



Full wwPDB EM Validation Report ⓘ

Aug 16, 2025 – 03:24 PM EDT

PDB ID : 9BMF / pdb_00009bmf
EMDB ID : EMD-44697
Title : State-1(phi motor) of full-length human dynein-1 in 5mM ATPVi
Authors : Chai, P.; Zhang, K.
Deposited on : 2024-05-02
Resolution : 2.80 Å(reported)

This is a Full wwPDB EM Validation 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.dev126
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) : 2.45.1

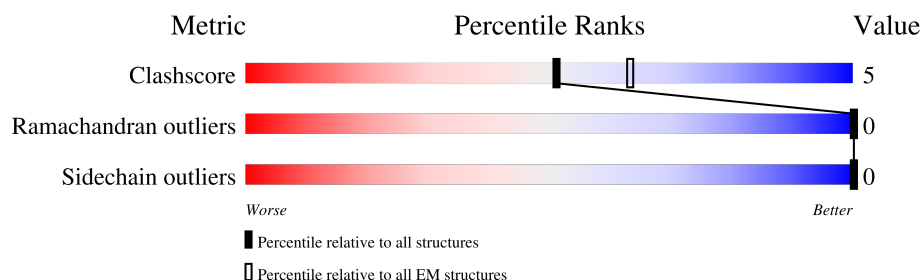
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.80 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)
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	4646	

2 Entry composition [i](#)

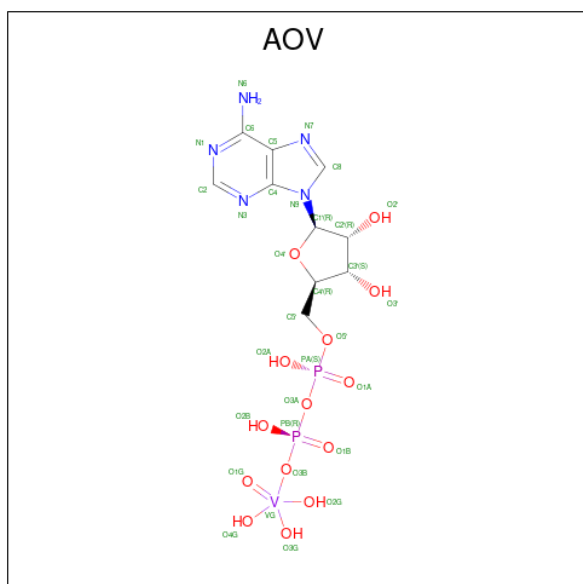
There are 5 unique types of molecules in this entry. The entry contains 23712 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Cytoplasmic dynein 1 heavy chain 1.

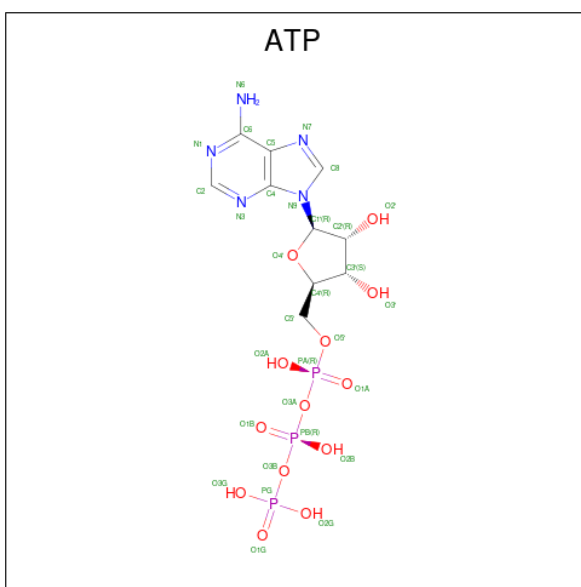
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	2937	23593	15028	4070	4378	117	0	0

- Molecule 2 is ADP ORTHOVANADATE (CCD ID: AOV) (formula: $C_{10}H_{17}N_5O_{14}P_2V$) (labeled as "Ligand of Interest" by depositor).



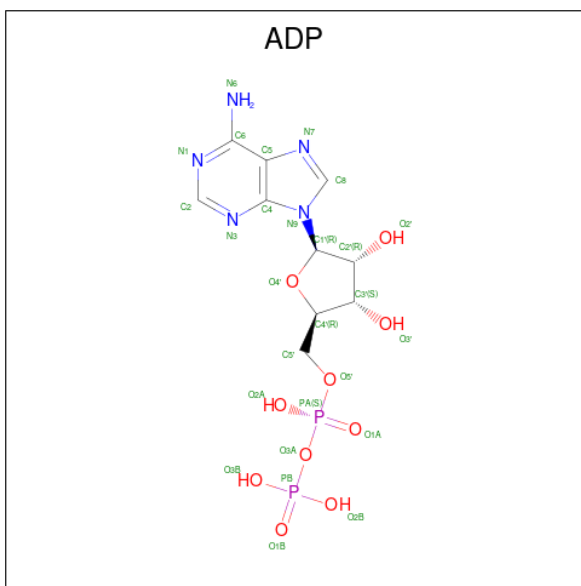
Mol	Chain	Residues	Atoms						AltConf
			Total	C	N	O	P	V	
2	A	1	32	10	5	14	2	1	0

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).



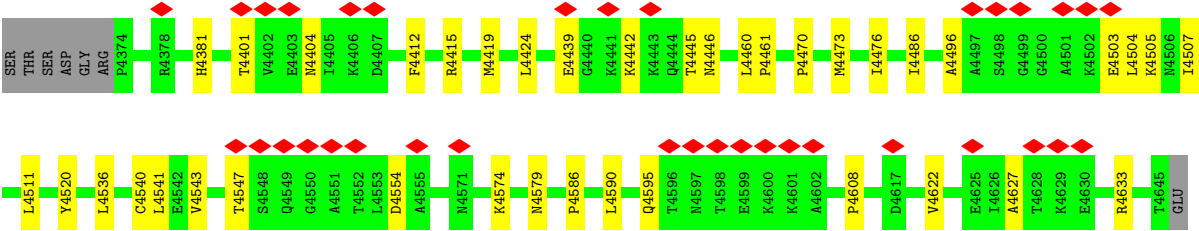
Mol	Chain	Residues	Atoms					AltConf
4	A	1	Total 27	C 10	N 5	O 10	P 2	0
4	A	1	Total 27	C 10	N 5	O 10	P 2	0

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
5	A	2	Total 2	Mg 2	0



A4215	A4216	D4217	A4227	R4230	I4251	G4254	D4257	F4260	F4270	R4271	E4281	K4287	V4288	D4289	G4290	H4291	P4297	D4298	W4308	L4312	N4326	K4342	M4346	Q4347	MET	LEU	GLU	ASP	GLU	ASP	GLU	R4168	K4171	R4178	R4195	K4203	K4204	L4212	THR	THR	ARG	THR	ASP					
M4043	C4044	D4050	A4051	S4052	L4058	Q4065	E4075	Q4079	V4088	R4092	M4095	L4096	K4097	N4098	V4099	W4105	L4106	L4116	Q4117	P4118	T4127	I4130	N4137	L4138	I4144	P4150	K4154	T4160	R4168	K4171	R4178	R4195	K4203	K4204	L4212	THR	THR	ARG	THR	ASP								
R3910	G3911	N3912	E3913	I3914	V3915	L3916	S3917	A3918	G3919	S3920	T3921	P3922	R3923	I3924	Q3925	G3926	E3930	E3933	K3934	V3935	V3936	R3937	K3945	D3946	L3947	Q3952	A3953	D3954	E3955	Q3956	V3970	E3976	E3977	T3978	P3979	A3980	I3983	R3989	L3990	M4004	V4009	L4013	L4027	P4037	L4042			
L3553	R3782	K3783	V3784	E3785	E3786	T3787	D3788	I3789	V3790	K3791	Q3792	E3793	V3794	E3795	Q3799	S3809	Y3825	Q3830	D3834	I3835	V3838	E3839	E3842	N3843	L3846	Q3709	E3726	L3731	L3732	R3743	L3750	Q3751	A3752	L3753	N3754	E3755	V3756	K3757	G3758	R3759	I3760	L3761	D3762	D3763	T3764	I3765	I3767	T3768
ARG	ASP	GLU	ALA	SER	ILE	ALA	ARG	TYR	LYS	E3449	E3450	Y3451	A3452	V3453	I3455	S3456	E3457	A3458	Q3459	A3460	I3461	K3462	D3464	L3465	A3466	E3469	A3470	K3471	V3472	N3473	R3474	K3480	S3481	K3486	E3487	E3494	N3498	S3510	A3517	Q3523	M3524	R3525	R3544	T3545	D3546	I3547		
ASN	TYR	ILE	VAL	ASN	ARG	ALA	ARG	SER	LYS	GLY	CYS	GLY	PRO	VAL	TRP	ALA	ILE	GLN	LEU	ASN	TYR	ALA	ASP	MET	ARG	GLU	VAL	ALA	ASN	PHE	SER	GLU	GLY	ILE	SER	ASP	ALA	ILE	ARG	GLY	LYS	MET	GLN	LYS	ASN	TYR		
GLN	GLU	ILE	GLN	GLU	GLN	LEU	HIS	LYS	GLN	GLY	VAL	ILE	ALA	ASP	LYS	GLN	SER	VAL	ASP	ILE	MET	ARG	GLU	VAL	ALA	VAL	ALA	ASN	PHE	SER	GLU	GLY	ILE	SER	ASP	ALA	ILE	ARG	GLY	LYS	MET	GLN	LYS	ASN	TYR			
V3148	F3149	R3164	G3165	G3166	T3172	H3182	K3209	E3210	D3213	Q3214	V3215	E3216	E3217	L3218	R3219	R3220	D3221	L3222	R3223	I3224	K3225	S3226	Q3227	E3228	L3229	E3230	V3231	K3232	N3233	A3234	A3235	A3236	N3237	D3238	K3239	L3240	K3241	K3242	MET	VAL	LYS	ASP	GLN	GLY	ALA	GLU	LYS	SER
L2976	L2980	M2994	N2998	V2999	D3001	S3002	E3006	N3014	V3017	L3020	M3043	S3046	E3049	F3054	Q3057	R3060	P3070	S3071	S3072	E3073	D3096	W3097	S3098	T3099	E3100	T3110	D3114	Y3125	V3129	Y3130	D3131	K3132	Q3135	P3136	P3137	R3140	GLU	LYS	LYS	VAL	VAL	MET	SER					
F2776	F2784	Y2792	I2793	Y2794	V2803	P2812	E2814	T2815	P2817	G2820	A2826	E2842	T2846	N2860	I2861	D2862	N2867	S2868	R2869	P2870	K2894	L2905	L2909	E2914	R2921	R2924	G2937	T2945	A2951	L2956	I2961	K2962	R2965	R2966	GLU	LYS	LYS	VAL	SER									
W2545	W2548	W2557	H2560	K2561	R2576	L2585	P2590	L2591	P2596	E2616	N2621	F2622	S2623	T2644	G2647	L2659	E2665	L2688	T2676	L2683	M2686	F2708	N2713	P2714	P2715	T2716	D2717	R2720	P2732	Y2738	F2751	R2757	E2767	S2542	GLU	LYS	LYS	VAL	SER									
ARG	ARG	LYS	GLY	LYS	GLU	ASP	GLU	GLU	GLU	ALA	S2410	A2420	W2450	V2433	I2446	L2449	L2452	R2453	S2457	D2478	F2479	I2483	E2484	R2488	R2492	I2498	L2499	L2502	G2503	G2504	D2505	S2506	R2507	L2508	K2509	W2510	E2513	A2529	E2538	S2542								



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	266214	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	3000	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	45000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	3.110	Depositor
Minimum map value	-1.492	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.060	Depositor
Recommended contour level	0.4	Depositor
Map size ($\text{\AA}$)	444.4032, 444.4032, 444.4032	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.1573, 1.1573, 1.1573	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: AOV, MG, ATP, ADP

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	0.09	0/24093	0.24	0/32651

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	23593	0	23658	249	0
2	A	32	0	12	3	0
3	A	31	0	12	1	0
4	A	54	0	24	0	0
5	A	2	0	0	0	0
All	All	23712	0	23706	249	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 5.

All (249) 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:A:1490:TRP:HH2	1:A:1537:TRP:HD1	1.36	0.72
1:A:2507:ARG:HE	1:A:2509:LYS:HE2	1.58	0.69
1:A:1564:GLU:HG3	1:A:1567:ARG:HH21	1.56	0.68
1:A:4505:LYS:NZ	1:A:4554:ASP:O	2.24	0.68
1:A:2239:LYS:HZ2	1:A:2243:ARG:HE	1.41	0.67
1:A:3838:ASN:ND2	1:A:3842:GLU:HB2	2.10	0.66
1:A:3638:VAL:HG12	1:A:3681:THR:HB	1.78	0.66
1:A:1558:LYS:HG3	1:A:1565:THR:HG21	1.78	0.66
1:A:2457:SER:HB2	1:A:2732:PRO:HB3	1.79	0.64
1:A:2047:GLN:HA	1:A:2070:VAL:HG21	1.78	0.64
1:A:1797:LEU:HD21	1:A:2060:ARG:HD3	1.80	0.63
1:A:3560:LEU:HD11	1:A:3743:ARG:HH22	1.63	0.63
1:A:2149:LEU:HD11	1:A:2157:LEU:HD13	1.80	0.63
1:A:4168:ARG:NH2	1:A:4217:ASP:OD1	2.32	0.63
1:A:1574:GLU:OE2	1:A:1603:ARG:NH2	2.31	0.63
1:A:1835:SER:OG	1:A:1837:GLU:OE1	2.17	0.63
1:A:3846:LEU:HD22	1:A:3855:ARG:HG2	1.81	0.63
1:A:2905:LEU:HD11	1:A:3652:GLU:HB3	1.81	0.62
1:A:4150:PRO:O	1:A:4195:ARG:NH2	2.32	0.62
1:A:1623:ARG:NH2	1:A:1634:ASP:OD1	2.33	0.61
1:A:2188:GLU:OE1	1:A:2243:ARG:NH2	2.33	0.61
1:A:3474:ARG:HH22	1:A:3768:THR:HG22	1.66	0.61
1:A:1537:TRP:HE3	1:A:1601:LEU:HD21	1.65	0.61
1:A:1537:TRP:CE3	1:A:1601:LEU:HD21	2.35	0.61
1:A:2312:VAL:HG13	1:A:2355:THR:HG21	1.83	0.60
1:A:1855:GLN:OE1	1:A:1867:ASN:ND2	2.35	0.60
1:A:2211:TYR:O	1:A:2214:THR:OG1	2.20	0.59
1:A:2433:VAL:HG22	1:A:2498:ILE:HD11	1.84	0.59
1:A:2717:ASP:O	1:A:4446:ASN:ND2	2.32	0.59
1:A:3838:ASN:HD22	1:A:3842:GLU:HB2	1.68	0.58
1:A:3172:THR:HG21	1:A:3694:SER:HB3	1.84	0.58
1:A:2665:GLU:HB3	1:A:2668:LEU:HD12	1.84	0.58
1:A:4095:MET:HE3	1:A:4097:LYS:HE2	1.85	0.58
1:A:4043:MET:HB3	1:A:4051:ALA:HB3	1.85	0.58
1:A:4496:ALA:HB2	1:A:4504:LEU:HD21	1.85	0.57
1:A:4097:LYS:HA	1:A:4127:THR:HB	1.86	0.57
1:A:2621:ASN:OD1	1:A:3014:ASN:ND2	2.37	0.57
1:A:3597:THR:HG23	1:A:3634:LEU:HD21	1.84	0.57
1:A:3517:ALA:HB1	1:A:3525:ARG:HG2	1.87	0.57
1:A:3510:SER:HB3	1:A:3553:LEU:HD21	1.86	0.56
1:A:1490:TRP:HH2	1:A:1537:TRP:CD1	2.20	0.56
1:A:2069:ILE:HB	1:A:2137:LEU:HD21	1.88	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4088:VAL:HG11	1:A:4116:LEU:HD21	1.87	0.56
1:A:3130:TYR:CZ	1:A:3132:LYS:HB2	2.41	0.55
1:A:2222:MET:HE1	1:A:2234:TRP:CD1	2.41	0.55
1:A:1490:TRP:CH2	1:A:1537:TRP:HD1	2.21	0.55
1:A:2623:SER:OG	1:A:3006:GLU:OE1	2.24	0.55
1:A:3229:LEU:HD12	1:A:3465:LEU:HD13	1.89	0.55
1:A:3708:LEU:HD23	1:A:3809:SER:HA	1.88	0.55
1:A:3581:LYS:HE3	1:A:3582:ARG:HG3	1.89	0.55
1:A:2039:LEU:HD12	1:A:4254:GLY:HA2	1.88	0.54
1:A:2290:SER:HB2	1:A:2295:LEU:HG	1.89	0.54
1:A:3935:VAL:HG13	1:A:3947:LEU:HD23	1.90	0.54
1:A:2488:ARG:NH2	1:A:2542:SER:O	2.40	0.54
1:A:2686:MET:HE3	1:A:2708:PHE:CZ	2.43	0.54
1:A:2172:ARG:NH1	1:A:2205:GLU:OE1	2.41	0.54
1:A:3970:VAL:HB	1:A:3989:ARG:HD3	1.89	0.53
1:A:4168:ARG:HA	1:A:4171:LYS:HE2	1.91	0.53
1:A:2179:ARG:NH2	1:A:2195:ASP:OD1	2.29	0.53
1:A:3114:ASP:O	1:A:3140:ARG:NH2	2.41	0.53
1:A:3129:VAL:HG21	1:A:3149:PHE:HB2	1.90	0.53
1:A:2257:LYS:NZ	1:A:2308:ASP:OD2	2.40	0.53
1:A:3544:ARG:HH21	1:A:3547:ILE:HG21	1.73	0.53
1:A:3750:LEU:O	1:A:3754:ASN:ND2	2.41	0.53
1:A:4470:PRO:HG2	1:A:4473:MET:HE3	1.91	0.53
1:A:1836:PHE:HA	1:A:1839:LEU:HB2	1.91	0.52
1:A:4424:LEU:HD13	1:A:4486:ILE:HG13	1.91	0.52
1:A:3846:LEU:HD21	1:A:3855:ARG:HA	1.92	0.52
1:A:2909:LEU:HD11	1:A:2945:THR:HG21	1.92	0.52
1:A:2826:ALA:HB2	1:A:2867:MET:HE1	1.91	0.52
1:A:2239:LYS:NZ	1:A:2243:ARG:HE	2.07	0.52
1:A:1671:SER:HB2	1:A:1693:THR:HG23	1.92	0.52
1:A:3135:GLN:O	1:A:3137:PRO:HD3	2.10	0.52
1:A:4543:VAL:HG21	1:A:4622:VAL:HG12	1.92	0.51
1:A:2181:GLU:HG3	1:A:2244:LEU:HB2	1.93	0.51
1:A:2091:ARG:NH1	2:A:4701:AOV:O1G	2.44	0.51
1:A:2221:MET:HG3	1:A:2343:PHE:HB2	1.92	0.51
1:A:2792:TYR:OH	1:A:2842:GLU:OE1	2.27	0.51
1:A:2091:ARG:HG3	2:A:4701:AOV:H4'	1.93	0.50
1:A:2297:LYS:O	1:A:2338:ASN:ND2	2.38	0.50
1:A:4415:ARG:O	1:A:4419:MET:HG3	2.11	0.50
1:A:1912:LYS:HE2	1:A:2017:THR:HG23	1.93	0.50
1:A:2042:THR:HG21	1:A:4257:ASP:HB2	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4326:ASN:ND2	1:A:4579:ASN:O	2.44	0.50
1:A:3100:GLU:OE2	1:A:3130:TYR:OH	2.27	0.50
1:A:1687:LYS:HG3	1:A:1715:LYS:HD2	1.94	0.50
1:A:2869:ARG:HB3	1:A:2870:PRO:HD3	1.94	0.50
1:A:1825:LEU:HA	1:A:1830:ILE:HD13	1.93	0.49
1:A:2914:GLU:OE2	1:A:3098:SER:OG	2.26	0.49
1:A:3763:ASP:OD2	1:A:3765:THR:OG1	2.22	0.49
1:A:4160:THR:HG23	1:A:4212:LEU:HD21	1.95	0.49
1:A:3914:ILE:O	1:A:3937:ARG:NH1	2.45	0.49
1:A:4096:LEU:HD13	1:A:4105:TRP:HH2	1.77	0.49
1:A:4401:THR:H	1:A:4404:ASN:HB2	1.75	0.49
1:A:3017:VAL:HB	1:A:3020:LEU:HB2	1.94	0.49
1:A:2776:PHE:HZ	1:A:2846:THR:HG23	1.78	0.49
1:A:3910:ARG:NH1	1:A:3913:GLU:OE2	2.45	0.49
1:A:4215:ALA:HA	1:A:4251:ILE:HD13	1.94	0.49
1:A:2313:GLU:OE2	1:A:2352:THR:OG1	2.31	0.48
1:A:2449:LEU:HA	1:A:2453:ARG:HH21	1.77	0.48
1:A:3732:LEU:HD12	1:A:3791:MET:HE1	1.94	0.48
1:A:3843:ASN:HD21	1:A:3858:ILE:HG22	1.78	0.48
1:A:1623:ARG:NH1	1:A:1632:VAL:O	2.45	0.48
1:A:1477:LEU:HB3	1:A:1485:ARG:HB3	1.95	0.48
1:A:3752:ALA:O	1:A:3756:VAL:HG23	2.13	0.48
1:A:4037:PRO:HB2	1:A:4118:PRO:HG2	1.94	0.48
1:A:2510:MET:HA	1:A:2513:GLU:HB2	1.95	0.48
1:A:3839:VAL:O	1:A:3843:ASN:HB2	2.13	0.48
1:A:1882:THR:HB	1:A:2045:ASP:HB2	1.96	0.47
1:A:4227:ALA:HA	1:A:4230:ARG:HD3	1.96	0.47
1:A:4460:LEU:HD12	1:A:4461:PRO:HD2	1.96	0.47
1:A:1839:LEU:O	1:A:1843:ARG:NH1	2.47	0.47
1:A:3471:LYS:HE2	1:A:3761:LEU:HD23	1.94	0.47
1:A:2498:ILE:HG23	1:A:2502:LEU:HD12	1.96	0.47
1:A:2557:VAL:O	1:A:2757:ARG:NH2	2.47	0.47
1:A:1508:LYS:HG2	1:A:1513:TYR:CZ	2.49	0.47
1:A:1946:VAL:HG22	1:A:2006:VAL:HG21	1.95	0.47
1:A:1985:HIS:CD2	1:A:2010:PRO:HB3	2.50	0.47
1:A:2131:LEU:HD12	1:A:2132:PRO:HD2	1.97	0.47
1:A:2784:PHE:HB2	1:A:2794:TYR:HE2	1.80	0.47
1:A:3209:LYS:HB2	1:A:3209:LYS:HE2	1.77	0.47
1:A:2221:MET:SD	1:A:2348:LEU:HD11	2.54	0.46
1:A:3795:GLU:O	1:A:3799:GLN:HG2	2.15	0.46
1:A:4540:CYS:HB2	1:A:4595:GLN:HG2	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:2320:ASP:OD1	1:A:2321:ASP:N	2.43	0.46
1:A:4137:ASN:OD1	1:A:4138:LEU:N	2.49	0.46
1:A:3057:GLN:OE1	1:A:3060:ARG:NH1	2.49	0.46
1:A:2139:GLN:HG3	1:A:2170:TYR:CE1	2.50	0.46
1:A:2446:ILE:HG22	1:A:2505:ASP:HB2	1.98	0.46
1:A:3182:HIS:NE2	1:A:3582:ARG:O	2.48	0.46
1:A:4050:ASP:OD2	1:A:4052:SER:OG	2.33	0.46
1:A:2816:LEU:HD11	1:A:2820:GLY:HA3	1.97	0.46
1:A:3046:SER:HB3	1:A:3049:GLU:HG3	1.96	0.46
1:A:3933:GLU:HG2	1:A:3937:ARG:HE	1.81	0.46
1:A:1541:GLN:O	1:A:1545:VAL:HG23	2.15	0.45
1:A:2164:VAL:HG23	1:A:4536:LEU:HD12	1.98	0.45
1:A:4503:GLU:O	1:A:4507:ILE:HG23	2.15	0.45
1:A:3825:TYR:CE1	1:A:3875:MET:HG2	2.51	0.45
1:A:1782:LEU:HD13	1:A:1822:THR:HB	1.98	0.45
1:A:2538:GLU:HB3	1:A:2548:TRP:CE2	2.51	0.45
1:A:3839:VAL:HG21	1:A:3863:LEU:HA	1.99	0.45
1:A:4297:PRO:HG3	1:A:4308:TRP:CG	2.51	0.45
1:A:1619:LEU:HD11	1:A:1638:LEU:HG	1.98	0.45
1:A:2951:ALA:HB1	1:A:2956:LEU:HB2	1.98	0.45
1:A:3523:GLN:CD	1:A:3523:GLN:H	2.25	0.45
1:A:4178:ARG:NH2	1:A:4297:PRO:O	2.49	0.45
1:A:4574:LYS:HB3	1:A:4627:ALA:HB2	1.98	0.45
1:A:3110:THR:O	1:A:3140:ARG:NH1	2.50	0.45
1:A:3761:LEU:HA	1:A:3767:ILE:HD11	1.97	0.45
1:A:1666:LEU:HD23	1:A:1673:VAL:HA	1.99	0.45
1:A:1850:GLN:HB3	1:A:1856:GLN:HG2	1.99	0.45
1:A:2683:ILE:HA	1:A:2686:MET:HE2	1.99	0.45
1:A:2358:ARG:NH2	2:A:4701:AOV:O3G	2.48	0.45
1:A:2548:TRP:CD1	1:A:2576:ARG:HG2	2.51	0.44
1:A:1859:ILE:HD11	1:A:1868:TYR:HD1	1.82	0.44
1:A:2585:LEU:HG	1:A:2591:LEU:HD21	1.99	0.44
1:A:2921:ARG:O	1:A:2924:ARG:HG2	2.17	0.44
1:A:3731:LEU:HD11	1:A:3790:VAL:HG12	1.98	0.44
1:A:2816:LEU:HD12	1:A:2817:PRO:HD2	1.99	0.44
1:A:2644:THR:OG1	1:A:2647:GLY:O	2.28	0.44
1:A:2751:PHE:HB3	1:A:2803:VAL:HG11	1.98	0.44
1:A:3825:TYR:OH	1:A:3879:ASP:OD2	2.28	0.44
1:A:1563:VAL:O	1:A:1567:ARG:HG3	2.17	0.44
1:A:4099:VAL:HB	1:A:4106:LEU:HD21	2.00	0.44
1:A:4009:VAL:HG13	1:A:4013:LEU:HD12	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:2509:LYS:HE3	1:A:2510:MET:HE3	2.00	0.44
1:A:4381:HIS:CD2	1:A:4439:GLU:HG3	2.53	0.44
1:A:2109:GLN:O	1:A:2113:ARG:HG3	2.18	0.43
1:A:2446:ILE:HD11	1:A:2714:PRO:HB3	1.99	0.43
1:A:1487:ILE:HD12	1:A:1537:TRP:NE1	2.33	0.43
1:A:2046:ARG:HH21	1:A:2093:LEU:HD13	1.83	0.43
1:A:2713:ASN:HB2	1:A:2720:ARG:HE	1.83	0.43
1:A:4154:LYS:HD2	1:A:4312:LEU:HB2	1.99	0.43
1:A:2812:PRO:HG2	1:A:2813:LEU:HD12	2.00	0.43
1:A:4547:THR:HA	1:A:4586:PRO:HG2	2.00	0.43
1:A:3990:LEU:HA	1:A:4004:MET:HG2	1.99	0.43
1:A:1601:LEU:HA	1:A:1601:LEU:HD23	1.81	0.43
1:A:4541:LEU:HD11	1:A:4590:LEU:HB3	2.00	0.43
1:A:2063:GLU:O	1:A:2067:ASN:ND2	2.50	0.43
1:A:4260:PHE:CE2	1:A:4608:PRO:HB3	2.54	0.43
1:A:2374:ILE:HD13	1:A:2452:LEU:HD21	2.01	0.43
1:A:4511:LEU:HD23	1:A:4511:LEU:HA	1.88	0.43
1:A:2324:LEU:HD21	1:A:2332:ARG:HH11	1.84	0.43
1:A:2616:GLU:HG3	1:A:2659:LEU:HD12	2.00	0.43
1:A:2894:LYS:HE3	1:A:2894:LYS:HB2	1.90	0.43
1:A:3096:ASP:OD1	1:A:3097:TRP:N	2.52	0.43
1:A:4412:PHE:CZ	1:A:4520:TYR:HB2	2.54	0.43
1:A:2087:ASP:O	1:A:2148:LYS:NZ	2.52	0.42
1:A:2190:TYR:O	1:A:2377:ASN:ND2	2.38	0.42
1:A:3232:LYS:HA	1:A:3232:LYS:HD3	1.76	0.42
1:A:4065:GLN:HB3	1:A:4092:ARG:HD2	2.00	0.42
1:A:4271:ARG:HD3	1:A:4633:ARG:NH1	2.34	0.42
1:A:3892:LEU:HD13	1:A:3983:ILE:HG21	2.01	0.42
1:A:3099:THR:HG23	1:A:3148:VAL:HG11	2.02	0.42
1:A:2596:PRO:HB2	1:A:2738:TYR:CZ	2.54	0.42
1:A:4342:LYS:O	1:A:4346:MET:HG2	2.19	0.42
1:A:1907:PRO:HD2	1:A:2042:THR:HA	2.02	0.42
1:A:2962:LYS:HA	1:A:2962:LYS:HD3	1.92	0.42
1:A:3872:ALA:HA	1:A:3875:MET:HE2	2.00	0.42
1:A:3873:ARG:HD3	1:A:3873:ARG:HA	1.84	0.42
1:A:2306:ASP:OD2	1:A:2676:THR:OG1	2.36	0.42
1:A:3916:LEU:HD12	1:A:3933:GLU:HG3	2.02	0.42
1:A:2560:HIS:CD2	1:A:2561:LYS:HG3	2.55	0.41
1:A:3783:LYS:O	1:A:3786:GLU:HG2	2.20	0.41
1:A:1555:ALA:HA	1:A:1558:LYS:NZ	2.35	0.41
1:A:3830:GLN:NE2	1:A:3834:ASP:OD1	2.48	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4042:LEU:HD12	1:A:4144:ILE:HG12	2.02	0.41
1:A:2382:LEU:HD23	1:A:2420:ALA:HB2	2.01	0.41
1:A:1661:VAL:HG22	1:A:1676:ILE:HD12	2.02	0.41
1:A:2976:LEU:HD23	1:A:2976:LEU:HA	1.95	0.41
1:A:4442:LYS:HE3	1:A:4442:LYS:HB2	1.88	0.41
1:A:1932:CYS:O	1:A:1962:ARG:NH1	2.52	0.41
1:A:2224:GLY:O	1:A:2346:GLN:HA	2.20	0.41
1:A:2492:ARG:HG2	1:A:2545:TRP:NE1	2.35	0.41
1:A:4044:CYS:HB3	1:A:4130:ILE:HG12	2.02	0.41
1:A:2007:LYS:HE3	1:A:2007:LYS:HB3	1.73	0.41
1:A:2285:ARG:NH1	1:A:2331:GLU:OE1	2.26	0.41
1:A:2994:MET:HE2	1:A:2999:VAL:HG22	2.03	0.41
1:A:4075:GLU:O	1:A:4079:GLN:HG3	2.20	0.41
1:A:4476:ILE:HD12	1:A:4476:ILE:H	1.85	0.41
1:A:2134:GLN:HE21	1:A:2165:PHE:HB3	1.86	0.41
1:A:2937:GLY:C	1:A:3070:PRO:HD3	2.45	0.41
1:A:2980:LEU:HB3	1:A:3054:PHE:HZ	1.86	0.41
1:A:3835:ILE:HG12	1:A:3870:ARG:HD2	2.02	0.41
1:A:4203:LYS:NZ	1:A:4257:ASP:OD1	2.46	0.41
1:A:1594:ILE:HB	1:A:1597:VAL:HB	2.02	0.41
1:A:1623:ARG:HD3	1:A:1630:TYR:HA	2.02	0.41
1:A:1533:LEU:HD11	1:A:1597:VAL:HG22	2.03	0.41
1:A:3709:GLN:HG3	1:A:3809:SER:HB3	2.03	0.41
1:A:2316:ASN:O	1:A:2320:ASP:HB2	2.20	0.41
1:A:2961:ILE:HD11	1:A:2998:ASN:HB3	2.03	0.41
1:A:3842:GLU:H	1:A:3842:GLU:HG3	1.73	0.41
1:A:2132:PRO:HB2	1:A:2135:GLU:HB2	2.03	0.40
1:A:2213:ILE:HG22	1:A:2220:LEU:HG	2.02	0.40
1:A:1526:LYS:HD2	1:A:1589:MET:HE1	2.03	0.40
1:A:1721:VAL:O	1:A:1725:GLU:HG2	2.20	0.40
1:A:2232:MET:HG3	3:A:4702:ATP:C8	2.56	0.40
1:A:2499:LEU:O	1:A:2503:SER:OG	2.34	0.40
1:A:2767:GLU:CD	1:A:2767:GLU:H	2.29	0.40
1:A:3474:ARG:NH2	1:A:3768:THR:HG22	2.34	0.40
1:A:2131:LEU:HD12	1:A:2131:LEU:HA	1.95	0.40
1:A:2324:LEU:HD21	1:A:2332:ARG:HD3	2.03	0.40
1:A:3621:LYS:HE3	1:A:3621:LYS:HB3	1.78	0.40
1:A:3922:PRO:HG2	1:A:3924:ILE:HD11	2.02	0.40
1:A:1488:ARG:HD2	1:A:1489:GLY:N	2.37	0.40
1:A:2590:PRO:O	1:A:2732:PRO:HD2	2.22	0.40
1:A:2716:THR:HB	1:A:4445:THR:HB	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:3788:ASP:O	1:A:3792:GLN:HG2	2.20	0.40
1:A:4027:LEU:HB3	1:A:4058:LEU:HD22	2.04	0.40

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	2929/4646 (63%)	2887 (99%)	42 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	2605/4125 (63%)	2605 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (26) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1479	ASN
1	A	1593	ASN

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Mol	Chain	Res	Type
1	A	1856	GLN
1	A	1921	HIS
1	A	2005	GLN
1	A	2057	GLN
1	A	2109	GLN
1	A	2134	GLN
1	A	2212	GLN
1	A	2464	GLN
1	A	2485	GLN
1	A	2549	GLN
1	A	2730	HIS
1	A	2834	GLN
1	A	3014	ASN
1	A	3038	GLN
1	A	3119	ASN
1	A	3622	ASN
1	A	3754	ASN
1	A	4038	ASN
1	A	4114	HIS
1	A	4156	ASN
1	A	4174	ASN
1	A	4231	GLN
1	A	4335	GLN
1	A	4347	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 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	4702	5	28,33,33	0.64	0	34,52,52	0.59	1 (2%)
2	AOV	A	4701	5	28,34,34	5.26	3 (10%)	28,56,56	1.69	6 (21%)
4	ADP	A	4704	-	24,29,29	0.90	0	29,45,45	1.19	2 (6%)
4	ADP	A	4703	-	24,29,29	0.89	0	29,45,45	1.21	2 (6%)

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	4702	5	-	4/18/38/38	0/3/3/3
2	AOV	A	4701	5	-	0/12/39/39	0/3/3/3
4	ADP	A	4704	-	-	1/12/32/32	0/3/3/3
4	ADP	A	4703	-	-	5/12/32/32	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	4701	AOV	O1G-VG	27.31	2.09	1.61
2	A	4701	AOV	PA-O3A	-2.62	1.56	1.59
2	A	4701	AOV	C2-N3	2.41	1.35	1.32

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	4701	AOV	N3-C2-N1	-4.04	123.19	128.67
2	A	4701	AOV	C4-C5-N7	-3.72	105.40	109.34
4	A	4703	ADP	N3-C2-N1	-3.70	123.65	128.67
4	A	4704	ADP	N3-C2-N1	-3.67	123.69	128.67
2	A	4701	AOV	O2B-PB-O3A	3.63	117.10	107.27
2	A	4701	AOV	C4'-O4'-C1'	-3.36	106.85	109.92
4	A	4704	ADP	C4-C5-N7	-2.56	106.63	109.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	4703	ADP	C4-C5-N7	-2.50	106.69	109.34
3	A	4702	ATP	C5-C6-N6	2.30	123.82	120.31
2	A	4701	AOV	O3A-PA-O1A	-2.26	103.91	110.70
2	A	4701	AOV	O3A-PB-O1B	-2.12	104.31	110.70

There are no chirality outliers.

All (10) torsion outliers are listed below:

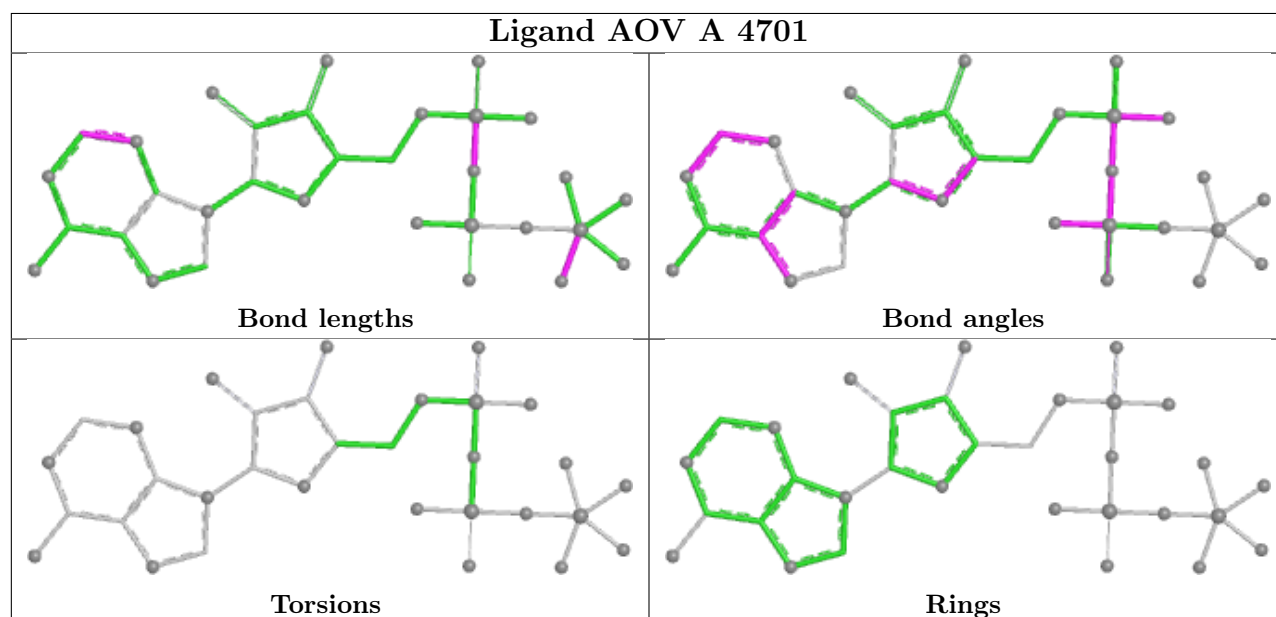
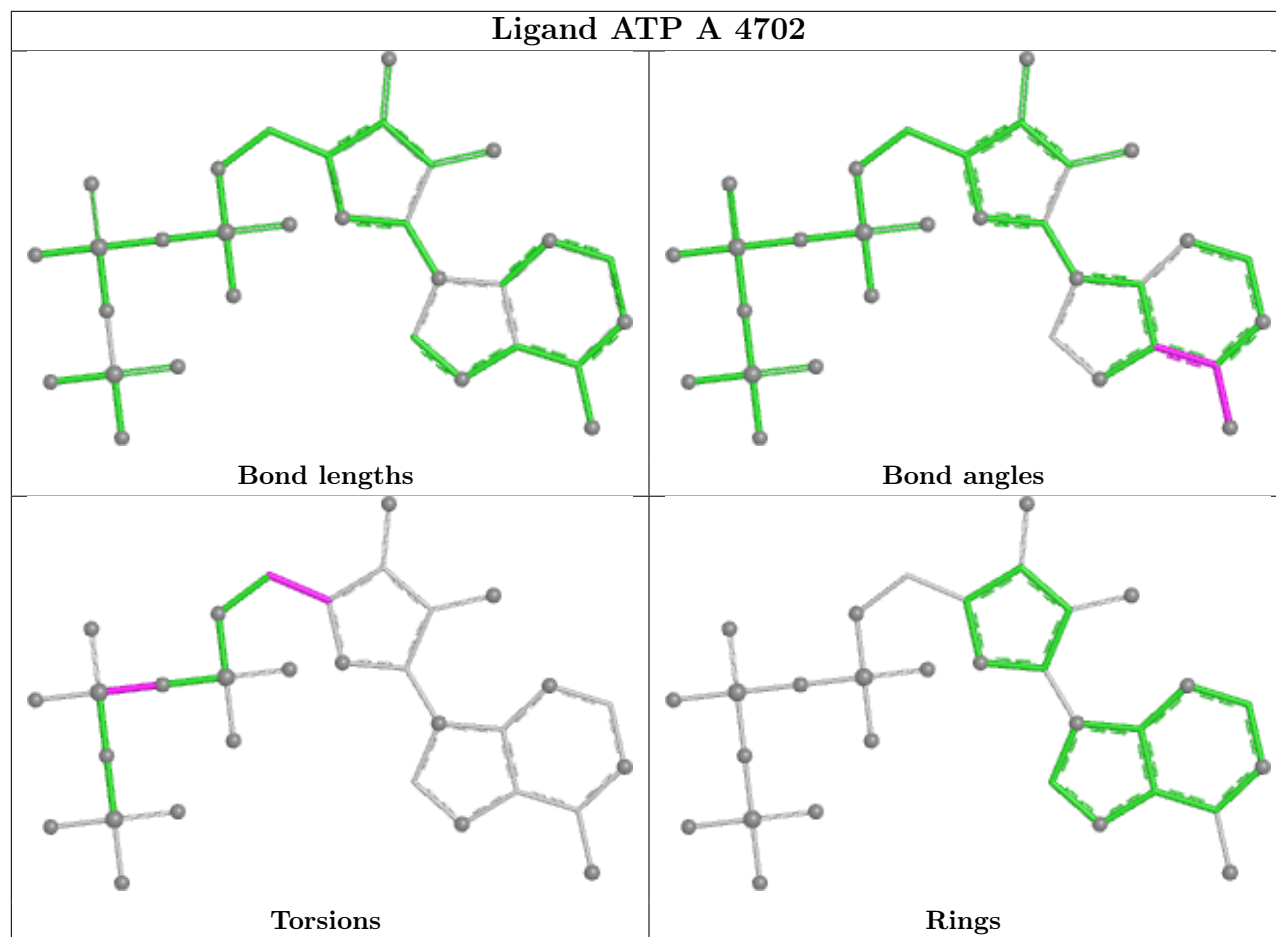
Mol	Chain	Res	Type	Atoms
4	A	4703	ADP	C5'-O5'-PA-O1A
3	A	4702	ATP	O4'-C4'-C5'-O5'
3	A	4702	ATP	C3'-C4'-C5'-O5'
3	A	4702	ATP	PA-O3A-PB-O1B
4	A	4703	ADP	O4'-C4'-C5'-O5'
4	A	4703	ADP	C5'-O5'-PA-O2A
4	A	4703	ADP	C5'-O5'-PA-O3A
4	A	4704	ADP	C5'-O5'-PA-O1A
3	A	4702	ATP	PA-O3A-PB-O2B
4	A	4703	ADP	C3'-C4'-C5'-O5'

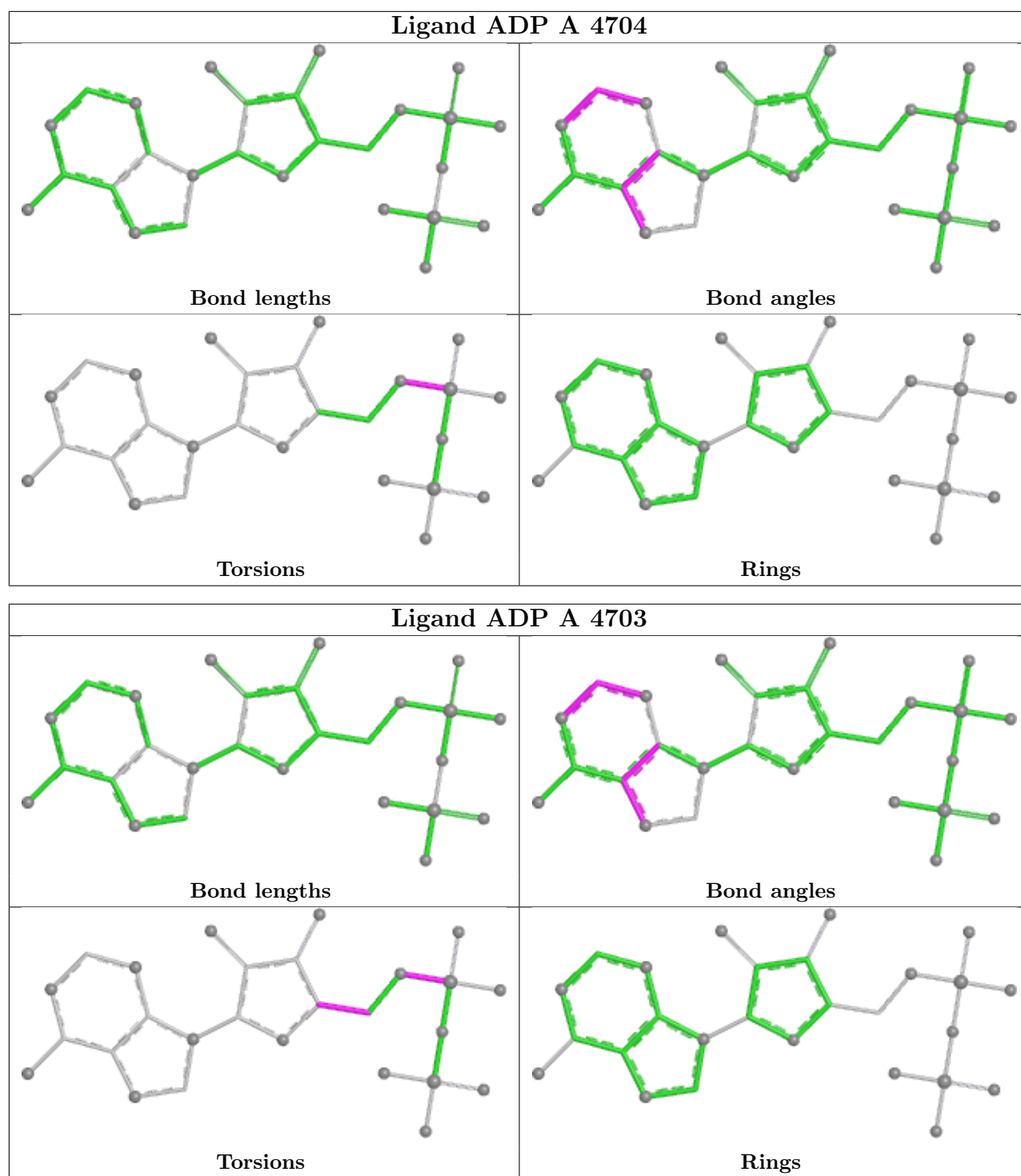
There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	4702	ATP	1	0
2	A	4701	AOV	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

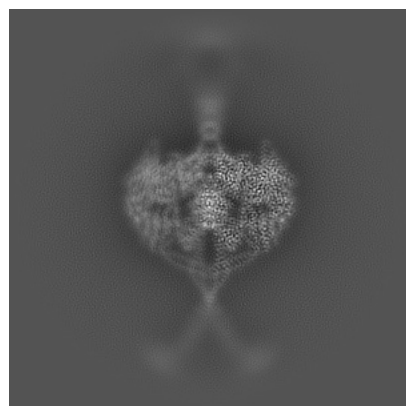
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-44697. These allow visual inspection of the internal detail of the map and identification of artifacts.

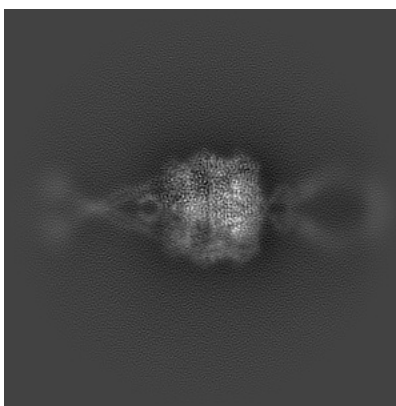
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

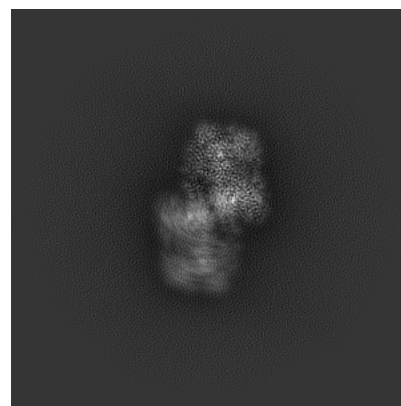
6.1.1 Primary map



X

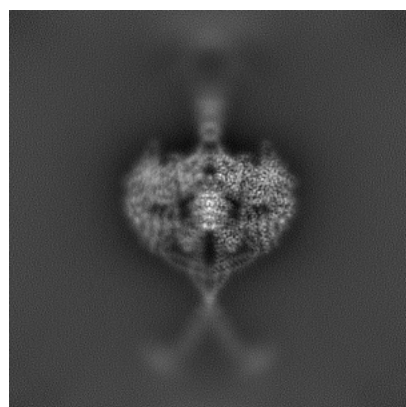


Y

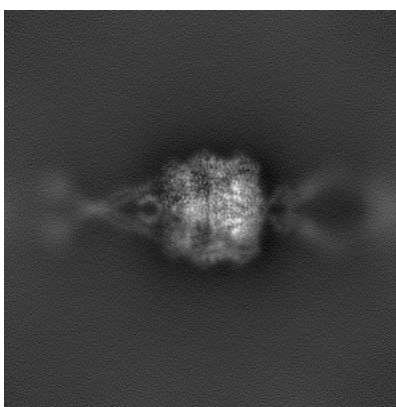


Z

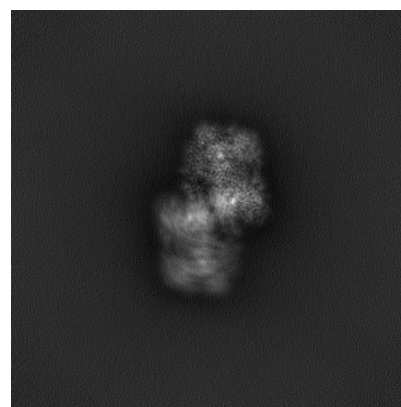
6.1.2 Raw map



X



Y

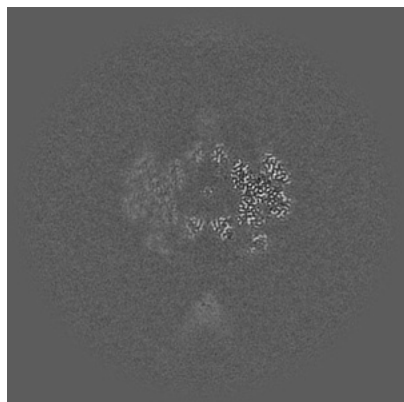


Z

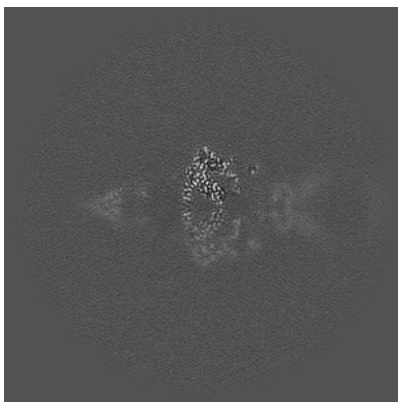
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

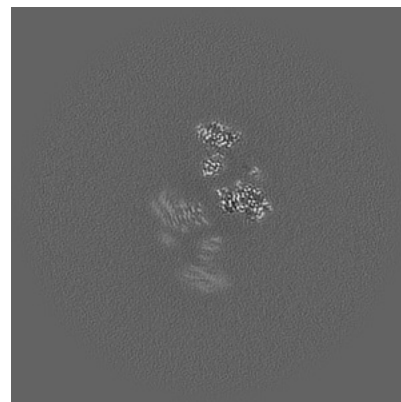
6.2.1 Primary map



X Index: 192

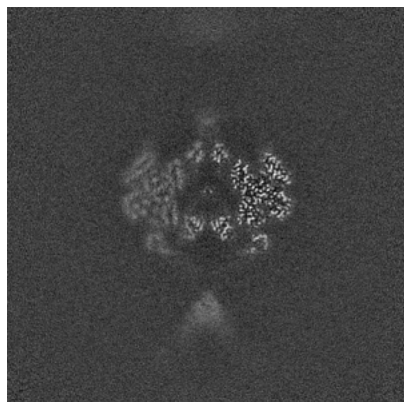


Y Index: 192

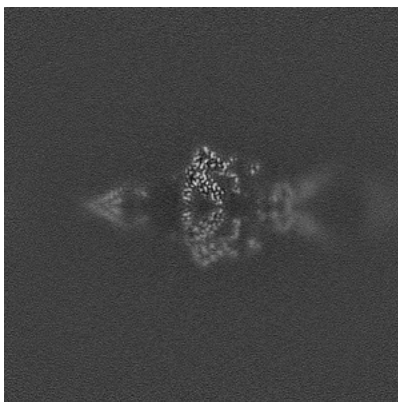


Z Index: 192

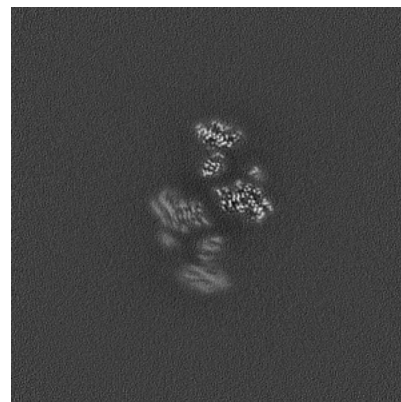
6.2.2 Raw map



X Index: 192



Y Index: 192

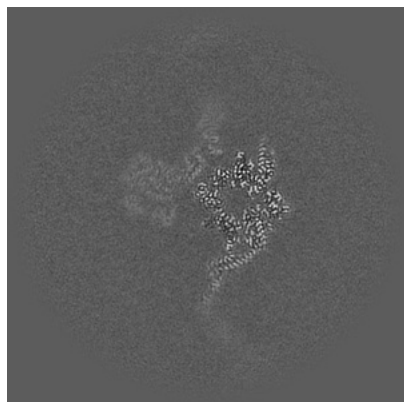


Z Index: 192

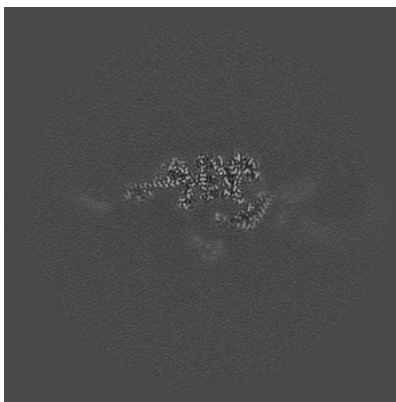
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

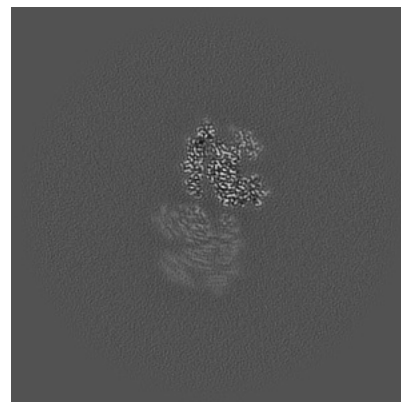
6.3.1 Primary map



X Index: 202

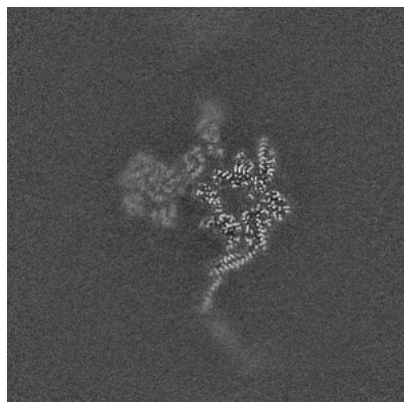


Y Index: 202

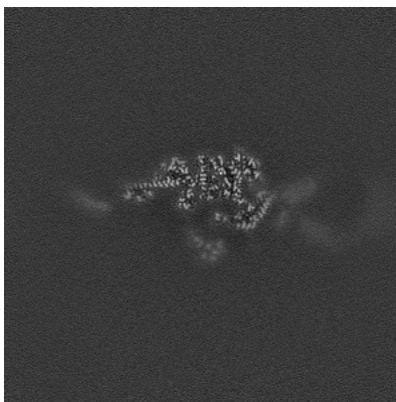


Z Index: 221

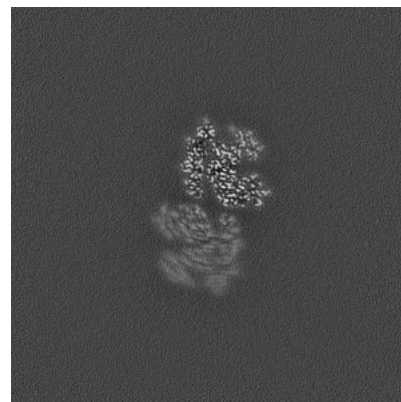
6.3.2 Raw map



X Index: 201



Y Index: 202

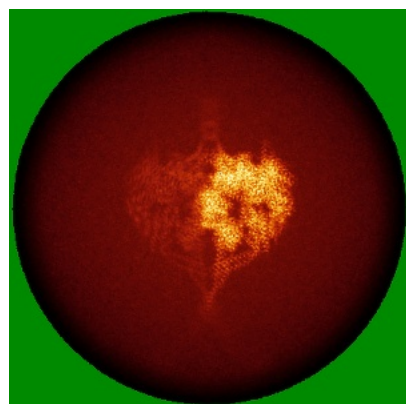


Z Index: 221

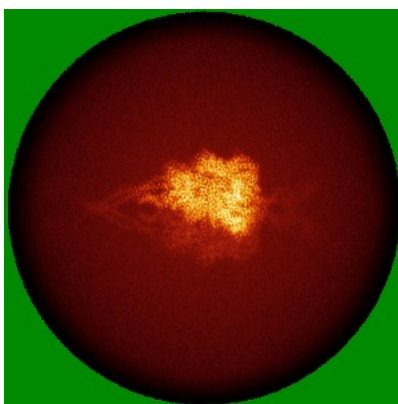
The images above show the largest variance slices of the map in three orthogonal directions.

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

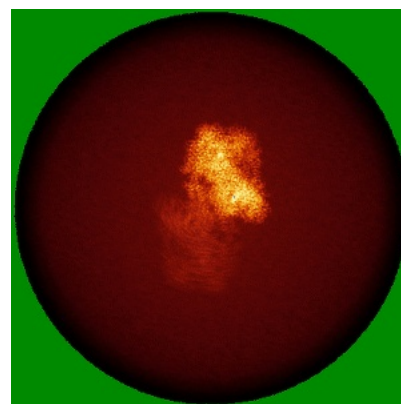
6.4.1 Primary map



X

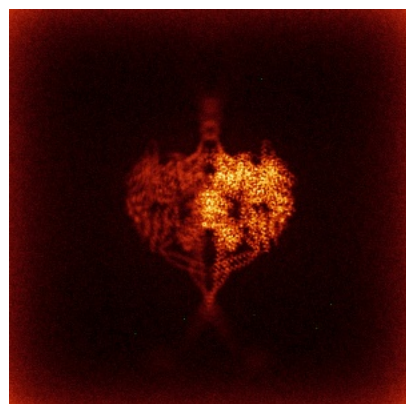


Y

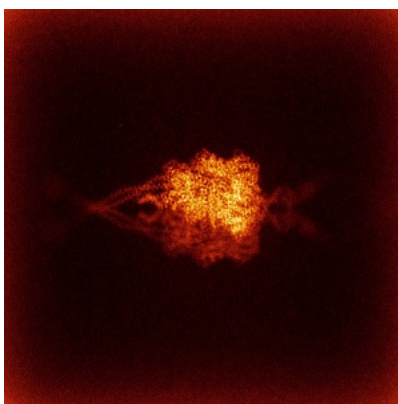


Z

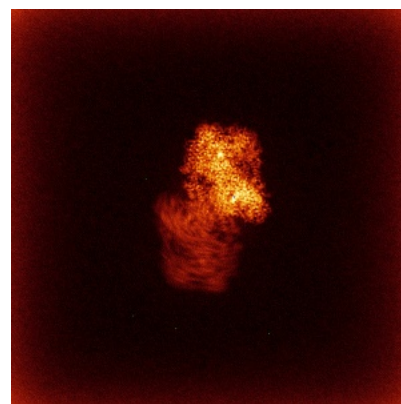
6.4.2 Raw map



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.

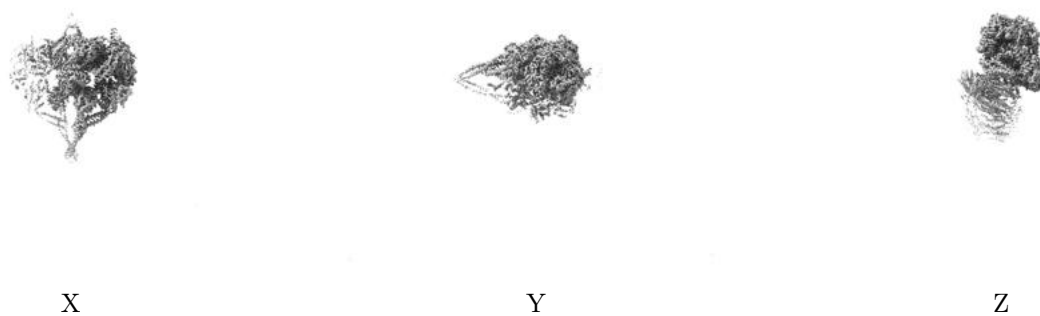
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.4. 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.

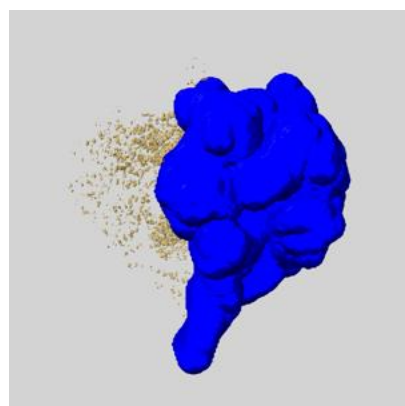
6.6 Mask visualisation [i](#)

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

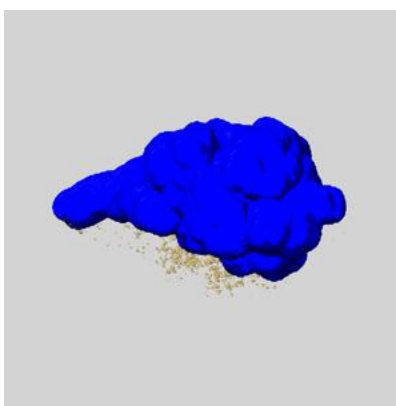
A mask typically either:

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

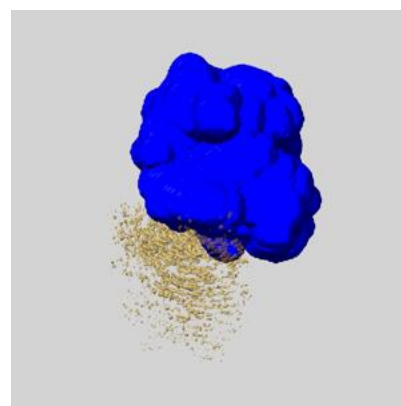
6.6.1 emd_44697_msk_1.map [i](#)



X



Y

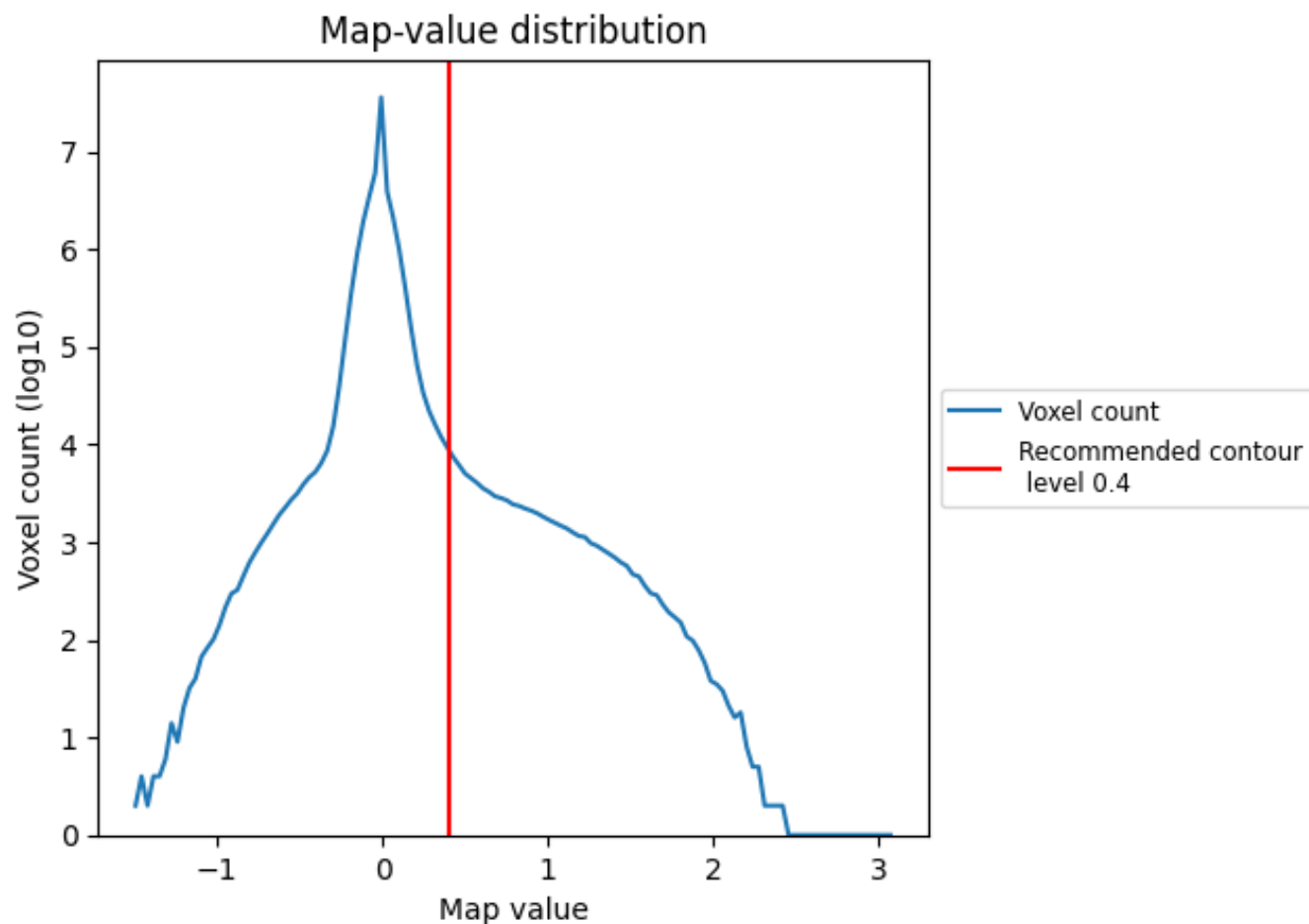


Z

7 Map analysis [i](#)

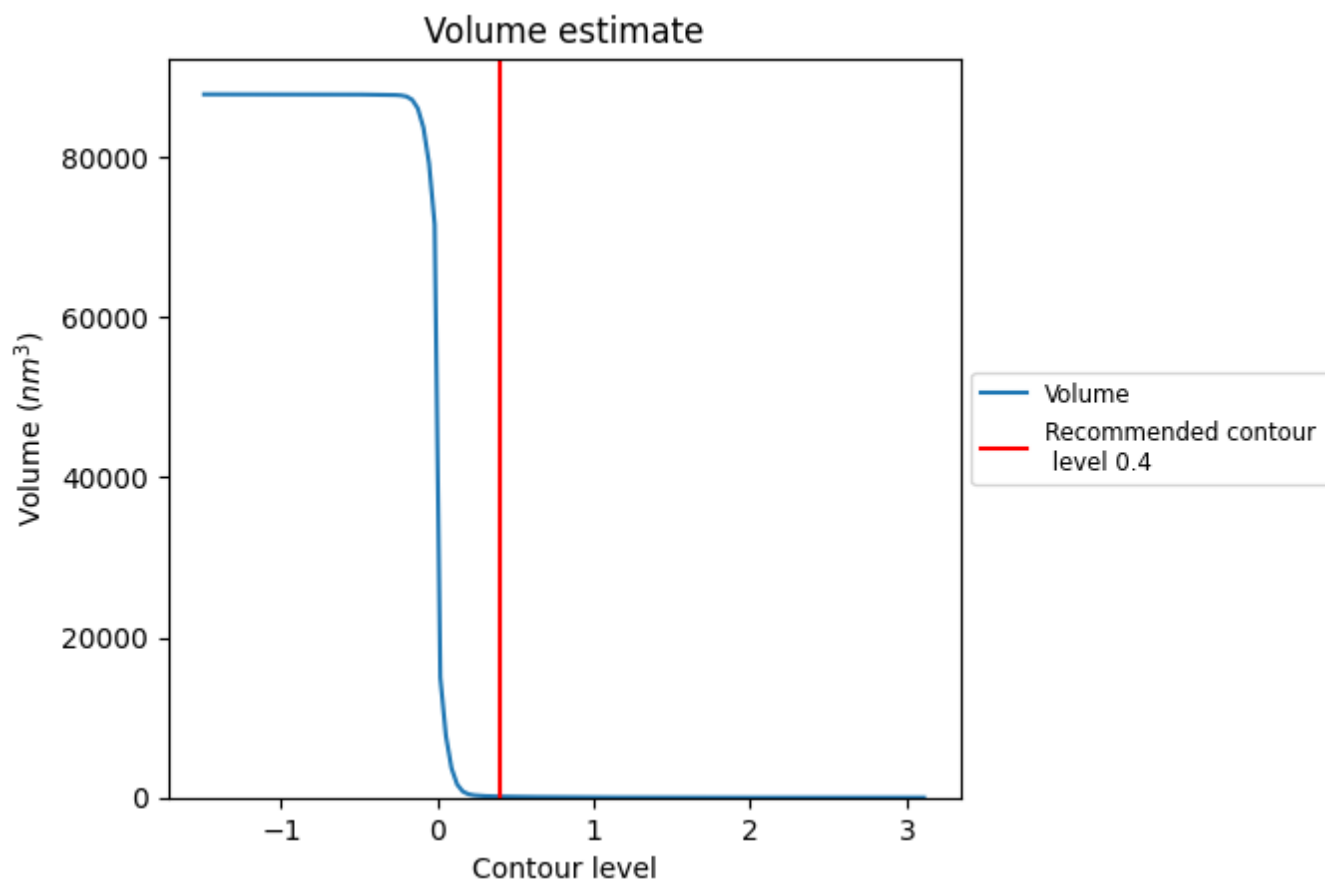
This section contains the results of statistical analysis of the map.

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.

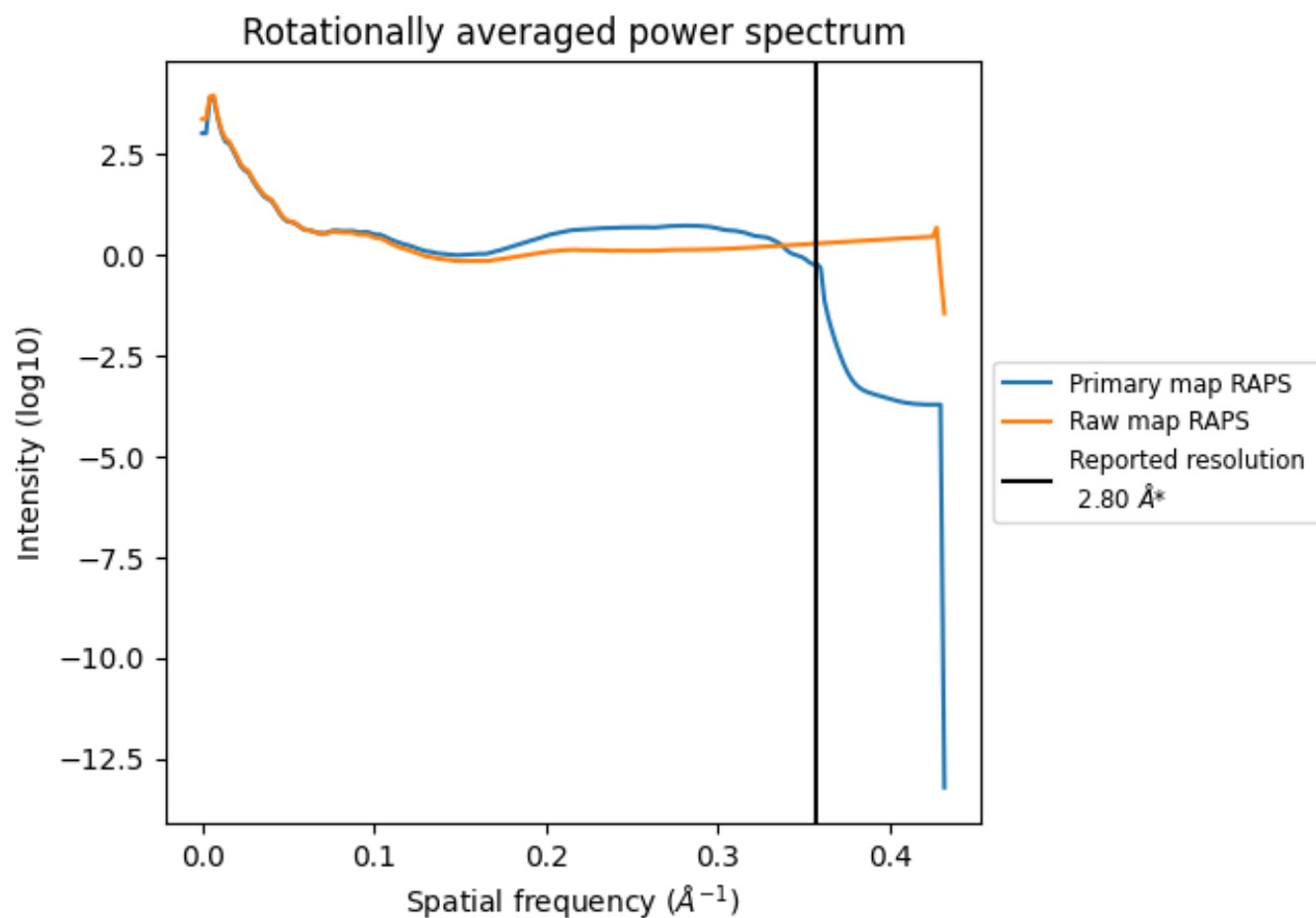
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 126 nm³; this corresponds to an approximate mass of 113 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 ⓘ

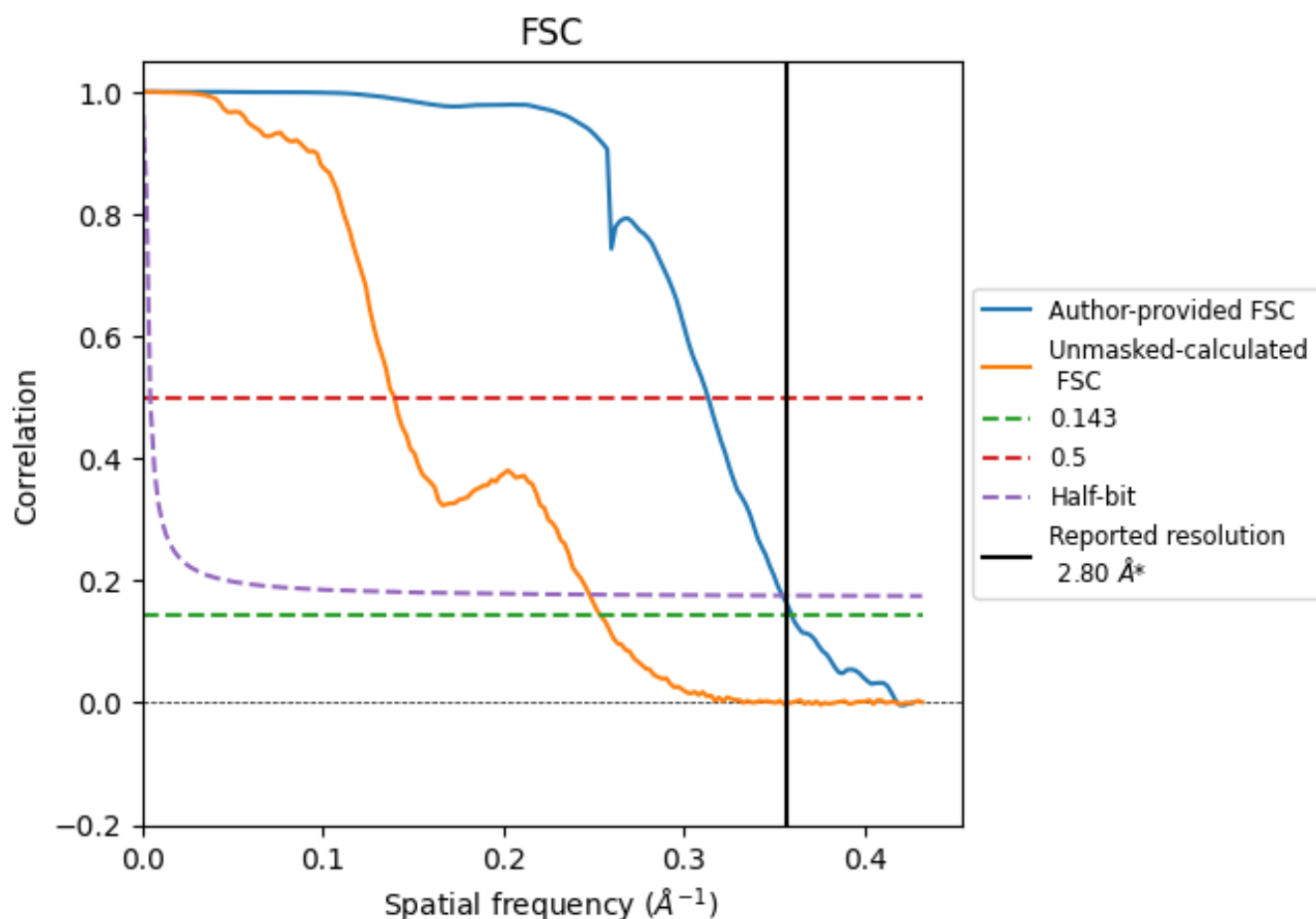


*Reported resolution corresponds to spatial frequency of 0.357 Å⁻¹

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 $0.357 \text{ \AA}^{-1}$

8.2 Resolution estimates [i](#)

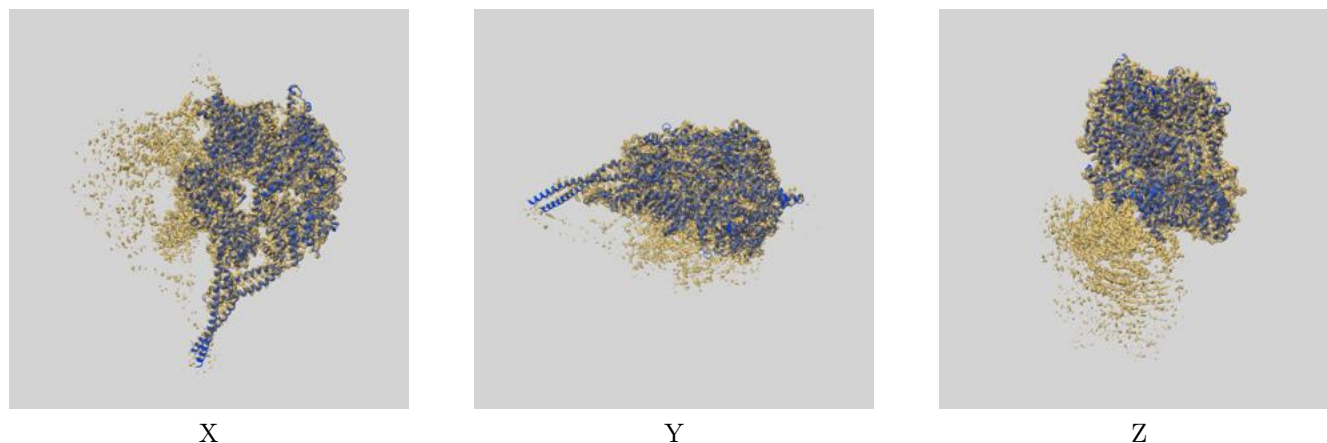
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.80	-	-
Author-provided FSC curve	2.78	3.19	2.82
Unmasked-calculated*	3.94	7.16	4.04

*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 3.94 differs from the reported value 2.8 by more than 10 %

9 Map-model fit [i](#)

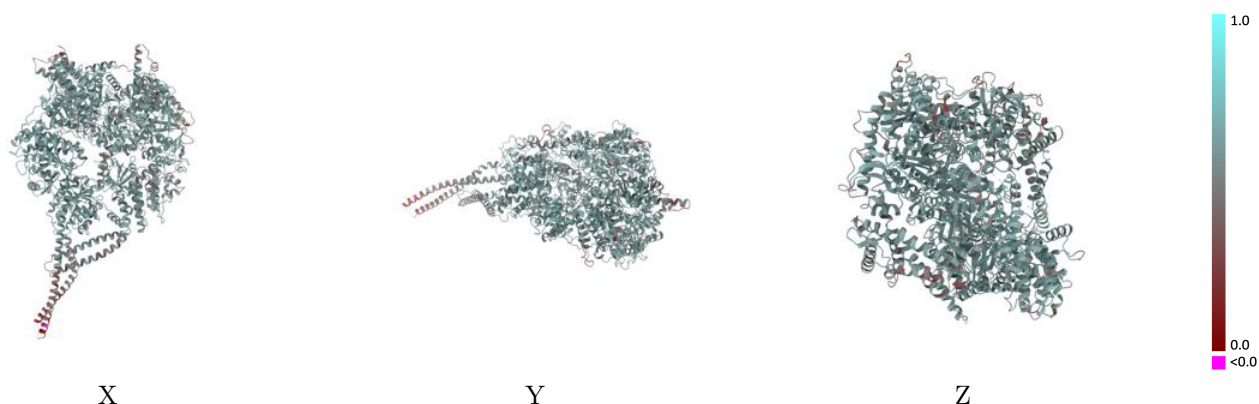
This section contains information regarding the fit between EMDB map EMD-44697 and PDB model 9BMF. Per-residue inclusion information can be found in [section 3](#) on [page 6](#).

9.1 Map-model overlay [i](#)



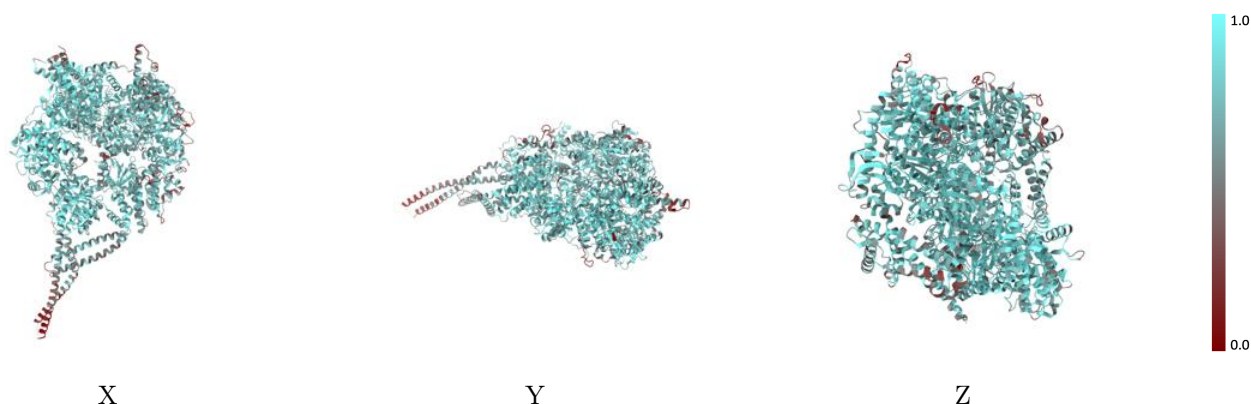
The images above show the 3D surface view of the map at the recommended contour level 0.4 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



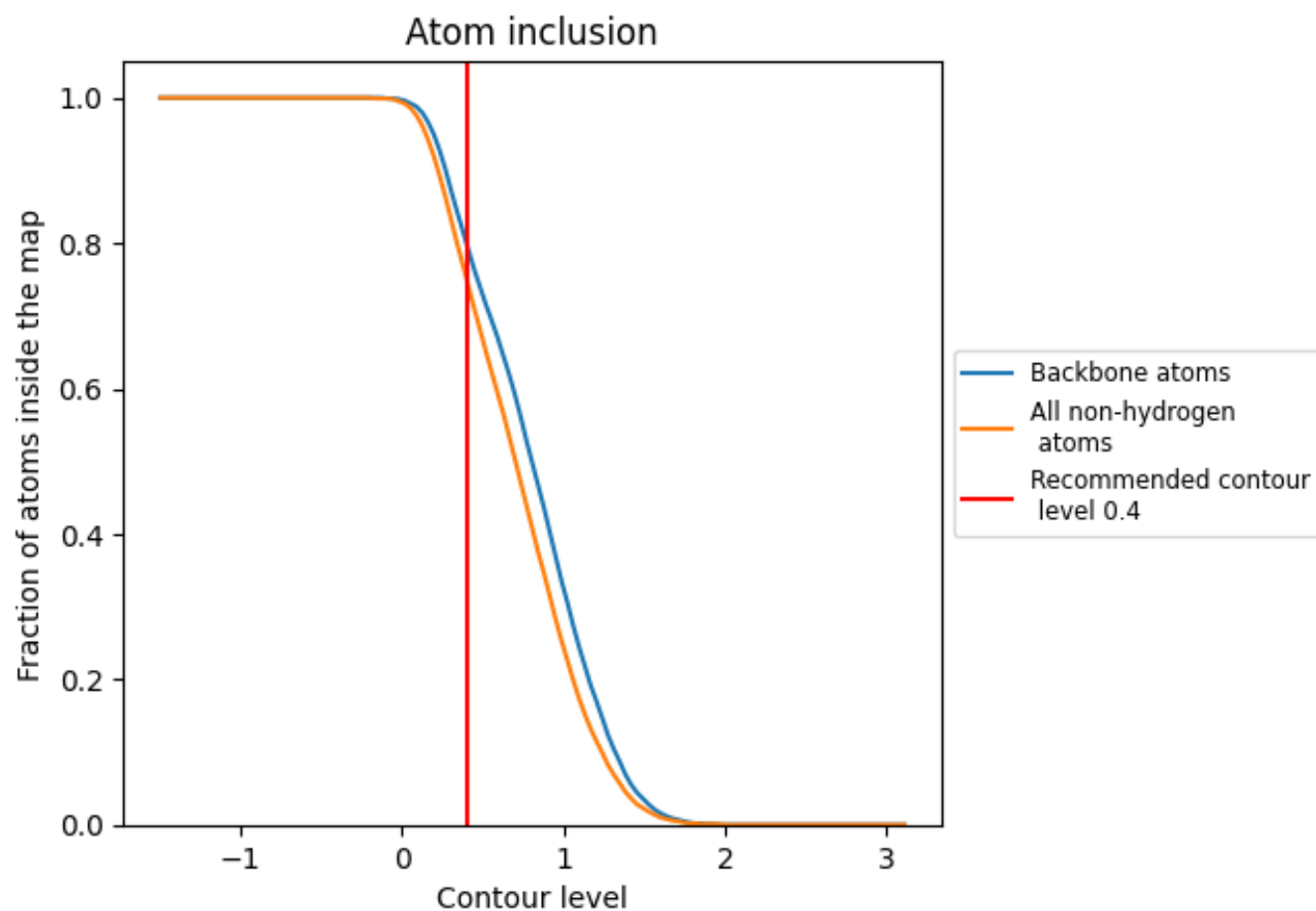
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.4).

9.4 Atom inclusion [i](#)



At the recommended contour level, 80% of all backbone atoms, 75% 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 (0.4) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7520	0.5680
A	0.7520	0.5680

