



wwPDB EM Validation Summary Report ⓘ

Aug 3, 2026 – 03:18 pm BST

PDB ID : 9S2S / pdb_00009s2s
EMDB ID : EMD-54509
Title : Primed-state RyR1 with calcium in activating concentration in the native membrane
Authors : Mikirtumov, V.
Deposited on : 2025-07-22
Resolution : 3.80 Å(reported)
Based on initial model : 7tzc

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

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

A user guide is available at

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

The types of validation reports are described at

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

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

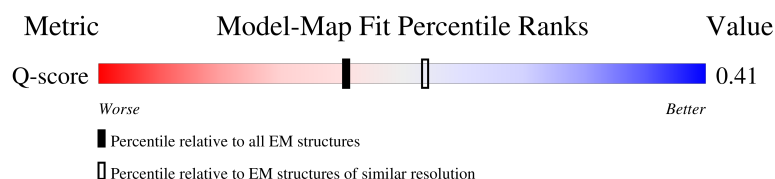
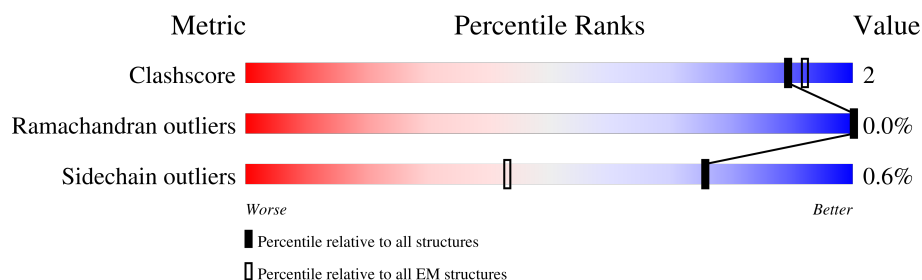
EMDB validation analysis : 0.0.1.dev133
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

1 Overall quality at a glance

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

The reported resolution of this entry is 3.80 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	10198 (3.30 - 4.30)

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	23% 82% 5% 13%
1	B	5037	22% 83% • 13%
1	C	5037	22% 83% 5% 13%
1	D	5037	22% 82% 6% 13%

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Mol	Chain	Length	Quality of chain
2	E	108	6% 95%
2	F	108	95%
2	G	108	6% 95%
2	H	108	95%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 287012 atoms, of which 142908 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called Ryanodine receptor 1.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	4404	Total	C	H	N	O	S	0	0
			69822	22323	34734	6046	6482	237		
1	B	4404	Total	C	H	N	O	S	0	0
			69822	22323	34734	6046	6482	237		
1	C	4404	Total	C	H	N	O	S	0	0
			69822	22323	34734	6046	6482	237		
1	D	4404	Total	C	H	N	O	S	0	0
			69822	22323	34734	6046	6482	237		

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

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

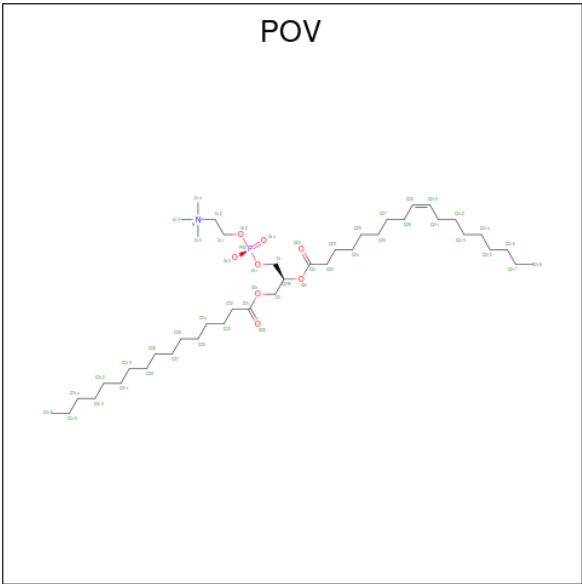
- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 4 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 5 is (2S)-3-(hexadecanoyloxy)-2-[(9Z)-octadec-9-enoyloxy]propyl 2-(trimethylammonio)ethyl phosphate (CCD ID: POV) (formula: C₄₂H₈₂NO₈P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						AltConf
5	A	1	Total	C	H	N	O	P	0
			134	42	82	1	8	1	
5	A	1	Total	C	H	N	O	P	0
			134	42	82	1	8	1	
5	B	1	Total	C	H	N	O	P	0
			134	42	82	1	8	1	
5	B	1	Total	C	H	N	O	P	0
			134	42	82	1	8	1	
5	C	1	Total	C	H	N	O	P	0
			134	42	82	1	8	1	

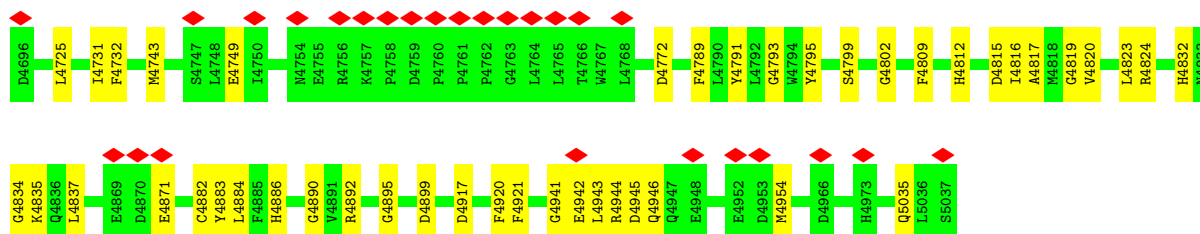
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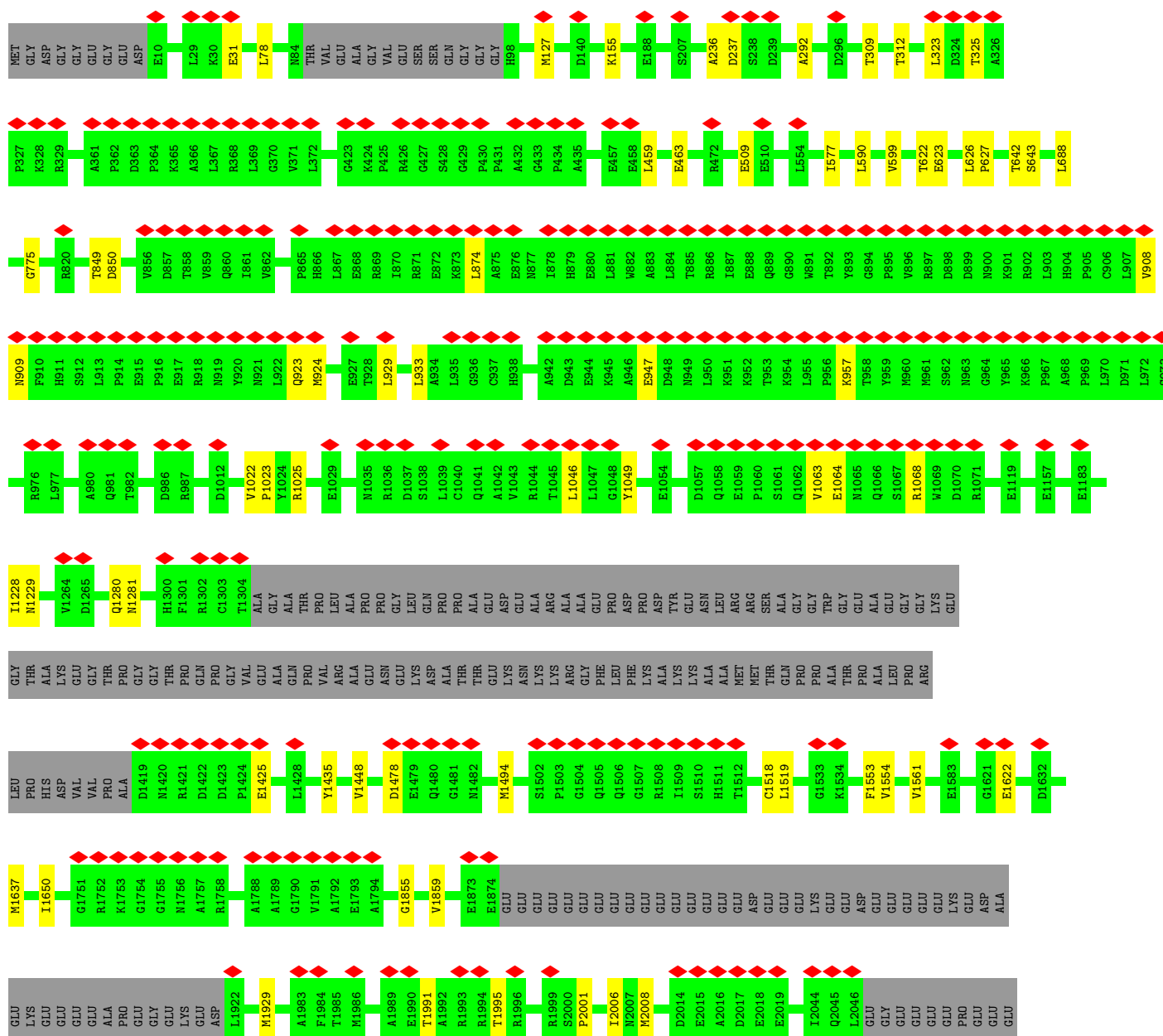
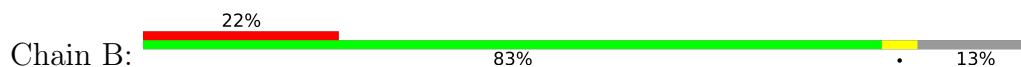
Mol	Chain	Residues	Atoms						AltConf
5	C	1	Total	C	H	N	O	P	0
			134	42	82	1	8	1	
5	D	1	Total	C	H	N	O	P	0
			134	42	82	1	8	1	
5	D	1	Total	C	H	N	O	P	0
			134	42	82	1	8	1	







• Molecule 1: Ryanodine receptor 1

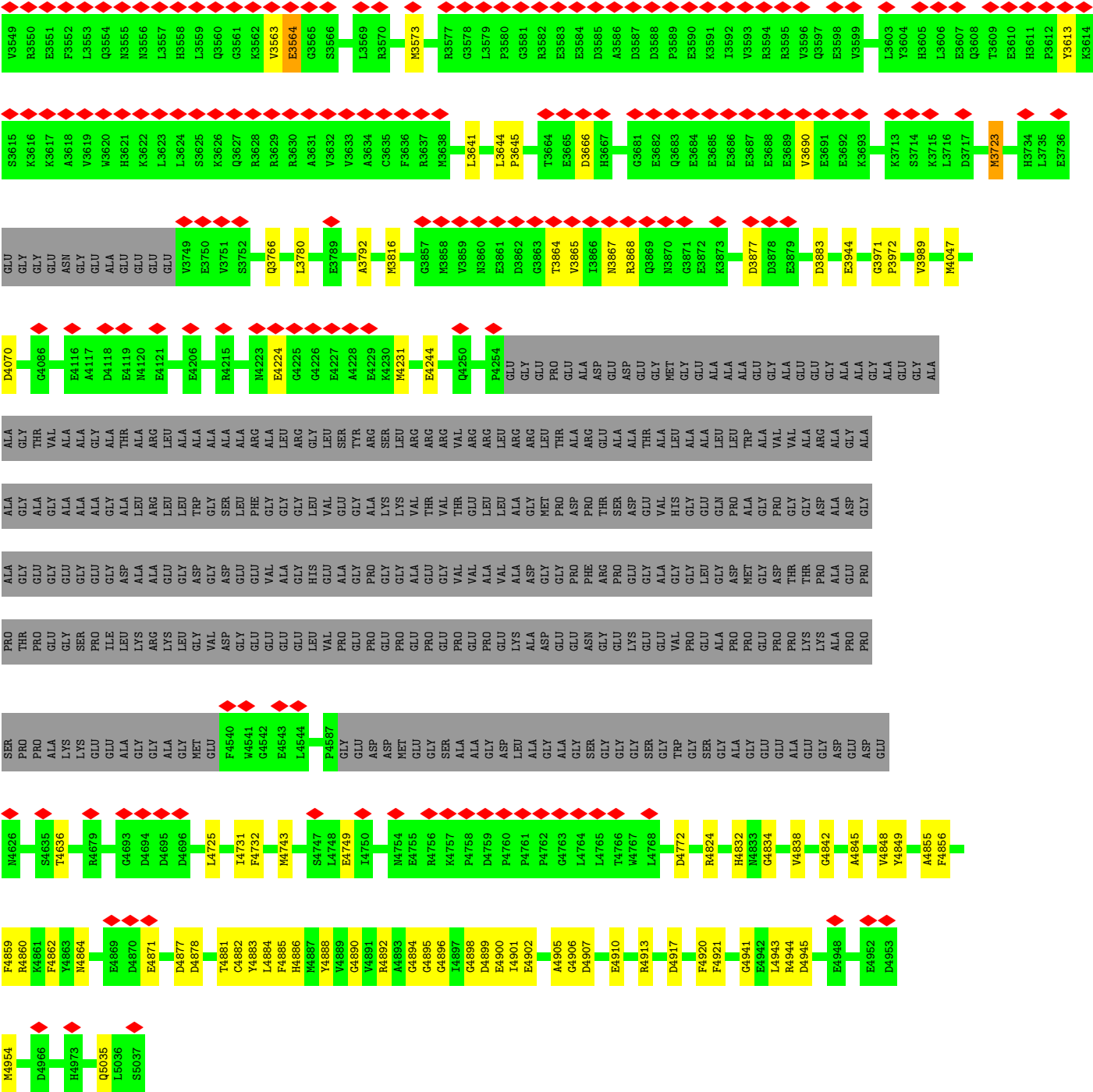




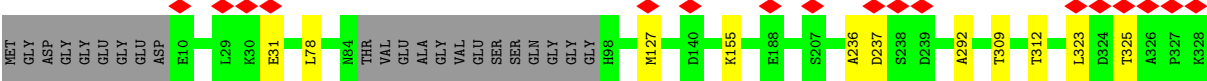
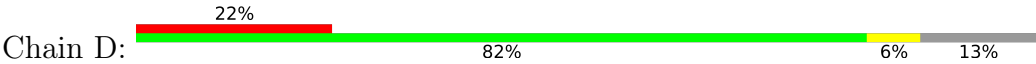






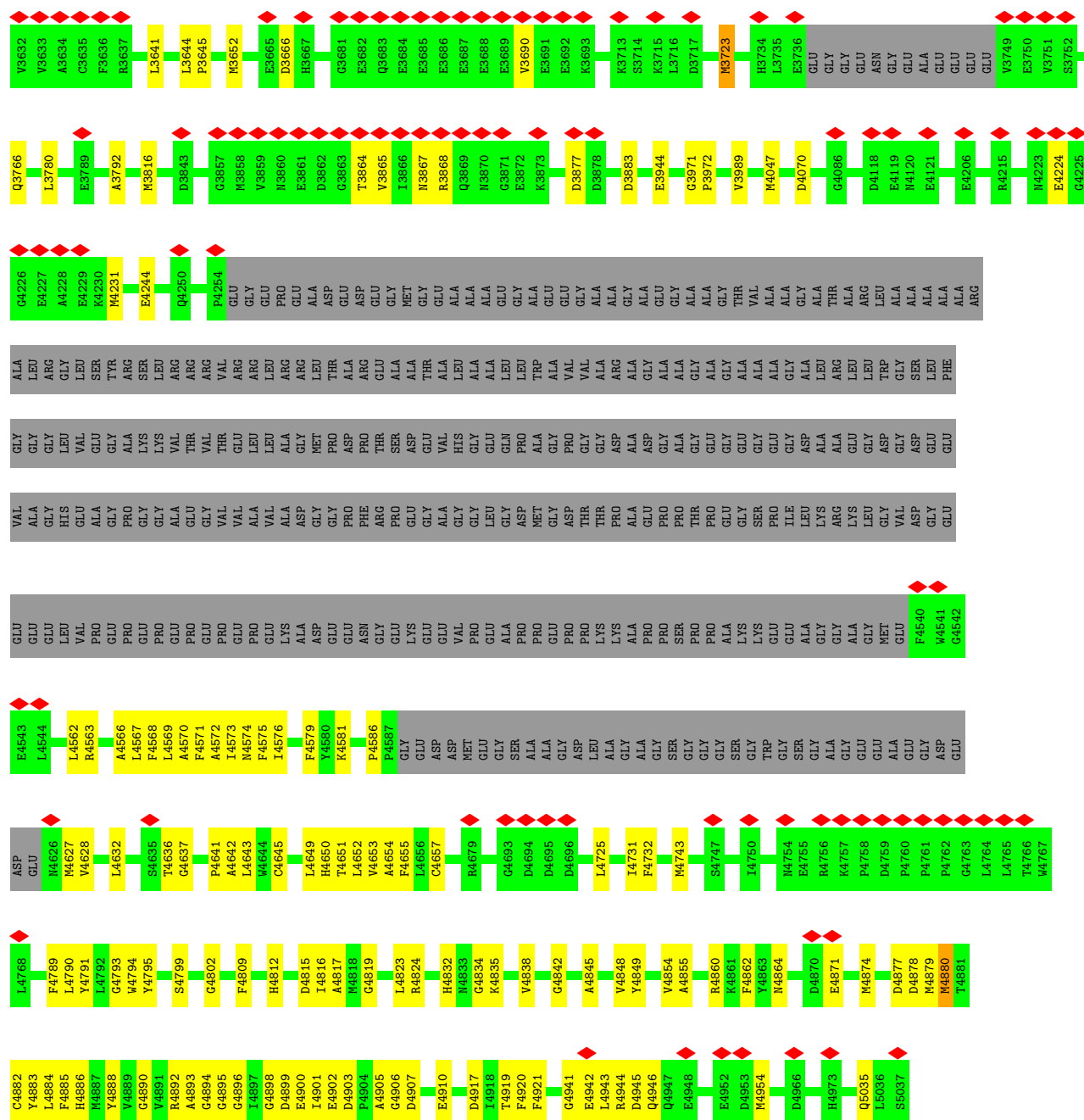


● Molecule 1: Ryanodine receptor 1

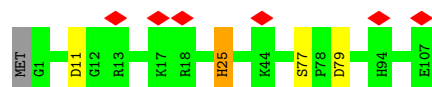




S3566	L3569	R3570	M3573	R3577	G3578	L3579	P3580	G3581	R3582	E3583	E3584	D3585	A3586	D3587	D3588	P3589	E3590	K3591	L3592	V3593	R3594	R3595	V3596	K3597	E3598	V3599	L3603	Y3604	H3605	L3606	E3607	K3642	D3643	T3609	E3610	D3646	P3612	Y3613	K3614	S3615	K3616	L3617	A3618	V3619	H3620	K3621	K3622	L3623	L3624	S3625	K3626	Q3627	R3628	R3629	R3630	A3631						
LYS	LYS	R3498	R3499	G3500	D3501	R3502	R3503	S3504	V3505	Q3506	L3509	I3510	T3513	M3517	M3524	C3525	T3528	D3529	Q3530	D3531	L3532	I3533	M3534	L3535	A3536	K3537	T3538	R3539	Y3540	A3541	L3542	K3543	D3544	T3545	R3546	E3547	E3548	R3549	E3551	F3552	L3553	Q3554	N3555	N3556	L3557	H3558	L3559	Q3560	G3561	K3562	V3563	E3564	G3565									
A3429	N3430	A3431	E3432	F3435	R3436	N3437	I3441	F3442	L3443	Y3444	K3447	S3448	H3449	N3450	F3451	K3452	R3453	E3454	F3458	Q3461	N3462	E3463	L3464	N3465	N3466	M3467	S3468	F3469	L3470	T3471	A3472	D3473	S3474	K3475	S3476	K3477	N3478	LYS	ALA	GLY	ASP	ALA	SER	GLY	GLY	SER	GLY	SER	GLN	GLU	THR	LYS										
I3362	G3363	R3364	L3365	R3366	K3367	R3368	A3369	G3370	K3371	V3372	V3373	A3374	E3375	E3376	E3377	Q3378	L3379	R3380	L3381	E3382	K3383	K3384	A3385	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	D3396	E3397	F3398	S3399	V3400	L3401	C3402	R3403	D3404	L3405	Y3406	A3407	L3411	L3412	I3413	R3414	GLN	GLY	S3415	D3416	W3423	L3424	N3428						
F3297	A3298	G3299	A3300	P3301	P3302	P3303	C3304	T3305	A3306	V3307	T3308	S3309	D3310	H3311	L3312	N3313	S3314	L3315	L3316	L3317	N3318	L3319	L3320	R3321	I3322	V3323	N3324	N3325	N3326	L3327	G3328	L3329	D3330	E3331	A3332	T3333	V3334	M3335	K3336	R3337	L3338	A3339	V3340	F3341	A3342	I3345	R3348	R3349	R3350	F3351	E3352	L3353	L3354	H3355	R3356	H3357	F3358					
I3362	G3363	R3364	L3365	R3366	K3367	R3368	A3369	G3370	K3371	V3372	V3373	A3374	E3375	E3376	E3377	Q3378	L3379	R3380	L3381	E3382	K3383	K3384	A3385	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	D3396	E3397	F3398	S3399	V3400	L3401	C3402	R3403	D3404	L3405	Y3406	A3407	L3411	L3412	I3413	R3414	GLN	GLY	S3415	D3416	W3423	L3424	N3428						
A3429	N3430	A3431	E3432	F3435	R3436	N3437	I3441	F3442	L3443	Y3444	K3447	S3448	H3449	N3450	F3451	K3452	R3453	E3454	F3458	Q3461	N3462	E3463	L3464	N3465	N3466	M3467	S3468	F3469	L3470	T3471	A3472	D3473	S3474	K3475	S3476	K3477	N3478	LYS	ALA	GLY	ASP	ALA	SER	GLY	GLY	SER	GLY	SER	GLN	GLU	THR	LYS										
LYS	LYS	R3498	R3499	G3500	D3501	R3502	R3503	S3504	V3505	Q3506	L3509	I3510	T3513	M3517	M3524	C3525	T3528	D3529	Q3530	D3531	L3532	I3533	M3534	L3535	A3536	K3537	T3538	R3539	Y3540	A3541	L3542	K3543	D3544	T3545	R3546	E3547	E3548	R3549	E3551	F3552	L3553	Q3554	N3555	N3556	L3557	H3558	L3559	Q3560	G3561	K3562	V3563	E3564	G3565									
G2900	T2901	H2902	P2903	L2904	L2905	V2906	P2907	D2908	D2909	T2910	L2911	T2912	A2913	K2914	E2915	A2916	A2917	R2918	D2919	E2920	E2921	K2922	A2923	Q2924	E2925	L2926	L2927	K2928	P2929	L2930	Q2931	N2932	M2933	G2934	Y2935	T3001	L3002	L3003	P3004	L3005	I3006	C3014	L3015	Y3016	F3017	L3018	S3019	T3020	P3021	A3022	K3023	L3024	L3025	G3026	S3027	G3028	L2960					
ARG	LYS	ILE	SER	GLN	THR	ALA	GLN	THR	ASP	PRO	ARG	GLU	GLY	Y2855	N2856	P2857	Q2858	P2859	P2860	D2861	L2862	S2863	G2864	V2865	T2866	L2867	S2868	R2869	E2870	L2871	Q2872	A2873	M2874	A2875	E2876	Q2877	L2878	A2879	E2880	N2881	Y2882	H2883	N2884	T2885	W2886	ASP	MET	GLU	L2946	D2947	T2948	S2949	S2950	L2951	E2952	L2894	E2953	R2954	F2955	A2956	G2957	G2958

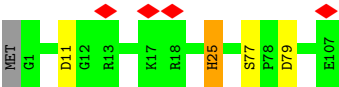


• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

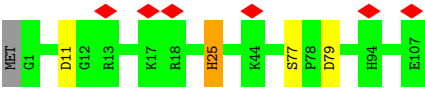
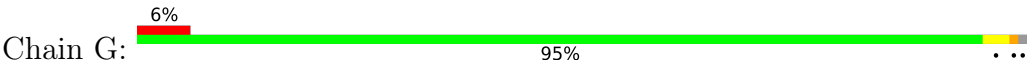


• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

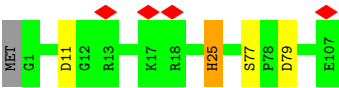




- Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A



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4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C4	Depositor
Number of particles used	82421	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 ($e^-/\text{\AA}^2$)	60.9	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	4000	Depositor
Magnification	64000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	13.634	Depositor
Minimum map value	-0.000	Depositor
Average map value	0.051	Depositor
Map value standard deviation	0.278	Depositor
Recommended contour level	1.14	Depositor
Map size (Å)	409.80002, 409.80002, 409.80002	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.366, 1.366, 1.366	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.48	31/35885 (0.1%)	0.62	120/48603 (0.2%)
1	B	0.36	14/35885 (0.0%)	0.53	15/48603 (0.0%)
1	C	0.42	26/35885 (0.1%)	0.58	64/48603 (0.1%)
1	D	0.53	44/35885 (0.1%)	0.67	180/48603 (0.4%)
2	E	0.31	1/851 (0.1%)	0.51	2/1146 (0.2%)
2	F	0.31	1/851 (0.1%)	0.51	2/1146 (0.2%)
2	G	0.31	1/851 (0.1%)	0.51	2/1146 (0.2%)
2	H	0.31	1/851 (0.1%)	0.51	2/1146 (0.2%)
All	All	0.45	119/146944 (0.1%)	0.60	387/198996 (0.2%)

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
2	E	0	1
2	F	0	1
2	G	0	1
2	H	0	1
All	All	0	4

The worst 5 of 119 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	4650	HIS	CE1-NE2	-8.90	1.23	1.32
1	A	4812	HIS	CE1-NE2	-8.83	1.23	1.32
1	D	4812	HIS	CE1-NE2	-8.82	1.23	1.32
1	C	4886	HIS	ND1-CE1	-8.80	1.23	1.32
1	D	4650	HIS	ND1-CE1	-8.78	1.23	1.32

The worst 5 of 387 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	4920	PHE	CA-CB-CG	7.58	121.38	113.80
1	C	4920	PHE	CA-CB-CG	7.55	121.35	113.80
1	D	4899	ASP	CA-CB-CG	7.53	120.13	112.60
1	D	4627	MET	CA-C-N	7.50	130.29	122.27
1	D	4627	MET	C-N-CA	7.50	130.29	122.27

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	E	25	HIS	Sidechain
2	F	25	HIS	Sidechain
2	G	25	HIS	Sidechain
2	H	25	HIS	Sidechain

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	35088	34734	34715	132	0
1	B	35088	34734	34715	129	0
1	C	35088	34734	34715	129	0
1	D	35088	34734	34715	130	0
2	E	832	829	831	2	0
2	F	832	829	831	2	0
2	G	832	829	831	2	0
2	H	832	829	831	2	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
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	104	164	164	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	104	164	164	0	0
5	C	104	164	164	0	0
5	D	104	164	164	0	0
All	All	144104	142908	142840	528	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 2.

The worst 5 of 528 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:3372:VAL:HG21	1:B:3401:LEU:HD11	1.45	0.98
1:C:3372:VAL:HG21	1:C:3401:LEU:HD11	1.45	0.95
1:D:3372:VAL:HG21	1:D:3401:LEU:HD11	1.45	0.95
1:A:3372:VAL:HG21	1:A:3401:LEU:HD11	1.45	0.95
1:A:849:THR:HG22	1:A:850:ASP:H	1.52	0.75

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	4376/5037 (87%)	4255 (97%)	120 (3%)	1 (0%)	100	100
1	B	4376/5037 (87%)	4255 (97%)	120 (3%)	1 (0%)	100	100
1	C	4376/5037 (87%)	4253 (97%)	122 (3%)	1 (0%)	100	100
1	D	4376/5037 (87%)	4253 (97%)	122 (3%)	1 (0%)	100	100
2	E	105/108 (97%)	97 (92%)	8 (8%)	0	100	100
2	F	105/108 (97%)	97 (92%)	8 (8%)	0	100	100
2	G	105/108 (97%)	97 (92%)	8 (8%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	H	105/108 (97%)	97 (92%)	8 (8%)	0	100	100
All	All	17924/20580 (87%)	17404 (97%)	516 (3%)	4 (0%)	100	100

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3613	TYR
1	B	3613	TYR
1	C	3613	TYR
1	D	3613	TYR

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	3827/4276 (90%)	3805 (99%)	22 (1%)	78	79
1	B	3827/4276 (90%)	3805 (99%)	22 (1%)	78	79
1	C	3827/4276 (90%)	3805 (99%)	22 (1%)	78	79
1	D	3827/4276 (90%)	3805 (99%)	22 (1%)	78	79
2	E	89/90 (99%)	88 (99%)	1 (1%)	65	73
2	F	89/90 (99%)	88 (99%)	1 (1%)	65	73
2	G	89/90 (99%)	88 (99%)	1 (1%)	65	73
2	H	89/90 (99%)	88 (99%)	1 (1%)	65	73
All	All	15664/17464 (90%)	15572 (99%)	92 (1%)	76	79

5 of 92 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	3564	GLU
1	D	1435	TYR
1	C	3766	GLN
1	C	5035	GLN
1	D	2222	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 108 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	838	HIS
1	C	2441	HIS
1	D	3150	HIS
1	C	1066	GLN
1	C	1719	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	$\# Z > 2$
5	POV	B	5104	-	51,51,51	0.74	0	57,59,59	0.64	1 (1%)
5	POV	D	5103	-	51,51,51	0.73	0	57,59,59	0.63	1 (1%)
5	POV	A	5104	-	51,51,51	0.86	2 (3%)	57,59,59	0.57	1 (1%)
5	POV	B	5103	-	51,51,51	0.83	2 (3%)	57,59,59	0.54	1 (1%)
5	POV	C	5103	-	51,51,51	0.83	2 (3%)	57,59,59	0.54	1 (1%)
5	POV	D	5104	-	51,51,51	0.85	2 (3%)	57,59,59	0.53	1 (1%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	POV	C	5104	-	51,51,51	0.74	0	57,59,59	0.60	1 (1%)
5	POV	A	5103	-	51,51,51	0.75	0	57,59,59	0.64	1 (1%)

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
5	POV	B	5104	-	-	11/55/55/55	-
5	POV	D	5103	-	-	11/55/55/55	-
5	POV	A	5104	-	-	11/55/55/55	-
5	POV	B	5103	-	-	11/55/55/55	-
5	POV	C	5103	-	-	12/55/55/55	-
5	POV	D	5104	-	-	12/55/55/55	-
5	POV	C	5104	-	-	11/55/55/55	-
5	POV	A	5103	-	-	12/55/55/55	-

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	5103	POV	C1-C2	2.34	1.57	1.50
5	A	5104	POV	C1-C2	2.30	1.57	1.50
5	D	5104	POV	C1-C2	2.29	1.57	1.50
5	B	5103	POV	C1-C2	2.25	1.57	1.50
5	A	5104	POV	C3-C2	2.09	1.57	1.50

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	5104	POV	C2-O21-C21	3.01	125.19	117.79
5	A	5103	POV	C2-O21-C21	2.94	125.04	117.79
5	D	5103	POV	C2-O21-C21	2.81	124.71	117.79
5	C	5104	POV	C2-O21-C21	2.61	124.21	117.79
5	A	5104	POV	C2-O21-C21	2.38	123.64	117.79

There are no chirality outliers.

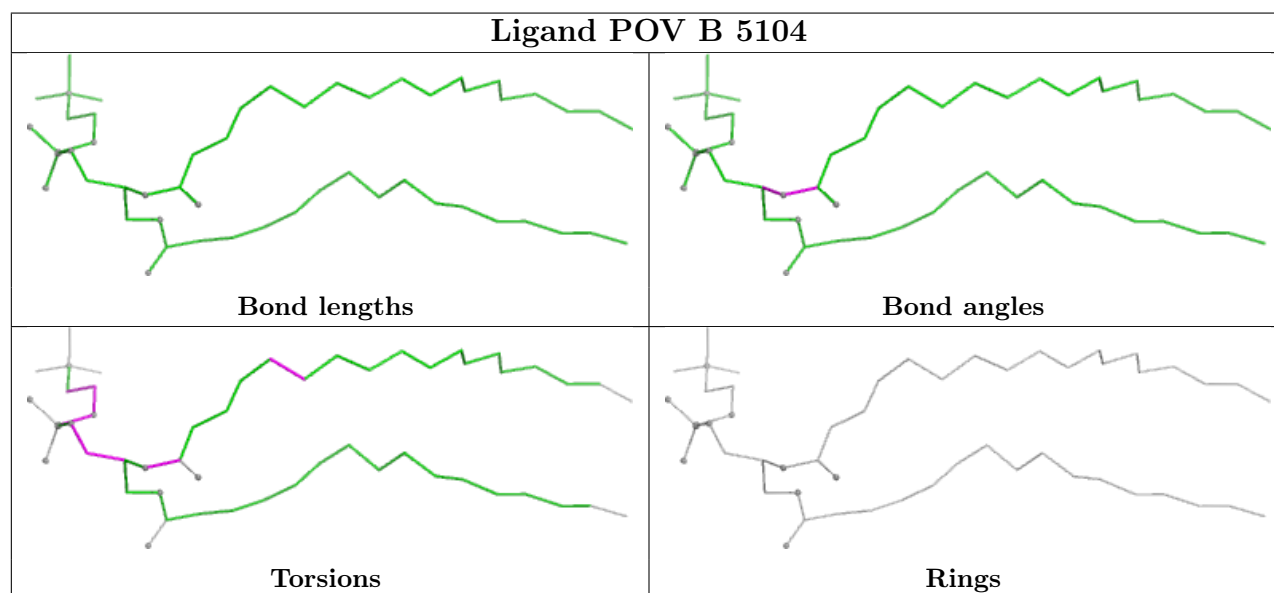
5 of 91 torsion outliers are listed below:

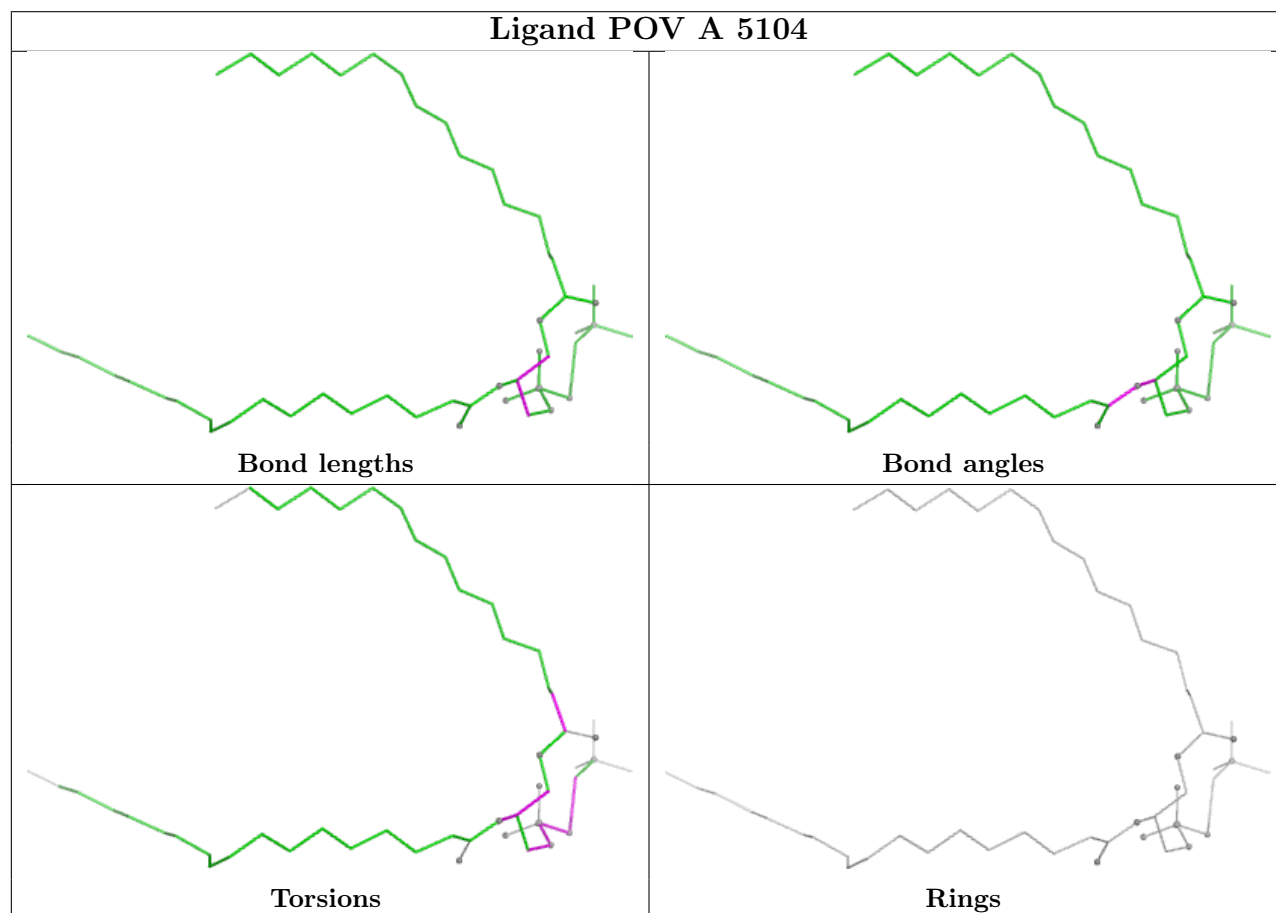
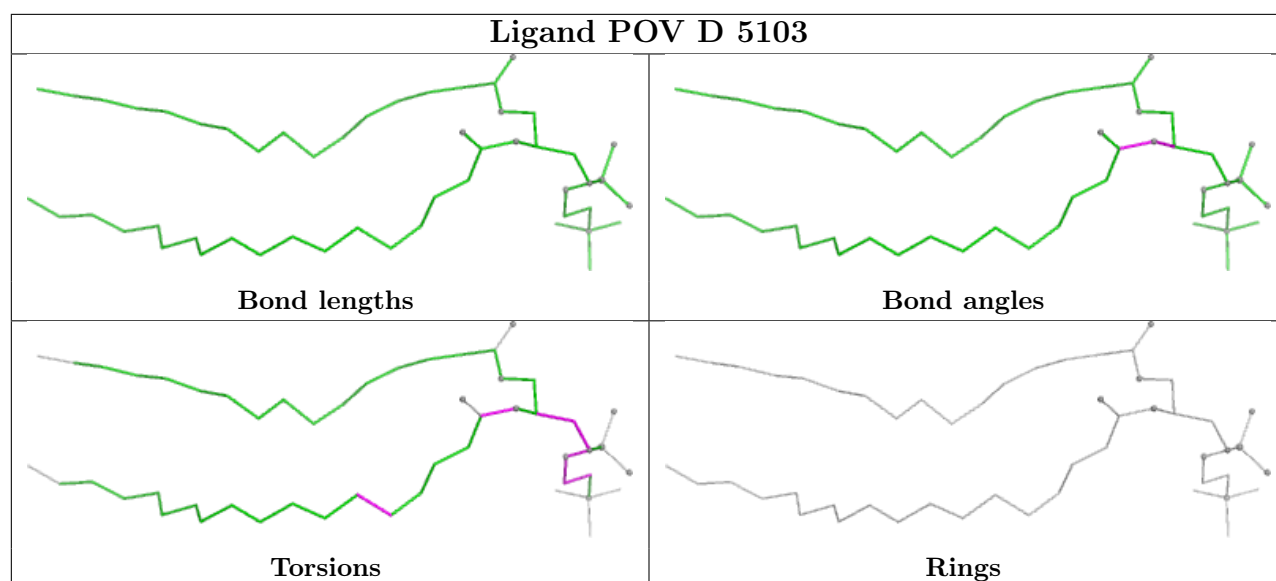
Mol	Chain	Res	Type	Atoms
5	A	5103	POV	C11-O12-P-O11
5	A	5103	POV	C11-O12-P-O13
5	A	5103	POV	C11-O12-P-O14
5	A	5103	POV	C2-C1-O11-P
5	A	5103	POV	C12-C11-O12-P

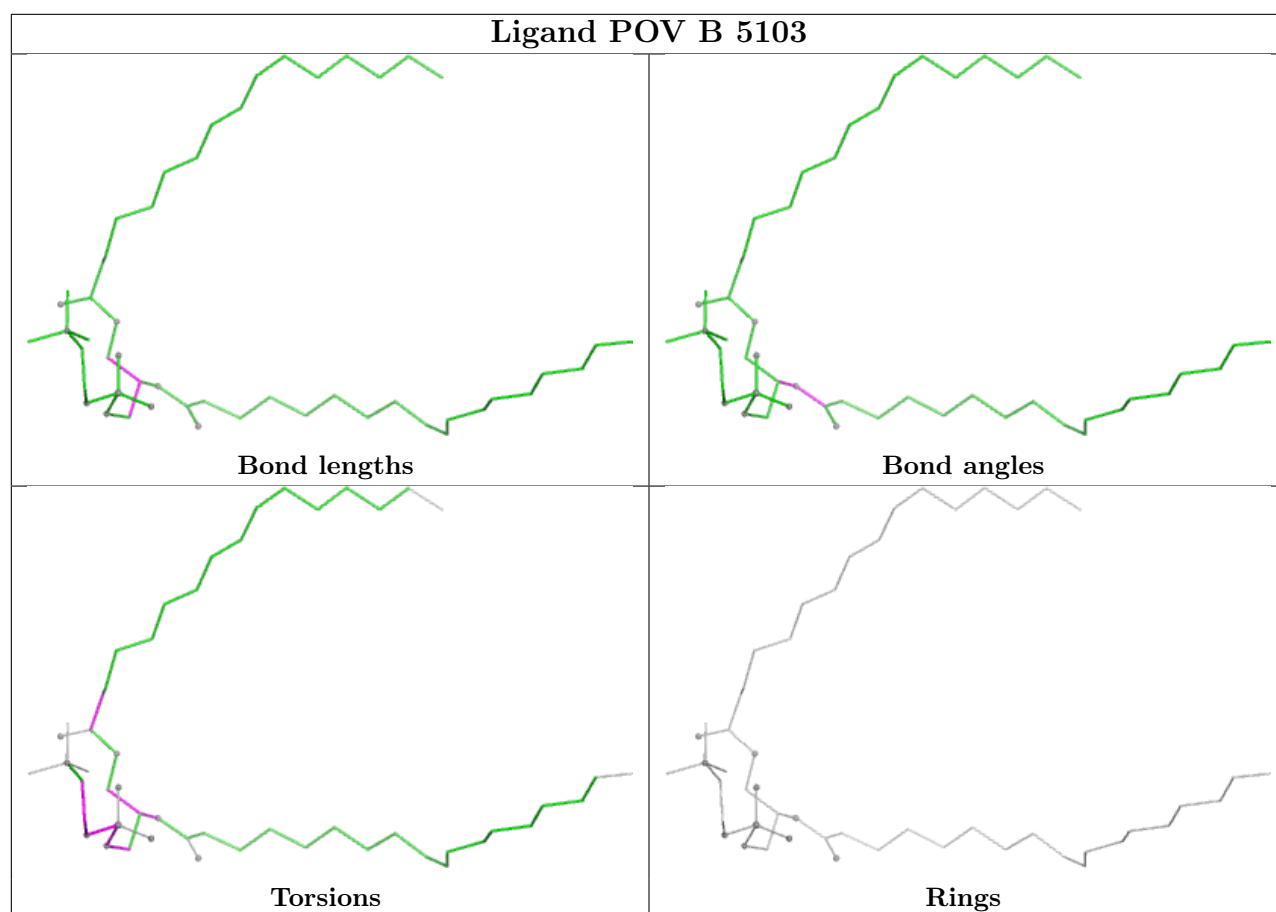
There are no ring outliers.

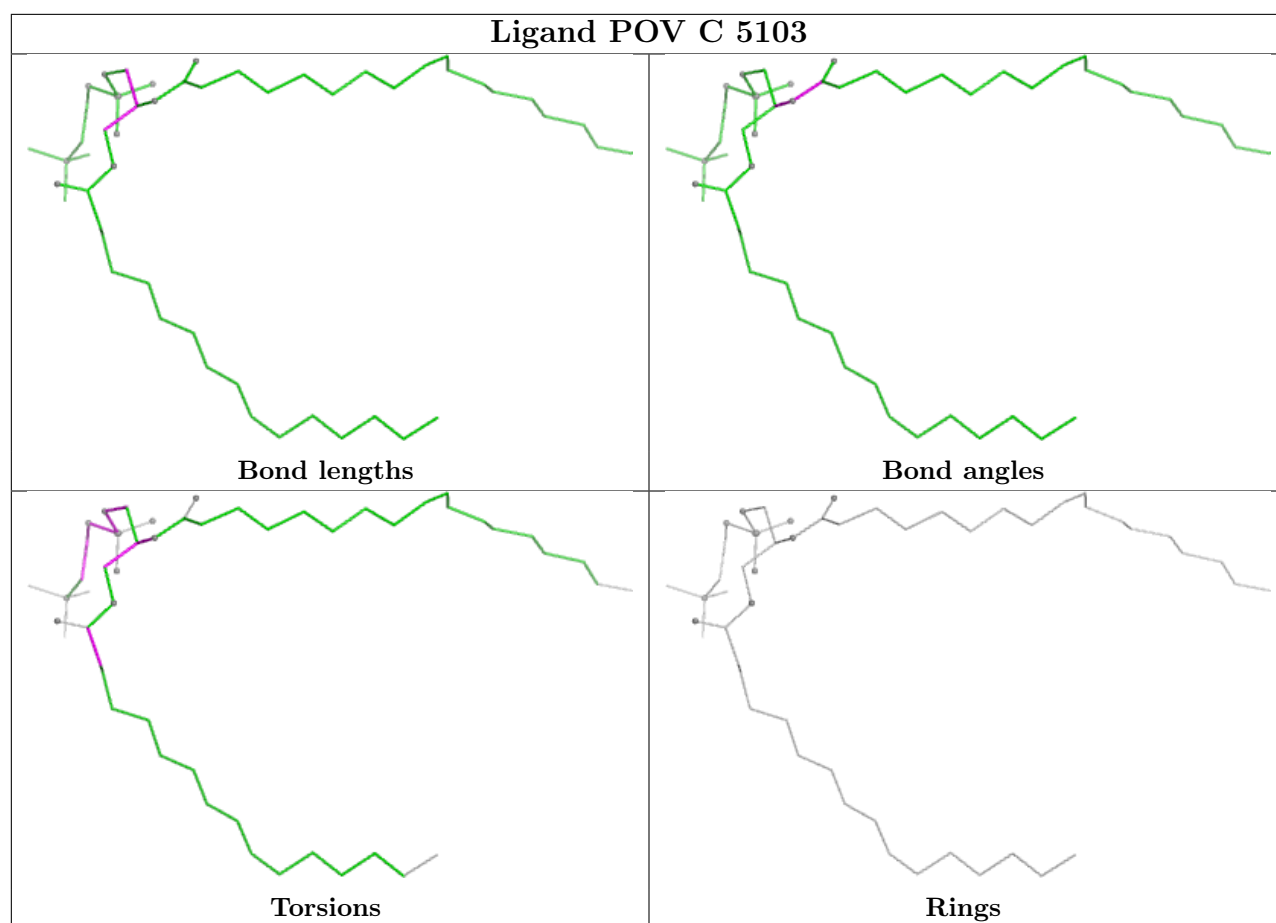
No monomer is involved in short contacts.

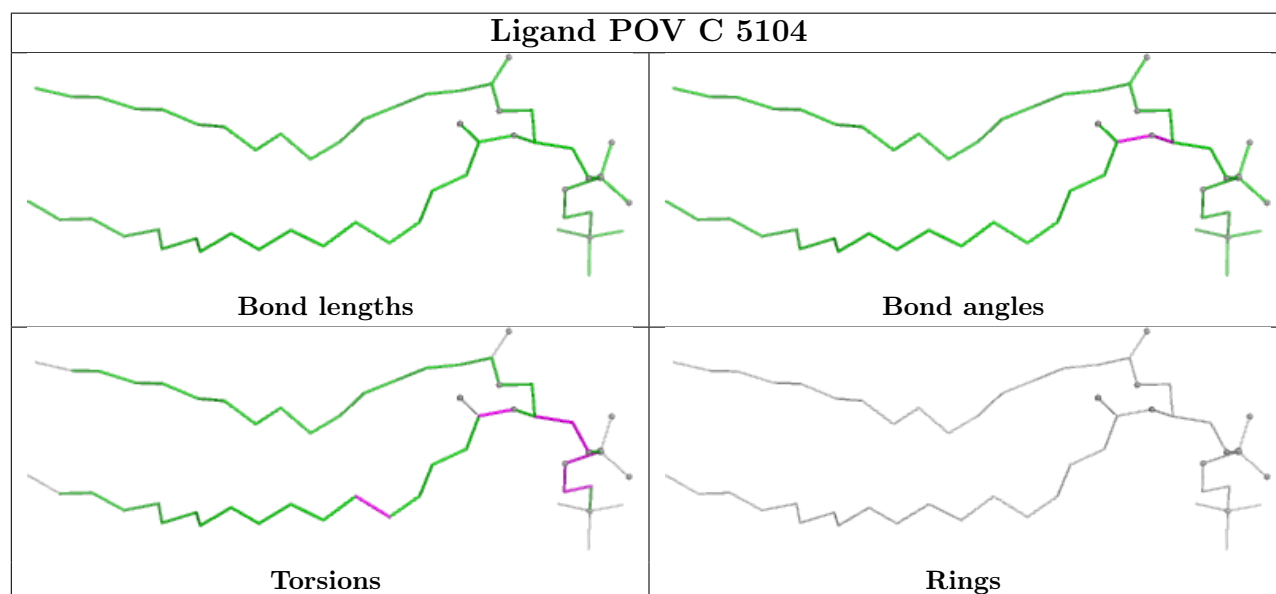
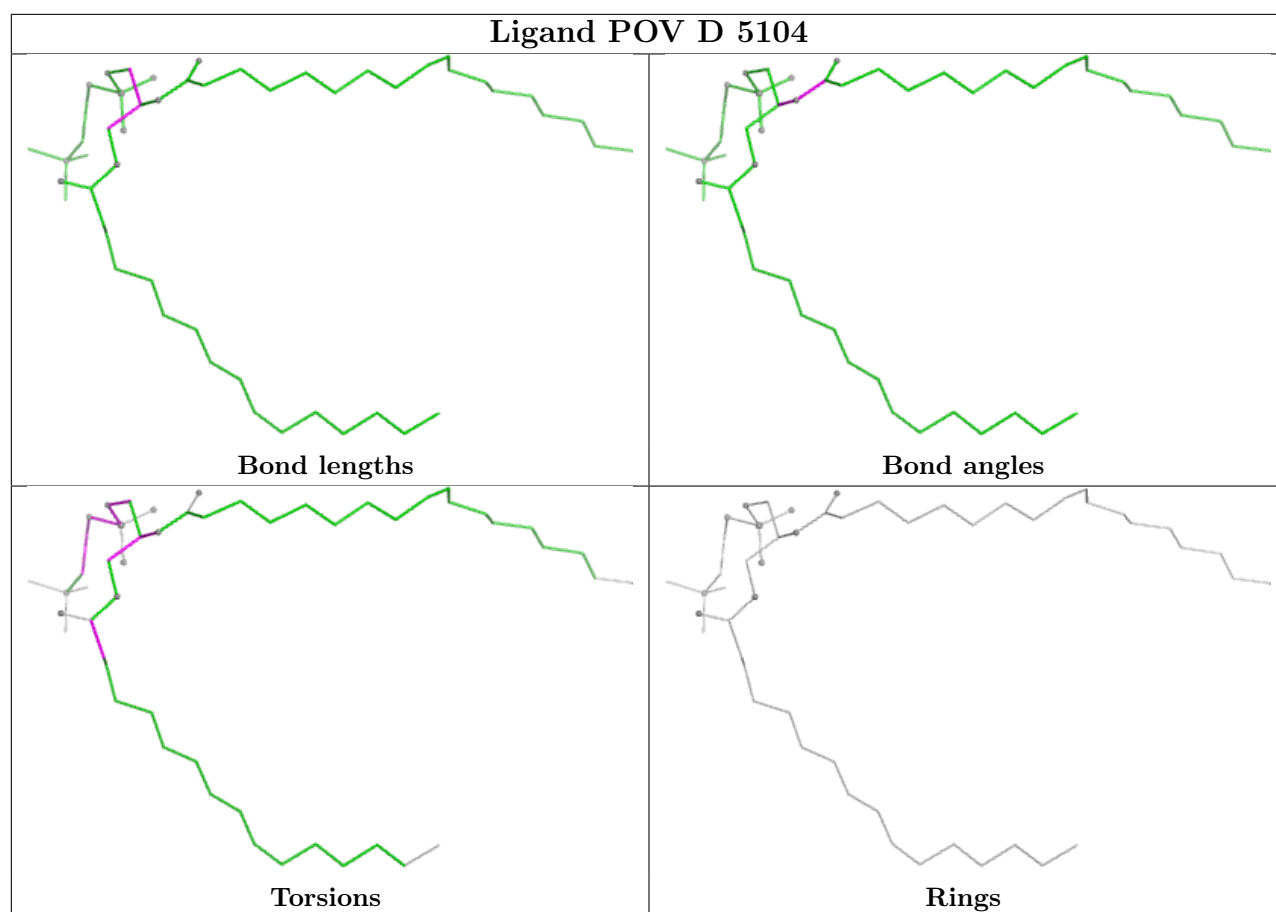
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

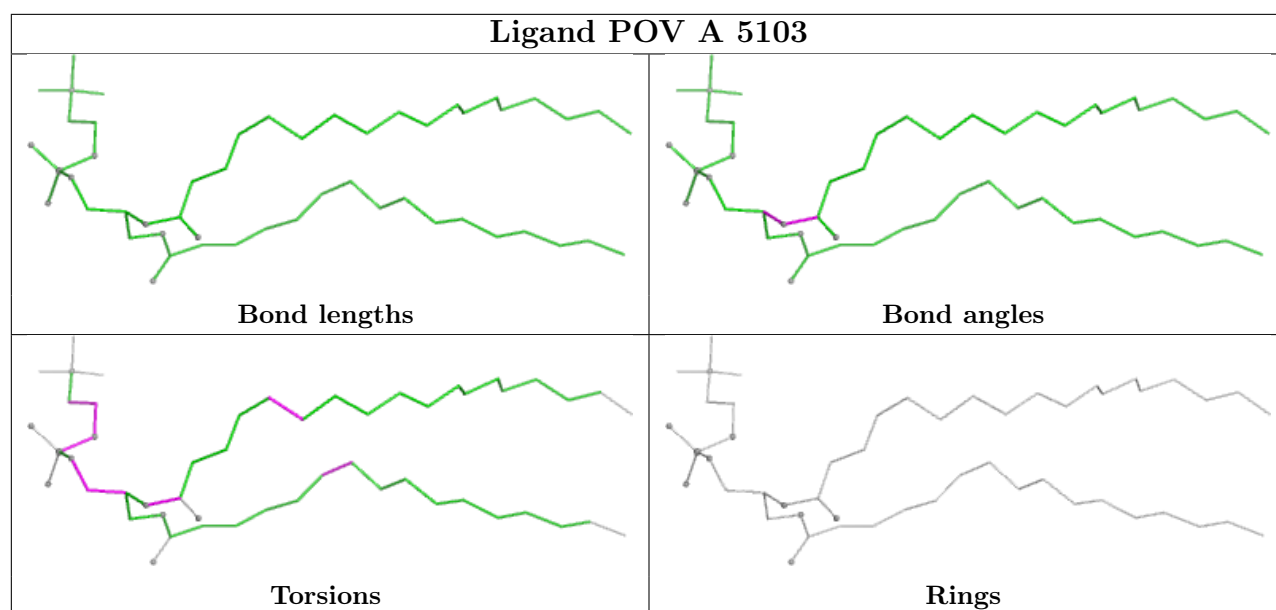












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

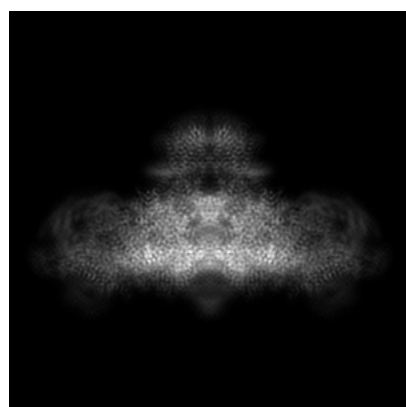
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-54509. These allow visual inspection of the internal detail of the map and identification of artifacts.

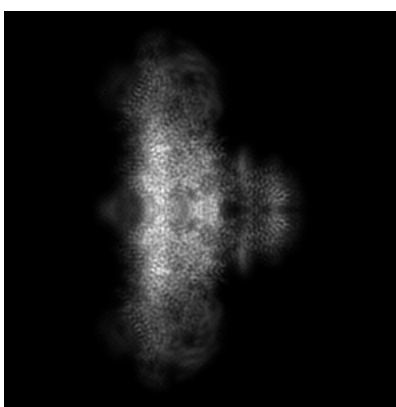
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

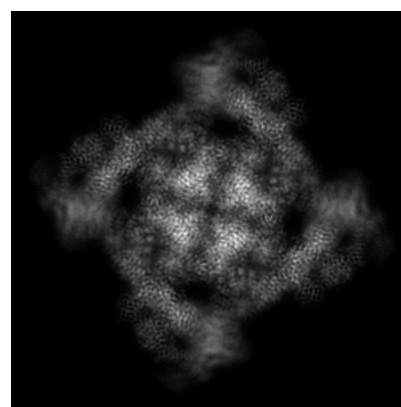
6.1.1 Primary map



X



Y

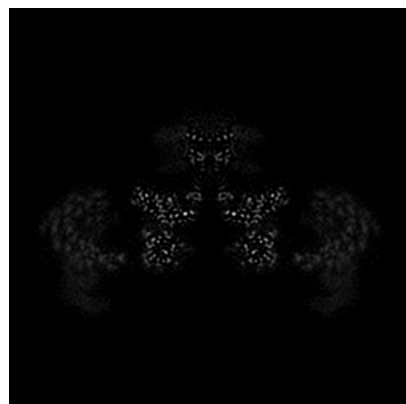


Z

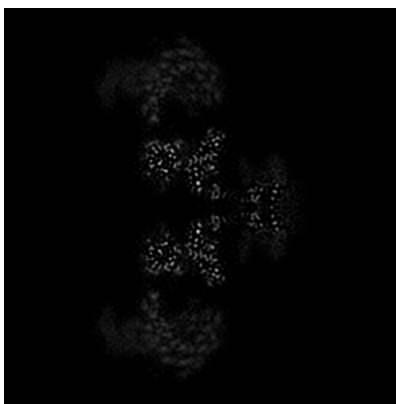
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

6.2.1 Primary map



X Index: 150



Y Index: 150



Z Index: 150

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

6.3 Largest variance slices [i](#)

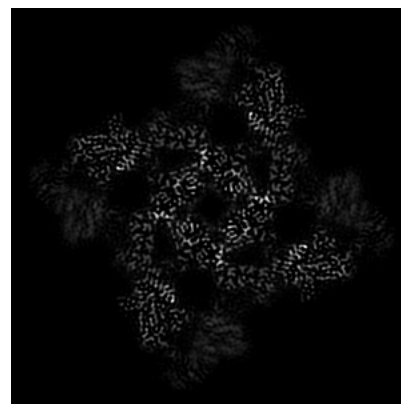
6.3.1 Primary map



X Index: 168



Y Index: 132

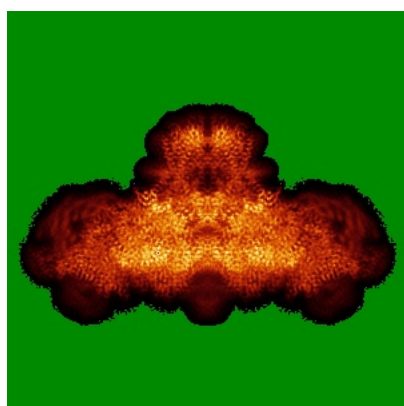


Z Index: 119

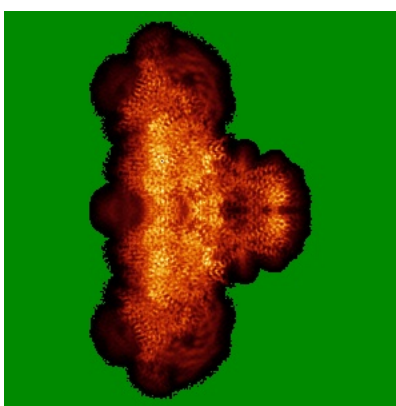
The images above show the largest variance slices of the map in three orthogonal directions.

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

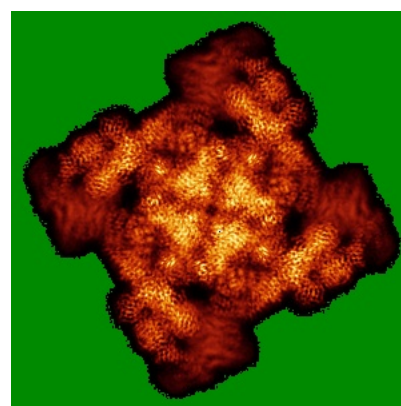
6.4.1 Primary map



X



Y



Z

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

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 1.14. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

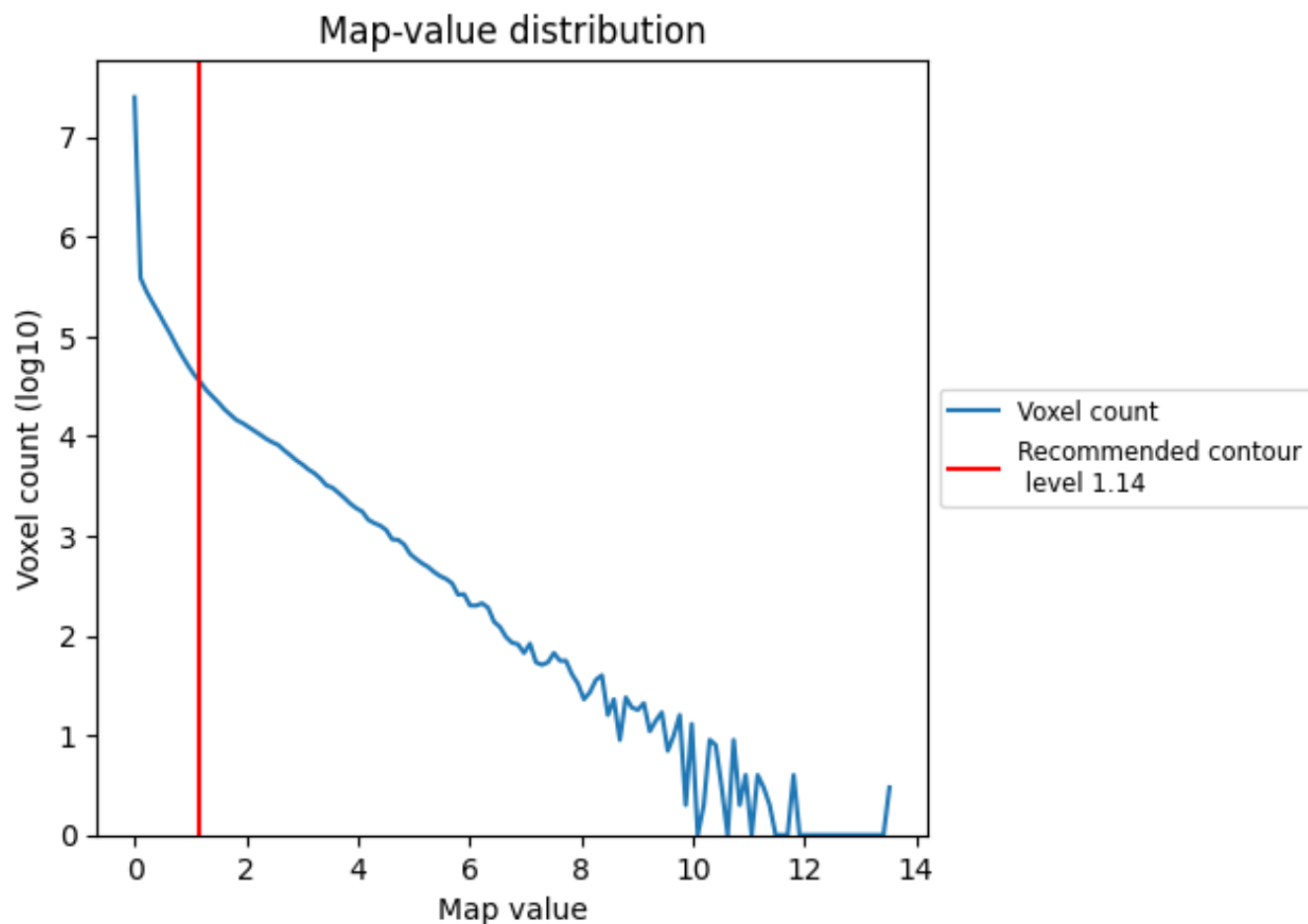
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

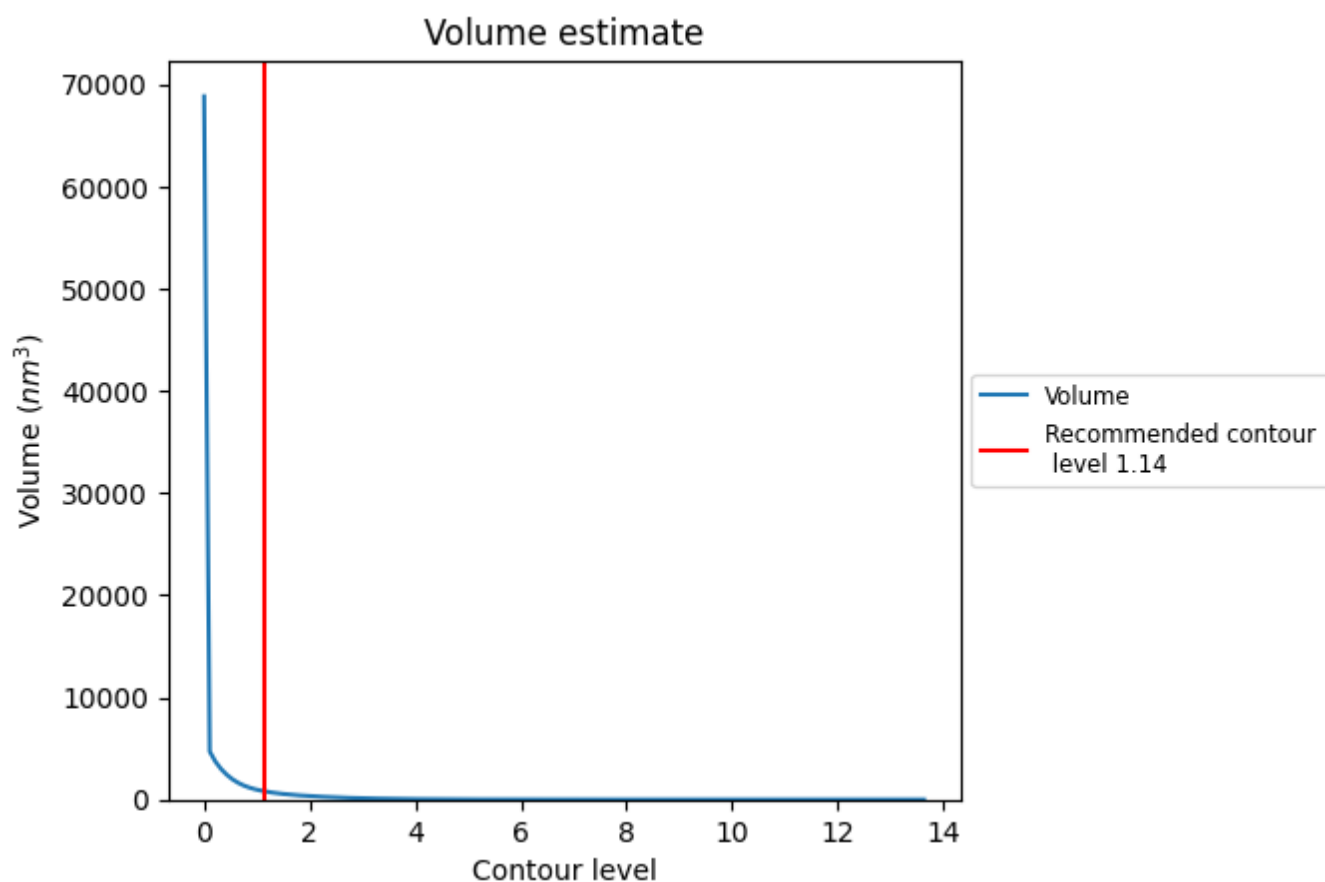
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

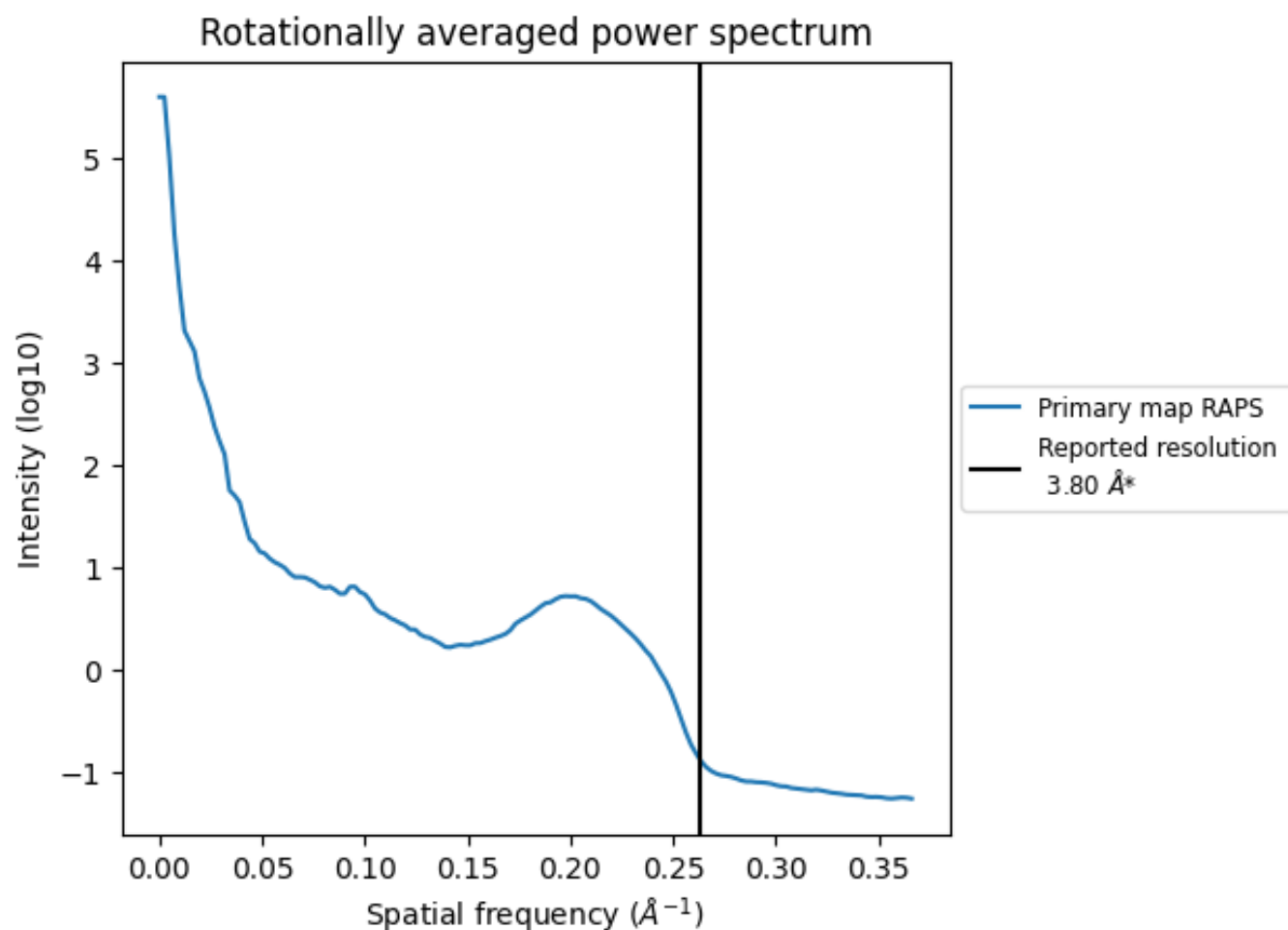
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 813 nm³; this corresponds to an approximate mass of 735 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 0.263 Å⁻¹

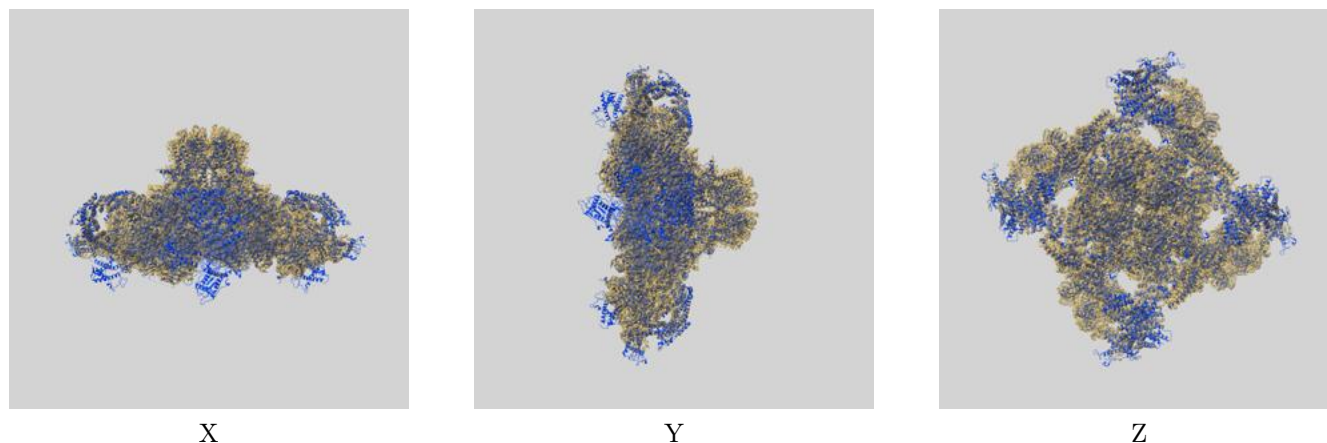
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

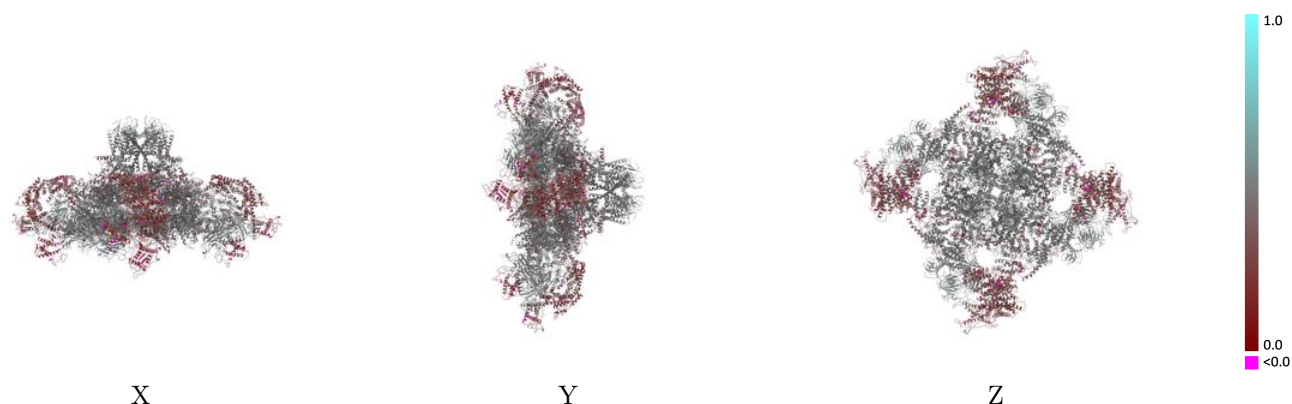
This section contains information regarding the fit between EMDB map EMD-54509 and PDB model 9S2S. Per-residue inclusion information can be found in section 3 on page 7.

9.1 Map-model overlay [i](#)



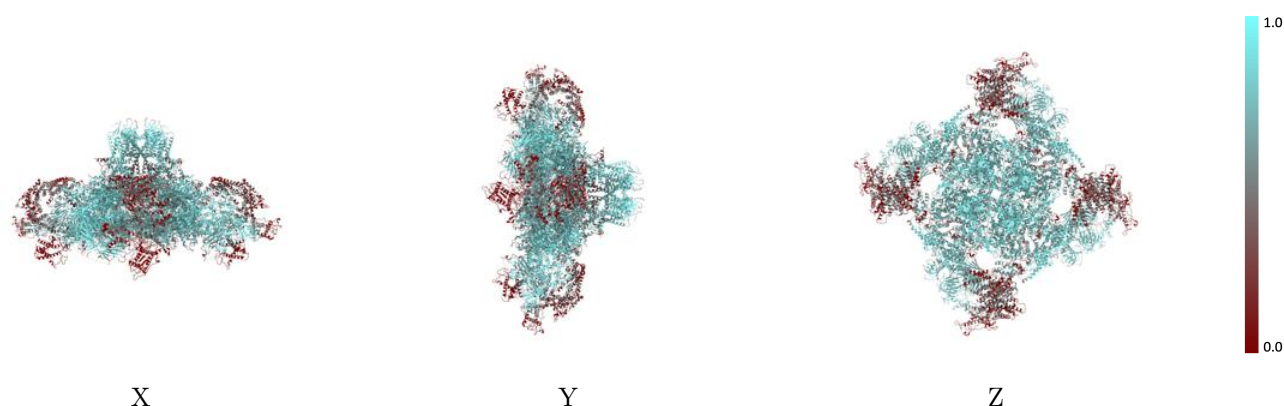
The images above show the 3D surface view of the map at the recommended contour level 1.14 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



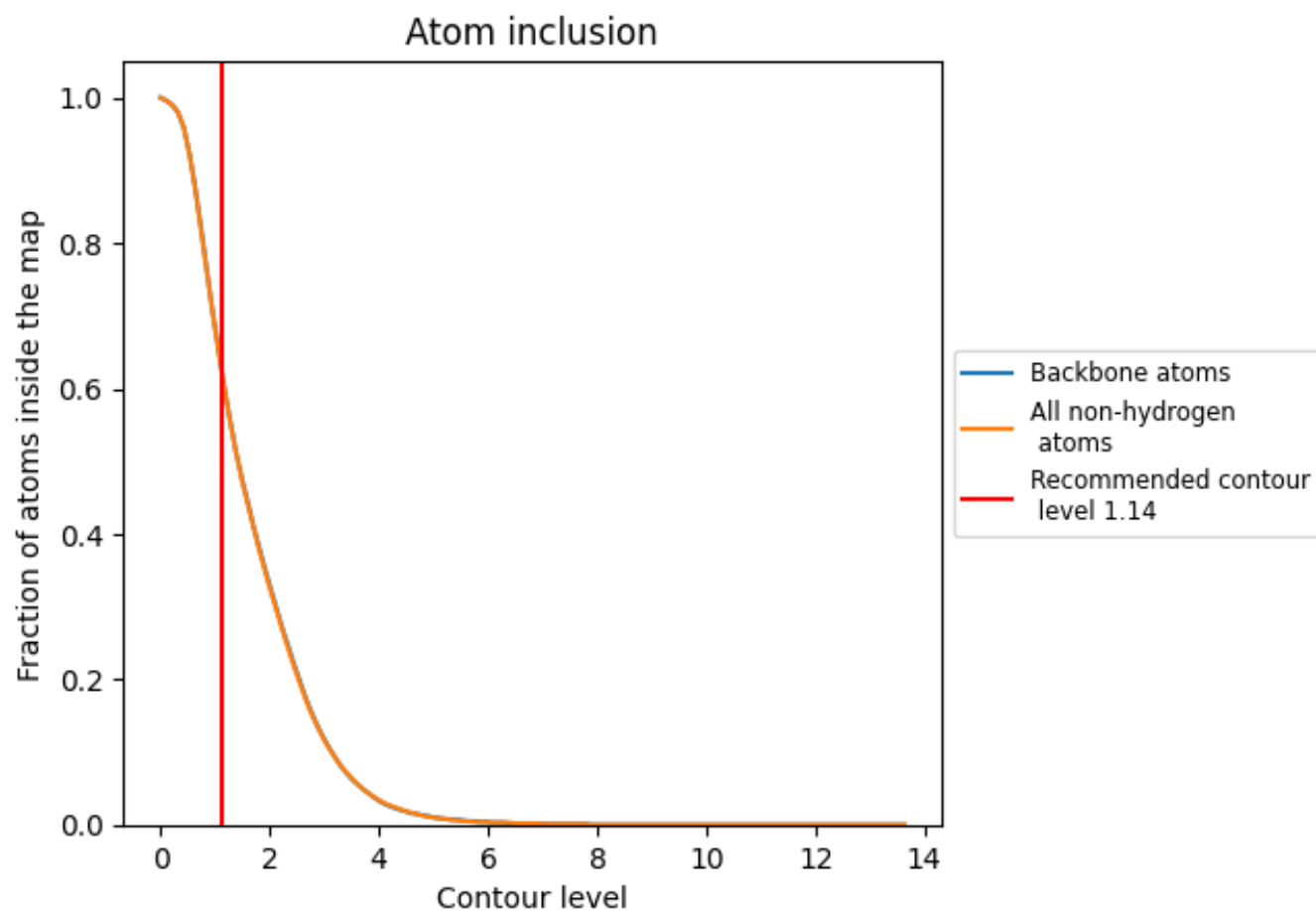
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (1.14).

9.4 Atom inclusion [i](#)



At the recommended contour level, 62% 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 (1.14) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6140	0.4100
A	0.6140	0.4090
B	0.6140	0.4090
C	0.6140	0.4090
D	0.6260	0.4060
E	0.7610	0.4790
F	0.7610	0.4800
G	0.7600	0.4810
H	0.7820	0.4760

1.0

0.0

<0.0