



## wwPDB EM Validation Summary Report ⓘ

May 18, 2024 – 11:32 AM EDT

PDB ID : 6WOU  
EMDB ID : EMD-21861  
Title : Cryo-EM structure of recombinant mouse Ryanodine Receptor type 2 mutant R176Q in complex with FKBP12.6 in nanodisc  
Authors : Iyer, K.A.; Hu, Y.; Kurebayashi, N.; Murayama, T.; Samso, M.  
Deposited on : 2020-04-25  
Resolution : 3.27 Å (reported)  
Based on initial model : 5L1D

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev92  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

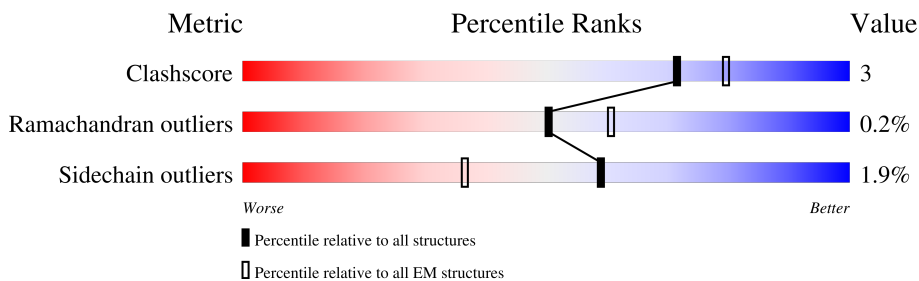
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.27 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	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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

Mol	Chain	Length	Quality of chain
1	A	4966	
1	B	4966	
1	C	4966	
1	D	4966	
2	E	107	
2	F	107	
2	G	107	
2	H	107	

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 245683 atoms, of which 120439 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Ryanodine receptor 2.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	A	3921	59779	19348	29287	5250	5702	192	0	0
1	B	3921	59778	19348	29286	5250	5702	192	0	0
1	C	3921	59778	19348	29286	5250	5702	192	0	0
1	D	3921	59776	19348	29284	5250	5702	192	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	176	GLN	ARG	engineered mutation	UNP E9Q401
B	176	GLN	ARG	engineered mutation	UNP E9Q401
C	176	GLN	ARG	engineered mutation	UNP E9Q401
D	176	GLN	ARG	engineered mutation	UNP E9Q401

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
2	E	107	1642	516	824	144	154	4	0	0
2	F	107	1642	516	824	144	154	4	0	0
2	G	107	1642	516	824	144	154	4	0	0
2	H	107	1642	516	824	144	154	4	0	0

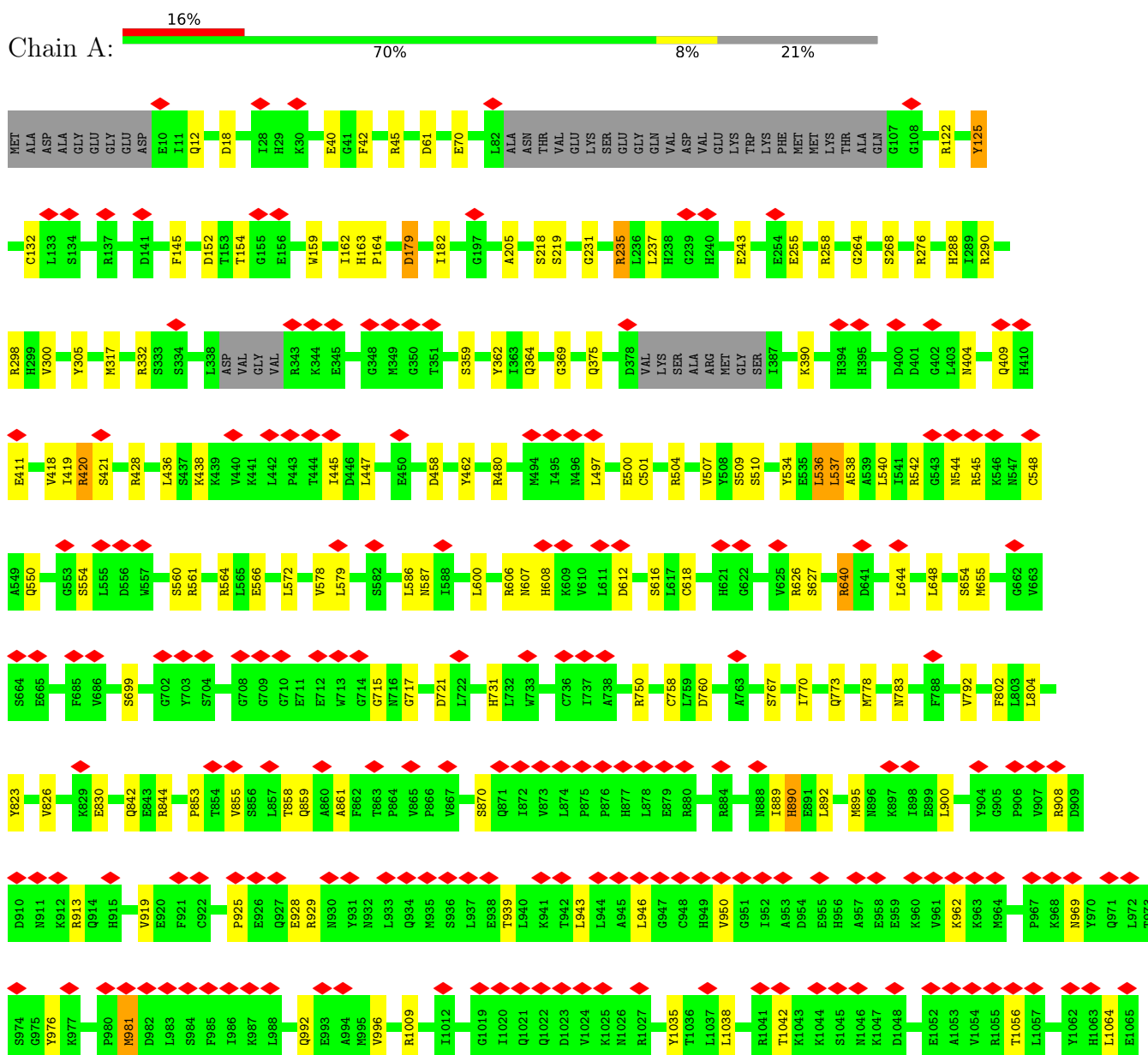
- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

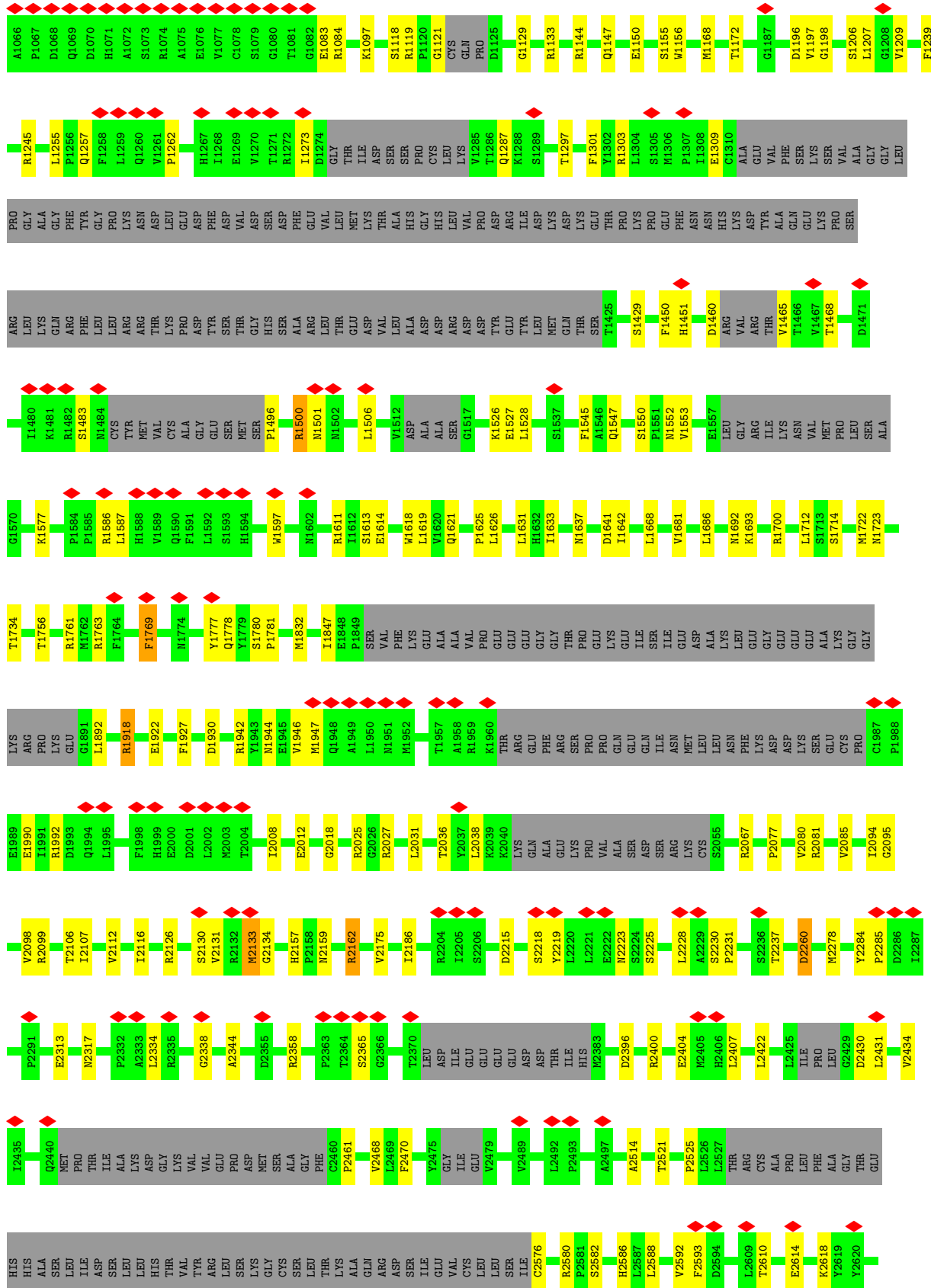
<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>AltConf</b>
3	A	1	Total 1	Zn 1	0
3	B	1	Total 1	Zn 1	0
3	C	1	Total 1	Zn 1	0
3	D	1	Total 1	Zn 1	0

### 3 Residue-property plots

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

- Molecule 1: Ryanodine receptor 2

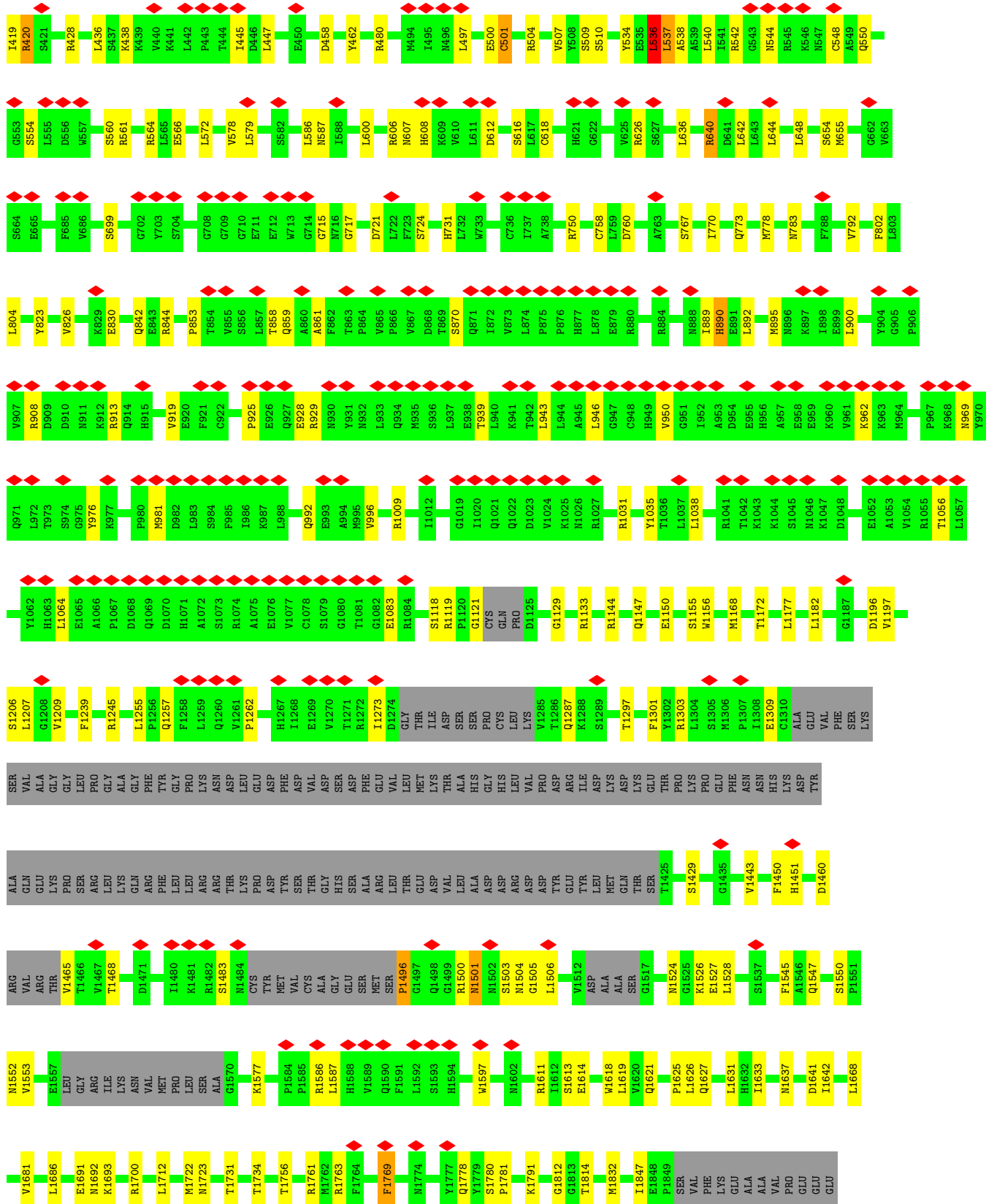




W2626	H2726	W2786	M2846	ASP	PRO	A3058	D3202	ILE	A3343	Y3404	L3464
E2636	S2727	R2787	Y2847	LEU	LEU	D3061	V3203	LEU	R3344	W3405	I3465
I2647	H2728	I2788	H2848	ASP	ILE	A3064	C3204	THR	G3345	S3406	V3466
L2651	D2729	E2789	N2849	GLN	ASP	A3064	F3205	SER	D3346	K3407	A3467
K2654	K2730	R2790	I2850	THR	TVR	E3065	N3206	TVR	M3347	S3408	A3468
K2655	W2731	T2791	W2851	PRO	PHE	E3068	I3207	ALA	I3281	H3409	L3469
Y2656	S2732	K2792	A2852	SER	LYS	K3069	S3208	LEU	I3282	M3410	K3470
Y2657	M2733	E2793	K2853	ILE	ASN	T3070	S3209	THR	I3283	F3411	R3471
E2658	D2734	E2794	K2854	GLU	HIS	M3071	L3210	THR	F3284	K3412	L3472
L2660	K2735	D2795	L2855	ARG	ARG	E3072	T2215	SER	N3285	R3413	L3473
F2661	L2736	S2796	K2856	PHE	TVR	E3072	E3219	LYS	L3287	E3414	P3474
P2666	A2737	S2797	L2857	ALA	PHE	Q3076	E3219	ILE	G3288	Q3415	L3475
F2677	N2738	M2798	L2858	TYR	L2982	Q3077	E3220	TYR	I3289	Q3416	G3476
D2678	R2739	L2799	E2858	SER	S2983	Q3078	A3221	VAL	D3290	F3417	I3477
Y2679	G2739	L2799	L2859	LEU	R2987	F3079	E3222	GLU	E3291	M3418	L3478
M2687	W2740	Y2800	E2860	GLN	F2988	T3080	E3228	GLN	G3292	V3419	L3479
Q2691	I2741	Y2800	K2861	GLN	L2989	H3081	T3228	SER	A3292	F3419	C3480
S2692	I2742	N2801	K2862	LEU	L2989	T3082	Q3229	ALA	TRP	M3420	C3481
M2694	G2743	ARG	G2863	THR	A2996	Q3086	M3230	ALA	MET	Q3421	A3481
ASP	R2744	ARG	H2867	ARG	S2996	P3086	F3231	GLY	L3361	M3422	P3482
GLY	I2745	THR	P2868	ILE	T3004	P3086	M3233	VAL	A3362	E3423	G3483
ASN	Y2746	THR	L2869	ASP	G3011	I3092	M3234	ALA	D3364	I3424	D3484
PHE	S2747	THR	L2870	GLU	R3015	V3098	M3234	ALA	L3365	M3425	Q3485
ASN	R2748	THR	L2871	ALA	H3016	A3099	M3236	ALA	Y3366	M3426	E3486
ASN	S2749	THR	W2871	HIS	R3016	L3100	V3236	PHE	F3368	M3427	L3487
PRO	S2750	VAL	P2872	GLN	H3016	P3102	V3237	GLY	Y3369	F3429	I3488
GLN	K2751	VAL	Y2873	THR	M3103	P3102	L3238	ALA	I3300	L3430	A3489
PRO	I2752	ILE	D2874	LEU	LEU	M3103	M3240	ALA	I3306	I3431	I3490
PRO	Q2753	ASP	T2875	LEU	SER	M3103	M3241	ALA	N3307	L3432	A3491
V2705	P2754	ASP	L2876	GLY	LEU	M3103	L3241	ALA	K3308	F3433	K3492
D2706	L2755	GLY	T2877	GLY	PHE	M3103	C3242	PHE	H3317	R3434	R3493
T2707	L2756	ASN	A2878	ASN	GLY	M3103	C3243	LEU	F3318	T3435	R3494
S2708	M2757	ARG	K2879	ASP	LEU	M3103	S3244	GLU	L3319	K3436	F3495
M2709	K2758	LYS	E2880	ALA	THR	M3103	M3245	THR	P3320	S3437	S3496
I2710	Y2759	GLY	K2881	LYS	ILE	M3103	S3246	HIS	L3313	N3379	L3497
T2711	Y2760	GLU	A2882	GLY	ILE	M3103	R3247	ASP	T3316	R3380	K3498
I2712	E2766	ILE	K2883	HIS	VAL	M3103	W3248	ASP	H3317	K3400	D3499
P2713	K2767	PHE	L2884	PHE	ASN	M3103	W3249	LEU	F3318	A3441	T3500
E2714	E2768	ALA	K2885	THR	CYS	M3103	E3250	LEU	L3319	A3442	E3501
R2715	I2769	LYS	E2886	LYS	HIS	M3103	H3251	GLN	P3320	K3443	E3502
L2716	Y2770	VAL	K2887	GLN	ILE	M3103	G3252	PHE	L3321	S3444	E3503
E2717	R2771	VAL	A2888	LEU	A3041	M3103	P3253	ASP	K3324	D3445	V3504
Y2718	W2772	VAL	N2889	PHE	V3044	M3103	E3254	ASP	K3327	Q3446	R3505
F2719	P2773	VAL	D2890	THR	G5048	M3103	N3255	LEU	K3328	E3447	D3506
I2720	I2774	VAL	L2892	ALA	S3054	M3103	H3256	GLU	A3329	R3448	I3507
M2721	Y2775	VAL	L2893	LYS	A3055	M3103	E3258	ALA	M3331	K3449	ARG
K2722	K2776	VAL	K2894	VAL	L3056	M3103	P3257	GLU	K3330	K3450	SER
Y2723	E2777	LEU	L2895	VAL	R3057	M3103	H3259	GLY	A3330	M3451	ASN
A2724	L2778	LEU	Q2896	THR	M3103	M3103	R3182	LEU	M3331	K3452	ILE
E2725	K2779	ARG	L2897	TYR	M3103	M3103	R3186	LEU	V3332	R3453	LEU
	T2780	ARG	S2898	SER	M3103	M3103	S3188	ASP	V3333	K3454	GLY
	M2781	ARG	G2899	ARG	M3103	M3103	R3191	ASP	E3336	K3455	GLY
	L2782	ARG	A2840	GLY	M3103	M3103	A3192	ASP	K3340	G3456	LYS
	A2783	ARG	E2841	PHE	M3103	M3103	A3198	ASP		D3456	LEU
	W2784	ARG	M2843	LYS	M3103	M3103		ASP		R3457	GLY
	W2785	ARG	E2845	LYS	M3103	M3103		ASP		Y3458	ASP
										S3459	PRO
										K3460	ALA
										T3462	ALA
										S3463	ILE

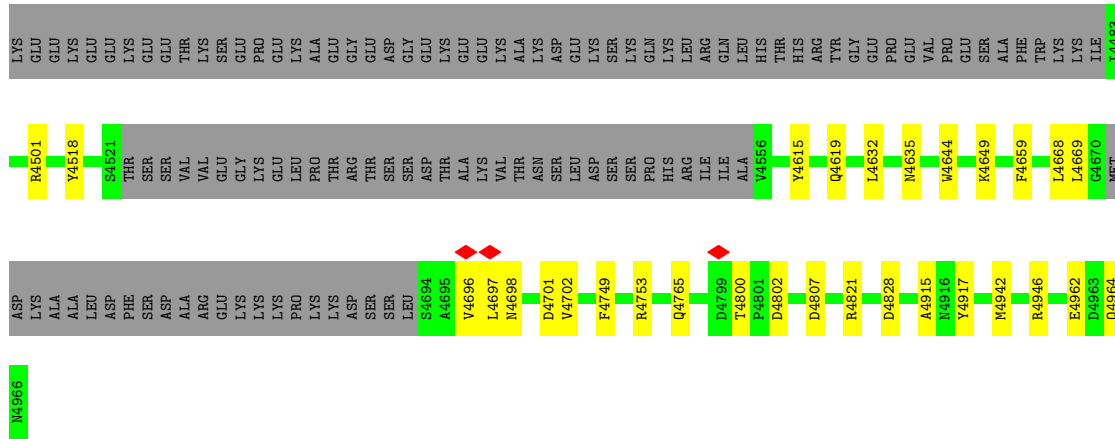




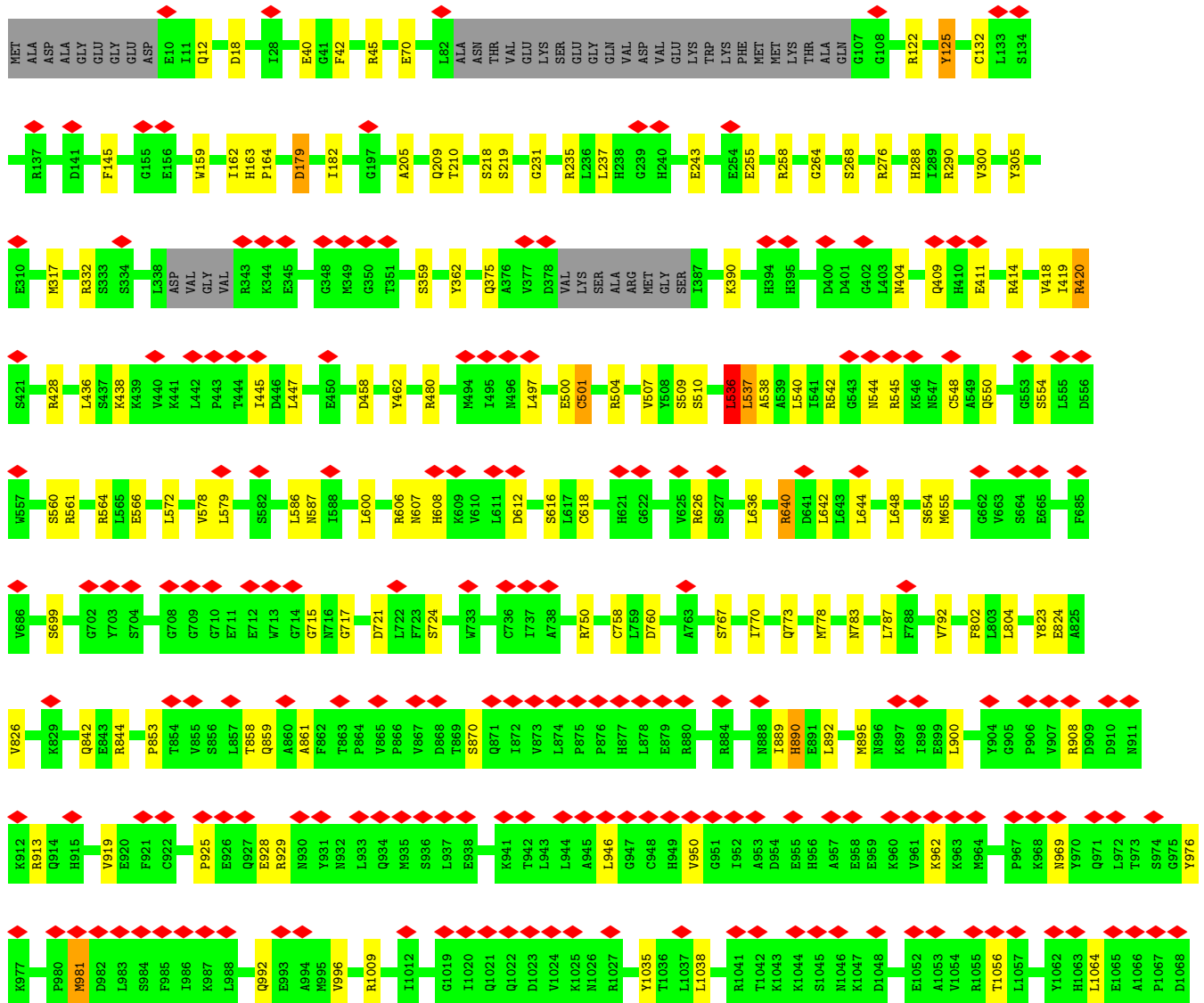


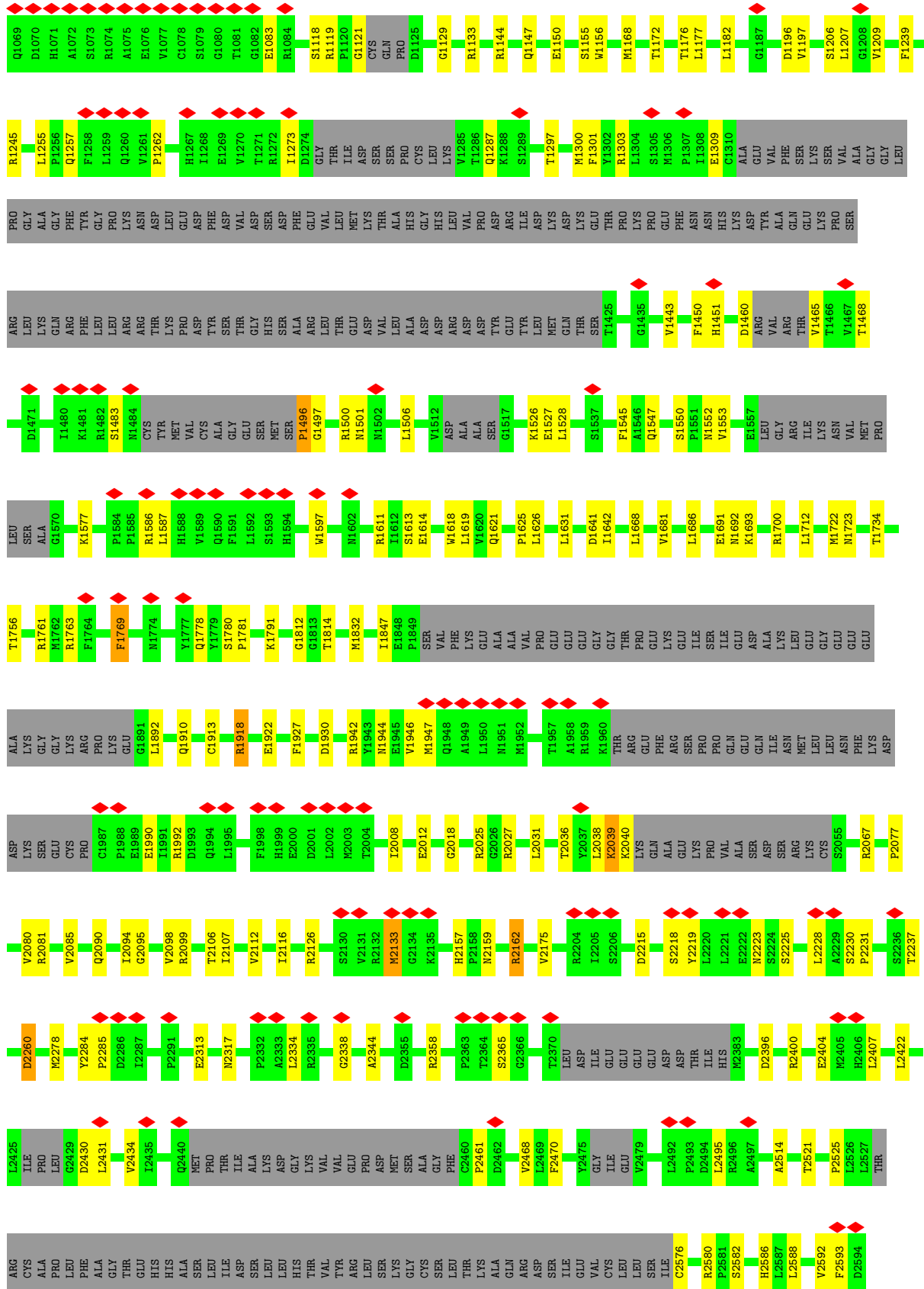




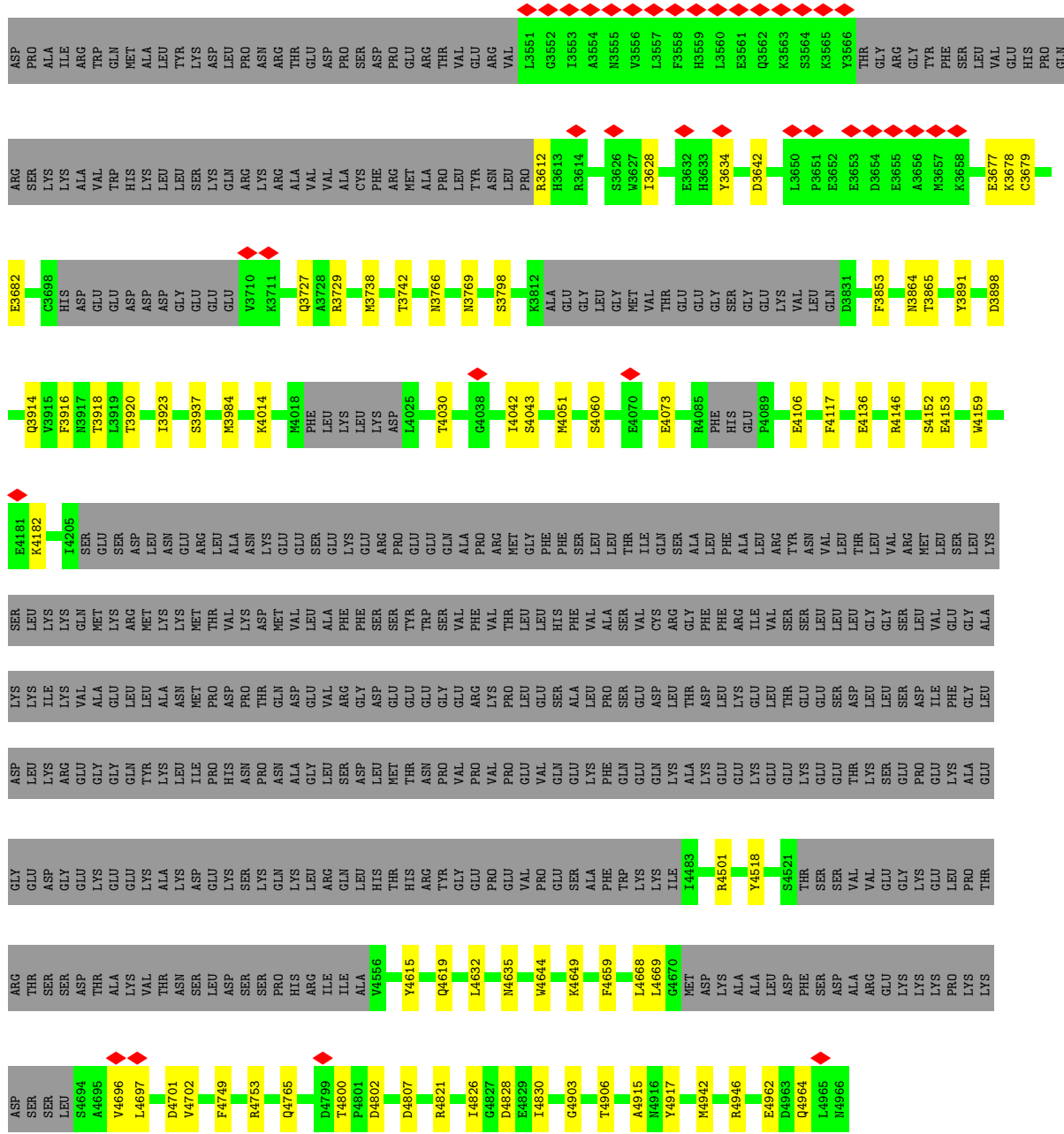


• Molecule 1: Ryanodine receptor 2

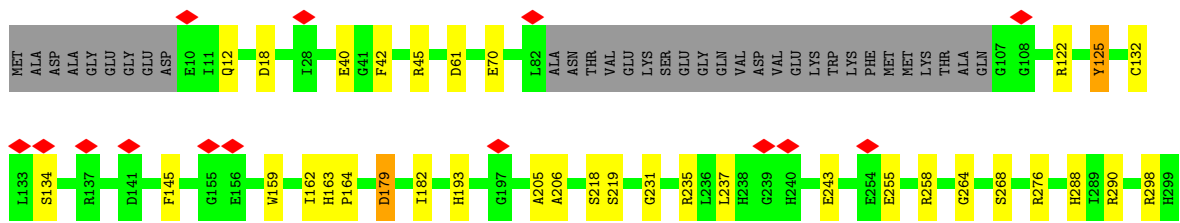




M3460	M3461	T3462	SS463	Y3404	W3405	S3406	K3407	S3408	H3409	N3410	F3411	K3412	R3413	E3414	E3415	Q3416	N3417	F3418	V3419	V3420	Q3421	N3422	E3423	L3424	N3425	N3426	M3427	S3428	F3429	L3430	I3431	T3432	R3433	T3434	K3435	S3436	K3437	M3438	S3439	K3440	A3441	A3442	I3443	S3444	D3445	Q3446	E3447	K3448	K3449	M3450	K3451	K3452	R3453	K3454	K3455	D3456	R3457	Y3458	S3459														
L2609	E2614	K2618	V2619	Y2620	W2626	E2636	I2647	F2648	D2649	A2650	L2651	S2652	Q2653	K2655	Y2656	E2657	F2661	T2666	V2679	M2687	S2693	F2694	ASP	GLU	GLY	ASN	PHE	ASN	PRO	GLN	PRO	V2705	D2706	T2707	S2708	H2709	I2710	T2711	I2712	F2713	E2714	L2716	E2717	Y2718	F2719																												
I2720	N2721	K2722	Y2723	A2724	E2725	H2726	S2727	H2728	D2729	K2730	W2731	S2732	M2733	D2734	A2735	L2736	A2737	N2738	G2739	I2741	Y2742	G2743	E2744	I2745	Y2746	S2747	D2748	S2749	S2750	K2751	I2752	Q2753	P2754	L2755	M2756	K2757	P2758	Y2759	K2760	L2761	L2762	S2763	E2764	K2765	E2766	K2767	E2768	I2769	R2771	W2772	P2773	I2774	K2775	E2776	S2777	L2779																	
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V2902	S2903	ARG	GLY	PHE	LYS	LEU	LEU	ASP	LEU	LEU	THR	PRO	SER	PRO	ILE	GLU	LYS	ARG	PHE	ALA	LEU	GLN	LEU	ILE	ARG	THR	VAL	ASP	GLU	ALA	HIS	GLN	TYR	I2982	S2983	Q3078	F3079	T3080	H3081	T3082	Q3085	P3086	I3092	T3004	G3011	R3015	H3016	ARG	ILE	SER	PHE	ASN	ASP	GLU	GLY	ASP	SER	ARG	ALA	ALA	THR	HIS	LYS	GLY	GLU	GLN	GLY	GLU	ASP	GLU	ILE	LYS	PHE
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S3054	A3065	L3066	R3057	A3058	D3061	A3064	E3065	E3068	K3069	T3070	H3071	E3072	Q3076	G3077	Q3078	F3079	T3080	H3081	T3082	Q3085	P3086	I3092	V3098	A3099	L3100	L3101	P3102	M3103	LEU	SER	LEU	PHE	GLY	ASN	ASP	GLU	GLY	ASP	THR	HIS	ILE	VAL	GLN	HIS	ASN	CYS	LEU	GLY	ASP	LEU	ILE	LEU	LEU	ASP	VAL	VAL																	
SER	CYS	TYR	ARG	ILE	LEU	THR	SER	LEU	THR	TYR	ALA	LEU	THR	SER	LYS	SER	ILE	TVR	VAL	GLU	ARG	GLN	ARG	ALA	LEU	GLY	GLU	CYS	LEU	ALA	ALA	PHE	ALA	ALA	GLY	ALA	PHE	PRO	ILE	ALA	PHE	LEU	GLU	THR	L3174	D3175	K3176	H3177	V3179	I3182	R3186	S3187	S3188	R3191																			
A3192	A3196	D3202	V3203	C3204	F3205	N3206	I3207	P3208	S3209	L3210	T3215	E3219	L3220	A3221	E3222	T3228	Q3229	M3230	F3231	Y3232	M3233	E3235	V3236	V3237	L3238	P3239	M3240	L3241	S3243	M3245	S3246	R3247	W3248	W3249	E3250	H3251	G3252	F3253	E3254	N3255	H3256	P3257	E3258	R3259	A3260	E3261	C3264	E3270	H3271																								
M3272	N3273	T3274	L3275	LEU	GLY	ASN	LEU	K3281	I3282	I3283	N3285	M3286	L3287	G3288	I3289	D3290	E3291	G3292	ALA	TRP	MET	LYS	ARG	LEU	ALA	VAL	F3301	S3302	Q3303	P3304	I3305	I3306	M3307	K3308	V3309	K3310	P3311	Q3312	L3313	T3316	H3317	F3318	L3319	P3320	L3321	K3324	K3327	K3328	A3329	A3330	M3331	V3332	V3333																				
E3336	K3340	A3343	R3344	G3345	D3346	M3347	S3348	E3349	A3350	E3351	L3352	L3353	L3354	L3355	D3356	F3357	F3358	T3359	Y3360	L3361	A3362	L3365	Y3366	A3367	F3368	V3369	P3370	L3371	L3372	L3373	R3374	F3375	V3376	D3377	Y3378	N3379	R3380	A3381	K3382	W3383	L3384	K3385	E3386	F3387	N3388	P3389	GLU	ALA	GLU	LEU	PHE	ILE	ARG	MET	VAL	ALA																	
GLU	VAL	PHE	ILE	Y3404	W3405	S3406	K3407	S3408	H3409	N3410	F3411	K3412	R3413	E3414	E3415	Q3416	N3417	F3418	V3419	V3420	Q3421	N3422	E3423	L3424	N3425	N3426	M3427	S3428	F3429	L3430	I3431	T3432	R3433	T3434	K3435	S3436	K3437	M3438	S3439	K3440	A3441	A3442	I3443	S3444	D3445	Q3446	E3447	K3448	K3449	M3450	K3451	K3452	R3453	K3454	K3455	D3456	R3457	Y3458	S3459														
M3460	Q3461	T3462	SS463	Y3404	W3405	S3406	K3407	S3408	H3409	N3410	F3411	K3412	R3413	E3414	E3415	Q3416	N3417	F3418	V3419	V3420	Q3421	N3422	E3423	L3424	N3425	N3426	M3427	S3428	F3429	L3430	I3431	T3432	R3433	T3434	K3435	S3436	K3437	M3438	S3439	K3440	A3441	A3442	I3443	S3444	D3445	Q3446	E3447	K3448	K3449	M3450	K3451	K3452	R3453	K3454	K3455	D3456	R3457	Y3458	S3459														



● Molecule 1: Ryanodine receptor 2

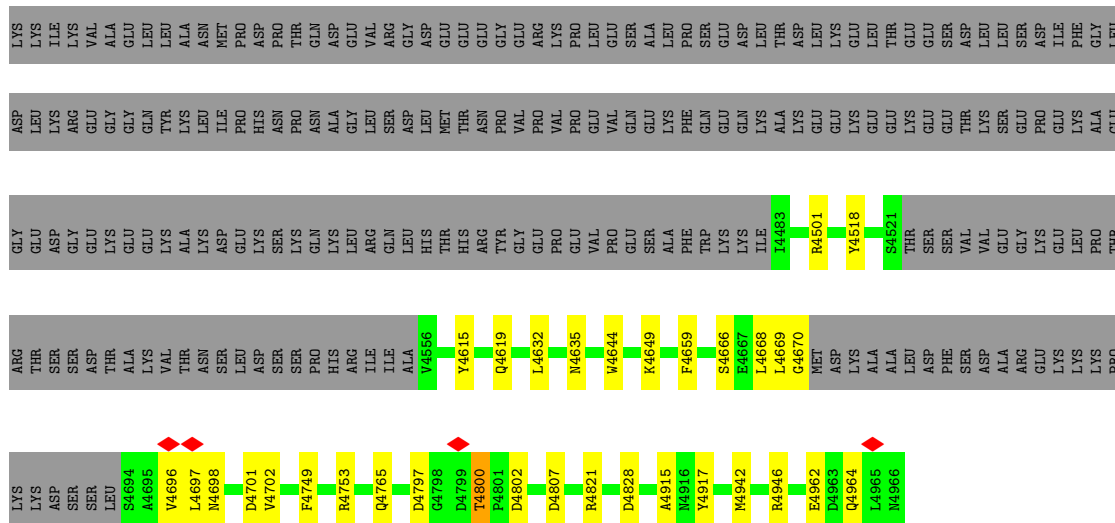


V900	V905	E310	M317	R332	S333	S334	L338	ASP	VAL	GLY	VAL	R343	K344	E345	G348	M349	G350	T351	S359	Y362	Q375	A376	V377	D378	VAL	LYS	SER	ALA	ARG	MET	GLY	SER	I387	K390	H394	H395	D400	D401	G402	L403	N404	Q409	H410	E411	R414										
V418	I419	R420	S421	R428	L436	S437	K438	K439	V440	K441	L442	P443	T444	I445	D446	L447	E450	D458	Y462	R480	M494	I495	M496	L497	E500	C501	R504	V507	Y508	S509	S510	Y534	E535	L537	A538	A539	L540	I541	R542	G543	N544	R545	K546	M547	C548	A549									
Q550	G553	S554	L555	D556	W557	S560	R561	R564	L565	E566	V578	L579	S582	L586	N587	I588	L600	R606	N607	H608	K609	V610	L611	D612	S616	L617	C618	H621	G622	V625	R626	S627	R640	D641	L644	L648	S654	M655	G662	V663	S664	E665													
F685	V686	S689	G702	Y703	S704	G708	G709	G710	E711	E712	W713	G714	G715	M716	G717	D721	L722	F723	S724	W733	C736	I737	A738	R750	C758	L759	D760	A763	S767	I770	Q773	W778	M783	L787	F788	V792	F802	L803	L804	Y823															
V826	K829	E830	Q842	R844	P853	T854	S855	L857	T858	Q859	A860	F862	T863	P864	R865	V867	T868	S870	Q871	I872	V873	L874	P875	R876	H877	L878	E879	R880	R884	N888	I889	H890	E891	L892	M895	N896	I898	E899	L900	Y904	G905	P906	V907	R908	D909	D910									
M911	K912	R913	Q914	H915	V919	E920	F921	C922	P925	E926	Q927	E928	R929	N930	Y931	N932	L933	Q934	M935	S936	L937	E938	K941	T942	L943	L944	A945	L946	G947	C948	H949	Y950	G951	L952	A953	D954	E955	H956	A957	M958	E959	X960	Y961	K962	M964	P967	K968	N969	Y970	Q971	L972	T973	S974	G975	
Y976	K977	P980	M981	D982	L983	S984	F985	I986	K987	L988	Q992	E993	A994	M995	V996	R1009	I1012	G1019	I1020	Q1021	Q1022	D1023	V1024	K1025	N1026	R1027	Y1035	L1036	L1037	L1038	R1041	T1042	K1043	K1044	S1045	M1046	K1047	D1048	E1052	A1053	V1054	T1056	L1057	Y1062	H1063	L1064	E1065	A1066	P1067						
D1068	Q1069	D1070	H1071	A1072	R1073	A1074	A1075	V1076	V1077	C1078	S1079	G1080	T1081	G1082	E1083	H1084	S1118	R1119	F1120	CYS	PRO	D1125	G1129	R1133	R1144	Q1147	E1150	S1155	M1156	M1168	G1187	D1196	V1197	S1206	L1207	G1208	V1209	F1239	R1245	L1255	P1256	Q1257	F1259												
L1259	Q1260	V1261	P1262	H1267	I1268	E1269	V1270	T1271	R1272	I1273	D1274	GLY	THR	ILE	LYS	THR	ALA	SER	PRO	CYS	V1285	T1286	Q1287	K1288	S1289	T1297	F1301	Y1302	R1303	L1304	S1305	M1306	P1307	I1308	E1309	C1310	ALA	GLU	TYR	VAL	PHE	GLN	SER	LYS	SER	VAL	ALA	GLY	GLY	LEU	PRO	GLN	GLY	PHE	LEU
PRO	LYS	ASN	ASP	LEU	GLU	ASP	PHE	ASP	VAL	THR	ASP	ASP	THR	GLY	ALA	HIS	GLY	HIS	LEU	VAL	PRO	ASP	ARG	ILE	ASP	LYS	ASP	GLY	LYS	THR	GLU	THR	PRO	PHE	ASN	HIS	LYS	ASP	TYR	ALA	ALA	GLN	GLY	GLY	LYS	PRO	VAL	ARG	ARG	LEU	LEU	GLY	PHE	LEU	
LEU	ARG	THR	LYS	PRO	ASP	THR	THR	GLY	HIS	SER	ALA	ARG	GLU	LEU	VAL	ALA	ASP	ARG	ASP	ASP	TYR	TYR	LEU	MET	GLN	SER	T1425	S1429	G1435	V1443	F1450	H1451	D1460	ARG	VAL	THR	THR	THR	V1465	T1466	V1467	T1468	D1471	T1480	K1481										
R1482	S1483	H1484	CYS	TYR	MET	VAL	CYS	ALA	GLY	GLU	HIS	SER	SER	ALA	SER	ARG	P1496	G1497	Q1498	G1499	M1500	M1501	M1504	G1505	L1506	V1512	ASP	ALA	ALA	SER	G1517	M1524	G1525	K1526	E1527	L1528	S1537	F1545	A1546	Q1547	S1550	P1551	M1552	V1553	F1556	E1557	LEU	GLY	ARG	ILE	LYS	ASN	VAL	MET	PRO
LEU	SER	ALA	G1570	K1577	P1584	P1585	R1586	L1587	H1588	V1589	Q1590	F1591	L1592	S1593	H1594	W1597	N1602	R1611	I1612	S1613	E1614	V1618	L1619	V1620	Q1621	P1625	L1626	Q1627	L1631	D1641	I1642	L1688	V1681	L1686	M1682	K1683	R1700	L1712	M1722	N1723	T1734														

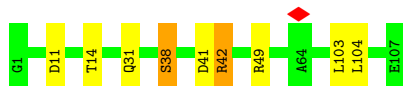
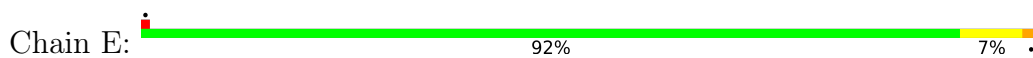




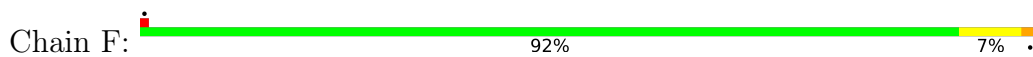




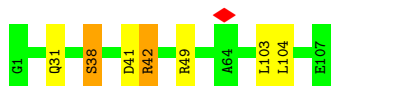
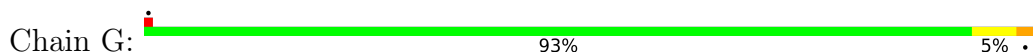
• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B



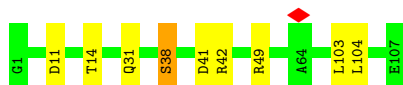
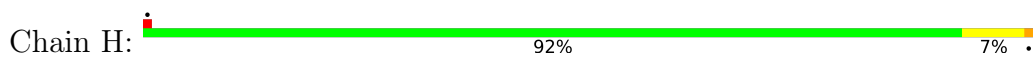
• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B



• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B



• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1B



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C4	Depositor
Number of particles used	282778	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	50, 50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 (6k x 4k), GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.715	Depositor
Minimum map value	-0.955	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.042	Depositor
Recommended contour level	0.132	Depositor
Map size ( $\text{\AA}$ )	501.12003, 501.12003, 501.12003	wwPDB
Map dimensions	464, 464, 464	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.08, 1.08, 1.08	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	0.38	0/31107	0.67	22/42056 (0.1%)
1	B	0.38	0/31107	0.67	16/42056 (0.0%)
1	C	0.38	0/31107	0.67	17/42056 (0.0%)
1	D	0.38	0/31107	0.67	19/42056 (0.0%)
2	E	0.31	0/834	0.65	1/1123 (0.1%)
2	F	0.31	0/834	0.65	1/1123 (0.1%)
2	G	0.31	0/834	0.64	1/1123 (0.1%)
2	H	0.31	0/834	0.64	0/1123
All	All	0.38	0/127764	0.67	77/172716 (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	9
1	B	0	9
1	C	0	9
1	D	0	7
All	All	0	34

There are no bond length outliers.

The worst 5 of 77 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	536	LEU	CA-CB-CG	8.00	133.70	115.30
1	A	536	LEU	CA-CB-CG	7.99	133.68	115.30
1	C	536	LEU	CA-CB-CG	7.97	133.64	115.30
1	D	536	LEU	CA-CB-CG	7.96	133.62	115.30

*Continued on next page...*

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	1303	ARG	NE-CZ-NH1	6.34	123.47	120.30

There are no chirality outliers.

5 of 34 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1552	ASN	Peptide
1	A	159	TRP	Peptide
1	A	1769	PHE	Peptide
1	A	1780	SER	Peptide
1	A	618	CYS	Peptide

## 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	30492	29287	29275	204	0
1	B	30492	29286	29275	212	0
1	C	30492	29286	29275	206	0
1	D	30492	29284	29275	215	0
2	E	818	824	824	4	0
2	F	818	824	824	4	0
2	G	818	824	824	3	0
2	H	818	824	824	4	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	125244	120439	120396	848	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 3.

The worst 5 of 848 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:612:ASP:O	1:D:616:SER:OG	2.07	0.72
1:C:612:ASP:O	1:C:616:SER:OG	2.07	0.70
1:B:612:ASP:O	1:B:616:SER:OG	2.07	0.70
1:A:612:ASP:O	1:A:616:SER:OG	2.07	0.69
1:C:2278:MET:SD	1:C:2284:TYR:OH	2.51	0.69

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	3849/4966 (78%)	3318 (86%)	523 (14%)	8 (0%)	47	77
1	B	3849/4966 (78%)	3325 (86%)	517 (13%)	7 (0%)	47	77
1	C	3849/4966 (78%)	3323 (86%)	516 (13%)	10 (0%)	41	72
1	D	3849/4966 (78%)	3329 (86%)	512 (13%)	8 (0%)	47	77
2	E	105/107 (98%)	98 (93%)	7 (7%)	0	100	100
2	F	105/107 (98%)	98 (93%)	7 (7%)	0	100	100
2	G	105/107 (98%)	98 (93%)	7 (7%)	0	100	100
2	H	105/107 (98%)	98 (93%)	7 (7%)	0	100	100
All	All	15816/20292 (78%)	13687 (86%)	2096 (13%)	33 (0%)	50	77

5 of 33 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	607	ASN
1	B	607	ASN
1	B	1501	ASN
1	C	607	ASN
1	C	1497	GLY

### 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	3181/4355 (73%)	3121 (98%)	60 (2%)	57	77
1	B	3181/4355 (73%)	3120 (98%)	61 (2%)	57	77
1	C	3181/4355 (73%)	3124 (98%)	57 (2%)	59	78
1	D	3181/4355 (73%)	3117 (98%)	64 (2%)	55	76
2	E	88/88 (100%)	85 (97%)	3 (3%)	37	65
2	F	88/88 (100%)	85 (97%)	3 (3%)	37	65
2	G	88/88 (100%)	85 (97%)	3 (3%)	37	65
2	H	88/88 (100%)	85 (97%)	3 (3%)	37	65
All	All	13076/17772 (74%)	12822 (98%)	254 (2%)	59	77

5 of 254 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	4518	TYR
1	D	2654	LYS
1	C	976	TYR
1	D	2651	LEU
1	D	4518	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	658	ASN
1	D	2090	GLN
1	C	1440	ASN
1	D	781	ASN
1	C	930	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.



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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides 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 [i](#)

There are no chain breaks in this entry.

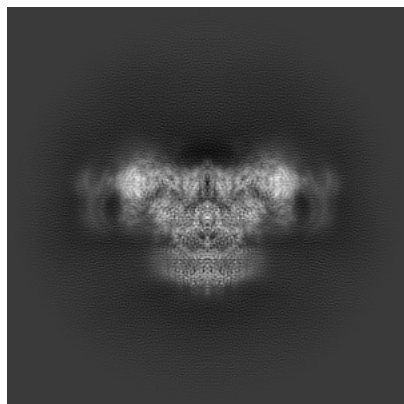
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-21861. These allow visual inspection of the internal detail of the map and identification of artifacts.

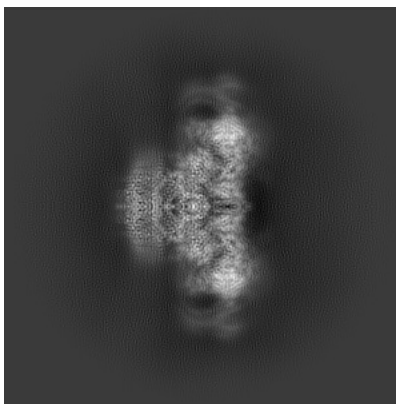
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

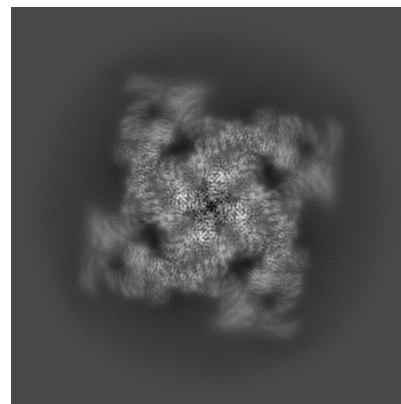
#### 6.1.1 Primary map



X

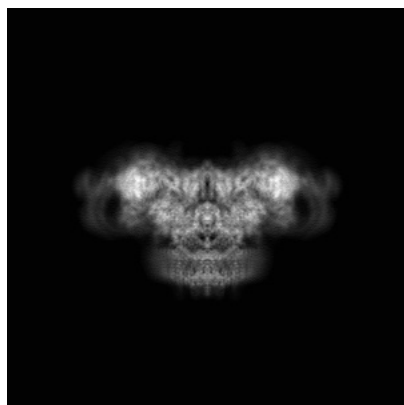


Y

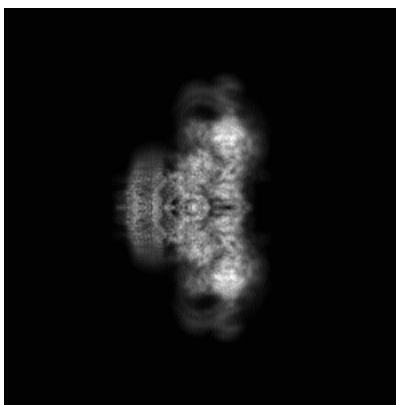


Z

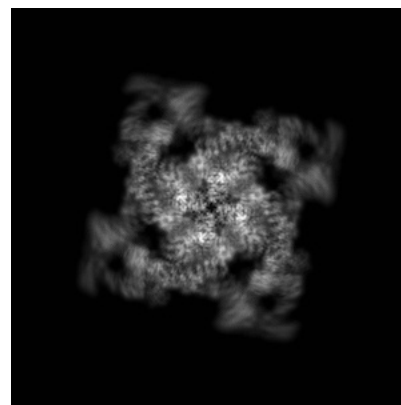
#### 6.1.2 Raw map



X



Y

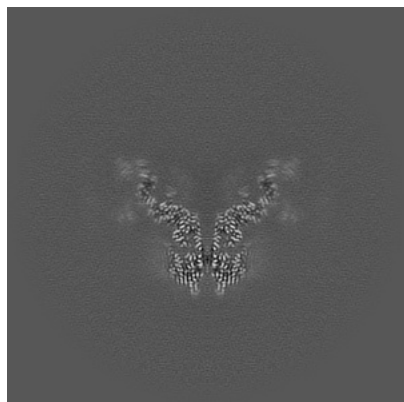


Z

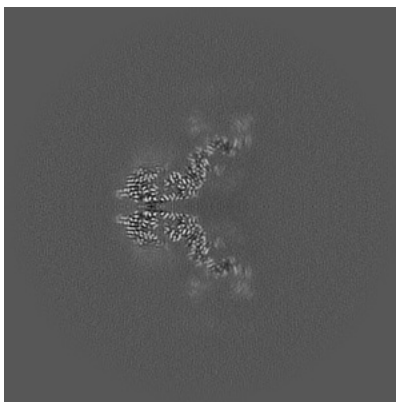
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

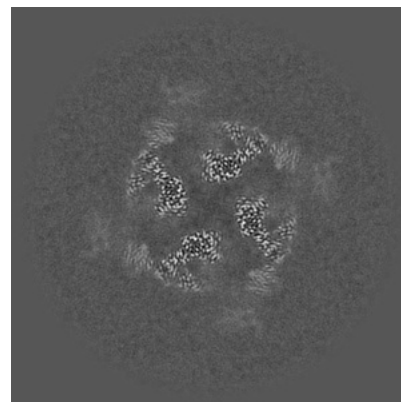
### 6.2.1 Primary map



X Index: 232

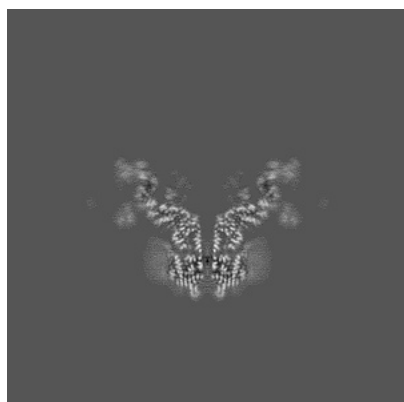


Y Index: 232

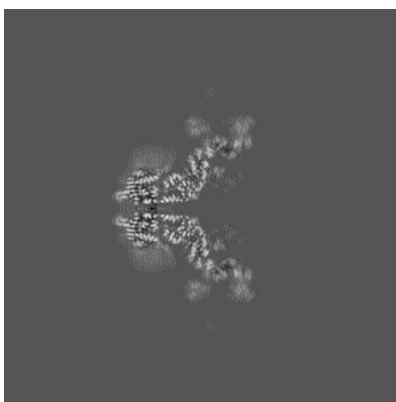


Z Index: 232

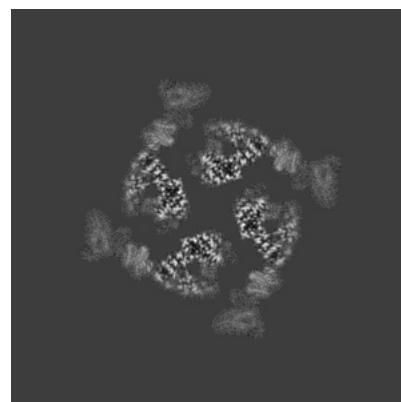
### 6.2.2 Raw map



X Index: 232



Y Index: 232



Z Index: 232

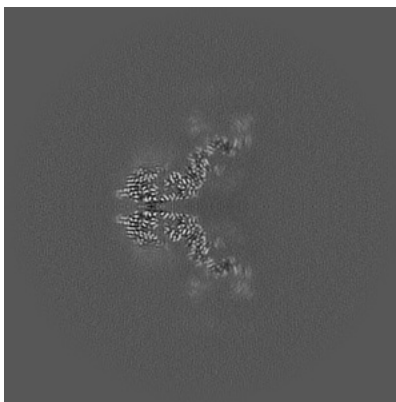
The images above show central slices of the map in three orthogonal directions.

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

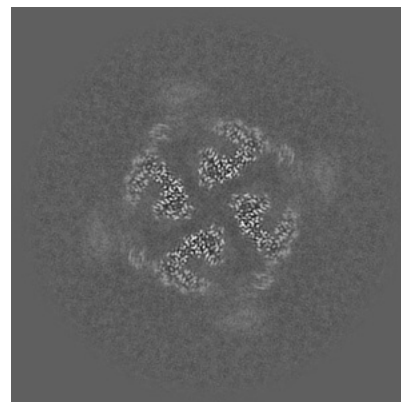
### 6.3.1 Primary map



X Index: 232

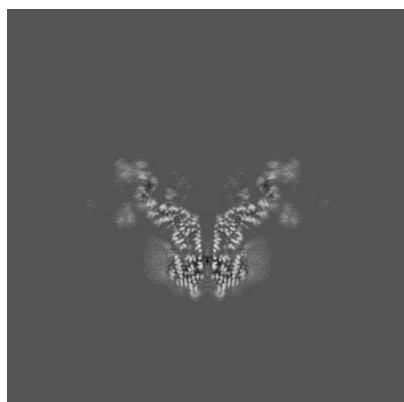


Y Index: 232

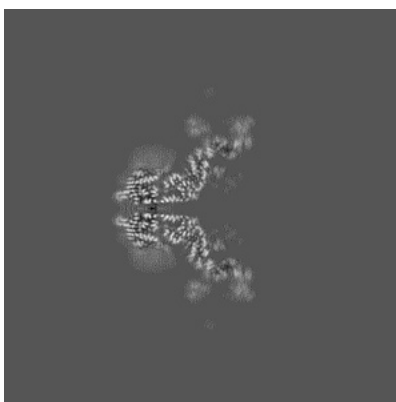


Z Index: 227

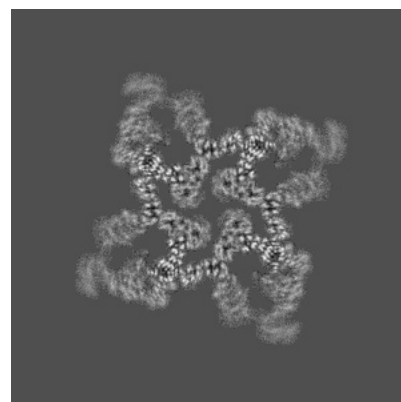
### 6.3.2 Raw map



X Index: 232



Y Index: 232

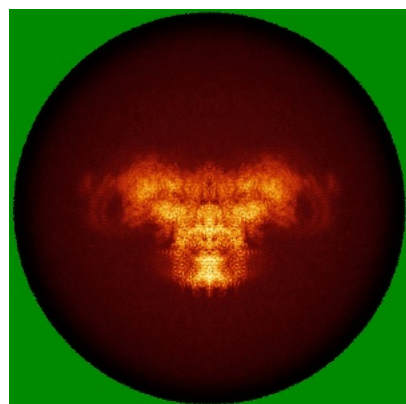


Z Index: 259

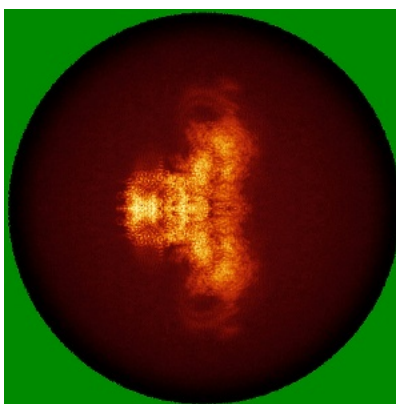
The images above show the largest variance slices of the map in three orthogonal directions.

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

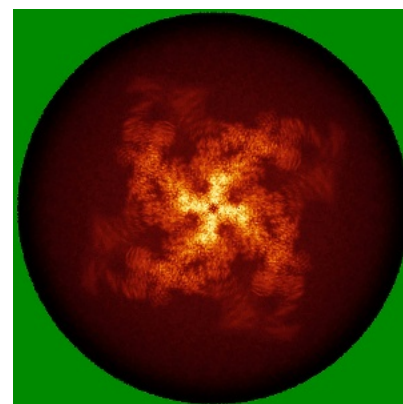
### 6.4.1 Primary map



X

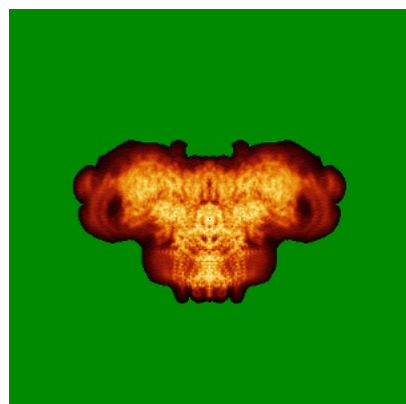


Y

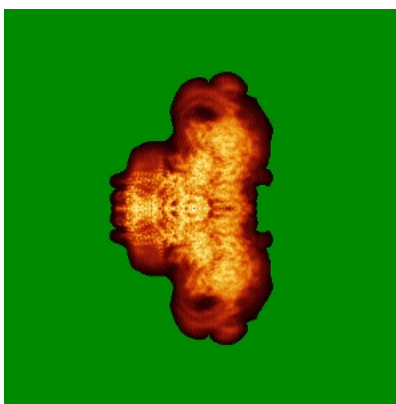


Z

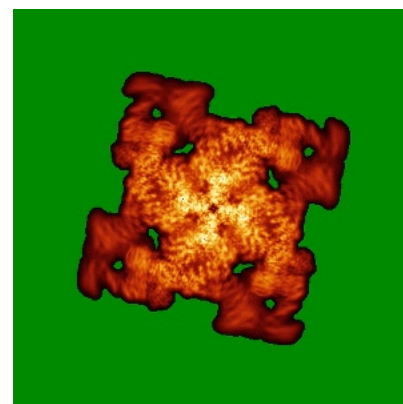
### 6.4.2 Raw map



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



X



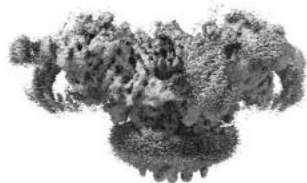
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.132. 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



X



Y



Z

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.

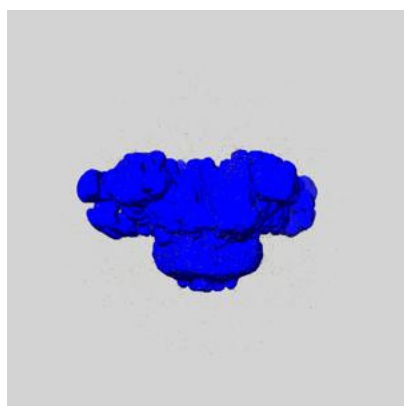
## 6.6 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

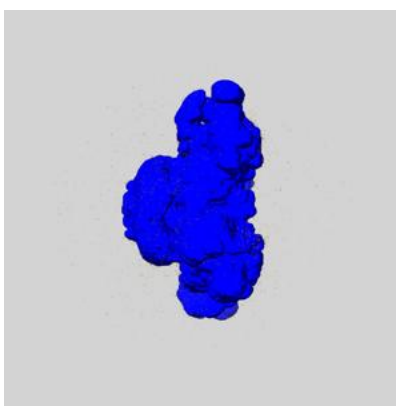
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

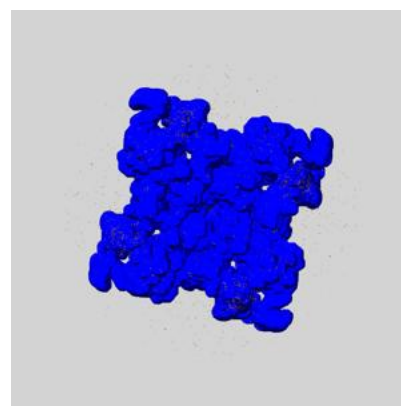
### 6.6.1 emd\_21861\_msk\_1.map [i](#)



X



Y

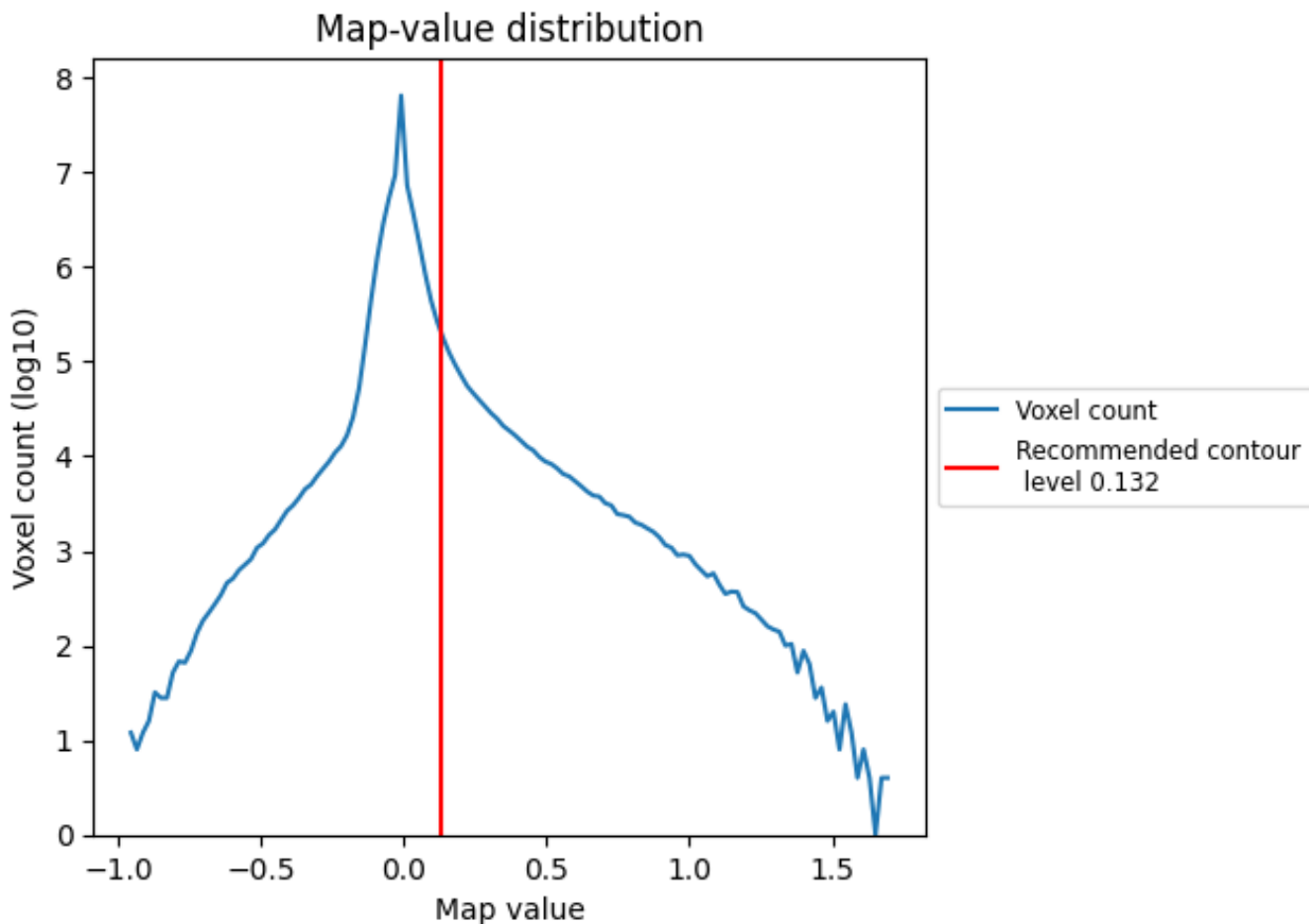


Z

## 7 Map analysis [i](#)

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

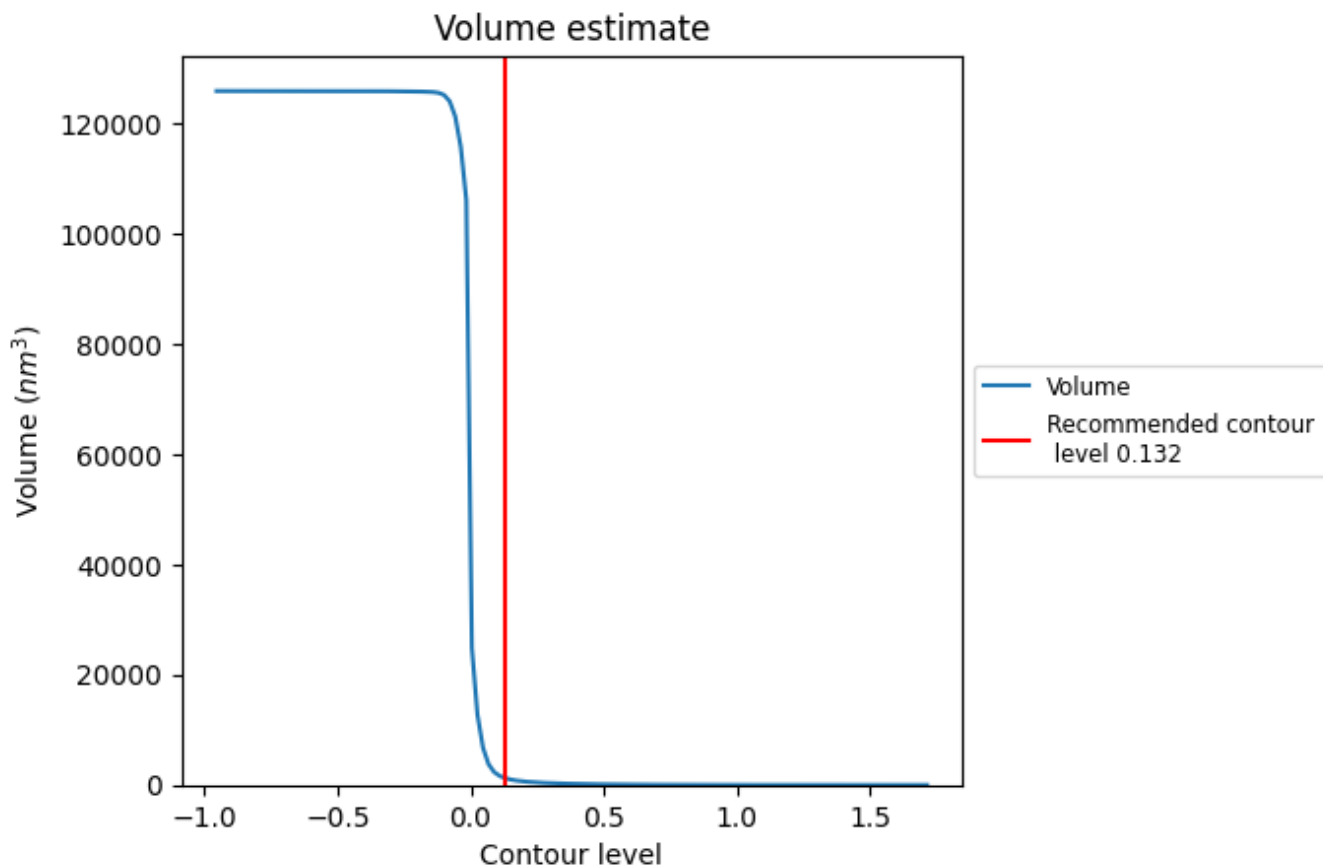
### 7.1 Map-value distribution [i](#)



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.



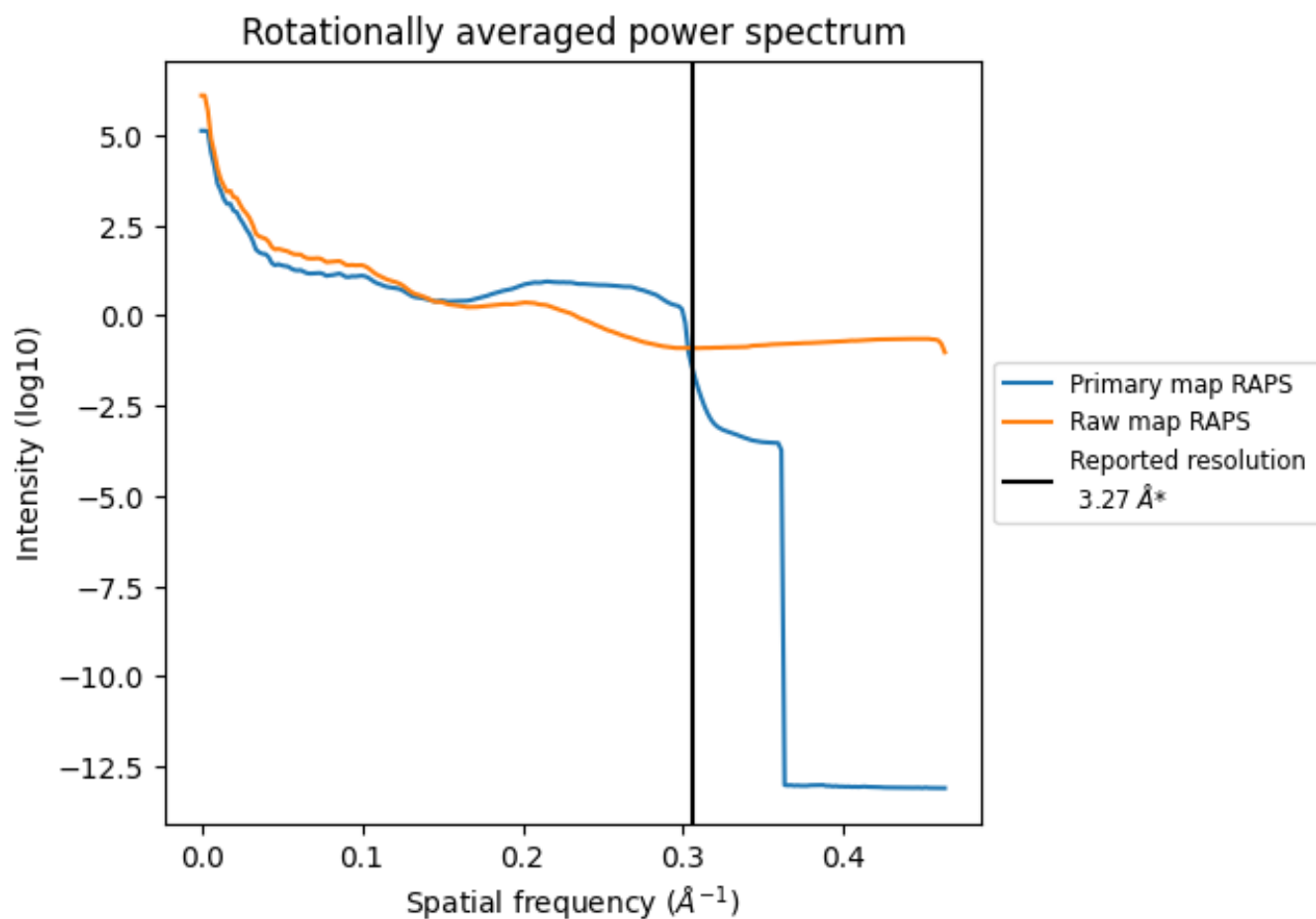
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1213  $\text{nm}^3$ ; this corresponds to an approximate mass of 1096 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](#)

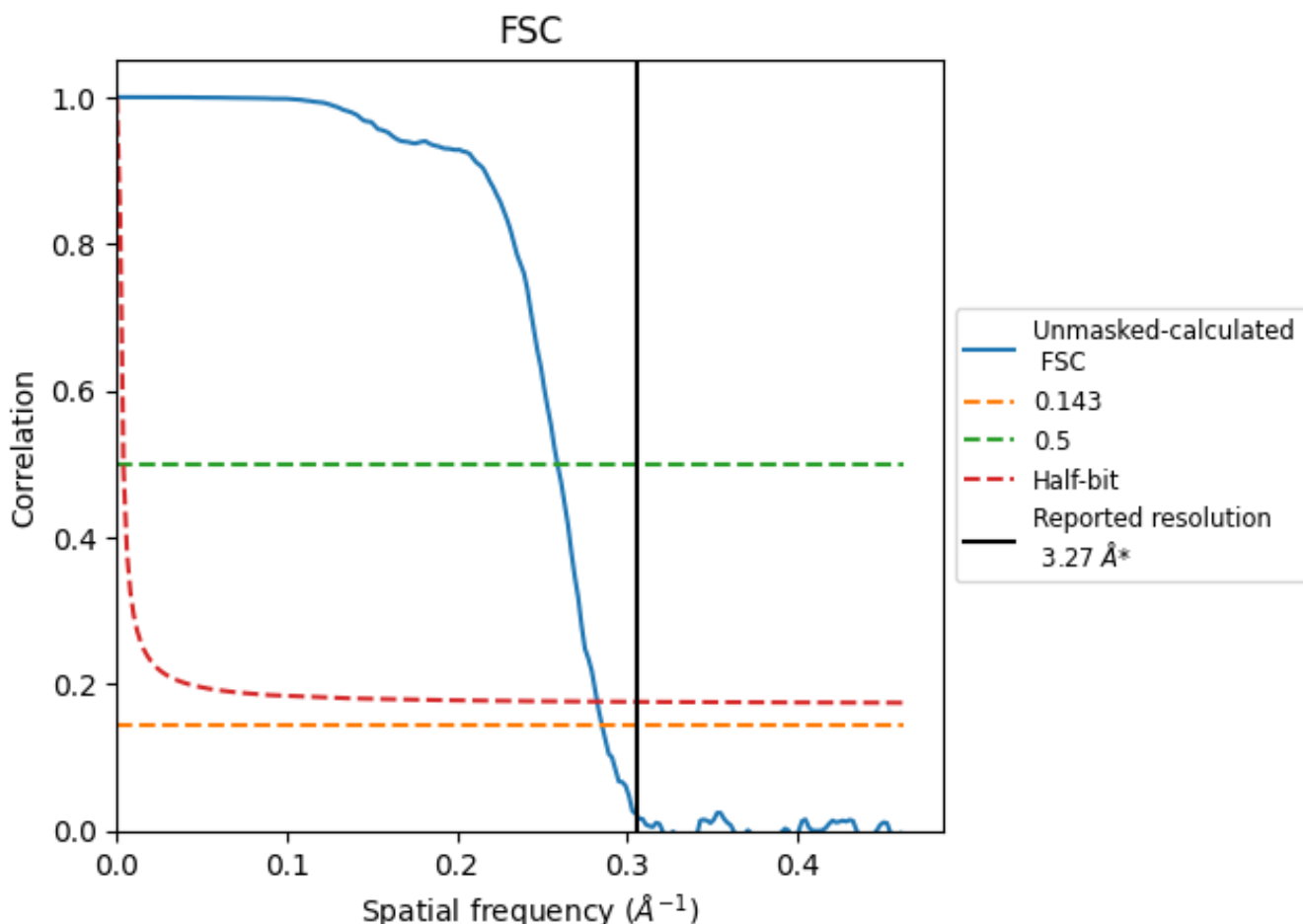


\*Reported resolution corresponds to spatial frequency of 0.306 Å<sup>-1</sup>

## 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  $0.306 \text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

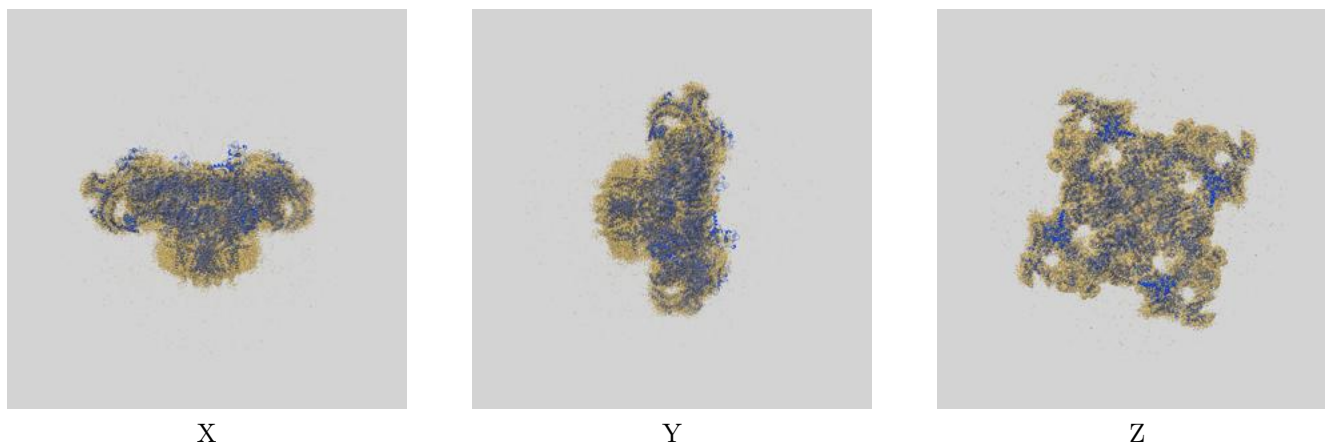
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.27	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.50	3.86	3.54

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

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

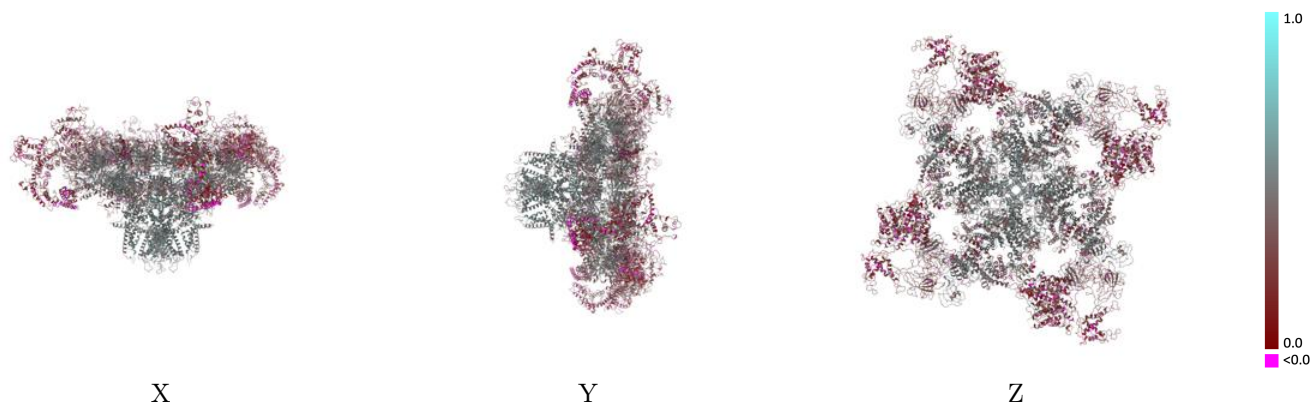
This section contains information regarding the fit between EMDB map EMD-21861 and PDB model 6WOU. Per-residue inclusion information can be found in section 3 on page 5.

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



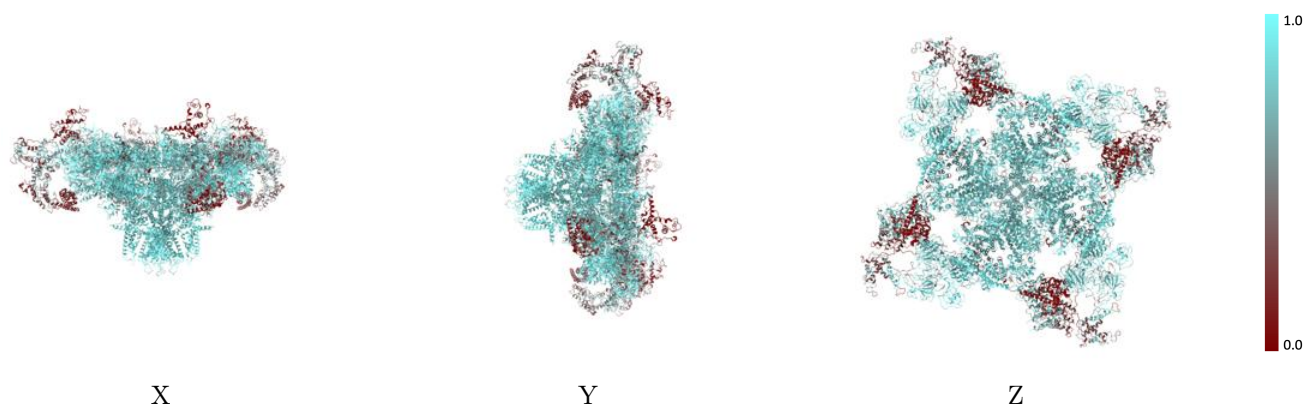
The images above show the 3D surface view of the map at the recommended contour level 0.132 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



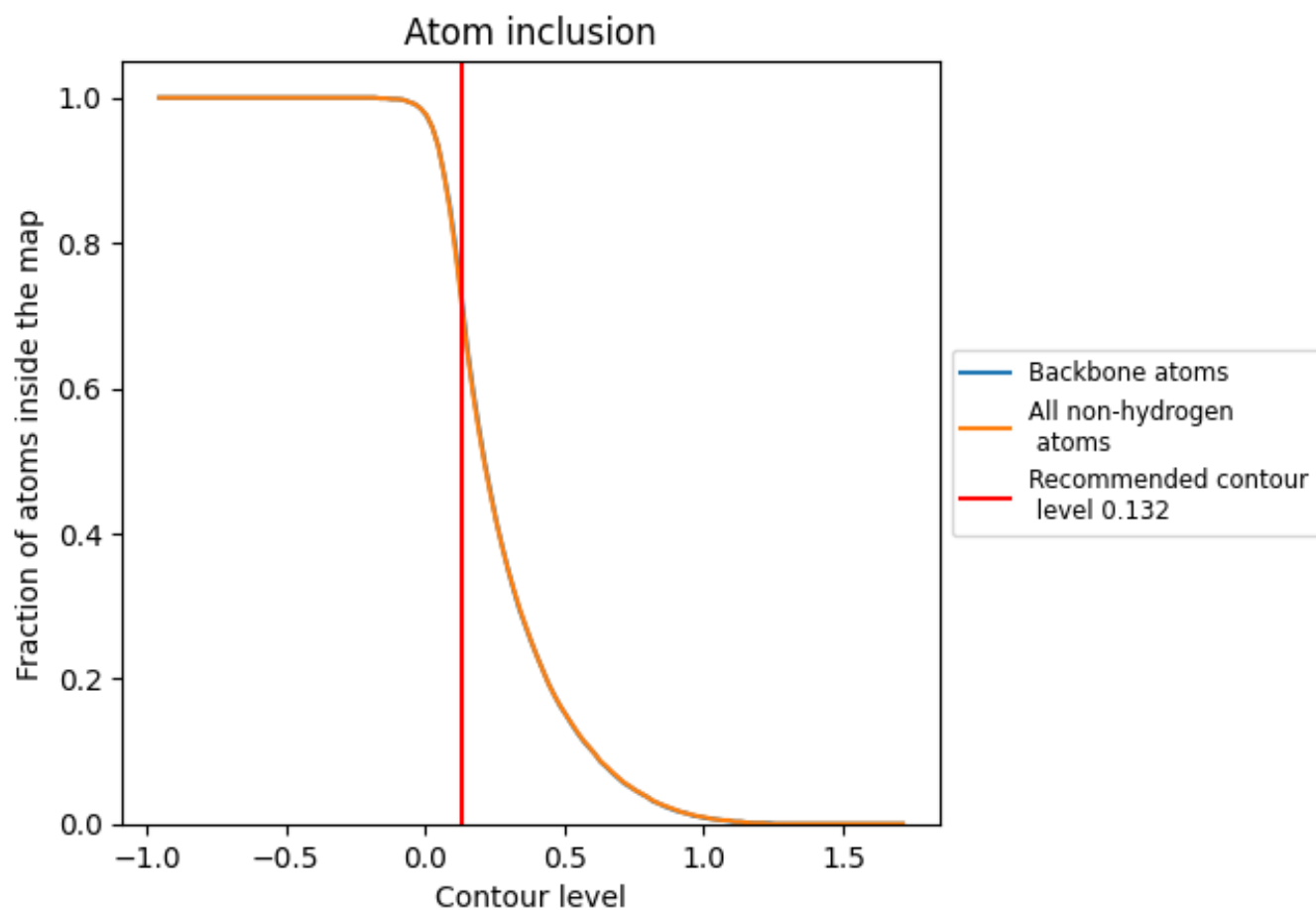
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.132).



















## 9.4 Atom inclusion [i](#)



At the recommended contour level, 72% of all backbone atoms, 71% 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 (0.132) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7120	 0.3760
A	 0.7110	 0.3740
B	 0.7110	 0.3730
C	 0.7110	 0.3740
D	 0.7110	 0.3740
E	 0.8710	 0.4550
F	 0.8720	 0.4560
G	 0.8670	 0.4560
H	 0.8690	 0.4580

