



# wwPDB EM Validation Summary Report ⓘ

Jun 10, 2024 – 09:27 AM EDT

PDB ID : 8G7E  
EMDB ID : EMD-29812  
Title : Cryo-EM structure of 3DVA component 0 of Escherichia coli que-PEC (paused elongation complex) RNA Polymerase plus preQ1 ligand  
Authors : Porta, J.C.; Chauvier, A.; Deb, I.; Ellinger, E.; Frank, A.T.; Meze, K.; Ohi, M.D.; Walter, N.G.  
Deposited on : 2023-02-16  
Resolution : 3.90 Å (reported)  
Based on initial model : 6ASX

This is a wwPDB EM Validation Summary 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

EMDB validation analysis : 0.0.1.dev92  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
MolProbity : 4.02b-467  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

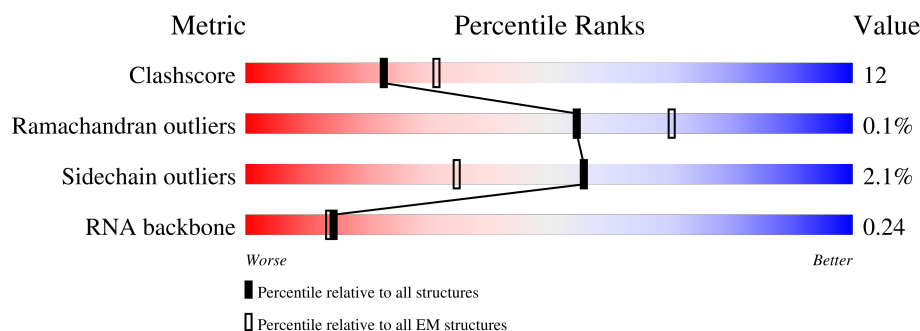
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.90 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
RNA backbone	4643	859

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  $\geq 3$ , 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	39	<div> <div>28%</div> <div>13% 36% 51%</div> </div>
2	B	31	<div> <div>39%</div> <div>71% 29%</div> </div>
3	G	235	<div> <div>11%</div> <div>72% 21% 7%</div> </div>
3	H	235	<div> <div>29%</div> <div>63% 29% 7%</div> </div>
4	K	79	<div> <div>28%</div> <div>86% 13%</div> </div>
5	R	47	<div> <div>83%</div> <div>34% 49% 13%</div> </div>
6	I	1341	<div> <div>28%</div> <div>76% 21%</div> </div>

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Mol	Chain	Length	Quality of chain
7	J	1434	<div><div></div><div>38%</div><div>72%</div><div>21%</div><div>7%</div></div>

## 2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 26810 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 DNA chain called DNA (39-mer).

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	19	Total	C	N	O	P	0	0
			388	186	78	107	17		

- Molecule 2 is a DNA chain called DNA (31-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	31	Total	C	N	O	P	0	0
			631	301	107	192	31		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	218	Total	C	N	O	S	0	0
			1684	1053	300	325	6		
3	H	218	Total	C	N	O	S	0	0
			1685	1052	297	330	6		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	235	GLU	-	expression tag	UNP A0A5B9AW69
H	235	GLU	-	expression tag	UNP A0A5B9AW69

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

Mol	Chain	Residues	Atoms					AltConf	Trace
4	K	79	Total	C	N	O	S	0	0
			627	382	118	126	1		

- Molecule 5 is a RNA chain called RNA (47-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
5	R	47	Total	C	N	O	P	0	0
			997	449	185	317	46		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
6	I	1316	Total	C	N	O	S	0	0
			10381	6514	1810	2014	43		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
7	J	1337	Total	C	N	O	S	0	0
			10403	6536	1856	1961	50		

There are 28 discrepancies between the modelled and reference sequences:

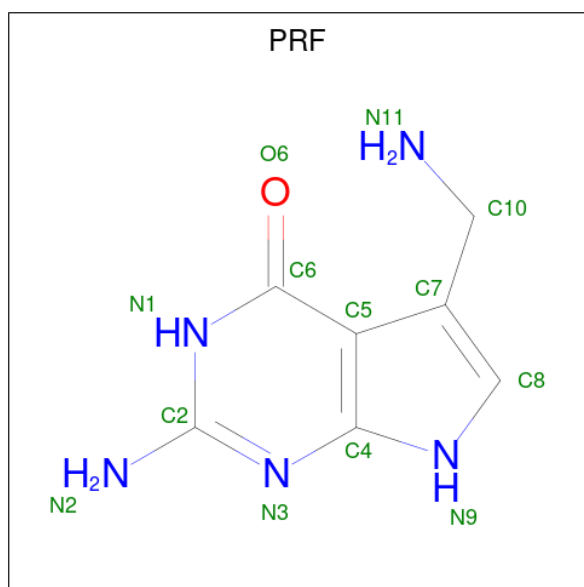
Chain	Residue	Modelled	Actual	Comment	Reference
J	1	VAL	MET	conflict	UNP A7ZUK2
J	1408	LEU	-	expression tag	UNP A7ZUK2
J	1409	ASP	-	expression tag	UNP A7ZUK2
J	1410	ARG	-	expression tag	UNP A7ZUK2
J	1411	ARG	-	expression tag	UNP A7ZUK2
J	1412	ALA	-	expression tag	UNP A7ZUK2
J	1413	SER	-	expression tag	UNP A7ZUK2
J	1414	GLU	-	expression tag	UNP A7ZUK2
J	1415	ASN	-	expression tag	UNP A7ZUK2
J	1416	LEU	-	expression tag	UNP A7ZUK2
J	1417	TYR	-	expression tag	UNP A7ZUK2
J	1418	PHE	-	expression tag	UNP A7ZUK2
J	1419	GLN	-	expression tag	UNP A7ZUK2
J	1420	GLY	-	expression tag	UNP A7ZUK2
J	1421	GLY	-	expression tag	UNP A7ZUK2
J	1422	LEU	-	expression tag	UNP A7ZUK2
J	1423	ASN	-	expression tag	UNP A7ZUK2
J	1424	ASP	-	expression tag	UNP A7ZUK2
J	1425	ILE	-	expression tag	UNP A7ZUK2
J	1426	PHE	-	expression tag	UNP A7ZUK2
J	1427	GLU	-	expression tag	UNP A7ZUK2
J	1428	ALA	-	expression tag	UNP A7ZUK2
J	1429	GLN	-	expression tag	UNP A7ZUK2
J	1430	LYS	-	expression tag	UNP A7ZUK2
J	1431	ILE	-	expression tag	UNP A7ZUK2

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Chain	Residue	Modelled	Actual	Comment	Reference
J	1432	GLU	-	expression tag	UNP A7ZUK2
J	1433	TRP	-	expression tag	UNP A7ZUK2
J	1434	HIS	-	expression tag	UNP A7ZUK2

- Molecule 8 is 7-DEAZA-7-AMINOMETHYL-GUANINE (three-letter code: PRF) (formula:  $C_7H_9N_5O$ ) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				AltConf
8	R	1	Total	C	N	O	0
			13	7	5	1	

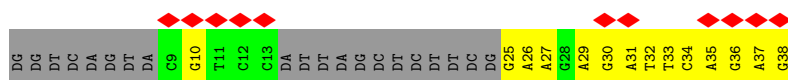
- Molecule 9 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
9	J	1	Total	Mg	0
			1	1	

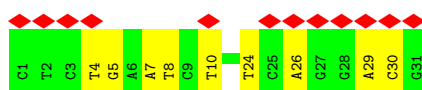
### 3 Residue-property plots [i](#)

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.

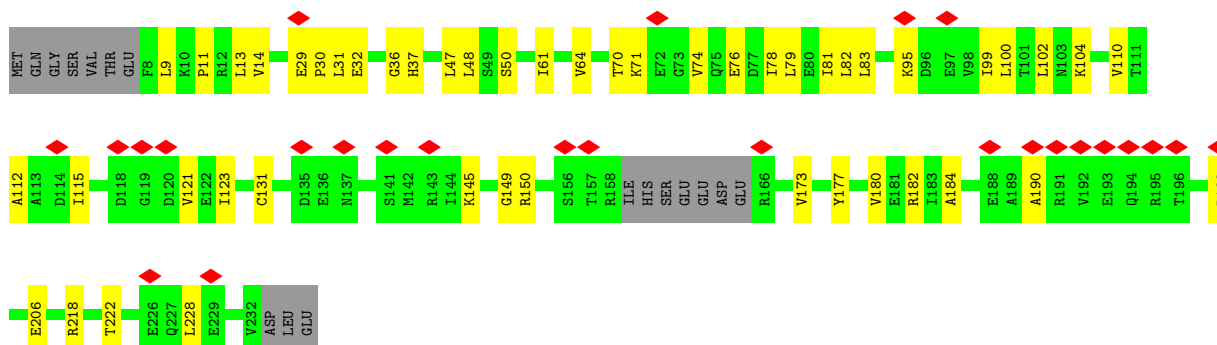
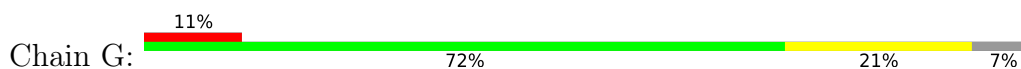
- Molecule 1: DNA (39-mer)



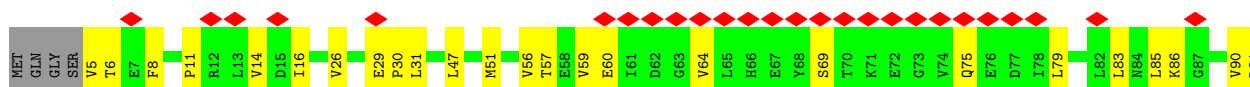
- Molecule 2: DNA (31-MER)

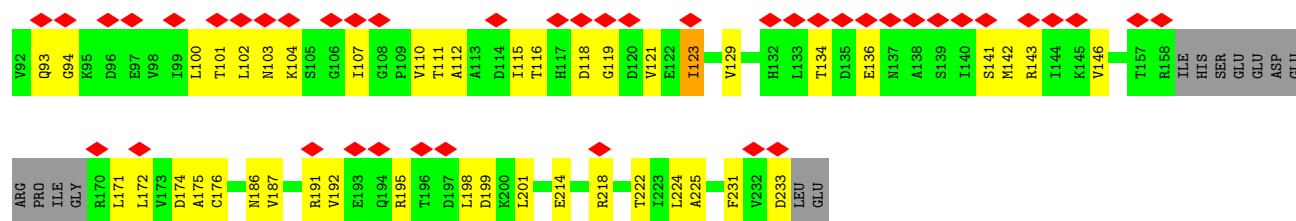


- Molecule 3: DNA-directed RNA polymerase subunit alpha

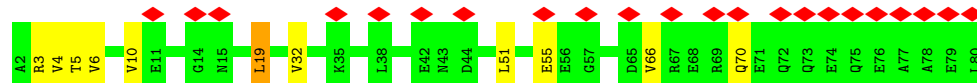
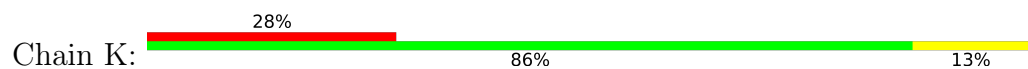


- Molecule 3: DNA-directed RNA polymerase subunit alpha

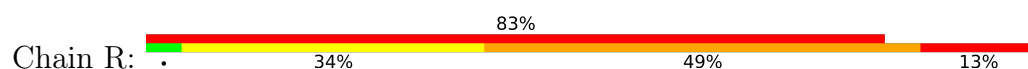




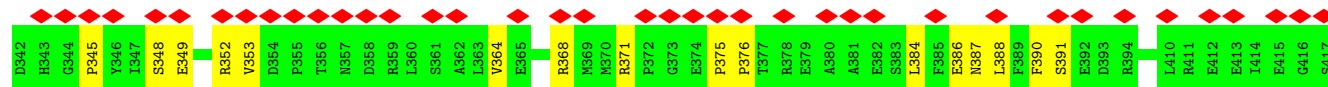
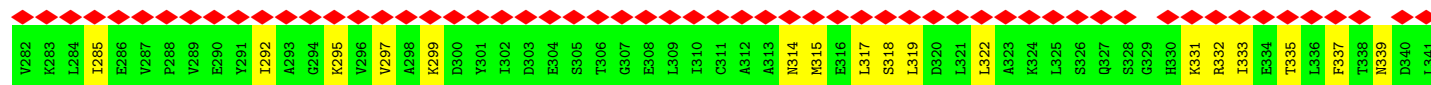
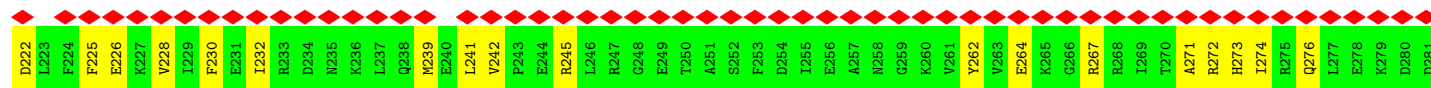
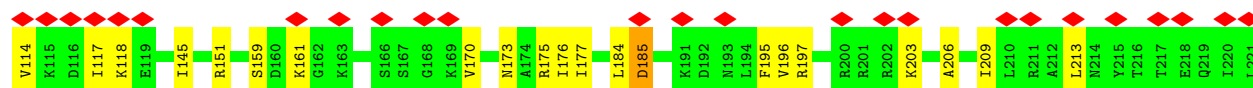
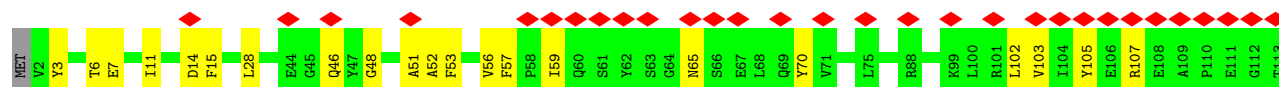
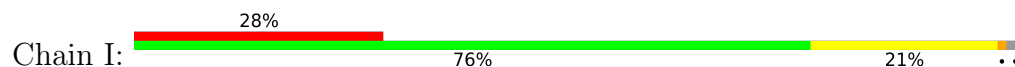
- Molecule 4: DNA-directed RNA polymerase subunit omega



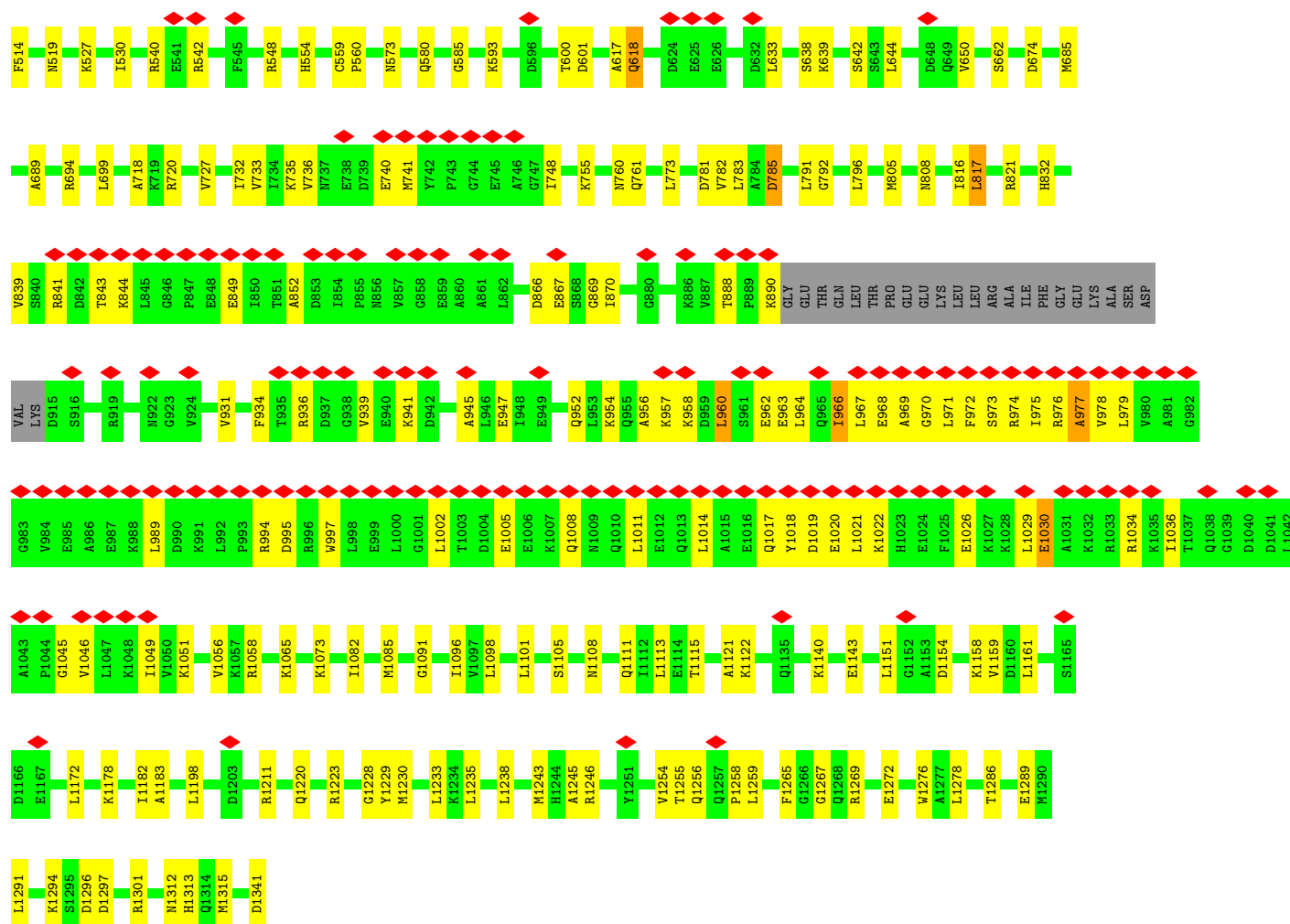
- Molecule 5: RNA (47-MER)



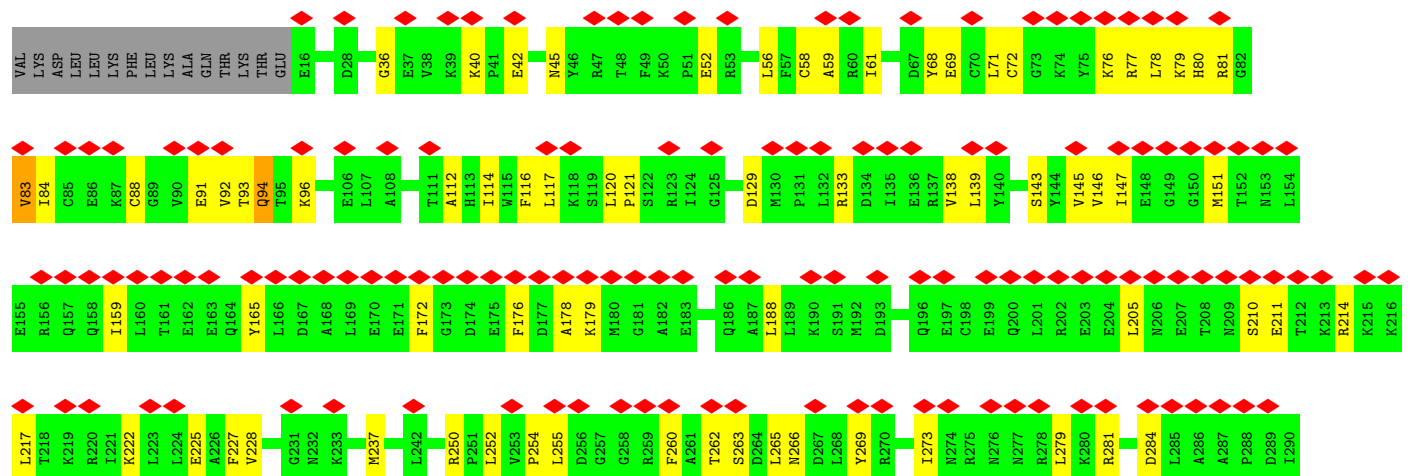
- Molecule 6: DNA-directed RNA polymerase subunit beta







• Molecule 7: DNA-directed RNA polymerase subunit beta'



ALA	D1368	V1255	I1256	V1257	K1263	A1264	I1265	I1266	V1267	N1268	E1269	A1270	G1271	S1272	D1273	F1274	L1275	E1276	G1277	A1278	Q1279	R1284	V1285	A1288	N1289	R1290	E1291	L1292	E1293	A1294	N1295	G1296	L1297	V1298	G1299	A1300	S1303	R1304	D1305	L1306	L1307	A1315	T1316	F1317	F1325	I1326	E1327	F1328	L1334	T1335	D1143	E1146	R1149	P1150	K1151	E1152	P1153	A1154	I1155	L1156	A1157	E1158	I1159	S1160	G1161	I1162	V1163	S1164	F1165	G1166	K1167	E1168	T1169	K1170	G1171	K1172	R1173	G1174	L1175	V1176	I1177	T1178	P1179	E1102	G1103	F1104	M1095	P1096	A1097	Q1098	F1099	F1100	L1101	P1102	G1104	K1104	A1105	I1106	V1107	Q1108	E1110	D1111	E1052	L1053	T1054	G1055	L1056	S1057	S1058	L1059	V1060	V1061	L1062	D1063	S1064	A1065	E1066	R1067	T1068	A1069	G1070	G1071	K1072	D1073	L1074	R1075	P1076	A1077	L1078	K1079	I1080	V1081	D1082	A1083	Q1084	G1085	M1086	D1087	V1088	L1089	I1090	P1091	G1092	T1093	D1094	M1095	P1026	P1027	I1028	E1030	V1031	S1032	G1033	F1034	V1035	R1036	I1037	T1038	D1039	M1040	I1041	D1042	G1043	Q1044	T1045	I1046	T1047	R1048	T1050	D1051	K992	E993	S994	Y995	K996	Y997	P998	Y999	G1000	A1001	V1002	L1003	A1004	K1005	G1006	D1007	G1008	E1009	Q1010	V1011	A1012	G1013	G1014	E1015	T1016	V1017	A1018	N1019	W1020	K964	S965	V966	Y967	N968	S969	S970	G971	K972	L973	V974	T975	T976	S977	R978	N979	T980	E981	L982	K983	L984	T985	E986	F987	F988	G989	T990	T991	A945	E946	D947	V948	L949	K950	P951	G952	T953	A954	D955	T956	L957	V958	P959	R960	L963	L964	H965	E966	Q967	W968	C969	D970	L971	L972	E973	E974	N975	S976	V977	D978	C988	D989	F992	C995	R901	A904	R905	G906	T909	E913	E925	P926	L930	T931	A845	E846	D847	V848	L849	K850	P851	G852	T853	A854	D855	T856	L857	V858	P859	R860	L863	L864	H865	E866	Q867	W868	C869	D870	L871	L872	E873	E874	N875	S876	V877	D878	C888	D889	F892	C895	R901	A904	R905	G906	T909	E913	E925	P926	L930	T931	A749	P750	S753	E756	T757	P758	T759	L770	Q771	T774	T775	H777	K781	D785	K789	G794	R798	R799	L800	V801	Q805	D806	L807	T816	H817	E818	G819	I820	M821	N822	T823	P824	V825	I826	E827	G828	G829	D830	V831	K832	E833	P834	L835	R836	D837	R838	V839	L746	R738	Q736	I737	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	E405	A406	D410	I411	D412	E413	E414	R417	E418	A426	P427	T428	L432	G433	I442	E443	G444	Q448	L449	H450	F451	L452	D460	F461	D462	G463	Q465	M466	L472	T473	L474	Q477	A482	P493	E497	P498	I499	I500	V501	P502	V506	V507	L508	L510	A396	A397	K398	K399	R403	E404	K325	S326	L327	F338	R346	S353	G367	K370	M372	I381	L387	R388	T392	K395	A396	A397	K398	K399	R403	E404	I291	V292	R293	N294	E295	K296	R297	M298	L299	A302	V303	L306	R309	R312	G313	R314	A315	I316	T317	G318	S319	N320	K321	R322	K325	S326	L327	F338	R346	S353	G367	K370	M372	I381	L387	R388	T392	K395	A396	A397	K398	K399	R403	E404	T514	R515	V518	V526	L527	T528	R535	S543	R551	I552	T553	E554	Y555	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S721	R731	G732	S733	H651	E852	E856	R678	E677	A675	V673	T674	E556	K557	D558	A559	N560	L449	G561	E562	G586	D684	R692	K695	A696	M697	R610	I611	L612	K615	P616	G628	A633	G636	V639	G640	I641	E648	I722	S72
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## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	31355	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 ( $e^-/\text{\AA}^2$ )	62.00	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	1.265	Depositor
Minimum map value	-0.510	Depositor
Average map value	0.013	Depositor
Map value standard deviation	0.044	Depositor
Recommended contour level	0.3	Depositor
Map size ( $\text{\AA}$ )	300.0, 300.0, 300.0	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.0, 1.0, 1.0	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: MG, PRF

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	0.50	0/436	0.71	0/670
2	B	0.40	0/704	0.70	0/1084
3	G	0.25	0/1704	0.49	0/2308
3	H	0.35	0/1704	0.53	0/2309
4	K	0.33	0/629	0.52	0/847
5	R	2.94	109/1116 (9.8%)	3.01	179/1736 (10.3%)
6	I	0.37	2/10547 (0.0%)	0.53	3/14232 (0.0%)
7	J	0.28	0/10560	0.49	0/14257
All	All	0.68	111/27400 (0.4%)	0.83	182/37443 (0.5%)

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
5	R	0	13

The worst 5 of 111 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	I	947	GLU	C-N	13.45	1.65	1.34
5	R	13	G	C6-N1	12.38	1.48	1.39
5	R	18	A	N7-C5	-11.81	1.32	1.39
5	R	4	G	N7-C5	-11.62	1.32	1.39
5	R	28	A	C6-N6	11.09	1.42	1.33

The worst 5 of 182 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	R	18	A	N1-C6-N6	16.24	128.34	118.60
5	R	27	A	N1-C6-N6	16.08	128.25	118.60
5	R	3	A	N1-C6-N6	14.99	127.59	118.60
5	R	29	A	N1-C6-N6	14.57	127.34	118.60
5	R	14	C	N3-C4-N4	13.81	127.67	118.00

There are no chirality outliers.

5 of 13 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
5	R	1	G	Sidechain
5	R	10	C	Sidechain
5	R	4	G	Sidechain
5	R	7	G	Sidechain
5	R	9	U	Sidechain

## 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	388	0	216	20	0
2	B	631	0	352	8	0
3	G	1684	0	1726	40	0
3	H	1685	0	1718	84	0
4	K	627	0	634	8	0
5	R	997	0	510	11	0
6	I	10381	0	10389	267	0
7	J	10403	0	10636	275	0
8	R	13	0	9	0	0
9	J	1	0	0	0	0
All	All	26810	0	26190	647	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 12.

The worst 5 of 647 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)
6:I:519:ASN:ND2	6:I:796:LEU:CD2	1.72	1.52
7:J:56:LEU:HB3	7:J:250:ARG:NH2	1.18	1.47
7:J:69:GLU:HG2	7:J:76:LYS:CD	1.59	1.29
6:I:161:LYS:CD	6:I:170:VAL:HG22	1.63	1.27
6:I:1113:LEU:CD2	7:J:641:ILE:HD11	1.62	1.27

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	
3	G	214/235 (91%)	205 (96%)	9 (4%)	0	100	100
3	H	214/235 (91%)	198 (92%)	15 (7%)	1 (0%)	29	67
4	K	77/79 (98%)	74 (96%)	3 (4%)	0	100	100
6	I	1312/1341 (98%)	1248 (95%)	61 (5%)	3 (0%)	47	79
7	J	1331/1434 (93%)	1264 (95%)	67 (5%)	0	100	100
All	All	3148/3324 (95%)	2989 (95%)	155 (5%)	4 (0%)	54	84

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	I	977	ALA
6	I	1019	ASP
3	H	123	ILE
6	I	59	ILE

### 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	
3	G	186/202 (92%)	185 (100%)	1 (0%)	88	93
3	H	187/202 (93%)	185 (99%)	2 (1%)	73	84
4	K	67/67 (100%)	66 (98%)	1 (2%)	65	80
6	I	1135/1156 (98%)	1104 (97%)	31 (3%)	44	67
7	J	1122/1191 (94%)	1101 (98%)	21 (2%)	57	75
All	All	2697/2818 (96%)	2641 (98%)	56 (2%)	56	73

5 of 56 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
6	I	1026	GLU
7	J	1304	ARG
7	J	83	VAL
7	J	1194	ARG
7	J	785	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 14 such sidechains are listed below:

Mol	Chain	Res	Type
7	J	80	HIS
7	J	94	GLN
7	J	1367	GLN
7	J	805	GLN
7	J	865	HIS

### 5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
5	R	47/47 (100%)	25 (53%)	3 (6%)

5 of 25 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
5	R	2	C
5	R	3	A
5	R	8	U

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
5	R	9	U
5	R	10	C

All (3) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
5	R	1	G
5	R	15	U
5	R	36	A

## 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 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
8	PRF	R	101	-	13,14,14	0.88	1 (7%)	9,20,20	1.44	2 (22%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.



Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	PRF	R	101	-	-	0/0/2/2	0/2/2/2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	R	101	PRF	C5-C6	-2.20	1.42	1.47

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	R	101	PRF	C5-C6-N1	-2.70	113.07	115.36
8	R	101	PRF	C10-C7-C8	2.62	132.25	126.96

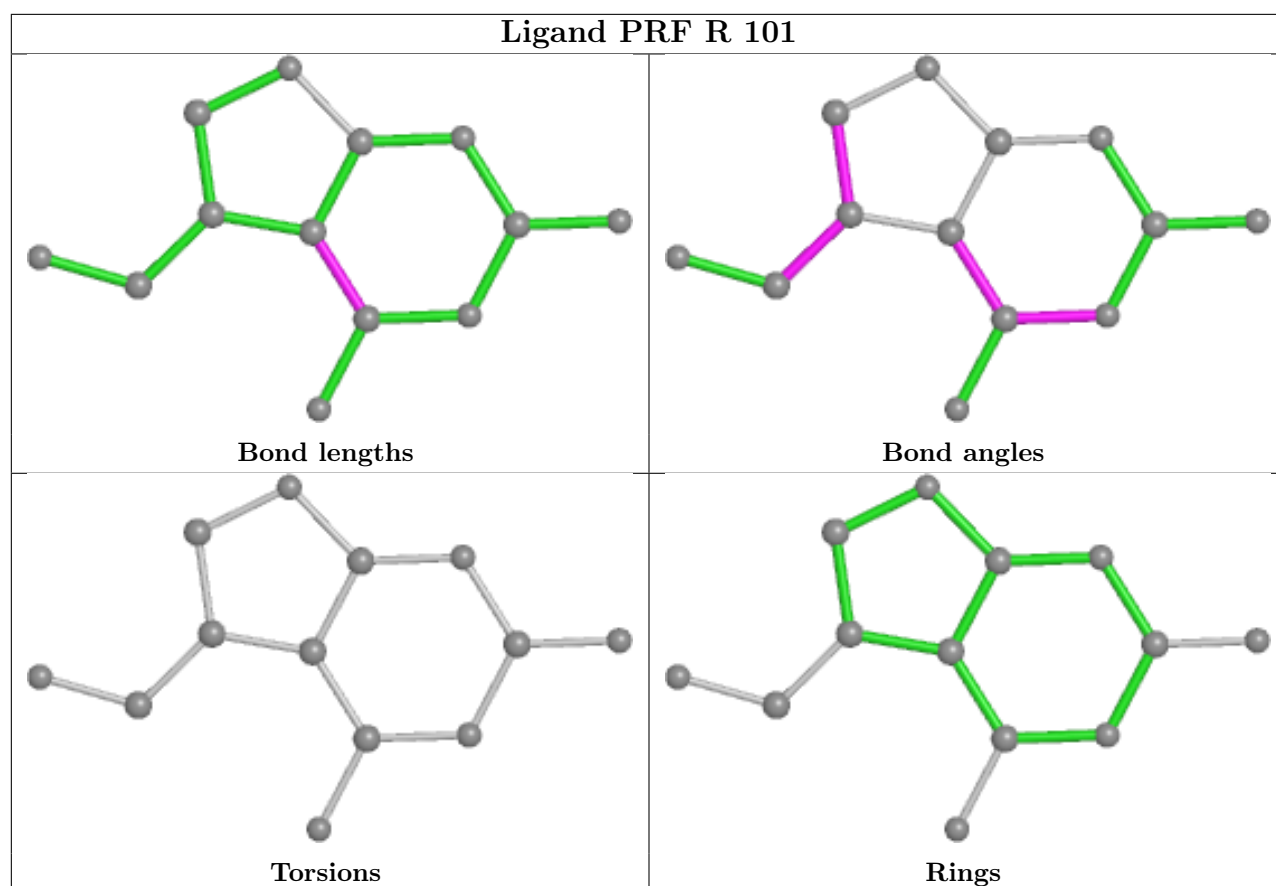
There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

The following chains have linkage breaks:

Mol	Chain	Number of breaks
6	I	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	I	947:GLU	C	948:ILE	N	1.65
1	I	945:ALA	C	946:LEU	N	1.14

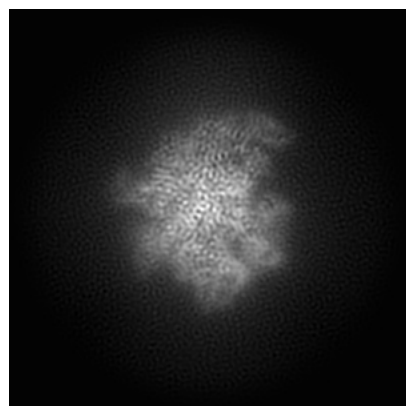
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-29812. These allow visual inspection of the internal detail of the map and identification of artifacts.

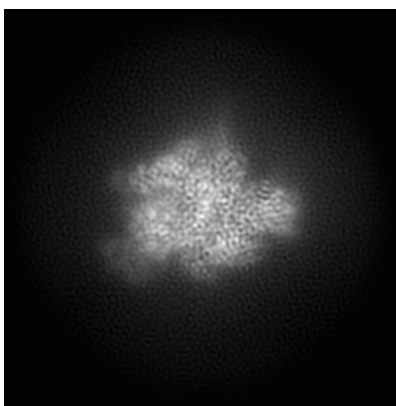
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

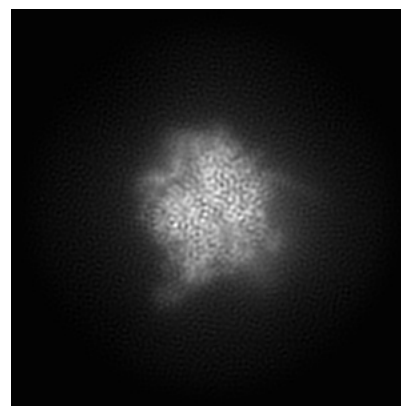
#### 6.1.1 Primary map



X

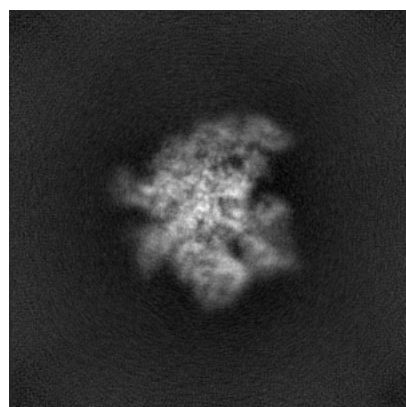


Y

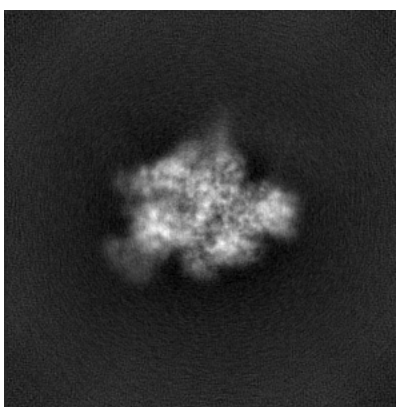


Z

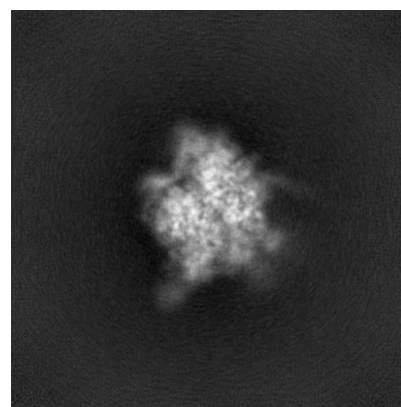
#### 6.1.2 Raw map



X



Y

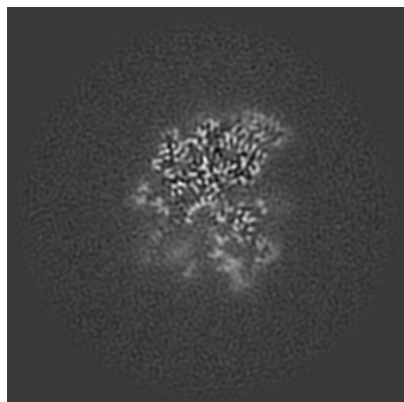


Z

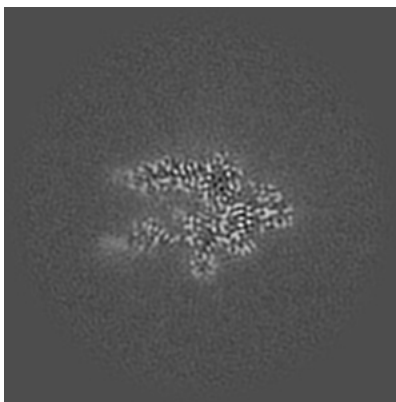
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

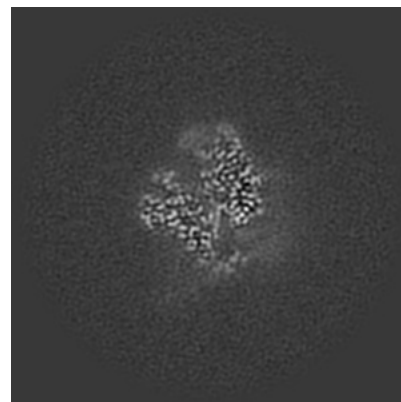
### 6.2.1 Primary map



X Index: 150

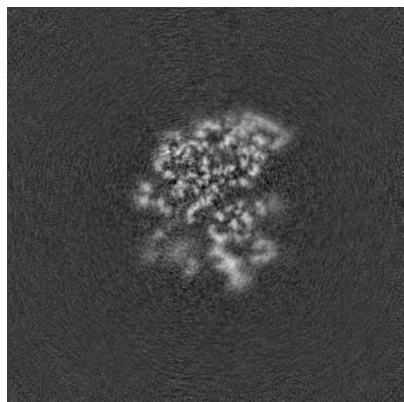


Y Index: 150

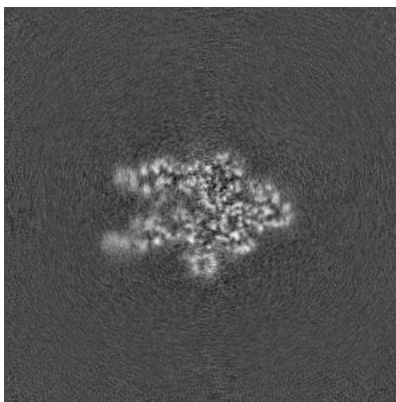


Z Index: 150

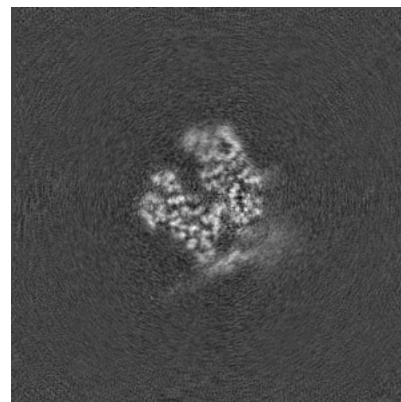
### 6.2.2 Raw map



X Index: 150



Y Index: 150

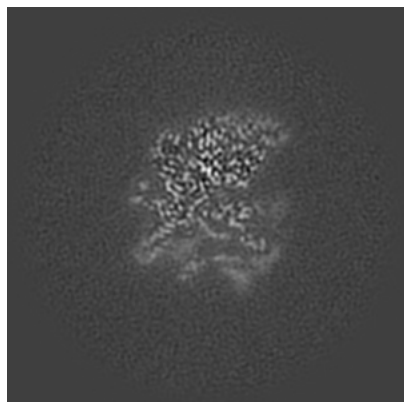


Z Index: 150

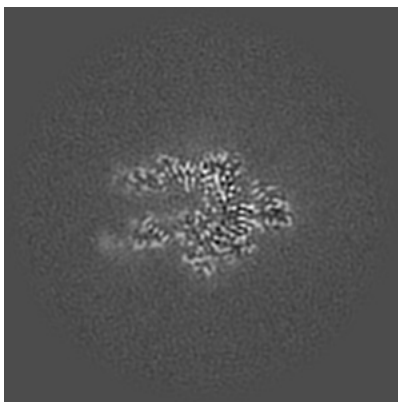
The images above show central slices of the map in three orthogonal directions.

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

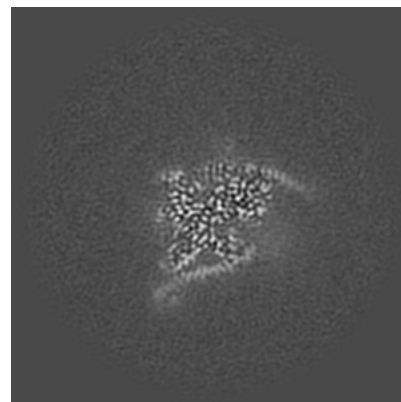
### 6.3.1 Primary map



X Index: 146

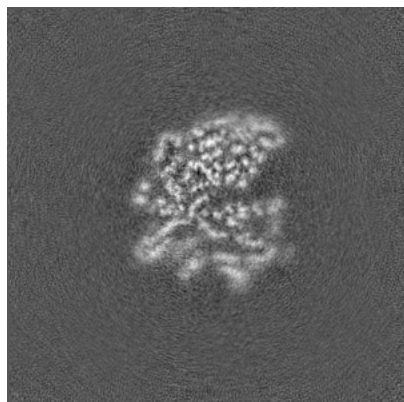


Y Index: 148

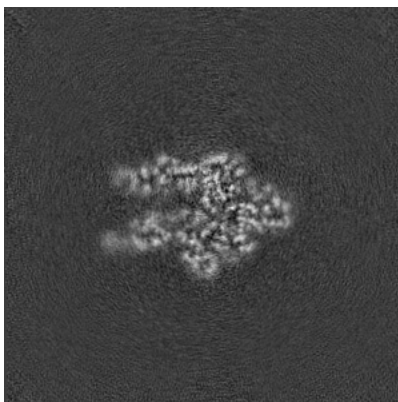


Z Index: 165

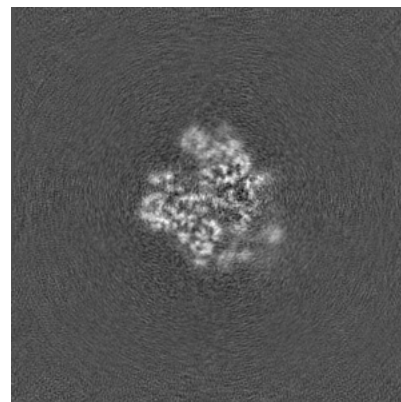
### 6.3.2 Raw map



X Index: 146



Y Index: 148



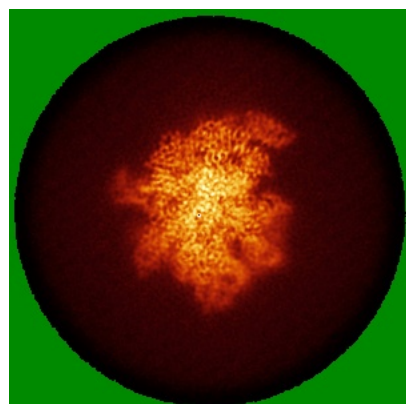
Z Index: 146

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

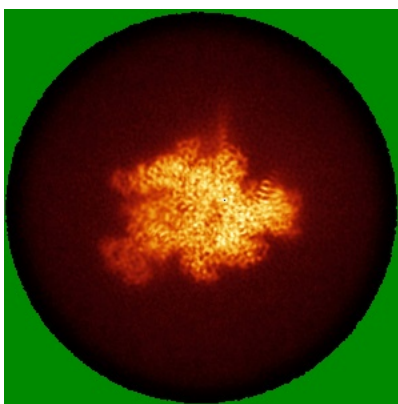


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

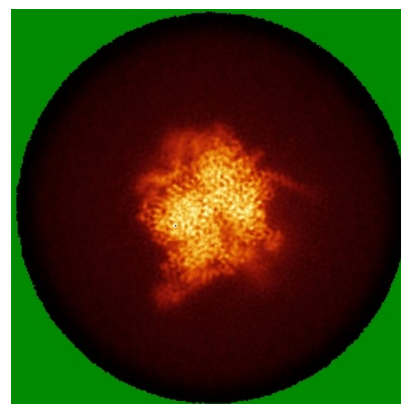
### 6.4.1 Primary map



X

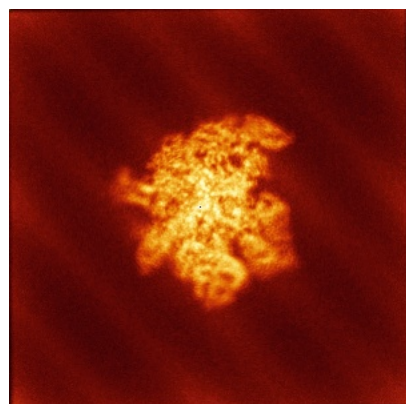


Y

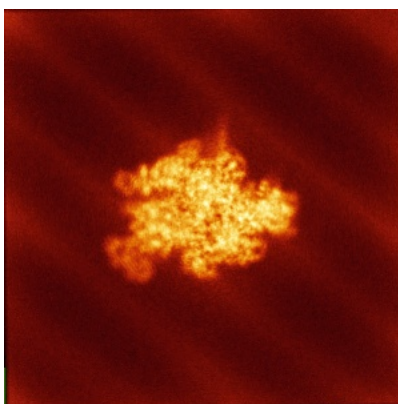


Z

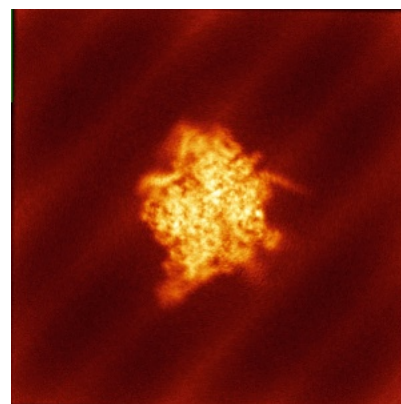
### 6.4.2 Raw map



X



Y

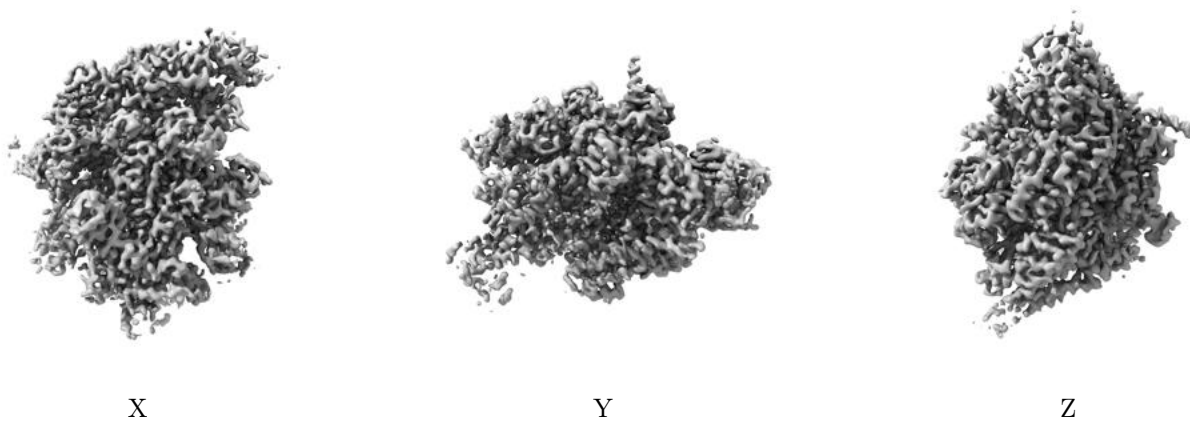


Z

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.

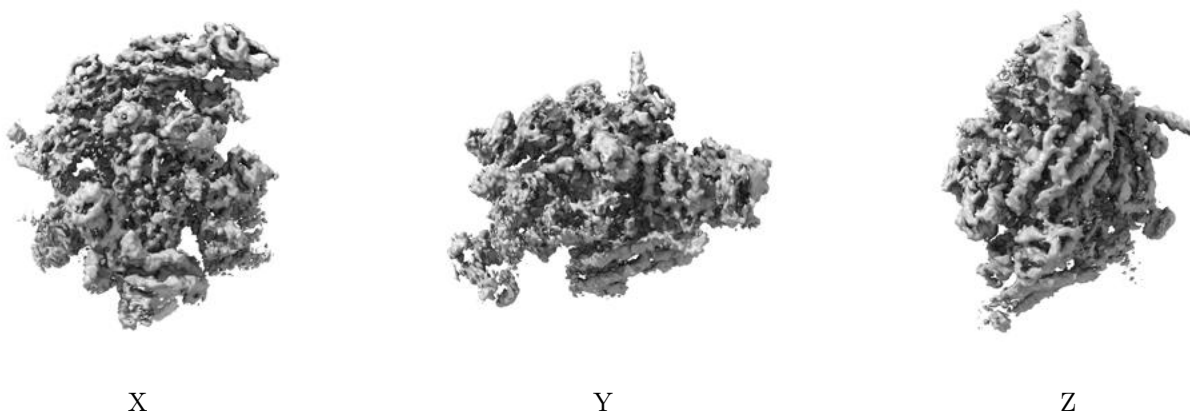
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.3. 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.

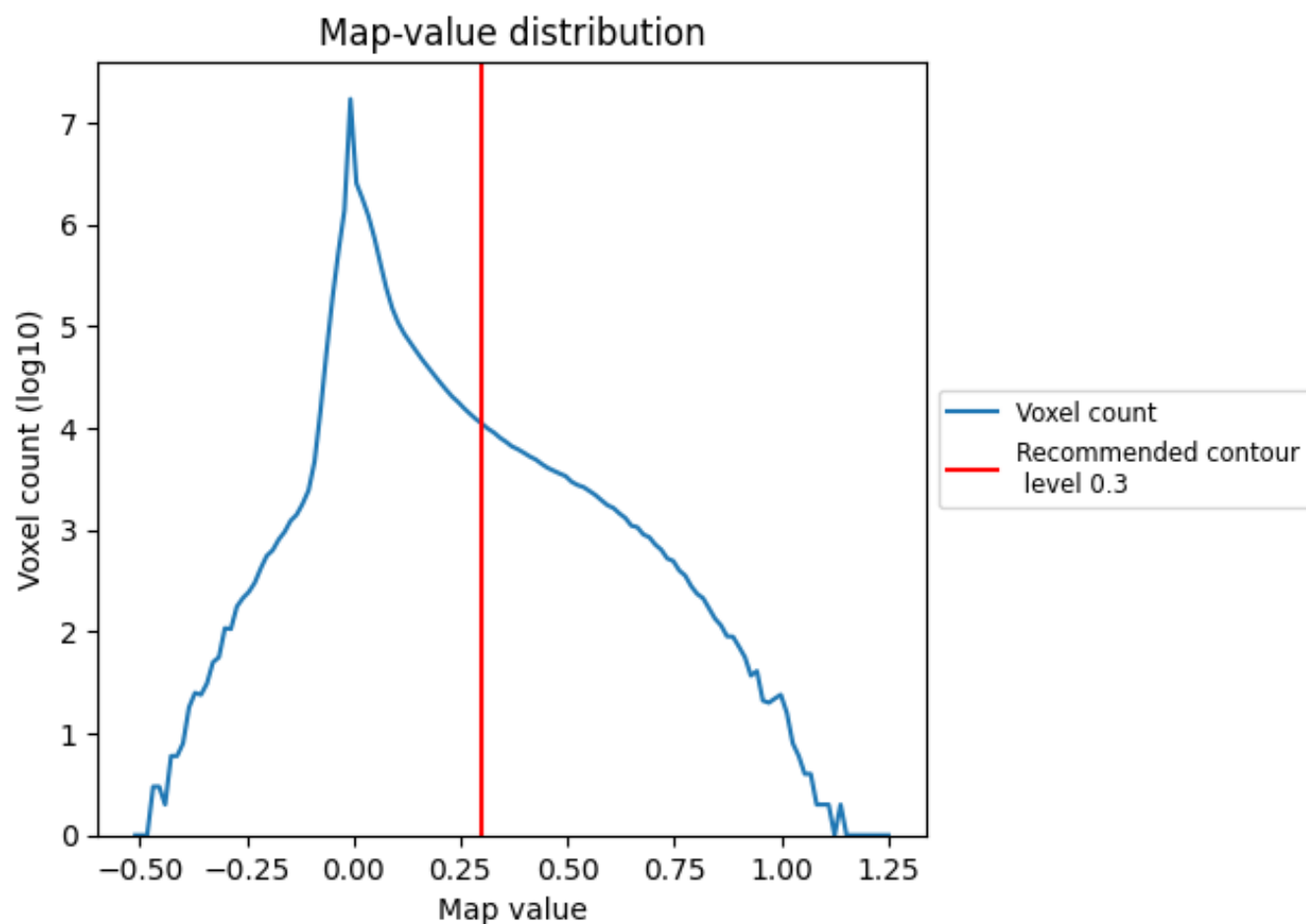
## 6.6 Mask visualisation [i](#)

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.

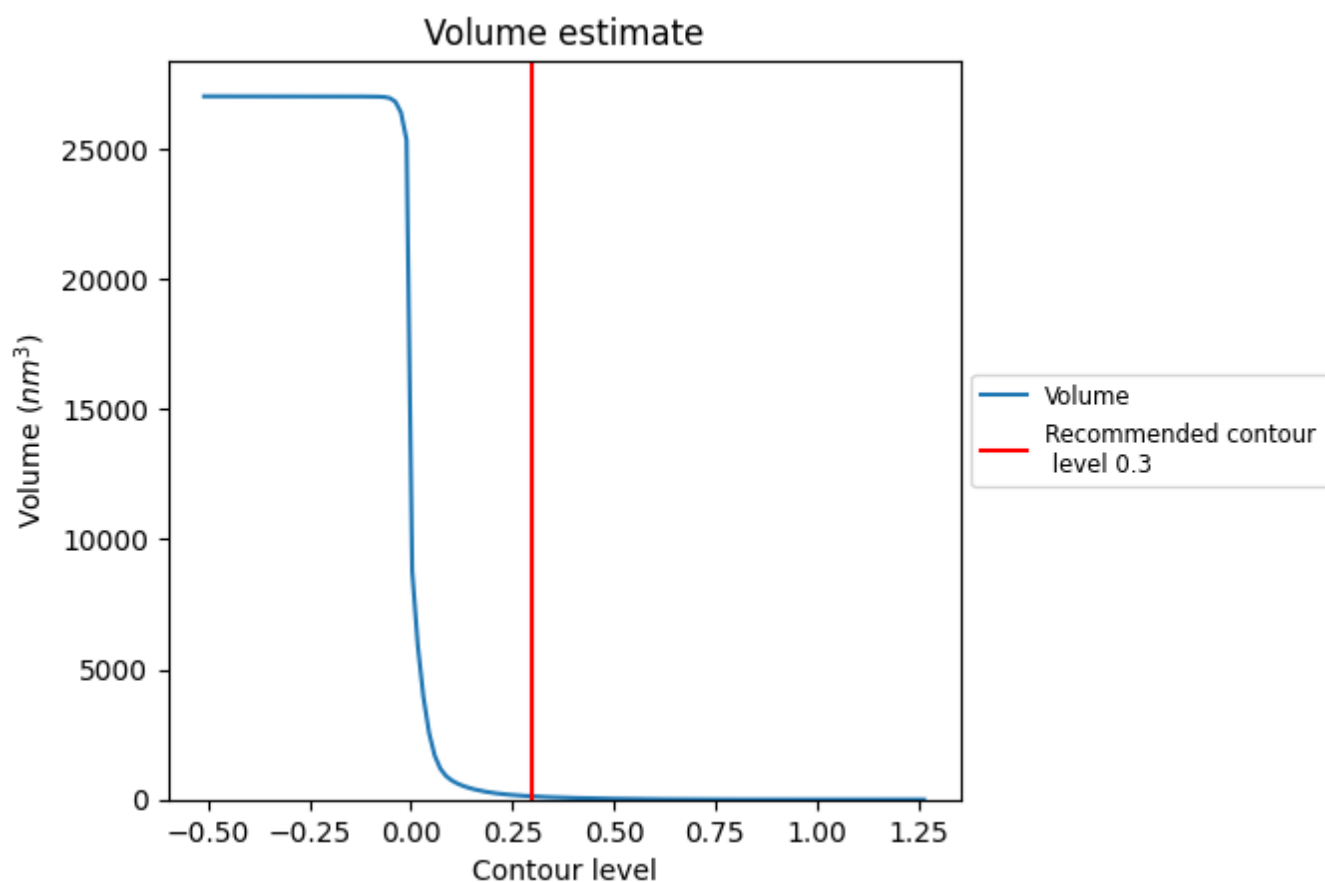
### 7.1 Map-value distribution [i](#)



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.



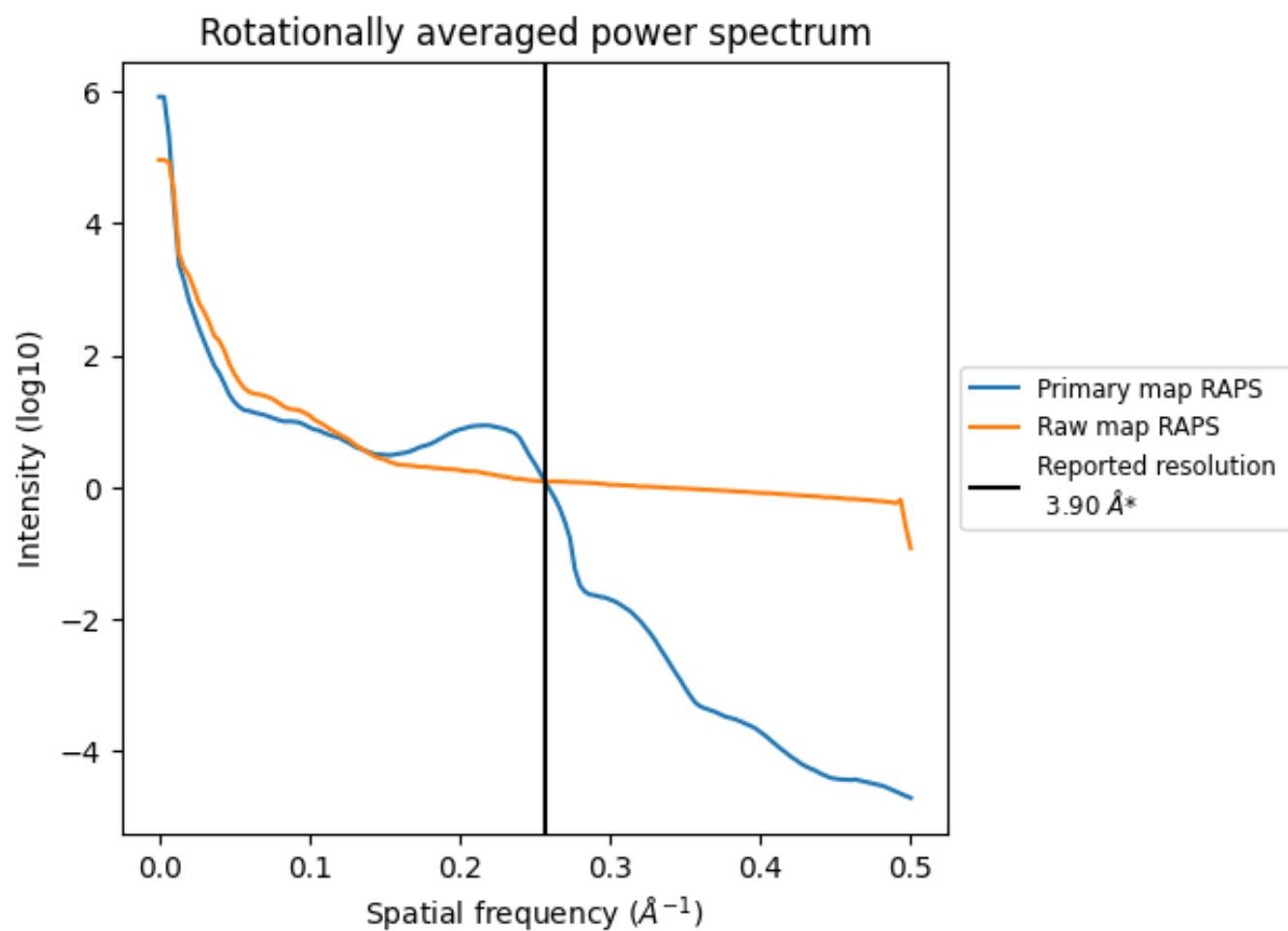
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 123 nm<sup>3</sup>; this corresponds to an approximate mass of 111 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 ⓘ

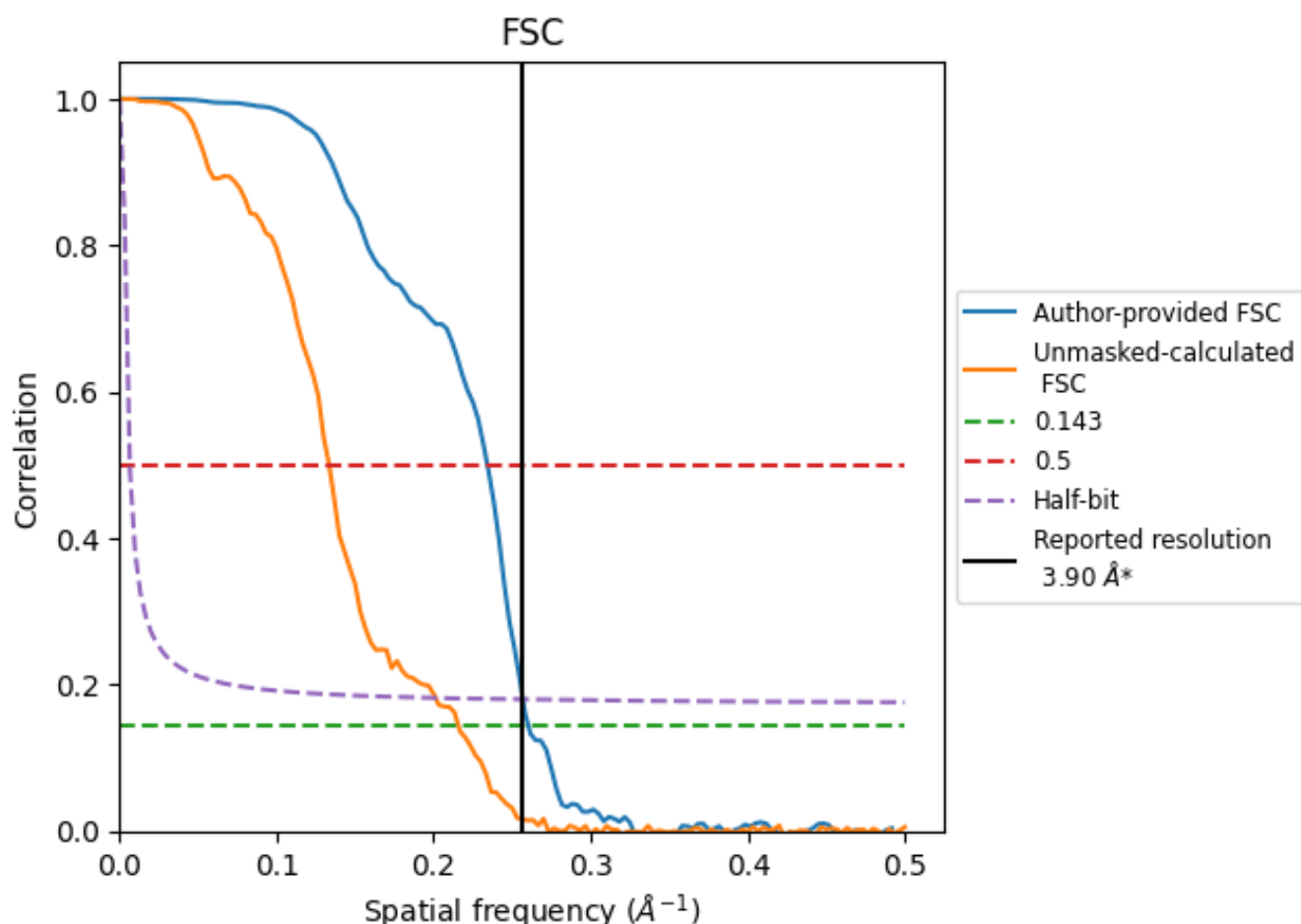


\*Reported resolution corresponds to spatial frequency of 0.256 Å<sup>-1</sup>

## 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 0.256 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

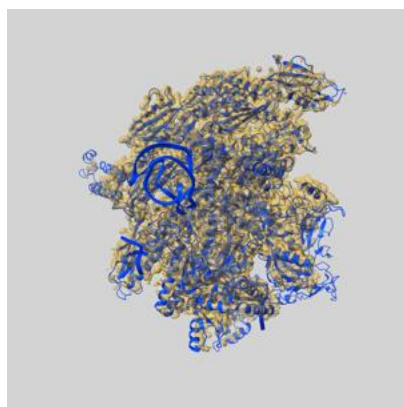
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	3.84	4.27	3.89
Unmasked-calculated*	4.63	7.49	4.97

\*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 4.63 differs from the reported value 3.9 by more than 10 %

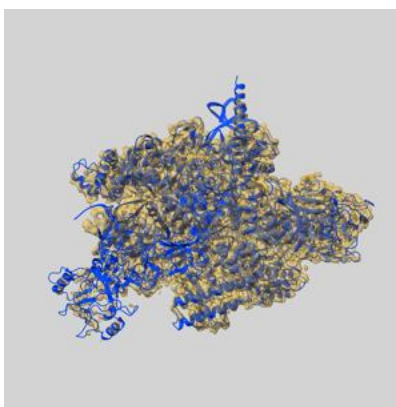
## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-29812 and PDB model 8G7E. Per-residue inclusion information can be found in [section 3](#) on [page 7](#).

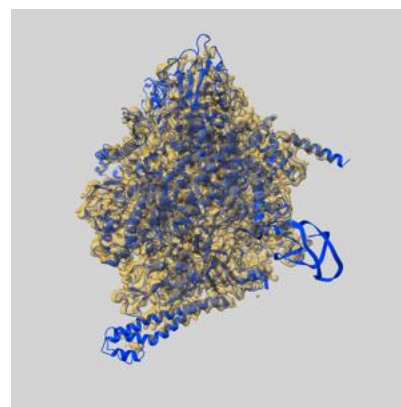
### 9.1 Map-model overlay [i](#)



X



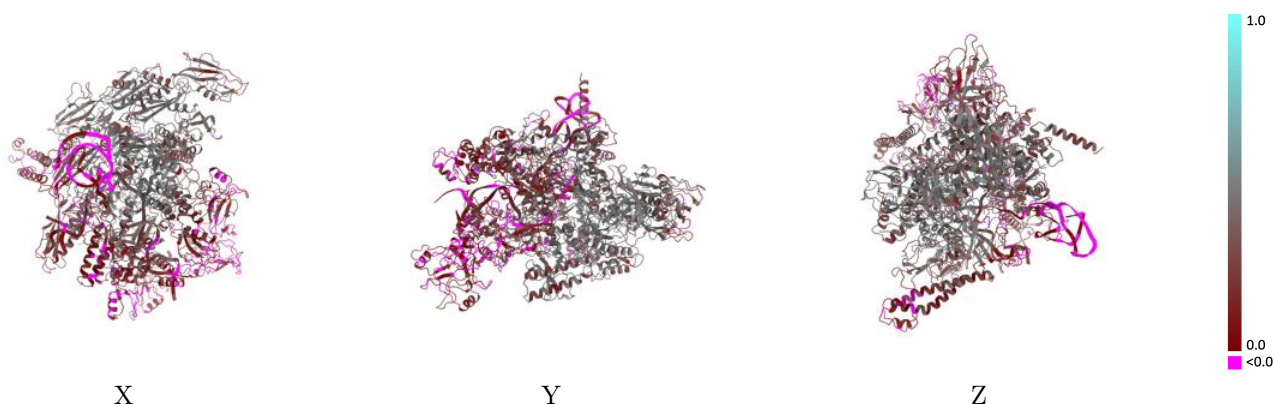
Y



Z

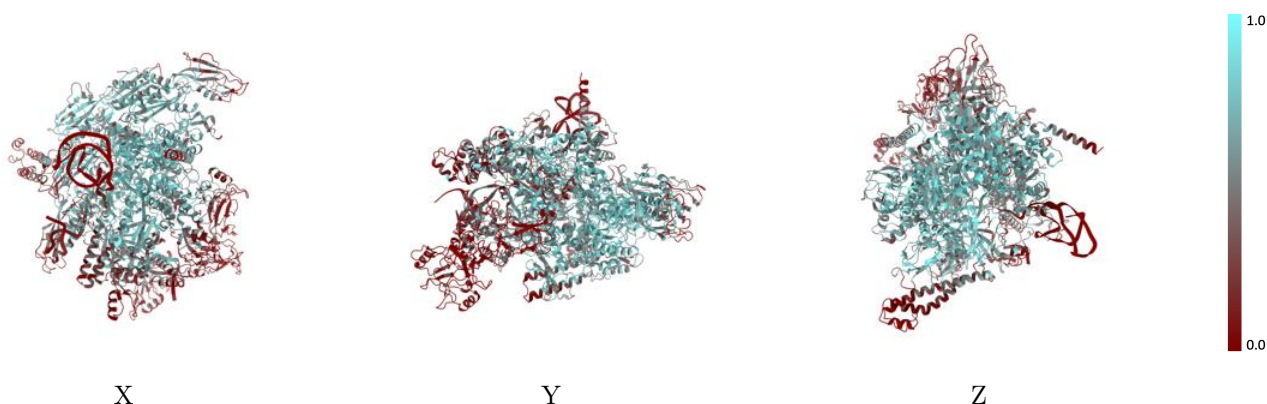
The images above show the 3D surface view of the map at the recommended contour level 0.3 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



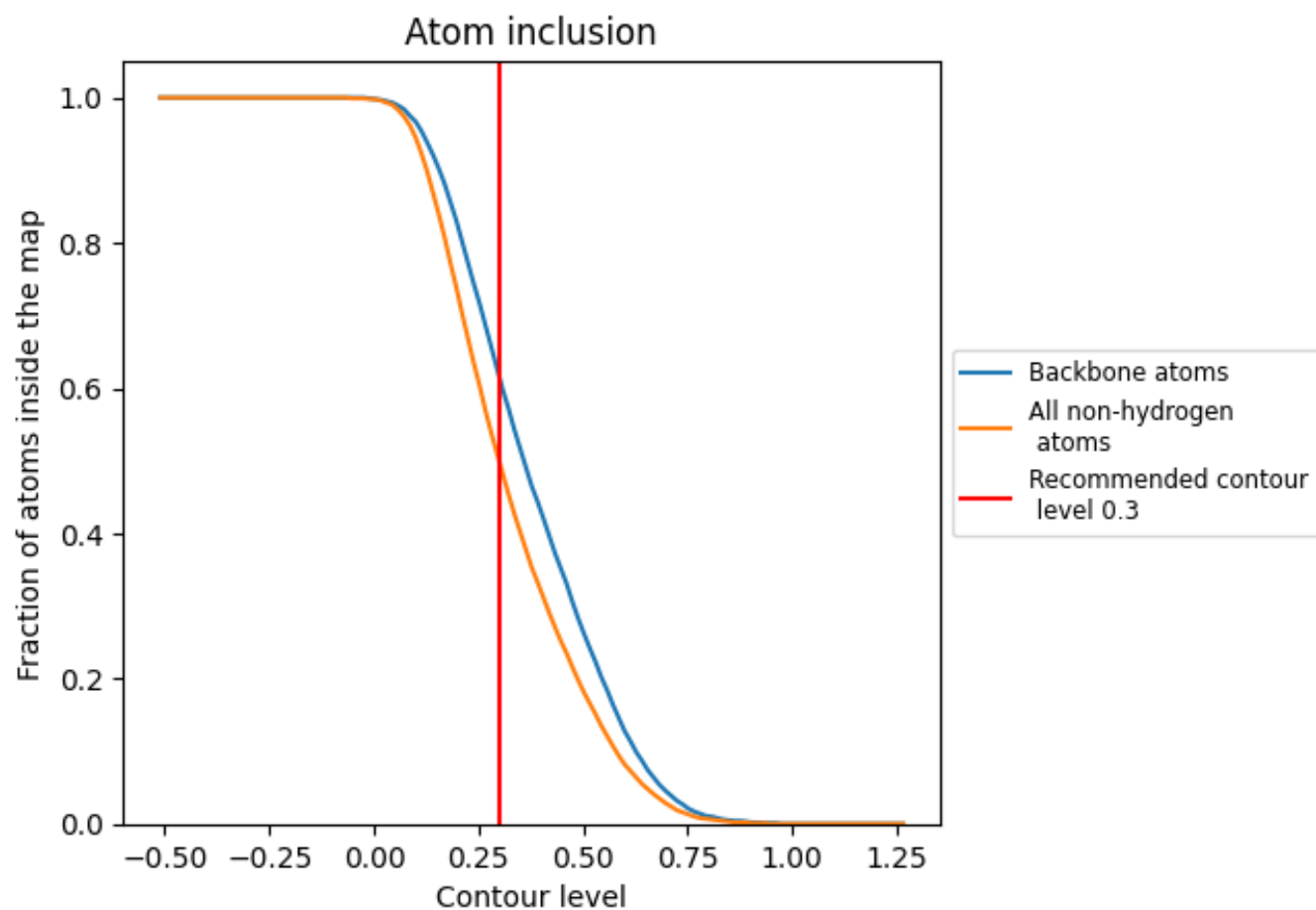
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.3).

## 9.4 Atom inclusion [i](#)



At the recommended contour level, 61% of all backbone atoms, 50% 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 (0.3) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	<div></div> 0.4980	<div></div> 0.2940
A	<div></div> 0.4100	<div></div> 0.1450
B	<div></div> 0.5070	<div></div> 0.2540
G	<div></div> 0.6460	<div></div> 0.4030
H	<div></div> 0.4940	<div></div> 0.3630
I	<div></div> 0.5460	<div></div> 0.3340
J	<div></div> 0.4610	<div></div> 0.2530
K	<div></div> 0.5380	<div></div> 0.3480
R	<div></div> 0.1530	<div></div> 0.0500

