



wwPDB EM Validation Summary Report ⓘ

Apr 5, 2026 – 08:05 PM UTC

PDB ID : 9YND / pdb_00009ynd
EMDB ID : EMD-73174
Title : Motor domain of human dynein-1 in pre-power stroke bound to dynactin-p15
0glued-CC1B and LIS1
Authors : Yang, J.; Rao, Q.; Chai, P.; Zhang, K.
Deposited on : 2025-10-10
Resolution : 4.26 Å(reported)

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.dev132
Mogul : 2022.3.0, CSD as543be (2022)
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) : 2.49

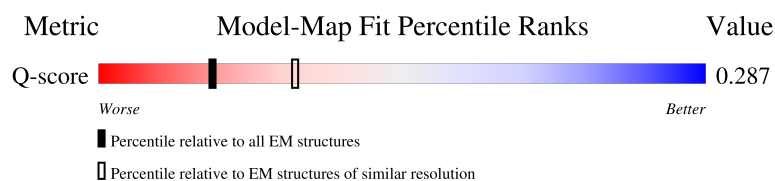
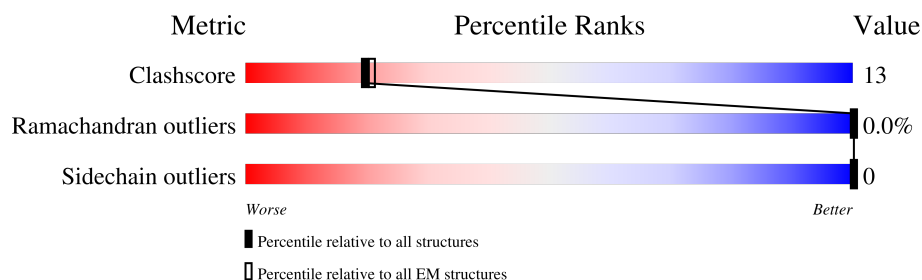
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY



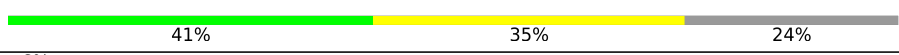

The reported resolution of this entry is 4.26 Å.

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.




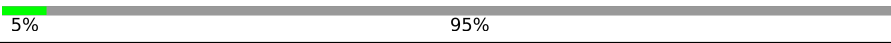
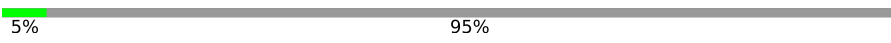
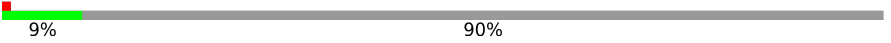

Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	4601 (3.76 - 4.76)

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	B	410	
2	C	410	
2	D	410	

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	E	410	 18%82%
3	F	638	 5%95%
3	G	638	 5%95%
4	H	1281	 9%90%
4	I	1281	 9%91%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	ADP	A	4701	-	-	X	-

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 32118 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
1	A	3065	Total	C	N	O	S	0	0
			24658	15711	4260	4566	121		

- Molecule 2 is a protein called Platelet-activating factor acetylhydrolase IB subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	322	Total	C	N	O	S	0	0
			2557	1608	452	477	20		
2	C	313	Total	C	N	O	S	0	0
			2494	1571	440	463	20		
2	D	75	Total	C	N	O		0	0
			373	223	75	75			
2	E	75	Total	C	N	O		0	0
			373	223	75	75			

- Molecule 3 is a protein called Cytoplasmic dynein 1 intermediate chain 2.

Mol	Chain	Residues	Atoms				AltConf	Trace
3	F	34	Total	C	N	O	0	0
			170	102	34	34		
3	G	34	Total	C	N	O	0	0
			170	102	34	34		

- Molecule 4 is a protein called Dynactin subunit 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	H	122	Total	C	N	O	0	0
			607	363	122	122		
4	I	120	Total	C	N	O	1	0
			602	360	121	121		

There are 56 discrepancies between the modelled and reference sequences:

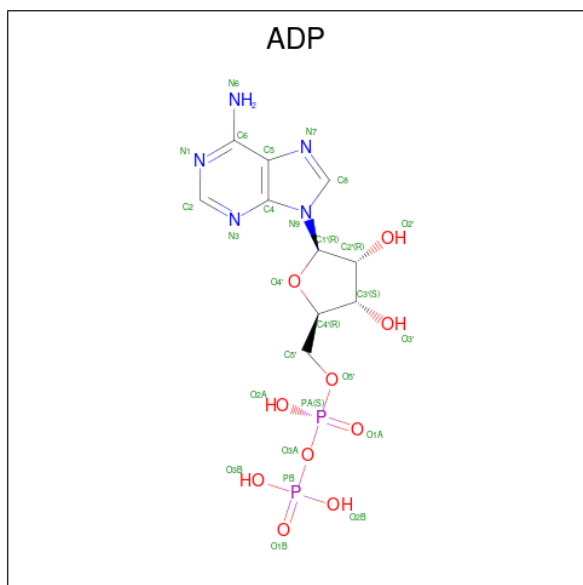
Chain	Residue	Modelled	Actual	Comment	Reference
H	118	ARG	LYS	conflict	UNP Q14203
H	124	SER	THR	conflict	UNP Q14203
H	125	ASN	THR	conflict	UNP Q14203
H	134	PRO	LEU	conflict	UNP Q14203
H	200	ALA	VAL	conflict	UNP Q14203
H	207	ALA	VAL	conflict	UNP Q14203
H	631	ASP	GLU	conflict	UNP Q14203
H	742	SER	CYS	conflict	UNP Q14203
H	778	SER	THR	conflict	UNP Q14203
H	821	ALA	PRO	conflict	UNP Q14203
H	862	PRO	LEU	conflict	UNP Q14203
H	1048	ILE	LEU	conflict	UNP Q14203
H	1072	GLY	ALA	conflict	UNP Q14203
H	1073	ALA	ILE	conflict	UNP Q14203
H	1080	ILE	SER	conflict	UNP Q14203
H	1113	VAL	ILE	conflict	UNP Q14203
H	1125	ALA	SER	conflict	UNP Q14203
H	1136	LEU	-	insertion	UNP Q14203
H	1137	PRO	-	insertion	UNP Q14203
H	1138	PRO	-	insertion	UNP Q14203
H	1147	ALA	PRO	conflict	UNP Q14203
H	1156	ASN	SER	conflict	UNP Q14203
H	1177	SER	THR	conflict	UNP Q14203
H	1189	LEU	MET	conflict	UNP Q14203
H	1193	THR	ALA	conflict	UNP Q14203
H	1202	ILE	VAL	conflict	UNP Q14203
H	1259	LEU	PHE	conflict	UNP Q14203
H	1277	ASP	SER	conflict	UNP Q14203
I	118	ARG	LYS	conflict	UNP Q14203
I	124	SER	THR	conflict	UNP Q14203
I	125	ASN	THR	conflict	UNP Q14203
I	134	PRO	LEU	conflict	UNP Q14203
I	200	ALA	VAL	conflict	UNP Q14203
I	207	ALA	VAL	conflict	UNP Q14203
I	631	ASP	GLU	conflict	UNP Q14203
I	742	SER	CYS	conflict	UNP Q14203
I	778	SER	THR	conflict	UNP Q14203
I	821	ALA	PRO	conflict	UNP Q14203
I	862	PRO	LEU	conflict	UNP Q14203
I	1048	ILE	LEU	conflict	UNP Q14203
I	1072	GLY	ALA	conflict	UNP Q14203
I	1073	ALA	ILE	conflict	UNP Q14203
I	1080	ILE	SER	conflict	UNP Q14203

Continued on next page...

Continued from previous page...

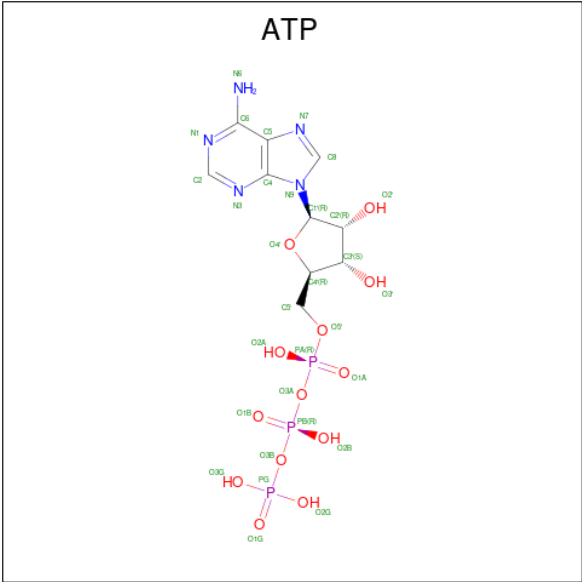
Chain	Residue	Modelled	Actual	Comment	Reference
I	1113	VAL	ILE	conflict	UNP Q14203
I	1125	ALA	SER	conflict	UNP Q14203
I	1136	LEU	-	insertion	UNP Q14203
I	1137	PRO	-	insertion	UNP Q14203
I	1138	PRO	-	insertion	UNP Q14203
I	1147	ALA	PRO	conflict	UNP Q14203
I	1156	ASN	SER	conflict	UNP Q14203
I	1177	SER	THR	conflict	UNP Q14203
I	1189	LEU	MET	conflict	UNP Q14203
I	1193	THR	ALA	conflict	UNP Q14203
I	1202	ILE	VAL	conflict	UNP Q14203
I	1259	LEU	PHE	conflict	UNP Q14203
I	1277	ASP	SER	conflict	UNP Q14203

- Molecule 5 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
5	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
5	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
5	A	1	Total	C	N	O	P	0
			27	10	5	10	2	

- Molecule 6 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



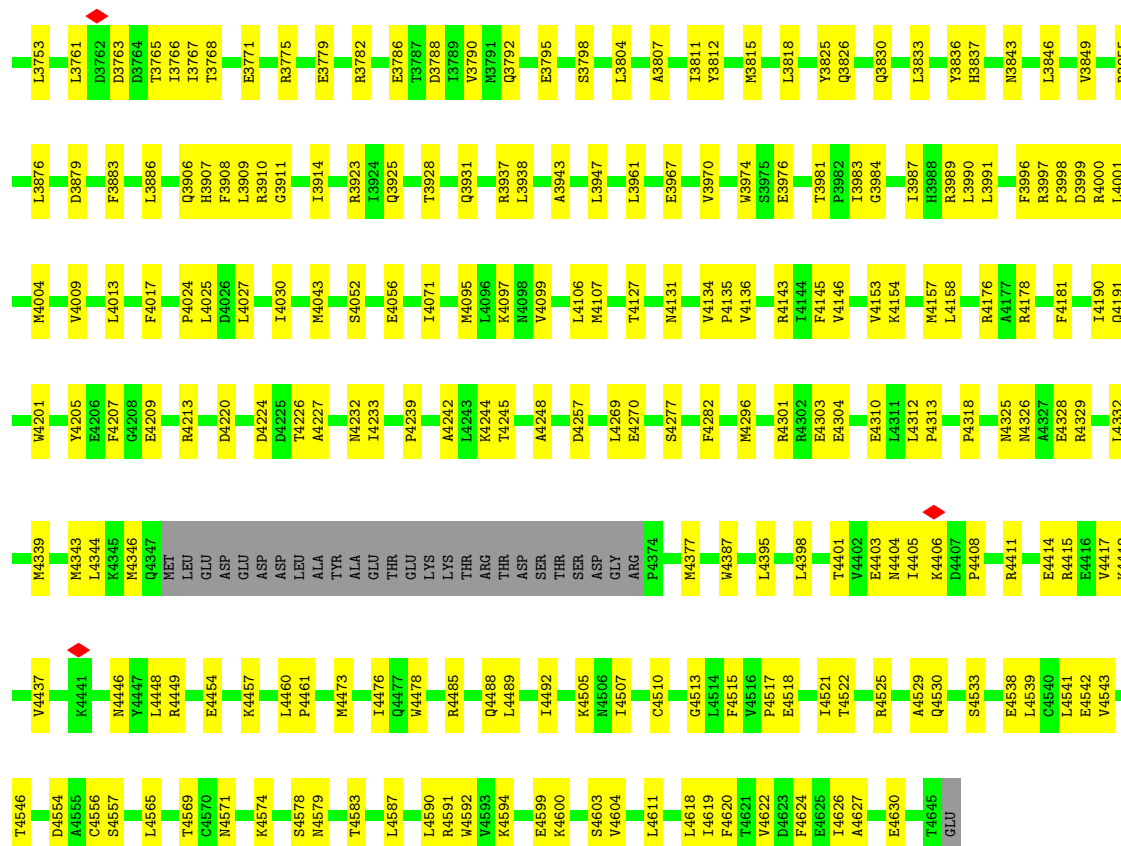
Mol	Chain	Residues	Atoms					AltConf
6	A	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 7 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

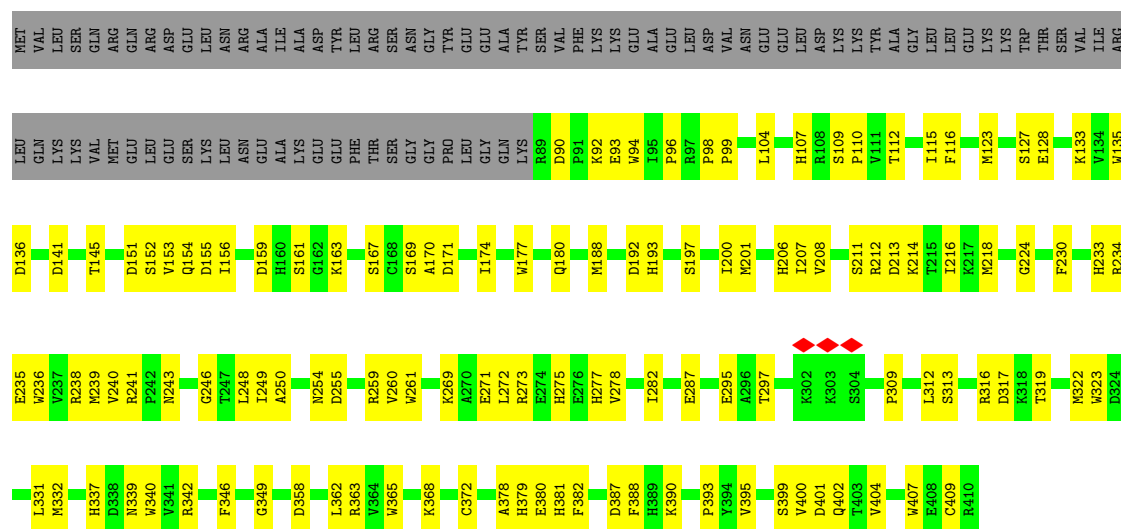
Mol	Chain	Residues	Atoms		AltConf
7	A	2	Total	Mg	0
			2	2	

F2072	R1962	M1867	E1700	N1593	C1484	K1395	VAL	TRP	ARG	GLU	ALA	ASN	GLU	ASN	PHE
F2073	L1963	Y1868	W1701	I1594	R1485	I1396	ALA	GLU	PHE	PHE	LEU	LEU	LEU	LYS	ASN
R2074	E1964	L1873	E1708	I1594	L1486	L1399	LEU	THR	THR	THR	THR	THR	THR	GLN	PHE
L2075	E1965	L1873	E1708	I1594	L1486	L1399	GLU	LYS	LYS	GLN	ILE	MET	GLY	LYS	GLY
R2077	L1968	Y1880	K1715	V1597	D1491	L1403	LEU	PRO	PRO	ASN	ILE	MET	PRO	ASN	LYS
E2078	Q1974	Q1881	E1723	L1601	D1492	K1404	GLN	VAL	TRP	SER	ARG	ARG	VAL	ILE	VAL
Q2079	P1883	T1882	E1723	E1620	L1493	S1405	ASP	THR	TRP	LYS	LYS	ASP	VAL	GLY	ASP
L2080	C1977	P1883	I1739	E1620	F1494	E1406	LEU	THR	LYS	SER	ALA	GLY	ILE	ILE	ASP
S2081	I1978	D1886	T1740	R1623	N1495	A1407	LYS	ASN	TYR	GLN	ARG	VAL	VAL	GLY	LEU
R2091	L1982	Y1889	W1741	R1623	K1498	L1408	VAL	ARG	ASP	GLU	THR	ALA	ASN	ILE	ILE
E2092	L1982	Y1889	I1742	P1627	E1499	K1409	TRP	PRO	ASN	LEU	PHE	LEU	PRO	VAL	ILE
L2093	D1991	M1892	Q1746	R1628	H1500	D1410	SER	GLU	ILE	GLU	ASP	GLU	PRO	ARG	GLU
R2094	K1992	H1892	A1747	F1629	V1504	H1411	GLU	GLU	GLY	GLN	ASN	GLU	ILE	LEU	LYS
S2095	T1993	R1899	Q1748	D1634	W1413	H1412	LEU	ALA	GLY	HIS	ALA	SER	ILE	GLY	LYS
L2097	S1994	P1904	L1749	E1635	M1507	K1414	LYS	GLN	GLY	THR	THR	GLY	GLY	ALA	ILE
W2098	F1905	F1905	L1782	D1636	K1508	Q1415	VAL	ASP	GLY	ASP	LYS	ALA	LEU	LEU	ASP
S2099	L2001	F1905	L1782	D1636	Y1512	Q1416	TRP	ALA	GLY	THR	LYS	VAL	ARG	LEU	GLY
N2102	L2002	A1908	E1763	E1639	Y1513	M1417	ALA	LEU	ILE	ALA	LYS	VAL	TYR	ARG	VAL
R2105	N2003	G1911	S1767	I1650	Y1513	K1418	GLN	LEU	ASP	GLY	LYS	VAL	GLN	GLY	GLY
E2106	K2004	T1912	A1776	H1653	W1523	R1419	MET	LYS	ARG	GLY	ALA	VAL	VAL	THR	THR
R2107	D2011	T1913	H1779	M1657	R1529	V1426	LYS	PHE	ARG	VAL	ILE	VAL	VAL	GLY	GLY
E2120	L2016	K1917	H1779	M1657	R1529	V1426	GLY	THR	LYS	THR	ASP	GLY	GLY	ALA	LEU
D2123	T2017	A1918	M1798	V1661	A1532	S1427	LEU	ARG	ASP	PHE	THR	TRP	ALA	ALA	GLY
E2126	M2018	L1919	E1798	E1668	L1533	E1428	THR	GLY	LYS	ILE	GLY	TYR	GLN	GLY	TYR
L2127	P2020	G1920	Q1800	I1664	F1534	L1431	LYS	ASP	ALA	THR	LYS	VAL	VAL	VAL	ASP
A2128	G2021	H1921	R1805	I1665	D1535	L1439	ASP	ASP	ILE	VAL	LYS	VAL	VAL	VAL	GLY
E2129	Y2022	F1926	R1805	D1668	Q1541	L1439	LYS	GLN	GLN	VAL	GLN	VAL	VAL	VAL	ASP
Q2139	R2025	R1925	R1804	E1669	V1540	W1435	ASN	CYS	ALA	LEU	ASN	TYR	PRO	ARG	LEU
C2142	S2026	F1926	R1804	D1669	Q1541	W1435	LEU	LYS	ALA	LEU	ASN	TYR	PRO	ARG	LEU
V2146	N2027	V1927	E1809	N1670	R1542	L1439	ASN	CYS	ALA	LEU	ASN	TYR	PRO	ARG	LEU
R2147	L2028	F1930	H1817	S1671	R1543	M1442	LEU	LYS	ALA	ARG	ASN	TYR	PRO	ARG	LEU
K2148	N2031	N1931	S1824	V1672	Y1546	I1445	LEU	LYS	LYS	ILE	LYS	TRP	ASP	ASP	ASP
L2149	Y2034	D1933	K1827	I1676	S1554	V1446	ALA	ALA	ILE	PHE	GLY	GLN	PRO	PRO	GLN
D2153	A2040	F1936	F1836	R1679	I1557	V1449	VAL	GLU	VAL	GLY	LYS	ALA	ALA	ALA	VAL
L2157	L2048	F1938	L1839	E1680	K1558	L1450	GLN	GLU	GLY	GLY	LYS	VAL	VAL	VAL	VAL
R2172	I2049	Q1939	R1843	E1681	L1561	L1451	ASP	VAL	ASP	VAL	GLY	VAL	GLY	HIS	ASP
G2173	M2053	A1940	Q1850	E1682	Y1561	Y1452	ARG	GLU	ARG	LEU	ILE	ILE	VAL	VAL	LYS
E2174	L2054	M1941	Q1850	F1686	E1564	Q1454	VAL	LEU	VAL	TYR	LYS	SER	PRO	ASN	ASN
Y2190	R2060	G1942	Q1850	K1687	L1576	G1455	GLY	ARG	GLY	ARG	ASN	ARG	GLY	GLY	GLY
E2197	L2063	R1943	Q1850	T1688	L1576	E1456	LEU	SER	THR	THR	GLY	GLY	GLY	GLY	GLY
Y2211	E2063	L1948	Q1856	S1691	M1579	I1466	ASN	GLY	GLY	THR	GLY	GLY	GLY	GLY	GLY
E2197	N2067	Q1950	L1857	E1694	K1580	R1467	LEU	SER	THR	THR	GLY	GLY	GLY	GLY	GLY
Y2211	D1958	Q1860	Q1860	E1694	S1583	N1471	LEU	GLU	ASP	ASP	LEU	LEU	LEU	LEU	LEU
L2220	N2067	M1861	M1861	E1694	S1583	N1471	LEU	GLU	ASP	ASP	LEU	LEU	LEU	LEU	LEU
	V2070	F1960	K1865	K1697	M1589	L1477	GLY	GLU	LEU	LEU	SER	GLY	GLY	GLY	GLY
	P2071	N1961	F1866	N1699	D1590	Y1480	THR	VAL	THR	THR	LYS	TRP	TRP	TRP	TRP
							HIS	VAL	VAL	VAL	ASN	VAL	VAL	VAL	VAL

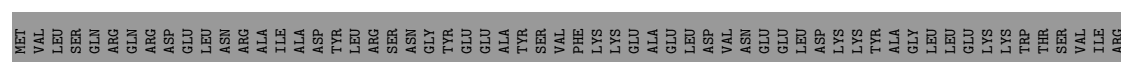
V3635	Q3499	GLN	GLU	LYS	L3229	K3117	E3006	F2900	P2796	V2658	W2545	GLN	P2309	W2221
V3638	T3502	LYS	GLU	ILE	N3233	M3126	R3007	E2903	R2797	L2659	W2548	ARG	E2310	W2222
E3639	GLU	LYS	ASP	LYS	P3127	P3127	M3008	E2903	M2799	V2660	W2548	ARG	W2311	W2223
S3510	ASP	GLN	ASP	LYS	V3129	V3129	A3013	V2910	T2800	D2664	E2556	LYS	E2313	S2228
I3514	ASP	ILE	ALA	GLN	V3130	V3130	V3017	V2915	R2804	W2667	E2557	LYS	W2314	G2229
A3515	LYS	ARG	ARG	LEU	D3131	D3131	L3020	I2922	G2805	L2668	V2561	ASP	L2315	K2230
V3516	ASP	VAL	VAL	VAL	L3132	L3132	L3020	I2922	L2806	P2669	H2560	GLU	L2319	K2232
L3649	GLN	LYS	VAL	VAL	L3133	L3133	L3020	I2922	L2813	V2679	K2561	GLU	N2322	R2235
V3653	GLN	LYS	ARG	ARG	Q3135	Q3135	E3035	R2927	L2816	I2683	E2563	GLU	T2326	V2236
F3520	LYS	SER	SER	SER	Q3136	Q3136	A3037	L2933	L2816	R2684	E2564	GLU	T2327	L2237
D3521	MET	ASN	MET	ASN	P3137	P3137	Q3038	L2934	P2817			ALA	L2327	
M3524	ASN	ALA	ALA	ALA	R3140	R3140	K3039	T2944	G2820	E2688	V2568	ALA	E2242	E2242
R3655	MET	ASN	ASN	ASN	I3143	I3143	L3042	T2945	R2823	R2694	V2569	ALA	E2248	E2248
G3657	VAL	PRO	PRO	PRO	V3144	V3144	M3043	L2946	L2824	R2694	D2573	ALA	L2335	E2248
V3660	GLU	ASN	ASN	ASN	N3145	N3145	L3044	V2950	E2828	D2697	R2576	ALA	P2336	T2254
L3661	ILE	VAL	VAL	VAL	V3148	V3148	E3049	K2951	L2832	L2703	A2579	ALA	R2340	K2257
G3665	TYR	LYS	LYS	LYS	H3151	H3151	L3050	W2952	L2836	E2704		ALA	R2340	S2280
L3679	GLU	ALA	ALA	ALA	K3162	K3162	M3065	M2953	V2837	R2705		ALA	K2261	K2261
S3680	ILE	GLU	GLU	GLU	R3167	R3167	V3065	V2966	Q2834	I2706	E2582	ALA	F2343	D2262
T3681	ARG	GLU	GLU	GLU	T3168	T3168	F3054	S2957	D2835	Q2707	T2583	ALA	H2263	H2263
E3687	ASN	ILE	ILE	ILE	T3172	T3172	R3060	S2957	R2836	A2711	P2590	ALA	L2264	L2264
R3561	ASN	GLN	GLN	GLN	R3173	R3173	V3065	V2966	L2837	C2712	L2581	ALA	K2349	N2271
S3694	GLN	CYS	CYS	CYS	H3175	H3175	V3065	V2966	V2839	N2713	V2592	ALA	T2272	T2272
I3578	ALA	LEU	LEU	LEU	T3176	T3176	N3069	R2965	D2840	P2714	L2593	ALA	R2273	R2273
M3579	CYS	GLY	GLY	GLY	F3177	F3177	P3070	K2966	E2842	R2720	P2596	ALA	L2352	L2279
R3582	PRO	GLU	GLU	GLU	R3177	R3177	S3071	V2967	R2843	R2726	K2601	ALA	L2353	L2279
R3585	VAL	THR	THR	THR	H3178	H3178	S3072	G2969	E2848	R2729	M2603	ALA	A2354	F2280
Y3586	LYS	ASP	ASP	ASP	D3178	D3178	L3075	D2973	D2851	P2732	L2609	ALA	R2358	T2281
P3587	TRP	TRP	TRP	TRP	H3182	H3182	P3083	L2976	L2855	Y2735	D2614	ALA	M2361	V2283
L3588	ALA	LYS	LYS	LYS	H3182	H3182	A3084	L2976	R2863	R2755	E2615	ALA	V2362	L2284
D3723	ILE	GLN	GLN	GLN	E3189	E3189	L3085	L2980	M2867	R2753	F2622	ALA	W2363	R2285
V3724	ALA	ILE	ILE	ILE	K3190	K3190	F3086	R2981	S2868	K2754	S2623	ALA	S2365	K2286
R3725	GLN	SER	SER	SER	R3191	R3191	R3087	R2982	R2869	K2755	V2617	ALA	S2365	L2287
E3726	LEU	ILE	ILE	ILE	R3191	R3191	R3088	G2984	S2867	R2757		ALA	L2369	S2290
K3727	ASN	ILE	ILE	ILE	E3195	E3195	D3096	N2987	S2868	R2757		ALA	V2291	S2290
L3731	TYR	ALA	ALA	ALA	E3196	E3196	W3097	E2988	L2871	K2755	F2622	ALA	R2292	V2291
L3732	ASP	ARG	ARG	ARG	E3196	E3196	W3097	E2988	L2871	K2755	F2622	ALA	D2372	R2292
K3733	MET	GLU	GLU	GLU	H3199	H3199	G3106	K2989	Y2873	R2757		ALA	M2373	E2294
L3734	LEU	ASN	ASN	ASN	T3208	T3208	K3107	K2991	S2874	R2757		ALA	N2377	L2295
Q3735	LYS	PHE	PHE	PHE	Q3214	Q3214	E3108	L2990	N2875	L2762		ALA	T2385	Q2296
G3736	VAL	THR	THR	THR	Q3214	Q3214	F3109	L2992	P2883	R2763	P2628	ALA	D2388	L2387
E3737	GLU	THR	THR	THR	L3218	L3218	T3110	L2993	P2883	E2767	V2648	ALA	E2389	F2303
A3626	PRO	ILE	ILE	ILE	L3218	L3218	S3112	M2994	V2893	H2791	L2650	ALA	GLY	D2304
L3627	LEU	VAL	VAL	VAL	L3222	L3222	N3113	N2998	V2893	H2791	L2650	ALA	GLU	G2306
R3628	ARG	ASN	ASN	ASN	E3228	E3228	D3114	F3004	R2896	L2793	Q2654	ALA	ASP	D2306
R3741	ARG	ASN	ASN	ASN	E3228	E3228	L3115	F3004	L2897	L2793	Q2654	ALA	GLU	V2307
L3742	PHE	SER	SER	SER	E3228	E3228	E3116	L3005			K2657	ALA	ALA	D2308
Q3744	LEU	ALA	ALA	ALA	E3228	E3228	E3116	L3005			K2657	ALA	ALA	D2308
L3745	ALA	ALA	ALA	ALA	E3228	E3228	E3116	L3005			K2657	ALA	ALA	D2308

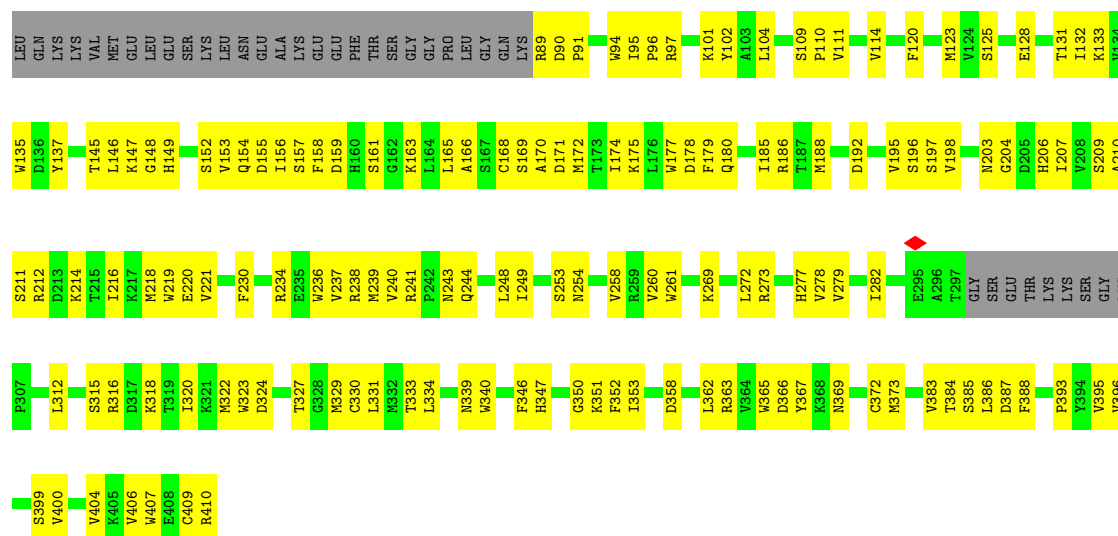


• Molecule 2: Platelet-activating factor acetylhydrolase IB subunit beta

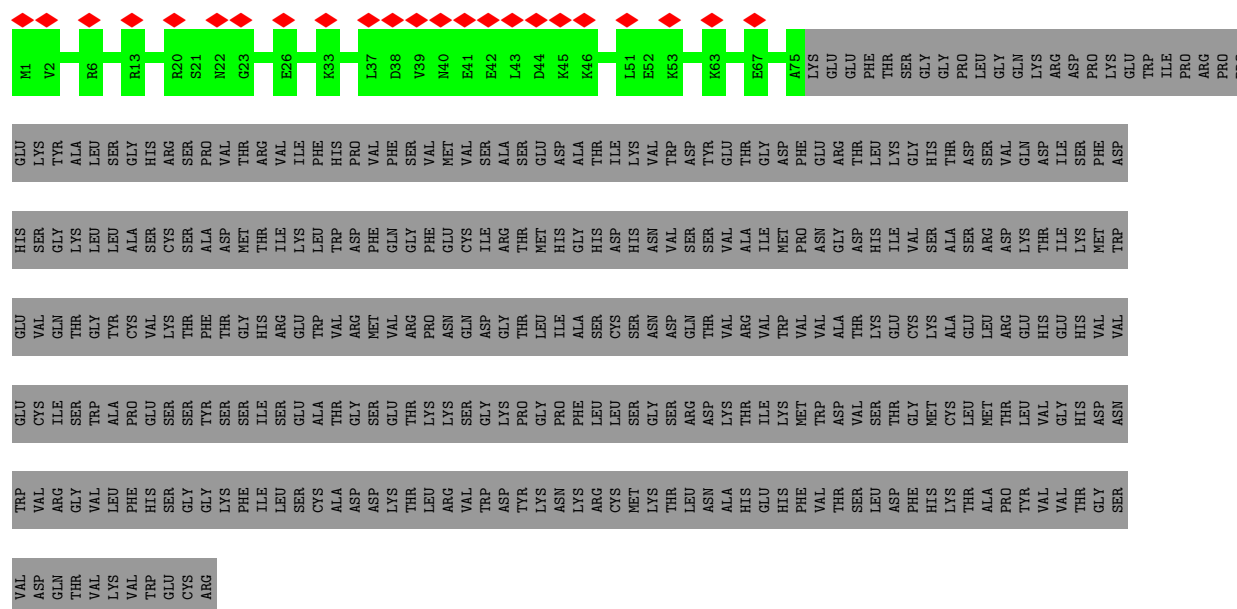


• Molecule 2: Platelet-activating factor acetylhydrolase IB subunit beta

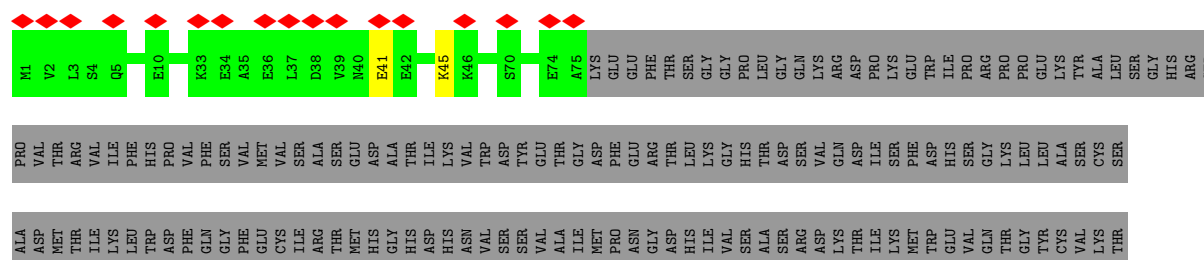




• Molecule 2: Platelet-activating factor acetylhydrolase IB subunit beta



• Molecule 2: Platelet-activating factor acetylhydrolase IB subunit beta



ARG	GLY	THR	PHE
THR	THR	THR	THR
GLY	GLY	GLY	GLY
ILE	ILE	ILE	HIS
LEU	LEU	GLU	ARG
CYS	CYS	ALA	TRP
ASP	ALA	THR	VAL
ASP	ASP	GLY	ARG
LYS	LYS	GLU	MET
THR	THR	THR	VAL
LEU	LEU	LYS	ARG
ARG	ARG	LYS	PRO
VAL	VAL	GLN	ASN
TRP	TRP	GLY	ASP
ASP	ASP	LYS	THR
TVR	TVR	PRO	THR
LYS	LYS	GLY	LEU
ASN	ASN	PRO	ILE
LYS	LYS	PHE	ALA
ARG	ARG	LEU	SER
CYS	CYS	LEU	CYS
MET	MET	SER	SER
LYS	LYS	GLY	ASN
THR	THR	SER	ASP
LEU	LEU	ARG	GLN
ASN	ASN	ASP	THR
ALA	ALA	LYS	VAL
HIS	HIS	THR	ARG
GLU	GLU	ILE	VAL
PHE	PHE	LYS	TRP
VAL	VAL	MET	VAL
THR	THR	TRP	VAL
SER	SER	ASP	ALA
LEU	LEU	VAL	THR
ALA	ALA	LEU	GLU
PRO	PRO	THR	ARG
TVR	TVR	LEU	GLU
VAL	VAL	VAL	HIS
THR	THR	GLY	GLU
GLY	GLY	HIS	HIS
SER	SER	ASP	VAL
VAL	VAL	ASN	VAL
ASP	ASP	TRP	GLU
GLN	GLN	VAL	CYS
THR	THR	ARG	ILE
VAL	VAL	GLY	SER
LYS	LYS	VAL	TRP
VAL	VAL	LEU	ALA
TRP	TRP	PHE	ALA
GLU	GLU	HIS	PRO
CYS	CYS	SER	GLU
			SER

- Molecule 3: Cytoplasmic dynein 1 intermediate chain 2

Chain F: 5% 95%

[illegible]

- Molecule 3: Cytoplasmic dynein 1 intermediate chain 2

Chain G: 5% 95%

MET	S2	K35	GLU	THR	ASP	ASN	GLN	LYS	LYS	GLU	ALA	VAL	ALA	ALA	VAL	GLN	GLU	GLU	SER	ASP	LEU	GLU	LYS	LYS	ARG	ARG	GLU	ALA	ALA	LEU	LEU	GLN	SER	SER	MET	GLY	THR	PRO	GLU	SER	SER	PRO	ILE	VAL	PHE	GLU	TYR	TRP	VAL	PRO	PRO	PRO	MET	SER	PRO	SER	SER
-----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

[illegible]

- Molecule 4: Dynactin subunit 1

Chain H: 9% 90%

[illegible]



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	37109	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)	1200	Depositor
Maximum defocus (nm)	2600	Depositor
Magnification	45000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.853	Depositor
Minimum map value	-0.366	Depositor
Average map value	-0.002	Depositor
Map value standard deviation	0.031	Depositor
Recommended contour level	0.15	Depositor
Map size (Å)	444.416, 444.416, 444.416	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.736, 1.736, 1.736	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: ADP, ATP, MG

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	0.10	0/25177	0.28	0/34112
2	B	0.12	0/2624	0.36	0/3555
2	C	0.11	0/2560	0.31	0/3470
2	D	0.06	0/372	0.19	0/518
2	E	0.07	0/372	0.17	0/518
3	F	0.04	0/169	0.13	0/235
3	G	0.05	0/169	0.13	0/235
4	H	0.19	0/606	0.29	0/845
4	I	0.40	0/601	0.54	0/838
All	All	0.12	0/32650	0.30	0/44326

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
4	I	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
4	I	533[A]	GLU	Mainchain
4	I	533[B]	GLU	Mainchain

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	24658	0	24763	598	0
2	B	2557	0	2487	90	0
2	C	2494	0	2419	102	0
2	D	373	0	172	0	0
2	E	373	0	172	1	0
3	F	170	0	73	0	0
3	G	170	0	73	0	0
4	H	607	0	285	1	0
4	I	602	0	282	3	0
5	A	81	0	36	14	0
6	A	31	0	12	2	0
7	A	2	0	0	0	0
All	All	32118	0	30774	788	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 13.

The worst 5 of 788 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:2965:ARG:NH2	1:A:3640:SER:O	2.00	0.94
2:C:174:ILE:HB	2:C:188:MET:HB3	1.60	0.82
1:A:2503:SER:HB3	1:A:2511:ARG:HG2	1.60	0.81
2:C:207:ILE:HB	2:C:219:TRP:HB2	1.64	0.79
1:A:3039:LYS:O	2:B:273:ARG:NH2	2.16	0.79

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	3057/4646 (66%)	2977 (97%)	79 (3%)	1 (0%)	100	100
2	B	320/410 (78%)	306 (96%)	14 (4%)	0	100	100
2	C	309/410 (75%)	289 (94%)	20 (6%)	0	100	100
2	D	73/410 (18%)	73 (100%)	0	0	100	100
2	E	73/410 (18%)	72 (99%)	1 (1%)	0	100	100
3	F	32/638 (5%)	32 (100%)	0	0	100	100
3	G	32/638 (5%)	32 (100%)	0	0	100	100
4	H	120/1281 (9%)	119 (99%)	1 (1%)	0	100	100
4	I	119/1281 (9%)	119 (100%)	0	0	100	100
All	All	4135/10124 (41%)	4019 (97%)	115 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1374	PRO

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	2721/4125 (66%)	2721 (100%)	0	100	100
2	B	287/364 (79%)	287 (100%)	0	100	100
2	C	280/364 (77%)	280 (100%)	0	100	100
All	All	3288/4853 (68%)	3288 (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. 5 of 28 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	3069	ASN
2	C	277	HIS
1	A	3535	HIS
1	A	4530	GLN
1	A	3522	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$
5	ADP	A	4703	-	28,29,29	1.41	4 (14%)	43,45,45	1.89	8 (18%)
5	ADP	A	4701	7	28,29,29	1.45	5 (17%)	43,45,45	1.83	8 (18%)
6	ATP	A	4702	7	32,33,33	0.31	0	48,52,52	0.30	0
5	ADP	A	4704	-	28,29,29	1.41	4 (14%)	43,45,45	1.82	9 (20%)

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	ADP	A	4703	-	-	2/16/32/32	0/3/3/3
5	ADP	A	4701	7	-	4/16/32/32	0/3/3/3
6	ATP	A	4702	7	-	0/22/38/38	0/3/3/3
5	ADP	A	4704	-	-	2/16/32/32	0/3/3/3

The worst 5 of 13 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	4703	ADP	C5-C4	4.79	1.47	1.39
5	A	4701	ADP	C5-C4	4.76	1.47	1.39
5	A	4704	ADP	C5-C4	4.69	1.47	1.39
5	A	4704	ADP	C5-C6	2.75	1.48	1.41
5	A	4703	ADP	C5-C6	2.72	1.48	1.41

The worst 5 of 25 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	4703	ADP	C5-C4-N3	-6.38	117.93	126.72
5	A	4701	ADP	C5-C4-N3	-6.02	118.42	126.72
5	A	4704	ADP	C5-C4-N3	-5.87	118.63	126.72
5	A	4703	ADP	N3-C4-N9	5.10	135.84	127.17
5	A	4701	ADP	N3-C4-N9	4.74	135.23	127.17

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

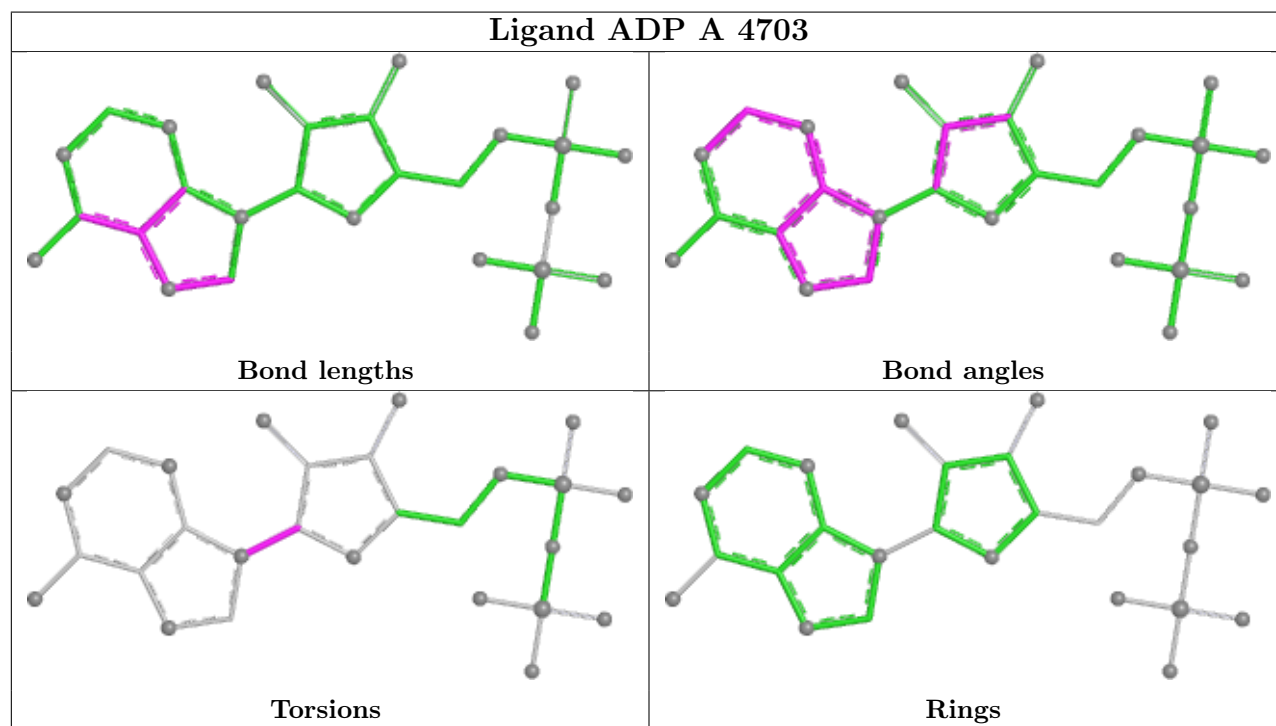
Mol	Chain	Res	Type	Atoms
5	A	4701	ADP	PA-O3A-PB-O2B
5	A	4701	ADP	PA-O3A-PB-O3B
5	A	4701	ADP	O4'-C4'-C5'-O5'
5	A	4701	ADP	C3'-C4'-C5'-O5'
5	A	4704	ADP	C3'-C4'-C5'-O5'

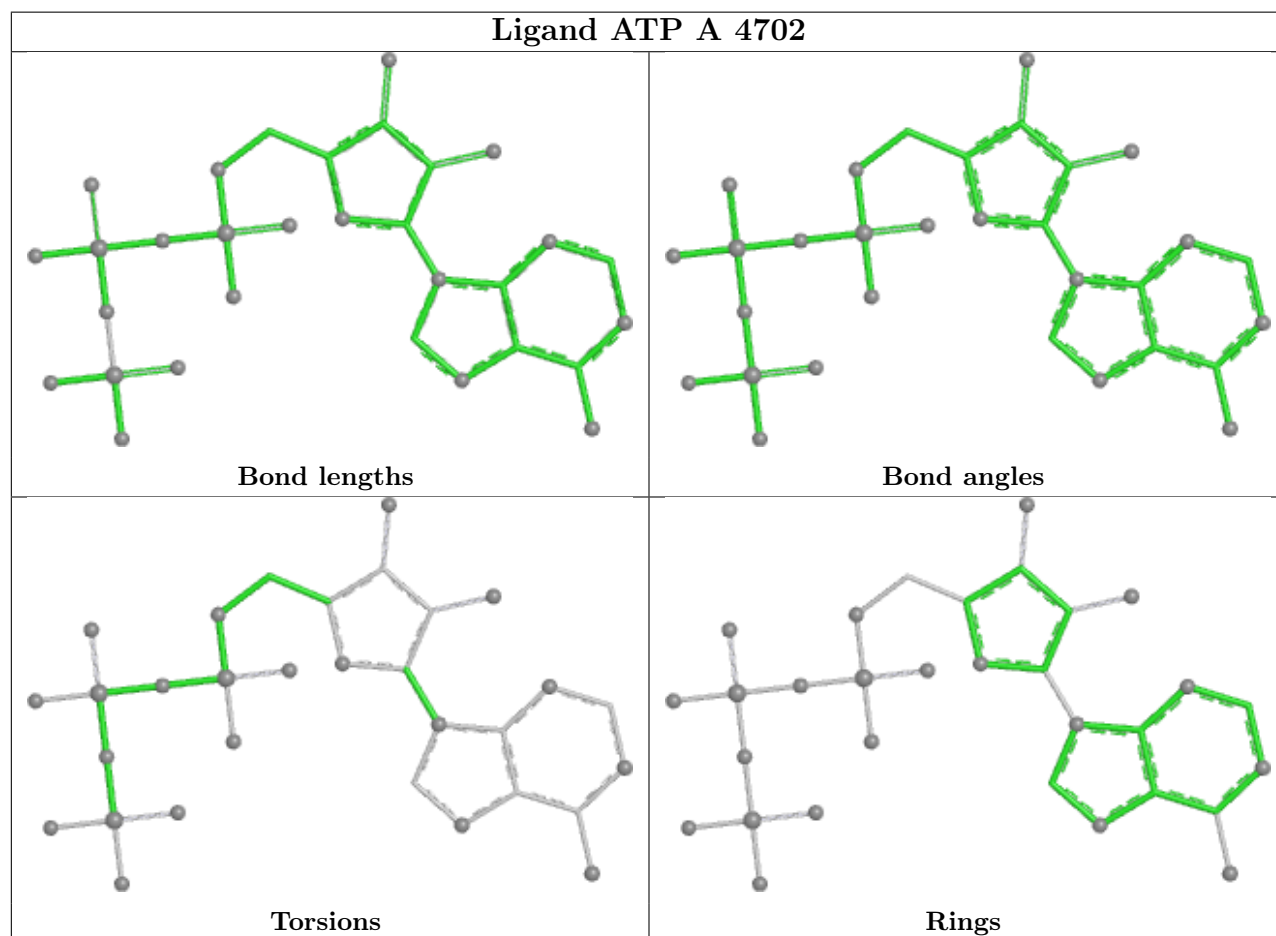
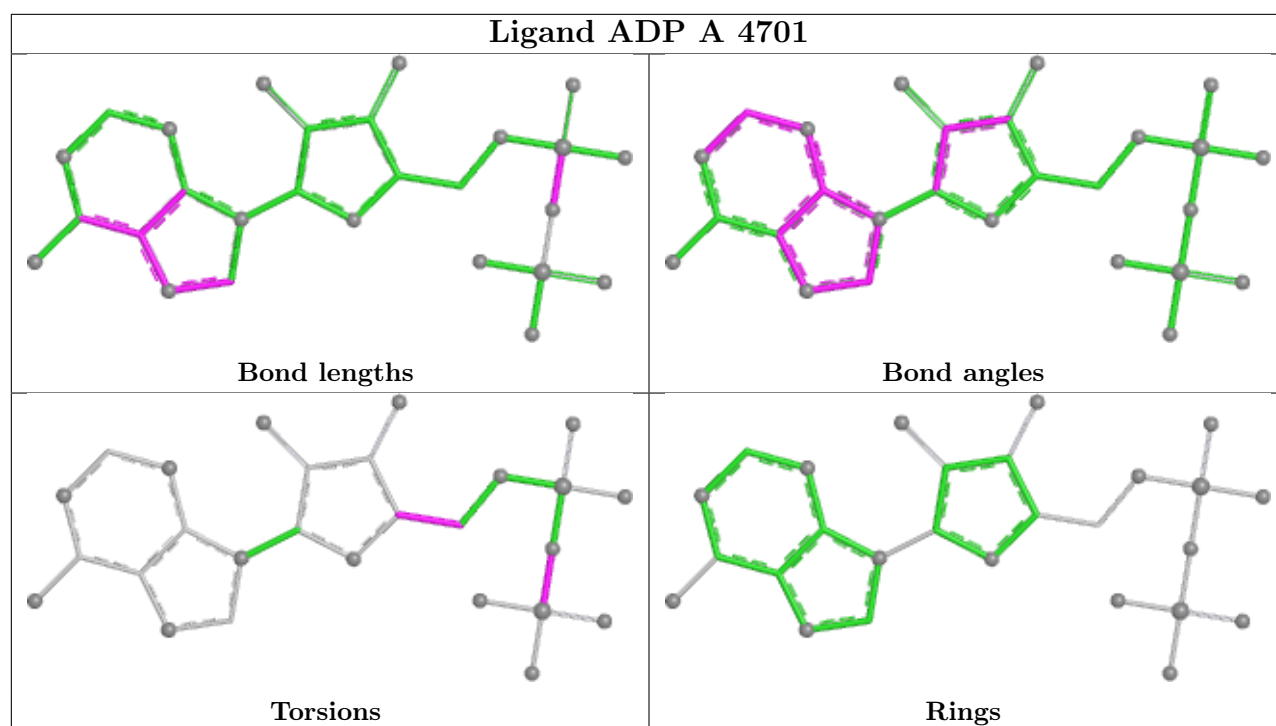
There are no ring outliers.

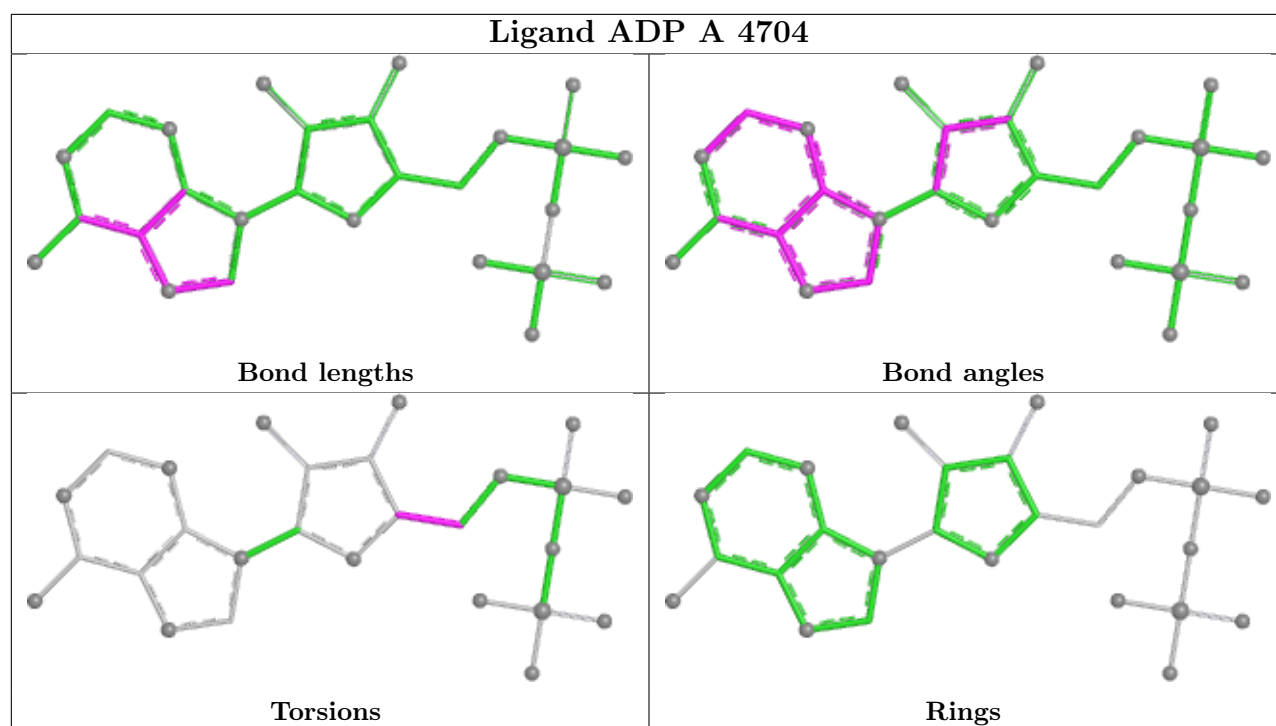
4 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	4703	ADP	2	0
5	A	4701	ADP	9	0
6	A	4702	ATP	2	0
5	A	4704	ADP	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 [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

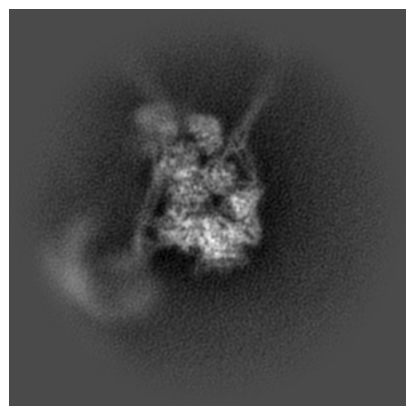
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-73174. These allow visual inspection of the internal detail of the map and identification of artifacts.

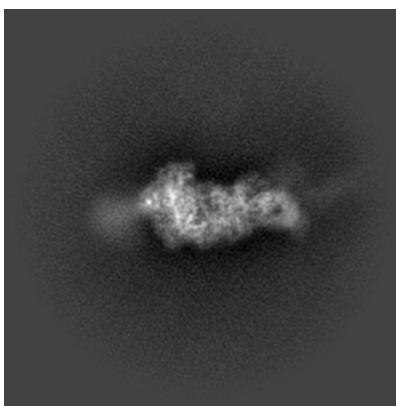
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

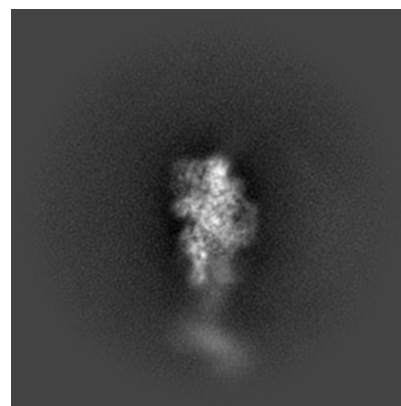
6.1.1 Primary map



X

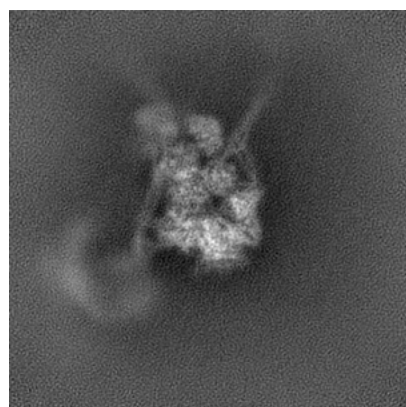


Y

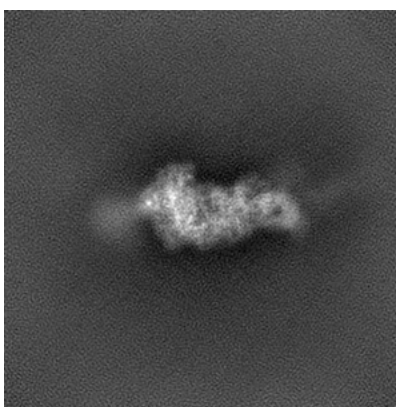


Z

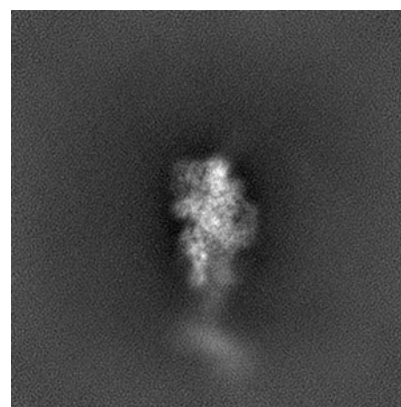
6.1.2 Raw map



X



Y

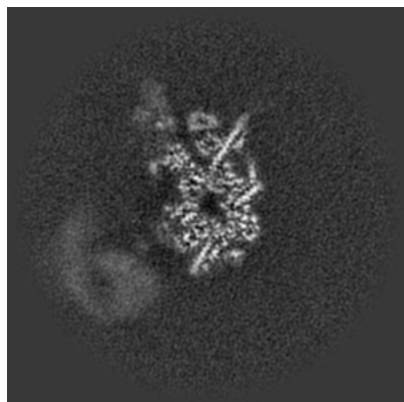


Z

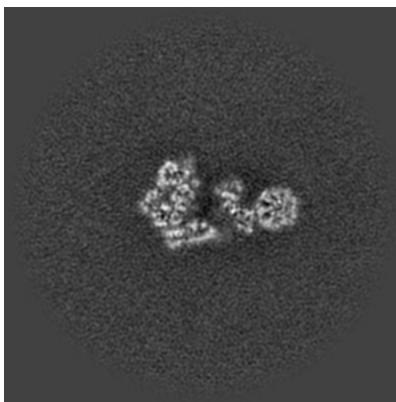
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

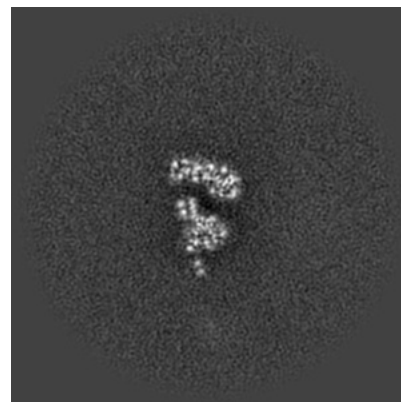
6.2.1 Primary map



X Index: 128

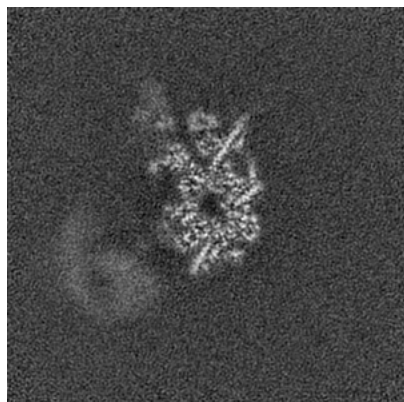


Y Index: 128

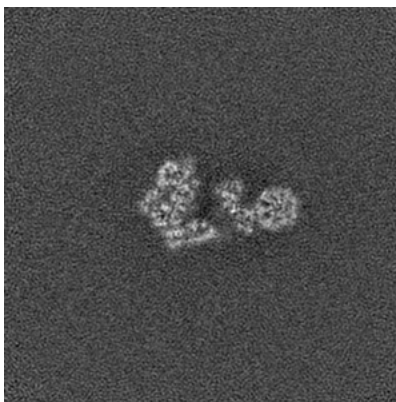


Z Index: 128

6.2.2 Raw map



X Index: 128



Y Index: 128

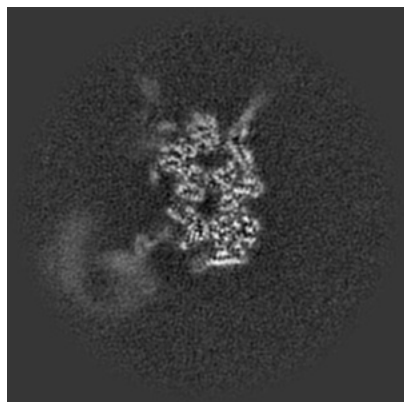


Z Index: 128

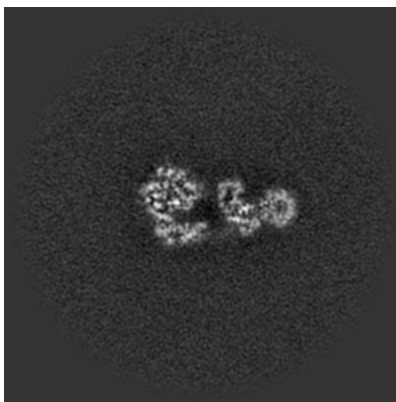
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

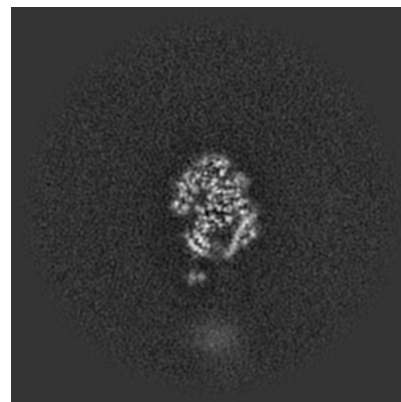
6.3.1 Primary map



X Index: 132

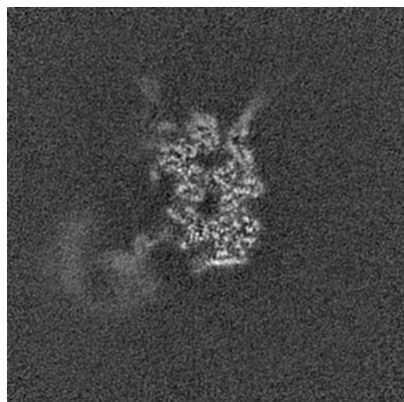


Y Index: 132

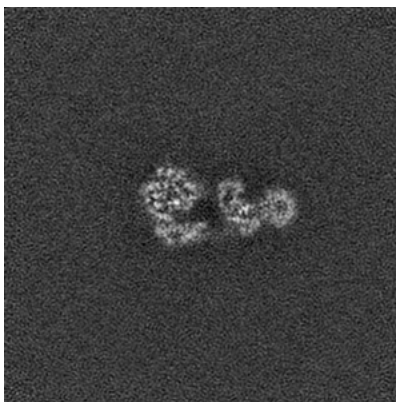


Z Index: 112

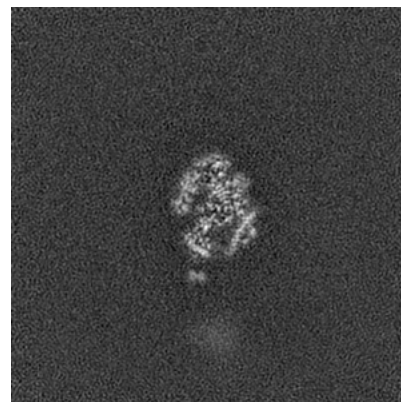
6.3.2 Raw map



X Index: 132



Y Index: 132

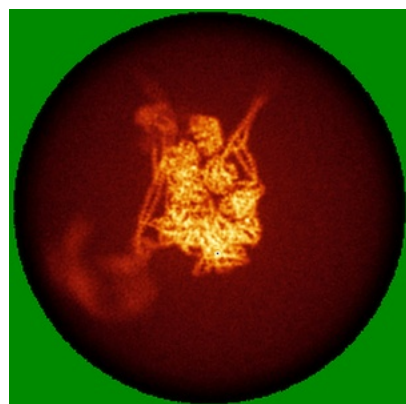


Z Index: 113

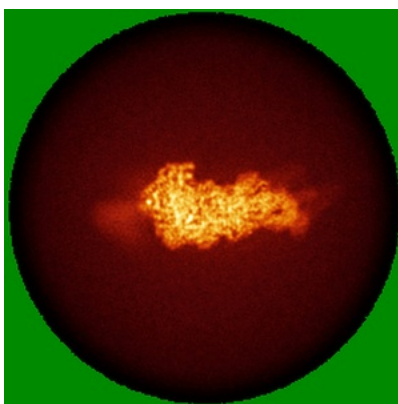
The images above show the largest variance slices of the map in three orthogonal directions.

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

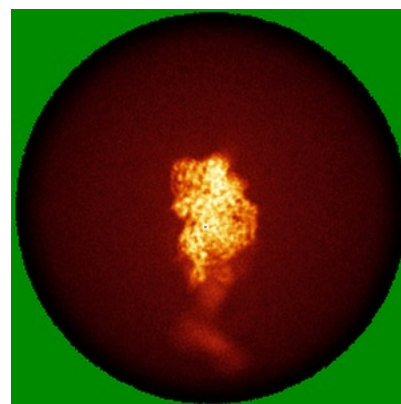
6.4.1 Primary map



X

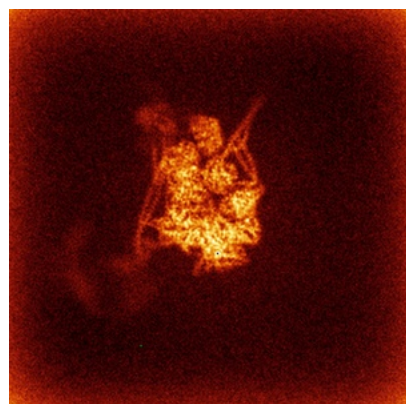


Y

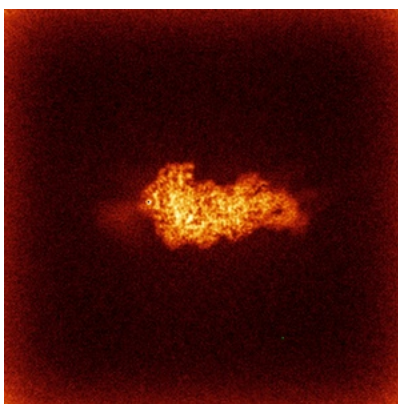


Z

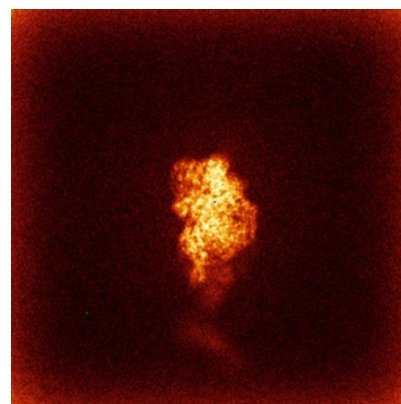
6.4.2 Raw map



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.

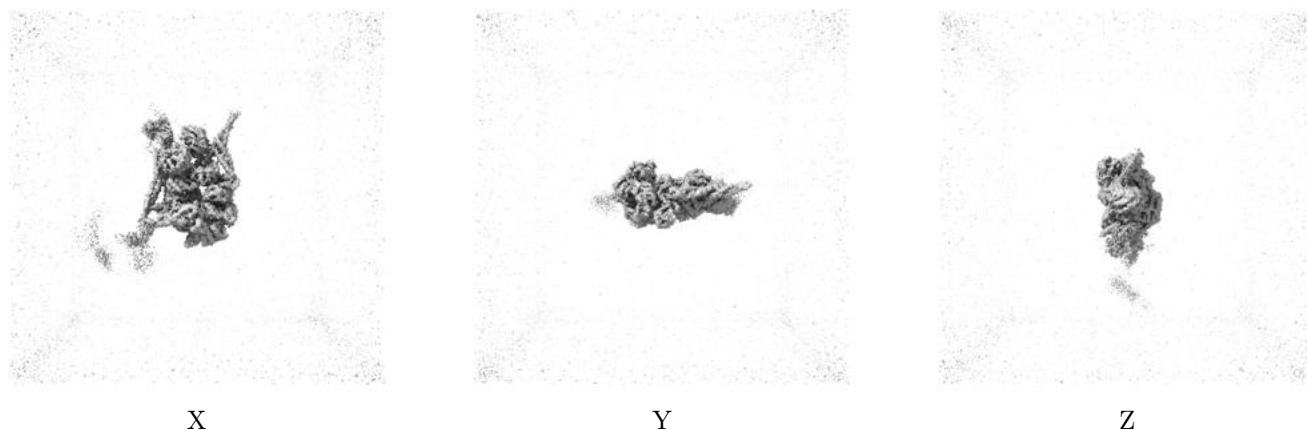
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.15. 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.

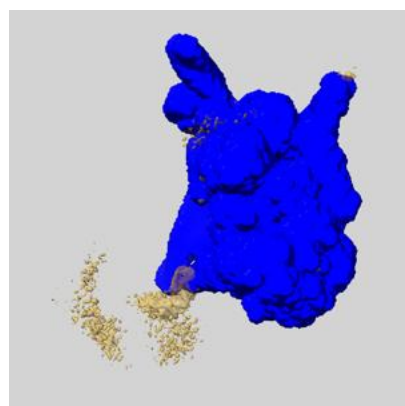
6.6 Mask visualisation [i](#)

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

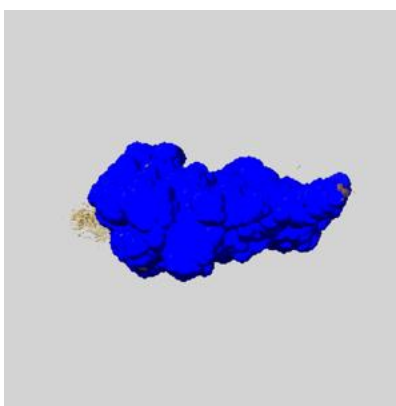
A mask typically either:

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

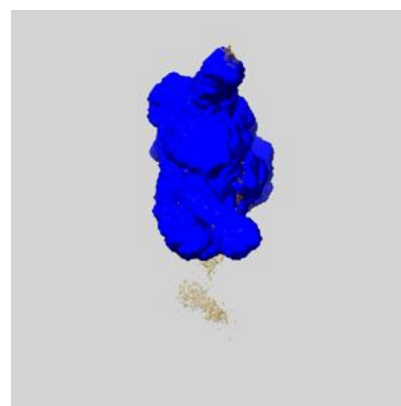
6.6.1 emd_73174_msk_1.map [i](#)



X



Y

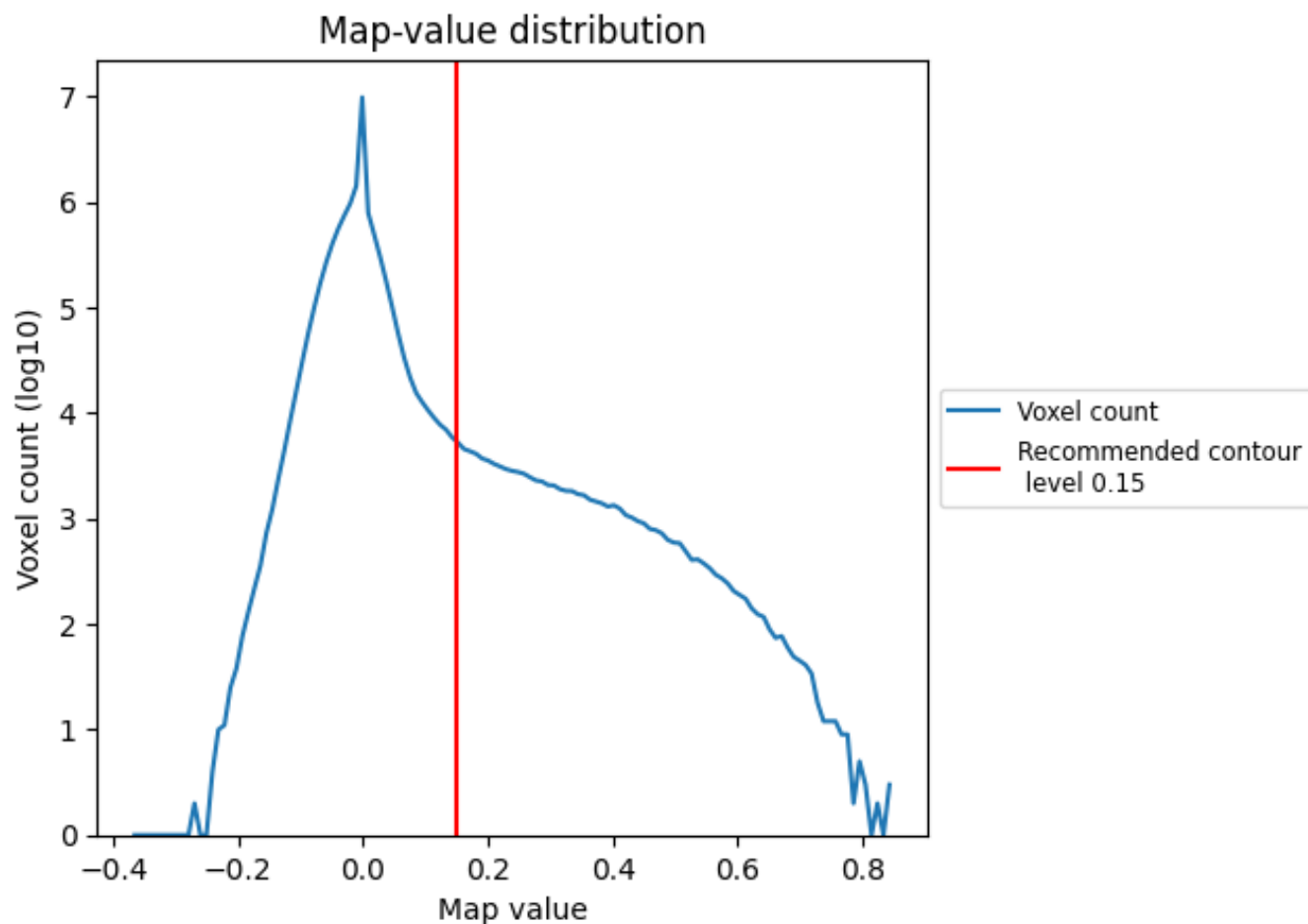


Z

7 Map analysis [i](#)

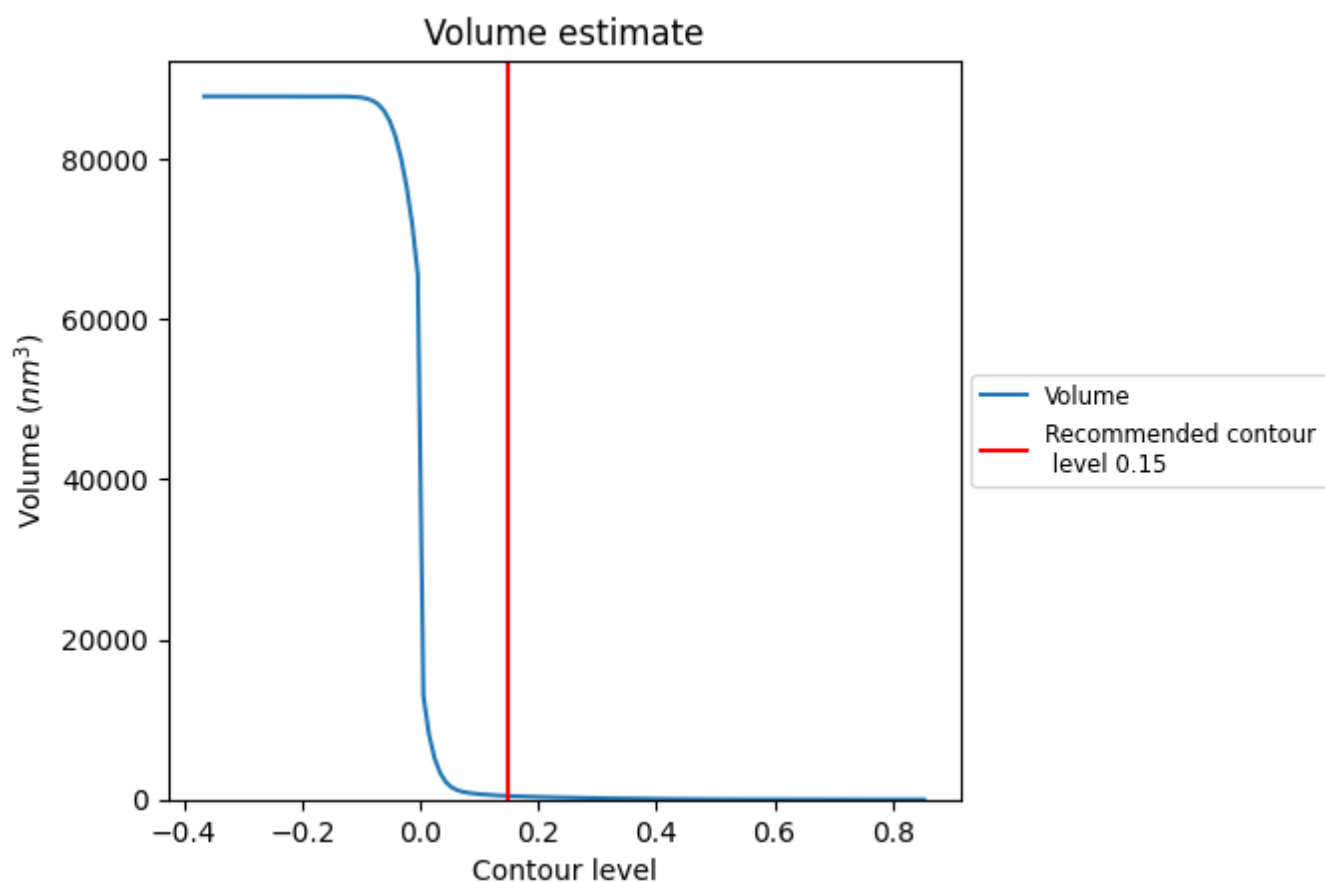
This section contains the results of statistical analysis of the map.

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.

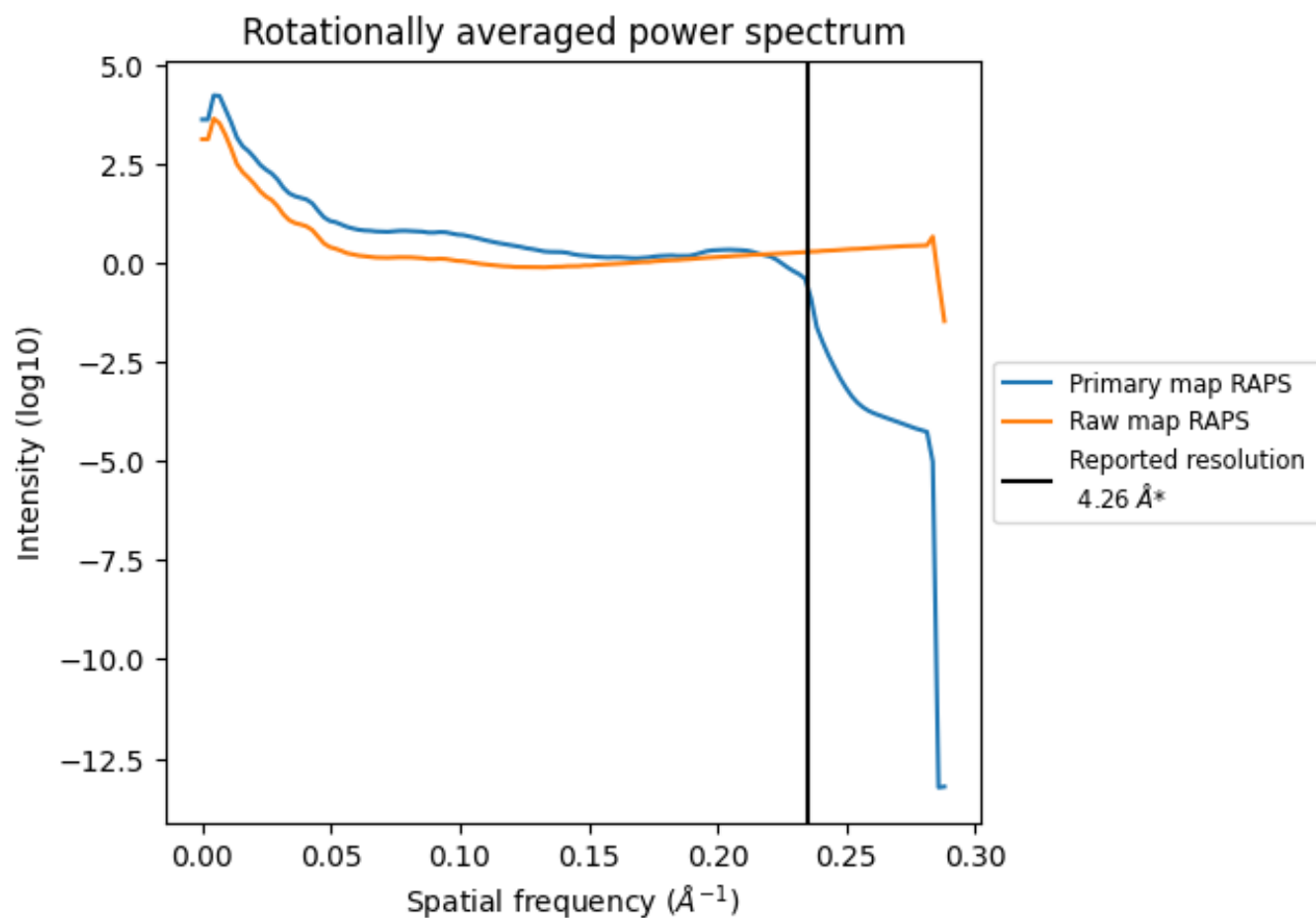
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 447 nm³; this corresponds to an approximate mass of 404 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 ⓘ

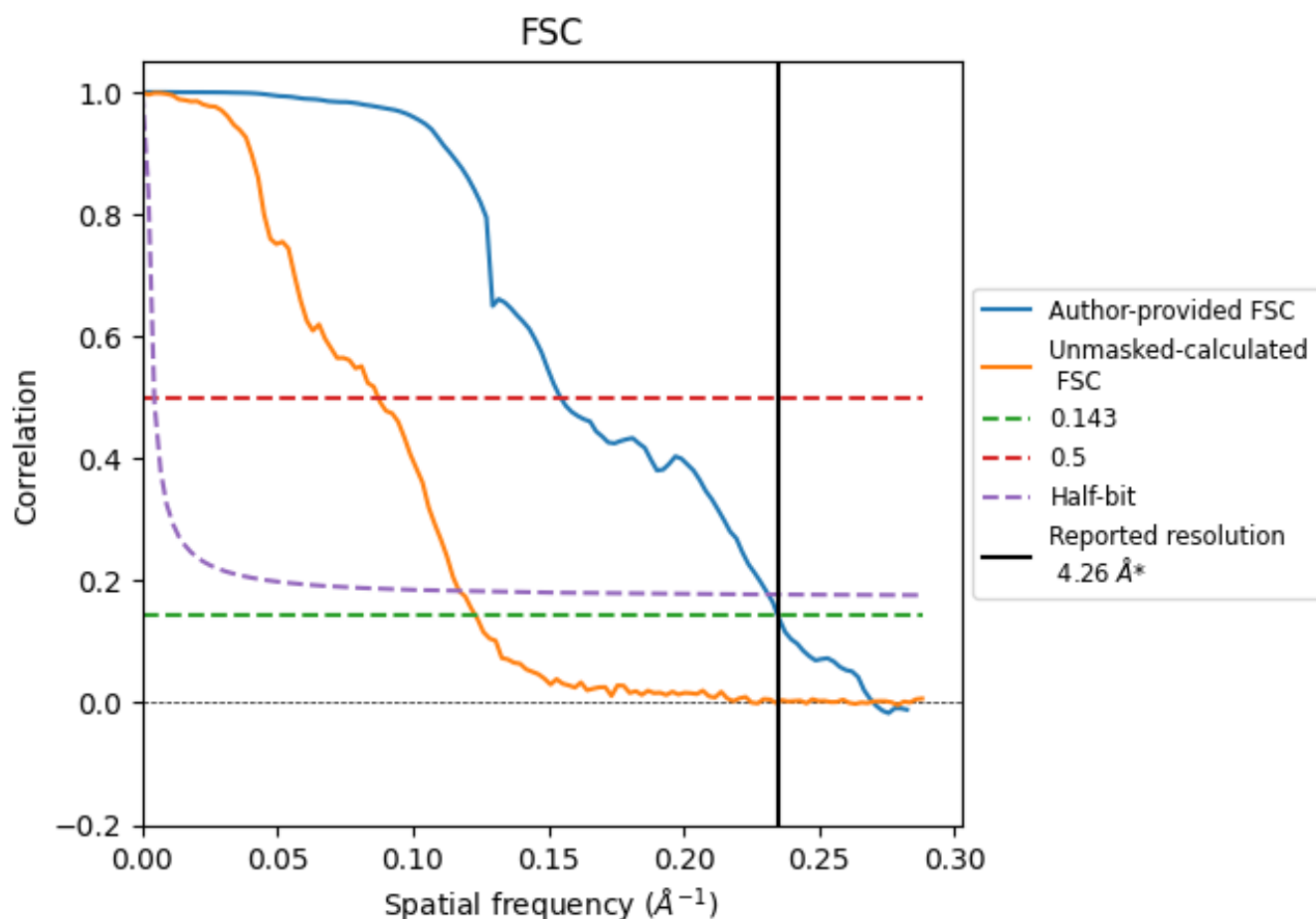


*Reported resolution corresponds to spatial frequency of 0.235 Å⁻¹

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 0.235 \AA^{-1}

8.2 Resolution estimates [i](#)

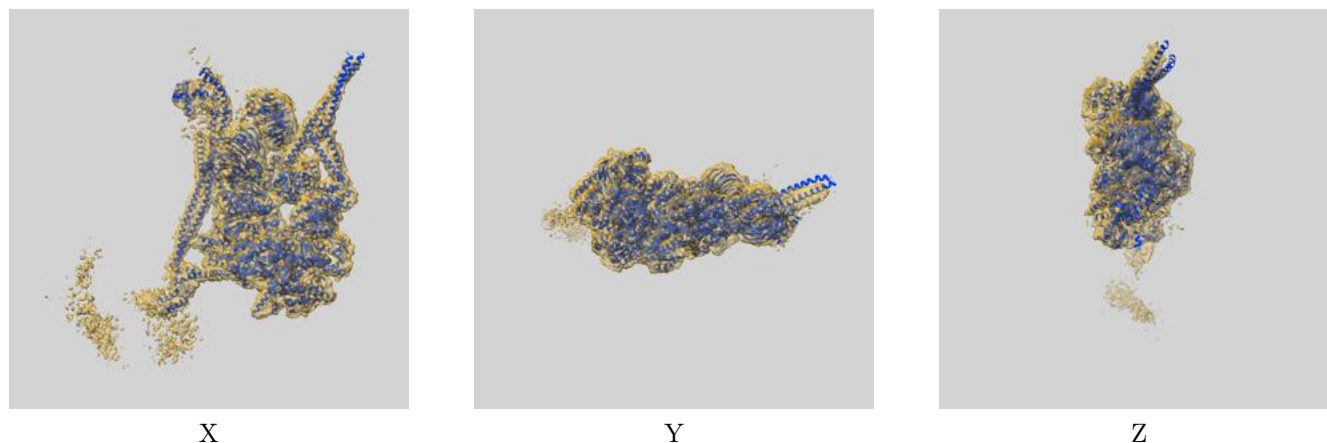
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.26	-	-
Author-provided FSC curve	4.26	6.47	4.33
Unmasked-calculated*	8.13	11.48	8.54

*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 8.13 differs from the reported value 4.26 by more than 10 %

9 Map-model fit [i](#)

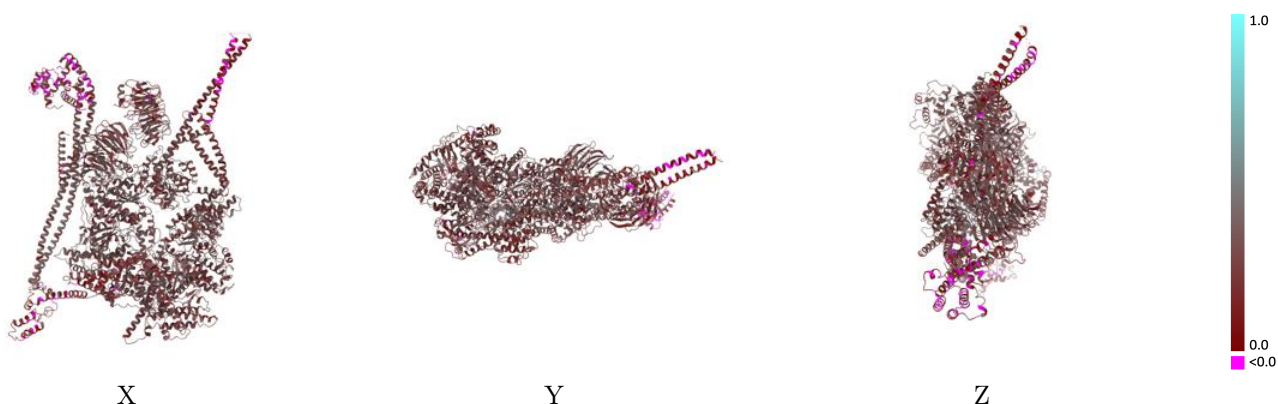
This section contains information regarding the fit between EMDB map EMD-73174 and PDB model 9YND. Per-residue inclusion information can be found in section [3](#) on page [8](#).

9.1 Map-model overlay [i](#)



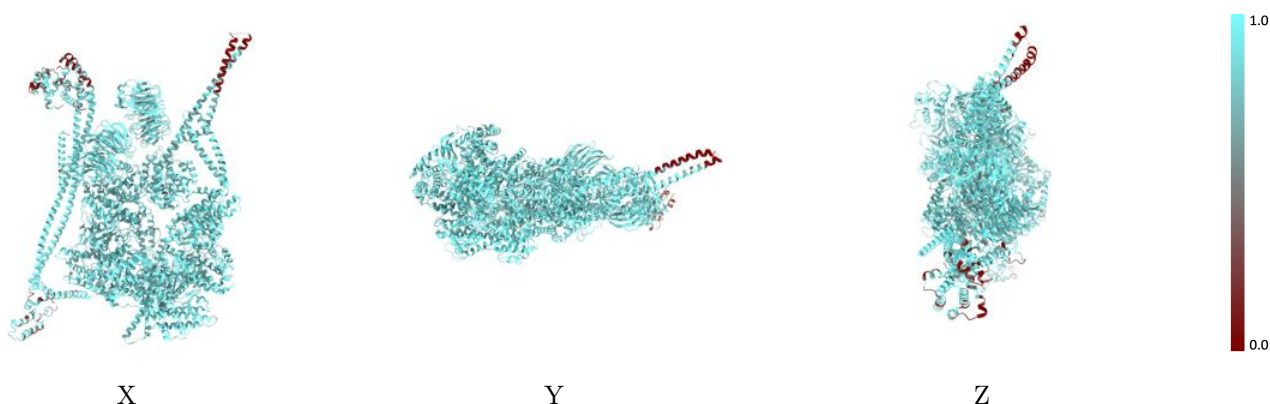
The images above show the 3D surface view of the map at the recommended contour level 0.15 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



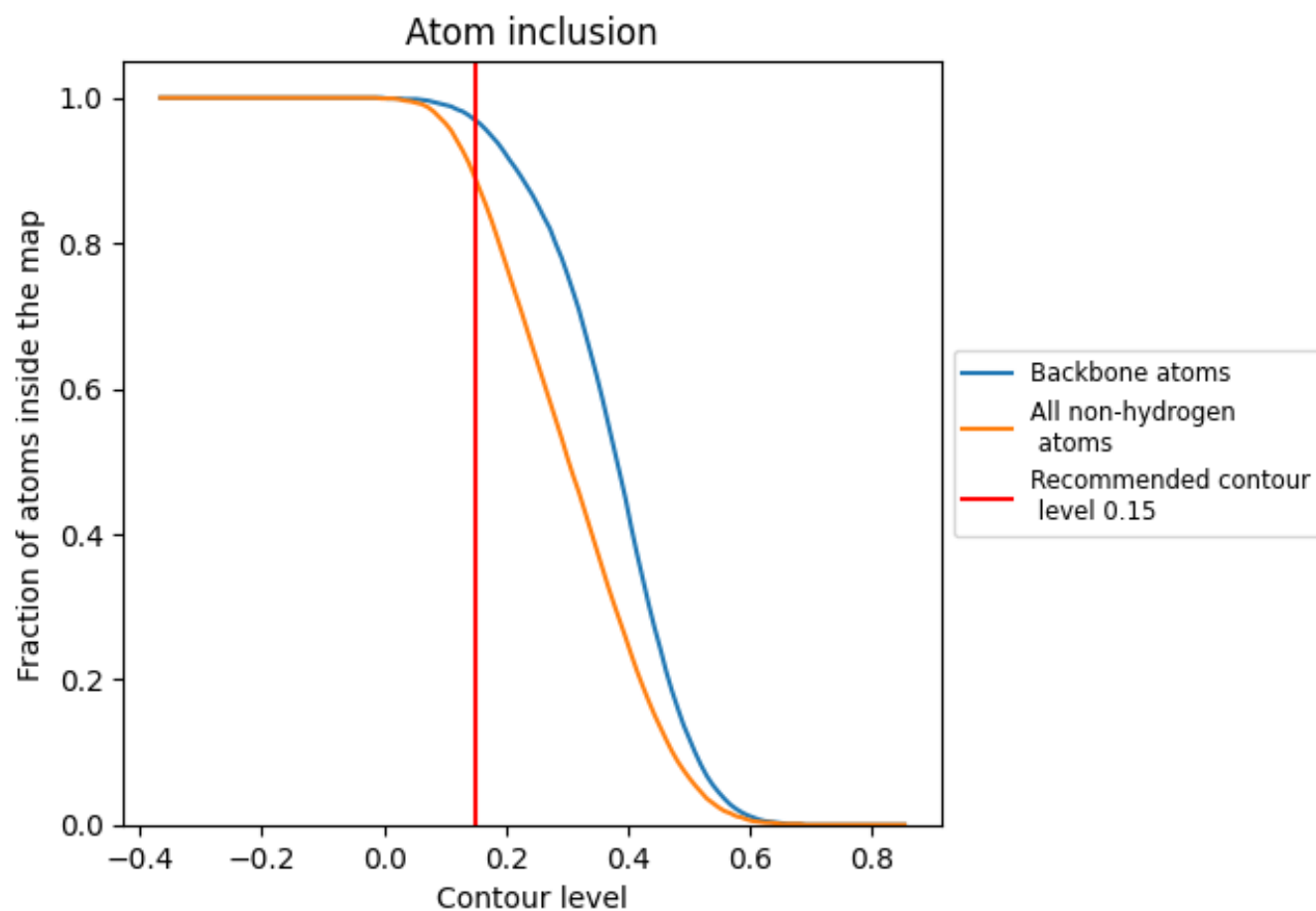
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.15).

9.4 Atom inclusion [i](#)



At the recommended contour level, 97% of all backbone atoms, 89% 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 (0.15) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div><div></div>0.8890</div>	<div><div></div>0.2870</div>
A	<div><div></div>0.8920</div>	<div><div></div>0.2930</div>
B	<div><div></div>0.8950</div>	<div><div></div>0.3020</div>
C	<div><div></div>0.9050</div>	<div><div></div>0.2610</div>
D	<div><div></div>0.6700</div>	<div><div></div>0.1660</div>
E	<div><div></div>0.7400</div>	<div><div></div>0.1450</div>
F	<div><div></div>0.9410</div>	<div><div></div>0.2990</div>
G	<div><div></div>0.9590</div>	<div><div></div>0.3040</div>
H	<div><div></div>0.8900</div>	<div><div></div>0.2630</div>
I	<div><div></div>0.8880</div>	<div><div></div>0.2740</div>

1.0

0.0

<0.0