



# Full wwPDB EM Map/Model Validation Report ⓘ

Aug 29, 2020 – 05:28 PM BST

PDB ID : 6KF9  
EMDB ID : EMD-9960  
Title : Cryo-EM structure of Thermococcus kodakarensis RNA polymerase  
Authors : Jun, S.-H.; Hyun, J.; Jeong, H.; Cha, J.S.; Kim, H.; Bartlett, M.S.; Cho, H.-S.;  
Murakami, K.S.  
Deposited on : 2019-07-07  
Resolution : 3.79 Å(reported)

This is a Full wwPDB EM Map/Model Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto: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.

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

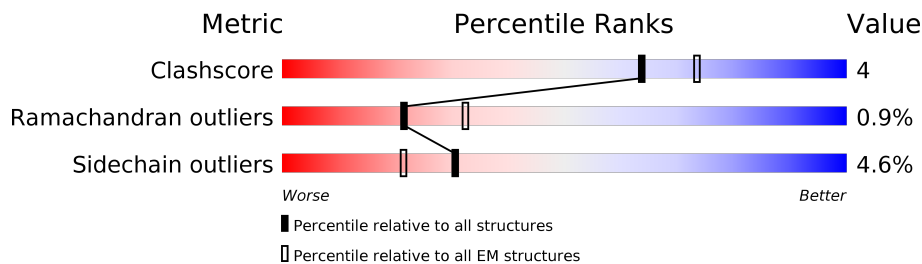
EMDB validation analysis : 0.0.0.dev33  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.13

# 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 3.79 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 on the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	906	
2	B	1123	
3	C	391	
4	D	259	
5	E	190	
6	F	122	
7	H	82	
8	K	57	

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Mol	Chain	Length	Quality of chain
9	L	94	
10	N	65	
11	P	49	
12	G	185	
13	X	16	
14	Y	27	

## 2 Entry composition [i](#)

There are 16 unique types of molecules in this entry. The entry contains 28232 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-directed RNA polymerase subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	900	Total	C	N	O	S	0	0
			7181	4535	1277	1330	39		

- Molecule 2 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	1114	Total	C	N	O	S	0	0
			8892	5616	1587	1652	37		

- Molecule 3 is a protein called DNA-directed RNA polymerase subunit A”.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	388	Total	C	N	O	S	0	0
			3037	1920	525	582	10		

- Molecule 4 is a protein called DNA-directed RNA polymerase subunit D.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	257	Total	C	N	O	S	0	0
			2058	1325	340	389	4		

- Molecule 5 is a protein called DNA-directed RNA polymerase, subunit E.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	181	Total	C	N	O	S	0	0
			1465	939	250	267	9		

- Molecule 6 is a protein called DNA-directed RNA polymerase, subunit F.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	F	122	Total	C	N	O	S	0	0
			1020	654	169	193	4		

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	115	ILE	-	expression tag	UNP Q5JI52
F	116	ASP	-	expression tag	UNP Q5JI52
F	117	GLU	-	expression tag	UNP Q5JI52
F	118	TYR	-	expression tag	UNP Q5JI52
F	119	ARG	-	expression tag	UNP Q5JI52
F	120	PRO	-	expression tag	UNP Q5JI52
F	121	LEU	-	expression tag	UNP Q5JI52
F	122	GLU	-	expression tag	UNP Q5JI52

- Molecule 7 is a protein called DNA-directed RNA polymerase subunit H.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	H	76	Total	C	N	O	0	0
			627	408	105	114		

- Molecule 8 is a protein called DNA-directed RNA polymerase subunit K.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	K	56	Total	C	N	O	S	0	0
			433	284	75	73	1		

- Molecule 9 is a protein called DNA-directed RNA polymerase subunit L.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	L	94	Total	C	N	O	S	0	0
			775	493	134	146	2		

- Molecule 10 is a protein called DNA-directed RNA polymerase subunit N.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	N	65	Total	C	N	O	S	0	0
			529	340	89	94	6		

- Molecule 11 is a protein called DNA-directed RNA polymerase subunit P.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	P	44	Total	C	N	O	S	0	0
			352	221	70	57	4		

- Molecule 12 is a protein called Transcription factor E.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	G	166	Total	C	N	O	S	0	0
			1386	881	228	267	10		

- Molecule 13 is a DNA chain called DNA (5'-D(P\*TP\*CP\*GP\*GP\*TP\*AP\*AP\*TP\*CP\*AP\*CP\*GP\*CP\*TP\*CP\*C)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
13	X	14	Total	C	N	O	P	0	0
			285	136	50	85	14		

- Molecule 14 is a DNA chain called DNA (27-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
14	Y	9	Total	C	N	O	P	0	0
			185	88	35	53	9		

- Molecule 15 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
15	A	1	Total	Mg	0
			1	1	

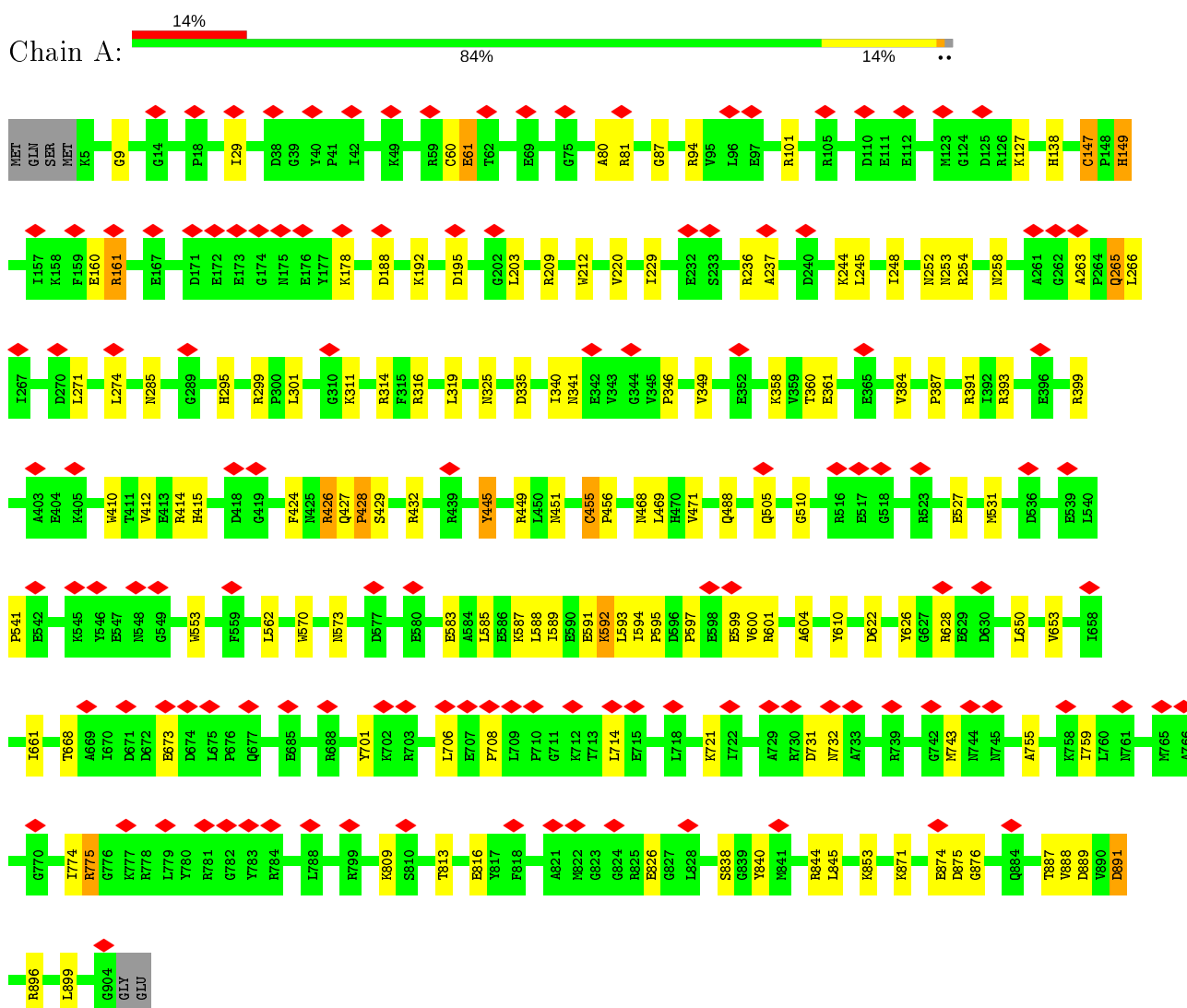
- Molecule 16 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
16	P	1	Total	Zn	0
			1	1	
16	G	1	Total	Zn	0
			1	1	
16	B	1	Total	Zn	0
			1	1	
16	A	2	Total	Zn	0
			2	2	
16	N	1	Total	Zn	0
			1	1	

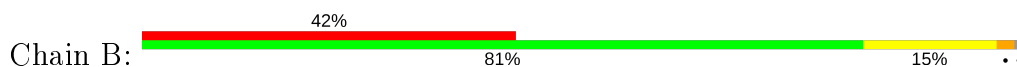
### 3 Residue-property plots

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 sequence, but not in the model, are shown in grey.

- Molecule 1: DNA-directed RNA polymerase subunit

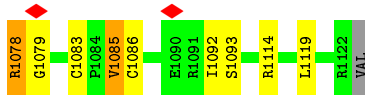


- Molecule 2: DNA-directed RNA polymerase subunit beta

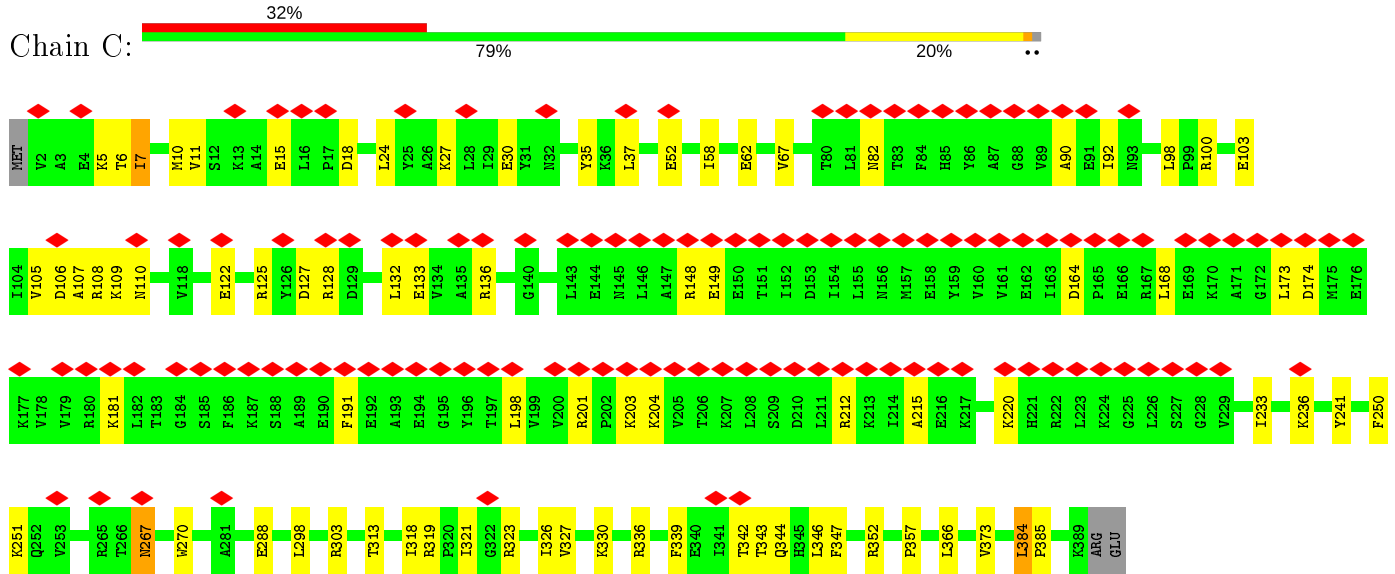


F966	F967	H968	S969	G970	H971	E972	H973	H974	H975	H976	G977	H978	H981	H982	H983	H984	H985	H986	H987	H988	H989	H990	H991	H992	H993	H994	H998	H999	H1008	H1009	H1010	H1011	H1015	H1016	H1017	H1024	E1027	G1028	G1029	L1030	R1031	E1036	R1052	E1056	S1057	D1058	C1065	E1066	E1074	D1075	K1076	R1077	R885	H886	G887	Q888	L894	P897	Q898	E899	P902	H903	T904	S905	G906	G907	S908	H909	P910	D911	L912	I919	V925	G926	Q927	L928	I929	I932	K935	I939	T940	G941	R942	R943	V944	D945	G946	I950	G951	E952	P953	E954	E955	K956	L957	K958	K959	E960	L961	E962	E963	L964	G965	D717	Q722	H723	F724	V725	V726	N735	D738	A739	V740	I741	I742	N743	K744	A745	S746	E747	E748	N749	G750	L751	A752	E761	A762	E763	E764	K765	R766	K772	D773	M774	F775	E776	S779	F780	N781	I782	Q783	G784	Y785	L786	G787	E788	K789	H793	D797	G798	L799	E803	E807	D810	V811	L812	R815	T816	S817	R818	P819	R820	F821	I822	E823	E824	Q825	S826	S827	L828	G829	P830	H831	H832	H833	L834	G835	R836	R837	E838	R844	E847	K848	V851	D852	H853	I855	V856	E858	H859	G860	D861	G862	H863	K864	L865	V868	H869	V870	L878	G879	D880	S884	E337	D338	D339	K340	D341	H342	Y343	A344	N345	K346	R347	L348	A351	G352	D353	K356	L358	F359	R360	V361	A362	F363	L366	V367	K368	D369	H370	Q371	Y372	H373	K374	T375	K376	T377	Y378	Q379	R380	K381	G382	E383	R384	Y385	T386	F387	K388	N389	I390	Q391	R392	F393	V394	R395	N396	L398	R399	P400	D401	V402	L403	S404	E405	R406	L407	E408	L411	G414	G418	G419	R420	T421	V423	S424	L425	L426	L427	D428	R429	N431	Y432	H433	L436	L439	R440	G442	E443	A444	R445	D447	H448	H452	F453	E454	A455	R456	D457	L458	H459	G460	H463	G464	E470	E473	E477	G478	N482	L483	A484	L485	H486	T491	G492	L493	P494	E495	R496	E497	V498	R499	E500	H504	M505	G506	P509	I510	E511	B512	B513	H514	P515	A516	F517	Y520	H521	Y522	L528	I529	G530	T531	Y532	E533	D534	G535	R536	H537	E540	H541	A544	D545	R546	H547	A548	G549	I551	S552	D553	V554	I555	H556	V557	A558	L559	V560	E561	D562	E563	E564	V565	K566	E567	Y568	D573	R576	R579	L581	I582	V583	V584	E585	N586	G587	K588	L591	T592	H593	E594	R600	N601	G602	T603	L604	T605	D608	L609	H612	G613	L614	L615	E616	V617	E622	E623	E624	E625	E626	E629	T630	H631	F632	H633	E634	V635	T636	E637	L642	H645	P646	A647	L650	G651	I652	P653	A654	S655	Y659	P660	E661	H662	N663	R667	N668	G671	A672	A675	L679	G680	L681	G682	H683	A684	R687	L688	D691	T692	R693	H696	V699	L704	V705	N706	S707	R708	K711	A712	E716	E867	K868	I869	H870	L878	G879	D880	S884	R209	K210	K211	D212	G213	I214	L215	V216	Y217	T218	I219	P220	N221	V222	K223	R224	P225	V226	K227	F228	V229	M232	R233	A234	L235	G236	L237	L238	T239	D240	K241	E242	L243	V244	E245	A246	V247	S248	D249	D250	P251	R252	I253	F258	D259	M260	L261	E262	D263	A264	S265	D266	L267	S268	T269	Q270	E271	E272	A273	L274	D275	Y276	L277	G278	R279	L280	L281	L282	P283	G284	Q285	F286	K287	E288	Y289	R290	L291	R292	R293	A294	E295	H296	L297	D299	N300	N301	L302	L303	F304	H305	N306	G307	V308	D309	P310	E311	N312	R313	R314	A315	K316	A317	Y318	Y319	M322	N323	A324	L325	E329	L332	G333	L334	R335	G336	E337	D338	D339	K340	D341	H342	Y343	A344	N345	K346	R347	L348	A351	G352	D353	K356	L358	F359	R360	V361	A362	F363	L366	V367	K368	D369	H370	Q371	Y372	H373	K374	T375	K376	T377	Y378	Q379	R380	K381	G382	E383	R384	Y385	T386	F387	K388	N389	I390	Q391	R392	F393	V394	R395	N396	L398	R399	P400	D401	V402	L403	S404	E405	R406	L407	E408	L411	G414	G418	G419	R420	T421	V423	S424	L425	L426	L427	D428	R429	N431	Y432	H433	L436	L439	R440	G442	E443	A444	R445	D447	H448	H452	F453	E454	A455	R456	D457	L458	H459	G460	H463	G464	E470	E473	E477	G478	N482	L483	A484	L485	H486	T491	G492	L493	P494	E495	R496	E497	V498	R499	E500	H504	M505	G506	P509	I510	E511	B512	B513	H514	P515	A516	F517	Y520	H521	Y522	L528	I529	G530	T531	Y532	E533	D534	G535	R536	H537	E540	H541	A544	D545	R546	H547	A548	G549	I551	S552	D553	V554	I555	H556	E567	K568	I569	H570	L578	G579	D580	S584	R585	H586	L587	H588	I589	H590	L591	H592	H593	H594	H595	H596	H597	H598	H599	H600	H601	H602	H603	H604	H605	H606	H607	H608	H609	H610	H611	H612	H613	H614	H615	H616	H617	H618	H619	H620	H621	H622	H623	H624	H625	H626	H627	H628	H629	H630	H631	H632	H633	H634	H635	H636	H637	H638	H639	H640	H641	H642	H643	H644	H645	H646	H647	H648	H649	H650	H651	H652	H653	H654	H655	H656	H657	H658	H659	H660	H661	H662	H663	H664	H665	H666	H667	H668	H669	H670	H671	H672	H673	H674	H675	H676	H677	H678	H679	H680	H681	H682	H683	H684	H685	H686	H687	H688	H689	H690	H691	H692	H693	H694	H695	H696	H697	H698	H699	H700	H701	H702	H703	H704	H705	H706	H707	H708	H709	H710	H711	H712	H713	H714	H715	H716	H717	H718	H719	H720	H721	H722	H723	H724	H725	H726	H727	H728	H729	H730	H731	H732	H733	H734	H735	H736	H737	H738	H739	H740	H741	H742	H743	H744	H745	H746	H747	H748	H749	H750	H751	H752	H753	H754	H755	H756	H757	H758	H759	H760	H761	H762	H763	H764	H765	H766	H767	H768	H769	H770	H771	H772	H773	H774	H775	H776	H777	H778	H779	H780	H781	H782	H783	H784	H785	H786	H787	H788	H789	H790	H791	H792	H793	H794	H795	H796	H797	H798	H799	H800	H801	H802	H803	H804	H805	H806	H807	H808	H809	H810	H811	H812	H813	H814	H815	H816	H817	H818	H819	H820	H821	H822	H823	H824	H825	H826	H827	H828	H829	H830	H831	H832	H833	H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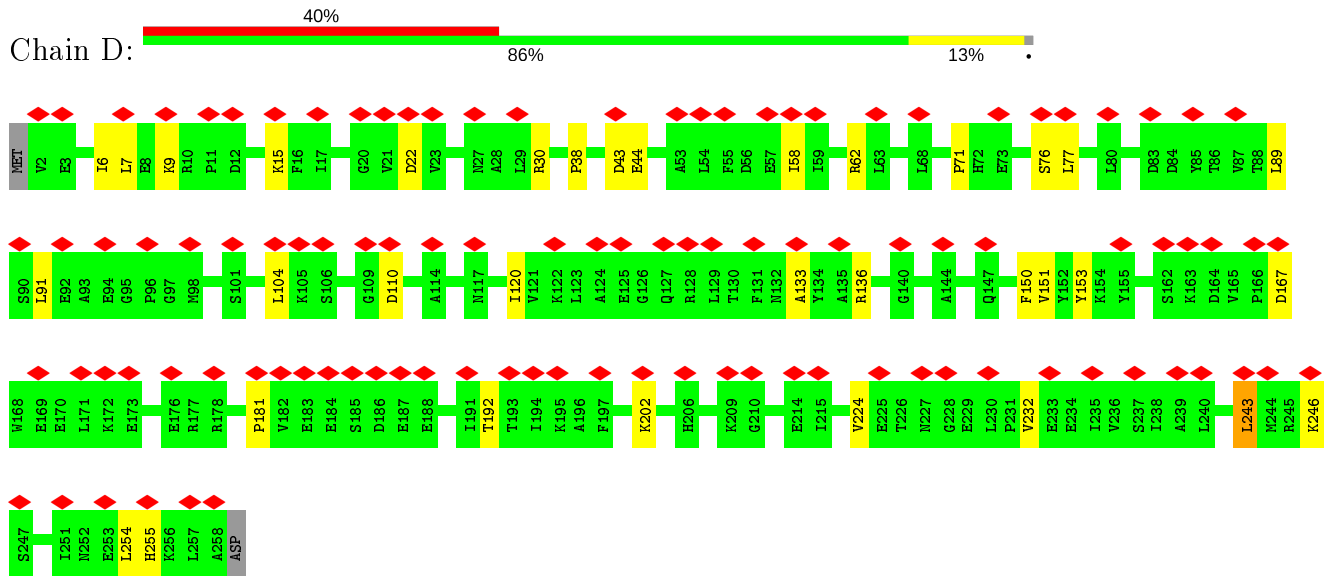




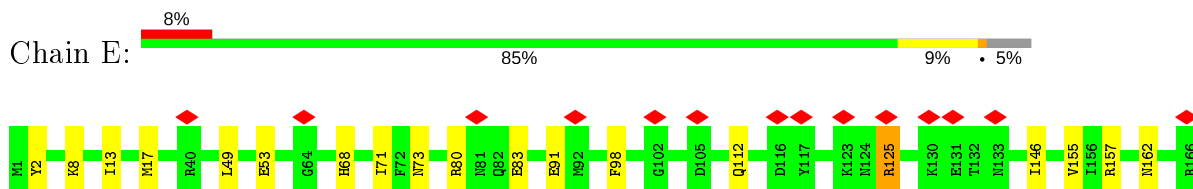
- Molecule 3: DNA-directed RNA polymerase subunit A''

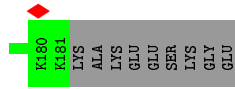


- Molecule 4: DNA-directed RNA polymerase subunit D

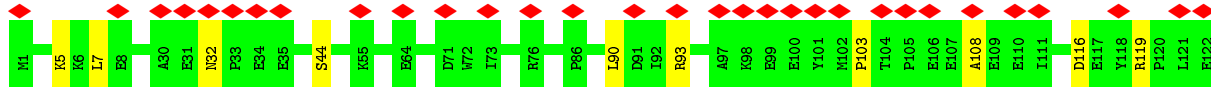
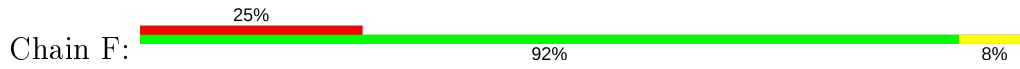


- Molecule 5: DNA-directed RNA polymerase, subunit E

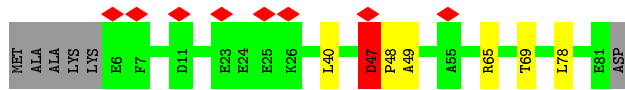
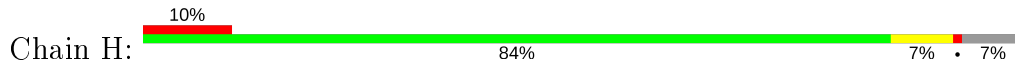




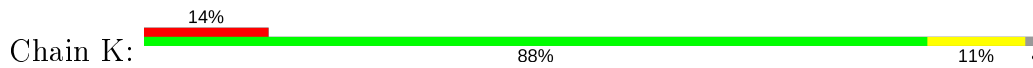
- Molecule 6: DNA-directed RNA polymerase, subunit F



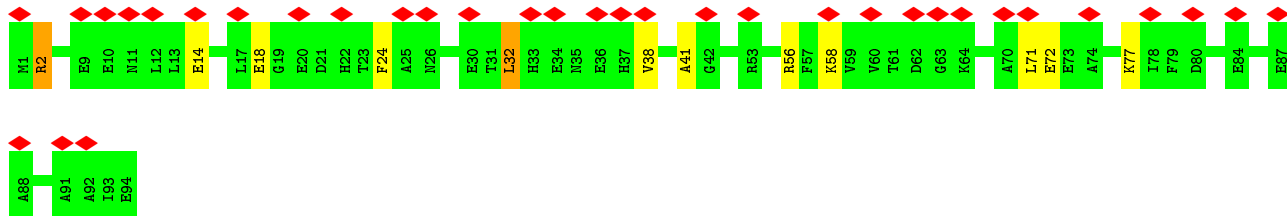
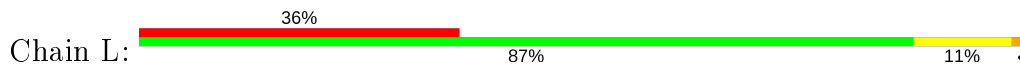
- Molecule 7: DNA-directed RNA polymerase subunit H



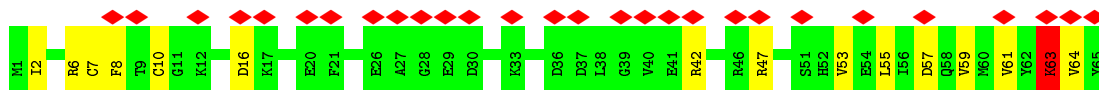
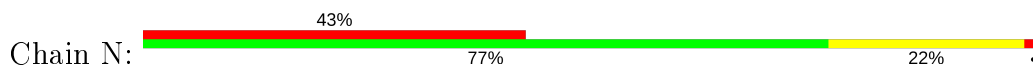
- Molecule 8: DNA-directed RNA polymerase subunit K



- Molecule 9: DNA-directed RNA polymerase subunit L



- Molecule 10: DNA-directed RNA polymerase subunit N

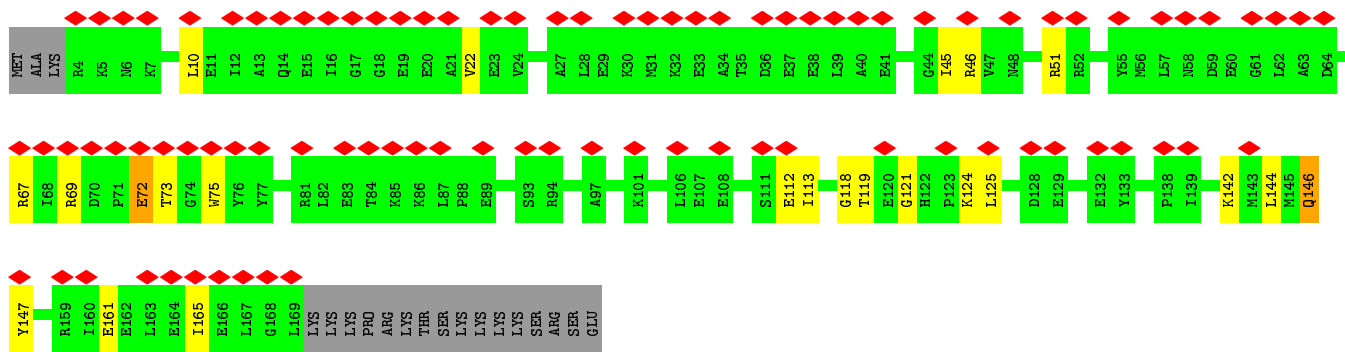
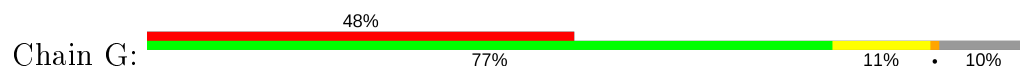


- Molecule 11: DNA-directed RNA polymerase subunit P

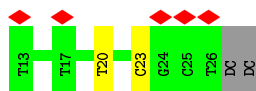
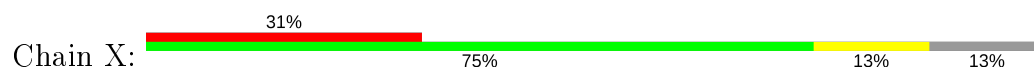




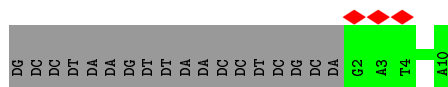
- Molecule 12: Transcription factor E



- Molecule 13: DNA (5'-D(P\*TP\*CP\*GP\*GP\*TP\*AP\*AP\*TP\*CP\*AP\*CP\*GP\*CP\*TP\*CP\*C)-3')



- Molecule 14: DNA (27-MER)



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	Depositor
Number of particles used	312092	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 ( $e^-/\text{\AA}^2$ )	35.0	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	Not provided	Depositor
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	1.000	Depositor
Minimum map value	0.000	Depositor
Average map value	0.128	Depositor
Map value standard deviation	0.322	Depositor
Recommended contour level	0.07	Depositor
Map size (Å)	246.4, 246.4, 246.4	Depositor
Map dimensions	176, 176, 176	Depositor
Map angles (°)	90.0, 90.0, 90.0	Depositor
Pixel spacing (Å)	1.4, 1.4, 1.4	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: ZN, 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	0.40	1/7324 (0.0%)	0.68	1/9885 (0.0%)
2	B	0.40	0/9070	0.72	9/12256 (0.1%)
3	C	0.37	0/3077	0.71	3/4156 (0.1%)
4	D	0.38	0/2103	0.65	0/2848
5	E	0.34	1/1491 (0.1%)	0.53	0/2008
6	F	0.26	0/1040	0.54	0/1399
7	H	0.38	0/641	0.73	1/866 (0.1%)
8	K	0.36	0/441	0.60	0/598
9	L	0.33	0/790	0.62	0/1066
10	N	0.48	0/538	0.76	0/723
11	P	0.42	0/357	1.01	3/477 (0.6%)
12	G	0.30	0/1409	0.56	0/1890
13	X	0.88	0/318	1.22	2/488 (0.4%)
14	Y	0.65	0/207	1.01	0/317
All	All	0.40	2/28806 (0.0%)	0.69	19/38977 (0.0%)

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
1	A	0	3
2	B	0	3
3	C	0	6
7	H	0	1
8	K	0	2
11	P	0	1
12	G	0	3
All	All	0	19

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	E	125	ARG	CA-CB	6.06	1.67	1.53
1	A	562	LEU	C-N	-5.26	1.22	1.34

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	H	47	ASP	CB-CG-OD1	8.36	125.82	118.30
2	B	12	LEU	C-N-CA	6.92	139.01	121.70
13	X	23	DC	O4'-C1'-N1	6.92	112.84	108.00
2	B	1078	ARG	NE-CZ-NH1	6.34	123.47	120.30
13	X	20	DT	O4'-C1'-N1	6.16	112.31	108.00
2	B	57	VAL	C-N-CD	-6.09	107.19	120.60
2	B	894	LEU	CA-CB-CG	6.06	129.25	115.30
2	B	426	LEU	CA-CB-CG	5.85	128.76	115.30
2	B	1030	LEU	CA-CB-CG	-5.71	102.16	115.30
1	A	469	LEU	CA-CB-CG	5.64	128.27	115.30
11	P	13	LYS	CA-CB-CG	5.61	125.74	113.40
3	C	384	LEU	CA-CB-CG	5.45	127.84	115.30
3	C	298	LEU	CA-CB-CG	5.38	127.66	115.30
2	B	289	TYR	CA-CB-CG	5.21	123.29	113.40
11	P	13	LYS	C-N-CA	5.11	134.47	121.70
2	B	105	LEU	CA-CB-CG	5.10	127.03	115.30
11	P	17	LEU	CA-CB-CG	5.07	126.96	115.30
2	B	57	VAL	C-N-CA	5.01	143.06	122.00
3	C	24	LEU	CA-CB-CG	5.00	126.80	115.30

There are no chirality outliers.

All (19) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	427	GLN	Peptide
1	A	455	CYS	Peptide
1	A	874	GLU	Peptide
2	B	10	PRO	Peptide
2	B	704	LEU	Peptide
2	B	781	ASN	Peptide
3	C	110	ASN	Peptide
3	C	203	LYS	Peptide
3	C	204	LYS	Peptide
3	C	342	THR	Peptide
3	C	35	TYR	Peptide

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Mol	Chain	Res	Type	Group
3	C	384	LEU	Peptide
12	G	112	GLU	Peptide
12	G	146	GLN	Peptide
12	G	147	TYR	Peptide
7	H	47	ASP	Peptide
8	K	30	VAL	Peptide
8	K	31	PRO	Peptide
11	P	14	GLU	Peptide

## 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	7181	0	7249	73	0
2	B	8892	0	8950	93	0
3	C	3037	0	3151	38	0
4	D	2058	0	2068	20	0
5	E	1465	0	1503	9	0
6	F	1020	0	1024	5	0
7	H	627	0	642	3	0
8	K	433	0	466	3	0
9	L	775	0	770	9	0
10	N	529	0	543	9	0
11	P	352	0	376	9	0
12	G	1386	0	1382	12	0
13	X	285	0	159	0	0
14	Y	185	0	102	0	0
15	A	1	0	0	0	0
16	A	2	0	0	0	0
16	B	1	0	0	0	0
16	G	1	0	0	0	0
16	N	1	0	0	0	0
16	P	1	0	0	0	0
All	All	28232	0	28385	243	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 4.

All (243) 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)
3:C:107:ALA:HB1	3:C:270:TRP:HE1	1.53	0.73
1:A:597:PRO:HA	1:A:601:ARG:HD2	1.72	0.72
1:A:445:TYR:HB2	1:A:449:ARG:HH22	1.58	0.67
1:A:203:LEU:HD21	3:C:352:ARG:HH21	1.61	0.65
10:N:7:CYS:SG	10:N:8:PHE:N	2.70	0.65
1:A:263:ALA:O	12:G:51:ARG:NH1	2.30	0.65
2:B:78:GLN:HB3	2:B:84:ARG:HG2	1.80	0.64
1:A:285:ASN:ND2	1:A:301:LEU:O	2.32	0.60
2:B:857:THR:OG1	2:B:858:GLU:N	2.33	0.60
4:D:89:LEU:HB2	4:D:133:ALA:HB3	1.84	0.60
2:B:1065:CYS:SG	2:B:1066:GLU:N	2.75	0.59
2:B:427:LEU:HD23	2:B:429:ARG:HH21	1.66	0.59
4:D:62:ARG:HH22	10:N:2:ILE:HB	1.67	0.59
2:B:1052:ARG:NH1	2:B:1056:GLU:OE1	2.35	0.59
1:A:570:TRP:HB3	1:A:610:TYR:HD1	1.66	0.59
1:A:340:ILE:HD12	1:A:650:LEU:HD22	1.85	0.58
1:A:325:ASN:OD1	2:B:1008:ARG:NH1	2.36	0.58
2:B:13:THR:OG1	2:B:16:GLU:OE1	2.21	0.58
1:A:429:SER:OG	2:B:1036:GLU:OE2	2.19	0.57
4:D:71:PRO:HG3	4:D:110:ASP:HB3	1.87	0.57
1:A:468:ASN:OD1	1:A:468:ASN:N	2.37	0.57
8:K:34:ILE:HG23	8:K:38:GLN:HB2	1.86	0.57
2:B:47:GLN:HE21	2:B:51:ASN:HD21	1.53	0.57
1:A:147:CYS:SG	1:A:149:HIS:ND1	2.77	0.56
1:A:871:LYS:HB3	1:A:875:ASP:HB3	1.87	0.56
4:D:62:ARG:NH1	4:D:120:ILE:O	2.38	0.56
1:A:384:VAL:HG23	1:A:412:VAL:HG22	1.86	0.56
1:A:774:ILE:HG13	1:A:826:GLU:HG3	1.87	0.56
1:A:853:LYS:HB3	3:C:373:VAL:HG12	1.87	0.56
6:F:5:LYS:HE2	6:F:7:LEU:HB3	1.86	0.56
2:B:659:TYR:HB3	2:B:662:HIS:HD2	1.71	0.56
1:A:178:LYS:O	12:G:67:ARG:NH2	2.39	0.56
4:D:43:ASP:OD2	4:D:136:ARG:NH1	2.39	0.56
1:A:360:THR:OG1	1:A:361:GLU:N	2.39	0.55
10:N:8:PHE:HB2	10:N:47:ARG:HH22	1.71	0.55
2:B:579:ARG:NH2	2:B:623:GLU:OE2	2.38	0.55
2:B:81:GLN:NE2	11:P:24:GLU:OE2	2.40	0.55
2:B:512:GLU:OE2	2:B:514:ARG:NH1	2.40	0.55
1:A:311:LYS:HA	1:A:316:ARG:HH21	1.72	0.55
2:B:773:ASP:HB3	2:B:818:PRO:HD3	1.89	0.55
1:A:236:ARG:HE	2:B:820:ARG:HH11	1.55	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:436:LEU:HD22	2:B:652:ILE:HG12	1.88	0.55
1:A:896:ARG:NH2	3:C:52:GLU:OE2	2.40	0.54
2:B:1058:ASP:OD1	2:B:1058:ASP:N	2.40	0.54
4:D:6:ILE:HG21	4:D:9:LYS:HE3	1.89	0.54
2:B:165:GLU:OE1	2:B:429:ARG:NH2	2.41	0.54
3:C:127:ASP:N	3:C:127:ASP:OD1	2.41	0.54
2:B:284:GLY:O	12:G:69:ARG:NH2	2.41	0.54
1:A:426:ARG:HD3	1:A:428:PRO:HD2	1.90	0.53
1:A:891:ASP:N	1:A:891:ASP:OD1	2.40	0.53
1:A:541:PRO:O	1:A:553:TRP:NE1	2.42	0.53
5:E:53:GLU:HB2	5:E:71:ILE:HD12	1.90	0.53
12:G:113:ILE:HG21	12:G:124:LYS:HB2	1.91	0.53
2:B:903:TRP:HH2	4:D:153:TYR:H	1.56	0.52
2:B:884:SER:OG	2:B:885:ARG:N	2.42	0.52
3:C:136:ARG:NH2	3:C:174:ASP:OD2	2.41	0.52
3:C:215:ALA:O	3:C:220:LYS:NZ	2.41	0.52
3:C:336:ARG:HB3	3:C:346:LEU:HD21	1.91	0.52
1:A:813:THR:OG1	1:A:816:GLU:OE1	2.24	0.52
2:B:735:ASN:HA	2:B:739:ALA:HB3	1.92	0.52
3:C:267:ASN:ND2	3:C:288:GLU:OE2	2.43	0.52
9:L:2:ARG:NH2	9:L:18:GLU:OE2	2.43	0.52
2:B:546:ARG:NH2	2:B:616:GLU:OE2	2.43	0.52
3:C:133:GLU:HA	3:C:136:ARG:HD3	1.92	0.52
1:A:263:ALA:HB1	12:G:51:ARG:HD2	1.92	0.52
1:A:595:PRO:HD2	1:A:601:ARG:HH11	1.76	0.51
12:G:10:LEU:HD22	12:G:22:VAL:HG13	1.92	0.51
5:E:91:GLU:HB3	5:E:98:PHE:HB2	1.92	0.51
3:C:90:ALA:HA	3:C:233:ILE:HG21	1.93	0.51
2:B:95:ARG:HG3	2:B:97:LEU:HD13	1.92	0.51
2:B:239:THR:HG22	2:B:241:LYS:H	1.76	0.50
2:B:66:LYS:HB3	2:B:108:ILE:HB	1.92	0.50
2:B:50:VAL:HG21	2:B:70:ILE:HD11	1.93	0.50
4:D:246:LYS:HE2	9:L:24:PHE:HB2	1.93	0.50
6:F:103:PRO:HB2	6:F:108:ALA:HB2	1.93	0.50
11:P:18:ASP:N	11:P:18:ASP:OD1	2.39	0.50
4:D:151:VAL:HG22	4:D:224:VAL:HG22	1.93	0.50
1:A:335:ASP:N	1:A:335:ASP:OD1	2.43	0.50
1:A:471:VAL:O	2:B:1052:ARG:NH2	2.45	0.50
2:B:878:LEU:HD21	2:B:894:LEU:HA	1.93	0.50
9:L:14:GLU:OE1	9:L:56:ARG:NH2	2.44	0.49
1:A:432:ARG:HG3	3:C:67:VAL:HG12	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:522:VAL:HG22	2:B:568:VAL:HB	1.95	0.49
1:A:188:ASP:O	1:A:192:LYS:NZ	2.45	0.49
2:B:212:ASP:N	2:B:212:ASP:OD1	2.44	0.49
3:C:168:LEU:HG	3:C:173:LEU:HB2	1.95	0.49
7:H:40:LEU:HB2	7:H:78:LEU:HD13	1.94	0.49
2:B:64:LYS:HB2	2:B:110:VAL:HB	1.94	0.49
1:A:265:GLN:HB2	12:G:51:ARG:HD3	1.94	0.49
11:P:19:LEU:HD12	11:P:20:ALA:H	1.77	0.49
2:B:958:ARG:HH21	2:B:968:HIS:CD2	2.31	0.49
2:B:735:ASN:HB3	2:B:741:ILE:HG13	1.95	0.49
1:A:244:LYS:HE2	1:A:301:LEU:HD22	1.95	0.49
2:B:222:VAL:HG11	2:B:281:ALA:HA	1.95	0.49
1:A:875:ASP:N	1:A:875:ASP:OD1	2.46	0.49
2:B:60:ILE:HG12	2:B:62:ASN:H	1.76	0.49
2:B:856:VAL:HG13	11:P:35:LEU:HB2	1.95	0.49
2:B:10:PRO:O	2:B:593:ARG:NH2	2.42	0.48
3:C:122:GLU:HG2	3:C:125:ARG:HH12	1.77	0.48
2:B:510:ILE:HD11	2:B:529:ILE:HA	1.95	0.48
2:B:852:ASP:O	11:P:39:ARG:NH2	2.45	0.48
3:C:343:THR:O	3:C:347:PHE:N	2.40	0.48
1:A:245:LEU:HD23	1:A:248:ILE:HD12	1.94	0.48
1:A:838:SER:HB2	3:C:98:LEU:HD11	1.96	0.48
3:C:191:PHE:HD2	3:C:198:LEU:HD13	1.78	0.48
1:A:774:ILE:HG12	1:A:775:ARG:HD3	1.96	0.48
2:B:854:VAL:HG22	2:B:868:VAL:HG22	1.95	0.48
2:B:546:ARG:NH1	2:B:555:ILE:O	2.41	0.48
2:B:652:ILE:HG23	2:B:653:PRO:HD3	1.96	0.48
2:B:699:TYR:O	2:B:722:GLN:NE2	2.45	0.48
2:B:298:ILE:HG23	2:B:302:LEU:HD12	1.95	0.47
1:A:80:ALA:O	1:A:81:ARG:NE	2.46	0.47
9:L:32:LEU:HD22	9:L:38:VAL:HG21	1.95	0.47
1:A:195:ASP:OD1	1:A:209:ARG:NH1	2.46	0.47
1:A:706:LEU:HG	1:A:708:PRO:HD3	1.97	0.47
1:A:840:TYR:OH	3:C:323:ARG:NH1	2.47	0.47
6:F:116:ASP:HA	6:F:119:ARG:HE	1.77	0.47
1:A:341:ASN:ND2	1:A:488:GLN:OE1	2.47	0.47
3:C:58:ILE:HD11	3:C:62:GLU:HG2	1.95	0.47
2:B:175:ALA:HB1	2:B:178:LYS:HG3	1.96	0.47
2:B:389:ASN:O	2:B:393:PHE:N	2.40	0.47
1:A:844:ARG:NH1	3:C:106:ASP:OD2	2.47	0.47
2:B:635:VAL:HG11	2:B:642:LEU:HD12	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:H:47:ASP:O	7:H:49:ALA:N	2.48	0.47
2:B:207:VAL:HG12	2:B:217:VAL:HG22	1.96	0.47
2:B:591:LEU:HB2	2:B:614:VAL:HG21	1.97	0.47
12:G:119:THR:OG1	12:G:121:GLY:O	2.32	0.47
5:E:2:TYR:HH	6:F:44:SER:HG	1.60	0.47
11:P:17:LEU:HD11	11:P:35:LEU:HD21	1.96	0.47
3:C:148:ARG:NH1	3:C:149:GLU:OE2	2.47	0.46
1:A:29:ILE:HD13	1:A:220:VAL:HG21	1.96	0.46
2:B:766:ARG:HG2	2:B:772:LYS:HB2	1.97	0.46
3:C:319:ARG:HH21	3:C:326:ILE:HG12	1.81	0.46
1:A:314:ARG:HH22	2:B:1017:THR:HG22	1.80	0.46
2:B:556:ASN:N	2:B:556:ASN:OD1	2.48	0.46
1:A:673:GLU:HB2	1:A:809:LYS:HE3	1.97	0.46
4:D:255:HIS:NE2	9:L:72:GLU:OE2	2.47	0.46
1:A:414:ARG:NH1	1:A:415:HIS:O	2.48	0.46
2:B:132:SER:OG	2:B:133:LYS:N	2.49	0.46
3:C:313:THR:HG22	3:C:318:ILE:HG22	1.97	0.46
2:B:679:LEU:HD21	2:B:998:HIS:HB3	1.97	0.46
2:B:766:ARG:HH12	2:B:862:GLY:HA3	1.80	0.46
1:A:87:GLY:HA3	3:C:344:GLN:HE21	1.81	0.46
4:D:167:ASP:OD2	4:D:202:LYS:NZ	2.48	0.46
5:E:83:GLU:HB3	5:E:146:ILE:HD12	1.97	0.46
12:G:118:GLY:O	12:G:142:LYS:NZ	2.44	0.46
1:A:875:ASP:HA	1:A:876:GLY:HA2	1.66	0.45
1:A:887:THR:O	1:A:889:ASP:N	2.49	0.45
3:C:303:ARG:NH2	7:H:69:THR:OG1	2.50	0.45
4:D:38:PRO:HG2	4:D:77:LEU:HD22	1.98	0.45
2:B:452:HIS:HB3	2:B:455:ALA:HB3	1.98	0.45
2:B:706:ASN:ND2	2:B:716:GLU:OE2	2.38	0.45
2:B:369:ASP:OD1	2:B:399:ARG:NH2	2.49	0.45
3:C:236:LYS:HG3	3:C:241:TYR:HE1	1.81	0.45
4:D:22:ASP:OD1	4:D:22:ASP:N	2.47	0.45
2:B:273:ALA:HA	2:B:276:TYR:HB2	1.98	0.45
8:K:49:ILE:HG13	8:K:49:ILE:H	1.61	0.45
1:A:505:GLN:HA	1:A:755:ALA:HB1	1.98	0.45
1:A:701:TYR:HE1	1:A:714:LEU:HB3	1.81	0.45
2:B:105:LEU:HD12	2:B:123:ILE:HD11	1.98	0.45
2:B:431:ASN:ND2	2:B:675:ALA:O	2.50	0.45
2:B:904:THR:HG23	2:B:974:MET:HG3	1.99	0.44
6:F:90:LEU:HA	6:F:93:ARG:HH21	1.81	0.44
1:A:295:HIS:CD2	1:A:299:ARG:HH21	2.36	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:229:ILE:O	1:A:237:ALA:N	2.51	0.44
2:B:763:GLU:HA	2:B:865:LEU:HA	1.99	0.44
2:B:782:ILE:H	2:B:782:ILE:HG12	1.58	0.44
2:B:774:ASN:O	2:B:816:THR:OG1	2.29	0.44
12:G:125:LEU:HD12	12:G:144:LEU:HD21	1.98	0.44
2:B:509:PRO:HA	2:B:530:GLY:HA2	2.00	0.44
4:D:181:PRO:HG2	4:D:192:THR:HB	1.98	0.44
5:E:49:LEU:HB2	5:E:73:ASN:HB2	2.00	0.44
2:B:956:LYS:HD2	2:B:956:LYS:HA	1.81	0.44
1:A:358:LYS:HG2	8:K:21:ALA:HB1	1.99	0.44
11:P:7:ARG:NH1	11:P:21:THR:OG1	2.46	0.44
1:A:9:GLY:H	2:B:1119:LEU:HA	1.83	0.44
3:C:37:LEU:H	3:C:37:LEU:HD23	1.82	0.44
1:A:391:ARG:NH1	2:B:1010:ARG:HH12	2.16	0.43
3:C:103:GLU:HG2	3:C:108:ARG:HD3	2.00	0.43
1:A:531:MET:HE1	9:L:58:LYS:HD3	2.00	0.43
1:A:319:LEU:HD23	3:C:366:LEU:HD11	2.00	0.43
2:B:126:LEU:HD12	2:B:127:PRO:HD2	2.00	0.43
9:L:71:LEU:HA	9:L:71:LEU:HD23	1.88	0.43
11:P:26:ARG:HG2	11:P:33:LYS:HE2	2.01	0.43
4:D:243:LEU:HD22	4:D:243:LEU:HA	1.88	0.43
1:A:94:ARG:HG3	1:A:138:HIS:CD2	2.53	0.43
1:A:209:ARG:HB2	1:A:212:TRP:CD2	2.53	0.42
1:A:573:ASN:ND2	1:A:622:ASP:OD1	2.51	0.42
3:C:327:VAL:HG11	3:C:339:PHE:HB3	2.01	0.42
10:N:53:VAL:HB	10:N:55:LEU:HG	2.00	0.42
1:A:387:PRO:HD3	1:A:410:TRP:CD1	2.53	0.42
2:B:35:LEU:HD21	2:B:132:SER:HA	2.00	0.42
12:G:165:ILE:HD13	12:G:165:ILE:HA	1.90	0.42
1:A:743:MET:SD	1:A:743:MET:N	2.93	0.42
3:C:321:ILE:HD12	3:C:326:ILE:HD12	2.01	0.42
5:E:8:LYS:HG2	5:E:71:ILE:HG12	2.02	0.42
1:A:127:LYS:HE2	3:C:336:ARG:HH22	1.85	0.42
1:A:527:GLU:OE2	9:L:41:ALA:N	2.40	0.42
3:C:100:ARG:HA	3:C:100:ARG:HD2	1.83	0.42
2:B:698:HIS:CD2	4:D:58:ILE:HD11	2.55	0.42
2:B:726:VAL:HG21	2:B:992:ILE:HD12	2.02	0.42
2:B:797:ASP:N	2:B:797:ASP:OD1	2.51	0.42
1:A:60:CYS:SG	1:A:61:GLU:N	2.89	0.41
2:B:510:ILE:HA	2:B:513:ARG:HG2	2.02	0.41
4:D:44:GLU:OE2	11:P:45:ARG:NH2	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:166:ARG:NH2	2:B:424:SER:O	2.37	0.41
2:B:742:ILE:HD13	2:B:747:ILE:HD11	2.02	0.41
2:B:817:SER:HB3	2:B:837:ARG:HH21	1.85	0.41
3:C:15:GLU:O	3:C:18:ASP:N	2.48	0.41
5:E:112:GLN:HG2	12:G:146:GLN:HE22	1.86	0.41
5:E:155:VAL:HG12	5:E:157:ARG:H	1.85	0.41
1:A:254:ARG:O	1:A:258:ASN:N	2.47	0.41
2:B:925:VAL:HG23	2:B:925:VAL:H	1.67	0.41
4:D:91:LEU:HD13	4:D:104:LEU:HD23	2.03	0.41
10:N:63:LYS:HB2	10:N:63:LYS:HE2	1.92	0.41
1:A:510:GLY:HA2	1:A:661:ILE:HD13	2.03	0.41
3:C:100:ARG:NH2	3:C:288:GLU:OE2	2.42	0.41
4:D:7:LEU:HD12	4:D:15:LYS:HG2	2.03	0.41
2:B:744:LYS:HB3	2:B:897:PRO:HA	2.03	0.41
9:L:77:LYS:HB2	9:L:77:LYS:HE2	1.78	0.41
10:N:16:ASP:OD1	10:N:16:ASP:N	2.53	0.41
10:N:6:ARG:HD3	10:N:6:ARG:HA	1.93	0.41
1:A:845:LEU:HD11	3:C:105:VAL:HG11	2.03	0.41
2:B:161:ILE:HD12	2:B:411:LEU:HD22	2.03	0.41
2:B:884:SER:HB2	2:B:994:TYR:CE1	2.56	0.41
2:B:89:PRO:HG3	2:B:99:TYR:CZ	2.56	0.41
2:B:743:ASN:HB3	2:B:746:SER:HB2	2.02	0.40
1:A:160:GLU:HG2	1:A:161:ARG:H	1.85	0.40
1:A:346:PRO:HG2	1:A:349:VAL:HB	2.03	0.40
2:B:520:TYR:CD1	2:B:531:THR:HB	2.55	0.40
2:B:510:ILE:HD11	2:B:529:ILE:HG22	2.03	0.40
1:A:592:LYS:O	1:A:594:ILE:N	2.54	0.40
2:B:837:ARG:HE	2:B:837:ARG:HB3	1.68	0.40
3:C:128:ARG:HH12	3:C:132:LEU:HD21	1.86	0.40
2:B:376:LYS:HA	2:B:376:LYS:HD2	1.93	0.40
2:B:385:TYR:O	2:B:389:ASN:N	2.55	0.40
2:B:688:ILE:HG23	10:N:64:VAL:HG23	2.03	0.40
2:B:724:PHE:CD2	2:B:994:TYR:HB2	2.55	0.40
3:C:7:ILE:H	3:C:7:ILE:HG12	1.57	0.40
1:A:626:TYR:CE1	1:A:653:VAL:HG11	2.57	0.40
2:B:470:GLU:OE2	2:B:654:ALA:N	2.55	0.40
5:E:13:ILE:HD12	5:E:68:HIS:CE1	2.56	0.40
4:D:150:PHE:HE2	10:N:10:CYS:HA	1.85	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	898/906 (99%)	750 (84%)	140 (16%)	8 (1%)	17	54
2	B	1112/1123 (99%)	940 (84%)	159 (14%)	13 (1%)	13	50
3	C	386/391 (99%)	309 (80%)	74 (19%)	3 (1%)	19	57
4	D	255/259 (98%)	242 (95%)	12 (5%)	1 (0%)	34	70
5	E	179/190 (94%)	166 (93%)	13 (7%)	0	100	100
6	F	120/122 (98%)	110 (92%)	10 (8%)	0	100	100
7	H	74/82 (90%)	63 (85%)	10 (14%)	1 (1%)	11	46
8	K	54/57 (95%)	46 (85%)	8 (15%)	0	100	100
9	L	92/94 (98%)	82 (89%)	10 (11%)	0	100	100
10	N	63/65 (97%)	54 (86%)	8 (13%)	1 (2%)	9	44
11	P	42/49 (86%)	27 (64%)	14 (33%)	1 (2%)	6	37
12	G	164/185 (89%)	148 (90%)	14 (8%)	2 (1%)	13	50
All	All	3439/3523 (98%)	2937 (85%)	472 (14%)	30 (1%)	21	54

All (30) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	593	LEU
2	B	432	TYR
2	B	819	PRO
1	A	604	ALA
1	A	888	VAL
2	B	287	LYS
2	B	431	ASN
2	B	863	THR
2	B	1079	GLY
2	B	1085	VAL
3	C	357	PRO
10	N	63	LYS

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Mol	Chain	Res	Type
11	P	20	ALA
12	G	46	ARG
2	B	283	PRO
3	C	109	LYS
1	A	428	PRO
2	B	861	ASP
4	D	76	SER
1	A	599	GLU
7	H	48	PRO
12	G	72	GLU
2	B	860	GLY
1	A	161	ARG
2	B	862	GLY
1	A	455	CYS
1	A	456	PRO
3	C	385	PRO
2	B	705	VAL
2	B	517	PRO

### 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	774/779 (99%)	741 (96%)	33 (4%)	29 58
2	B	961/969 (99%)	904 (94%)	57 (6%)	19 51
3	C	331/334 (99%)	314 (95%)	17 (5%)	24 54
4	D	226/228 (99%)	222 (98%)	4 (2%)	59 77
5	E	160/167 (96%)	156 (98%)	4 (2%)	47 70
6	F	107/107 (100%)	106 (99%)	1 (1%)	78 88
7	H	68/72 (94%)	67 (98%)	1 (2%)	65 81
8	K	45/46 (98%)	45 (100%)	0	100 100
9	L	81/81 (100%)	79 (98%)	2 (2%)	47 70
10	N	59/59 (100%)	54 (92%)	5 (8%)	10 40

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
11	P	37/40 (92%)	29 (78%)	8 (22%)	1	7
12	G	148/166 (89%)	143 (97%)	5 (3%)	37	64
All	All	2997/3048 (98%)	2860 (95%)	137 (5%)	31	56

All (137) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	61	GLU
1	A	101	ARG
1	A	147	CYS
1	A	149	HIS
1	A	252	ASN
1	A	253	ASN
1	A	265	GLN
1	A	266	LEU
1	A	271	LEU
1	A	274	LEU
1	A	393	ARG
1	A	399	ARG
1	A	424	PHE
1	A	426	ARG
1	A	445	TYR
1	A	451	ASN
1	A	583	GLU
1	A	585	LEU
1	A	587	LYS
1	A	588	LEU
1	A	589	ILE
1	A	591	GLU
1	A	592	LYS
1	A	600	VAL
1	A	628	ARG
1	A	668	THR
1	A	721	LYS
1	A	731	ASP
1	A	732	ASN
1	A	759	ILE
1	A	775	ARG
1	A	891	ASP
1	A	899	LEU
2	B	35	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	B	56	VAL
2	B	57	VAL
2	B	121	VAL
2	B	131	LYS
2	B	174	LEU
2	B	194	VAL
2	B	198	ARG
2	B	207	VAL
2	B	209	ARG
2	B	216	TYR
2	B	260	ASN
2	B	282	LEU
2	B	287	LYS
2	B	288	GLU
2	B	289	TYR
2	B	290	ARG
2	B	335	ARG
2	B	411	LEU
2	B	513	ARG
2	B	556	ASN
2	B	635	VAL
2	B	650	LEU
2	B	652	ILE
2	B	693	ARG
2	B	743	ASN
2	B	772	LYS
2	B	774	ASN
2	B	775	PHE
2	B	779	SER
2	B	781	ASN
2	B	782	ILE
2	B	783	GLN
2	B	785	TYR
2	B	786	LEU
2	B	788	GLU
2	B	789	LYS
2	B	815	ARG
2	B	816	THR
2	B	817	SER
2	B	838	GLU
2	B	851	VAL
2	B	856	VAL

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	B	857	THR
2	B	859	THR
2	B	865	LEU
2	B	870	VAL
2	B	885	ARG
2	B	981	ARG
2	B	1031	ARG
2	B	1078	ARG
2	B	1083	CYS
2	B	1085	VAL
2	B	1086	CYS
2	B	1092	ILE
2	B	1093	SER
2	B	1114	ARG
3	C	5	LYS
3	C	6	THR
3	C	7	ILE
3	C	10	MET
3	C	11	VAL
3	C	27	LYS
3	C	30	GLU
3	C	82	ASN
3	C	92	ILE
3	C	164	ASP
3	C	181	LYS
3	C	201	ARG
3	C	212	ARG
3	C	250	PHE
3	C	251	LYS
3	C	267	ASN
3	C	330	LYS
4	D	30	ARG
4	D	232	VAL
4	D	243	LEU
4	D	254	LEU
5	E	17	MET
5	E	80	ARG
5	E	125	ARG
5	E	162	ASN
6	F	32	ASN
7	H	65	ARG
9	L	2	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
9	L	32	LEU
10	N	42	ARG
10	N	57	ASP
10	N	59	VAL
10	N	61	VAL
10	N	63	LYS
11	P	8	CYS
11	P	13	LYS
11	P	15	VAL
11	P	16	GLU
11	P	19	LEU
11	P	23	ARG
11	P	29	TYR
11	P	44	ARG
12	G	45	ILE
12	G	72	GLU
12	G	73	THR
12	G	75	TRP
12	G	161	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (23) such sidechains are listed below:

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	252	ASN
1	A	253	ASN
1	A	265	GLN
1	A	278	HIS
1	A	295	HIS
1	A	451	ASN
1	A	732	ASN
2	B	51	ASN
2	B	260	ASN
2	B	312	ASN
2	B	639	HIS
2	B	662	HIS
2	B	743	ASN
2	B	917	HIS
3	C	19	ASN
3	C	82	ASN
3	C	124	HIS
3	C	267	ASN
3	C	344	GLN

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Mol	Chain	Res	Type
4	D	50	ASN
5	E	68	HIS
5	E	162	ASN
6	F	32	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](#)

Of 7 ligands modelled in this entry, 7 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

### 5.7 Other polymers [i](#)

There are no such residues in this entry.

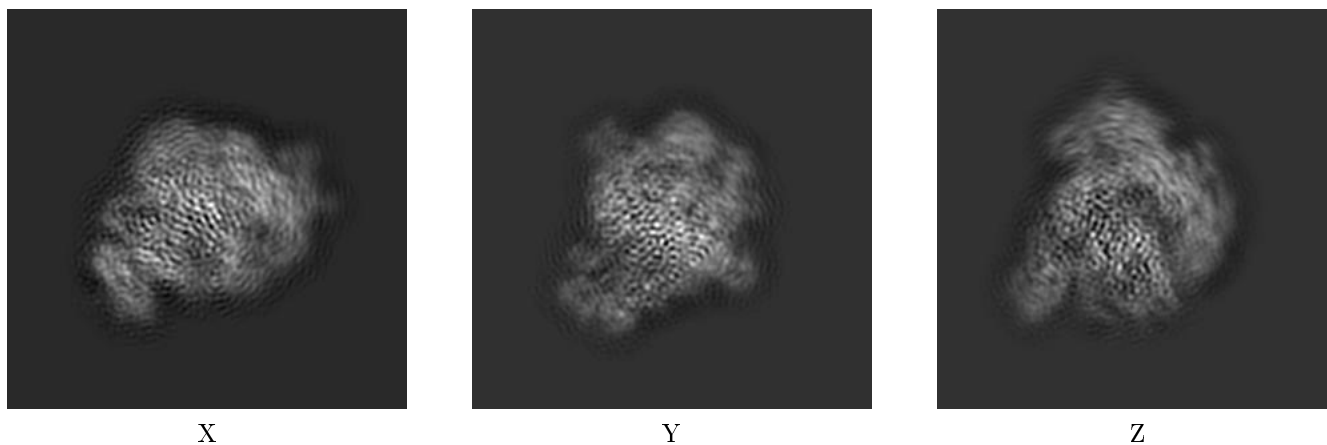
### 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Map visualisation [i](#)

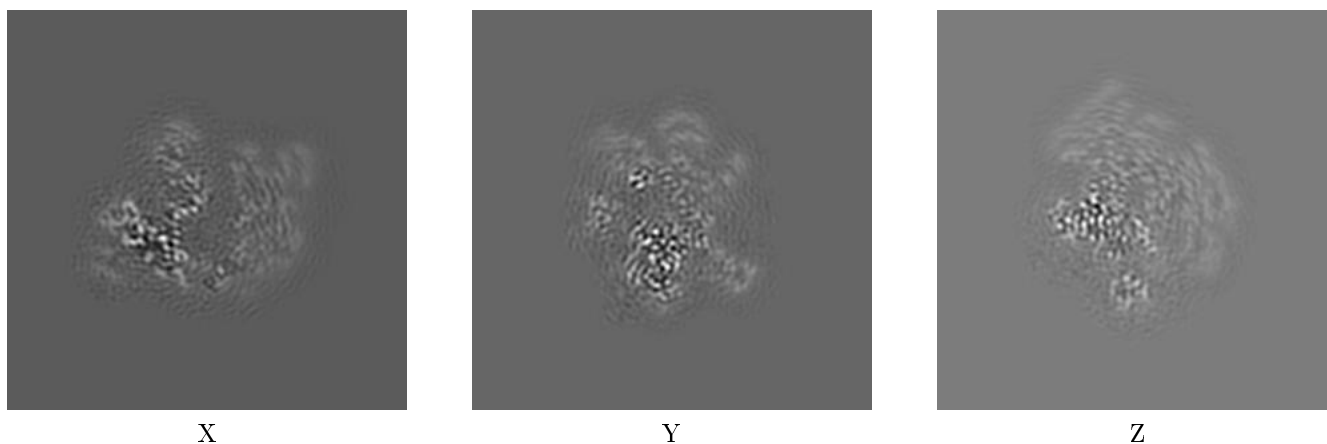
This section contains visualisations of the EMDB entry EMD-9960. These are intended to permit visual inspection of the internal detail of the map and identification of artifacts.

### 6.1 Orthogonal projections [i](#)



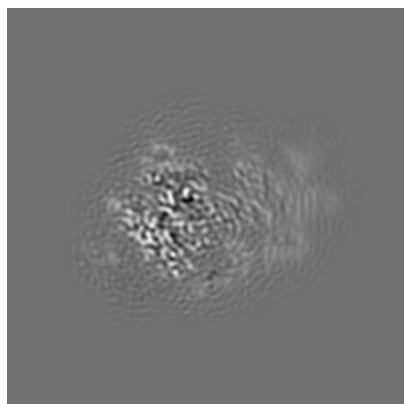
The images above show the map projected in three orthogonal projections, in greyscale.

### 6.2 Central slices [i](#)

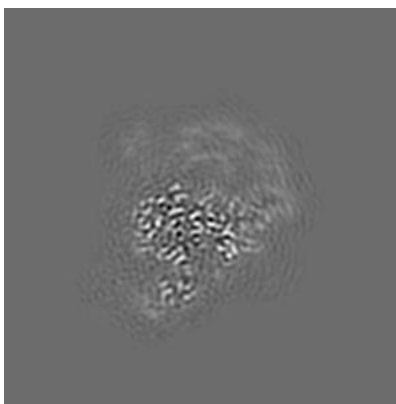


The images above show central slices of the map in three orthogonal directions, in greyscale.

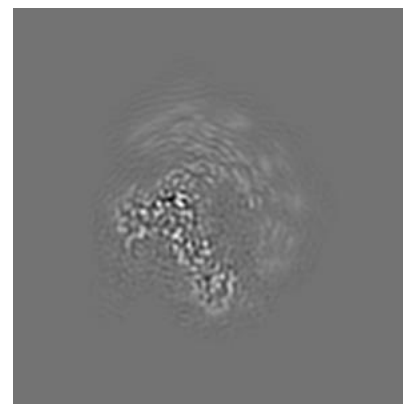
### 6.3 Largest variance slices [i](#)



X Index: 80



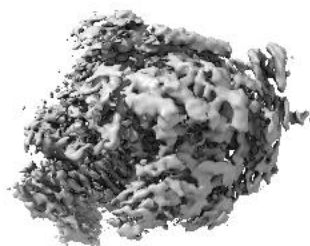
Y Index: 72



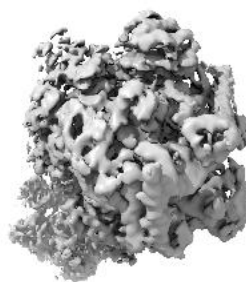
Z Index: 83

The images above show the highest variance slices of the map in three orthogonal directions, in greyscale.

### 6.4 Orthogonal surface views [i](#)



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.07. This in conjunction with the slice images can indicate whether an appropriate contour level has been selected.

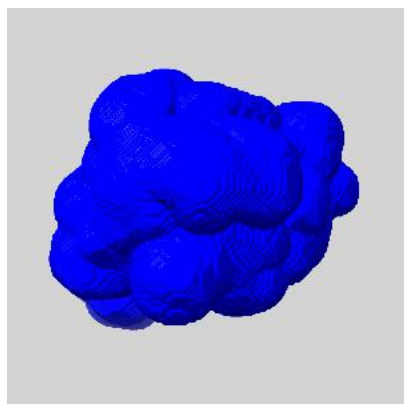
## 6.5 Mask visualisation [i](#)

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

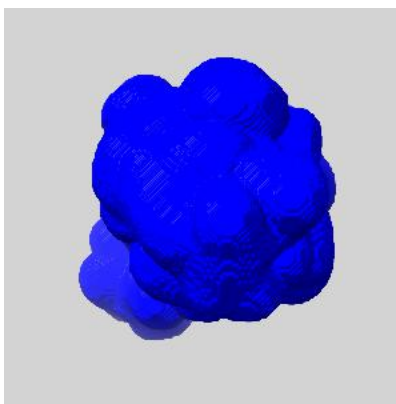
A mask typically either:

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

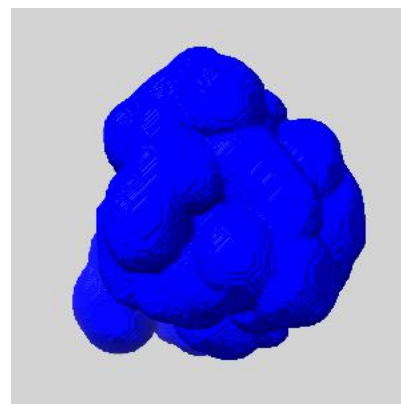
### 6.5.1 emd\_9970\_msk\_1.map [i](#)



X



Y

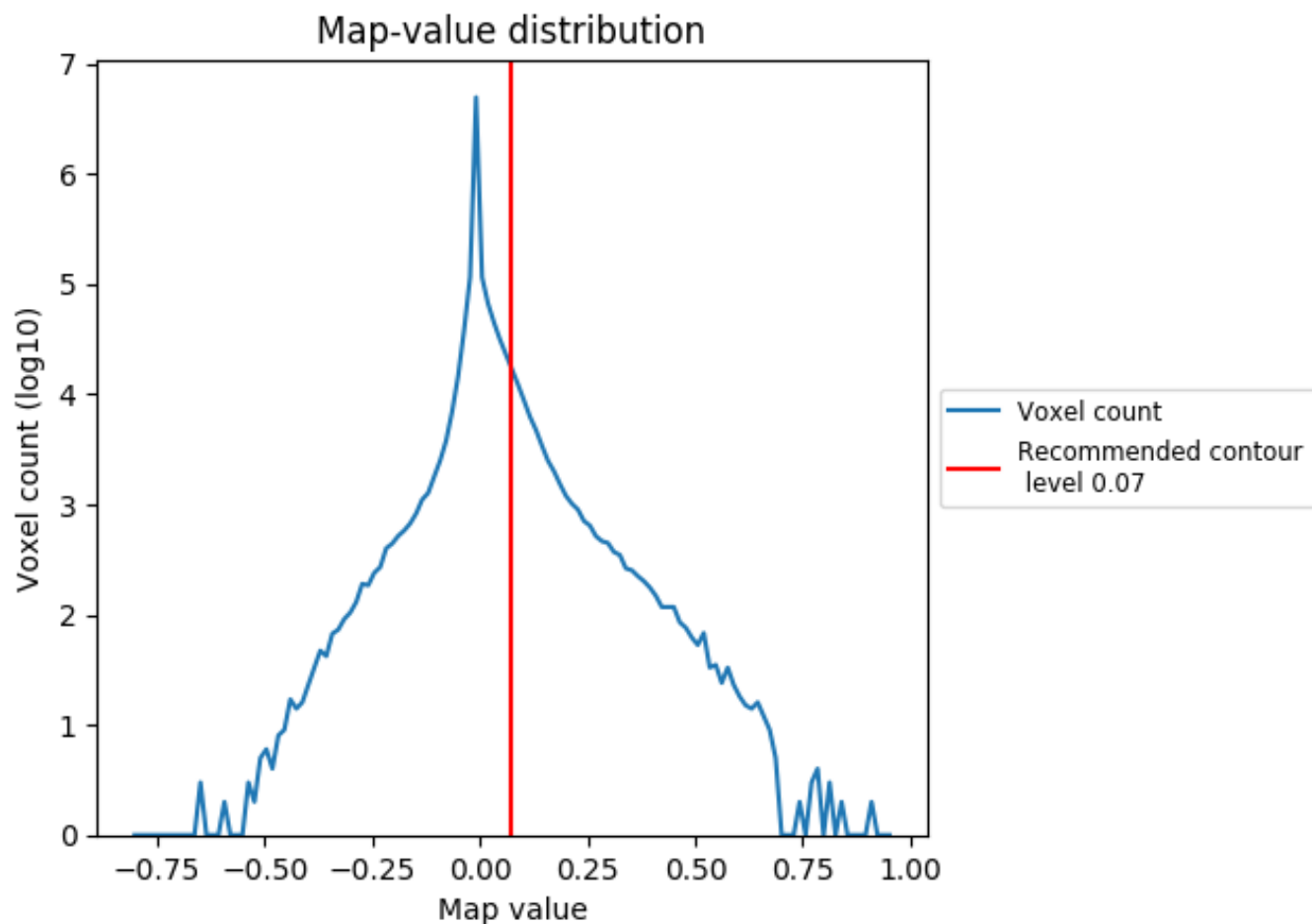


Z

## 7 Map analysis [i](#)

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

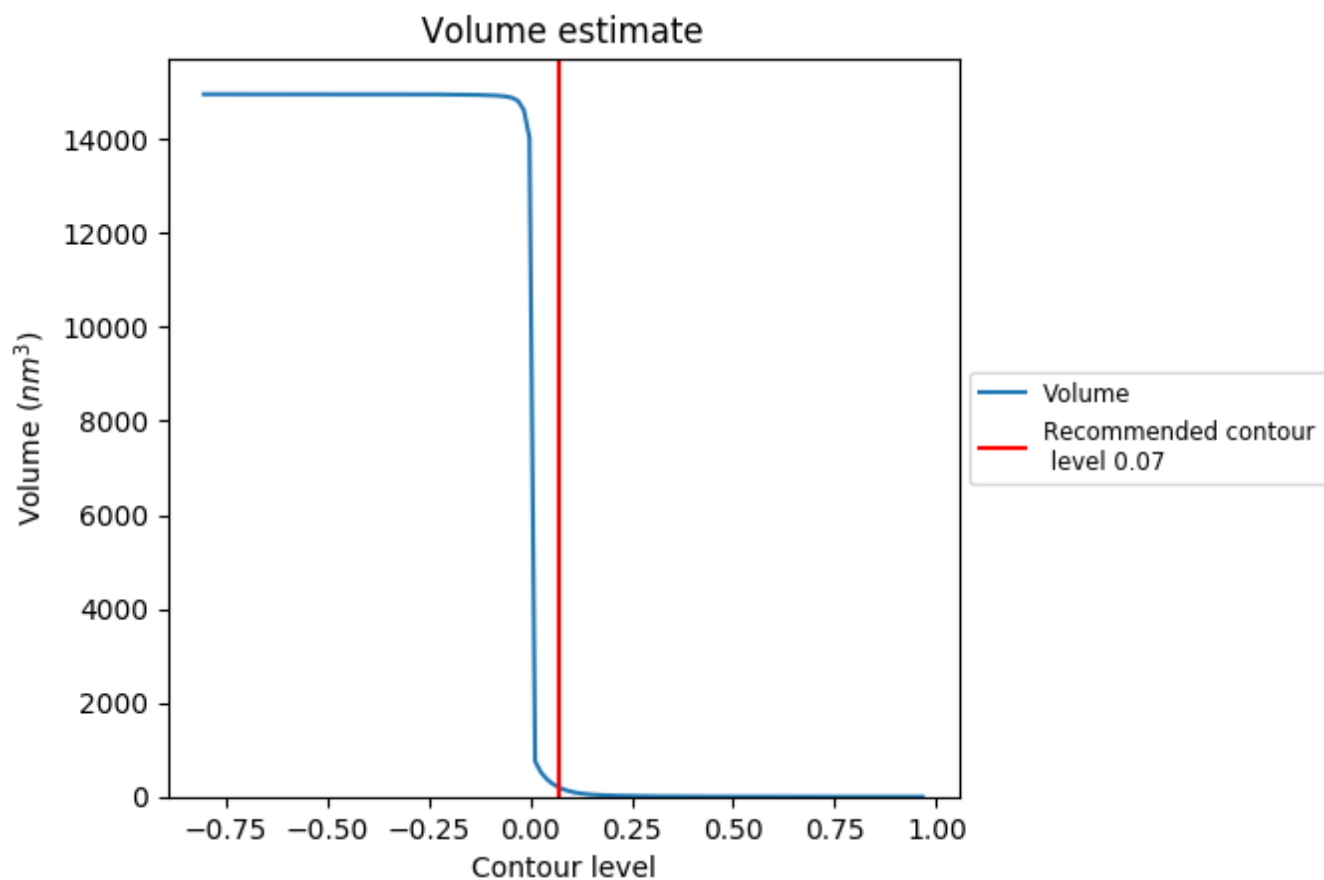
### 7.1 Map-value distribution [i](#)



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.



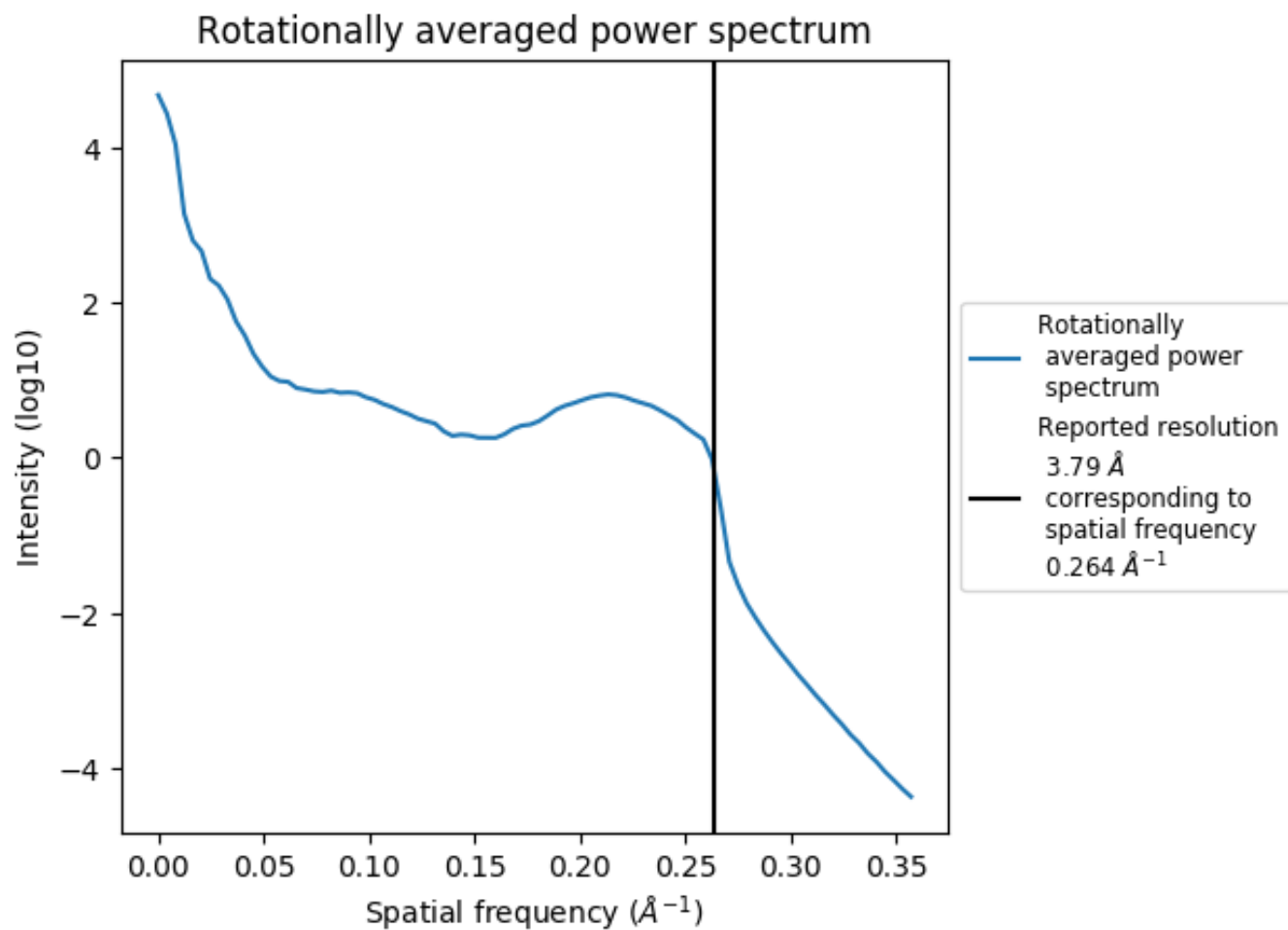
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 203 nm<sup>3</sup>; this corresponds to an approximate mass of 183 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](#)



## 8 Fourier-Shell correlation

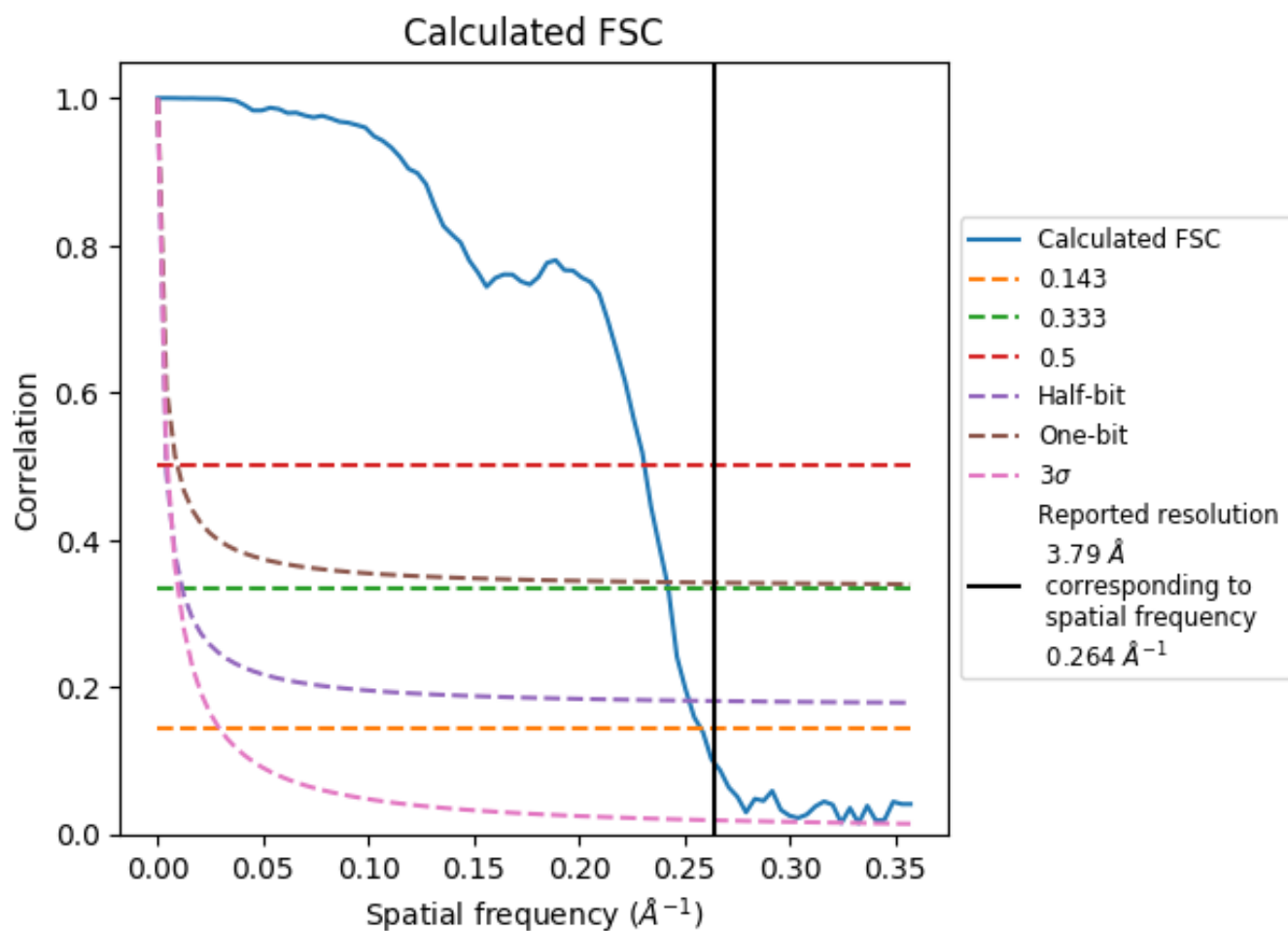
Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution for single-particle and subtomogram-averaging methods. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. Curves are displayed for  $3\sigma$ , 1-bit and 1/2-bit in addition to lines showing the 0.143 gold standard cut-off, 0.333 cut-off and legacy 0.5 cut-off.

### 8.1 Resolution estimates

These are global values for the map.

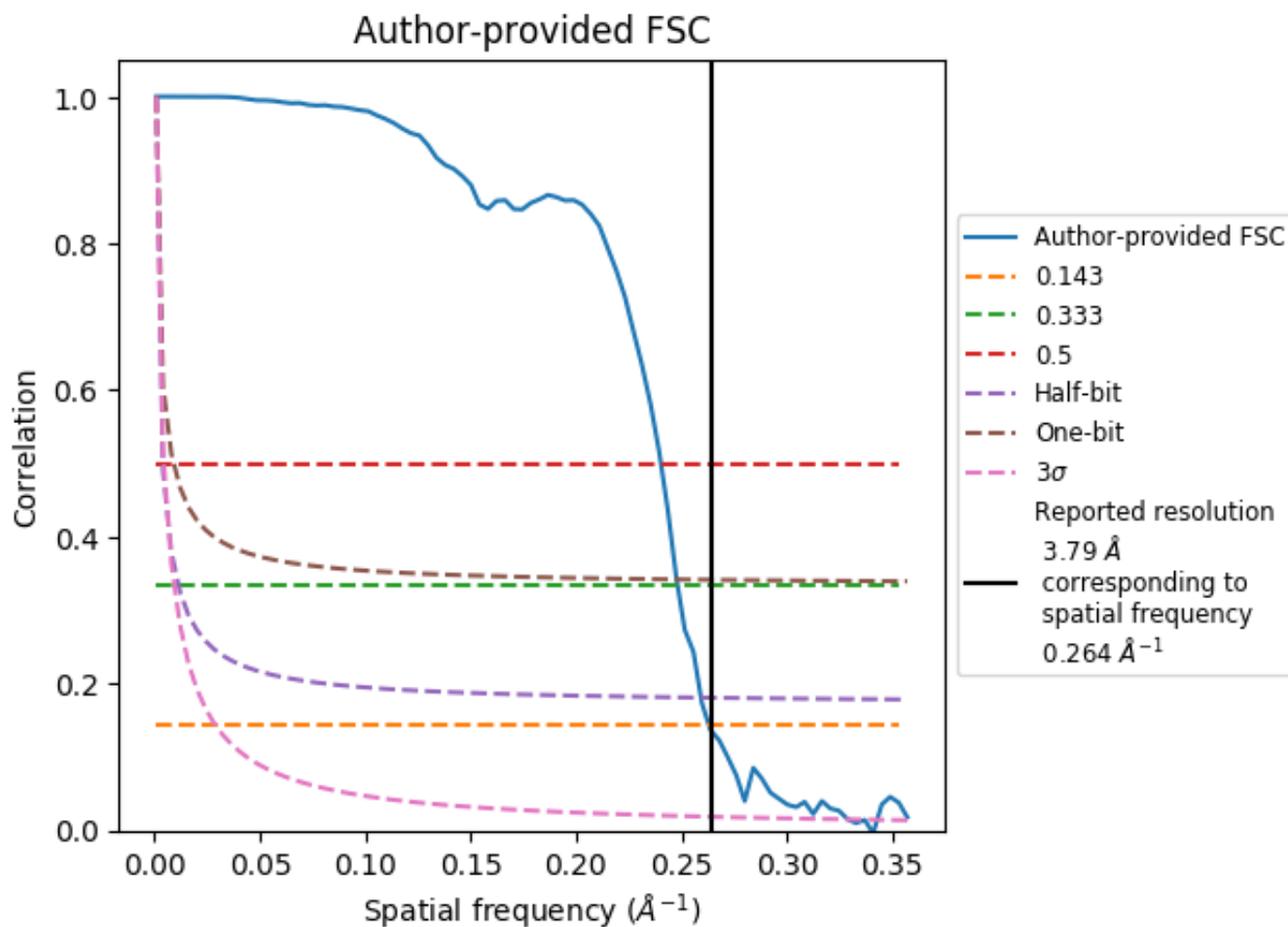
Source	Criterion	Resolution estimate (Å)
Reported value	FSC 0.143 CUT-OFF	3.79
Calculated FSC	FSC 0.5 CUT-OFF	4.33
Calculated FSC	FSC 1 BIT CUT-OFF	4.21
Calculated FSC	FSC 0.33 CUT-OFF	4.13
Calculated FSC	FSC 1/2 BIT CUT-OFF	4.03
Calculated FSC	FSC 0.143 CUT-OFF	3.88
Calculated FSC	FSC 3 SIGMA CUT-OFF	3.12
Author-provided FSC	FSC 0.5 CUT-OFF	4.23
Author-provided FSC	FSC 1 BIT CUT-OFF	4.11
Author-provided FSC	FSC 0.33 CUT-OFF	4.10
Author-provided FSC	FSC 1/2 BIT CUT-OFF	3.92
Author-provided FSC	FSC 0.143 CUT-OFF	3.86
Author-provided FSC	FSC 3 SIGMA CUT-OFF	3.08

## 8.2 Calculated FSC [i](#)



This FSC information has been calculated from the half-maps provided by the depositor. As we request un-masked, un-processed half-maps the curve may be significantly different to the author-provided FSC.

### 8.3 Author-provided FSC [i](#)

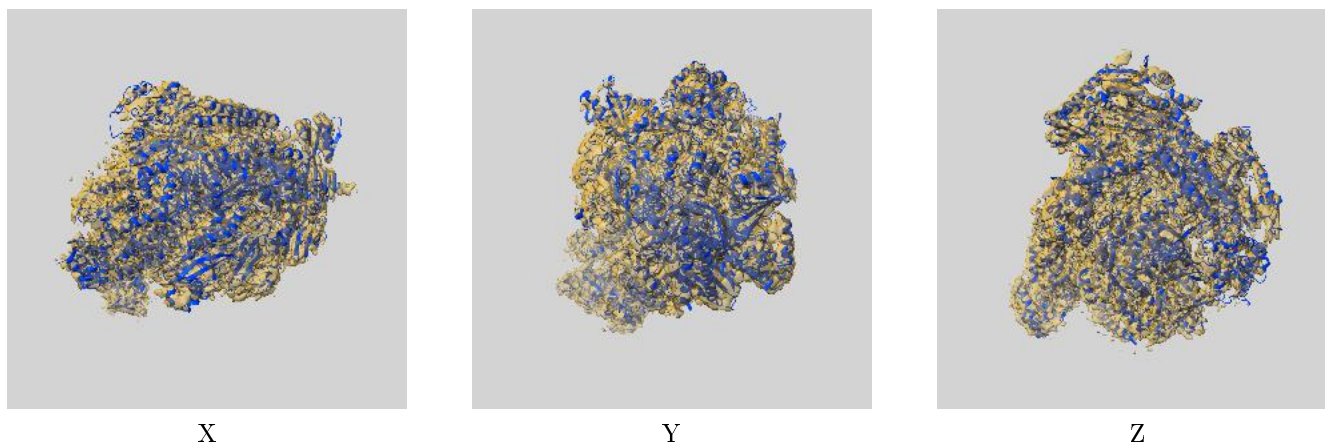


This FSC information was provided by the depositor.

## 9 Map-model fit [i](#)

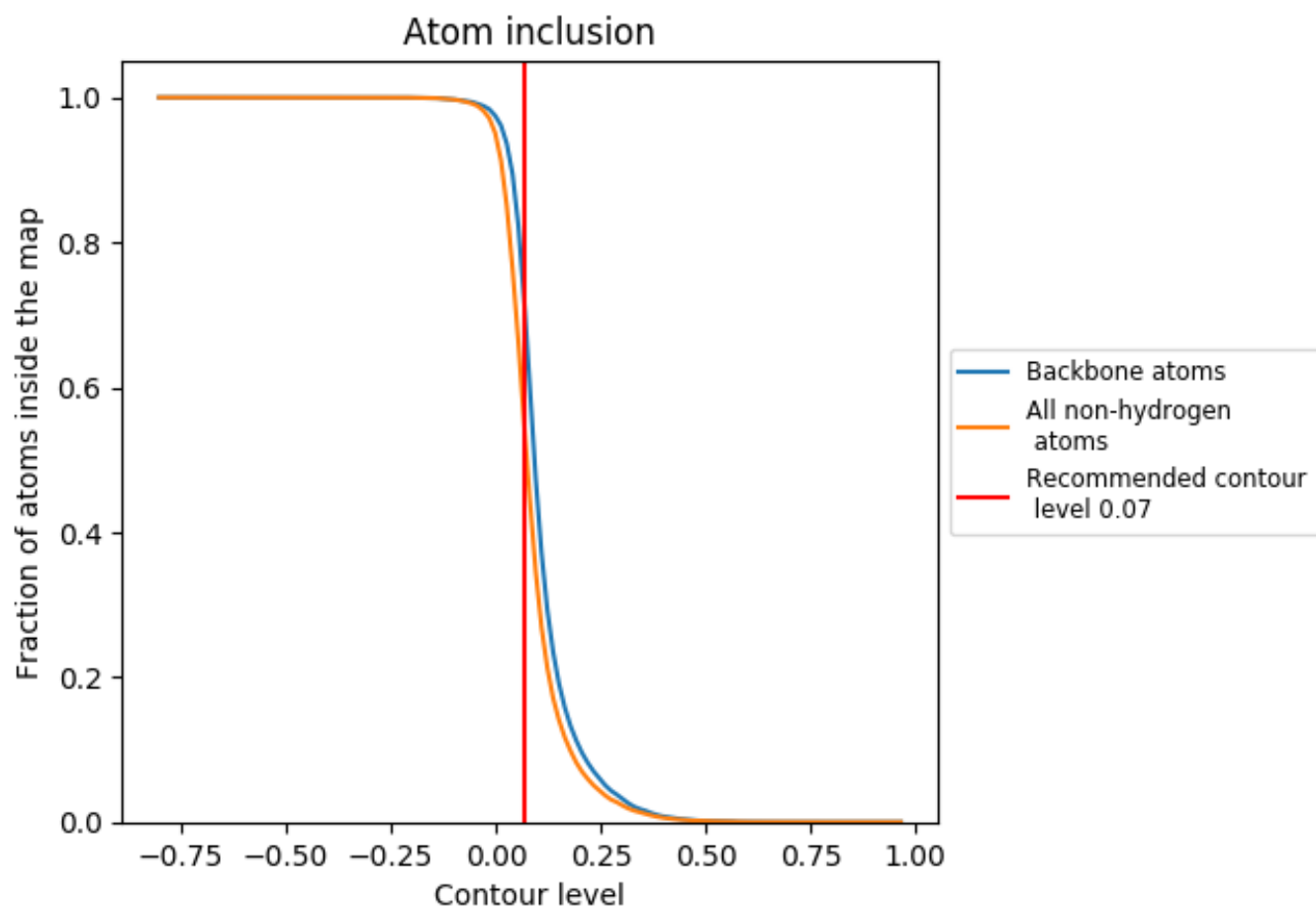
This section contains information regarding the fit between EMDB map EMD-9960 and PDB model 6KF9. Per-residue inclusion information can be found in section 3 on page 7.

### 9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.07 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 Atom inclusion [i](#)



At the recommended contour level, 70% of all backbone atoms, 53% of all non-hydrogen atoms, are inside the map.