



wwPDB EM Validation Summary Report ⓘ

Oct 1, 2024 – 04:17 pm BST

PDB ID : 8RRT
EMDB ID : EMD-19464
Title : Structure of rabbit RyR1 reconstituted into lipid liposomes in open state in complex with FKBP and Nb9657
Authors : Li, C.; Efremov, R.G.
Deposited on : 2024-01-23
Resolution : 4.60 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.dev113
Mogul : 1.8.4, CSD as541be (2020)
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

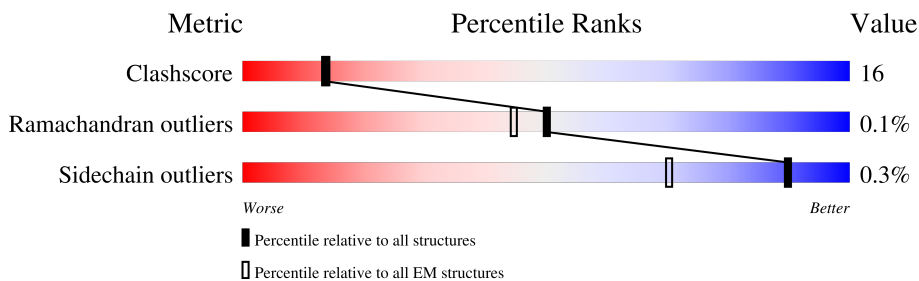
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.60 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.






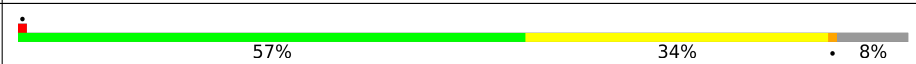
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	B	5027	58% 28% 14%
1	E	5027	57% 28% 14%
1	G	5027	57% 29% 14%
1	J	5027	57% 28% 14%
2	A	107	64% 36%
2	D	107	63% 37%
2	H	107	62% 37% .
2	I	107	61% 39%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
3	C	137	 51% 40% 8%
3	F	137	 51% 40% 8%
3	K	137	 53% 38% 8%
3	M	137	 57% 34% 8%

2 Entry composition i

There are 7 unique types of molecules in this entry. The entry contains 143740 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	B	4319	Total 34103	C 21737	N 5881	O 6261	S 224	1	0
1	E	4319	Total 34103	C 21737	N 5881	O 6261	S 224	1	0
1	G	4319	Total 34103	C 21737	N 5881	O 6261	S 224	1	0
1	J	4319	Total 34103	C 21737	N 5881	O 6261	S 224	1	0

- Molecule 2 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	A	107	Total 818	C 516	N 144	O 154	S 4	0	0
2	D	107	Total 818	C 516	N 144	O 154	S 4	0	0
2	H	107	Total 818	C 516	N 144	O 154	S 4	0	0
2	I	107	Total 818	C 516	N 144	O 154	S 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

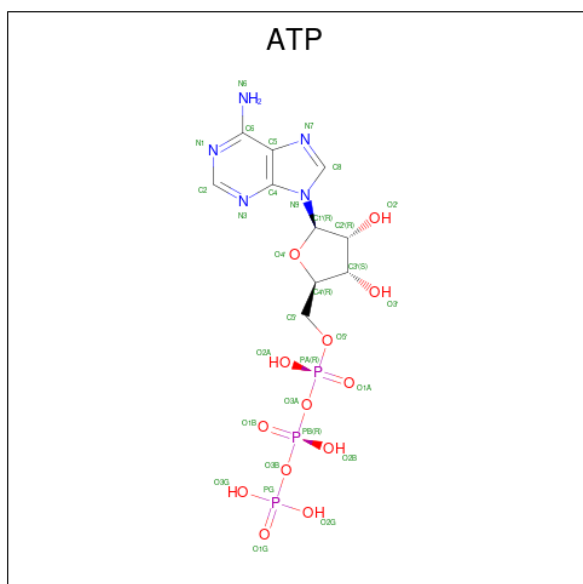
- Molecule 3 is a protein called Nanobody 9657.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	126	Total	C	N	O	S	0	0
			967	597	170	195	5		
3	F	126	Total	C	N	O	S	0	0
			967	597	170	195	5		
3	K	126	Total	C	N	O	S	0	0
			967	597	170	195	5		
3	M	126	Total	C	N	O	S	0	0
			967	597	170	195	5		

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

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

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



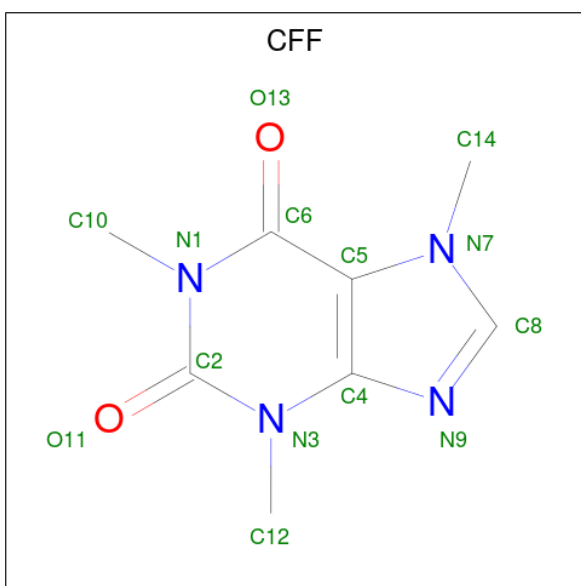
Mol	Chain	Residues	Atoms					AltConf
5	B	1	Total	C	N	O	P	0
			31	10	5	13	3	

Continued on next page...

Continued from previous page...

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
7	B	1	Total 1	Ca 1	0

Continued on next page...

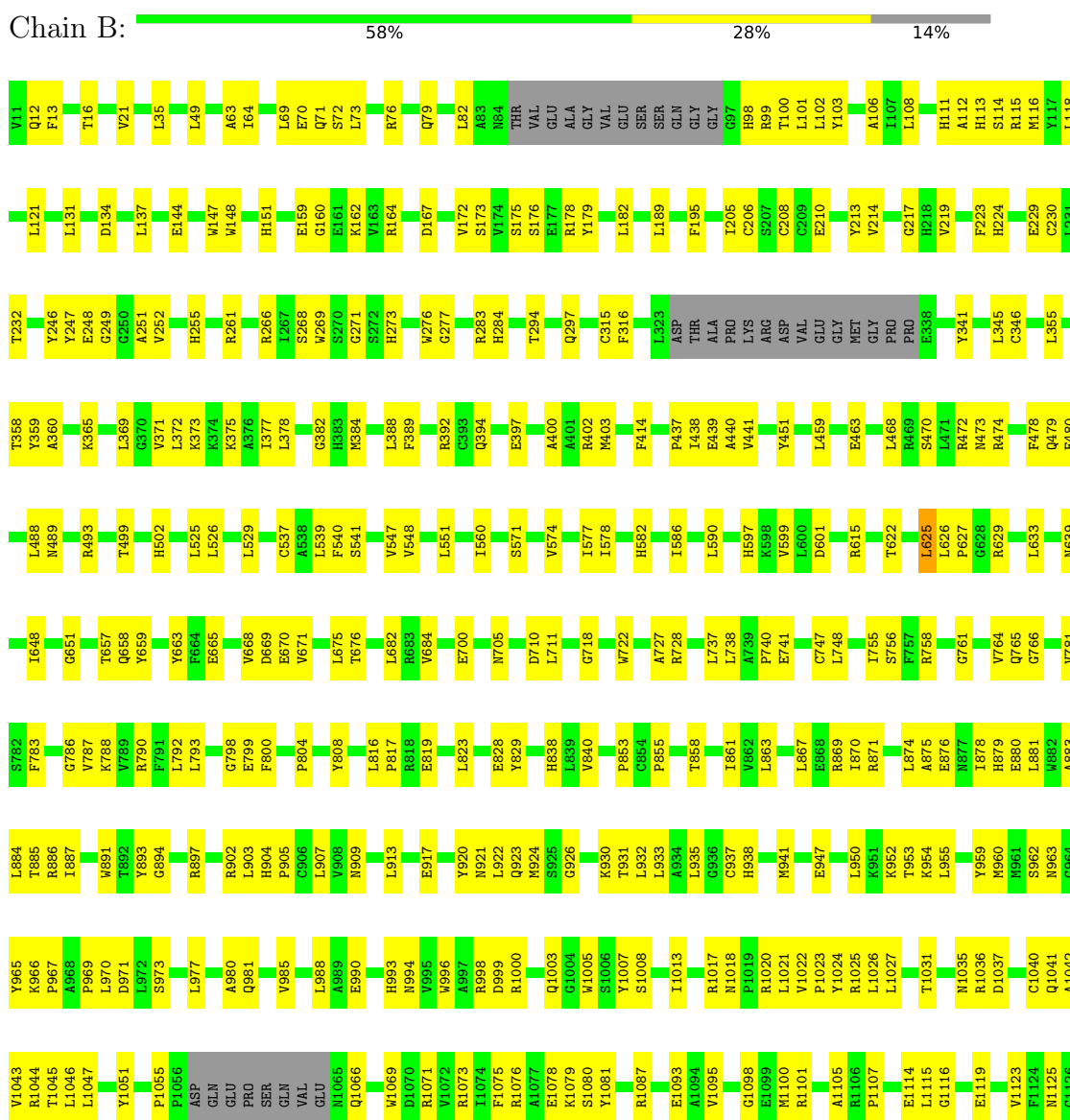
Continued from previous page...

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: Ryanodine receptor 1



Y3937	L4019	D4118	GLU	LEU	VAL	GLU	I4573	L4648	K4774	R4913	W5019
D3941	Q4020	M4122	ALA	ARG	ALA	LYS	L4657	L4652	K4775	V4914	D5020
Y3942	K4021	L4123	ASP	ARG	ASP	ASP	L4577	L4653	Q4776	W4915	P5023
L3943	D4022	L4123	GLU	THR	GLY	GLU	Y4580	A4654	Y4776	I4918	S5037
E3944	M4023	F4125	THR	ALA	PRO	GLU	Y4581	F4655	K4779	I4919	
E3945	V4024	N4126	GLU	THR	ASP	ASN	Y4582	L4656	Y4782	I4920	
Q3946	V4025	E4127	GLY	GLU	PRO	GLY	S4583	C4657	I4783	I4931	
G3947	M4026	F4128	MET	ALA	THR	GLY	D4584	G4658	Y4788	L4935	
R3949	L4027	F4129	GLY	ALA	PRO	LYS	P4587	Q4660	S4788	L4935	
	L4031	N4130	GLU	ALA	VAL	GLU	GLY	Y4661	M4796	A4939	
	M4039	R4131	ALA	ALA	GLY	VAL	GLU	L4664	L4800	E4942	
	I4040	F4132	GLU	LEU	GLY	PRO	ASP	K4665	L4800	L4943	
		Q4133	GLY	ALA	GLY	GLU	GLY	V4666	H4803	L4943	
		E4134	GLY	ALA	LEU	GLU	MET	F4667	F4807	Q4946	
	Q4043	P4135	ALA	LEU	GLN	ALA	ALA	L4668	F4807	D4947	
	M4044	L4150	GLU	LEU	PRO	PRO	PRO	L4669	L4826	E4948	
	V4045	S4151	GLU	LEU	ASP	PRO	ALA	I4670	K4821	V4950	
	M4046	E4152	GLY	ALA	THR	PRO	ALA	R4673	T4822	W4951	
	M4047	E4152	GLY	ALA	THR	PRO	ALA	K4674	L4823	K4951	
	L4048	E4152	GLY	ALA	THR	PRO	ALA	K4675	R4824	F4952	
	V4049	Y4177	ALA	ALA	THR	PRO	PRO	E4676	L4826	D4953	
	F4061	Y4177	ALA	ALA	THR	PRO	PRO	L4677	L4827	K4954	
	F4062	R4180	ALA	ALA	THR	PRO	ALA	A4678	V4827	E4955	
	D4063	R4180	ALA	ALA	THR	PRO	ALA	R4679	L4827	T4956	
		R4180	ALA	ALA	THR	PRO	PRO	R4679	V4830	F4957	
	K4067	M4184	GLY	GLY	PRO	PRO	PRO	K4680	V4830	K4957	
	T3974	M4184	GLY	GLY	PRO	PRO	PRO	V4681	M4833	F4959	
	G3975	R4192	VAL	ALA	GLY	LYS	LYS	Y4693	Y4838	L4960	
	I3976	E4199	ALA	ALA	GLY	LYS	LYS	D4696	V4838	E4981	
	I3977	E4199	ALA	ALA	GLY	LYS	LYS	V4697	V4841	F4982	
	Q3978	R4202	ALA	ALA	GLY	LYS	LYS	K4698	V4841	H4983	
		Y4080	ALA	ALA	GLY	LYS	LYS	Q4700	F4856	Y4988	
	A3981	V4081	ALA	ALA	GLY	LYS	LYS	W4701	F4859	F4991	
	S3983	L4088	ARG	ARG	GLY	LYS	LYS	D4702	R4860	L4992	
	R3984	S4089	LEU	LEU	GLY	LYS	LYS	R4703	R4860	L4996	
	L3985	I4218	ALA	LEU	GLY	MET	GLY	L4704	Y4863	I4996	
	W3986	F4219	ALA	TRP	GLY	GLY	GLY	L4725	M4864	K4997	
	D3987	F4219	ALA	TRP	GLY	GLY	GLY	D4726	K4865	K4997	
		E4229	ALA	TRP	GLY	GLY	GLY	K4727	C4876	K4998	
	H3994	E4232	ALA	TRP	GLY	GLY	GLY	H4728	D4877	D4999	
	F3996	D4240	LEU	TRP	GLY	GLY	GLY	E4735	C4877	E5002	
	A3997	D4240	LEU	TRP	GLY	GLY	GLY	M4879	D4877	H5003	
	H3998	S4099	LEU	TRP	GLY	GLY	GLY	M4880	M4880	H5003	
	M3999	Q4100	LEU	TRP	GLY	GLY	GLY	I4737	M4880	H5007	
	M4000	Q4100	LEU	TRP	GLY	GLY	GLY	M4627	Y4888	S5008	
		F4103	TYR	GLY	GLY	GLY	GLY	M4627	Y4888	Y5009	
	L4003	T4104	ARG	ALA	PRO	PRO	PRO	Y4630	R4889	W5010	
	Q4009	G4105	ARG	ALA	PRO	PRO	PRO	F4631	R4889	V5011	
	L4013	I4108	LEU	LYS	PRO	GLY	GLY	L4632	Y4760	W5012	
	K4014	I4108	LEU	LYS	PRO	GLY	GLY	A4642	P4761	H5013	
	E4015	L4112	ARG	THR	GLY	GLY	GLY	L4646	T4766	E5016	
	L4016	L4112	ARG	THR	GLY	GLY	GLY	S4647	W4767		
	L4017	S4115	ARG	THR	VAL	VAL	VAL		Y4909		
	D4018	PRO	ARG	THR	VAL	VAL	VAL		Y4909		

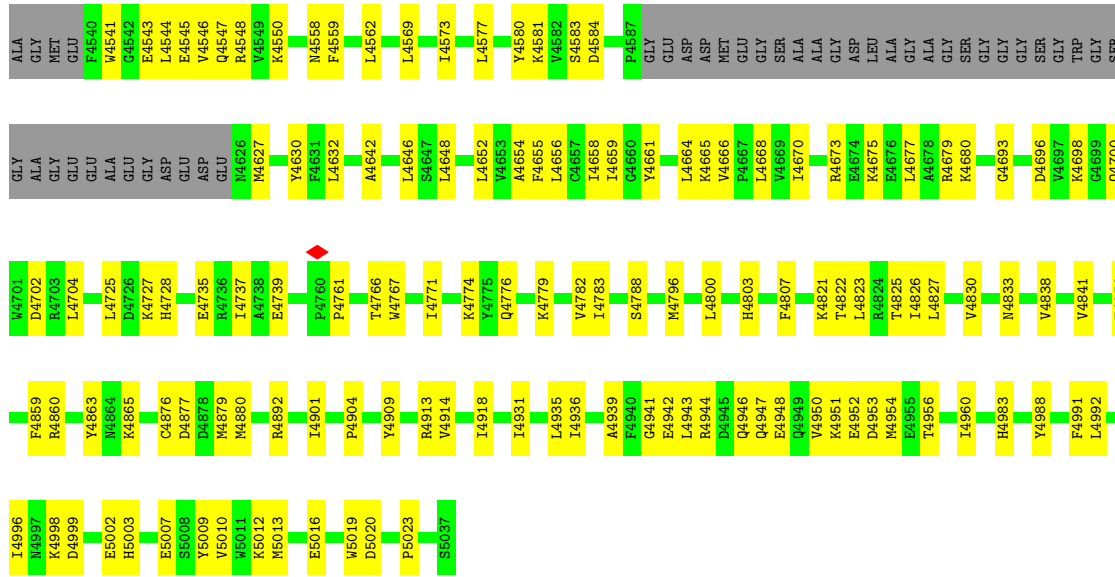
• Molecule 1: Ryanodine receptor 1



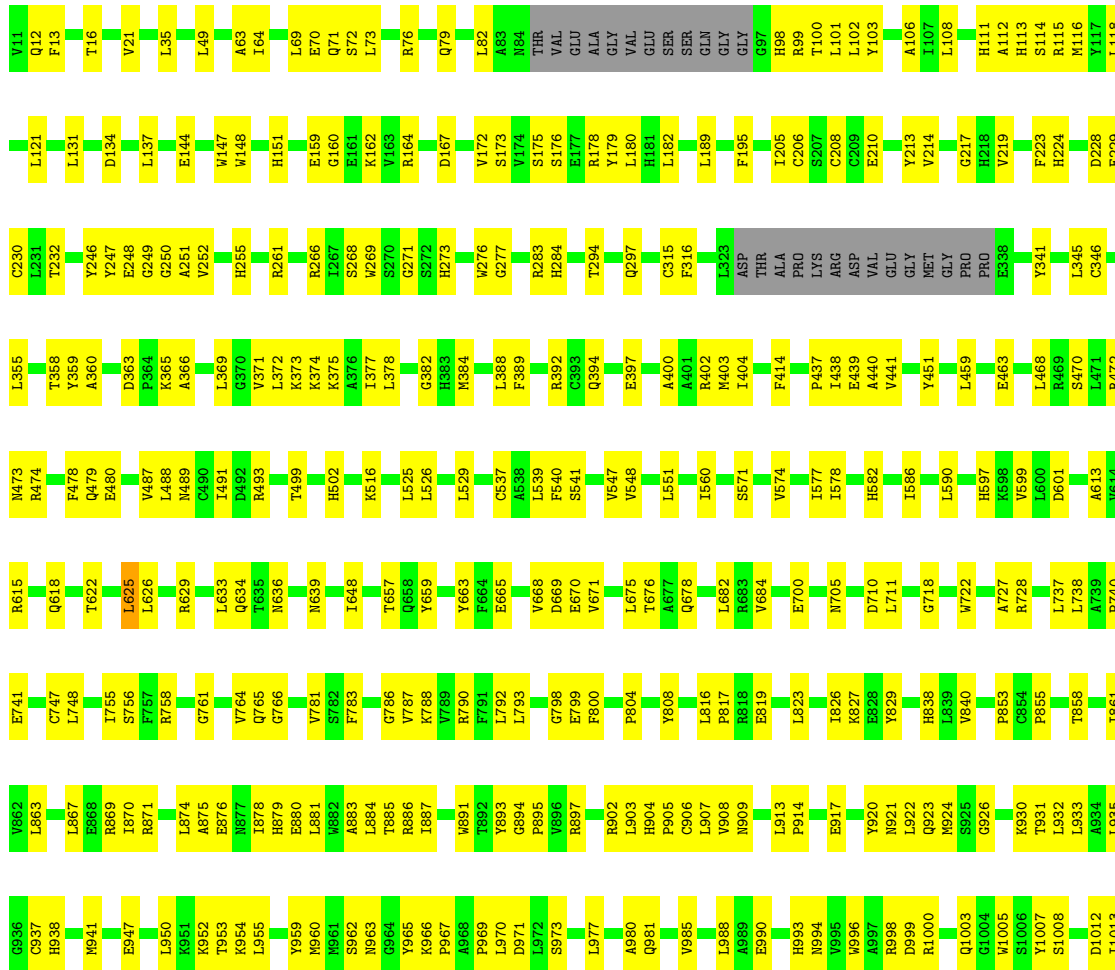
W11	W121	W172	W182	W187	W188	W189	W195	W205	W206	W207	W208	W209	W210	W213	W214	W218	W219	W223	W224	W228
Q12	L121	V173	S173	V174	V175	V176	F195	I205	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
F13	L131	H84	T84	V177	V178	V179	F195	R99	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
T16	L134	T84	V177	V178	V179	V180	F195	T100	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
V21	D134	T84	V177	V178	V179	V180	F195	L101	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
L35	L137	T84	V177	V178	V179	V180	F195	L102	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
L49	E144	T84	V177	V178	V179	V180	F195	L103	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
A63	W147	T84	V177	V178	V179	V180	F195	L104	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
I64	W148	T84	V177	V178	V179	V180	F195	L105	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
L69	T149	T84	V177	V178	V179	V180	F195	L106	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
E70	M150	T84	V177	V178	V179	V180	F195	L107	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
Q71	H151	T84	V177	V178	V179	V180	F195	L108	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
S72	E159	T84	V177	V178	V179	V180	F195	L109	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
L73	C160	T84	V177	V178	V179	V180	F195	L110	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	S161	T84	V177	V178	V179	V180	F195	L111	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	K162	T84	V177	V178	V179	V180	F195	L112	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	V163	T84	V177	V178	V179	V180	F195	L113	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	R164	T84	V177	V178	V179	V180	F195	L114	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	D167	T84	V177	V178	V179	V180	F195	L115	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	W172	T84	V177	V178	V179	V180	F195	L116	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	S173	T84	V177	V178	V179	V180	F195	L117	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	V174	T84	V177	V178	V179	V180	F195	L118	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	V175	T84	V177	V178	V179	V180	F195	L119	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	S176	T84	V177	V178	V179	V180	F195	L120	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	S177	T84	V177	V178	V179	V180	F195	L121	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	R178	T84	V177	V178	V179	V180	F195	L122	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	Y179	T84	V177	V178	V179	V180	F195	L123	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	L180	T84	V177	V178	V179	V180	F195	L124	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	H181	T84	V177	V178	V179	V180	F195	L125	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	L182	T84	V177	V178	V179	V180	F195	L126	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115
	L189	T84	V177	V178	V179	V180	F195	L127	C206	S207	C208	E210	A106	Y213	V214	H111	H112	H113	H114	H115

K3023	L2946	L2874	K2802	V2630	F2541	L2429	E2329	G2216	Y2110	L2031	P1803
A3031	S2950	L2878	R2806	P2631	L2550	I2430	R2330	GLY	V2111	L2031	L1804
S3032	R2954	A2879	K2810	L2632	L2558	D2431	D2333	GLU	Q2112	D2037	R1808
K3033	R2954	E2880	K2813	F2636	L2559	R2435	F2334	THR	Q2113	Q2045	M1814
E3035	F2957	N2881	L2813	P2640	L2562	E2439	L2335	LYS	V2117	LEU	L1815
K3036	G2958	Y2882	L2814	P2640	T2563	H2440	R2336	GLU	M2120	GLY	G1816
E3037	G2961	H2883	A2815	L2641	T2563	H2441	V2352	GLU	F2121	GLY	R1820
M3038	Q2962	N2884	A2816	K2642	K2564	L2442	V2353	GLU	S2122	GLU	M1821
L3042	Q2962	L2885	L2817	L2643	C2565	I2443	R2355	GLU	L2123	GLU	G1822
K3045	L2963	W2886	A2818	L2644	T2572	K2447	L2356	GLU	R2126	PRO	R1827
L3046	L2966	G2887	E2820	N2646	E2573	G2448	L2357	GLU	Q2127	GLU	D1828
A3047	W2967	H2647	W2821	Y2648	H2574	E2449	R2358	GLU	Y2128	GLU	G1836
A3048	Q2892	L2746	T2822	A2651	R2575	A2450	R2359	GLU	L2131	GLU	F1837
L3049	L2893	I2747	L2823	C2651	R2579	R2451	E2362	ALA	L2131	THR	F1838
V3050	L2894	I2748	R2827	W2652	D2580	R2452	C2363	GLU	L2134	THR	F1839
V3051	E2895	P2748	R2827	K2653	S2581	I2453	F2364	GLU	L2134	LEU	V1839
R3052	A2896	E2749	R2827	K2653	S2582	R2454	Q2247	GLU	L2138	GLU	K1843
R3053	K2897	K2750	E2820	Y2654	M2582	R2458	F2251	GLU	L2138	GLU	L1844
R3054	G2898	L2751	E2820	C2655	T2585	L2463	Y2256	GLU	A2141	GLU	V1845
V3054	G2900	F2754	L2755	W2661	R2588	L2463	Y2257	ALA	Y2142	ALA	M1851
F3057	T2901	I2755	L2755	S2668	R2589	I2469	Q2372	PRO	M2153	PRO	G1852
D3060	A2759	A2759	L2755	E2671	G2592	L2472	L2376	GLU	R2163	GLU	L1852
V3065	E2760	E2760	L2755	E2671	G2592	L2472	L2376	GLY	R2163	LEU	F1854
N3066	E2764	E2764	L2755	E2671	G2592	L2472	L2376	GLU	R2163	GLU	F1854
C3067	K2765	K2765	L2755	H2673	S2594	L2479	I2380	THR	L2166	THR	E1857
L3068	W2766	W2766	L2755	L2674	L2595	L2479	E2381	VAL	E2175	VAL	D1858
H3069	E2768	E2768	L2755	K2677	A2598	K2489	I2384	ARG	E2175	ARG	V1859
I3070	D2769	D2769	L2755	L2678	Q2599	M2490	R2385	LEU	M2178	LEU	K1860
S3073	K2770	K2770	L2755	L2678	R2600	S2491	R2385	VAL	L2179	VAL	Q1861
K3074	L2771	L2771	L2755	I2682	D2601	F2494	P2395	LYS	L2182	LYS	I1862
L3075	Q2772	Q2772	L2755	F2683	L2603	P2496	GLY	LYS	L2182	LYS	L1863
A3077	N2773	N2773	L2755	D2684	E2604	D2497	ARG	GLU	V2190	GLU	K1864
R3078	E2779	E2779	L2755	H2688	C2606	H2498	ARG	LYS	M1939	LYS	I1866
T3079	W2780	W2780	L2755	K2689	C2606	F2505	ASP	PRO	L1942	PRO	V1870
V3080	E2783	E2783	L2755	L2694	L2607	L2509	ARG	GLU	L1942	GLU	F1871
M3081	E2784	E2784	L2755	L2694	L2607	V2509	ARG	GLU	Y1945	GLU	F1871
K3082	K2785	K2785	L2755	Y2696	A2608	G2511	ARG	GLU	Y1945	GLU	F1871
P3085	T2787	T2787	L2755	R2697	A2609	D2507	ARG	GLU	Q1949	LEU	E1874
E3086	H2788	H2788	L2755	H2698	L2610	R2508	GLU	GLU	Q1949	LEU	E1874
K3089	P2789	P2789	L2755	M2698	L2610	R2508	HIS	PRO	Q1949	LEU	E1874
L3092	W2790	W2790	L2755	C2702	L2614	V2509	PHE	ALA	R1954	ALA	GLU
R3093	R2791	R2791	L2755	L2706	R2615	G2511	GLY	GLU	M2202	GLU	GLU
S3094	R2792	R2792	L2755	L2706	R2615	G2511	GLY	GLU	M2202	GLU	GLU
F3095	P2793	P2793	L2755	L2706	R2615	G2511	GLY	GLU	M2202	GLU	GLU
E3097	T2866	T2866	L2755	L2710	L2619	Q2515	PRO	GLU	E2209	GLU	GLU
S3098	L2867	L2867	L2755	P2711	Q2620	D2516	PRO	GLU	Q2095	GLU	GLU
A3099	S2868	S2868	L2755	P2711	H2621	F2517	PRO	GLU	E2096	GLU	GLU
S3100	L2871	L2871	L2755	D2716	L2622	L2518	GLU	GLU	L2097	GLU	GLU
			L2801	D2801	L2622	L2519	M2414	GLU	H2100	GLU	GLU
			K2800	K2800	R2624	L2519	M2414	GLU	H2100	GLU	GLU
			E2799	E2799	R2625	L2522	L2418	GLU	V2212	GLU	GLU
			S2798	S2798	R2625	L2522	L2418	GLU	V2212	GLU	GLU
			L2867	L2867	R2625	L2522	L2418	GLU	V2212	GLU	GLU
			S2868	S2868	R2625	L2522	L2418	GLU	V2212	GLU	GLU
			L2871	L2871	R2625	L2522	L2418	GLU	V2212	GLU	GLU
					F2526	F2526	I2422	GLU	V2215	GLU	GLU

LYS	LEU	GLY	LEU	LEU	LEU	E4206	I4088	R3984	K3760	V3549	MET	K3266	E3101
GLY	ALA	ASP	ALA	TRP	ALA	L4218	S4089	L3884	Q3761	R3550	ALA	F3267	D3102
ASP	ALA	GLY	GLY	GLY	ALA	F4219	K4090	F3886	Y3765	E3551	LYS	H3268	I3103
ASP	ALA	ASP	ASP	ASP	ALA	F4229	K4091	R3886	Q3766	F3552	GLY	V3269	E3104
GLY	ALA	GLY	ALA	ALA	ALA	E4232	D4092	F3887	Q3767	L3553	ASP	I3270	K3105
VAL	ALA	VAL	ARG	PHE	ARG	F4093	F4093	Q3889	S3768	G3561	ALA	L3274	K3106
ALA	ALA	ALA	ALA	GLY	ALA	H3994	L3993	L3890	L3769	E3368	GLN	F3276	V3107
ALA	LEU	ALA	LEU	GLY	LEU	Y3995	H3996	E3893	L3770	S3568	SER	M3276	R3111
GLY	GLY	GLY	GLY	GLY	GLY	F3996	F3997	T3772	H3771	W3571	GLY	Y3280	LEU
HIS	LEU	HIS	LEU	LEU	LEU	D4098	A3997	R3773	Q3572	R3395	GLY	L3281	GLY
GLY	LEU	GLY	LEU	VAL	LEU	S4099	H3998	R3672	M3573	F3398	SER	L3282	LYS
ALA	LEU	ALA	LEU	VAL	LEU	Q4100	M4000	H3673	A3874	S3399	VAL	P3282	VAL
PRO	ALA	PRO	THR	GLY	THR	F4103	L4003	A3775	A3776	V3400	GLN	L3315	SER
PRO	ALA	PRO	ALA	ALA	ARG	T4104	L4009	A3777	E3777	R3402	GLY	L3316	GLN
GLY	LEU	GLY	LEU	VAL	ARG	G4105	Q4009	M3778	D3676	C3403	ALA	G3317	ALA
GLY	THR	GLY	ARG	VAL	ARG	I4108	L3923	M3779	D3677	R3404	THR	N3318	ARG
VAL	ARG	VAL	ARG	VAL	ARG	L4118	L3926	K3679	K3679	L3405	LYS	L3319	GLN
VAL	ARG	VAL	ARG	THR	ARG	L4119	L3926	Q3683	Q3683	L3405	LYS	L3320	VAL
VAL	ARG	VAL	ARG	THR	ARG	L4014	L3934	Q3683	Q3683	Y3409	ARG	R3321	LYS
VAL	ARG	VAL	ARG	THR	ARG	E4015	Y3934	V3690	V3690	Y3409	ARG	L3322	GLY
VAL	ARG	VAL	ARG	THR	ARG	L4016	L4017	V3690	V3690	Y3409	ARG	L3323	VAL
VAL	ARG	VAL	ARG	THR	ARG	L4017	Y3937	V3690	V3690	Y3409	ARG	L3323	VAL
VAL	ARG	VAL	ARG	THR	ARG	L4018	Y3937	V3690	V3690	Y3409	ARG	L3323	VAL
VAL	ARG	VAL	ARG	THR	ARG	L4019	D3941	H3699	H3699	R3414	ASP	V3324	GLY
VAL	ARG	VAL	ARG	THR	ARG	L4020	V3942	Q3813	Q3813	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	Q4021	V3942	Q3814	Q3814	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	D4022	E3944	K3815	K3815	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	M4023	E3944	K3816	K3816	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	N4124	E3944	K3816	K3816	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	F4125	Q3946	V4025	V4025	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	E4126	Q3947	V4025	V4025	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	E4127	K3948	K3948	K3948	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	F4128	R3949	R3949	R3949	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	A4129	M3955	M3955	M3955	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	N4130	M3955	M3955	M3955	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	R4131	A3958	A3958	A3958	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	F4132	M4039	M4039	M4039	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	Q4133	I4040	I4040	I4040	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	E4134	M4044	M4044	M4044	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	P4135	V3961	V3961	V3961	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	M4142	F3962	F3962	F3962	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	T4148	L3965	L3965	L3965	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	N4149	T3966	T3966	T3966	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	L4150	E3967	E3967	E3967	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	L4151	Y3968	Y3968	Y3968	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	S4151	I3969	I3969	I3969	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	E4152	F4061	F4061	F4061	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	Y4177	F4062	F4062	F4062	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	M4184	D4063	D4063	D4063	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	R4192	K3973	K3973	K3973	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	E4199	T3974	T3974	T3974	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	R4202	N3975	N3975	N3975	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	G3975	G3975	G3975	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	N3976	N3976	N3976	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	Q3977	Q3977	Q3977	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	Q3978	Q3978	Q3978	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	Q4078	Q4078	Q4078	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	D4079	D4079	D4079	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	H3981	H3981	H3981	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	A3982	A3982	A3982	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	S3983	S3983	S3983	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	F3880	F3880	F3880	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	E3547	E3547	E3547	R3414	ASP	N3325	GLY
VAL	ARG	VAL	ARG	THR	ARG	ALA	E3548	E3548	E3548	R3414	ASP	N3325	GLY



● Molecule 1: Ryanodine receptor 1



ARG	R1017	LEU	L1194	GLU	G1442	THR	T1557	GLU	E1874	LEU	H2194	GLU	Q2293	ARG	R2418
GLU	M1018	ALA	G1195	GLU	Q1443	VAL	H1588	GLU	E1793	PRO	H2194	GLU	L2197	GLU	L2418
PHE	M1019	PRO	P1196	ALA	E1444	ARG	Q1559	GLU	E1786	ALA	L2197	GLU	M2198	GLU	L2418
GLY	R1020	GLY	G1098	GLU	P1445	ALA	M1561	GLU	P1787	GLU	G2202	GLU	R1984	GLU	I2422
GLU	L1021	LEU	V1199	ASN	W1449	ASN	I1562	GLU	ALA	GLY	M2203	GLU	K1988	GLU	L2429
GLU	V1022	GLN	G1200	GLY	V1450	LYS	Q1563	GLU	VAL	VAL	H2204	GLU	K1988	GLU	L2430
PRO	P1023	PRO	H1201	LYS	P1455	ASP	E1565	GLU	E1793	ALA	M2208	GLU	Q1973	PRO	L2431
GLU	P1024	PRO	V1208	ALA	A1215	THR	Q1569	GLU	R1797	GLU	E2209	GLU	P2001	GLU	L2432
GLU	R1025	ALA	A1215	THR	H1458	THR	Q1572	GLU	L1798	GLU	V2210	GLU	Q2005	GLU	L2433
GLU	L1026	ASP	L1219	GLU	M1476	GLY	M1573	GLU	L1798	GLU	V2210	GLU	F2012	GLU	L2434
GLU	L1027	ALA	L1115	LYS	G1477	LYS	M1573	GLU	L1798	GLU	V2210	GLU	F2012	GLU	L2435
GLU	T1031	ALA	G1116	ASN	D1478	ASN	P1574	GLU	L1798	GLU	V2210	GLU	K2013	GLU	L2436
GLU	M1035	ARG	E1221	LYS	G1222	LYS	L1575	GLU	P1803	GLU	V2210	GLU	K2013	GLU	L2437
GLU	R1036	ALA	G1222	LYS	F1223	ARG	L1581	GLU	L1804	GLU	V2210	GLU	L2031	GLU	L2438
GLU	D1037	GLU	E1224	ARG	V1483	GLY	L1581	GLU	R1808	GLU	V2210	GLU	L2031	GLU	L2439
GLU	C1040	PRO	I1228	PHE	H1484	PHE	R1584	GLU	R1808	GLU	V2210	GLU	D2037	GLU	L2440
GLU	Q1041	PRO	N1229	LEU	S1485	LEU	R1584	GLU	R1813	GLU	V2210	GLU	Q2045	GLU	L2441
GLU	A1042	ASP	M1125	LEU	S1486	LEU	P1587	GLU	M1814	GLU	V2210	GLU	Q2045	GLU	L2442
GLU	V1043	ASP	H1126	LEU	L1487	PHE	P1587	GLU	L1815	GLU	V2210	GLU	Q2045	GLU	L2443
GLU	R1044	TYR	H1127	LYS	K1488	LYS	R1594	GLU	G1816	GLU	V2210	GLU	Q2045	GLU	L2444
GLU	T1045	GLU	R1232	GLU	C1489	ALA	L1595	GLU	G1816	GLU	V2210	GLU	Q2045	GLU	L2445
GLU	L1046	ASN	K1240	ASN	S1241	LYS	L1595	GLU	R1820	GLU	V2210	GLU	Q2045	GLU	L2446
GLU	L1047	LEU	S1241	LEU	L1242	ALA	E1586	GLU	H1821	GLU	V2210	GLU	Q2045	GLU	L2447
GLU	Y1051	ARG	L1242	ALA	Q1244	ALA	V1597	GLU	G1821	GLU	V2210	GLU	Q2045	GLU	L2448
GLU	P1055	ARG	Q1244	ALA	F1245	ALA	Q1598	GLU	C1724	GLU	V2210	GLU	Q2045	GLU	L2449
GLU	P1056	SER	Q1244	SER	D1245	MET	M1599	GLU	R1827	GLU	V2210	GLU	Q2045	GLU	L2450
ASP	ASP	GLY	F1245	THR	F1245	THR	L1613	GLU	D1828	GLU	V2210	GLU	Q2045	GLU	L2451
GLN	GLN	TRP	V1248	GLN	V1248	GLN	Q1614	GLU	F1836	GLU	V2210	GLU	Q2045	GLU	L2452
GLU	GLU	GLY	P1249	PRO	P1249	PRO	V1615	GLU	Q1837	GLU	V2210	GLU	Q2045	GLU	L2453
PRO	PRO	GLY	H1252	ALA	H1252	ALA	E1616	GLU	F1838	GLU	V2210	GLU	Q2045	GLU	L2454
SER	SER	GLY	V1148	GLU	V1148	GLU	T1617	GLU	V1839	GLU	V2210	GLU	Q2045	GLU	L2455
GLN	GLN	GLY	M1152	GLU	E1256	ALA	R1623	GLU	K1843	GLU	V2210	GLU	Q2045	GLU	L2456
VAL	VAL	GLY	I1153	GLY	M1260	LEU	L1624	GLU	L1844	GLU	V2210	GLU	Q2045	GLU	L2457
GLU	GLU	LYS	D1154	LYS	M1260	PRO	V1628	GLU	V1844	GLU	V2210	GLU	Q2045	GLU	L2458
GLU	GLU	GLY	L1155	GLU	C1269	ARG	Q1629	GLU	M1851	GLU	V2210	GLU	Q2045	GLU	L2459
GLU	GLU	GLY	L1155	GLU	L1270	ARG	C1630	GLU	G1852	GLU	V2210	GLU	Q2045	GLU	L2460
GLU	GLU	THR	L1159	THR	R1271	PRO	Q1631	GLU	G1852	GLU	V2210	GLU	Q2045	GLU	L2461
GLU	GLU	ALA	T1160	ALA	R1271	HIS	L1639	GLU	I1853	GLU	V2210	GLU	Q2045	GLU	L2462
GLU	GLU	LYS	I1161	LYS	H1274	ASP	L1689	GLU	F1864	GLU	V2210	GLU	Q2045	GLU	L2463
GLU	GLU	GLY	I1161	GLY	R1275	VAL	R1689	GLU	E1857	GLU	V2210	GLU	Q2045	GLU	L2464
GLU	GLU	GLY	T1177	GLY	R1275	VAL	R1646	GLU	D1858	GLU	V2210	GLU	Q2045	GLU	L2465
GLU	GLU	THR	A1178	THR	R1290	VAL	C1647	GLU	V1859	GLU	V2210	GLU	Q2045	GLU	L2466
GLU	GLU	PRO	F1179	PRO	L1291	ALA	M1648	GLU	K1860	GLU	V2210	GLU	Q2045	GLU	L2467
GLU	GLU	THR	R1180	THR	S1292	ASP	D1649	GLU	Q1861	GLU	V2210	GLU	Q2045	GLU	L2468
GLU	GLU	GLY	E1181	GLY	L1293	ASP	I1680	GLU	Q1861	GLU	V2210	GLU	Q2045	GLU	L2469
GLU	GLU	THR	I1182	THR	L1293	THR	P1773	GLU	L1862	GLU	V2210	GLU	Q2045	GLU	L2470
GLU	GLU	GLN	I1183	GLN	F1297	THR	H1775	GLU	L1863	GLU	V2210	GLU	Q2045	GLU	L2471
GLU	GLU	PRO	I1184	PRO	F1297	GLN	S1778	GLU	K1864	GLU	V2210	GLU	Q2045	GLU	L2472
GLU	GLU	PRO	I1184	PRO	F1297	GLN	S1778	GLU	M1865	GLU	V2210	GLU	Q2045	GLU	L2473
GLU	GLU	GLY	L1189	GLY	T1304	GLY	H1663	GLU	I1866	GLU	V2210	GLU	Q2045	GLU	L2474
GLU	GLU	VAL	F1190	VAL	ALA	VAL	S1664	GLU	I1866	GLU	V2210	GLU	Q2045	GLU	L2475
GLU	GLU	ALA	V1191	ALA	GLY	ALA	H1665	GLU	F1870	GLU	V2210	GLU	Q2045	GLU	L2476
GLU	GLU	THR	C1192	THR	ALA	ALA	T1666	GLU	C1781	GLU	V2210	GLU	Q2045	GLU	L2477
GLU	GLU	PRO	S1193	PRO	THR	PRO	L1667	GLU	V1871	GLU	V2210	GLU	Q2045	GLU	L2478
GLU	GLU	GLN	E1093	GLN	PRO	GLN	V1783	GLU	V1871	GLU	V2210	GLU	Q2045	GLU	L2479

K2928	F2929	L2930	N2933	G2934	P2935	A2936	T2937	R2938	R2939	GLY	LEU	LYS	ASP	MET	GLU	L2946	S2950	R2954	F2957	G2958	Q2961	Q2962	L2963	L2964	R2965	V2966	M2967	I2968	S2970	F2973	I2974	H2976	L2977	E2978	A2979	V2980	V2986	S2989	E2992	Q2993	E2994	I2995	K2996	F2997	F2998	A2999	K3000	I3001				
D2692	Q2693	E2694	L2695	Y2696	R2697	M2698	C2702	L2706	L2710	P2711	D2716	K2725	LYS	ALA	THR	VAL	ASP	GLU	GLY	M2734	F2735	D2736	P2739	T2742	L2746	L2747	P2748	E2749	K2750	L2751	F2754	L2755	A2759	E2760	E2764	K2765	M2766	A2767	F2768	D2769	K2770	L2771	Q2772	M2773	E2779	M2780						
E2783	E2784	L2785	K2786	T2787	H2788	P2789	M2790	L2791	R2792	P2793	F2797	S2798	E2799	K2800	D2801	K2802	R2806	K2810	L2813	K2814	M2815	M2816	L2817	A2818	W2819	E2820	W2821	L2822	R2827	E2830	GLU	GLU	ARG	THR	GLU	LYS	LYS	THR	ARG	LYS	ILE	SER	GLN	THR	ALA	GLN	TYR	ASP	PRO			
ARG	GLU	GLY	Y2855	P2857	Q2858	P2859	P2860	J2861	L2862	S2863	T2866	L2867	S2868	M2874	A2875	L2878	K2879	E2880	N2881	H2883	A2884	T2885	W2886	G2887	R2888	Q2882	E2883	L2884	E2885	K2886	L2887	Q2889	K2897	L2898	Q2898	G2899	T2901	H2902	P2903	L2904	V2906	P2907	Y2908	D2909	I2910	L2911	K2914	E2915	Q2924	E2925	L2926	L2927
D2682	Q2683	E2684	L2685	Y2686	R2687	M2688	C2702	L2706	L2710	P2711	D2716	K2725	LYS	ALA	THR	VAL	ASP	GLU	GLY	M2734	F2735	D2736	P2739	T2742	L2746	L2747	P2748	E2749	K2750	L2751	F2754	L2755	A2759	E2760	E2764	K2765	M2766	A2767	F2768	D2769	K2770	L2771	Q2772	M2773	E2779	M2780						
R2508	V2509	Y2510	G2511	L2512	Q2515	D2516	F2517	L2518	L2519	L2522	F2526	F2541	L2542	L2543	L2550	V2558	L2559	L2562	T2563	K2564	C2565	T2572	E2573	H2574	R2575	V2579	W2580	S2581	M2582	T2585	R2588	R2591	G2592	R2593	S2594	L2595	A2598	Q2599	R2600	D2601	V2602	L2603	E2604	D2605	C2606	L2607	M2608	A2609				
L2610	L2614	R2615	P2616	L2619	K2620	H2621	L2622	L2623	R2624	L2625	L2626	V2627	V2630	P2631	T2632	L2633	F2636	P2640	L2641	T2643	K2642	L2643	L2644	T2645	T2646	H2647	Y2648	C2651	W2661	S2668	E2671	L2672	H2673	L2674	K2677	L2678	L2682	F2683	D2684	H2688	K2689	K2690	Y2691									
R2508	V2509	Y2510	G2511	L2512	Q2515	D2516	F2517	L2518	L2519	L2522	F2526	F2541	L2542	L2543	L2550	V2558	L2559	L2562	T2563	K2564	C2565	T2572	E2573	H2574	R2575	V2579	W2580	S2581	M2582	T2585	R2588	R2591	G2592	R2593	S2594	L2595	A2598	Q2599	R2600	D2601	V2602	L2603	E2604	D2605	C2606	L2607	M2608	A2609				
L2610	L2614	R2615	P2616	L2619	K2620	H2621	L2622	L2623	R2624	L2625	L2626	V2627	V2630	P2631	T2632	L2633	F2636	P2640	L2641	T2643	K2642	L2643	L2644	T2645	T2646	H2647	Y2648	C2651	W2661	S2668	E2671	L2672	H2673	L2674	K2677	L2678	L2682	F2683	D2684	H2688	K2689	K2690	Y2691									
D2692	Q2693	E2694	L2695	Y2696	R2697	M2698	C2702	L2706	L2710	P2711	D2716	K2725	LYS	ALA	THR	VAL	ASP	GLU	GLY	M2734	F2735	D2736	P2739	T2742	L2746	L2747	P2748	E2749	K2750	L2751	F2754	L2755	A2759	E2760	E2764	K2765	M2766	A2767	F2768	D2769	K2770	L2771	Q2772	M2773	E2779	M2780						
E2783	E2784	L2785	K2786	T2787	H2788	P2789	M2790	L2791	R2792	P2793	F2797	S2798	E2799	K2800	D2801	K2802	R2806	K2810	L2813	K2814	M2815	M2816	L2817	A2818	W2819	E2820	W2821	L2822	R2827	E2830	GLU	GLU	ARG	THR	GLU	LYS	LYS	THR	ARG	LYS	ILE	SER	GLN	THR	ALA	GLN	TYR	ASP	PRO			
ARG	GLU	GLY	Y2855	P2857	Q2858	P2859	P2860	J2861	L2862	S2863	T2866	L2867	S2868	M2874	A2875	L2878	K2879	E2880	N2881	H2883	A2884	T2885	W2886	G2887	R2888	Q2882	E2883	L2884	E2885	K2886	L2887	Q2889	K2897	L2898	Q2898	G2899	T2901	H2902	P2903	L2904	V2906	P2907	Y2908	D2909	I2910	L2911	K2914	E2915	Q2924	E2925	L2926	L2927
K2928	F2929	L2930	N2933	G2934	P2935	A2936	T2937	R2938	R2939	GLY	LEU	LYS	ASP	MET	GLU	L2946	S2950	R2954	F2957	G2958	Q2961	Q2962	L2963	L2964	R2965	V2966	M2967	I2968	S2970	F2973	I2974	H2976	L2977	E2978	A2979	V2980	V2986	S2989	E2992	Q2993	E2994	I2995	K2996	F2997	F2998	A2999	K3000	I3001				
T1666	L1667	R1668	L1669	Y1670	L1676	M1679	Q1691	L1695	L1698	L1698	P1803	L1804	P1704	R1808	R1813	Y1712	I1716	E1721	S1722	A1723	C1724	R1725	S1726	R1727	F1836	M1730	F1838	V1839	Y1734	E1741	T1742	R1743	A1744	I1745	F1748	P1749	R1758	P1763	R1772	P1773	P1774	H1775	S1778	P1779	F1871	P1780						
A1784	A1785	L1786	P1787	ALA	ALA	GLY	VAL	ALA	E1793	R1797	L1798	I1802	P1803	L1804	R1808	R1813	M1814	L1815	G1816	R1820	D1821	A1822	C1823	R1827	D1828	F1836	Q1837	F1838	V1839	K1843	L1844	V1845	M1851	G1852	I1853	F1854	E1857	D1858	W1859	K1860	Q1861	L1862	L1863	K1864	M1865	L1866	W1870	F1871				
E1874	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU		
Q1949	R1954	R1964	R1964	K1968	Q1973	P2001	Q2005	F2012	K2013	L2031	D2037	Q2045	LEU	GLY	GLU	GLU	GLU	GLU	GLU	GLU	GLU	PRO	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU	GLU		
LEU	PRO	ALA	GLU	K2089	L2094	Q2095	E2096	V2207	M2208	E2209	V2210	M2211	V2212	H2100	Q2107	L2214	L2215	G2216	GLY	GLY	THR	V2117	M2120	S2122	L2123	Q2126	Q2127	Y2128	L2131	L2134	L2138	A2141	Y2142	M2153	R2163	L2166	L2265	G2266	M2267	Q2268	S2270	T2271	L2272	L2273	V2190	Q2193	H2194	L2197				
M2198	G2202	M2203	H2204	E2205	T2206	V2207	M2208	E2209	V2210	M2211	V2212	K2213	V2214	L2215	G2216	GLY	GLY	THR	V2117	M2120	S2122	L2123	Q2126	Q2127	Y2128	L2131	L2134	L2138	A2141	Y2142	M2153	R2163	L2166	L2265	G2266	M2267	Q2268	S2270	T2271	L2272	L2273	V2190	Q2193	H2194	L2197							
E2286	C2305	C2310	L2313	Y2318	L2321	M2324	P2325	E2329	R2330	D2333	F2334	L2335	R2336	V2352	V2353	R2355	L2356	L2357	L2358	R2359	I2362	L2363	F2364	G2365	L2368	R2369	G2372	L2376	I2380	E2381	L2384	R2385	P2389	GLY	VAL	ARG	ARG	ARG	ASP	ARG	ARG	ARG	ARG	ARG	ARG	ARG	ARG					
GLU	HIS	PHE	GLY	GLU	PRO	PRO	GLU	GLU	M2414	L2418	I2422	L2429	L2430	D2431	R2435	E2439	M2440	H2441	L2442	I2443	K2447	G2448	E2449	K2450	L2451	R2452	L2453	R2454	R2458	L2463	I2469	L2472	L2479	K2489	M2490	S2491	F2494	V2495	P2496	D2497	H2498	F2505	L2506	D2507								

P101	M102	G103	Y104	N105	P106	W107	G108	T109	P110	N111	Y114	Q122	V123	T124	V125	S126	SER	HIS	HIS	HIS	HIS	HIS	HIS	HIS	GLU	PRO	GLU	ALA
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	26815	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	5.503	Depositor
Minimum map value	-0.105	Depositor
Average map value	0.053	Depositor
Map value standard deviation	0.121	Depositor
Recommended contour level	0.2	Depositor
Map size (\AA)	504.0, 504.0, 504.0	wwPDB
Map dimensions	336, 336, 336	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.5, 1.5, 1.5	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: CFF, ATP, ZN, CA

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	B	0.25	0/34879	0.51	3/47280 (0.0%)
1	E	0.25	0/34879	0.51	3/47280 (0.0%)
1	G	0.25	0/34879	0.51	3/47280 (0.0%)
1	J	0.25	0/34879	0.51	3/47280 (0.0%)
2	A	0.29	0/834	0.57	0/1123
2	D	0.29	0/834	0.57	0/1123
2	H	0.29	0/834	0.57	0/1123
2	I	0.29	0/834	0.57	0/1123
3	C	0.25	0/987	0.54	0/1340
3	F	0.25	0/987	0.54	0/1340
3	K	0.25	0/987	0.54	0/1340
3	M	0.25	0/987	0.54	0/1340
All	All	0.25	0/146800	0.51	12/198972 (0.0%)

There are no bond length outliers.

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	2905	LEU	CA-CB-CG	6.09	129.32	115.30
1	J	2905	LEU	CA-CB-CG	6.09	129.32	115.30
1	E	2905	LEU	CA-CB-CG	6.09	129.31	115.30
1	G	2905	LEU	CA-CB-CG	6.08	129.28	115.30
1	E	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

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	B	34103	0	33491	1051	0
1	E	34103	0	33491	1054	0
1	G	34103	0	33491	1068	0
1	J	34103	0	33491	1061	0
2	A	818	0	824	25	0
2	D	818	0	824	29	0
2	H	818	0	824	33	0
2	I	818	0	824	30	0
3	C	967	0	916	51	0
3	F	967	0	916	53	0
3	K	967	0	916	48	0
3	M	967	0	916	44	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	2	0
5	E	31	0	12	1	0
5	G	31	0	12	1	0
5	J	31	0	12	2	0
6	B	14	0	10	1	0
6	E	14	0	10	1	0
6	G	14	0	10	1	0
6	J	14	0	10	1	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	143740	0	141012	4460	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 16.

The worst 5 of 4460 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)
1:G:1616:GLU:HG3	1:G:1629:GLN:HG3	1.58	0.86
1:E:1008:SER:HB2	1:E:1017:ARG:HE	1.41	0.85
1:J:1616:GLU:HG3	1:J:1629:GLN:HG3	1.58	0.85
1:E:2214:VAL:HG13	1:E:2215:LEU:HD12	1.58	0.85
1:J:2214:VAL:HG13	1:J:2215:LEU:HD12	1.58	0.85

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	B	4280/5027 (85%)	4189 (98%)	89 (2%)	2 (0%)	100	100
1	E	4280/5027 (85%)	4190 (98%)	88 (2%)	2 (0%)	100	100
1	G	4280/5027 (85%)	4190 (98%)	88 (2%)	2 (0%)	100	100
1	J	4280/5027 (85%)	4190 (98%)	88 (2%)	2 (0%)	100	100
2	A	105/107 (98%)	96 (91%)	8 (8%)	1 (1%)	13	48
2	D	105/107 (98%)	96 (91%)	8 (8%)	1 (1%)	13	48
2	H	105/107 (98%)	96 (91%)	8 (8%)	1 (1%)	13	48
2	I	105/107 (98%)	96 (91%)	8 (8%)	1 (1%)	13	48
3	C	124/137 (90%)	113 (91%)	11 (9%)	0	100	100
3	F	124/137 (90%)	113 (91%)	11 (9%)	0	100	100
3	K	124/137 (90%)	113 (91%)	11 (9%)	0	100	100
3	M	124/137 (90%)	111 (90%)	13 (10%)	0	100	100
All	All	18036/21084 (86%)	17593 (98%)	431 (2%)	12 (0%)	50	83

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	A	86	GLY

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
2	D	86	GLY
2	H	86	GLY
2	I	86	GLY
1	B	2909	ASP

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	B	3659/4270 (86%)	3650 (100%)	9 (0%)	92 93
1	E	3659/4270 (86%)	3650 (100%)	9 (0%)	92 93
1	G	3659/4270 (86%)	3650 (100%)	9 (0%)	92 93
1	J	3659/4270 (86%)	3649 (100%)	10 (0%)	91 91
2	A	88/88 (100%)	86 (98%)	2 (2%)	45 64
2	D	88/88 (100%)	86 (98%)	2 (2%)	45 64
2	H	88/88 (100%)	86 (98%)	2 (2%)	45 64
2	I	88/88 (100%)	86 (98%)	2 (2%)	45 64
3	C	104/114 (91%)	103 (99%)	1 (1%)	73 81
3	F	104/114 (91%)	103 (99%)	1 (1%)	73 81
3	K	104/114 (91%)	103 (99%)	1 (1%)	73 81
3	M	104/114 (91%)	103 (99%)	1 (1%)	73 81
All	All	15404/17888 (86%)	15355 (100%)	49 (0%)	90 91

5 of 49 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	J	1954	ARG
1	J	3694	LYS
1	J	2268	GLN
1	J	2827	ARG
2	A	35	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 58 such sidechains are listed below:

Mol	Chain	Res	Type
1	G	1691	GLN
3	K	44	GLN
1	G	3813	GLN
3	F	122	GLN
1	J	3960	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	$\# Z > 2$
5	ATP	G	5102	-	26,33,33	0.60	0	31,52,52	0.77	2 (6%)
6	CFE	G	5103	-	8,15,15	1.02	0	8,23,23	2.45	2 (25%)
6	CFE	J	5103	-	8,15,15	1.03	0	8,23,23	2.44	2 (25%)
5	ATP	J	5102	-	26,33,33	0.60	0	31,52,52	0.77	2 (6%)
6	CFE	E	5103	-	8,15,15	1.01	0	8,23,23	2.45	2 (25%)
5	ATP	E	5102	-	26,33,33	0.60	0	31,52,52	0.77	2 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	CFF	B	5103	-	8,15,15	1.03	0	8,23,23	2.46	2 (25%)
5	ATP	B	5102	-	26,33,33	0.60	0	31,52,52	0.77	2 (6%)

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	G	5102	-	-	5/18/38/38	0/3/3/3
6	CFF	G	5103	-	-	-	0/2/2/2
6	CFF	J	5103	-	-	-	0/2/2/2
5	ATP	J	5102	-	-	5/18/38/38	0/3/3/3
6	CFF	E	5103	-	-	-	0/2/2/2
5	ATP	E	5102	-	-	5/18/38/38	0/3/3/3
6	CFF	B	5103	-	-	-	0/2/2/2
5	ATP	B	5102	-	-	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(°)
6	B	5103	CFF	C5-C6-N1	-5.83	111.98	118.20
6	E	5103	CFF	C5-C6-N1	-5.82	111.99	118.20
6	G	5103	CFF	C5-C6-N1	-5.82	111.99	118.20
6	J	5103	CFF	C5-C6-N1	-5.82	112.00	118.20
6	E	5103	CFF	C4-C5-C6	3.47	122.19	119.96

There are no chirality outliers.

5 of 20 torsion outliers are listed below:

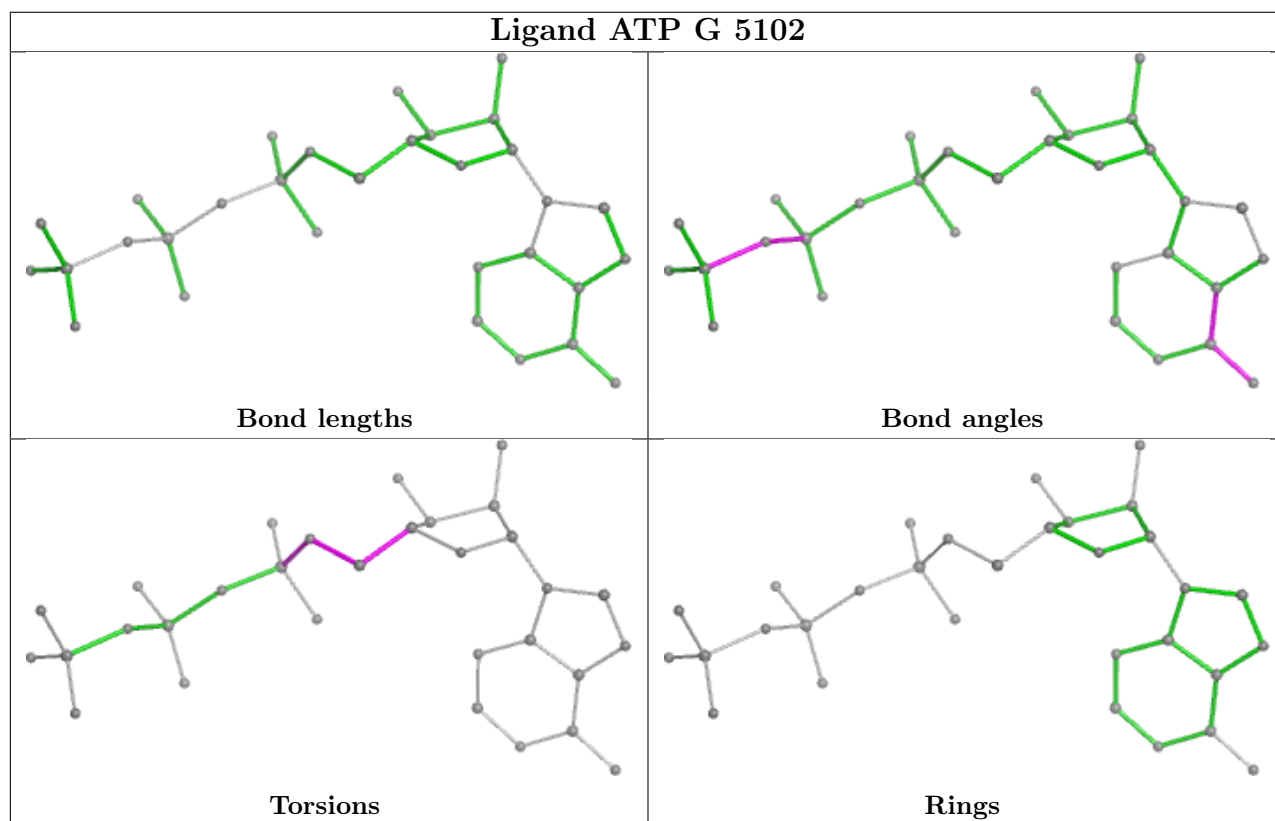
Mol	Chain	Res	Type	Atoms
5	B	5102	ATP	C5'-O5'-PA-O1A
5	B	5102	ATP	C5'-O5'-PA-O2A
5	E	5102	ATP	C5'-O5'-PA-O1A
5	E	5102	ATP	C5'-O5'-PA-O2A
5	G	5102	ATP	C5'-O5'-PA-O1A

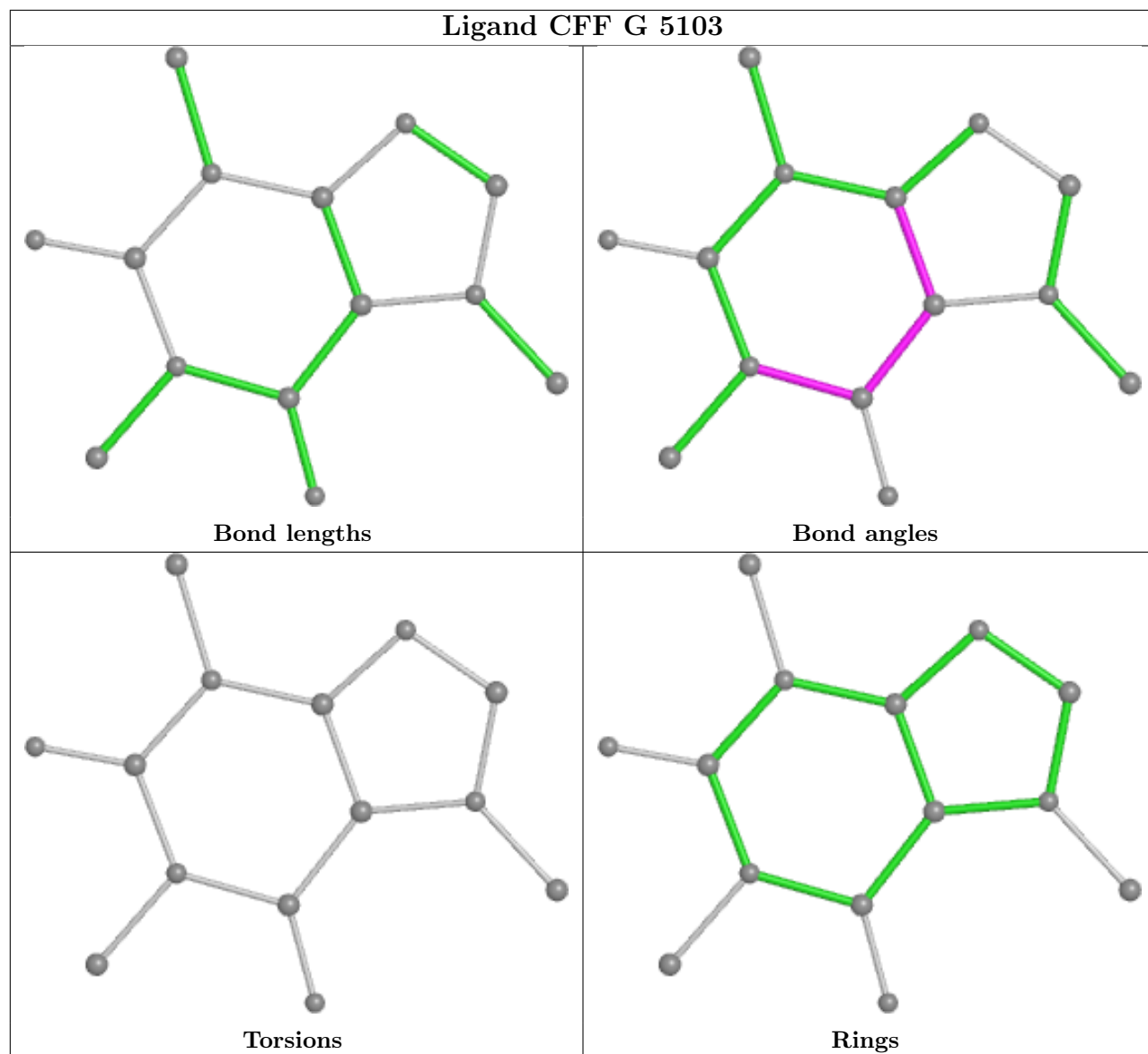
There are no ring outliers.

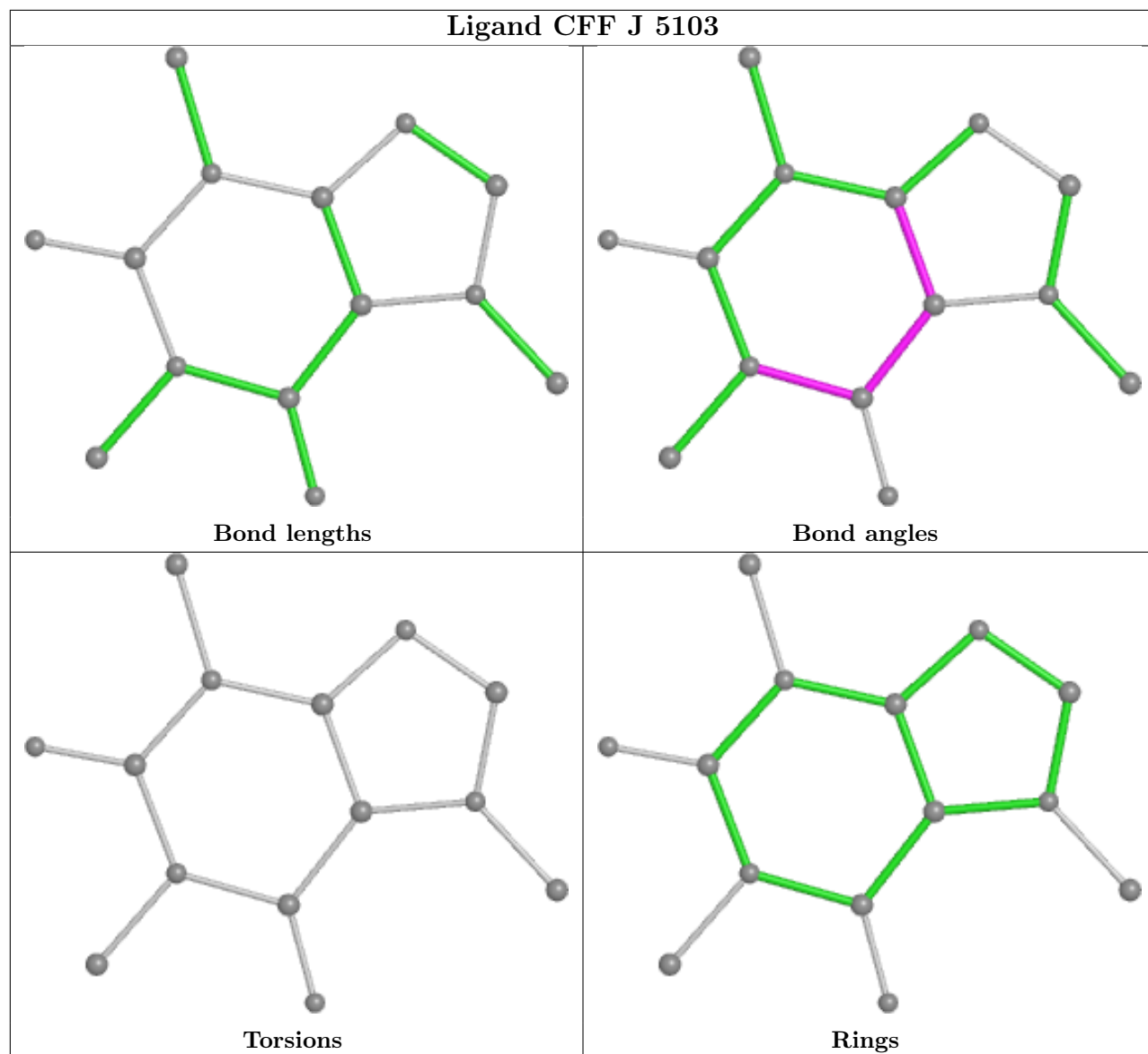
8 monomers are involved in 10 short contacts:

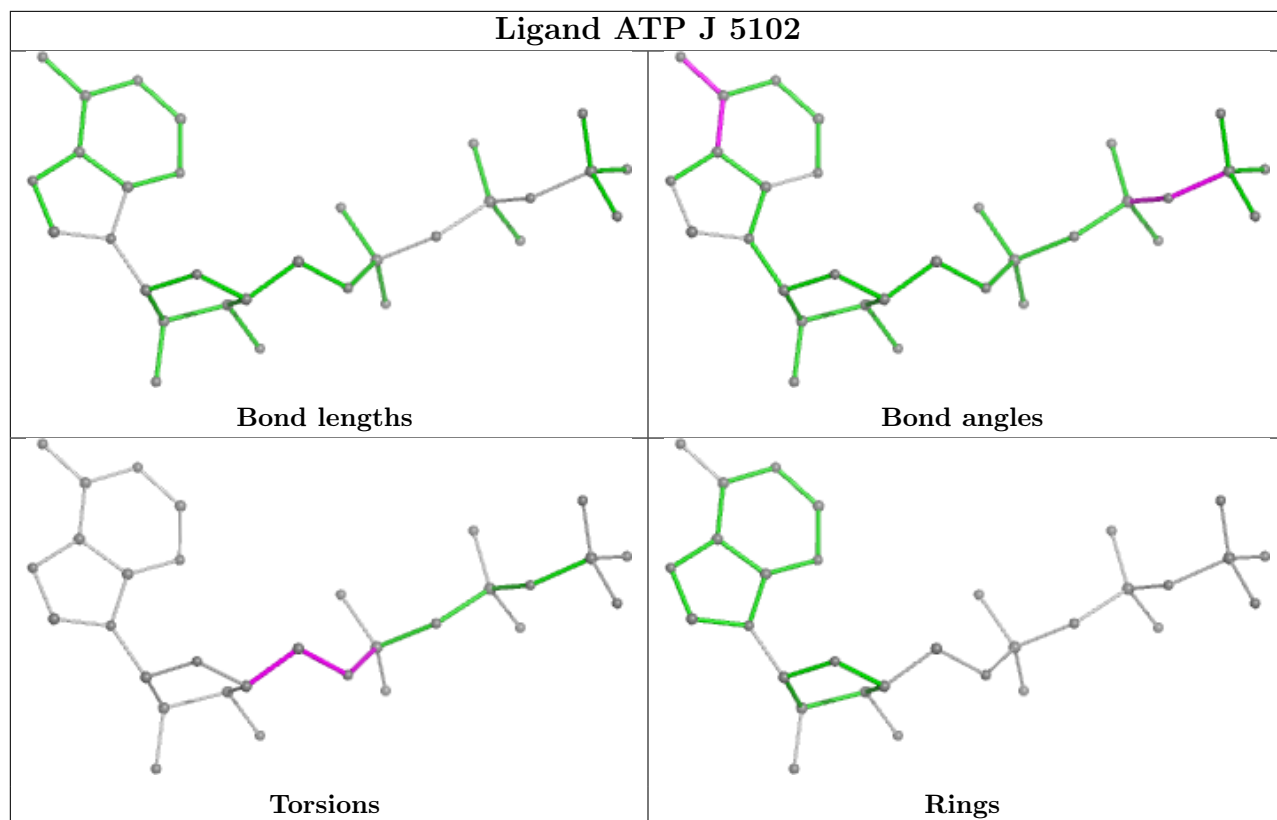
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	G	5102	ATP	1	0
6	G	5103	CFF	1	0
6	J	5103	CFF	1	0
5	J	5102	ATP	2	0
6	E	5103	CFF	1	0
5	E	5102	ATP	1	0
6	B	5103	CFF	1	0
5	B	5102	ATP	2	0

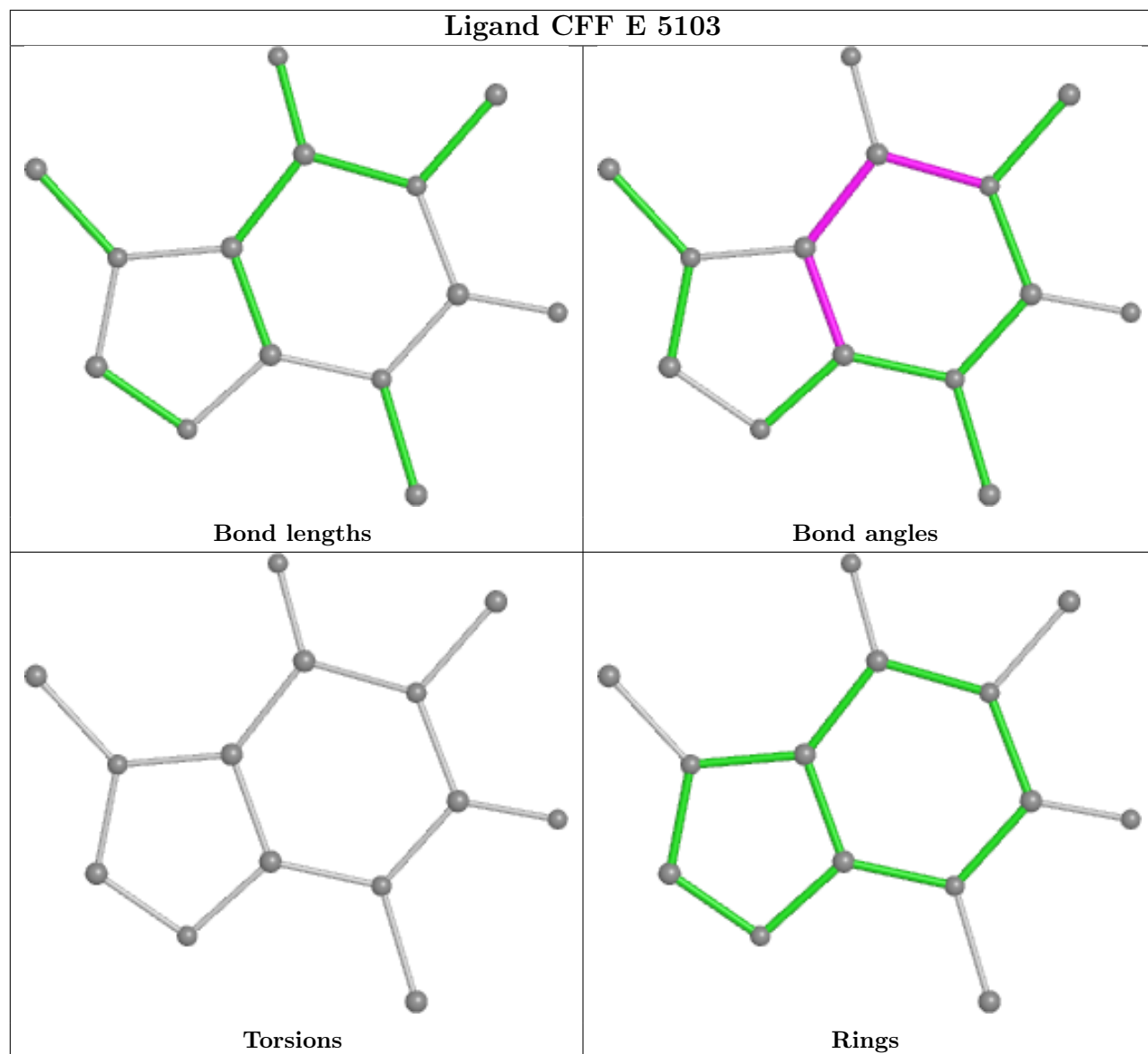
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

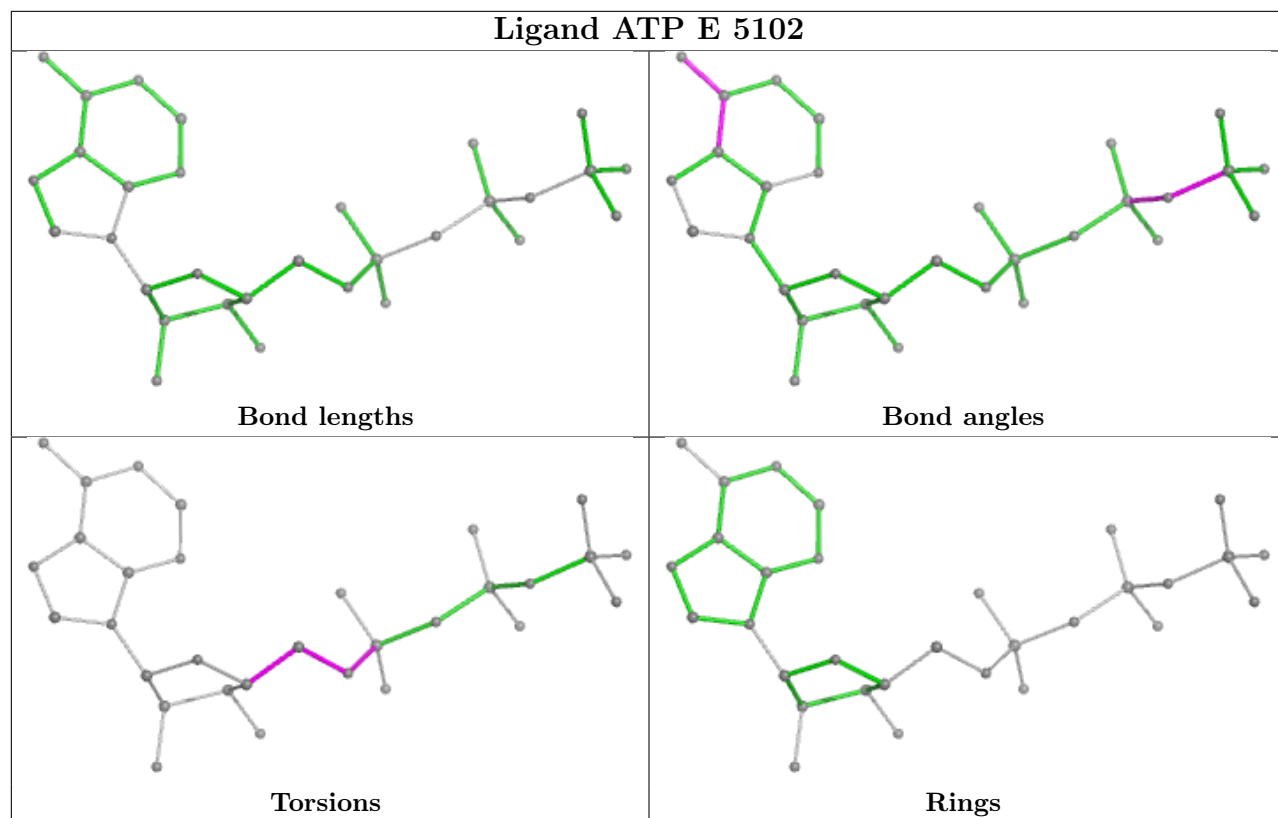


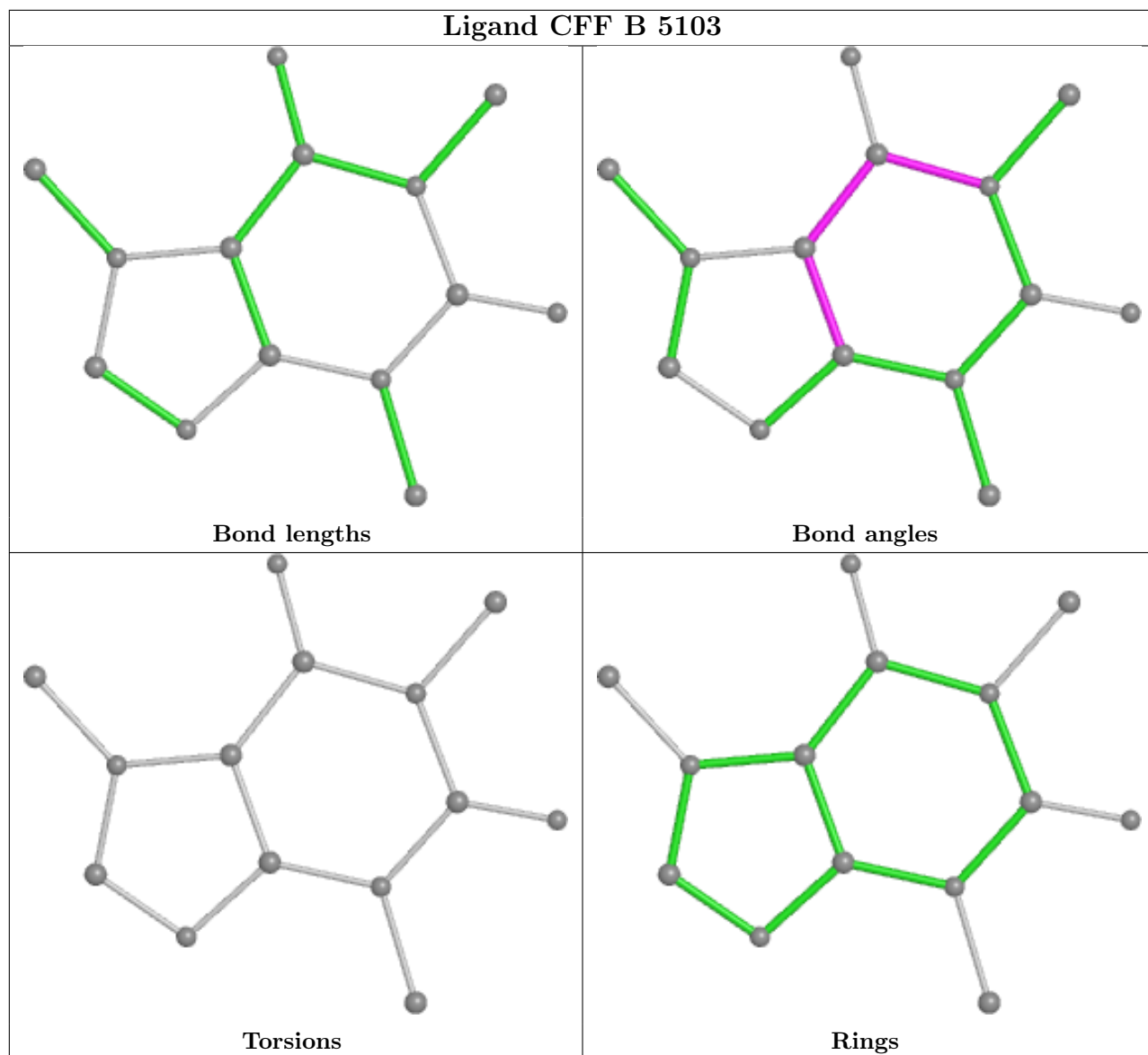


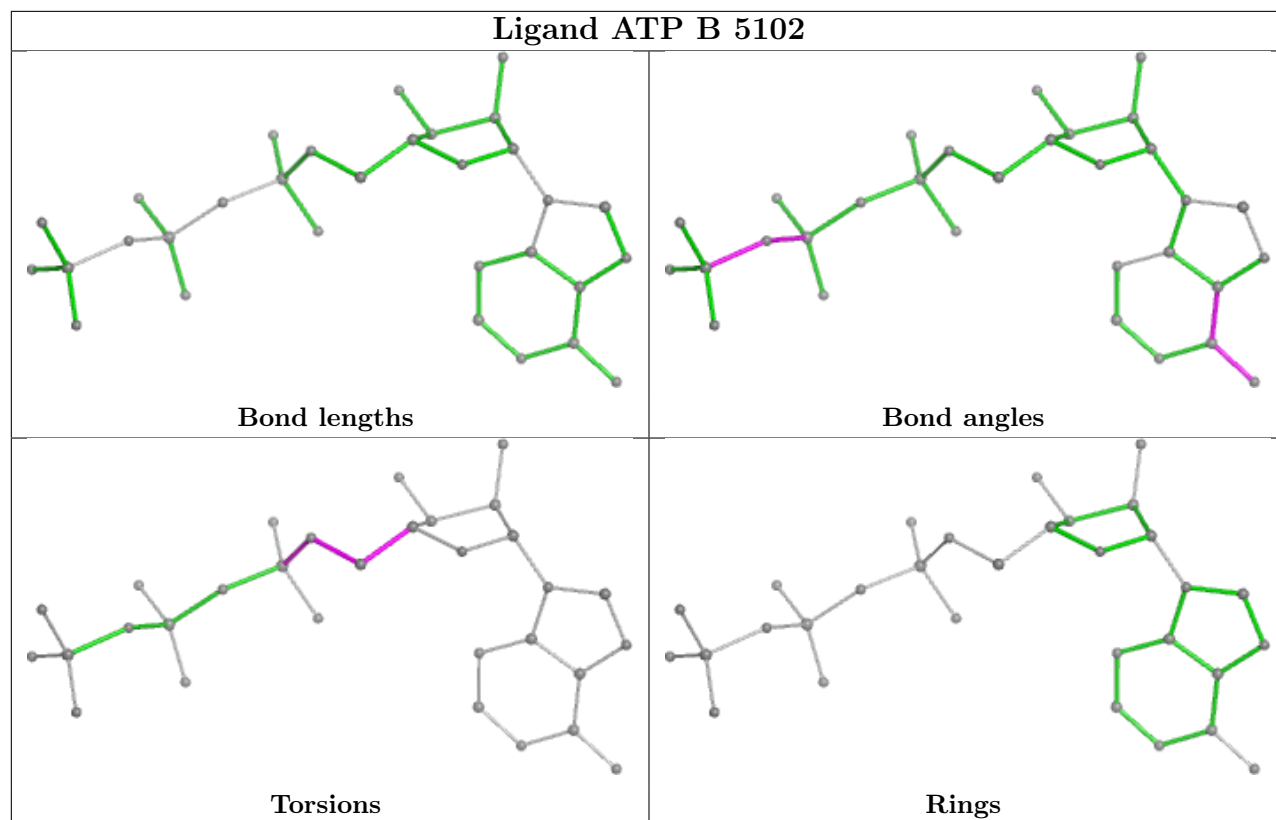












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

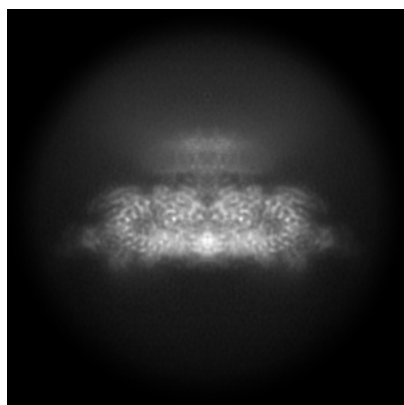
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-19464. These allow visual inspection of the internal detail of the map and identification of artifacts.

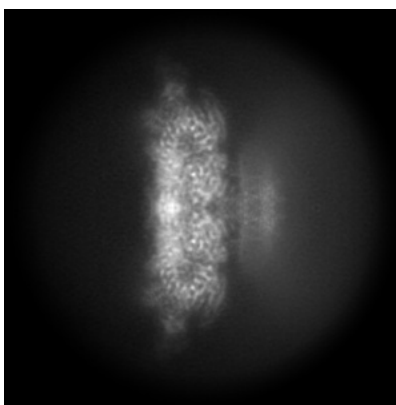
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

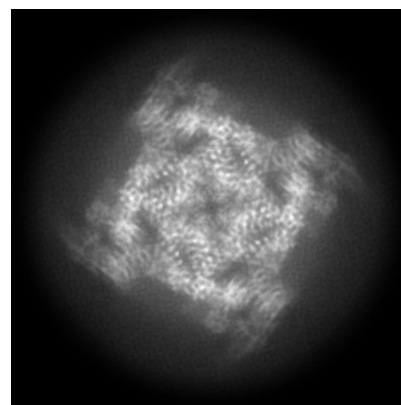
6.1.1 Primary map



X



Y

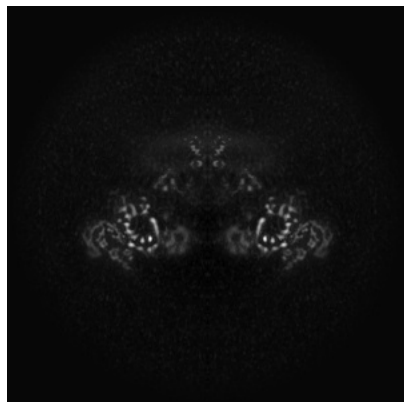


Z

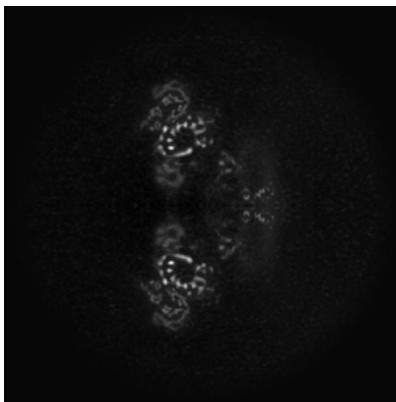
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

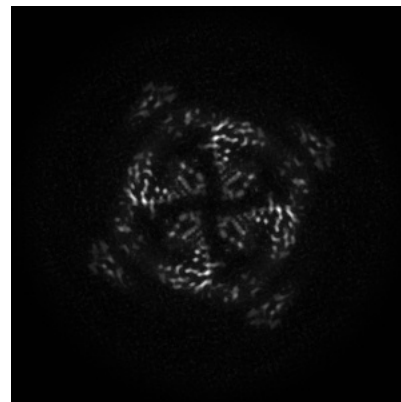
6.2.1 Primary map



X Index: 168



Y Index: 168

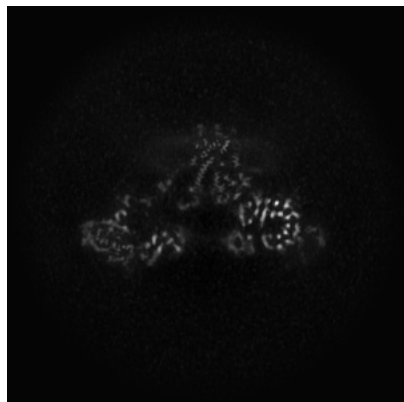


Z Index: 168

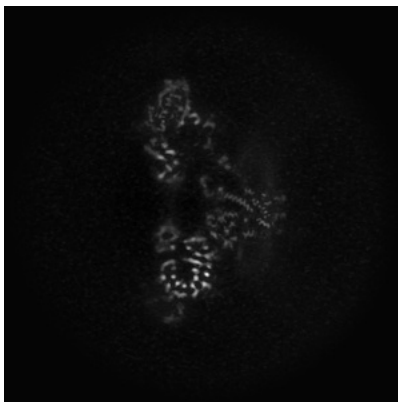
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

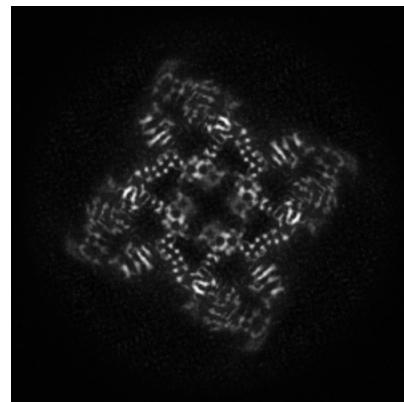
6.3.1 Primary map



X Index: 175



Y Index: 175

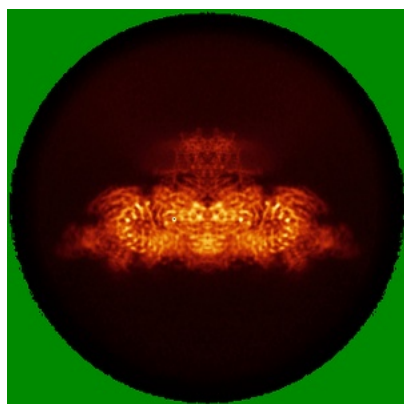


Z Index: 144

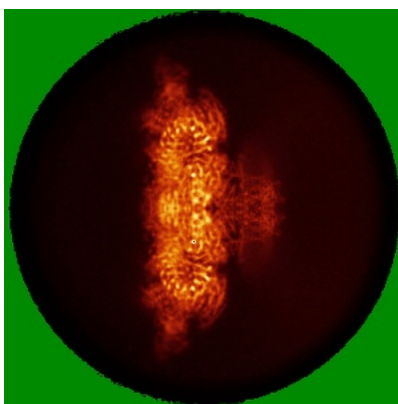
The images above show the largest variance slices of the map in three orthogonal directions.

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

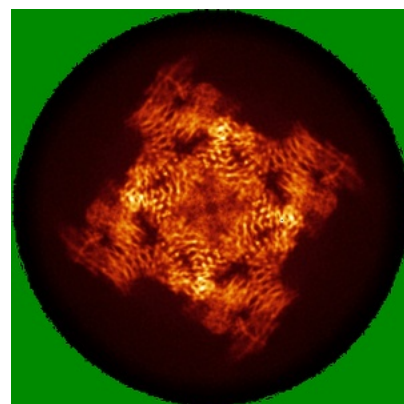
6.4.1 Primary map



X



Y



Z

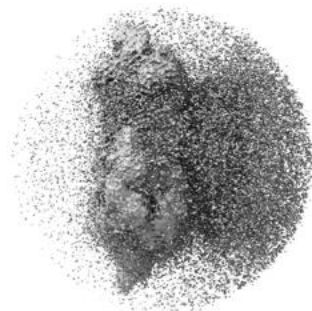
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.2. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

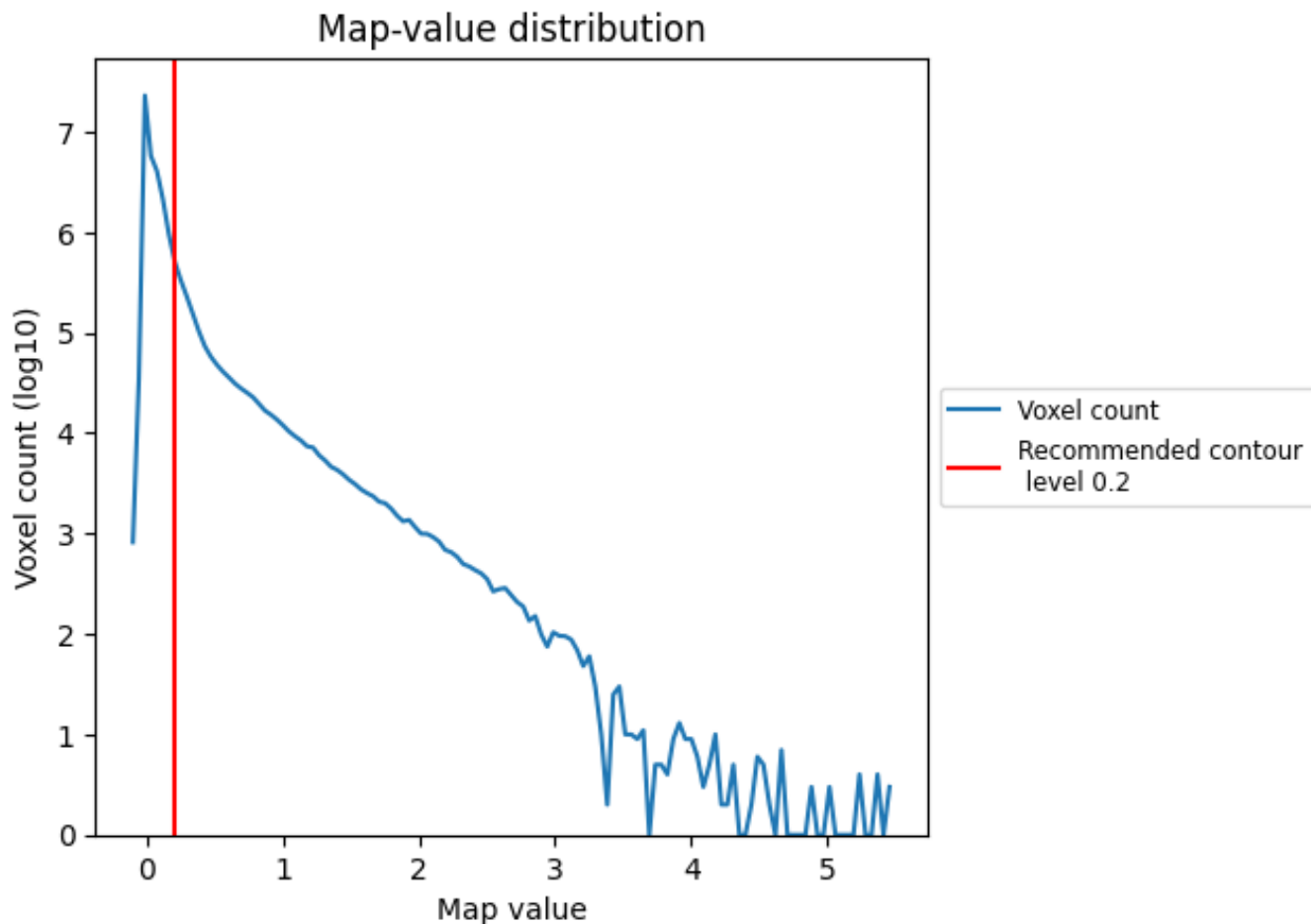
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

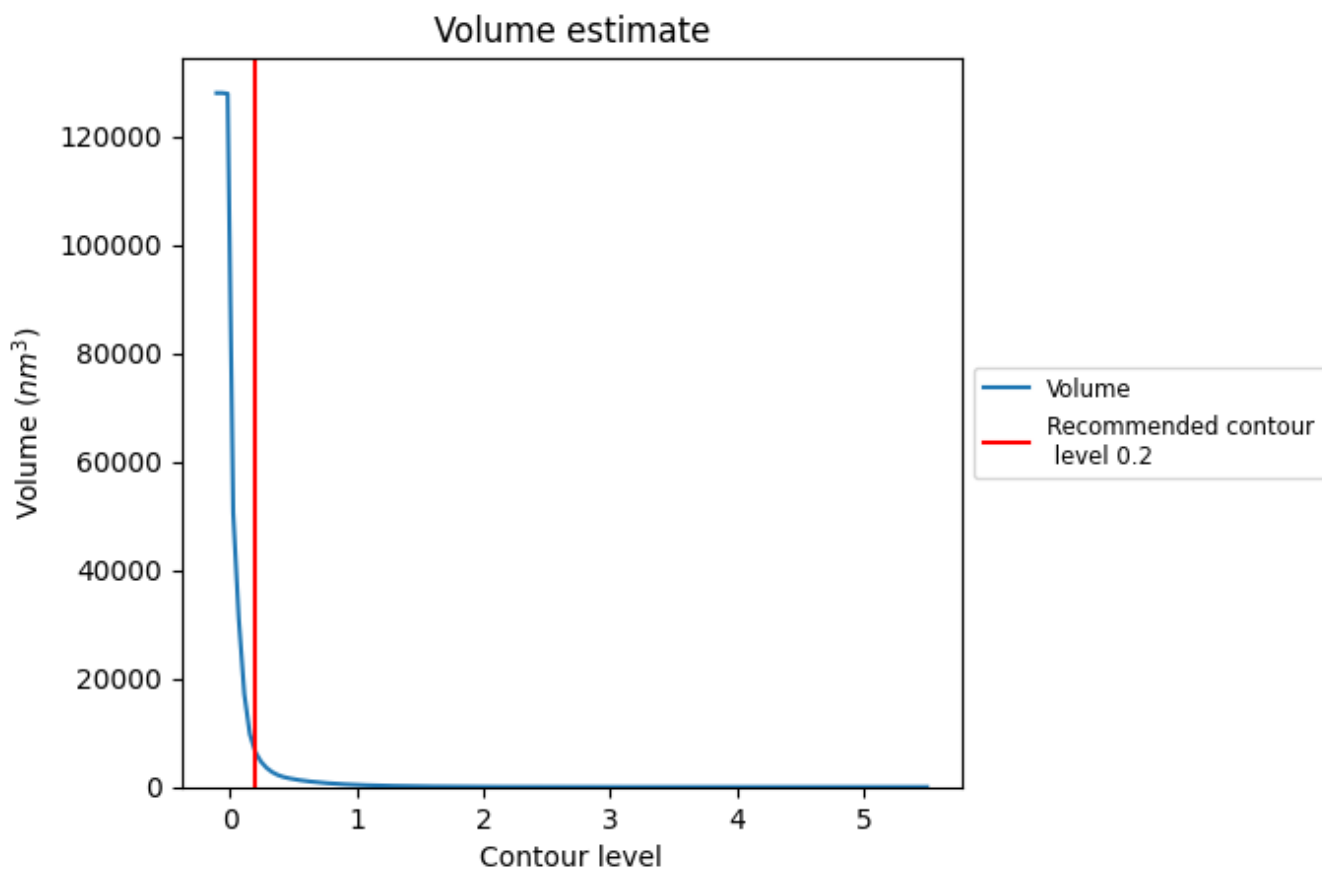
This section contains the results of statistical analysis of the map.

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.

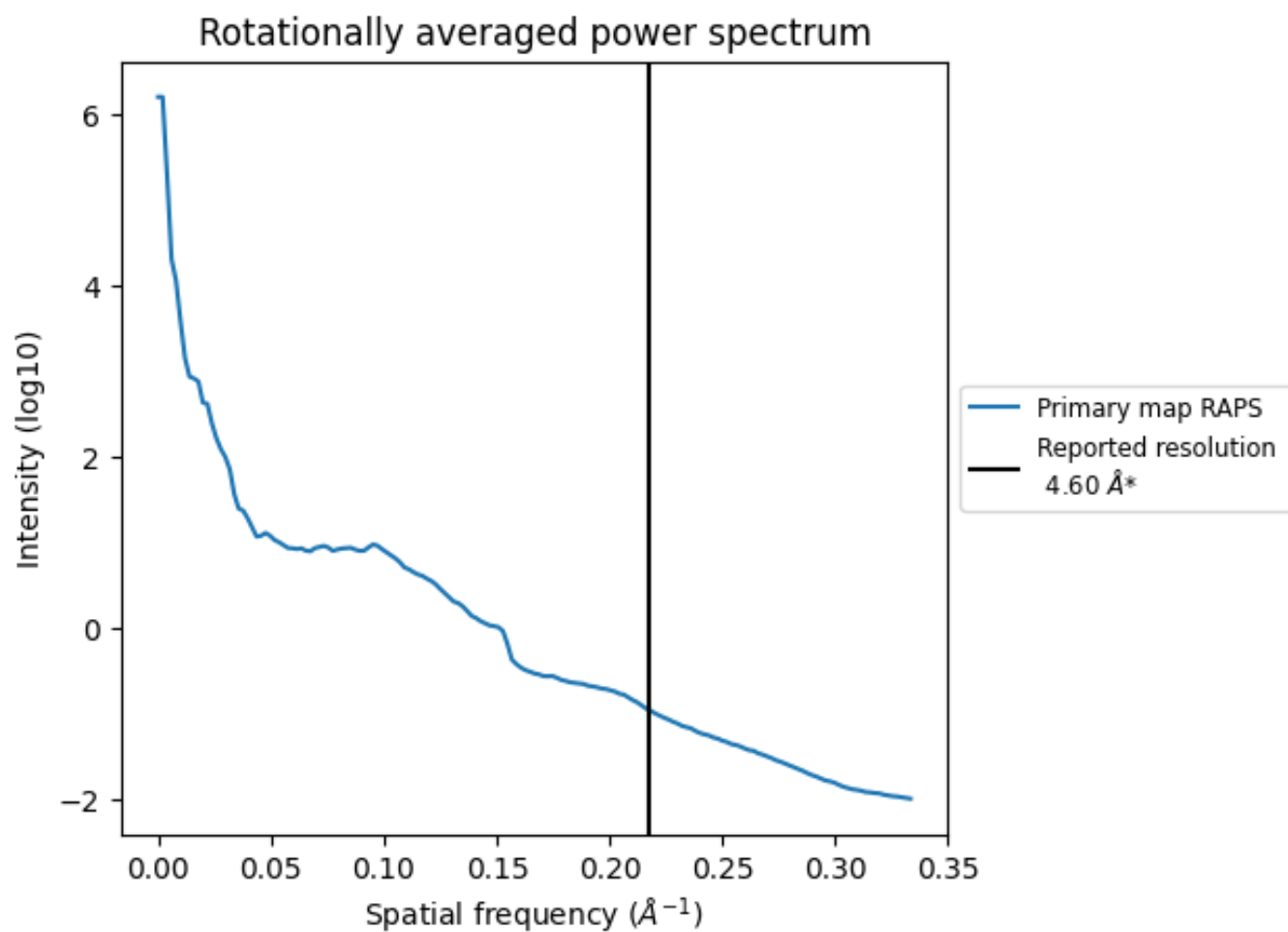
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 6569 nm^3 ; this corresponds to an approximate mass of 5934 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](#)

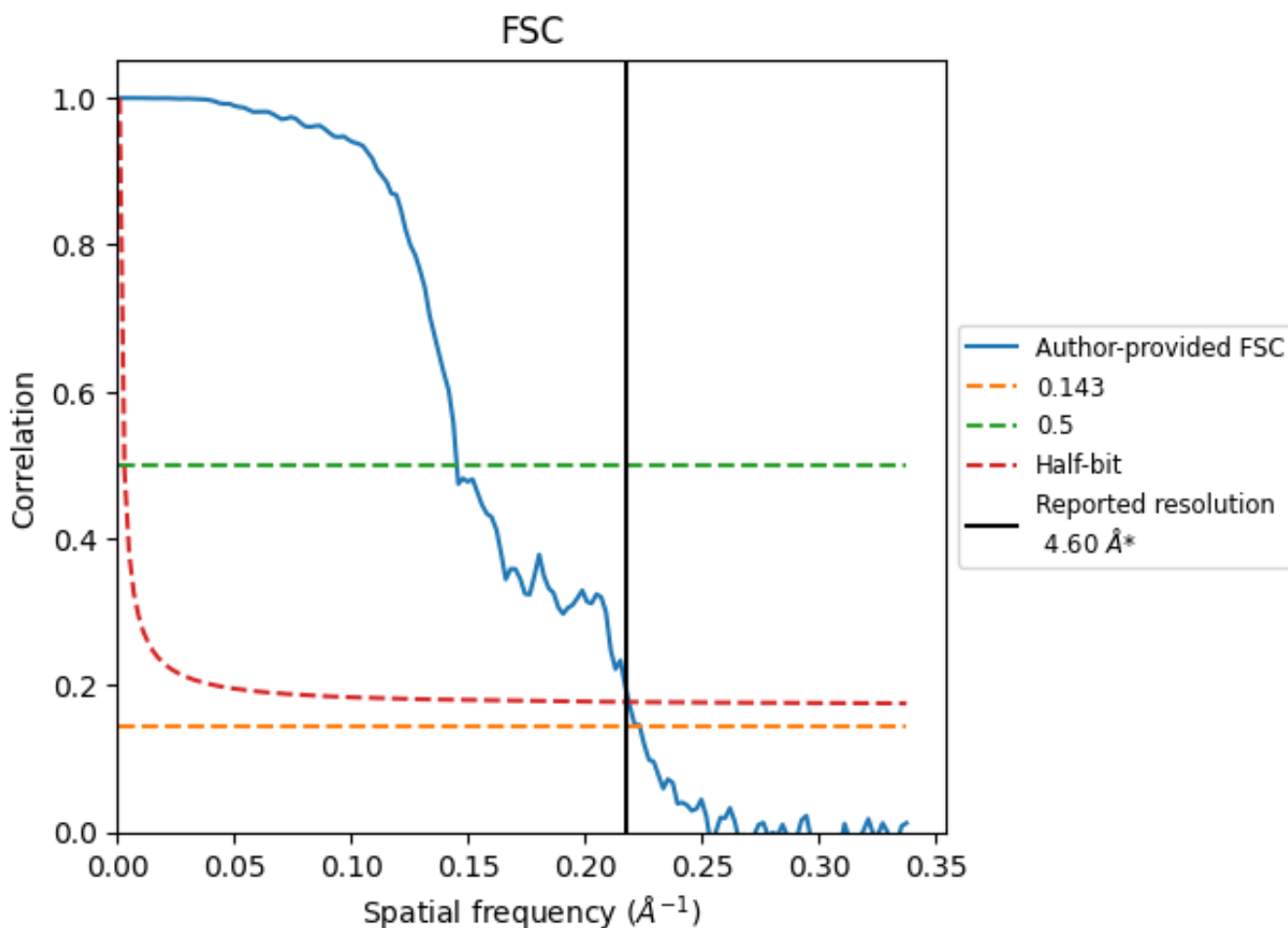


*Reported resolution corresponds to spatial frequency of 0.217 Å⁻¹

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 0.217 Å⁻¹

8.2 Resolution estimates [i](#)

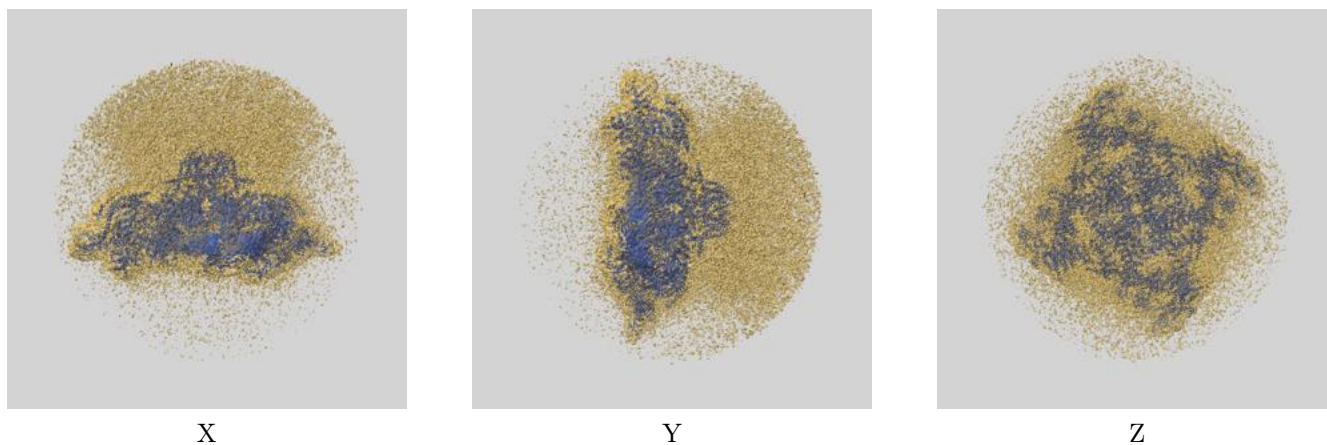
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.60	-	-
Author-provided FSC curve	4.48	6.89	4.57
Unmasked-calculated*	-	-	-

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

9 Map-model fit [i](#)

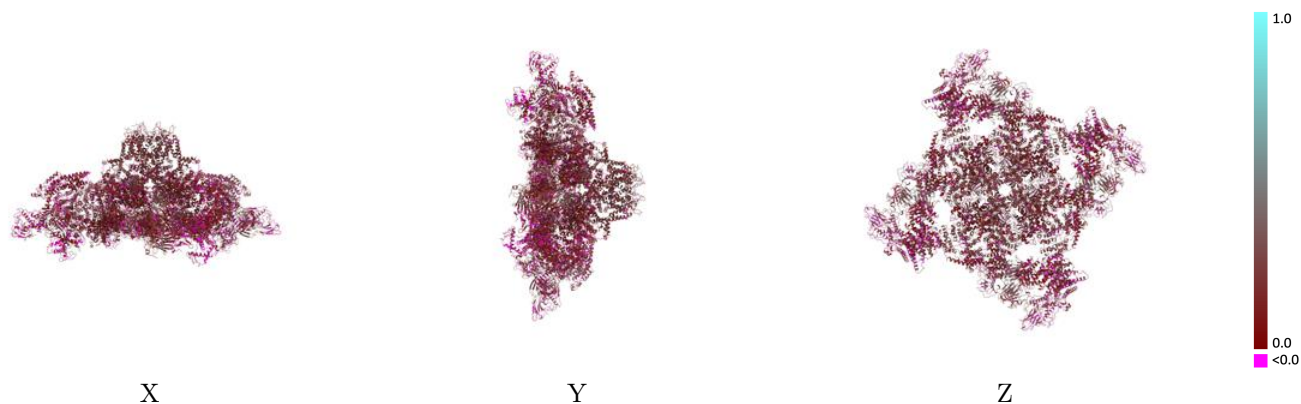
This section contains information regarding the fit between EMDB map EMD-19464 and PDB model 8RRT. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)



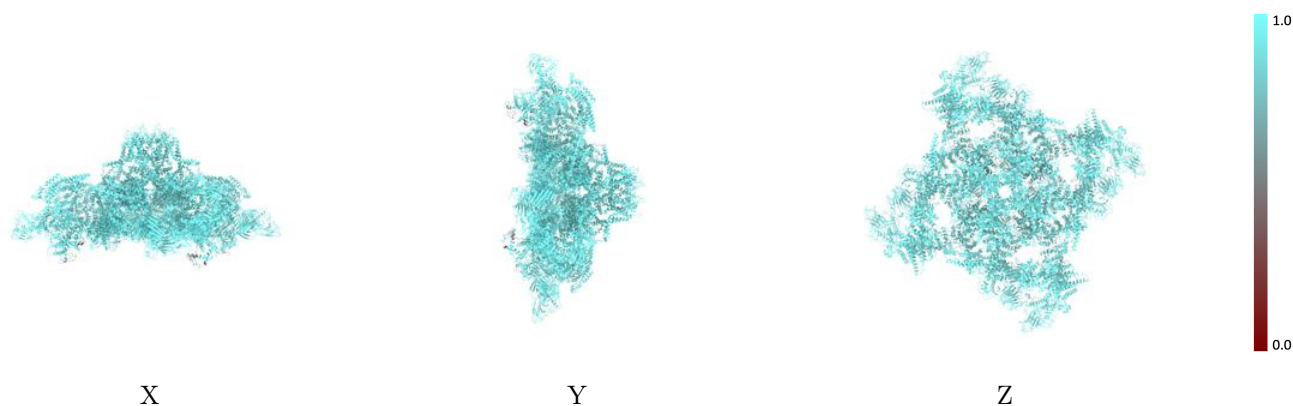
The images above show the 3D surface view of the map at the recommended contour level 0.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



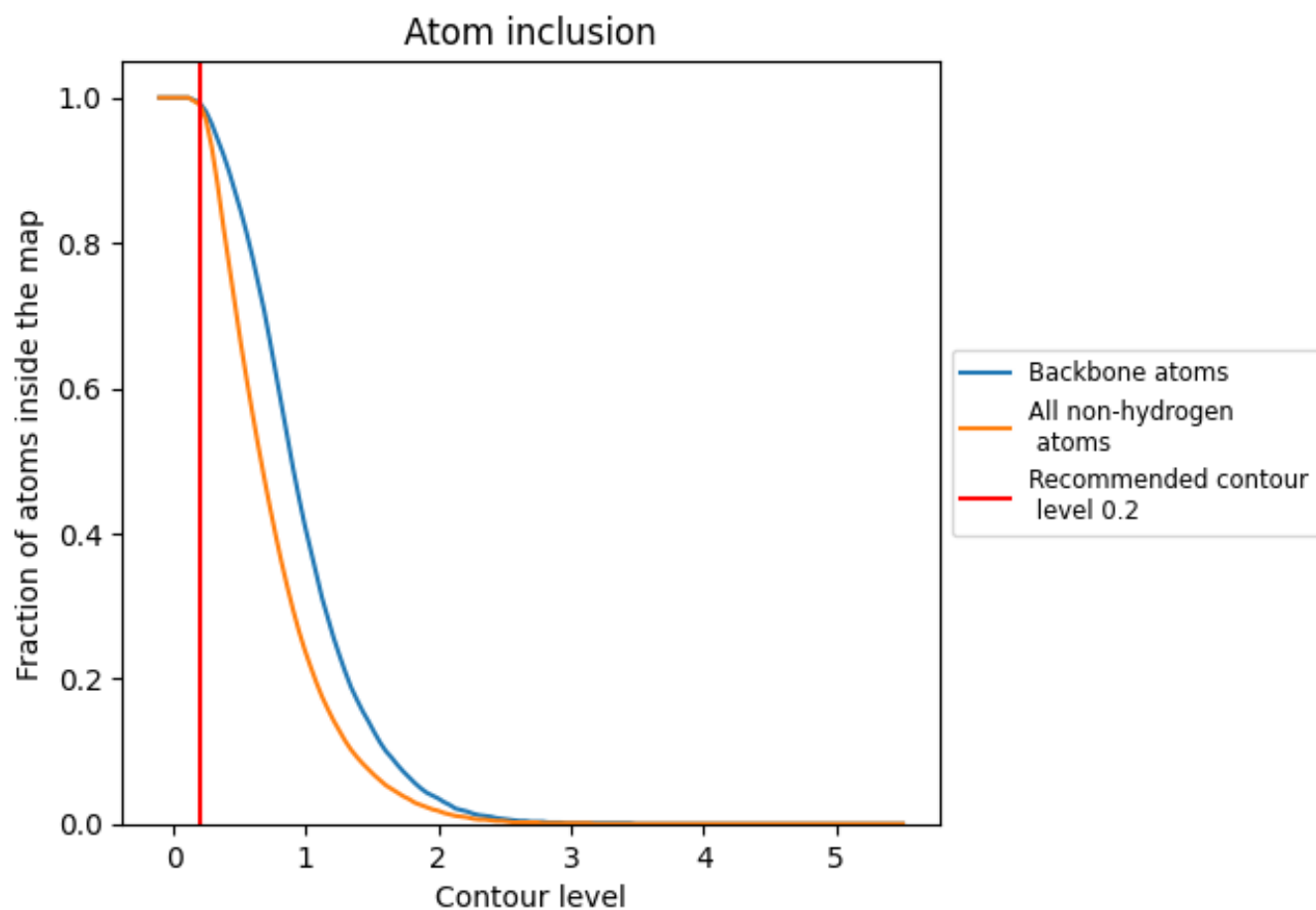
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.2).



























9.4 Atom inclusion [i](#)



At the recommended contour level, 99% of all backbone atoms, 99% 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 (0.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9900	 0.1540
A	 0.9980	 0.1450
B	 0.9910	 0.1570
C	 0.9680	 0.0830
D	 0.9980	 0.1380
E	 0.9910	 0.1560
F	 0.9680	 0.0820
G	 0.9910	 0.1570
H	 0.9980	 0.1350
I	 0.9980	 0.1380
J	 0.9910	 0.1560
K	 0.9680	 0.0800
M	 0.9670	 0.0810

