



wwPDB EM Validation Summary Report ⓘ

Aug 3, 2026 – 08:19 pm BST

PDB ID : 9S5F / pdb_00009s5f
EMDB ID : EMD-54597
Title : Apo-state RyR1 in the native membrane solved by StA
Authors : Mikirtumov, V.
Deposited on : 2025-07-31
Resolution : 4.00 Å(reported)
Based on initial model : 7tzc

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

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

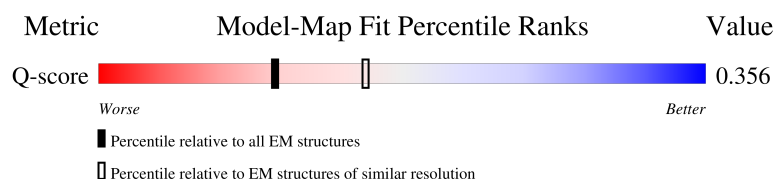
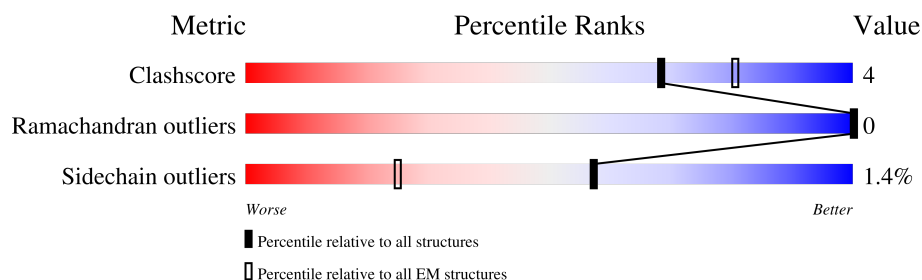
EMDB validation analysis : 0.0.1.dev133
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 4.00 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.



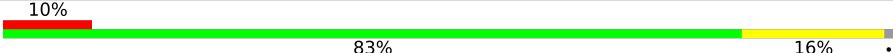
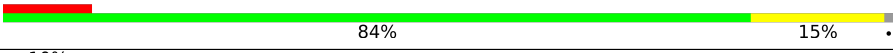
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	7587 (3.50 - 4.50)

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

Mol	Chain	Length	Quality of chain
1	A	5037	
1	B	5037	
1	C	5037	
1	D	5037	

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Mol	Chain	Length	Quality of chain
2	E	108	 10% 83% 16%
2	F	108	 9% 82% 17%
2	G	108	 10% 84% 15%
2	H	108	 10% 86% 13%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 285960 atoms, of which 142276 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
1	A	4404	Total	C	H	N	O	S	0	0
			69828	22323	34740	6046	6482	237		
1	B	4404	Total	C	H	N	O	S	0	0
			69828	22323	34740	6046	6482	237		
1	C	4404	Total	C	H	N	O	S	0	0
			69828	22323	34740	6046	6482	237		
1	D	4404	Total	C	H	N	O	S	0	0
			69828	22323	34740	6046	6482	237		

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

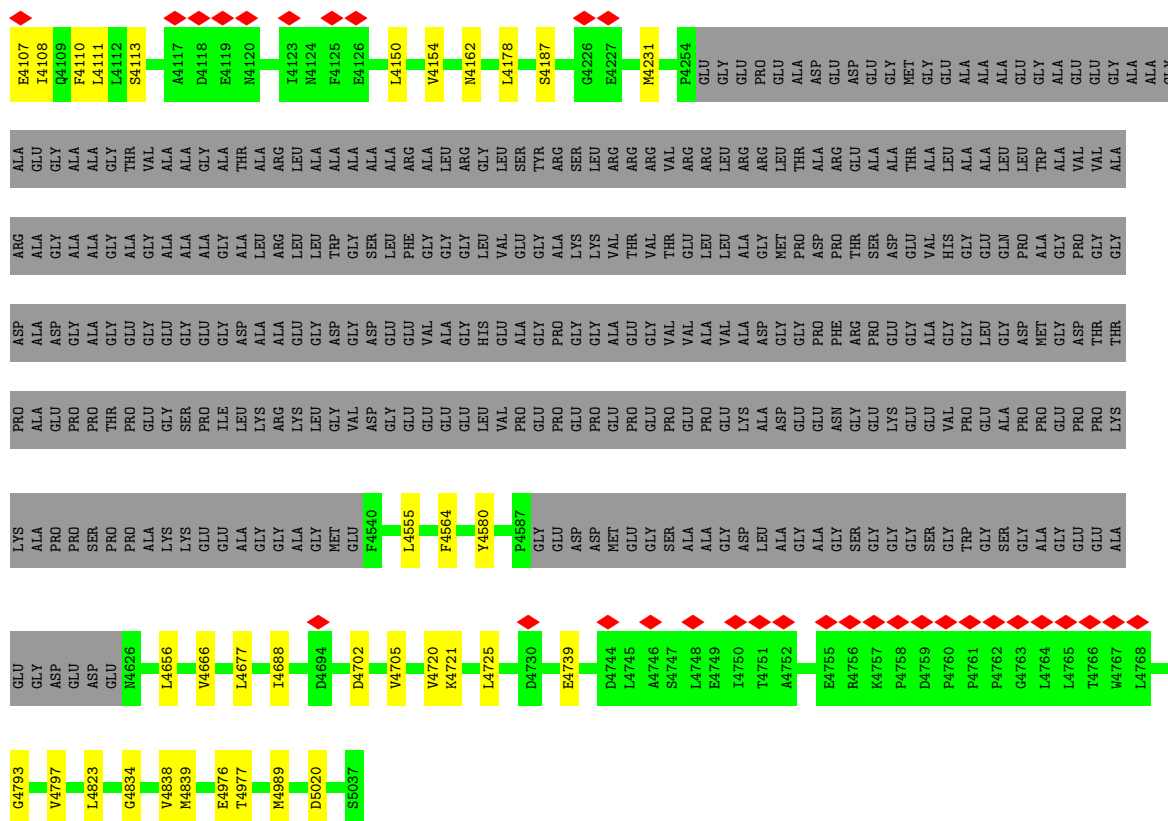
Mol	Chain	Residues	Atoms						AltConf	Trace
2	E	107	Total	C	H	N	O	S	0	0
			1661	527	829	146	155	4		
2	F	107	Total	C	H	N	O	S	0	0
			1661	527	829	146	155	4		
2	G	107	Total	C	H	N	O	S	0	0
			1661	527	829	146	155	4		
2	H	107	Total	C	H	N	O	S	0	0
			1661	527	829	146	155	4		

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

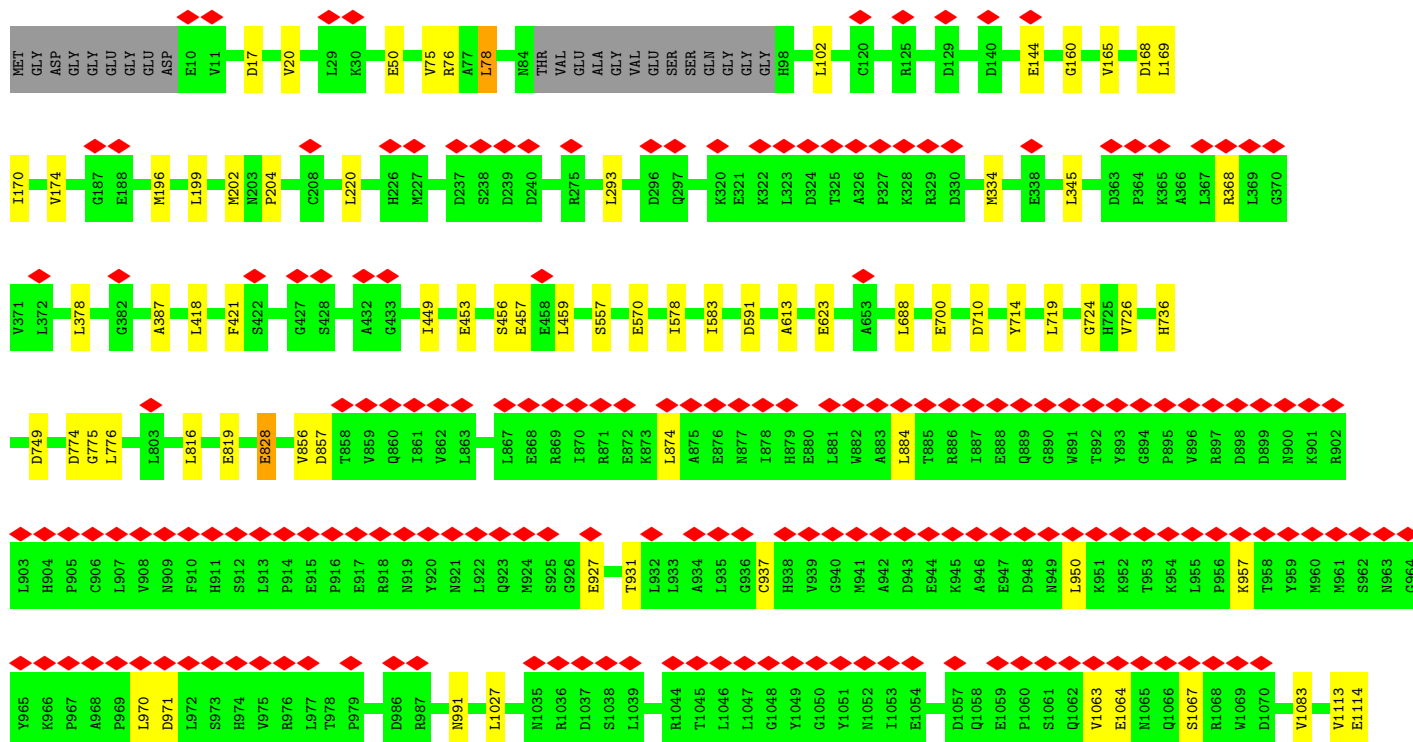
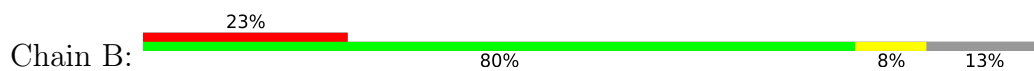
Mol	Chain	Residues	Atoms		AltConf
3	A	1	Total	Zn	0
			1	1	
3	B	1	Total	Zn	0
			1	1	
3	C	1	Total	Zn	0
			1	1	
3	D	1	Total	Zn	0
			1	1	

E2925	L2926	L2927	K2928	F2929	L2930	Q2931	M2932	K2933	G2934	Y2935	A2936	V2937	T2938	R2939	GLY	LEU	LYS	ASP	MET	GLU	L2946	D2947	T2948	S2949	E2952	K2953	R2954	F2955	A2956	F2957	G2958	F2959	L2960	Q2961	Q2962	L2963	L2964	R2965	W2966	Y2967	D2968	I2969	S2970	Q2971	E2972	F2973	A2975	H2976	L2977	E2978	A2979	V2980	S2981	S2982	S2983	G2984	R2985																																																																																																																																																																																																																																																																																																																					
V2865	T2866	L2867	S2868	R2869	E2870	L2871	Q2872	M2873	M2874	A2875	E2876	Q2877	L2878	A2879	E2880	M2881	Y2882	H2883	T2884	T2885	W2886	G2887	R2888	K2889	K2890	K2891	Q2892	E2893	L2894	E2895	A2896	K2897	G2898	G2899	G2900	T2901	H2902	P2903	L2904	L2905	V2906	P2907	Y2908	D2909	T2910	L2911	T2912	A2913	K2914	E2915	K2916	A2917	V2980	S2981	S2982	S2983	G2984	R2985																																																																																																																																																																																																																																																																																																																				
S2885	L2886	A2887	H2888	K2889	K2890	Y2891	D2892	Q2893	E2894	L2895	Y2896	R2897	M2898	A2899	M2700	P2701	C2702	L2703	C2704	A2705	I2706	G2708	A2709	L2710	F2711	P2712	D2713	Y2714	V2715	D2716	A2717	S2718	Y2719	S2720	S2721	K2722	A2723	E2724	K2725	LYS	ALA	THR	VAL	ASP	ALA	GLU	GLY	N2734	F2735	D2736	P2737	R2738	P2739	V2740	E2741	L2742	L2743	N2744																																																																																																																																																																																																																																																																																																																				
V2745	I2746	I2747	P2748	E2749	K2750	L2751	D2752	S2753	F2754	I2755	N2756	K2757	F2758	A2759	E2760	Y2761	T2762	H2763	E2764	K2765	W2766	A2767	F2768	D2769	K2770	I2771	Q2772	N2773	M2774	W2775	S2776	Y2777	G2778	E2779	M2780	V2781	D2782	E2783	E2784	L2785	K2786	T2787	H2788	F2789	M2790	L2791	R2792	F2793	Y2794	K2795	T2796	F2797	S2798	E2799	K2800	D2801	E2802	I2803	I2804																																																																																																																																																																																																																																																																																																																			
S2685	L2686	A2687	H2688	K2689	K2690	Y2691	D2692	Q2693	E2694	L2695	Y2696	R2697	M2698	A2699	M2700	P2701	C2702	L2703	C2704	A2705	I2706	G2708	A2709	L2710	F2711	P2712	D2713	Y2714	V2715	D2716	A2717	S2718	Y2719	S2720	S2721	K2722	A2723	E2724	K2725	LYS	ALA	THR	VAL	ASP	ALA	GLU	GLY	N2734	F2735	D2736	P2737	R2738	P2739	V2740	E2741	L2742	L2743	N2744																																																																																																																																																																																																																																																																																																																				
I2603	E2604	D2605	C2606	L2607	M2608	A2609	L2610	I2614	R2615	H2621	L2622	L2623	R2624	R2625	L2626	V2627	F2628	D2629	I2632	L2633	M2634	E2635	F2636	A2637	K2638	M2639	L2643	L2644	Y2648	Y2655	C2656	L2657	F2658	T2659	G2660	N2663	S2668	E2669	E2670	E2671	L2674	K2677	L2678	F2679	L2682	F2683	D2684																																																																																																																																																																																																																																																																																																																															
S2493	F2494	A2500	M2501	M2502	V2503	L2504	E2513	D2516	F2517	L2518	D2523	V2524	G2525	F2526	M2530	R2531	A2532	A2533	D2537	T2538	F2541	S2542	T2543	E2544	E2545	L2550	N2551	R2552	A2557	V2558	L2559	F2569	A2570	G2571	T2572	E2573	A2576	D2580	L2589	S2590	R2591	G2592	R2593	S2594	K2597																																																																																																																																																																																																																																																																																																																																	
S2387	E2388	D2389	P2390	A2391	R2392	D2393	G2396	V2397	ARG	ARG	ASP	ARG	ARG	ARG	GLU	HIS	GLY	GLU	P2410	P2411	E2412	E2413	N2414	R2415	V2416	H2417	L2418	G2419	M2423	D2465	T2469	I2470	V2558	L2559	F2569	A2570	G2571	T2572	E2573	A2576	D2580	L2589	S2590	R2591	G2592	R2593	S2594	K2597																																																																																																																																																																																																																																																																																																																														
V2098	M2101	L2123	T2143	P2146	V2149	M2153	M2198	M2208	G2217	G2218	E2219	T2220	K2221	I2222	R2224	F2225	M2228	V2229	S2243	Y2256	L2265	G2266	L2290	Q2291	L2295	V2299	L2307	D2320	R2330	Y2331	L2332	V2352	L2356	R2369	L2376																																																																																																																																																																																																																																																																																																																																											
L2023	P2024	I2027	L2031	T2044	Q2045	L2046	GLU	GLY	GLU	GLU	GLU	GLU	PRO	GLU	THR	SER	LEU	SER	SER	ARG	LEU	ARG	SER	LEU	THR	VAL	ARG	VAL	LYS	LYS	GLU	PRO	GLU	GLU	LEU	PRO	ALA	GLU	E2088	K2089	K2090	P2091	Q2092	Q2095																																																																																																																																																																																																																																																																																																																																		
ALA	PRO	GLY	GLY	LYS	ASP	L1922	E1923	E1924	G1925	L1926	M1929	K1930	L1931	Y1945	D1948	A1959	A1962	V1966	Q1970	L1980	M1981	R1982	A1983	F1984	T1985	M1986	S1987	A1988	E1990	T1991	A1992	R1993	R1994	E1997	S2000	M2008	L2009	L2010	D2014	E2015	A2016	D2017	E2018	E2019																																																																																																																																																																																																																																																																																																																																		
G1790	V1791	A1792	E1793	G1816	G1823	L1849	D1856	I1862	M1865	I1866	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	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	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	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	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	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	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	GLU	GLU	GLU	GLU

V3990	G3788	S3656	F3580	G3500	G3439	R3368	T3305	I3243	T3181	GLN	V3050	V2986
M4001	M3793	R3672	G3581	D3501	G3440	A3369	A3306	P3244	Y3182	ALA	R3051	E2987
L4002	I3804	R3672	E3582	R3502	E3441	G3370	V3307	V3245	V3183	THR	L3056	K2988
L4003	I3804	F3442	E3583	V3503	F3442	K3371	T3308	V3246	E3184	GLN	F3057	S2989
L4013	M3816	I3443	E3584	S3504	I3443	V3372	S3309	D3247	K3185	VAL	L3056	H2990
L4017	L3820	Y3444	D3585	V3505	Y3444	A3374	D3310	K3248	L3186		G3058	H2991
L4017	L3820	G3681	A3586	Q3506	S3446	E3375	H3311	L3249	R3187		T3059	E2992
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L3835	Q3683	Q3683	D3588	T3508	K3447	E3377	S3313	A3251	A3189		A3061	E2994
M4026	Q3684	L3509	P3589	I3510	S3448	E3377	S3314	D3252	F3188		P3062	I2995
L4030	E3685	L3510	E3590	V3511	H3449	Q3378	S3315	I3253	L3190		V3065	K2996
M4034	E3686	A3512	K3591	A3512	M3450	L3379	L3316	L3256	G3191		L3068	F2997
M4039	E3687	T3513	F3592	T3513	F3451	R3380		A3257	Y3131		T3130	F2998
L4040	E3688	K3516	V3593	K3516	K3452	L3381		E3258	T3132		T3133	E2999
A4041	R3595	C3525	R3595	C3525	E3455	E3382		S3259	T3133		V3134	K3000
M4045	E3598	T3528	E3598	T3528	Q3456	A3383		G3260	A3195		L3070	I3001
M4047	A3601	T3532	A3601	L3532	F3458	K3384		A3261	A3135		L3071	L3002
M4057	V3602	I3533	V3602	I3533	V3459	A3385		R3262	L3136		A3072	L3003
L4058	H3605	M3534	H3606	M3534	Q3461	E3386		R3263	L3137		R3073	P3004
F4062	L3606	L3535	L3606	L3535	E3463	E3387		T3264	P3138		S3074	L3005
K4067	T3609	A3536	T3609	A3536	I3464	E3388		E3265	V3139		L3075	I3006
L4068	E3610	K3537	E3610	K3537	M3466	E3389		H3268	L3140		D3076	F3010
L4068	H3611	T3538	H3611	T3538	K3467	E3391		I3270	T3141		A3077	T3011
D4070	H3612	R3539	H3612	R3539	M3467	L3392		E3271	T3142		R3078	N3012
L4071	Y3613	Y3540	Y3613	Y3540	S3468	L3393		T3273	L3143		T3079	H3013
V4072	K3614	A3541	K3614	A3541	F3469	R3396		P3275	F3144		M3081	C3014
G4073	S3615	L3542	S3615	L3542		E3397		M3276	Q3145		K3082	L3015
S4074	G3616	K3543	G3616	K3543	A3472	F3398		L3277	N3211		G3084	Y3016
E4075	K3617	D3544	K3617	D3544	D3473	S3399		C3278	E3212		P3085	F3017
D4079	K3617	T3545	K3617	T3545	S3474	V3400		S3279	L3214		E3086	L3018
Y4080	A3618	D3546	A3618	D3546	K3475	V3400		Y3280	A3215		I3087	S3019
V4081	G3619	E3547	G3619	E3547	S3476	F3401		L3281	G3216		V3088	P3021
T4082	A3620	V3548	A3620	V3548	K3477	R3403		P3282	S3217		K3089	A3022
R4085	H3621	V3549	H3621	V3549	M3478	D3404		R3283	V3218		A3090	K3023
C4086	K3622	L3623	K3622	L3623	A3479	L3405		Y3284	Y3219		G3091	V3024
L4087	L3624	S3625	L3624	S3625	LYS	Y3406		W3284	T3220		L3092	L3025
Y4090	S3625	Q3554	S3625	Q3554	ALA	A3407		E3286	T3221		F3095	G3026
K4091	K3626	N3555	K3626	N3555	GLY	L3408		R3287	S3222		F3096	G3027
N9950	K3626	N3556	K3626	N3556	ASP	L3408		G3288	Q3162		A3099	G3028
F3951	Q3627	L3557	Q3627	L3557	ALA	Y3409		R3289	V3163		S3100	G3029
L3965	R3628	H3558	R3628	H3558	GLN	P3410		E3290	S3164		E3101	H3030
L3965	R3629	H3559	R3629	H3559	SER	P3411		A3291	C3165		D3102	S3032
Y3968	R3630	Q3560	R3630	Q3560	GLY	L3412		P3292	T3168		I3103	H3033
G3971	A3631	G3561	A3631	G3561	ASP	I3413		P3293	L3169		E3104	E3037
P3972	V3632	K3562	V3632	K3562	GLY	R3414		P3294	C3170		K3105	H3038
S4099	A3634	V3563	A3634	V3563	THR	Y3415		A3295	I3172		M3106	T3040
T4104	F3635	E3564	F3635	E3564	LYS	V3416		R3296	S3173		S3107	S3041
	F3636	G3565	F3636	G3565	LYS	L3424		P3297	L3175		E3108	L3042
	R3637	L3569	R3637	L3569	LYS	N3428		A3298	T3177		N3109	F3043
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	T3639	G3578	T3639	G3578	R3499	N3430		P3301	T3178		L3112	K3045
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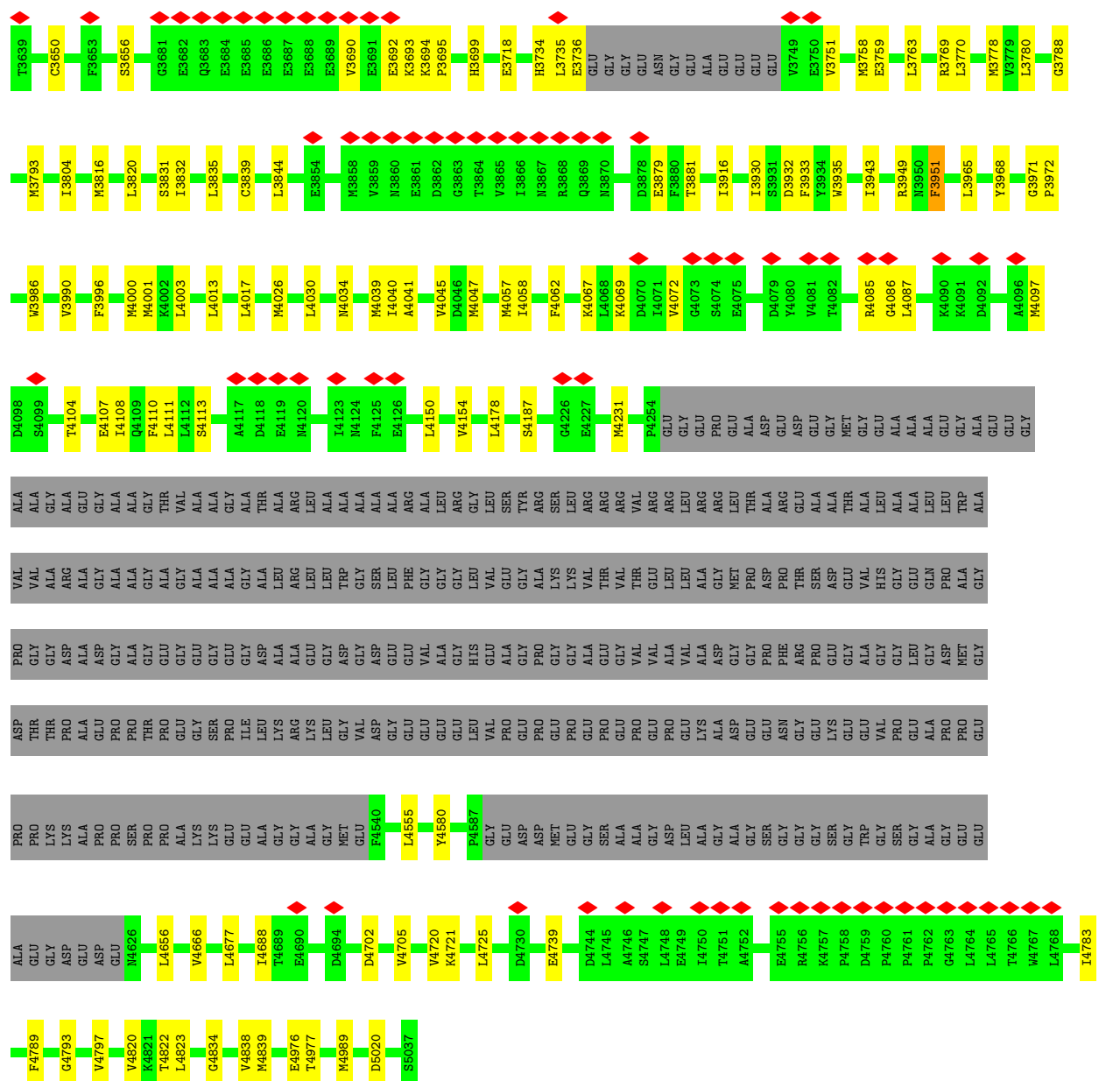


• Molecule 1: Ryanodine receptor 1

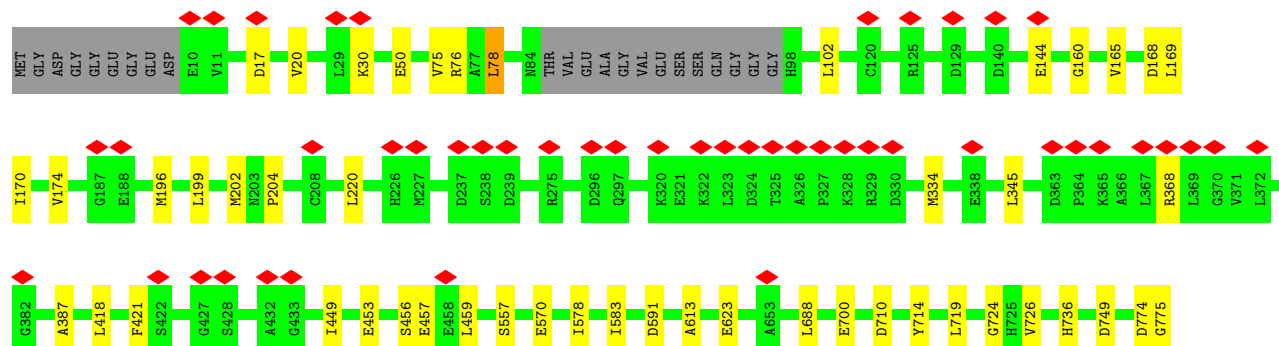
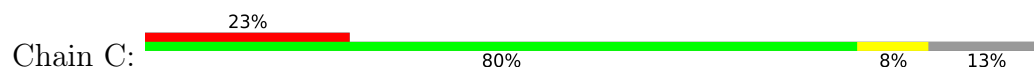


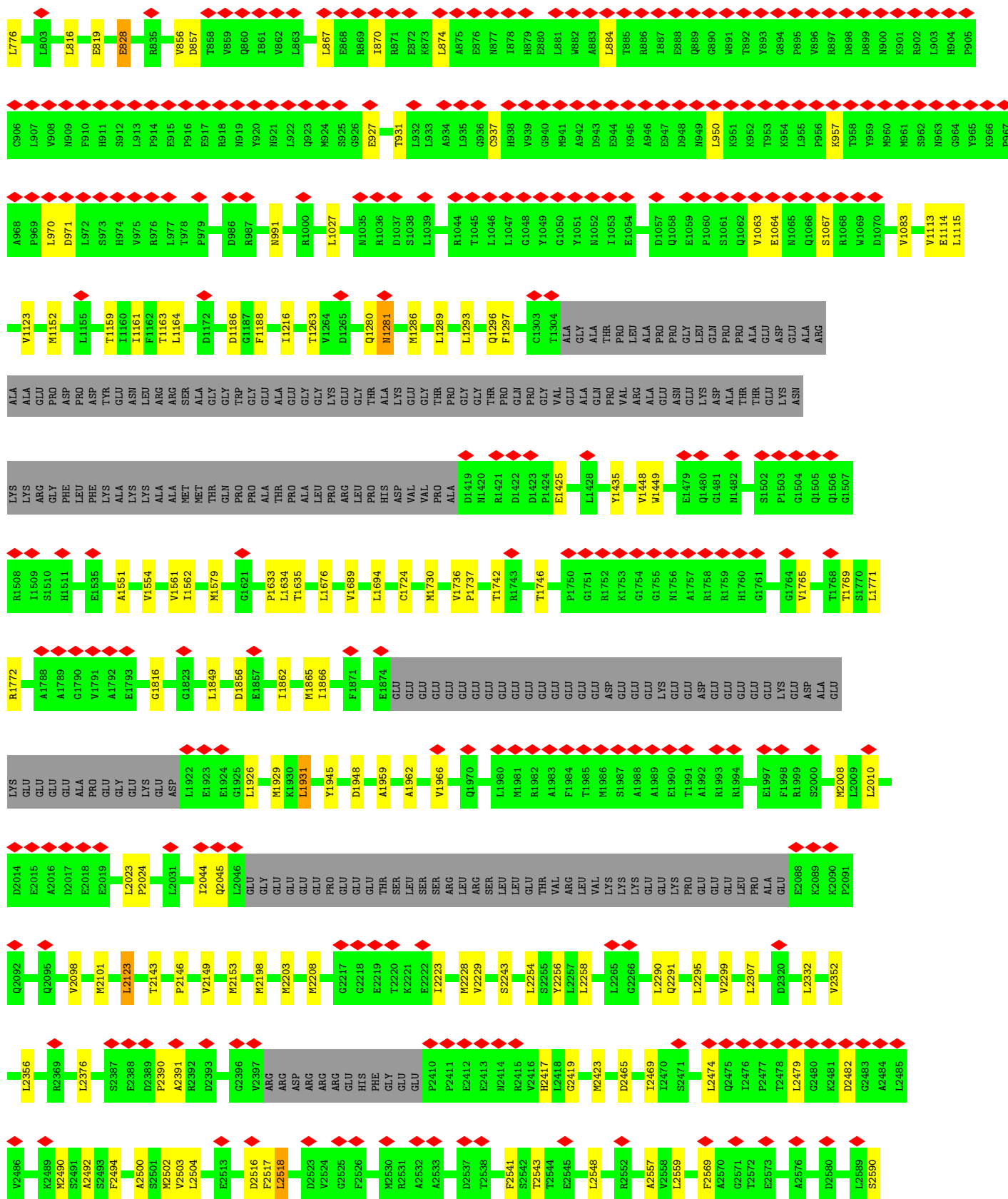
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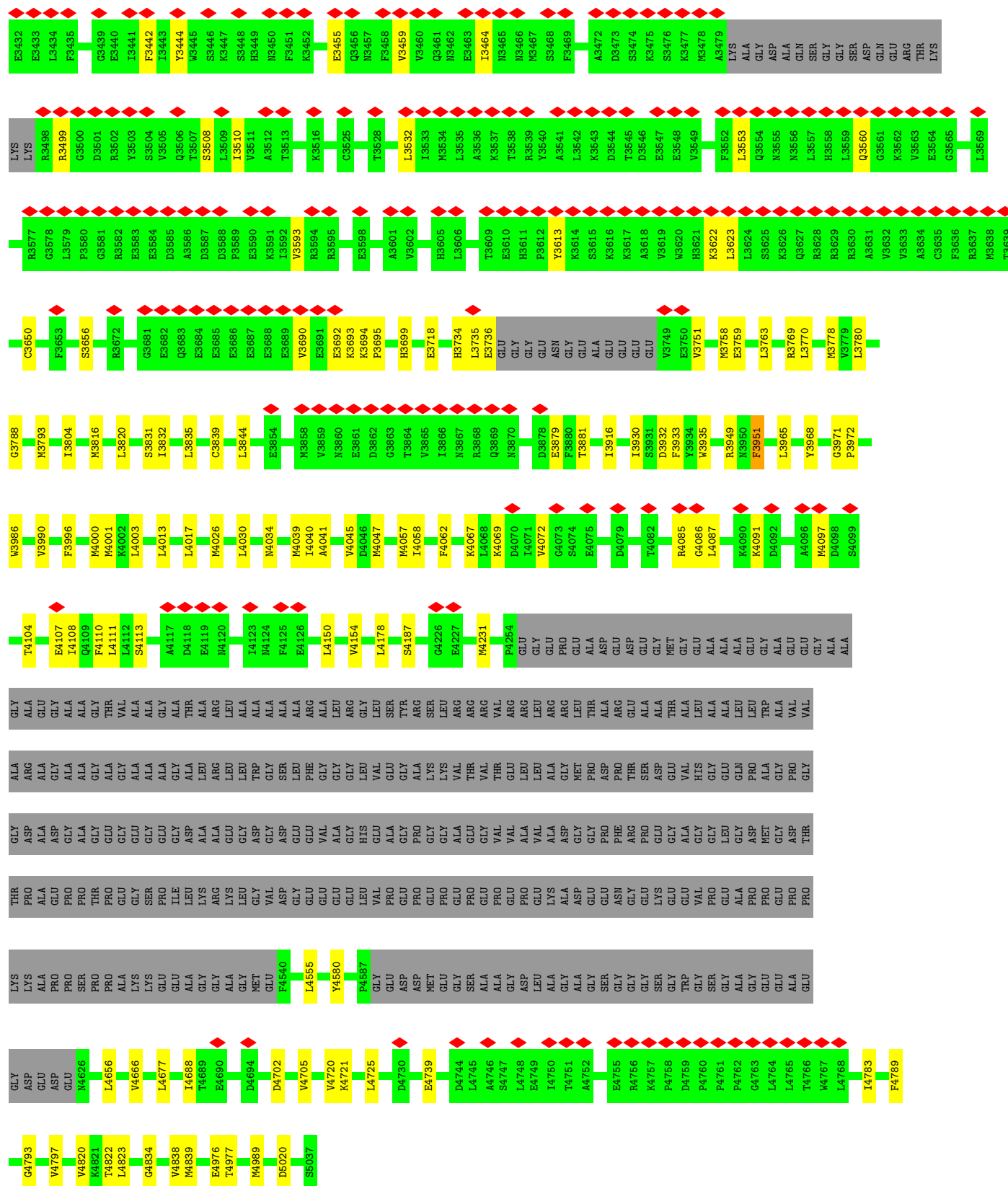


● Molecule 1: Ryanodine receptor 1



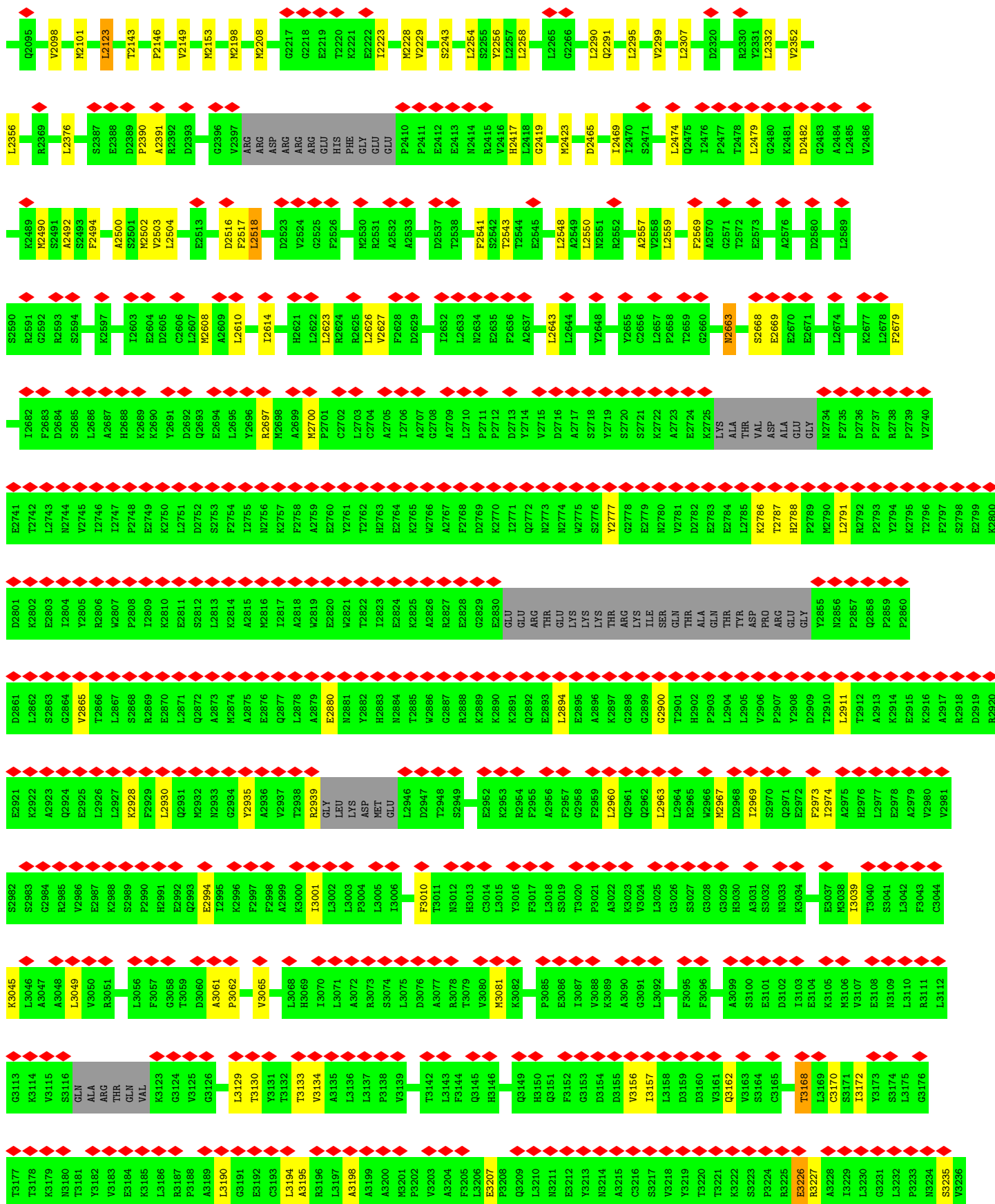


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R2920	E2921	K2922	A2923	Q2924	E2925	L2926	L2927	K2928	P2929	L2930	Q2931	N2932	K2933	Q2934	Y2935	A2936	V2937	T2938	R2939	GLY	LEU	LYS	ASP	MET	GLU	L2946	D2947	T2948	S2949											E2952	K2953	R2954	F2955	A2956	F2957	G2958	L2959	Q2961	Q2962	L2963	L2964	R2965	L2966	M2967	D2968	L2969	S2970	Q2971	Q2972	F2973	L2974	A2975	H2976	L2977	E2978	A2979	V2980																																				
V2740	E2741	T2742	L2743	T2744	V2745	L2746	T2747	P2748	E2749	K2750	L2751	D2752	S2753	F2754	T2755	K2756	K2757	F2758	A2759	E2760	Y2761	T2762	H2763	E2764	K2765	W2766	A2767	P2768	D2769	K2770	I2771	Q2772	N2773	K2774	W2775	S2776	Y2777	G2778	E2779	N2780	V2781	D2782	E2783	E2784	L2785	K2786	T2787	H2788	P2789	M2790	L2791	R2792	P2793	Y2794	K2795	T2796	P2797	S2798	P2799																																												
K2800	D2801	K2802	E2803	L2804	Y2805	R2806	H2807	P2808	L2809	K2810	E2811	D2812	L2813	K2814	A2815	M2816	L2817	A2818	L2819	E2820	N2821	T2822	L2823	E2824	K2825	A2826	K2827	E2828	G2829	E2830	GLU	GLU	ARG	THR	GLU	LYS	LYS	THR	ARG	LYS	ILE	SER	GLN	ALA	GLN	TYR	PRO	ARG	GLU	GLY	Y2855	N2856	P2857	Q2858	P2859																																																
P2860	D2861	L2862	S2863	D2864	V2865	T2866	L2867	S2868	R2869	E2870	L2871	Q2872	A2873	M2874	A2875	E2876	Q2877	L2878	A2879	E2880	N2881	Y2882	H2883	N2884	T2885	W2886	G2887	R2888	K2889	K2890	K2891	Q2892	L2894	E2895	A2896	K2897	G2898	G2899	G2900	T2901	H2902	P2903	L2904	L2905	L2906	P2907	Y2908	D2909	T2910	L2911	T2912	A2913	K2914	E2915	K2916	A2917	R2918	D2919																																													
R2591	Q2592	R2593	S2594	K2597		I2603		E2604	D2605	C2606	L2607	R2608	A2609	L2610	I2614		H2621		L2622	L2623	R2624	R2625	L2626	V2627	F2628	D2629	I2632		L2633	R2634	E2635	F2636	A2637	R2638	M2639	L2643		L2644	I2648		I2655		C2656	L2657	P2658	T2659	Q2660	M2663		S2668		E2669	E2670	E2671	L2674		K2677	L2678																																													
F2679	I2682		F2683	D2684	S2685		L2686	A2687	H2688	K2689	K2690	Y2691	D2692	Q2693	E2694	L2695		Y2696	R2697		M2698	A2699	M2700	P2701	C2702	L2703	C2704	A2705	I2706	A2707	G2708	A2709	L2710	P2711	P2712	D2713	Y2714	Y2715	D2716	A2717	S2718	Y2719	S2720	S2721	K2722	A2723	E2724	K2725	LYS	ALA	THR	ASP	VAL	ASP	ALA	GLU	GLY	N2734	F2735	D2736	P2737	R2738	P2739																																								

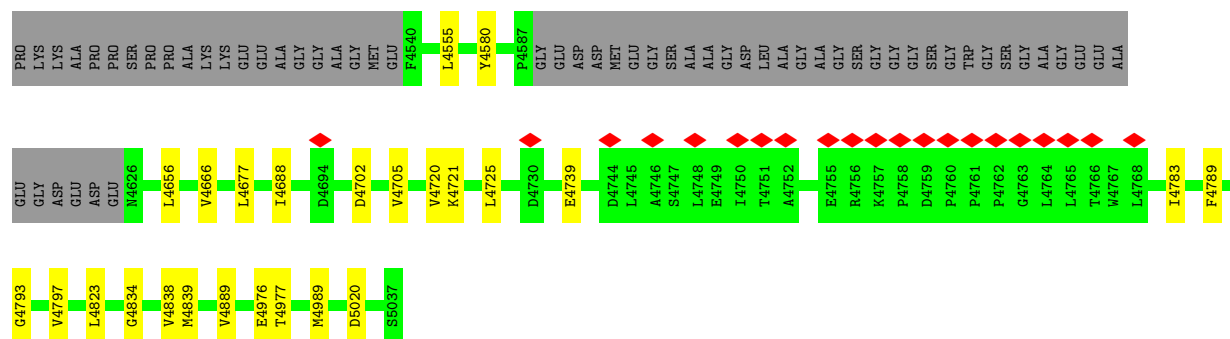


- Molecule 1: Ryanodine receptor 1

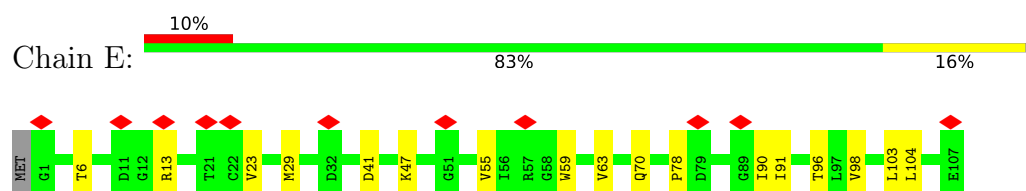




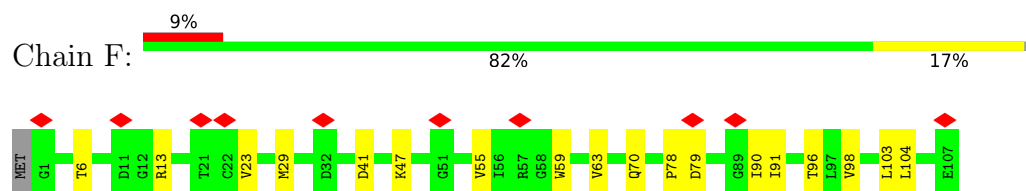




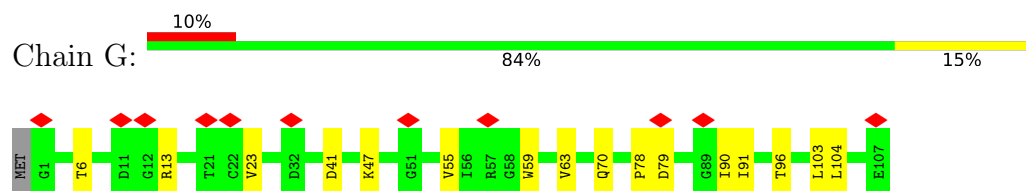
- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



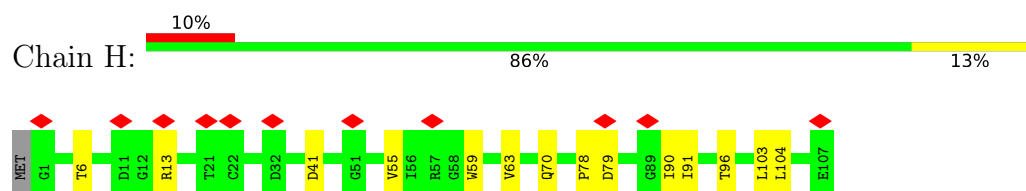
- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



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



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



4 Experimental information

Property	Value	Source
EM reconstruction method	SUBTOMOGRAM AVERAGING	Depositor
Imposed symmetry	POINT, C4	Depositor
Number of subtomograms used	13726	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	132	Depositor
Minimum defocus (nm)	1800	Depositor
Maximum defocus (nm)	3800	Depositor
Magnification	64000	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	5.530	Depositor
Minimum map value	0.000	Depositor
Average map value	0.033	Depositor
Map value standard deviation	0.181	Depositor
Recommended contour level	0.779	Depositor
Map size (Å)	409.80002, 409.80002, 409.80002	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.366, 1.366, 1.366	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	0.10	0/35885	0.27	0/48603
1	B	0.10	0/35885	0.27	0/48603
1	C	0.10	0/35885	0.27	0/48603
1	D	0.10	0/35885	0.27	0/48603
2	E	0.14	0/851	0.32	0/1146
2	F	0.13	0/851	0.31	0/1146
2	G	0.13	0/851	0.31	0/1146
2	H	0.13	0/851	0.31	0/1146
All	All	0.10	0/146944	0.27	0/198996

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	35088	34740	34715	258	0
1	B	35088	34740	34715	261	0
1	C	35088	34740	34715	262	0
1	D	35088	34740	34715	265	0
2	E	832	829	831	12	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	832	829	831	12	0
2	G	832	829	831	11	0
2	H	832	829	831	11	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
All	All	143684	142276	142184	1070	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 4.

The worst 5 of 1070 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:D:2503:VAL:HG11	1:D:2557:ALA:HB1	1.62	0.81
1:B:2503:VAL:HG11	1:B:2557:ALA:HB1	1.61	0.81
1:C:2503:VAL:HG11	1:C:2557:ALA:HB1	1.62	0.80
1:A:2503:VAL:HG11	1:A:2557:ALA:HB1	1.61	0.80
1:D:2307:LEU:O	1:D:2307:LEU:HD23	1.83	0.78

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	4376/5037 (87%)	4180 (96%)	196 (4%)	0	100	100
1	B	4376/5037 (87%)	4180 (96%)	196 (4%)	0	100	100
1	C	4376/5037 (87%)	4179 (96%)	197 (4%)	0	100	100
1	D	4376/5037 (87%)	4177 (96%)	199 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	E	105/108 (97%)	102 (97%)	3 (3%)	0	100	100
2	F	105/108 (97%)	102 (97%)	3 (3%)	0	100	100
2	G	105/108 (97%)	102 (97%)	3 (3%)	0	100	100
2	H	105/108 (97%)	102 (97%)	3 (3%)	0	100	100
All	All	17924/20580 (87%)	17124 (96%)	800 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	3827/4276 (90%)	3772 (99%)	55 (1%)	59	71
1	B	3827/4276 (90%)	3773 (99%)	54 (1%)	59	71
1	C	3827/4276 (90%)	3773 (99%)	54 (1%)	59	71
1	D	3827/4276 (90%)	3770 (98%)	57 (2%)	57	70
2	E	89/90 (99%)	88 (99%)	1 (1%)	65	74
2	F	89/90 (99%)	88 (99%)	1 (1%)	65	74
2	G	89/90 (99%)	88 (99%)	1 (1%)	65	74
2	H	89/90 (99%)	88 (99%)	1 (1%)	65	74
All	All	15664/17464 (90%)	15440 (99%)	224 (1%)	57	71

5 of 224 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	710	ASP
2	F	55	VAL
1	C	2911	LEU
1	D	4889	VAL
1	D	2939	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 111 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	582	HIS
1	D	4836	GLN
1	C	2892	GLN
1	D	4832	HIS
1	D	2892	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 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

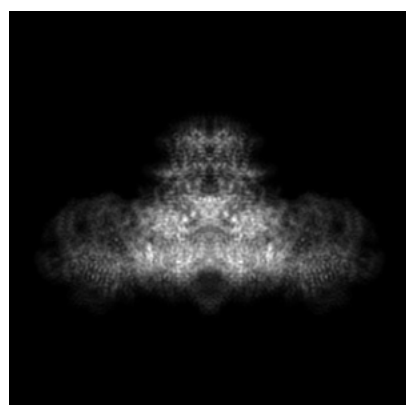
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-54597. These allow visual inspection of the internal detail of the map and identification of artifacts.

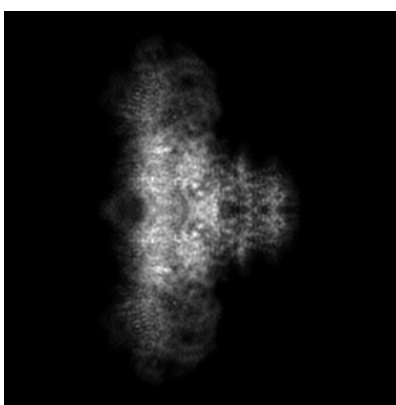
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

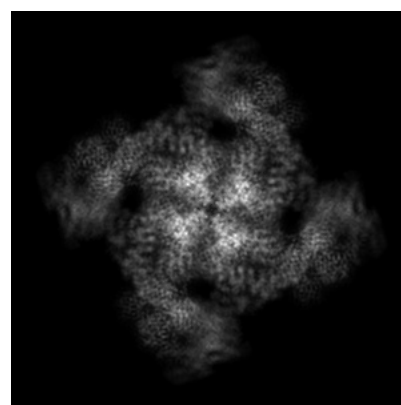
6.1.1 Primary map



X



Y



Z

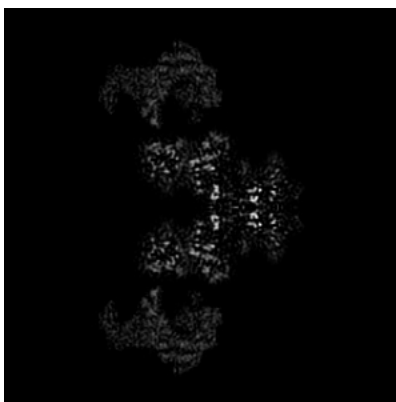
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

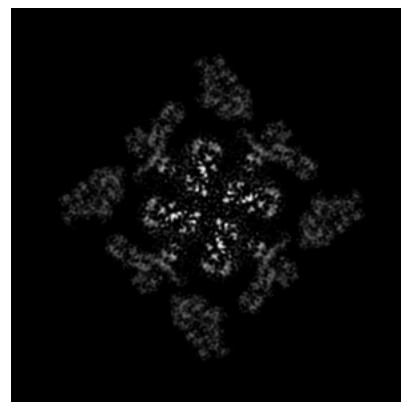
6.2.1 Primary map



X Index: 150



Y Index: 150

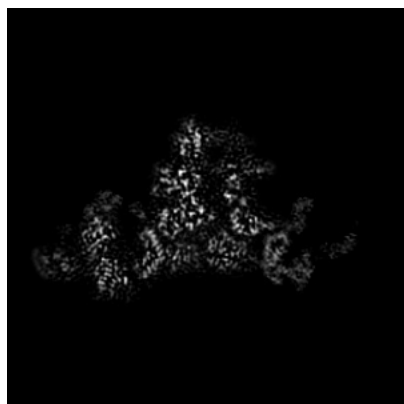


Z Index: 150

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: 127



Y Index: 127

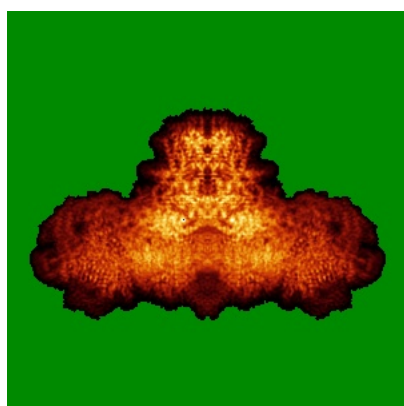


Z Index: 114

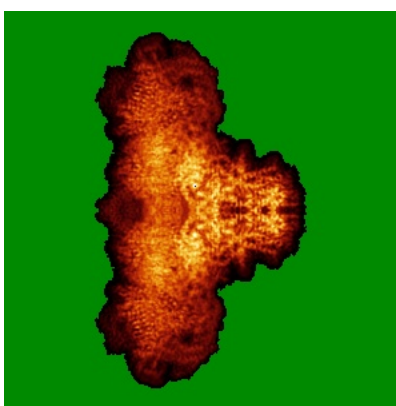
The images above show the largest variance slices of the map in three orthogonal directions.

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

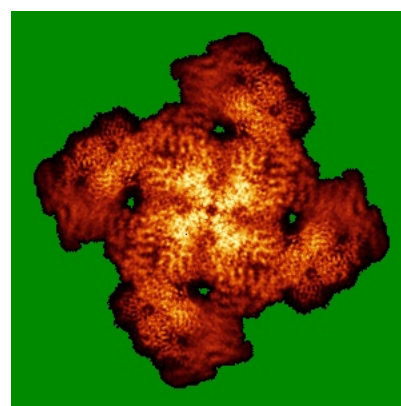
6.4.1 Primary map



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

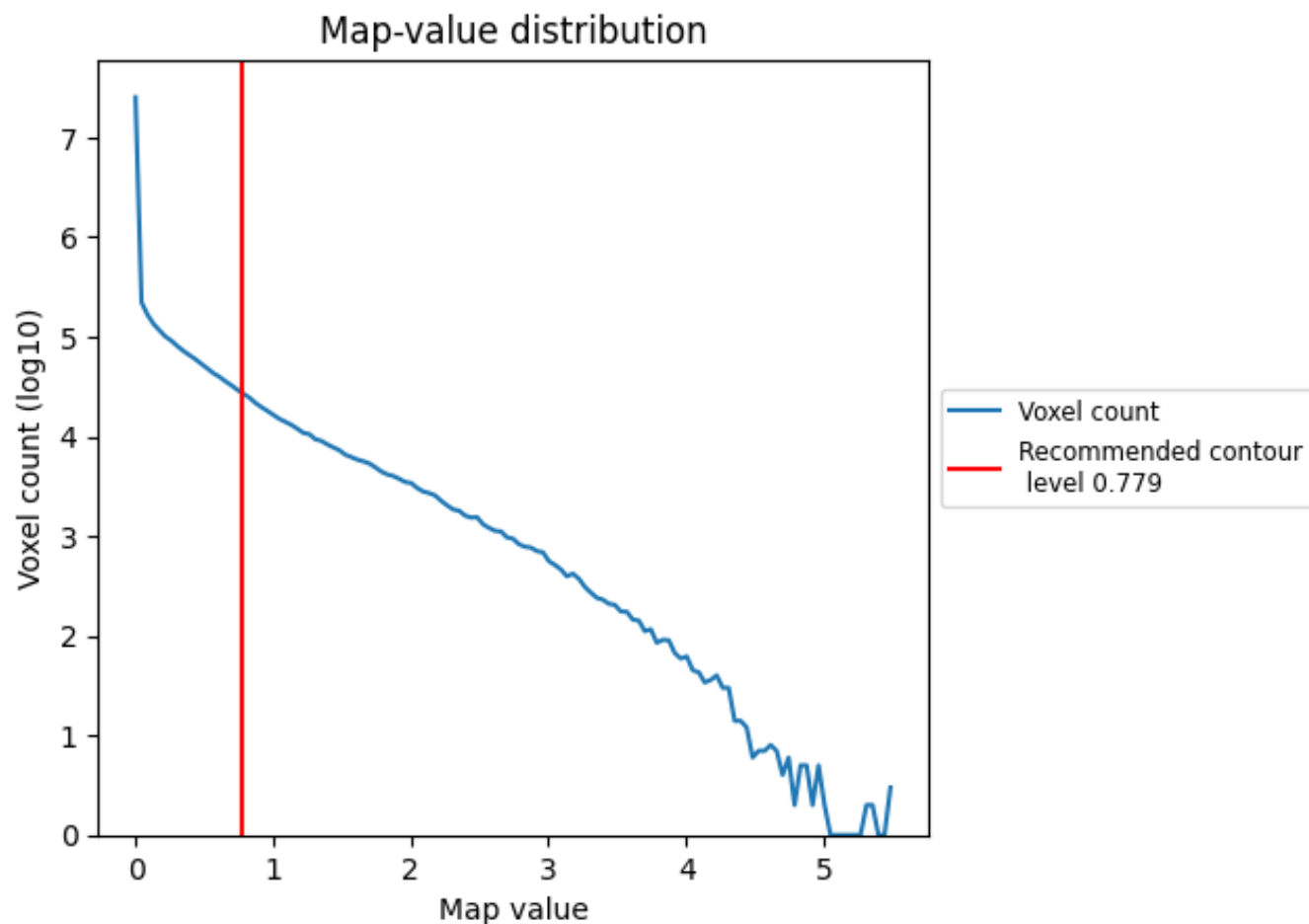
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

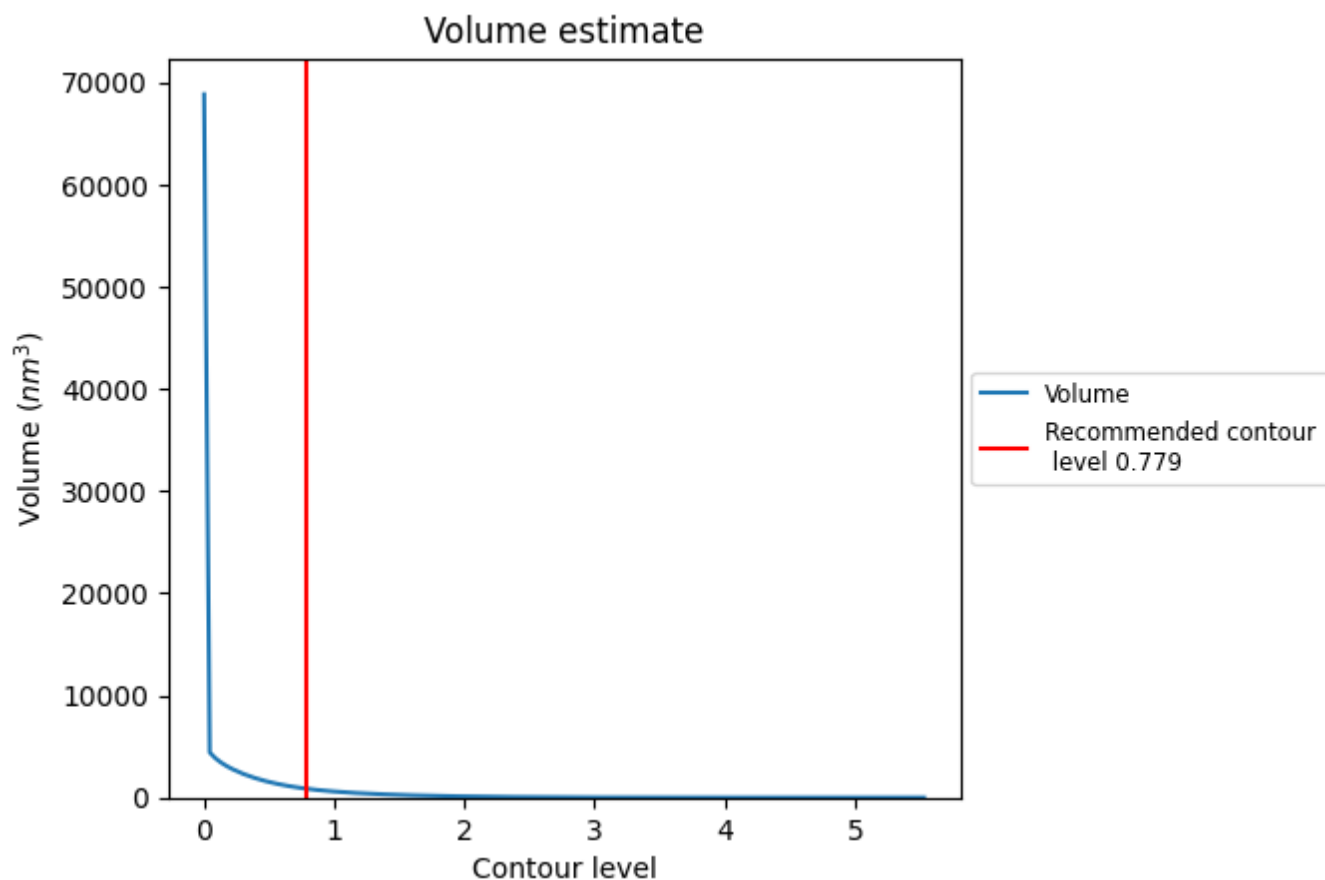
This section contains the results of statistical analysis of the map.

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.

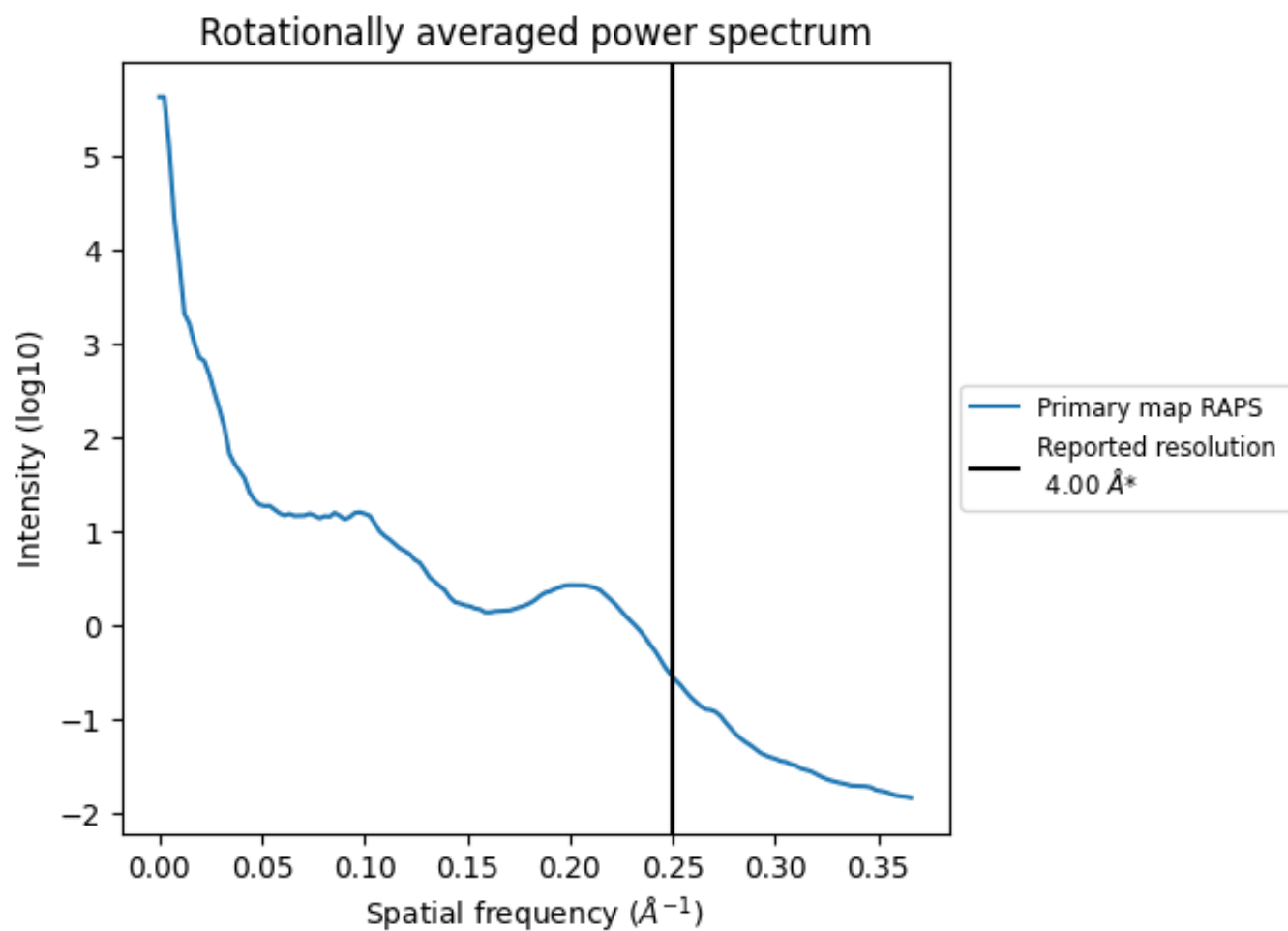
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 880 nm³; this corresponds to an approximate mass of 794 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.250 Å⁻¹

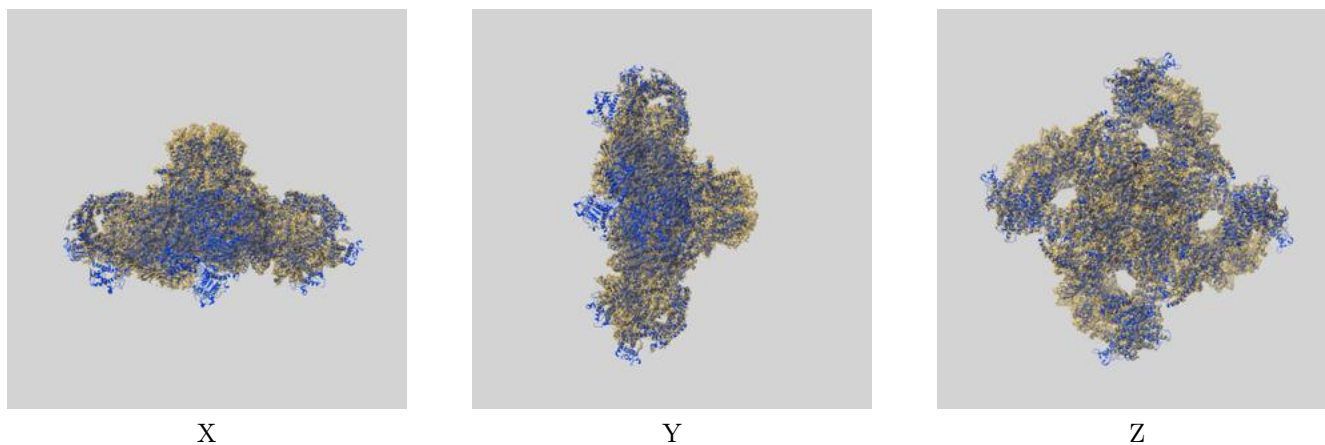
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

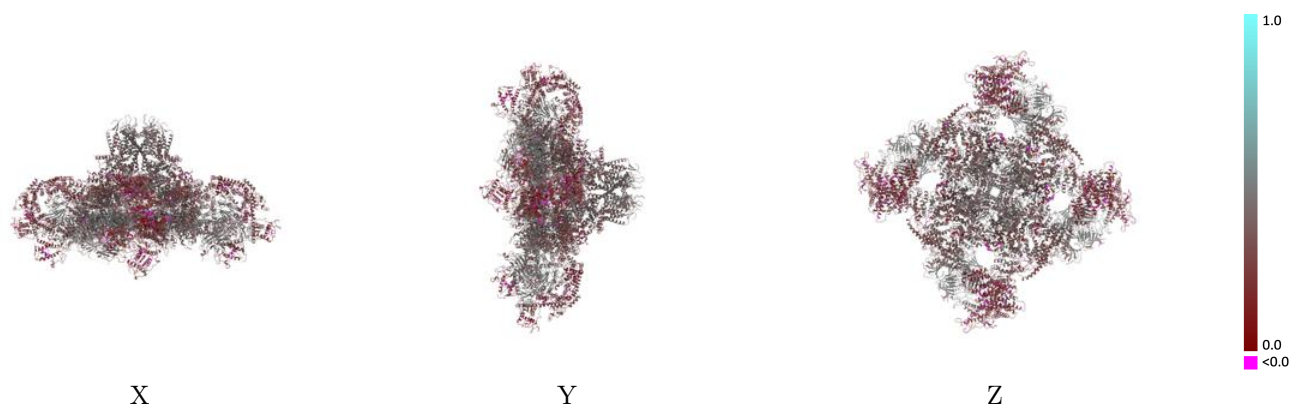
This section contains information regarding the fit between EMDB map EMD-54597 and PDB model 9S5F. Per-residue inclusion information can be found in section [3](#) on page [5](#).

9.1 Map-model overlay [i](#)



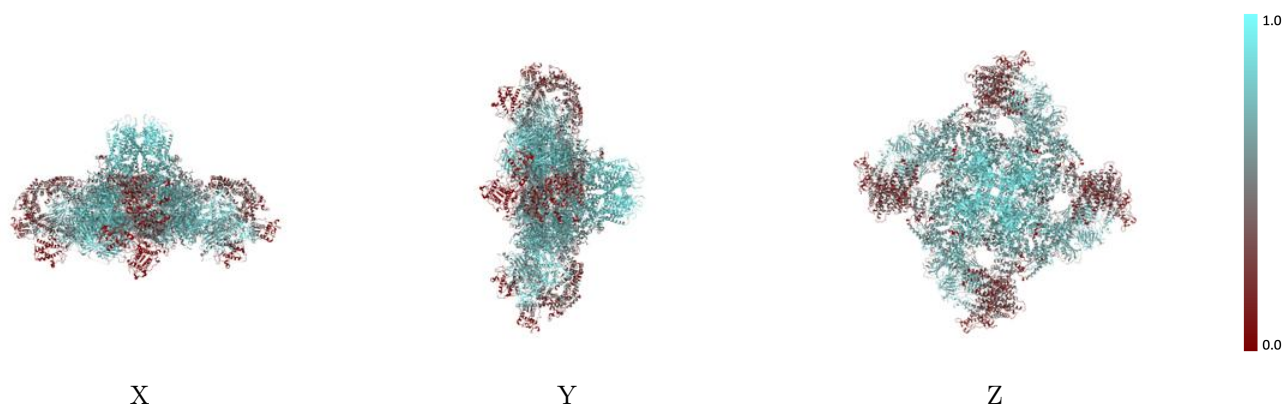
The images above show the 3D surface view of the map at the recommended contour level 0.779 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



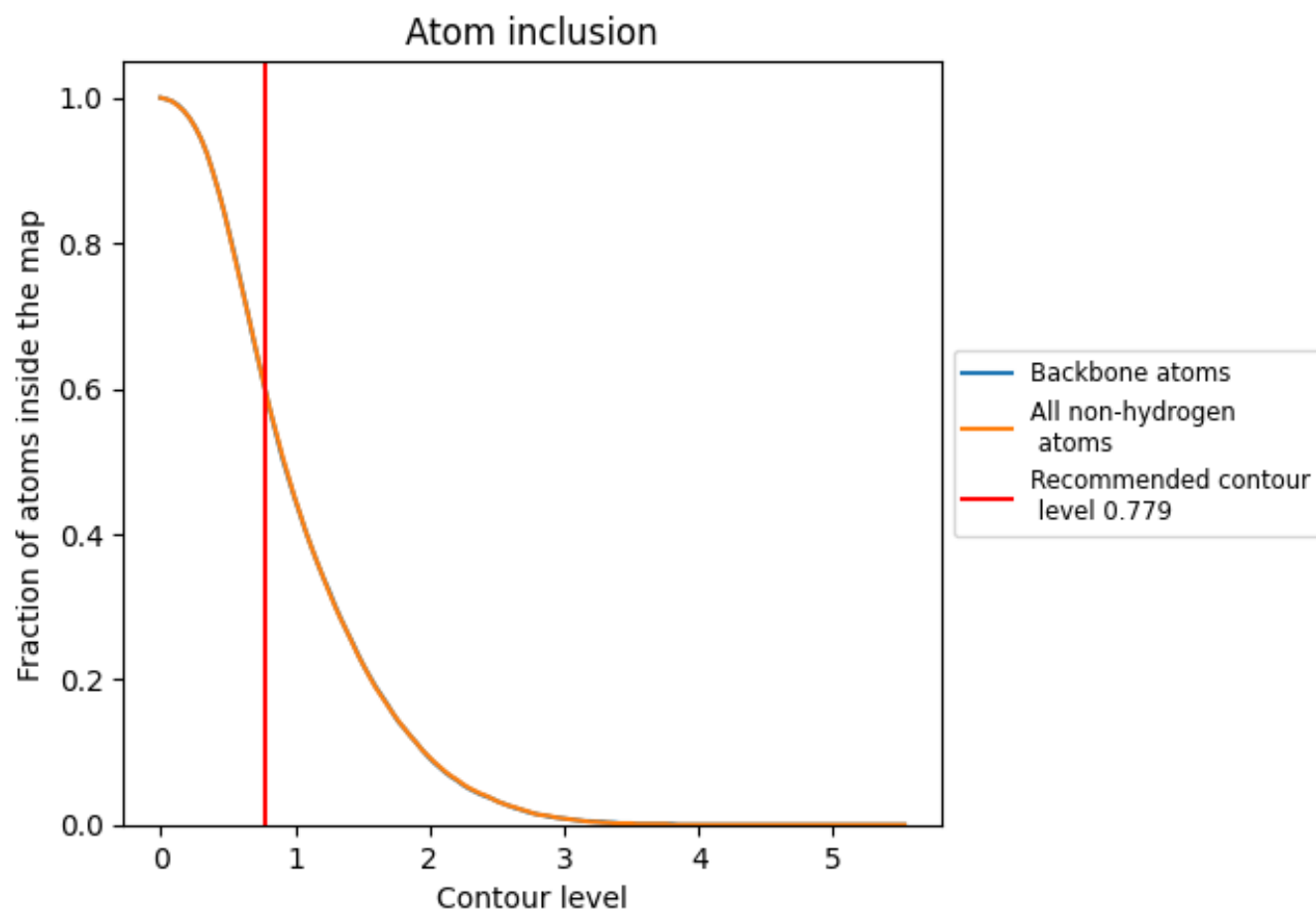
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.779).

9.4 Atom inclusion [i](#)



At the recommended contour level, 60% of all backbone atoms, 60% 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 (0.779) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5970	0.3560
A	0.6030	0.3540
B	0.6030	0.3540
C	0.6030	0.3540
D	0.6050	0.3540
E	0.6590	0.4340
F	0.6630	0.4370
G	0.6580	0.4380
H	0.6530	0.4350

1.0

0.0

<0.0