



wwPDB EM Validation Summary Report ⓘ

Nov 11, 2024 – 06:45 AM EST

PDB ID : 9E1C
EMDB ID : EMD-47389
Title : Structure of RyR1 in the primed state in the presence of IBMX
Authors : Miotto, M.C.; Marks, A.R.
Deposited on : 2024-10-21
Resolution : 2.63 Å (reported)
Based on initial model : 7TZC

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev113
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

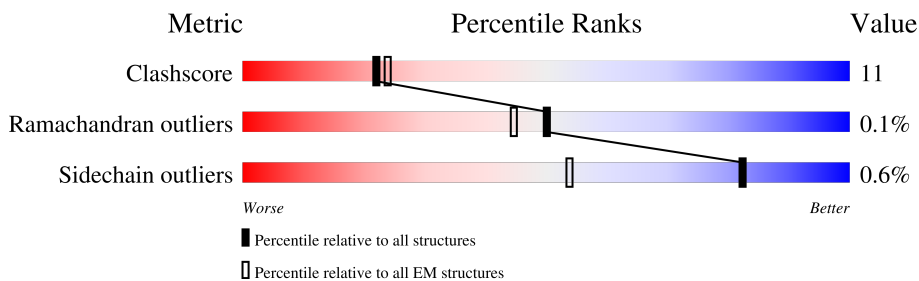
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.63 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



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

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

Mol	Chain	Length	Quality of chain
1	A	5037	
1	B	5037	
1	C	5037	
1	D	5037	
2	E	108	
2	F	108	
2	G	108	
2	H	108	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 144120 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Ryanodine receptor 1.

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	E	107	Total 831	C 527	N 146	O 154	S 4	0	0
2	H	107	Total 831	C 527	N 146	O 154	S 4	0	0
2	G	107	Total 831	C 527	N 146	O 154	S 4	0	0
2	F	107	Total 831	C 527	N 146	O 154	S 4	0	0

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



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

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

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

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

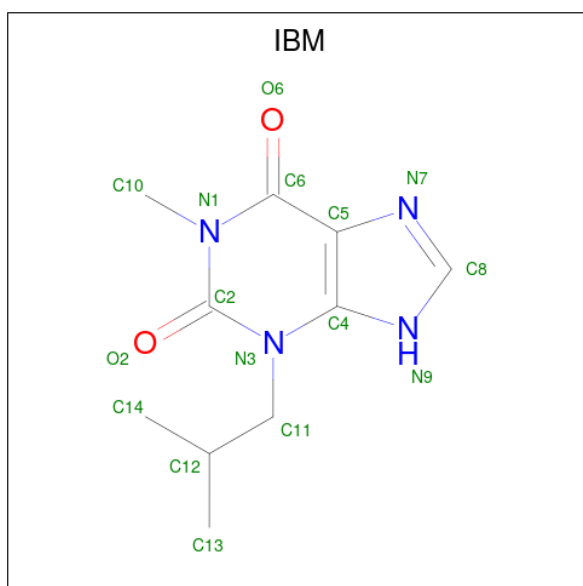
Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
5	A	1	Total	Zn	0
			1	1	

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

- Molecule 6 is 3-ISOBUTYL-1-METHYLNANTHINE (three-letter code: IBM) (formula: $C_{10}H_{14}N_4O_2$) (labeled as "Ligand of Interest" by depositor).

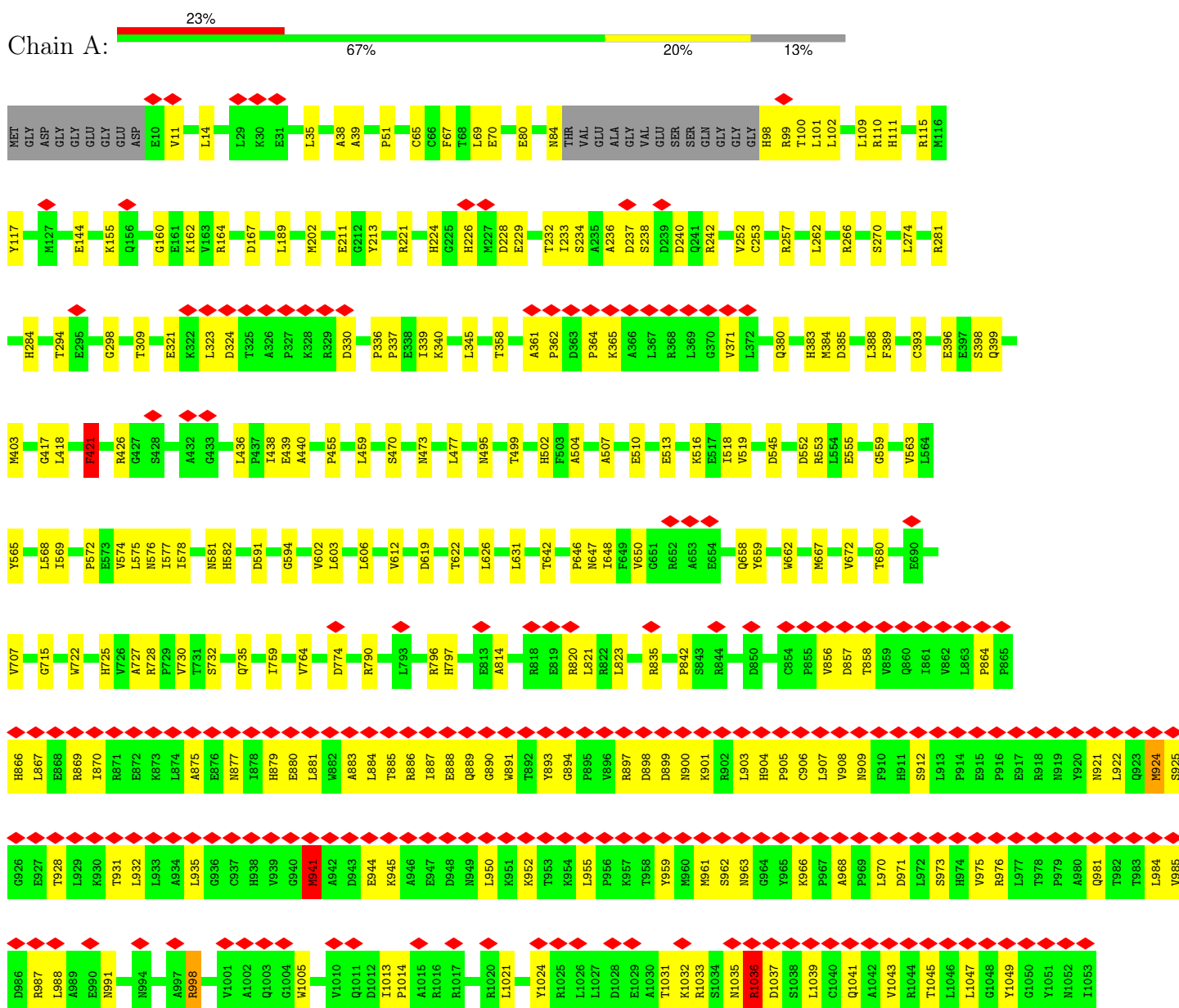


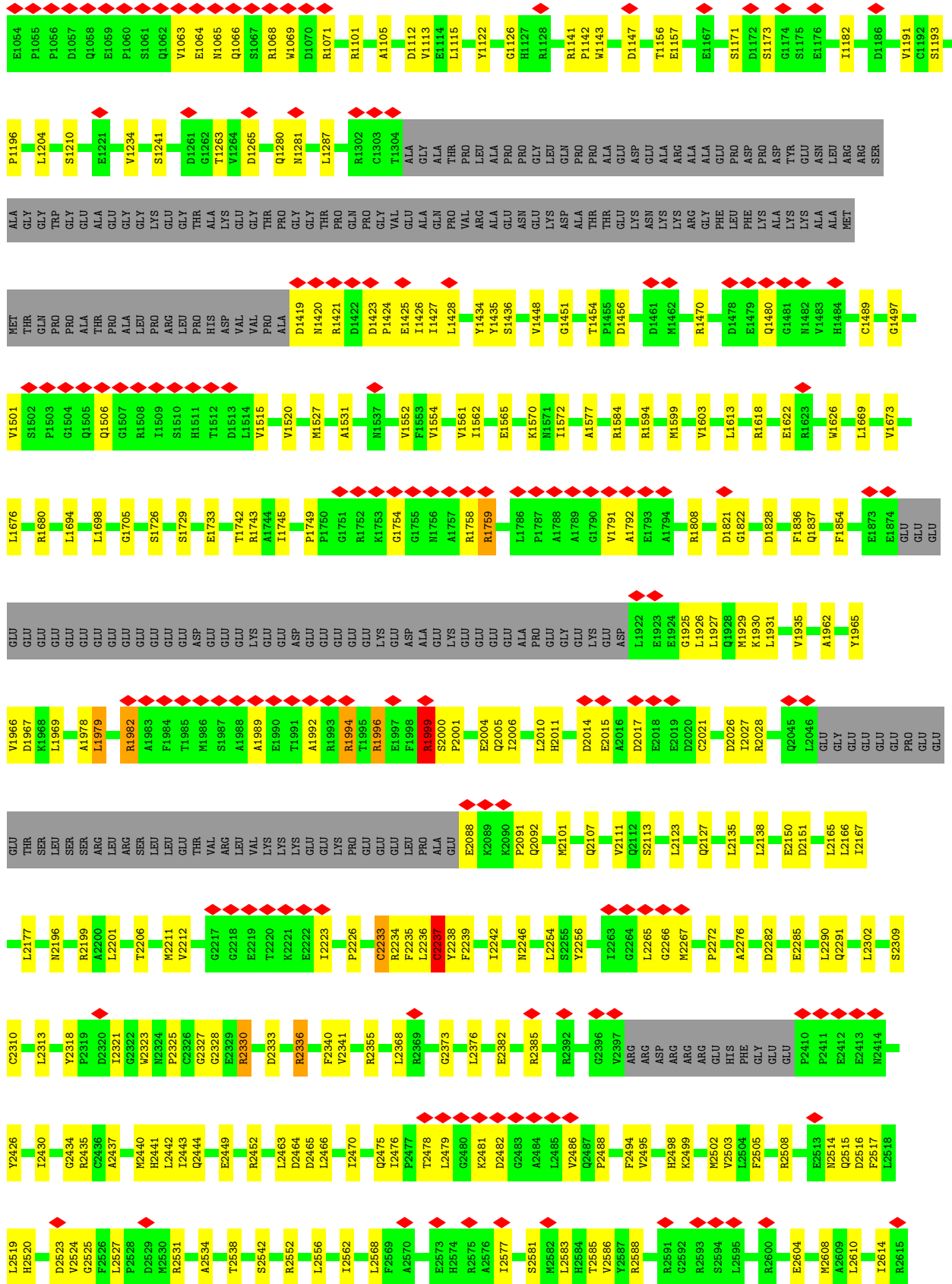
Mol	Chain	Residues	Atoms				AltConf
6	A	1	Total	C	N	O	0
			16	10	4	2	
6	B	1	Total	C	N	O	0
			16	10	4	2	
6	D	1	Total	C	N	O	0
			16	10	4	2	
6	C	1	Total	C	N	O	0
			16	10	4	2	

3 Residue-property plots

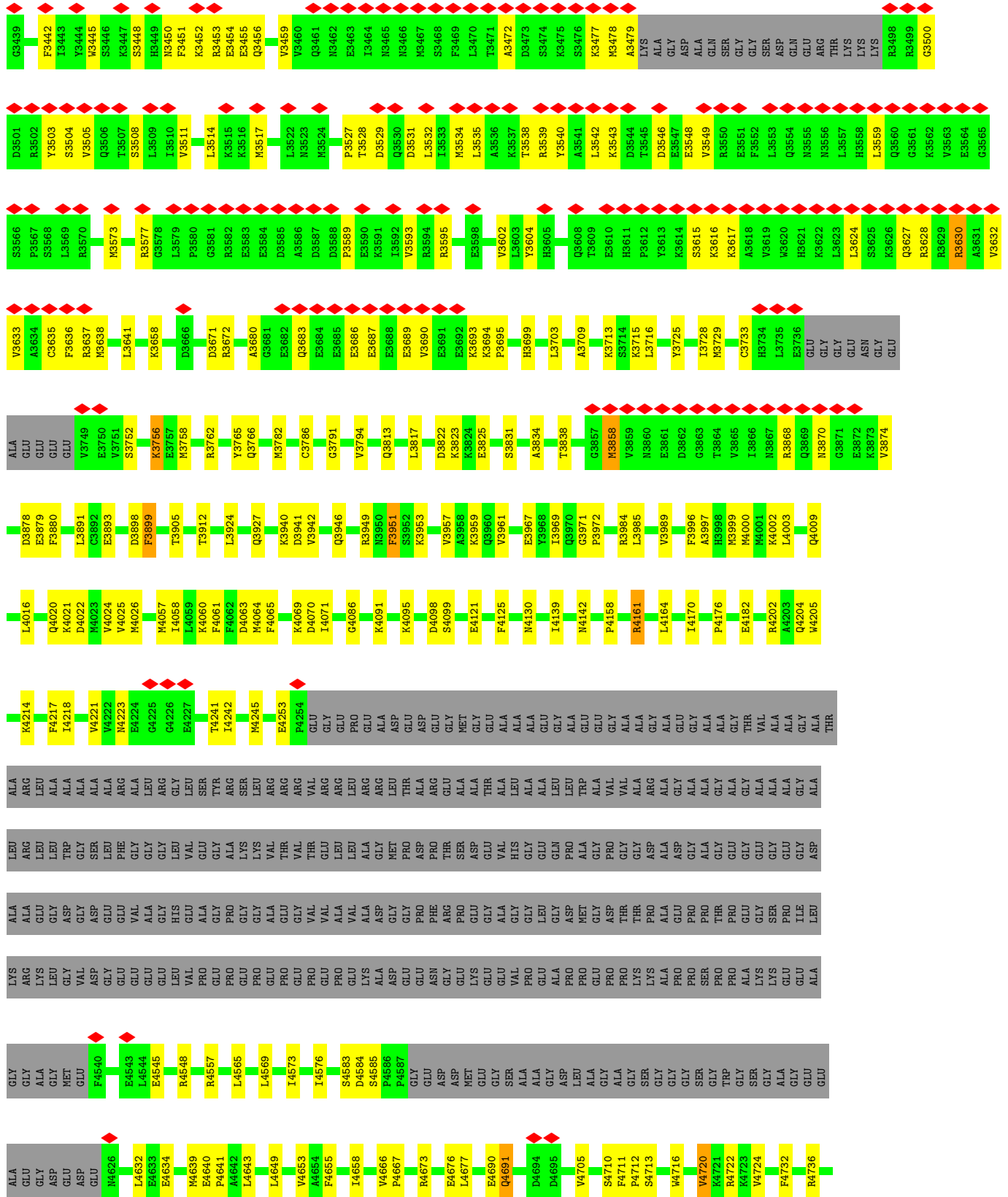
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

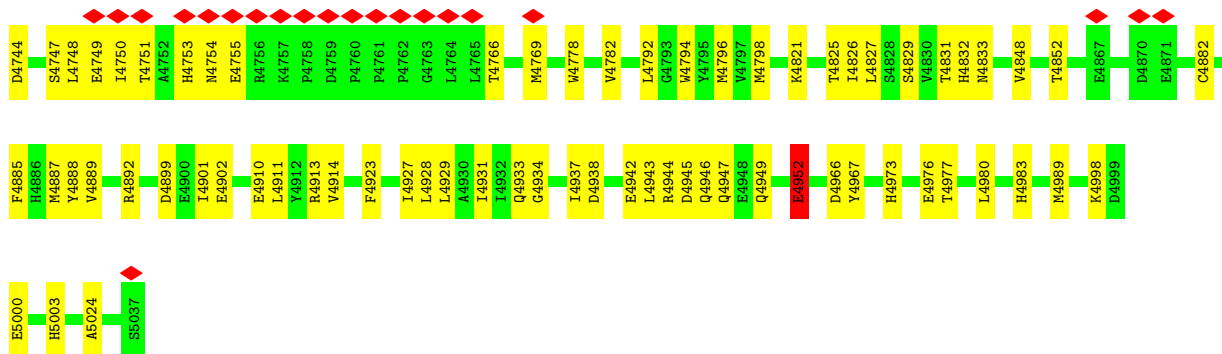
• Molecule 1: Ryanodine receptor 1



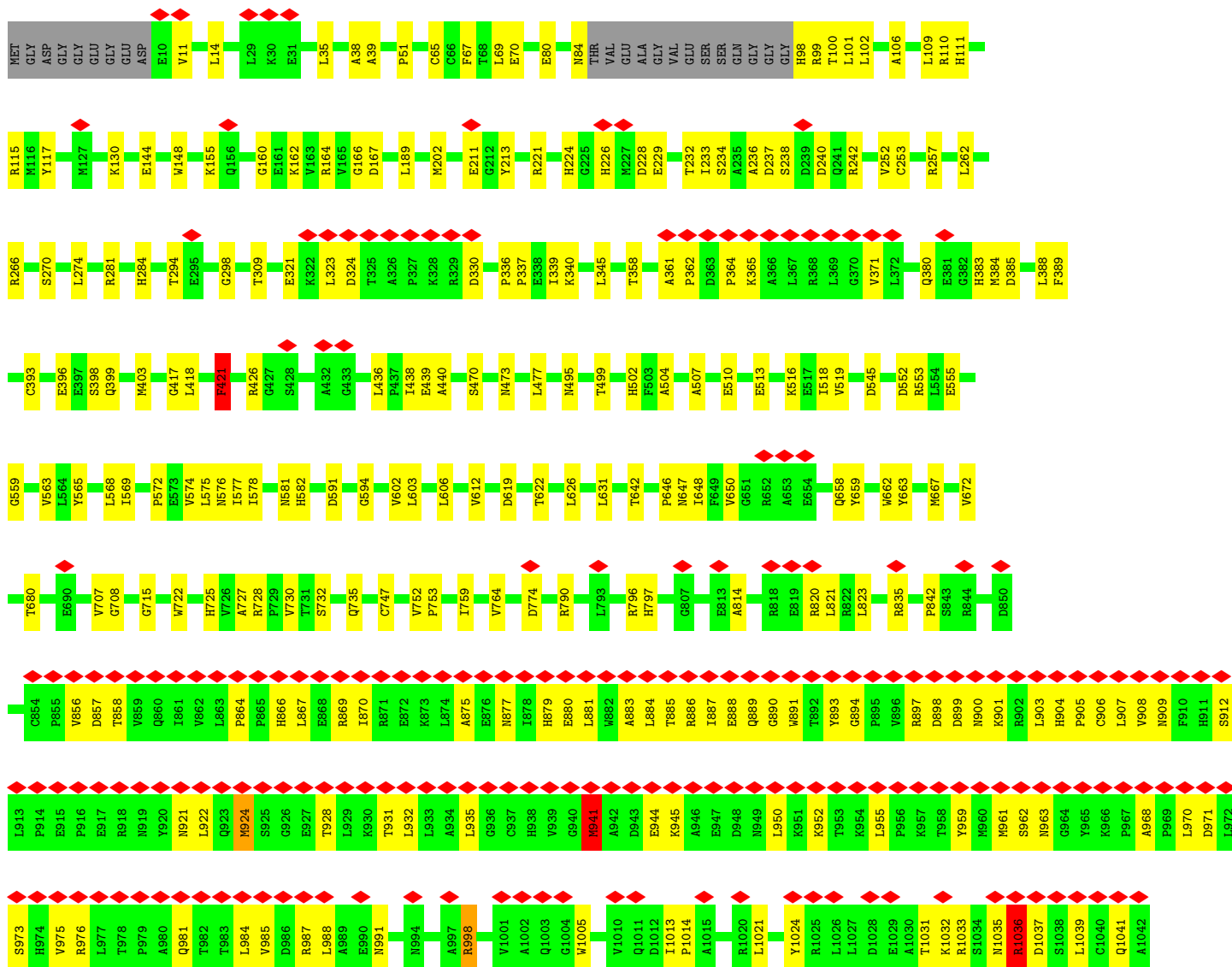


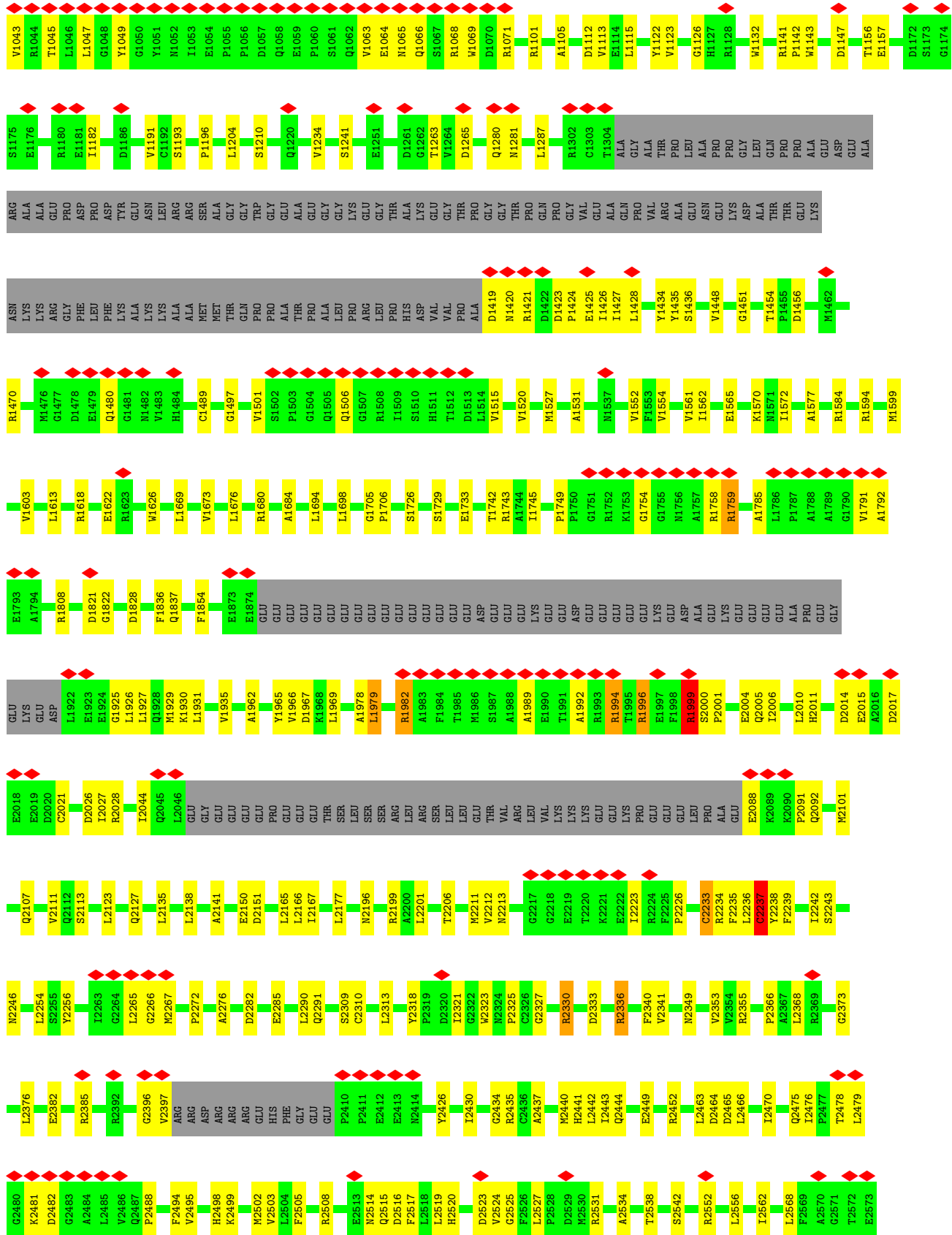
R3366	R3367	R3368	A3369	G3370	K3371	V3372	V3373	A3374	E3375	E3376	E3377	G3378	L3379	R3380	L3381	E3382	A3383	K3384	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	D3396	E3397	V3400	L3401	C3402	R3403	D3404	L3405	Y3406	A3407	L3408	V3409	P3410	L3411	L3412	L3413	R3414	D3417	E3426	N3430	L3434	F3435	G3436	R3437	V3438										
P3303	C3304	T3305	A3306	V3307	T3308	S3309	D3310	H3311	L3312	N3313	L3316	G3317	N3318	L3319	L3320	R3321	I3322	I3323	V3324	N3325	A3326	A3327	G3328	I3329	D3330	E3331	A3332	T3333	V3334	M3335	K3336	R3337	L3338	A3339	V3340	F3341	A3342	Q3343	P3344	I3345	V3346	S3347	R3348	A3349	R3350	L3353	L3354	H3357	F3358	I3359	T3361	I3362	G3363	R3364	L3365								
P3241	D3242	I3243	P3244	V3245	L3246	D3247	R3248	L3249	M3250	A3251	D3252	I3253	A3257	E3258	S3259	G3260	A3261	R3262	Y3263	T3264	E3265	M3266	P3267	H3268	V3269	I3270	E3271	I3272	T3273	L3274	P3275	M3276	L3277	C3278	S3279	L3281	P3282	R3283	W3284	W3285	E3286	R3287	G3288	P3289	E3290	A3291	P3292	P3293	A3294	A3295	L3296	P3297	A3298	G3299	A3300	P3301	P3302						
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S3116	G3117	ALA	ARG	THR	GLN	VAL	K3123	G3124	V3125	G3126	Q3127	N3128	L3129	L3130	Y3131	T3132	T3133	A3134	L3135	L3136	L3137	P3138	V3139	L3140	M3141	L3142	F3143	L3144	Q3145	Q3149	H3150	Q3151	F3152	G3153	D3154	D3155	V3156	L3157	L3158	D3159	D3160	V3161	C3165	R3166	Y3167	T3168	L3169	C3170	K3105	M3106	V3107	E3108	N3109	L3110	R3111	L3112	G3113	N3130					
E2994	L2995	K2996	F2997	F2998	D3060	A3061	F3062	A3063	V3064	V3065	N3066	C3067	L3068	H3069	L3070	L3071	A3072	R3073	S3074	L3075	D3076	A3077	R3078	T3079	V3080	M3081	L3143	K3082	S3083	C3084	F3085	E3086	L3087	V3088	K3089	A3090	G3091	G3092	H3093	A3031	S3032	N3033	K3034	A2975	E3097	L2977	E2978	A2979	V2980	L3042	F3043	S2982	C3044	K3045	M3046	A3047	E3048	L3049	H3052	R3053	V3054	S3055	
M2933	G2934	Y2935	F2936	A2937	V2938	T2939	R2939	GLY	I3001	LYS	ASP	MET	GLU	L2946	D2947	T2948	S2949	F3010	A3072	T2951	E2952	R2953	F2955	F2957	G2958	F2959	L2960	L2963	L2964	R2965	W2966	M2967	L2968	L2969	L2970	P2971	S2972	G3028	G3029	H3030	A3031	S3032	N3033	K3034	A2975	E3097	L2977	E2978	A2979	V2980	L3042	F3043	S2982	C3044	K3045	M3046	A3047	E3048	L3049	H3052	R3053	V3054	S3055
L2813	K2814	A2815	M2816	L2817	W2819	E2820	W2821	T2822	L2823	E2824	K2825	A2826	R2827	E2828	G2829	E2830	GLU	GLU	ARG	THR	ILE	SER	GLN	THR	ALA	GLN	THR	TVR	ASP	PRO	ARG	GLU	GLY	Y2885	M2856	F2857	Q2858	F2859	P2860	L2861	D2862	S2863	G2864	V2865	K2800	D2801	K2802	V2803	I2804	R2805	E2806	L2807	E2870	L2871	Q2872								
M2618	L2623	R2624	L2625	V2627	F2628	D2629	V2630	P2631	L2632	L2633	M2634	E2635	F2636	A2637	P2640	L2641	K2642	L2643	L2644	Y2648	E2649	R2650	C2651	Y2655	C2656	L2657	P2658	L2659	T2660	C2660	V2666	T2667	S2668	E2669	H2673	L2674	T2675	R2676	R2677	L2678	L2682	F2683	D2684	S2685	L2686	A2687	H2688	K2689	R2690	Y2691	D2692												
Q2693	E2694	L2695	Y2696	R2697	M2698	A2699	M2700	P2701	C2702	L2703	C2704	A2705	I2706	A2707	G2708	A2709	L2710	P2711	D2713	Y2714	Z2715	D2716	A2717	S2718	Y2719	S2720	S2721	K2722	A2723	E2724	K2725	LYS	THR	ALA	VAL	ASP	ALA	GLU	N2790	L2791	R2792	P2793	Y2794	K2795	T2796	F2797	E2798	E2799	K2800	L2743	N2744	V2745	I2746	P2748	E2749	K2750	L2751	D2752					
S2753	F2754	I2755	N2756	K2757	F2758	E2760	Y2761	T2762	H2763	E2764	K2765	W2766	A2767	F2768	D2769	K2770	I2771	Q2772	N2773	M2774	W2775	S2776	Q2777	G2778	E2779	N2780	Y2781	D2782	E2783	E2784	L2785	K2786	V2787	H2788	P2789	P2790	L2791	R2792	P2793	Y2794	K2795	T2796	F2797	E2798	E2799	K2800	L2743	N2744	V2745	I2746	P2748	E2749	K2750	L2751	D2752								
M2874	A2875	E2876	Q2877	L2878	A2879	E2880	N2881	Y2882	H2883	N2884	T2885	W2886	G2887	R2888	K2889	K2890	K2891	Q2892	E2893	L2894	E2895	A2896	K2897	G2898	E2899	G2900	T2901	H2902	P2903	L2904	L2905	V2906	P2907	Y2908	D2909	T2910	L2911	T2912	A2913	A2914	E2915	K2916	A2917	R2918	D2919	R2920	E2921	K2922	A2923	Q2924	E2925	L2926	K2928	F2929	L2930	Q2931	M2932						



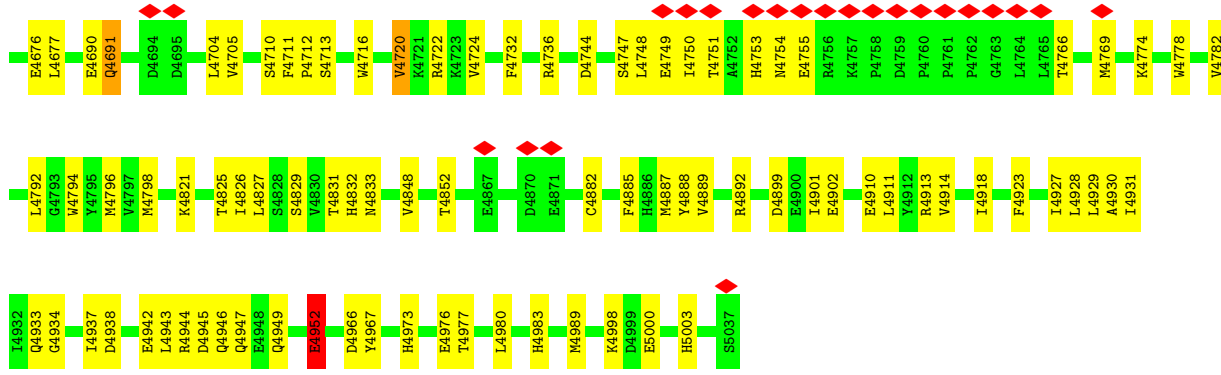


● Molecule 1: Ryanodine receptor 1

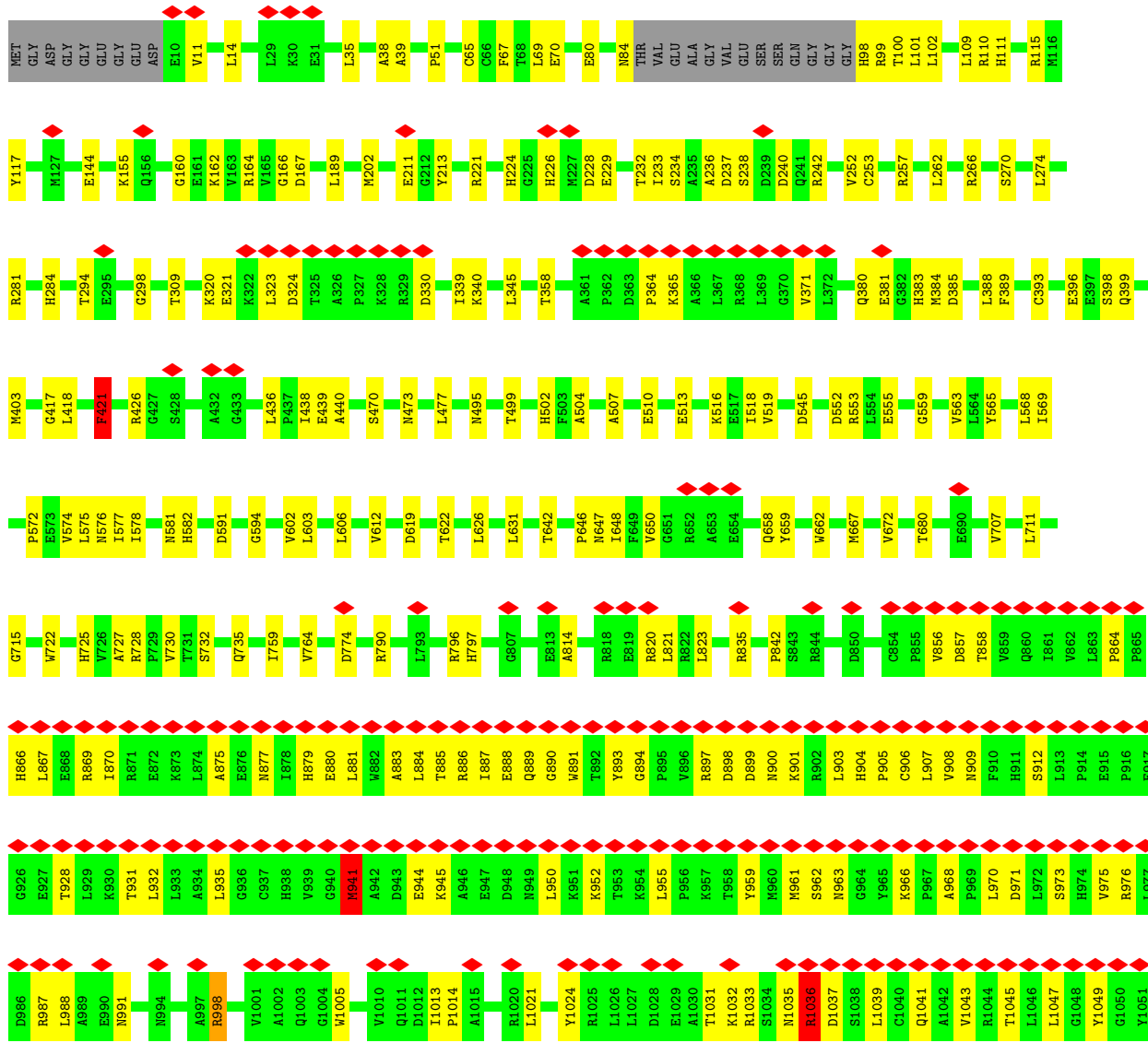


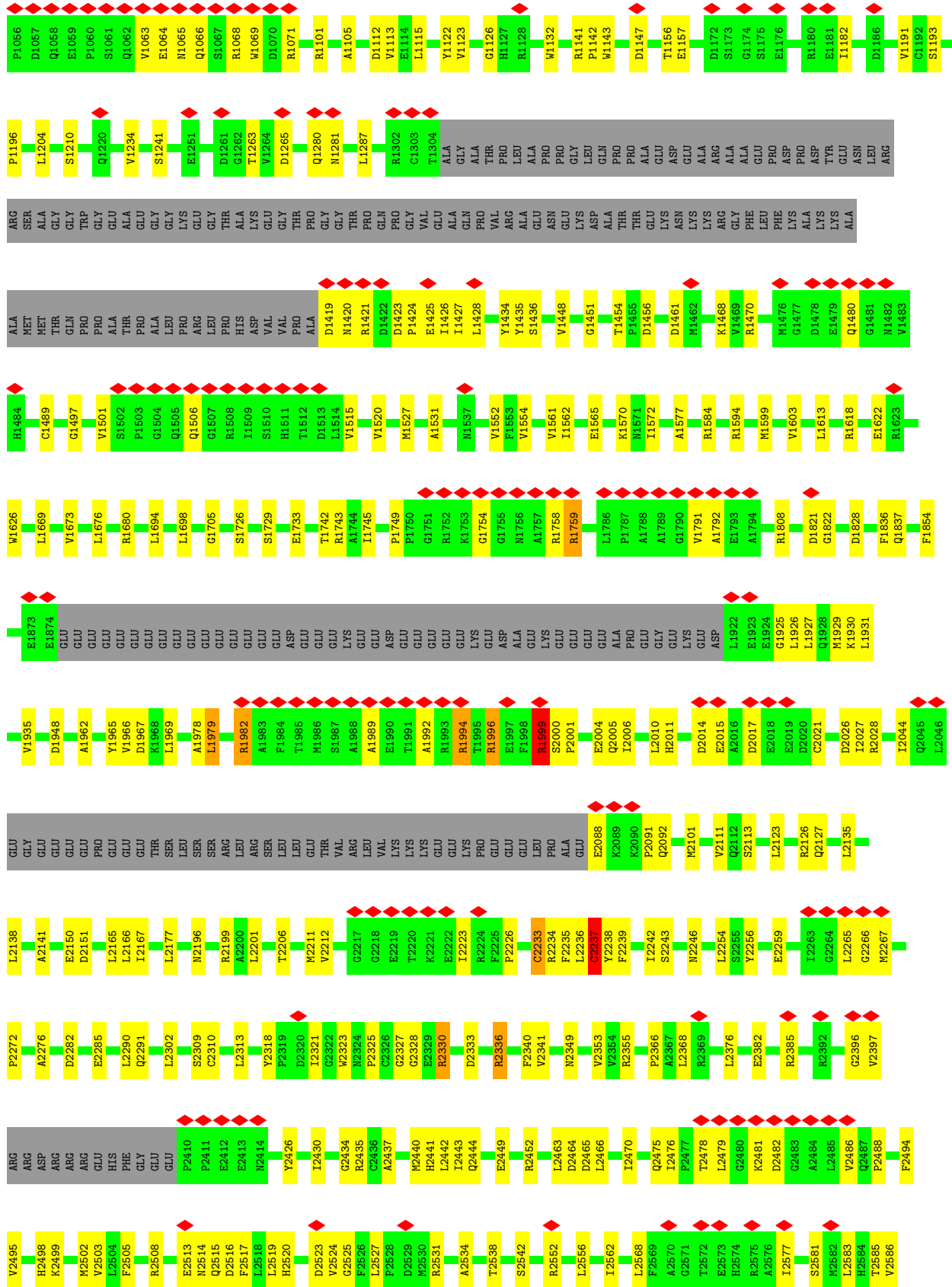


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Q3151	F3152	G3153	D3154	D3155	V3156	I3157	L3158	D3159	D3160	V3161	C3165	Y3166	R3167	T3168	L3169	C3170	S3171	I3172	Y3173	S3174	L3175	G3176	T3177	T3178	K3179	N3180	Y3181	Y3182	V3183	E3184	K3185	L3186	R3187	P3188	A3189	L3190	G3191	E3192	C3193	L3194	A3195	R3196	L3197	A3198	A3199	A3200	M3201	P3202	A3203	A3204	F3205	L3206	E3207	P3208	Q3209	L3210	N3211	E3212	
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L3025	G3026	S3027	G3028	G3029	H3030	A3031	S3032	N3033	K3034	E3035	K3036	E3037	M3038	L3039	L3042	F3043	L3046	A3047	A3048	L3049	H3052	R3053	V3054	S3055	L3056	F3057	E3058	G3059	T3059	D3060	A3061	P3062	A3063	V3064	N3066	C3067	L3068	H3069	I3070	L3071	A3072	R3073	S3074	L3075	D3076	A3077	R3078	T3079	V3080	M3081	K3082	S3083	G3084	P3085	E3086	I3087			
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E2724	K2725	LYS	ALA	THR	VAL	ASP	ALA	GLU	GLY	N2734	D2735	F2736	P2737	R2738	P2739	V2740	E2741	T2742	L2743	N2744	V2745	I2746	T2747	P2748	E2749	K2750	L2751	D2752	S2753	F2754	L2755	N2756	K2757	F2758	A2759	E2760	Y2761	T2762	E2763	E2764	K2765	W2766	A2767	F2768	D2769	K2770	L2771	Q2772	N2773	W2774	W2775	A2776	LYS	LYS	THR	ARG	LYS	LLE	
C2656	L2657	P2658	T2659	G2660	V2666	T2667	S2668	E2669	H2673	L2674	T2675	R2676	K2677	L2678	I2682	F2683	D2684	S2685	L2686	A2687	H2688	K2689	K2690	Y2691	Q2693	E2694	L2695	Y2696	R2697	M2698	D2629	V2630	P2631	L2632	L2633	E2635	F2636	A2637	P2640	L2641	K2642	L2643	L2644	Y2648	E2649	R2650	C2651	Y2655											

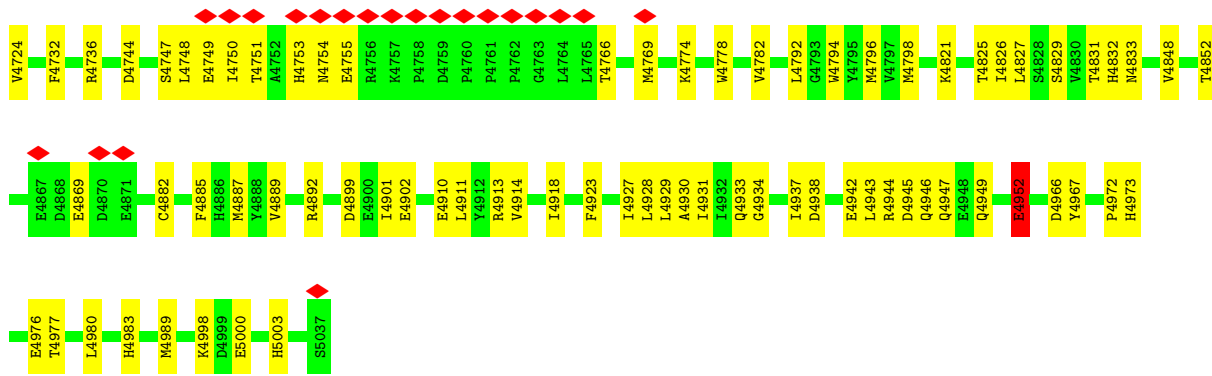


• Molecule 1: Ryanodine receptor 1

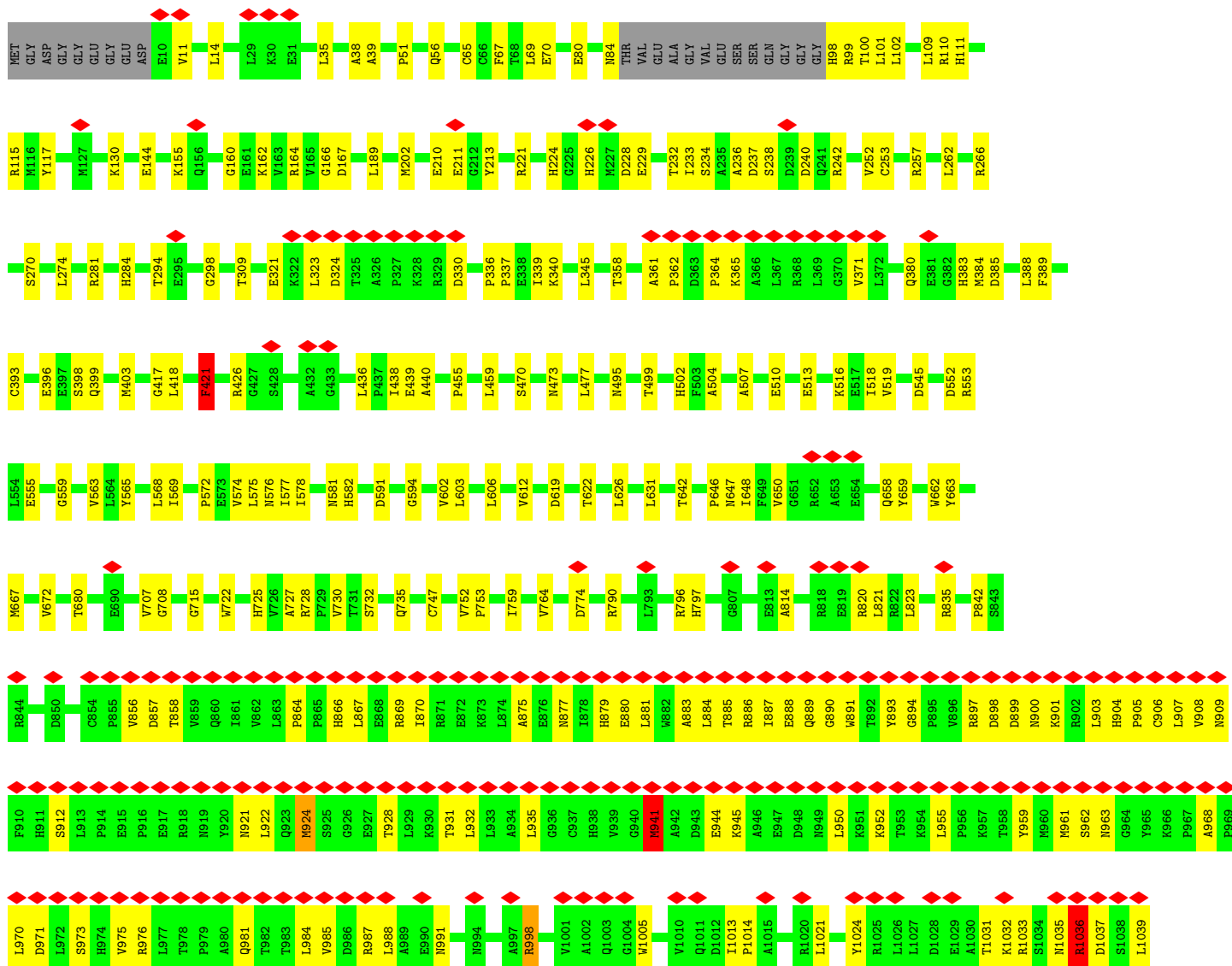


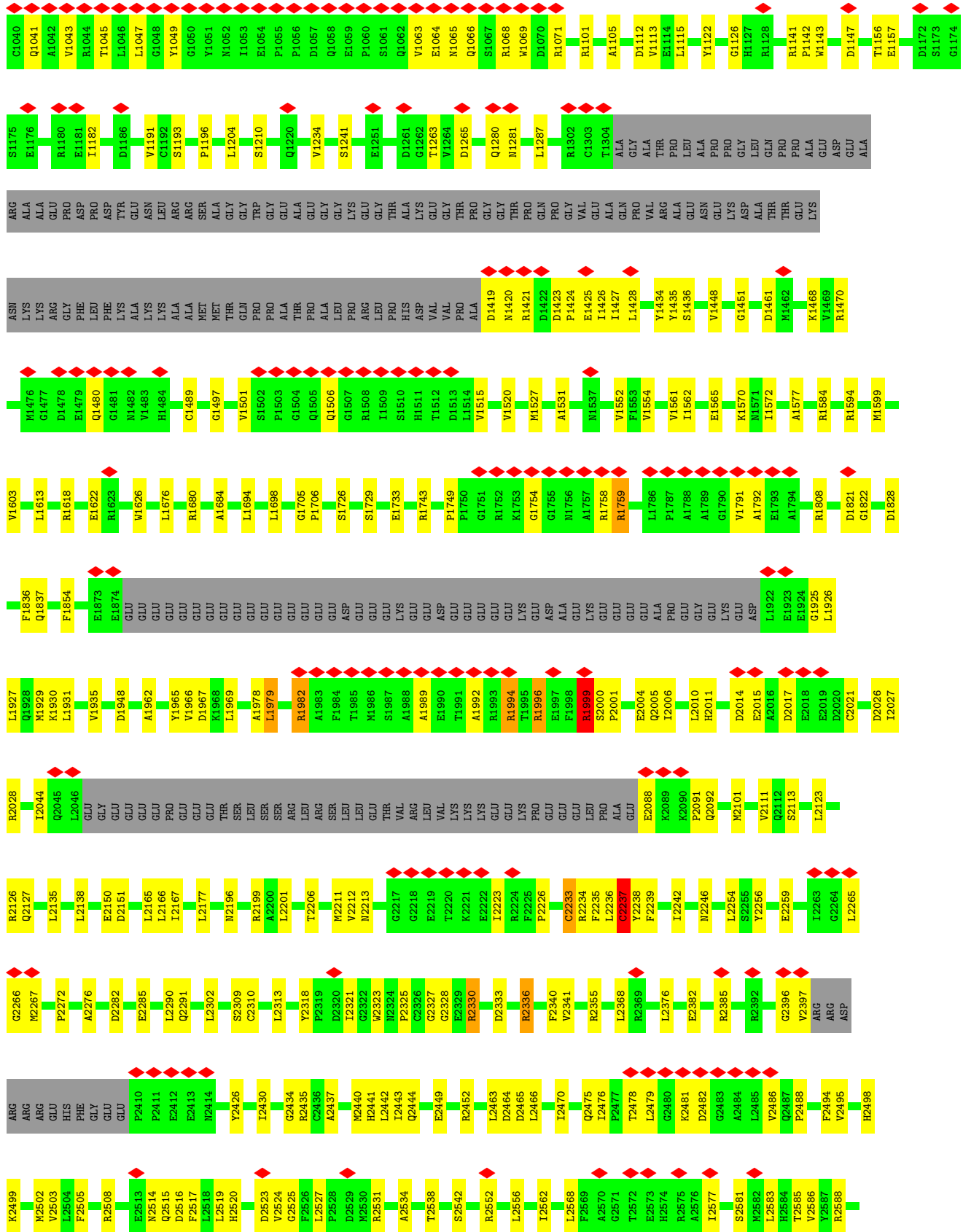


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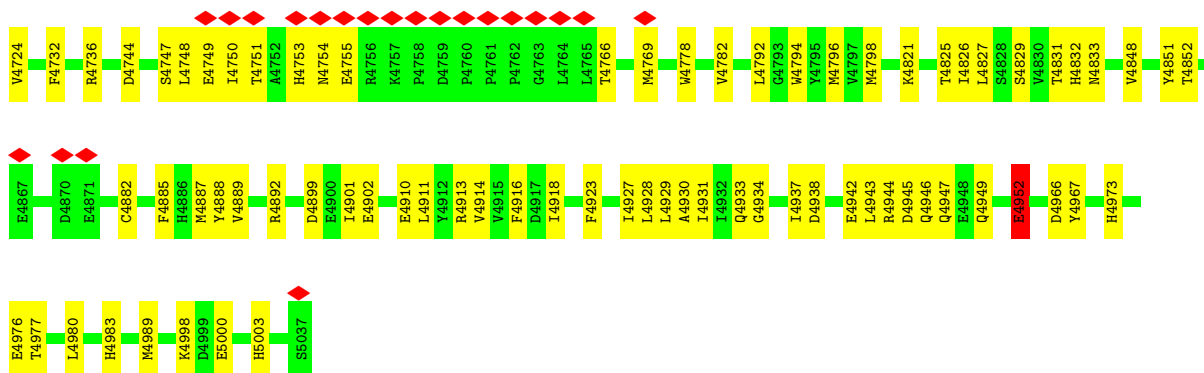
• Molecule 1: Ryanodine receptor 1



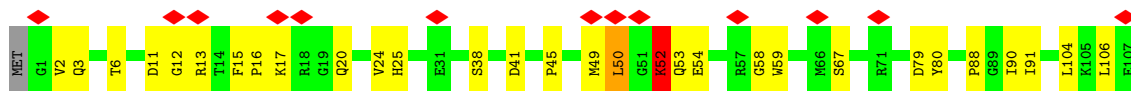


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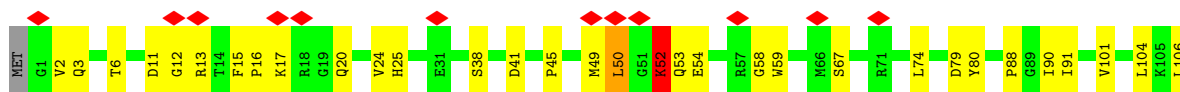
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PRO	THR	PRO	PRO	ALA	LYS	LYS	GLU	GLU	LEU	VAL	PRO	GLU	GLU	ALA	ASP	GLU	ASN	ASP	MET	GLU	GLY	LYS	GLU	GLU	VAL	ALA	PRO	PRO	PRO	PRO																				
GLY	ALA	ALA	THR	ALA	VAL	ALA	ALA	ALA	HIS	GLU	ALA	GLY	PRO	GLY	VAL	VAL	PRO	PHE	ARG	GLY	GLY	HIS	VAL	GLY	GLY	GLY	GLY	THR	LYS	PRO																				
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ALA	ALA	GLY	THR	VAL	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA		
ALA	ALA	GLY	THR	VAL	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA	ALA
PRO	SER	PRO	PRO	ALA	LYS	LYS	GLU	GLU	ILE	LYS	ALA	LYS	ARG	ALA	ALA	GLY	MET	GLU	F4540	E4543	L4544	E4545	R4548	R4557	L4565	L4569	I4573	L4576	S4583	D4584	S4585	P4586	P4587	GLY	ASP	ASP	MET	GLU	GLY	SER	ALA	ALA	ALA	ASP	LEU	ALA	GLY	PRO		
GLY	ALA	ALA	THR	GLY	GLY	GLY	GLY	GLY	ASP	ASP	ASP	GLY	GLY	VAL	GLU	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL



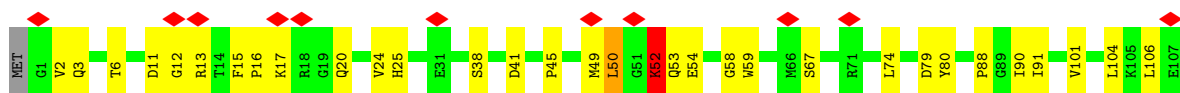
• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



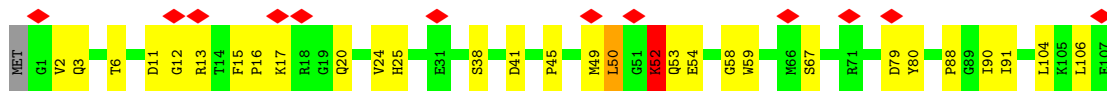
• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



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



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



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	128983	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	58	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.485	Depositor
Minimum map value	-0.205	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.019	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	427.52, 427.52, 427.52	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.835, 0.835, 0.835	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: IBM, CA, ATP, 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	0.30	6/35977 (0.0%)	0.55	19/48726 (0.0%)
1	B	0.30	6/35977 (0.0%)	0.55	19/48726 (0.0%)
1	C	0.30	6/35977 (0.0%)	0.55	19/48726 (0.0%)
1	D	0.30	6/35977 (0.0%)	0.55	19/48726 (0.0%)
2	E	0.44	0/850	0.84	3/1146 (0.3%)
2	F	0.44	0/850	0.84	3/1146 (0.3%)
2	G	0.44	0/850	0.84	3/1146 (0.3%)
2	H	0.44	0/850	0.84	3/1146 (0.3%)
All	All	0.30	24/147308 (0.0%)	0.56	88/199488 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	7
1	B	0	7
1	C	0	7
1	D	0	7
All	All	0	28

The worst 5 of 24 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	2237	CYS	CB-SG	6.82	1.93	1.82
1	B	2237	CYS	CB-SG	6.82	1.93	1.82
1	C	2237	CYS	CB-SG	6.82	1.93	1.82
1	D	2237	CYS	CB-SG	6.81	1.93	1.82
1	D	1999	ARG	CB-CG	6.01	1.68	1.52

The worst 5 of 88 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	52	LYS	CD-CE-NZ	14.60	145.27	111.70
2	G	52	LYS	CD-CE-NZ	14.57	145.21	111.70
2	F	52	LYS	CD-CE-NZ	14.56	145.19	111.70
2	E	52	LYS	CD-CE-NZ	14.56	145.18	111.70
1	D	998	ARG	CG-CD-NE	13.13	139.38	111.80

There are no chirality outliers.

5 of 28 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1994	ARG	Sidechain
1	A	1996	ARG	Sidechain
1	A	1999	ARG	Sidechain
1	A	2237	CYS	Peptide
1	A	421	PHE	Sidechain

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	35150	0	34793	805	0
1	B	35150	0	34793	818	0
1	C	35150	0	34793	802	0
1	D	35150	0	34793	798	0
2	E	831	0	831	18	0
2	F	831	0	831	21	0
2	G	831	0	831	20	0
2	H	831	0	831	19	0
3	A	31	0	12	1	0
3	B	31	0	12	1	0
3	C	31	0	12	1	0
3	D	31	0	12	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
6	A	16	0	14	2	0
6	B	16	0	14	2	0
6	C	16	0	14	2	0
6	D	16	0	14	2	0
All	All	144120	0	142600	3250	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 11.

The worst 5 of 3250 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:1032:LYS:HB3	1:D:1036:ARG:HH12	1.14	1.13
1:A:935:LEU:HD13	1:A:987:ARG:HE	1.16	1.10
1:C:1032:LYS:HB3	1:C:1036:ARG:HH12	1.14	1.09
1:B:935:LEU:HD13	1:B:987:ARG:HE	1.16	1.08
1:A:1032:LYS:HB3	1:A:1036:ARG:HH12	1.14	1.08

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	4385/5037 (87%)	4245 (97%)	136 (3%)	4 (0%)	48 65
1	B	4385/5037 (87%)	4245 (97%)	136 (3%)	4 (0%)	48 65
1	C	4385/5037 (87%)	4245 (97%)	136 (3%)	4 (0%)	48 65

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	4385/5037 (87%)	4245 (97%)	136 (3%)	4 (0%)	48	65
2	E	105/108 (97%)	99 (94%)	6 (6%)	0	100	100
2	F	105/108 (97%)	99 (94%)	6 (6%)	0	100	100
2	G	105/108 (97%)	99 (94%)	6 (6%)	0	100	100
2	H	105/108 (97%)	99 (94%)	6 (6%)	0	100	100
All	All	17960/20580 (87%)	17376 (97%)	568 (3%)	16 (0%)	50	65

5 of 16 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3300	ALA
1	B	3300	ALA
1	D	3300	ALA
1	C	3300	ALA
1	A	2669	GLU

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	3836/4276 (90%)	3815 (100%)	21 (0%)	86	93
1	B	3836/4276 (90%)	3815 (100%)	21 (0%)	86	93
1	C	3836/4276 (90%)	3815 (100%)	21 (0%)	86	93
1	D	3836/4276 (90%)	3815 (100%)	21 (0%)	86	93
2	E	89/90 (99%)	86 (97%)	3 (3%)	32	49
2	F	89/90 (99%)	86 (97%)	3 (3%)	32	49
2	G	89/90 (99%)	86 (97%)	3 (3%)	32	49
2	H	89/90 (99%)	86 (97%)	3 (3%)	32	49
All	All	15700/17464 (90%)	15604 (99%)	96 (1%)	82	92

5 of 96 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	945	LYS
1	D	4161	ARG
1	D	1036	ARG
1	D	2870[B]	GLU
1	C	155	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 55 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	5003	HIS
1	D	2417	HIS
1	C	5003	HIS
1	C	2902	HIS
1	D	105	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 8 are monoatomic - leaving 8 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	ATP	B	5301	-	28,33,33	0.61	0	34,52,52	1.00	3 (8%)
6	IBM	B	5304	-	8,17,17	0.80	0	11,25,25	2.30	4 (36%)
3	ATP	A	5301	-	28,33,33	0.60	0	34,52,52	1.00	3 (8%)
6	IBM	A	5304	-	8,17,17	0.77	0	11,25,25	2.29	4 (36%)
3	ATP	C	5301	-	28,33,33	0.61	0	34,52,52	1.00	3 (8%)
6	IBM	D	5304	-	8,17,17	0.78	0	11,25,25	2.29	4 (36%)
6	IBM	C	5304	-	8,17,17	0.78	0	11,25,25	2.29	4 (36%)
3	ATP	D	5301	-	28,33,33	0.60	0	34,52,52	1.00	3 (8%)

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

There are no bond length outliers.

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	D	5304	IBM	C5-C6-N1	-4.77	113.36	118.20
6	B	5304	IBM	C5-C6-N1	-4.77	113.36	118.20
6	C	5304	IBM	C5-C6-N1	-4.75	113.37	118.20
6	A	5304	IBM	C5-C6-N1	-4.74	113.39	118.20
6	B	5304	IBM	C11-N3-C4	4.02	121.87	118.46

There are no chirality outliers.

5 of 36 torsion outliers are listed below:

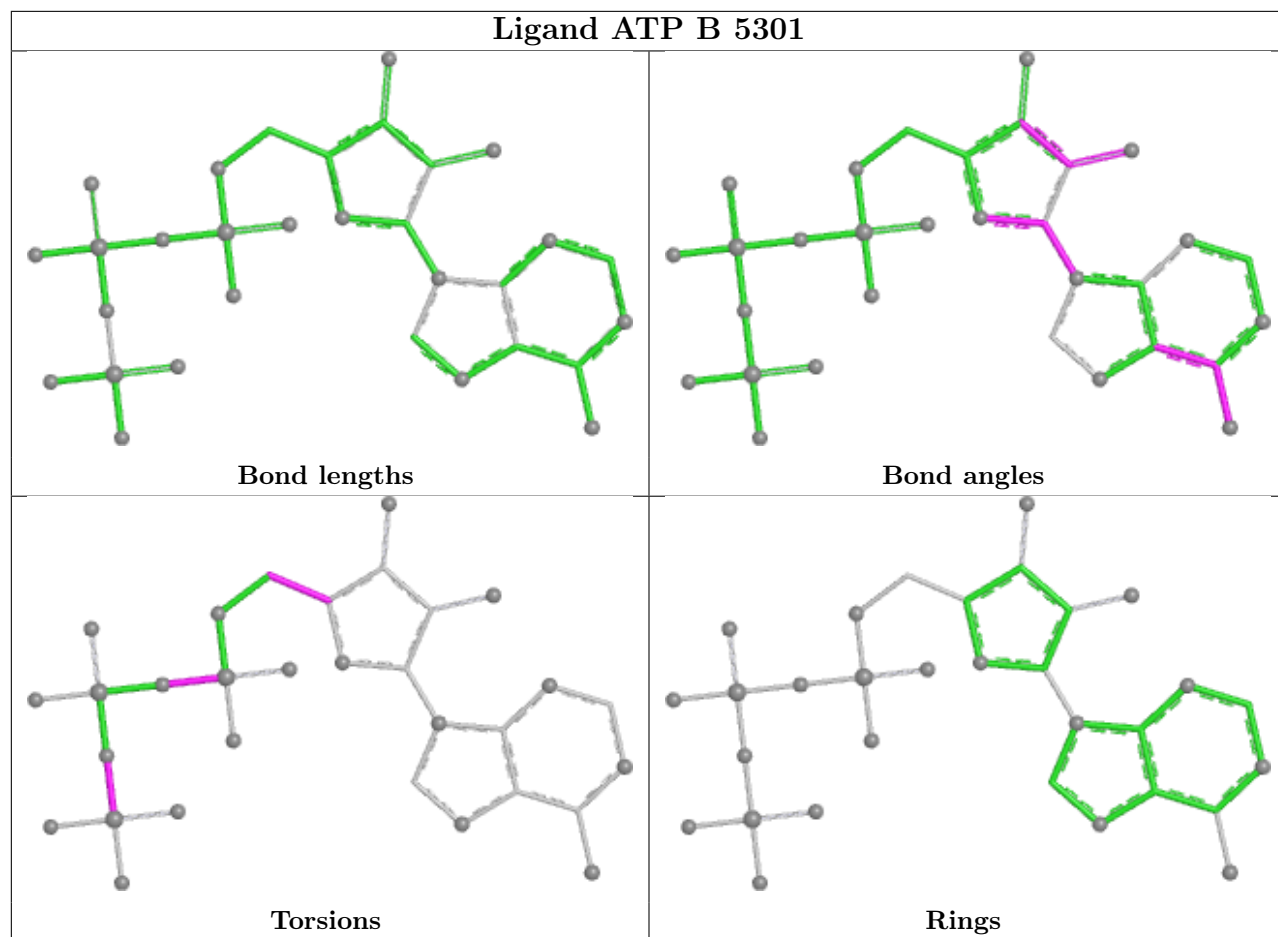
Mol	Chain	Res	Type	Atoms
6	A	5304	IBM	C12-C11-N3-C4
6	A	5304	IBM	N3-C11-C12-C13
6	A	5304	IBM	N3-C11-C12-C14
6	B	5304	IBM	C12-C11-N3-C4
6	B	5304	IBM	N3-C11-C12-C13

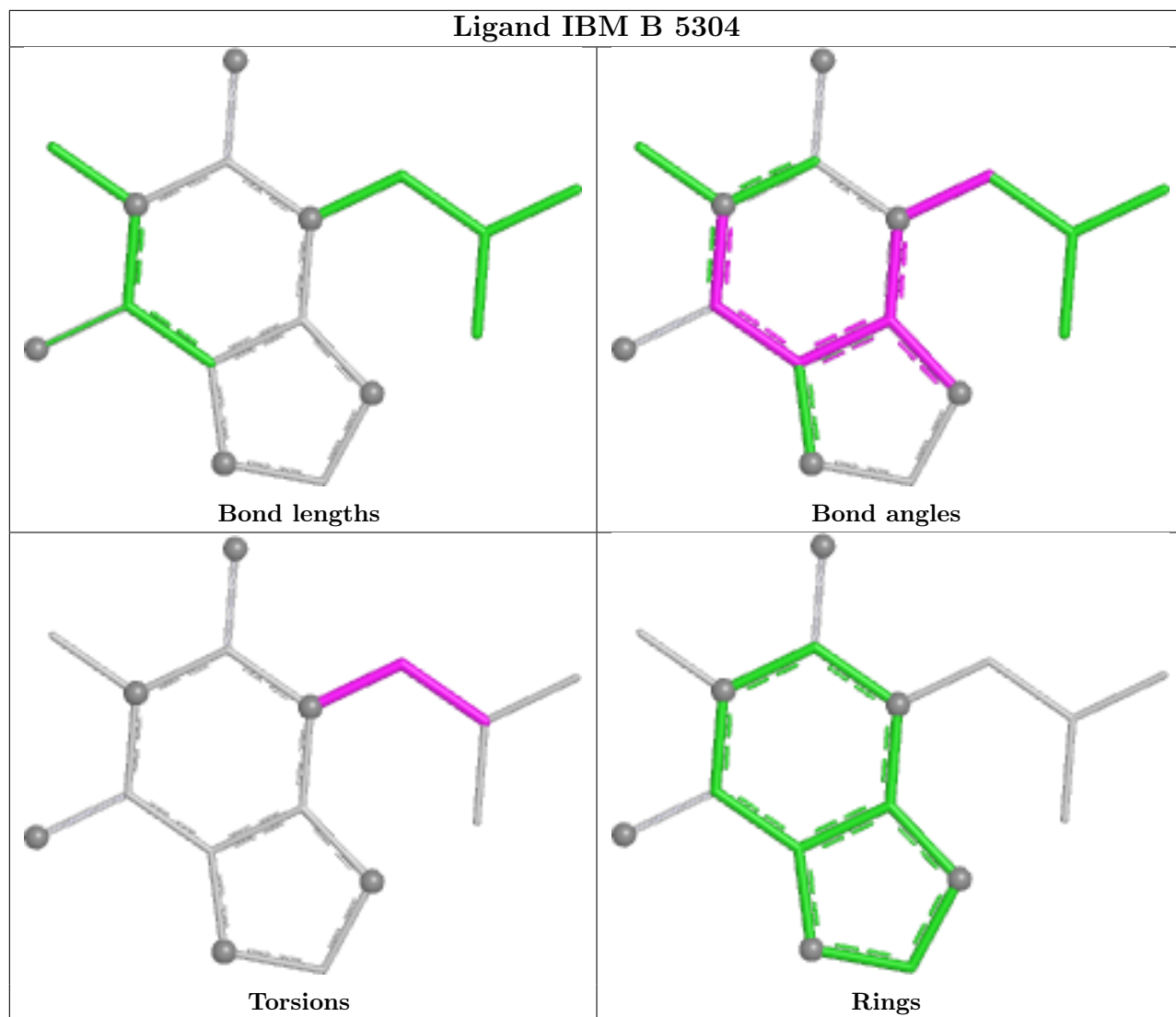
There are no ring outliers.

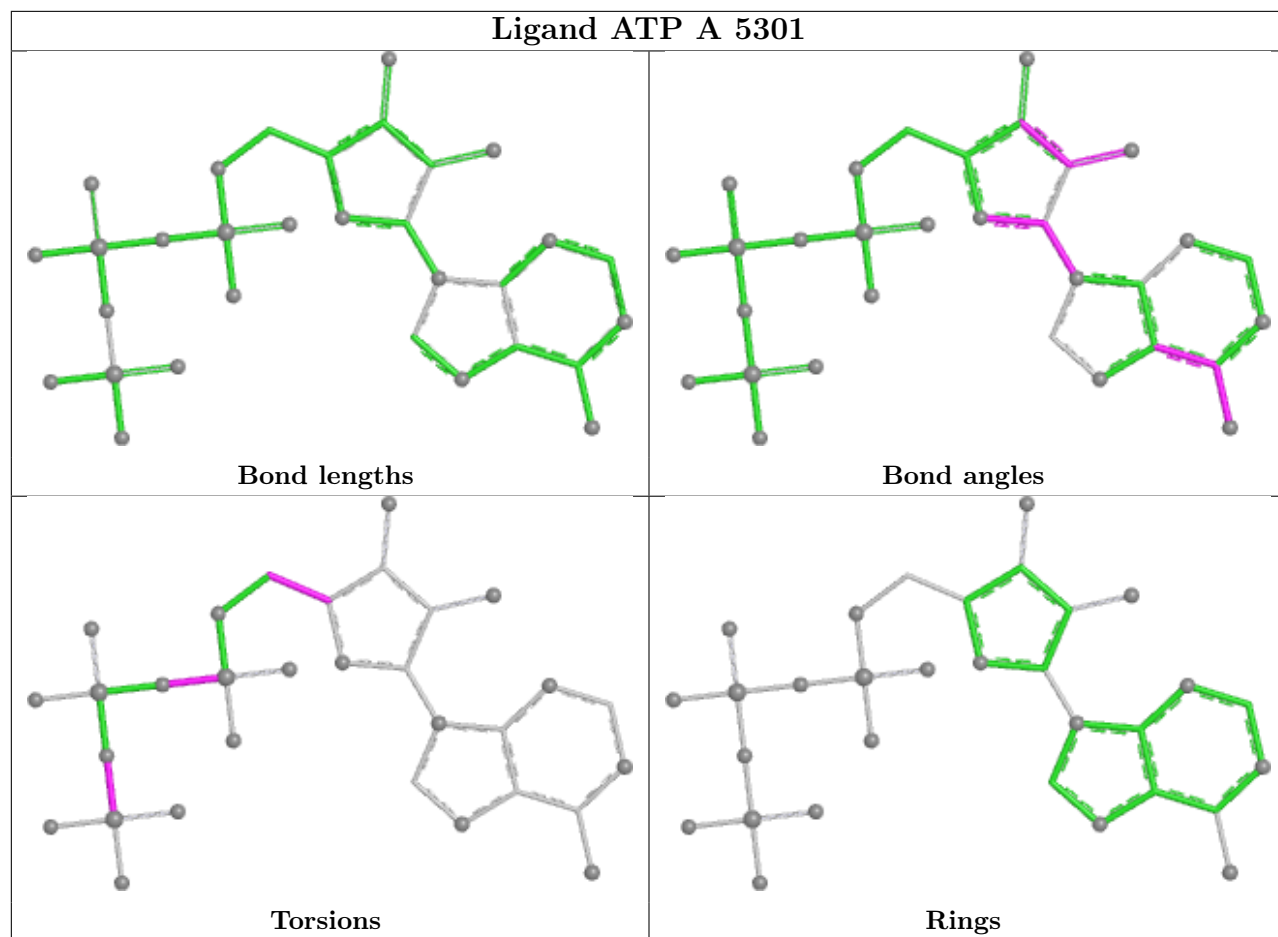
8 monomers are involved in 12 short contacts:

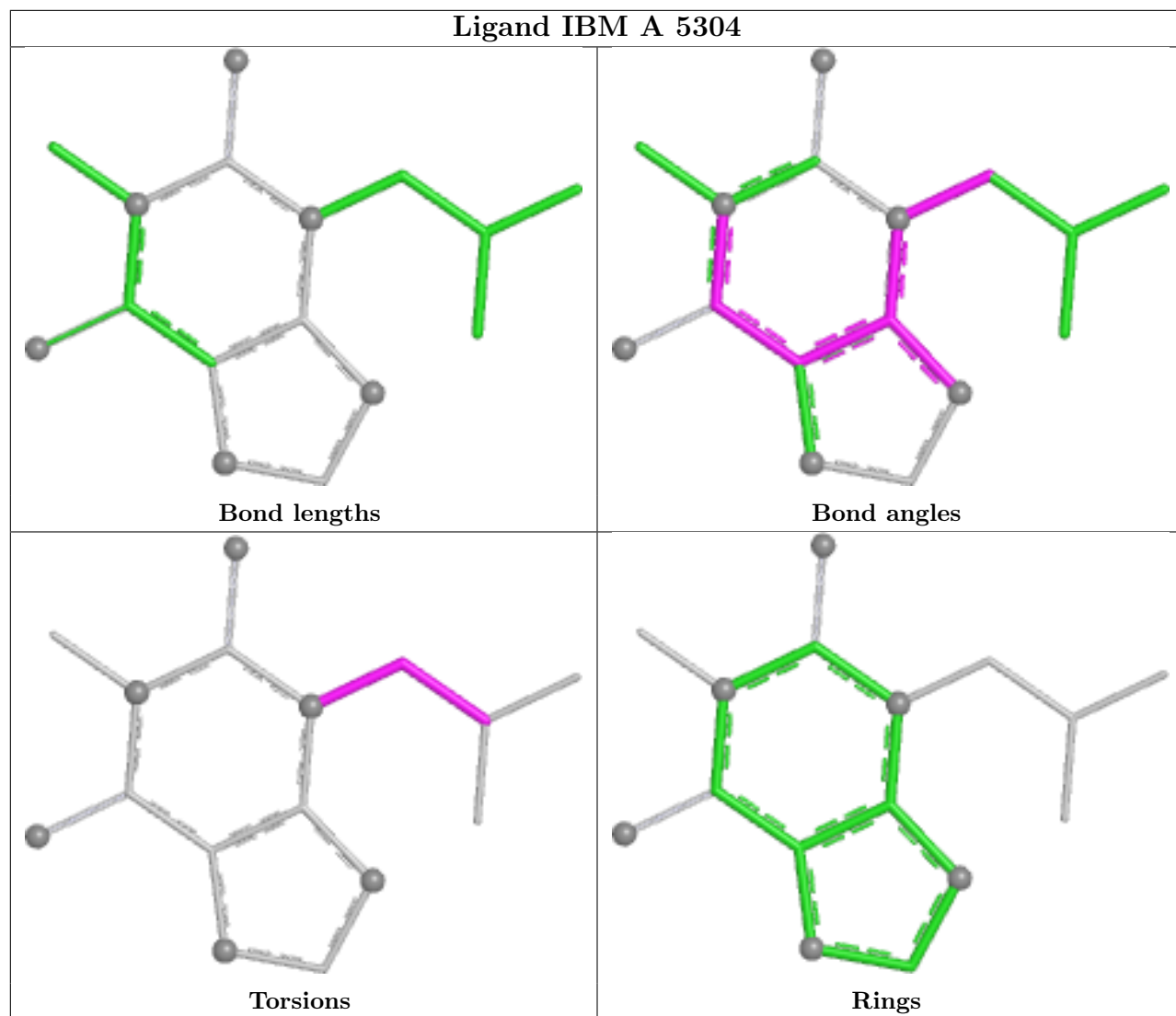
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	5301	ATP	1	0
6	B	5304	IBM	2	0
3	A	5301	ATP	1	0
6	A	5304	IBM	2	0
3	C	5301	ATP	1	0
6	D	5304	IBM	2	0
6	C	5304	IBM	2	0
3	D	5301	ATP	1	0

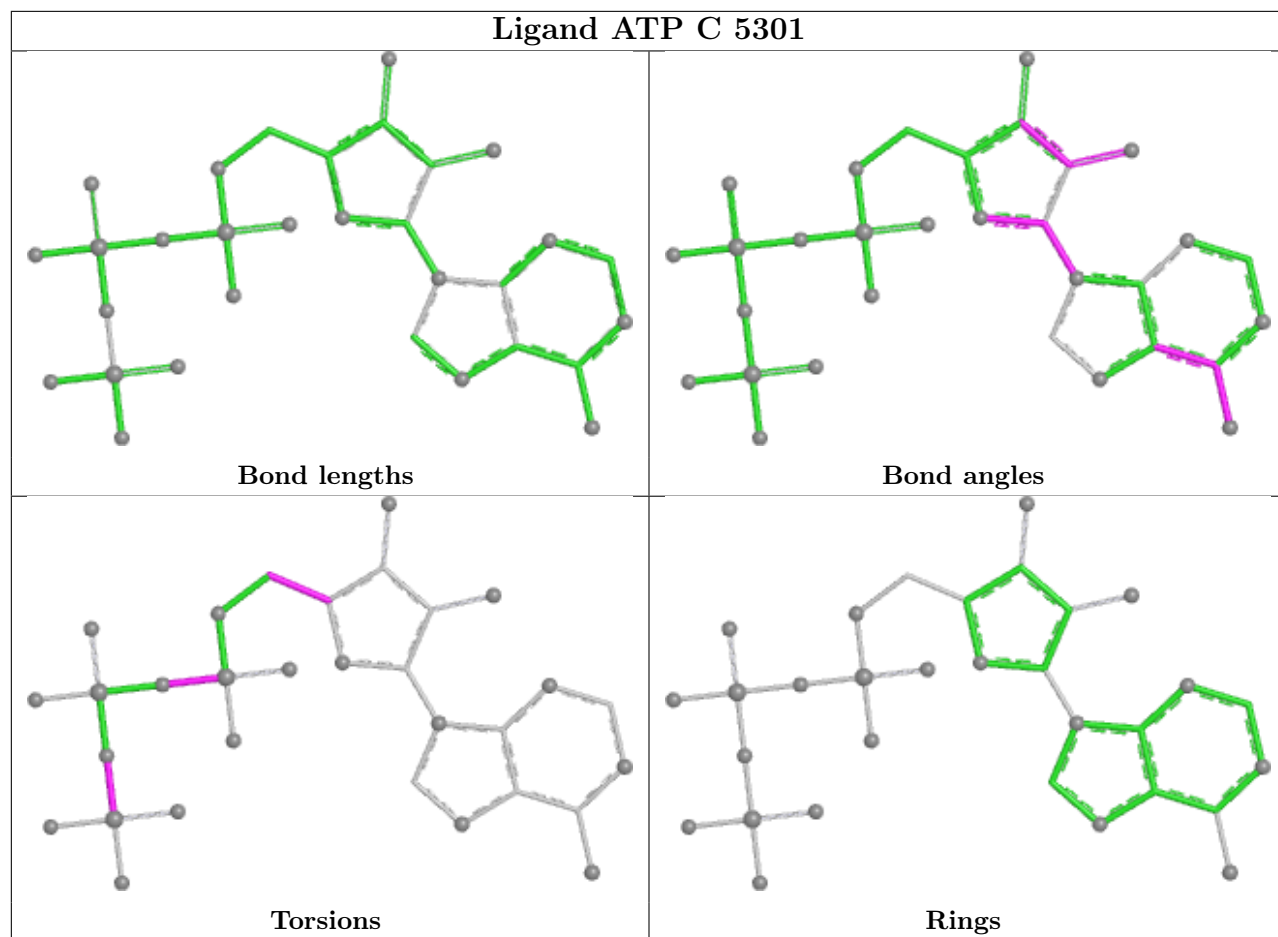
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

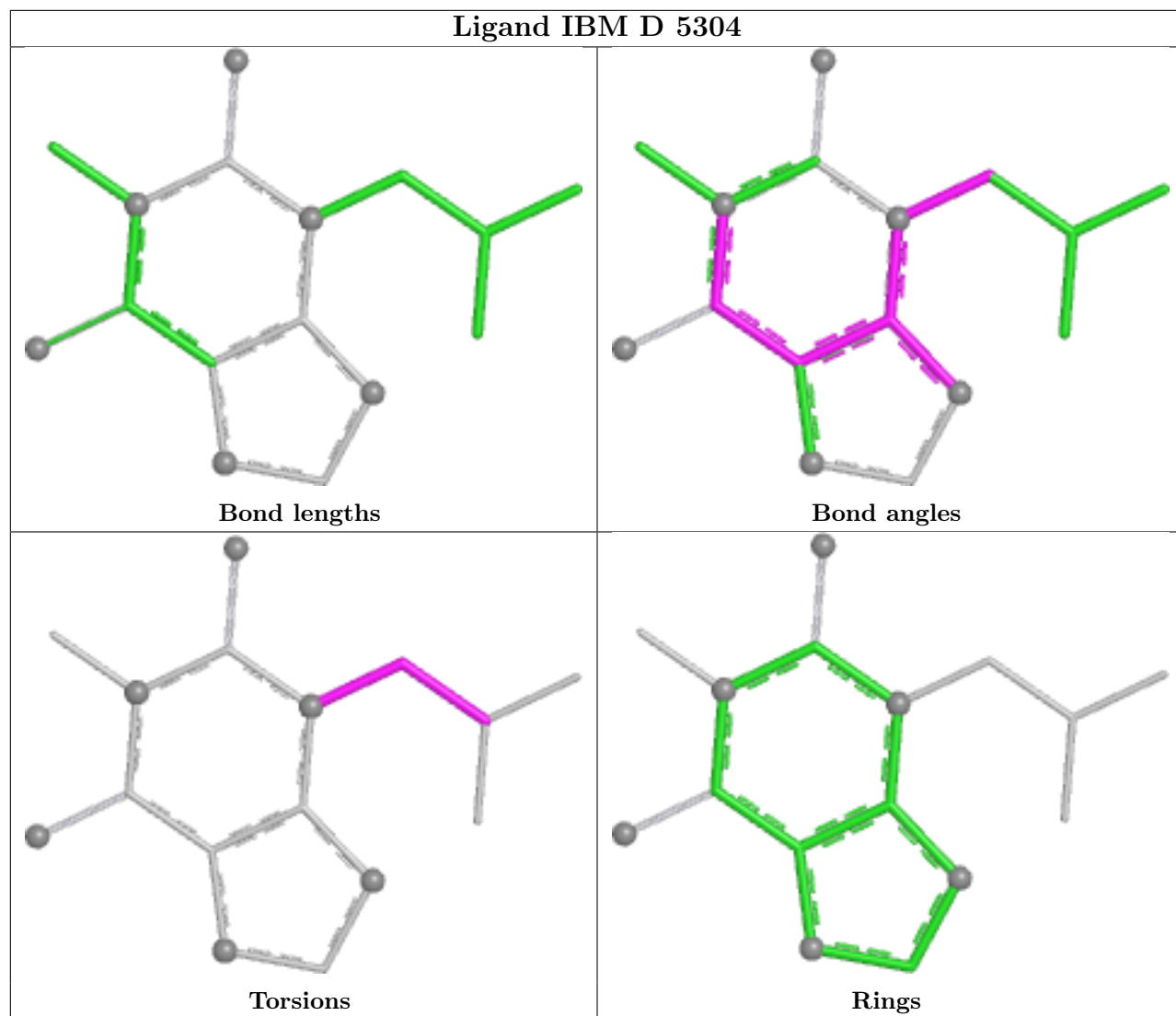


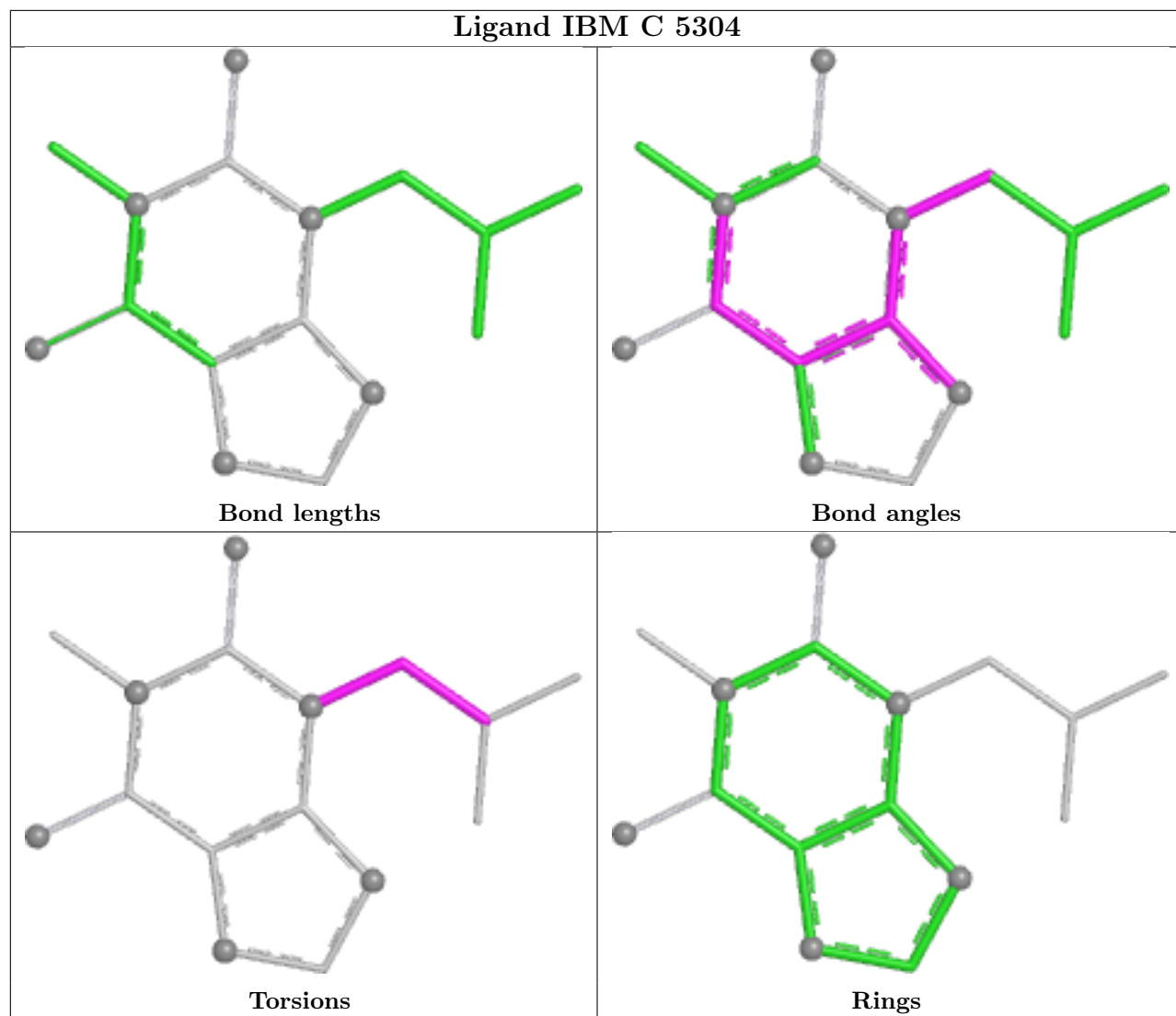


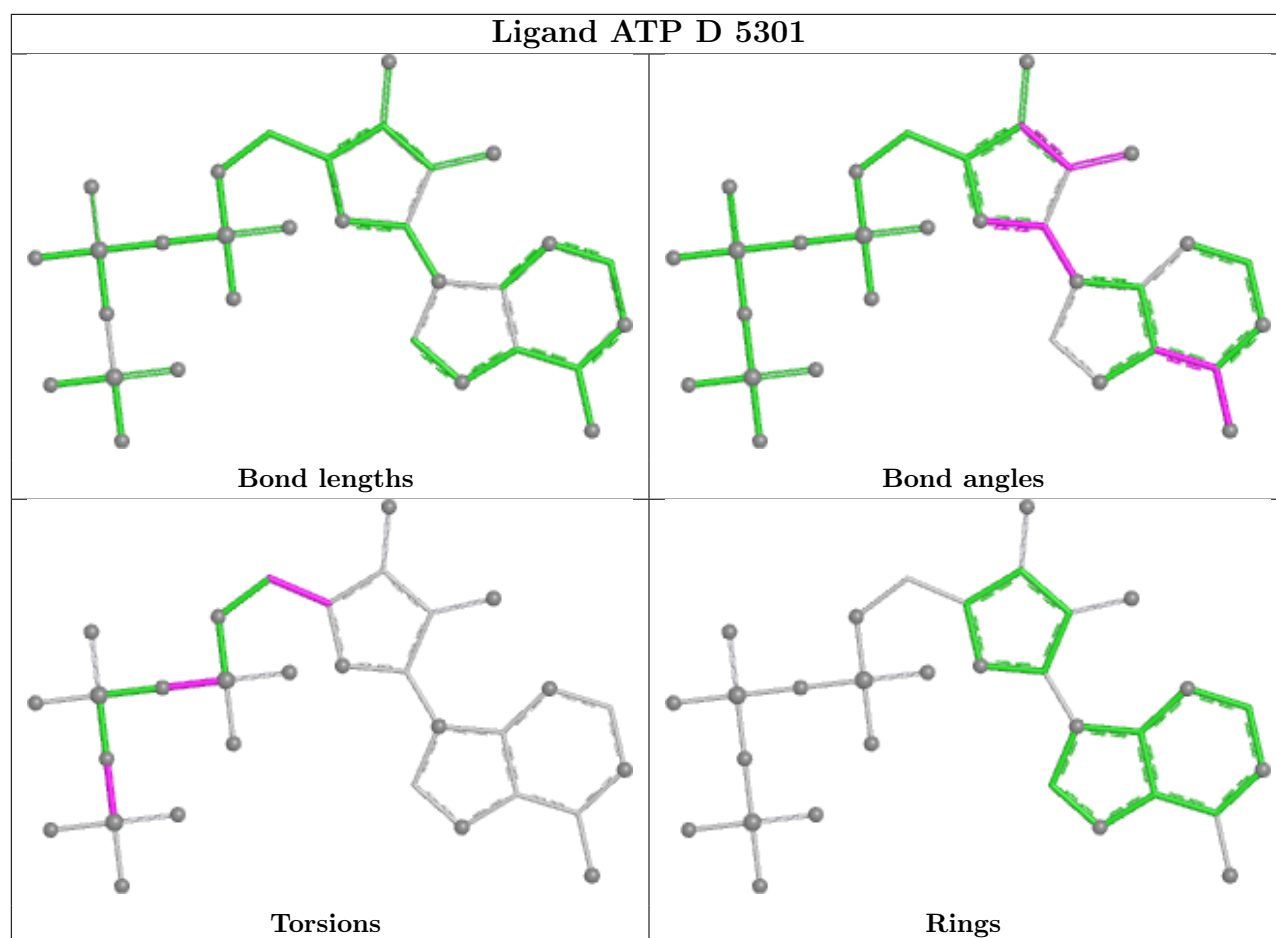












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

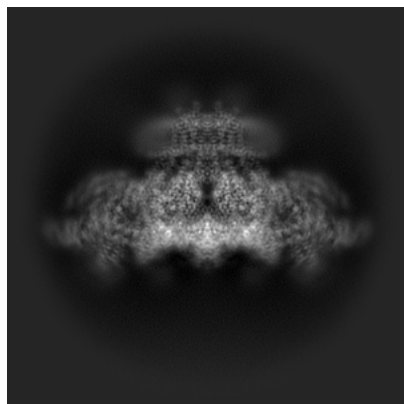
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-47389. These allow visual inspection of the internal detail of the map and identification of artifacts.

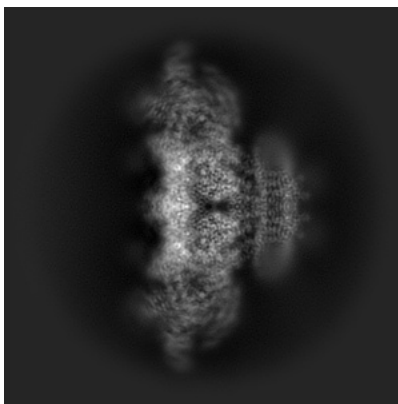
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

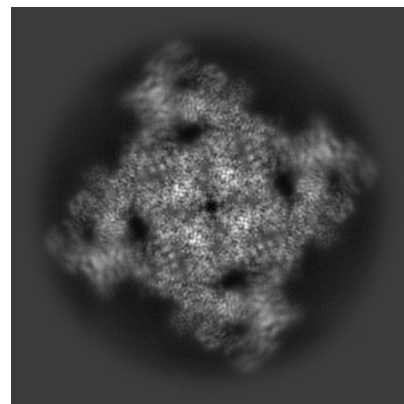
6.1.1 Primary map



X

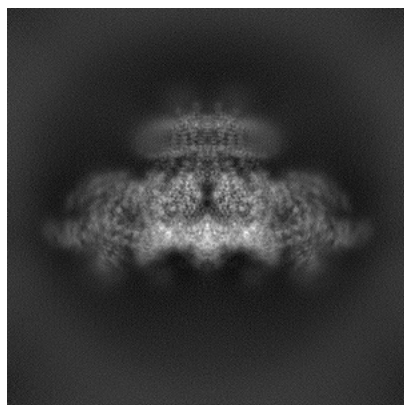


Y

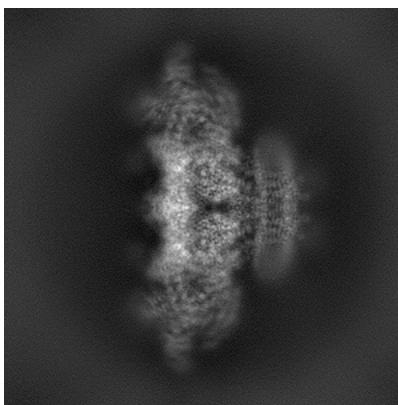


Z

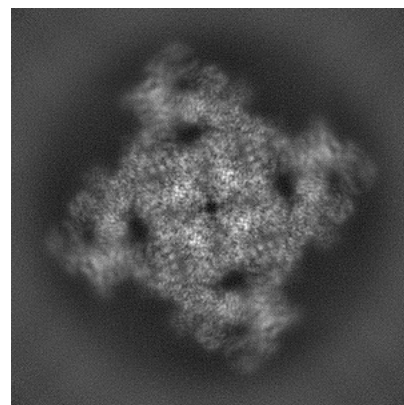
6.1.2 Raw map



X



Y

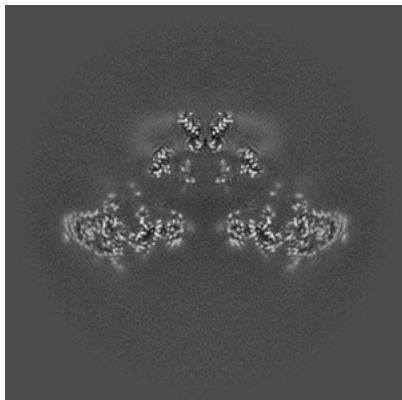


Z

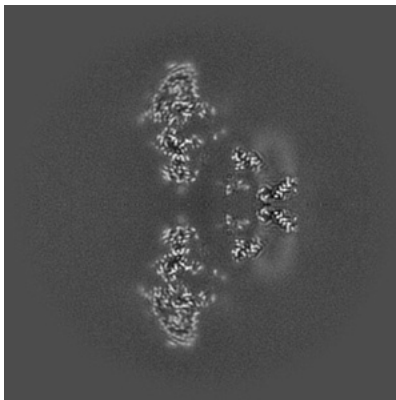
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

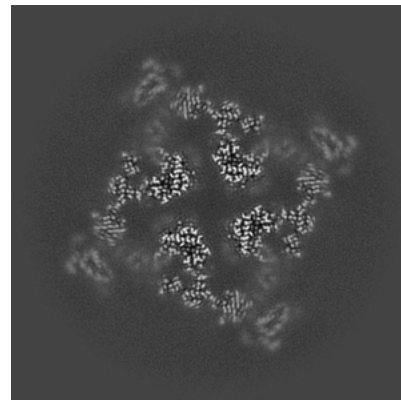
6.2.1 Primary map



X Index: 256

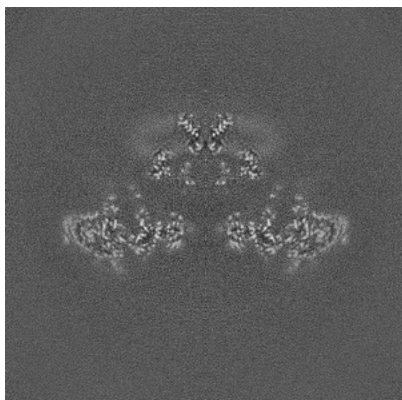


Y Index: 256

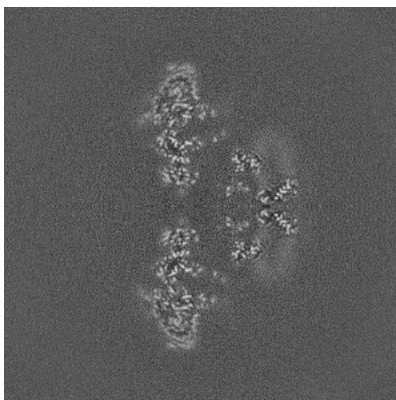


Z Index: 256

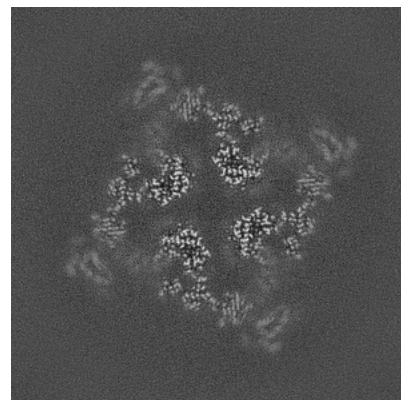
6.2.2 Raw map



X Index: 256



Y Index: 256

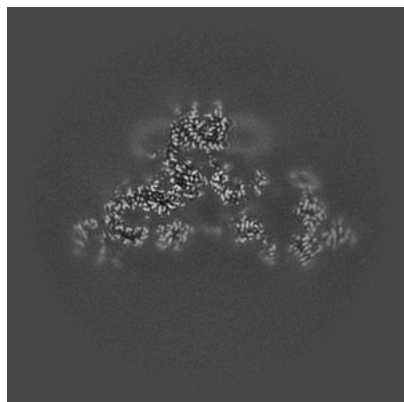


Z Index: 256

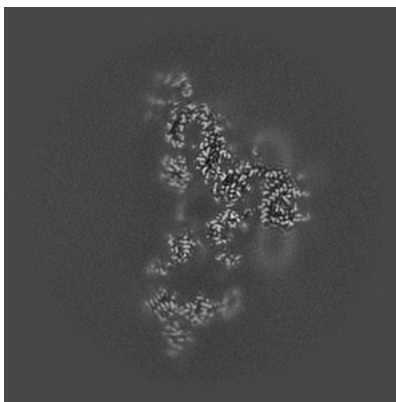
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

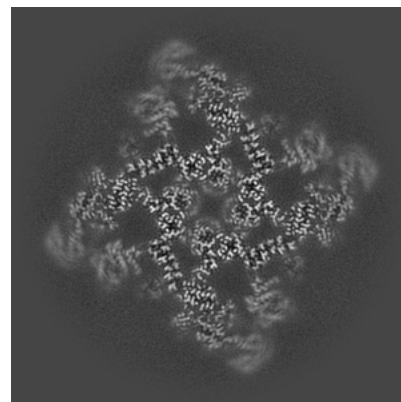
6.3.1 Primary map



X Index: 239

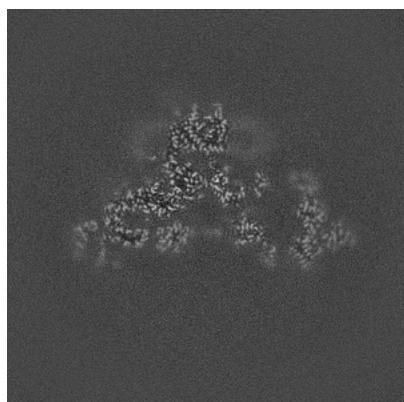


Y Index: 239

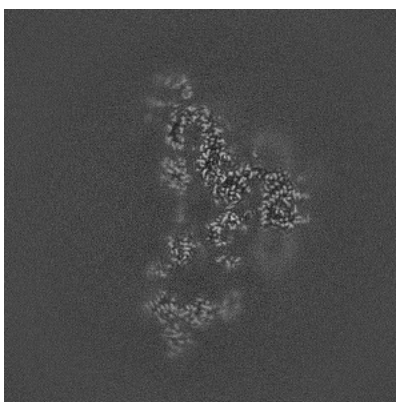


Z Index: 229

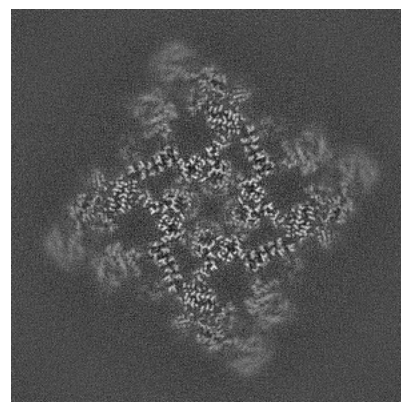
6.3.2 Raw map



X Index: 239



Y Index: 239

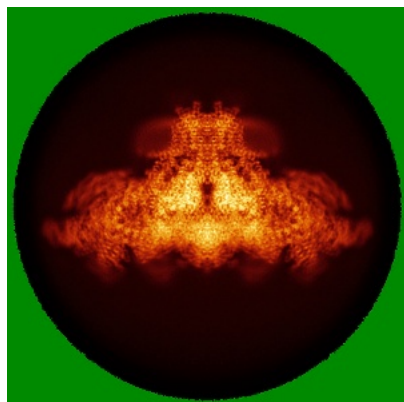


Z Index: 229

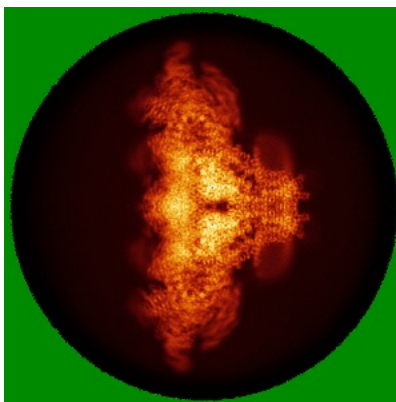
The images above show the largest variance slices of the map in three orthogonal directions.

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

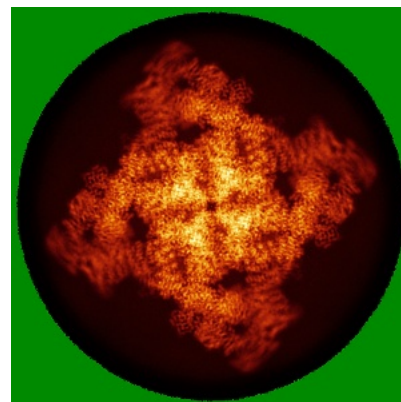
6.4.1 Primary map



X

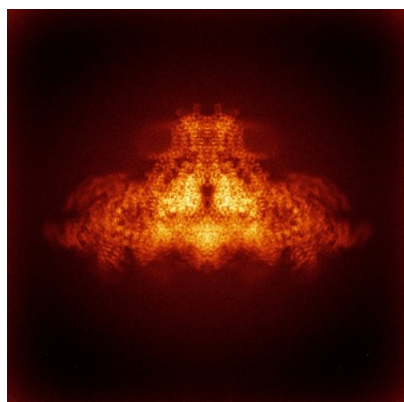


Y

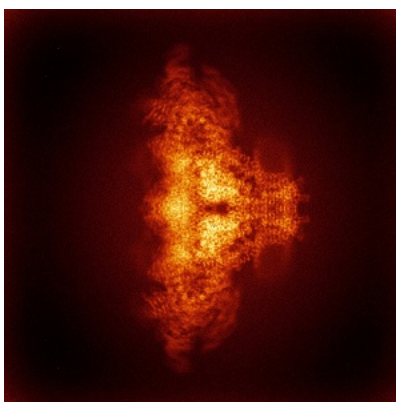


Z

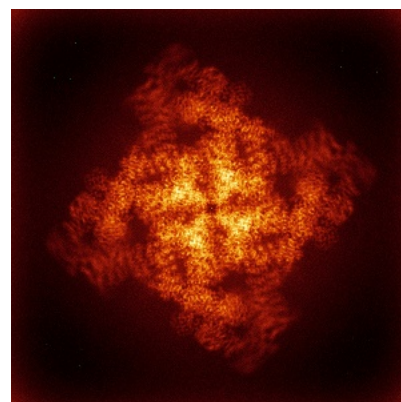
6.4.2 Raw map



X



Y

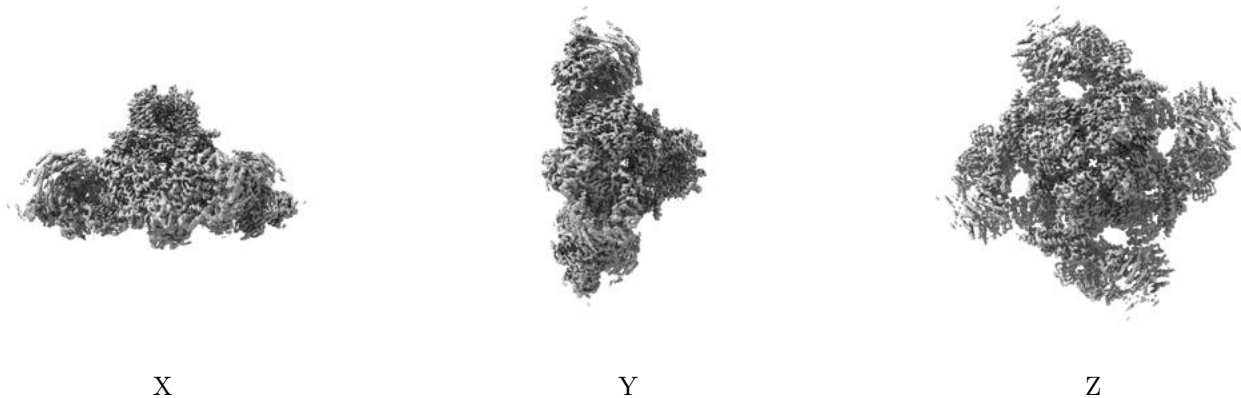


Z

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

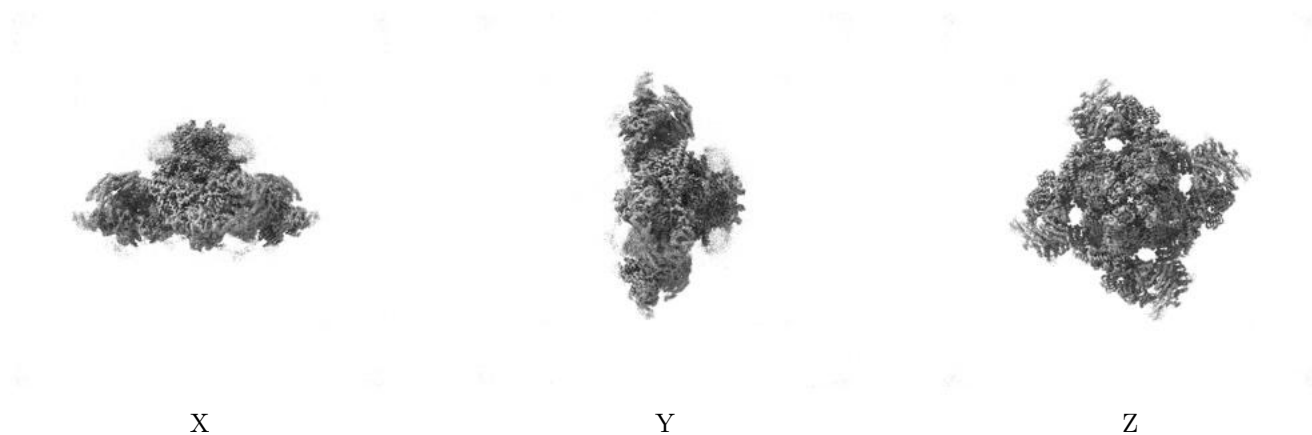
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.1. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

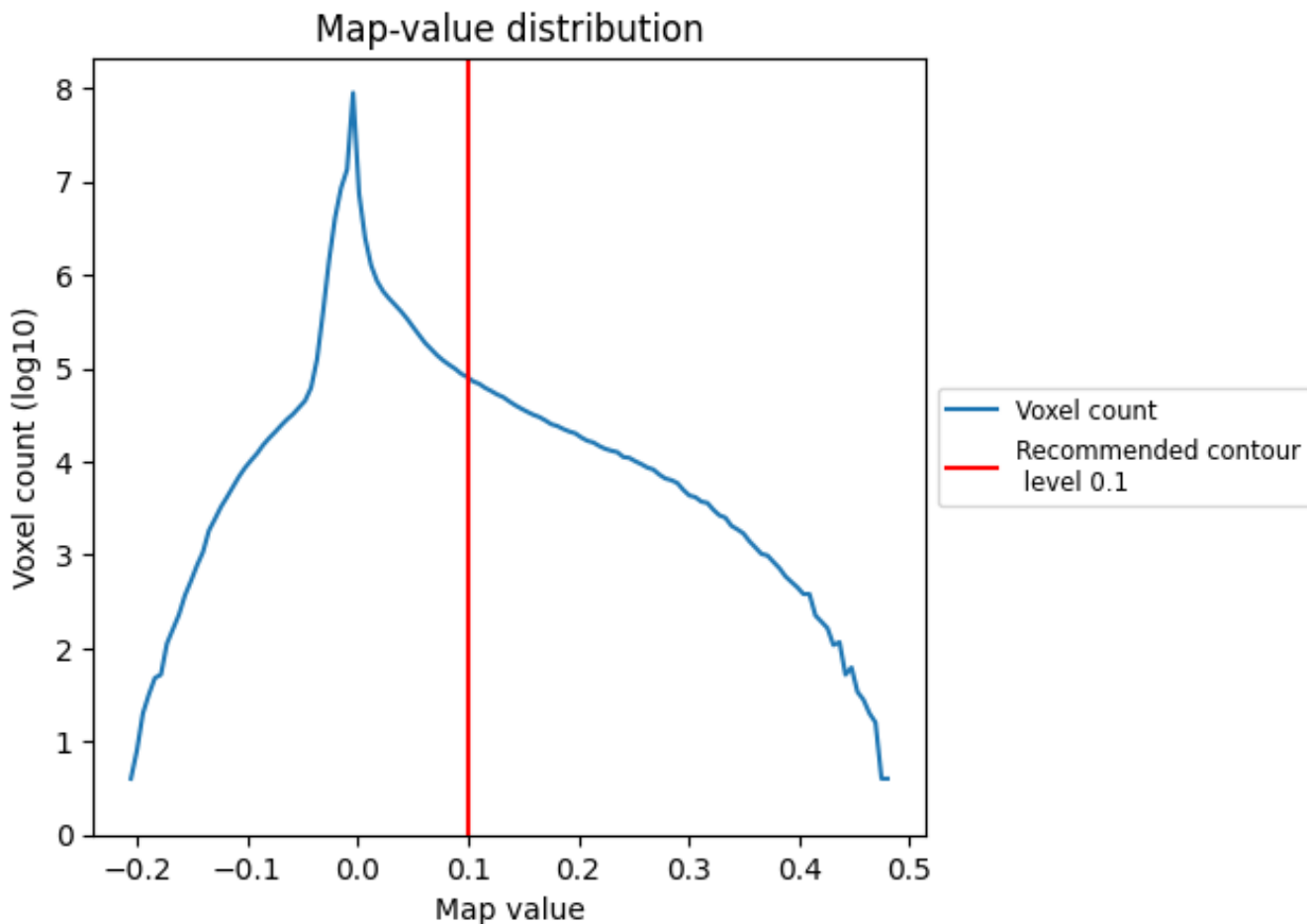
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

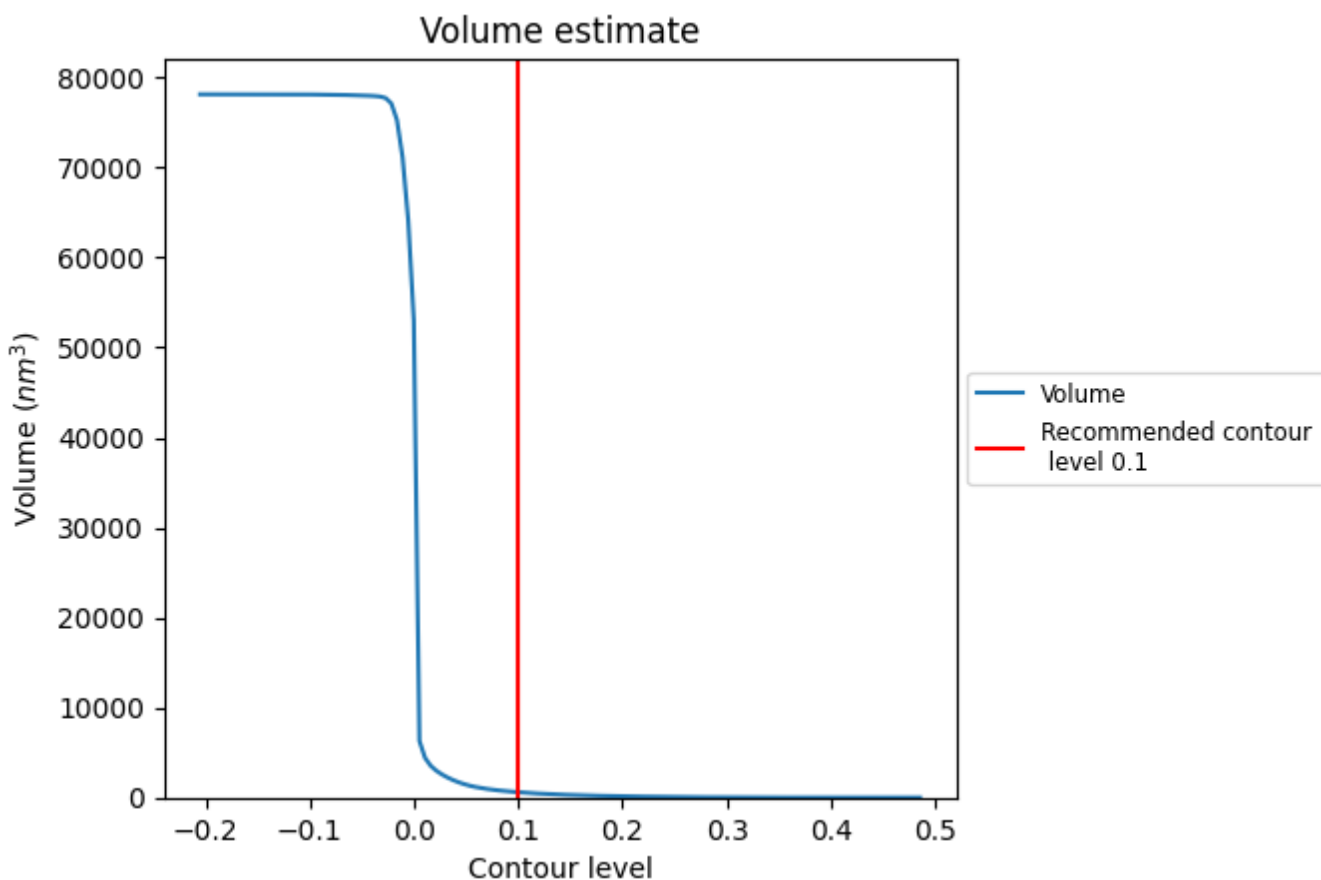
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

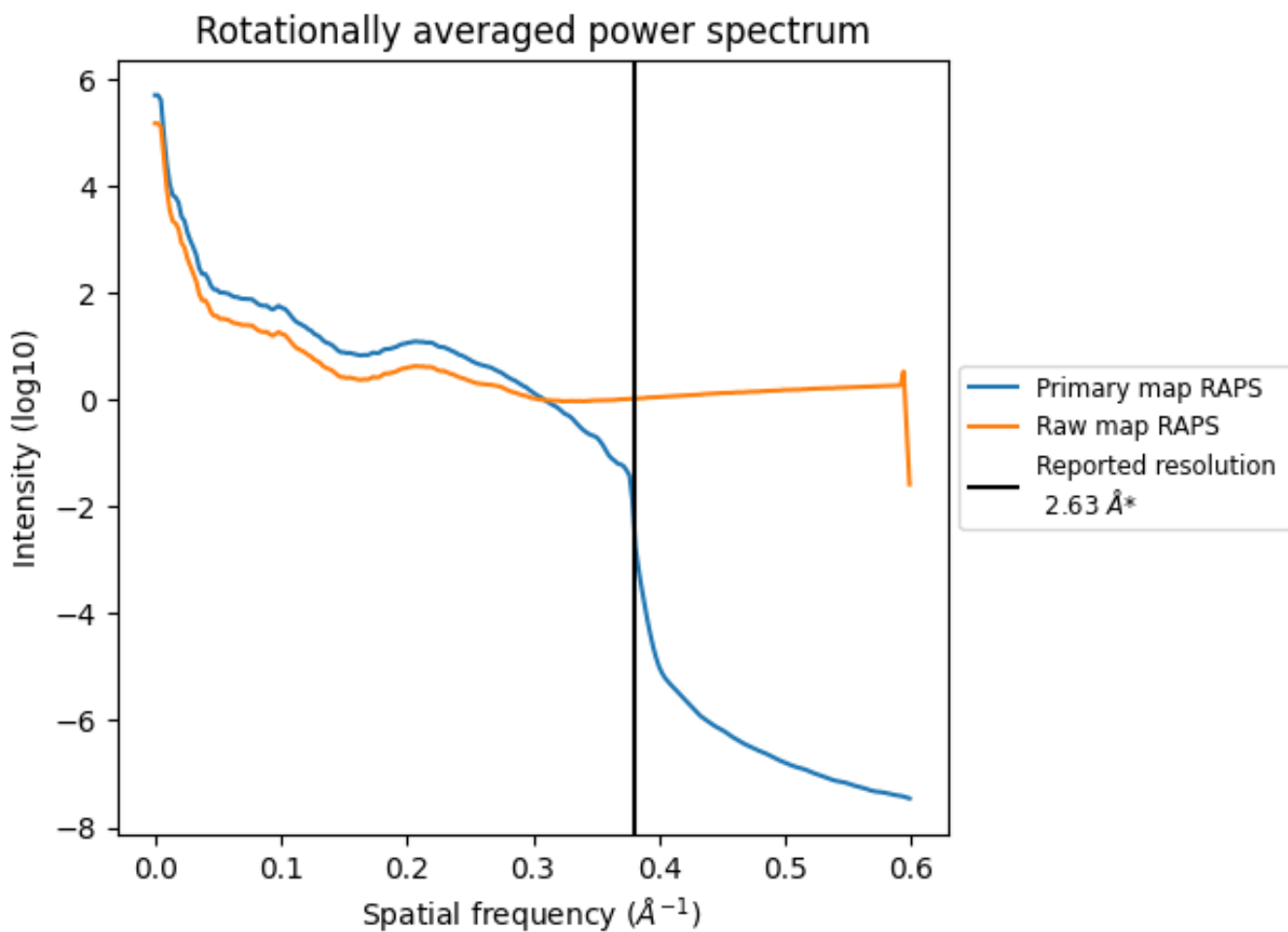
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 594 nm³; this corresponds to an approximate mass of 536 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

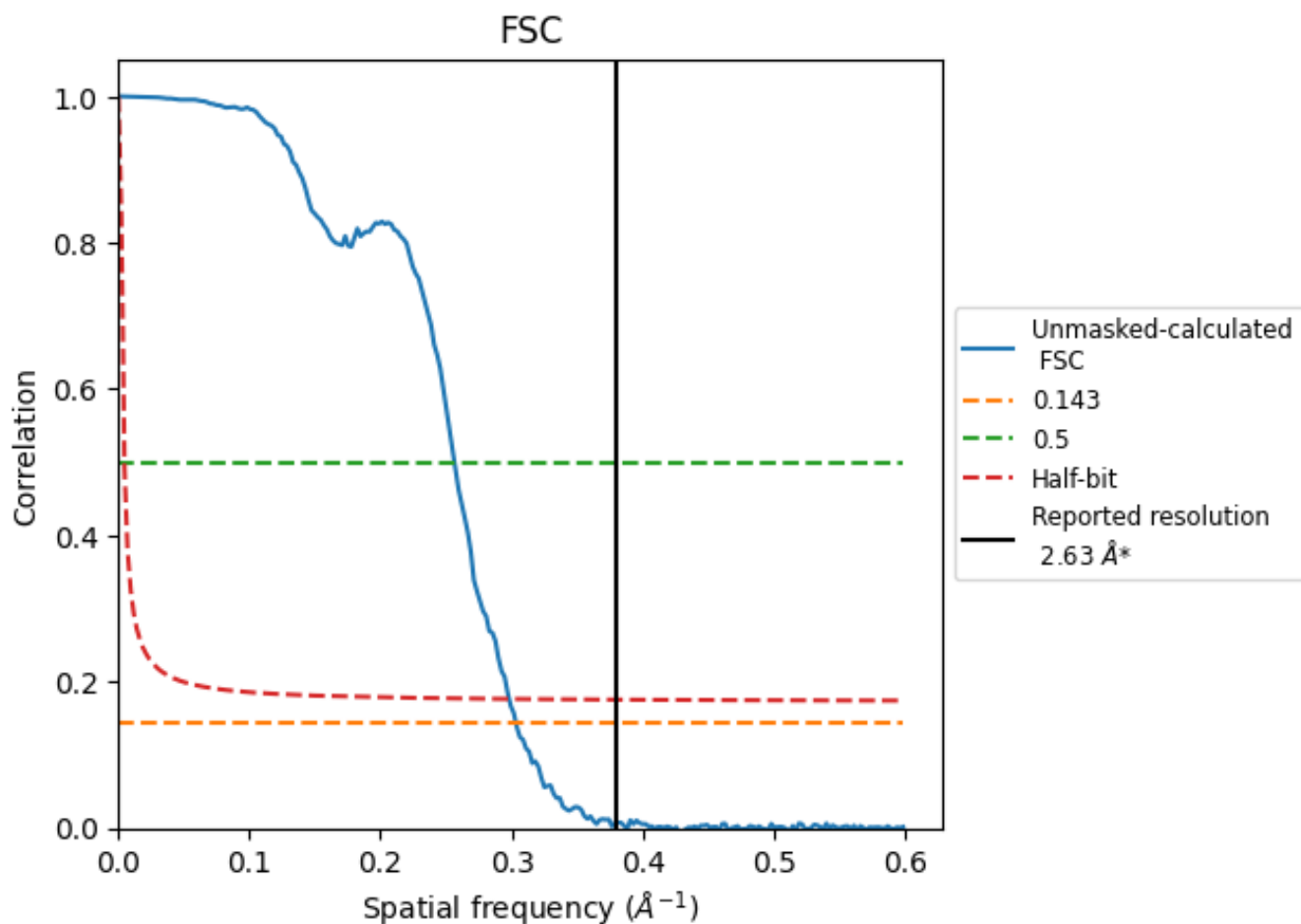


*Reported resolution corresponds to spatial frequency of 0.380 Å⁻¹

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 0.380 Å⁻¹

8.2 Resolution estimates [i](#)

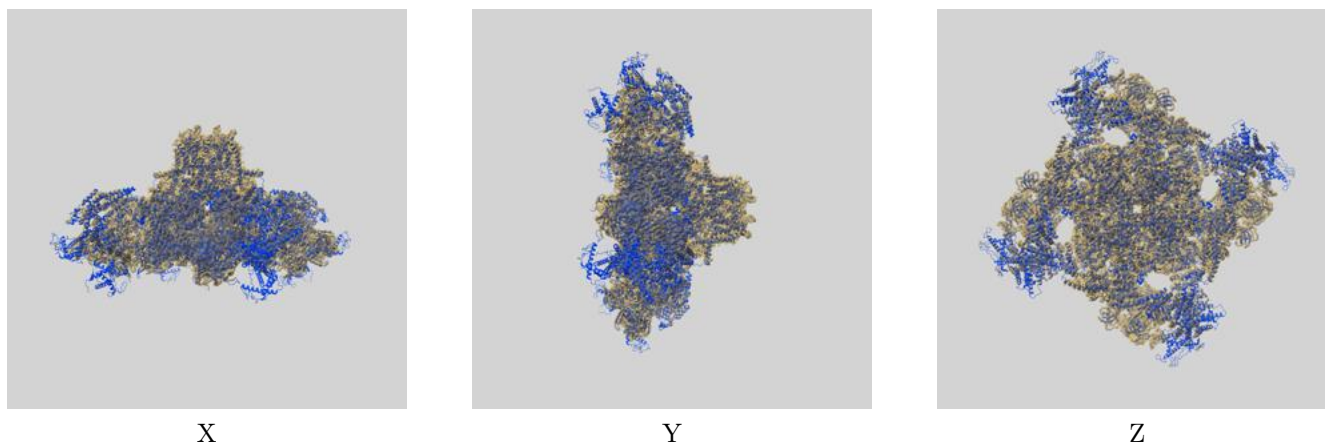
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.63	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.30	3.90	3.35

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.30 differs from the reported value 2.63 by more than 10 %

9 Map-model fit [i](#)

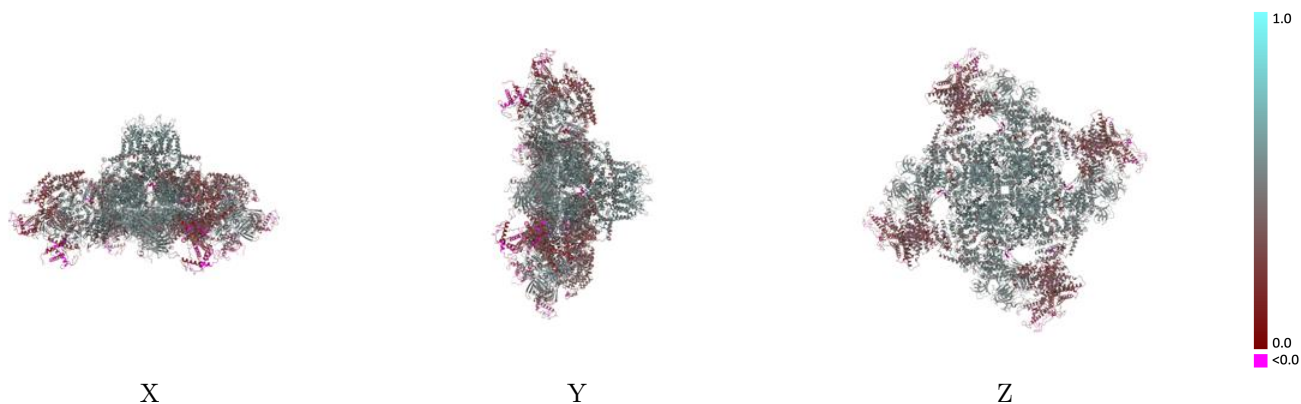
This section contains information regarding the fit between EMDB map EMD-47389 and PDB model 9E1C. Per-residue inclusion information can be found in section [3](#) on page [6](#).

9.1 Map-model overlay [i](#)



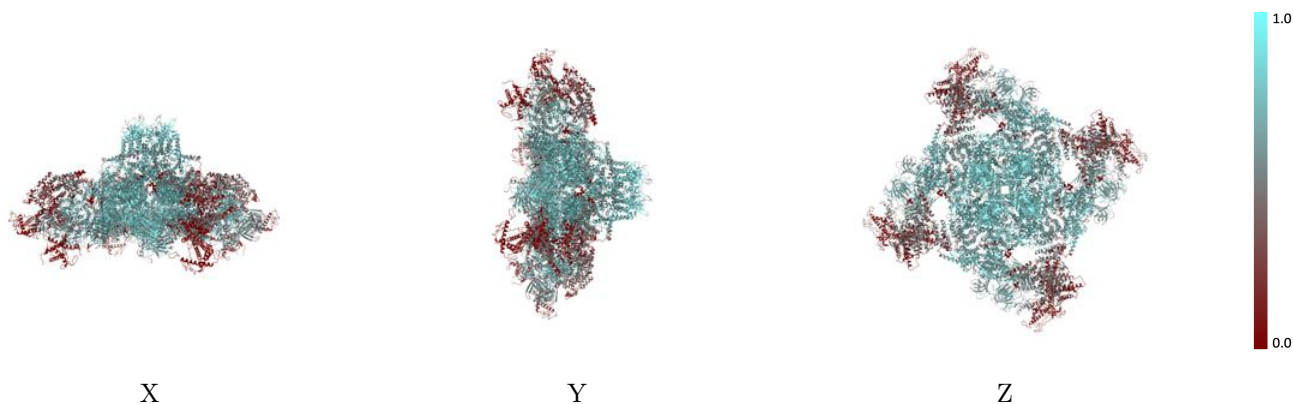
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



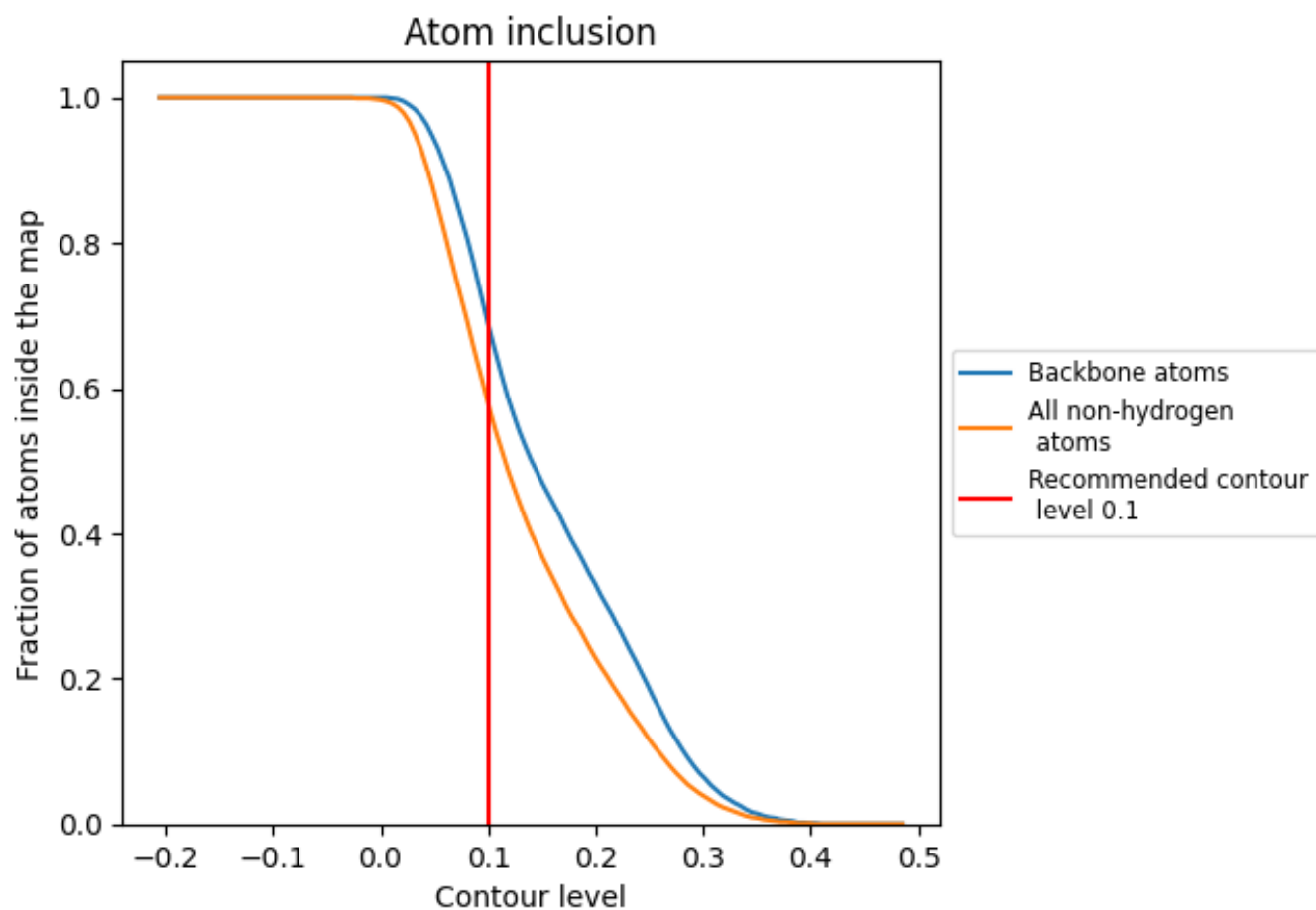
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.1).



















9.4 Atom inclusion [i](#)



At the recommended contour level, 69% of all backbone atoms, 58% of all non-hydrogen atoms, are inside the map.

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

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

Chain	Atom inclusion	Q-score
All	 0.5780	 0.4410
A	 0.5780	 0.4390
B	 0.5780	 0.4400
C	 0.5780	 0.4390
D	 0.5780	 0.4390
E	 0.5880	 0.5100
F	 0.5930	 0.5090
G	 0.5930	 0.5050
H	 0.5890	 0.5050

