



wwPDB EM Validation Summary Report ⓘ

Dec 17, 2022 – 06:45 pm GMT

PDB ID : 6ZHE
EMDB ID : EMD-11219
Title : Cryo-EM structure of DNA-PK dimer
Authors : Chaplin, A.K.; Hardwick, S.W.; Chirgadze, D.Y.; Blundell, T.L.
Deposited on : 2020-06-23
Resolution : 7.24 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.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.3

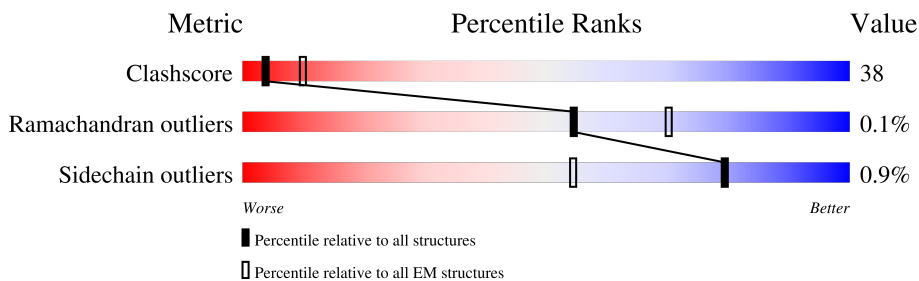
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 7.24 Å.

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



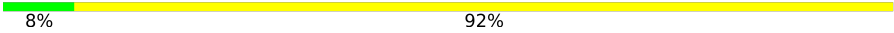

Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 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	4156	 35% 55% 9%
1	F	4156	 35% 55% 10%
2	B	609	 31% 49% 20%
2	G	609	 35% 44% 20%
3	C	732	 44% 52%
3	H	732	 44% 52%
4	J	25	 20% 80%
5	I	27	 26% 74%

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Mol	Chain	Length	Quality of chain
6	D	26	 8% 92%
7	E	28	 18% 82%

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 78785 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 DNA-dependent protein kinase catalytic subunit,DNA-PKcs.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	3768	Total	C	N	O	S	0	0
			29018	18632	4914	5293	179		
1	F	3731	Total	C	N	O	S	0	0
			29012	18636	4896	5295	185		

- Molecule 2 is a protein called X-ray repair cross-complementing protein 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	489	Total	C	N	O	S	0	0
			3789	2430	640	704	15		
2	G	489	Total	C	N	O	S	0	0
			3797	2434	640	708	15		

- Molecule 3 is a protein called X-ray repair cross-complementing protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	705	Total	C	N	O	S	0	0
			5490	3502	927	1037	24		
3	H	700	Total	C	N	O	S	0	0
			5517	3522	929	1041	25		

- Molecule 4 is a DNA chain called DNA (25-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	J	25	Total	C	N	O	P	0	0
			509	244	86	154	25		

- Molecule 5 is a DNA chain called DNA (27-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
5	I	27	Total	C	N	O	P	0	0
			552	265	102	158	27		

- Molecule 6 is a DNA chain called DNA (26-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
6	D	26	528	253	89	160	26	0	0

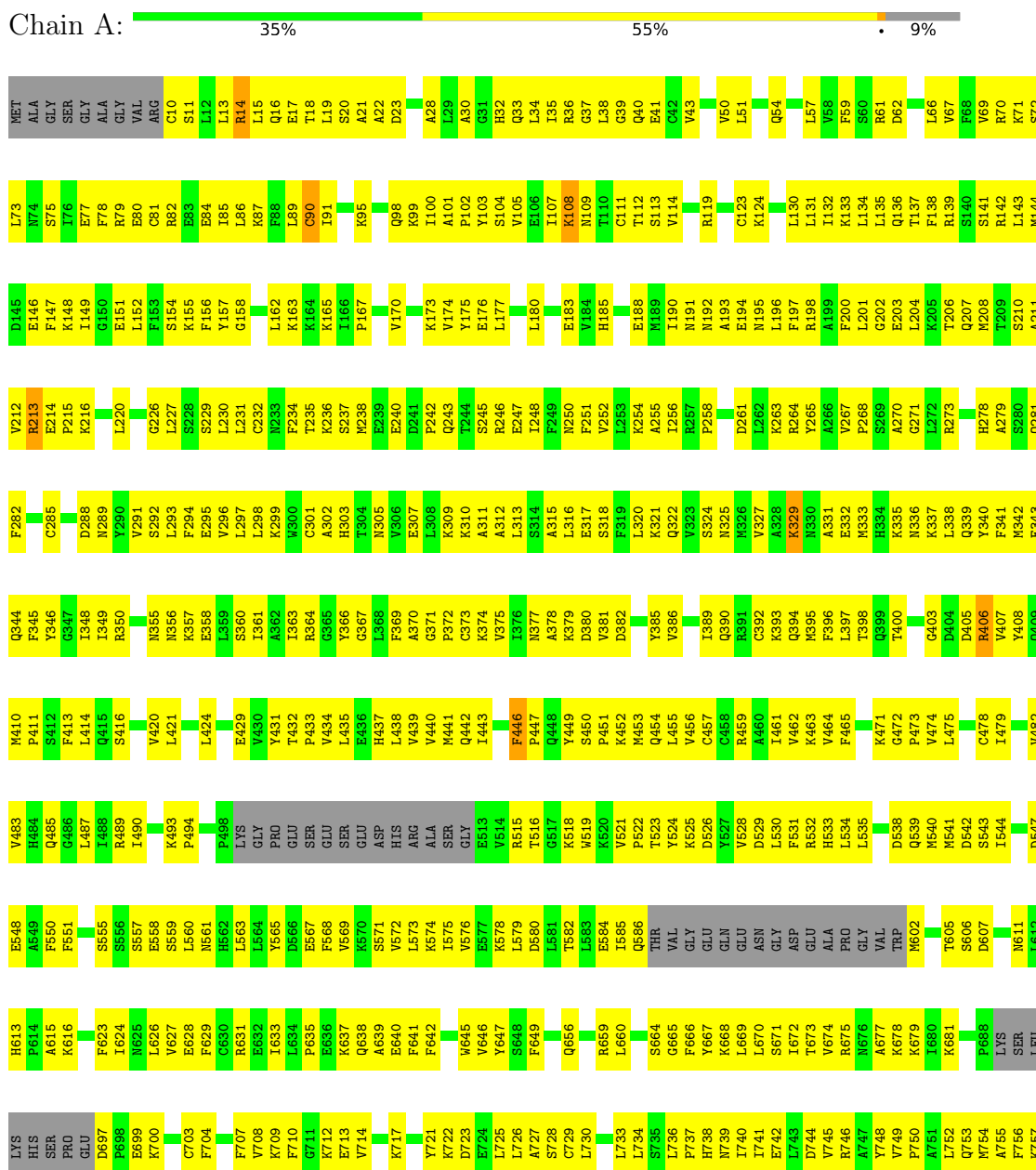
- Molecule 7 is a DNA chain called DNA (28-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
7	E	28	573	275	107	163	28	0	0

3 Residue-property plots

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

- Molecule 1: DNA-dependent protein kinase catalytic subunit,DNA-PKcs



F2854	K2786	LEU	PRO	PHE	H2527	R2456	F2389	I2326	F2260	F2128	M1859
V2855	H2787	ARG	LEU	VAL	E2528	F2457	H2390	L2327	S2261	L2129	E1860
S2856	G2788	LEU	VAL	GLU	R2529	V2458	G2391	G2262	G2262	L2129	S1861
C2857	S2789	ARG	ASP	THR	R2530	V2459	V2392	Y2328	K2263	H2130	T1862
I2858	L2790	ARG	HIS	GLN	L2531	E2460	L2393	D2264	P2202	K2132	F1863
Q2859	I2791	ARG	THR	ALA	P2534	H2464	K2394	M2331	T2203	L2133	Q1866
N2860	T2792	PHE	SER	SER	N2534	F2465	T2395	G2204	G2204	G2134	I1867
L2861	P2793	MET	PRO	GLN	D2537	F2466	R2396	V2205	V2205	N2135	I1870
S2862	L2794	ARG	SER	GLY	S2466	T2467	C2397	P2206	P2206	L2136	K1870
Q2863	Q2795	ASP	SER	THR	L2538	T2468	L2398	K2207	K2207	L2137	M1871
C2864	Q2796	GLN	ASP	THR	R2539	E2399	N2336	N2270	N2270	L2138	E1935
H2865	V2797	GLY	SER	GLN	C2469	C2469	L2337	E2209	E2209	R1936	G1872
A2798	A2798	LEU	LEU	THR	R2470	R2470	F2338	V2210	V2210	L1873	R1937
Q2799	Q2799	LEU	LEU	ARG	E2471	E2471	E2339	L2211	L2211	Y1874	Y1874
L2868	R2800	SER	PHE	THR	Q2472	Q2472	I2274	A2212	A2212	K1875	K1875
L2869	D2801	LEU	ALA	GLN	M2473	M2473	Q2275	N2213	N2213	L1876	L1876
P2873	P2802	MET	HIS	GLU	Y2474	Y2474	E2343	R2214	R2214	L1877	L1877
A2804	L2804	GLY	HIS	GLY	N2475	N2475	L2277	L2215	L2215	C1942	C1942
S2877	A2805	ALA	ARG	SER	E2551	I2476	A2346	L2216	L2216	A1943	A1943
C2880	K2806	LYS	SER	LEU	F2554	M2479	K2347	L2219	L2219	M1946	M1946
L2881	Q2807	GLY	GLU	ALA	L2555	I2480	M2220	M2220	M2220	C1947	C1947
A2882	L2808	VAL	LEU	ARG	H2481	H2481	K2350	K2221	K2221	R1883	R1883
S2883	F2809	ALA	GLM	TRP	T2559	D2482	Q2351	H2222	H2222	L1884	L1884
L2884	S2810	GLU	ARG	PRO	N2560	N2483	P2286	V2223	V2223	P1885	P1885
Q2885	S2811	GLN	ALA	VAL	F2561	V2484	P2287	F2224	F2224	K1886	K1886
Q2886	L2812	LYS	PRO	ALA	R2485	R2485	Q2291	H2225	H2225	D1887	D1887
F2887	F2813	ARG	LEU	GLY	D2486	D2486	Q2291	R2226	R2226	V1965	V1965
L2890	L2817	LYS	LYS	SER	L2562	L2562	M2356	P2226	P2226	F1966	F1966
R2891	K2818	GLU	LYS	ILE	E2564	E2564	F2423	K2227	K2227	N1957	N1957
L2892	E2819	ILE	VAL	ARG	M2565	M2494	N2424	R2228	R2228	H1890	H1890
N2820	N2820	LYS	PRO	GLY	R2497	H2426	K2359	A2229	A2229	E1891	E1891
D2821	D2821	THR	PRO	THR	S2569	R2427	I2361	F2231	F2231	L1892	L1892
T2825	T2825	SER	PHE	GLN	Y2572	L2498	F2300	H2233	H2233	E1893	E1893
L2826	E2894	GLU	ASP	GLN	R2573	R2573	C2363	R2232	R2232	S1894	S1894
S2897	E2895	LEU	GLY	GLN	N2574	N2574	L2364	H2234	H2234	K1896	K1896
E2898	L2897	LYS	LYS	HIS	N2575	K2503	M2365	L2235	L2235	P1971	P1971
R2899	L2898	MET	LYS	ASP	P2576	D2504	K2366	E2236	E2236	E1972	E1972
L2900	E2828	LYS	ARG	PHE	M2576	V2505	V2367	I2237	I2237	K1973	K1973
L2901	K2829	GLN	LEU	THR	L2506	L2506	T2368	F2238	F2238	M1974	M1974
P2902	N2830	ASP	GLY	LEU	T2507	T2507	K2369	K2239	K2239	L1976	L1976
A2903	N2831	LEU	LEU	THR	Q2508	Q2508	S2370	T2240	T2240	G1902	G1902
E2904	L2832	MET	PRO	GLN	G2509	G2509	F2371	L2241	L2241	S1903	S1903
A2907	K2835	LYS	ASP	ALA	I2511	I2511	P2372	V2242	V2242	E1979	E1979
L2836	L2836	GLU	GLU	ASP	D2512	D2512	F2373	W2245	W2245	M1980	M1980
Q2838	L2837	VAL	VAL	GLY	E2513	E2513	A2375	K2246	K2246	L1981	L1981
D2839	Q2838	ASN	ASN	ARG	N2514	N2514	D2376	D2247	D2247	I1982	I1982
F2840	F2840	LYS	LYS	SER	P2515	P2515	R2377	G2248	G2248	P1986	P1986
M2841	M2841	VAL	VAL	PHE	G2516	G2516	F2378	L2249	L2249	R1986	R1986
R2842	R2842	LYS	LYS	ASP	L2517	L2517	M2379	S2250	S2250	ARG	ARG
F2843	F2843	GLY	TRP	ASP	Q2518	Q2518	M2380	I2251	I2251	TYR	TYR
L2844	D2779	ALA	ALA	LEU	L2519	L2519	A2381	P2252	P2252	ASN	ASN
N2845	L2844	ALA	LEU	LEU	L2520	L2520	V2382	R2253	R2253	GLN	GLN
F2850	N2845	THR	THR	THR	T2521	T2521	F2384	R2254	R2254	PHE	PHE
F2851	F2850	ARG	ARG	GLY	R2522	R2522	L2451	A2320	A2320	THR	THR
L2852	F2851	THR	THR	LEU	N2523	N2523	L2385	L2255	L2255	VAL	VAL
D2852	L2852	THR	THR	SER	F2524	F2524	L2386	I2256	I2256	GLU	GLU
P2853	L2785	LEU	LEU	ASP	W2526	W2526	K2388	F2257	F2257	VAL	VAL
								K2259	K2259	GLN	GLN

A3931	V3852	T3790	A3720	Q3494	L3416	L3348	K3267	L3135	I3065	D2992
M3932	G3853	Y3791	G3721	F3495	A3417	A3349	T3268	T3136	D3066	W2923
E3933	A3854	S3792	F3722	I3496	D3418	E3350	R3269	E3137	K3067	W2924
T3934	Y3855	D3723	L3652	L3499	F3419	L3351	R3270	I3138	A3068	E2995
G3935	M3856	R3653	L3562	S3400	C3420	E3352	D3271	K3139	M3069	L2996
G3936	M3654	D3563	R3275	I3350	D3421	E3352	W3272	E3140	H3070	L2997
V3937	K3796	Q3564	V3726	H3501	D3421	R3357	L3273	F3141	G3071	K2998
	K3797	G3565	T3727	M3502	R3425	R3358	V3274	I3142	E3072	L2999
H3944	G3860	G3566	T3728	L3505	E3429	I3359	S3275	S3143	D3000	L2999
A3945	N3660	V3567	M3729	L3506	ASN	L3360	W3276	F3144	C3001	Y2930
F3946	T3663	V3567	M3729	D3507	ALA	L3360	W3276	I3145	Y3002	R2931
N3947	N3664	L3506	R3733	K3508	ALA	E3361	V3277	K3075	N3003	
A3949	M3665	L3508	P3735	A3511	SER	S3365	Q3278	H3004	H3004	G2934
T3950	L3667	L3571	P3735	A3512	ILE	S3366	R3282	L3005	E2935	G2935
Q3951	M3677	M3573	R3736	A3513	ASP	E3367	R3283	L3005	Y2936	E2937
F3952	L3668	A3574	R3737	A3514	ASP	E3368	L3283	L3007	W3008	W2938
L3953	L3669	L3575	M3679	A3515	SER	D3369	R3287	L3007	K3009	L2939
L3954	M3670	K3586	I3740	Q3515	ALA	E3438	R3287	S3083	R2940	R2940
V3955	K3671	D3587	K3672	H3516	E3438	K3372	R3287	G3084	G2941	G2941
	D3587	K3588	D3587	H3516	P3443	V3373	S3290	E3085	L2942	L2942
P3960	K3588	K3588	S3517	H3516	P3443	I3374	S3290	E3085	F2943	F2943
F3961	S3589	S3589	A3375	V3518	V3446	A3375	Q3292	S3087	D3020	D3020
L3962	M3590	M3590	E3376	E3519	V3446	G3376	G3292	S3087	L3088	L3088
L3963	D3591	D3591	L3377	E3520	V3446	L3377	C3293	R3167	L3089	L3089
T3964	V3592	V3592	Y3378	E3520	K3449	Y3378	S3294	L3161	L3089	L3089
R3965	R3593	R3593	Q3379	D3523	M3450	Q3379	E3295	L3162	Y3090	Y3090
F3967	A3594	A3594	R3380	N3524	K3451	R3380	L3298	T3163	L3092	L3092
I3968	E3595	E3595	A3381	M3525	K3452	A3381	L3298	W3164	L3092	L3092
N3969	L3596	L3596	F3382	F3531	A3453	F3382	K3302	K3158	Q3093	Q3093
L3970	W3686	K3602	Q3383	Y3532	A3453	Q3383	K3302	R3159	W3031	W3031
L3971	D3689	M3603	F3384	L3529	K3455	H3384	S3305	L3160	D3094	D3094
F3972	D3689	K3604	R3461	V3530	A3461	S3385	L3306	L3161	R3095	R3095
P3973	F3690	M3613	R3462	Y3531	L3462	A3388	E3309	R3166	R3232	R3232
M3974	K3691	Y3614	K3464	F3533	R3464	K3464	F3309	R3167	R3095	R3095
K3975	E3693	A3615	F3465	L3534	F3465	Q3390	M3310	L3168	E3033	E3033
E3976	F3694	A3616	P3466	L3535	P3466	A3391	M3311	P3169	P3034	P3034
T3977	L3695	L3617	R3467	S3536	R3467	S3386	L3307	T3169	F3036	F3036
R3978	R3696	G3626	L3468	S3537	L3468	S3387	Y3315	D3180	R3098	R3098
L3979	N3697	G3627	L3469	E3538	L3469	E3394	Y3316	D3181	A3099	A3099
M3980	E3698	A3627	Q3470	S3539	Q3470	E3395	L3317	I3182	K3100	K3100
Y3981	L3699	F3628	I3471	Y3540	I3471	A3396	S3317	I3183	Q3037	Q3037
S3982	E3700	R3629	L3472	S3541	L3472	G3397	K3318	T3184	E3038	E3038
L3983	I3701	R3650	E3473	F3542	E3473	PRO	M3250	R3185	T3039	T3039
M3984	Q3704	K3631	R3474	K3543	R3474	PRO	M3251	R3186	Y3040	Y3040
V3985	Y3705	F3632	Y3475	D3544	Y3475	PRO	L3321	C3187	L3041	L3041
A3987	D3706	I3633	T3478	T3545	E3478	TRP	F3252	I3188	P3042	P3042
L3988	G3707	Q3634	T3479	T3547	T3479	TRP	F3252	F3189	I3045	I3045
R3989	R3708	F3636	L3480	G3548	L3480	GLY	S3253	L3190	R3046	R3046
A3990	G3709	G3637	S3481	H3549	S3481	GLY	L3254	L3189	S3047	S3047
F3991	P3711	K3638	L3482	K3550	L3482	PRO	M3257	L3193	K3048	K3048
R3992	P3711	E3639	E3486	N3551	L3482	PRO	M3257	E3195	L3049	L3049
	P3713	E3642	I3487	F3552	E3486	PRO	M3257	R3196	K3050	K3050
	V3717	H3643	A3412	F3554	I3487	PRO	M3257	L3126	L3052	L3052
M4000	R3718	G3644	M3413	A3555	P3491	PRO	M3257	K3192	L3053	L3053
T4001	R3789	G3645	Y3414	A3556	C3492	PRO	M3257	E3199	Q3054	Q3054
	R3789	K3646	W3493	R3557	K3492	PRO	M3257	E3195	E3056	E3056
								L3129	S3060	S3060
								Q3130	L3061	L3061
								L3129	L3062	L3062
								Q3130	L3063	L3063
								A3134	F3064	F3064

M4002 D4003 F4004 V4005 W4006 K4007 E4008 F4009 S4010 F4011 F4012 F4013 F4014 F4015 F4016 F4017 F4018 F4019 F4020 F4021 F4022 W4027 A4034 E4035 N4036 W4037 W4038 T4044 C4045 Y4046 A4047 A4048 R4049 F4050 L4051 A4052 N4055 C4061 P4062 E4063 L4064 L4065 L4066 G4067 H4068 E4069 R4070 A4071 P4072 A4073 F4074 R4075 D4076 Y4077 Y4078

A4079 R4082 F4083 W4084 K4085 M4088 I4089 Q4092 F4095 L4098 S4099 E4100 E4101 T4102 Q4103 F4104 K4105 C4106 L4107 Q4110 D4113 P4114 M4115 I4116 L4117 G4118 T4119 T4120 W4121 P4126 W4127 X6006 X6007 X6008 X6009 X6010 X6011 X6012 X6013 X6014 X6015 X6023

● Molecule 1: DNA-dependent protein kinase catalytic subunit,DNA-PKCs



RET ALA GLY SER GLY VAL C10 S11 L12 L13 R14 L15 Q16 E17 T18 L19 S20 A21 A22 D23 C25 L34 L35 R36 G37 L38 C42 V43 S46 S47 P48 L51 Q54 T55 V58 F59 R61 L66 V67 F68 R70 K71 S72 L73 H74 I75 I76

F77 F78 R79 E80 C81 E83 E84 L85 L86 R87 F88 L89 C90 I91 R95 M96 G97 Q98 R99 I100 S104 V105 E106 I107 K108 C111 Y115 T116 K117 D118 S46 S47 P48 L51 Q54 T55 V58 F59 R61 L66 V67 F68 R70 K71 S72 L73 H74 I75 I76

E151 L152 F153 S154 K155 E159 L162 K163 K164 F165 V170 L171 E172 K173 V174 E176 L177 L178 L180 L181 L182 H185 P186 S187 E188 M189 N191 M192 A193 E194 F197 R198 F200 L201 G202 L203 L204 K205 L206 T209 S210 A211 V212 R213 E214 P215 K216 L217 S219 V291 S292 F293 F294

L224 G226 L227 S228 S229 M233 K236 S237 M238 E239 E240 E241 P242 S245 R246 F249 M250 F251 V252 L255 K254 A255 L256 R257 P258 Q259 L260 D261 L262 K263 R264 Y265 A266 V267 S268 Q269 Y340 G271 L272 R273 F275 H278 Q281 F282 M289 N290 V291 S292 F293 F294

E295 V296 L297 R298 K299 M300 H303 T304 N305 V306 E307 L308 K309 K310 A311 A312 L313 S314 A315 L316 E317 Q318 F319 L320 K321 S324 N325 K326 V327 K328 K329 N330 A331 E332 K333 H334 K337 L338 Q339 S341 F341 H342 E343 F345 Y346 R350 H351 V352 S353 S354 K357 E358 L359 S360

L363 R364 G365 K366 F367 L368 F372 S373 K374 V375 K378 F383 K384 Y385 V386 E387 K388 Q390 Q391 C392 K393 Q394 M395 F396 L397 T398 Q399 Q403 M410 F413 L414 A418 S419 Q485 Q486 L421 L422 Y423 P428 C491 F492 K493 L497 P498 LYS GLY PRO GLU SER V440

M441 Q442 T443 D444 S445 F446 P447 Q448 V449 S450 G451 K452 M453 Q454 L455 V456 C457 C458 R459 A460 I461 V462 K463 V464 A467 L468 K471 V474 L475 R476 M477 C478 L479 S480 T481 V482 H483 H484 Q485 Q486 L487 L488 R489 C491 F492 K493 L497 P498 LYS GLY PRO GLU SER V440

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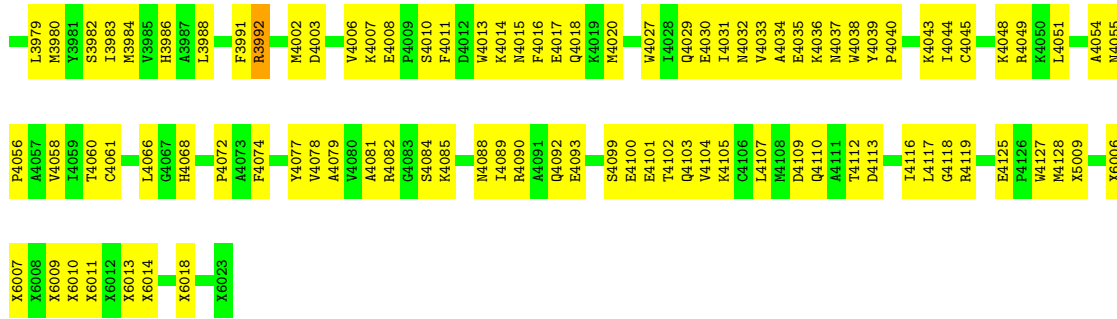
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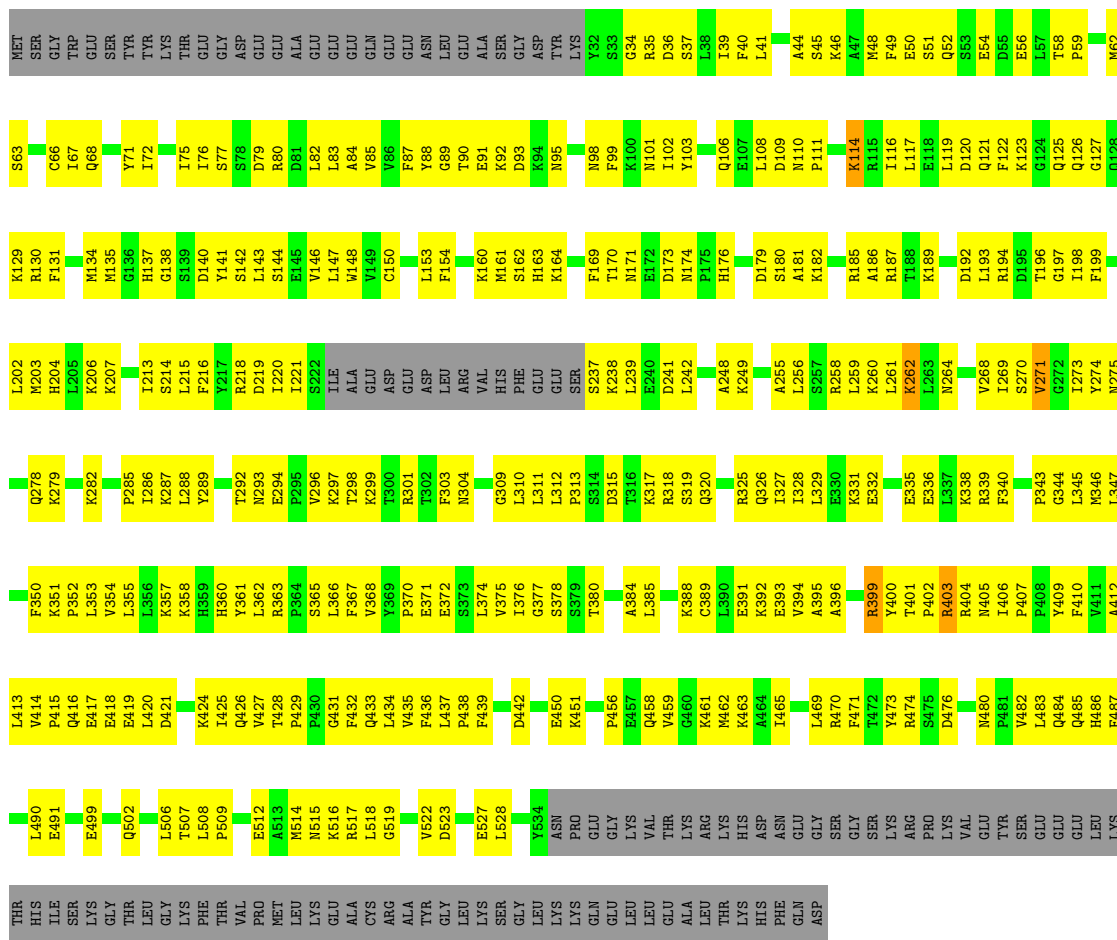
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L2908	L2908	D2839	L2517	E2578	L2517	L2451	L2385	A2320	K1985	E2115	PHE	PHE
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N3954	M3682	M3682	A3556	A3557	E3402	E3402	F3476	SER	SER	SER	P3175	M3111	R3046	R3046
P3955	G3683	G3683	R3557	R3558	E3403	E3403	E3477	SER	SER	SER	M3176	Q3112	S3047	S3047
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• Molecule 2: X-ray repair cross-complementing protein 6

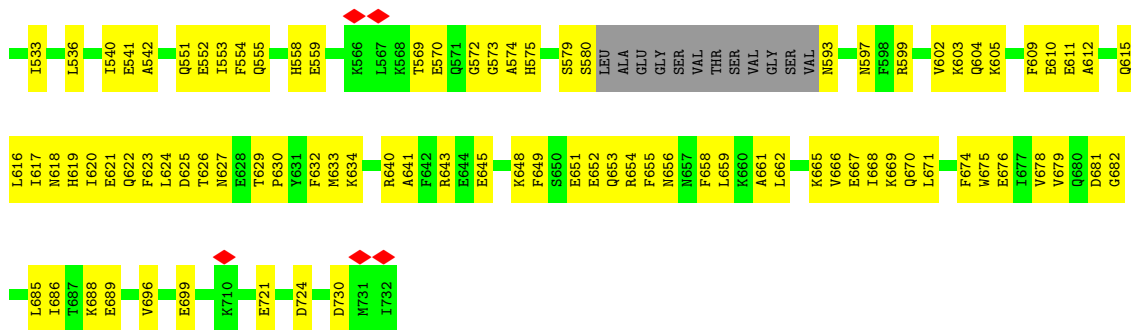
Chain B: 31% 49% 20%



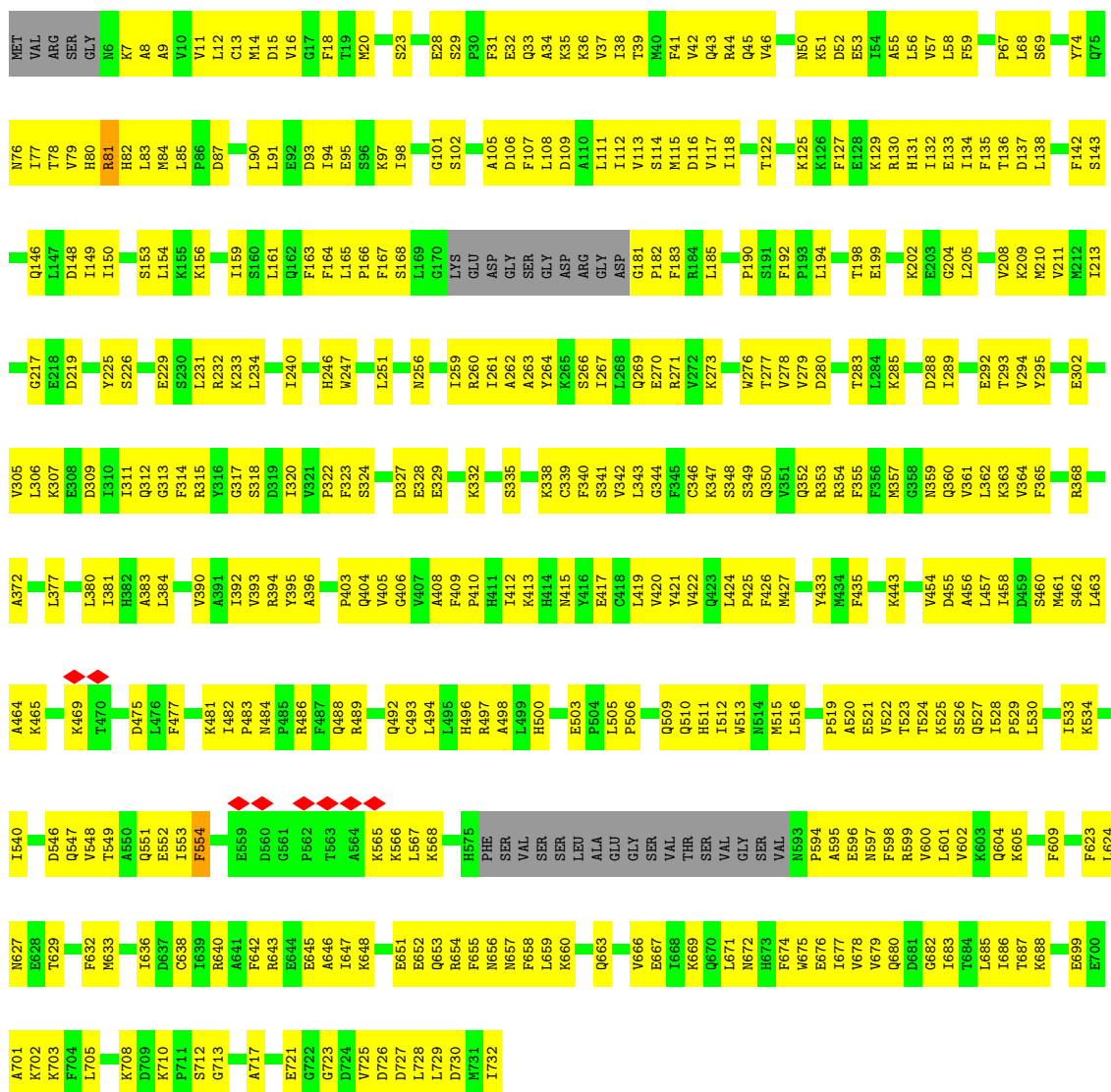
• Molecule 2: X-ray repair cross-complementing protein 6

Chain G: 35% 44% 20%



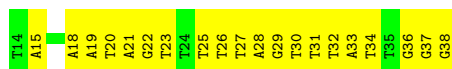


• Molecule 3: X-ray repair cross-complementing protein 5

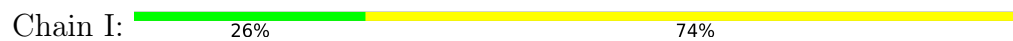


• Molecule 4: DNA (25-MER)





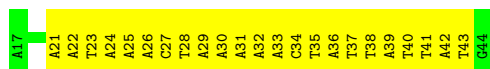
- Molecule 5: DNA (27-MER)



- Molecule 6: DNA (26-MER)



- Molecule 7: DNA (28-MER)



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	10808	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	52.97	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.469	Depositor
Minimum map value	-0.111	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.020	Depositor
Recommended contour level	0.085	Depositor
Map size (Å)	588.0, 588.0, 588.0	wwPDB
Map dimensions	560, 560, 560	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.05, 1.05, 1.05	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.35	0/29462	0.54	1/39939 (0.0%)
1	F	0.33	0/29464	0.51	2/39913 (0.0%)
2	B	0.33	0/3864	0.56	0/5226
2	G	0.31	0/3871	0.55	0/5236
3	C	0.30	0/5595	0.49	0/7557
3	H	0.29	0/5625	0.50	0/7589
4	J	0.68	0/570	1.01	0/876
5	I	0.77	0/620	0.97	0/953
6	D	0.82	0/591	0.99	0/908
7	E	0.80	0/644	0.95	0/990
All	All	0.35	0/80306	0.55	3/109187 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	2259	LYS	CB-CG-CD	5.69	126.38	111.60
1	F	1721	HIS	C-N-CA	-5.38	108.24	121.70
1	A	2939	LEU	CB-CG-CD2	-5.16	102.23	111.00

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	29018	0	28461	2369	0
1	F	29012	0	28652	2188	0
2	B	3789	0	3721	347	0
2	G	3797	0	3734	318	0
3	C	5490	0	5397	391	0
3	H	5517	0	5468	380	0
4	J	509	0	271	33	0
5	I	552	0	301	35	0
6	D	528	0	282	49	0
7	E	573	0	312	48	0
All	All	78785	0	76599	5907	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 38.

The worst 5 of 5907 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:3443:PRO:HB2	1:A:3478:GLU:CB	1.66	1.26
2:G:271:VAL:HG12	2:G:370:PRO:CA	1.72	1.20
1:A:446:PHE:H	1:A:447:PRO:CD	1.54	1.19
2:G:271:VAL:CG1	2:G:370:PRO:HA	1.72	1.17
2:G:273:ILE:CG1	2:G:368:VAL:HG22	1.75	1.13

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	3714/4156 (89%)	3263 (88%)	446 (12%)	5 (0%)	51	86
1	F	3675/4156 (88%)	3257 (89%)	416 (11%)	2 (0%)	51	86

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	485/609 (80%)	422 (87%)	63 (13%)	0	100	100
2	G	485/609 (80%)	428 (88%)	56 (12%)	1 (0%)	47	81
3	C	699/732 (96%)	633 (91%)	66 (9%)	0	100	100
3	H	694/732 (95%)	625 (90%)	69 (10%)	0	100	100
All	All	9752/10994 (89%)	8628 (88%)	1116 (11%)	8 (0%)	54	86

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	446	PHE
1	A	3487	ILE
2	G	372	GLU
1	F	2257	PHE
1	A	2333	ARG

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	3033/3671 (83%)	3004 (99%)	29 (1%)	76	86
1	F	3087/3671 (84%)	3063 (99%)	24 (1%)	81	89
2	B	400/548 (73%)	391 (98%)	9 (2%)	50	70
2	G	402/548 (73%)	395 (98%)	7 (2%)	60	78
3	C	591/649 (91%)	590 (100%)	1 (0%)	93	96
3	H	601/649 (93%)	597 (99%)	4 (1%)	84	90
All	All	8114/9736 (83%)	8040 (99%)	74 (1%)	79	87

5 of 74 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	3586	LYS
3	H	209	LYS

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Mol	Chain	Res	Type
1	F	3799	ARG
2	G	271	VAL
1	A	3614	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 71 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	3093	GLN
1	F	3249	GLN
2	G	126	GLN
1	A	3850	HIS
1	A	3808	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	F	2
1	A	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	F	4128:MET	C	5009:UNK	N	96.98
1	A	4128:MET	C	5009:UNK	N	96.43
1	A	5016:UNK	C	6004:UNK	N	49.12
1	F	5016:UNK	C	6004:UNK	N	48.83

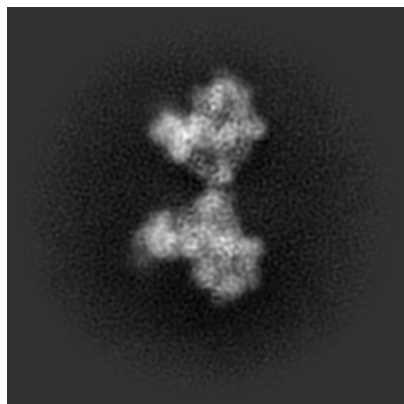
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-11219. These allow visual inspection of the internal detail of the map and identification of artifacts.

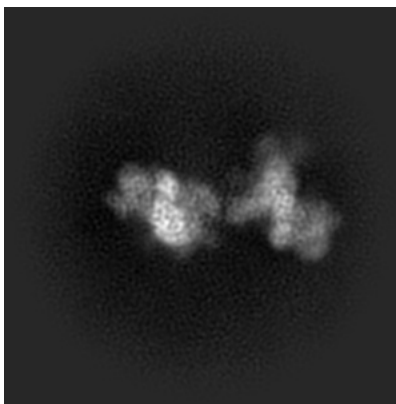
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

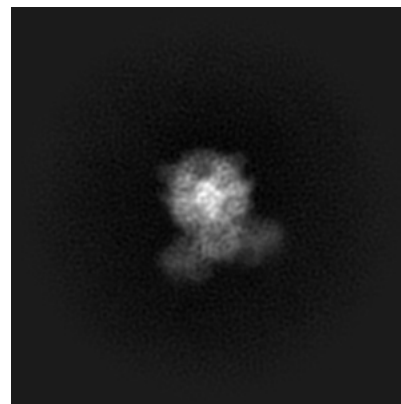
6.1.1 Primary map



X

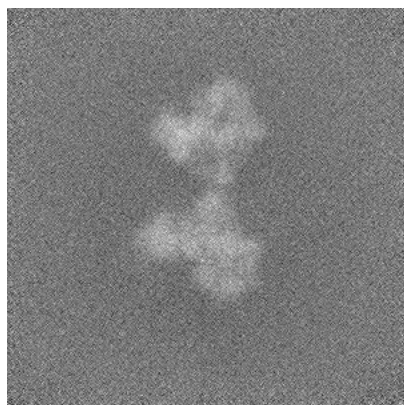


Y

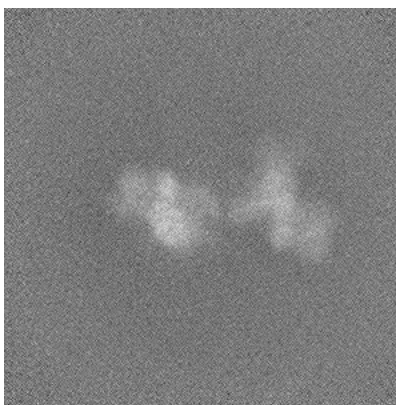


Z

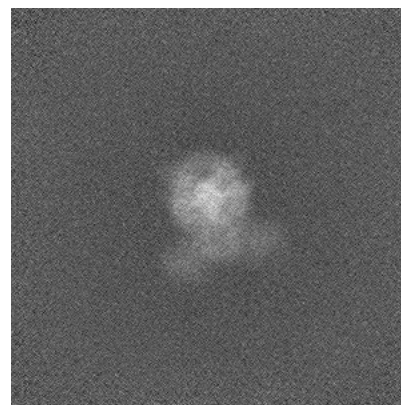
6.1.2 Raw map



X



Y

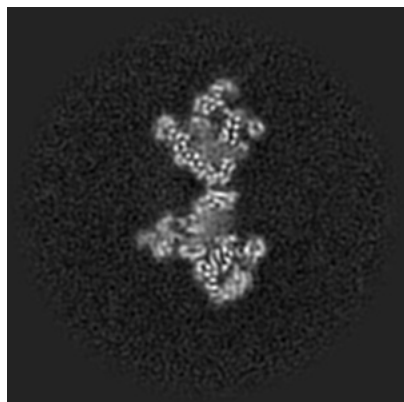


Z

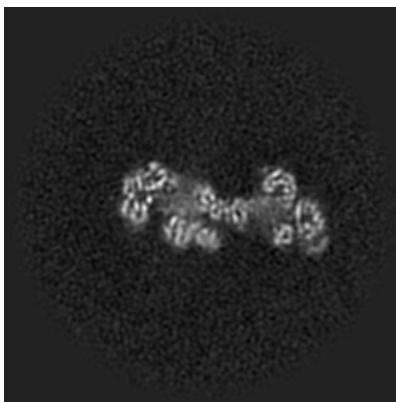
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

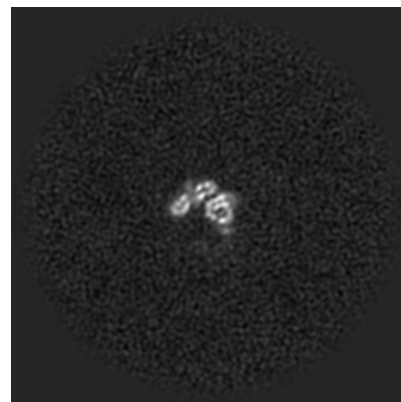
6.2.1 Primary map



X Index: 280

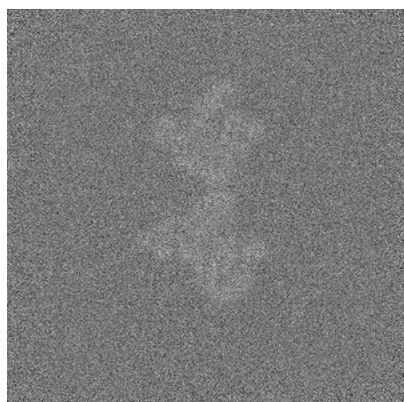


Y Index: 280

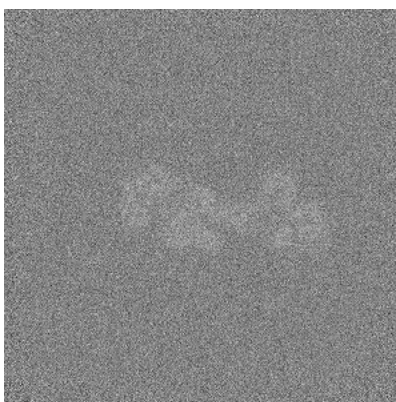


Z Index: 280

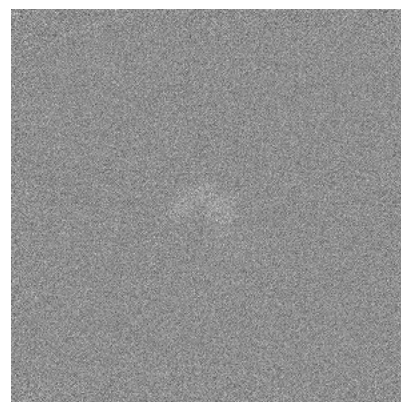
6.2.2 Raw map



X Index: 280



Y Index: 280

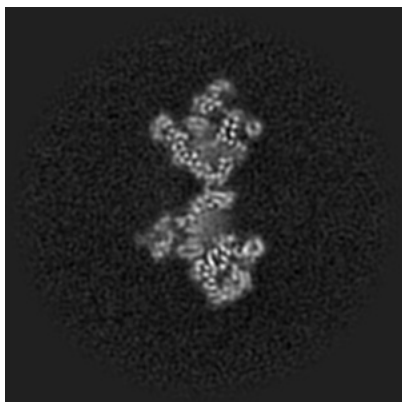


Z Index: 280

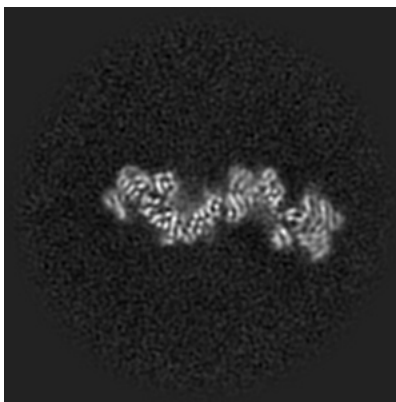
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

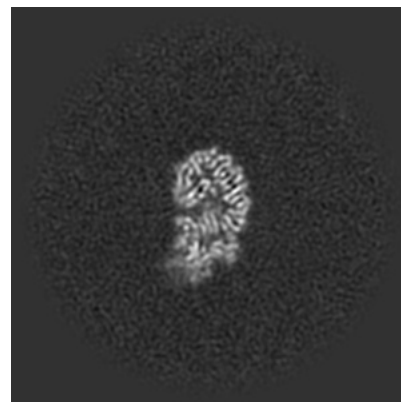
6.3.1 Primary map



X Index: 282

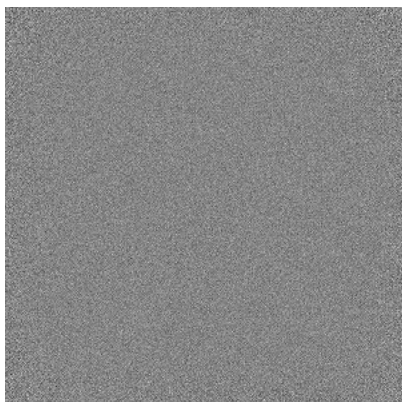


Y Index: 299

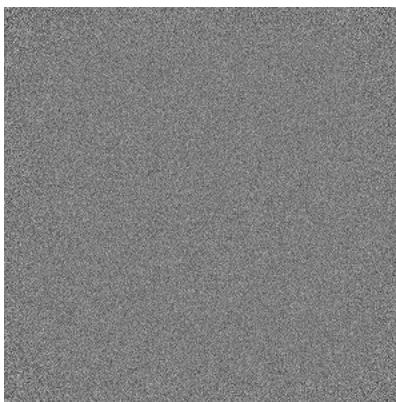


Z Index: 225

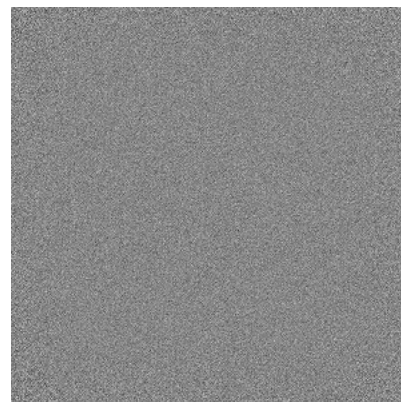
6.3.2 Raw map



X Index: 0



Y Index: 0



Z Index: 0

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

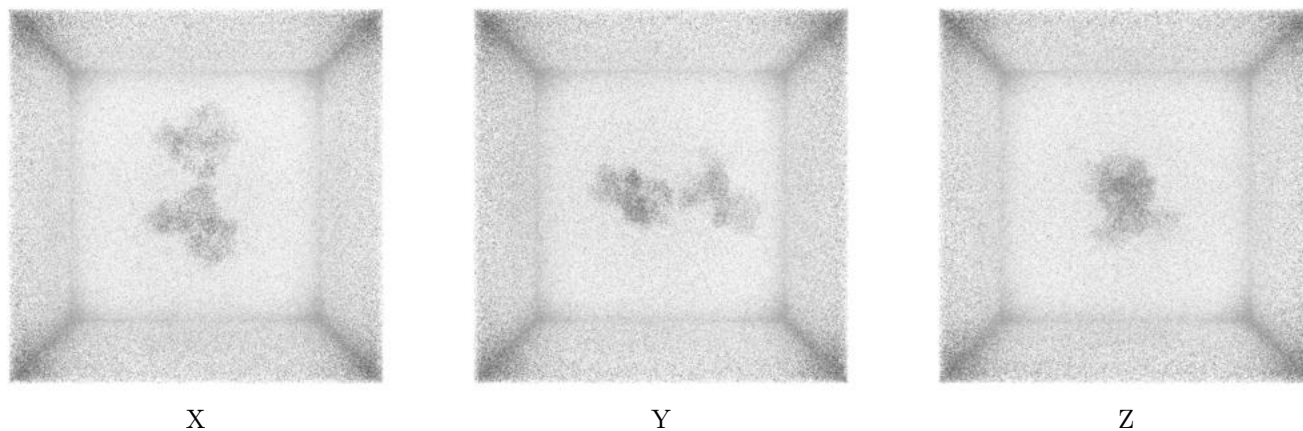
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.085. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 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.

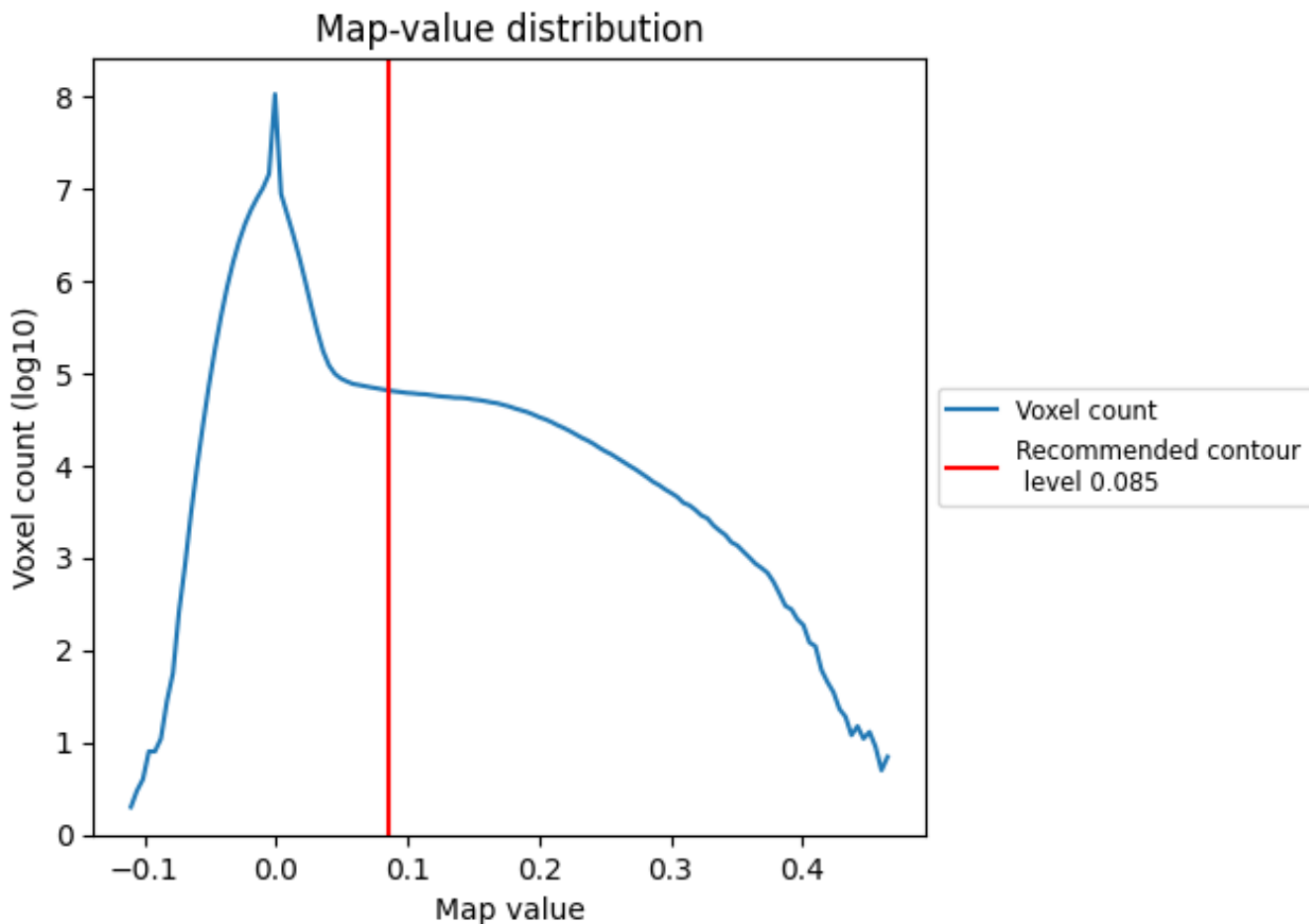
6.5 Mask visualisation [i](#)

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

7 Map analysis [i](#)

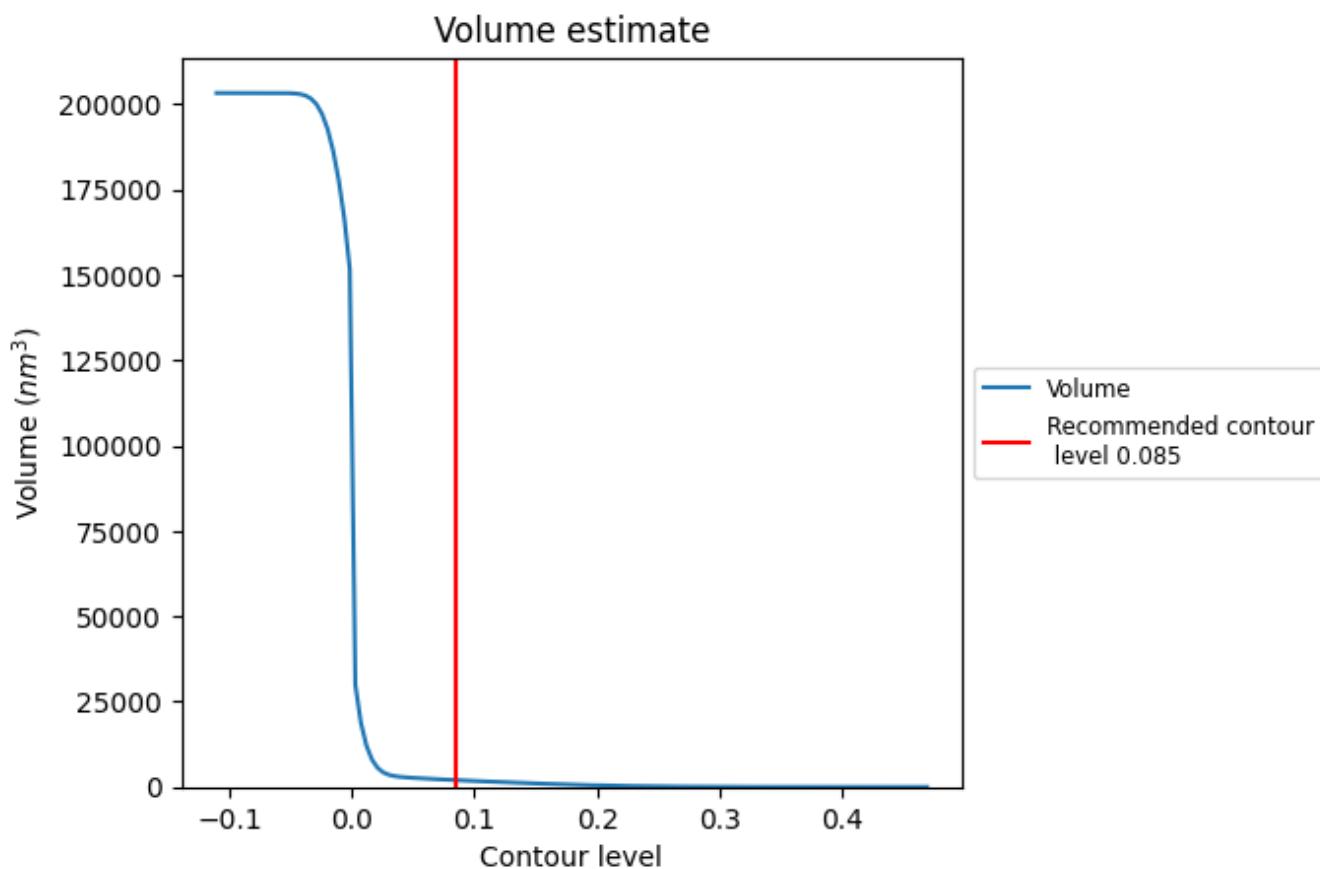
This section contains the results of statistical analysis of the map.

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.

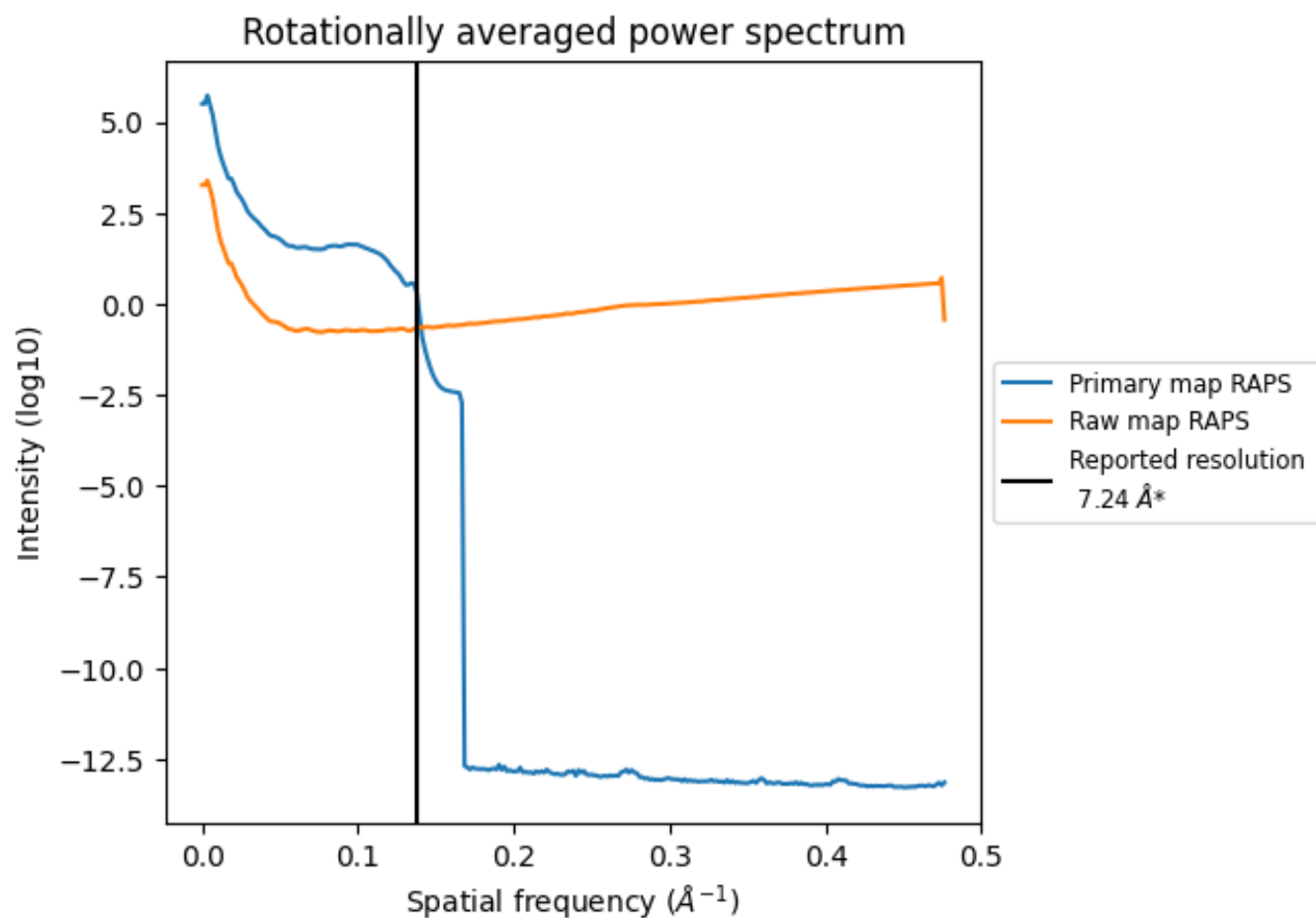
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1998 nm^3 ; this corresponds to an approximate mass of 1805 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum [i](#)

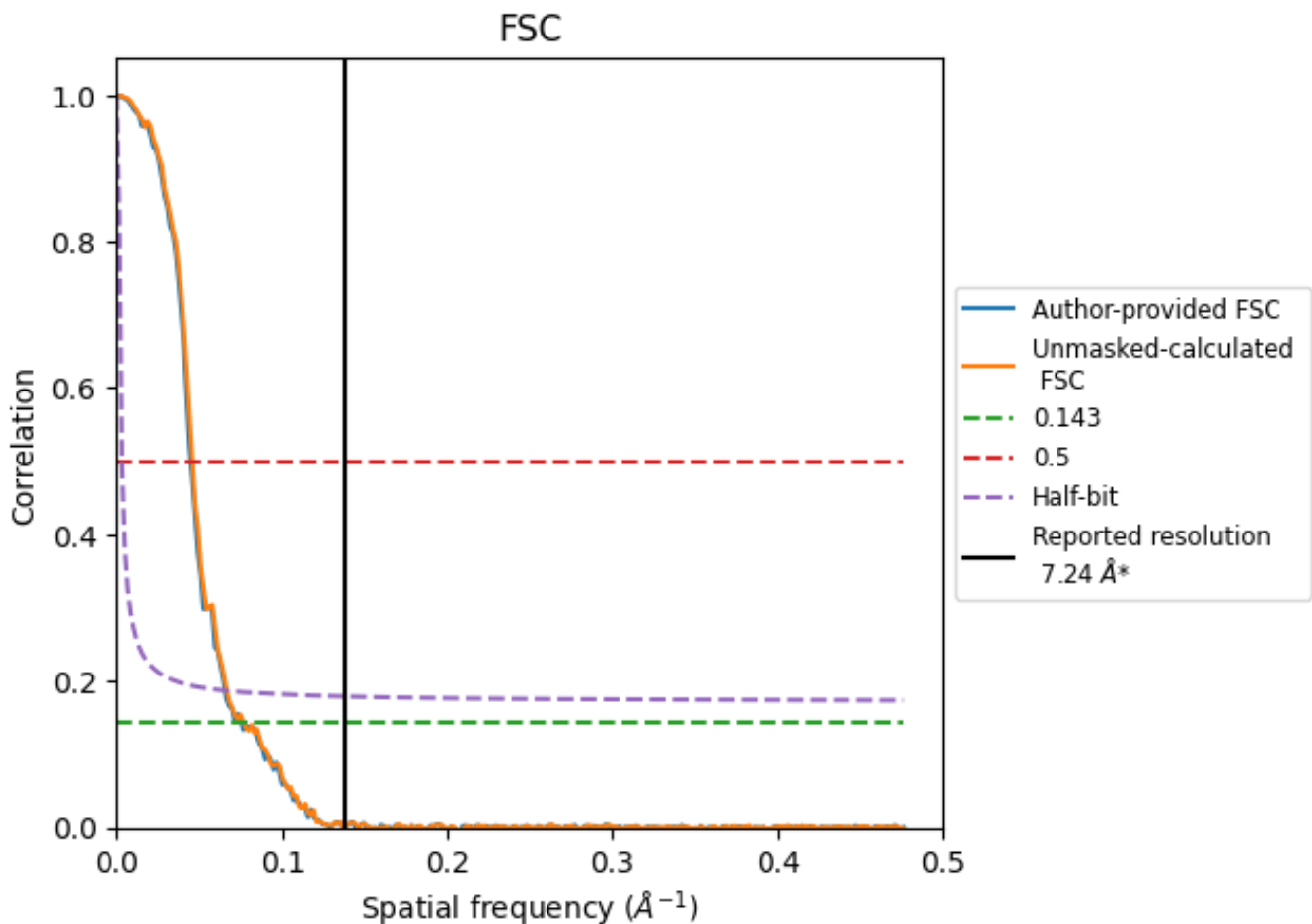


*Reported resolution corresponds to spatial frequency of 0.138 Å⁻¹

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 0.138 Å⁻¹

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	7.24	-	-
Author-provided FSC curve	13.23	22.27	15.24
Unmasked-calculated*	13.02	21.74	14.99

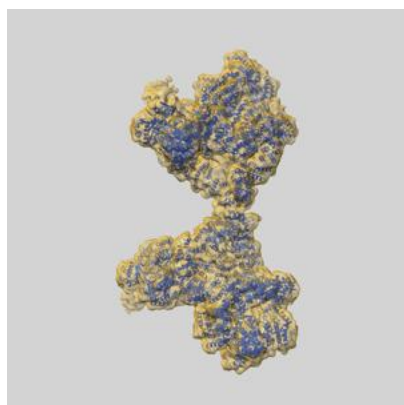
*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 13.23 differs from the reported value 7.24 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 13.02 differs from the reported value 7.24 by more than 10 %

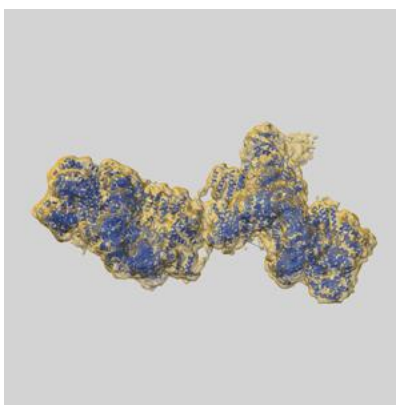
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-11219 and PDB model 6ZHE. Per-residue inclusion information can be found in section 3 on page 6.

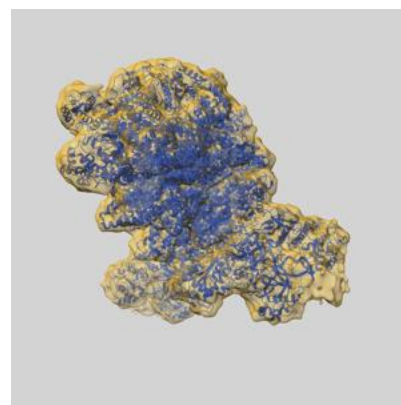
9.1 Map-model overlay [i](#)



X



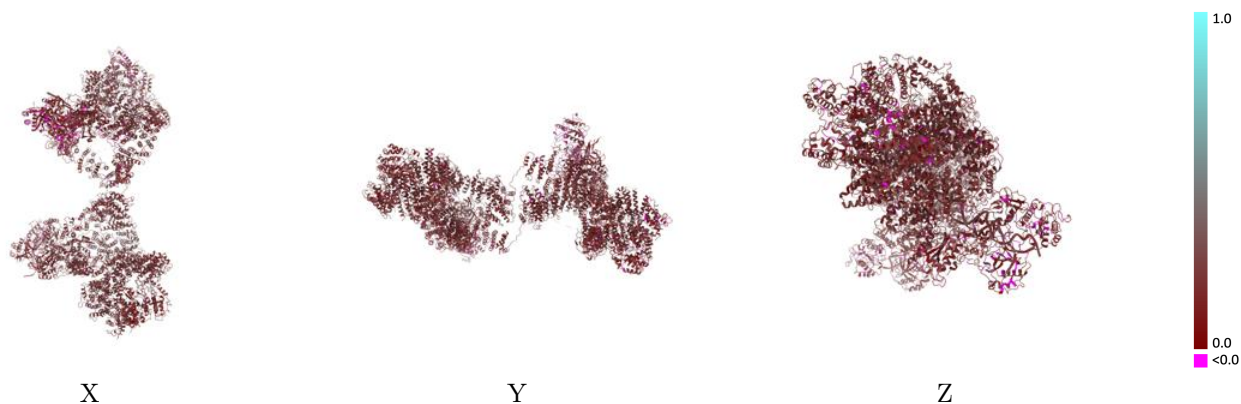
Y



Z

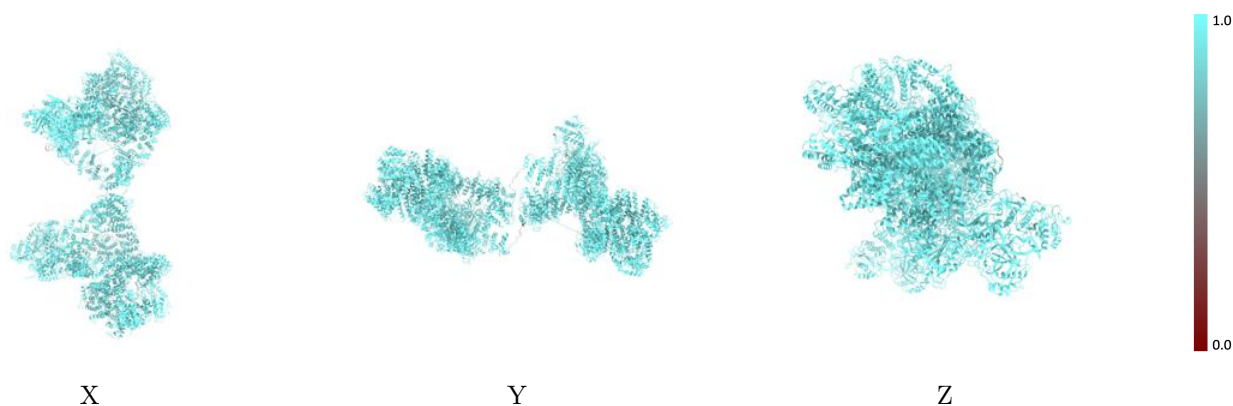
The images above show the 3D surface view of the map at the recommended contour level 0.085 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



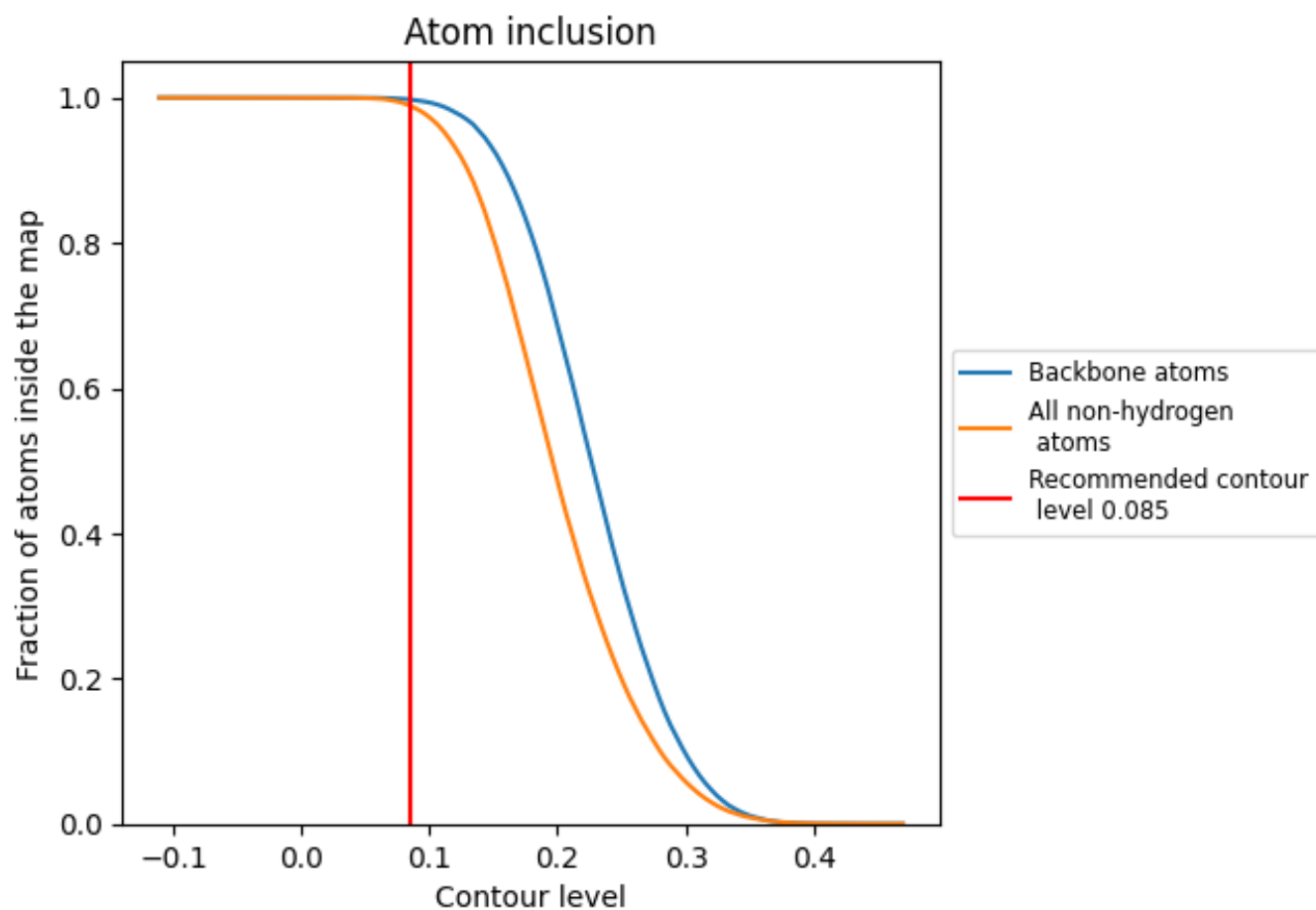
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.085).























9.4 Atom inclusion [i](#)



At the recommended contour level, 100% of all backbone atoms, 99% 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 (0.085) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9888	 0.1950
A	 0.9906	 0.2070
B	 0.9949	 0.1870
C	 0.9840	 0.1740
D	 1.0000	 0.2510
E	 1.0000	 0.2500
F	 0.9892	 0.1970
G	 0.9896	 0.1600
H	 0.9732	 0.1600
I	 1.0000	 0.2540
J	 1.0000	 0.2430

