



wwPDB EM Validation Summary Report ⓘ

Jun 16, 2025 – 05:15 PM EDT

PDB ID : 9E1D / pdb_00009e1d
EMDB ID : EMD-47390
Title : Structure of RyR1 in the primed state in the presence of enprofylline
Authors : Miotto, M.C.; Marks, A.R.
Deposited on : 2024-10-21
Resolution : 2.76 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.dev118
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0rc1
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) : 2.44

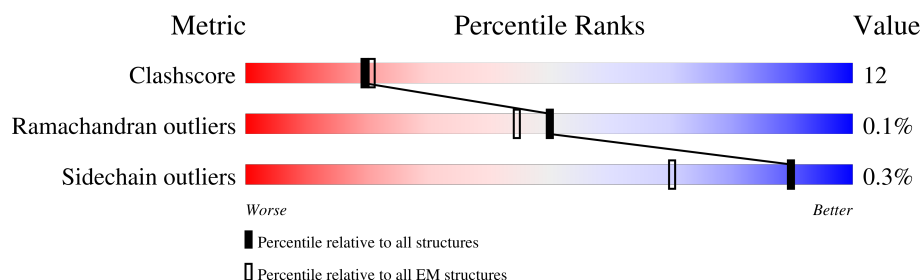
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.76 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 144112 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
1	A	4404	Total	C	N	O	S	9	0
			35150	22365	6063	6485	237		
1	B	4404	Total	C	N	O	S	9	0
			35150	22365	6063	6485	237		
1	D	4404	Total	C	N	O	S	9	0
			35150	22365	6063	6485	237		
1	C	4404	Total	C	N	O	S	9	0
			35150	22365	6063	6485	237		

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

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

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: C₁₀H₁₆N₅O₁₃P₃).



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

- Molecule 4 is CALCIUM ION (CCD ID: CA) (formula: Ca).

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

- Molecule 5 is ZINC ION (CCD ID: ZN) (formula: Zn).

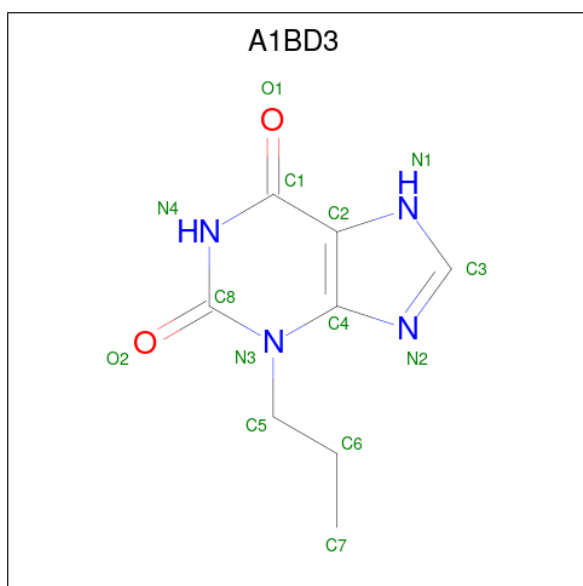
Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Zn	0
			1	1	

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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 enprofylline (CCD ID: A1BD3) (formula: $C_8H_{10}N_4O_2$) (labeled as "Ligand of Interest" by depositor).

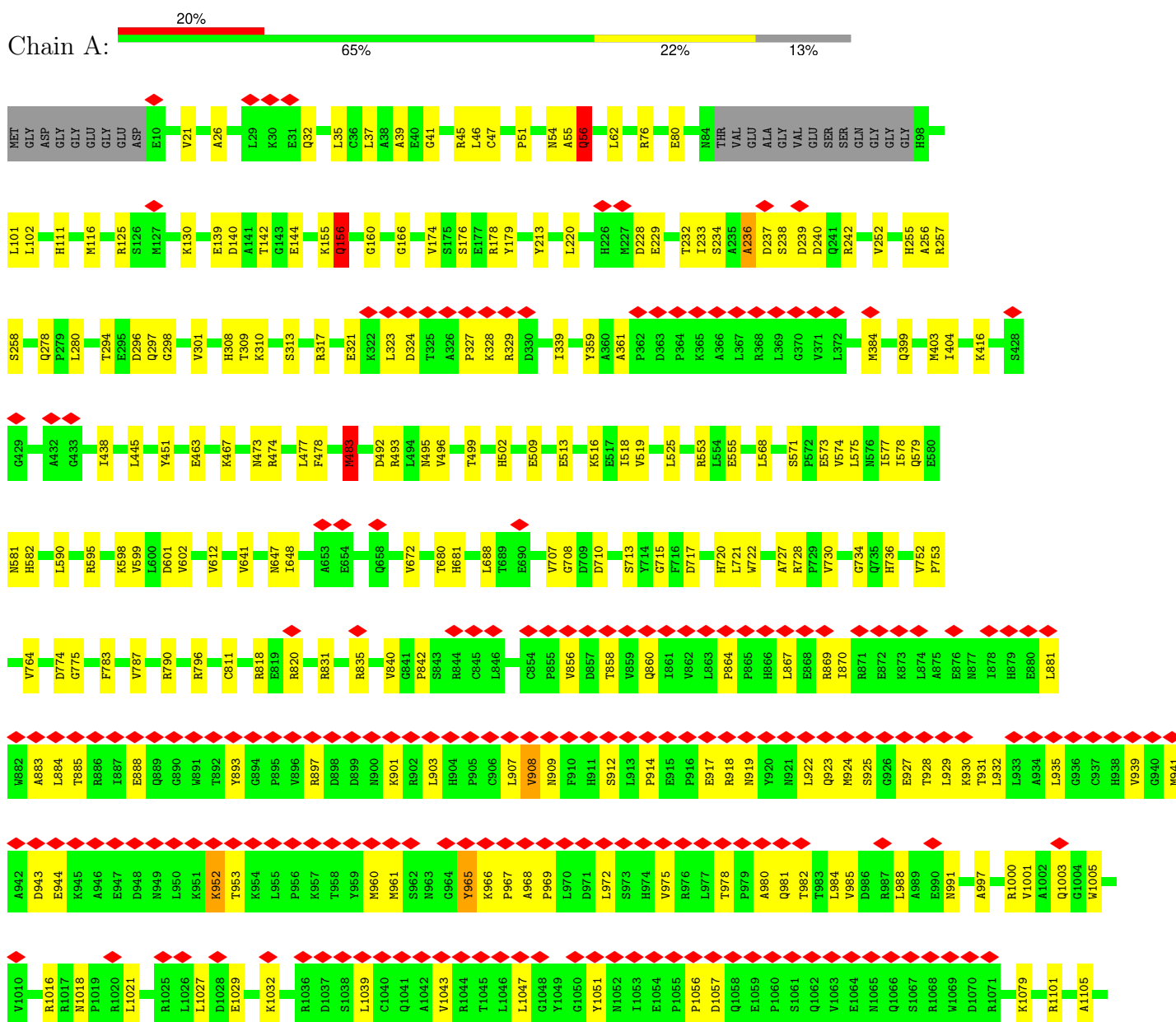


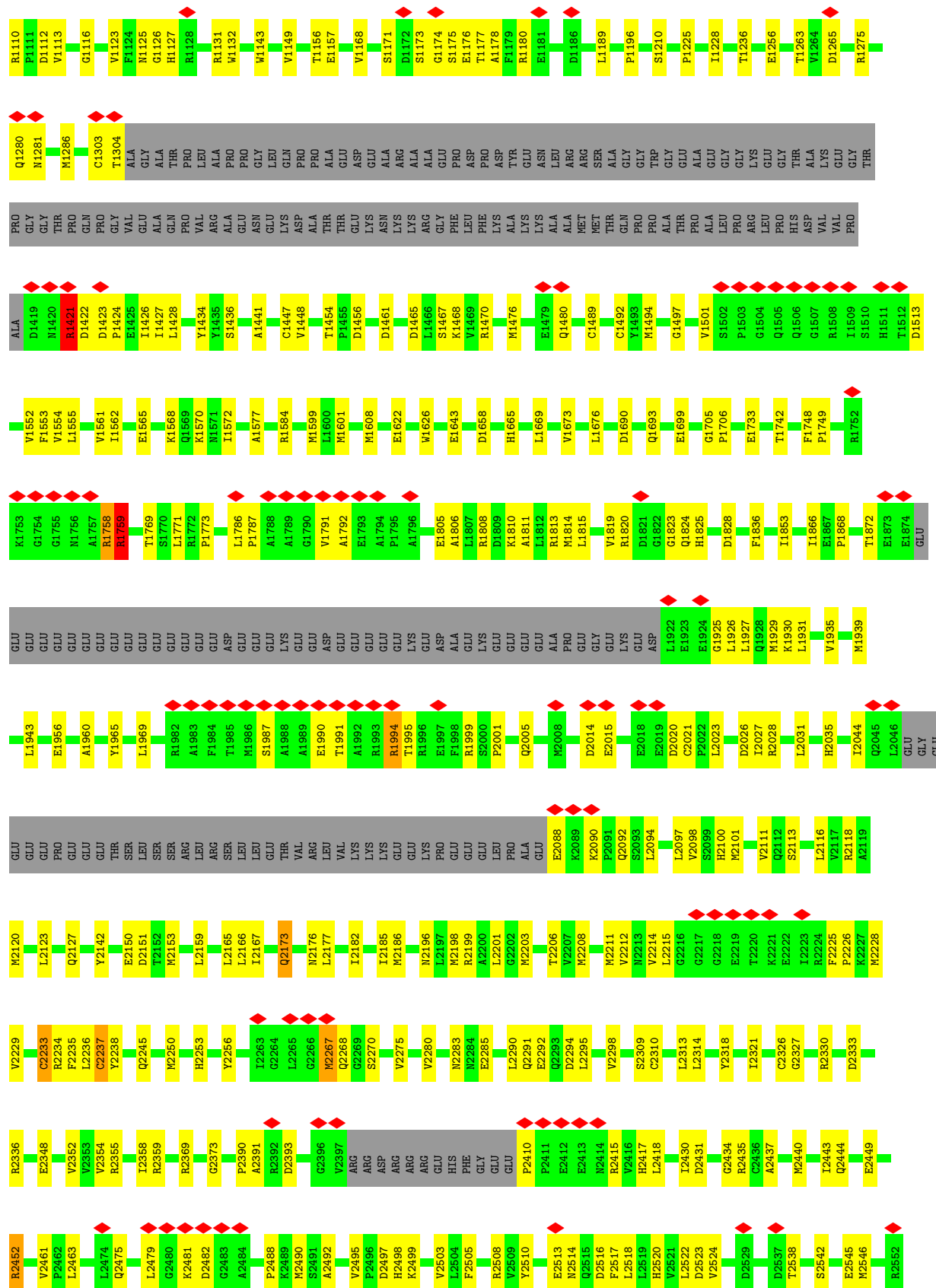
Mol	Chain	Residues	Atoms				AltConf
6	A	1	Total	C	N	O	0
			14	8	4	2	
6	B	1	Total	C	N	O	0
			14	8	4	2	
6	D	1	Total	C	N	O	0
			14	8	4	2	
6	C	1	Total	C	N	O	0
			14	8	4	2	

3 Residue-property plots

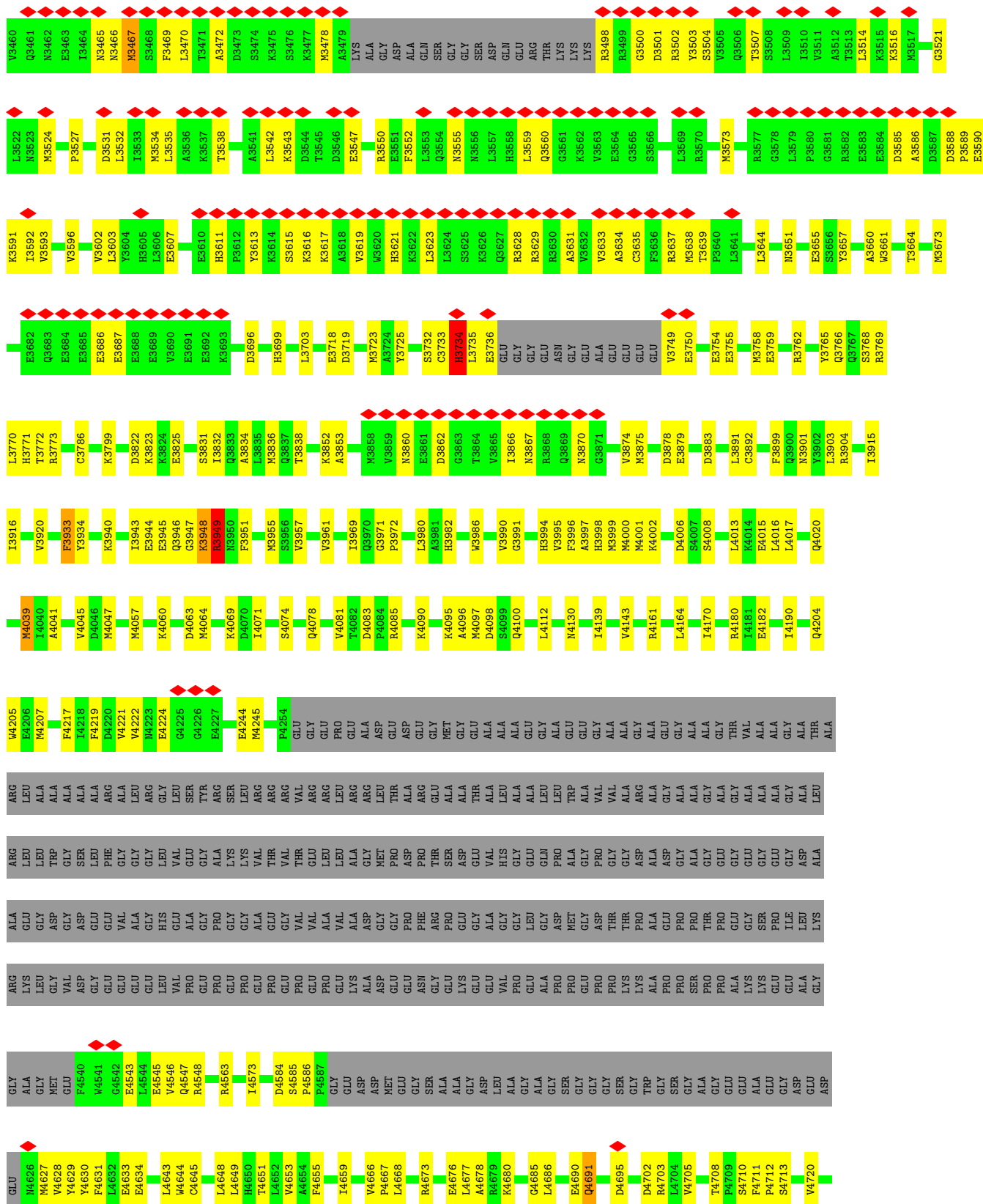
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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.

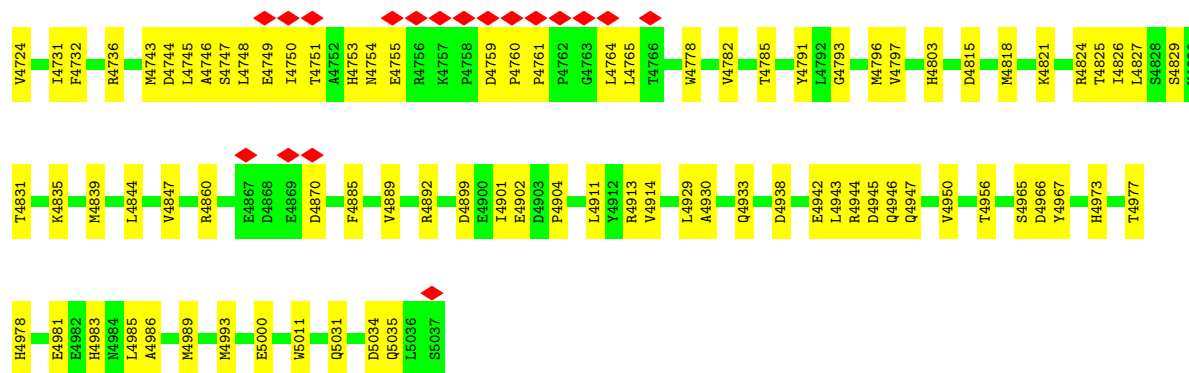
• Molecule 1: Ryanodine receptor 1



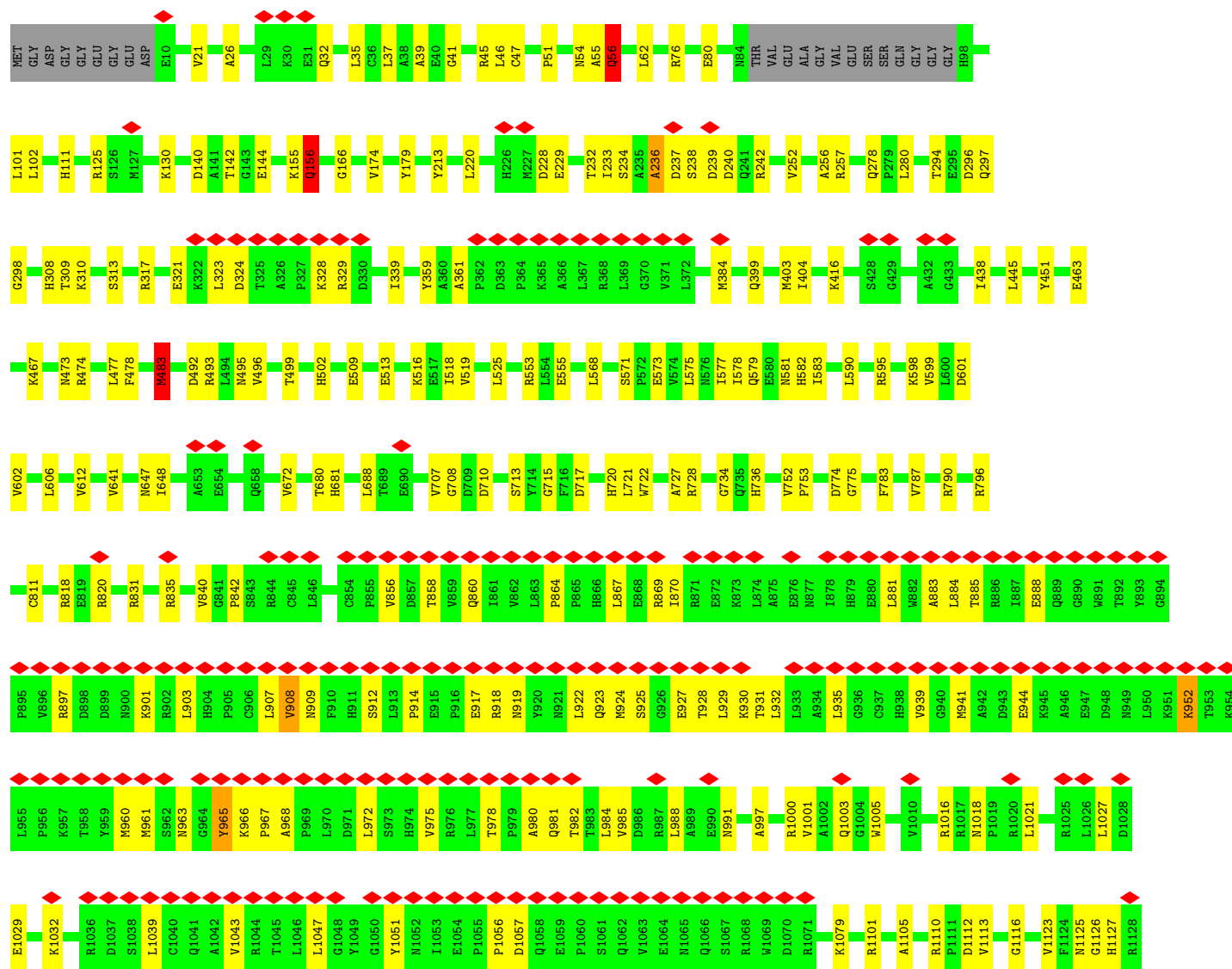


A3374	E3375	E3376	E3377	Q3378	L3379	K3380	L3381	E3382	A3383	K3384	A3385	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	L3401	C3402	R3403	D3404	L3405	Y3406	A3407	L3408	Y3409	P3410	L3411	L3412	L3413	R3414	R3420	L3434	F3435	R3436	M3437	F3442	W3445	S3446	K3447	S3448	H3449	N3450	F3451	K3452	R3453	E3454	E3455	V3459					
C3304	T3305	A3306	H3311	L3312	L3316	G3317	N3318	I3319	R3320	R3321	L3322	K3323	V3324	N3325	N3326	L3327	G3328	I3329	D3330	E3331	A3332	M3335	K3336	R3337	L3338	L3339	L3340	F3341	A3342	Q3343	P3344	I3345	V3346	S3347	R3350	L3354	H3355	S3356	H3357	F3358	L3359	P3360	T3361	I3362	K3363	R3364	L3365	R3366	K3367	K3368	A3369	V3372	V3373					
E3238	M3239	G3240	P3241	D3242	L3243	V3244	L3246	R3247	L3248	L3249	K3250	A3251	D3252	A3257	E3258	S3259	G3260	A3261	R3262	Y3263	T3264	E3265	M3266	P3267	H3268	V3269	L3270	E3271	L3272	T3273	L3274	P3275	M3276	L3281	P3282	R3283	W3284	W3285	E3286	R3287	G3288	P3289	E3290	A3291	P3292	P3293	P3294	L3295	L3296	P3297	A3298	G3299	A3300	P3301	P3302	P3303		
G3176	T3177	T3178	K3179	N3180	T3181	Y3182	V3183	E3184	K3185	L3186	R3187	L3190	G3191	E3192	C3193	L3194	A3195	R3196	L3197	A3198	A3199	A3200	M3201	P3202	V3203	A3204	F3205	L3206	E3207	L3210	N3211	E3212	Y3213	N3214	A3215	C3216	S3217	V3218	Y3219	T3220	T3221	K3222	S3223	F3224	R3225	E3226	R3227	A3228	L3229	L3230	G3231	L3232	M3234	S3235	E3237			
R3111	L3112	G3113	K3114	V3115	S3116	GLN	ALA	ARG	THR	GLN	VAL	K3123	G3124	V3125	G3126	Q3127	N3128	L3129	T3130	T3133	V3134	A3135	L3136	L3137	P3138	V3139	L3140	T3141	T3142	L3143	F3144	Q3149	H3150	Q3151	F3152	G3153	D3154	D3155	V3156	L3157	L3158	D3159	D3160	V3161	S3162	V3163	S3164	C3165	Y3166	R3167	T3168	L3169	C3170	S3171	I3172	L3175		
A3047	A3048	L3049	V3050	R3051	H3052	R3053	V3054	S3055	L3056	F3057	G3058	T3059	D3060	A3061	V3064	N3066	C3067	L3068	H3069	L3070	L3071	L3072	R3073	S3074	L3075	D3076	A3077	T3078	V3079	V3080	M3081	K3082	S3083	G3084	P3085	E3086	I3087	V3088	K3089	L3092	R3093	S3094	F3095	F3096	E3097	S3098	A3099	S3100	L3103	E3104	K3105	M3106	V3107	L3110				
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A2913	K2914	E2915	K2916	A2917	D2918	D2919	R2920	E2921	K2922	A2923	Q2924	L2925	L2926	L2927	K2928	F2929	L2930	Q2931	W2932	N2933	Q2934	Y2935	L2936	T2937	T2938	R2939	GLY	LEU	LYS	ASP	MET	GLU	L2946	D2947	T2948	G2949	S2950	L2951	E2952	K2953	R2954	F2955	A2956	F2957	G2958	F2959	L2960	W2966	W2967	D2968	L2969	S2970	F2973	T2974	A2975	H2976	L2977	
E2669	E2670	E2671	L2672	H2673	L2674	T2675	S2681	S2682	L2583	L2584	T2585	T2586	T2587	R2591	G2592	R2593	E2604	D2605	K2608	A2609	R2612	V2613	L2614	M2618	L2619	L2623	R2624	C2701	C2702	L2625	L2626	V2627	F2628	L2632	L2633	W2634	E2635	F2636	A2637	K2638	W2639	F2640	L2644	R2650	C2651	V2655	T2659	G2660	V2666	T2667	ALA	THR	VAL	ASP	ALA	GLU		
GLY	N2734	P2735	D2736	P2737	R2738	P2739	V2740	T2741	T2742	L2743	N2744	V2745	L2746	T2747	P2748	E2749	K2750	L2751	D2752	S2753	F2754	L2755	K2756	R2757	M2758	A2759	E2760	T2761	T2762	H2763	G2764	K2765	W2766	A2767	P2768	D2769	K2770	L2771	Q2772	THR	GLU	THR	GLU	W2775	S2776	L2777	ARG	GLU	THR	GLN	ALA	GLN	THR	TVR	ASP	PRO	ARG	
P2793	Y2794	K2795	T2796	S2797	F2798	E2799	K2800	D2801	K2802	E2803	L2804	Y2805	R2806	W2807	P2808	L2809	K2810	E2811	S2812	L2813	A2814	A2815	M2816	L2817	A2818	W2819	E2820	W2821	L2822	L2823	E2824	K2825	A2826	K2827	E2828	G2829	GLU	GLU	ARG	THR	GLU	L2894	E2895	L2896	K2897	G2898	L2899	T2901	H2902	P2903	L2904	L2905	V2906	P2907	D2908	T2910	L2911	T2912





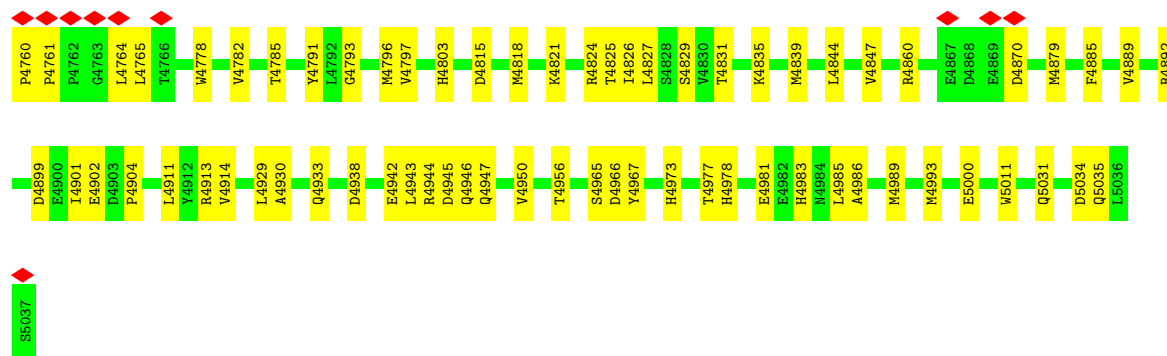
• Molecule 1: Ryanodine receptor 1



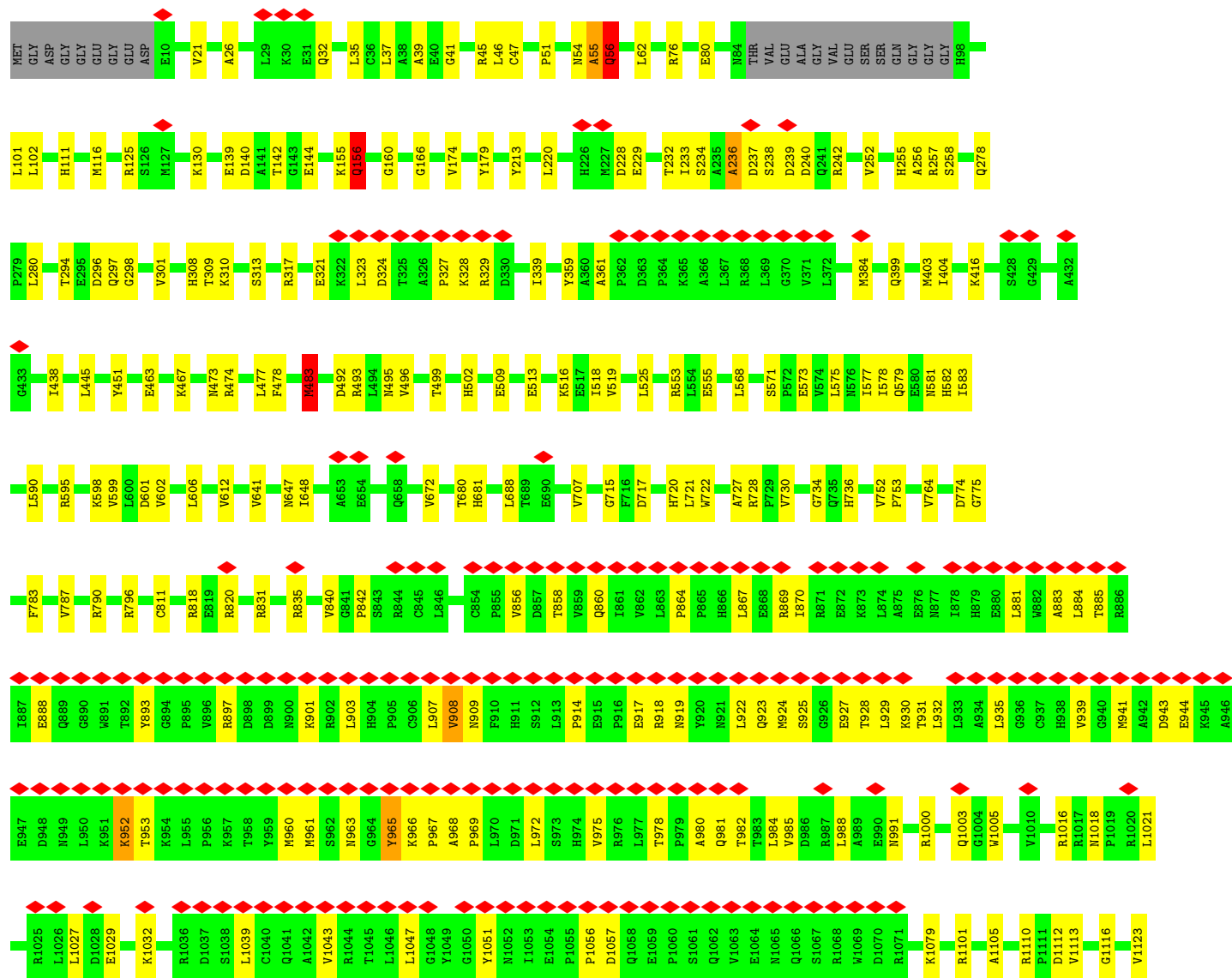








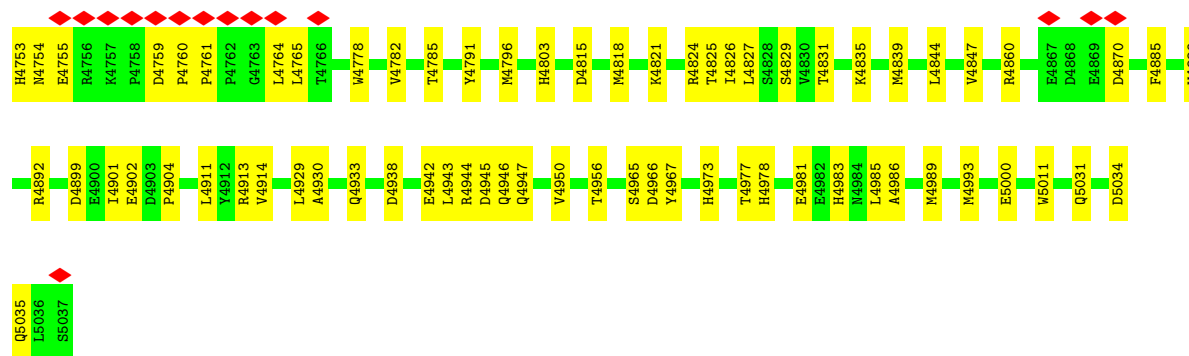
• Molecule 1: Ryanodine receptor 1



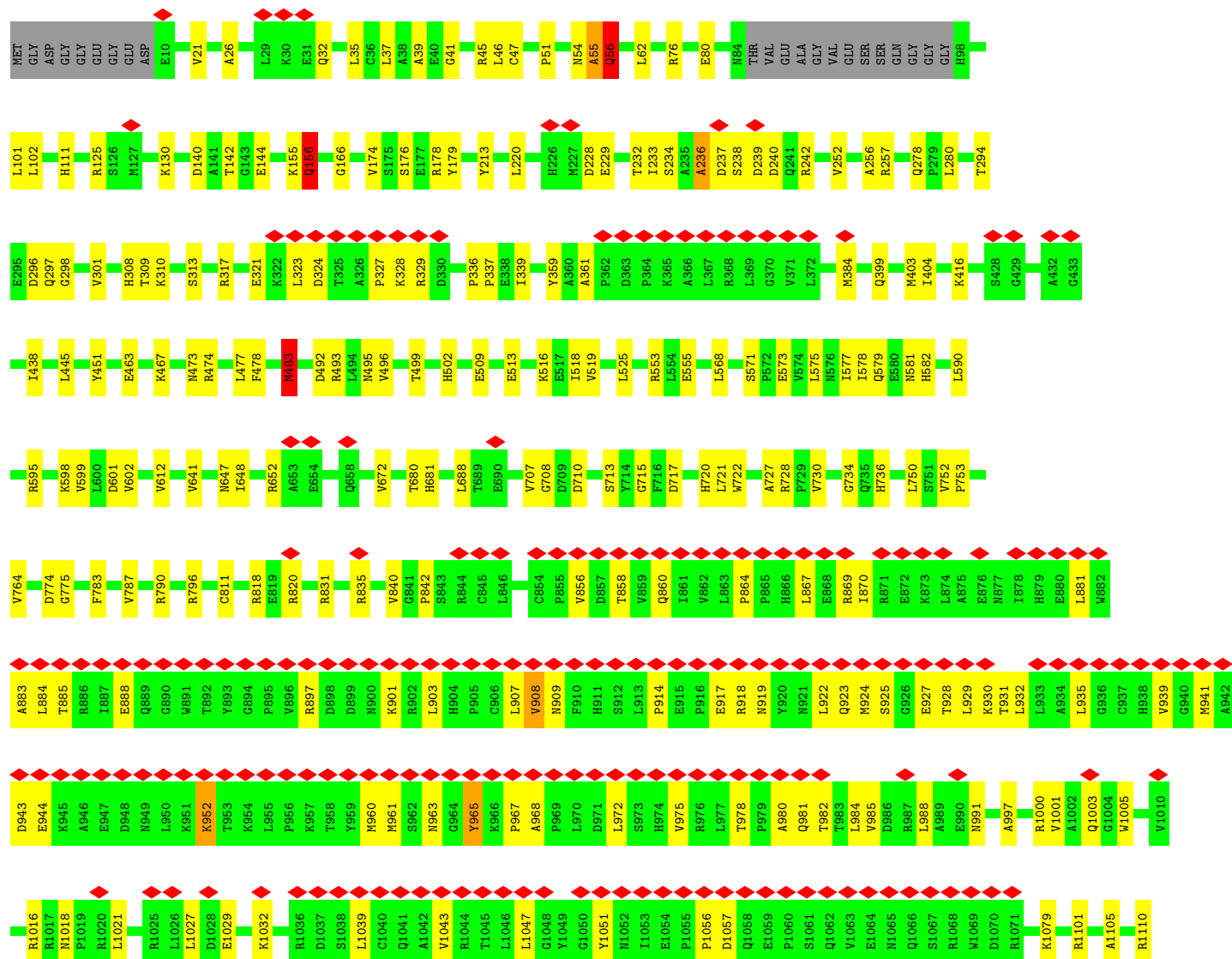


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R3073	S3074	L3075	D3076	A3077	R3078	T3079	V3080	K3081	R3082	S3083	G3084	P3085	E3086	L3087	V3088	K3089	L3092	R3093	S3094	F3095	G3096	S3097	S3104	A3099	S3100	I3103	E3104	K3105	V3107	L3110	R3111	L3112	G3113	K3114	V3115	S3116	GLN	ALA	ARG	THR	GLN	VAL	K3123	G3124	V3125	G3126	Q3127	H3128	L3129	T3130	T3133	V3134	A3135	L3136																										
L3137	P3138	V3139	L3140	T3141	T3142	L3143	F3144	Q3149	H3150	Q3151	F3152	G3153	D3154	D3155	V3156	L3157	L3158	D3159	L3160	V3161	Q3162	V3163	S3164	G3165	Y3166	R3167	T3168	L3169	C3170	S3171	I3172	L3175	G3176	T3177	T3178	K3179	N3180	T3181	V3182	V3183	E3184	K3185	L3186	R3187	L3190	G3191	S3192	C3193	L3194	A3195	R3196	L3197	A3198	S3199	A3199	A3200	M3201																							
F3202	V3203	A3204	F3205	L3206	E3207	L3210	N3211	E3212	Y3213	N3214	A3215	C3216	S3217	V3218	Y3219	T3220	T3221	K3222	S3223	P3224	R3225	E3226	R3227	A3228	L3229	L3230	G3231	L3232	P3233	N3234	S3235	V3236	E3237	E3238	K3239	C3240	F3241	D3242	I3243	P3244	V3245	L3246	D3247	R3248	L3249	M3250	A3251	D3252	L3253	A3257	E3258	S3259	G3260	A3261	R3262	Y3263	T3264																							
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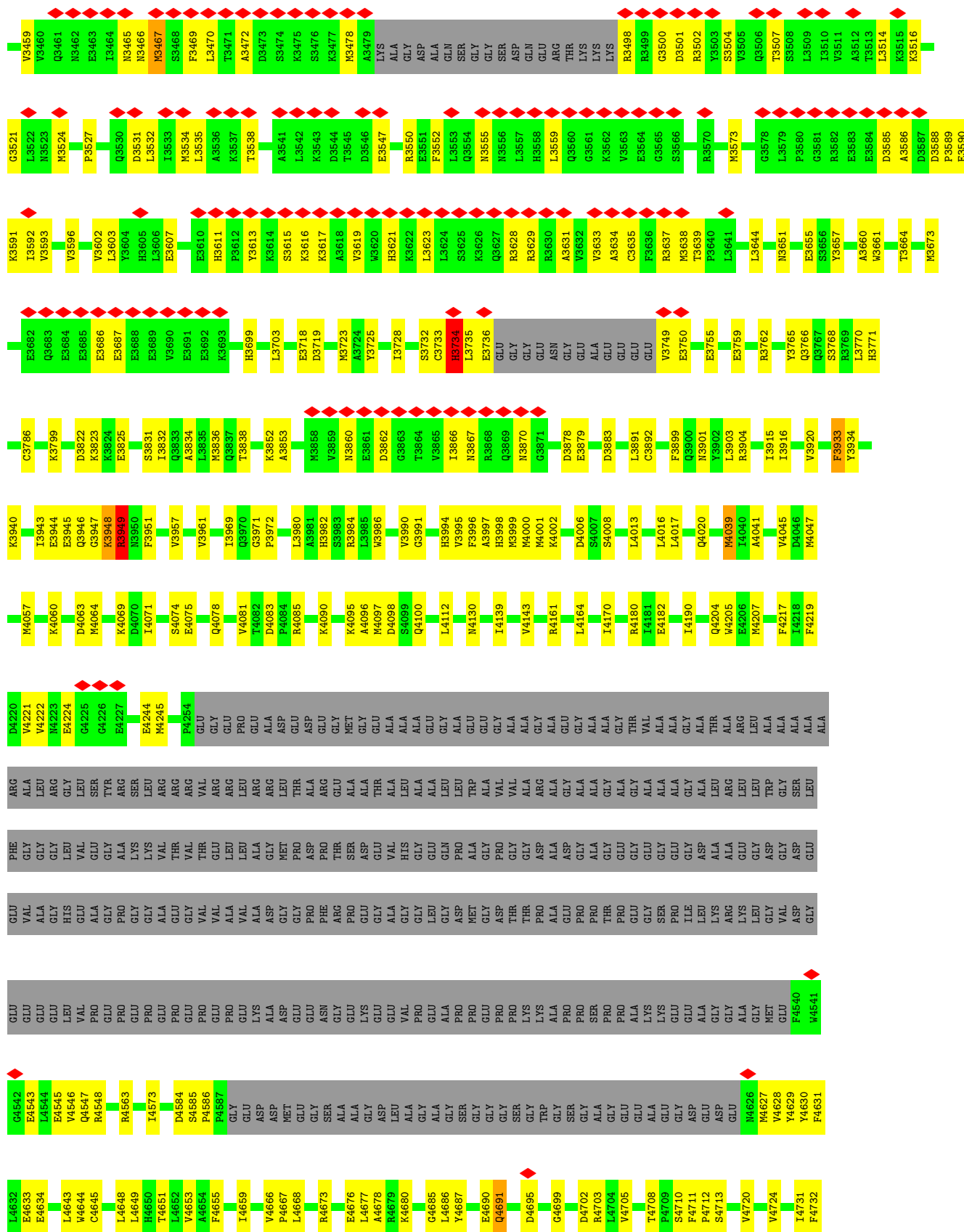


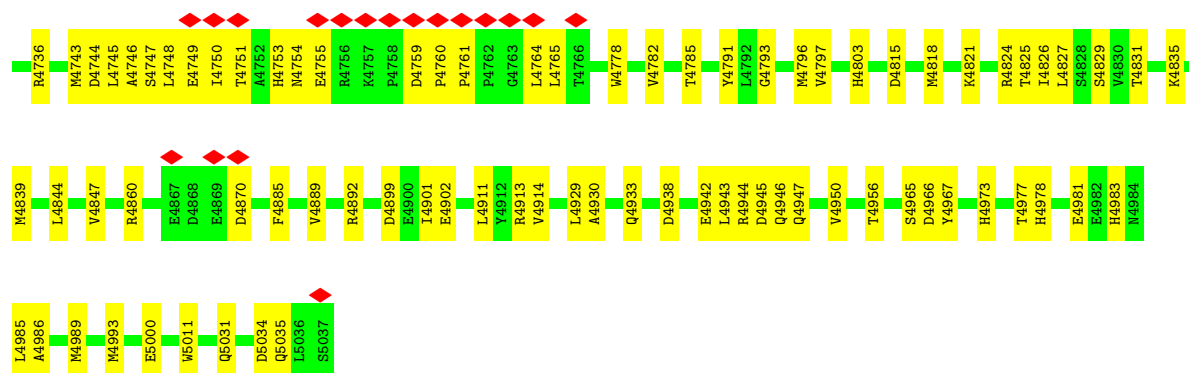
• Molecule 1: Ryanodine receptor 1



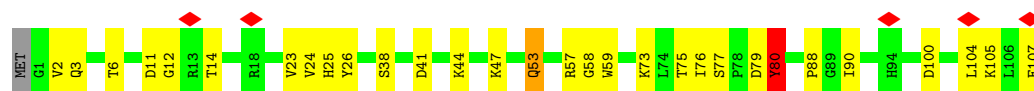


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P3303	C3304	T3305	A3306	H3311	L3312	L3316	L3317	G3318	I3319	L3320	R3321	I3322	I3323	V3324	N3325	N3326	L3327	G3328	I3329	D3330	E3331	A3332	M3335	K3336	R3337	L3338	A3339	V3340	F3341	A3342	Q3343	F3344	L3345	V3346	S3347	R3350	L3354	H3355	S3356	H3357	F3358	I3359	P3360	L3361	I3362	G3363	R3364	L3365	R3366	K3367	R3368	A3369	V3372						
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G3113	K3114	V3115	S3116	GLN	ALA	ARG	THR	GLN	VAL	K3123	G3124	V3125	G3126	Q3127	N3128	L3129	T3130	T3133	V3134	A3135	L3136	L3137	P3138	V3139	L3140	T3141	T3142	L3143	F3144	Q3149	H3150	Q3151	F3152	G3153	D3154	D3155	V3156	I3157	L3158	D3159	T3160	V3161	Q3162	V3163	S3164	C3165	Y3166	R3167	T3168	L3169	C3170	S3171	I3172	L3175	G3176	T3177			
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P3303	C3304	T3305	A3306	H3311	L3312	L3316	L3317	G3318	I3319	L3320	R3321	I3322	I3323	V3324	N3325	N3326	L3327	G3328	I3329	D3330	E3331	A3332	M3335	K3336	R3337	L3338	A3339	V3340	F3341	A3342	Q3343	F3344	L3345	V3346	S3347	R3350	L3354	H3355	S3356	H3357	F3358	I3359	P3360	L3361	I3362	G3363	R3364	L3365	R3366	K3367	R3368	A3369	V3372						
V3373	V3374	E3375	E3376	E3377	E3378	E3379	R3380	L3381	E3382	A3383	A3384	A3385	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	L3401	C3402	R3403	D3404	L3405	Y3406	A3407	L3408	Y3409	P3410	L3411	L3412	L3413	R3414	R3420	L3434	F3435	R3436	K3437	V3438	G3439	F3442	K3445	S3446	R3447	S3448	H3449	K3452	R3453	E3454	E3455						
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N2734	F2735	D2736	P2737	R2738	P2739	V2740	E2741	T2742	L2743	N2744	V2745	L2746	L2747	P2748	E2749	K2750	L2751	D2752	S2753	T2754	L2755	N2756	K2757	F2758	A2759	E2760	Y2761	T2762	H2763	E2764	K2765	N2766	A2767	F2768	K2769	D2770	Q2771	Q2772	Q2773	N2774	N2775	N2776	Y2777	K2778	E2779	N2780	V2781	D2782	E2783	E2784	L2785	K2786	P2787	H2788	D2789	M2790	L2791	R2792	P2793
Y2794	K2795	T2796	F2797	S2798	E2799	K2800	D2801	K2802	E2803	L2804	Y2805	R2806	L2807	P2808	L2809	K2810	S2811	D2812	L2813	K2814	A2815	M2816	L2817	N2818	E2820	N2821	T2822	L2823	E2824	K2825	A2826	R2827	E2828	G2829	E2830	GLU	ARG	THR	GLU	LVS	LVS	THR	ARG	LVS	ILE	SER	GLN	THR	ALA	GLN	THR	TYR	ASP	PRO	ARG	GLU			
Y2855	N2856	P2857	Q2858	P2859	P2860	D2861	L2862	S2863	G2864	V2865	T2866	L2867	S2868	R2869	E2870	L2871	Q2872	S2873	M2874	E2875	E2876	Q2877	L2878	A2879	E2880	N2881	Y2882	H2883	N2884	T2885	V2886	Q2887	R2888	K2889	K2890	K2891	Q2892	L2894	E2895	A2896	K2897	G2898	G2899	Q2900	T2901	H2902	P2903	L2904	L2905	V2906	P2907	Y2908	T2910	L2911	T2912	A2913			
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G3113	K3114	V3115	S3116	GLN	ALA	ARG	THR	GLN	VAL	K3123	G3124	V3125	G3126	Q3127	N3128	L3129	T3130	T3133	V3134	A3135	L3136	L3137	P3138	V3139	L3140	T3141	T3142	L3143	F3144	Q3149	H3150	Q3151	F3152	G3153	D3154	D3155	V3156	I3157	L3158	D3159	T3160	V3161	Q3162	V3163	S3164	C3165	Y3166	R3167	T3168	L3169	C3170	S3171	I3172	L3175	G3176	T3177			
T3178	K3179	N3180	T3181	V3182	V3183	E3184	K3185	L3186	R3187	L3190	G3191	E3192	C3193	L3194	A3195	R3196	L3197	A3198	A3199	A3200	K3201	P3202	V3203	A3204	F3205	L3206	L3207	E3207	L3210	N3211	N3212	Y3213	N3214	A3215	C3216	S3217	V3218	Y3219	T3220	T3221	A3222	S3223	P3224	R3225	E3226	R3227	A3228	I3229	L3230	G3231	L3232	P3233	N3234	S3235	E3237	E3238	N3239		
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P3303	C3304	T3305	A3306	H3311	L3312	L3316	L3317	G3318	I3319	L3320	R3321	I3322	I3323	V3324	N3325	N3326	L3327	G3328	I3329	D3330	E3331	A3332	M3335	K3336	R3337	L3338	A3339	V3340	F3341	A3342	Q3343	F3344	L3345	V3346	S3347	R3350	L3354	H3355	S3356	H3357	F3358	I3359	P3360	L3361	I3362	G3363	R3364	L3365	R3366	K3367	R3368	A3369	V3372						
V3373	V3374	E3375	E3376	E3377	E3378	E3379	R3380	L3381	E3382	A3383	A3384	A3385	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	L3401	C3402	R3403	D3404	L3405	Y3406	A3407	L3408	Y3409	P3410	L3411	L3412	L3413	R3414	R3420	L3434	F3435	R3436	K3437	V3438	G3439	F3442	K3445	S3446	R3447	S3448	H3449	K3452	R3453	E3454	E3455						

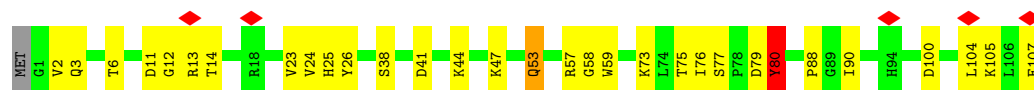




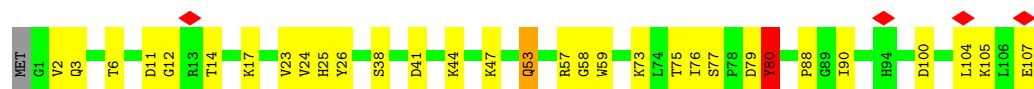
- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



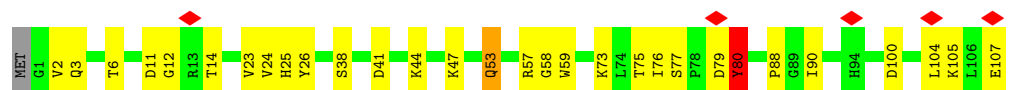
- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



- 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	94090	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	0.513	Depositor
Minimum map value	-0.205	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.021	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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, ZN, A1BD3, 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	0.37	29/35977 (0.1%)	0.61	57/48726 (0.1%)
1	B	0.37	29/35977 (0.1%)	0.61	57/48726 (0.1%)
1	C	0.37	29/35977 (0.1%)	0.61	57/48726 (0.1%)
1	D	0.37	29/35977 (0.1%)	0.61	57/48726 (0.1%)
2	E	1.03	9/850 (1.1%)	1.42	11/1146 (1.0%)
2	F	1.03	9/850 (1.1%)	1.42	11/1146 (1.0%)
2	G	1.04	9/850 (1.1%)	1.42	11/1146 (1.0%)
2	H	1.03	9/850 (1.1%)	1.42	11/1146 (1.0%)
All	All	0.39	152/147308 (0.1%)	0.64	272/199488 (0.1%)

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	1	11
1	B	1	11
1	C	1	11
1	D	1	11
2	E	0	1
2	F	0	1
2	G	0	1
2	H	0	1
All	All	4	48

The worst 5 of 152 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	3949	ARG	NE-CZ	-19.60	1.11	1.33
1	B	3949	ARG	NE-CZ	-19.60	1.11	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	3949	ARG	NE-CZ	-19.60	1.11	1.33
1	D	3949	ARG	NE-CZ	-19.59	1.11	1.33
1	D	3321	ARG	CG-CD	-19.16	0.94	1.52

The worst 5 of 272 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	3321	ARG	N-CA-CB	36.30	164.29	110.20
1	D	3321	ARG	N-CA-CB	36.30	164.29	110.20
1	A	3321	ARG	N-CA-CB	36.29	164.28	110.20
1	C	3321	ARG	N-CA-CB	36.29	164.28	110.20
1	D	3949	ARG	NE-CZ-NH1	-34.53	86.97	121.50

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	3321	ARG	CA
1	B	3321	ARG	CA
1	D	3321	ARG	CA
1	C	3321	ARG	CA

5 of 48 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1421	ARG	Sidechain
1	A	156	GLN	Sidechain
1	A	1758	ARG	Sidechain
1	A	2173	GLN	Sidechain
1	A	3320	LEU	Peptide

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	35150	0	34794	881	0
1	B	35150	0	34794	863	0
1	C	35150	0	34794	863	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	35150	0	34794	869	0
2	E	831	0	829	25	0
2	F	831	0	829	25	0
2	G	831	0	829	28	0
2	H	831	0	829	26	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
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	14	0	0	0	0
6	B	14	0	0	0	0
6	C	14	0	0	0	0
6	D	14	0	0	0	0
All	All	144112	0	142540	3523	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 12.

The worst 5 of 3523 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:B:2237:CYS:SG	1:B:2237:CYS:CB	2.11	1.39
1:A:2237:CYS:CB	1:A:2237:CYS:SG	2.11	1.38
1:D:2237:CYS:CB	1:D:2237:CYS:SG	2.11	1.37
1:C:2237:CYS:SG	1:C:2237:CYS:CB	2.11	1.37
1:C:2229:VAL:HG11	1:C:2267:MET:HE1	1.26	1.18

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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%)	4256 (97%)	123 (3%)	6 (0%)	48	70
1	B	4385/5037 (87%)	4256 (97%)	123 (3%)	6 (0%)	48	70
1	C	4385/5037 (87%)	4256 (97%)	123 (3%)	6 (0%)	48	70
1	D	4385/5037 (87%)	4256 (97%)	123 (3%)	6 (0%)	48	70
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	17960/20580 (87%)	17432 (97%)	504 (3%)	24 (0%)	50	70

5 of 24 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	55	ALA
1	A	908	VAL
1	A	3300	ALA
1	A	3949	ARG
1	B	55	ALA

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	3836/4276 (90%)	3826 (100%)	10 (0%)	91	95

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	3836/4276 (90%)	3826 (100%)	10 (0%)	91	95
1	C	3836/4276 (90%)	3826 (100%)	10 (0%)	91	95
1	D	3836/4276 (90%)	3826 (100%)	10 (0%)	91	95
2	E	89/90 (99%)	88 (99%)	1 (1%)	70	83
2	F	89/90 (99%)	88 (99%)	1 (1%)	70	83
2	G	89/90 (99%)	88 (99%)	1 (1%)	70	83
2	H	89/90 (99%)	88 (99%)	1 (1%)	70	83
All	All	15700/17464 (90%)	15656 (100%)	44 (0%)	90	95

5 of 44 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	1759	ARG
1	C	156	GLN
1	D	2268[A]	GLN
1	D	3321	ARG
1	C	960	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 159 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	4034	ASN
1	C	2856	ASN
1	D	4946	GLN
1	C	725	HIS
1	C	3850	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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	5301	-	28,33,33	0.65	0	34,52,52	0.95	1 (2%)
3	ATP	D	5301	-	28,33,33	0.64	0	34,52,52	0.95	1 (2%)
3	ATP	C	5301	-	28,33,33	0.65	0	34,52,52	0.95	1 (2%)
6	A1BD3	D	5304	-	11,15,15	5.56	6 (54%)	13,21,21	3.55	8 (61%)
3	ATP	B	5301	-	28,33,33	0.65	0	34,52,52	0.95	1 (2%)
6	A1BD3	A	5304	-	11,15,15	5.56	6 (54%)	13,21,21	3.55	8 (61%)
6	A1BD3	C	5304	-	11,15,15	5.56	6 (54%)	13,21,21	3.55	8 (61%)
6	A1BD3	B	5304	-	11,15,15	5.56	6 (54%)	13,21,21	3.54	8 (61%)

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	5301	-	-	10/18/38/38	0/3/3/3
3	ATP	D	5301	-	-	10/18/38/38	0/3/3/3
3	ATP	C	5301	-	-	10/18/38/38	0/3/3/3
6	A1BD3	D	5304	-	-	1/3/3/3	0/2/2/2
3	ATP	B	5301	-	-	10/18/38/38	0/3/3/3
6	A1BD3	A	5304	-	-	1/3/3/3	0/2/2/2
6	A1BD3	C	5304	-	-	1/3/3/3	0/2/2/2
6	A1BD3	B	5304	-	-	1/3/3/3	0/2/2/2

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	D	5304	A1BD3	C8-N3	10.26	1.49	1.37
6	A	5304	A1BD3	C8-N3	10.19	1.49	1.37
6	B	5304	A1BD3	C8-N3	10.17	1.49	1.37
6	C	5304	A1BD3	C8-N3	10.17	1.49	1.37
6	A	5304	A1BD3	O2-C8	9.75	1.40	1.23

The worst 5 of 36 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	C	5304	A1BD3	C1-N4-C8	-8.20	119.67	127.38
6	A	5304	A1BD3	C1-N4-C8	-8.17	119.69	127.38
6	B	5304	A1BD3	C1-N4-C8	-8.17	119.69	127.38
6	D	5304	A1BD3	C1-N4-C8	-8.15	119.72	127.38
6	C	5304	A1BD3	C3-N2-C4	6.83	114.09	101.92

There are no chirality outliers.

5 of 44 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	5301	ATP	C5'-O5'-PA-O1A
3	A	5301	ATP	C5'-O5'-PA-O3A
3	B	5301	ATP	C5'-O5'-PA-O1A
3	B	5301	ATP	C5'-O5'-PA-O3A
3	D	5301	ATP	C5'-O5'-PA-O1A

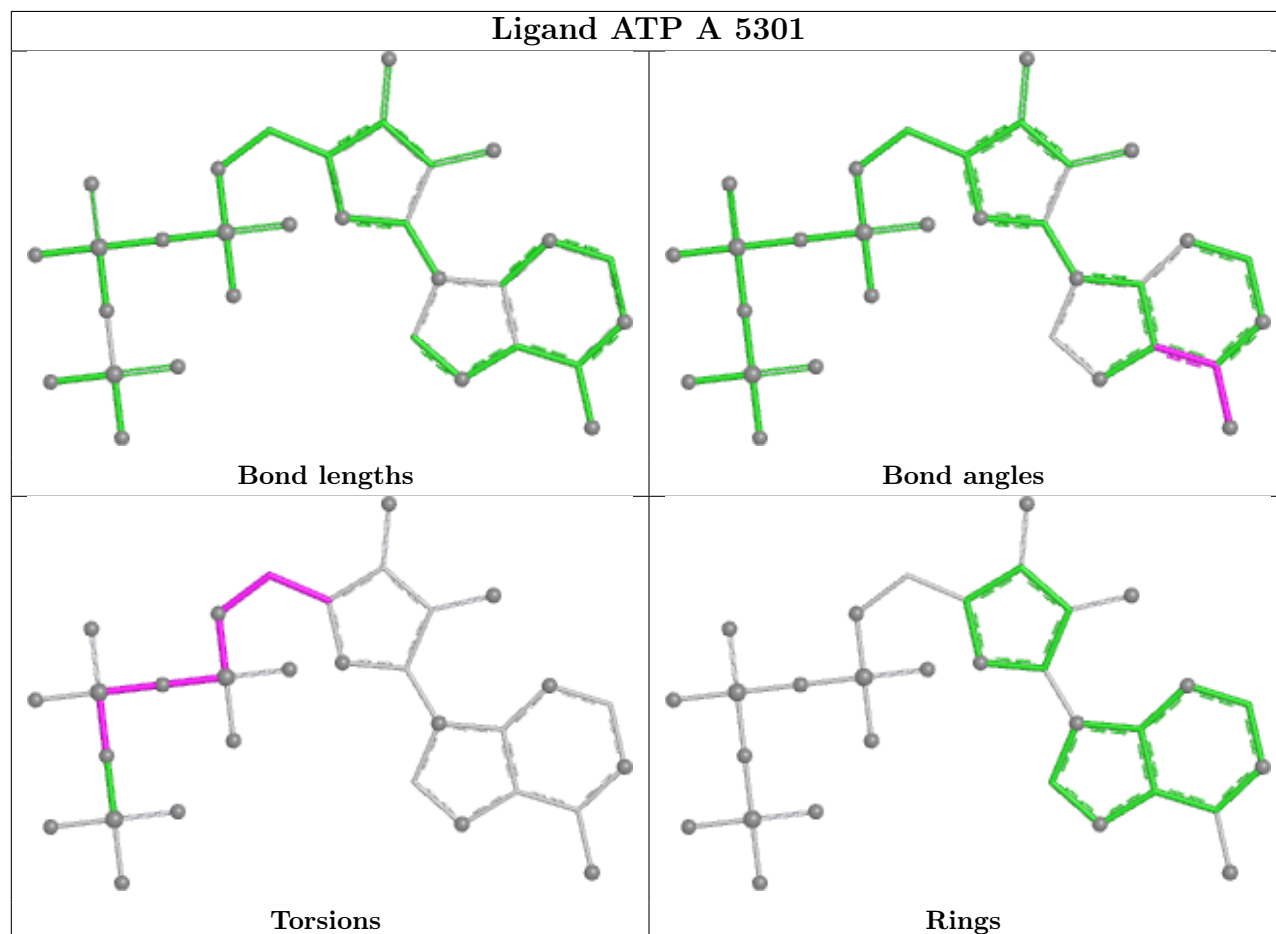
There are no ring outliers.

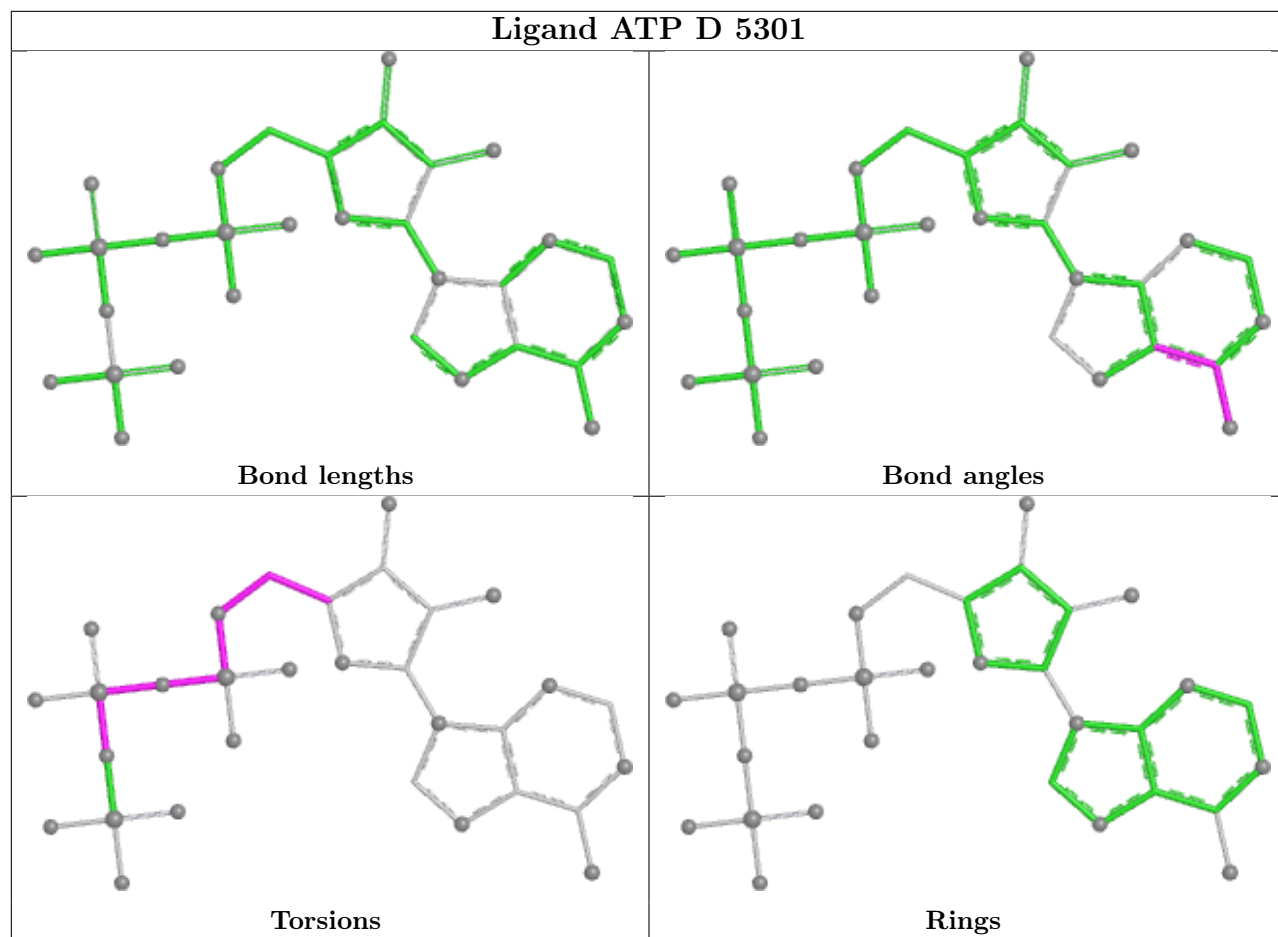
4 monomers are involved in 4 short contacts:

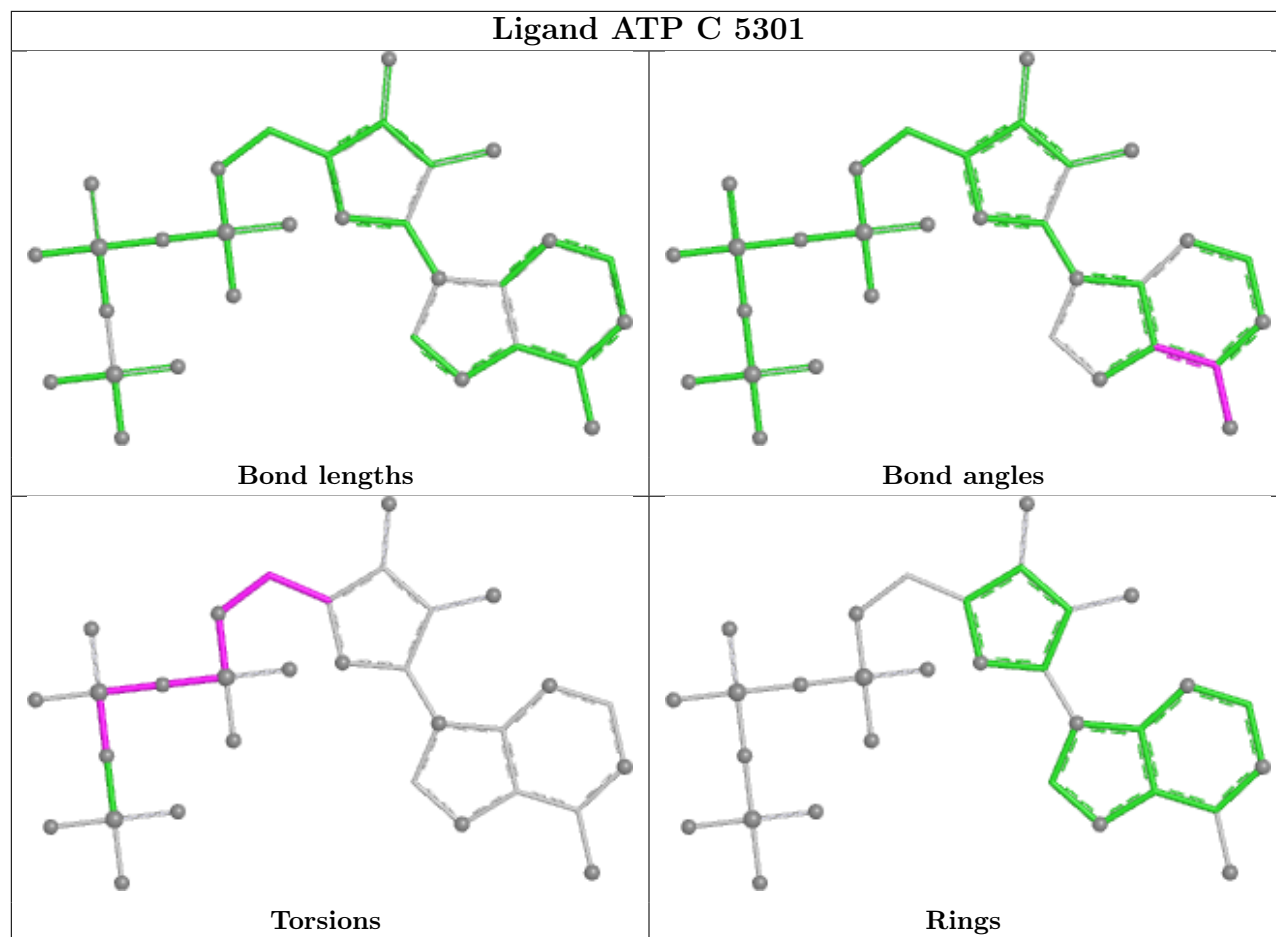
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	5301	ATP	1	0
3	D	5301	ATP	1	0
3	C	5301	ATP	1	0
3	B	5301	ATP	1	0

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

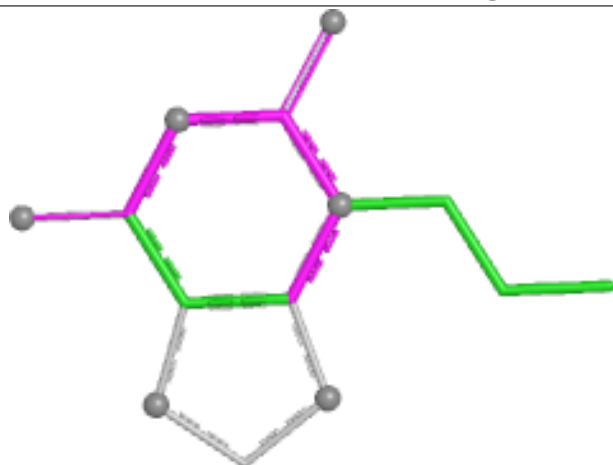
in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



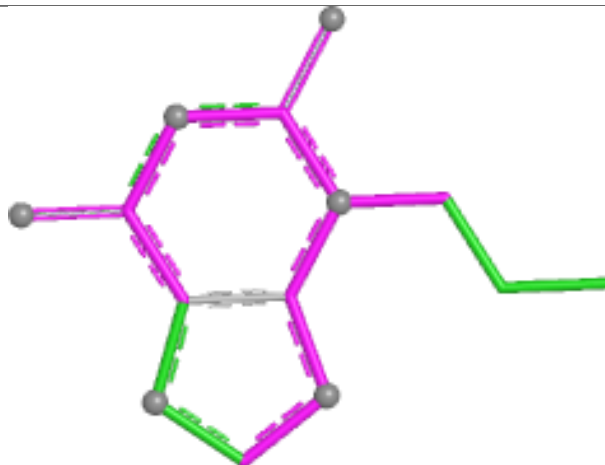




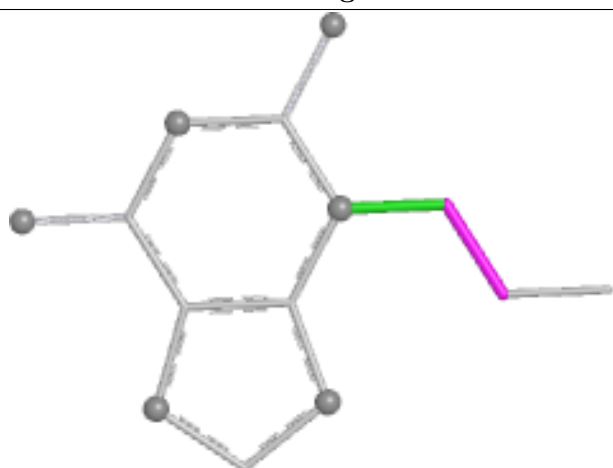
Ligand A1BD3 D 5304



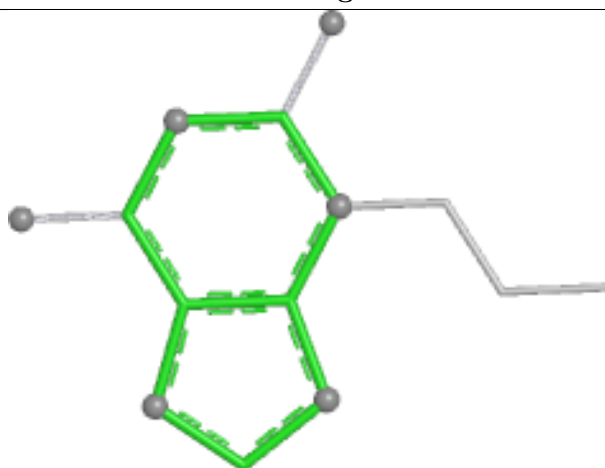
Bond lengths



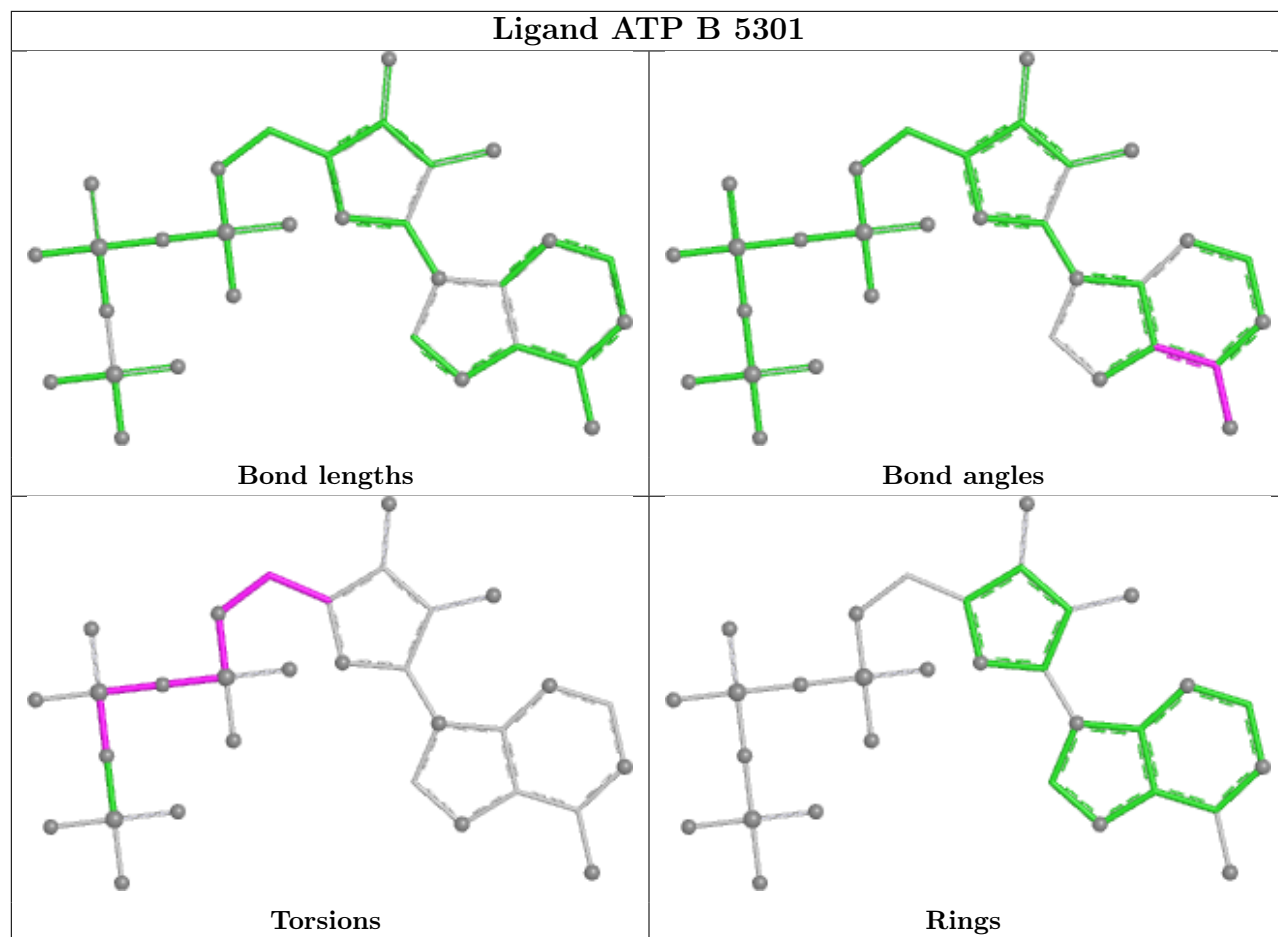
Bond angles



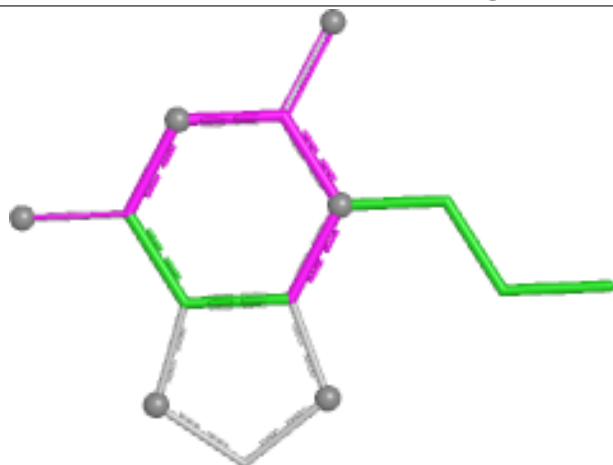
Torsions



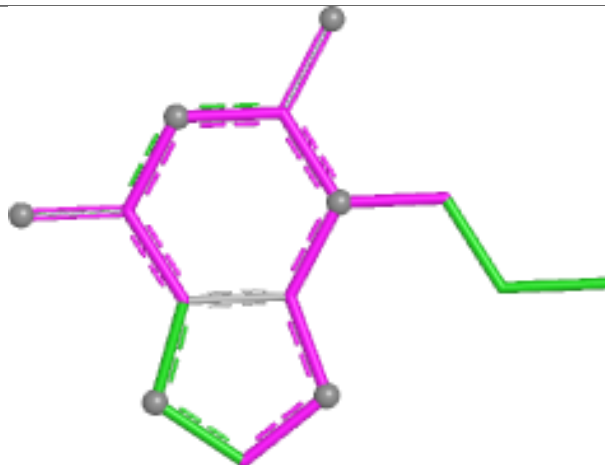
Rings



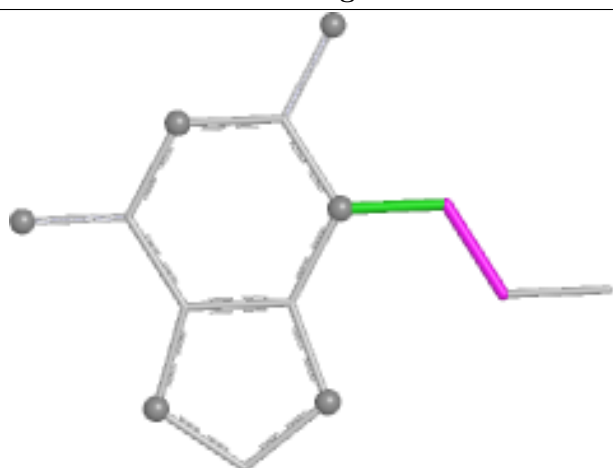
Ligand A1BD3 A 5304



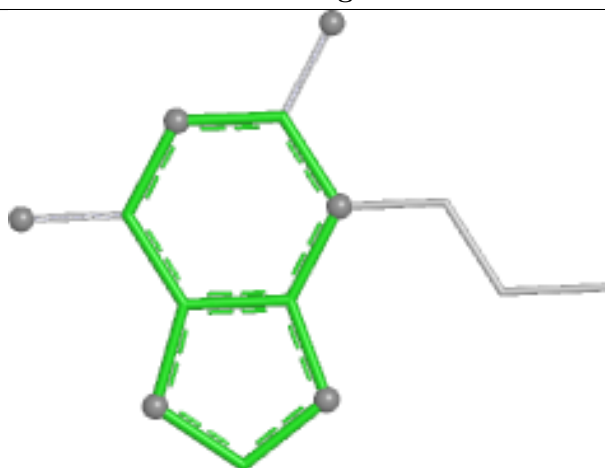
Bond lengths



Bond angles

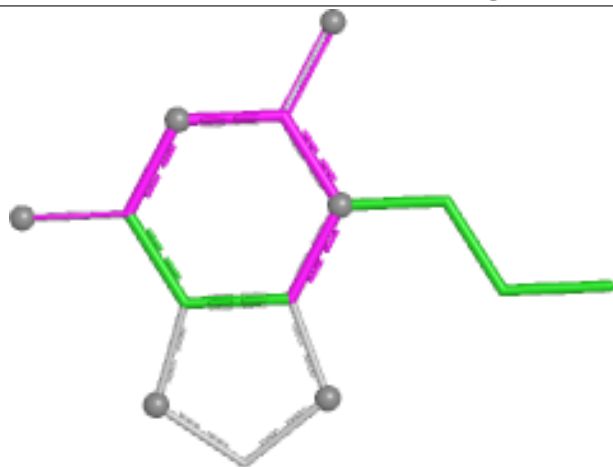


Torsions

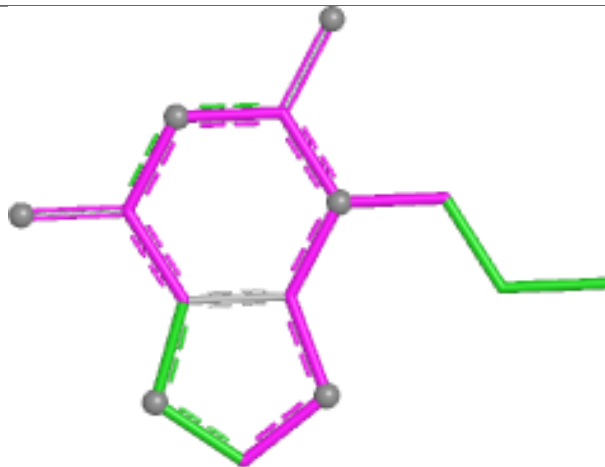


Rings

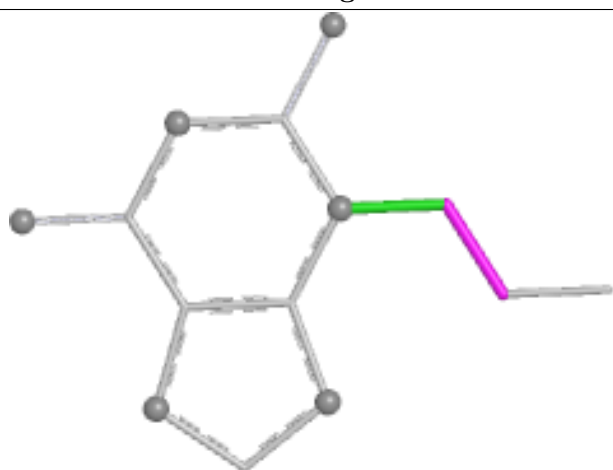
Ligand A1BD3 C 5304



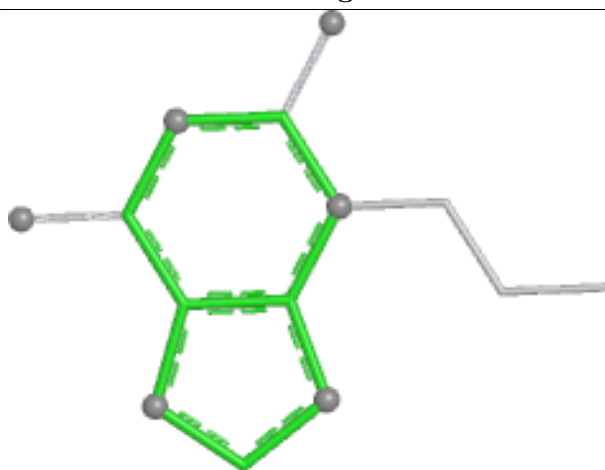
Bond lengths



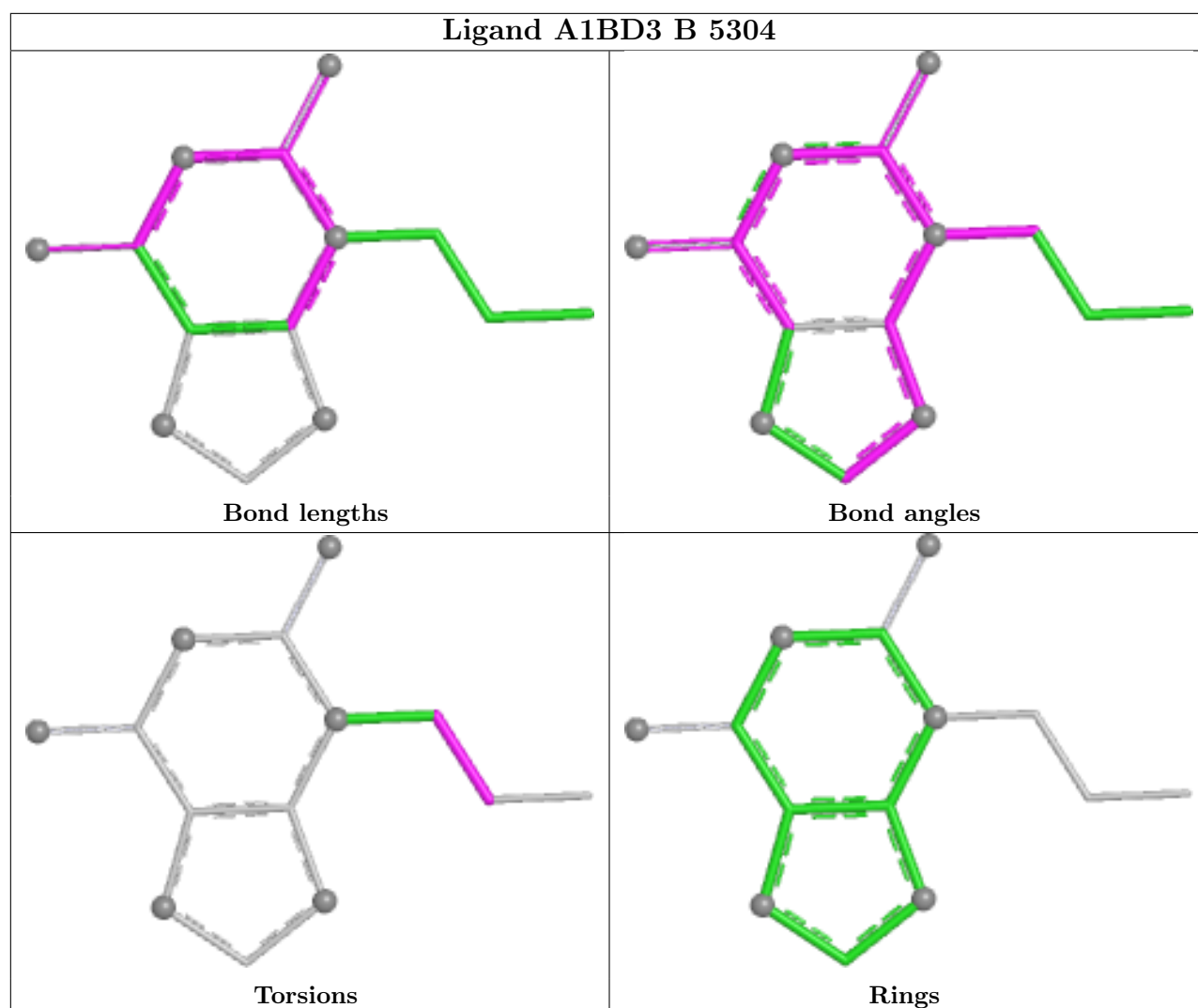
Bond angles



Torsions



Rings



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.

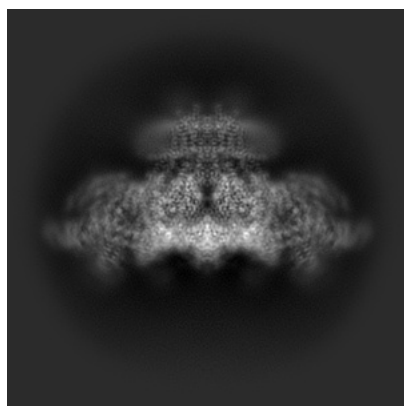
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-47390. These allow visual inspection of the internal detail of the map and identification of artifacts.

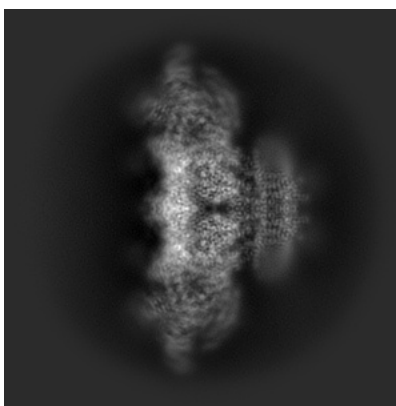
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

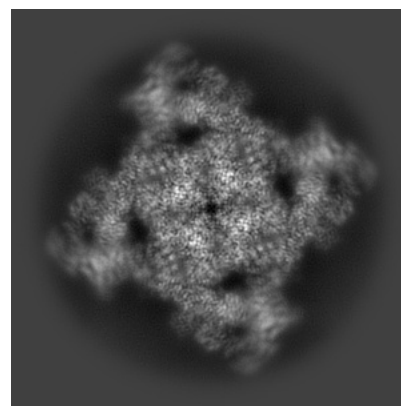
6.1.1 Primary map



X

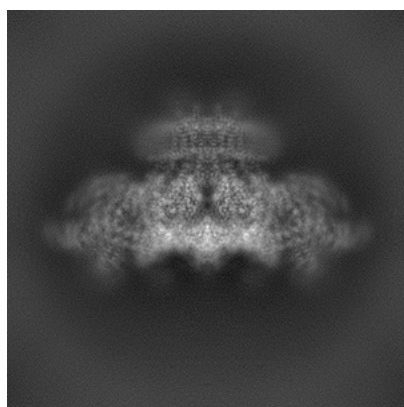


Y

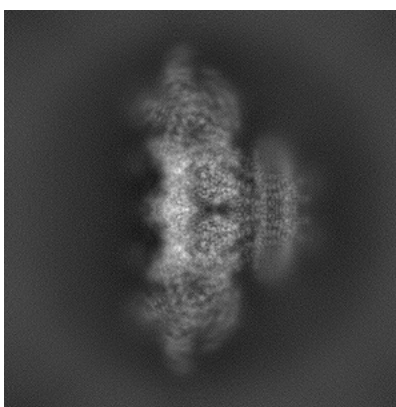


Z

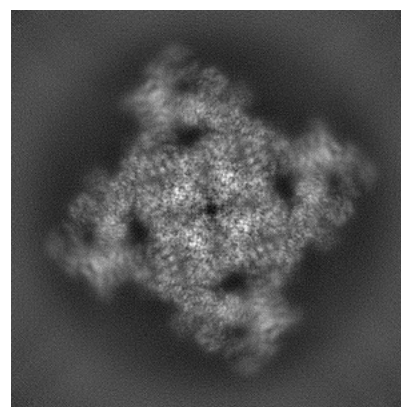
6.1.2 Raw map



X



Y

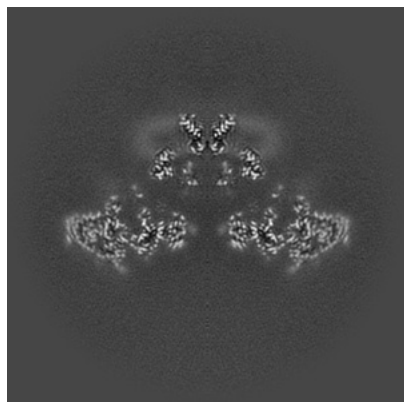


Z

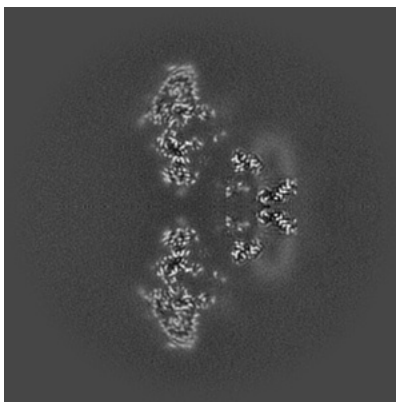
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

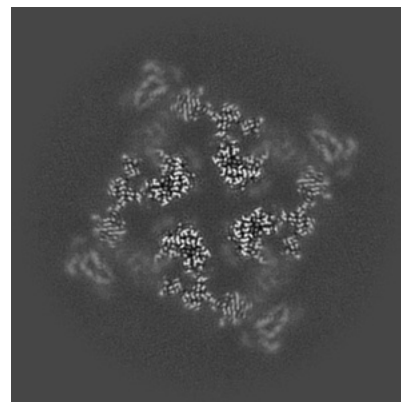
6.2.1 Primary map



X Index: 256

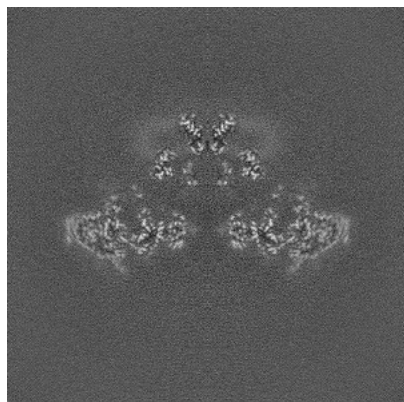


Y Index: 256

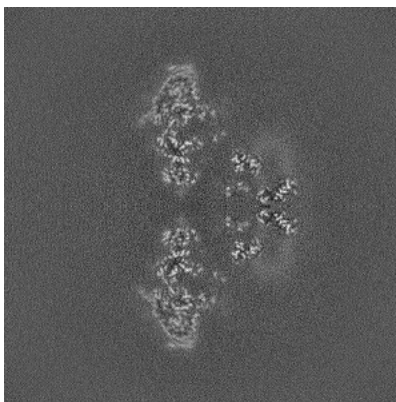


Z Index: 256

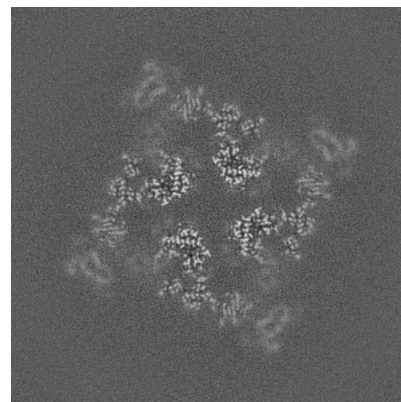
6.2.2 Raw map



X Index: 256



Y Index: 256

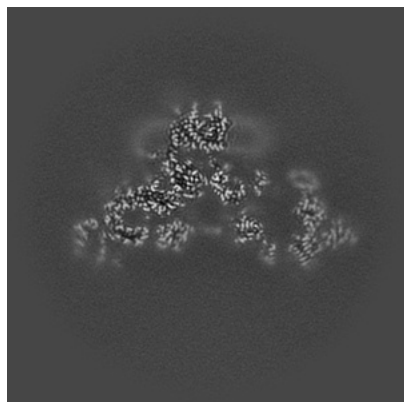


Z Index: 256

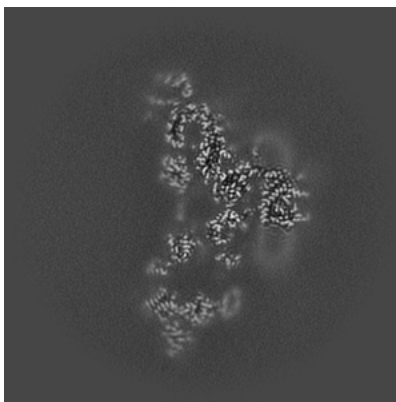
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

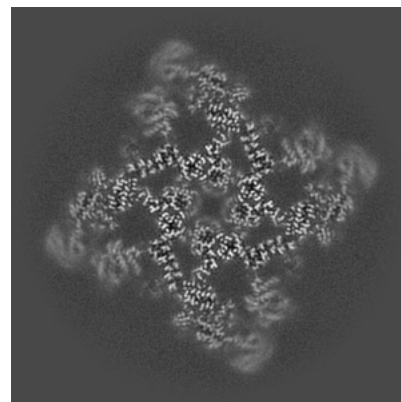
6.3.1 Primary map



X Index: 239

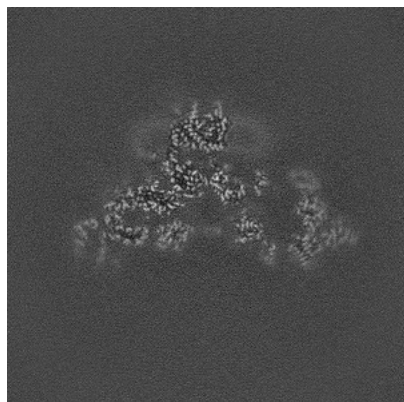


Y Index: 239

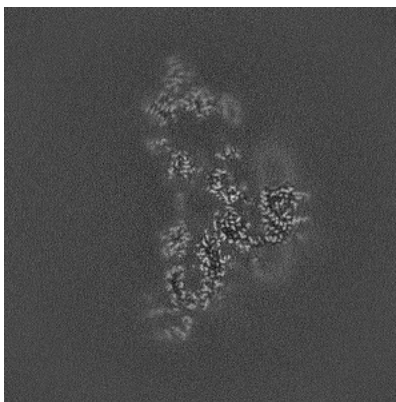


Z Index: 229

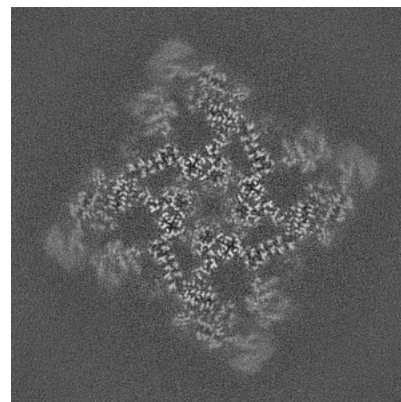
6.3.2 Raw map



X Index: 239



Y Index: 273

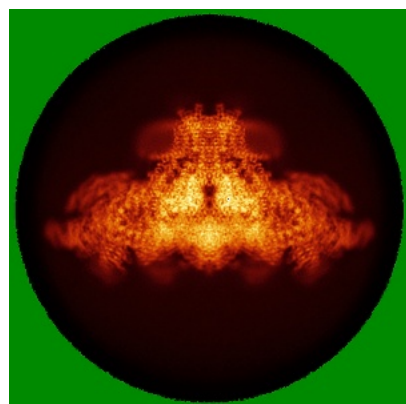


Z Index: 229

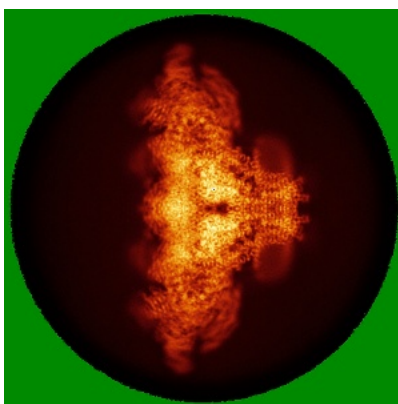
The images above show the largest variance slices of the map in three orthogonal directions.

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

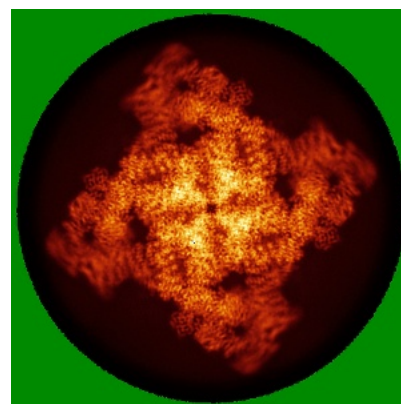
6.4.1 Primary map



X

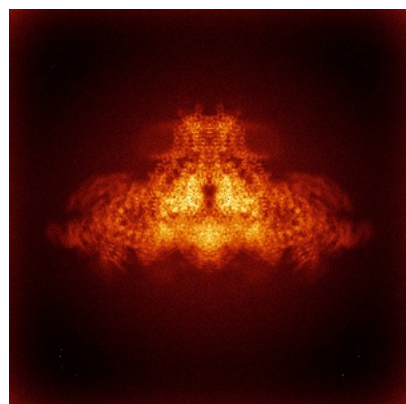


Y

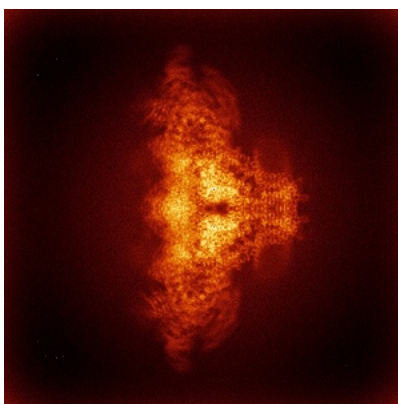


Z

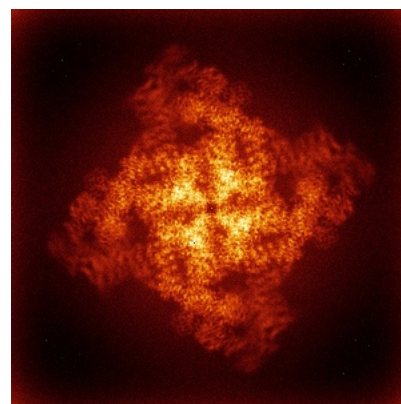
6.4.2 Raw map



X



Y

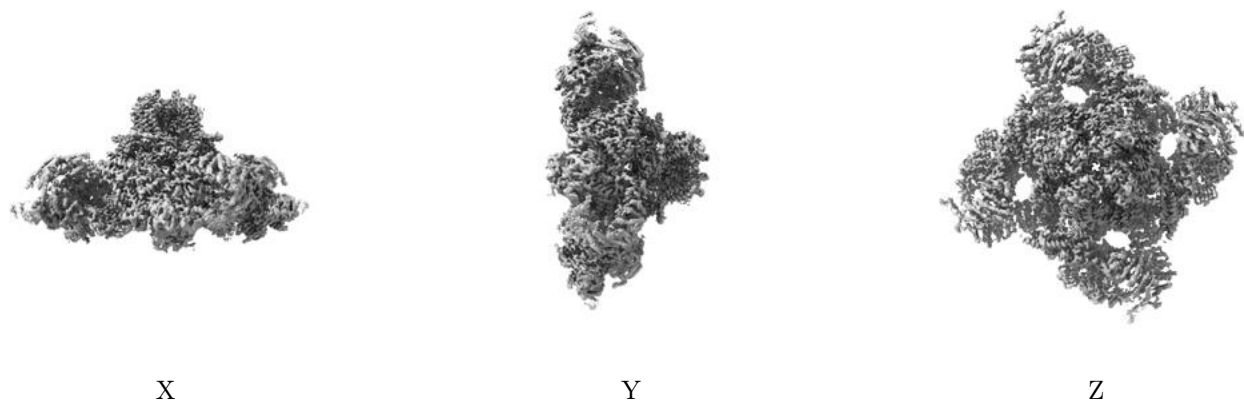


Z

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.

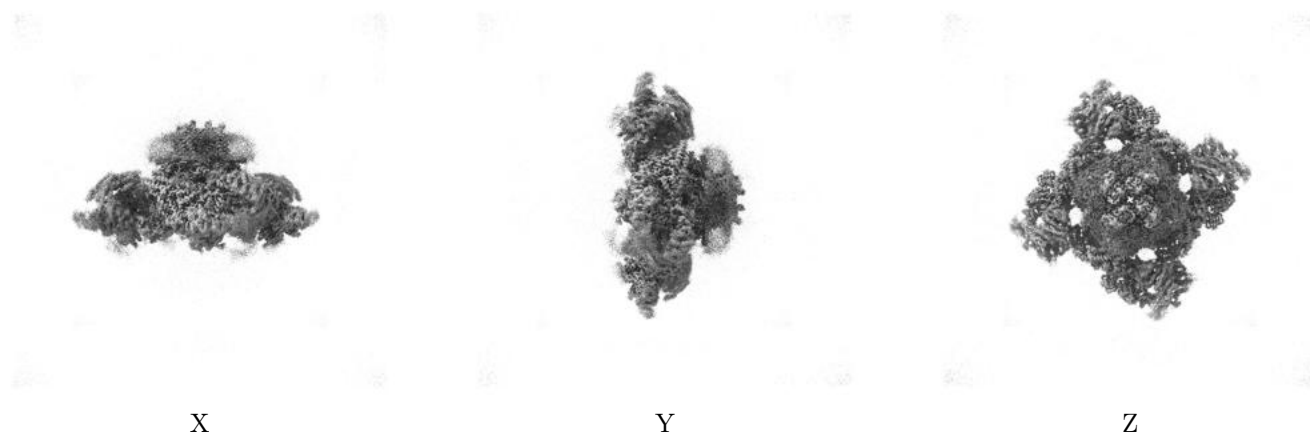
6.5 Orthogonal surface views [i](#)

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.

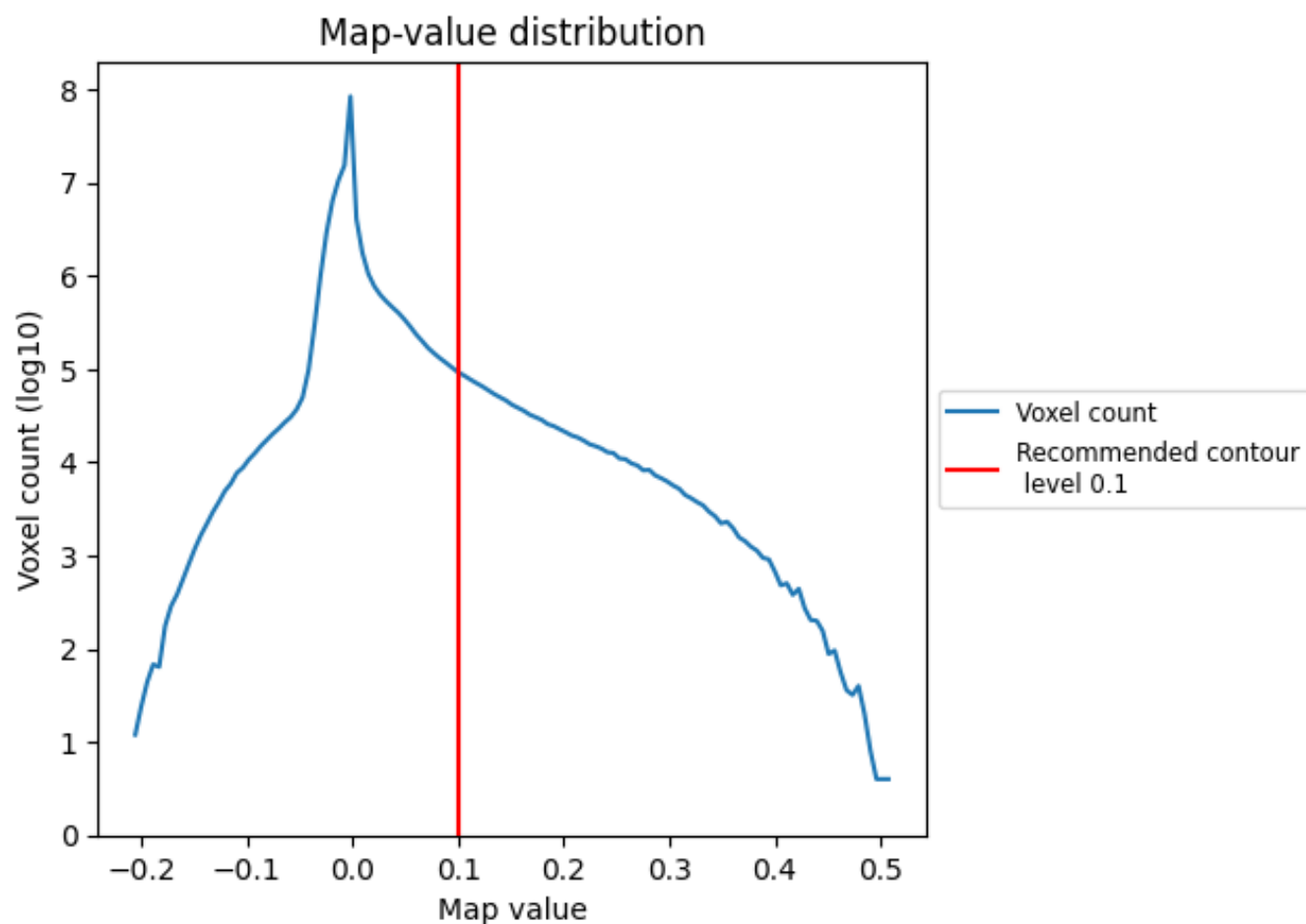
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

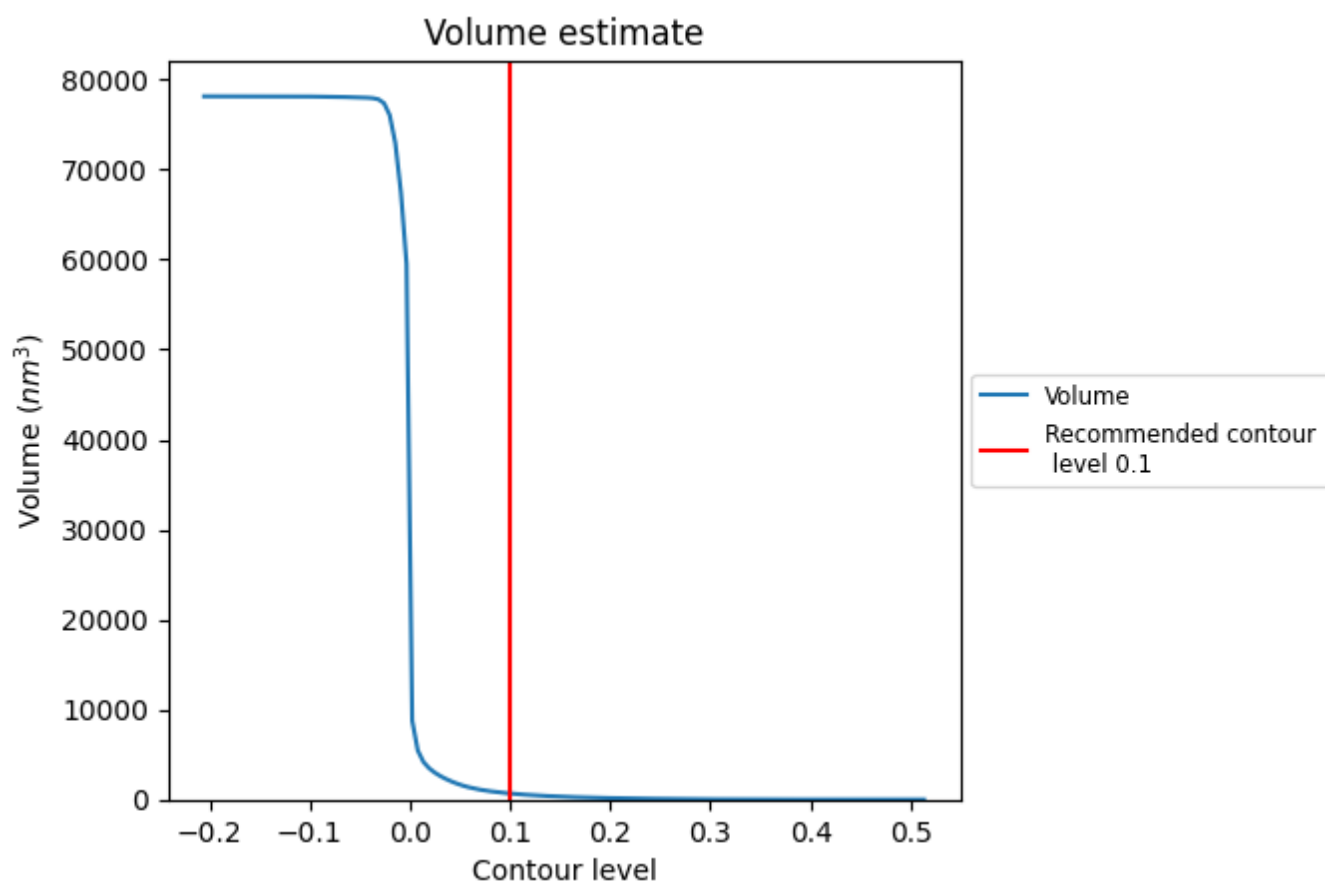
This section contains the results of statistical analysis of the map.

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.

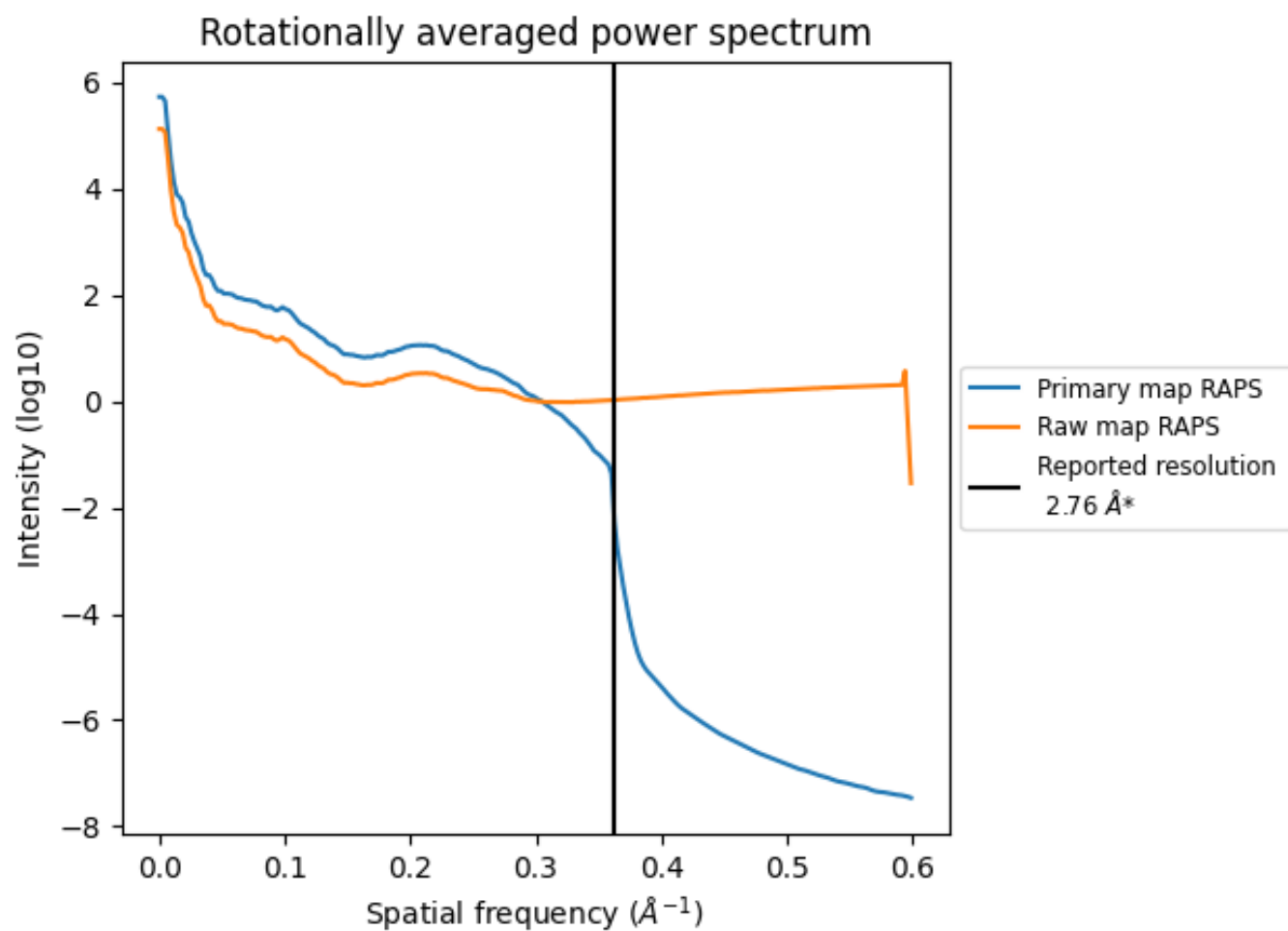
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 676 nm³; this corresponds to an approximate mass of 611 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 ⓘ

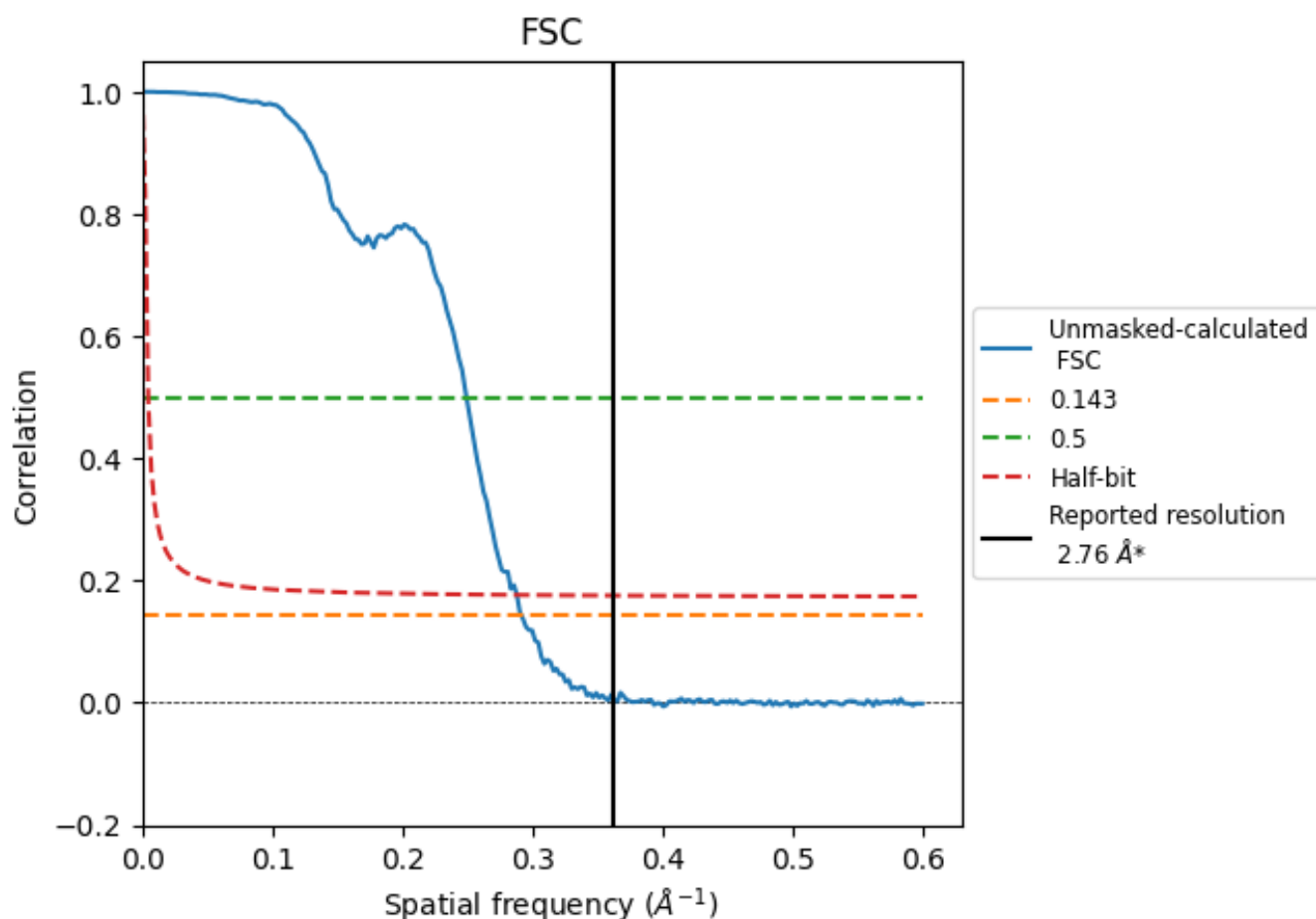


*Reported resolution corresponds to spatial frequency of 0.362 Å⁻¹

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 0.362 Å⁻¹

8.2 Resolution estimates [i](#)

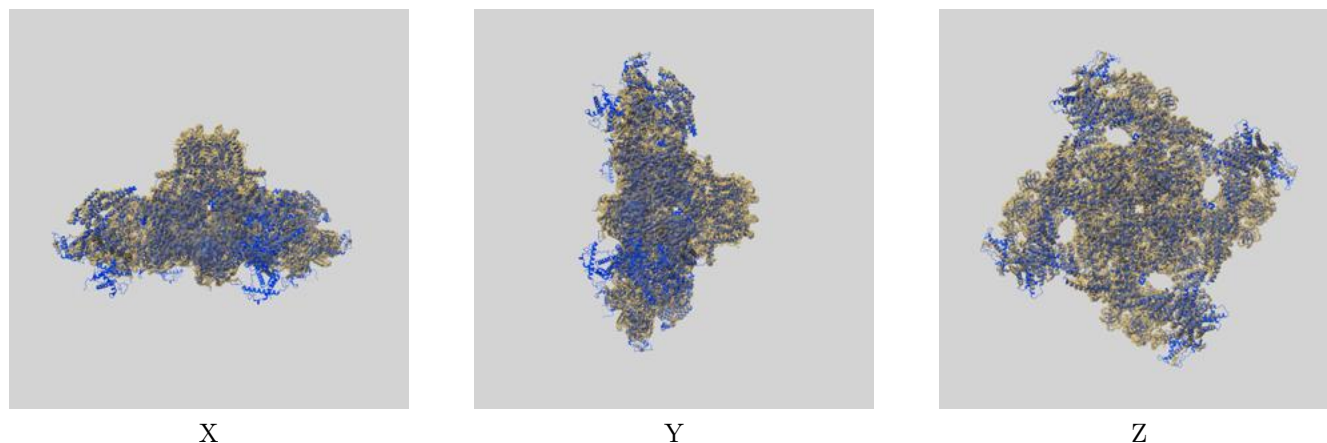
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.76	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.44	4.02	3.48

*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 3.44 differs from the reported value 2.76 by more than 10 %

9 Map-model fit [i](#)

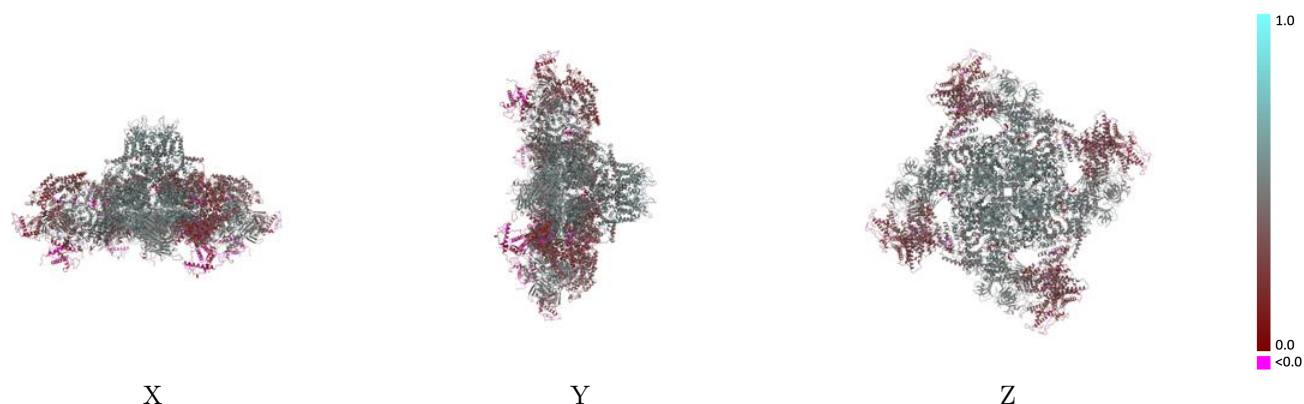
This section contains information regarding the fit between EMDB map EMD-47390 and PDB model 9E1D. Per-residue inclusion information can be found in section [3](#) on page [6](#).

9.1 Map-model overlay [i](#)



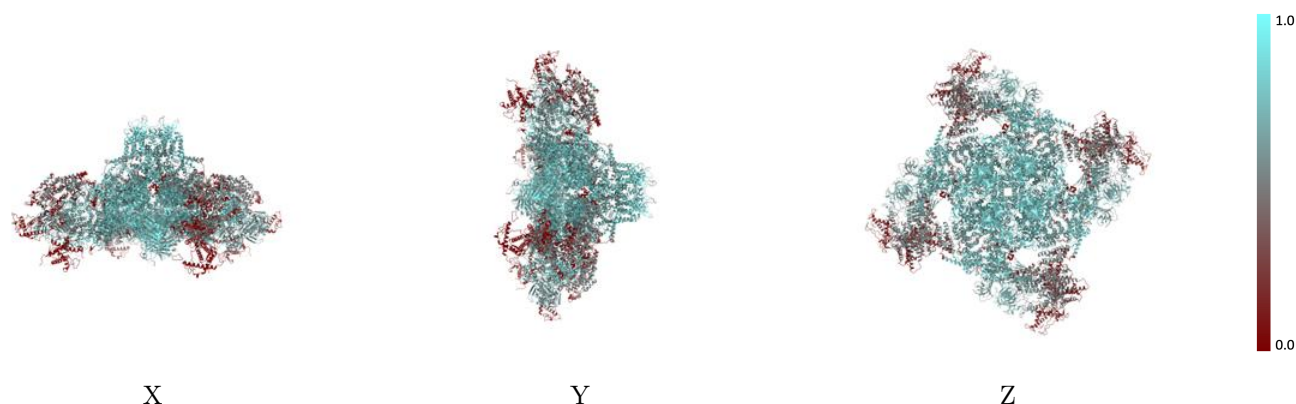
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



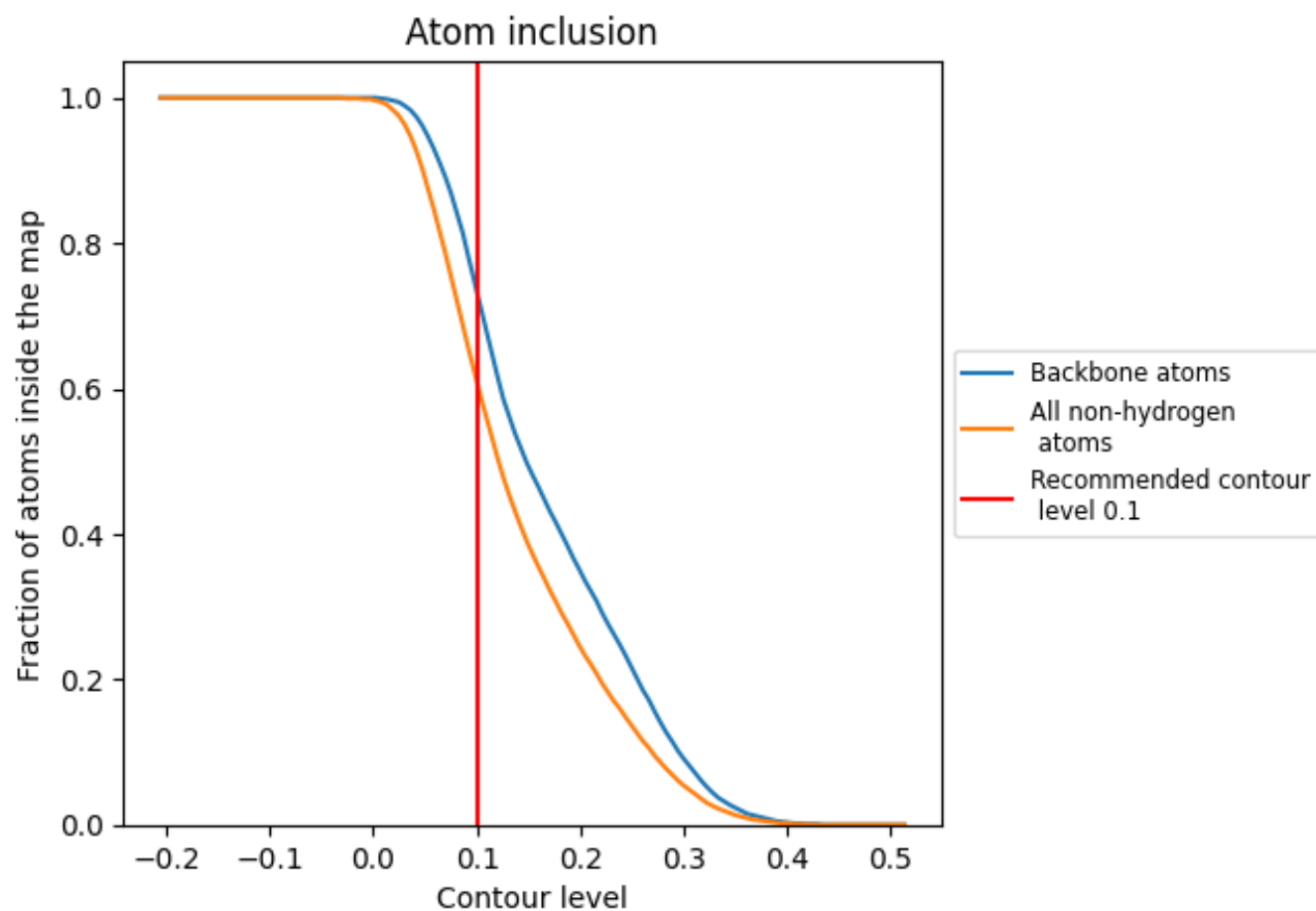
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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, 73% of all backbone atoms, 61% 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 (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6090	0.4220
A	0.6100	0.4200
B	0.6090	0.4200
C	0.6090	0.4200
D	0.6090	0.4200
E	0.6110	0.4940
F	0.6140	0.4920
G	0.6100	0.4900
H	0.6090	0.4920

1.0

0.0

<0.0