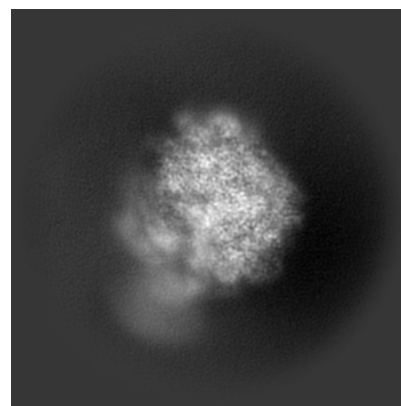
#### 6.1.1 Primary map



X

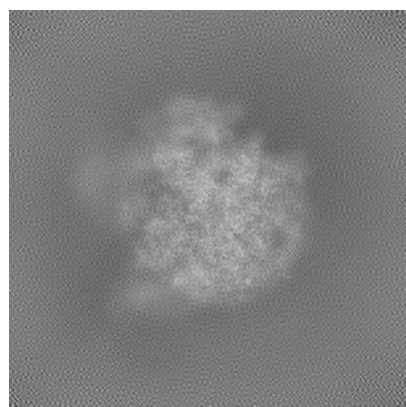


Y

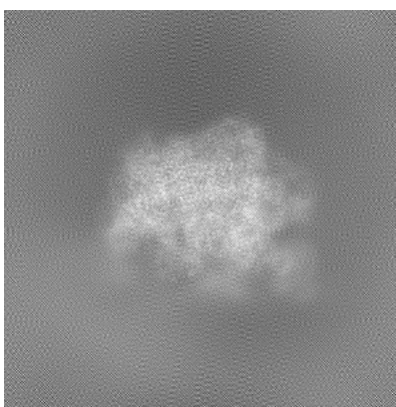


Z

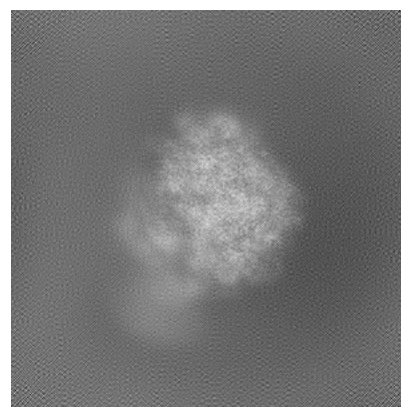
#### 6.1.2 Raw map



X



Y

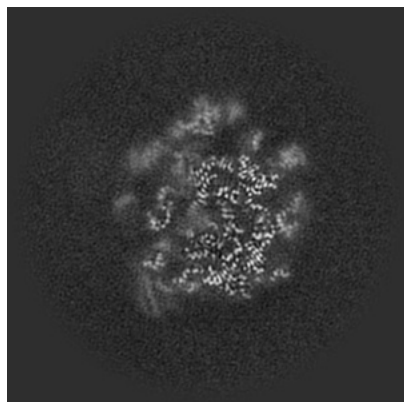


Z

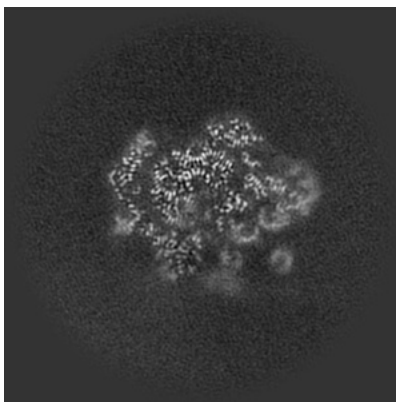
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

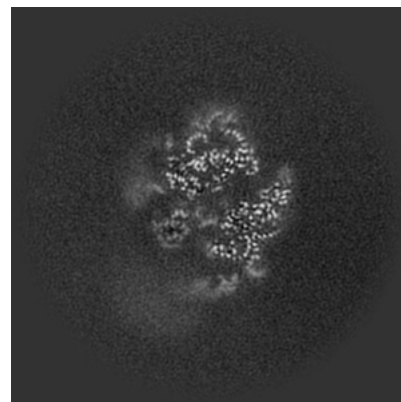
### 6.2.1 Primary map



X Index: 224

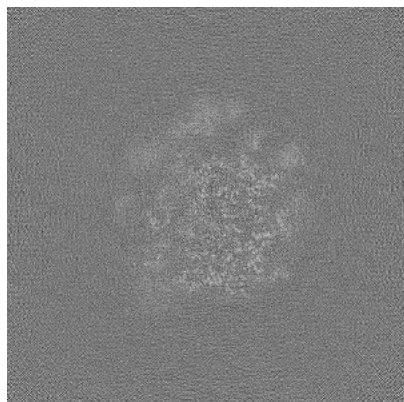


Y Index: 224

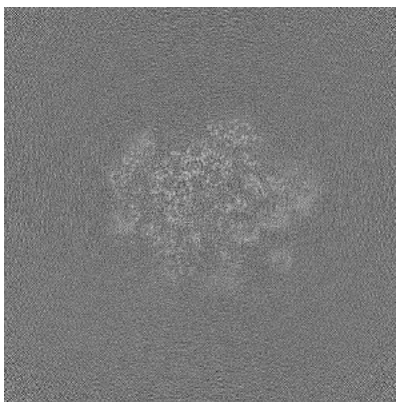


Z Index: 224

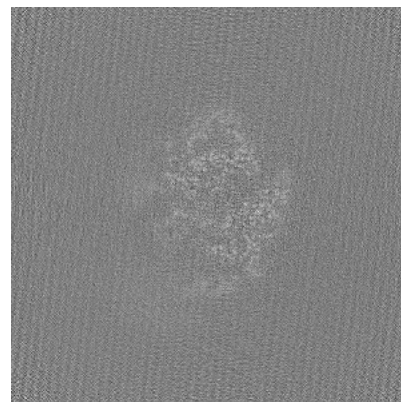
### 6.2.2 Raw map



X Index: 224



Y Index: 224

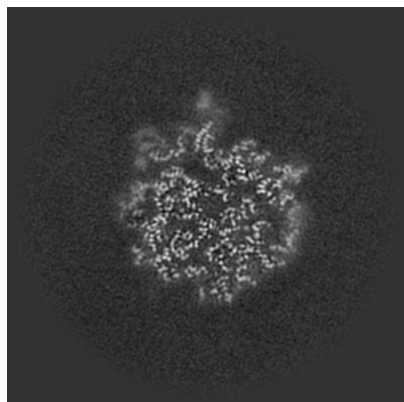


Z Index: 224

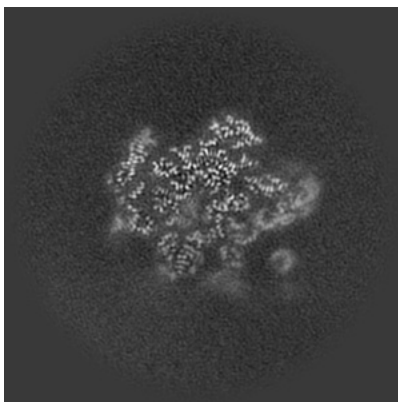
The images above show central slices of the map in three orthogonal directions.

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

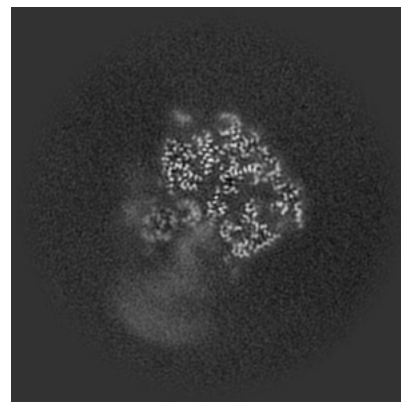
### 6.3.1 Primary map



X Index: 246

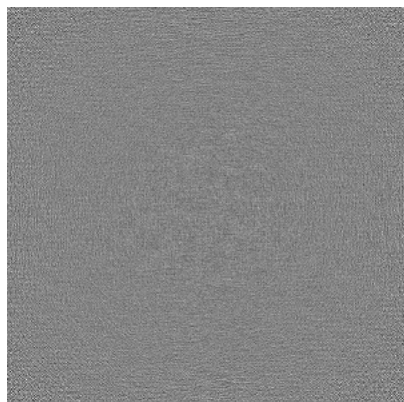


Y Index: 221

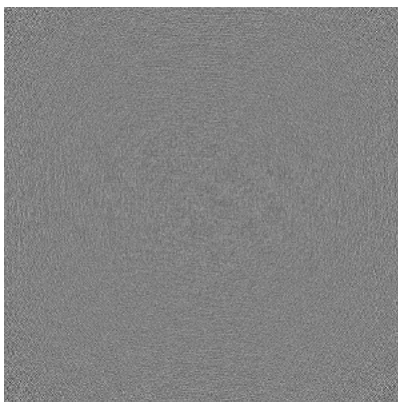


Z Index: 255

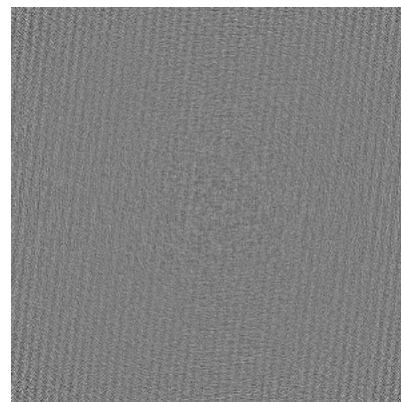
### 6.3.2 Raw map



X Index: 0



Y Index: 0



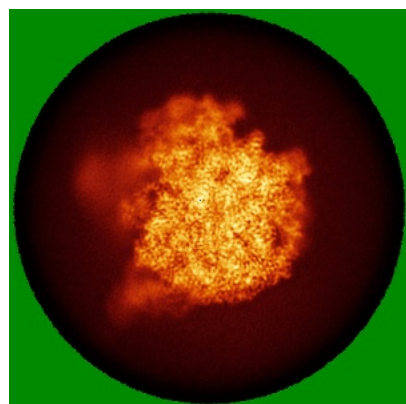
Z Index: 0

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

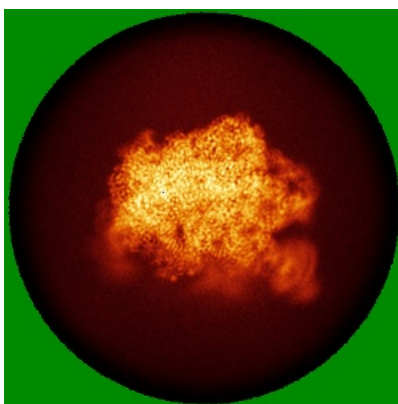


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

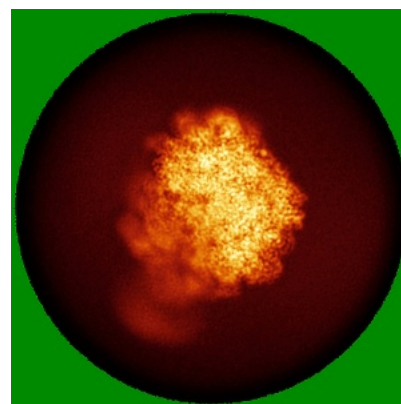
### 6.4.1 Primary map



X

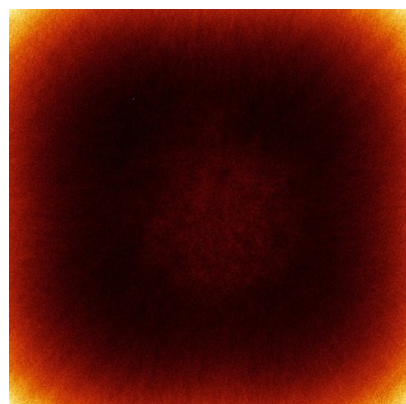


Y

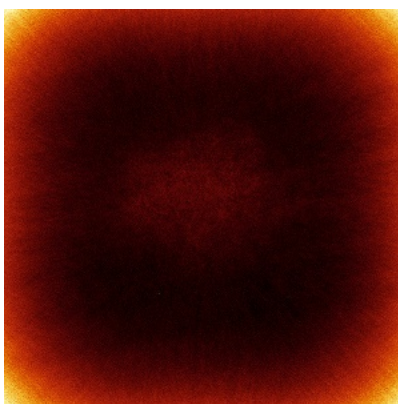


Z

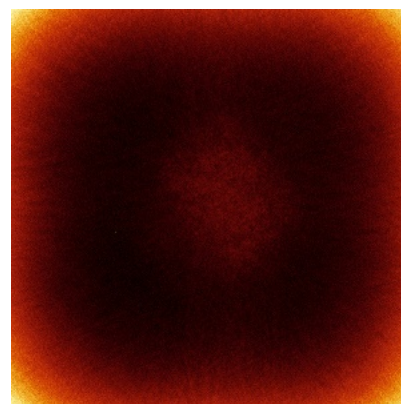
### 6.4.2 Raw map



X



Y

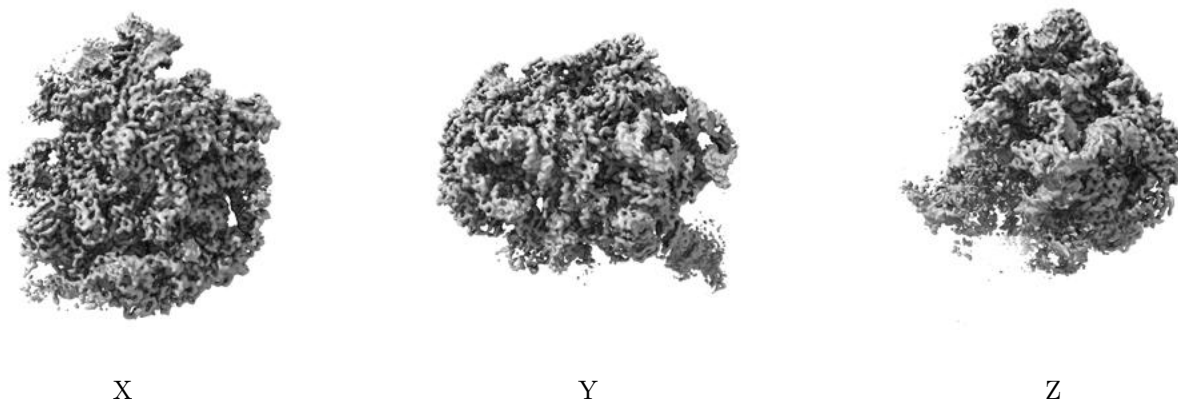


Z

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.

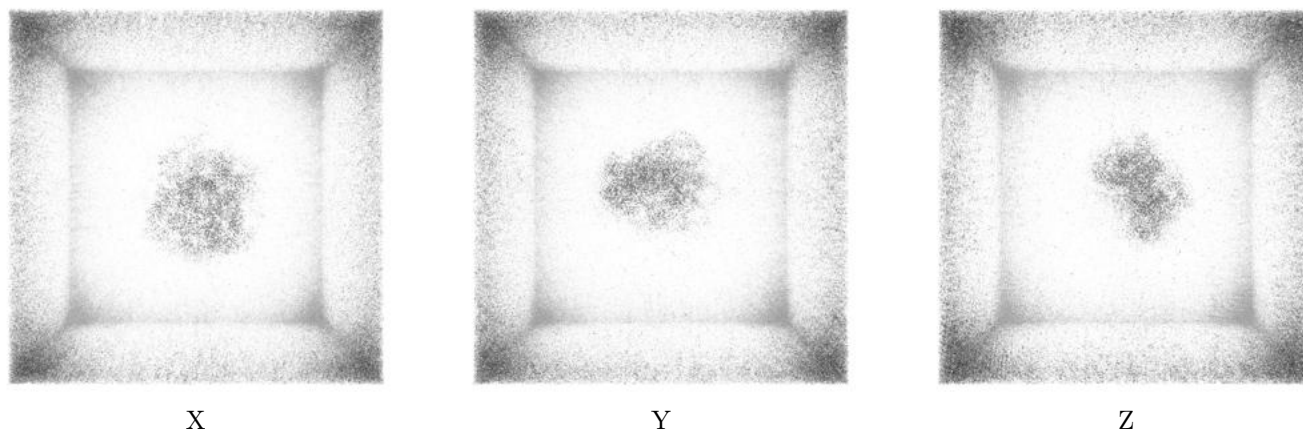
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.142. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



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

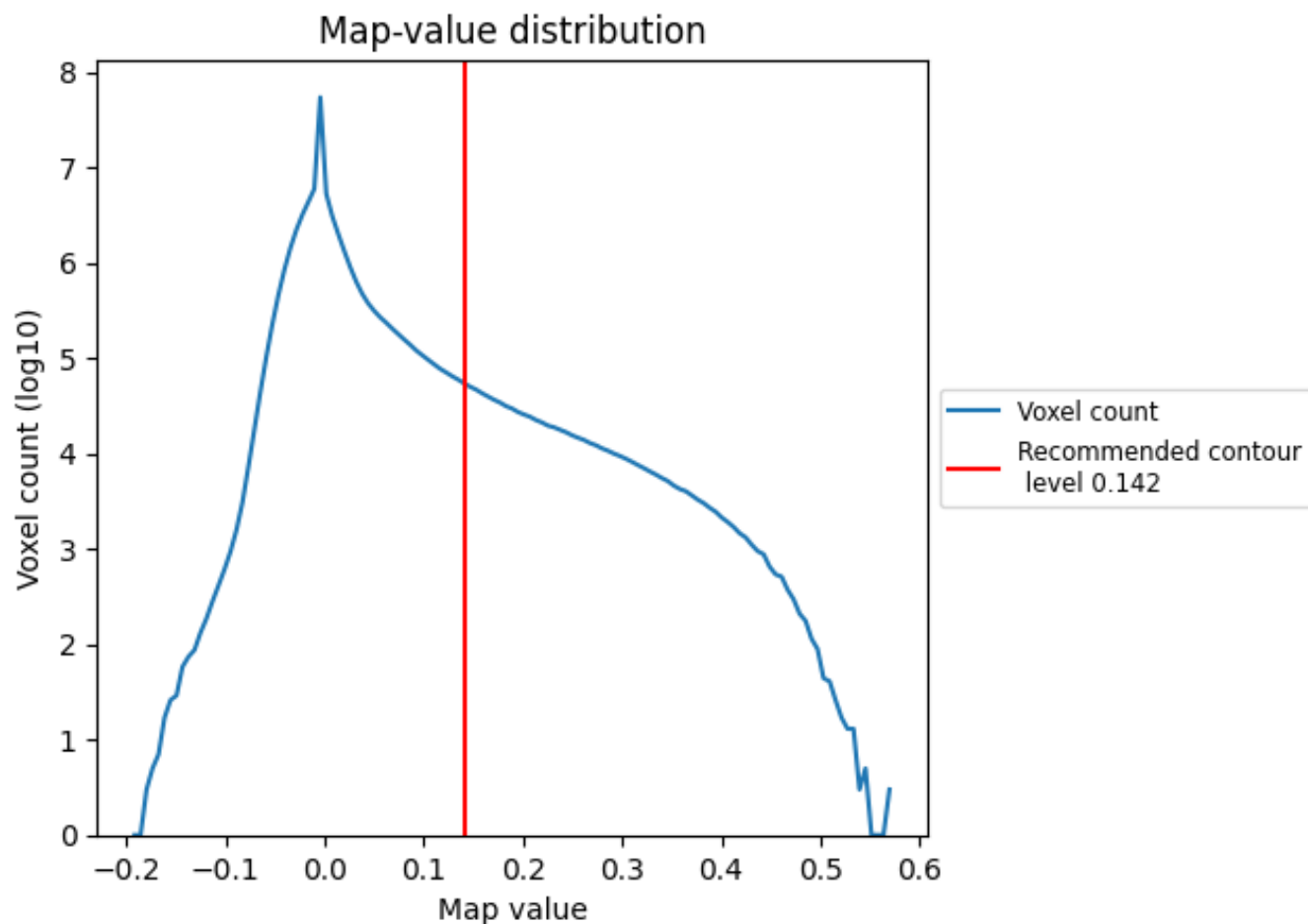
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

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

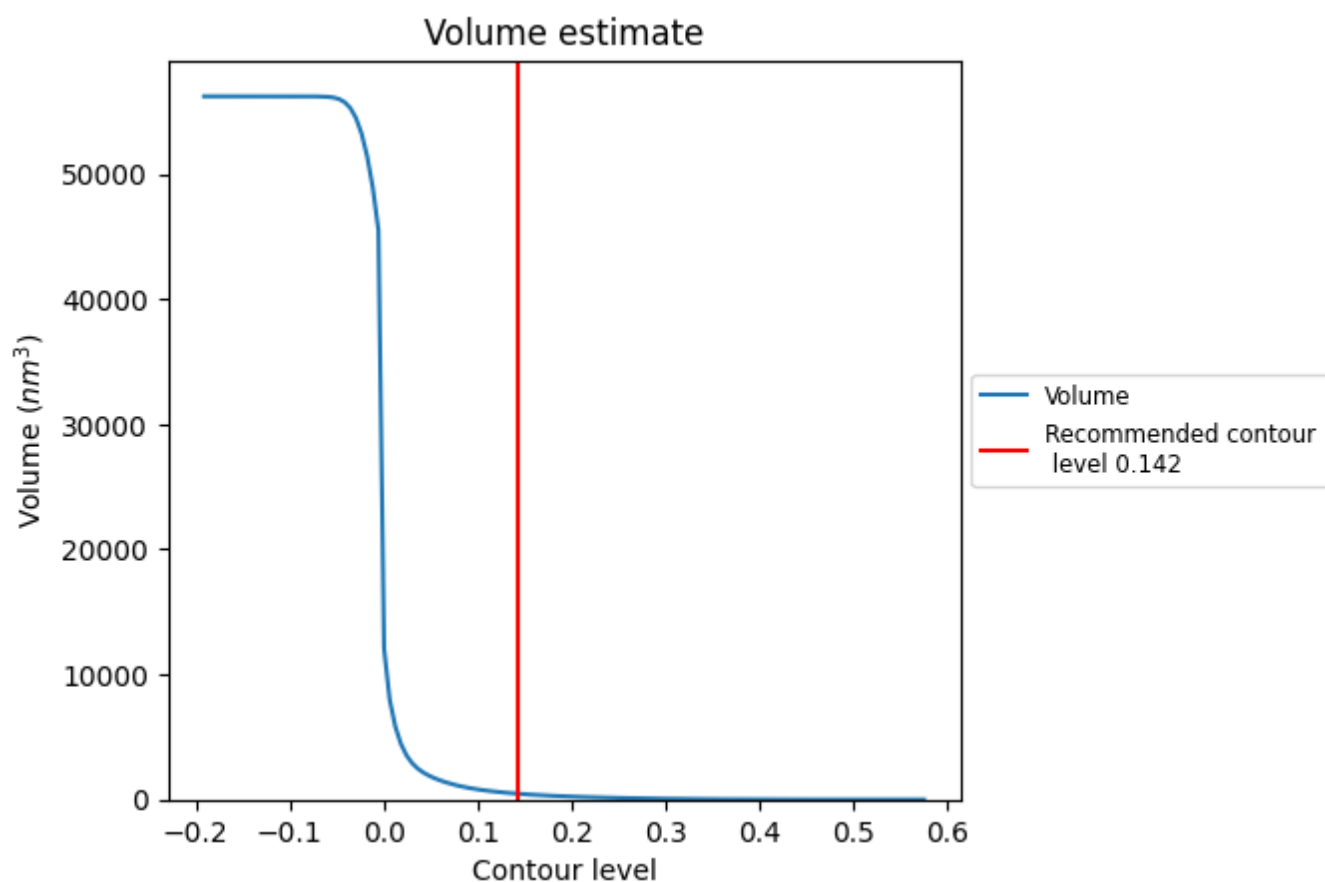
### 7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.



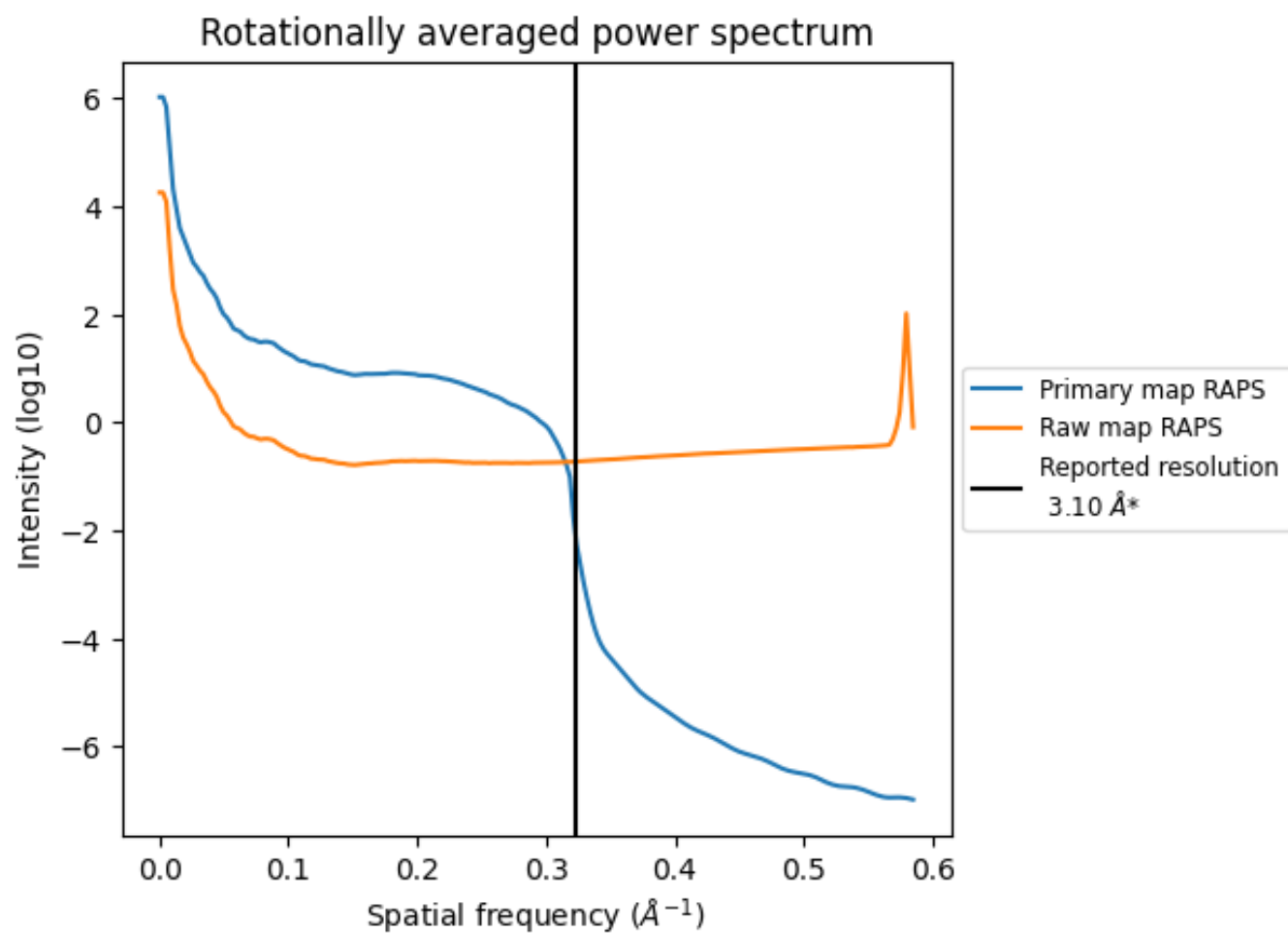
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 472 nm<sup>3</sup>; this corresponds to an approximate mass of 426 kDa.

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

### 7.3 Rotationally averaged power spectrum ⓘ

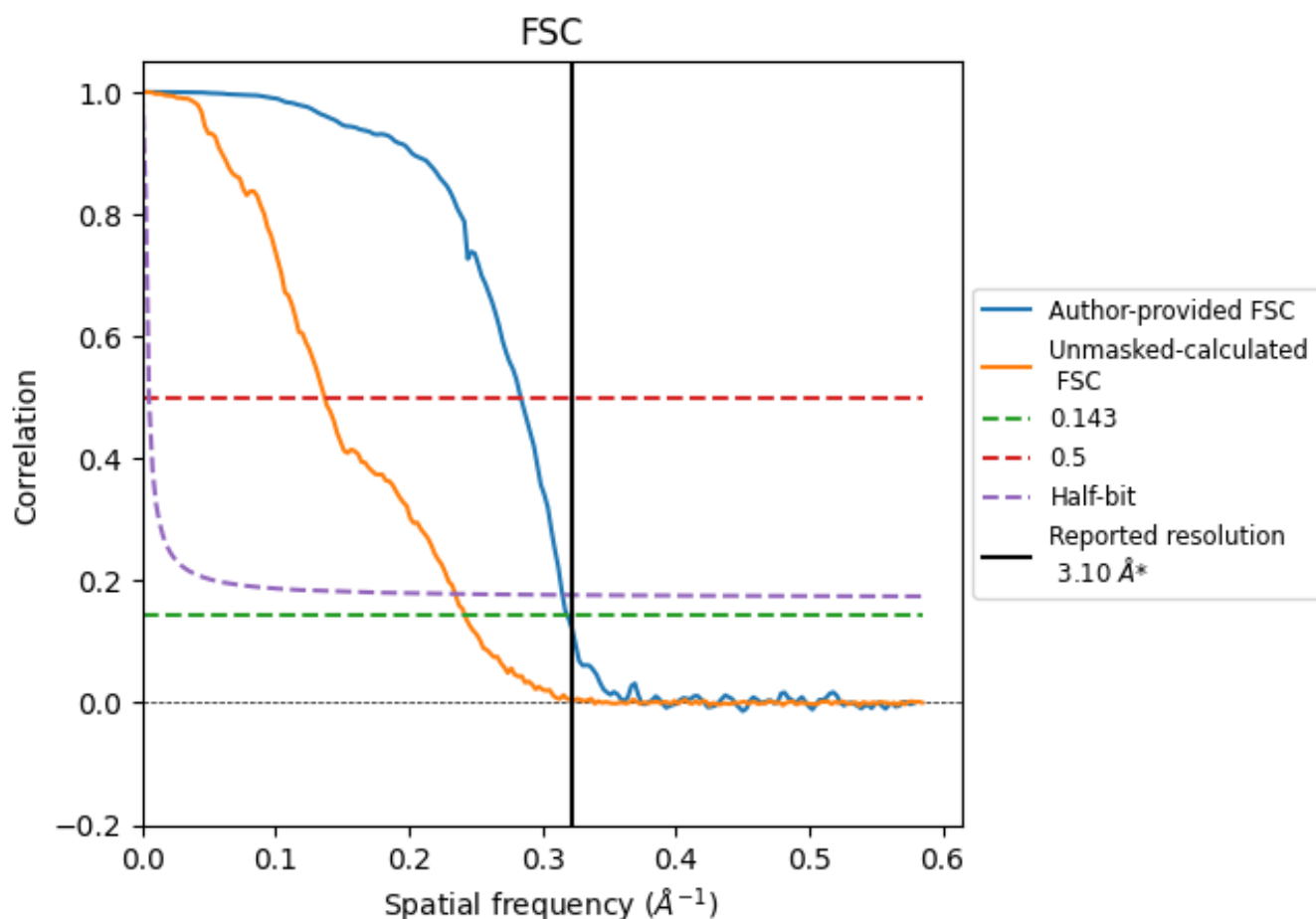


\*Reported resolution corresponds to spatial frequency of 0.323 Å<sup>-1</sup>

## 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 0.323  $\text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

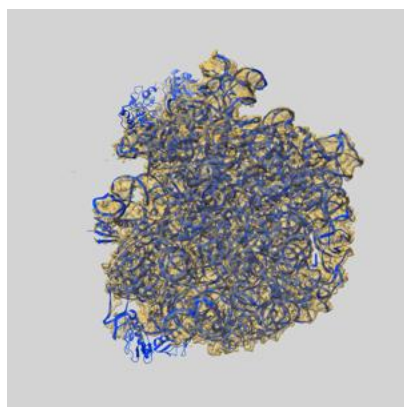
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	3.14	3.52	3.17
Unmasked-calculated*	4.13	7.32	4.26

\*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 4.13 differs from the reported value 3.1 by more than 10 %

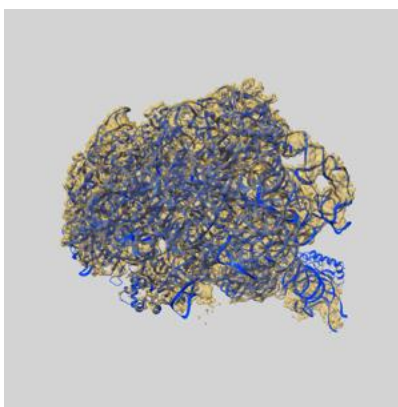
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-44869 and PDB model 9BSL. Per-residue inclusion information can be found in section [3](#) on page [8](#).

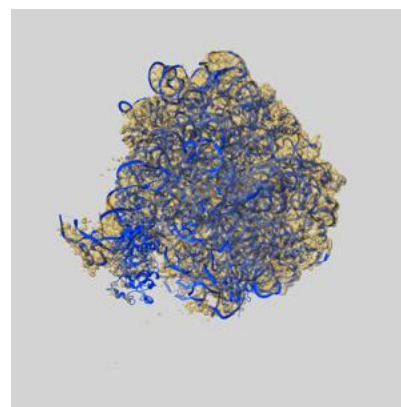
### 9.1 Map-model overlay [i](#)



X



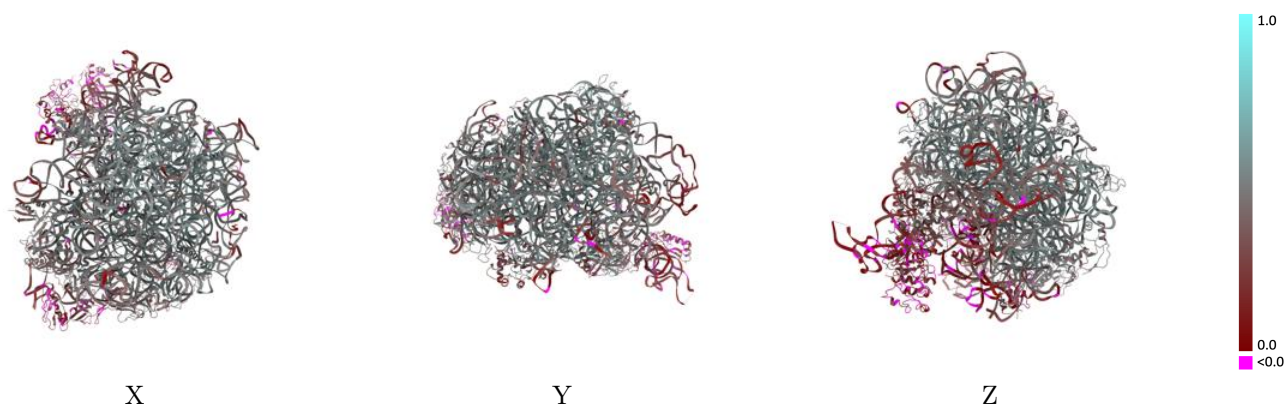
Y



Z

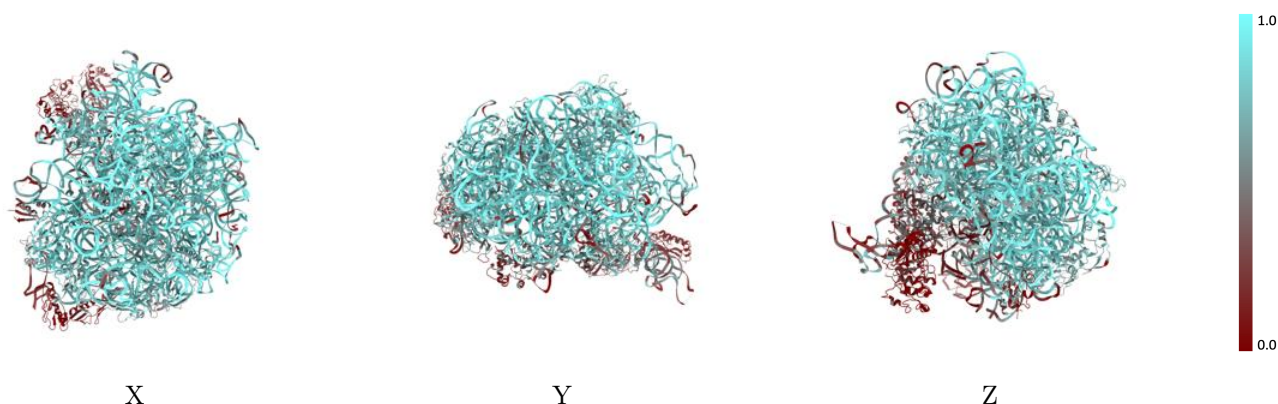
The images above show the 3D surface view of the map at the recommended contour level 0.142 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



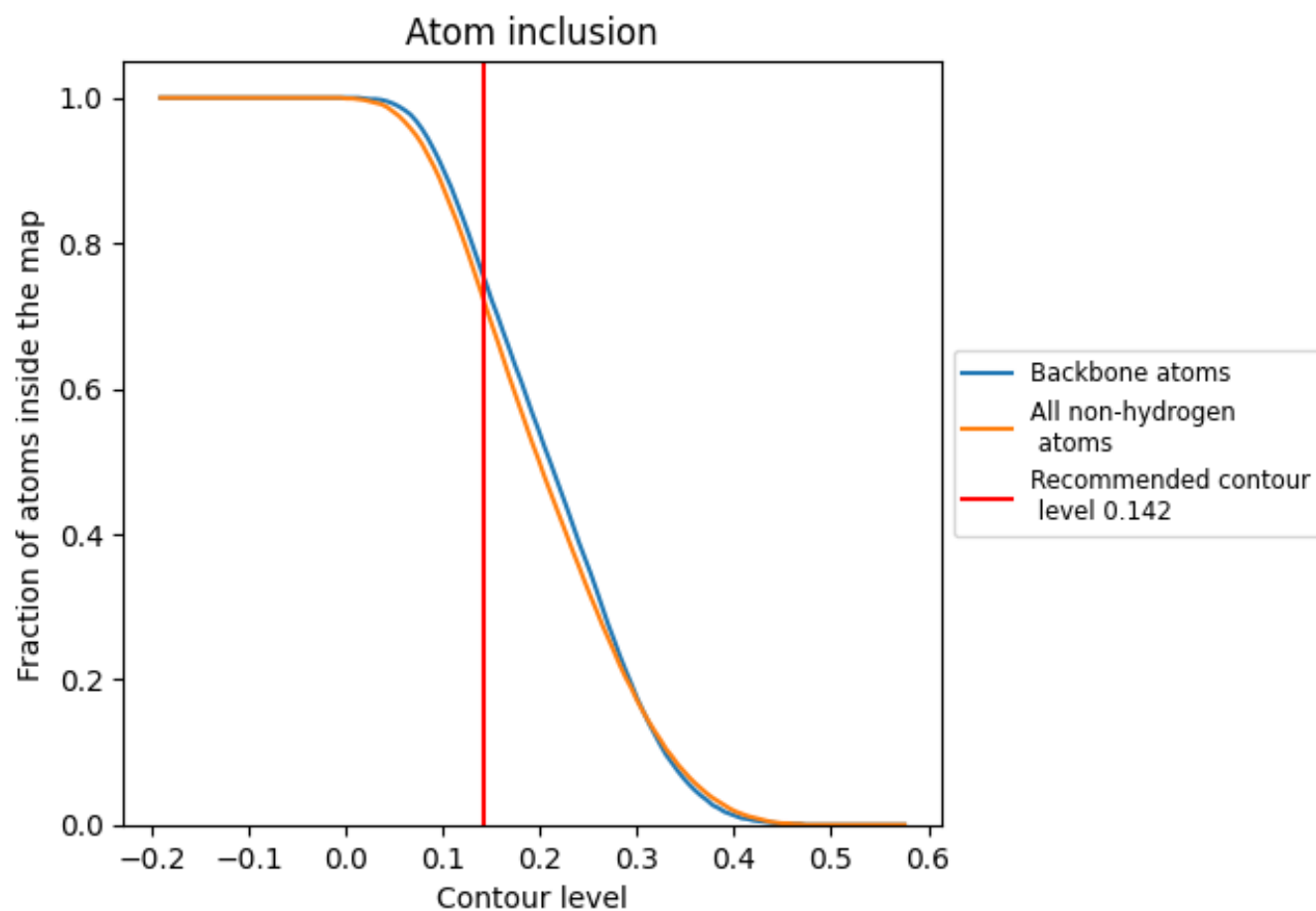
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.142).















































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 75% of all backbone atoms, 72% 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 (0.142) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7200	 0.4140
A	 0.8020	 0.4260
C	 0.7320	 0.5150
D	 0.7280	 0.4610
E	 0.6990	 0.4840
F	 0.0370	 0.0990
G	 0.7370	 0.4410
H	 0.6300	 0.4650
I	 0.3110	 0.2860
J	 0.8140	 0.4970
K	 0.6660	 0.4490
L	 0.7770	 0.4670
M	 0.6690	 0.4600
N	 0.7790	 0.5070
O	 0.7540	 0.4990
P	 0.6950	 0.4810
R	 0.7240	 0.4400
S	 0.3820	 0.3840
T	 0.7060	 0.3680
U	 0.8290	 0.5510
V	 0.3820	 0.3580
W	 0.2940	 0.2870
Y	 0.0260	 0.0790

