



wwPDB EM Validation Summary Report ⓘ

Jan 1, 2025 – 08:33 AM EST

PDB ID : 8RS0
EMDB ID : EMD-19472
Title : Structure of RyR1 in detergent in primed state in complex with nanobody and FKBP
Authors : Li, C.; Efremov, R.G.
Deposited on : 2024-01-24
Resolution : 3.30 Å(reported)

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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) : 2.40

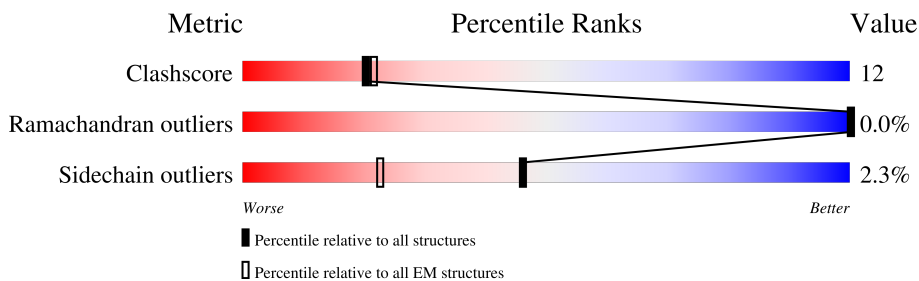
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.30 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.



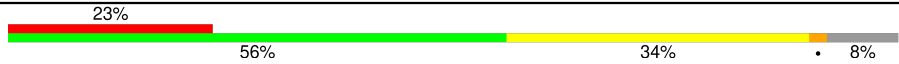
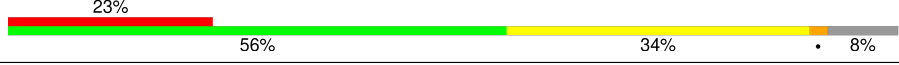
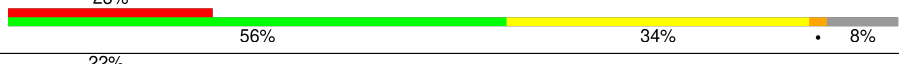

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	107	
1	D	107	
1	H	107	
1	I	107	
2	B	5027	
2	E	5027	
2	G	5027	
2	J	5027	

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Mol	Chain	Length	Quality of chain
3	C	137	
3	F	137	
3	K	137	
3	M	137	

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 143570 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	816	514	144	154	4	0	0
1	D	107	816	514	144	154	4	0	0
1	H	107	816	514	144	154	4	0	0
1	I	107	816	514	144	154	4	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	100	ASP	GLY	conflict	UNP Q8HYX6
D	100	ASP	GLY	conflict	UNP Q8HYX6
H	100	ASP	GLY	conflict	UNP Q8HYX6
I	100	ASP	GLY	conflict	UNP Q8HYX6

- Molecule 2 is a protein called Ryanodine receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	4305	34043	21690	5866	6261	226	1	0
2	E	4305	34043	21690	5866	6261	226	1	0
2	G	4319	34149	21751	5887	6284	227	1	0
2	J	4305	34043	21690	5866	6261	226	1	0

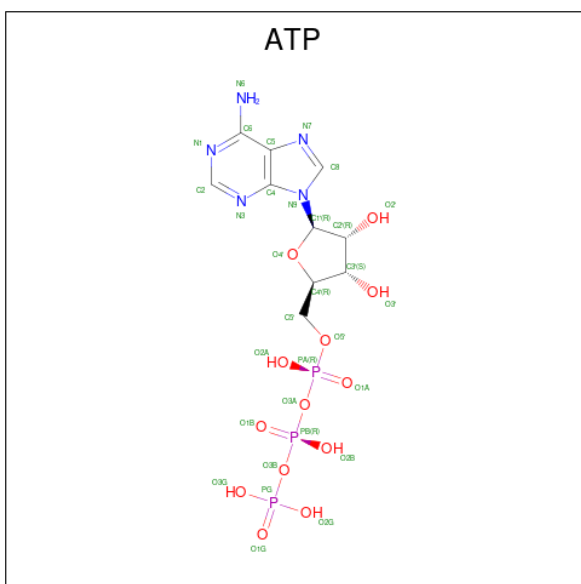
- Molecule 3 is a protein called Nanobody 9657.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	126	Total 960	C 591	N 170	O 194	S 5	0	0
3	F	126	Total 960	C 591	N 170	O 194	S 5	0	0
3	K	126	Total 960	C 591	N 170	O 194	S 5	0	0
3	M	126	Total 960	C 591	N 170	O 194	S 5	0	0

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

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
4	B	1	Total 1	Zn 1	0
4	E	1	Total 1	Zn 1	0
4	G	1	Total 1	Zn 1	0
4	J	1	Total 1	Zn 1	0

- Molecule 5 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: C₁₀H₁₆N₅O₁₃P₃) (labeled as "Ligand of Interest" by depositor).



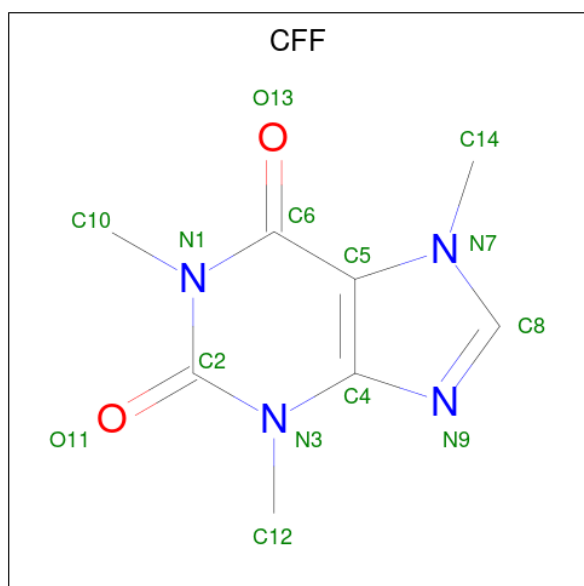
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
5	B	1	Total 31	C 10	N 5	O 13	P 3	0

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Mol	Chain	Residues	Atoms				AltConf	
			Total	C	N	O		P
5	E	1	Total 31	C 10	N 5	O 13	P 3	0
5	G	1	Total 31	C 10	N 5	O 13	P 3	0
5	J	1	Total 31	C 10	N 5	O 13	P 3	0

- Molecule 6 is CAFFEINE (three-letter code: CFF) (formula: $C_8H_{10}N_4O_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
6	B	1	Total 14	C 8	N 4	O 2	0
6	E	1	Total 14	C 8	N 4	O 2	0
6	G	1	Total 14	C 8	N 4	O 2	0
6	J	1	Total 14	C 8	N 4	O 2	0

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Ca	
7	B	1	Total 1	Ca 1	0

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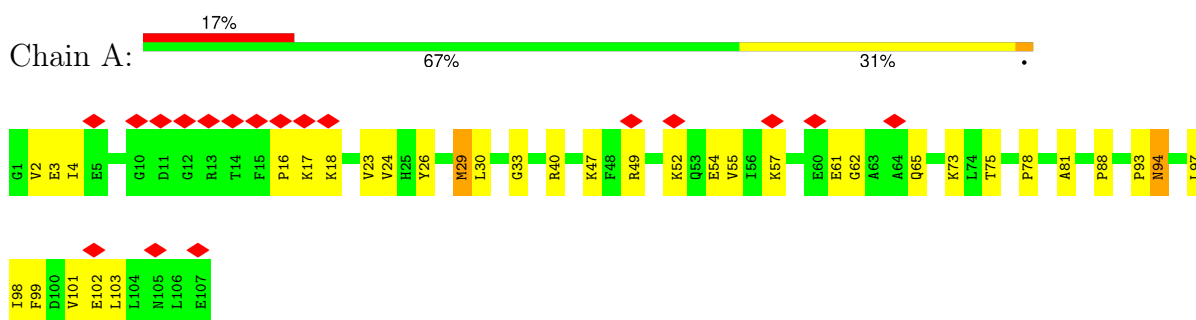
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Mol	Chain	Residues	Atoms		AltConf
7	E	1	Total 1	Ca 1	0
7	G	1	Total 1	Ca 1	0
7	J	1	Total 1	Ca 1	0

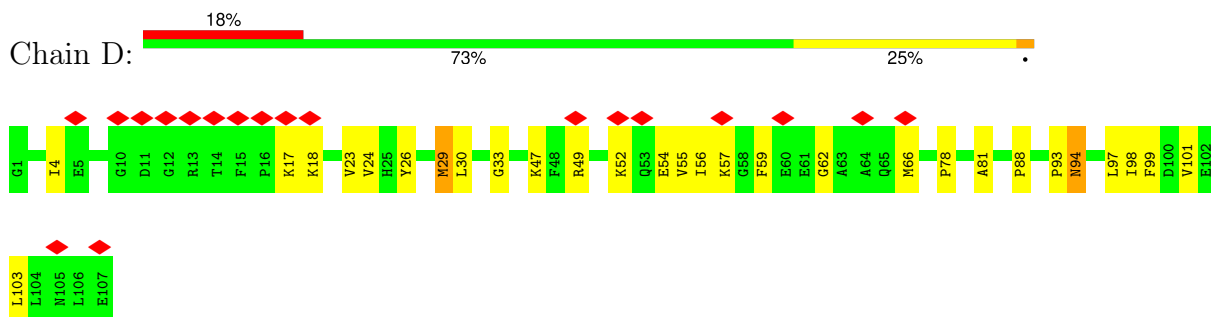
3 Residue-property plots [i](#)

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.

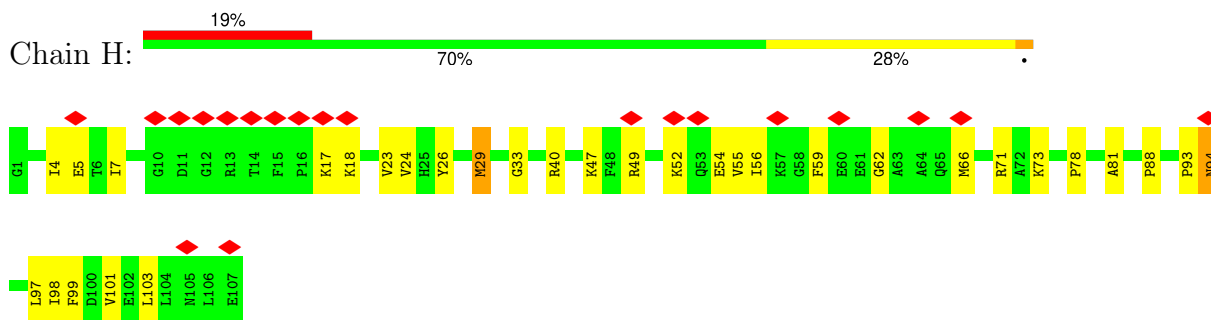
- Molecule 1: Peptidyl-prolyl cis-trans isomerase FKBP1B



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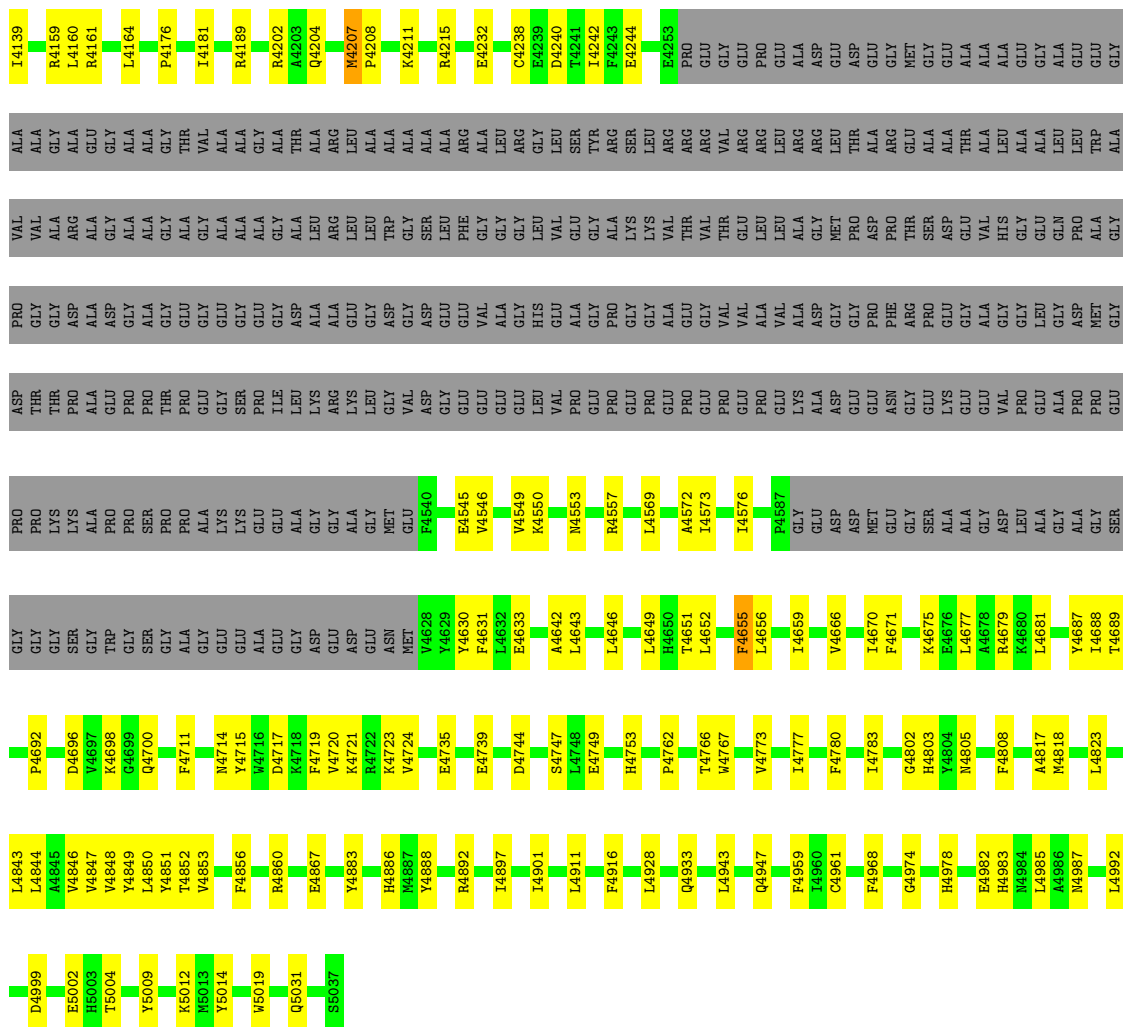
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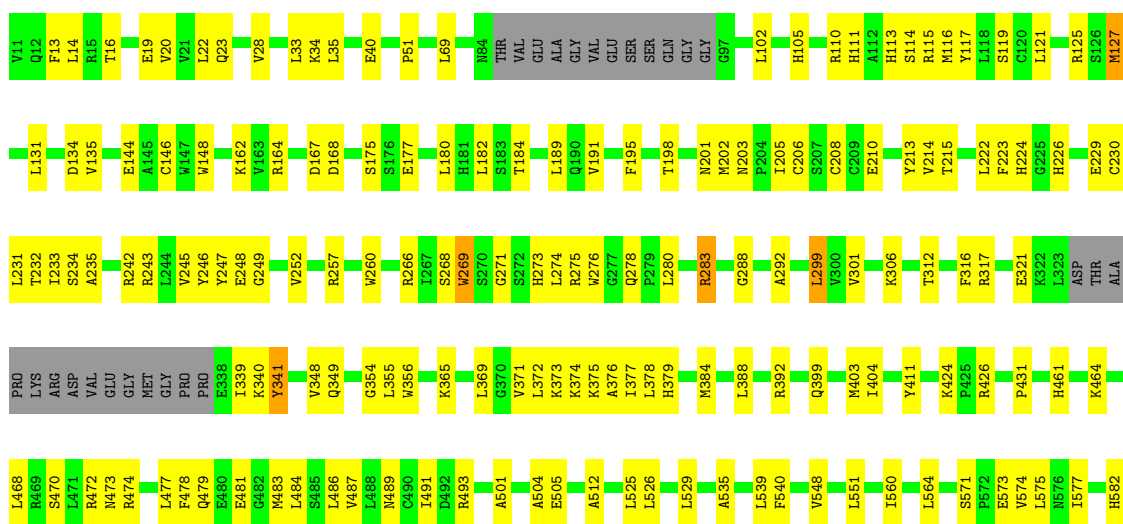
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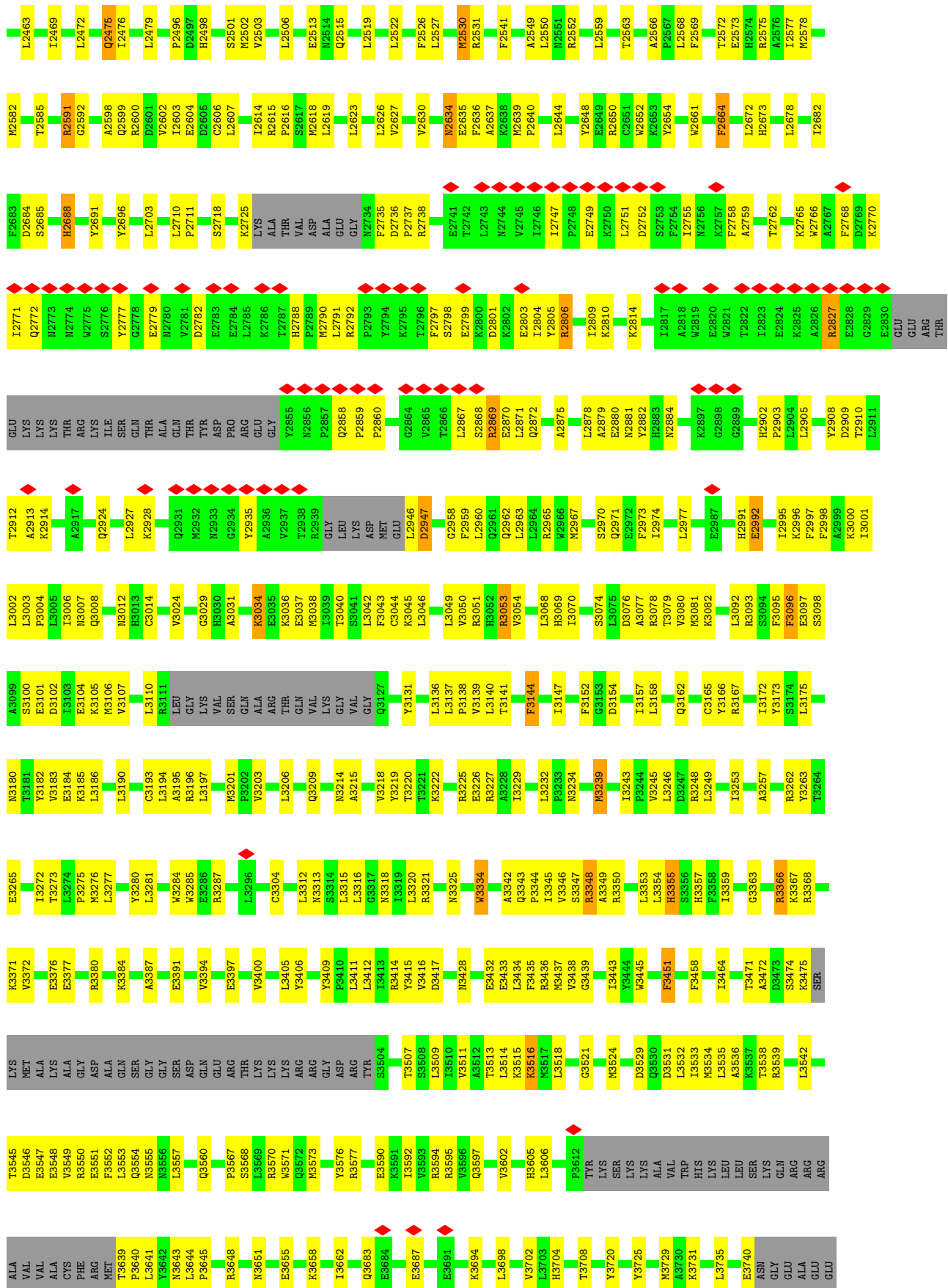


V4024	D3878	L3735	F3451	H3555	Y3166	L3092	I2995	P2903	R2827	T2762
V4025	E3879	L3533	F3458	S3556	R3167	K3093	I2996	L2904	E2828	K2765
G4038	F3880	M3534	F3458	H3357	Y3173	S3094	K2996	L2905	G2829	K2766
A4041	F3887	L3535	ASN	I3359	G3174	F3095	F2998	D2908	E2830	A2767
B4042	F3887	L3538	A3472	G3363	L3175	F3096	A2999	D2909	F2768	F2768
Q4043	R3559	T3538	B3473	R3366	M3180	E3097	K3000	T2910	G2769	D2769
M4044	L3542	R3559	S3474	R3366	T3181	S3098	I3001	L2911	GLU	K2770
V4045	L3542	L3542	S3474	R3366	Y3182	A3099	L3002	T2912	THR	L2771
L4048	D3546	L3542	SER	R3368	Y3183	E3101	L3003	A2913	THR	Q2772
V4055	E3547	L3542	LYS	R3371	K3184	T3273	L3005	K2914	LYS	H2773
K4060	E3548	L3542	MET	K3371	E3185	T3274	I3006	H2774	LYS	H2774
D4063	E3549	L3542	ALA	V3372	K3186	P3275	L3007	H2775	THR	H2775
M4064	R3550	L3542	LYS	E3376	L3190	M3276	Q3008	S2776	ARG	S2776
K4067	E3551	L3542	GLY	E3377	C3193	L3200	N3012	Y2777	ILE	Y2777
K4069	F3552	L3542	ALA	E3377	L3194	L3201	H3013	G2778	ILE	G2778
F4077	L3553	L3542	ASP	R3380	A3195	P3202	N3014	E2779	GLN	E2779
Y4080	Q3554	L3542	GLN	R3380	R3196	V3203	C3014	N2780	THR	N2780
L4087	N3555	L3542	SER	K3384	R3197	L3206	V3024	V2781	ALA	V2781
L4087	L3557	L3542	GLY	W3284	L3197	L3206	G3029	D2782	GLN	D2782
K4090	L3557	L3542	GLY	W3285	M3201	E3207	G3029	E2783	TVR	E2783
K4091	L3557	L3542	GLY	E3286	P3202	P3208	H3030	E2784	TVR	E2784
A4096	Q3560	L3542	ASP	R3287	V3203	Q3209	A3031	L2785	PRD	L2785
Q4100	P3567	L3542	GLN	L3296	L3206	L3209	K3034	K2786	ARG	K2786
Q4100	S3568	L3542	ARG	C3304	E3207	E3207	E3035	K2787	ARG	K2787
T4104	L3569	L3542	THR	E3307	P3208	P3209	K3036	H2788	GLY	H2788
G4105	W3571	L3542	LYS	T3308	Q3209	Q3209	E3037	N2789	GLY	N2789
I4108	Q3572	L3542	LYS	H3311	N3214	N3214	M3038	N2790	GLY	N2790
Q4109	M3573	L3542	ARG	L3312	A3215	A3215	I3089	L2791	LEU	L2791
F4110	Y3576	L3542	GLY	L3312	Y3219	Y3219	L3040	L2792	LEU	L2792
L4111	R3577	L3542	ASP	S3314	L3316	L3316	S3041	R2793	ASP	R2793
L4112	E3590	L3542	ARG	L3316	L3317	L3317	F3043	P2794	ASP	P2794
S4115	R3591	L3542	TYR	L3317	G3317	G3317	C3044	K2795	GLY	K2795
D4118	L3592	L3542	S3504	N3325	I3229	I3229	L3046	T2796	GLY	T2796
E4119	V3602	L3542	T3507	W3334	L3232	L3232	L3049	V2864	GLY	V2864
M4120	H3605	L3542	R3414	A3342	L3232	L3232	L3050	V2865	GLY	V2865
M4122	L3606	L3542	Y3415	A3342	P3233	P3233	F2959	T2866	GLY	T2866
M4130	L3606	L3542	L3416	Q3343	N3234	N3234	L2960	L2867	GLY	L2867
M4122	H3704	L3542	D3417	P3344	M3239	M3239	Q2962	L2801	GLY	Q2962
M4122	T3708	L3542	N3428	Q3344	L3239	L3239	Q2963	K2802	GLY	Q2963
M4122	Y3720	L3542	E3432	I3345	L3243	L3243	L2964	E2803	GLY	L2964
M4130	Y3725	L3542	E3433	I3345	P3244	P3244	L2965	L2871	GLY	L2965
P4135	L3612	L3542	L3436	I3345	V3245	V3245	W2965	Q2872	GLY	W2965
D4138	T3729	L3542	M3437	I3345	L3246	L3246	M2967	A2875	GLY	M2967
D4138	A3730	L3542	M3437	I3345	L3246	L3246	S2970	L2878	GLY	S2970
D4138	K3731	L3542	G3439	I3345	L3246	L3246	Q2971	A2879	GLY	Q2971
		L3542	G3439	I3345	L3246	L3246	F2973	E2880	GLY	F2973
		L3542	G3439	I3345	L3246	L3246	I2974	L2881	GLY	I2974
		L3542	G3439	I3345	L3246	L3246	L2977	Y2882	GLY	L2977
		L3542	G3439	I3345	L3246	L3246	E2987	N2884	GLY	E2987
		L3542	G3439	I3345	L3246	L3246	H2991	K2897	GLY	H2991
		L3542	G3439	I3345	L3246	L3246	E2992	G2898	GLY	E2992
		L3542	G3439	I3345	L3246	L3246		G2899	GLY	G2899
		L3542	G3439	I3345	L3246	L3246		H2902	GLY	H2902

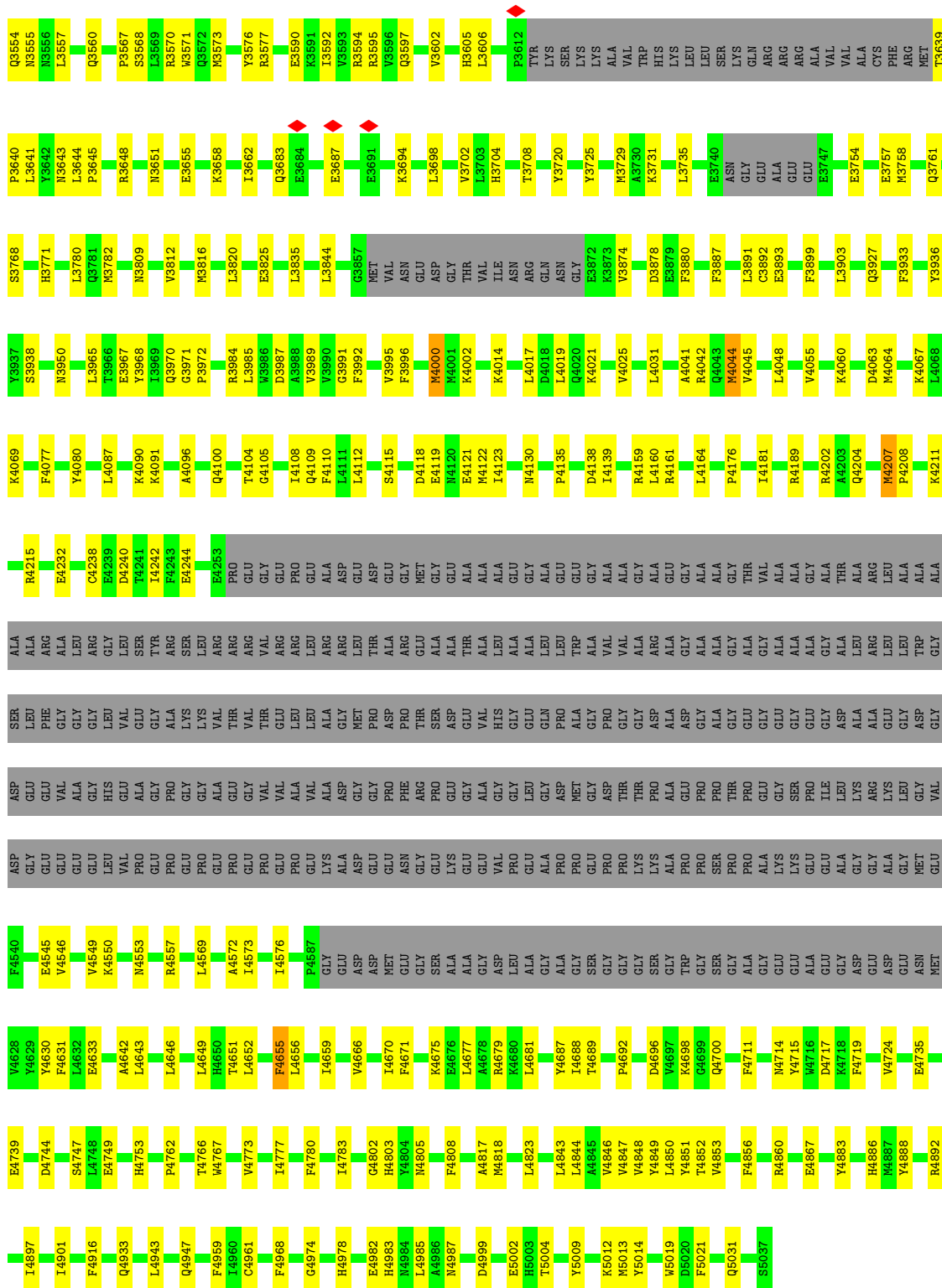


• Molecule 2: Ryanodine receptor 1





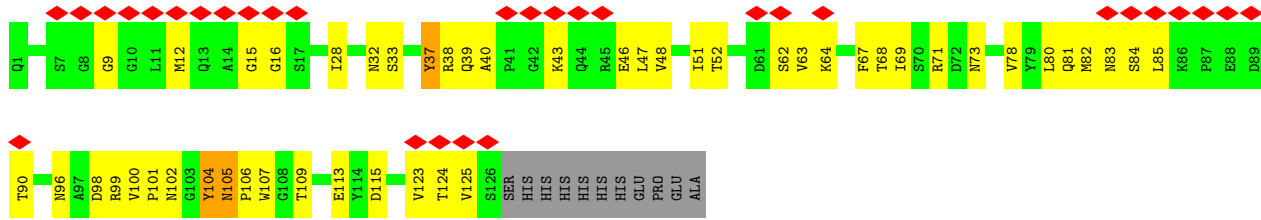
Q2161	GLU	L929	L1021	I1182	GLU	GLU	C1489	M1637	E1817	GLU	GLU	C1489	M1637	E1817	LEU	Q2161
I2162	GLY	L932	L1027	D1186	ALA	ALA	W1496	A1698	R1827	GLY	LYS	W1496	A1698	R1827	ARG	I2162
R2163	MET	L936	L1042	D1497	ALA	ALA	G1497	L1639	F1836	LYS	LYS	G1497	L1639	F1836	SER	R2163
L2165	PRO	C937	A1042	V1199	GLU	GLU	D1498	C1647	V1845	GLY	ARG	D1498	C1647	V1845	LEU	L2165
Q2173	PRO	D943	V1043	L1204	ASP	ASP	F1500	D1658	V1845	PHE	GLY	F1500	D1658	V1845	THR	Q2173
E2174	E338	L823	R1044	F1214	ASP	ASP	V1501	L1669	L1849	LEU	LEU	V1501	L1669	L1849	VAL	E2174
E2175	I339	L833	R1046	A1215	ASP	ASP	P1502	P1503	F1854	THR	TYR	P1502	P1503	F1854	ARG	E2175
M2176	K340	L863	L1053	L1219	TYR	TYR	G1504	V1673	D1858	ALA	ALA	G1504	V1673	D1858	LEU	M2176
M2178	K341	L866	I1056	L1220	ASN	ASN	GLN	R1680	V1859	LYS	LYS	GLN	R1680	V1859	LYS	M2178
I2179	V348	L867	P1056	E1221	LEU	LEU	GLY	L1694	K1860	LYS	LYS	GLY	L1694	K1860	LYS	I2179
K2189	Q349	E868	ASP	E1222	ARG	ARG	GLY	L1695	K1864	ALA	ALA	GLY	L1695	K1864	GLU	K2189
Y2192	G354	R869	GLN	E1223	ARG	ARG	ALA	L1696	F1874	ALA	ALA	ALA	L1696	F1874	GLU	Y2192
L2201	L355	R870	GLU	F1223	ARG	ARG	MET	L1699	K1874	MET	MET	MET	L1699	K1874	PRO	L2201
T2206	W356	I871	PRO	E1224	SER	SER	ALA	H1699	E1874	THR	THR	THR	H1699	E1874	GLU	T2206
M2208	K365	E872	SER	P1225	GLY	GLY	GLN	E1699	GLU	GLN	GLN	GLN	E1699	GLU	GLU	M2208
E2209	L369	K873	VAL	I1228	TRP	TRP	PRO	R1708	GLU	PRO	PRO	PRO	R1708	GLU	GLU	E2209
M2211	G370	L874	VAL	M1229	GLY	GLY	ALA	L1715	GLU	ALA	ALA	ALA	L1715	GLU	GLU	M2211
M2212	V371	E876	GLU	N1253	GLY	GLY	ALA	I1718	GLU	PRO	PRO	PRO	I1718	GLU	GLU	M2212
V2214	L372	R877	Q1084	H1254	GLY	GLY	ALA	R1727	GLU	ALA	ALA	ALA	R1727	GLU	GLU	V2214
G2218	K373	I878	R1087	R1259	LYS	LYS	LEU	E1733	GLU	LEU	LEU	LEU	E1733	GLU	GLU	G2218
GLU	K374	H879	R1088	M1260	LYS	LYS	PRO	M1734	GLU	PRO	PRO	PRO	M1734	GLU	GLU	GLU
THR	K375	I880	R1089	D1261	LYS	LYS	ARG	L1735	GLU	VAL	VAL	VAL	L1735	GLU	GLU	THR
LYS	A376	E881	Y1089	G1262	GLY	GLY	ARG	I1738	GLU	VAL	VAL	VAL	I1738	GLU	GLU	LYS
GLU	I377	W882	F1090	T1263	GLY	GLY	ASP	L1745	GLU	VAL	VAL	VAL	L1745	GLU	GLU	GLU
GLU	L378	A883	F1091	H1263	THR	THR	HIS	I1757	GLU	PRO	PRO	PRO	I1757	GLU	GLU	GLU
GLU	H379	L884	V1095	T1263	ALA	ALA	ALA	A1758	GLU	ALA	ALA	ALA	A1758	GLU	GLU	GLU
GLU	M384	T885	V1096	H1263	ALA	ALA	ALA	R1759	GLU	ALA	ALA	ALA	R1759	GLU	GLU	GLU
GLU	L388	R886	T1096	C1269	LYS	LYS	VAL	L1769	GLU	VAL	VAL	VAL	L1769	GLU	GLU	GLU
GLU	L392	I887	T1097	L1270	GLY	GLY	VAL	P1773	GLU	VAL	VAL	VAL	P1773	GLU	GLU	GLU
GLU	Q399	W891	D1112	H1274	GLY	GLY	ASP	E1773	GLU	ASP	ASP	ASP	E1773	GLU	GLU	GLU
GLU	M403	L892	L1115	W1277	THR	THR	ASP	A1784	GLU	ASP	ASP	ASP	A1784	GLU	GLU	GLU
GLU	I404	Y893	A1121	M1286	THR	THR	THR	L1785	GLU	THR	THR	THR	L1785	GLU	GLU	GLU
GLU	Y411	V548	Y1122	M1286	PRO	PRO	THR	R1786	GLU	THR	THR	THR	R1786	GLU	GLU	GLU
GLU	K424	L551	V1123	T1304	GLN	GLN	GLY	P1787	GLU	GLY	GLY	GLY	P1787	GLU	GLU	GLU
GLU	P425	L560	G1126	ALA	VAL	VAL	VAL	E1793	GLU	ALA	ALA	ALA	E1793	GLU	GLU	GLU
GLU	R426	L564	R1131	ALA	VAL	VAL	VAL	R1813	GLU	ALA	ALA	ALA	R1813	GLU	GLU	GLU
GLU	P431	S571	R1132	ALA	ALA	ALA	ALA	M1814	GLU	VAL	VAL	VAL	M1814	GLU	GLU	GLU
GLU	L574	P572	R1133	PRO	GLN	GLN	ALA	L1815	GLU	ALA	ALA	ALA	L1815	GLU	GLU	GLU
GLU	L575	E573	W1143	PRO	GLN	GLN	ALA	G1816	GLU	ALA	ALA	ALA	G1816	GLU	GLU	GLU
GLU	H461	V574	M1152	PRO	PRO	PRO	ALA	R1816	GLU	ALA	ALA	ALA	R1816	GLU	GLU	GLU
GLU	K464	L577	I1153	GLY	ASN	ASN	ALA	C1447	GLU	VAL	VAL	VAL	C1447	GLU	GLU	GLU
GLU	L468	I578	D1154	LEU	ASN	ASN	ALA	Q1629	GLU	VAL	VAL	VAL	Q1629	GLU	GLU	GLU
GLU	R469	I578	E1157	PRO	LYS	LYS	ALA	W1626	GLU	ALA	ALA	ALA	W1626	GLU	GLU	GLU
GLU	S470	H582	I1160	PRO	ASP	ASP	ALA	Q1630	GLU	ALA	ALA	ALA	Q1630	GLU	GLU	GLU
GLU	L471	I566	F1179	ASP	THR	THR	ALA	P1631	PRO	ALA	ALA	ALA	P1631	PRO	PRO	GLU



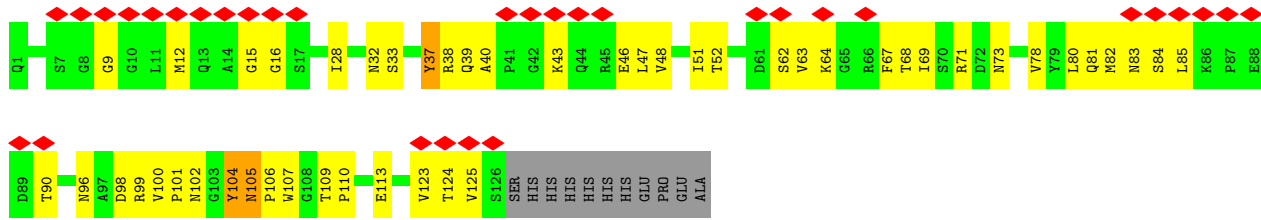
• Molecule 3: Nanobody 9657



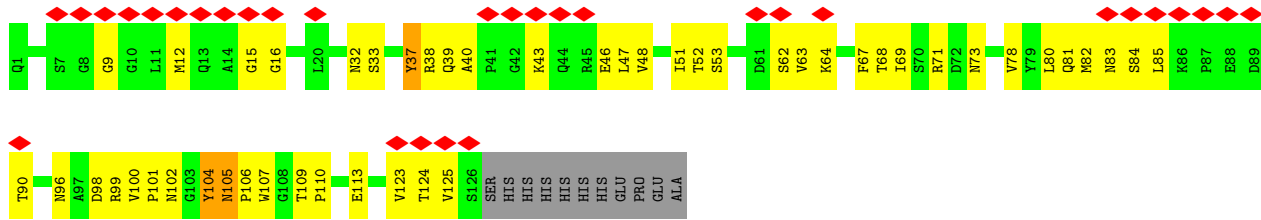
Chain C:



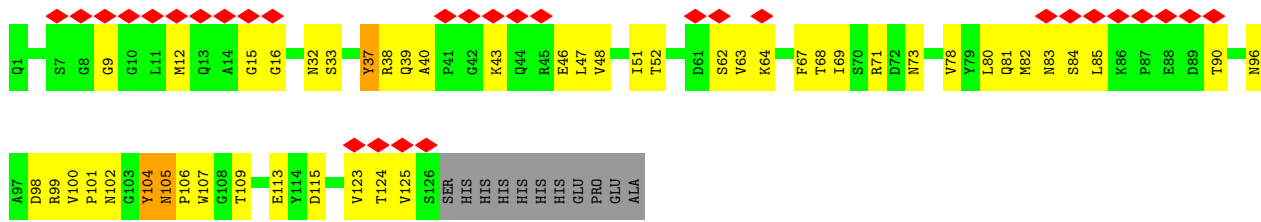
• Molecule 3: Nanobody 9657



• Molecule 3: Nanobody 9657



• Molecule 3: Nanobody 9657



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	145830	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	JEOL CRYO ARM 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	4.519	Depositor
Minimum map value	-0.106	Depositor
Average map value	0.057	Depositor
Map value standard deviation	0.125	Depositor
Recommended contour level	0.3	Depositor
Map size (\AA)	500.64, 500.64, 500.64	wwPDB
Map dimensions	336, 336, 336	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.49, 1.49, 1.49	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: CA, CFF, 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	0.27	0/831	0.55	0/1118
1	D	0.27	0/831	0.56	0/1118
1	H	0.27	0/831	0.56	0/1118
1	I	0.27	0/831	0.56	0/1118
2	B	0.25	0/34814	0.50	1/47183 (0.0%)
2	E	0.25	0/34814	0.50	1/47183 (0.0%)
2	G	0.25	0/34921	0.50	1/47329 (0.0%)
2	J	0.25	0/34814	0.50	1/47183 (0.0%)
3	C	0.28	0/979	0.58	0/1329
3	F	0.28	0/979	0.58	0/1329
3	K	0.28	0/979	0.58	0/1329
3	M	0.28	0/979	0.58	0/1329
All	All	0.25	0/146603	0.50	4/198666 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	1503	PRO	N-CA-CB	5.74	110.19	103.30
2	J	1503	PRO	N-CA-CB	5.71	110.15	103.30
2	B	1503	PRO	N-CA-CB	5.68	110.11	103.30
2	G	1503	PRO	N-CA-CB	5.66	110.09	103.30

There are no chirality outliers.

There are no planarity outliers.

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	816	0	818	28	0
1	D	816	0	818	23	0
1	H	816	0	818	25	0
1	I	816	0	818	24	0
2	B	34043	0	33446	799	0
2	E	34043	0	33446	803	0
2	G	34149	0	33547	812	0
2	J	34043	0	33446	792	0
3	C	960	0	909	36	0
3	F	960	0	909	41	0
3	K	960	0	909	41	0
3	M	960	0	909	40	0
4	B	1	0	0	0	0
4	E	1	0	0	0	0
4	G	1	0	0	0	0
4	J	1	0	0	0	0
5	B	31	0	12	0	0
5	E	31	0	12	0	0
5	G	31	0	12	0	0
5	J	31	0	12	0	0
6	B	14	0	10	0	0
6	E	14	0	10	0	0
6	G	14	0	10	0	0
6	J	14	0	10	0	0
7	B	1	0	0	0	0
7	E	1	0	0	0	0
7	G	1	0	0	0	0
7	J	1	0	0	0	0
All	All	143570	0	140881	3411	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 3411 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:4961:CYS:SG	2:B:4983:HIS:CE1	2.61	0.94
2:G:4961:CYS:SG	2:G:4983:HIS:CE1	2.60	0.93
2:E:4961:CYS:SG	2:E:4983:HIS:CE1	2.60	0.93
3:K:100:VAL:HG22	3:K:105:ASN:HD22	1.34	0.92
2:J:4961:CYS:SG	2:J:4983:HIS:CE1	2.60	0.92

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	105/107 (98%)	100 (95%)	5 (5%)	0	100	100
1	D	105/107 (98%)	103 (98%)	2 (2%)	0	100	100
1	H	105/107 (98%)	101 (96%)	4 (4%)	0	100	100
1	I	105/107 (98%)	103 (98%)	2 (2%)	0	100	100
2	B	4264/5027 (85%)	4160 (98%)	103 (2%)	1 (0%)	100	100
2	E	4264/5027 (85%)	4162 (98%)	102 (2%)	0	100	100
2	G	4280/5027 (85%)	4175 (98%)	105 (2%)	0	100	100
2	J	4264/5027 (85%)	4161 (98%)	103 (2%)	0	100	100
3	C	124/137 (90%)	116 (94%)	8 (6%)	0	100	100
3	F	124/137 (90%)	116 (94%)	8 (6%)	0	100	100
3	K	124/137 (90%)	116 (94%)	8 (6%)	0	100	100
3	M	124/137 (90%)	116 (94%)	8 (6%)	0	100	100
All	All	17988/21084 (85%)	17529 (97%)	458 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	375	LYS

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	87/88 (99%)	85 (98%)	2 (2%)	45	68
1	D	87/88 (99%)	85 (98%)	2 (2%)	45	68
1	H	87/88 (99%)	85 (98%)	2 (2%)	45	68
1	I	87/88 (99%)	85 (98%)	2 (2%)	45	68
2	B	3662/4270 (86%)	3580 (98%)	82 (2%)	47	69
2	E	3662/4270 (86%)	3581 (98%)	81 (2%)	47	69
2	G	3674/4270 (86%)	3594 (98%)	80 (2%)	47	69
2	J	3662/4270 (86%)	3580 (98%)	82 (2%)	47	69
3	C	103/114 (90%)	99 (96%)	4 (4%)	27	55
3	F	103/114 (90%)	99 (96%)	4 (4%)	27	55
3	K	103/114 (90%)	99 (96%)	4 (4%)	27	55
3	M	103/114 (90%)	99 (96%)	4 (4%)	27	55
All	All	15420/17888 (86%)	15071 (98%)	349 (2%)	46	68

5 of 349 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	G	3348	ARG
2	J	2392	ARG
2	G	3933	PHE
2	J	379	HIS
2	J	2914	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 53 such sidechains are listed below:

Mol	Chain	Res	Type
2	G	23	GLN
2	G	3605	HIS
3	C	105	ASN
2	G	203	ASN
2	G	1300	HIS

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$
5	ATP	E	5102	-	28,33,33	0.62	0	34,52,52	0.76	2 (5%)
5	ATP	G	5102	-	28,33,33	0.62	0	34,52,52	0.77	2 (5%)
6	CFF	J	5103	-	8,15,15	2.21	3 (37%)	8,23,23	1.23	1 (12%)
5	ATP	J	5102	-	28,33,33	0.63	0	34,52,52	0.76	2 (5%)
5	ATP	B	5102	-	28,33,33	0.62	0	34,52,52	0.77	2 (5%)
6	CFF	G	5103	-	8,15,15	2.21	3 (37%)	8,23,23	1.21	1 (12%)
6	CFF	B	5103	-	8,15,15	2.20	3 (37%)	8,23,23	1.21	1 (12%)
6	CFF	E	5103	-	8,15,15	2.20	3 (37%)	8,23,23	1.23	1 (12%)

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
5	ATP	E	5102	-	-	7/18/38/38	0/3/3/3
5	ATP	G	5102	-	-	7/18/38/38	0/3/3/3
6	CFF	J	5103	-	-	-	0/2/2/2
5	ATP	J	5102	-	-	7/18/38/38	0/3/3/3
5	ATP	B	5102	-	-	7/18/38/38	0/3/3/3
6	CFF	G	5103	-	-	-	0/2/2/2
6	CFF	B	5103	-	-	-	0/2/2/2
6	CFF	E	5103	-	-	-	0/2/2/2

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	G	5103	CFF	C5-C6	4.21	1.48	1.41
6	J	5103	CFF	C5-C6	4.20	1.48	1.41
6	E	5103	CFF	C5-C6	4.20	1.48	1.41
6	B	5103	CFF	C5-C6	4.16	1.48	1.41
6	B	5103	CFF	C5-C4	3.91	1.45	1.39

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	G	5102	ATP	C4'-O4'-C1'	-2.85	107.31	109.92
5	B	5102	ATP	C4'-O4'-C1'	-2.84	107.33	109.92
5	J	5102	ATP	C4'-O4'-C1'	-2.82	107.34	109.92
5	E	5102	ATP	C4'-O4'-C1'	-2.81	107.35	109.92
6	J	5103	CFF	C5-C6-N1	-2.39	115.77	118.20

There are no chirality outliers.

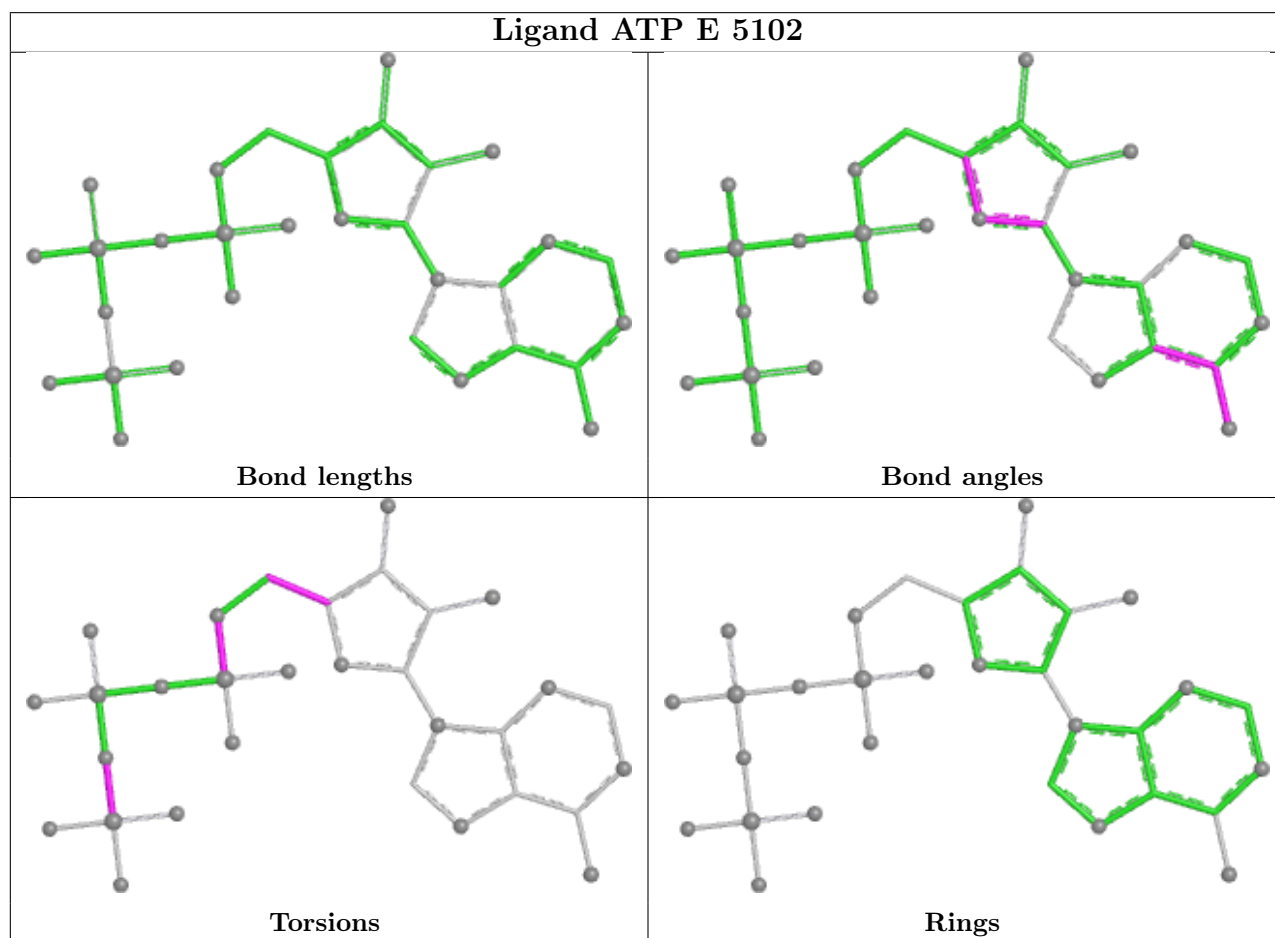
5 of 28 torsion outliers are listed below:

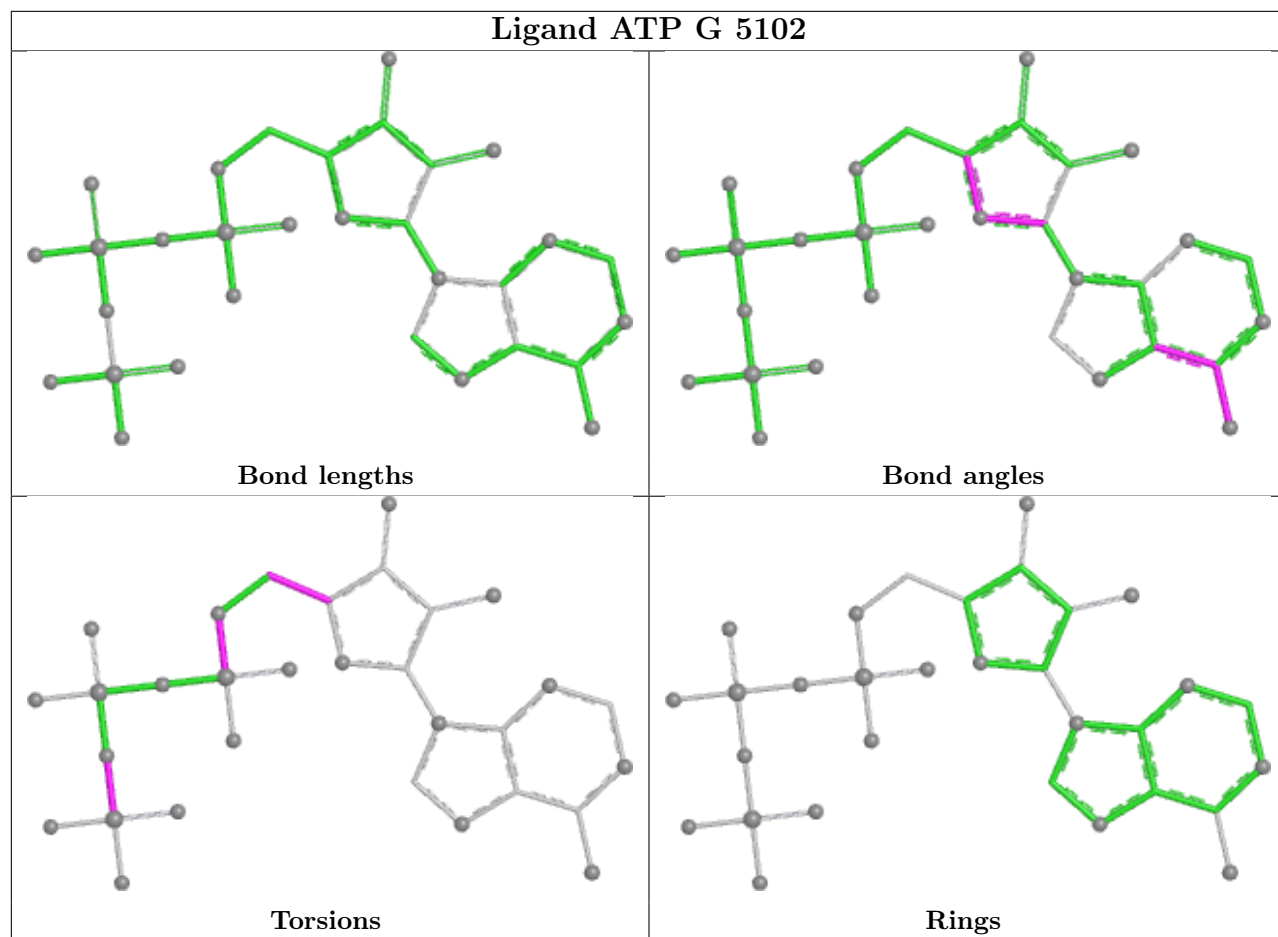
Mol	Chain	Res	Type	Atoms
5	B	5102	ATP	PB-O3B-PG-O2G
5	B	5102	ATP	C5'-O5'-PA-O3A
5	E	5102	ATP	PB-O3B-PG-O2G
5	E	5102	ATP	C5'-O5'-PA-O3A
5	G	5102	ATP	PB-O3B-PG-O2G

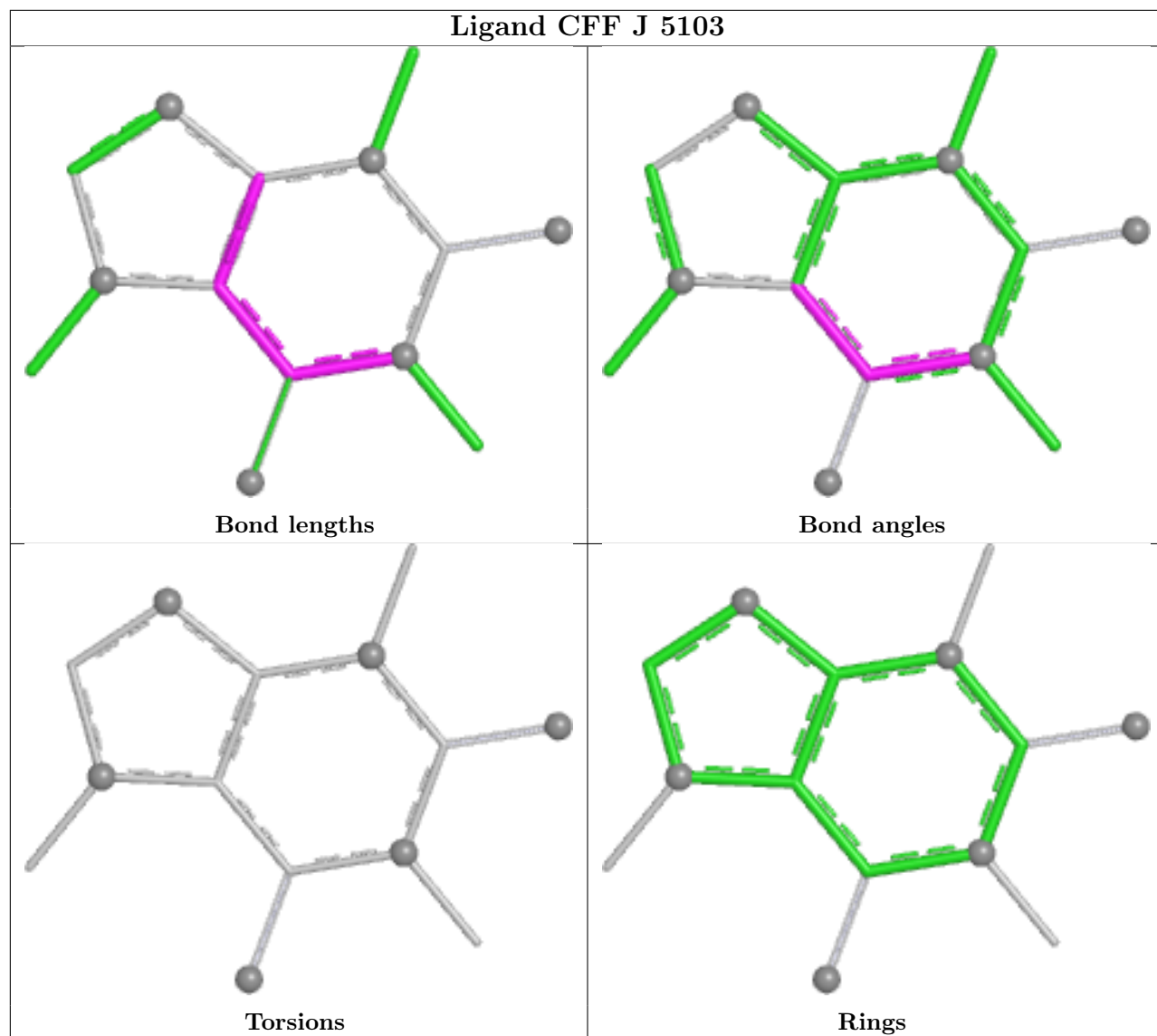
There are no ring outliers.

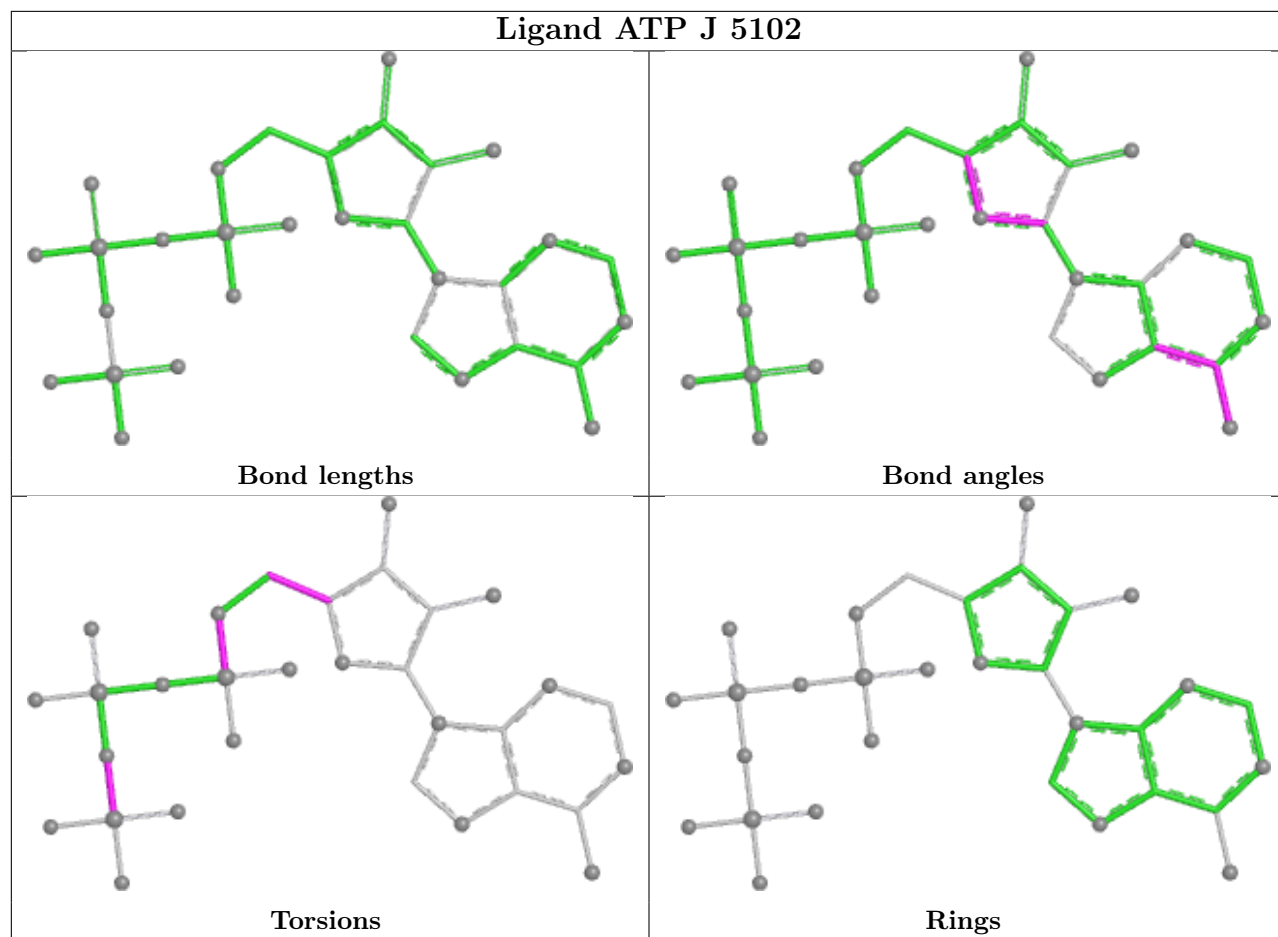
No monomer is involved in short contacts.

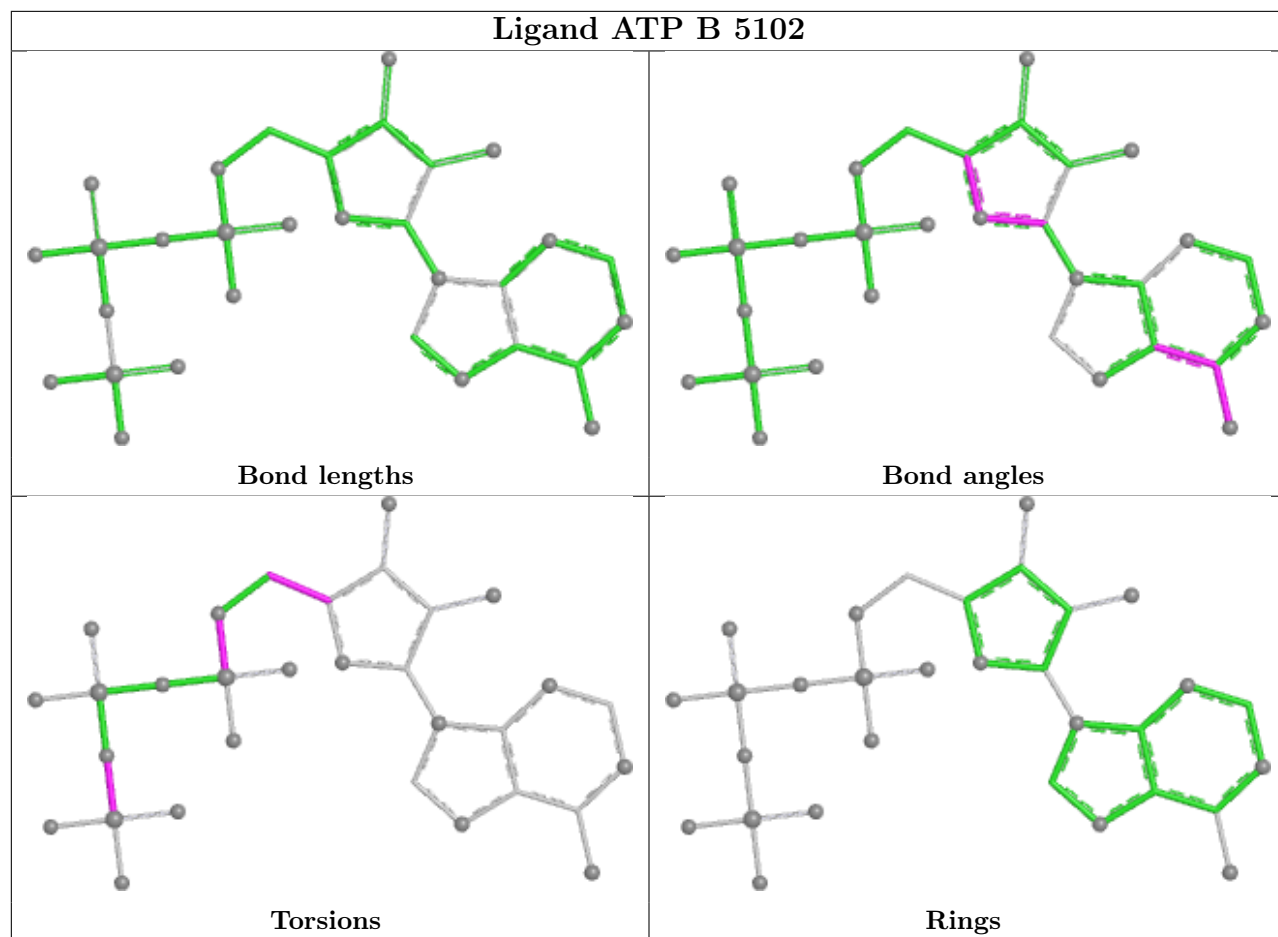
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

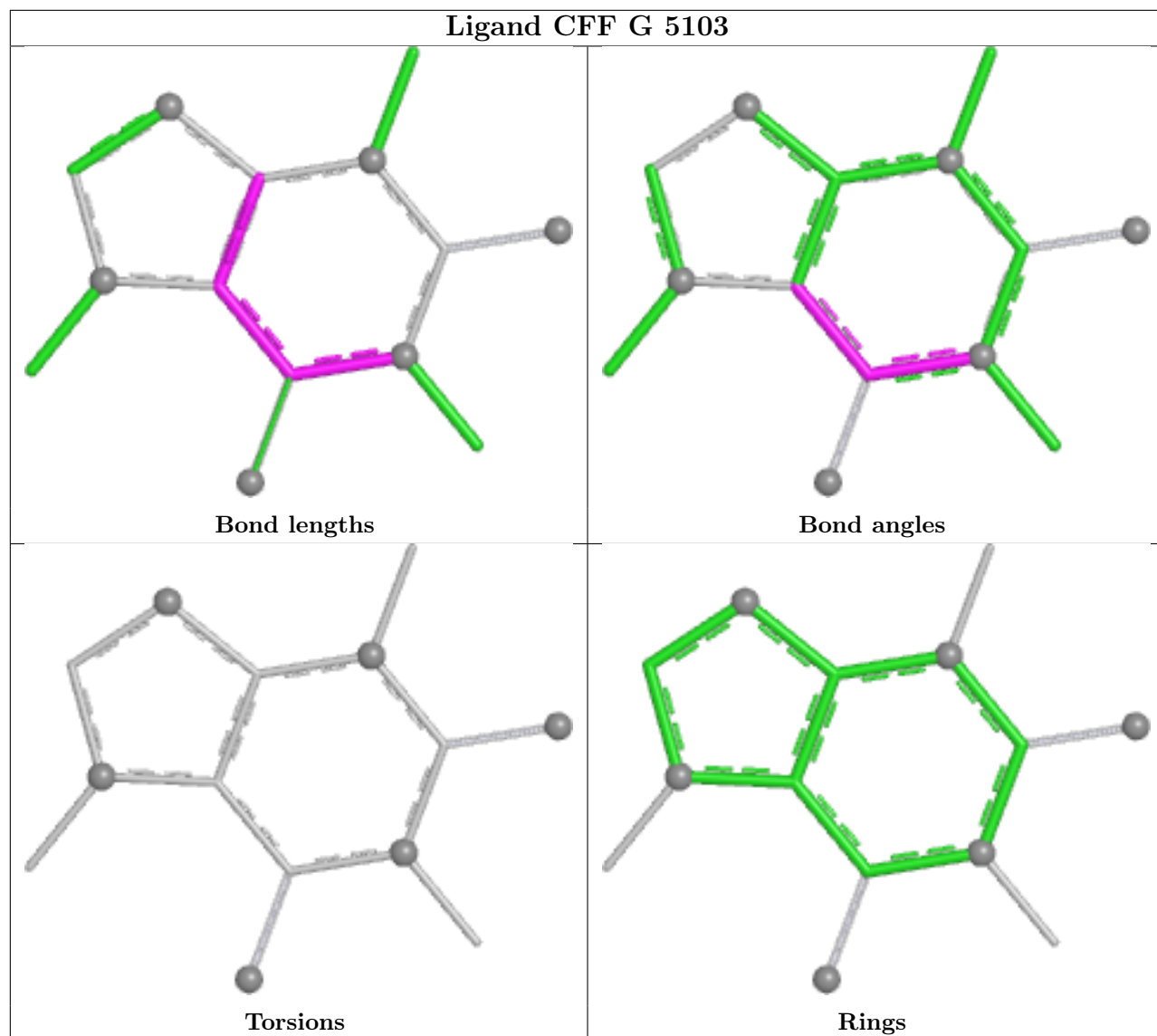


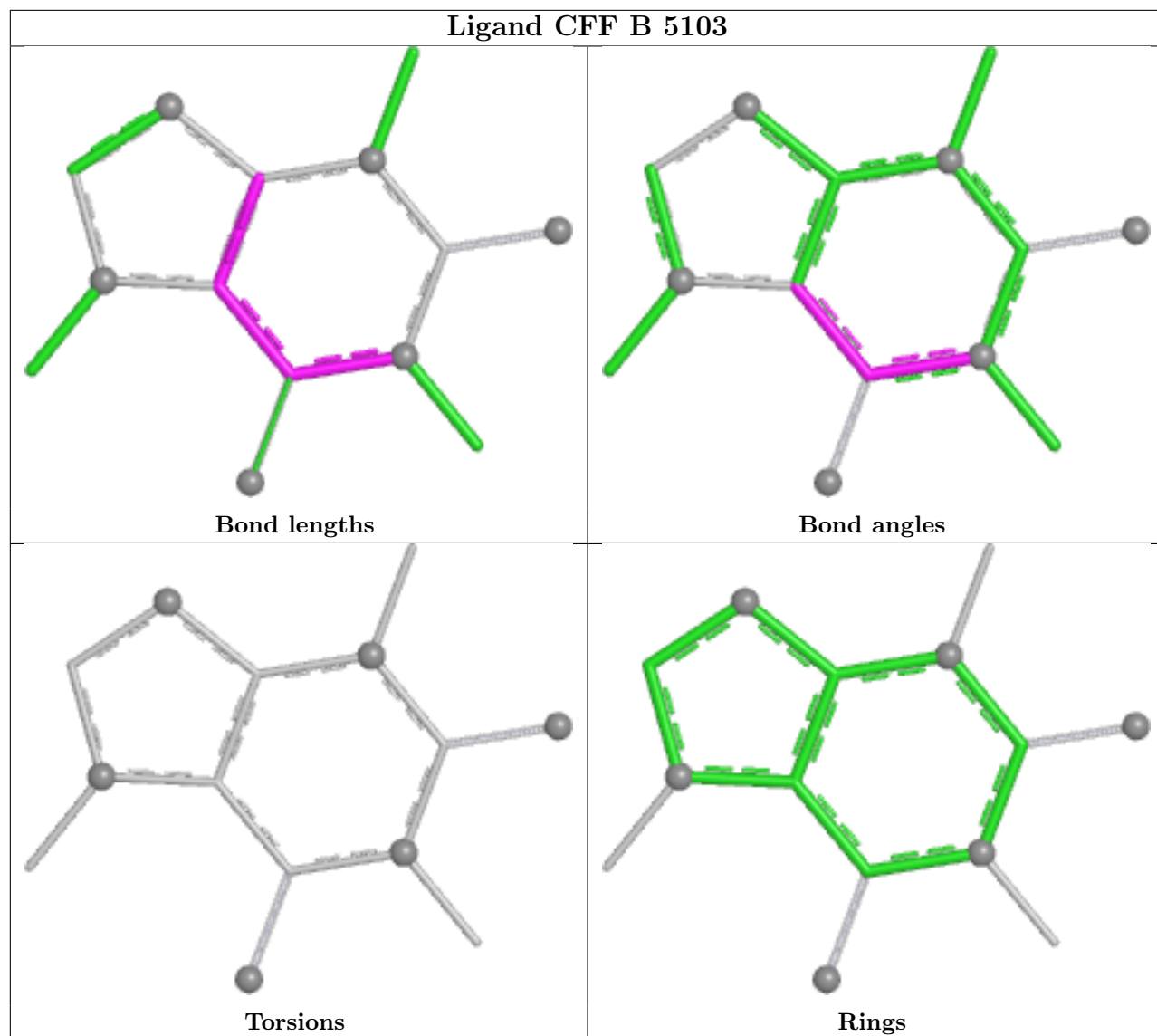


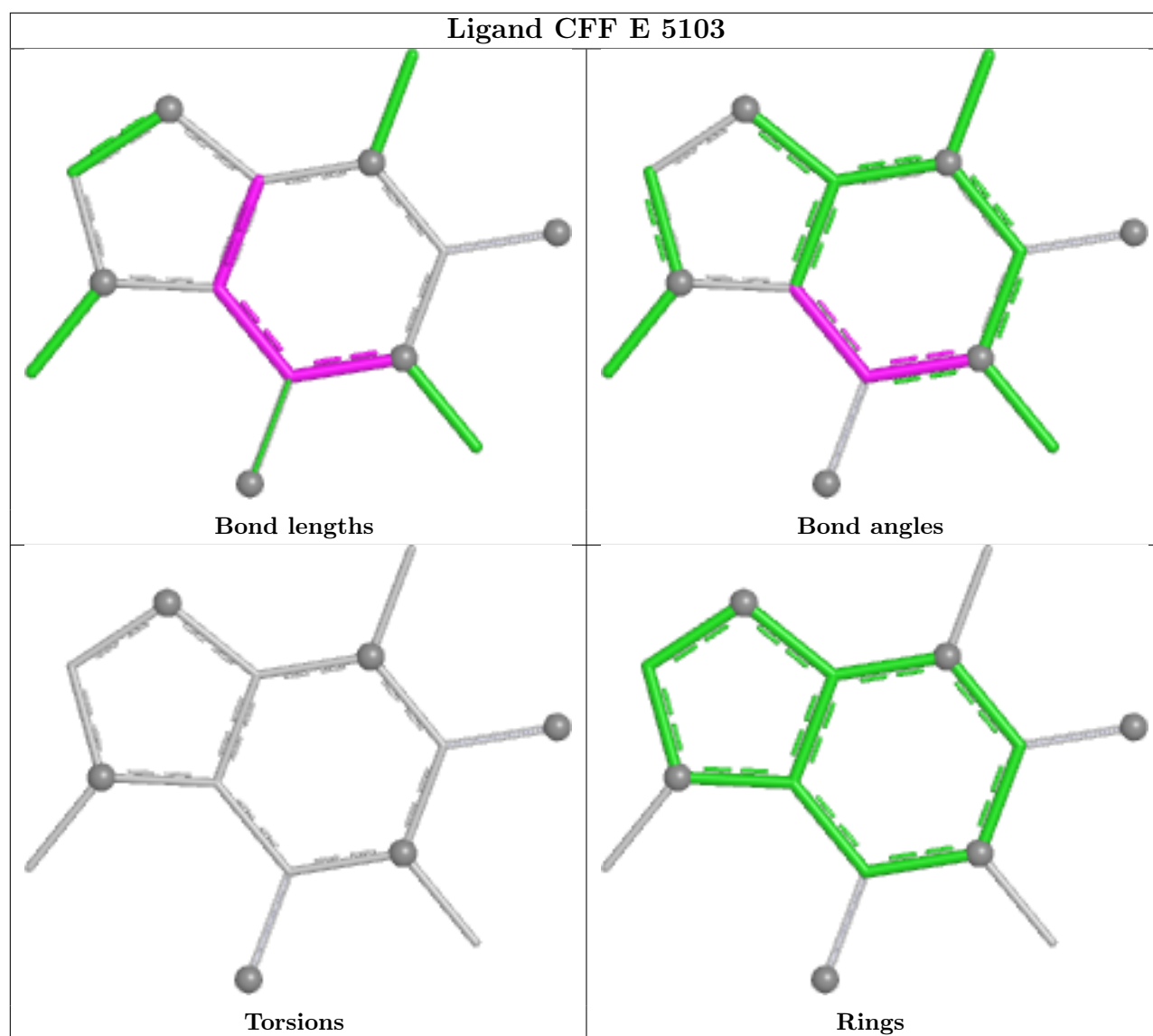












5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

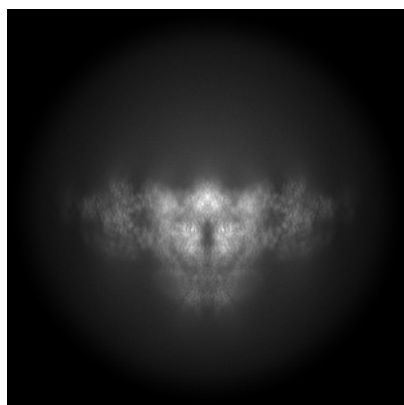
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-19472. These allow visual inspection of the internal detail of the map and identification of artifacts.

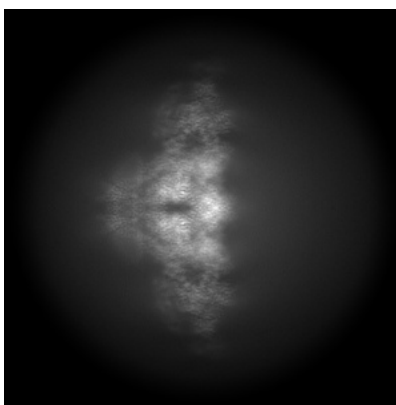
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

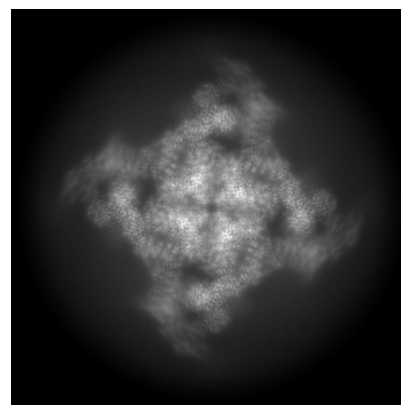
6.1.1 Primary map



X



Y

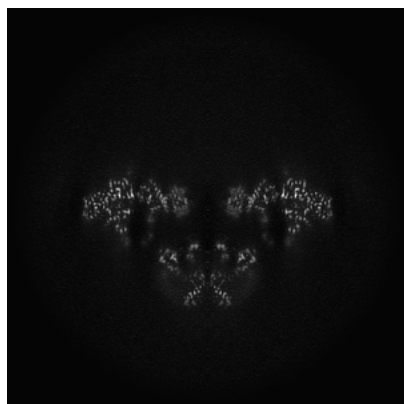


Z

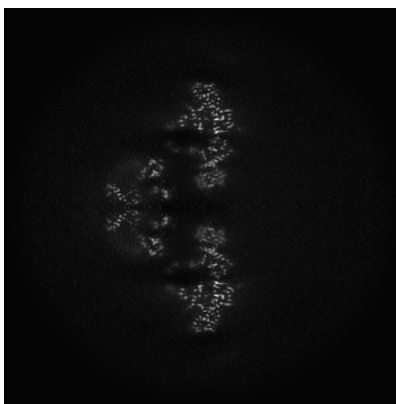
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

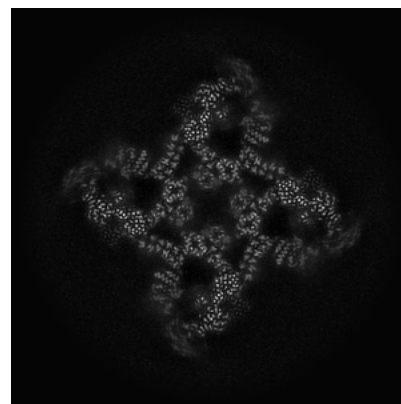
6.2.1 Primary map



X Index: 168



Y Index: 168

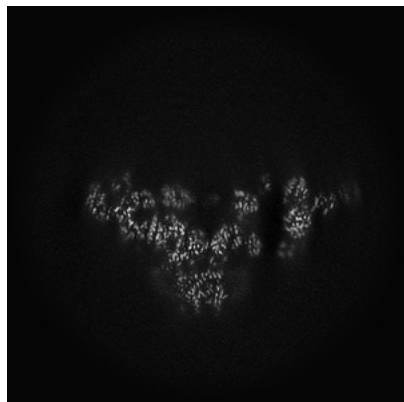


Z Index: 168

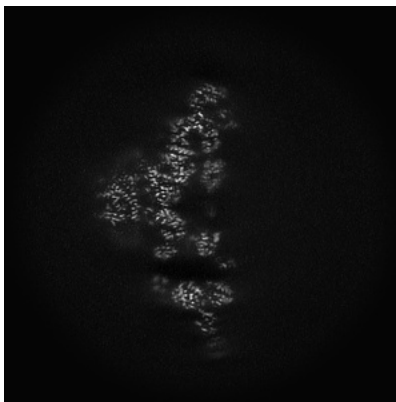
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

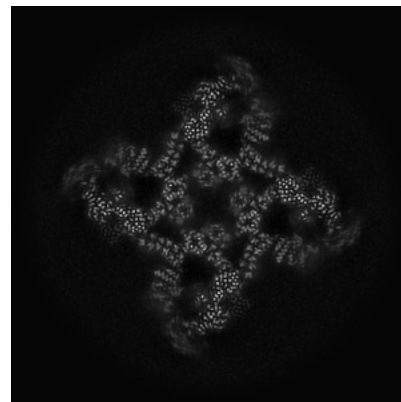
6.3.1 Primary map



X Index: 178



Y Index: 178

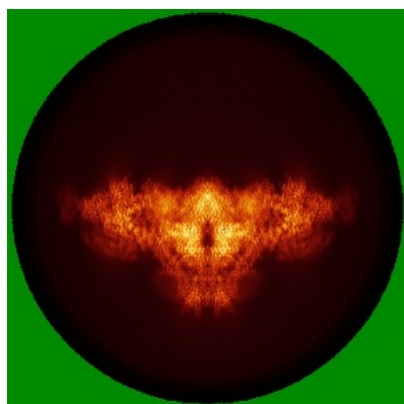


Z Index: 168

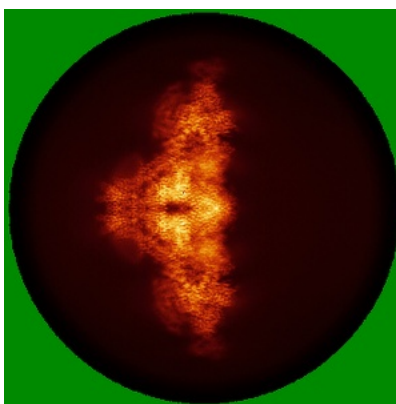
The images above show the largest variance slices of the map in three orthogonal directions.

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

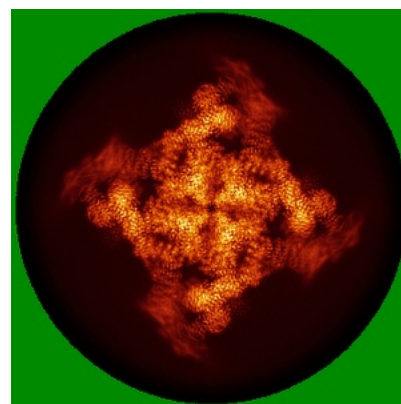
6.4.1 Primary map



X



Y

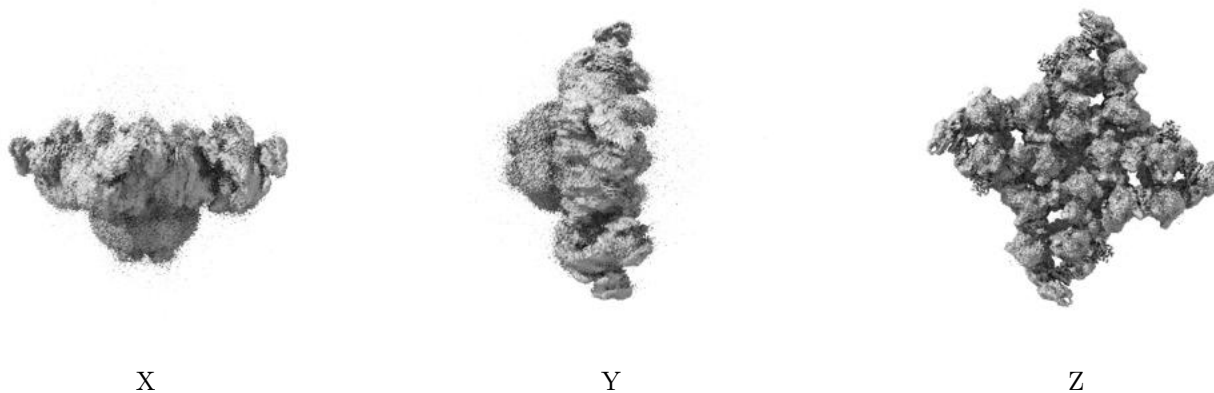


Z

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 0.3. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

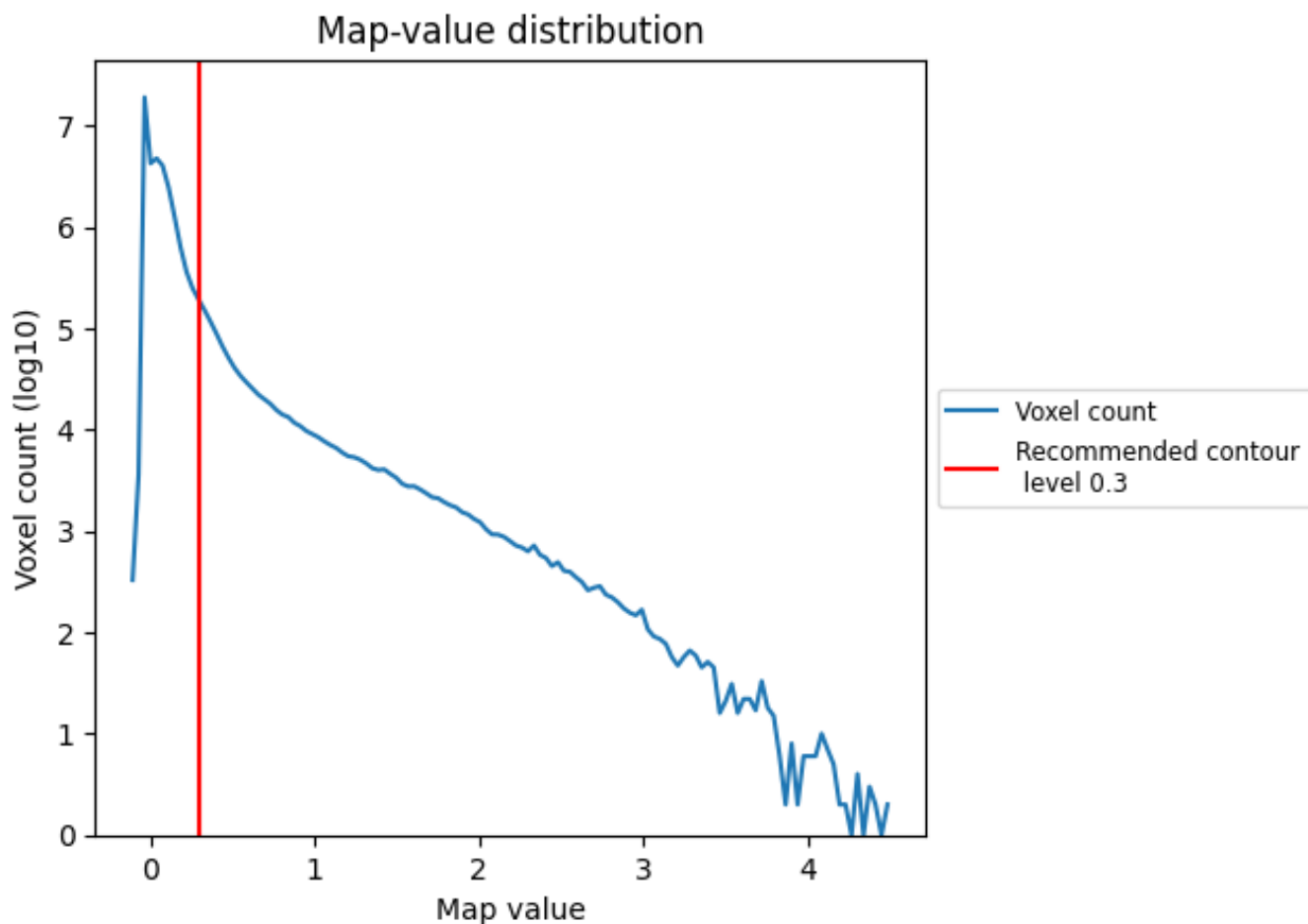
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

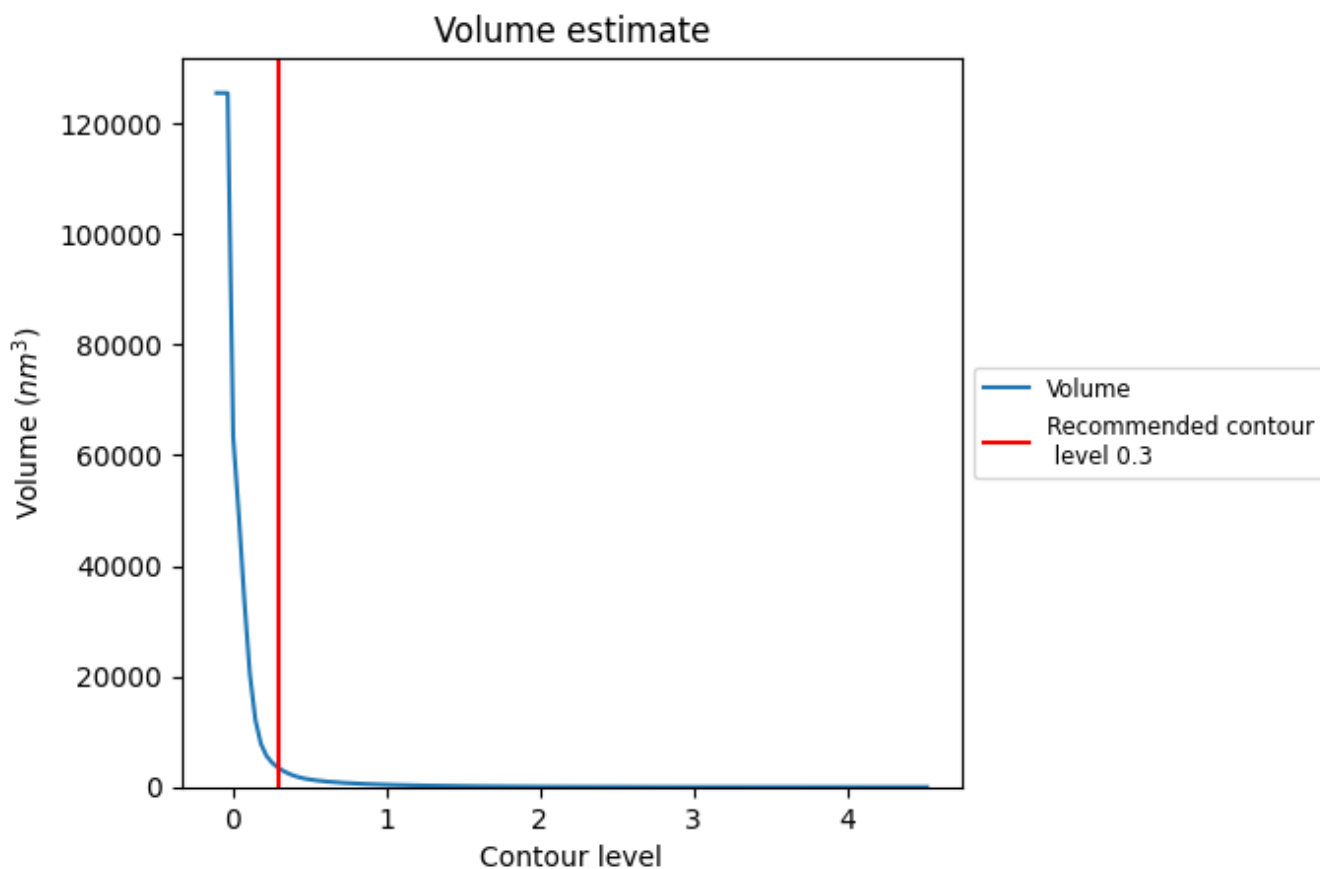
This section contains the results of statistical analysis of the map.

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.

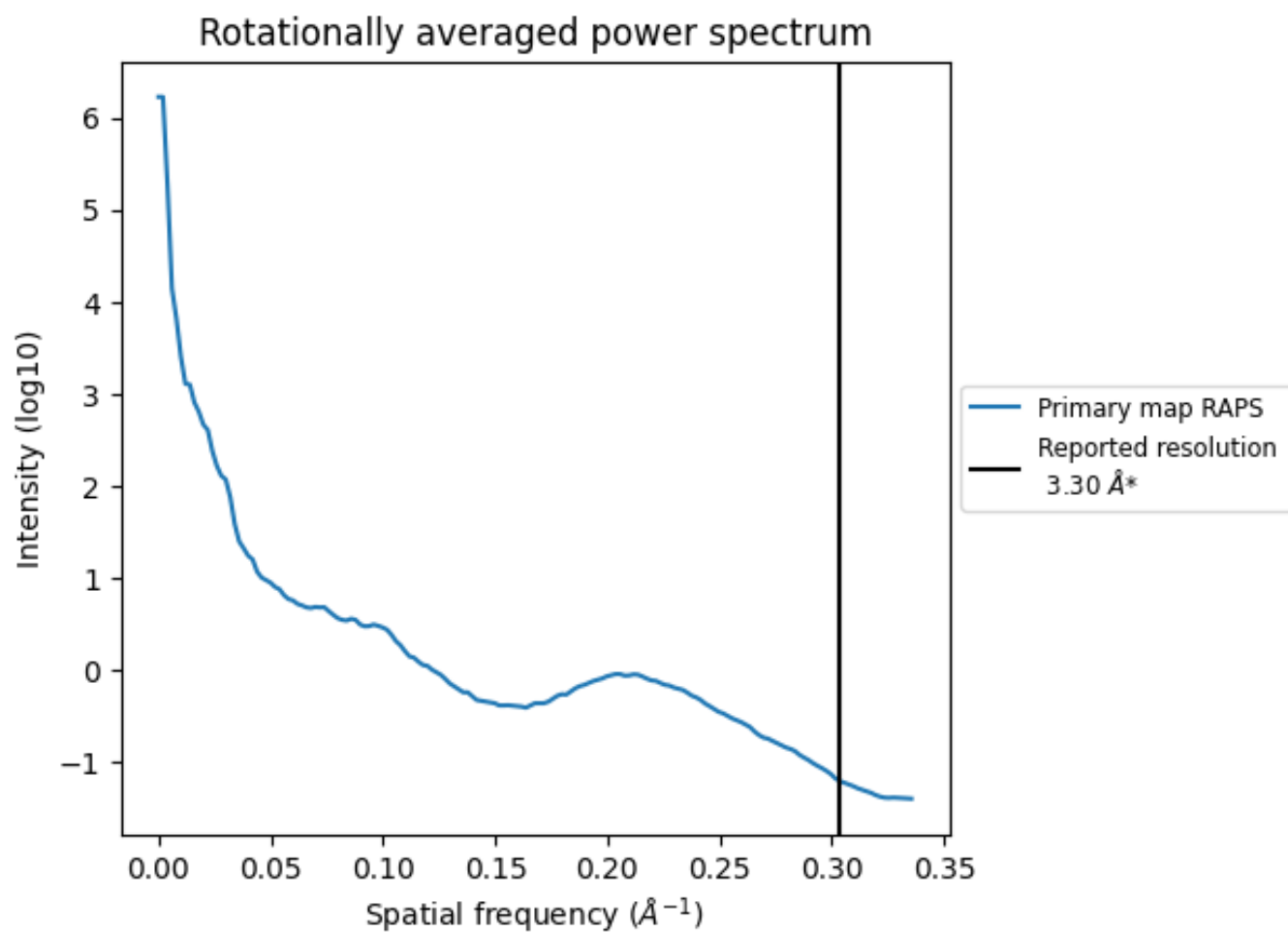
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 3395 nm³; this corresponds to an approximate mass of 3067 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

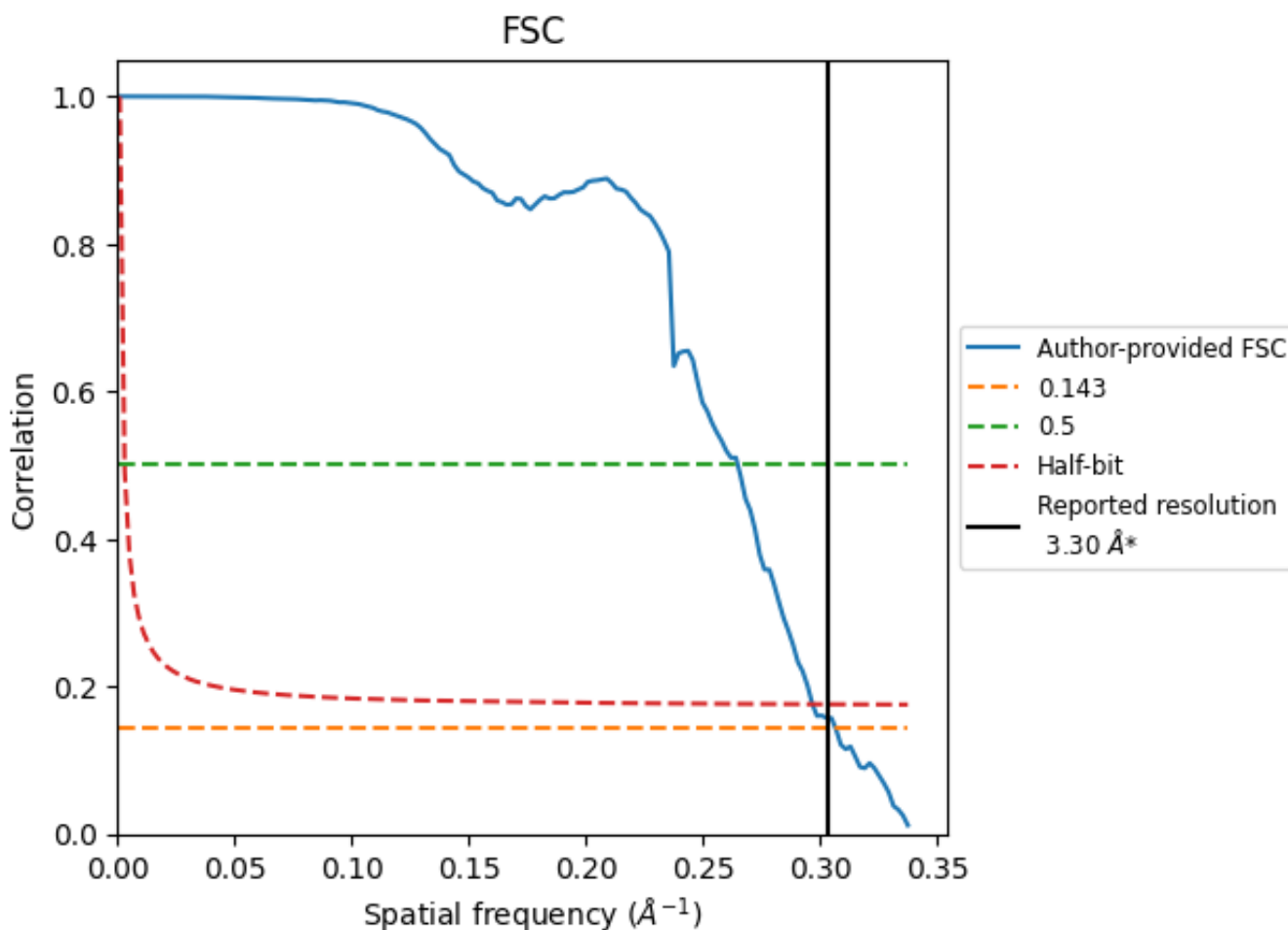


*Reported resolution corresponds to spatial frequency of 0.303 Å⁻¹

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 0.303 Å⁻¹

8.2 Resolution estimates [i](#)

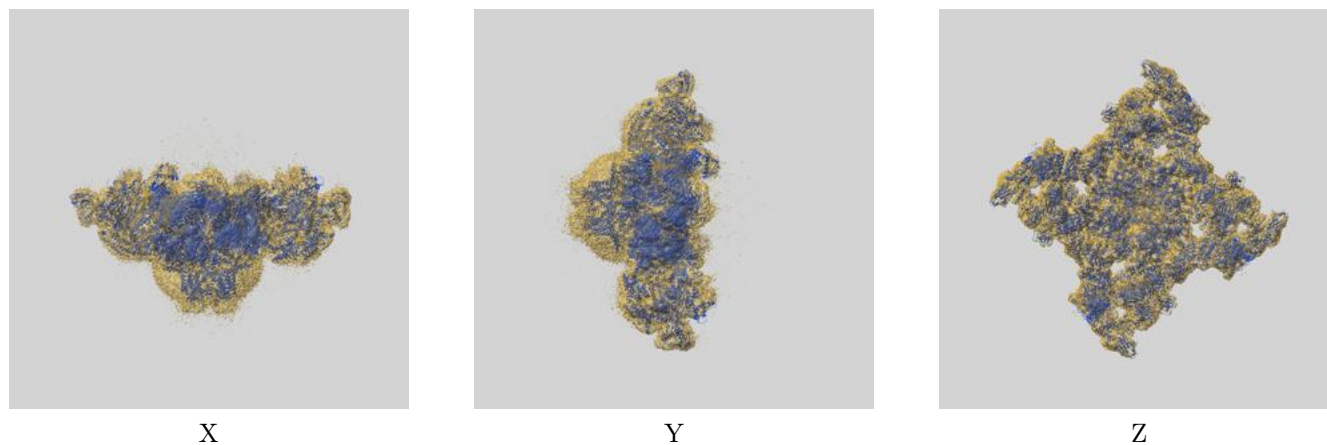
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.30	-	-
Author-provided FSC curve	3.26	3.78	3.37
Unmasked-calculated*	-	-	-

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

9 Map-model fit [i](#)

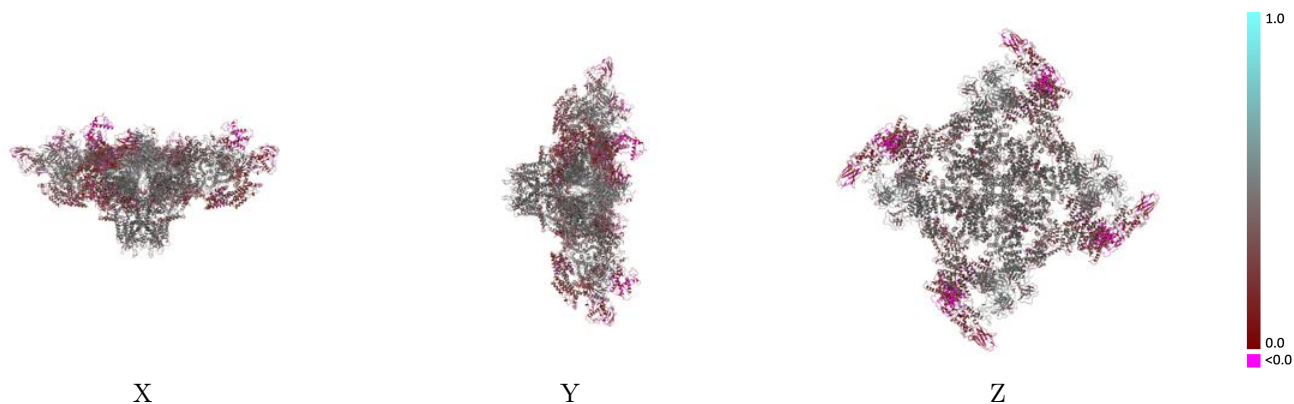
This section contains information regarding the fit between EMDB map EMD-19472 and PDB model 8RS0. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)



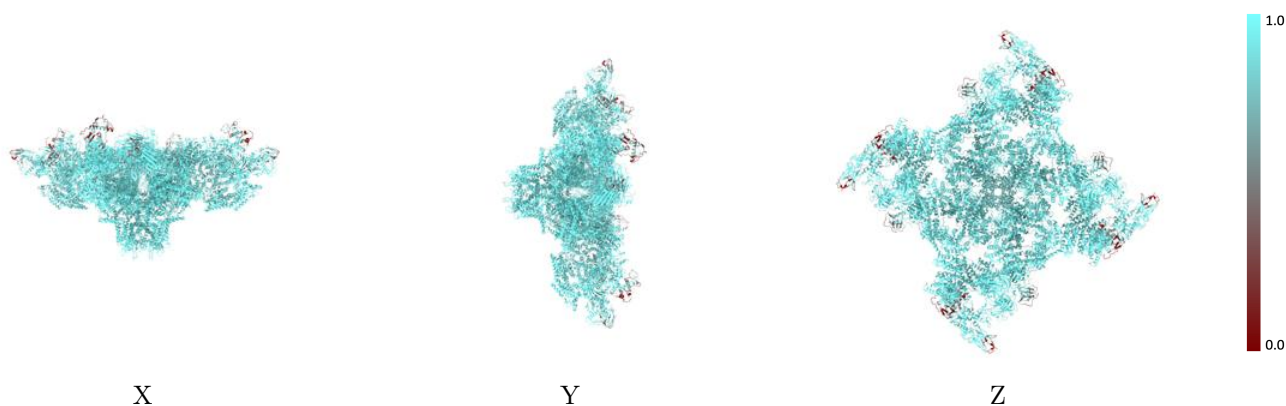
The images above show the 3D surface view of the map at the recommended contour level 0.3 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



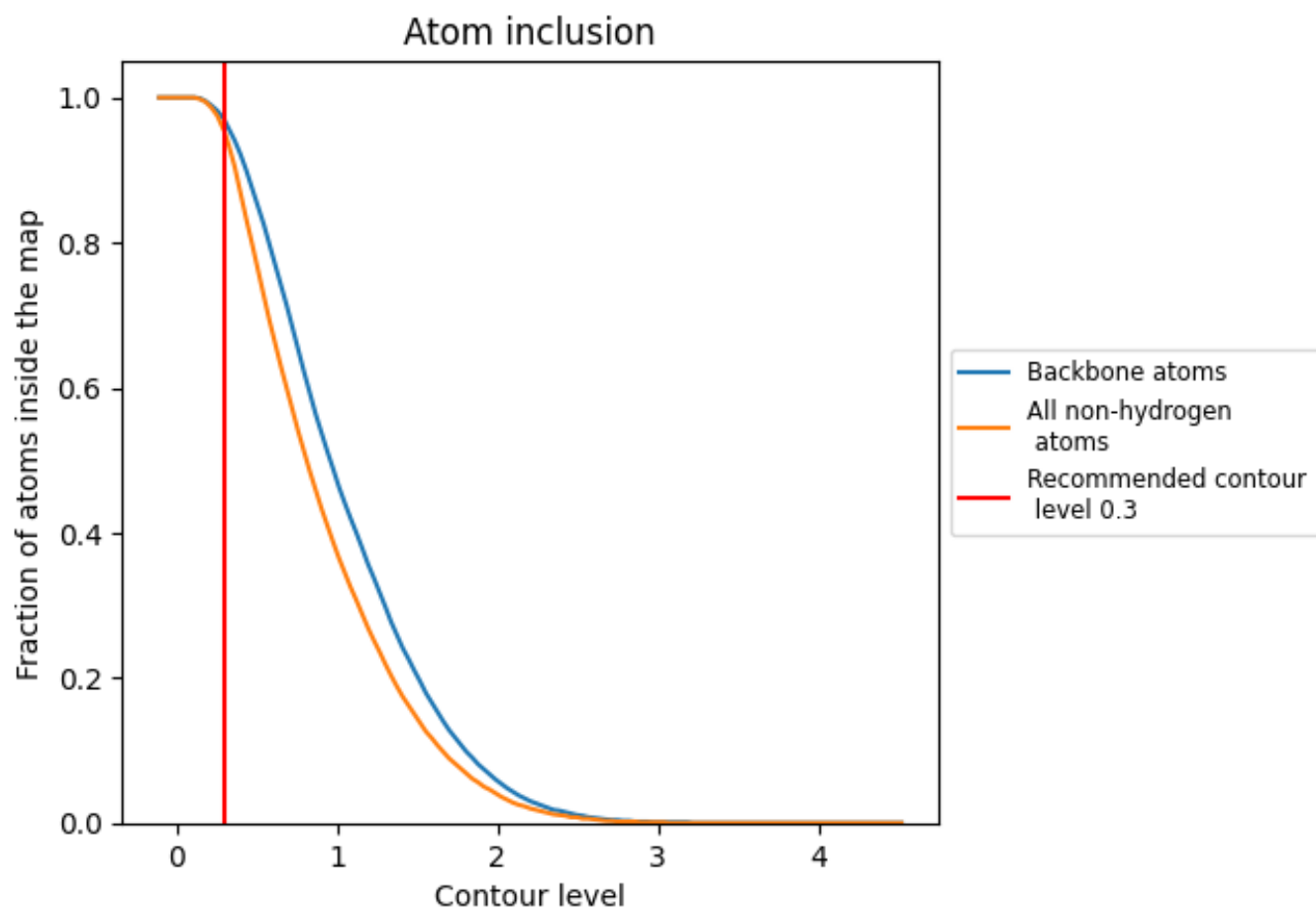
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.3).



























9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 95% 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 (0.3) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9530	 0.3560
A	 0.6870	 0.3860
B	 0.9670	 0.3620
C	 0.6930	 0.1320
D	 0.6890	 0.3950
E	 0.9670	 0.3620
F	 0.6880	 0.1320
G	 0.9670	 0.3610
H	 0.6880	 0.3920
I	 0.6850	 0.3940
J	 0.9670	 0.3620
K	 0.6880	 0.1340
M	 0.6910	 0.1310

