



wwPDB EM Validation Summary Report ⓘ

Mar 19, 2024 – 10:29 PM JST

PDB ID : 6JH6
EMDB ID : EMD-9825
Title : Structure of RyR2 (F/A/Ca²⁺ dataset)
Authors : Chi, X.M.; Gong, D.S.; Ren, K.; Zhou, G.W.; Huang, G.X.Y.; Lei, J.L.; Zhou, Q.; Yan, N.
Deposited on : 2019-02-17
Resolution : 4.80 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev70
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

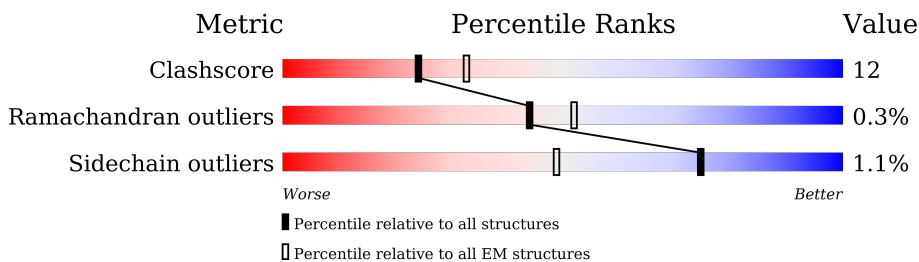
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.80 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	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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

Mol	Chain	Length	Quality of chain
1	A	108	
1	C	108	
1	E	108	
1	G	108	
2	B	4968	
2	D	4968	
2	F	4968	
2	H	4968	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 108924 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	107	819	516	144	155	4	0	0
1	C	107	819	516	144	155	4	0	0
1	E	107	819	516	144	155	4	0	0
1	G	107	819	516	144	155	4	0	0

- Molecule 2 is a protein called RyR2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	3454	26380	16798	4512	4915	155	0	0
2	D	3454	26380	16798	4512	4915	155	0	0
2	F	3454	26380	16798	4512	4915	155	0	0
2	H	3454	26380	16798	4512	4915	155	0	0

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
3	B	1	Total	C	N	O	P	0
			31	10	5	13	3	
3	D	1	Total	C	N	O	P	0
			31	10	5	13	3	
3	F	1	Total	C	N	O	P	0
			31	10	5	13	3	
3	H	1	Total	C	N	O	P	0
			31	10	5	13	3	

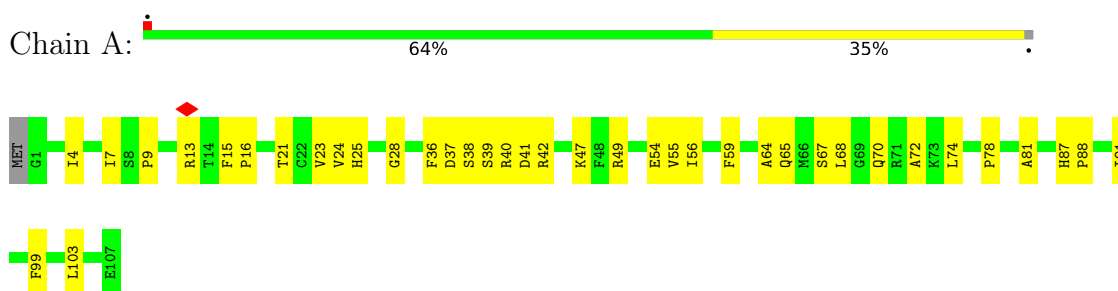
- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
4	B	1	Total	Zn	0
			1	1	
4	D	1	Total	Zn	0
			1	1	
4	F	1	Total	Zn	0
			1	1	
4	H	1	Total	Zn	0
			1	1	

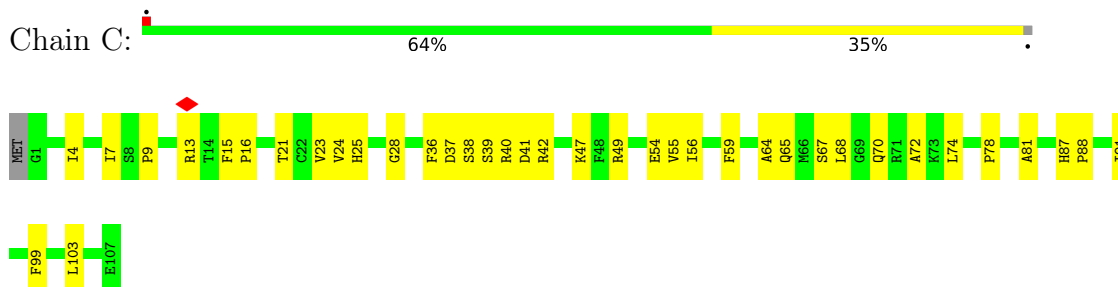
3 Residue-property plots [i](#)

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.

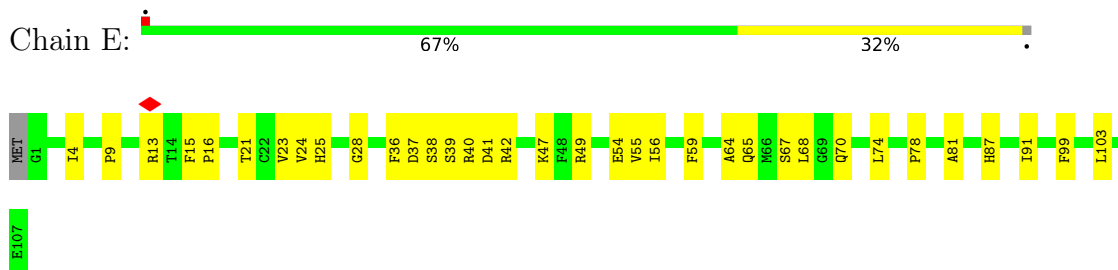
- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B



- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B

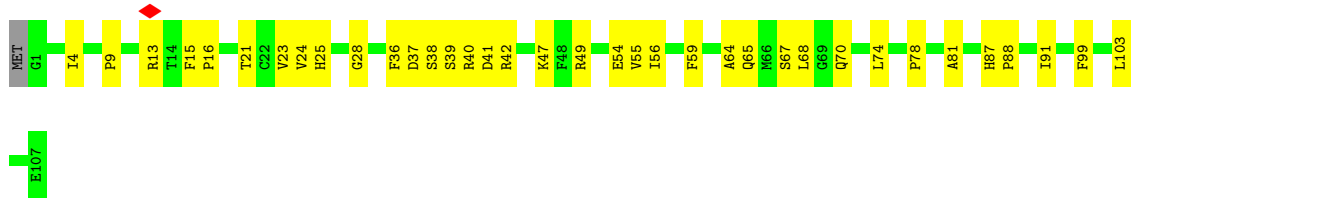


- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B

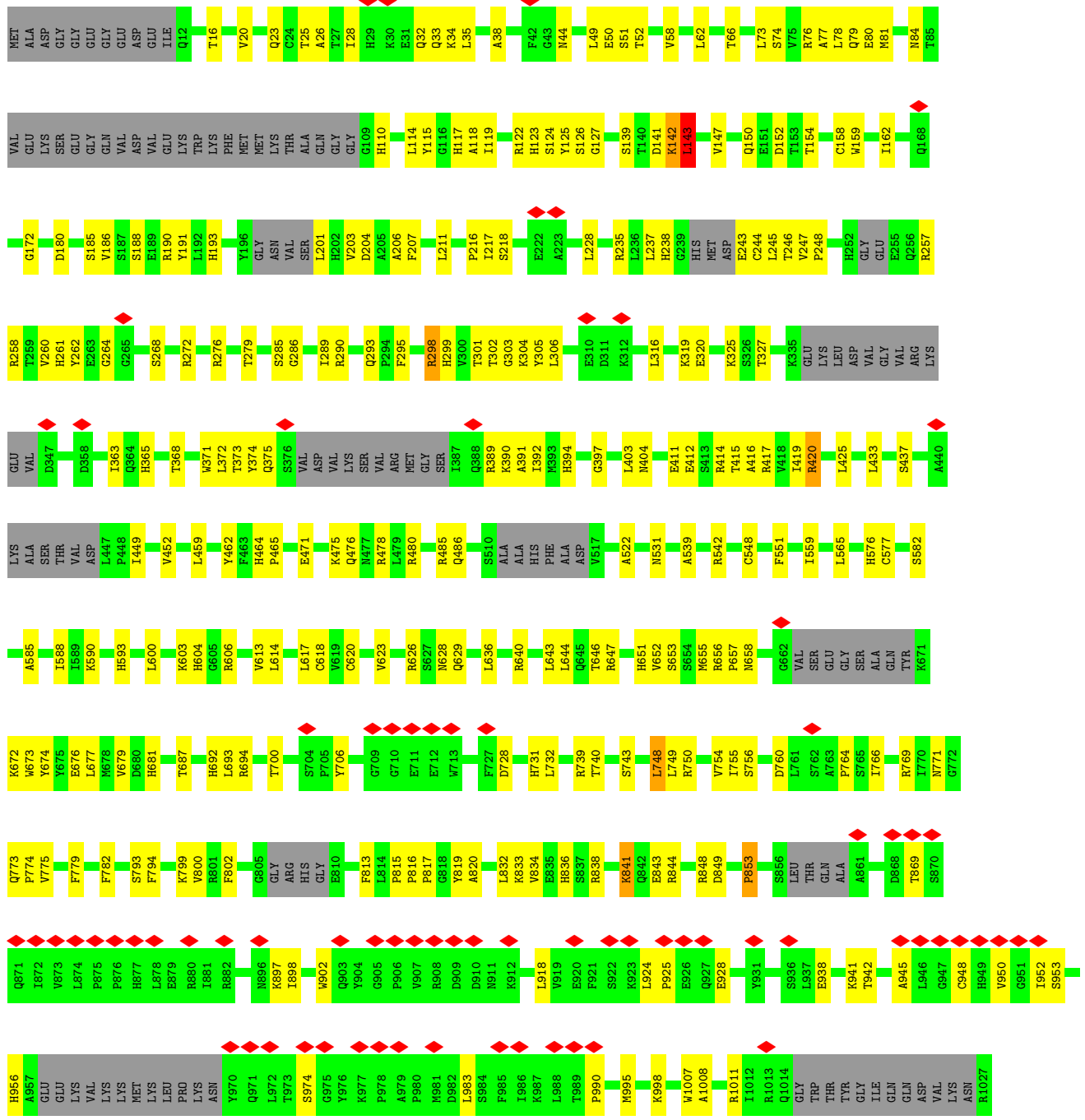


- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B



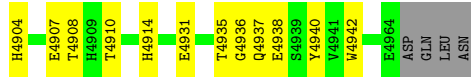


● Molecule 2: RyR2

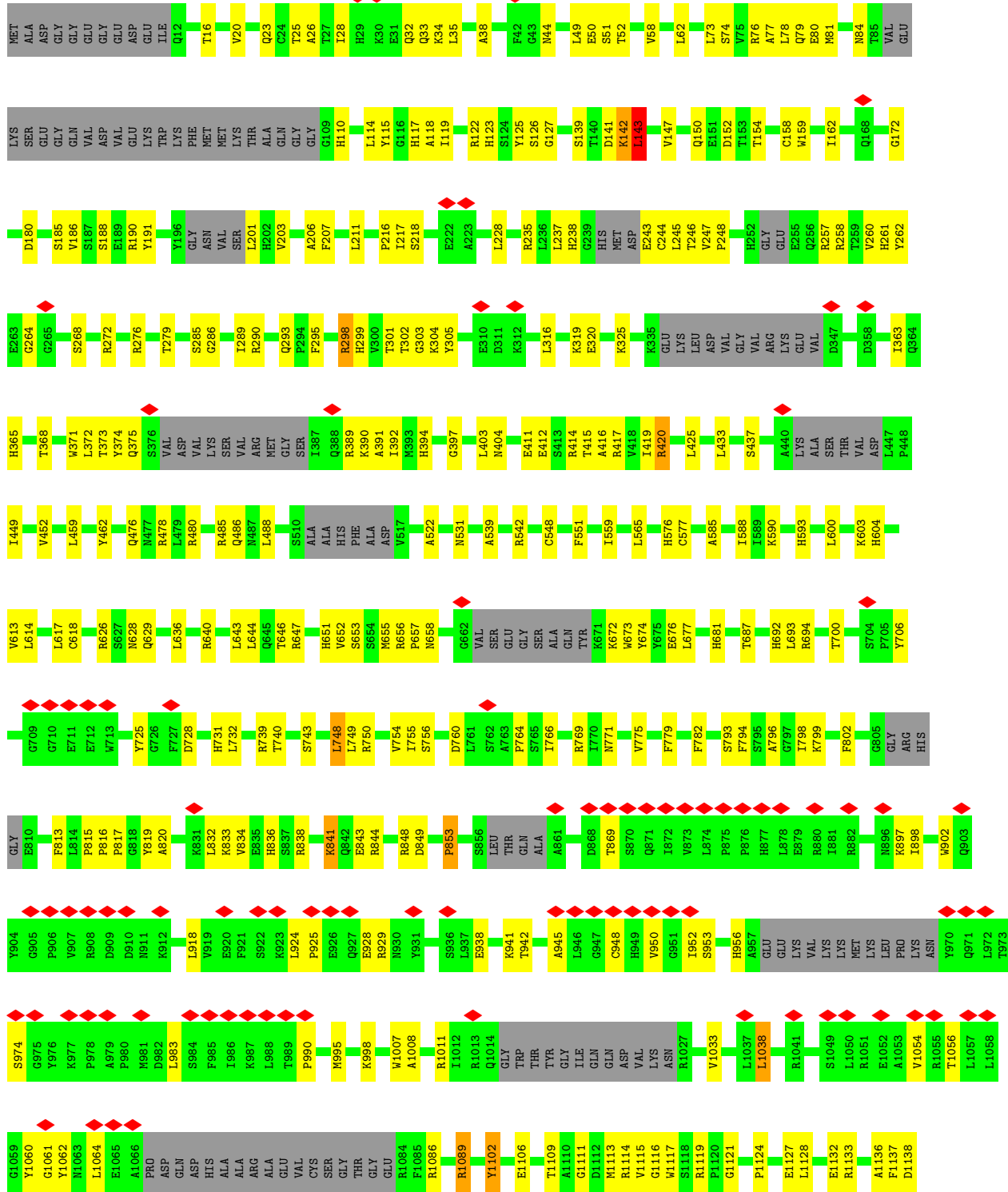


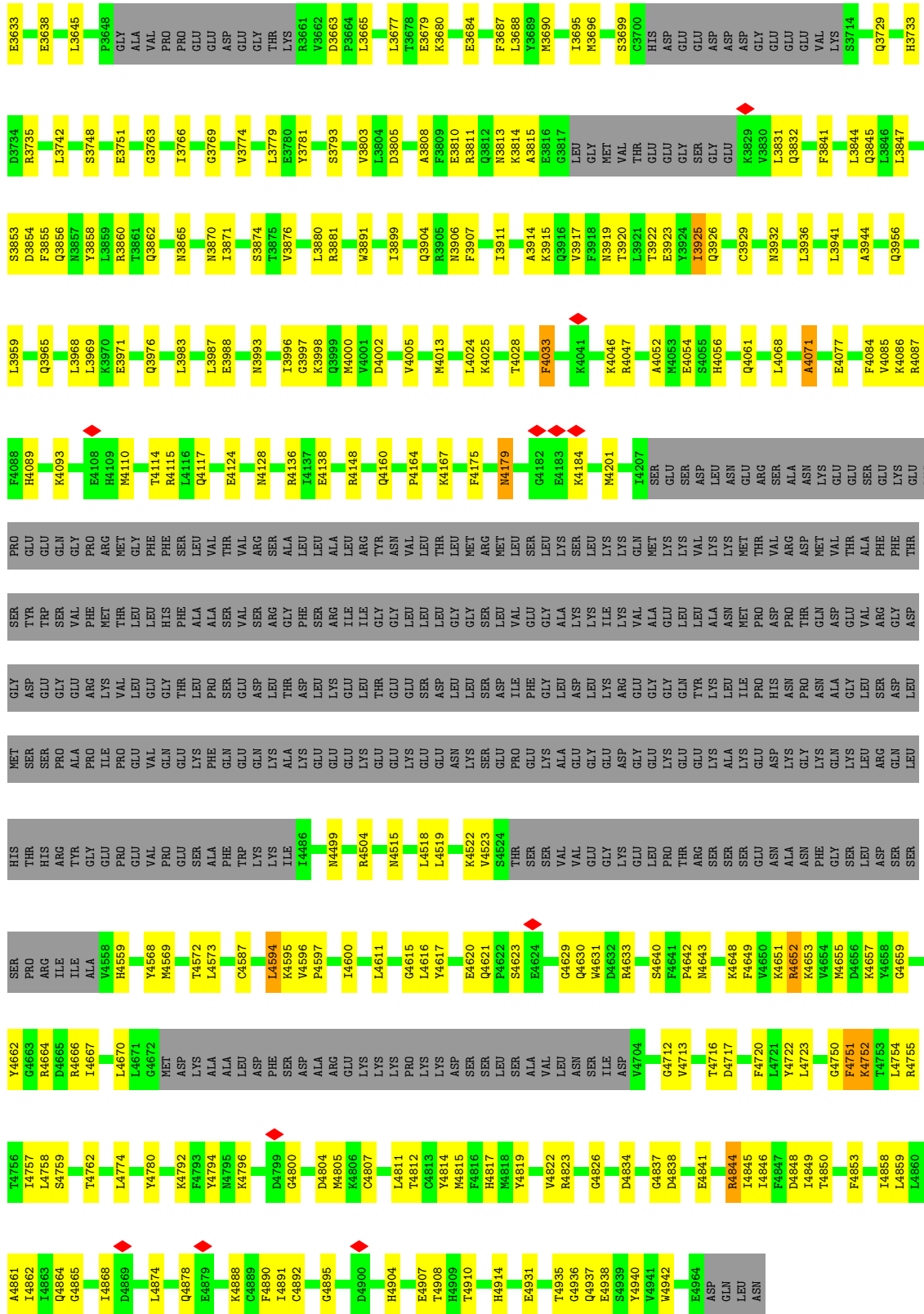
V1033	L1037	L1038	R1041	S1049	L1050	R1051	E1052	A1053	V1054	R1055	T1056	L1057	L1058	G1059	Y1060	G1061	Y1062	H1063	L1064	A1065	A1066	PRO	ASP	ASN	GLN	ASP	ASP	HIS	ALA	ALA	ALA	ALA	GLU	VAL	CYS	GLY	THR	GLY	R1084	F1085	R1086	R1089	A1098	M1101	Y1102	E1106	T1109	G1111	P1112																																									
M1113	R1114	V1115	G1116	W1117	S1118	R1119	P1120	G1121	P1124	E1127	L1128	E1132	R1133	A1136	F1137	D1138	Q1143	R1144	W1145	H1146	Q1147	E1150	H1151	Y1152	G1153	R1154	S1155	W1156	Q1157	A1158	G1159	D1160	M1165	T1172	M1173	M1174	F1175	T1176	L1177	N1178	G1179	E1180	I1181	L1182	L1183	D1184	G1187	S1188	E1189	L1190																																								
A1191	F1192	D1196	S1206	L1207	Q1211	V1212	G1213	R1214	S1222	T1223	L1224	F1227	T1228	G1231	L1232	G1235	Y1236	F1239	M1242	W1250	L1251	S1252	K1253	R1254	L1255	P1256	Q1257	F1258	H1267	R1272	I1273	D1274	GLY	THR	ILE	ASP	SER	ASP	HIS	GLY	PRO	CYS	VAL	LEU	V1285	T1286	G1291																																											
N1294	Y1302	R1303	L1304	M1306	C1310	ALA	ASN	VAL	PHE	SER	LYS	THR	ALA	GLN	SER	GLY	GLY	PRO	GLY	ILE	ARG	PRO	GLY	ALA	ALA	SER	LEU	PHE	GLY	PRO	M1242	W1250	L1251	S1252	K1253	R1254	L1255	P1256	Q1257	F1258	H1267	R1272	I1273	D1274	GLY	THR	ILE	ASP	SER	ASP	HIS	GLY	PRO	CYS	VAL	LEU	TYR	ASP	THR	SER	HIS	GLU	VAL	LEU	MET	GLU	LYS	THR	THR	VAL	ALA	ALA	HIS	GLY	ASP	PRO	GLY	VAL	ASP	THR	TYR	ASP	ASP	VAL	VAL	ASP	TYR	ASP	MET	LYS
GLN	THR	SER	T1425	S1429	V1430	R1431	G1434	GLY	GLU	GLU	PRO	ALA	N1440	V1441	W1442	V1443	W1444	W1445	I1446	H1451	Q1452	T1455	L1459	ASP	ARG	VAL	ARG	THR	LEU	THR	V1465	L1469	K1475	V1476	H1477	E1478	S1479	R1482	S1483	N1484	CYS	Y1486	M1487	V1488	C1489	A1490	GLY	GLU	SER	GLU	SER	MET	LYS	PRO	GLY																																			
GLN	GLY	ARG	R1502	I1507	L1508	C1509	V1510	ASP	ALA	ALA	SER	G1516	T1521	Y1531	F1543	F1544	Q1545	Q1546	S1549	P1550	M1551	Q1554	F1555	E1556	LEU	GLY	ARG	ILE	L1642	L1643	H1654	Y1655	H1656	T1657	L1658	R1659	L1667	G1668	N1669	H1670	R1671	V1672	Q1581	A1673	C1582	L1676	L1586	H1587	F1590	L1591																																								
S1592	H1593	W1596	A1688	I1689	E1690	N1691	G1696	R1699	Y1703	I1707	L1711	T1716	A1717	R1718	L1719	M1722	M1723	I1726	V1727	L1738	P1741	GLU	ASN	LYS	GLY	VAL	H1664	Y1665	H1656	T1657	L1658	R1659	L1667	G1668	N1669	H1670	R1671	V1672	Q1581	A1673	C1582	L1676	L1586	H1587	F1590	L1591																																												
Q1684	Y1687	A1688	I1689	E1690	N1691	G1696	R1699	Y1703	I1707	L1711	T1716	A1717	R1718	L1719	M1722	M1723	I1726	V1727	L1738	P1741	GLU	ASN	LYS	GLY	VAL	H1664	Y1665	H1656	T1657	L1658	R1659	L1667	G1668	N1669	H1670	R1671	V1672	Q1581	A1673	C1582	L1676	L1586	H1587	F1590	L1591																																													
P1783	I1786	L1795	V1799	S1803	R1807	D1808	P1809	V1810	G1811	G1812	F1816	L1817	P1820	L1821	I1830	E1847	P1848	VAL	PHE	LYS	GLY	ALA	ALA	GLY	PRO	GLU	GLU	GLU	L1748	P1749	G1750	L1753	S1756	L1757	R1758	M1761	Q1762	S1767	S1770	I1771	N1772	H1773	E1774	S1779																																														
GLU	GLU	GLU	SER	GLY	GLY	LYS	ARG	PRO	LYS	GLU	GLU	L1684	P1902	L1905	R1920	H1921	R1922	V1927	Y1934	Q1938	D1939	N1940	Q1941	R1942	F1943	R1944	V1948	MET	GLN	ALA	LEU	GLU	ALA	ALA	LEU	THR	THR	THR	LYS	GLU	PHE	ASP	SER	GLY	ALA	ARG	PRO	PRO	GLY	GLN	GLU	ALA																																						
ILE	ASN	MET	LEU	LEU	ASN	PHE	LYS	ASP	ASP	ASP	SER	GLU	CYS	PRO	PRO	GLU	GLY	ILE	E2011	L2012	D2013	GLU	GLY	SER	LEU	ASP	ASN	S2022	D2023	L2024	T2025	L2026	R2027	G2028	R2029	L2030	L2031	E2035	K2036	V2037	T2038	Y2039	L2040																																															
GLU	SER	ASP	SER	LYS	SER	SER	T2058	L2059	Q2060	Q2070	A2071	S2074	V2075	I2076	L2081	R2083	H2090	R2091	Q2092	L2096	V2100	R2101	A2102	K2105	T2106	Y2107	T2108	I2109	D2116	T2117	I2118	L2121	L2124	I2127	L2142	M2143	R2145	M2153	M2161	V2177																																																		
G2181	GLY	GLU	GLY	GLY	GLY	GLU	THR	F2296	E2297	R2298	Y2299	L2300	R2304	F2305	F2308	S2313	I2326	E2330	CYS	PHE	GLY	PRO	ALA	ALA	L2026	R2259	V2267	R2268	Y2269	L2270	G2274	LEU	GLN	SER	SER	CYS	GLN	MET	GLY	VAL	SER	SER	LYS	GLY	TYR	PRO																																												
ASP	ILE	TRP	ASN	LYS	GLU	ILE	THR	G2296	E2297	R2298	Y2299	L2300	R2304	F2305	F2308	S2313	I2326	E2330	CYS	PHE	GLY	PRO	ALA	ALA	L2026	R2259	V2267	R2268	Y2269	L2270	G2274	LEU	GLN	SER	SER	CYS	GLN	MET	GLY	VAL	SER	SER	LYS	GLY	TYR	PRO																																												

Table containing amino acid residues and their corresponding protein identifiers, organized into 16 vertical columns. Each entry consists of a residue name (e.g., THR, GLU, SER) and a protein ID (e.g., P2706, V2707, D2708). The entries are color-coded: green for standard residues, yellow for specific residues like C2462, and grey for others. Small red diamond symbols are placed between certain entries in the first and second columns.



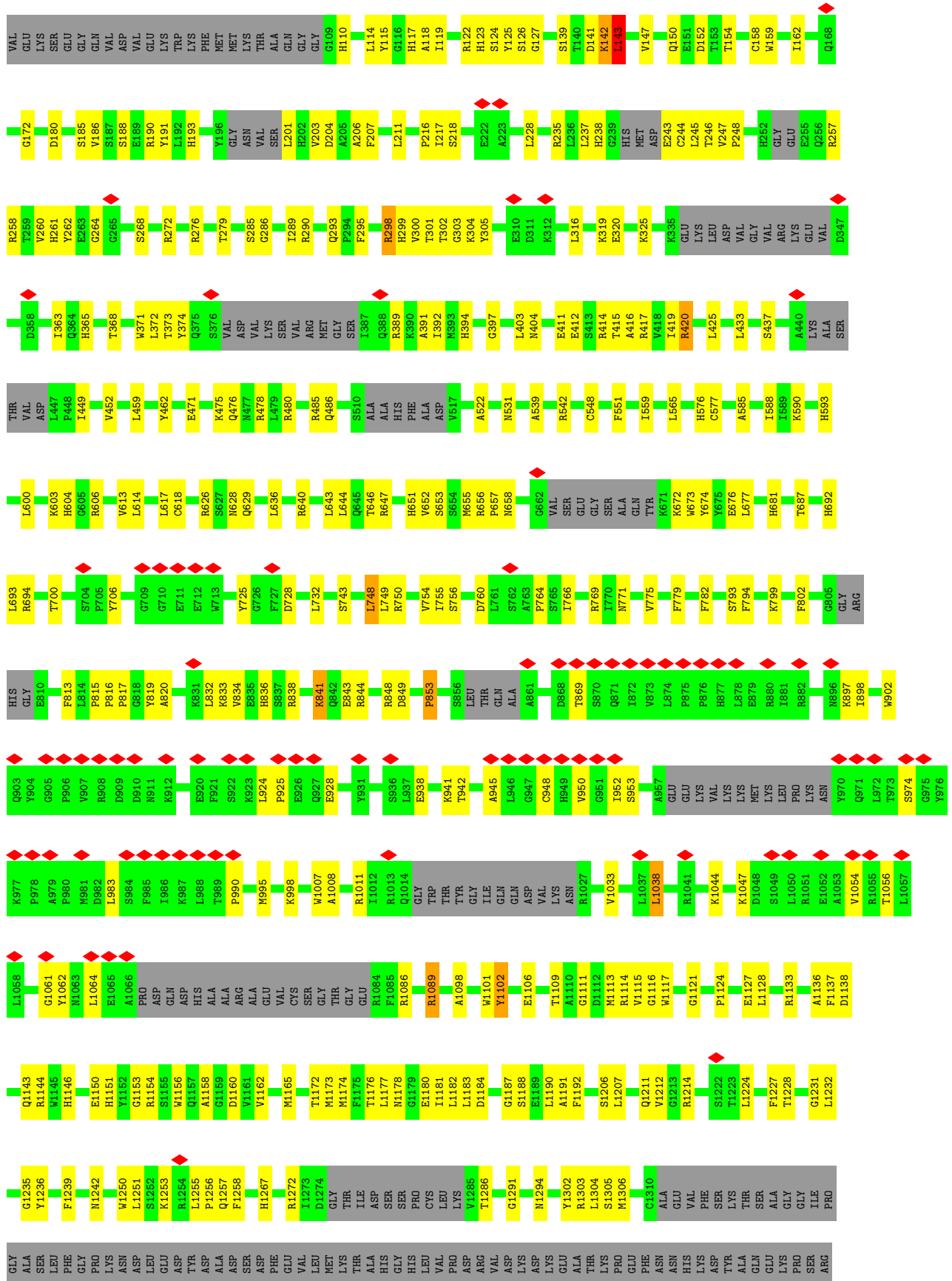
• Molecule 2: RyR2





● Molecule 2: RyR2





C3929	E4077	E4084	E4086	E4087	E4088	E4089	E4093	E4108	E4109	E4110	T4114	R4115	L4116	Q4117	E4124	M4128	R4136	I4137	E4138	R4148	Q4160	P4164	K4167	F4175	N4179	G4182	E4183	K4184	M4201	L4207	R4052	M4053	E4054	S4055	H4056	Q4061	L4068	A4071										
GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	PRO	ARG	MET	GLY	PHE	GLY	LEU	VAL	ARG	ALA	LEU	LEU	ALA	ARG	TYR	LEU	THR	MET	ARG	GLY	LEU	LEU	LEU	LEU	GLN	GLY	LEU	GLY	ASP	LEU	LEU	LEU	LEU	LEU	ASP						
MET	VAL	THR	ALA	THR	PHE	THR	THR	THR	THR	THR	LEU	LEU	PHE	ALA	ALA	ARG	GLY	PHE	LEU	LEU	LEU	LEU	GLY	GLY	LEU	LEU	VAL	GLY	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	THR							
GLN	ASP	GLY	VAL	GLY	GLN	ASP	GLY	ALA	PRO	VAL	GLY	GLY	THR	LEU	PRO	THR	ASP	LEU	LEU	GLY	THR	GLY	GLY	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	PRO							
ASN	ALA	LEU	LEU	LEU	LEU	MET	GLY	LEU	LEU	LEU	GLY	GLY	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU							
LYS	GLN	LYS	LEU	ARG	GLN	LEU	HIS	THR	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU							
ASN	PHE	GLY	SER	LEU	ASP	SER	SER	SER	SER	ALA	V4558	H4559	Y4568	M4569	T4572	L4573	C4587	L4594	K4595	V4596	P4597	I4600	K4610	L4611	G4615	L4616	L4617	E4620	Q4621	P4622	S4623	E4628	G4629	Q4630	W4631	D4632	R4633	S4640	F4641	P4642	M4643	K4648	F4649	V4650	K4651			
R4652	K4653	Y4654	M4655	D4656	Y4657	Y4658	G4659	Y4662	G4663	R4664	D4665	R4666	I4667	L4670	L4671	G4672	MET	ASP	PHE	SER	ASP	ALA	ARG	GLY	LYS	LYS	PRO	LYS	LYS	ASP	VAL	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU			
Y4722	L4723	G4750	F4751	K4752	T4753	L4754	R4755	R4756	I4757	L4758	S4759	T4762	L4774	Y4780	K4792	F4793	Y4794	N4795	K4796	D4799	G4800	ALA	ALA	ALA	D4804	M4805	K4806	C4807	D4808	L4811	T4812	C4813	Y4814	M4815	F4816	H4817	M4818	Y4819	V4822	R4823	G4826	D4834	D4838	E4841	R4844	I4845	F4846	F4847
D4848	I4849	T4850	F4853	I4858	L4859	L4860	A4861	L4862	I4863	Q4864	G4865	I4868	D4869	A4870	F4871	L4874	Q4878	E4879	K4888	C4889	F4890	I4891	C4892	G4895	D4900	P4903	H4904	E4907	T4908	H4909	T4910	H4914	E4931	T4935	Q4936	E4938	S4939	Y4940	V4941	V4942	A4955	E4964	ASP					
GLN	LEU	ASN																																														

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C4	Depositor
Number of particles used	44288	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 ($e^-/\text{\AA}^2$)	48.6	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.071	Depositor
Minimum map value	-0.031	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.017	Depositor
Map size (Å)	522.616, 522.616, 522.616	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.30654, 1.30654, 1.30654	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: ZN, ATP

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.32	0/835	0.55	0/1123
1	C	0.32	0/835	0.55	0/1123
1	E	0.32	0/835	0.55	0/1123
1	G	0.32	0/835	0.55	0/1123
2	B	0.34	0/26871	0.58	8/36338 (0.0%)
2	D	0.34	0/26871	0.58	9/36338 (0.0%)
2	F	0.34	0/26871	0.58	8/36338 (0.0%)
2	H	0.34	0/26871	0.58	8/36338 (0.0%)
All	All	0.34	0/110824	0.58	33/149844 (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
2	B	0	21
2	D	0	21
2	F	0	21
2	H	0	21
All	All	0	84

There are no bond length outliers.

The worst 5 of 33 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	2038	THR	C-N-CA	6.49	137.94	121.70
2	B	2038	THR	C-N-CA	6.49	137.91	121.70
2	H	2038	THR	C-N-CA	6.47	137.88	121.70
2	F	2038	THR	C-N-CA	6.47	137.86	121.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	1753	LEU	CA-CB-CG	5.70	128.40	115.30

There are no chirality outliers.

5 of 84 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	141	ASP	Peptide
2	B	142	LYS	Peptide
2	B	143	LEU	Peptide
2	B	748	LEU	Peptide
2	B	816	PRO	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	819	0	824	28	0
1	C	819	0	824	28	0
1	E	819	0	824	25	0
1	G	819	0	824	27	0
2	B	26380	0	24897	701	0
2	D	26380	0	24897	685	0
2	F	26380	0	24897	686	0
2	H	26380	0	24897	688	0
3	B	31	0	12	2	0
3	D	31	0	12	2	0
3	F	31	0	12	2	0
3	H	31	0	12	2	0
4	B	1	0	0	0	0
4	D	1	0	0	0	0
4	F	1	0	0	0	0
4	H	1	0	0	0	0
All	All	108924	0	102932	2514	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 12.

The worst 5 of 2514 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)
2:B:4861:ALA:CB	2:D:4864:GLN:HG2	1.60	1.32
2:D:4861:ALA:CB	2:F:4864:GLN:HG2	1.61	1.30
2:F:4861:ALA:CB	2:H:4864:GLN:HG2	1.65	1.27
2:F:4814:TYR:CE2	2:H:4518:LEU:HD13	1.71	1.24
2:D:4780:TYR:CE1	2:F:4518:LEU:HD22	1.73	1.23

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	
1	A	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
1	C	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
1	E	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
1	G	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
2	B	3332/4968 (67%)	2955 (89%)	368 (11%)	9 (0%)	41	76
2	D	3332/4968 (67%)	2955 (89%)	368 (11%)	9 (0%)	41	76
2	F	3332/4968 (67%)	2955 (89%)	368 (11%)	9 (0%)	41	76
2	H	3332/4968 (67%)	2958 (89%)	365 (11%)	9 (0%)	41	76
All	All	13748/20304 (68%)	12227 (89%)	1485 (11%)	36 (0%)	44	76

5 of 36 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	4595	LYS
2	D	4595	LYS
2	F	4595	LYS
2	H	4595	LYS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
2	B	143	LEU

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	88/89 (99%)	87 (99%)	1 (1%)	73	85
1	C	88/89 (99%)	87 (99%)	1 (1%)	73	85
1	E	88/89 (99%)	87 (99%)	1 (1%)	73	85
1	G	88/89 (99%)	87 (99%)	1 (1%)	73	85
2	B	2657/4355 (61%)	2627 (99%)	30 (1%)	73	85
2	D	2658/4355 (61%)	2627 (99%)	31 (1%)	71	84
2	F	2657/4355 (61%)	2627 (99%)	30 (1%)	73	85
2	H	2658/4355 (61%)	2627 (99%)	31 (1%)	71	84
All	All	10982/17776 (62%)	10856 (99%)	126 (1%)	74	85

5 of 126 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	4179	ASN
2	H	1089	ARG
2	F	531	ASN
2	H	1054	VAL
2	H	4087	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 183 such sidechains are listed below:

Mol	Chain	Res	Type
2	F	2755	GLN
2	H	123	HIS
2	F	3865	ASN
2	F	4098	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
2	H	1546	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
3	ATP	D	5101	-	26,33,33	0.88	1 (3%)	31,52,52	1.58	5 (16%)
3	ATP	B	5101	-	26,33,33	0.88	1 (3%)	31,52,52	1.58	5 (16%)
3	ATP	F	5101	-	26,33,33	0.87	1 (3%)	31,52,52	1.58	5 (16%)
3	ATP	H	5101	-	26,33,33	0.88	1 (3%)	31,52,52	1.58	5 (16%)

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
3	ATP	D	5101	-	-	7/18/38/38	0/3/3/3
3	ATP	B	5101	-	-	7/18/38/38	0/3/3/3
3	ATP	F	5101	-	-	7/18/38/38	0/3/3/3
3	ATP	H	5101	-	-	7/18/38/38	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	5101	ATP	C5-C4	2.18	1.46	1.40
3	H	5101	ATP	C5-C4	2.18	1.46	1.40
3	B	5101	ATP	C5-C4	2.17	1.46	1.40
3	F	5101	ATP	C5-C4	2.16	1.46	1.40

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	5101	ATP	C3'-C2'-C1'	4.19	107.29	100.98
3	H	5101	ATP	C3'-C2'-C1'	4.19	107.29	100.98
3	F	5101	ATP	C3'-C2'-C1'	4.19	107.28	100.98
3	D	5101	ATP	C3'-C2'-C1'	4.18	107.27	100.98
3	D	5101	ATP	N3-C2-N1	-3.40	123.37	128.68

There are no chirality outliers.

5 of 28 torsion outliers are listed below:

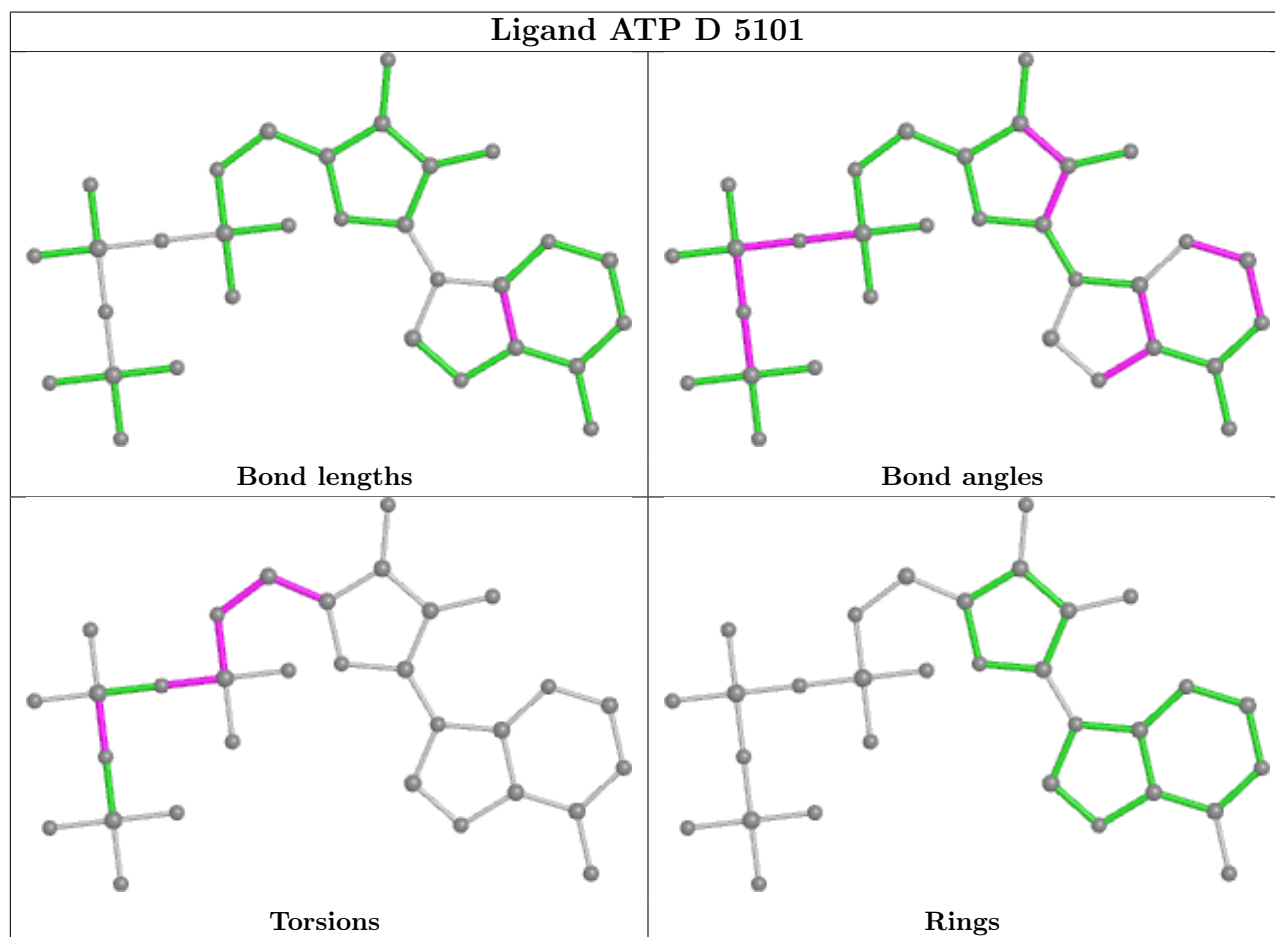
Mol	Chain	Res	Type	Atoms
3	B	5101	ATP	C5'-O5'-PA-O2A
3	B	5101	ATP	C5'-O5'-PA-O3A
3	D	5101	ATP	C5'-O5'-PA-O2A
3	D	5101	ATP	C5'-O5'-PA-O3A
3	F	5101	ATP	C5'-O5'-PA-O2A

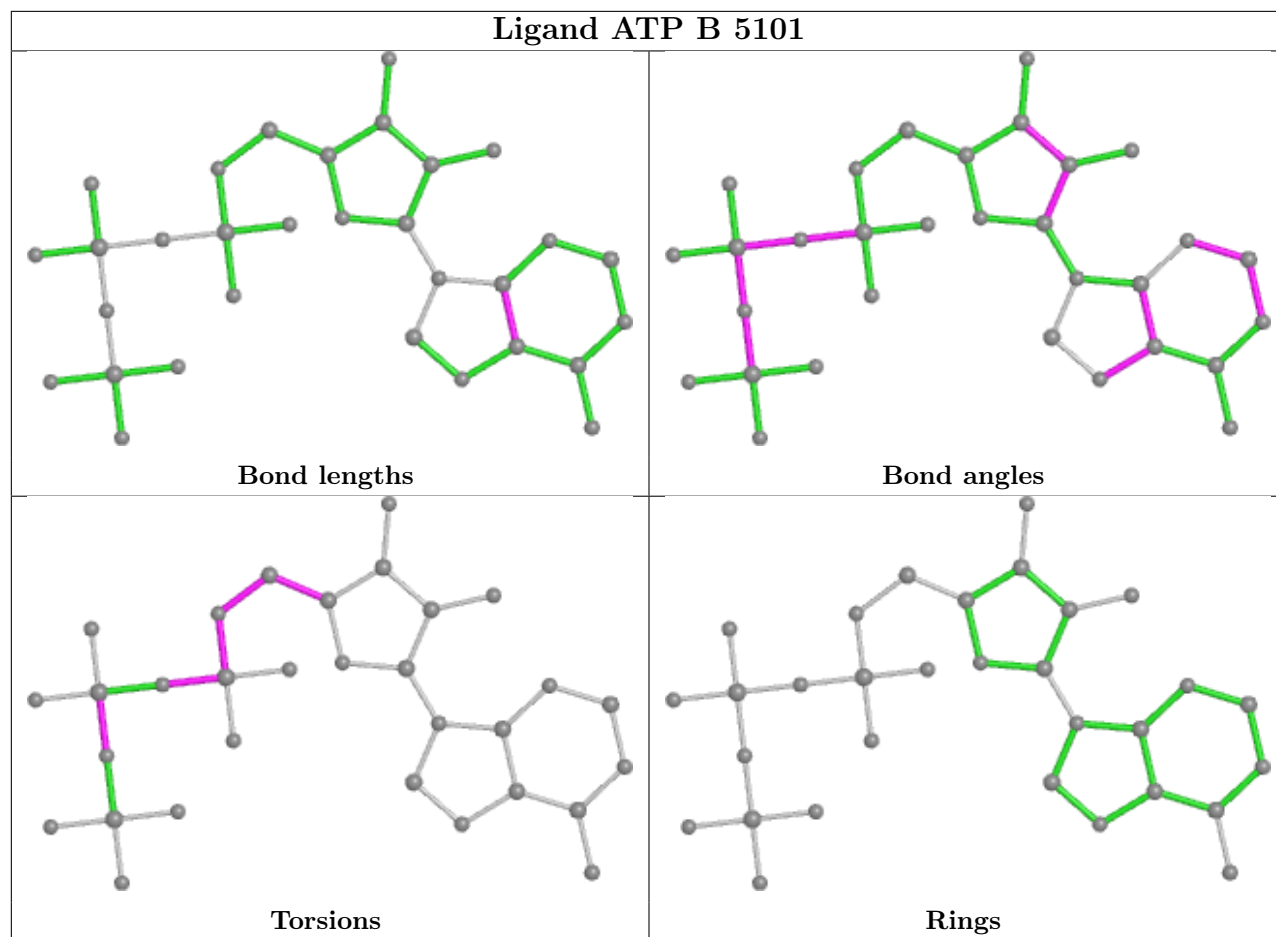
There are no ring outliers.

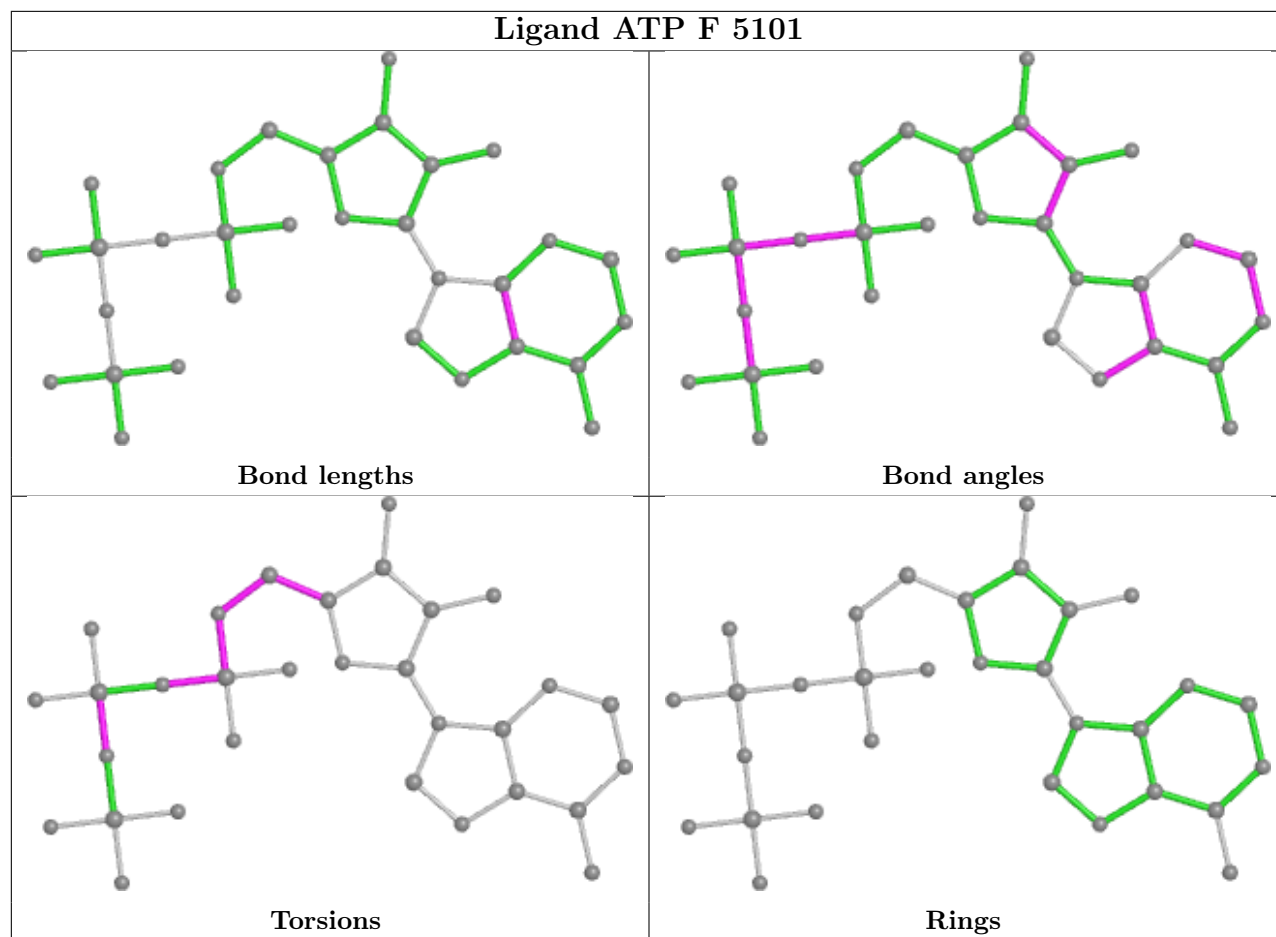
4 monomers are involved in 8 short contacts:

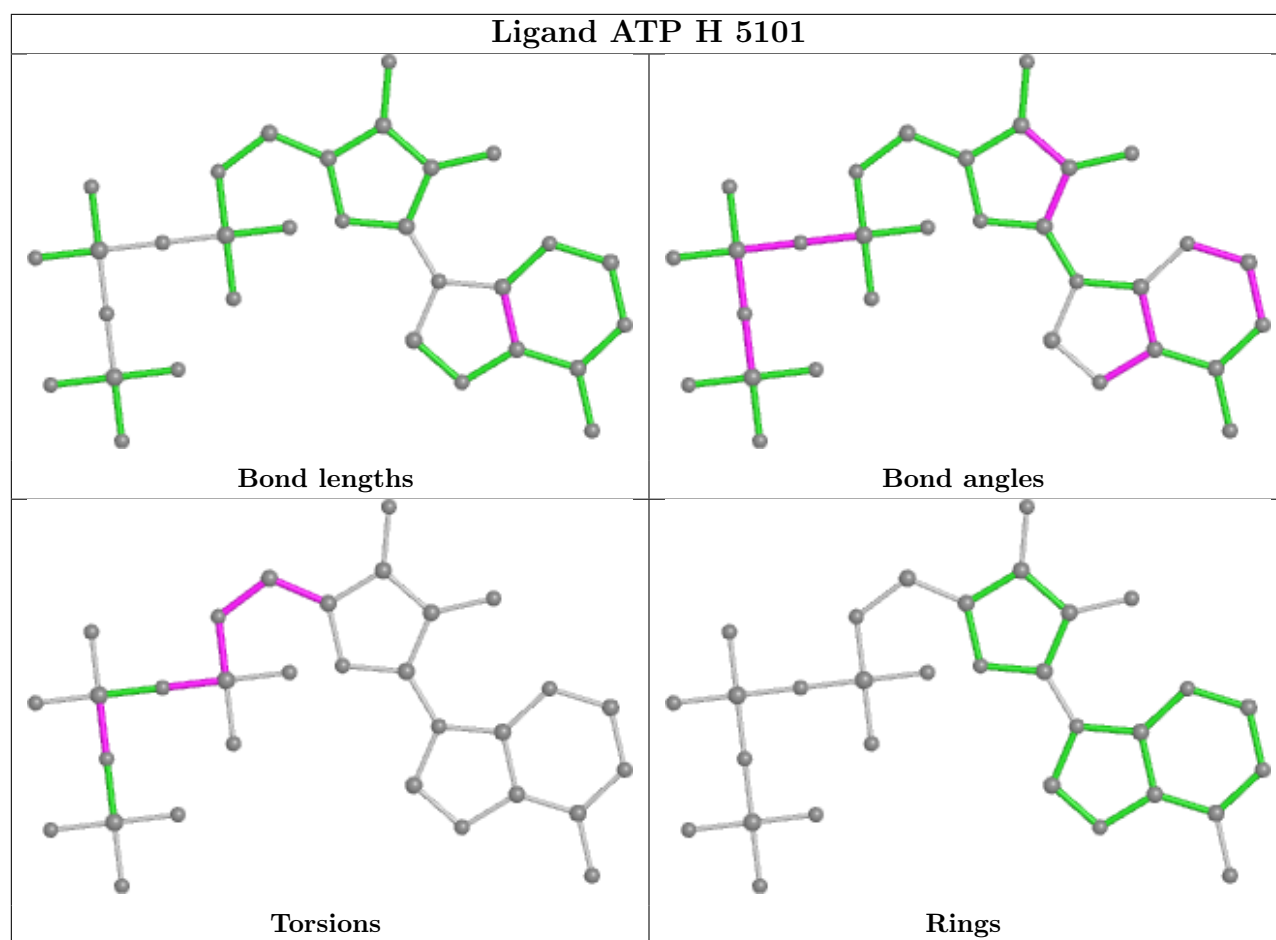
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	5101	ATP	2	0
3	B	5101	ATP	2	0
3	F	5101	ATP	2	0
3	H	5101	ATP	2	0

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.

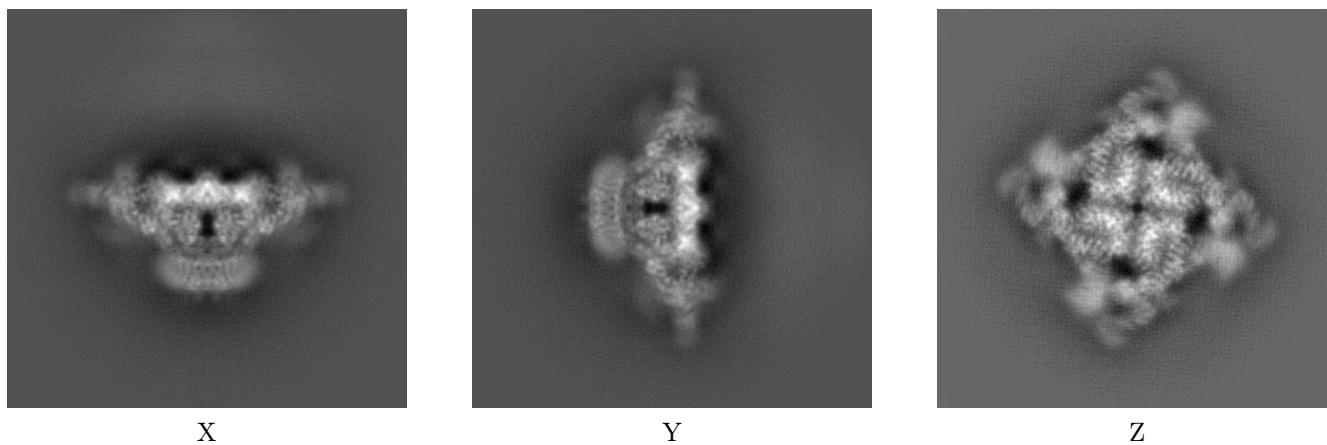
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-9825. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

6.1 Orthogonal projections [i](#)

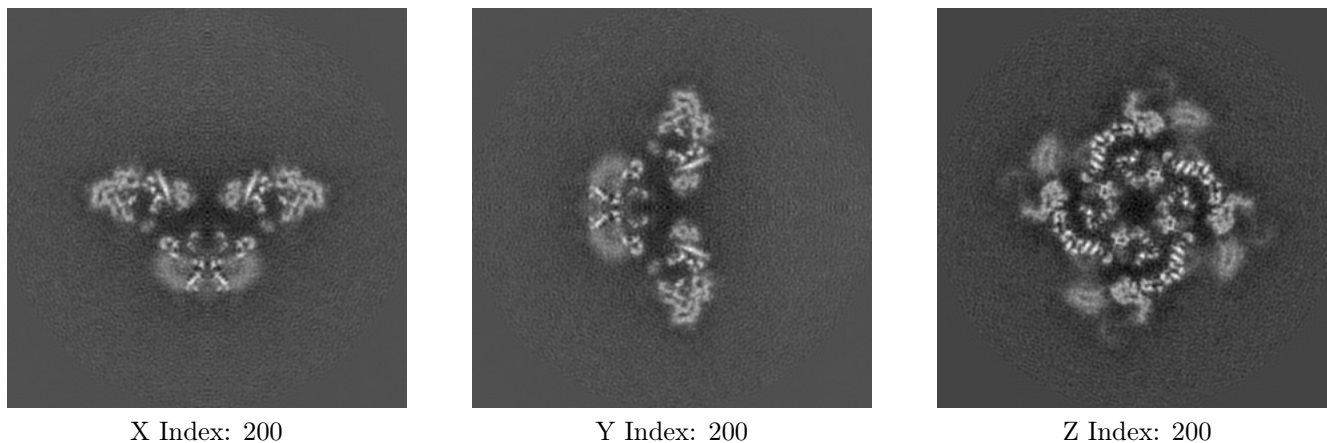
6.1.1 Primary map



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

6.2 Central slices [i](#)

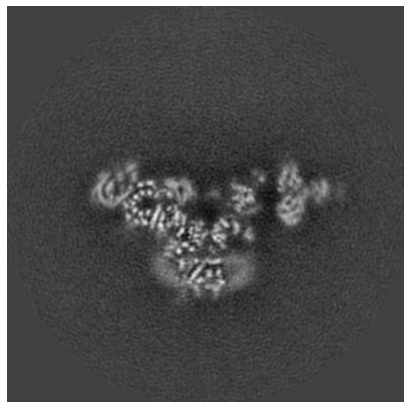
6.2.1 Primary map



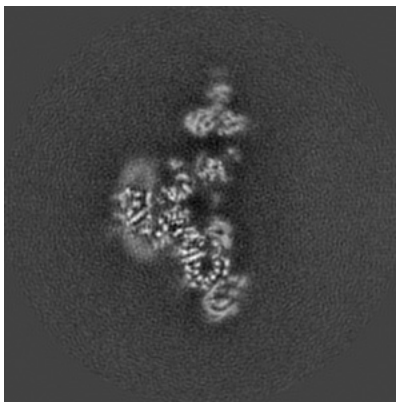
The images above show central slices of the map in three orthogonal directions.

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

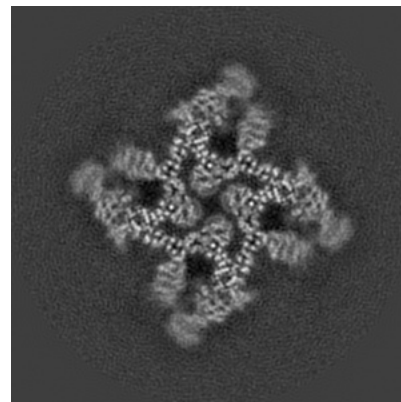
6.3.1 Primary map



X Index: 211



Y Index: 189

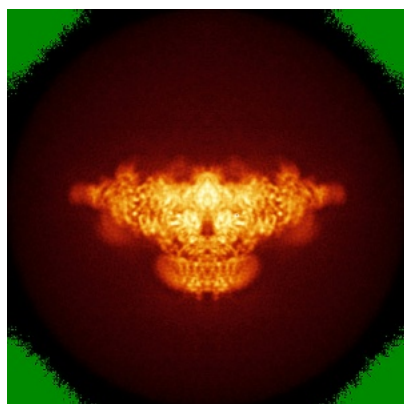


Z Index: 212

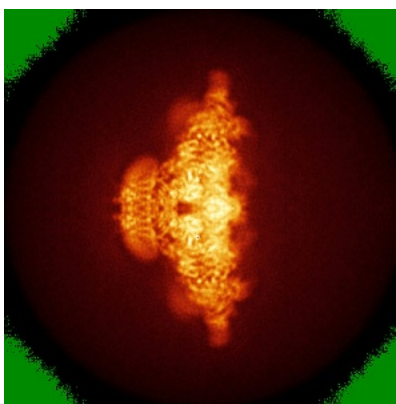
The images above show the largest variance slices of the map in three orthogonal directions.

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

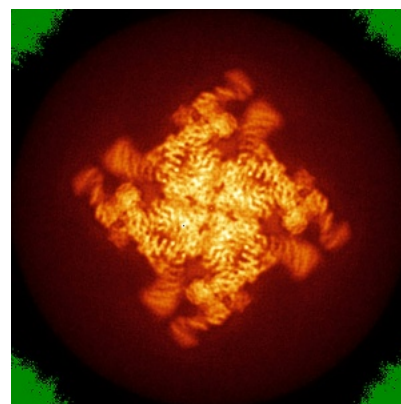
6.4.1 Primary map



X



Y

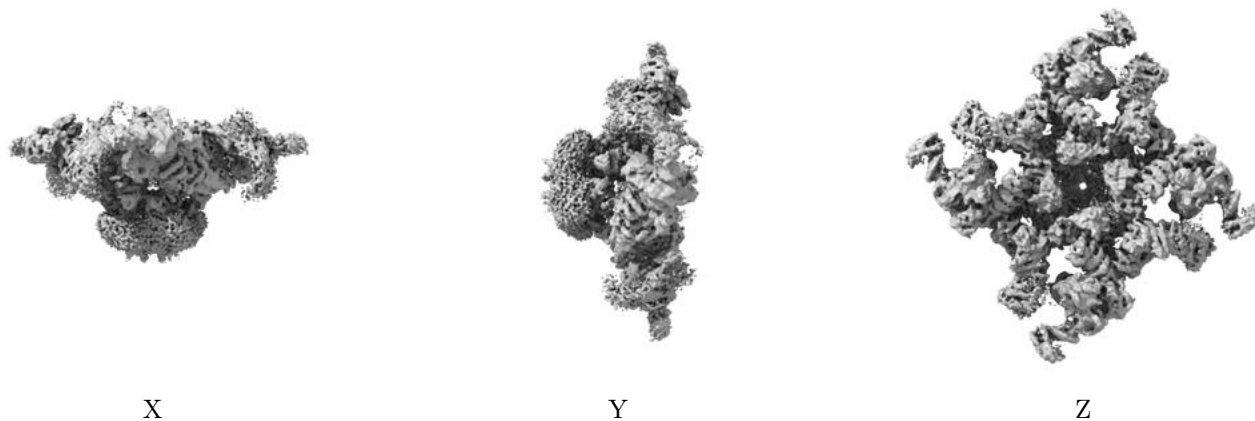


Z

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

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.017. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

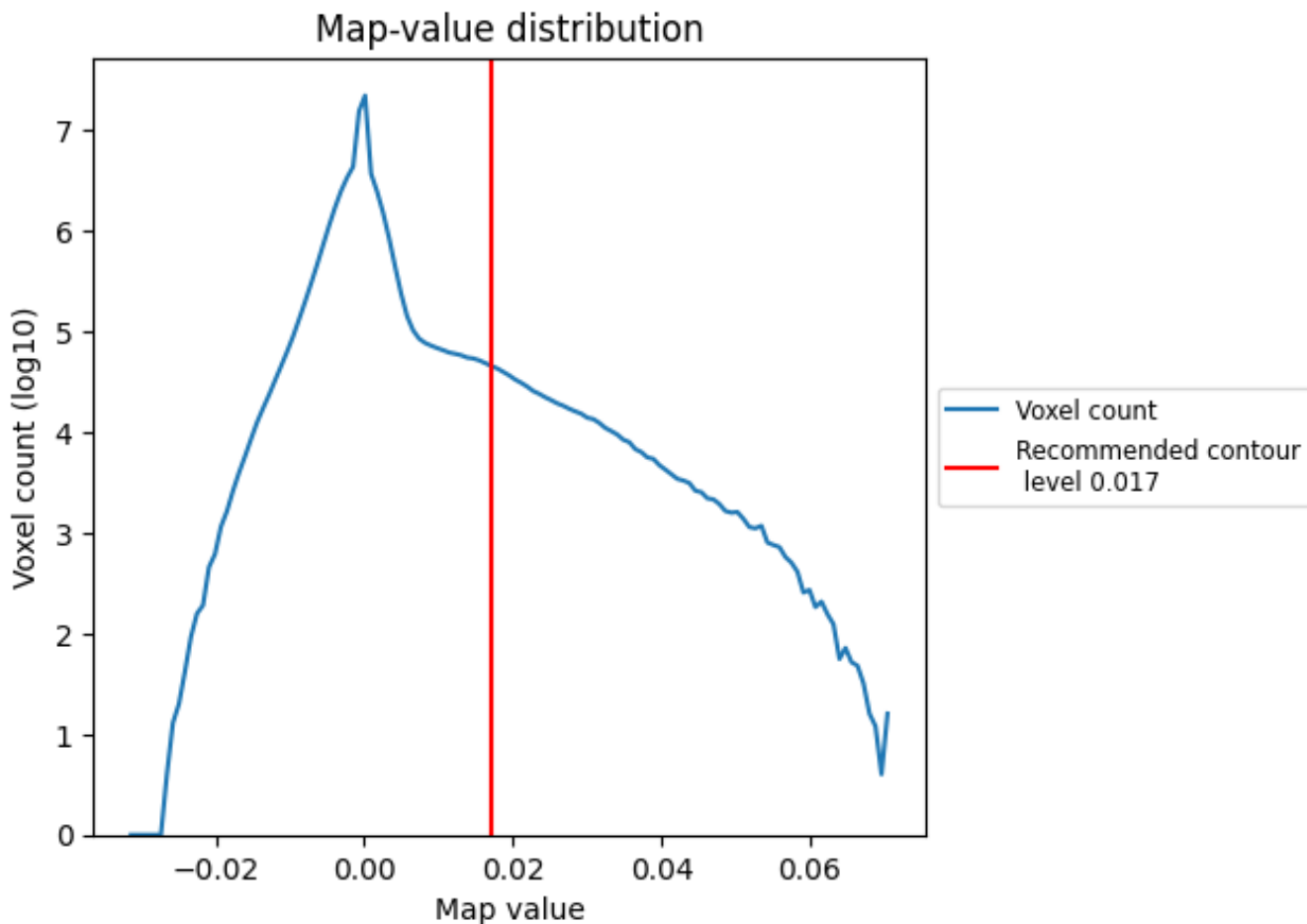
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

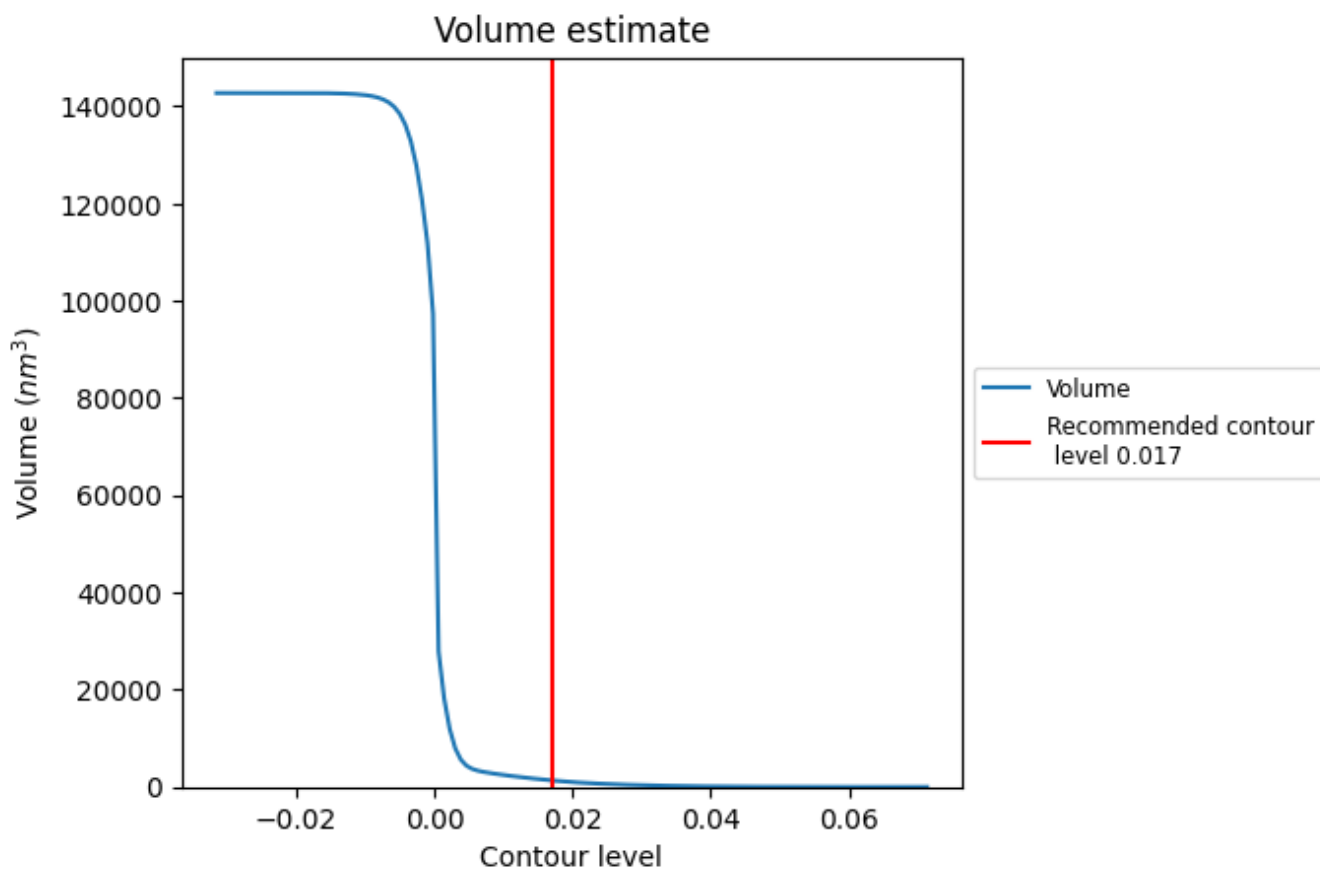
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

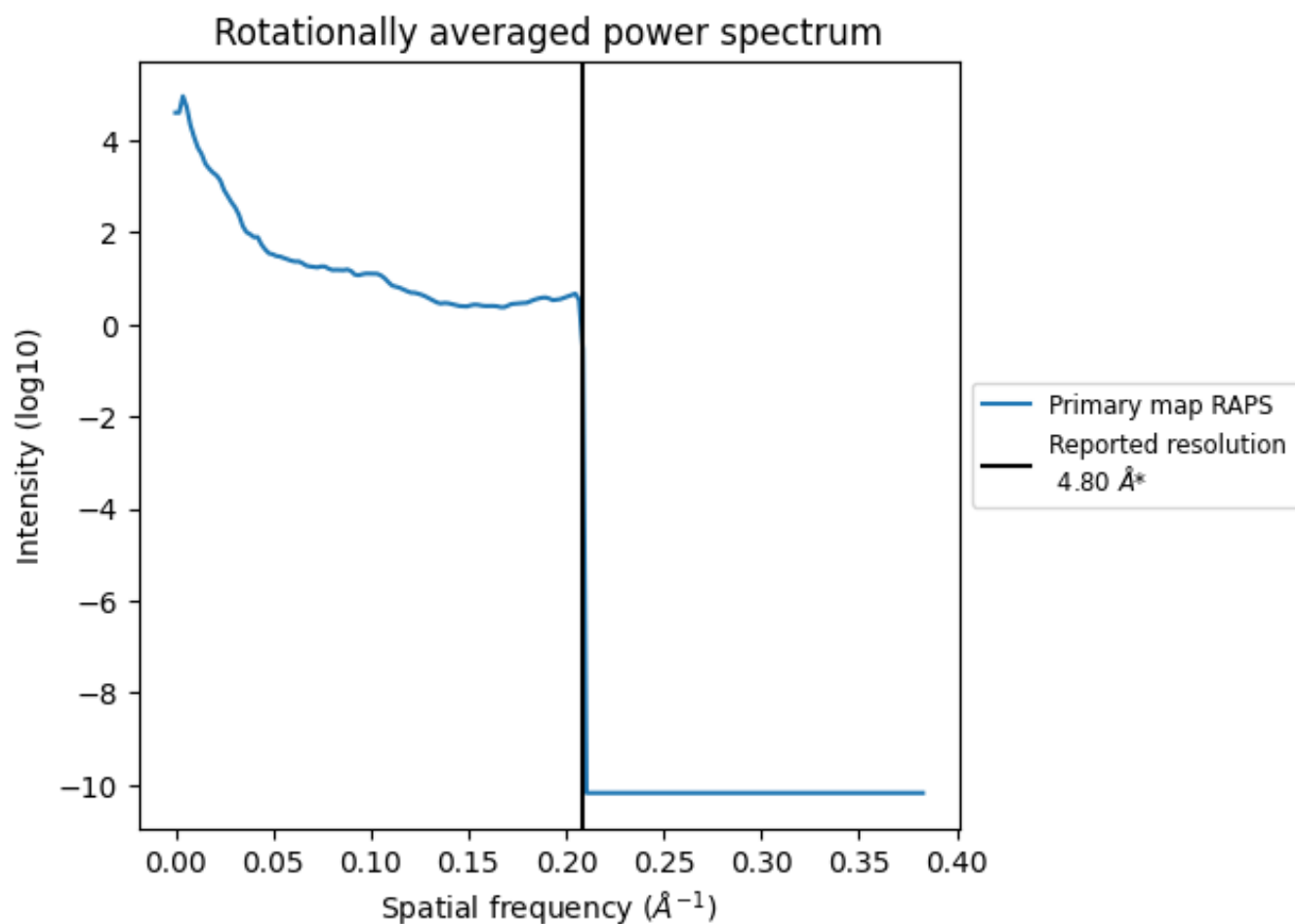
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1350 nm³; this corresponds to an approximate mass of 1219 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 [\(i\)](#)

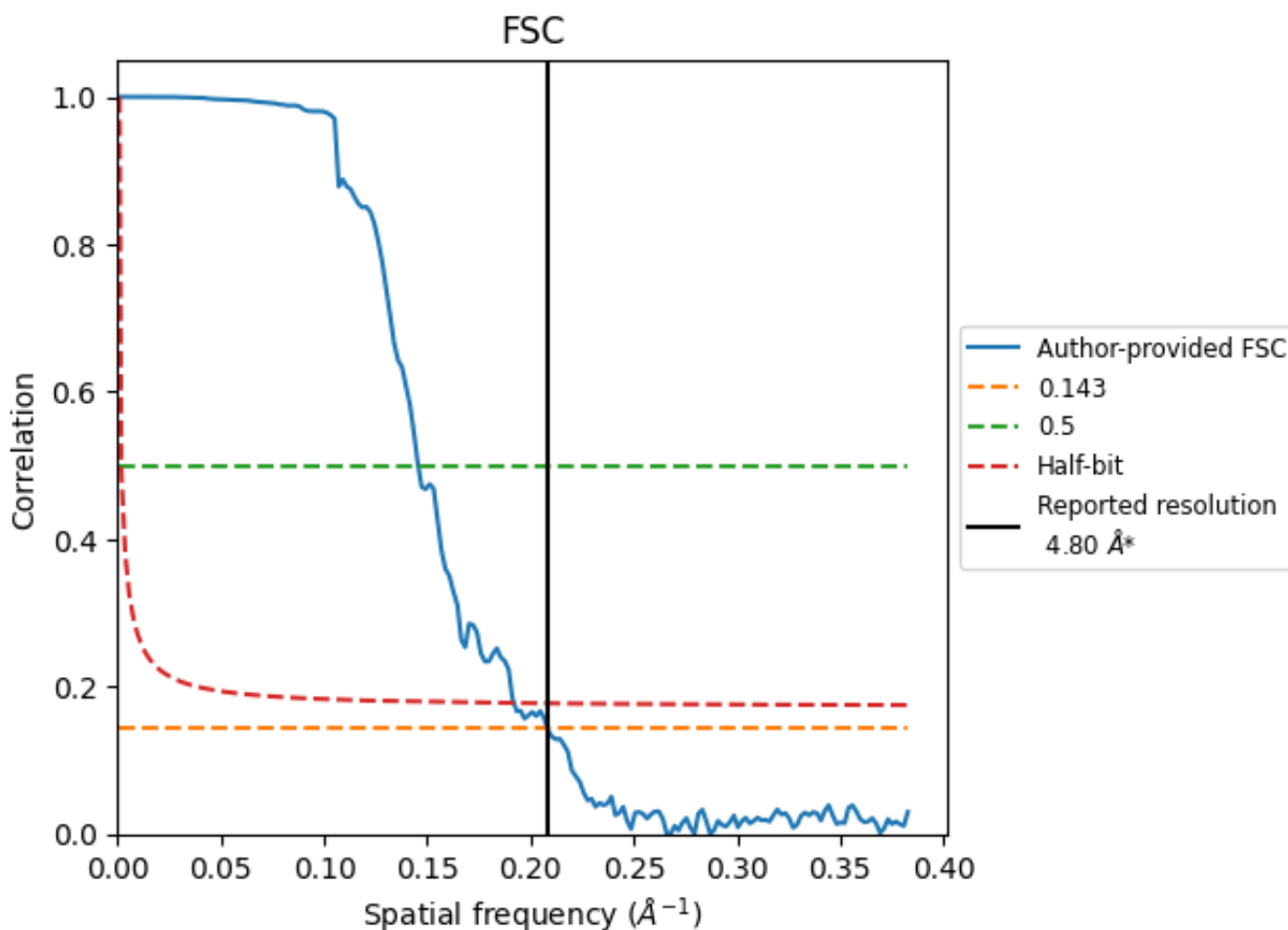


*Reported resolution corresponds to spatial frequency of 0.208 Å⁻¹

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.208 Å⁻¹

8.2 Resolution estimates [i](#)

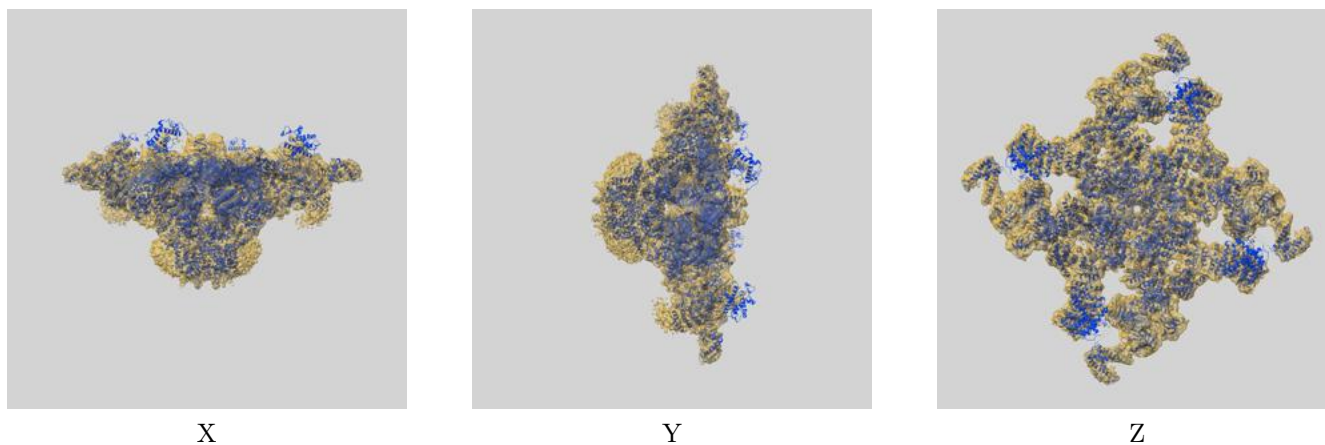
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.80	-	-
Author-provided FSC curve	4.81	6.87	5.21
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit [i](#)

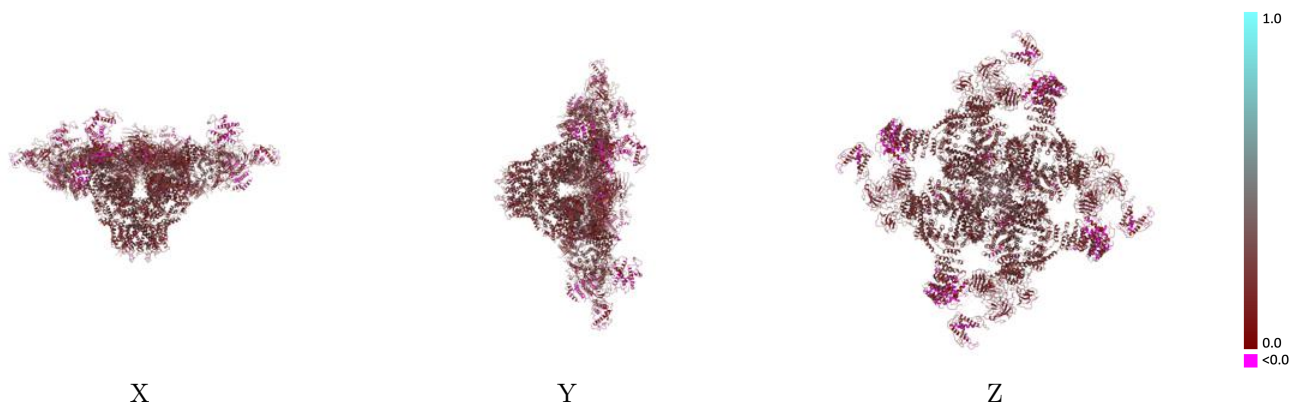
This section contains information regarding the fit between EMDB map EMD-9825 and PDB model 6JH6. Per-residue inclusion information can be found in section 3 on page 5.

9.1 Map-model overlay [i](#)



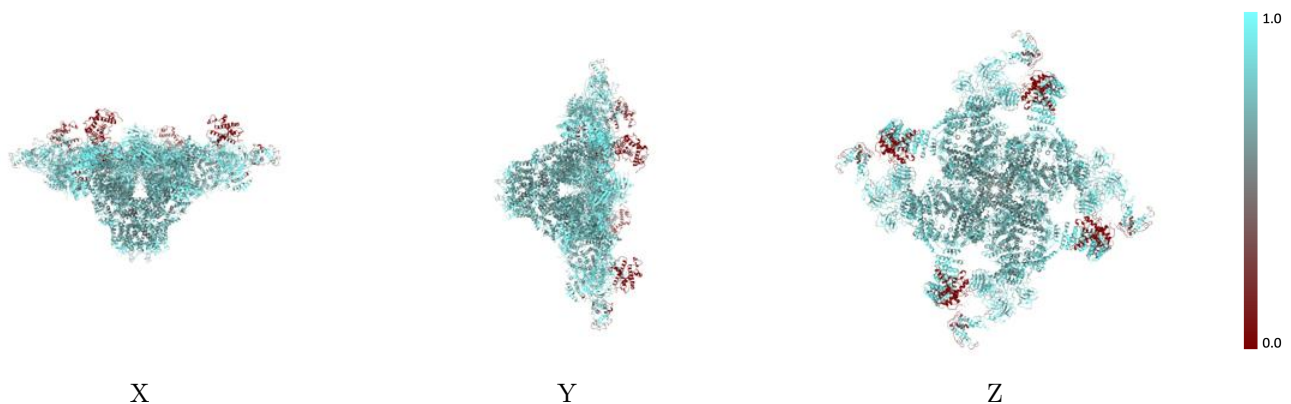
The images above show the 3D surface view of the map at the recommended contour level 0.017 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



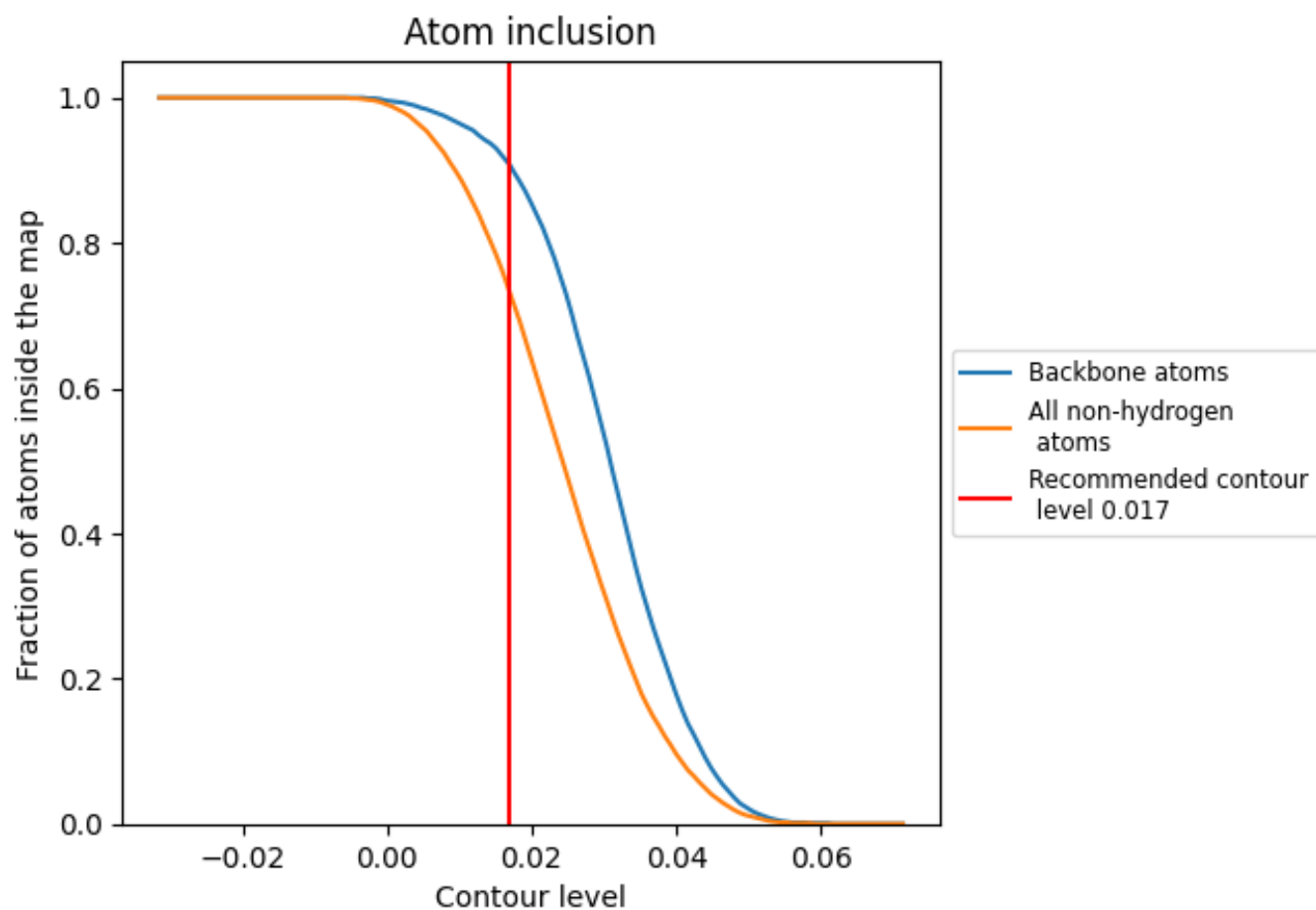
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.017).



















9.4 Atom inclusion [i](#)



At the recommended contour level, 91% of all backbone atoms, 73% 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 (0.017) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7310	 0.2220
A	 0.7920	 0.2290
B	 0.7300	 0.2220
C	 0.7920	 0.2300
D	 0.7290	 0.2220
E	 0.7880	 0.2300
F	 0.7290	 0.2220
G	 0.7890	 0.2260
H	 0.7290	 0.2210

