



wwPDB EM Validation Summary Report ⓘ

Jan 20, 2026 – 01:34 pm GMT

PDB ID : 9Q9F / pdb_00009q9f
EMDB ID : EMD-52958
Title : DNA-PK bound to a 153 bp H2AX nucleosome model 1
Authors : Hall, C.; Chaplin, A.K.
Deposited on : 2025-02-26
Resolution : 4.54 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:

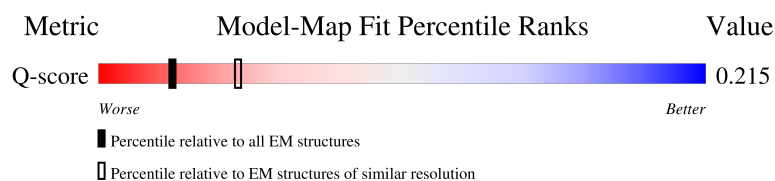
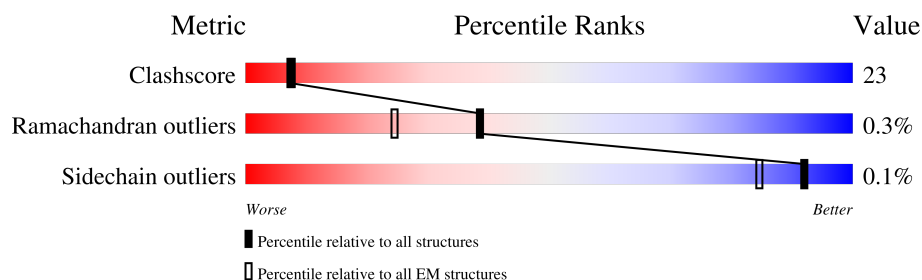
EMDB validation analysis : 0.0.1.dev129
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.47

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 4.54 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	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	2475 (4.04 - 5.04)

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	K	609	42% 38% 19%
2	L	732	37% 35% 28%
3	I	153	22% 26% 58% 16%
4	J	153	17% 26% 59% 14%

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Mol	Chain	Length	Quality of chain
5	O	4128	
6	C	143	
6	G	143	
7	D	126	
7	H	126	
8	A	136	
8	E	136	
9	B	103	
9	F	103	

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 46624 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 X-ray repair cross-complementing protein 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	K	495	Total	C	N	O	S	0	0
			3926	2511	662	736	17		

- Molecule 2 is a protein called X-ray repair cross-complementing protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	L	527	Total	C	N	O	S	0	0
			4165	2667	697	779	22		

- Molecule 3 is a DNA chain called DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	I	129	Total	C	N	O	P	0	0
			2630	1247	481	773	129		

- Molecule 4 is a DNA chain called DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	J	131	Total	C	N	O	P	0	0
			2697	1275	504	787	131		

- Molecule 5 is a protein called DNA-dependent protein kinase catalytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	O	3527	Total	C	N	O	S	0	0
			27830	17852	4683	5123	172		

- Molecule 6 is a protein called Histone H2AX.

Mol	Chain	Residues	Atoms				AltConf	Trace
6	C	95	Total	C	N	O	0	0
			690	432	133	125		

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Mol	Chain	Residues	Atoms				AltConf	Trace
6	G	94	Total	C	N	O	0	0
			692	438	132	122		

- Molecule 7 is a protein called Histone H2B type 1-J.

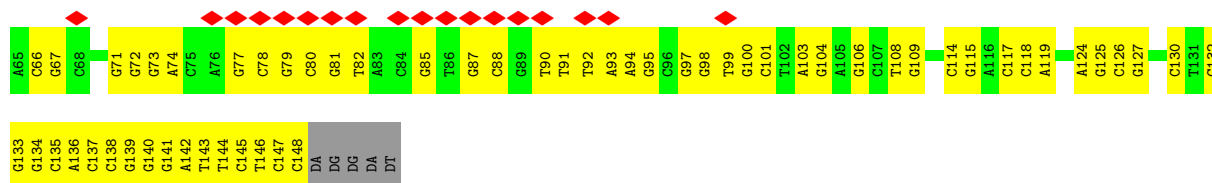
Mol	Chain	Residues	Atoms					AltConf	Trace
7	D	93	Total	C	N	O	S	0	0
			719	450	130	137	2		
7	H	92	Total	C	N	O	S	0	0
			718	453	127	136	2		

- Molecule 8 is a protein called Histone H3.1.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	A	88	Total	C	N	O	S	0	0
			697	442	128	123	4		
8	E	88	Total	C	N	O	S	0	0
			711	450	131	126	4		

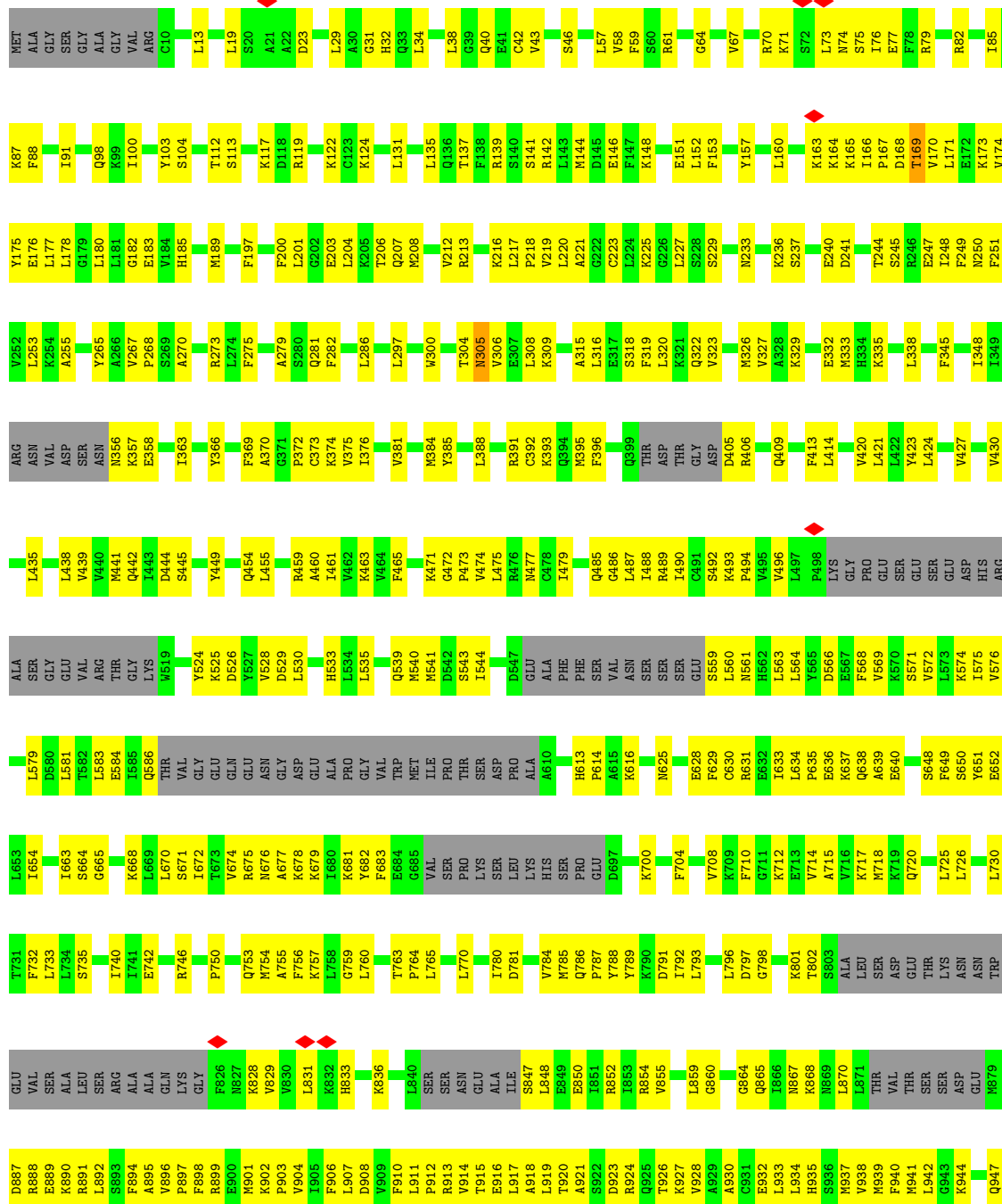
- Molecule 9 is a protein called Histone H4.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	B	71	Total	C	N	O	S	0	0
			568	357	113	97	1		
9	F	72	Total	C	N	O	S	0	0
			581	370	112	98	1		



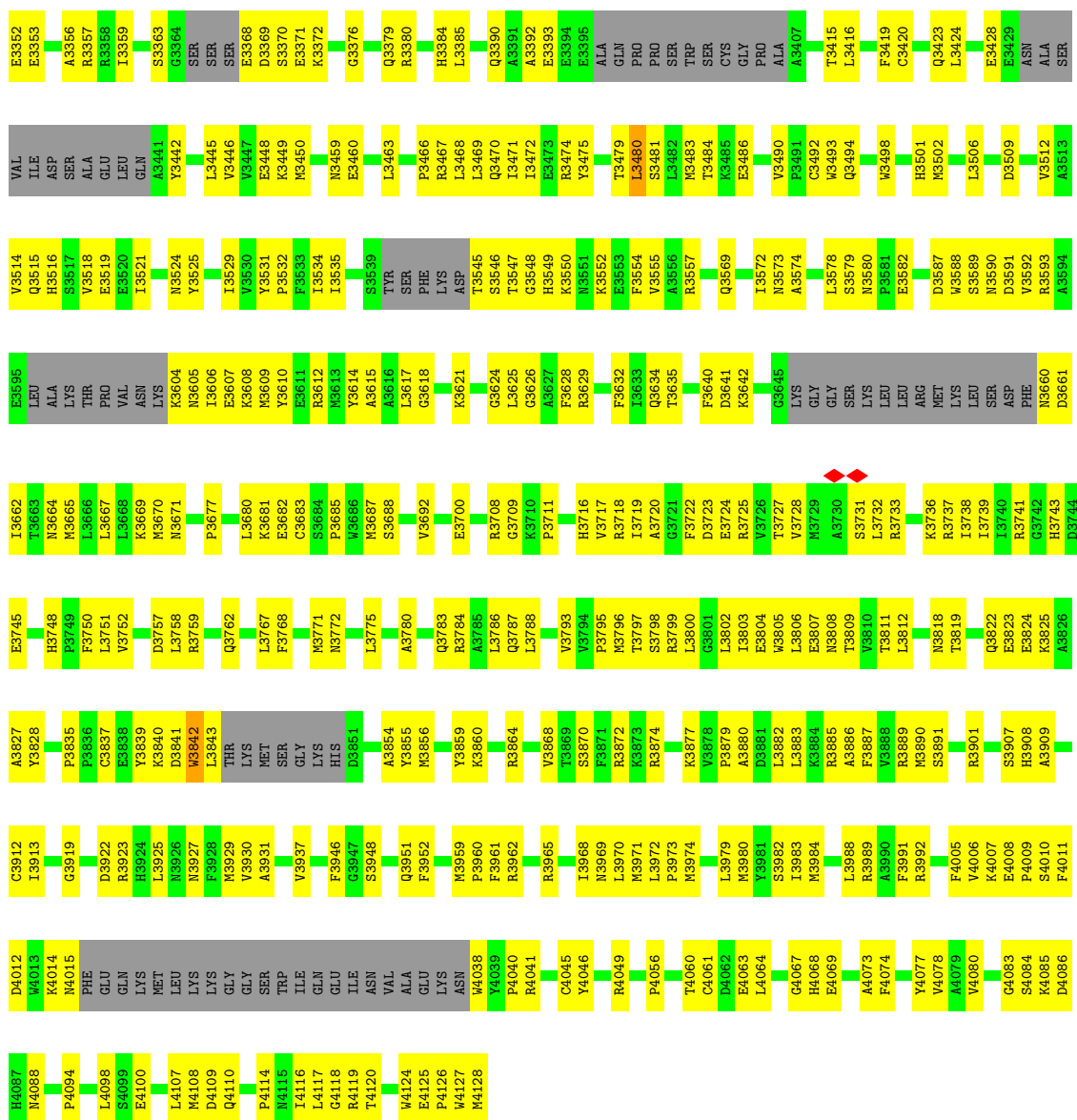
• Molecule 5: DNA-dependent protein kinase catalytic subunit

Chain O: 46% 39% 15%

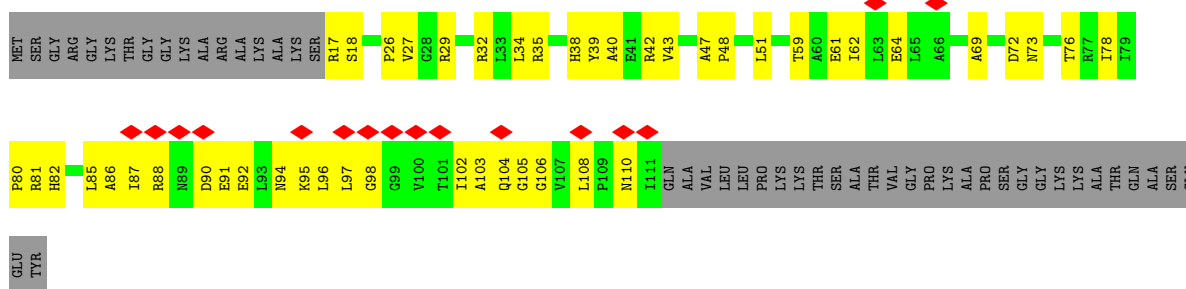




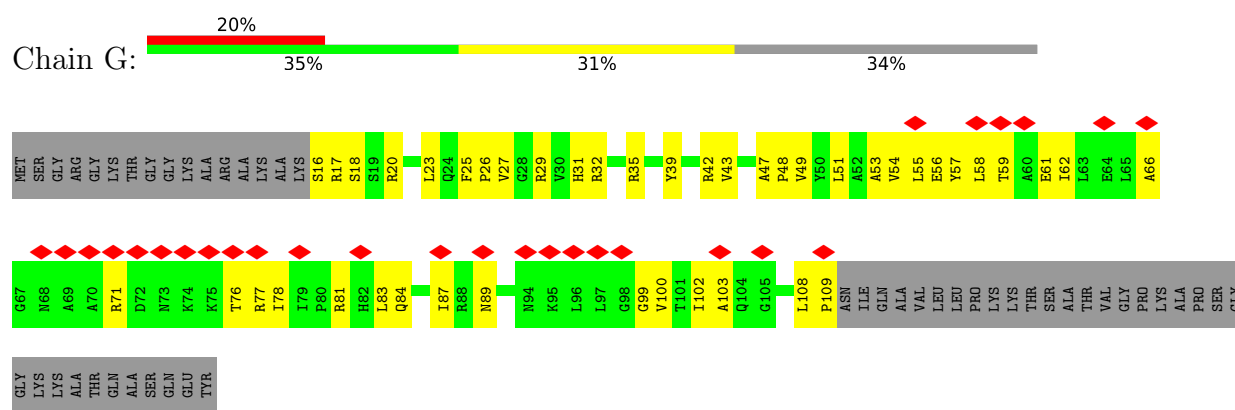
T3268	K3269	L3092	D3020	PRO	L2808	GLU	THR	T2535	C2435	N2365	P2284	D2208	P2136
D3270	K3192	A3099	S3021	P2918	G2815	LYS	LEU	L2536	I2438	K2366	L2285	L2211	I2137
D3271	L3193	K3100	ASN	D2919	G2819	LEU	GLN	D2537	I2439	P2138	C2292	L2212	V2138
K3196	K3196	Y3101	PRO	W2923	E2819	LEU	ARG	R2538	N2442	R2214	Q2295	R2214	L2140
K3272	L3197	Y3102	ASP	W2924	Q2834	THR	GLN	N2543	L2446	F3171	E2298	L2215	N2141
V3274	THR	I3103	ASP	E2925	K2835	ALA	GLY	S2644	P2457	P2372	Y2299	R2216	I2142
S3275	PRO	Q3104	LEU	K2928	L2836	ARG	GLY	L2545	F2373	F2218	Q2300	F2217	R2143
W3276	LEU	I3107	ASN	L2929	L2837	GLY	SER	P2548	E2460	L2219	A2375	L2219	L2146
Q3277	GLU	F3110	I3030	W2936	Q2838	VAL	LEU	E2551	D2461	V2223	D2376	V2223	L2149
S3279	ASP	F3111	W3031	D2937	F2840	ALA	SER	E2552	V2462	F2224	L2303	F2224	P2250
R3282	SER	Y3114	E3033	Y2938	N2841	GLU	ARG	H2553	F2376	H2225	R2377	H2225	L2151
L3283	MET	D3118	P3034	L2939	R2842	GLN	THR	P2557	M2379	K2227	N2305	K2227	I2152
S3284	ASN	V3119	F3035	W2940	L2942	LYS	PRO	H2465	N2380	R2228	N2306	R2228	T2153
H3285	VAL	V3120	Q3036	I2942	F2847	ARG	ALA	S2556	S2466	A2229	F2309	A2229	E2154
C3286	ASP	R3125	Q3037	K2948	T2848	GLY	ALA	L2557	T2467	E2155	V2310	V2310	V2156
R3287	GLN	R3126	E3038	K2950	F2851	LYS	GLY	A2558	R2470	V2156	R2311	F2231	F2157
S3288	ASP	K3128	T3039	L2957	F2852	GLY	GLN	T2560	E2471	R2158	R2312	R2312	R2158
R3289	GLY	L3129	M3044	L2958	P2853	ILE	ILE	N2561	Q2472	P2159	A2317	H2233	P2159
S3290	ASP	L3130	I3045	A2961	F2854	LYS	VAL	E2564	N2473	N2234	A2318	N2234	V2160
Q3291	PRO	Q3131	K3046	D2963	V2855	GLY	ALA	M2565	T2476	N2235	A2319	E2236	A2161
S3294	SER	Q3132	S3047	D2973	I2858	LYS	GLN	T2567	L2477	I2237	A2319	I2237	K2162
E3295	ARG	L3135	K3048	K2978	C2863	MET	GLN	D2571	I2480	K2393	R2392	K2393	W2164
Q3296	MET	T3136	L3049	Q2979	Q2864	LYS	HIS	Y2572	T2486	K2394	T2397	K2394	L2165
V3297	GLU	E3137	K3050	D2980	Q2864	GLN	ASP	P2573	Y2484	T2395	R2397	T2395	S2166
L3298	VAL	I3138	L3051	D2980	Q2864	GLN	ASP	N2574	D2486	L2396	V2329	V2329	P2167
T3299	GLN	Q3139	L3052	D2980	Q2864	GLN	ASP	S2582	PRO	E2399	V2330	V2330	L2168
V3300	GLY	F3140	L3053	G2984	L2868	LEU	THR	F2588	D2486	L2398	R2332	L2249	L2169
L3301	GLN	F3141	Q3054	E2985	L2869	GLY	LEU	Y2589	GLU	V2400	E2331	S2250	Q2170
K3302	GLU	S3142	Q3059	P2986	P2873	LEU	THR	F2586	GLU	E2332	R2332	P2252	L2171
T3303	GLU	F3143	S3060	T2987	P2873	PRO	GLN	E2587	GLU	K2334	N2335	P2252	A2172
S3305	GLU	K3147	L3061	E2989	R2891	GLY	ASP	E2588	T2491	N2336	R2254	R2254	V2176
L3306	GLU	V3155	T3063	K2991	E2894	VAL	GLY	Y2589	E2497	L2336	L2256	L2256	ASN
E3309	GLU	F3156	F3064	D2992	E2895	ASP	ARG	T2590	E2497	L2337	I2256	I2256	GLY
V3312	GLU	L3157	K3067	F2993	A2896	ASN	ARG	D2591	L2411	E2338	K2259	K2259	L2182
L3321	M3242	K3158	E3072	W2994	L2897	LYS	SER	D2592	Y2412	S2339	F2260	F2260	L2182
A3322	I3243	R3159	E3072	E2995	L2898	VAL	PHE	S2593	F2413	S2340	S2261	S2261	H2183
F3323	D3244	L3161	L3073	L2996	R2899	LYS	ASP	D2594	L2415	C2342	D2264	D2264	V2186
R3324	S3245	N3162	Q3074	L2999	L2901	GLY	THR	W2595	D2419	E2343	P2265	P2265	E2187
A3246	A3246	K3162	A3075	D3000	PRO	ALA	THR	F2597	F2420	L2344	N2266	N2266	E2188
R3247	K3247	W3164	A3076	C3001	ALA	GLY	GLY	R2598	V2421	V2345	S2267	S2267	I2189
Q3247	R3247	T3165	I3077	Y3002	LEU	THR	SER	E2598	Q2422	A2346	V2190	V2190	V2190
K3248	K3248	W3165	L3078	N3003	GLU	THR	SER	T2603	V2423	L2349	N2270	N2270	K2191
Q3249	Q3249	P3169	H3081	H3004	PRO	THR	THR	PRO	H2424	K2350	I2274	I2274	I2192
L3328	L3328	F3175	Y3082	W3008	ALA	LYS	ASP	MET	R2425	Q2351	I2274	I2274	I2193
L3329	L3329	P3176	S3083	L3011	ARG	VAL	VAL	PHE	H2426	H2352	Q2275	Q2275	L2194
F3325	F3325	W3179	Q3084	L3011	VAL	VAL	VAL	VAL	R2427	Q2353	L2276	L2276	S2195
G3331	G3331	K3179	E3085	C3014	ARG	GLY	ASP	THR	T2529	D2428	D2279	D2279	V2196
T3332	T3332	T3183	L3088	S3015	LYS	LYS	HIS	THR	R2530	D2429	V2280	V2280	A2200
L3335	L3335	H3263	L3089	S3018	ARG	ARG	THR	ALA	E2430	K2359	M2281	M2281	A2200
K3348	K3348	K3267	Y3090	S3018	ARG	ARG	SER	SER	F2360	T2361	A2282	A2282	V2205
I3351	I3351	K3267	L3091	L3019	LEU	LEU	SER	GLN	Q2432	V2362	N2283	N2283	



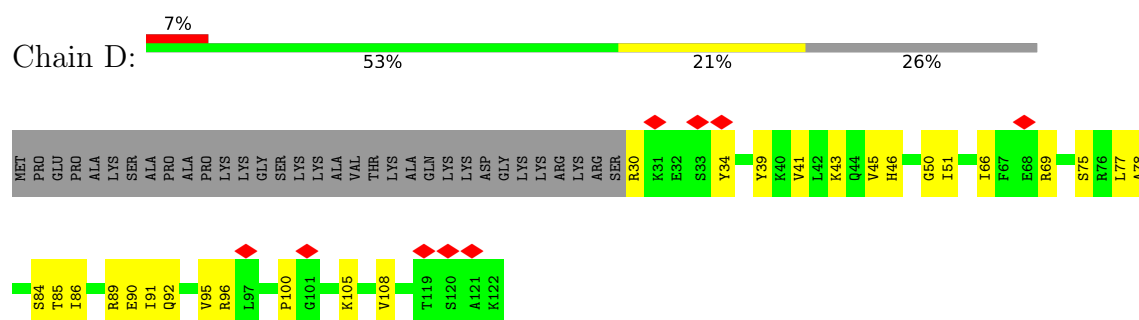
• Molecule 6: Histone H2AX



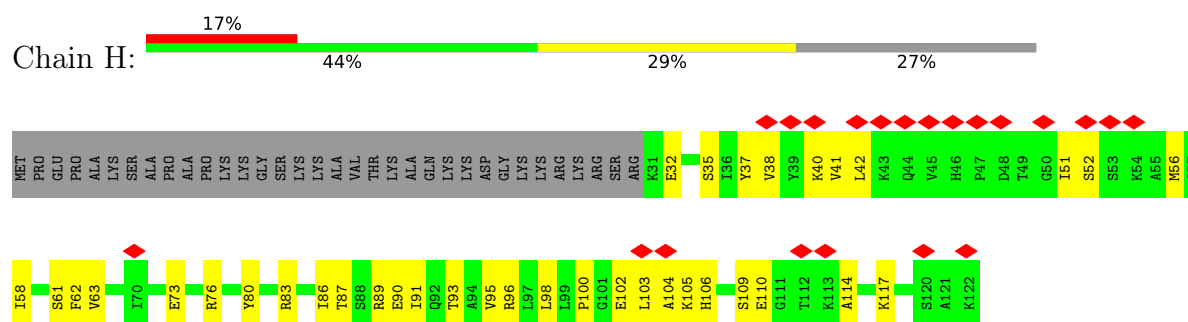
• Molecule 6: Histone H2AX



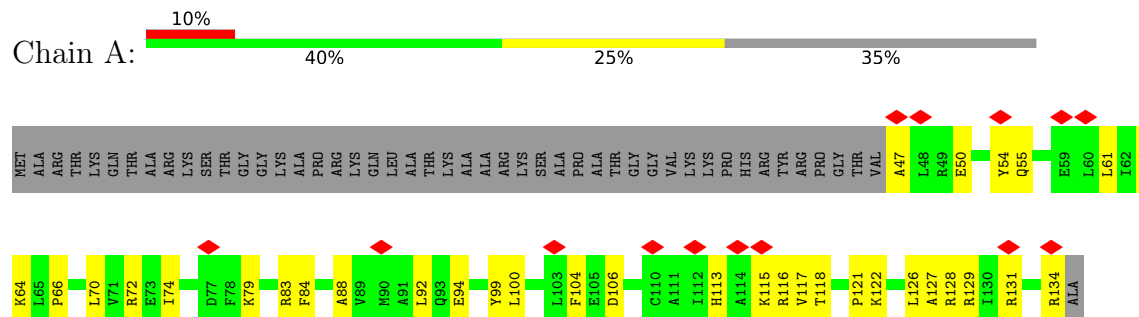
- Molecule 7: Histone H2B type 1-J



- Molecule 7: Histone H2B type 1-J

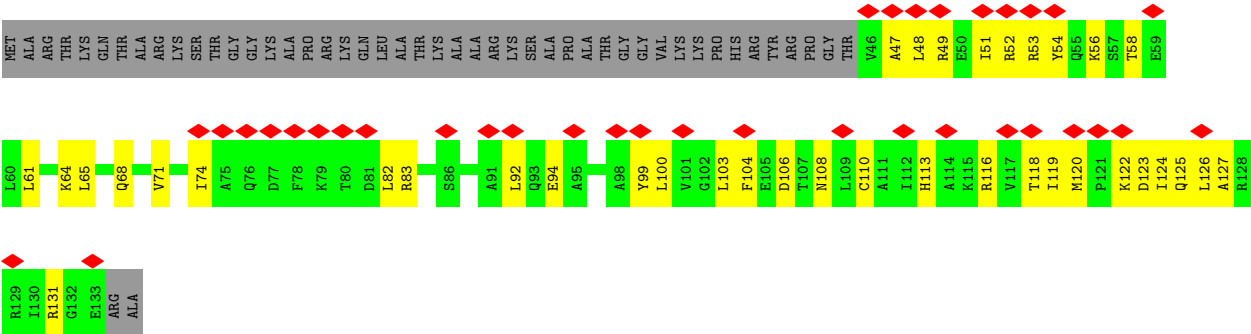


- Molecule 8: Histone H3.1

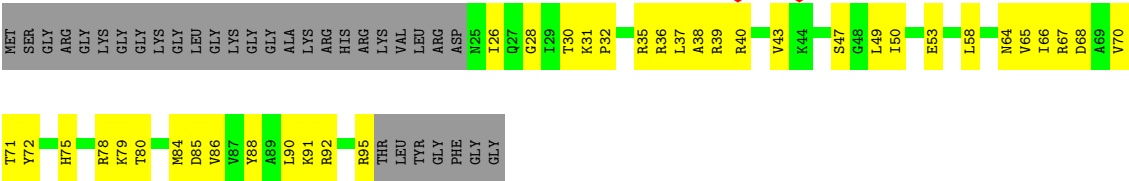


- Molecule 8: Histone H3.1

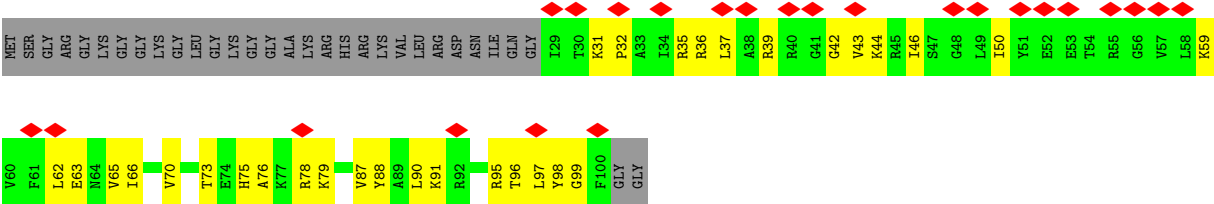




● Molecule 9: Histone H4



● Molecule 9: Histone H4



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	14174	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	48.59	Depositor
Minimum defocus (nm)	700	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.839	Depositor
Minimum map value	-0.247	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.022	Depositor
Recommended contour level	0.2	Depositor
Map size (Å)	692.16, 692.16, 692.16	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.6479999, 1.6479999, 1.6479999	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	K	0.10	0/4004	0.32	0/5409
2	L	0.12	0/4249	0.34	0/5742
3	I	0.18	0/2947	0.37	0/4542
4	J	0.17	0/3027	0.36	0/4673
5	O	0.14	0/28381	0.37	0/38396
6	C	0.12	0/700	0.33	0/951
6	G	0.14	0/702	0.42	0/951
7	D	0.11	0/729	0.31	0/980
7	H	0.13	0/729	0.38	0/979
8	A	0.10	0/705	0.31	0/948
8	E	0.18	0/719	0.41	0/966
9	B	0.11	0/573	0.28	0/767
9	F	0.14	0/588	0.38	0/788
All	All	0.14	0/48053	0.36	0/66092

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	K	3926	0	3920	239	0
2	L	4165	0	4165	229	0
3	I	2630	0	1446	111	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	J	2697	0	1469	118	0
5	O	27830	0	27756	1243	0
6	C	690	0	676	42	0
6	G	692	0	704	57	0
7	D	719	0	735	23	0
7	H	718	0	740	42	0
8	A	697	0	710	46	0
8	E	711	0	737	44	0
9	B	568	0	614	39	0
9	F	581	0	625	40	0
All	All	46624	0	44297	2033	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 23.

The worst 5 of 2033 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)
5:O:965:THR:HG22	5:O:969:LEU:CD1	1.97	0.94
5:O:1633:TRP:HB2	5:O:1678:LEU:HD21	1.51	0.93
5:O:965:THR:HG22	5:O:969:LEU:HG	1.52	0.91
6:G:26:PRO:HB2	6:G:29:ARG:HB3	1.53	0.91
5:O:965:THR:HG22	5:O:969:LEU:CG	2.01	0.90

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	K	491/609 (81%)	438 (89%)	49 (10%)	4 (1%)	16	54
2	L	523/732 (71%)	471 (90%)	52 (10%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	O	3455/4128 (84%)	3065 (89%)	379 (11%)	11 (0%)	37	72
6	C	93/143 (65%)	83 (89%)	9 (10%)	1 (1%)	12	46
6	G	92/143 (64%)	81 (88%)	11 (12%)	0	100	100
7	D	91/126 (72%)	88 (97%)	3 (3%)	0	100	100
7	H	90/126 (71%)	83 (92%)	7 (8%)	0	100	100
8	A	86/136 (63%)	82 (95%)	4 (5%)	0	100	100
8	E	86/136 (63%)	82 (95%)	4 (5%)	0	100	100
9	B	69/103 (67%)	68 (99%)	1 (1%)	0	100	100
9	F	70/103 (68%)	66 (94%)	4 (6%)	0	100	100
All	All	5146/6485 (79%)	4607 (90%)	523 (10%)	16 (0%)	38	72

5 of 16 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
5	O	2229	ALA
5	O	2535	THR
5	O	3295	GLU
5	O	3480	LEU
5	O	3855	TYR

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	K	432/548 (79%)	430 (100%)	2 (0%)	86	89
2	L	462/649 (71%)	462 (100%)	0	100	100
5	O	3042/3671 (83%)	3040 (100%)	2 (0%)	92	94
6	C	63/106 (59%)	63 (100%)	0	100	100
6	G	65/106 (61%)	65 (100%)	0	100	100
7	D	77/105 (73%)	77 (100%)	0	100	100
7	H	78/105 (74%)	78 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
8	A	71/111 (64%)	71 (100%)	0	100	100
8	E	75/111 (68%)	75 (100%)	0	100	100
9	B	59/79 (75%)	59 (100%)	0	100	100
9	F	60/79 (76%)	60 (100%)	0	100	100
All	All	4484/5670 (79%)	4480 (100%)	4 (0%)	92	94

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	K	95	ASN
1	K	171	ASN
5	O	305	ASN
5	O	1961	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	K	458	GLN
5	O	1385	ASN
5	O	1926	ASN
5	O	2217	ASN
5	O	3470	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](#)

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](#)

There are no chain breaks in this entry.

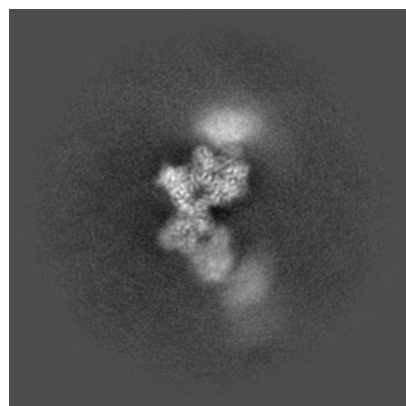
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-52958. These allow visual inspection of the internal detail of the map and identification of artifacts.

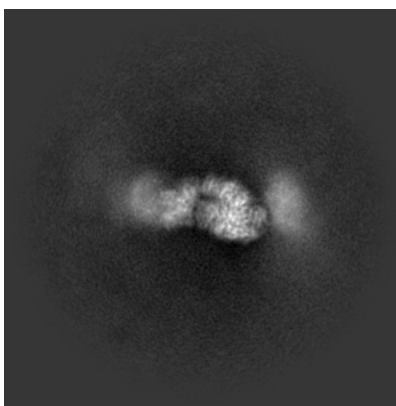
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

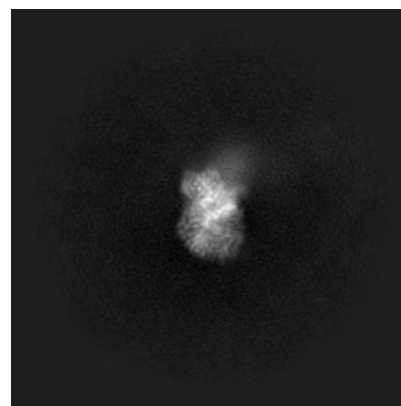
6.1.1 Primary map



X

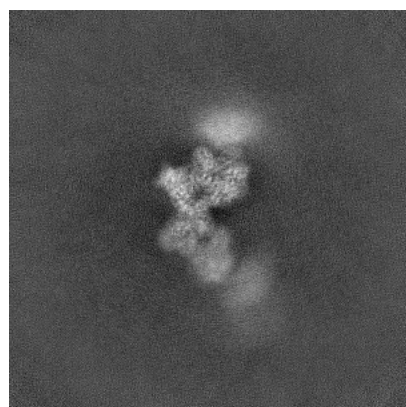


Y

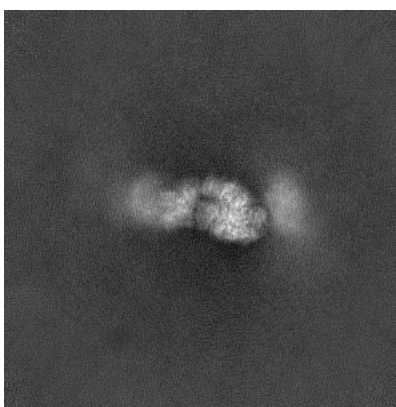


Z

6.1.2 Raw map



X



Y

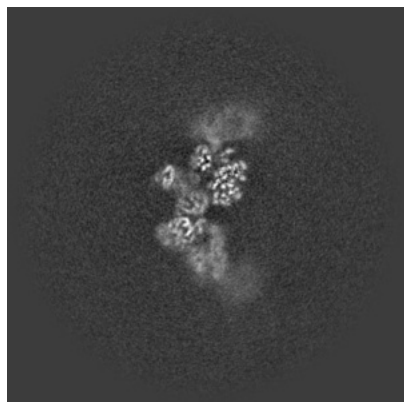


Z

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

6.2 Central slices [i](#)

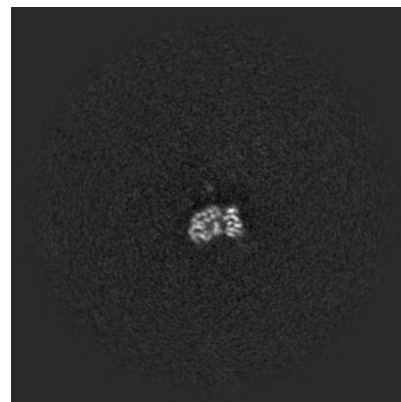
6.2.1 Primary map



X Index: 210

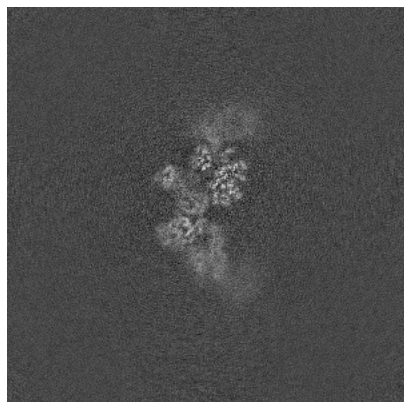


Y Index: 210



Z Index: 210

6.2.2 Raw map



X Index: 210



Y Index: 210

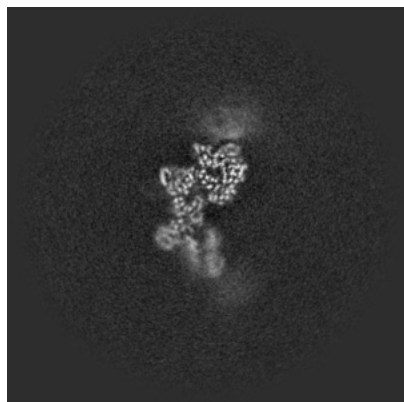


Z Index: 210

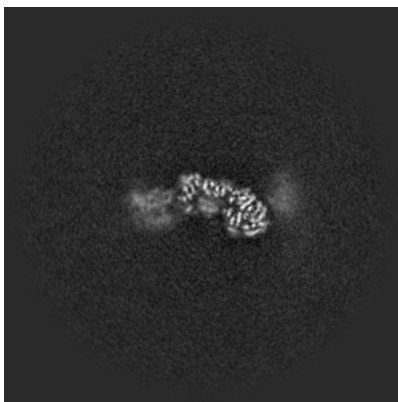
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

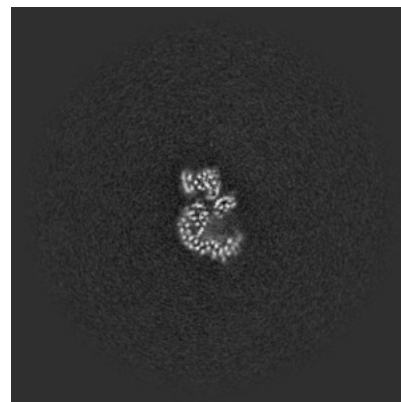
6.3.1 Primary map



X Index: 202



Y Index: 206



Z Index: 243

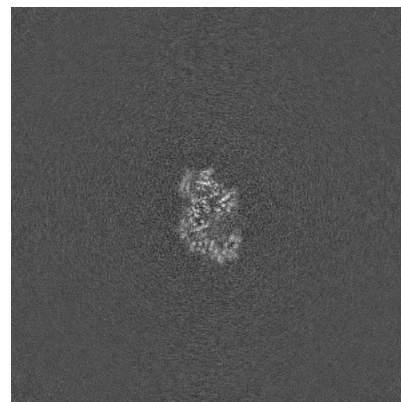
6.3.2 Raw map



X Index: 202



Y Index: 212

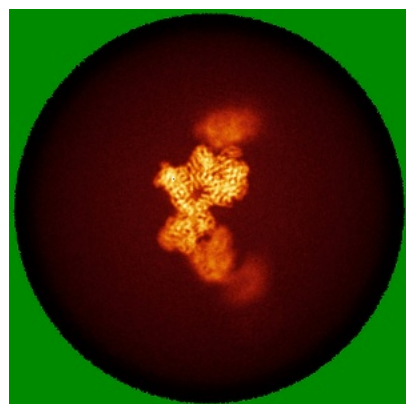


Z Index: 238

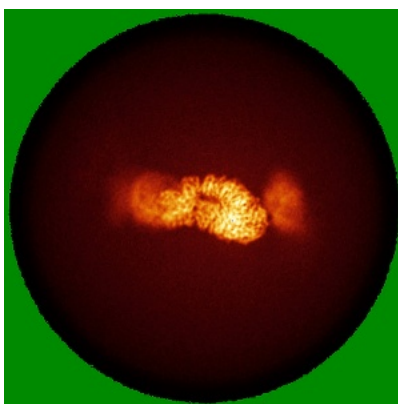
The images above show the largest variance slices of the map in three orthogonal directions.

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

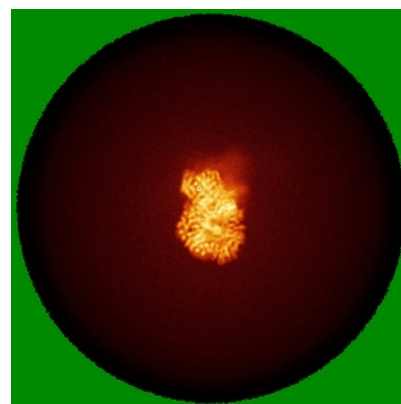
6.4.1 Primary map



X

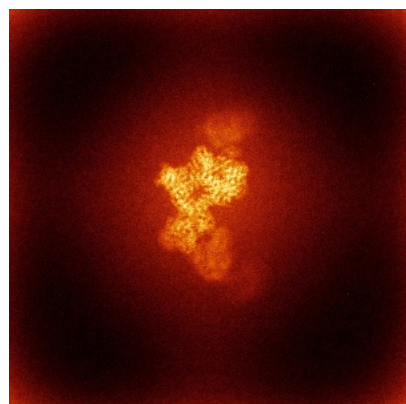


Y

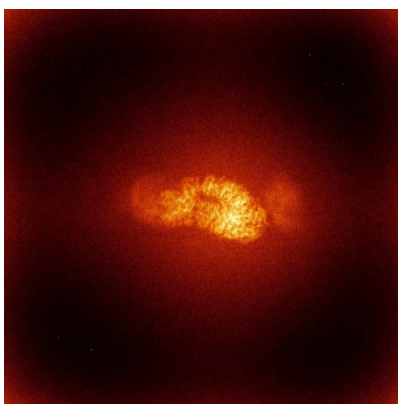


Z

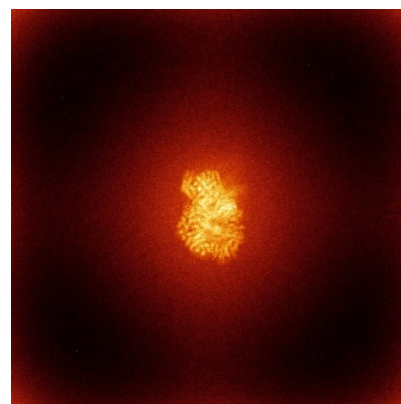
6.4.2 Raw map



X



Y

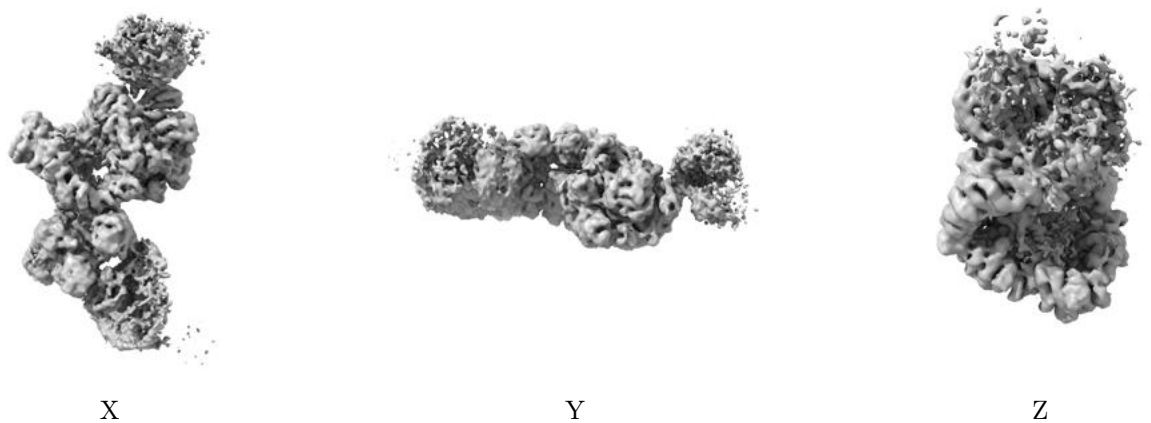


Z

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.

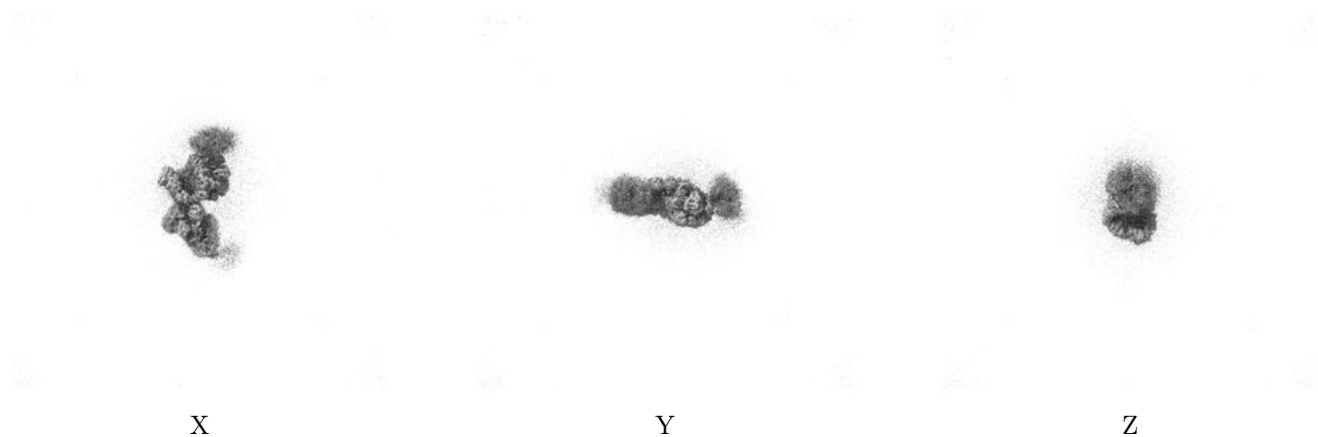
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.2. 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.

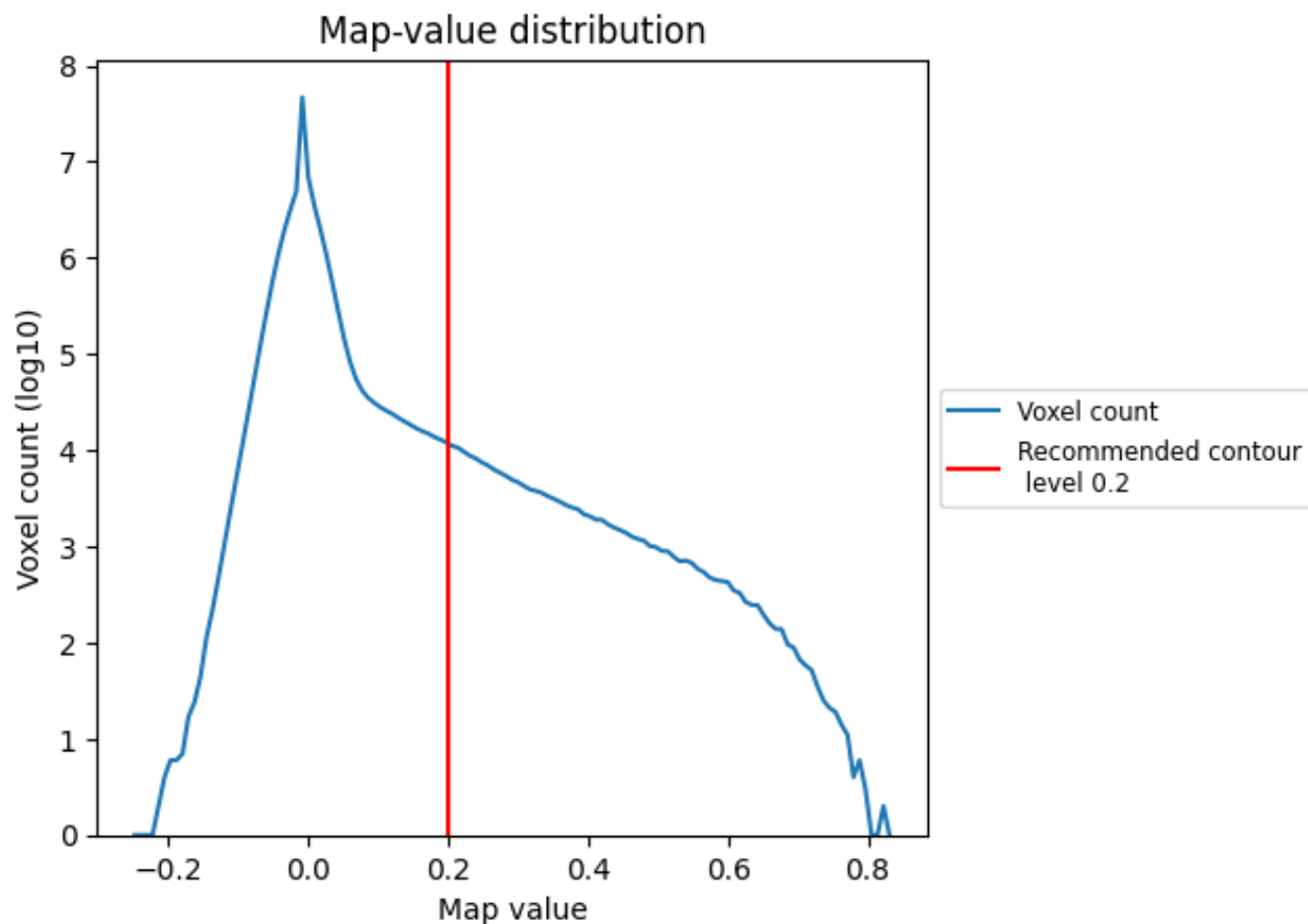
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

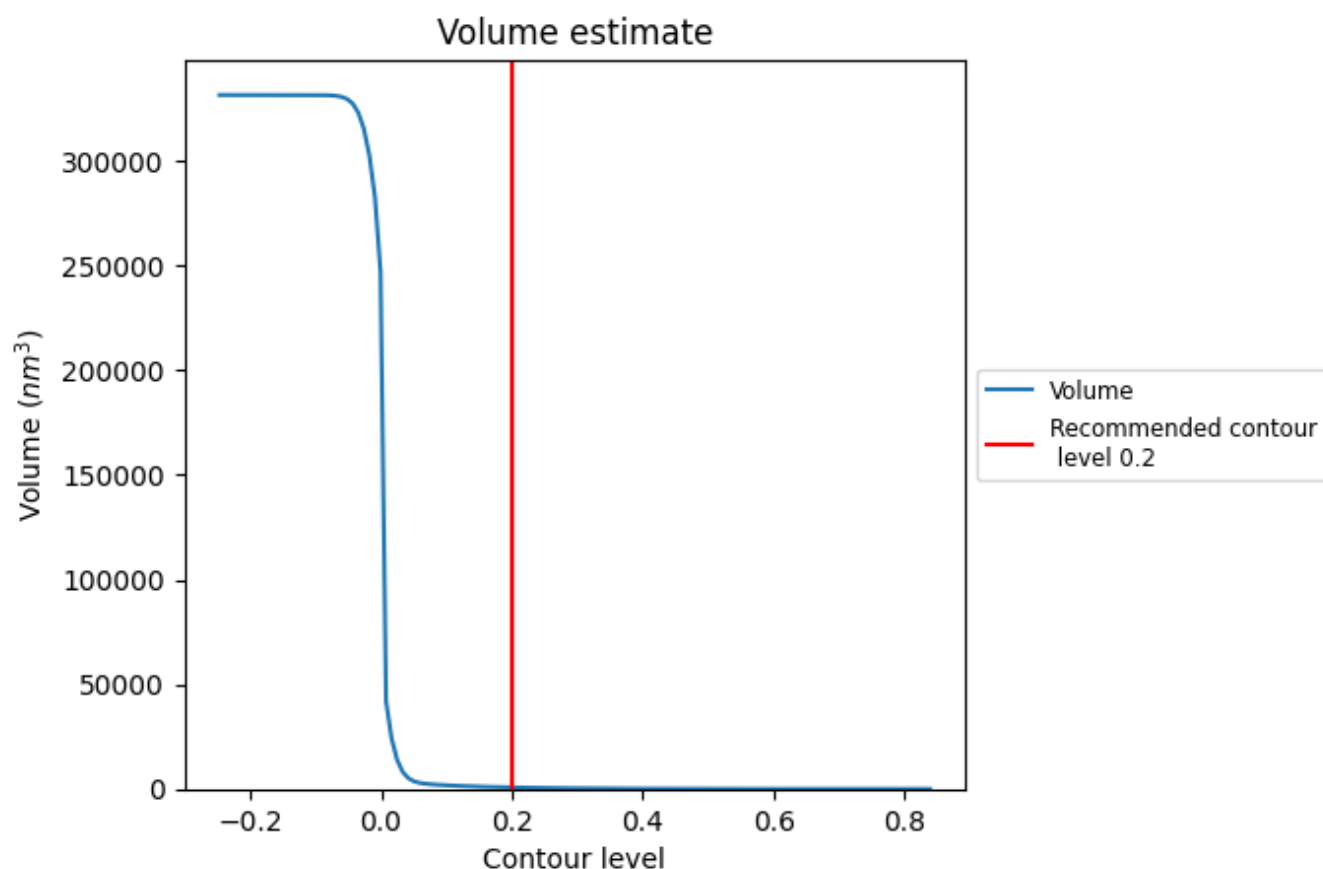
This section contains the results of statistical analysis of the map.

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.

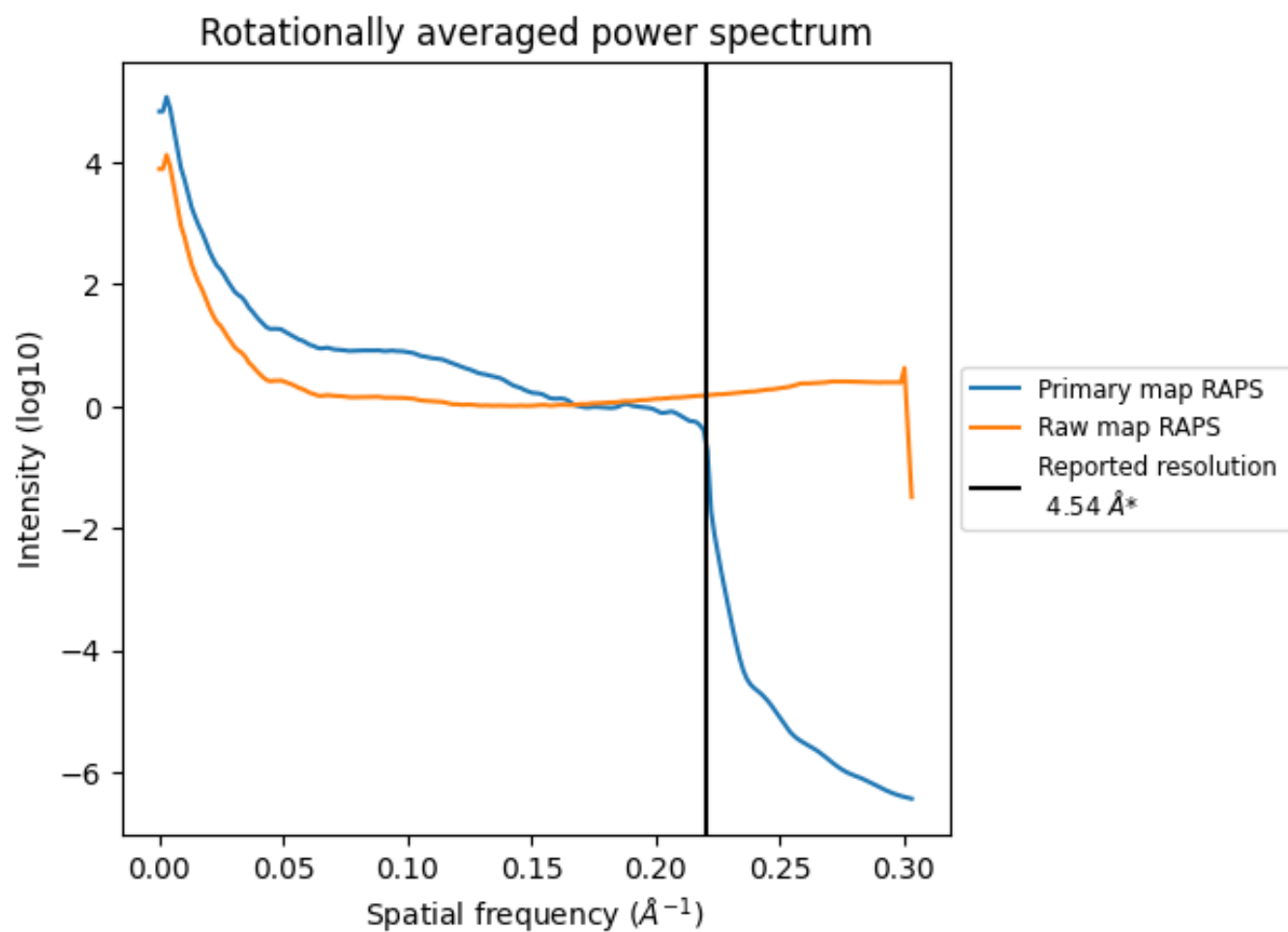
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 724 nm^3 ; this corresponds to an approximate mass of 654 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 ⓘ

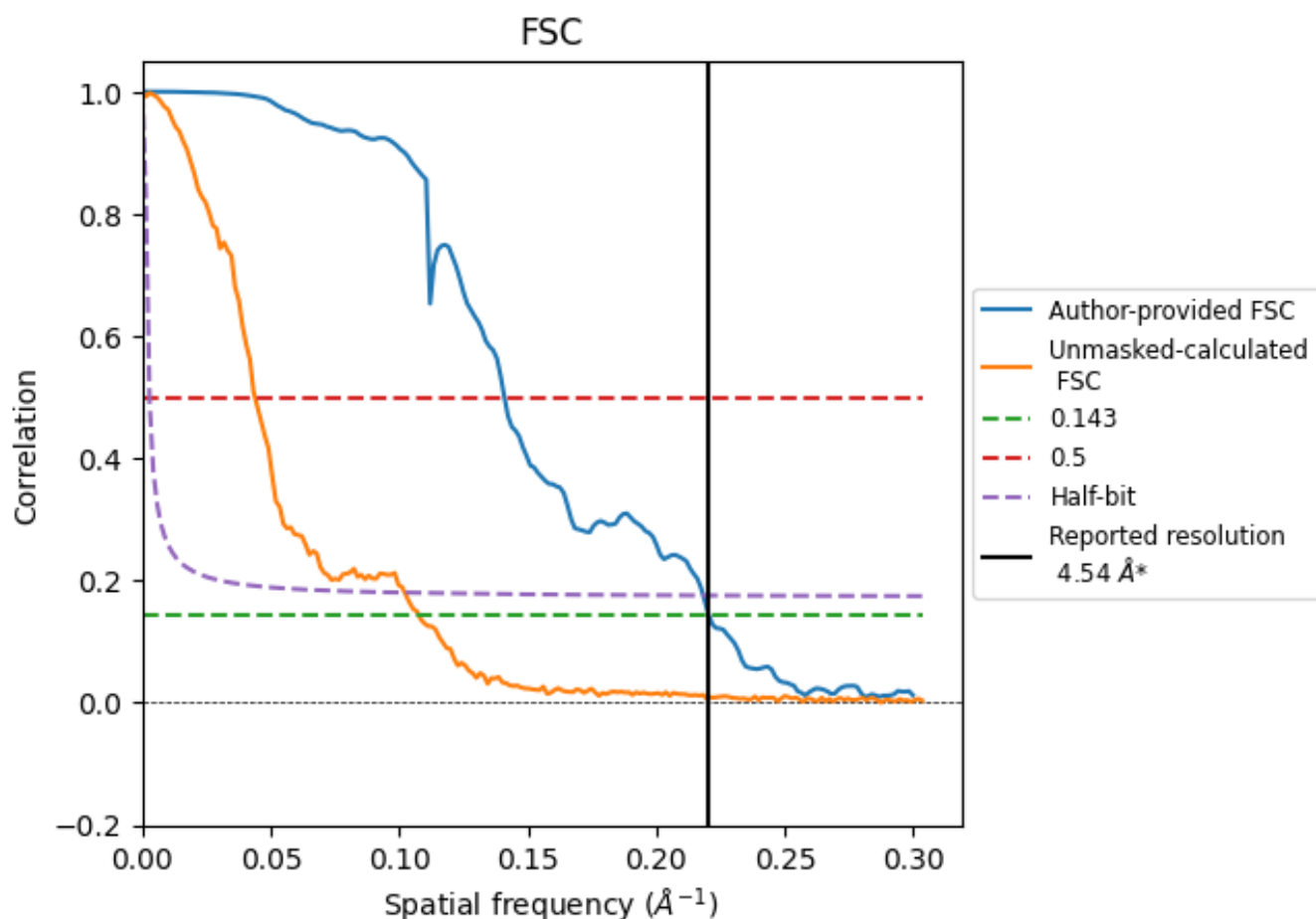


*Reported resolution corresponds to spatial frequency of 0.220 $\text{\AA}^{-1}$

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 $0.220 \text{ \AA}^{-1}$

8.2 Resolution estimates [i](#)

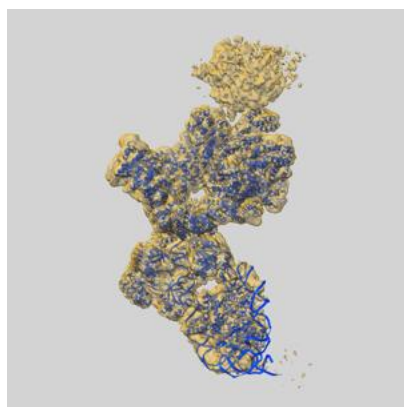
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.54	-	-
Author-provided FSC curve	4.54	7.10	4.58
Unmasked-calculated*	9.29	22.78	9.79

*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 9.29 differs from the reported value 4.54 by more than 10 %

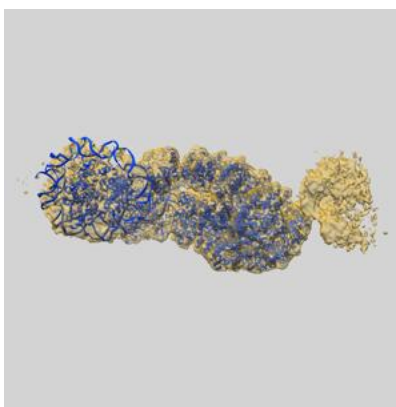
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-52958 and PDB model 9Q9F. Per-residue inclusion information can be found in [section 3](#) on [page 6](#).

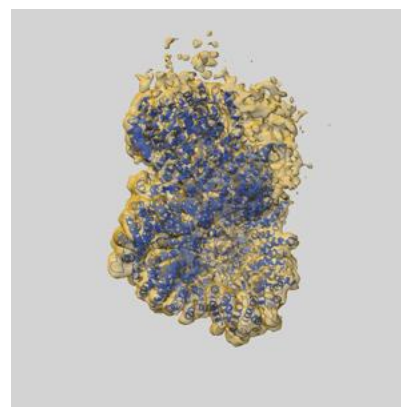
9.1 Map-model overlay [i](#)



X



Y



Z

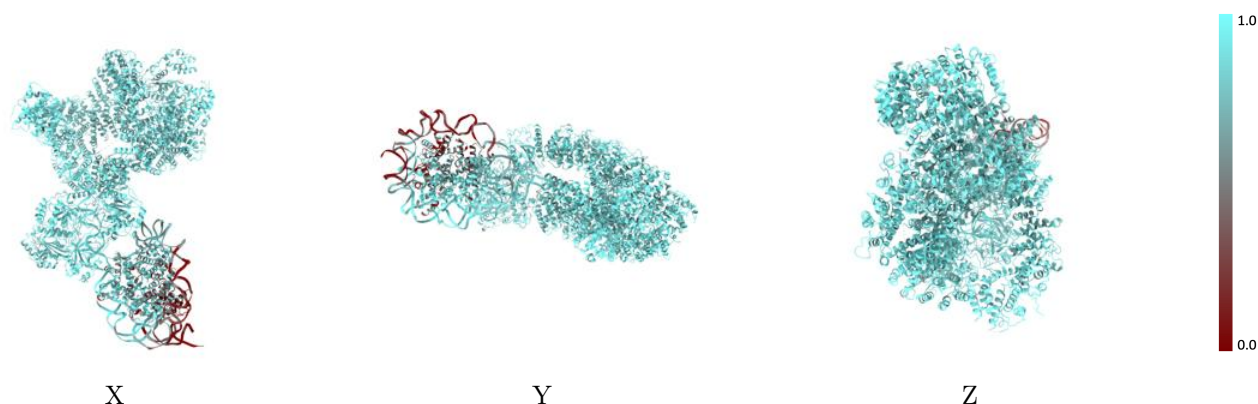
The images above show the 3D surface view of the map at the recommended contour level 0.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



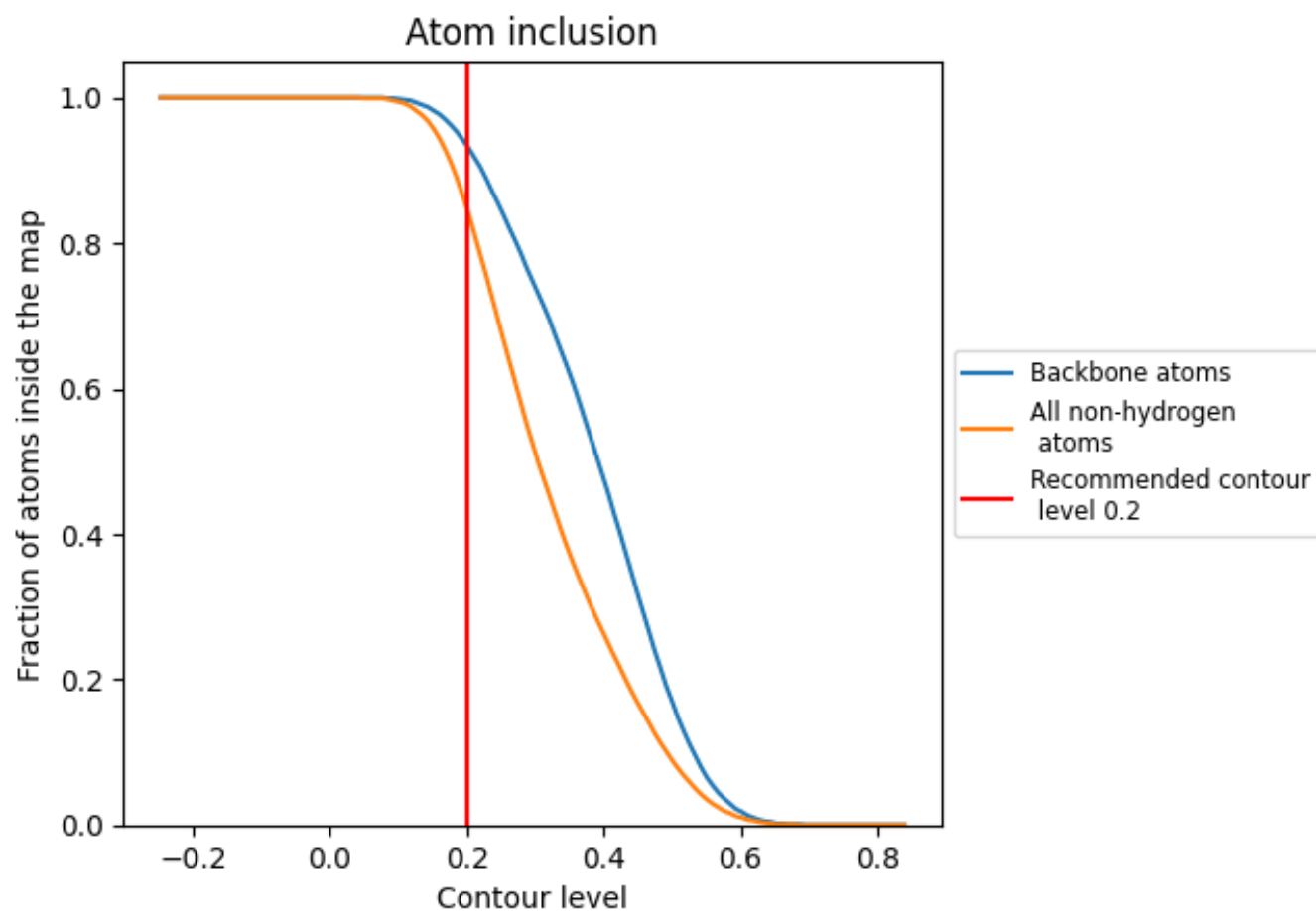
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.2).

9.4 Atom inclusion [i](#)



At the recommended contour level, 94% of all backbone atoms, 85% 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 (0.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8500	 0.2150
A	 0.7080	 0.1420
B	 0.8730	 0.1350
C	 0.7110	 0.1680
D	 0.7520	 0.1730
E	 0.4830	 0.1280
F	 0.5730	 0.1700
G	 0.6360	 0.1440
H	 0.6560	 0.1340
I	 0.6720	 0.1590
J	 0.6990	 0.1710
K	 0.9250	 0.2250
L	 0.9060	 0.2030
O	 0.8960	 0.2380

