



# wwPDB EM Validation Summary Report ⓘ

Oct 1, 2024 – 03:39 pm BST

PDB ID : 8RRS  
EMDB ID : EMD-19463  
Title : Structure of mouse RyR2 solubilised in detergent in open state in complex with Ca<sup>2+</sup>, ATP, caffeine and Nb9657.  
Authors : Li, C.; Efremov, R.G.  
Deposited on : 2024-01-23  
Resolution : 3.40 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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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

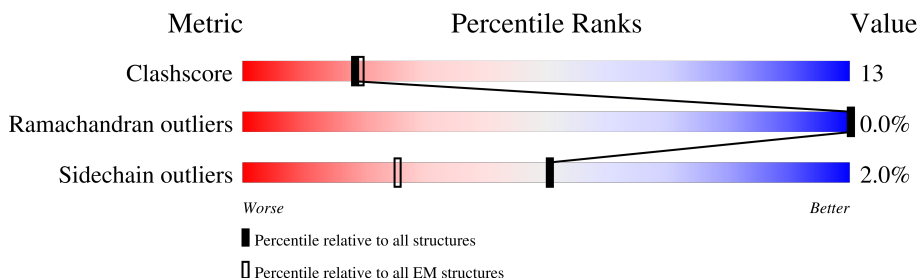
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.40 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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	4966	
1	C	4966	
1	E	4966	
1	F	4966	
2	B	137	
2	D	137	
2	G	137	
2	I	137	

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 136400 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 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	4142	Total	C	N	O	S	0	0
			33088	21113	5650	6106	219		
1	C	4142	Total	C	N	O	S	0	0
			33088	21113	5650	6106	219		
1	E	4142	Total	C	N	O	S	0	0
			33088	21113	5650	6106	219		
1	F	4142	Total	C	N	O	S	0	0
			33088	21113	5650	6106	219		

- Molecule 2 is a protein called Nanobody 9657.

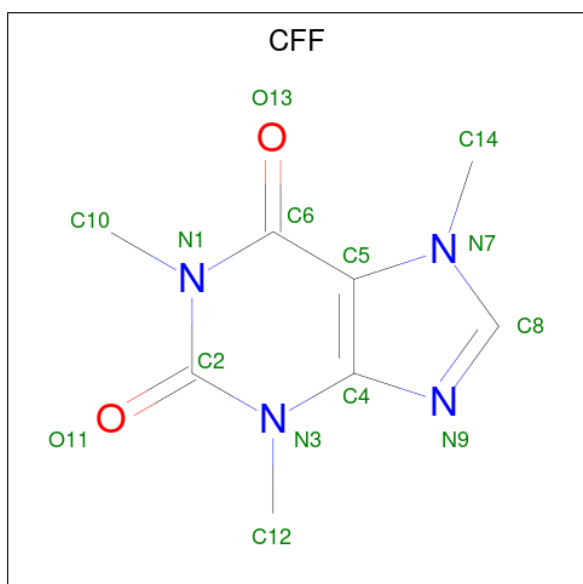
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	126	Total	C	N	O	S	0	0
			965	595	170	195	5		
2	D	126	Total	C	N	O	S	0	0
			965	595	170	195	5		
2	G	126	Total	C	N	O	S	0	0
			965	595	170	195	5		
2	I	126	Total	C	N	O	S	0	0
			965	595	170	195	5		

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



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

- Molecule 4 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
4	A	1	Total	C	N	O	0
			14	8	4	2	
4	C	1	Total	C	N	O	0
			14	8	4	2	
4	E	1	Total	C	N	O	0
			14	8	4	2	
4	F	1	Total	C	N	O	0
			14	8	4	2	

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

Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Zn	0
			1	1	
5	C	1	Total	Zn	0
			1	1	
5	E	1	Total	Zn	0
			1	1	
5	F	1	Total	Zn	0
			1	1	

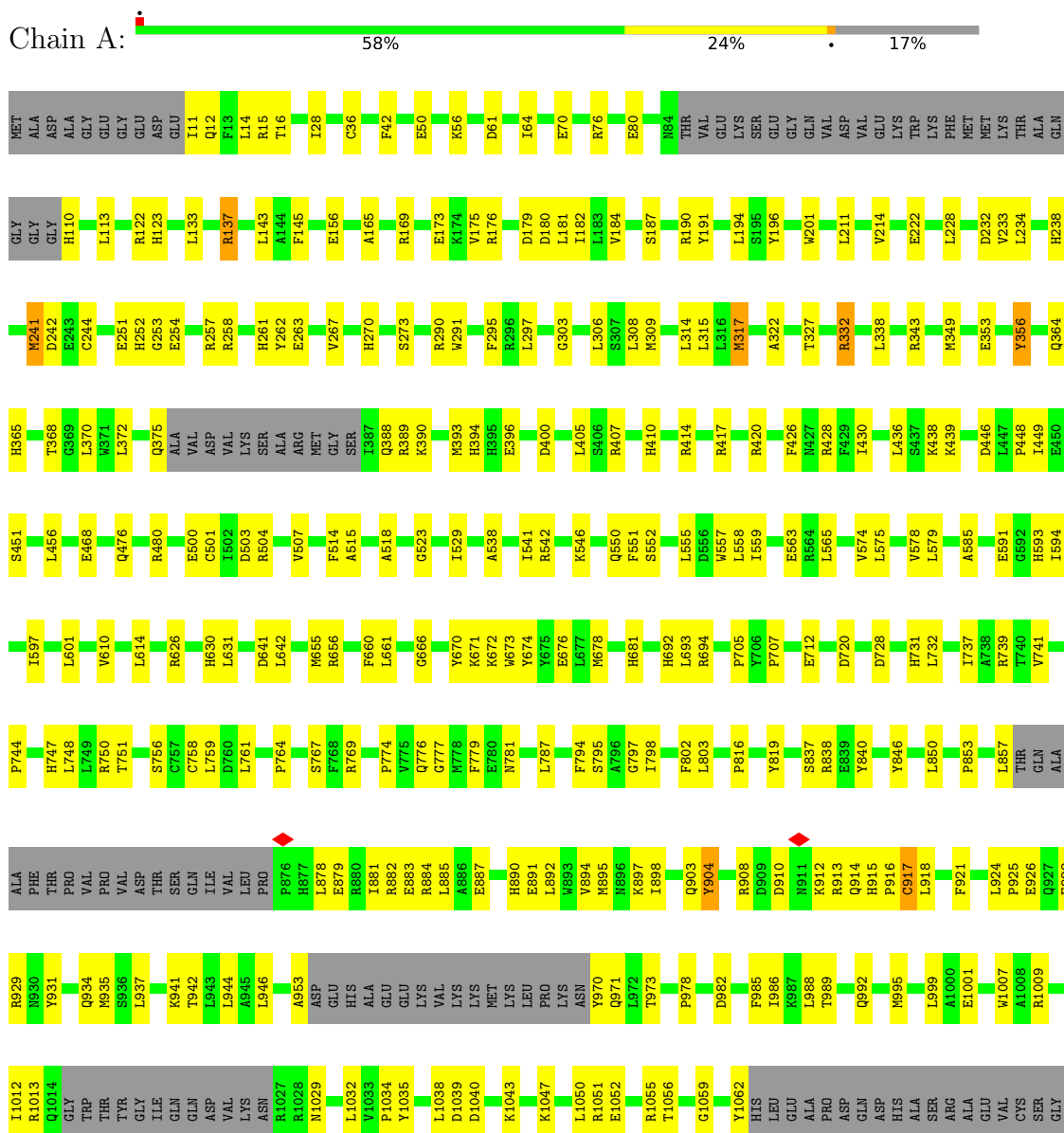
- Molecule 6 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		AltConf
6	A	1	Total	Ca	0
			1	1	
6	C	1	Total	Ca	0
			1	1	
6	E	1	Total	Ca	0
			1	1	
6	F	1	Total	Ca	0
			1	1	

### 3 Residue-property plots

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

#### • Molecule 1: Ryanodine receptor 2



Y2518	L2519	C2520	T2521	L2526	L2527	T2528	R2529	C2530	A2531	F2534	A2535	G2536	T2537	H2540	A2541	S2542	L2543	D2544	D2545	S2546	L2547	L2548	H2549	Y2552	R2553	L2554	S2555	R2556	T2551	Q2564	R2565	D2566	S2567	I2568	E2569	V2570	L2573	Q2578	L2579	R2580	P2581	S2582	M2583	Q2584	Q2585	H2586	L2587	L2588	L2591	V2592																													
P2442	THR	ILE	ALA	LYS	ASP	GLY	LYS	VAL	VAL	E2452	P2453	D2454	M2455	S2456	A2457	Q2458	F2459	C2460	H2463	K2464	M2467	D2472	R2473	V2474	Y2475	Q2480	D2481	F2482	L2483	L2484	H2485	L2486	V2489	G2490	F2491	R2496	A2497	A2498	A2499	S2500	C2501	L2501	D2502	T2503	L2506	S2507	Q2508	Q2509	A2512	A2513	A2514	L2515	M2516	R2517																									
L2079	L2098	L2099	M2083	L2086	R2089	Q2090	L2094	V2098	R2099	A2100	K2102	P2102	T2104	Y2105	S2121	R2132	M2133	L2145	M2149	F2154	P2158	N2159	L2160	M2161	L2164	G2165	M2166	V2175	K2184	R2184	S2189	K2190	M2191	A2193	R2197	Y2201	F2202	I2205	Q2210	Y2219	M2233	T2237	P2238	L2239	A2244	E2258	P2259	E2262	K2263	V2264	R2265	C2276	Q2277	M2278	L2279	W2289	R2296	F2300	L2301	R2302	M2317	V2320	R2321	R2325	R2326	F2330	L2342	L2343	M2346	E2347	E2348	A2349	K2351	L2352	L2353	I2354	E2354	D2355	R2358
P2361	THR	PRO	THR	SER	GLY	SER	THR	ASP	ILE	GLU	GLU	GLU	GLU	ASP	D2379	H2382	M2383	G2384	N2385	A2386	I2387	A2392	M2405	H2406	L2407	I2408	K2412	G2413	E2414	A2415	R2419	E2433	S2434	L2435	I2436	D2430	L2431	V2432	G2433	V2434	I2435	K2351	L2352	L2353	I2354	I2357	A2438	Q2439	M2441																														
L1840	K1841	H1842	L1843	L1844	Q1845	L1846	L1847	F1852	K1853	GLU	ALA	ALA	VAL	PRO	GLU	GLU	GLY	GLY	THR	ASN	ASP	C1776	D1786	K1789	T1961	K1791	M1795	K1801	E1802	L1805	R1808	D1809	P1810	V1811	T1814	T1815	E1816	F1817	L1818	P1821	Y1827	I1831	V1901	K1902	L1903	M1837	E1838	C1906																															
L1907	L1908	L1909	C1913	D1914	C1915	R1920	S1928	D1929	V1932	L1935	Q1939	R1942	S1953	A1954	L1955	L1956	R1959	K1960	T1961	R1962	R1965	S1966	P1967	P1968	Q1971	I1972	L1975	F1978	K1979	C1985	P1988	E1989	E1990	I1991	R1992	L1995	P1900	V1901	K1902	L1903	D2001	C2006																																					
G2007	I2008	LEU	ASP	GLU	ASP	SER	ASP	GLY	ASN	ASP	THR	ILE	ARG	GLY	ARG	LEU	LEU	SER	VAL	GLY	LEU	VAL	L2057	L2057	M2065	V2066	R2067	E2071	E2075	D2076																																																	
L2079	M2083	L2086	R2089	Q2090	L2094	V2098	R2099	A2100	K2102	P2102	T2104	Y2105	S2121	R2132	M2133	L2145	M2149	F2154	P2158	N2159	L2160	M2161	L2164	G2165	M2166	V2175	K2184	R2184	S2189	K2190	M2191	A2193	R2197	Y2201	F2202	I2205																																											
Q2210	Y2219	M2233	T2237	P2238	L2239	A2244	E2258	P2259	E2262	K2263	V2264	R2265	C2276	Q2277	M2278	L2279	W2289	R2296	F2300	L2301	R2302	M2317	V2320	R2321	R2325	R2326	F2330	L2342	L2343	M2346	E2347	E2348	A2349	K2351	L2352	L2353	I2354	E2354	D2355	R2358																																							
P2361	THR	PRO	THR	SER	GLY	SER	THR	ASP	ILE	GLU	GLU	GLU	GLU	ASP	D2379	H2382	M2383	G2384	N2385	A2386	I2387	A2392	M2405	H2406	L2407	I2408	K2412	G2413	E2414	A2415	R2419	E2433	S2434	L2435	I2436	D2430	L2431	V2432	G2433	V2434	I2435	K2351	L2352	L2353	I2354	I2357	A2438	Q2439	M2441																														
P2442	THR	ILE	ALA	LYS	ASP	GLY	LYS	VAL	VAL	E2452	P2453	D2454	M2455	S2456	A2457	Q2458	F2459	C2460	H2463	K2464	M2467	D2472	R2473	V2474	Y2475	Q2480	D2481	F2482	L2483	L2484	H2485	L2486	V2489	G2490	F2491	R2496	A2497	A2498	A2499	S2500	C2501	L2501	D2502	T2503	L2506	S2507	Q2508	Q2509	A2512	A2513	A2514	L2515	M2516	R2517																									
Y2518	L2519	C2520	T2521	L2526	L2527	T2528	R2529	C2530	A2531	F2534	A2535	G2536	T2537	H2540	A2541	S2542	L2543	D2544	D2545	S2546	L2547	L2548	H2549	Y2552	R2553	L2554	S2555	R2556	T2551	Q2564	R2565	D2566	S2567	I2568	E2569	V2570	L2573	Q2578	L2579	R2580	P2581	S2582	M2583	Q2584	Q2585	H2586	L2587	L2588	L2591	V2592																													

M2604	L2761	L2762	S2763	L2925	Q2926	K2765	E2766	E2768	R2771	I2774	L2778	M2781	V2784	L2785	K2786	TRP	ARG	ILE	GLU	ARG	THR	THR	ILE	THR	P2713	E2714	K2715	L2716	Y2723	S2727	W2731	S2732	K2735	N2738	G2739	W2740	I2741	G2742	G2743	G2673	A2674	L2675	P2676	P2677	M2680	GLU	SER	ASN	TVR	VAL	SER	MET	GLU							
S2823	F2824	L2825	Q2926	Q2927	L2928	R2929	K2930	Y2931	Y2932	L2836	M2839	W2851	A2852	K2855	K2856	L2857	E2858	L2859	E2860	S2861	K2862	G2863	G2864	G2865	N2866	H2867	Q2868	L2869	T2877	A2878	K2881	Q2889	D2890	L2891	F2892	K2893	G2905	PHE	LYS	ASP	LEU	LEU	ASP	ALA	ALA	ASP	HIS	GLY	TVR	SER	PRO	PRO	SER	ARG	I2916	E2917	K2918	R2919	Y2922	
S3096	T3097	S3105	F3108	F3109	H3110	F3116	G3117	L3120	I3121	L3122	E3123	D3124	N3030	C3031	L3032	H3033	I3034	T3038	F2961	F2962	V2965	V2965	L2967	I2970	D2971	Q2972	Y2973	F2974	H2977	R2978	L2979	Y2980	F2981	S2982	ALA	ALA	SER	ARG	PRO	CYS	THR	THR	GLY	HIS	ALA	S2996	N2997	K2998	E2999	K3000	E3001									
E3211	K3212	K3213	M3214	I3217	L3220	L3225	R3226	M3233	M3234	E3235	V3236	V3237	L3238	P3239	M3240	L3241	Y3244	K3245	S3246	N3247	N3248	M3249	E3250	E3254	N3255	H3256	K3262	H3271	M3272	N3273	T3274	L3275	L3276	I3279	L3280	K3281	L3282	L3283	M3286	L3287	G3288	D3289	D3290	E3291	G3292	A3293	M3294	K3295												
L3298	F3301	S3302	Q3303	I3306	N3307	K3308	V3309	K3310	L3313	L3314	K3315	T3316	E3390	A3391	E3392	E3393	L3394	F3395	R3396	N3397	V3398	A3399	E3400	V3401	S3428	F3429	L3430	K3435	S3436	S3439	M3440	I3443	E3447	K3450	K3454	R3457	L3618	V3555	T3557	P3540	V3547	E3548	R3549	V3550	L3551	G3552	I3553	A3554	R3555	V3556	L3557	I3465	V3466	H3559						
K3470	R3471	L3472	L3473	P3474	I3475	I3479	C3480	A3481	P3482	G3483	D3484	Q3485	E3486	L3487	I3488	A3489	L3490	R3505	I3508	I3512	G3516	K3517	L3518	A3522	W3525	Q3526	M3527	Y3530	L3533	P3534	N3535	R3536	T3537	P3540	V3547	E3548	R3549	V3550	L3551	G3552	I3553	A3554	R3555	V3556	L3557	I3465	V3466	H3559												
S3564	LYS	THR	GLY	ARG	GLY	TYR	PHE	SER	LEU	VAL	GLU	HIS	ASP	GLU	ALA	GLN	ARG	LYS	ALA	TRP	HIS	LEU	LEU	LEU	SER	LYS	GLN	ARG	LYS	ARG	ARG	ALA	VAL	VAL	VAL	ALA	CYS	PHE	ASP	ARG	MET	ALA	ALA	PRO	LEU	LEU	TYR	ASN	LEU	P3611	R3612	H3613	R3614	A3615	V3616	M3617	F3618	L3619	L3620	Y3623
W3627	E3636	K3637	D3638	G3647	A3648	E3649	PRO	GLU	GLU	ASP	GLU	GLU	ASP	ALA	MET	K3658	R3659	V3660	H3664	E3677	D3684	M3688	I3693	K3696	S3697	C3698	H3699	ASP	GLU	GLU	ASP	ASP	GLY	GLU	GLU	GLU	VAL	LYS	S3712	E3717	Q3721	Q3727	R3729	L3730	H3731	D3732														

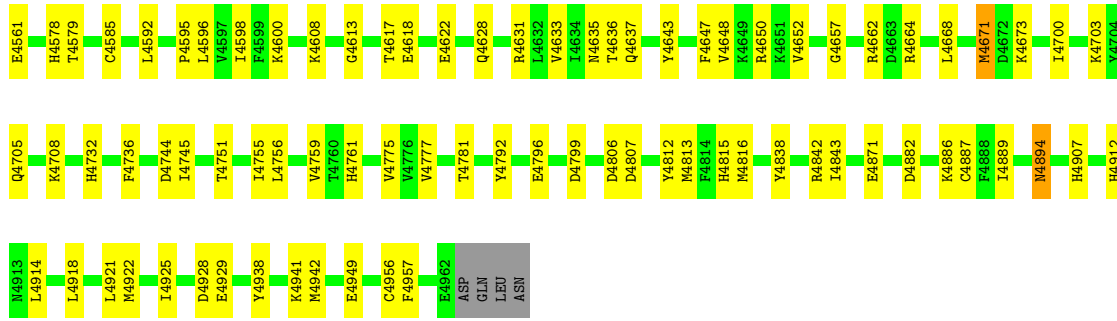




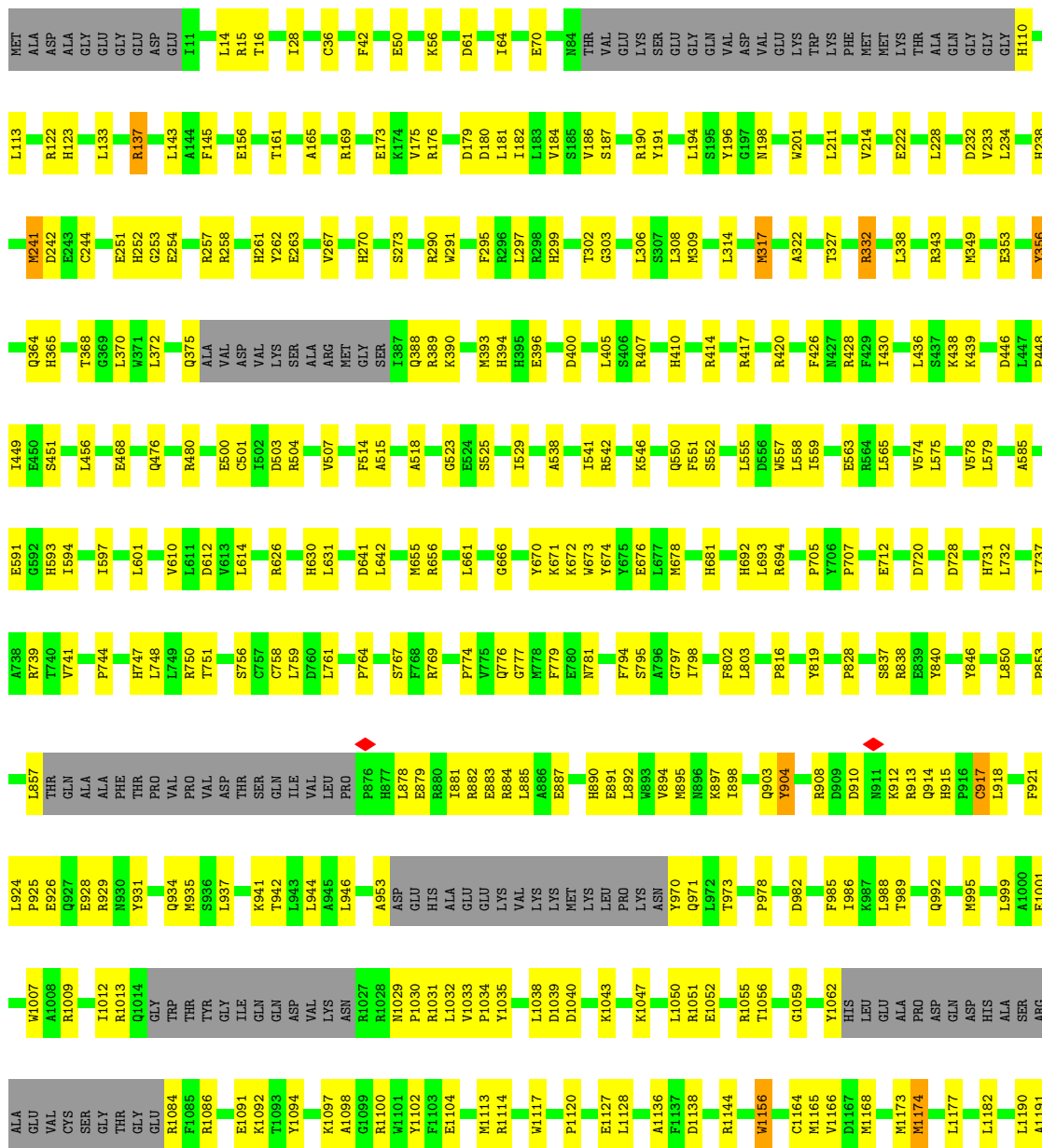


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E3123	V3029	D2943	L2857	G2620	G2536	K2262	V2088	SER	G2620	G2536	K2262	V2088	SER	V1932
D3124	N3030	K2949	L2857	L2622	G2537	A2457	L2101	ASN	L2622	G2537	A2457	L2101	ASN	L1935
V3125	C3031	G2950	E2858	Q2625	H2540	F2453	T2104	ASP	Q2625	H2540	F2453	T2104	ASP	Q1939
Q3126	L3032	G2950	L2859	G2825	A2941	C2460	Y2105	ILE	G2825	A2941	C2460	Y2105	ILE	R1942
C3129	H3033	Y2955	L2859	F2629	S2542	H2382	S2121	GLU	F2629	S2542	H2382	S2121	GLU	S1953
H3033	L3034	Y2961	E2860	H2638	L2543	H2463	M2145	GLY	H2638	L2543	H2463	M2145	GLY	A1955
L3034	L3035	F2961	S2861	H2638	L2544	K2464	M2149	ARG	H2638	L2544	K2464	M2149	ARG	L1956
S3135	T3038	F2962	K2862	R2641	D2546	M2467	V2131	LEU	R2641	D2546	M2467	V2131	LEU	R1965
Y3146	L3039	V2965	G2863	K2842	L2547	D2472	R2133	SER	K2842	L2547	D2472	R2133	SER	P1967
V3147	D3040	V2966	G2864	L2643	H2549	D2472	M2159	LEU	L2643	H2549	D2472	M2159	LEU	P1968
R3151	R3042	L2967	G2866	L2643	H2549	D2472	L2160	LEU	L2643	H2549	D2472	L2160	LEU	Q1971
G3155	T3043	L2970	H2867	I2647	Y2552	Y2475	M2161	ALA	I2647	Y2552	Y2475	M2161	ALA	L1972
K3046	D2971	D2971	F2868	E2657	R2553	H2406	L2145	GLY	E2657	R2553	H2406	L2145	GLY	F1978
T3047	Q2972	Q2972	L2869	Q2858	L2554	H2406	L2145	GLY	Q2858	L2554	H2406	L2145	GLY	K1979
G3048	Y2973	Y2973	T2877	E2859	R2555	H2407	L2145	VAL	E2859	R2555	H2407	L2145	VAL	C1985
L3049	F2974	F2974	A2878	F2660	K2556	L2407	L2166	VAL	F2660	K2556	L2407	L2166	VAL	P1988
D3050	H2977	H2977	K2881	F2661	K2556	L2407	L2166	VAL	F2661	K2556	L2407	L2166	VAL	E1989
S3051	R2978	R2978	Q2881	K2662	T2561	E2414	L2166	VAL	K2662	T2561	E2414	L2166	VAL	E1990
V3052	L2978	L2978	Q2881	S2869	Q2584	H2485	L2166	VAL	Q2869	Q2584	H2485	L2166	VAL	R1992
K3053	R2979	R2979	Q2881	A2870	R2585	L2486	L2166	VAL	A2870	R2585	L2486	L2166	VAL	L1995
R3057	Y2980	Y2980	D2889	V2870	L2573	V2489	L2166	VAL	V2870	L2573	V2489	L2166	VAL	F1998
E3065	F2981	F2981	D2890	V2871	L2573	V2489	L2166	VAL	D2890	V2871	L2573	V2489	VAL	K1979
S3069	Q2982	Q2982	L2891	Q2672	S2567	G2490	L2166	VAL	Q2672	S2567	G2490	L2166	VAL	C1985
K3069	R2983	R2983	K2893	Q2673	G2568	G2490	L2166	VAL	Q2673	G2568	G2490	L2166	VAL	P1988
T3070	ALA	ALA	G2905	A2674	V2570	E2414	L2166	VAL	A2674	V2570	E2414	L2166	VAL	E1989
R3071	ALA	ALA	G2905	L2875	P2570	H2485	L2166	VAL	L2875	P2570	H2485	L2166	VAL	E1990
L3074	ALA	ALA	G2905	P2576	M2680	E2414	L2166	VAL	P2576	M2680	E2414	L2166	VAL	R1992
Q3078	SER	SER	G2905	M2680	GLU	V2489	L2166	VAL	M2680	GLU	V2489	L2166	VAL	L1995
R3083	ARG	ARG	G2905	V2871	L2573	V2489	L2166	VAL	V2871	L2573	V2489	L2166	VAL	F1998
S3084	ARG	ARG	G2905	D2748	L2573	V2489	L2166	VAL	D2748	L2573	V2489	L2166	VAL	K1979
Q3085	ARG	ARG	G2905	S2750	R2580	D2502	L2166	VAL	S2750	R2580	D2502	L2166	VAL	C1985
V3089	ALA	ALA	G2905	E2744	V2570	H2485	L2166	VAL	E2744	V2570	H2485	L2166	VAL	P1988
I3093	ALA	ALA	G2905	L2745	V2570	H2485	L2166	VAL	L2745	V2570	H2485	L2166	VAL	E1989
N3094	ALA	ALA	G2905	L2746	V2570	H2485	L2166	VAL	L2746	V2570	H2485	L2166	VAL	E1990
Y3095	ALA	ALA	G2905	L2746	V2570	H2485	L2166	VAL	L2746	V2570	H2485	L2166	VAL	R1992
T3097	ALA	ALA	G2905	L2755	V2570	H2485	L2166	VAL	L2755	V2570	H2485	L2166	VAL	L1995
F3108	ALA	ALA	G2905	L2756	V2570	H2485	L2166	VAL	L2756	V2570	H2485	L2166	VAL	F1998
H3110	ALA	ALA	G2905	L2756	V2570	H2485	L2166	VAL	L2756	V2570	H2485	L2166	VAL	K1979
F3116	ALA	ALA	G2905	L2761	V2570	H2485	L2166	VAL	L2761	V2570	H2485	L2166	VAL	C1985
G3117	ALA	ALA	G2905	L2762	V2570	H2485	L2166	VAL	L2762	V2570	H2485	L2166	VAL	P1988
R3017	ALA	ALA	G2905	L2762	V2570	H2485	L2166	VAL	L2762	V2570	H2485	L2166	VAL	E1989
I3018	ALA	ALA	G2905	L2763	V2570	H2485	L2166	VAL	L2763	V2570	H2485	L2166	VAL	E1990
M3200	ALA	ALA	G2905	E2764	V2570	H2485	L2166	VAL	E2764	V2570	H2485	L2166	VAL	R1992
N2997	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	L1995
K2998	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	F1998
E2999	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	K1979
K3000	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	C1985
M3002	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	P1988
L3006	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	E1989
F3007	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	E1990
L3010	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	R1992
V3013	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	L1995
V3014	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	F1998
R3017	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	K1979
I3018	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	C1985
E3201	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	P1988
D3202	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	E1989
V3203	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	E1990
P3208	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	R1992
E3211	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	L1995
K3212	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	F1998
L3213	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	K1979
M3214	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	C1985
I3217	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	P1988
L3220	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	E1989
I3225	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	E1990
R3226	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	R1992
M3233	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2766	V2570	H2485	L2166	VAL	L1995
E2066	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2066	V2570	H2485	L2166	VAL	F1998
L2057	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	L2057	V2570	H2485	L2166	VAL	K1979
M2065	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	M2065	V2570	H2485	L2166	VAL	C1985
R2067	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	R2067	V2570	H2485	L2166	VAL	P1988
E2071	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2071	V2570	H2485	L2166	VAL	E1989
E2075	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2075	V2570	H2485	L2166	VAL	E1990
D2076	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	D2076	V2570	H2485	L2166	VAL	R1992
L2079	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	L2079	V2570	H2485	L2166	VAL	L1995
M2083	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	M2083	V2570	H2485	L2166	VAL	F1998
L2086	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	L2086	V2570	H2485	L2166	VAL	K1979
R2089	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	R2089	V2570	H2485	L2166	VAL	C1985
Q2090	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	Q2090	V2570	H2485	L2166	VAL	P1988
E2452	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	E2452	V2570	H2485	L2166	VAL	E1989
P2341	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	P2341	V2570	H2485	L2166	VAL	E1990
PRO	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	PRO	V2570	H2485	L2166	VAL	R1992
THR	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	THR	V2570	H2485	L2166	VAL	L1995
ILE	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	ILE	V2570	H2485	L2166	VAL	F1998
ALA	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	ALA	V2570	H2485	L2166	VAL	K1979
LYS	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	LYS	V2570	H2485	L2166	VAL	C1985
ASP	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	ASP	V2570	H2485	L2166	VAL	P1988
THR	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	THR	V2570	H2485	L2166	VAL	E1989
PRO	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	PRO	V2570	H2485	L2166	VAL	E1990
THR	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	THR	V2570	H2485	L2166	VAL	R1992
ILE	ALA	ALA	G2905	E2766	V2570	H2485	L2166	VAL	ILE	V2570	H2485	L2166	VAL	L1995
ALA	ALA	ALA	G2905	E2766										



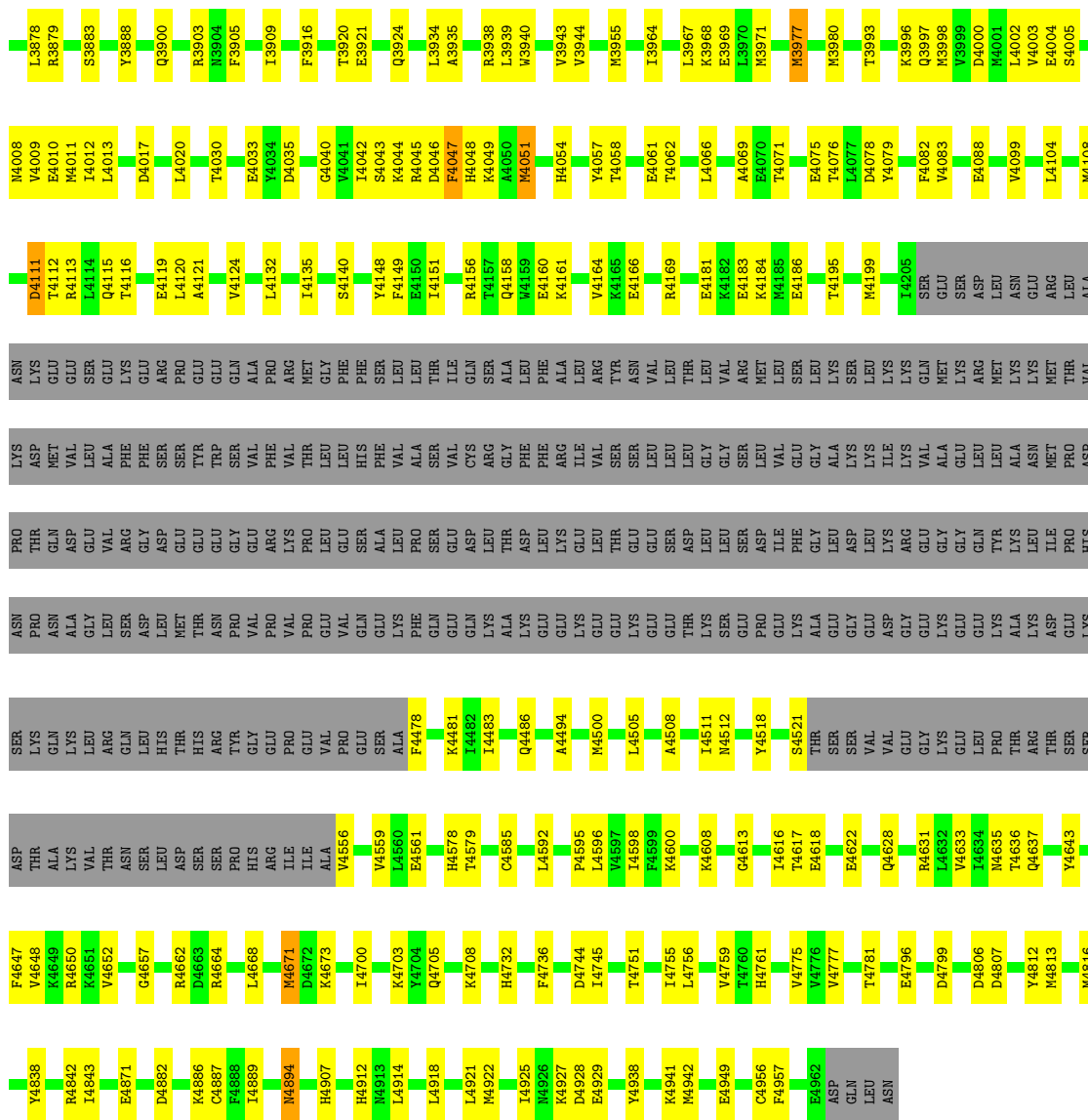


• Molecule 1: Ryanodine receptor 2

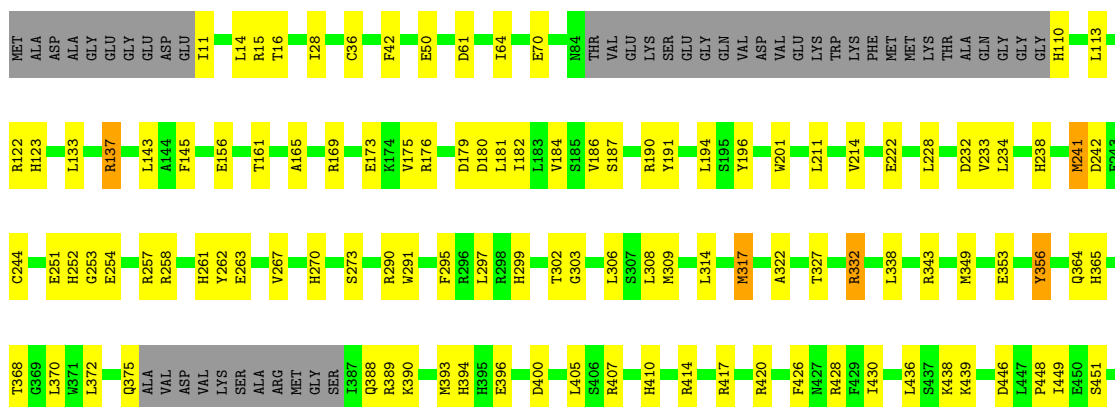


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D2430	L2431	V2432	G2433	V2434	L2435	S2436	I2437	A2438	L2439	L2440	M2441	P2442	THR	ILE	PRO	ALA	LYS	ASP	GLY	LYS	VAL	VAL	E2452	P2453	D2454	M2455	S2456	A2457	G2458	F2459	V2460	H2463	K2464	M2467	D2472	R2473	V2474	Y2475	Q2480	D2481	F2482	L2483	L2484	H2485	L2486	V2489	G2490	F2491	R2496	L2497	A2498	A2499	L2501			
R2502	T2503	L2506	S2507	A2512	L2513	L2514	L2515	L2516	R2517	L2518	L2519	C2520	T2521	L2526	L2527	T2528	R2529	C2530	A2531	F2534	A2535	G2536	T2537	H2540	A2541	S2542	L2543	L2544	D2545	S2546	L2547	L2548	H2549	Y2552	R2553	L2554	S2555	K2556	T2561	Q2564	L2565	R2566	S2567	L2568	E2569	V2570	L2573	Q2578	L2579							
L2343	M2346	K2350	L2351	L2352	A2353	D2354	D2355	R2358	F2361	SER	PRO	THR	LYS	THR	GLY	SER	SER	LYS	VAL	VAL	E2452	P2453	D2454	M2455	S2456	A2457	G2458	F2459	V2460	H2463	K2464	M2467	D2472	R2473	V2474	Y2475	Q2480	D2481	F2482	L2483	L2484	H2485	L2486	V2489	G2490	F2491	R2496	L2497	A2498	A2499	L2501					
R2067	E2071	E2075	D2076	L2079	M2083	L2086	R2089	Q2090	I2094	V2098	R2099	A2100	L2101	P2102	K2103	T2104	Y2105	S2121	L2125	V2131	R2132	M2133	Q2276	Q2277	M2278	L2279	Y2284	W2289	N2290	R2296	F2300	L2301	R2302	N2317	V2320	R2321	R2325	R2326	F2330	M2343	M2346	M2349	F2154	P2158	N2159	M2161	L2164	G2165	M2166	V2175	K2184	P2189	M2190	R2191	V2192	
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F1988	H1989	E2000	D2001	C2006	G2007	L2008	GLU	LEU	LEU	ASP	GLU	ASP	GLY	SER	LEU	LEU	GLY	LEU	GLY	LEU	LEU	LEU	LEU	LEU	VAL	GLU	LEU	LYS	L2160	VAL	ALA	PHO	VAL	ALA	SER	ASP	SER	ARG	PRO	LYS	CYS	LYS	G2056	L2057	M2065	V2066										
V1901	K1902	L1903	Q1904	M1905	L1906	L1907	L1908	L1909	C1913	D1914	C1915	R1920	S1928	D1929	V1932	L1935	Q1939	R1942	S1953	A1954	L1955	L1956	R1959	K1960	T1961	R1962	R1965	S1966	P1967	P1968	Q1971	I1972	L1975	F1978	K1979	C1985	P1988	E1989	E1990	I1991	R1992	L1995	E1999	P1900												
I1831	I1834	M1837	L1840	H1842	H1844	L1844	Q1845	L1846	I1847	F1852	K1853	ALA	ALA	VAL	PRO	GLU	GLY	VAL	GLY	THR	PRO	LEU	LYS	GLU	ILE	GLY	R1959	K1960	T1961	R1962	R1965	S1966	P1967	P1968	Q1971	I1972	L1975	F1978	K1979	C1985	P1988	E1989	E1990	I1991	R1992	L1995	E1999	P1900								
S1713	M1722	V1727	I1728	P1729	E1733	L1739	P1750	L1754	R1758	L1759	M1762	P1767	SER	PHE	VAL	SER	ILE	THR	ASN	ASP	C1776	D1786	K1789	A1790	K1791	M1795	K1801	E1802	L1805	R1808	D1809	V1810	V1811	L1814	T1815	F1816	L1818	P1821	D1705	L1706	L1707	I1708	D1709	I1710	Y1827											
I1561	K1562	M1563	H1576	K1577	P1583	P1584	P1585	H1588	V1589	Q1590	V1595	M1602	V1609	S1610	R1611	G1617	V1620	Q1621	C1622	L1623	E1636	H1637	R1638	D1641	E1644	E1649	H1657	C1666	L1677	V1691	L1686	Y1689	Y1704	D1705	L1706	L1707	I1708	D1709	I1710	Y1827																
Y1428	S1429	R1431	Q1436	E1437	F1438	M1439	M1440	G1444	V1445	H1451	D1458	L1459	D1460	R1461	T1466	V1467	T1468	L1469	G1470	D1471	H1477	L1480	R1481	S1482	N1484	C1485	Y1486	M1487	M1494	E1507	C1510	S1516	Q1533	Y1534	E1535	T1538	V1553	F1554	E1557	R1560																
F1192	Q1293	M1294	N1295	R1303	L1304	S1305	C1310	S1315	LYS	SER	VAL	ALA	GLY	LYS	PRO	GLY	LEU	PRO	GLY	ALA	GLN	LYS	GLN	PHE	TYR	GLY	PRO	L1251	R1254	Q1257	F1258	P1262	H1265	E1266	H1267	I1268	E1269	R1272	L1273	D1274	GLY	THR	THR	ILE	ASP	SER	SER	PRO	CYS	LEU	ARG	ILE	V1285	T1286	Q1287	F1290

E3717	R3614	E3548	R3448	I3384	I3283	R3186	R3169	L3074	PRO	ASP	SER	S2749	K2680
A3615	A3615	R3549	F3449	L3361	N3286	T3185	T3185	L3074	LEU	LEU	ILE	S2750	GLU
V3616	V3616	V3550	K3450	L3362	L3287	R3186	R3186	Q3078	CYS	ASP	ASP	K2751	ASP
Q3727	L3618	G3552	K3454	D3363	G3288	A3362	A3362	Q3083	THR	LEU	ALA	K2752	ALA
F3729	F3619	G3553	R3457	D3364	I3289	R3363	R3363	S3084	GLY	THR	HIS	Q2753	ASN
L3730	L3620	V3556	R3457	L3365	R3291	L3289	L3289	Q3085	PRO	PRO	GLY	P2754	VAL
H3731	Y3623	L3557	F3463	F3368	E3292	F3368	F3368	Q3085	ALA	SER	TYR	L2755	VAL
R3733	W3627	S3564	L3464	Y3369	G3292	Y3369	Y3369	V3089	PRO	PRO	PRO	M2756	SER
A3736	E3636	LYS	V3466	L3372	M3295	L3372	L3372	I3093	LYS	LYS	LYS	L2756	LYS
I3764	A3644	THR	K3470	V3376	L3298	V3376	V3376	R3094	THR	THR	THR	L2761	SER
N3769	G3647	GLY	R3471	D3377	F3301	D3377	D3377	T3096	ARG	ARG	SER	L2762	SER
F3772	A3648	ARG	L3472	Y3378	R3302	R3378	R3378	T3097	GLY	GLY	MET	S2763	MET
K3775	F3649	TVR	F3474	R3380	Q3303	F3474	F3474	S3105	GLY	ASN	SER	E2764	SER
M3776	F3649	PHE	I3475	A3381	Q3303	I3475	I3475	F3108	THR	THR	THR	K2765	SER
L3802	LEU	SER	I3475	K3382	I3306	I3475	I3475	F3109	LEU	LEU	THR	E2766	GLY
N3805	PRO	LEU	I3479	W3383	R3307	I3479	I3479	E3109	SER	SER	LEU	K2767	GLY
R3809	GLU	THR	C3480	L3384	K3308	C3480	C3480	H3110	VAL	VAL	ASN	K2768	ASN
Q3810	GLU	ARG	A3481	K3385	K3309	A3481	A3481	H3110	GLU	GLU	ASN	I2769	PHE
N3811	ASP	HIS	F3482	E3386	K3310	F3482	F3482	F3116	ASP	ASP	ASN	Y2770	ASN
E3814	ALA	PRO	G3483	F3387	K3310	G3483	G3483	G3117	PRO	PRO	PRO	R2771	GLN
M3818	ALA	GLN	D3484	N3388	L3313	D3484	D3484	G3117	GLN	GLN	PRO	I2774	PRO
V3828	MET	ARG	Q3485	F3389	L3314	Q3485	Q3485	L3120	VAL	VAL	VAL	K2775	VAL
D3831	SER	SER	K3486	E3390	K3315	K3486	K3486	I3121	ASP	ASP	ASP	K2781	ASP
D3832	LYS	LYS	L3487	A3391	T3316	L3487	L3487	I3122	THR	THR	THR	L2778	THR
F3834	V3660	LYS	I3488	E3392	R3317	I3488	I3488	E3123	THR	THR	THR	L2781	THR
R3840	L3663	ALA	A3489	E3393	F3236	A3489	A3489	D3124	ASN	ASN	ASN	M2781	ASN
Q3843	H3664	VAL	L3490	L3394	L3319	L3490	L3490	Q3126	ILE	ILE	ILE	W2784	ILE
L3844	F3677	TRP	R3505	F3395	F3320	R3505	R3505	Q3126	TRP	TRP	TRP	V2784	TRP
N3850	E3677	HIS	R3505	M3397	M3322	M3397	M3397	C3129	ARG	ARG	ARG	L2859	ARG
D3852	D3684	LEU	I3508	V3398	E3323	I3508	I3508	C3129	LEU	LEU	LEU	E2860	LEU
E3853	M3688	LEU	T3512	A3399	K3324	A3399	A3399	L3133	THR	THR	THR	S2861	THR
F3854	M3688	SER	F3516	E3400	L3325	E3400	E3400	T3134	ASP	ASP	ASP	L2859	ASP
R3840	F3693	GLN	K3517	F3402	K3327	F3402	F3402	S3135	GLY	GLY	GLY	K2856	GLY
Q3843	K3696	ARG	L3518	I3403	K3328	I3403	I3403	V3146	ARG	ARG	ARG	L2856	ARG
L3844	S3697	LYS	L3518	F3411	M3331	F3411	F3411	V3147	GLY	GLY	GLY	S2727	GLY
N3850	C3698	ALA	A3522	N3425	V3332	A3522	A3522	R3151	ASP	ASP	ASP	W2731	ASP
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S3851	A3522	VAL	M3427	M3426	E3335	M3427	M3427	E3156	MET	MET	MET	K2735	MET
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F3855	ASP	PHE	Y3530	L3430	A3341	Y3530	Y3530	A3160	ASN	ASN	ASN	A2738	ASN
Q3854	ASP	MET	K3435	L3430	E3342	K3435	K3435	F3161	ARG	ARG	ARG	G2739	ARG
R3858	ASP	ALA	S3436	K3435	E3342	S3436	S3436	F3161	THR	THR	THR	A2740	THR
T3859	GLY	PRO	P3534	A3343	A3343	P3534	P3534	P3166	ARG	ARG	ARG	L2741	ARG
L3870	GLU	LEU	P3535	A3343	A3343	P3535	P3535	I3167	ILE	ILE	ILE	G2743	ILE
V3874	GLU	TVR	R3536	S3439	D3344	R3536	R3536	T3172	ALA	ALA	ALA	E2744	ALA
D3875	VAL	ASN	T3537	K3440	M3347	T3537	T3537	N3178	SER	SER	SER	Y2746	SER
	LYS	LEU	P3540	K3440	M3347	P3540	P3540	N3178	GLN	GLN	GLN	Y2746	GLN
	S3712	P3611	V3547	E3447	L3352	V3547	V3547	I3282	PHE	PHE	PHE	S2747	PHE
		H3613			L3353			I3282	LYS	LYS	LYS	D2748	LYS



• Molecule 1: Ryanodine receptor 2

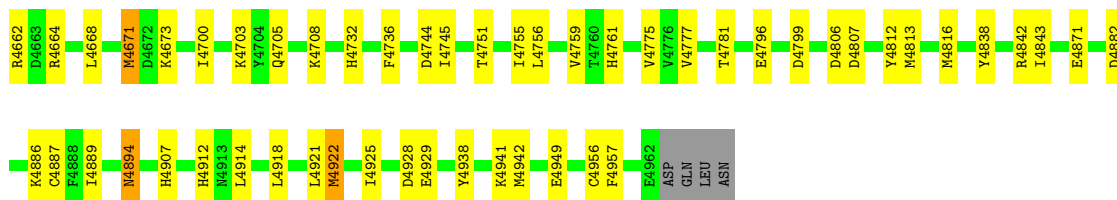




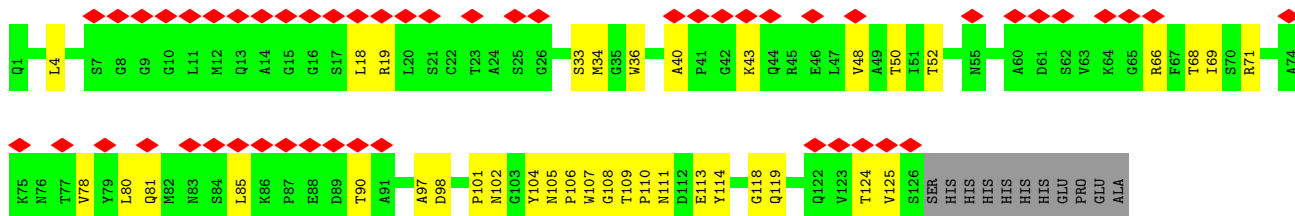




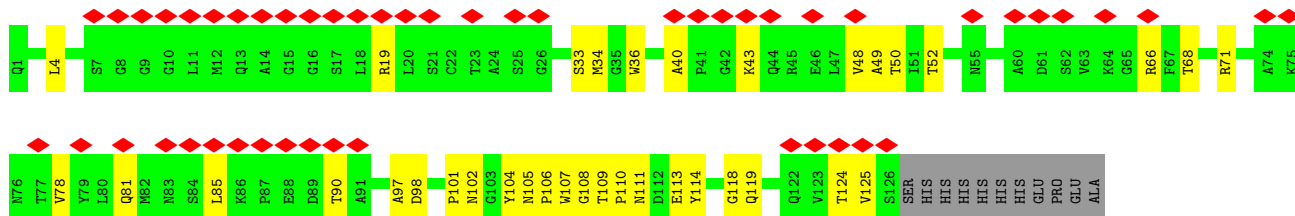
LEU	ASP	THR	MET	GLU	SER	PRO	GLU	L4020	R3903	W3627	S564	K3470	F3375	F3301
ASP	SER	HIS	THR	GLU	TYR	GLU	GLU	A4121	R3904	A3736	LYS	R3471	V3376	S3302
SER	ASN	ARG	ASN	GLY	TRP	GLY	GLY	V4124	R3905	D3637	THR	L3472	D3377	R3303
PRO	VAL	GLY	VAL	ARG	SER	ALA	ALA	L4132	I3909	K3638	GLY	L3473	Y3378	I3306
ARG	VAL	GLY	PRO	PRO	PHE	ARG	ARG	I4135	I3916	T3757	ARG	I3475	R3380	R3307
ILE	PRO	GLY	GLY	LEU	THR	MET	MET	I4135	F3916	I3764	GLY	A3811	A3381	K3308
ALA	PRO	LEU	LEU	LEU	LEU	GLY	GLY	Y4148	T3920	A3648	THR	I3479	K3382	V3309
ALA	VAL	LEU	PHE	LEU	PHE	PHE	PHE	F4149	E3921	E3649	PHE	C3480	W3383	K3310
ALA	VAL	LEU	HIS	GLY	HIS	GLY	GLY	E4150	Q3924	LEU	SER	P3482	L3384	L3313
ALA	ALA	LEU	PHE	ALA	PHE	SER	SER	I4151	Q3924	GLU	VAL	P3482	K3385	L3314
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	R4156	L3934	ASP	GLU	D3484	N3388	K3315
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	T4157	A3935	GLU	HIS	Q3485	P3389	T3316
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	F4158	M3977	GLU	PRO	E3486	E3390	H3317
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	W4159	R3938	ALA	GLN	L3487	A3391	F3318
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	E4160	R3939	MET	ARG	I3488	E3392	L3319
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	K4161	K4049	MET	ARG	I3489	E3393	P3320
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	M4051	V3940	R3659	LYS	L3490	L3394	L3321
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	V4164	V3943	V3660	LYS	F3395	F3395	H3322
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	R4166	M3955	H3664	ALA	R3505	R3396	E3323
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	E4166	V3944	H3664	VAL	R3506	M3397	E3324
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	F4167	M3955	E3677	TRP	I3508	V3398	K3324
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	K4168	M3955	E3677	HIS	I3508	V3398	K3326
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	R4169	M3955	E3677	LYS	I3512	V3398	K3327
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	E4169	M3955	E3677	LEU	I3512	V3398	K3328
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	E4181	Q3963	D8684	LEU	G3516	F3402	M3331
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	F4182	I3964	M3688	SER	K3517	I3403	V3332
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	E4183	D3832	M3688	SER	L3518	F3411	E3335
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	F4184	D3832	M3688	SER	A3522	N3425	L3339
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	K4185	L3967	M3688	GLN	W3525	N3426	K3340
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	E4186	K3968	M3688	GLN	Q3526	M3427	R3340
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	E4188	E3969	M3688	GLN	M3527	S3428	A3341
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	F4188	R3840	M3688	ARG	F3429	F3429	E3342
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	T4195	M3977	M3688	ARG	L3430	L3430	E3343
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	M4199	M3977	M3688	ARG	I3431	I3431	A3343
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	K3435	K3435	R3344
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	S3436	S3436	E3344
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	S3439	S3439	R3347
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	K3440	K3440	S3348
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	E3351	E3351	E3351
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	L3352	L3352	L3352
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	L3354	L3354	L3354
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	L3361	L3361	L3361
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	A3362	A3362	A3362
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	R3363	R3363	R3363
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	I3364	I3364	I3364
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	L3365	L3365	L3365
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	F3368	F3368	F3368
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	Y3369	Y3369	Y3369
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	L3372	L3372	L3372
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	I3373	I3373	I3373
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	H3559	H3559	H3559
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	F3556	F3556	F3556
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	L3464	L3464	L3464
ALA	ALA	LEU	ALA	LEU	ALA	LEU	LEU	I4205	M3977	M3688	ARG	V3466	V3466	V3466



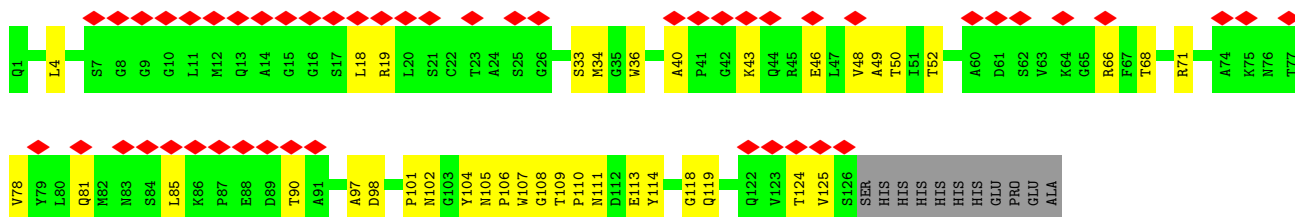
• Molecule 2: Nanobody 9657



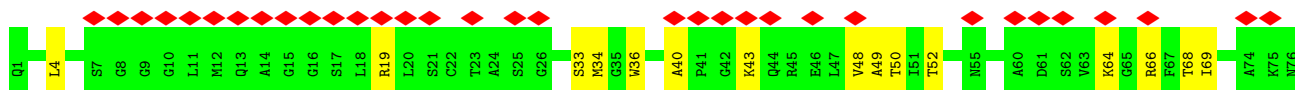
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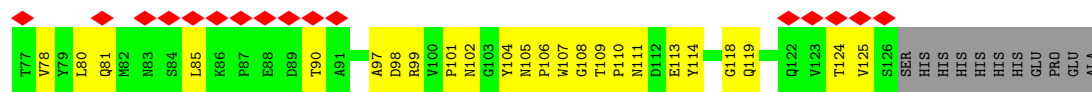


• Molecule 2: Nanobody 9657



• Molecule 2: Nanobody 9657





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	76852	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	5.181	Depositor
Minimum map value	-0.204	Depositor
Average map value	0.074	Depositor
Map value standard deviation	0.151	Depositor
Recommended contour level	0.35	Depositor
Map size ( $\text{\AA}$ )	490.56, 490.56, 490.56	wwPDB
Map dimensions	336, 336, 336	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.46, 1.46, 1.46	Depositor

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CFF, ZN, CA, ATP

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.26	0/33802	0.50	1/45653 (0.0%)
1	C	0.26	0/33802	0.50	1/45653 (0.0%)
1	E	0.26	0/33802	0.50	1/45653 (0.0%)
1	F	0.26	0/33802	0.50	1/45653 (0.0%)
2	B	0.26	0/984	0.51	0/1335
2	D	0.26	0/984	0.51	0/1335
2	G	0.26	0/984	0.51	0/1335
2	I	0.26	0/984	0.51	0/1335
All	All	0.26	0/139144	0.50	4/187952 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	1494	MET	CA-CB-CG	5.38	122.45	113.30
1	F	1494	MET	CA-CB-CG	5.38	122.44	113.30
1	C	1494	MET	CA-CB-CG	5.37	122.43	113.30
1	A	1494	MET	CA-CB-CG	5.36	122.41	113.30

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	A	33088	0	32662	852	0
1	C	33088	0	32662	837	0
1	E	33088	0	32662	853	0
1	F	33088	0	32662	854	0
2	B	965	0	910	28	0
2	D	965	0	910	27	0
2	G	965	0	910	28	0
2	I	965	0	910	27	0
3	A	31	0	12	3	0
3	C	31	0	12	3	0
3	E	31	0	12	3	0
3	F	31	0	12	3	0
4	A	14	0	10	0	0
4	C	14	0	10	0	0
4	E	14	0	10	0	0
4	F	14	0	10	0	0
5	A	1	0	0	0	0
5	C	1	0	0	0	0
5	E	1	0	0	0	0
5	F	1	0	0	0	0
6	A	1	0	0	0	0
6	C	1	0	0	0	0
6	E	1	0	0	0	0
6	F	1	0	0	0	0
All	All	136400	0	134376	3465	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 13.

The worst 5 of 3465 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:A:2641:ARG:HH12	1:A:2680:MET:HE3	1.42	0.85
1:C:2641:ARG:HH12	1:C:2680:MET:HE3	1.41	0.84
1:E:2641:ARG:HH12	1:E:2680:MET:HE3	1.41	0.84
1:A:4040:GLY:HA3	1:A:4078:ASP:HA	1.60	0.83
1:F:2641:ARG:HH12	1:F:2680:MET:HE3	1.41	0.83

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	4094/4966 (82%)	3987 (97%)	106 (3%)	1 (0%)	100	100
1	C	4094/4966 (82%)	3986 (97%)	107 (3%)	1 (0%)	100	100
1	E	4094/4966 (82%)	3986 (97%)	107 (3%)	1 (0%)	100	100
1	F	4094/4966 (82%)	3983 (97%)	110 (3%)	1 (0%)	100	100
2	B	124/137 (90%)	118 (95%)	6 (5%)	0	100	100
2	D	124/137 (90%)	118 (95%)	6 (5%)	0	100	100
2	G	124/137 (90%)	118 (95%)	6 (5%)	0	100	100
2	I	124/137 (90%)	118 (95%)	6 (5%)	0	100	100
All	All	16872/20412 (83%)	16414 (97%)	454 (3%)	4 (0%)	100	100

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2530	CYS
1	C	2530	CYS
1	E	2530	CYS
1	F	2530	CYS

### 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	3589/4355 (82%)	3516 (98%)	73 (2%)	50	70

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	3589/4355 (82%)	3517 (98%)	72 (2%)	50	70
1	E	3589/4355 (82%)	3516 (98%)	73 (2%)	50	70
1	F	3589/4355 (82%)	3516 (98%)	73 (2%)	50	70
2	B	103/114 (90%)	102 (99%)	1 (1%)	73	83
2	D	103/114 (90%)	102 (99%)	1 (1%)	73	83
2	G	103/114 (90%)	101 (98%)	2 (2%)	52	71
2	I	103/114 (90%)	102 (99%)	1 (1%)	73	83
All	All	14768/17876 (83%)	14472 (98%)	296 (2%)	50	70

5 of 296 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	913	ARG
1	F	4643	TYR
1	F	1293	GLN
1	F	2924	PHE
1	C	1962	ARG

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

Mol	Chain	Res	Type
1	E	238	HIS
1	E	2480	GLN
1	F	3485	GLN
1	E	375	GLN
1	E	1296	ASN

### 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
3	ATP	A	5101	-	26,33,33	0.61	0	31,52,52	0.78	2 (6%)
4	CFF	A	5102	-	8,15,15	1.04	0	8,23,23	2.52	2 (25%)
3	ATP	E	5101	-	26,33,33	0.62	0	31,52,52	0.78	2 (6%)
3	ATP	C	5101	-	26,33,33	0.62	0	31,52,52	0.78	2 (6%)
4	CFF	C	5102	-	8,15,15	1.04	0	8,23,23	2.51	2 (25%)
4	CFF	F	5102	-	8,15,15	1.04	0	8,23,23	2.51	2 (25%)
4	CFF	E	5102	-	8,15,15	1.04	0	8,23,23	2.52	2 (25%)
3	ATP	F	5101	-	26,33,33	0.62	0	31,52,52	0.78	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
3	ATP	A	5101	-	-	5/18/38/38	0/3/3/3
4	CFF	A	5102	-	-	-	0/2/2/2
3	ATP	E	5101	-	-	5/18/38/38	0/3/3/3
3	ATP	C	5101	-	-	5/18/38/38	0/3/3/3
4	CFF	C	5102	-	-	-	0/2/2/2
4	CFF	F	5102	-	-	-	0/2/2/2
4	CFF	E	5102	-	-	-	0/2/2/2
3	ATP	F	5101	-	-	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(°)
4	A	5102	CFF	C5-C6-N1	-5.88	111.93	118.20
4	E	5102	CFF	C5-C6-N1	-5.88	111.93	118.20
4	F	5102	CFF	C5-C6-N1	-5.87	111.94	118.20
4	C	5102	CFF	C5-C6-N1	-5.87	111.94	118.20
4	A	5102	CFF	C4-C5-C6	3.73	122.36	119.96

There are no chirality outliers.

5 of 20 torsion outliers are listed below:

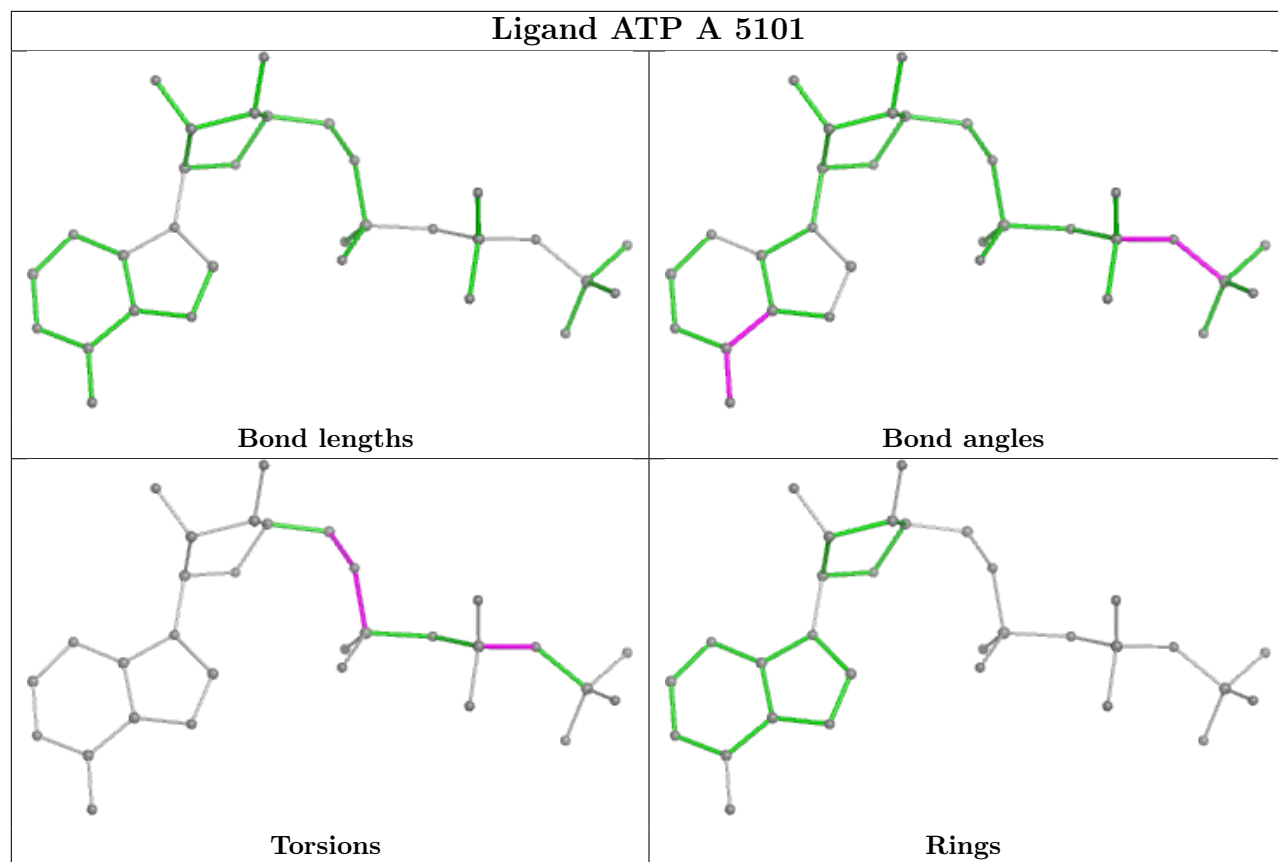
Mol	Chain	Res	Type	Atoms
3	A	5101	ATP	C5'-O5'-PA-O1A
3	C	5101	ATP	C5'-O5'-PA-O1A
3	E	5101	ATP	C5'-O5'-PA-O1A
3	F	5101	ATP	C5'-O5'-PA-O1A
3	A	5101	ATP	C4'-C5'-O5'-PA

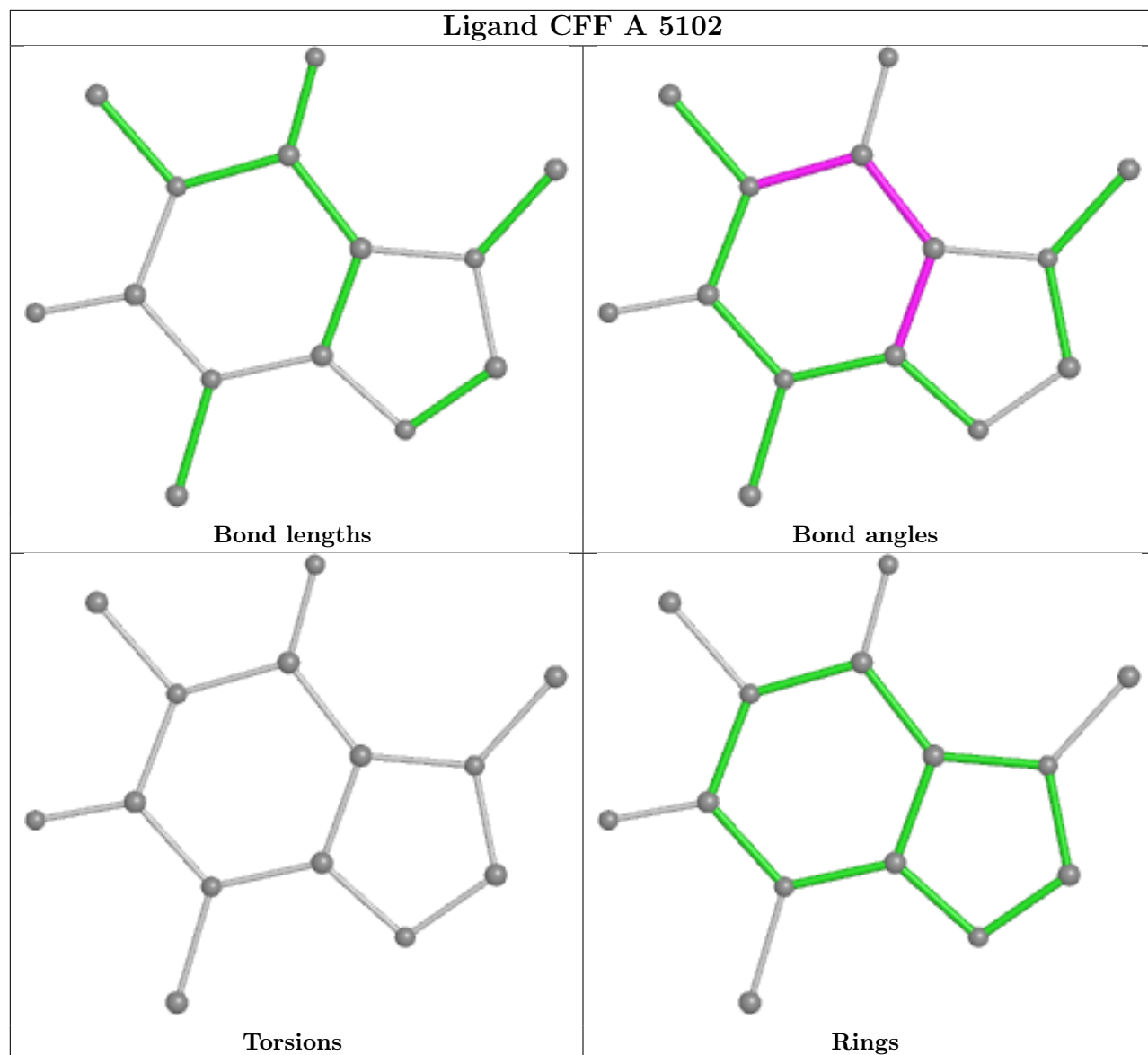
There are no ring outliers.

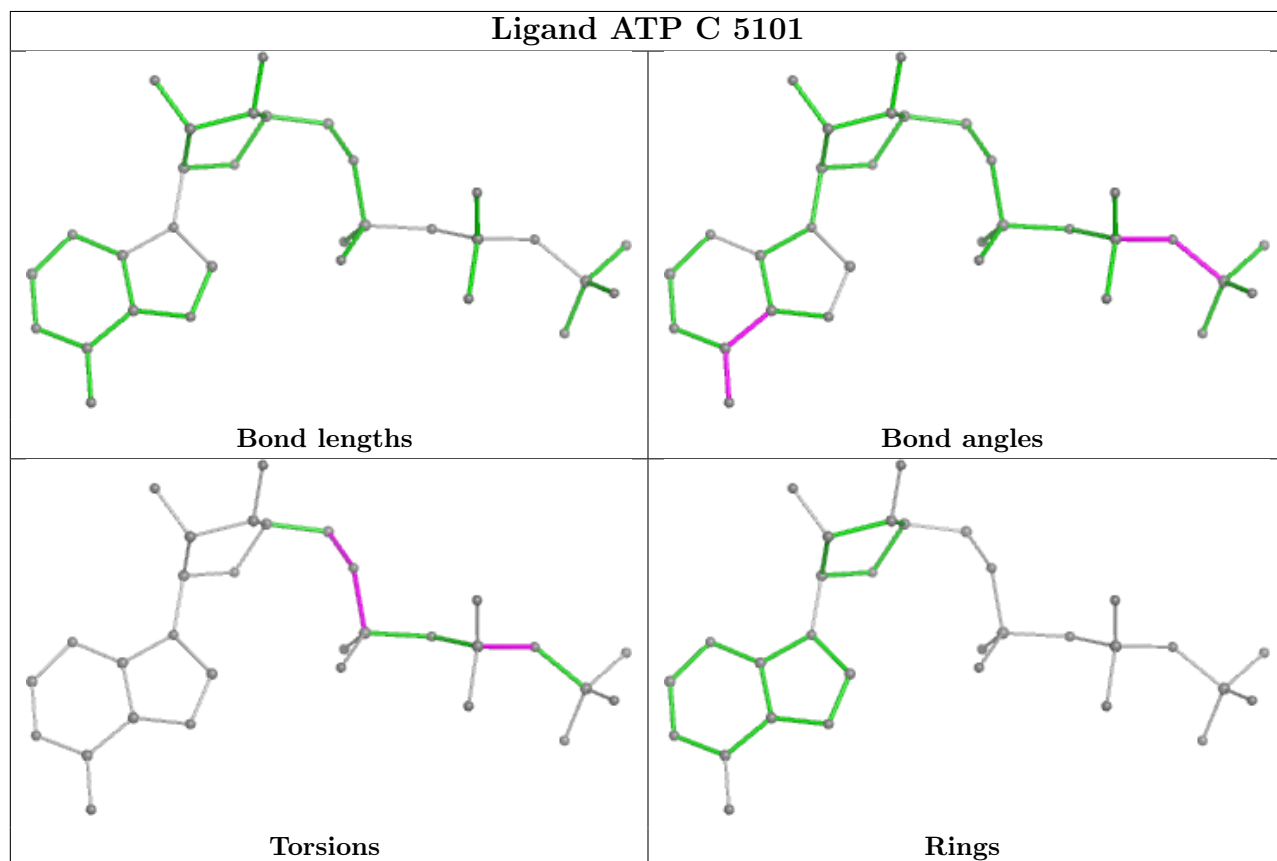
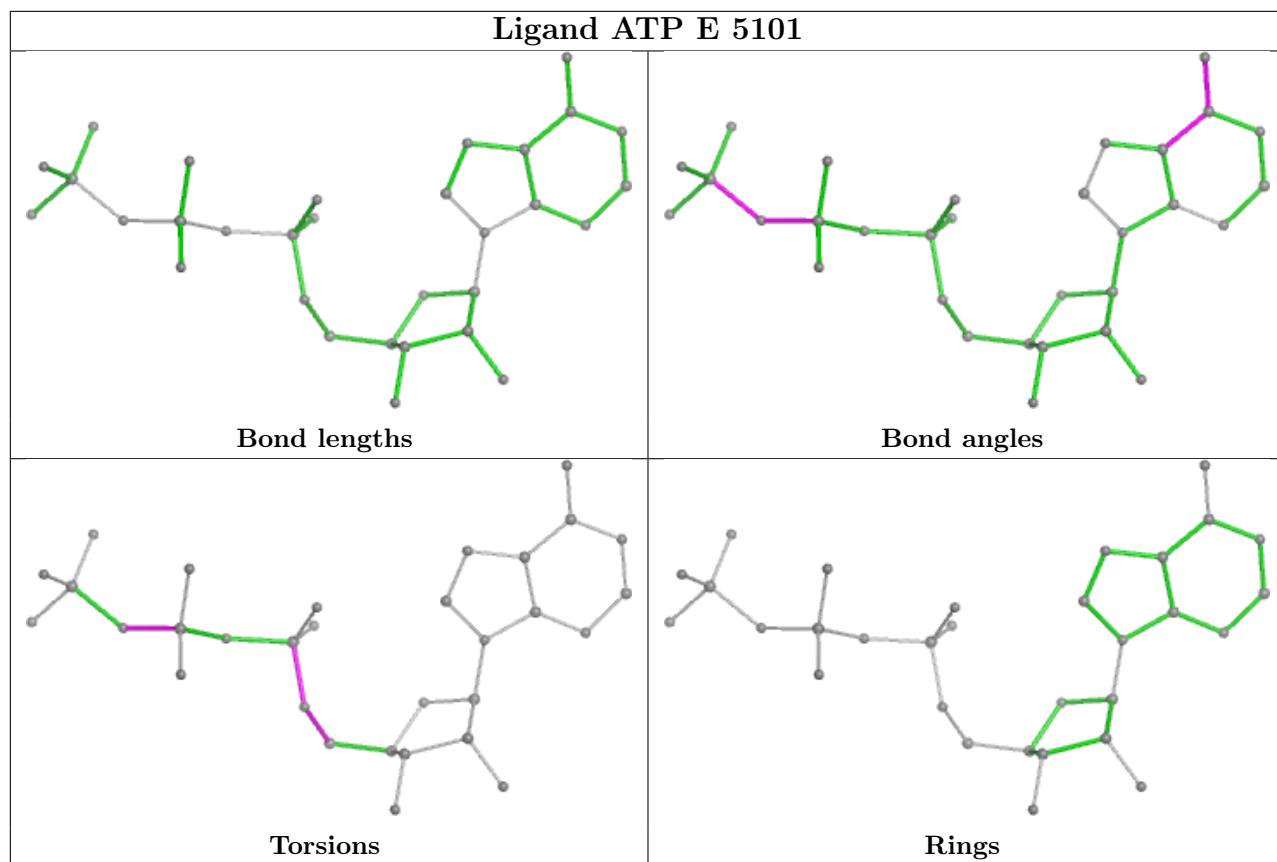
4 monomers are involved in 12 short contacts:

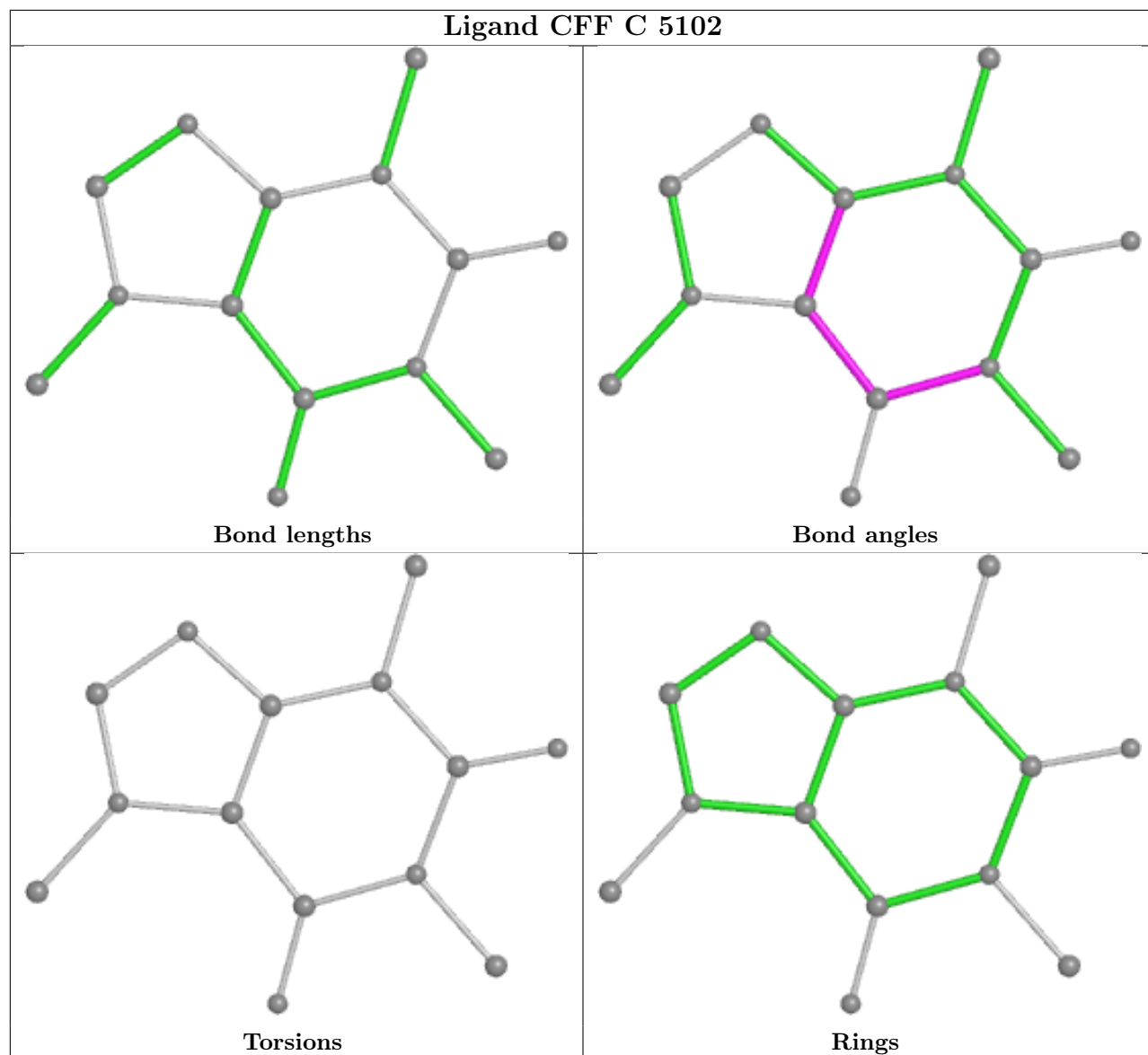
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	5101	ATP	3	0
3	E	5101	ATP	3	0
3	C	5101	ATP	3	0
3	F	5101	ATP	3	0

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

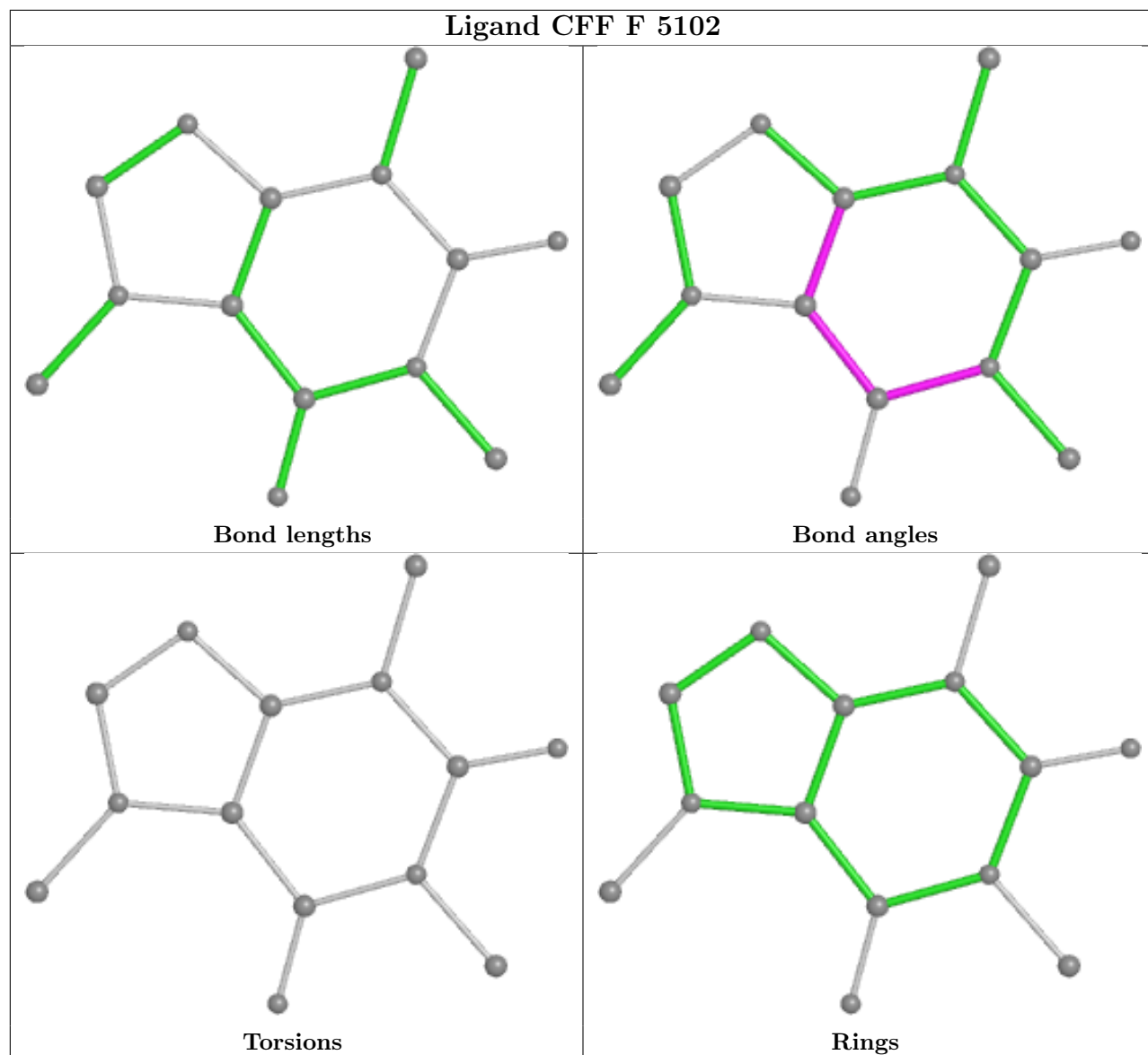


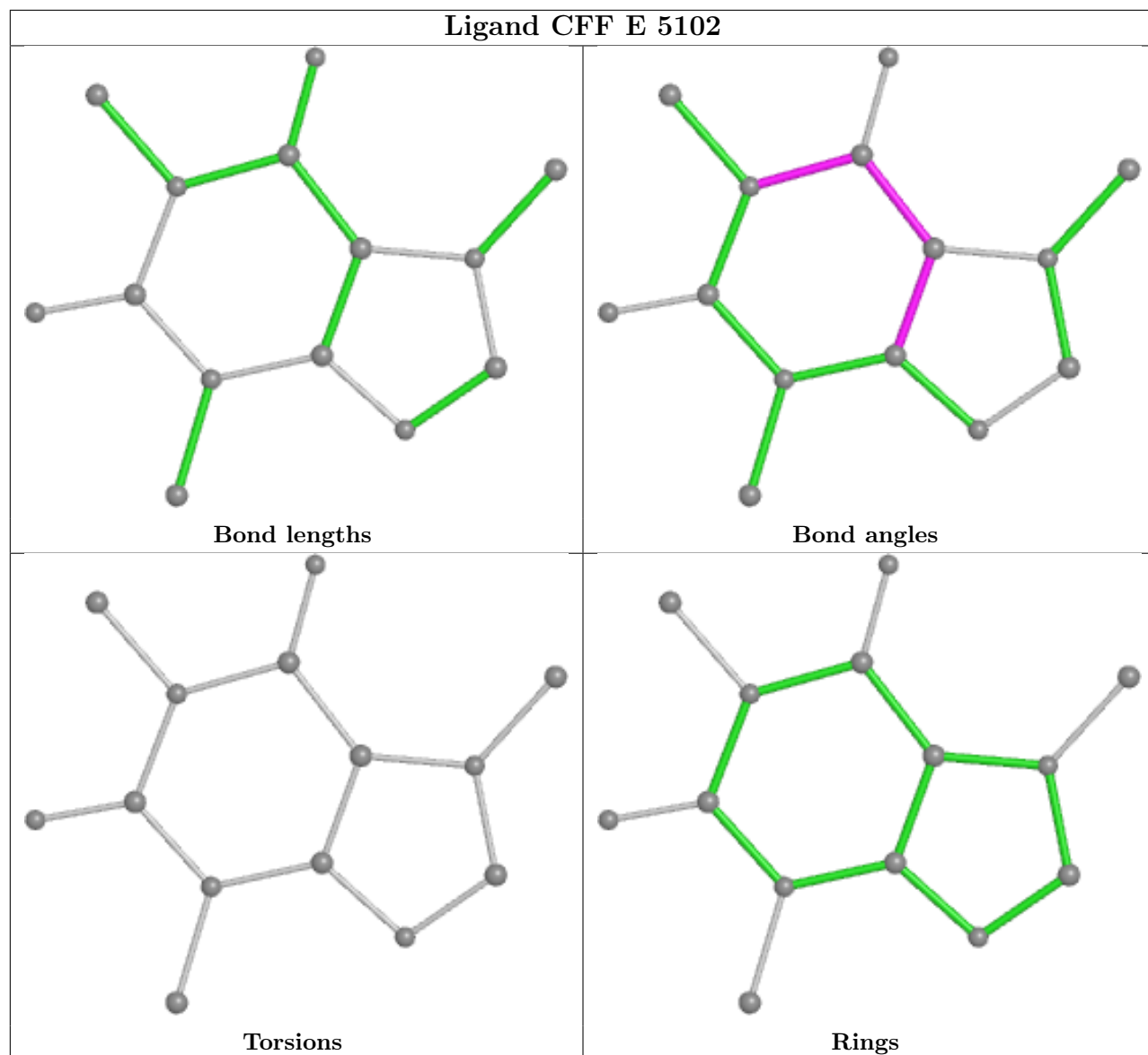


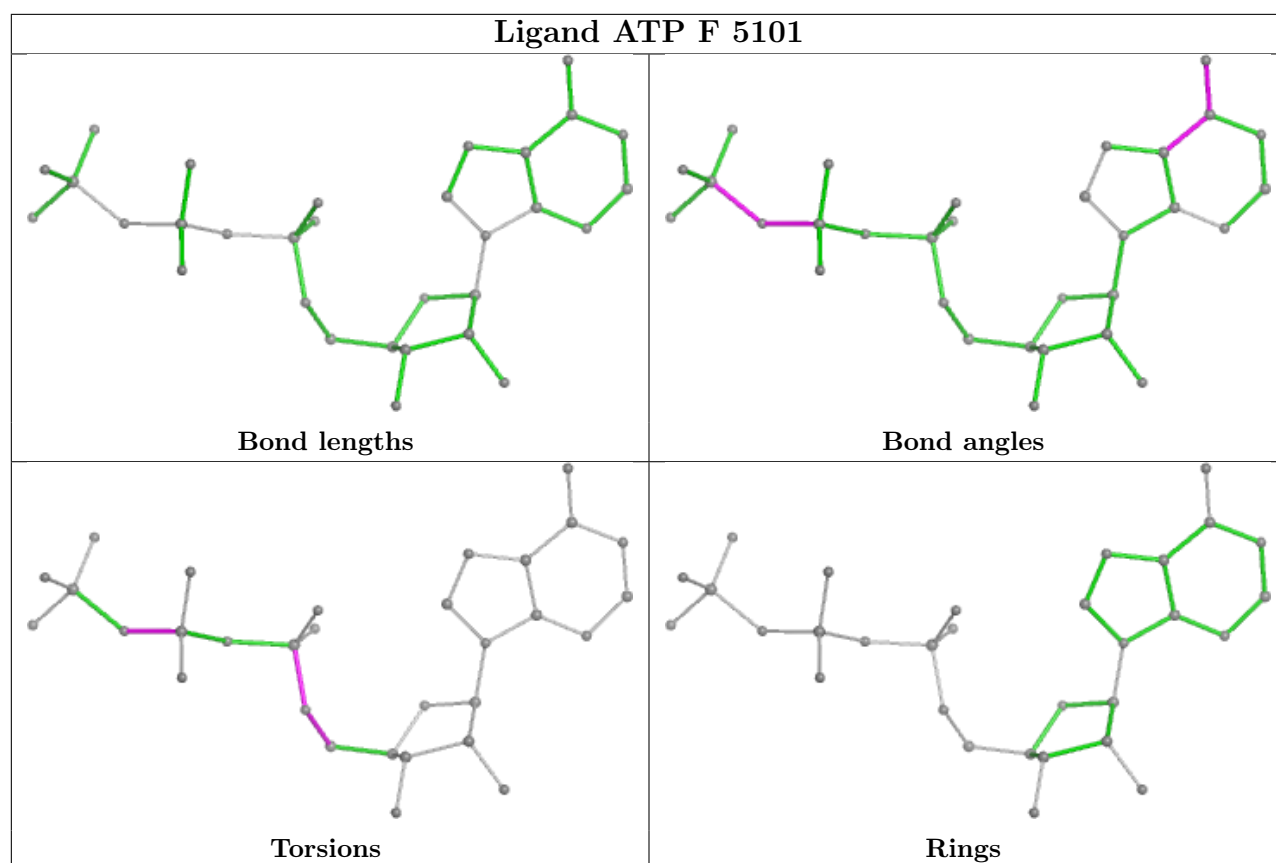












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

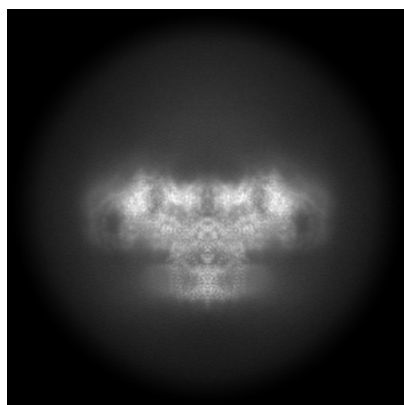
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-19463. These allow visual inspection of the internal detail of the map and identification of artifacts.

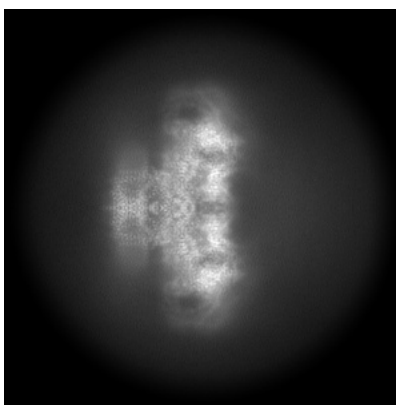
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

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

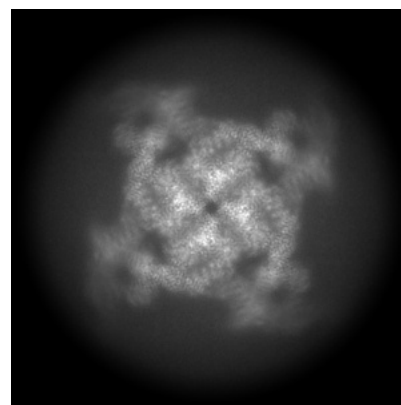
#### 6.1.1 Primary map



X



Y

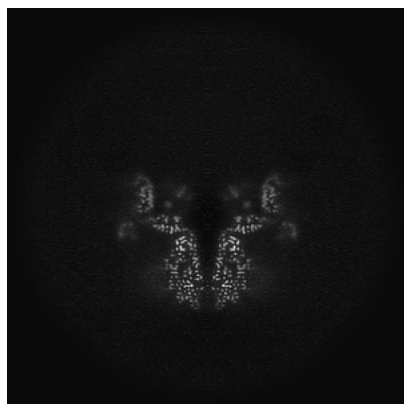


Z

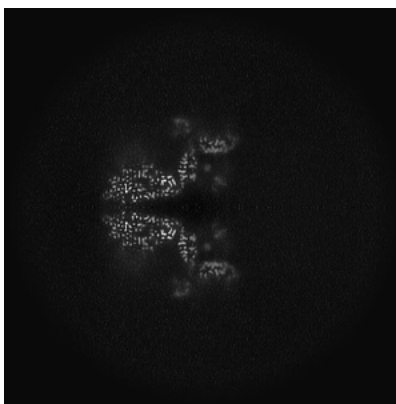
The images above show the map projected in three orthogonal directions.

### 6.2 Central slices [i](#)

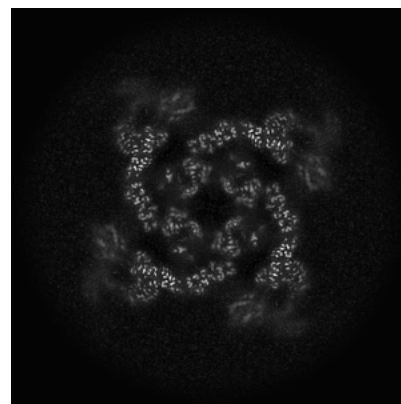
#### 6.2.1 Primary map



X Index: 168



Y Index: 168

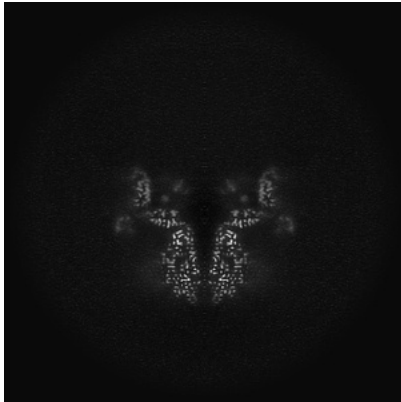


Z Index: 168

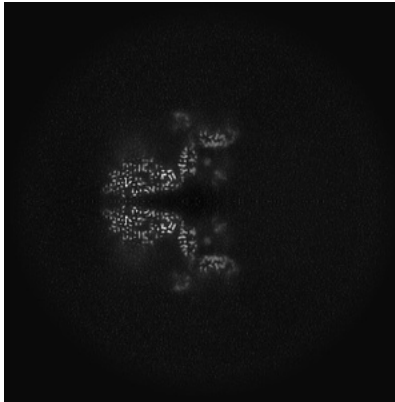
The images above show central slices of the map in three orthogonal directions.

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

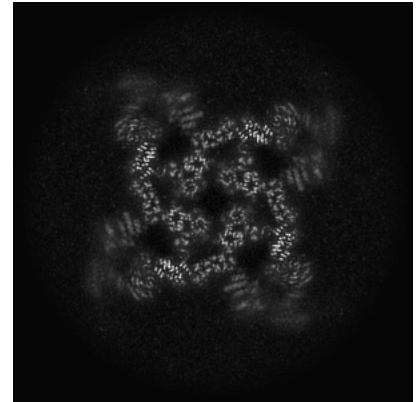
### 6.3.1 Primary map



X Index: 168



Y Index: 168

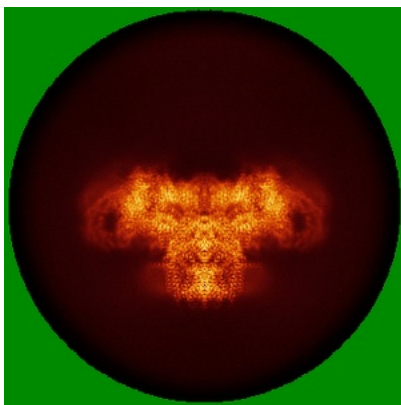


Z Index: 173

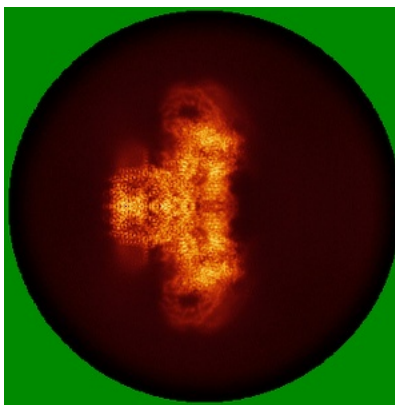
The images above show the largest variance slices of the map in three orthogonal directions.

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

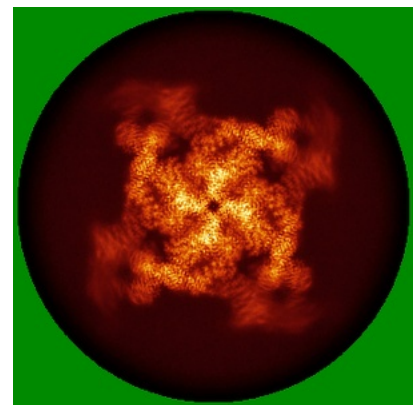
### 6.4.1 Primary map



X



Y

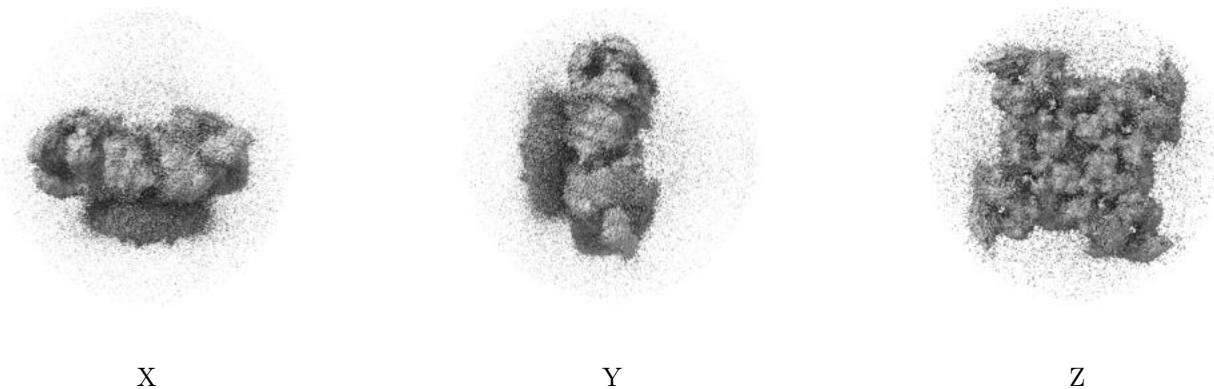


Z

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

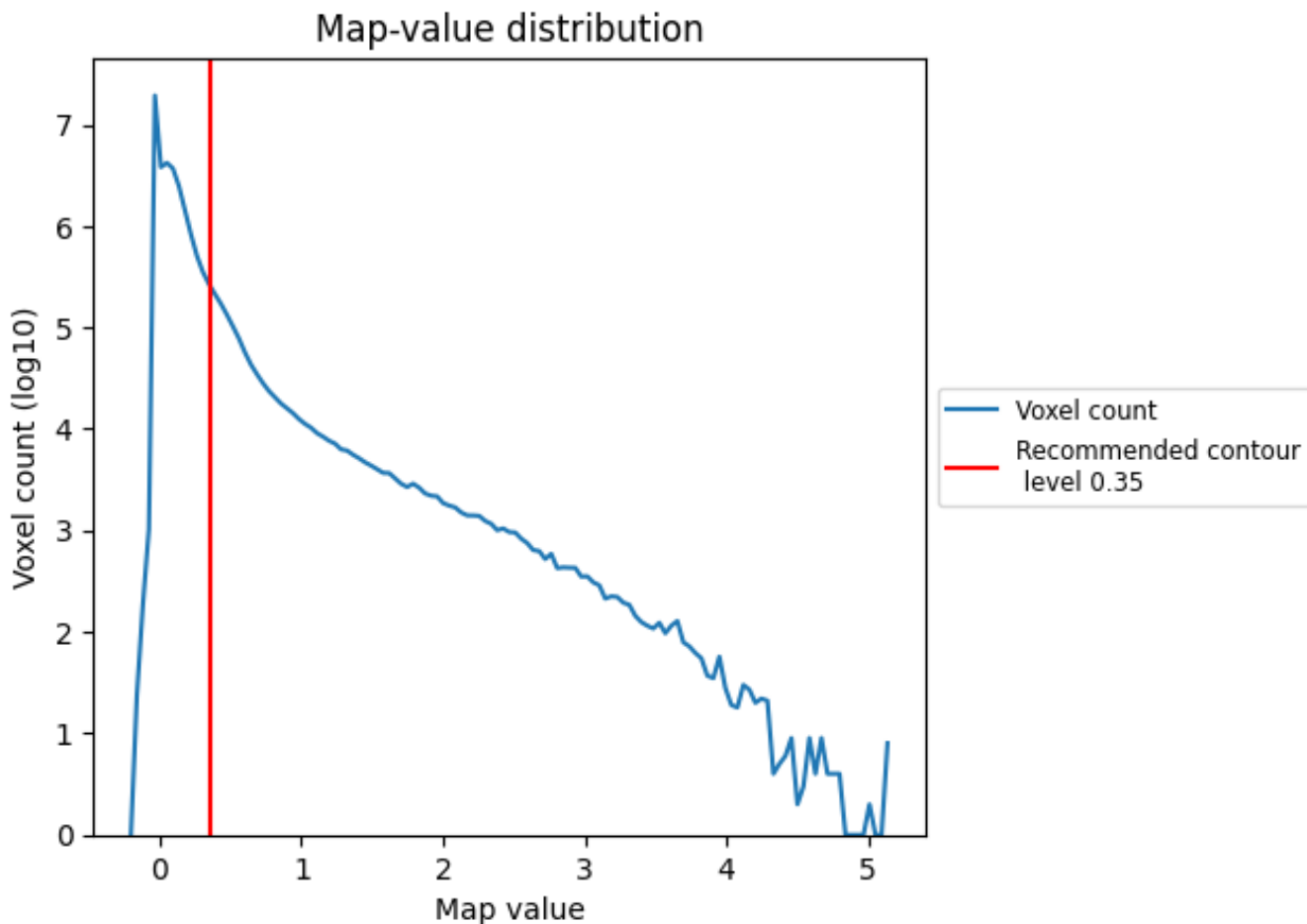
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

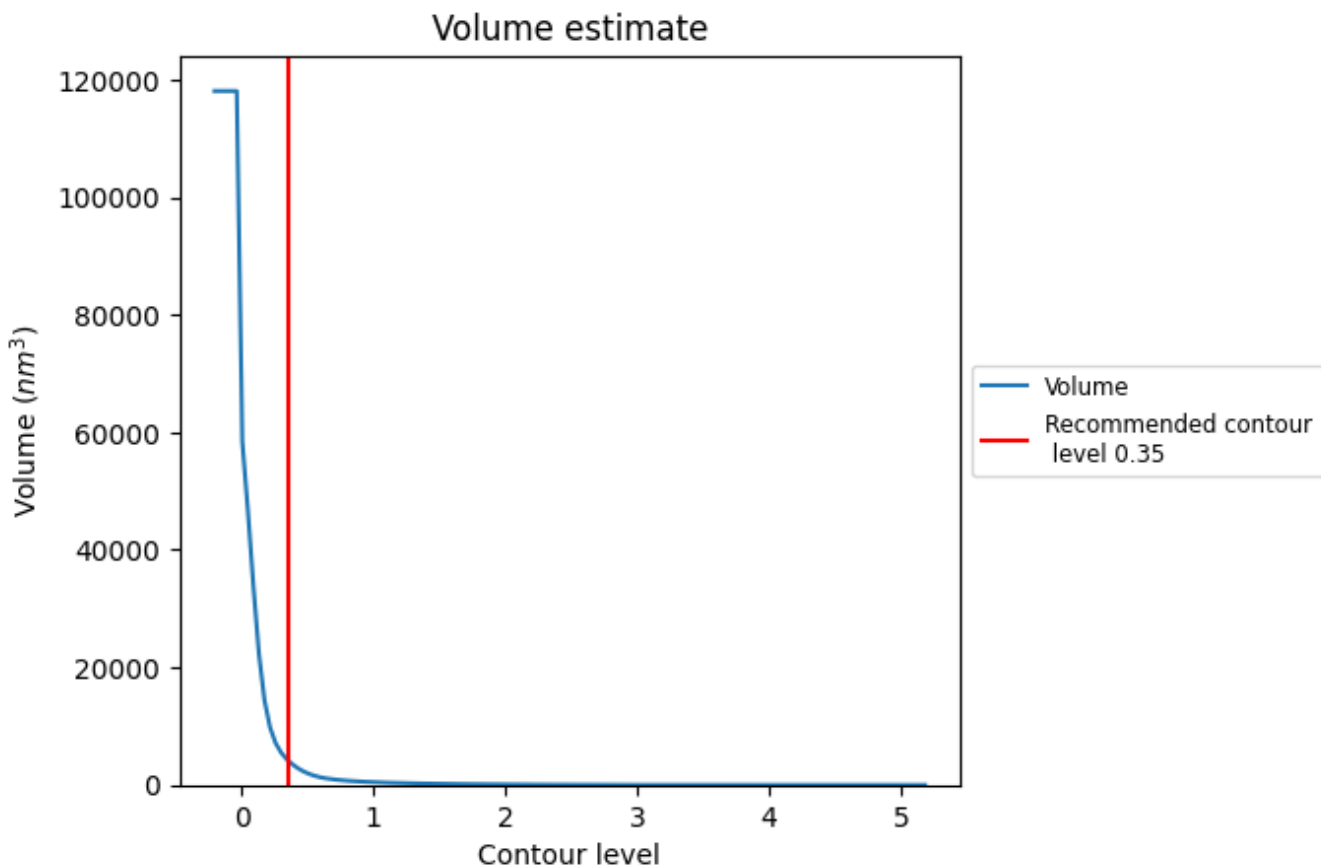
This section contains the results of statistical analysis of the map.

### 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](#)

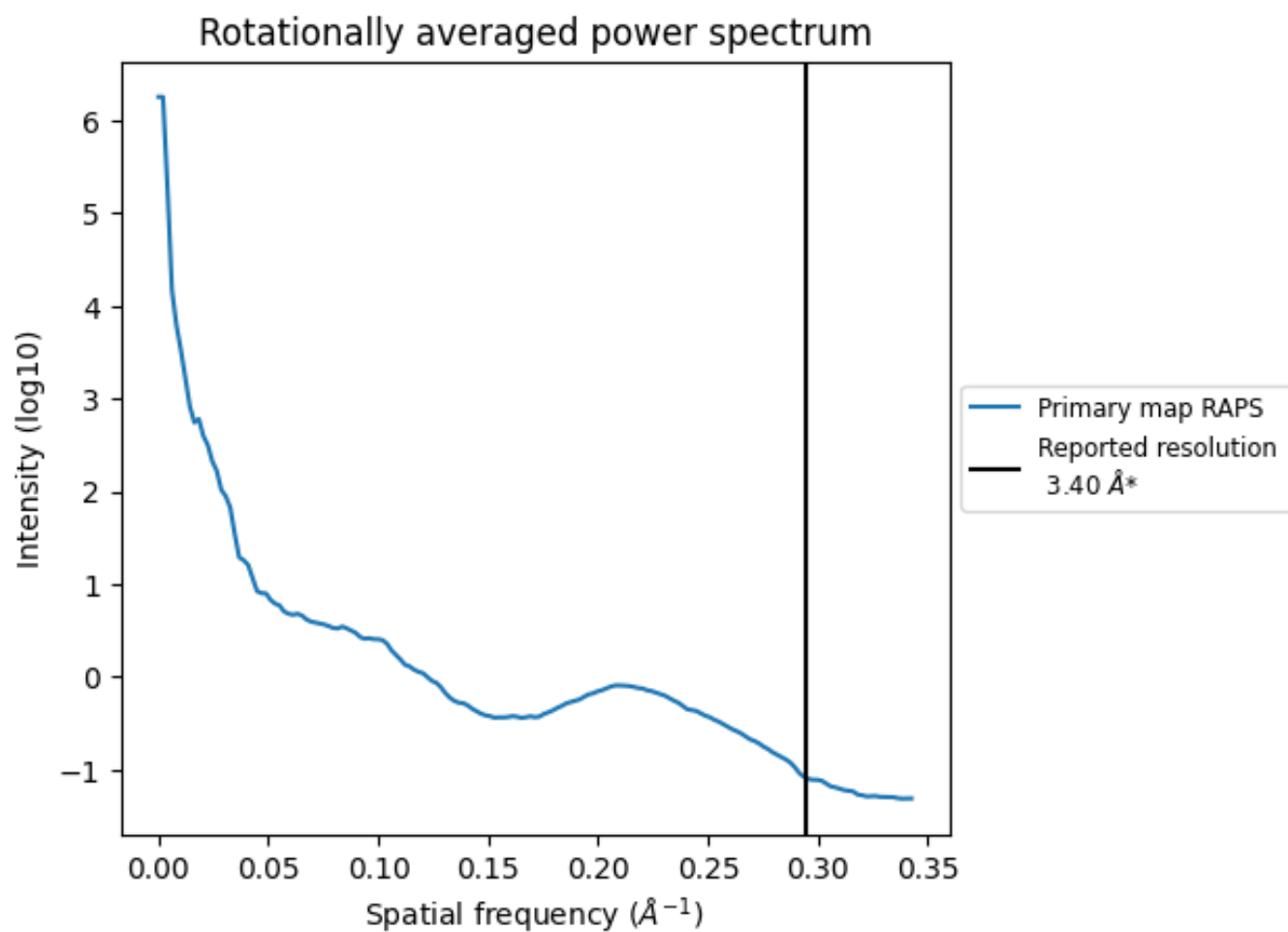


The volume at the recommended contour level is 4230 nm<sup>3</sup>; this corresponds to an approximate mass of 3821 kDa.

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

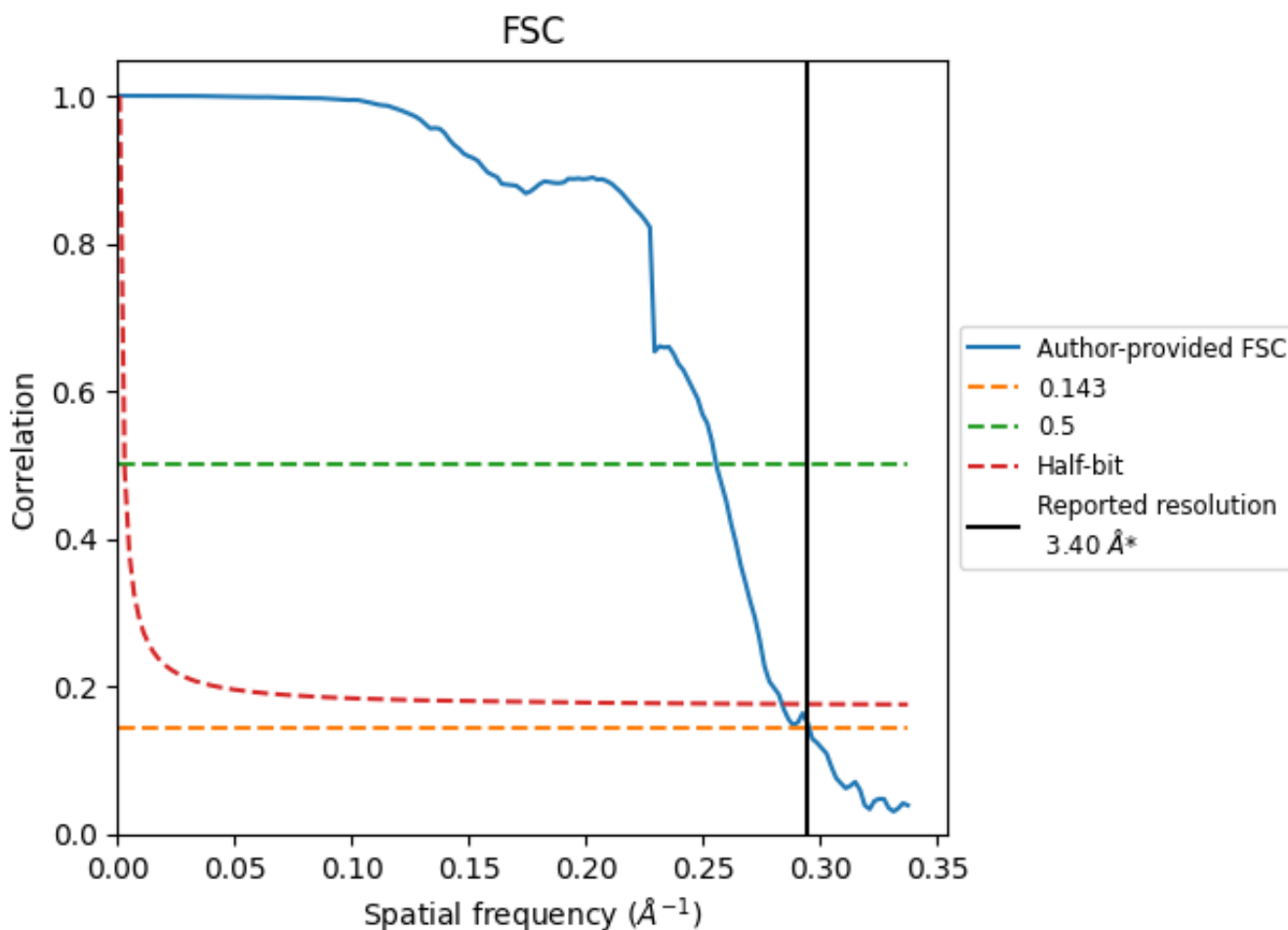


\*Reported resolution corresponds to spatial frequency of  $0.294 \text{ \AA}^{-1}$

## 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 0.294 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

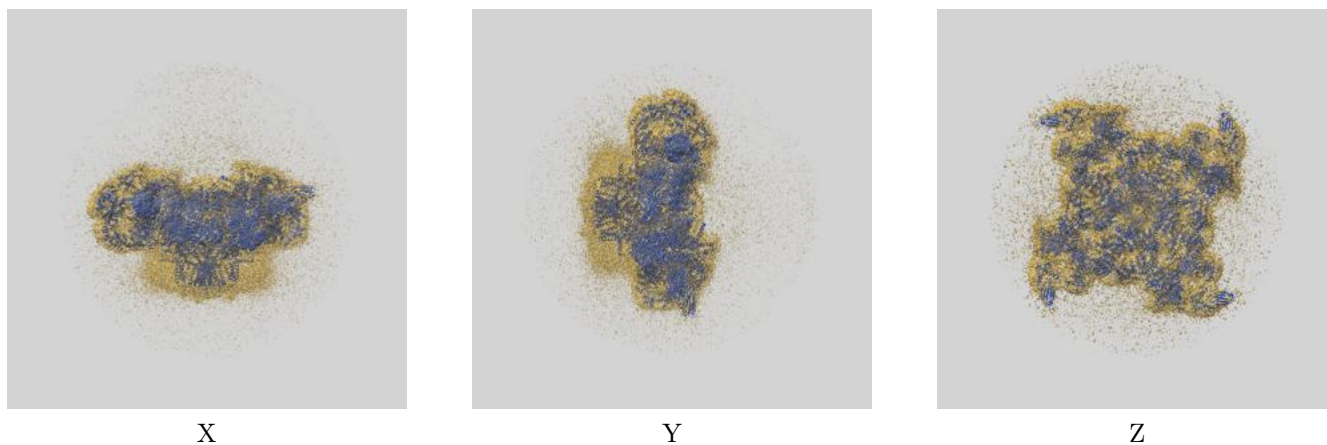
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	3.39	3.91	3.52
Unmasked-calculated*	-	-	-

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

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

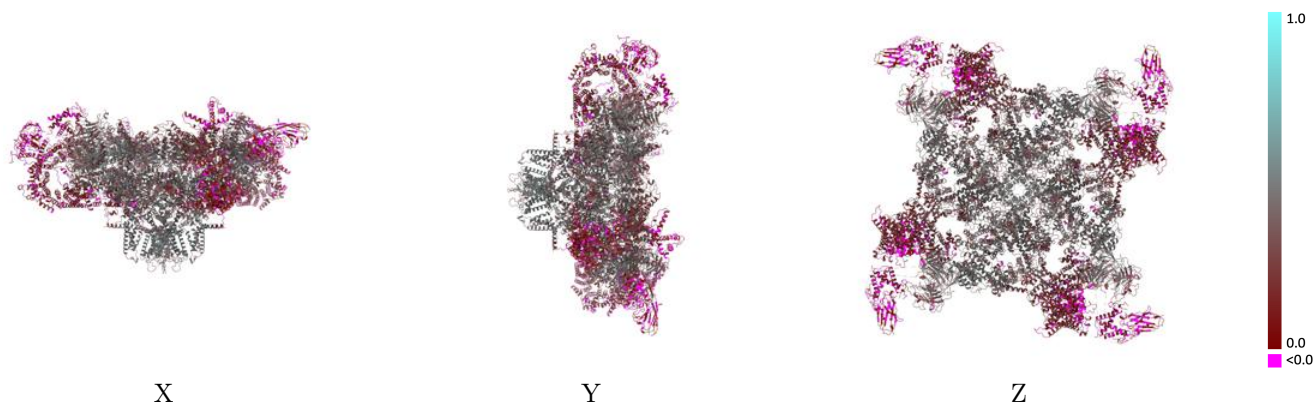
This section contains information regarding the fit between EMDB map EMD-19463 and PDB model 8RRS. Per-residue inclusion information can be found in section 3 on page 6.

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



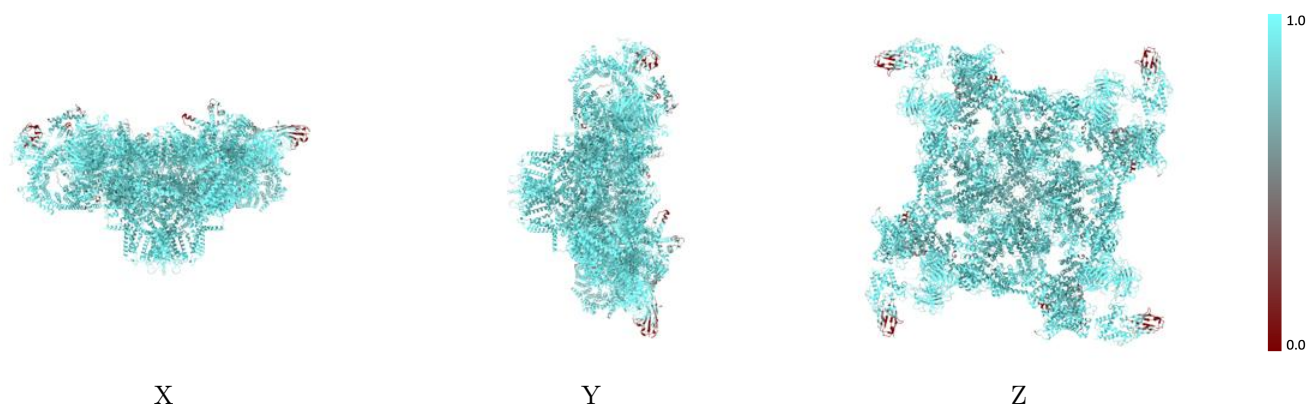
The images above show the 3D surface view of the map at the recommended contour level 0.35 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



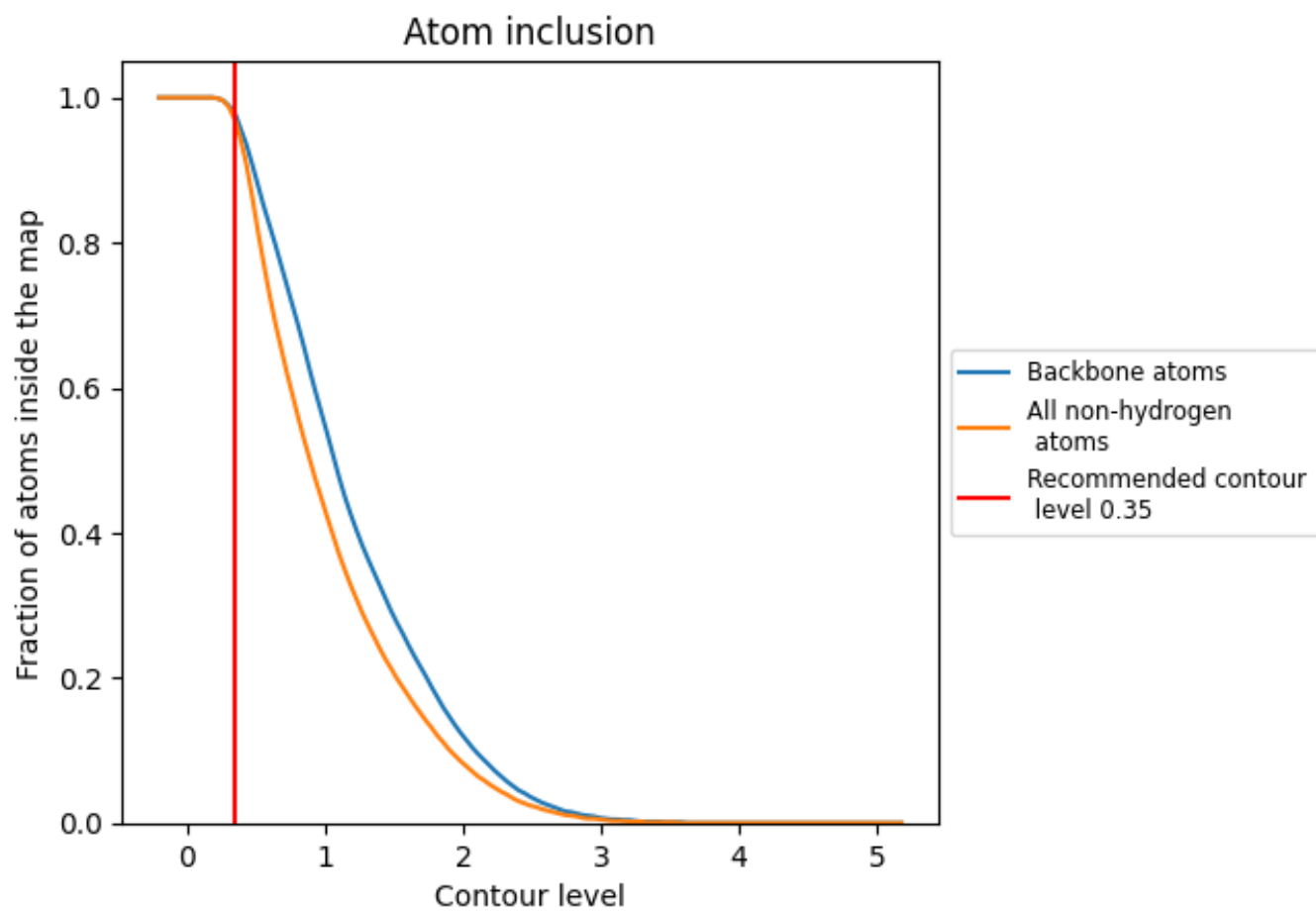
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.35).



















## 9.4 Atom inclusion [i](#)



At the recommended contour level, 98% of all backbone atoms, 97% of all non-hydrogen atoms, are inside the map.

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

The table lists the average atom inclusion at the recommended contour level (0.35) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9670	 0.3070
A	 0.9780	 0.3140
B	 0.5750	 0.0800
C	 0.9780	 0.3140
D	 0.5720	 0.0810
E	 0.9780	 0.3130
F	 0.9780	 0.3130
G	 0.5750	 0.0790
I	 0.5750	 0.0790

