



wwPDB EM Validation Summary Report ⓘ

Nov 10, 2024 – 11:50 PM EST

PDB ID : 9E1B
EMDB ID : EMD-47388
Title : Structure of RyR1 in the open state in the presence of dyphylline
Authors : Miotto, M.C.; Marks, A.R.
Deposited on : 2024-10-21
Resolution : 4.49 Å (reported)
Based on initial model : 7TZC

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.dev113
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4.02b-467
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) : 2.39

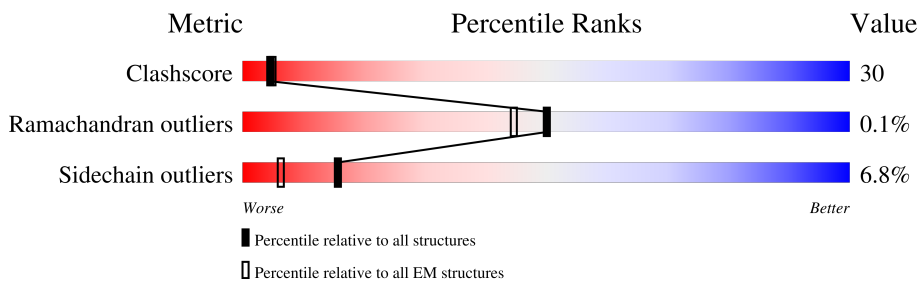
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.49 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

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	5037	<div style="display: flex; justify-content: space-between;"> 57% 39% 45% 13% </div>
1	B	5037	<div style="display: flex; justify-content: space-between;"> 57% 39% 45% 13% </div>
1	C	5037	<div style="display: flex; justify-content: space-between;"> 57% 39% 45% 13% </div>
1	D	5037	<div style="display: flex; justify-content: space-between;"> 57% 39% 45% 13% </div>
2	E	108	<div style="display: flex; justify-content: space-between;"> 97% 32% 59% 7% </div>
2	F	108	<div style="display: flex; justify-content: space-between;"> 97% 37% 56% 6% </div>
2	G	108	<div style="display: flex; justify-content: space-between;"> 96% 42% 53% 5% </div>
2	H	108	<div style="display: flex; justify-content: space-between;"> 96% 42% 49% 8% </div>

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 144128 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 Ryanodine receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	4404	35150	22365	6063	6485	237	9	0
1	B	4404	35150	22365	6063	6485	237	9	0
1	D	4404	35150	22365	6063	6485	237	9	0
1	C	4404	35150	22365	6063	6485	237	9	0

- Molecule 2 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	E	107	831	527	146	154	4	0	0
2	H	107	831	527	146	154	4	0	0
2	G	107	831	527	146	154	4	0	0
2	F	107	831	527	146	154	4	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
3	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
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	C	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		AltConf
4	A	1	Total	Ca	0
			1	1	
4	B	1	Total	Ca	0
			1	1	
4	D	1	Total	Ca	0
			1	1	
4	C	1	Total	Ca	0
			1	1	

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

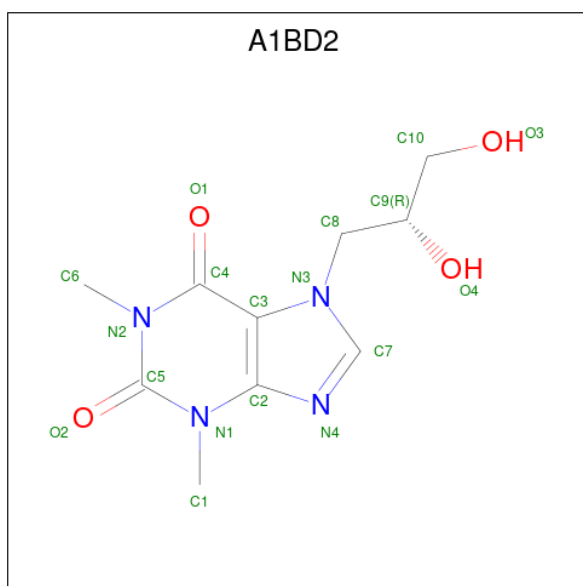
Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Zn	0
			1	1	

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Mol	Chain	Residues	Atoms		AltConf
5	B	1	Total	Zn	0
			1	1	
5	D	1	Total	Zn	0
			1	1	
5	C	1	Total	Zn	0
			1	1	

- Molecule 6 is dyphylline (three-letter code: A1BD2) (formula: $C_{10}H_{14}N_4O_4$) (labeled as "Ligand of Interest" by depositor).

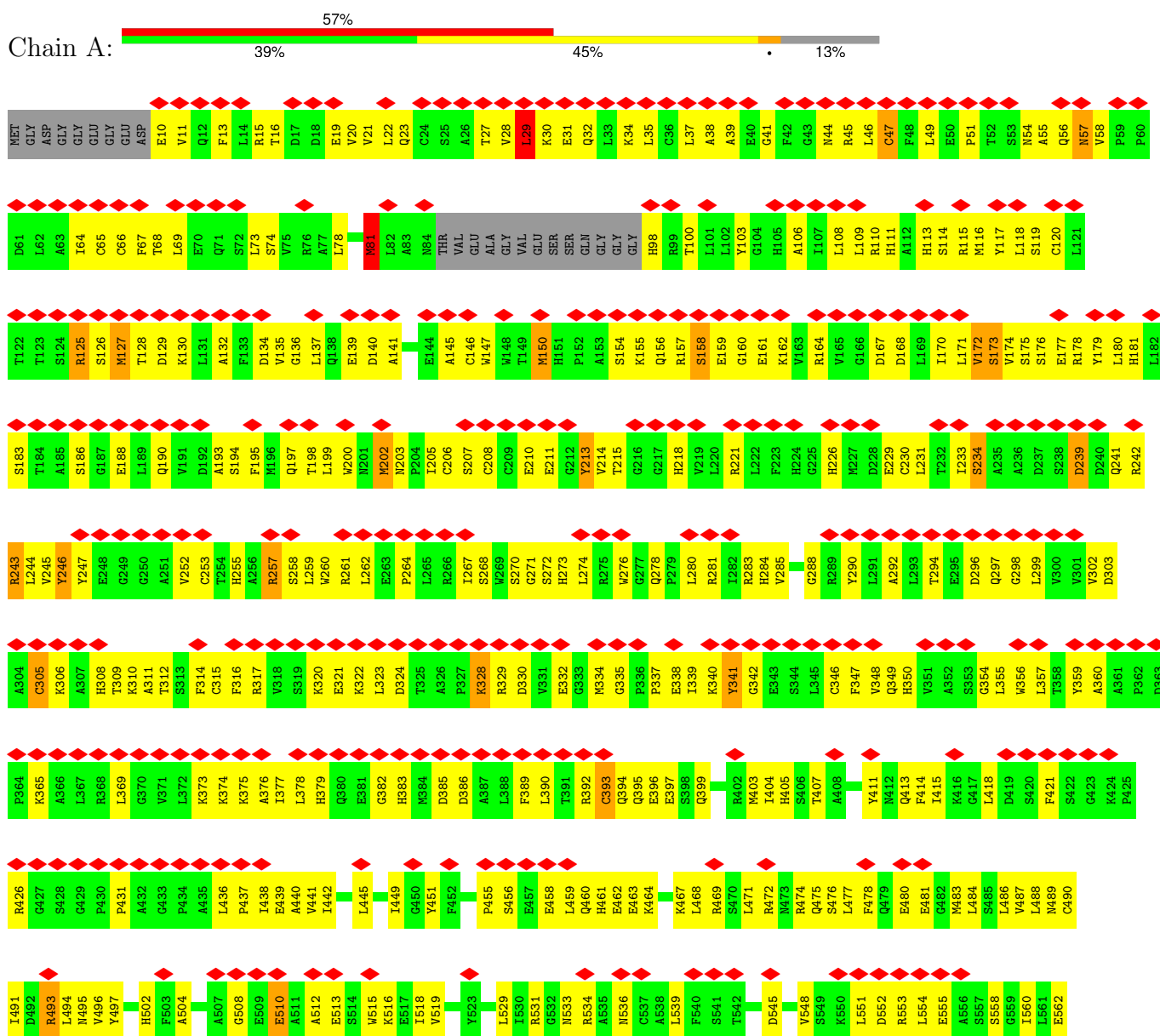


Mol	Chain	Residues	Atoms				AltConf
6	A	1	Total	C	N	O	0
			18	10	4	4	
6	B	1	Total	C	N	O	0
			18	10	4	4	
6	D	1	Total	C	N	O	0
			18	10	4	4	
6	C	1	Total	C	N	O	0
			18	10	4	4	

3 Residue-property plots

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

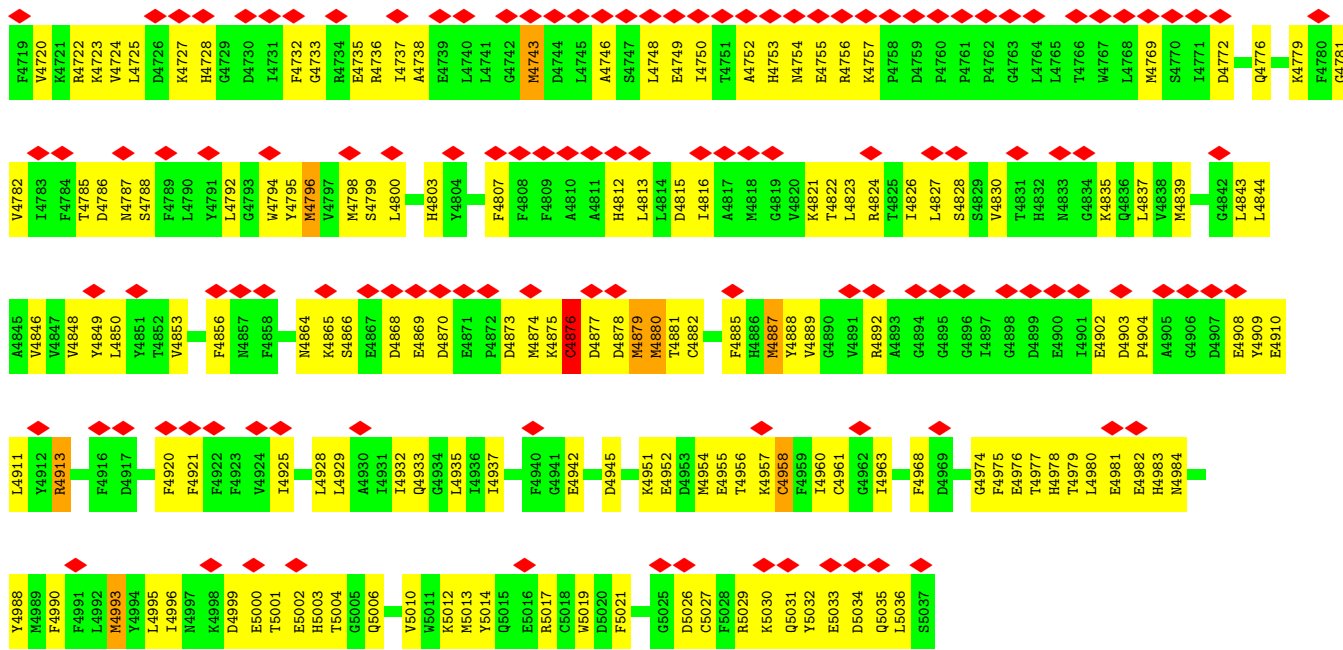
• Molecule 1: Ryanodine receptor 1



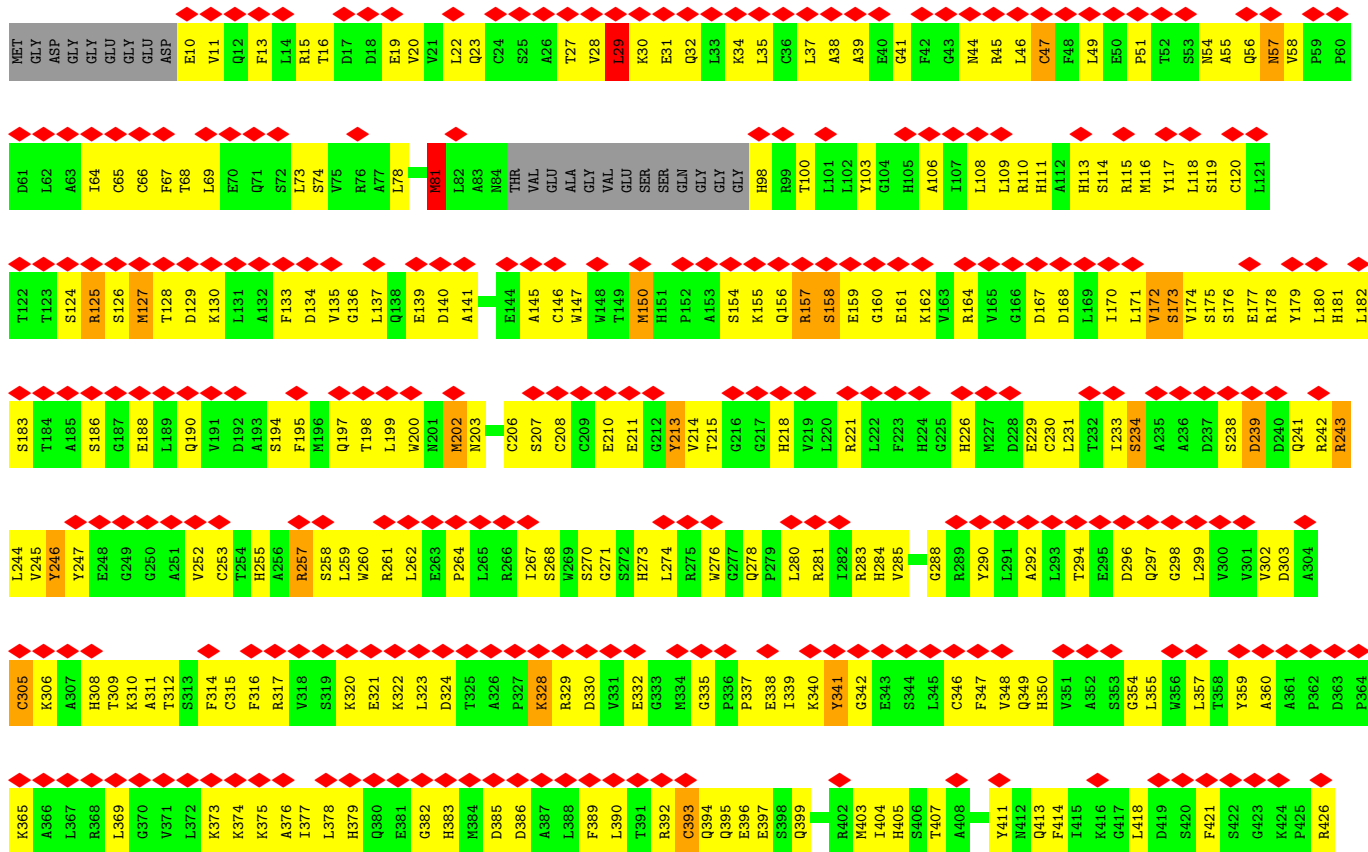
GLY	R1290	I1228	V1168	E1108	G1048	L988	E868	G807	V686	L626	V663
THR	L1291	M1229	L1169	L1109	Y1049	A989	R669	Y808	A887	P627	L564
ALA	S1292	M1230	M1170	R1110	G1050	E990	R670	A809	A688	G628	C566
LYS	L1293	Q1231	S1171	P1111	Y1051	M991	R671	P810	L688	R629	V667
GLU	P1294	R1232	D1172	V1112	M1052	H993	E872	C811	T689	E630	L568
THR	P1295	P1233	S1173	V1113	M1053	H994	E873	V752	E690	L631	I569
PRO	V1296	T1234	G1174	E1114	E1054	M995	L874	E813	G691	L632	E570
GLY	Q1296	V1235	S1175	L1115	P1055	W996	A875	A814	Y692	L633	S571
THR	Q1299	T1236	E1176	L1116	P1056	W997	E876	V815	S693	Q634	P572
PRO	H1300	F1237	E1177	A1117	D1057	R998	N877	L816	P694	T635	E573
GLN	F1301	T1177	A1178	D1118	D1057	R998	N878	P817	N636	M636	V574
PRO	L1302	A1178	F1179	E1119	Q1058	R1000	R878	R818	I638	I638	L575
VAL	C1303	F1179	E1059	E1059	E1059	V1001	H879	E819	G697	N639	N576
GLU	P1243	R1180	P1060	S1061	P1061	A1002	E880	R820	G698	Y640	I677
ALA	E1246	A1181	Q1062	Q1061	Q1062	Q1003	L881	L821	G699	V641	I578
GLY	P1247	Y1123	V1063	G1004	V1063	G1004	W882	R822	E700	V641	Q579
ALA	V1248	F1124	E1064	M1005	E1064	L884	L884	L823	W702	T642	E580
VAL	P1249	N1125	M1065	S1006	M1065	T885	T885	E824	W702	S643	N581
PRO	P1250	G1126	M1066	S1006	M1066	T885	T885	E824	G703	S643	H582
ALA	E1251	H1127	M1066	Y1007	M1066	R886	R886	P825	G704	I644	I583
GLU	H1252	H1127	Q1066	S1008	Q1066	E947	E887	I826	N705	R645	I586
PRO	P1253	R1128	S1067	A1009	S1067	E947	E888	K827	G706	P646	I587
LYS	H1254	Q1129	W1068	V1010	W1068	N949	Q889	K827	V707	N647	I588
ASN	E1255	Q1130	D1070	Q1011	D1070	N950	G890	R830	G708	I648	S588
GLU	E1256	R1131	R1071	Q1012	R1071	K951	W891	R831	D709	F649	L589
THR	V1257	H1133	E1072	I1013	E1072	K952	T892	R832	D710	V650	D591
PRO	A1258	L1134	V1073	P1014	V1073	T953	Y893	E833	L711	G651	K592
ALA	R1259	G1135	M1074	A1015	M1074	K954	G894	P834	L712	G651	H593
ASN	M1260	S1136	I1074	R1016	I1074	K954	G894	P834	L713	A653	G594
GLU	M1261	E1137	F1075	R1017	F1075	L955	P895	R835	S713	A653	R595
ALA	G1262	P1138	R1076	M1018	R1076	P956	W896	R835	Y114	E654	N596
ARG	T1263	F1139	A1077	N1018	A1077	P956	W897	R835	G715	G655	H597
ALA	V1264	G1140	E1078	P1019	E1078	K957	R897	R835	F716	S656	K598
GLU	H1265	R1141	R1079	P1019	R1079	T958	D898	H838	D717	T857	V599
PRO	T1266	P1142	S1080	L1021	S1080	Y959	D899	G841	Q658	T857	L600
ASP	F1267	Q1144	Y1081	V1022	Y1081	K960	N900	P842	Y659	Q658	D601
TYR	C1269	S1145	M1082	P1023	M1082	K961	K901	S843	L719	Y659	V602
ALA	L1270	G1146	V1083	Y1024	V1083	S862	R902	R844	H720	G660	L603
ALA	L1271	D1147	Q1084	R1025	Q1084	N963	L903	C845	L721	K661	C604
LEU	Q1206	V1148	S1085	L1026	S1085	G864	H904	L846	W722	Y663	S605
MET	D1207	V1148	S1086	L1027	S1086	Y865	P905	S847	T723	F664	L606
THR	V1208	G1150	Q1086	L1028	Q1086	K966	C906	S847	G724	F664	C607
GLN	S1209	C1151	W1088	E1029	W1088	P967	L907	T849	H725	V666	M610
ALA	S1210	M1152	F1090	A1030	F1090	A968	V908	D850	A727	M667	G611
GLY	L1211	L1153	E1091	T1031	E1091	P969	N909	D850	R728	V668	V612
TRP	R1212	D1154	K1032	K1032	K1032	L970	F910	V852	P729	D669	A613
GLY	F1213	L1155	F1092	R1033	F1092	D971	H911	P853	V730	E670	V614
ALA	F1214	E1093	E1093	S1034	E1093	L972	S812	C854	L731	V671	S615
GLU	A1215	M1157	M1035	M1035	M1035	S873	L913	P855	S732	V672	S616
GLY	I1216	N1158	M1036	R1036	M1036	H974	P914	V856	P733	F674	M617
GLY	C1217	T1159	T1096	D1037	T1096	V975	E915	D857	G734	F674	L620
LYS	L1219	I1160	T1097	S1038	T1097	R876	P916	T858	L675	T676	I621
GLY	Q1220	F1162	E1099	L1039	E1099	L977	E917	V859	H736	T676	T622
ALA	E1221	T1163	M1100	L1039	M1100	T978	R918	Q860	L737	A677	E623
ALA	F1222	L1164	R1101	Q1041	R1101	P979	N919	I861	L738	Q678	M624
GLY	G1223	N1165	V1102	V1043	V1102	A980	Y920	V862	A739	A679	L625
GLY	E1224	G1166	G1103	R1044	G1103	T982	L922	L863	P740	T680	
GLY	F1225	E1167	M1104	T1045	E1167	T983	Q923	P865	D742	H681	
GLY	A1227	L1289	R1106	L1046	L1289	L984	W924	H866	V743	L682	
ARG									S745	V684	
										G885	

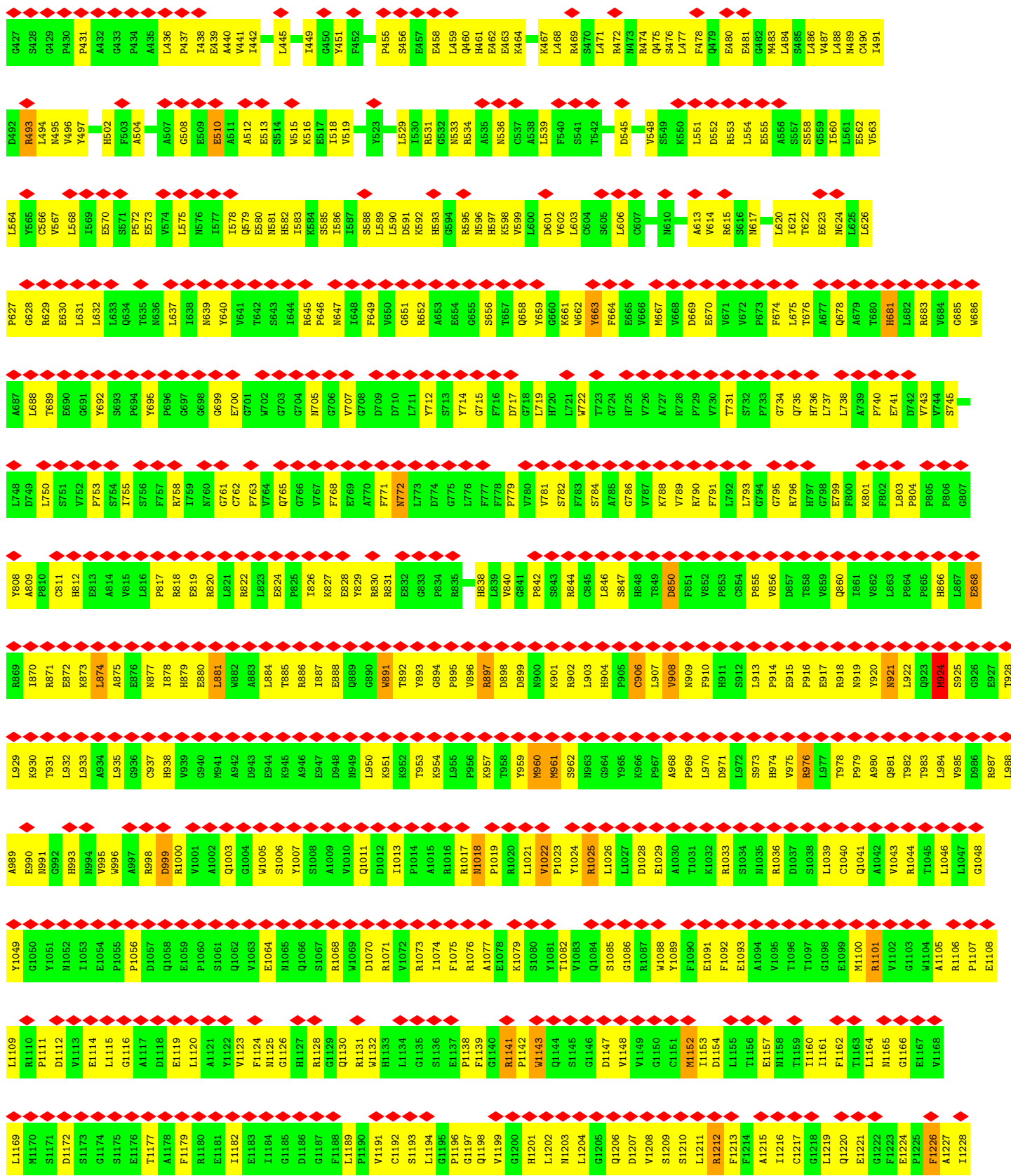
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● Molecule 1: Ryanodine receptor 1

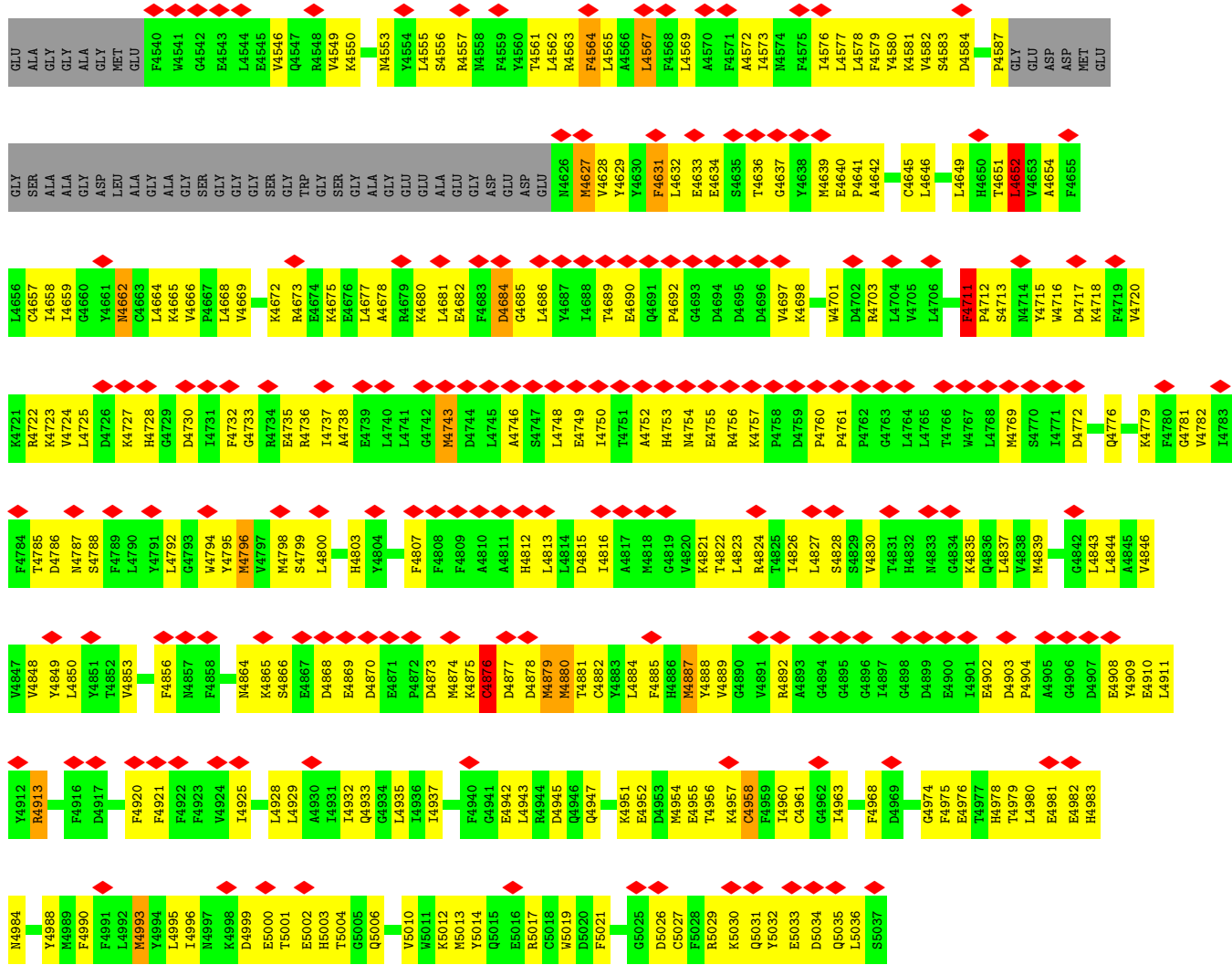




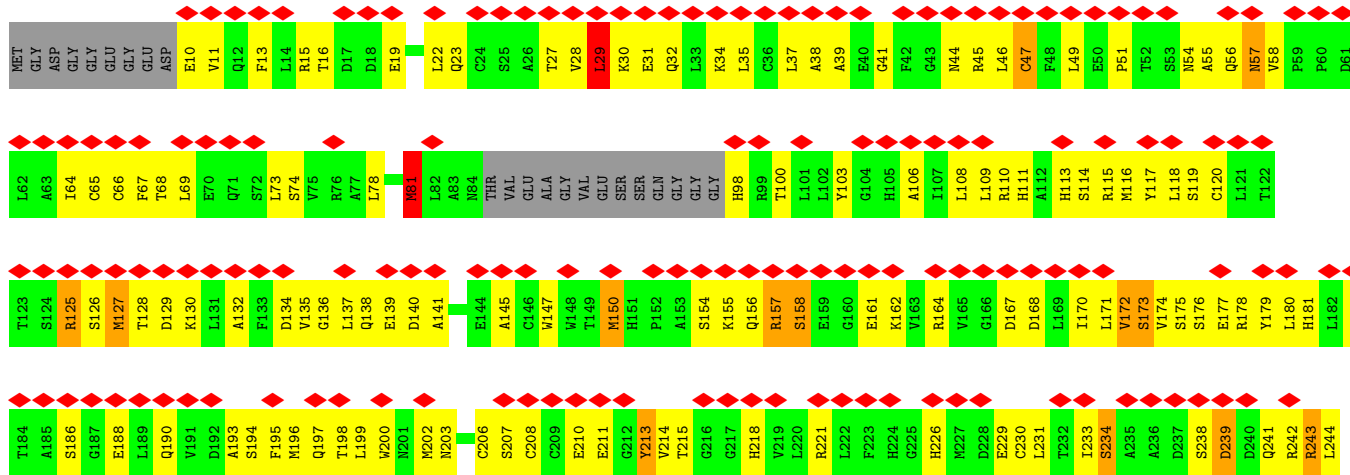
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L1980	L1853	A1789	E1721	L1659	M1599	T1538	D1478	VAL	THR	R1232
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A1983	D1856	A1792	S1726	F1662	P1602	Q1541	G1481	D1419	GLY	T1235
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A1988	Q1861	A1796	L1731	L1667	M1608	T1546	S1485	D1423	GLY	Q1299
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R1976	GLU					R1594		R1421	PRO	R1302
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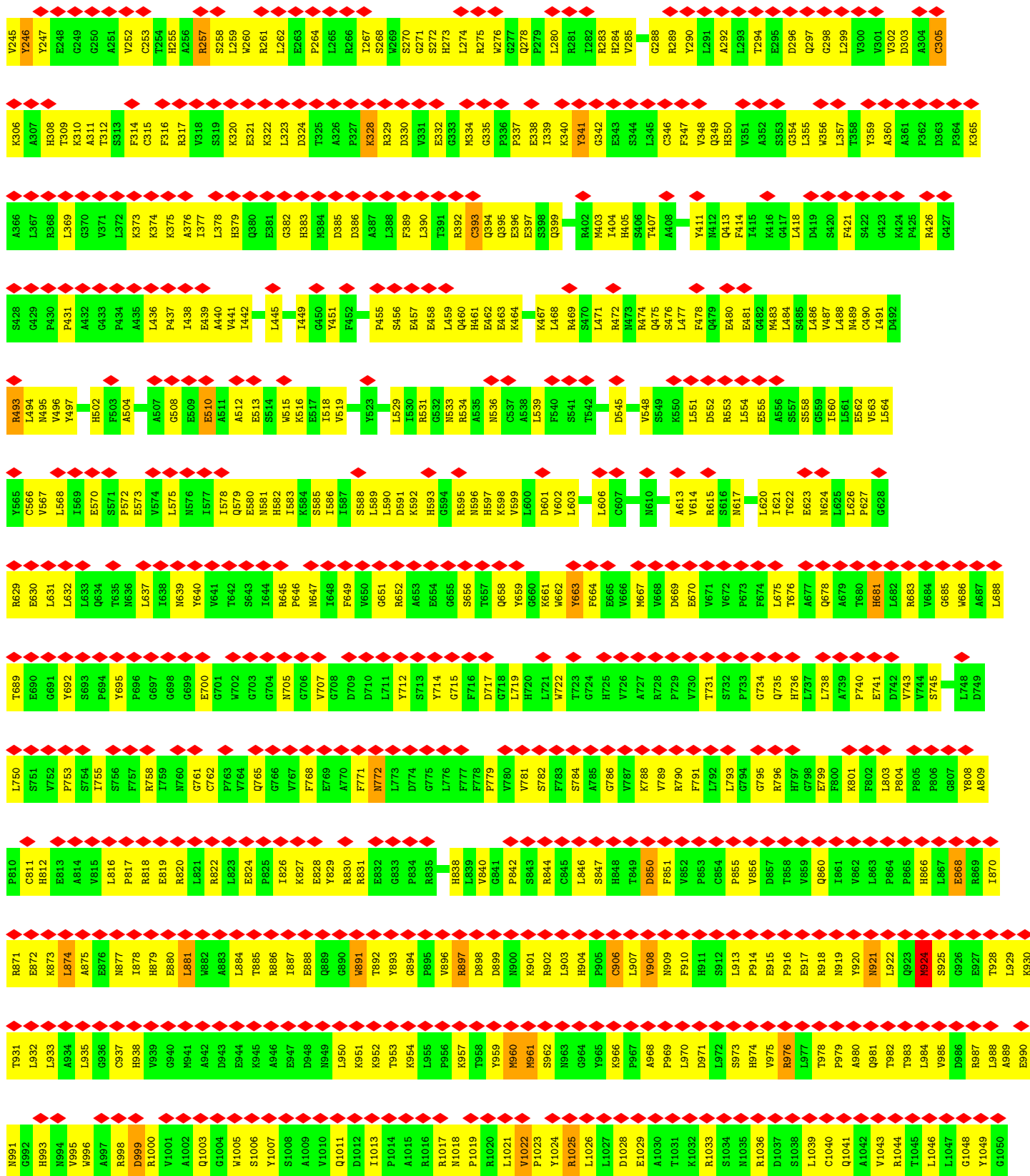
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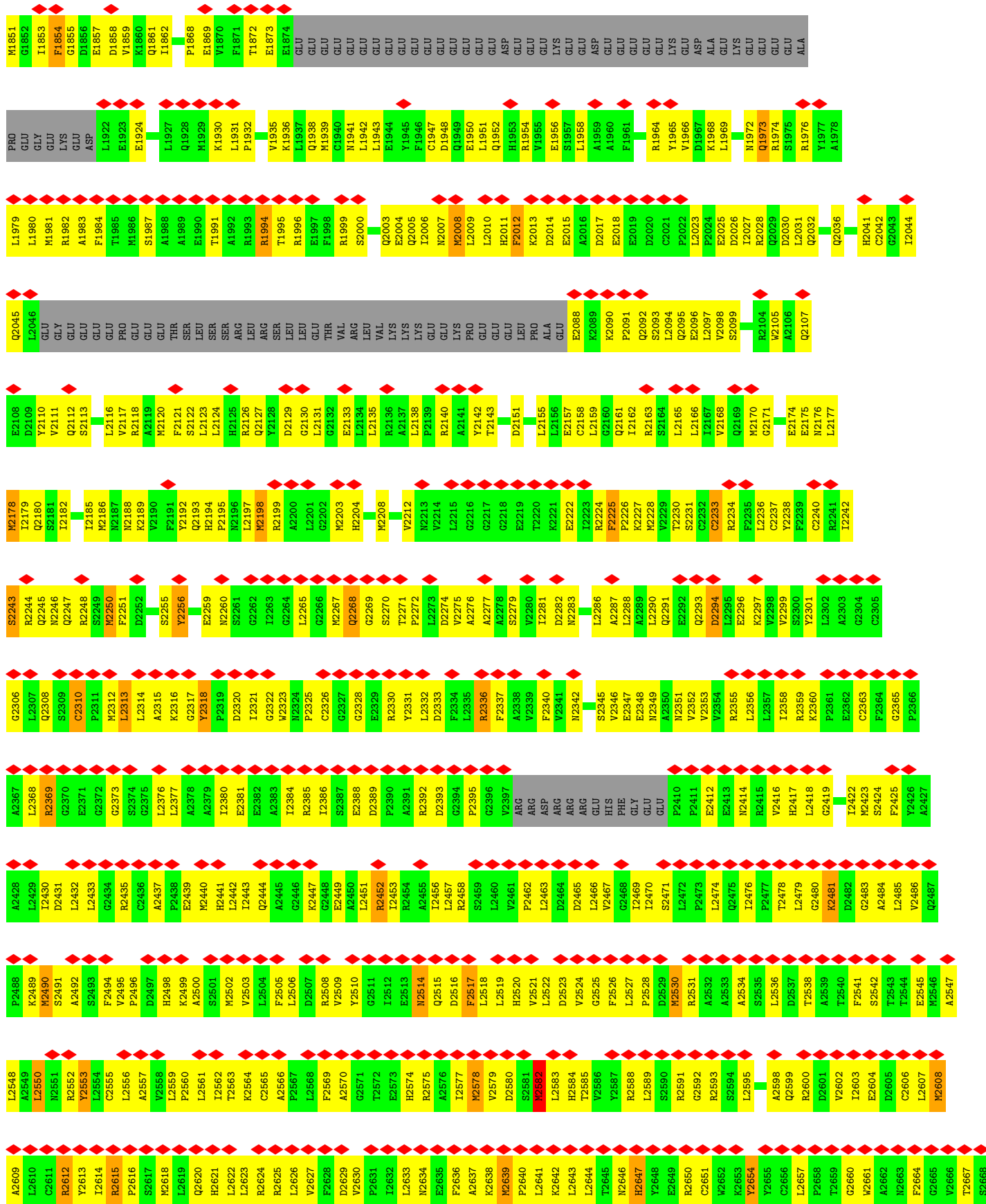


• Molecule 1: Ryanodine receptor 1



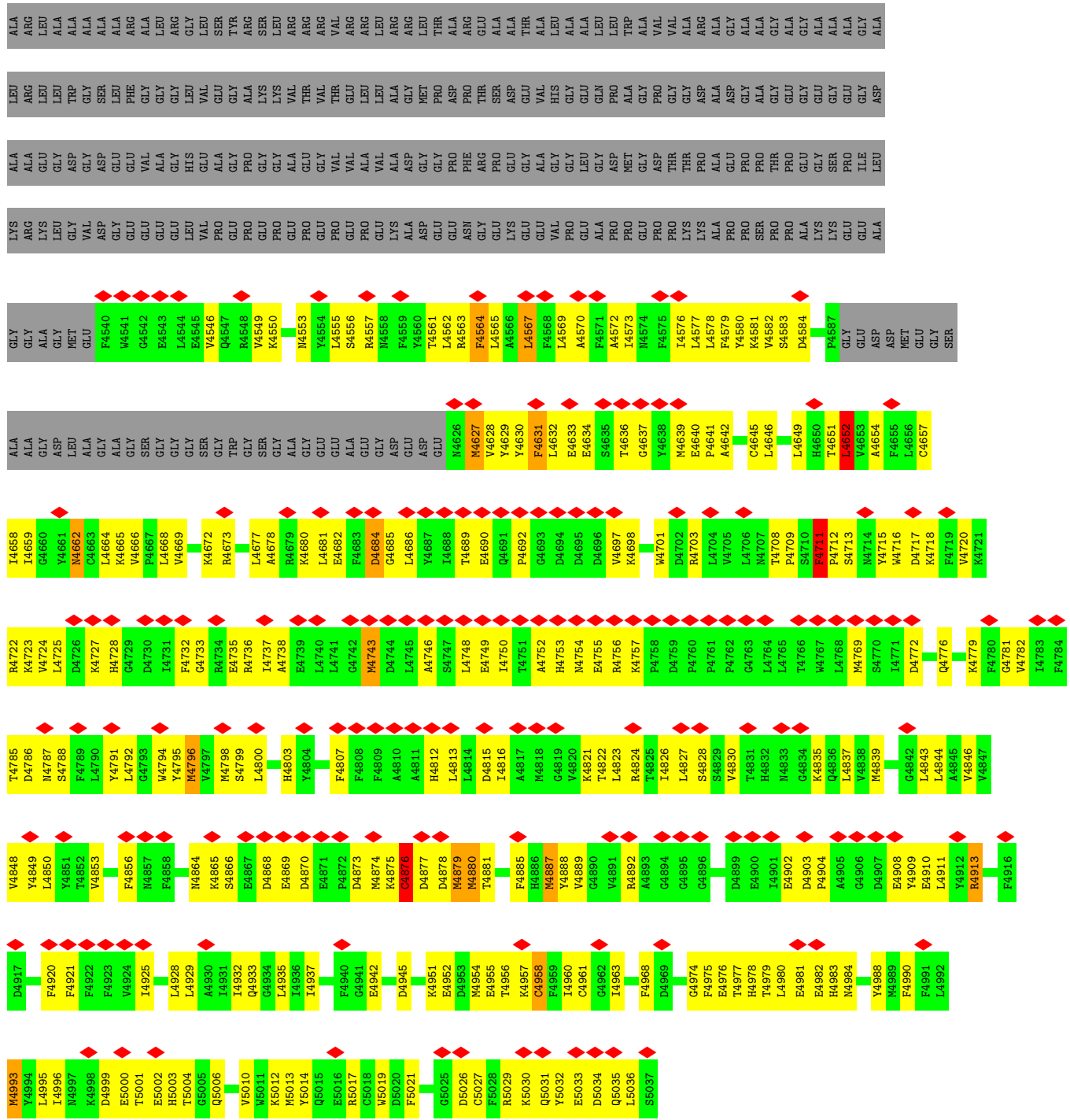


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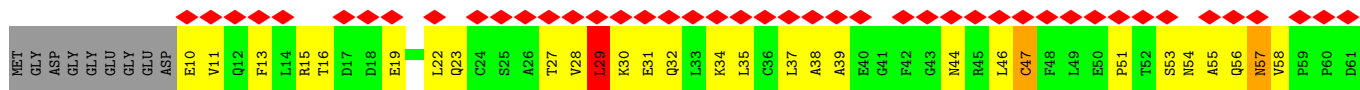


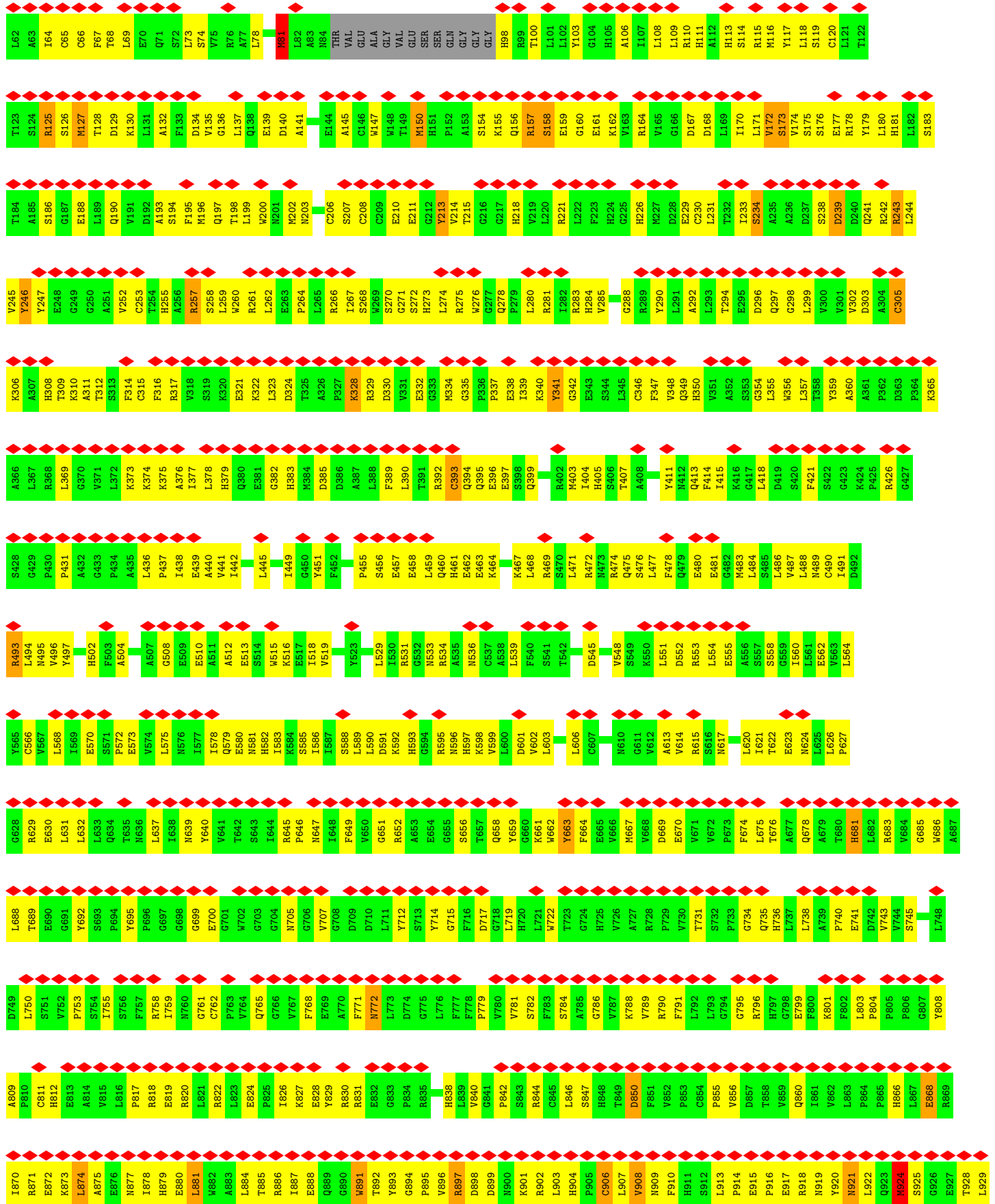
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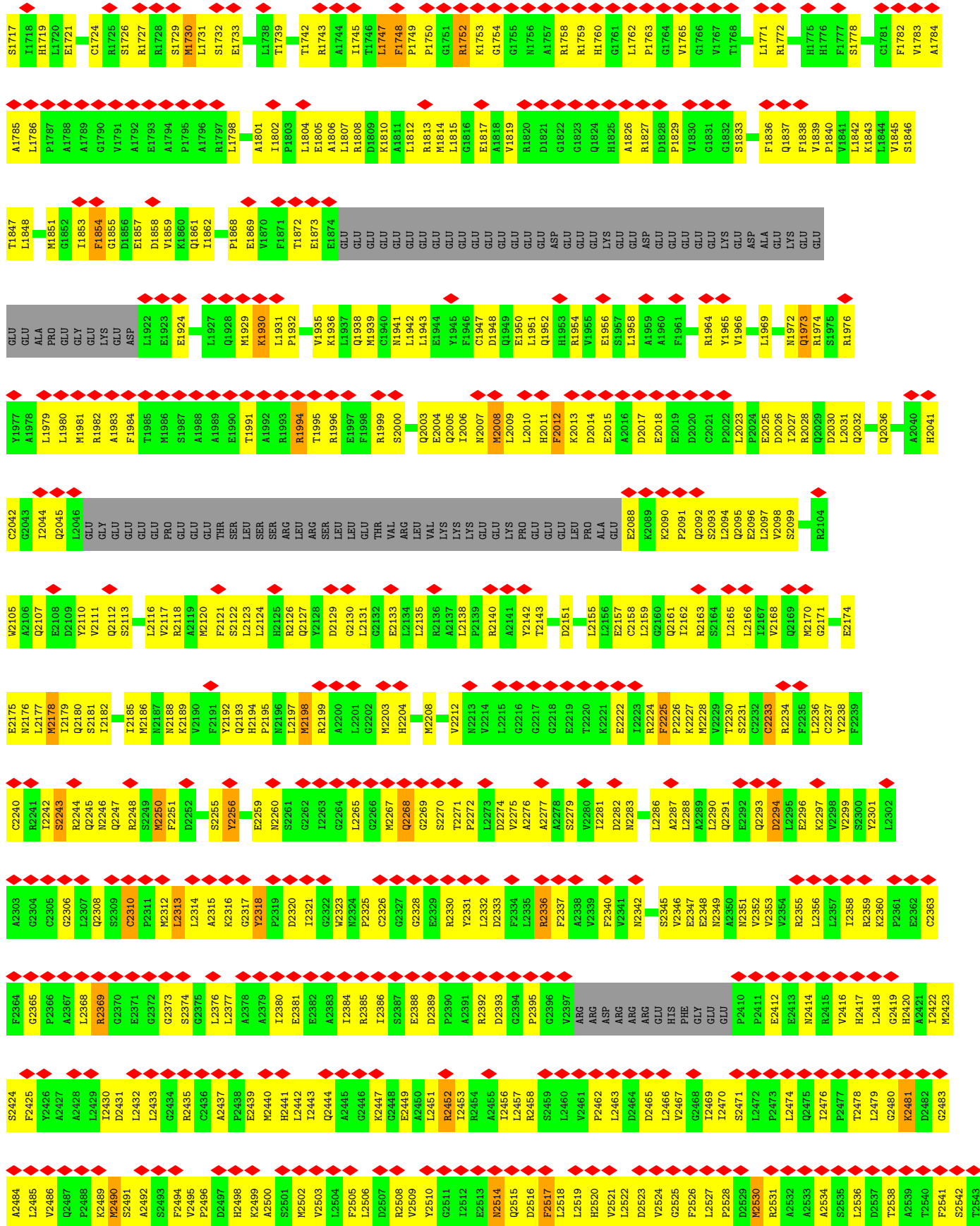


• Molecule 1: Ryanodine receptor 1

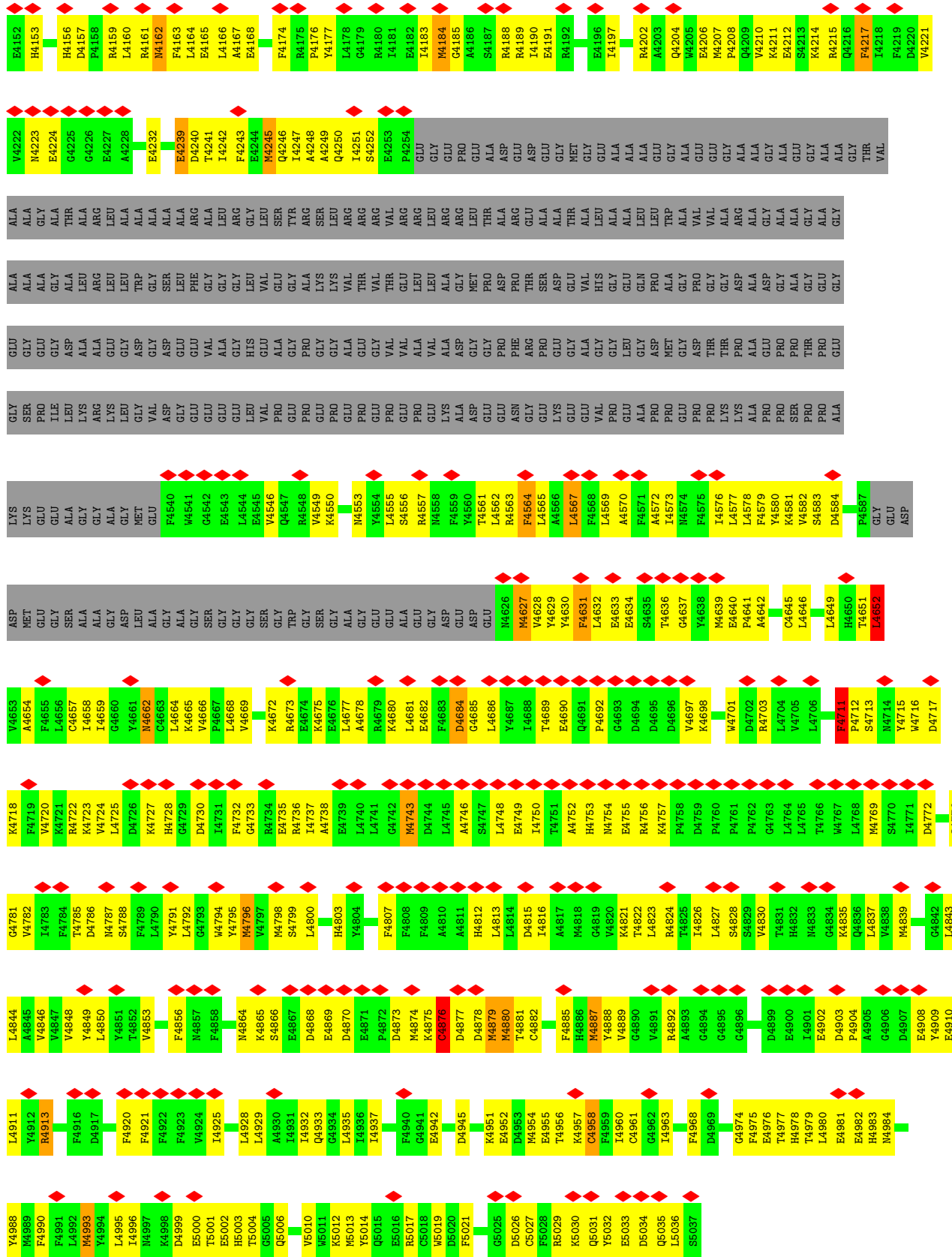




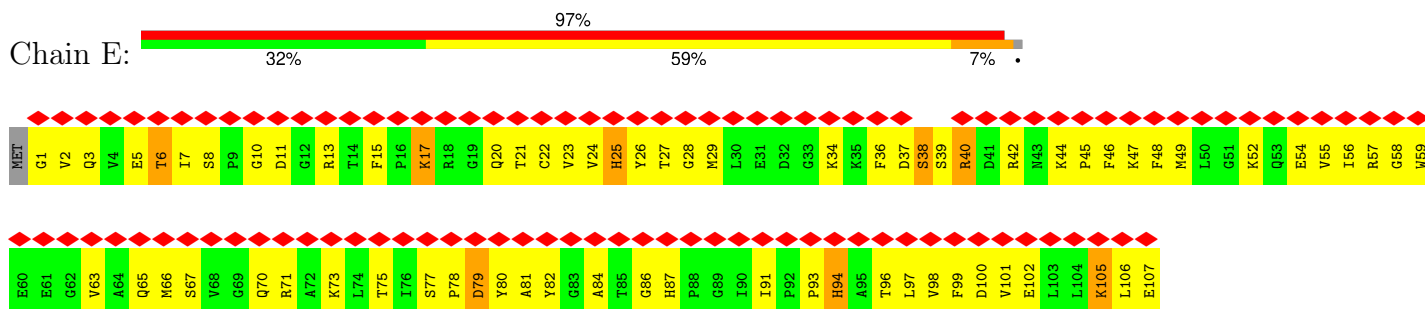
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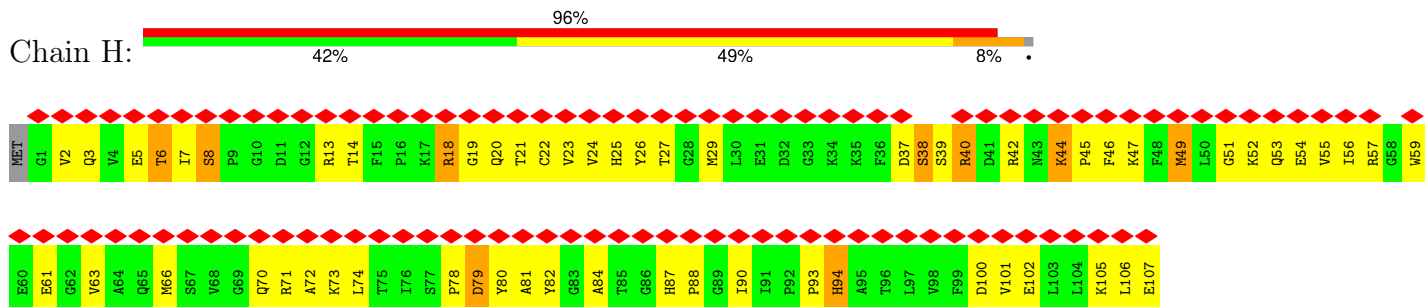
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L2785	K2786	T2787	H2788	P2789	M2790	L2791	R2792	P2793	Y2794	K2795	T2796	F2797	S2798	E2799	K2800	D2801	K2802	E2803	L2804	Y2805	R2806	W2807	P2808	I2809	K2810	E2811	S2812	L2813	K2814	A2815	M2816	I2817	A2818	W2819	E2820	W2821	T2822	I2823	E2824	K2825	R2827	E2828	G2829	E2830	GLU	ARG	THR	GLU	LYS	LYS	LYS	THR	ARG	ARG	GLU	LYS	LYS	ILE	SER	GLN																																																																																																		
K2725	LYS	ALA	THR	VAL	ASP	ALA	GLU	GLY	W2734	F2735	D2736	P2737	R2738	P2739	V2740	E2741	T2742	L2743	W2744	V2745	I2746	I2747	P2748	E2749	K2750	L2751	D2752	F2754	I2755	W2756	K2757	F2758	A2759	E2760	Y2761	T2762	H2763	E2764	K2765	W2766	A2767	F2768	D2769	K2770	I2771	Q2772	N2773	W2774	S2775	S2776	Y2777	G2778	E2779	W2780	L2781	D2782	E2783	E2784																																																																																																				
D2605	C2606	L2607	M2608	A2609	P2610	C2611	R2612	Y2613	I2614	R2615	P2616	S2617	M2618	L2619	Q2620	H2621	L2622	L2623	C2624	R2625	L2626	F2627	F2628	D2629	V2630	P2631	G2571	E2573	H2574	R2575	A2576	I2577	W2578	V2579	D2580	S2581	K2582	L2583	H2584	T2585	V2586	Y2587	R2588	L2589	S2590	R2591	G2592	R2593	S2594	L2595	A2598	Q2599	R2600	I2601	L2602	I2603	E2604																																																																																																					
G2665	V2666	T2667	S2668	E2669	E2670	E2671	L2672	H2673	L2674	T2675	K2676	L2678	P2679	W2680	G2681	I2682	P2683	D2684	S2685	S2686	L2686	A2687	H2688	K2689	K2690	Y2691	D2692	Q2693	E2694	L2695	L2696	R2697	M2698	K2699	M2700	P2701	C2702	L2703	L2704	A2705	I2706	A2707	G2708	E2709	L2710	P2711	W2652	K2653	Y2654	Y2655	C2656	L2657	P2658	T2659	G2660	W2661	A2662	E2723	E2724																																																																																																			



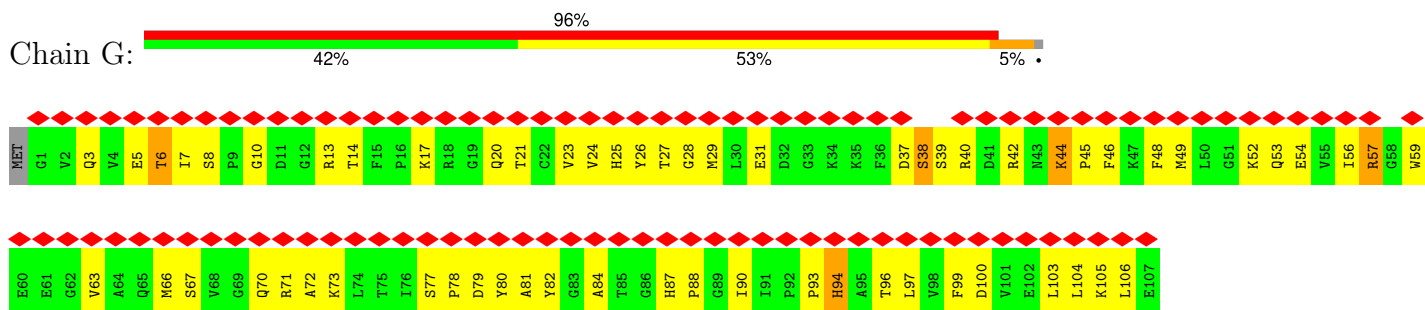
• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



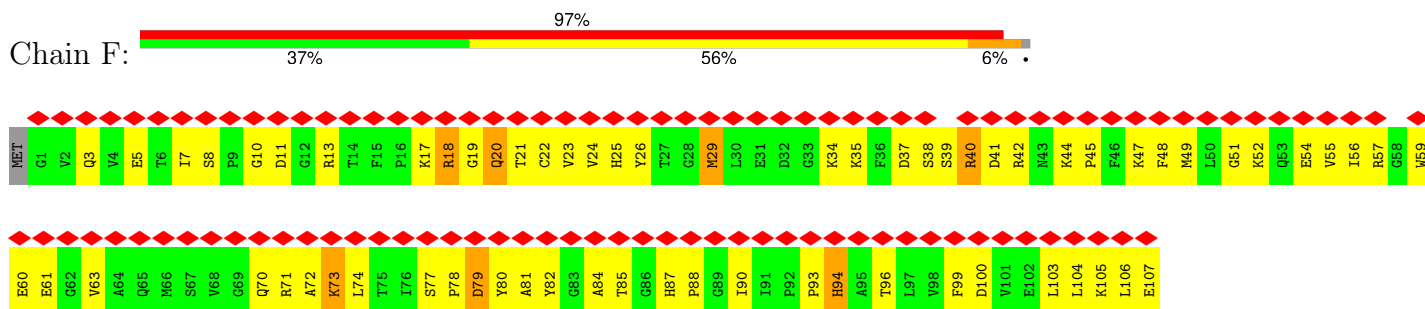
- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	17284	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	58	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.224	Depositor
Minimum map value	-0.085	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.015	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	427.008, 427.008, 427.008	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.834, 0.834, 0.834	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, A1BD2, CA, 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	0.29	1/35977 (0.0%)	0.59	20/48726 (0.0%)
1	B	0.29	1/35977 (0.0%)	0.59	20/48726 (0.0%)
1	C	0.29	1/35977 (0.0%)	0.59	20/48726 (0.0%)
1	D	0.29	1/35977 (0.0%)	0.59	20/48726 (0.0%)
2	E	0.31	0/850	0.65	0/1146
2	F	0.30	0/850	0.64	0/1146
2	G	0.28	0/850	0.59	0/1146
2	H	0.30	0/850	0.65	0/1146
All	All	0.29	4/147308 (0.0%)	0.59	80/199488 (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
1	A	0	2
1	B	0	2
1	C	0	2
1	D	0	2
All	All	0	8

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	4876	CYS	CB-SG	-5.89	1.72	1.81
1	D	4876	CYS	CB-SG	-5.88	1.72	1.81
1	B	4876	CYS	CB-SG	-5.85	1.72	1.81
1	C	4876	CYS	CB-SG	-5.85	1.72	1.81

The worst 5 of 80 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	4876	CYS	CA-CB-SG	9.65	131.37	114.00
1	A	4876	CYS	CA-CB-SG	9.64	131.34	114.00
1	B	4876	CYS	CA-CB-SG	9.62	131.31	114.00
1	D	4876	CYS	CA-CB-SG	9.61	131.30	114.00
1	A	29	LEU	CA-CB-CG	7.15	131.75	115.30

There are no chirality outliers.

5 of 8 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1671	ARG	Sidechain
1	A	4876	CYS	Peptide
1	B	1671	ARG	Sidechain
1	B	4876	CYS	Peptide
1	D	1671	ARG	Sidechain

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	35150	0	34793	2161	0
1	B	35150	0	34793	2145	0
1	C	35150	0	34793	2181	0
1	D	35150	0	34793	2174	0
2	E	831	0	831	75	0
2	F	831	0	830	64	0
2	G	831	0	831	75	0
2	H	831	0	831	75	0
3	A	31	0	12	1	0
3	B	31	0	12	2	0
3	C	31	0	12	2	0
3	D	31	0	12	2	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	1	0	0	0	0
5	D	1	0	0	0	0
6	A	18	0	0	1	0
6	B	18	0	0	1	0
6	C	18	0	0	1	0
6	D	18	0	0	1	0
All	All	144128	0	142543	8717	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 30.

The worst 5 of 8717 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:F:40:ARG:NH2	1:B:674:PHE:CE2	1.90	1.19
1:D:1220:GLN:HB3	1:C:3522:LEU:HD13	1.12	1.12
1:A:3522:LEU:HD13	1:B:1220:GLN:HB3	1.09	1.07
1:B:3522:LEU:HD13	1:C:1220:GLN:HB3	1.11	1.07
1:A:1220:GLN:HB3	1:D:3522:LEU:HD13	1.06	1.06

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	4385/5037 (87%)	4250 (97%)	129 (3%)	6 (0%)	48	83
1	B	4385/5037 (87%)	4250 (97%)	129 (3%)	6 (0%)	48	83
1	C	4385/5037 (87%)	4249 (97%)	130 (3%)	6 (0%)	48	83
1	D	4385/5037 (87%)	4250 (97%)	129 (3%)	6 (0%)	48	83
2	E	105/108 (97%)	97 (92%)	8 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	F	105/108 (97%)	102 (97%)	3 (3%)	0	100	100
2	G	105/108 (97%)	103 (98%)	2 (2%)	0	100	100
2	H	105/108 (97%)	103 (98%)	2 (2%)	0	100	100
All	All	17960/20580 (87%)	17404 (97%)	532 (3%)	24 (0%)	50	83

5 of 24 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	908	VAL
1	A	3300	ALA
1	A	4711	PHE
1	B	908	VAL
1	B	3300	ALA

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	3836/4276 (90%)	3575 (93%)	261 (7%)	13	34
1	B	3836/4276 (90%)	3575 (93%)	261 (7%)	13	34
1	C	3836/4276 (90%)	3574 (93%)	262 (7%)	13	34
1	D	3836/4276 (90%)	3575 (93%)	261 (7%)	13	34
2	E	89/90 (99%)	80 (90%)	9 (10%)	6	21
2	F	89/90 (99%)	78 (88%)	11 (12%)	4	16
2	G	89/90 (99%)	83 (93%)	6 (7%)	13	34
2	H	89/90 (99%)	78 (88%)	11 (12%)	4	16
All	All	15700/17464 (90%)	14618 (93%)	1082 (7%)	16	33

5 of 1082 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	1973	GLN

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Mol	Chain	Res	Type
1	C	2490	MET
1	C	1854	PHE
1	C	3790	THR
1	B	1619	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 163 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	3837	GLN
1	C	2417	HIS
1	D	4037	ASN
1	C	772	ASN
1	C	3149	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 8 are monoatomic - leaving 8 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
6	A1BD2	B	5304	-	16,19,19	0.82	0	15,28,28	1.22	2 (13%)
3	ATP	D	5301	-	28,33,33	0.68	0	34,52,52	0.87	2 (5%)
6	A1BD2	A	5304	-	16,19,19	0.82	0	15,28,28	1.21	2 (13%)
3	ATP	A	5301	-	28,33,33	0.68	0	34,52,52	0.87	2 (5%)
3	ATP	C	5301	-	28,33,33	0.68	0	34,52,52	0.87	2 (5%)
6	A1BD2	D	5304	-	16,19,19	0.82	0	15,28,28	1.21	2 (13%)
6	A1BD2	C	5304	-	16,19,19	0.81	0	15,28,28	1.19	2 (13%)
3	ATP	B	5301	-	28,33,33	0.68	0	34,52,52	0.87	2 (5%)

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
6	A1BD2	B	5304	-	-	0/4/6/6	0/2/2/2
3	ATP	D	5301	-	-	5/18/38/38	0/3/3/3
6	A1BD2	A	5304	-	-	0/4/6/6	0/2/2/2
3	ATP	A	5301	-	-	5/18/38/38	0/3/3/3
3	ATP	C	5301	-	-	5/18/38/38	0/3/3/3
6	A1BD2	D	5304	-	-	0/4/6/6	0/2/2/2
6	A1BD2	C	5304	-	-	0/4/6/6	0/2/2/2
3	ATP	B	5301	-	-	5/18/38/38	0/3/3/3

There are no bond length outliers.

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	5301	ATP	C4'-O4'-C1'	-3.65	106.58	109.92
3	A	5301	ATP	C4'-O4'-C1'	-3.64	106.59	109.92
3	B	5301	ATP	C4'-O4'-C1'	-3.64	106.59	109.92
3	C	5301	ATP	C4'-O4'-C1'	-3.62	106.61	109.92
6	A	5304	A1BD2	C2-N1-C5	-2.92	119.52	122.22

There are no chirality outliers.

5 of 20 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	5301	ATP	O4'-C4'-C5'-O5'

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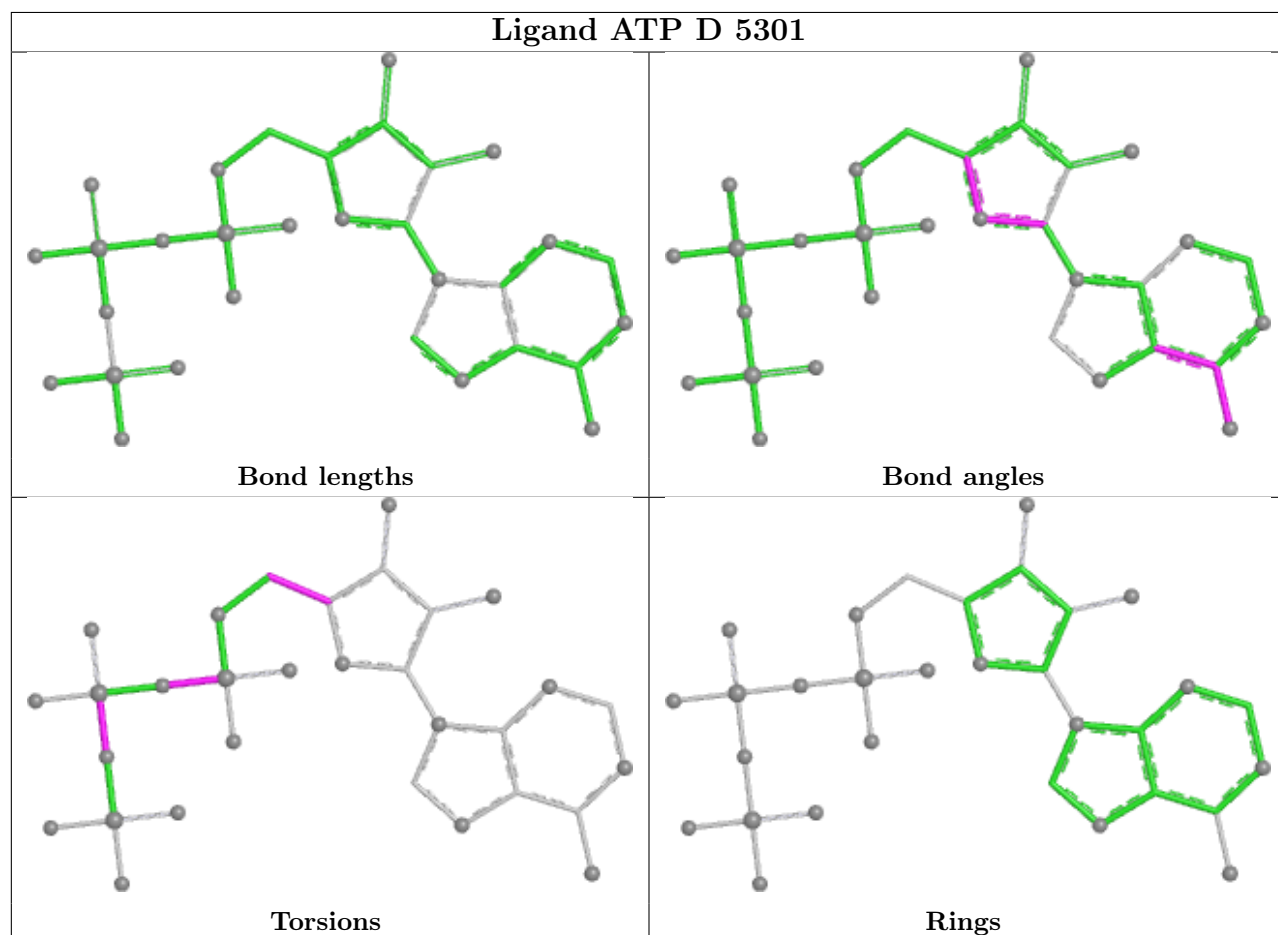
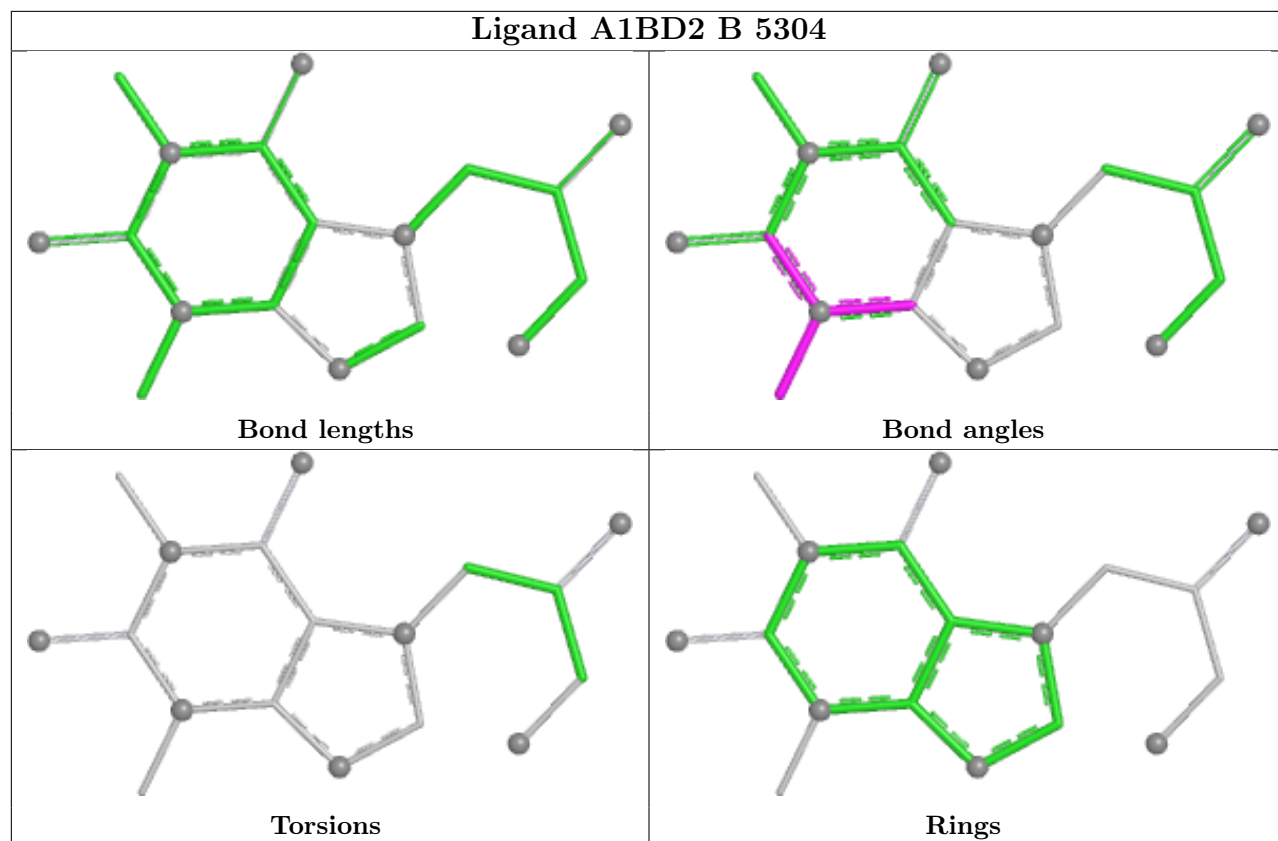
Mol	Chain	Res	Type	Atoms
3	A	5301	ATP	O4'-C4'-C5'-O5'
3	B	5301	ATP	O4'-C4'-C5'-O5'
3	C	5301	ATP	O4'-C4'-C5'-O5'
3	A	5301	ATP	PG-O3B-PB-O3A

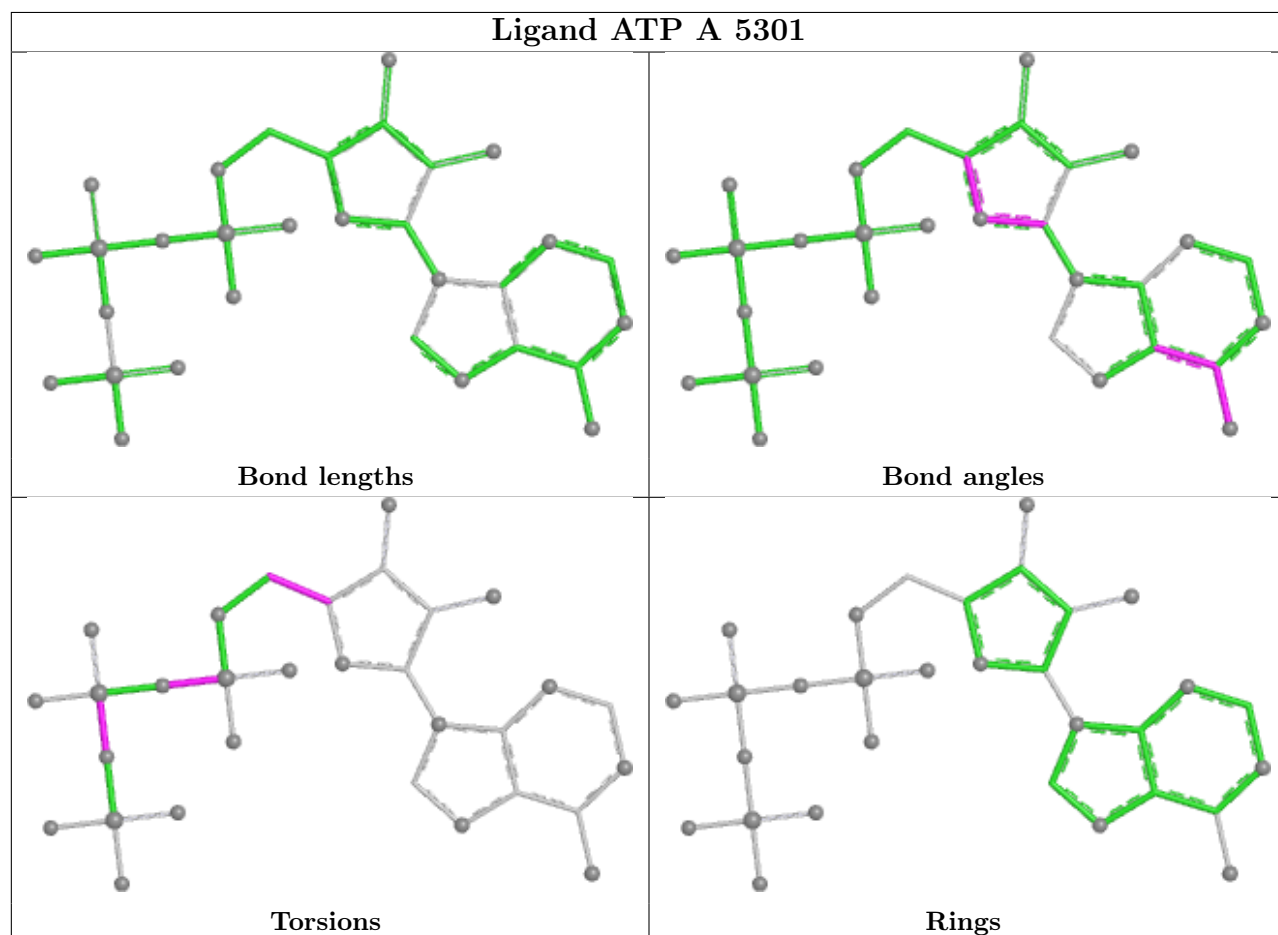
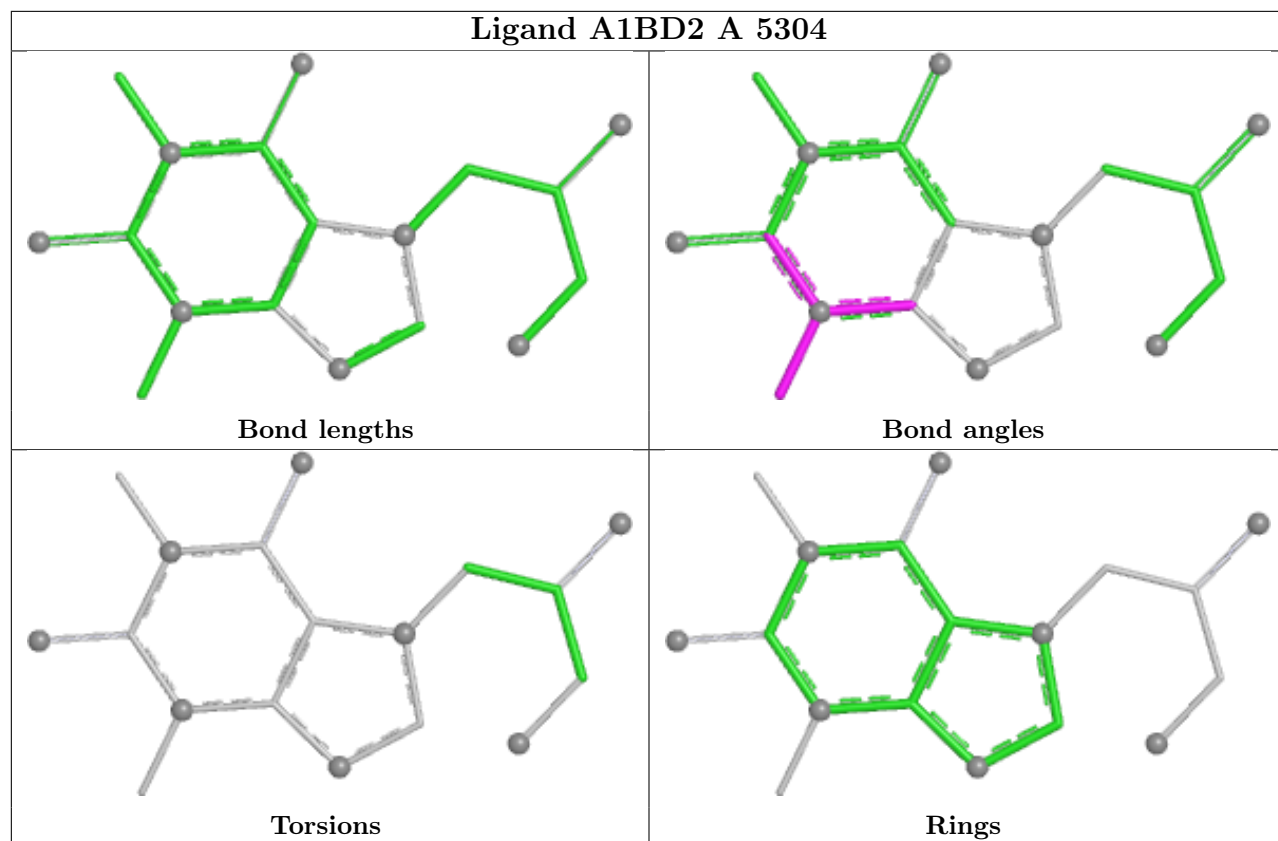
There are no ring outliers.

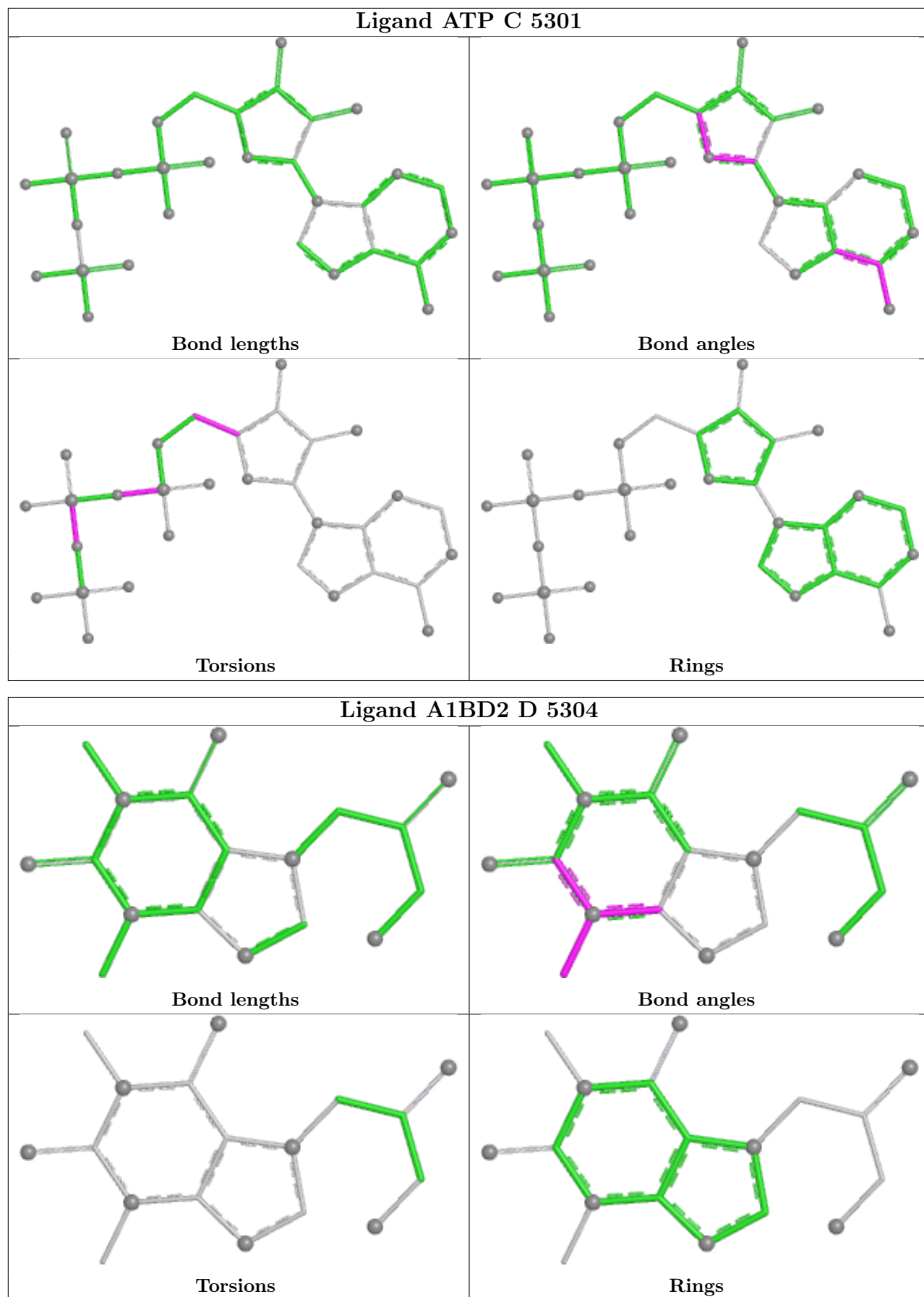
8 monomers are involved in 11 short contacts:

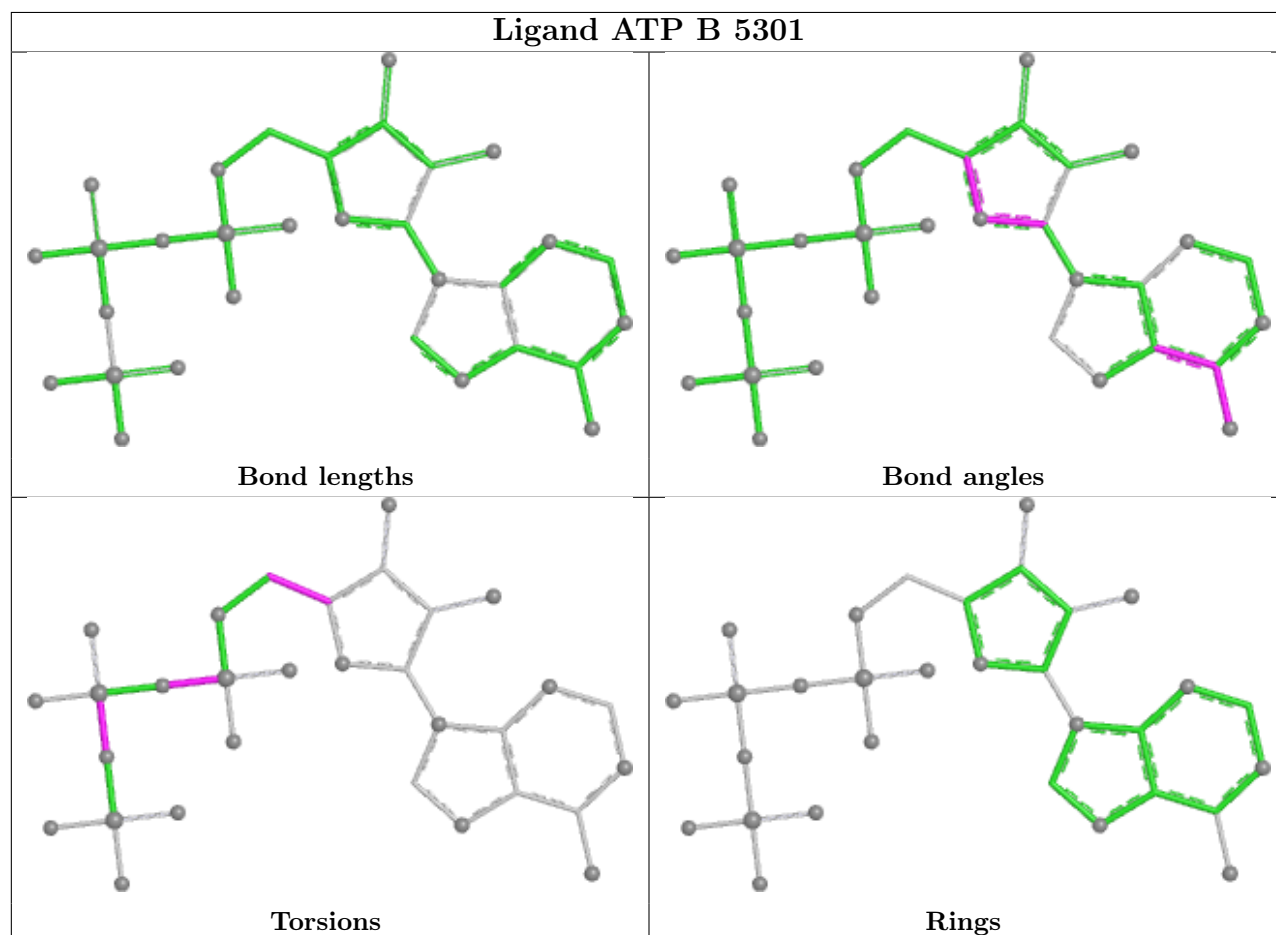
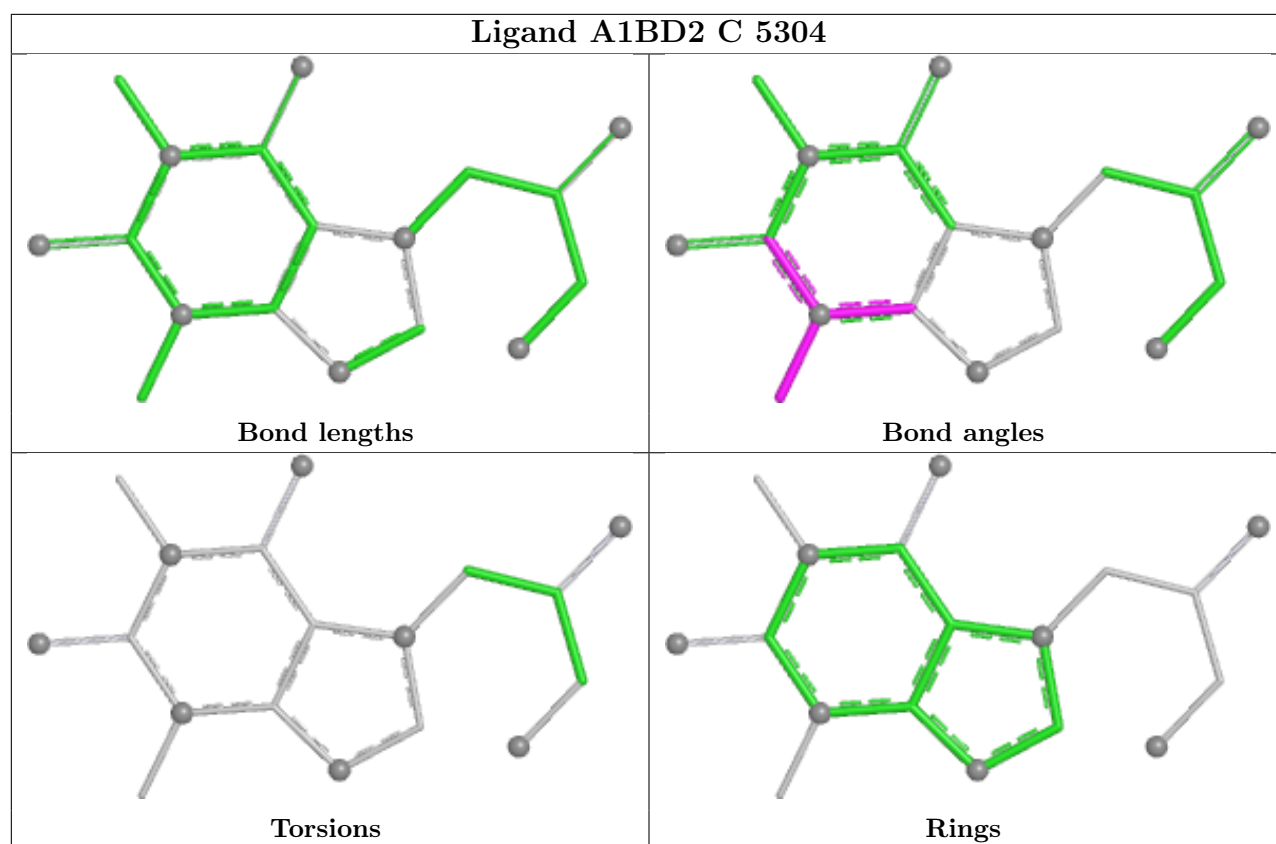
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	5304	A1BD2	1	0
3	D	5301	ATP	2	0
6	A	5304	A1BD2	1	0
3	A	5301	ATP	1	0
3	C	5301	ATP	2	0
6	D	5304	A1BD2	1	0
6	C	5304	A1BD2	1	0
3	B	5301	ATP	2	0

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.

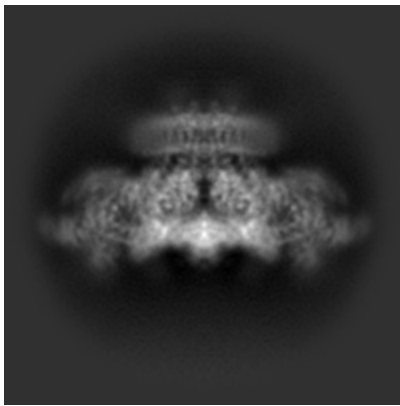
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-47388. These allow visual inspection of the internal detail of the map and identification of artifacts.

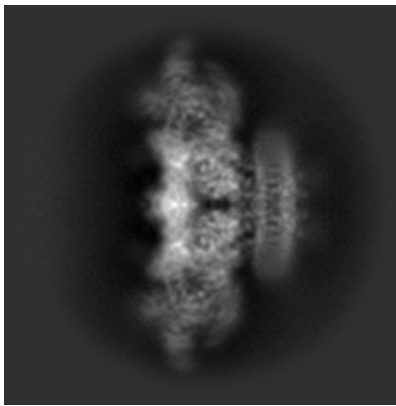
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

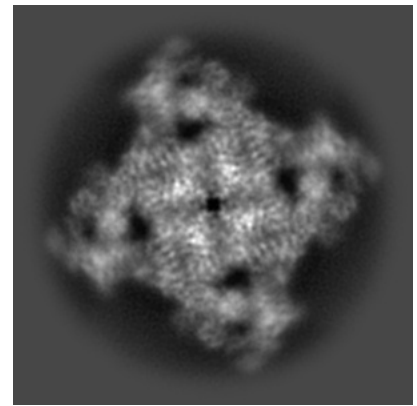
6.1.1 Primary map



X

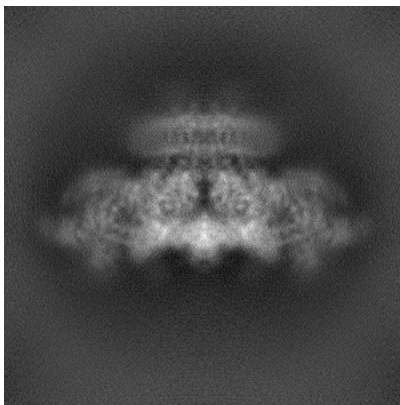


Y

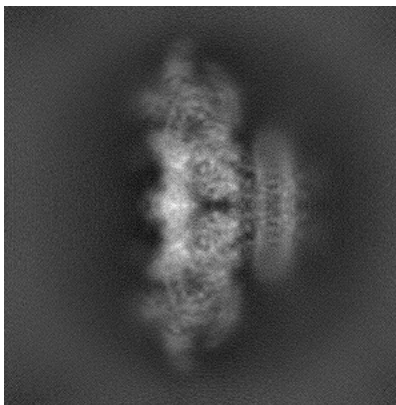


Z

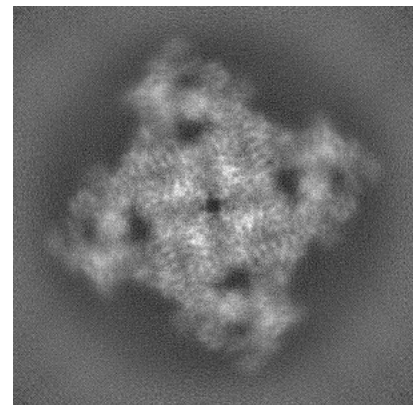
6.1.2 Raw map



X



Y

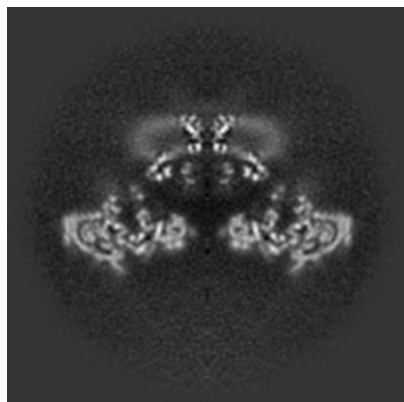


Z

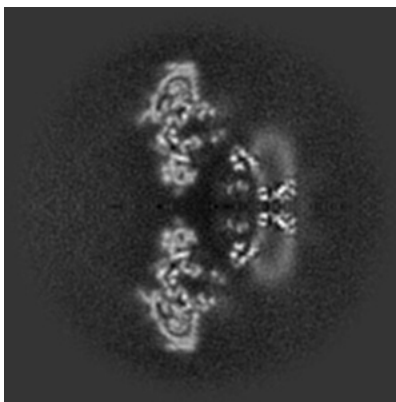
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

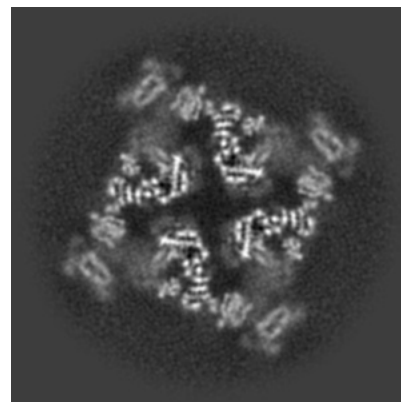
6.2.1 Primary map



X Index: 256

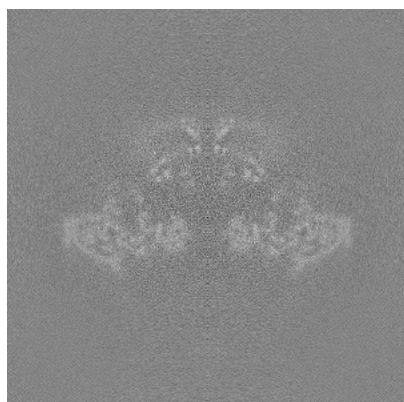


Y Index: 256

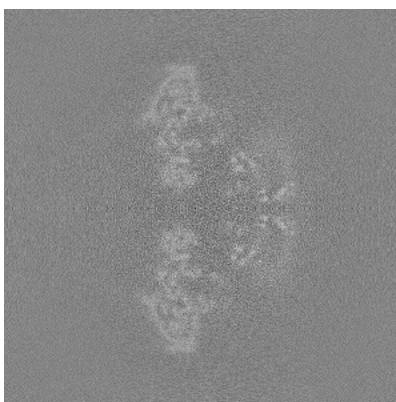


Z Index: 256

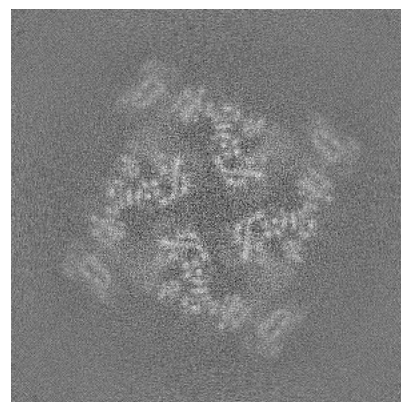
6.2.2 Raw map



X Index: 256



Y Index: 256

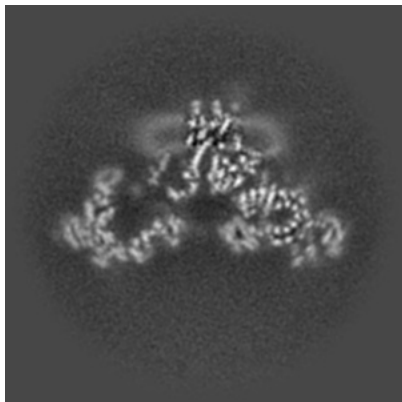


Z Index: 256

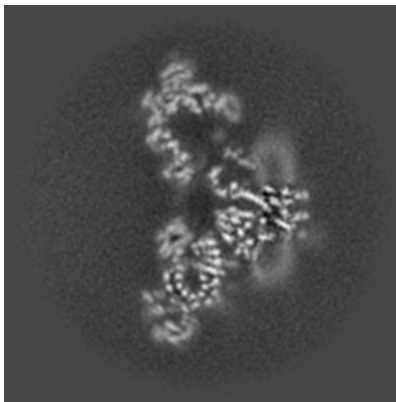
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

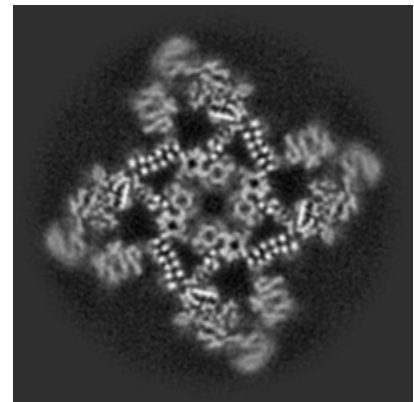
6.3.1 Primary map



X Index: 269

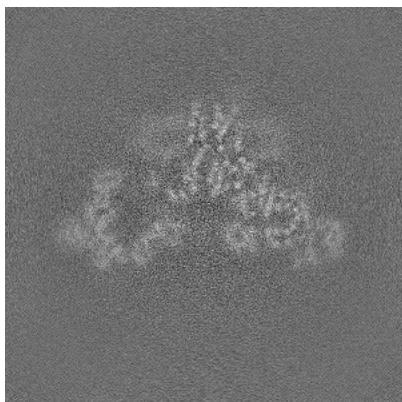


Y Index: 269

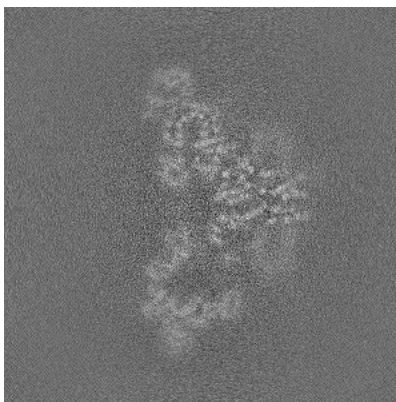


Z Index: 229

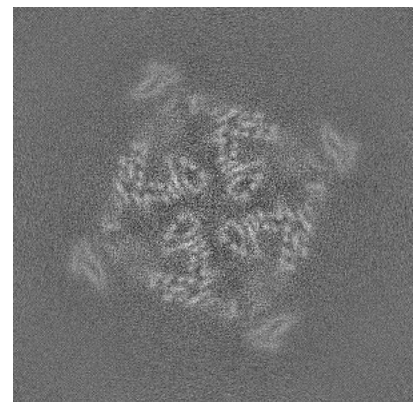
6.3.2 Raw map



X Index: 271



Y Index: 241

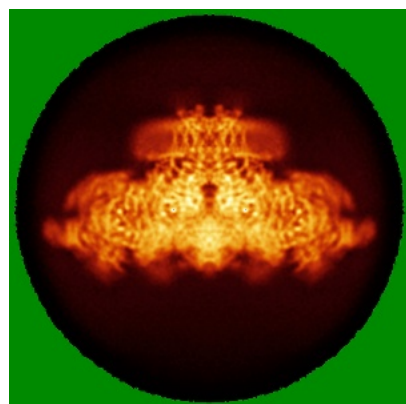


Z Index: 268

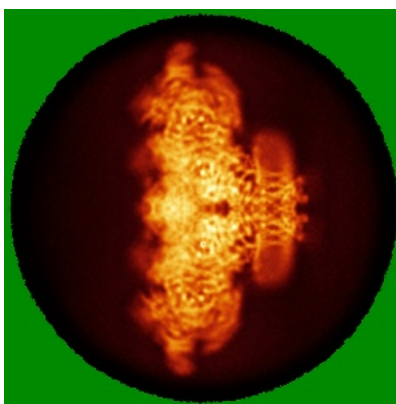
The images above show the largest variance slices of the map in three orthogonal directions.

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

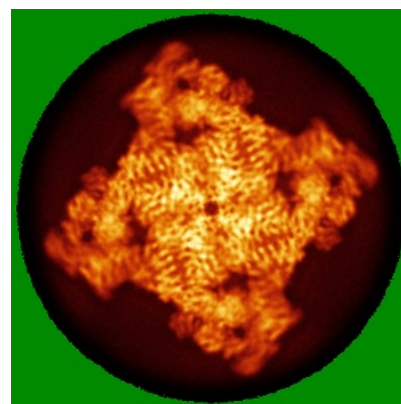
6.4.1 Primary map



X

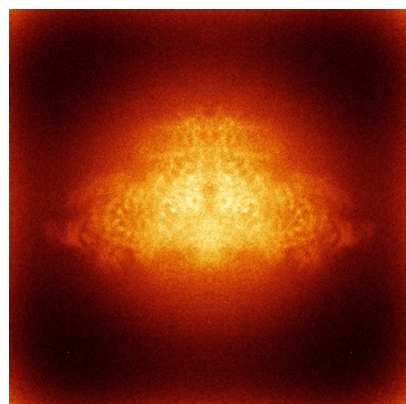


Y

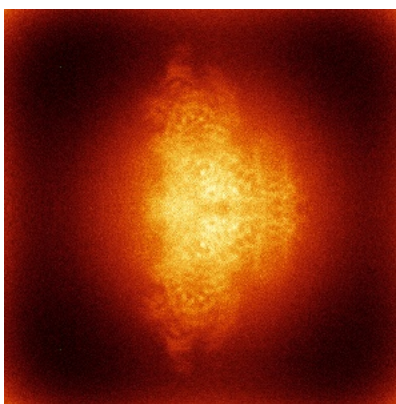


Z

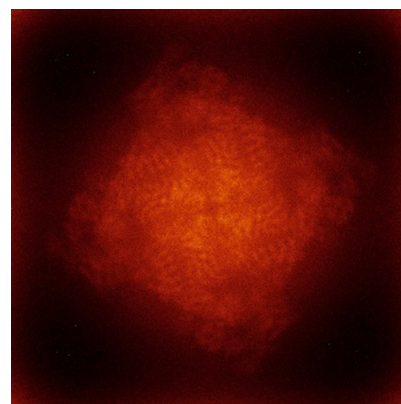
6.4.2 Raw map



X



Y

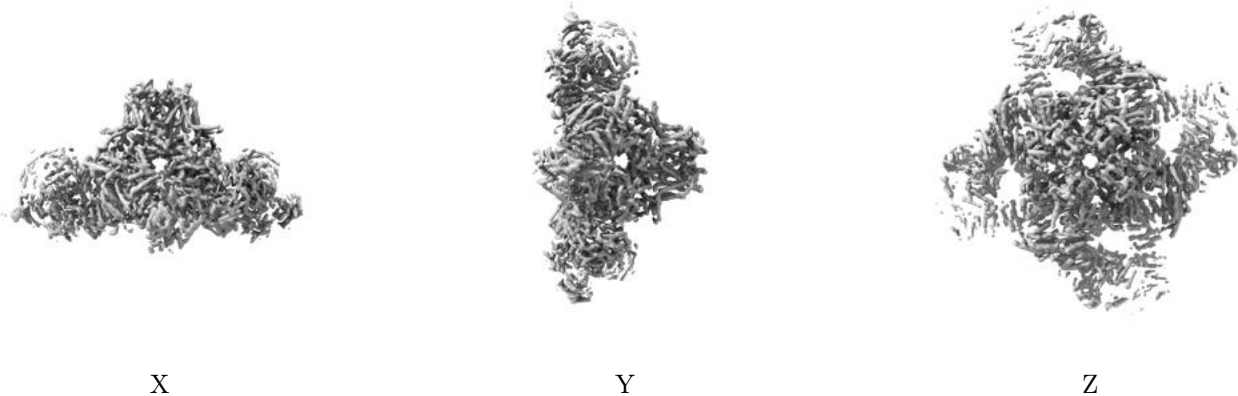


Z

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.

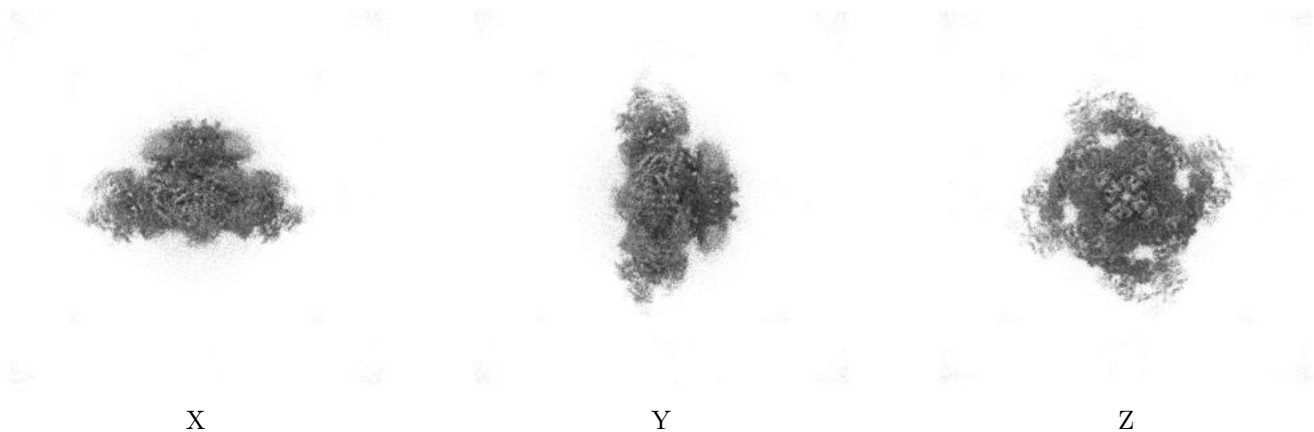
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.1. 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.

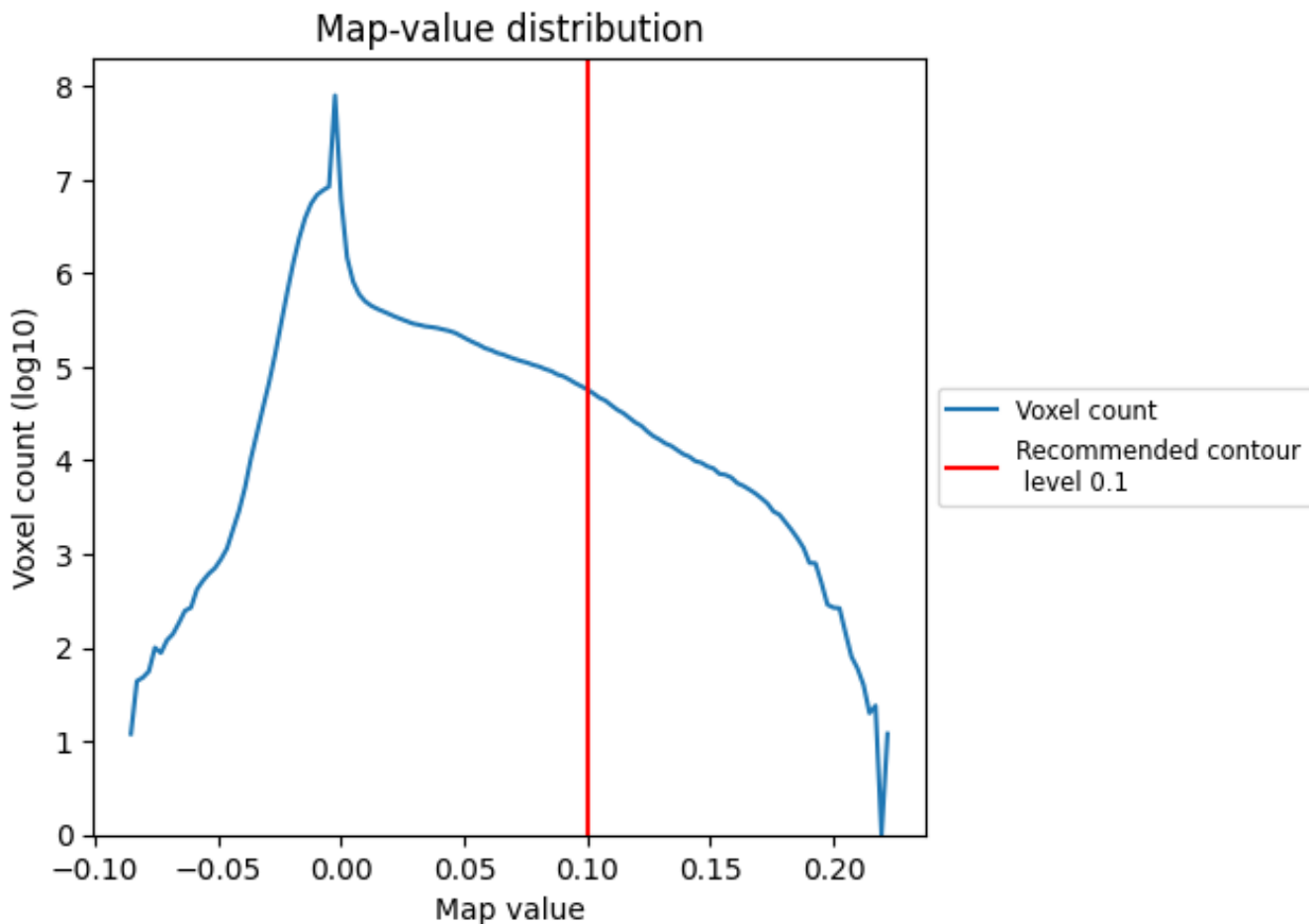
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

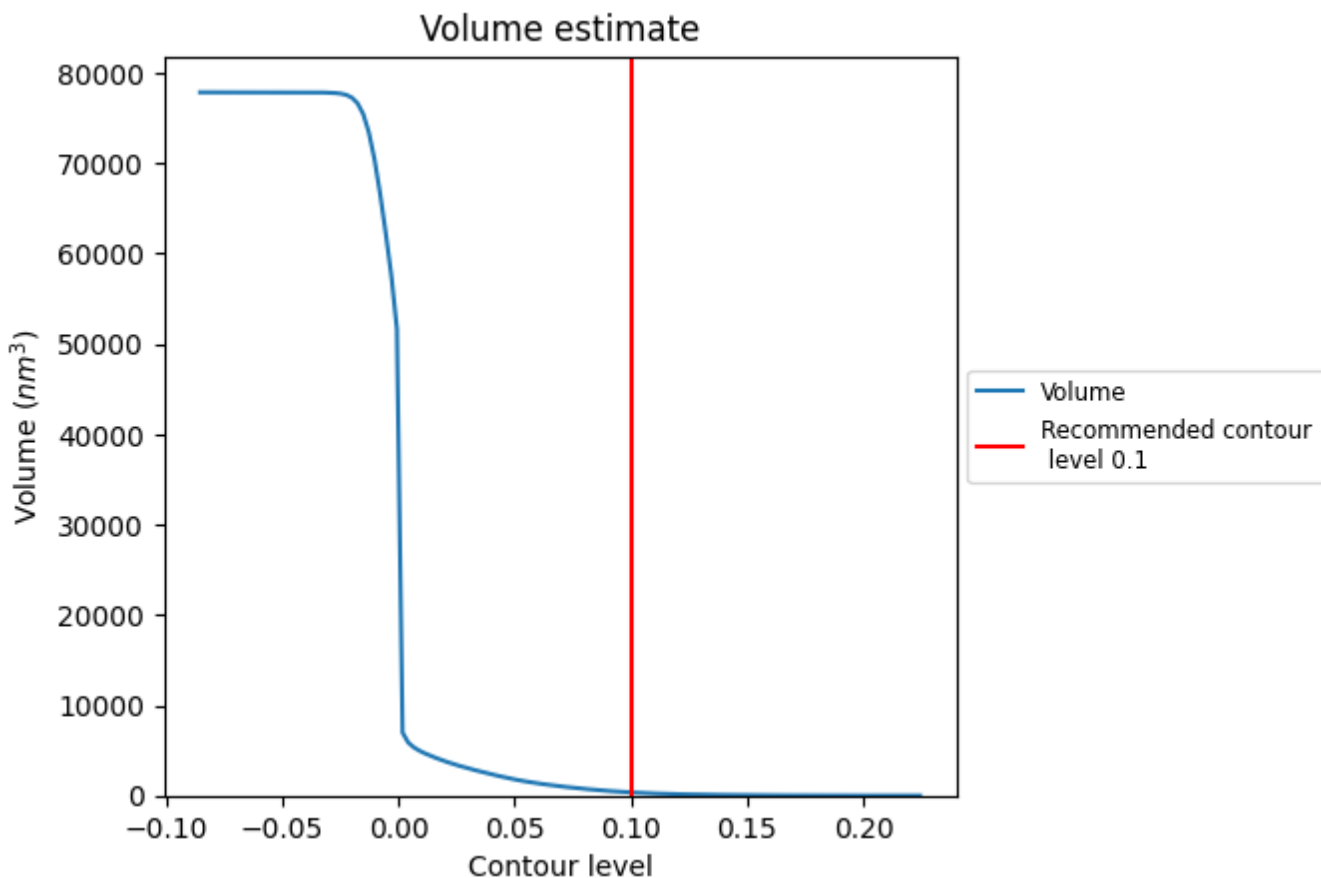
This section contains the results of statistical analysis of the map.

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.

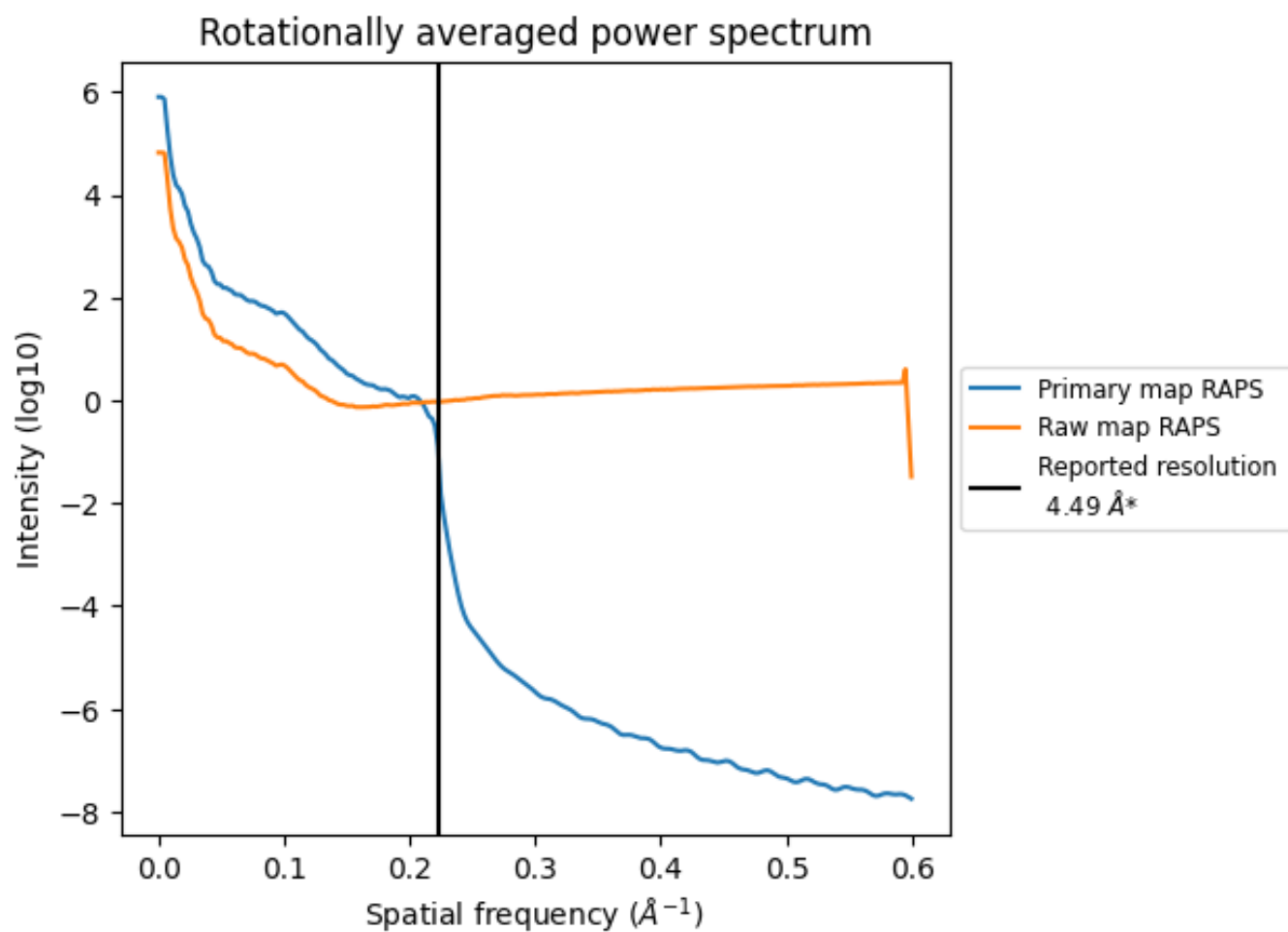
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 352 nm³; this corresponds to an approximate mass of 318 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 [\(i\)](#)

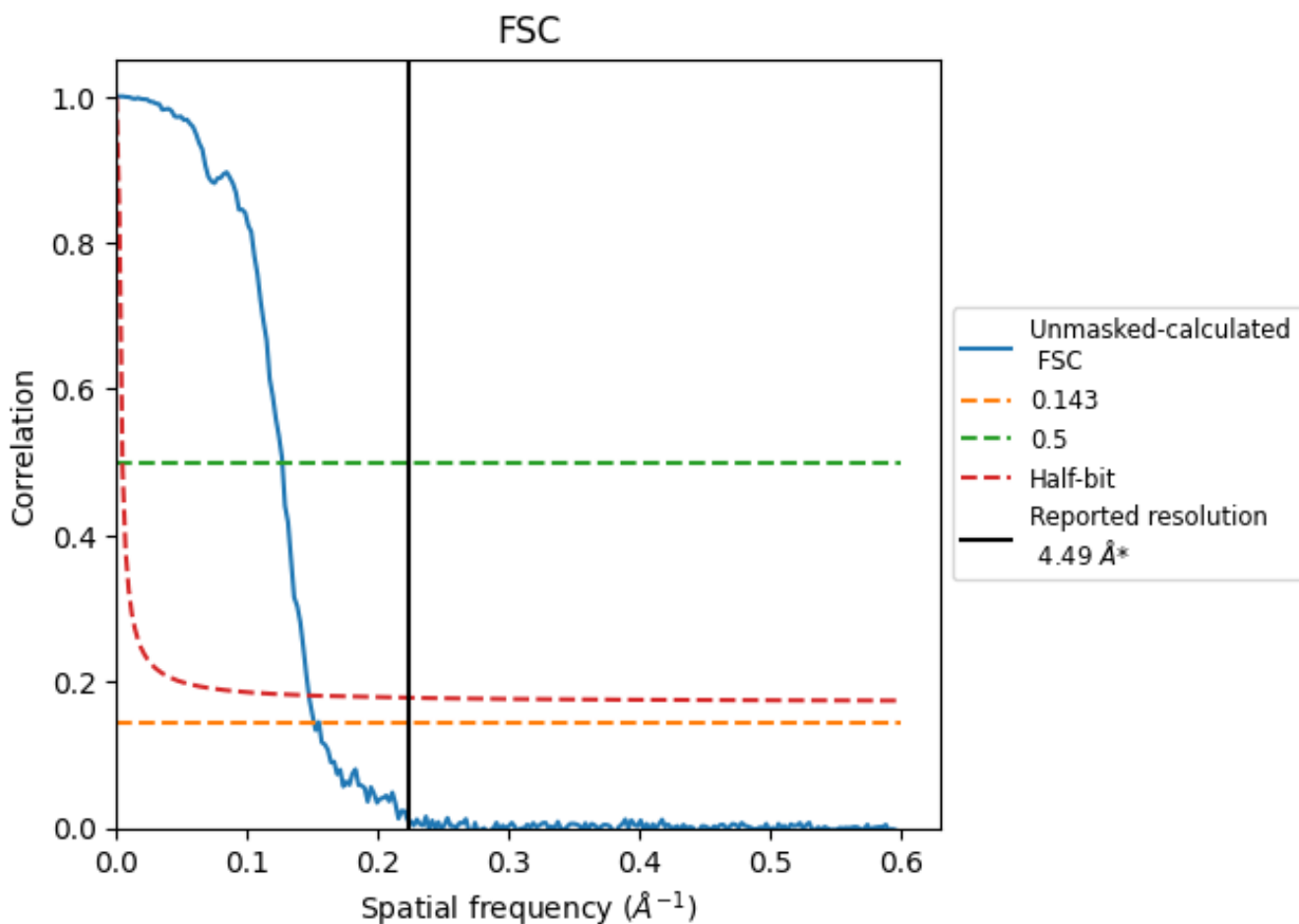


*Reported resolution corresponds to spatial frequency of 0.223 Å⁻¹

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 0.223 Å⁻¹

8.2 Resolution estimates [i](#)

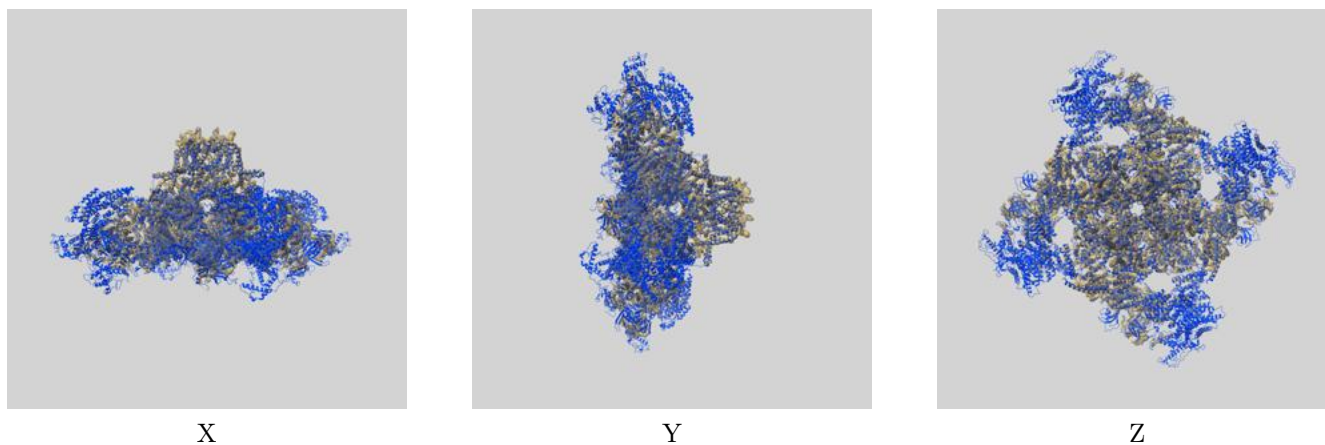
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.49	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	6.62	7.89	6.80

*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 6.62 differs from the reported value 4.49 by more than 10 %

9 Map-model fit [i](#)

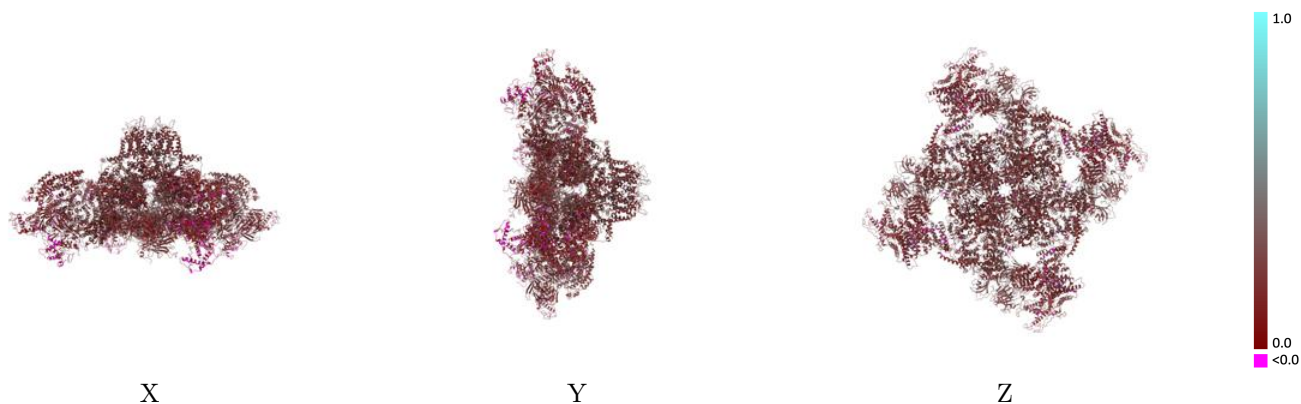
This section contains information regarding the fit between EMDB map EMD-47388 and PDB model 9E1B. Per-residue inclusion information can be found in section [3](#) on page [6](#).

9.1 Map-model overlay [i](#)



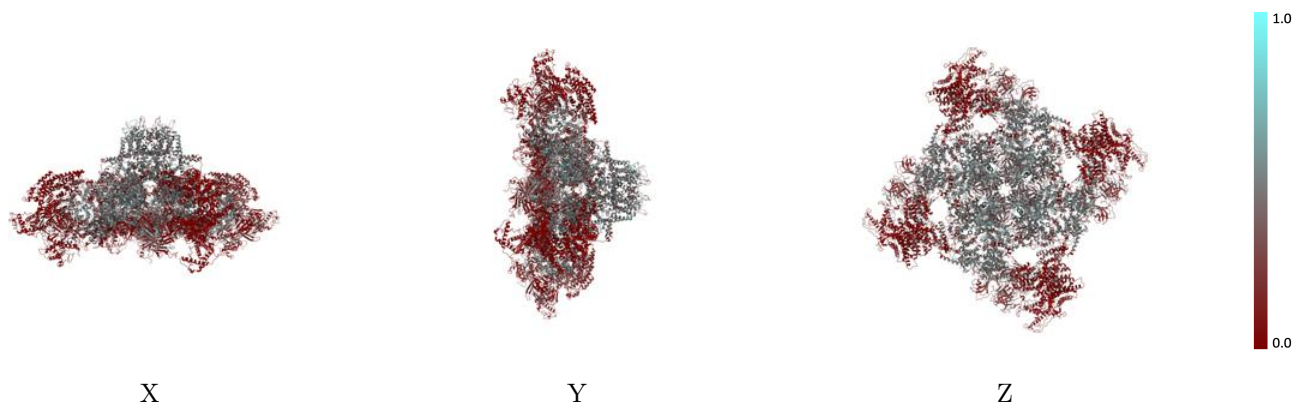
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



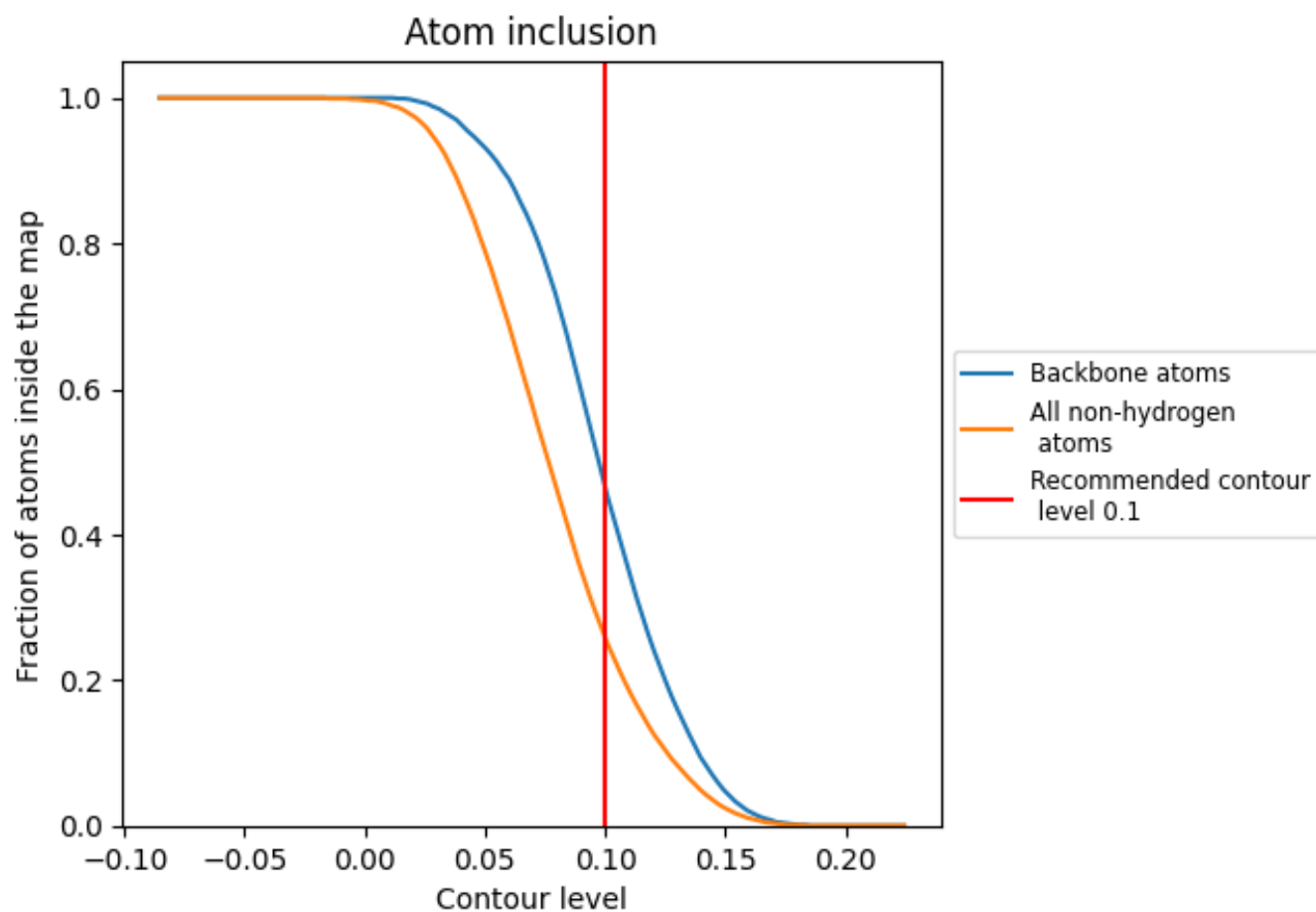
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.1).

9.4 Atom inclusion [i](#)



At the recommended contour level, 47% of all backbone atoms, 26% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary [i](#)

The table lists the average atom inclusion at the recommended contour level (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.2590	0.2100
A	0.2640	0.2100
B	0.2640	0.2090
C	0.2640	0.2090
D	0.2640	0.2090
E	0.0360	0.2600
F	0.0310	0.2560
G	0.0320	0.2630
H	0.0360	0.2580

