



wwPDB EM Validation Summary Report ⓘ

Aug 4, 2026 – 10:37 PM EDT

PDB ID : 7ML0 / pdb_00007ml0
EMDB ID : EMD-23904
Title : RNA polymerase II pre-initiation complex (PIC1)
Authors : Yang, C.; Fujiwara, R.; Kim, H.J.; Gorbea Colon, J.J.; Steimle, S.; Garcia, B.A.; Murakami, K.
Deposited on : 2021-04-27
Resolution : 3.00 Å(reported)
Based on initial model : 5OQJ

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

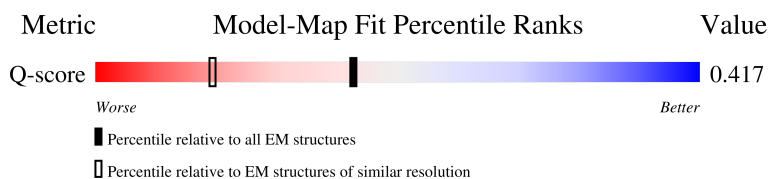
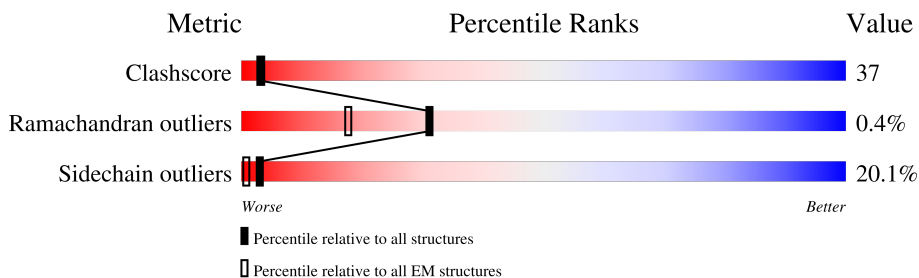
EMDB validation analysis : 0.0.1.dev133
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.00 Å.

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



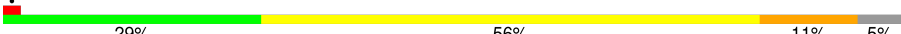
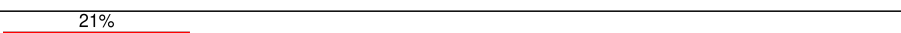
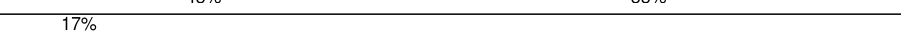
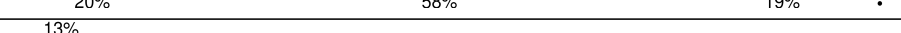
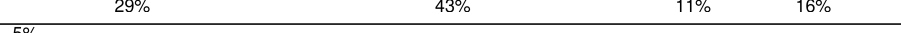
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	14081 (2.50 - 3.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	1733	
2	B	1224	
3	C	318	
4	D	221	

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Mol	Chain	Length	Quality of chain
5	E	215	
6	F	155	
7	G	171	
8	H	146	
9	I	122	
10	J	70	
11	K	120	
12	L	70	
13	M	345	
14	Q	735	
15	R	400	
16	W	482	
17	X	328	
18	O	240	
19	T	66	
20	N	66	
21	0	778	
22	1	541	
23	4	338	
24	6	461	
25	2	513	
26	5	72	
27	3	321	
28	7	843	

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

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
31	SF4	0	801	-	-	X	-

2 Entry composition

There are 31 unique types of molecules in this entry. The entry contains 64214 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
1	A	1398	Total	C	N	O	S	0	0
			10996	6931	1926	2078	61		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	1147	Total	C	N	O	S	0	0
			9132	5775	1602	1700	55		

- Molecule 3 is a protein called DNA-directed RNA polymerase II subunit RPB3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	262	Total	C	N	O	S	0	0
			2061	1299	343	406	13		

- Molecule 4 is a protein called DNA-directed RNA polymerase II subunit RPB4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	157	Total	C	N	O	S	0	0
			1253	779	220	252	2		

- Molecule 5 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC1.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	213	Total	C	N	O	S	0	0
			1744	1107	308	318	11		

- Molecule 6 is a protein called DNA-directed RNA polymerases I,II,and III subunit RPABC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	83	Total	C	N	O	S	0	0
			670	428	114	125	3		

- Molecule 7 is a protein called DNA-directed RNA polymerase II subunit RPB7.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	171	Total	C	N	O	S	0	0
			1340	861	222	249	8		

- Molecule 8 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC3.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	136	Total	C	N	O	S	0	0
			1089	686	184	215	4		

- Molecule 9 is a protein called DNA-directed RNA polymerase II subunit RPB9.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	116	Total	C	N	O	S	0	0
			944	581	172	181	10		

- Molecule 10 is a protein called DNA-directed RNA polymerases II subunit RPABC5.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	65	Total	C	N	O	S	0	0
			532	339	93	94	6		

- Molecule 11 is a protein called DNA-directed RNA polymerase II subunit RPB11.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	112	Total	C	N	O	S	0	0
			904	580	154	168	2		

- Molecule 12 is a protein called DNA-directed RNA polymerases II subunit RPABC4.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	45	Total	C	N	O	S	0	0
			358	221	71	62	4		

- Molecule 13 is a protein called Transcription initiation factor IIB.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	279	Total	C	N	O	S	0	0
			2175	1382	373	403	17		

- Molecule 14 is a protein called Transcription initiation factor IIF subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	Q	148	Total	C	N	O	S	0	0
			1144	733	195	212	4		

- Molecule 15 is a protein called Transcription initiation factor IIF subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	R	190	Total	C	N	O	S	0	0
			1303	812	238	246	7		

- Molecule 16 is a protein called Transcription initiation factor IIE subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	W	191	Total	C	N	O	S	0	0
			1469	932	254	277	6		

- Molecule 17 is a protein called Transcription initiation factor IIE subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	X	156	Total	C	N	O	S	0	0
			984	608	180	192	4		

- Molecule 18 is a protein called TATA-box-binding protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	O	180	Total	C	N	O	S	0	0
			1416	921	242	247	6		

- Molecule 19 is a DNA chain called template strand DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	T	66	Total	C	N	O	P	0	0
			1345	649	230	400	66		

- Molecule 20 is a DNA chain called non-template strand DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	N	66	Total	C	N	O	P	0	0
			1361	653	250	392	66		

- Molecule 21 is a protein called General transcription and DNA repair factor IIH helicase subunit XPD.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	0	753	Total	C	N	O	S	0	0
			6099	3886	1031	1144	38		

- Molecule 22 is a protein called DNA-directed RNA polymerase subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	1	367	Total	C	N	O	S	0	0
			2415	1538	439	431	7		

- Molecule 23 is a protein called DNA-directed RNA polymerase II subunit RPB4.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	4	284	Total	C	N	O	S	0	0
			2041	1310	343	376	12		

- Molecule 24 is a protein called General transcription and DNA repair factor IIH subunit SSL1.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	6	351	Total	C	N	O	S	0	0
			2527	1590	454	456	27		

- Molecule 25 is a protein called RNA polymerase II transcription factor B subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	2	461	Total	C	N	O	S	0	0
			3020	1862	564	585	9		

- Molecule 26 is a protein called General transcription and DNA repair factor IIH subunit TFB5.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	5	66	Total	C	N	O	S	0	0
			498	314	89	93	2		

- Molecule 27 is a protein called BJ4_G0050160.mRNA.1.CDS.1.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	3	137	Total	C	N	O	S	0	0
			890	552	164	166	8		

- Molecule 28 is a protein called General transcription and DNA repair factor IIH helicase subunit XPB.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	7	638	Total	C	N	O	S	0	0
			4478	2739	832	883	24		

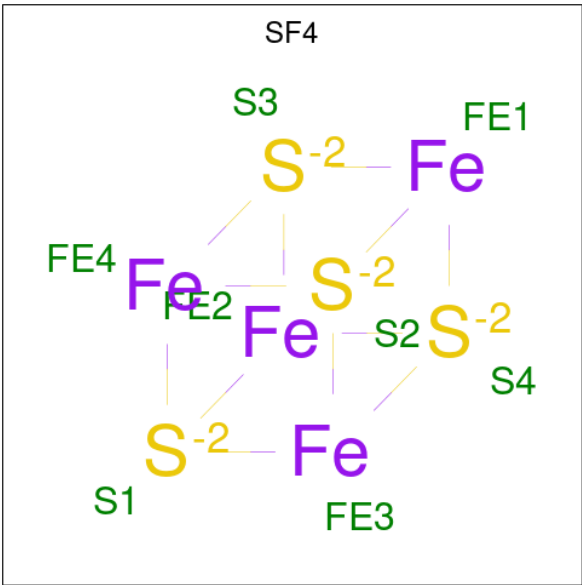
- Molecule 29 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
29	A	2	Total	Zn	0
			2	2	
29	B	1	Total	Zn	0
			1	1	
29	C	1	Total	Zn	0
			1	1	
29	I	2	Total	Zn	0
			2	2	
29	J	1	Total	Zn	0
			1	1	
29	L	1	Total	Zn	0
			1	1	
29	M	1	Total	Zn	0
			1	1	
29	W	1	Total	Zn	0
			1	1	
29	4	1	Total	Zn	0
			1	1	
29	6	4	Total	Zn	0
			4	4	
29	3	2	Total	Zn	0
			2	2	

- Molecule 30 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

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

- Molecule 31 is IRON/SULFUR CLUSTER (CCD ID: SF4) (formula: Fe₄S₄).

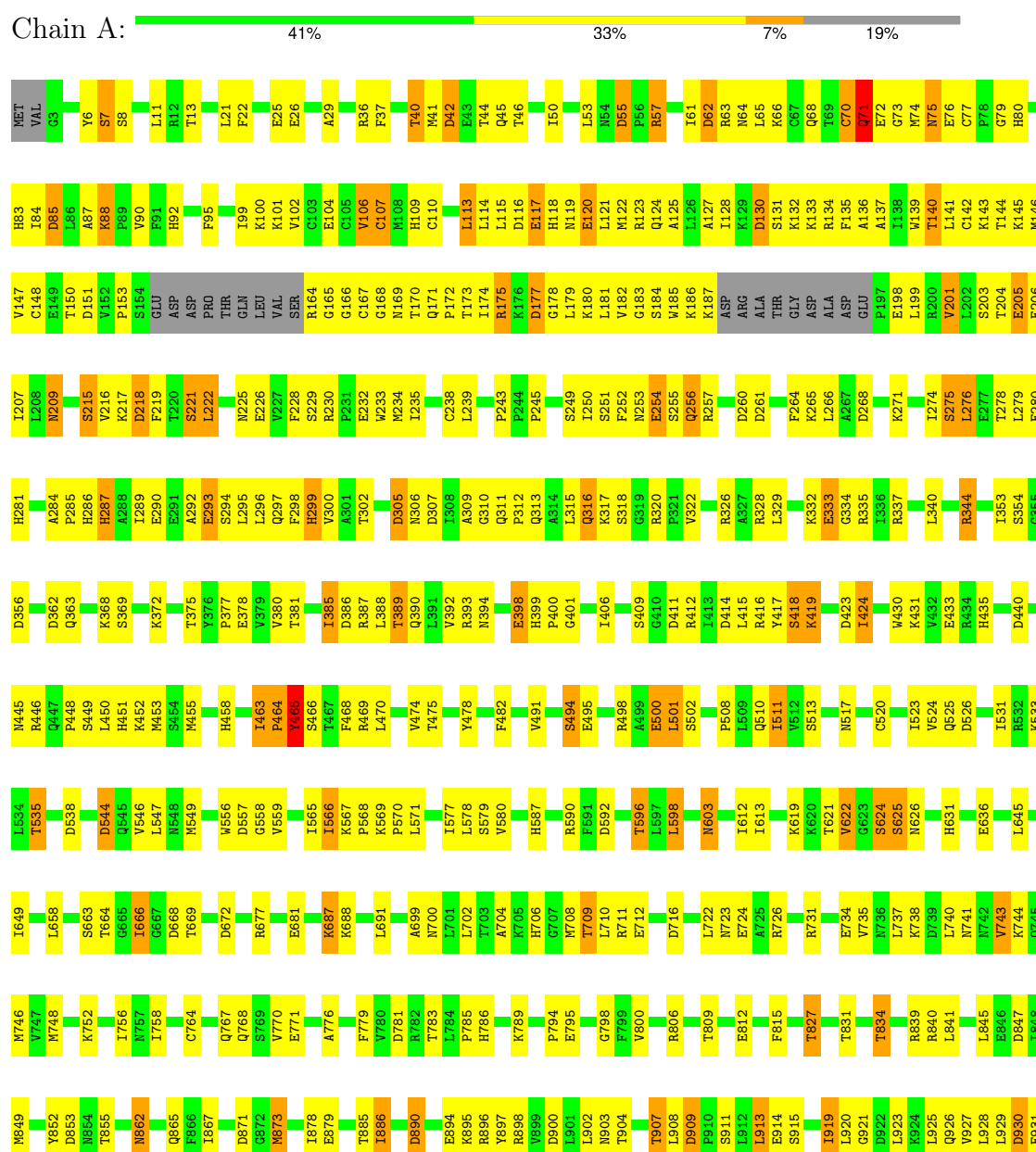


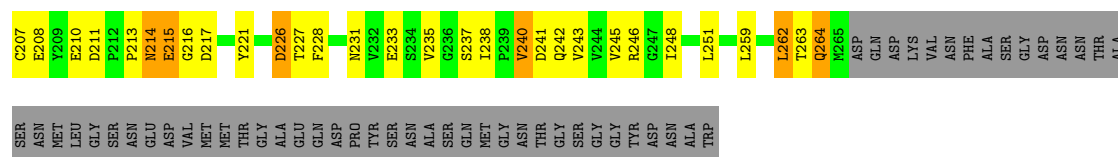
Mol	Chain	Residues	Atoms			AltConf
31	0	1	Total	Fe	S	0
			8	4	4	

3 Residue-property plots

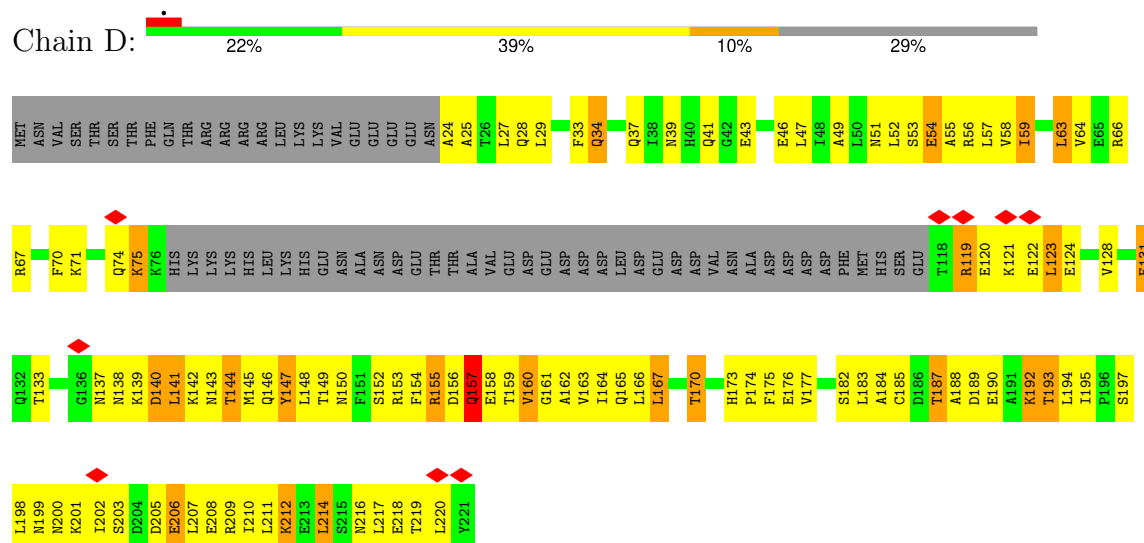
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

• Molecule 1: DNA-directed RNA polymerase subunit

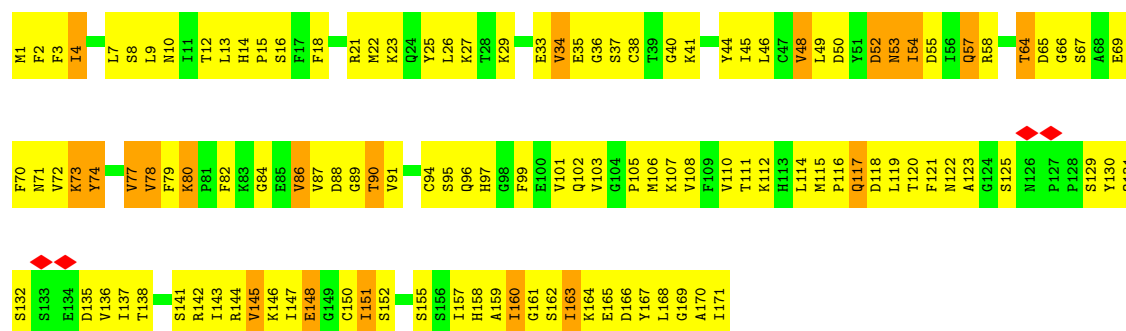




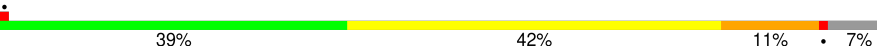
• Molecule 4: DNA-directed RNA polymerase II subunit RPB4

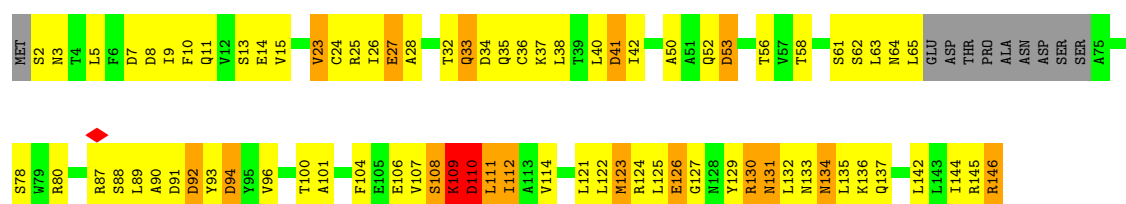


Chain G: 



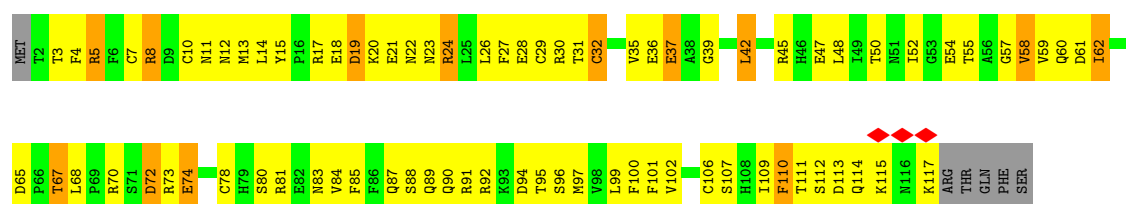
- Molecule 8: DNA-directed RNA polymerases I, II, and III subunit RPABC3

Chain H: 



- Molecule 9: DNA-directed RNA polymerase II subunit RPB9

Chain I: 



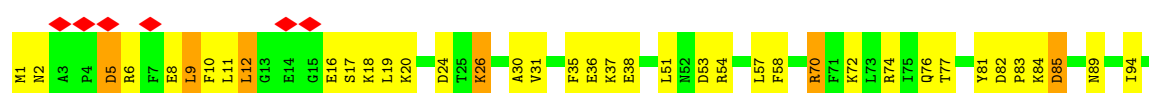
- Molecule 10: DNA-directed RNA polymerases II subunit RPABC5

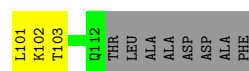
Chain J: 



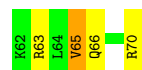
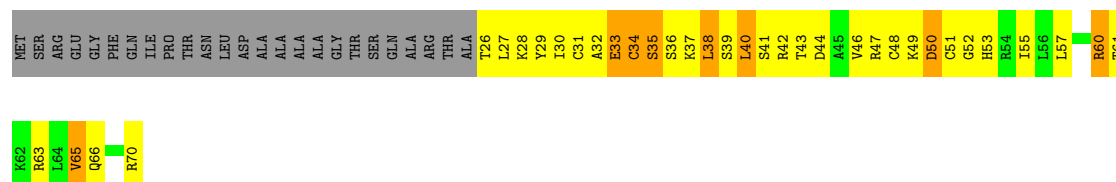
- Molecule 11: DNA-directed RNA polymerase II subunit RPB11

Chain K: 

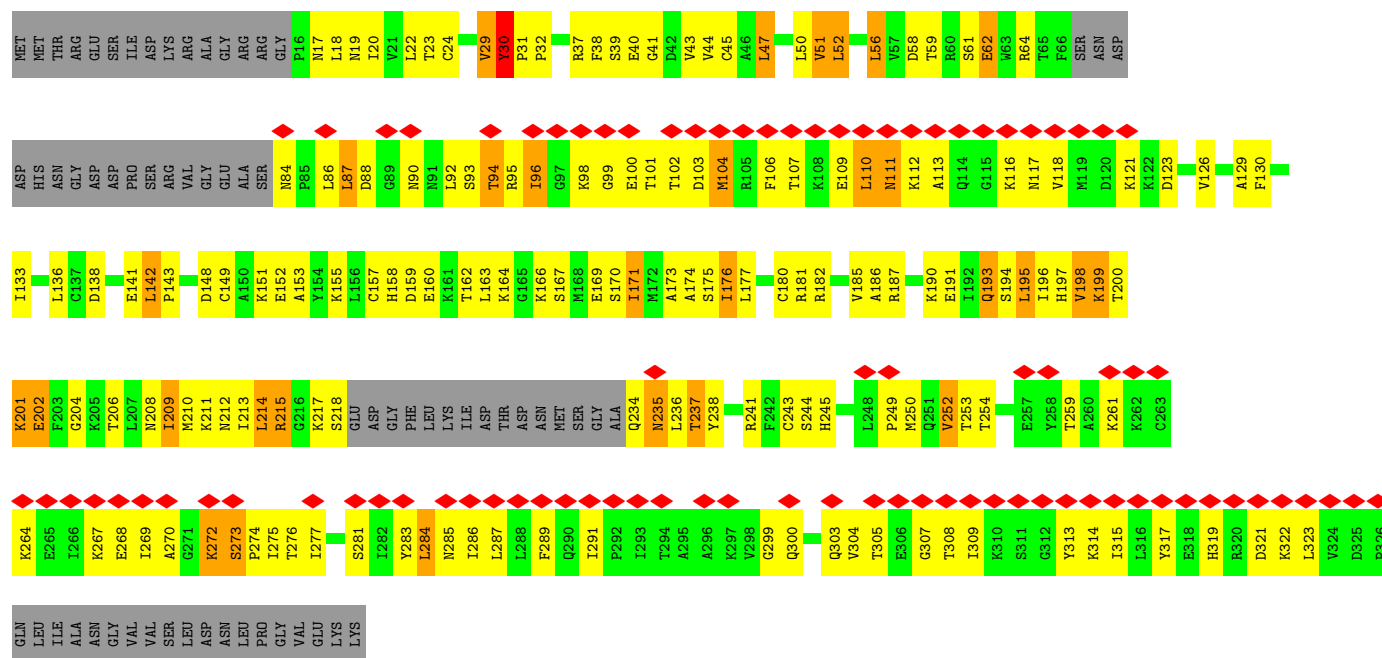




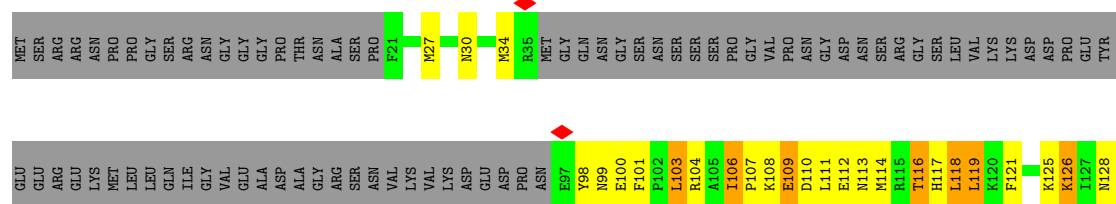
• Molecule 12: DNA-directed RNA polymerases II subunit RPABC4



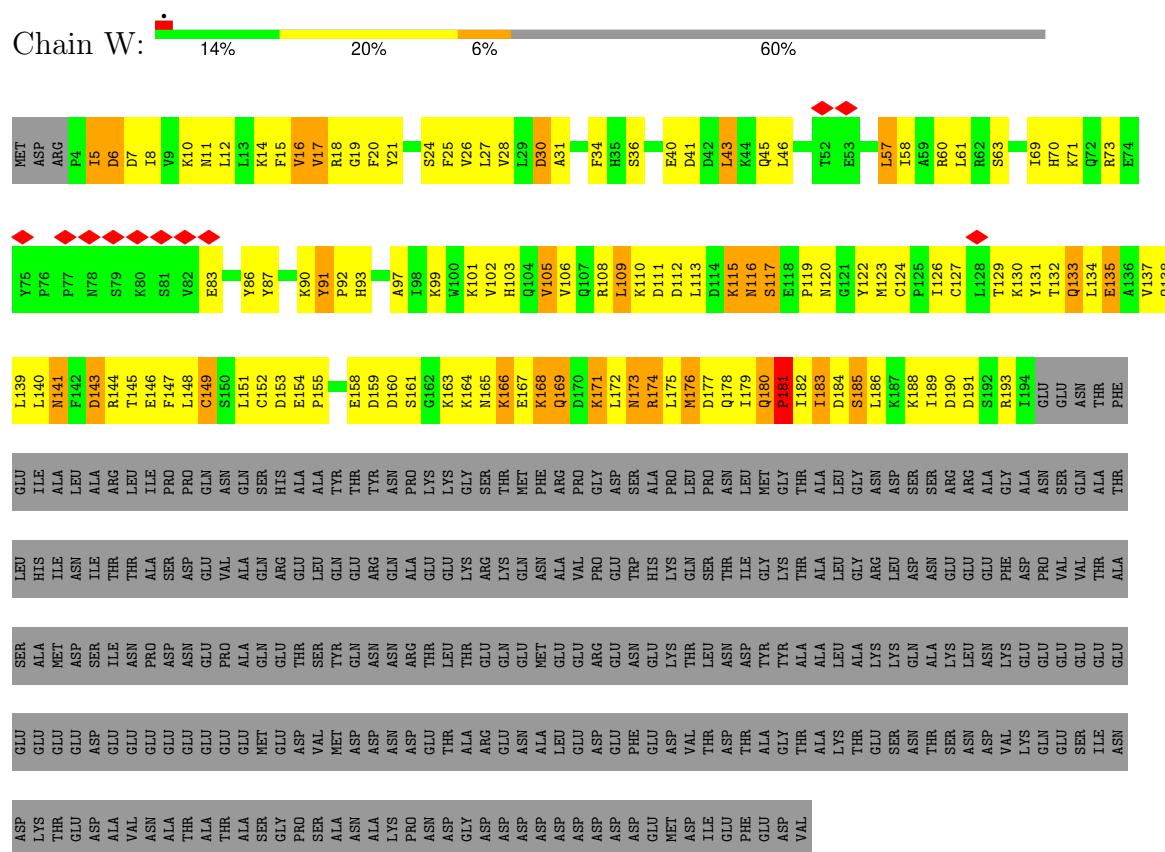
• Molecule 13: Transcription initiation factor IIB

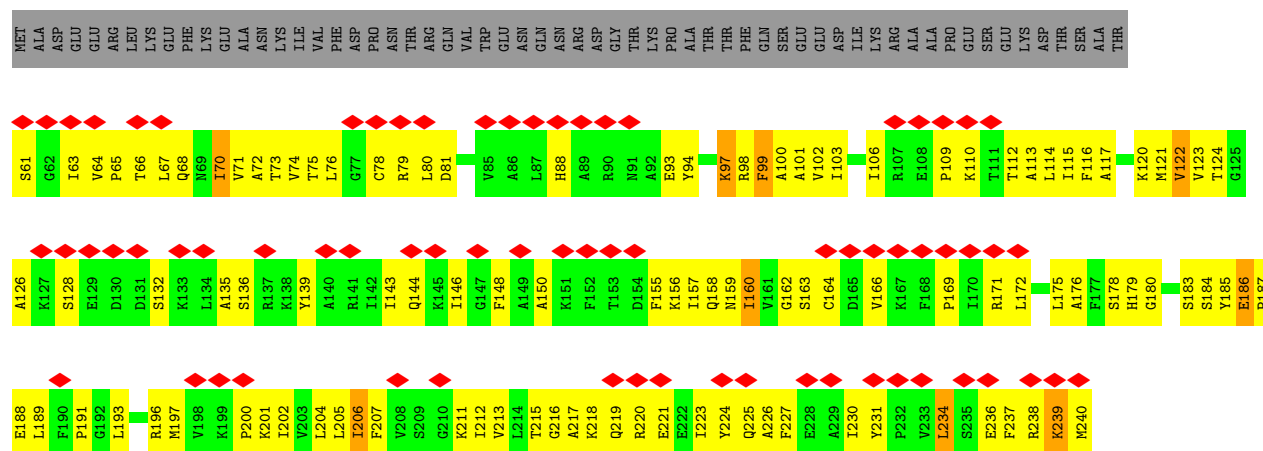


• Molecule 14: Transcription initiation factor IIF subunit alpha



- Molecule 16: Transcription initiation factor IIE subunit alpha





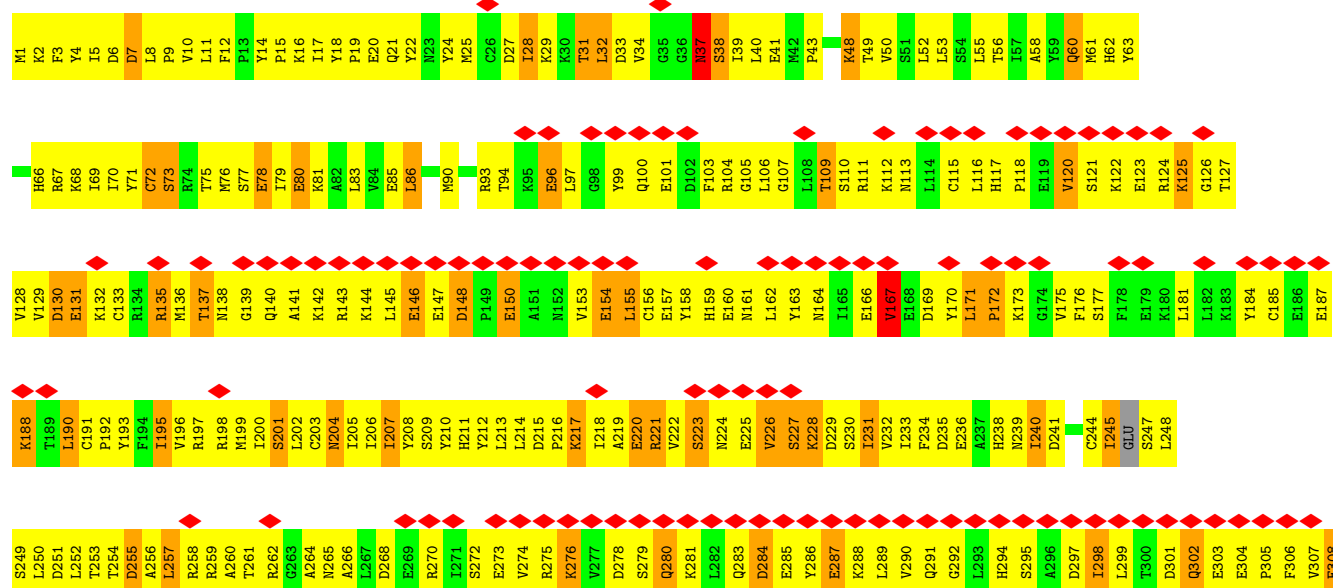
• Molecule 19: template strand DNA

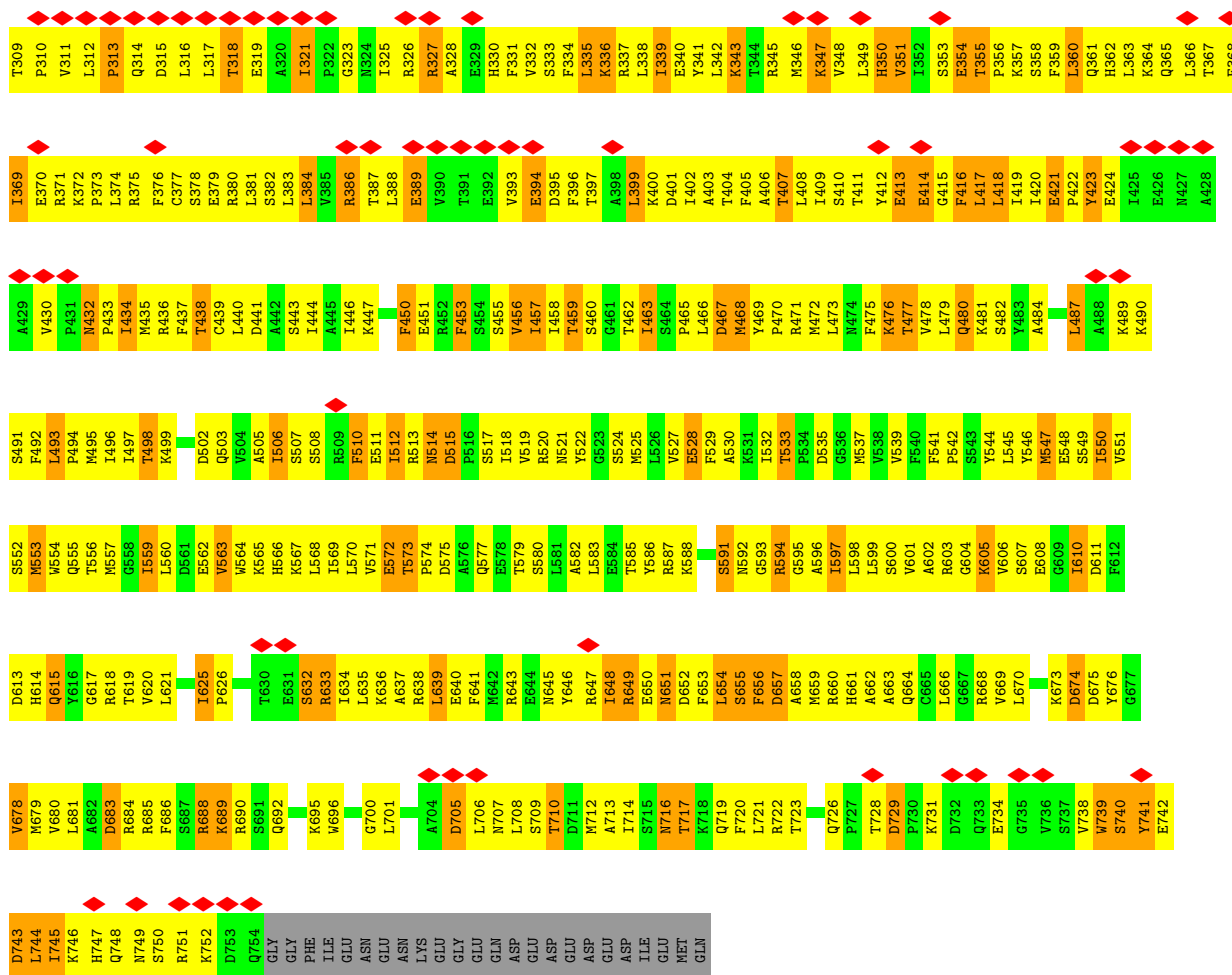


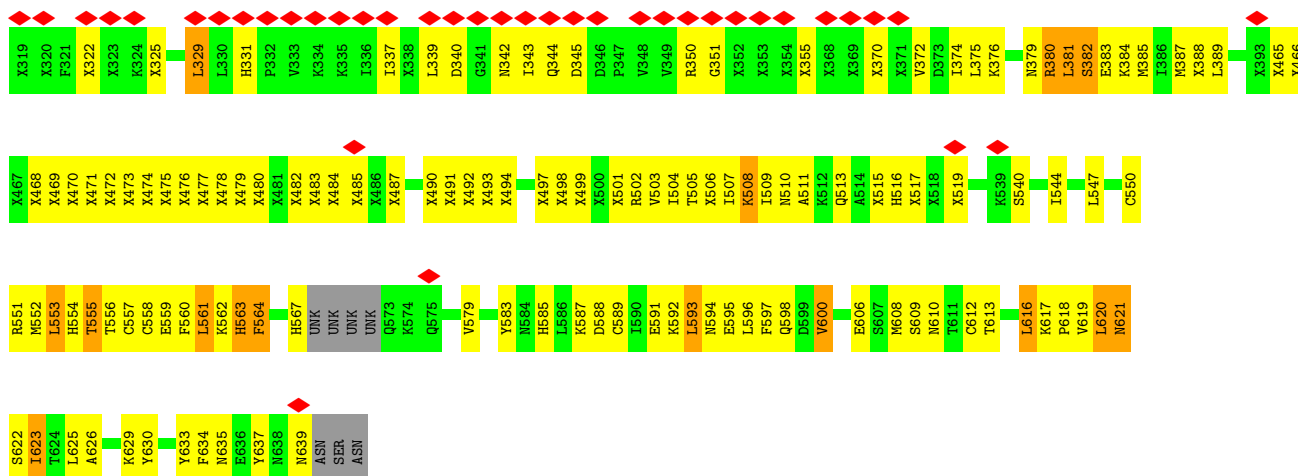
• Molecule 20: non-template strand DNA



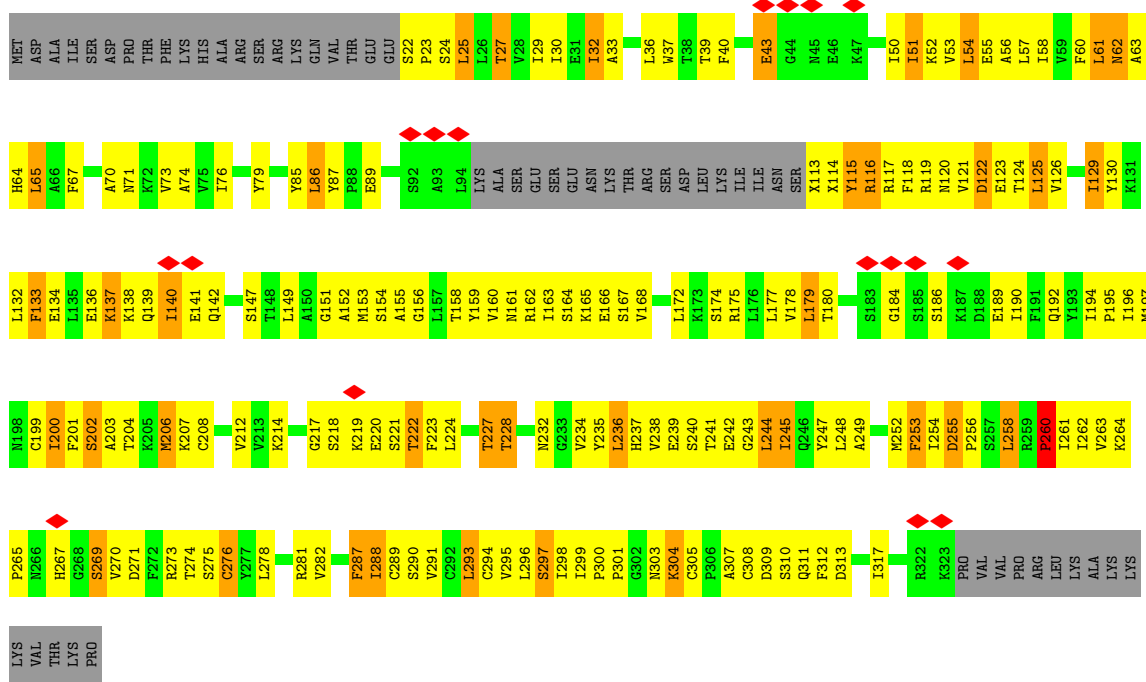
• Molecule 21: General transcription and DNA repair factor IIH helicase subunit XPD



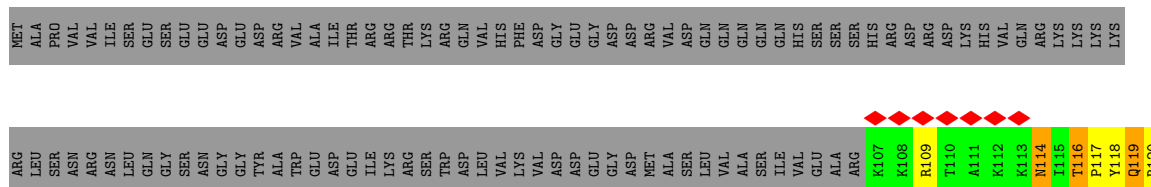
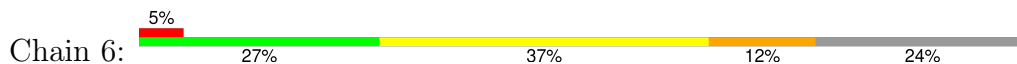




• Molecule 23: DNA-directed RNA polymerase II subunit RPB4



• Molecule 24: General transcription and DNA repair factor IIH subunit SSL1



LYS	VAL	E715	S655	Q589	F529	H468	I408	R348
MET	GLY	H716	K656	A590	L530	D469	V409	N349
TYR	ASP	Y717	V657	C591	I531	D470	L410	P350
TYR	ALA	Y718	G658	Q592	G532	V471	C411	D351
LYS	ASP	S719	D659	F593	P533	V472	T412	L352
ASN	ASP	T720	T660	L594	K534	M474	S413	D353
ASN	ASN	K721	S661	I595	D475	D476	S414	I354
SER	SER	R722	S662	Q596	L535	F476	V415	D355
VAL	VAL	Q723	D663	Q597	Y536	L477	S416	L356
GLY	GLY	A724	D664	H598	E537	T478	V417	L357
ARG	ARG	F725	L664	E599	A538	M418	P358	K357
GLY	GLY	L726	P665	R600	N539	G479	P359	P358
SER	SER	V727	E666	R501	W540	R480	S359	S358
ASN	ASN	D728	A667	G602	M541	E481	T360	T360
GLY	HIS	Q729	T668	D603	E542	W482	I361	Q361
LYS	LYS	G730	K604	D604	L543	G483	I362	I362
ARG	ARG	A732	L670	I605	S544	F484	R363	R363
PHE	PHE	F733	L671	I606	Q545	I485	P364	P364
LYS	LYS	K734	Q672	V607	K546	I486	Y365	Y365
SER	SER	V735	I673	F608	G547	L487	Q366	Q366
LYS	LYS	V736	S674	S609	H548	C428	E367	E367
ALA	ALA	I736	S675	D610	I549	T429	K368	K368
VAL	VAL	T737	H676	N611	A550	L430	S369	S369
ARG	ARG	H738	Y677	G612	N551	H491	L370	L370
GLY	GLY	L739	G678	V612	Q552	V492	S371	S371
GLU	GLY	H740	S679	Y613	Q553	P493	K372	K372
SER	SER	G741	R680	A614	C554	P494	M373	M373
LEU	LEU	M742	R681	L615	A555	A495	F374	F374
SER	SER	E743	E682	Q616	E556	M497	G375	G375
GLY	GLY	N744	E683	E617	V557	F498	N376	N376
ALA	ALA	I745	A684	Y618	W558	R499	G377	G377
GLY	GLY	P746	Q685	A619	C559	R500	R378	R378
GLY	GLY	N747	R686	L620	P560	V501	A379	A379
GLU	GLU	L748	L687	M621	T562	T504	R380	R380
ASP	MET	A749	G688	G623	M561	I505	S381	S381
ALA	ALA	Y750	R689	K624	E563	A506	G382	G382
TYR	TYR	A751	I690	P625	E564	A507	I383	I383
GLY	GLY	S752	L691	F626	F565	H508	I384	I384
TYR	TYR	P753	R692	Y628	Y566	Q447	V385	V385
SER	SER	R754	A693	I627	Q567	A509	L386	L386
THR	THR	E755	K694	Y628	E568	K510	P387	P387
LYS	LYS	R756	R695	T631	Y569	L511	C388	C388
ASN	ASN	R757	G696	P632	L570	G512	G389	G389
LYS	LYS	E758	N697	G632	R571	L513	A390	A390
GLU	GLU	L759	D698	R636	E572	T514	C391	C391
LEU	LEU	L760	E699	M637	T573	A515	K392	K392
LYS	LYS	Q761	G700	G637	A574	T516	T393	T393
GLY	GLY	E762	F701	N638	R575	L517	L394	L394
HIS	HIS	V763	N702	I639	K576	M459	V395	V395
HIS	HIS	V764	A703	L640	R577	V518	G396	G396
PRO	PRO	L765	F704	Q641	M578	R519	I397	I397
LEU	LEU	L766	F705	N642	L579	E520	T398	T398
ILE	ILE	K766	Y706	F643	L580	D521	A400	A400
ARG	ARG	N767	S707	D647	Y581	D522	C401	C401
		E768	L708	T650	I582	M523	T402	T402
		E769	V709	N650	M583	I524	I403	I403
		A770	S710	K650	P585	G525	K404	K404
		ALA	K711	T651	T586	D526	K405	K405
		GLY	D712	I652	F653	L527	S406	S406
		ILE	T713	F653	F588	N528	V407	V407
		GLU	Q714	L654				

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	137466	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 ($e^-/\text{\AA}^2$)	45	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.087	Depositor
Minimum map value	0.000	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.0164	Depositor
Map size (Å)	545.89996, 469.58, 507.73996	wwPDB
Map dimensions	515, 443, 479	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	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: SF4, MG, ZN

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	1.13	3/11191 (0.0%)	0.76	2/15127 (0.0%)
2	B	1.21	0/9311	0.76	3/12558 (0.0%)
3	C	1.23	0/2099	0.76	2/2845 (0.1%)
4	D	0.37	0/1262	0.54	0/1693
5	E	0.97	0/1780	0.69	0/2395
6	F	1.26	0/682	0.77	0/922
7	G	0.61	0/1368	0.59	0/1844
8	H	0.97	0/1107	0.75	0/1499
9	I	0.75	0/962	0.66	0/1295
10	J	1.39	0/541	0.84	0/727
11	K	1.18	0/922	0.72	0/1244
12	L	0.91	0/360	0.77	0/478
13	M	0.42	0/2204	0.56	0/2963
14	Q	0.43	0/1168	0.54	0/1579
15	R	0.31	0/1312	0.45	0/1777
16	W	0.24	0/1490	0.53	2/2014 (0.1%)
17	X	0.18	0/993	0.41	0/1357
18	O	0.21	0/1443	0.44	0/1942
19	T	0.33	0/1505	0.51	0/2319
20	N	0.37	0/1529	0.47	0/2359
21	0	0.39	0/6216	0.52	0/8392
22	1	0.38	0/1906	0.49	0/2558
23	4	0.56	0/2062	0.60	0/2805
24	6	0.53	0/2506	0.64	0/3402
25	2	0.42	0/3066	0.60	0/4082
26	5	0.46	0/502	0.74	0/677
27	3	0.28	0/902	0.48	0/1230
28	7	0.37	0/4552	0.70	7/6078 (0.1%)
All	All	0.82	3/64941 (0.0%)	0.65	16/88161 (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	2
4	D	0	1
8	H	0	1
13	M	0	2
16	W	0	1
21	0	0	5
23	4	0	2
24	6	0	3
28	7	0	7
All	All	0	27

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	354	SER	C-N	-5.48	1.23	1.33
1	A	569	LYS	C-N	-5.17	1.27	1.33
1	A	1404	GLU	CA-CB	-5.03	1.37	1.53

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1013	ASN	CA-C-N	9.97	129.73	119.56
2	B	1013	ASN	C-N-CA	9.97	129.73	119.56
16	W	116	ASN	N-CA-C	6.34	116.83	108.07
28	7	333	ILE	N-CA-C	-5.97	106.67	112.29
1	A	71	GLN	N-CA-C	5.60	118.54	109.86

There are no chirality outliers.

5 of 27 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	465	TYR	Peptide
1	A	70	CYS	Peptide
1	A	71	GLN	Peptide
2	B	363	HIS	Peptide
2	B	644	GLU	Peptide

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	10996	0	11079	535	0
2	B	9132	0	9146	402	0
3	C	2061	0	2029	68	0
4	D	1253	0	1275	126	0
5	E	1744	0	1772	101	0
6	F	670	0	690	23	0
7	G	1340	0	1357	124	0
8	H	1089	0	1062	66	0
9	I	944	0	899	77	0
10	J	532	0	542	21	0
11	K	904	0	911	38	0
12	L	358	0	381	38	0
13	M	2175	0	2283	157	0
14	Q	1144	0	1034	84	0
15	R	1303	0	1110	98	0
16	W	1469	0	1432	124	0
17	X	984	0	722	53	0
18	O	1416	0	1493	105	0
19	T	1345	0	753	55	0
20	N	1361	0	749	48	0
21	0	6099	0	6160	690	0
22	1	2415	0	1887	234	0
23	4	2041	0	1954	194	0
24	6	2527	0	2322	227	0
25	2	3020	0	2613	375	0
26	5	498	0	506	129	0
27	3	890	0	680	57	0
28	7	4478	0	3928	670	0
29	3	2	0	0	0	0
29	4	1	0	0	0	0
29	6	4	0	0	0	0
29	A	2	0	0	0	0
29	B	1	0	0	0	0
29	C	1	0	0	0	0
29	I	2	0	0	0	0
29	J	1	0	0	0	0
29	L	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
29	M	1	0	0	0	0
29	W	1	0	0	0	0
30	A	1	0	0	0	0
31	0	8	0	0	3	0
All	All	64214	0	60769	4626	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 37.

The worst 5 of 4626 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:70:CYS:SG	1:A:80:HIS:CE1	2.32	1.23
18:O:71:VAL:HA	18:O:123:VAL:O	1.40	1.17
18:O:106:ILE:O	18:O:110:LYS:HA	1.50	1.11
25:2:457:SER:HA	26:5:6:LYS:HA	1.33	1.07
24:6:403:CYS:SG	24:6:437:CYS:HB2	1.91	1.04

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	1386/1733 (80%)	1206 (87%)	174 (13%)	6 (0%)	30	65
2	B	1133/1224 (93%)	1030 (91%)	100 (9%)	3 (0%)	36	70
3	C	260/318 (82%)	229 (88%)	31 (12%)	0	100	100
4	D	153/221 (69%)	131 (86%)	21 (14%)	1 (1%)	18	53
5	E	211/215 (98%)	190 (90%)	21 (10%)	0	100	100
6	F	81/155 (52%)	75 (93%)	6 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
7	G	169/171 (99%)	145 (86%)	24 (14%)	0	100	100
8	H	132/146 (90%)	106 (80%)	25 (19%)	1 (1%)	16	50
9	I	114/122 (93%)	85 (75%)	29 (25%)	0	100	100
10	J	63/70 (90%)	56 (89%)	5 (8%)	2 (3%)	3	18
11	K	110/120 (92%)	98 (89%)	12 (11%)	0	100	100
12	L	43/70 (61%)	32 (74%)	11 (26%)	0	100	100
13	M	273/345 (79%)	225 (82%)	48 (18%)	0	100	100
14	Q	140/735 (19%)	117 (84%)	23 (16%)	0	100	100
15	R	176/400 (44%)	150 (85%)	26 (15%)	0	100	100
16	W	189/482 (39%)	170 (90%)	18 (10%)	1 (0%)	24	60
17	X	152/328 (46%)	131 (86%)	19 (12%)	2 (1%)	9	38
18	O	178/240 (74%)	169 (95%)	9 (5%)	0	100	100
21	0	749/778 (96%)	631 (84%)	116 (16%)	2 (0%)	36	70
22	1	257/541 (48%)	223 (87%)	30 (12%)	4 (2%)	7	34
23	4	279/338 (82%)	202 (72%)	76 (27%)	1 (0%)	30	65
24	6	336/461 (73%)	263 (78%)	71 (21%)	2 (1%)	21	56
25	2	457/513 (89%)	345 (76%)	111 (24%)	1 (0%)	43	76
26	5	64/72 (89%)	46 (72%)	18 (28%)	0	100	100
27	3	135/321 (42%)	121 (90%)	14 (10%)	0	100	100
28	7	634/843 (75%)	448 (71%)	184 (29%)	2 (0%)	36	70
All	All	7874/10962 (72%)	6624 (84%)	1222 (16%)	28 (0%)	31	65

5 of 28 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	465	TYR
1	A	525	GLN
2	B	364	ILE
8	H	110	ASP
10	J	6	ARG

5.3.2 Protein sidechains ⓘ

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

entries.

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	1221/1520 (80%)	1010 (83%)	211 (17%)	2	10
2	B	995/1061 (94%)	847 (85%)	148 (15%)	3	15
3	C	230/274 (84%)	197 (86%)	33 (14%)	3	16
4	D	139/200 (70%)	110 (79%)	29 (21%)	1	7
5	E	195/197 (99%)	159 (82%)	36 (18%)	1	9
6	F	73/137 (53%)	60 (82%)	13 (18%)	2	10
7	G	152/152 (100%)	122 (80%)	30 (20%)	1	8
8	H	119/128 (93%)	92 (77%)	27 (23%)	1	5
9	I	110/116 (95%)	88 (80%)	22 (20%)	1	7
10	J	60/65 (92%)	48 (80%)	12 (20%)	1	7
11	K	97/102 (95%)	86 (89%)	11 (11%)	5	24
12	L	40/57 (70%)	29 (72%)	11 (28%)	0	2
13	M	245/299 (82%)	192 (78%)	53 (22%)	1	6
14	Q	109/641 (17%)	84 (77%)	25 (23%)	1	5
15	R	107/363 (30%)	74 (69%)	33 (31%)	0	1
16	W	155/429 (36%)	121 (78%)	34 (22%)	1	5
17	X	62/295 (21%)	51 (82%)	11 (18%)	2	10
18	O	152/205 (74%)	135 (89%)	17 (11%)	6	24
21	0	685/707 (97%)	527 (77%)	158 (23%)	1	5
22	1	170/396 (43%)	135 (79%)	35 (21%)	1	7
23	4	198/298 (66%)	149 (75%)	49 (25%)	1	4
24	6	247/406 (61%)	183 (74%)	64 (26%)	0	3
25	2	259/468 (55%)	189 (73%)	70 (27%)	0	2
26	5	53/66 (80%)	37 (70%)	16 (30%)	0	1
27	3	63/303 (21%)	51 (81%)	12 (19%)	1	8
28	7	417/737 (57%)	299 (72%)	118 (28%)	0	2
All	All	6353/9622 (66%)	5075 (80%)	1278 (20%)	3	7

5 of 1278 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
22	1	280	GLU
26	5	58	LEU
23	4	43	GLU
22	1	271	THR
24	6	292	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 61 such sidechains are listed below:

Mol	Chain	Res	Type
17	X	251	ASN
28	7	596	GLN
21	0	555	GLN
28	7	553	GLN
28	7	729	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 18 are 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
31	SF4	0	801	21	0,12,12	-	-	-		

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
31	SF4	0	801	21	-	-	0/6/5/5

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.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
31	0	801	SF4	3	0

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
22	1	3

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	1	393:UNK	C	465:UNK	N	86.50
1	1	519:UNK	C	537:GLU	N	13.64
1	1	355:UNK	C	368:UNK	N	9.80

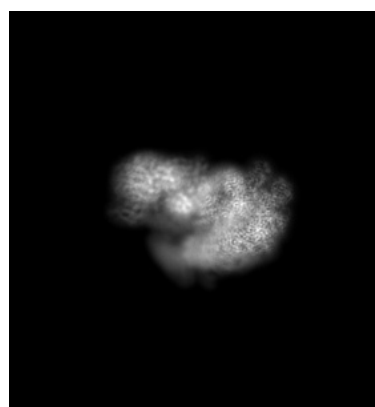
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-23904. These allow visual inspection of the internal detail of the map and identification of artifacts.

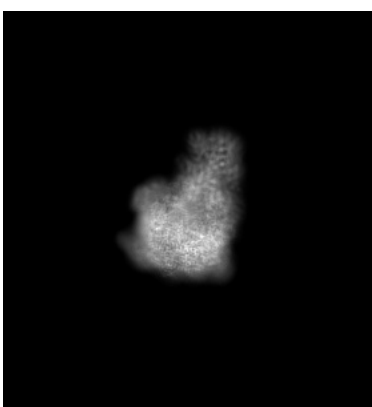
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

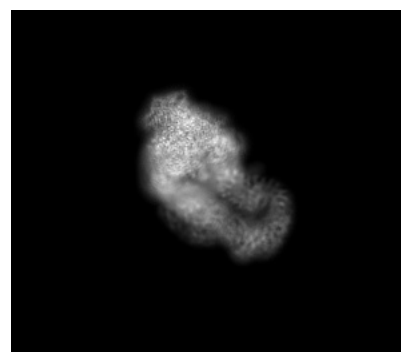
6.1.1 Primary map



X



Y

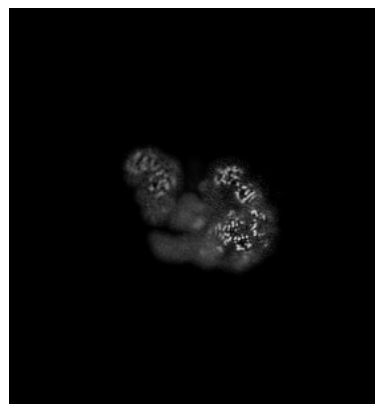


Z

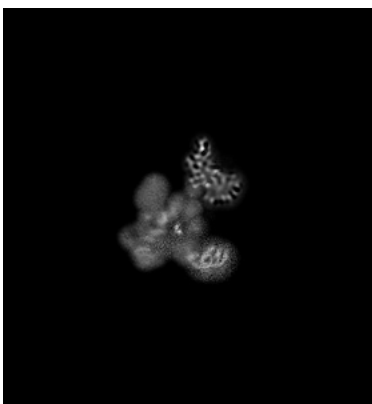
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

6.2.1 Primary map



X Index: 257



Y Index: 221

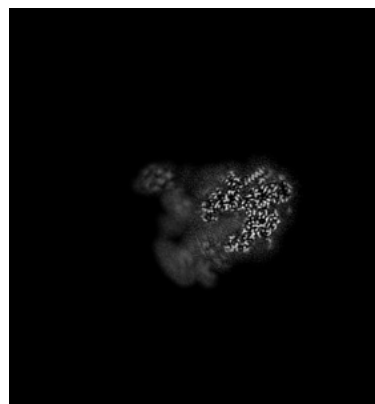


Z Index: 239

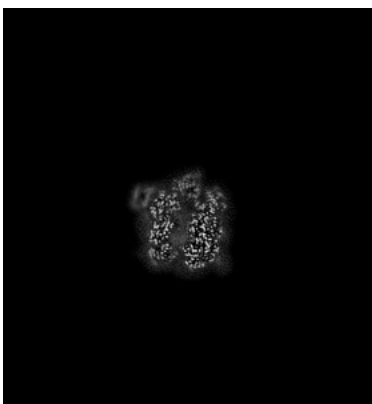
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

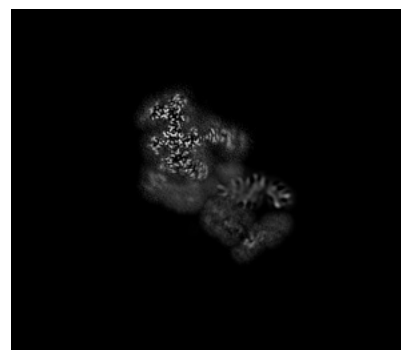
6.3.1 Primary map



X Index: 215



Y Index: 273

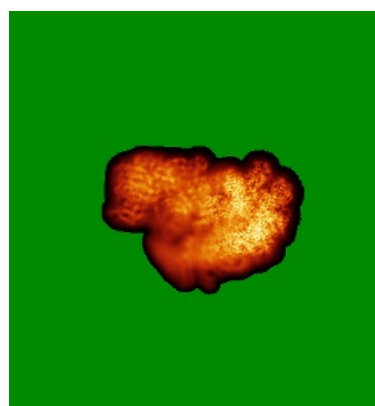


Z Index: 248

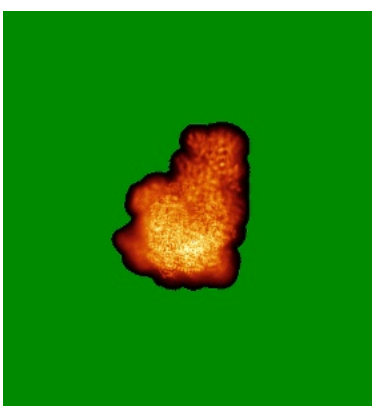
The images above show the largest variance slices of the map in three orthogonal directions.

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

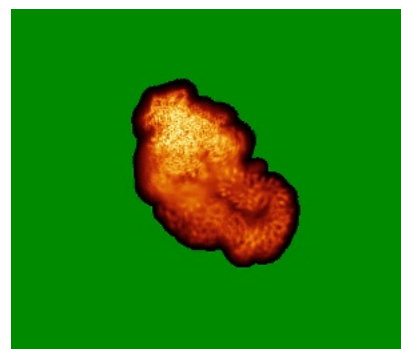
6.4.1 Primary map



X



Y

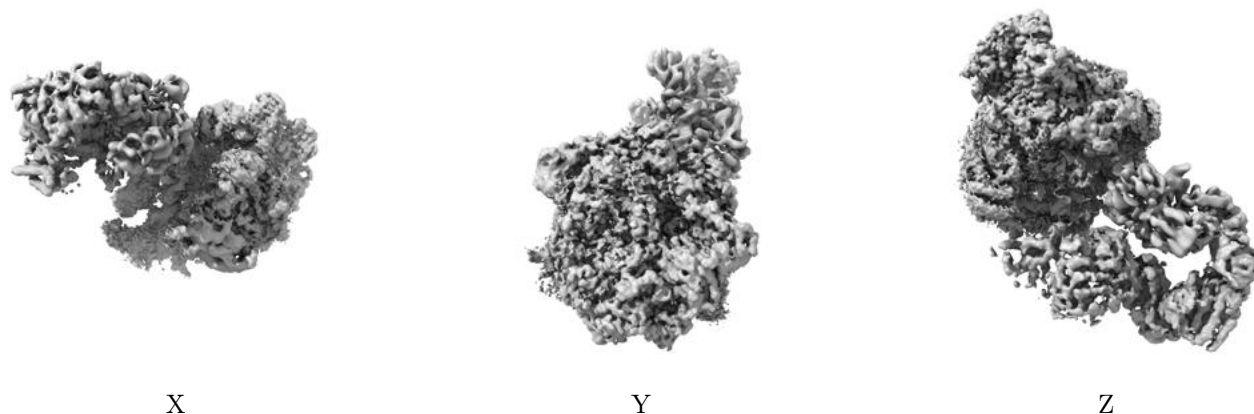


Z

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 0.0164. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

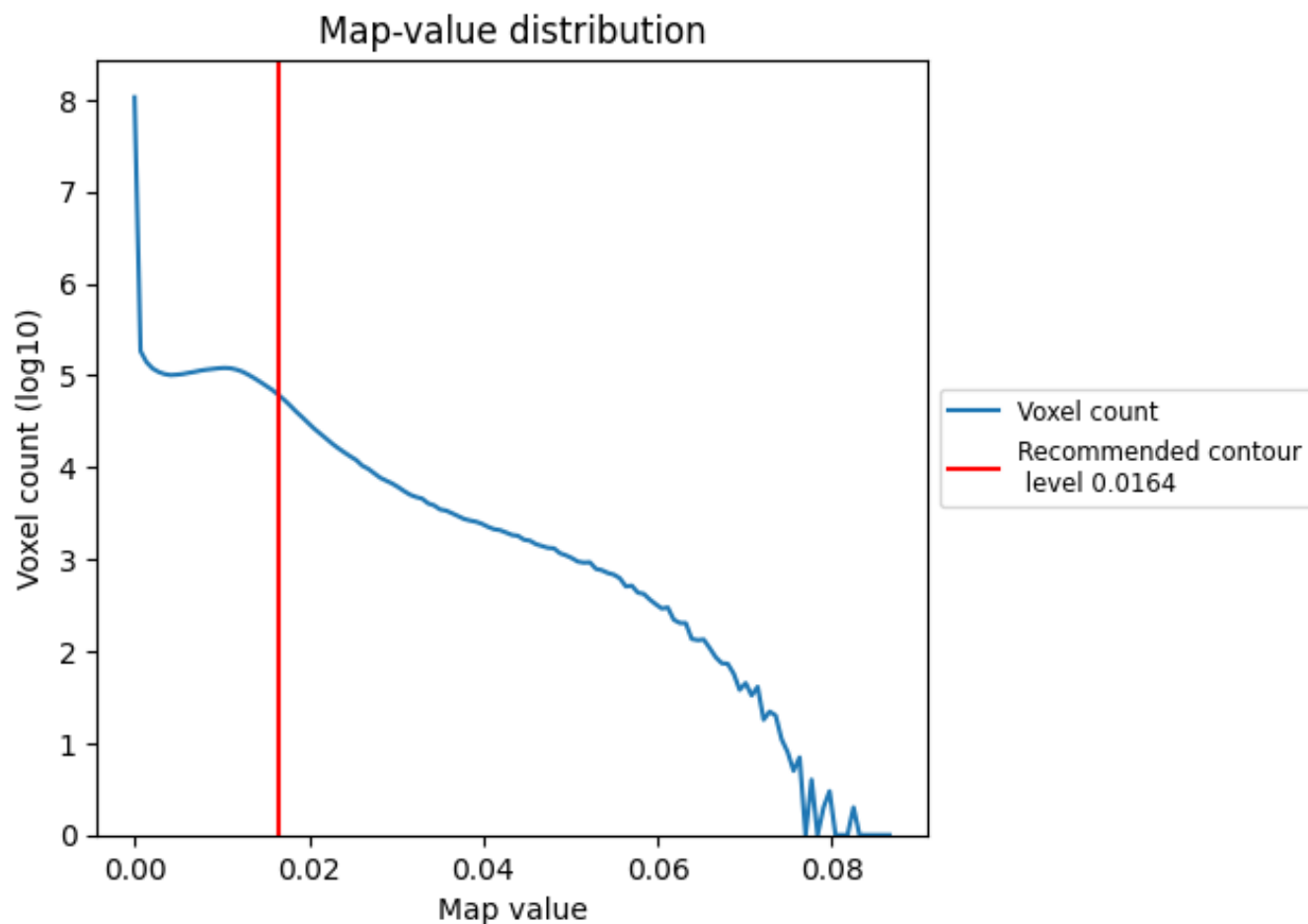
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

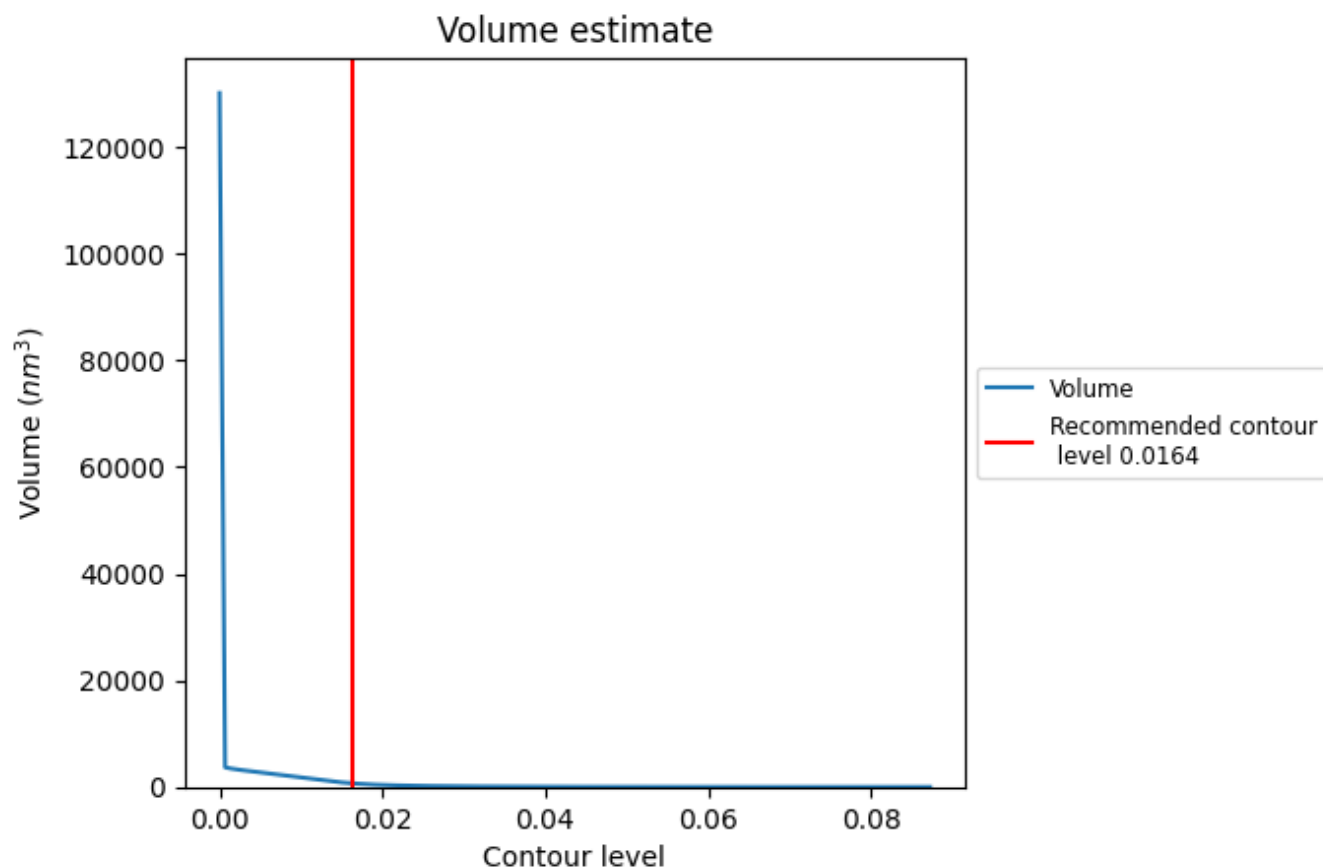
This section contains the results of statistical analysis of the map.

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 672 nm^3 ; this corresponds to an approximate mass of 607 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.

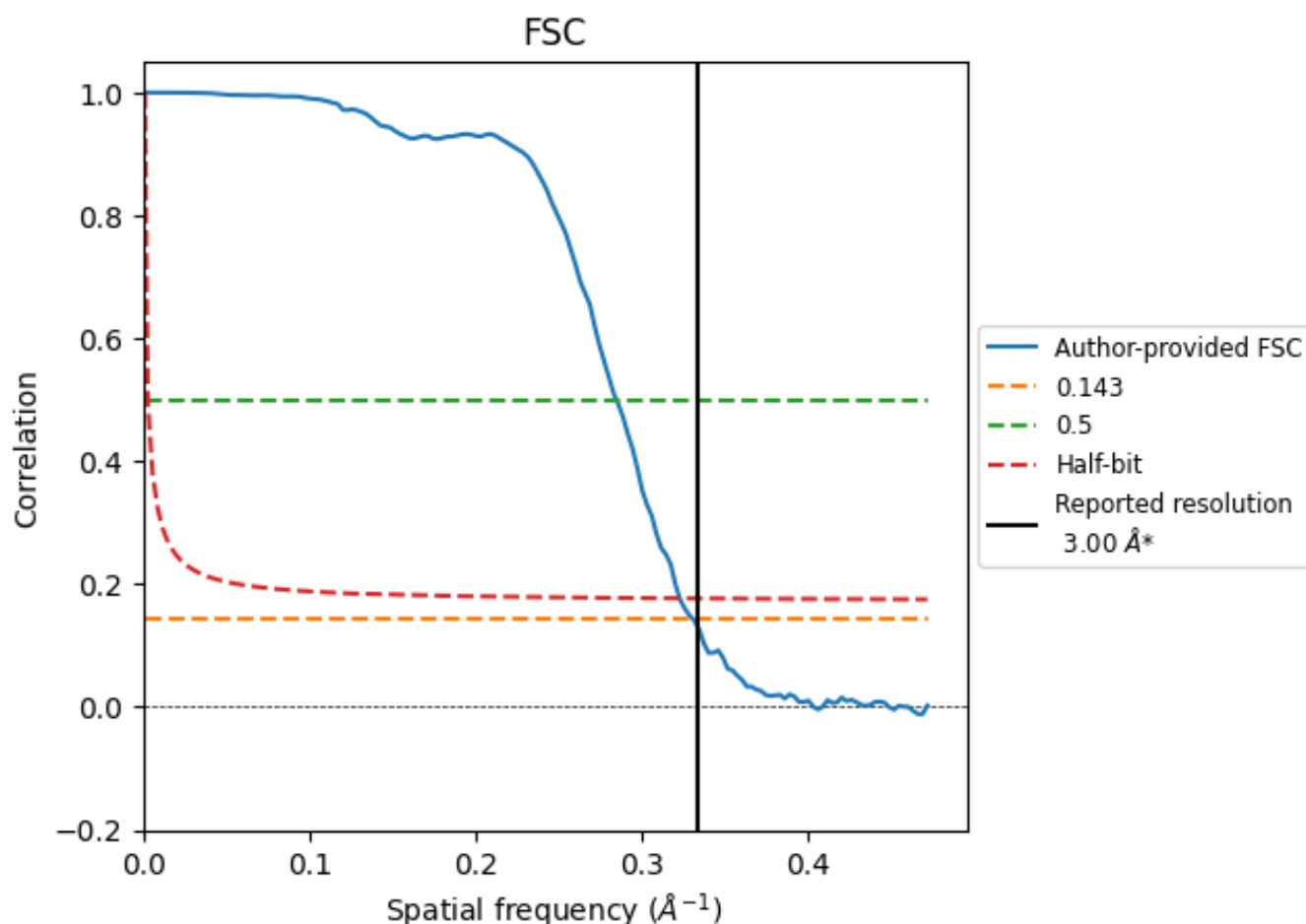
7.3 Rotationally averaged power spectrum [i](#)

This section was not generated. The rotationally averaged power spectrum is only generated for cubic maps.

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 0.333 Å⁻¹

8.2 Resolution estimates [i](#)

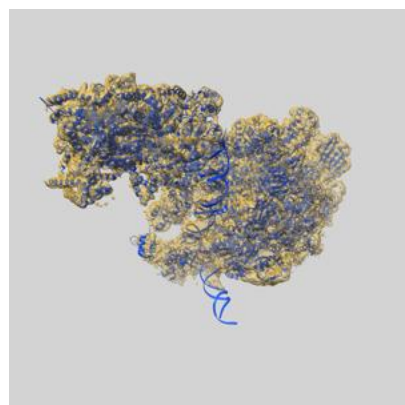
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.00	-	-
Author-provided FSC curve	3.02	3.51	3.10
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

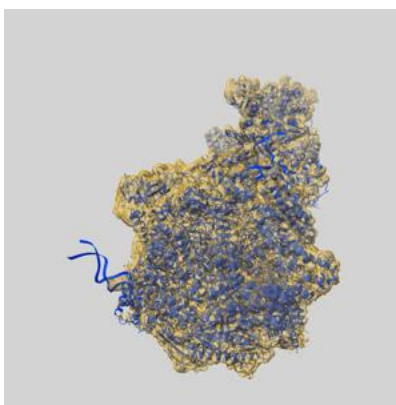
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-23904 and PDB model 7ML0. Per-residue inclusion information can be found in section 3 on page 11.

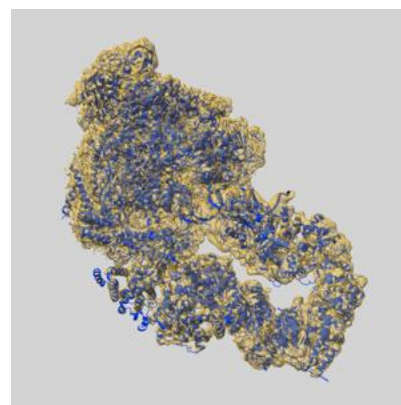
9.1 Map-model overlay [i](#)



X



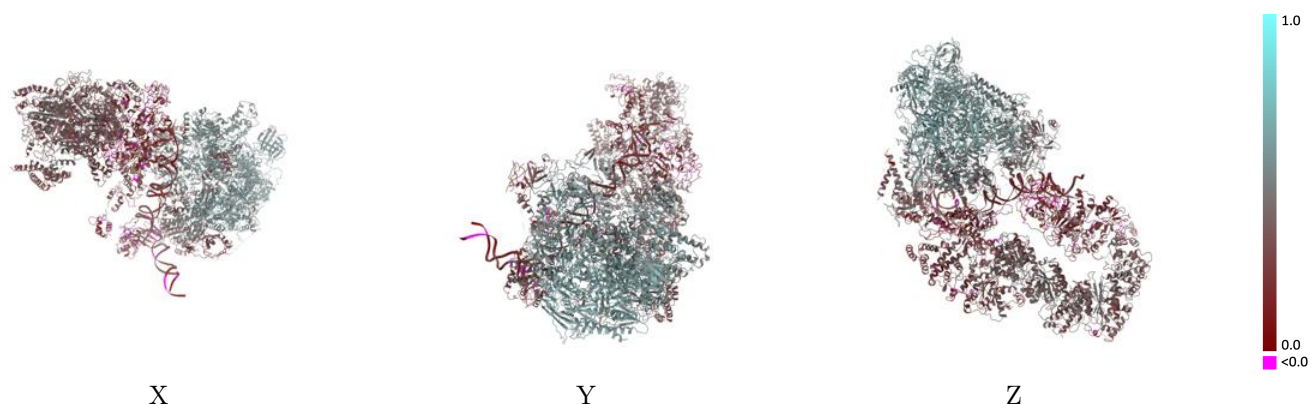
Y



Z

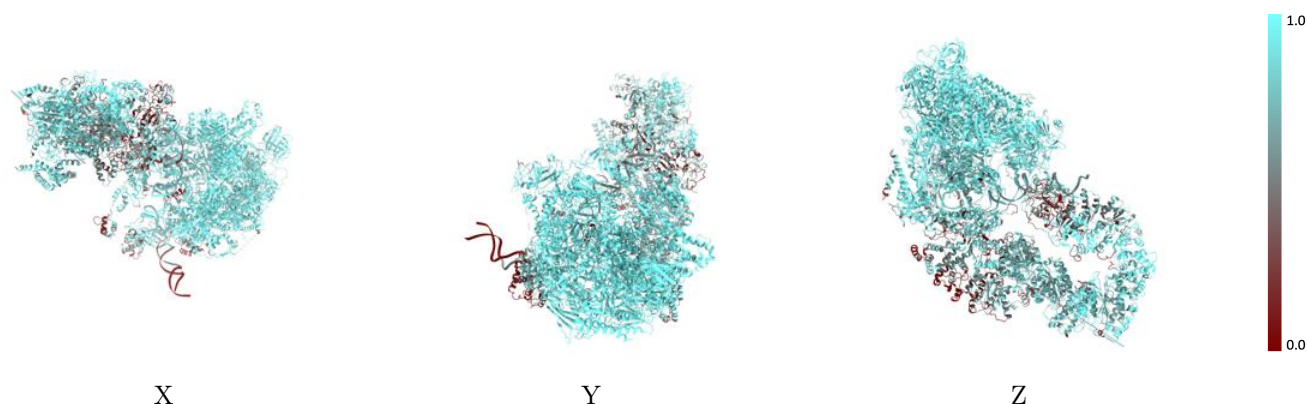
The images above show the 3D surface view of the map at the recommended contour level 0.0164 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



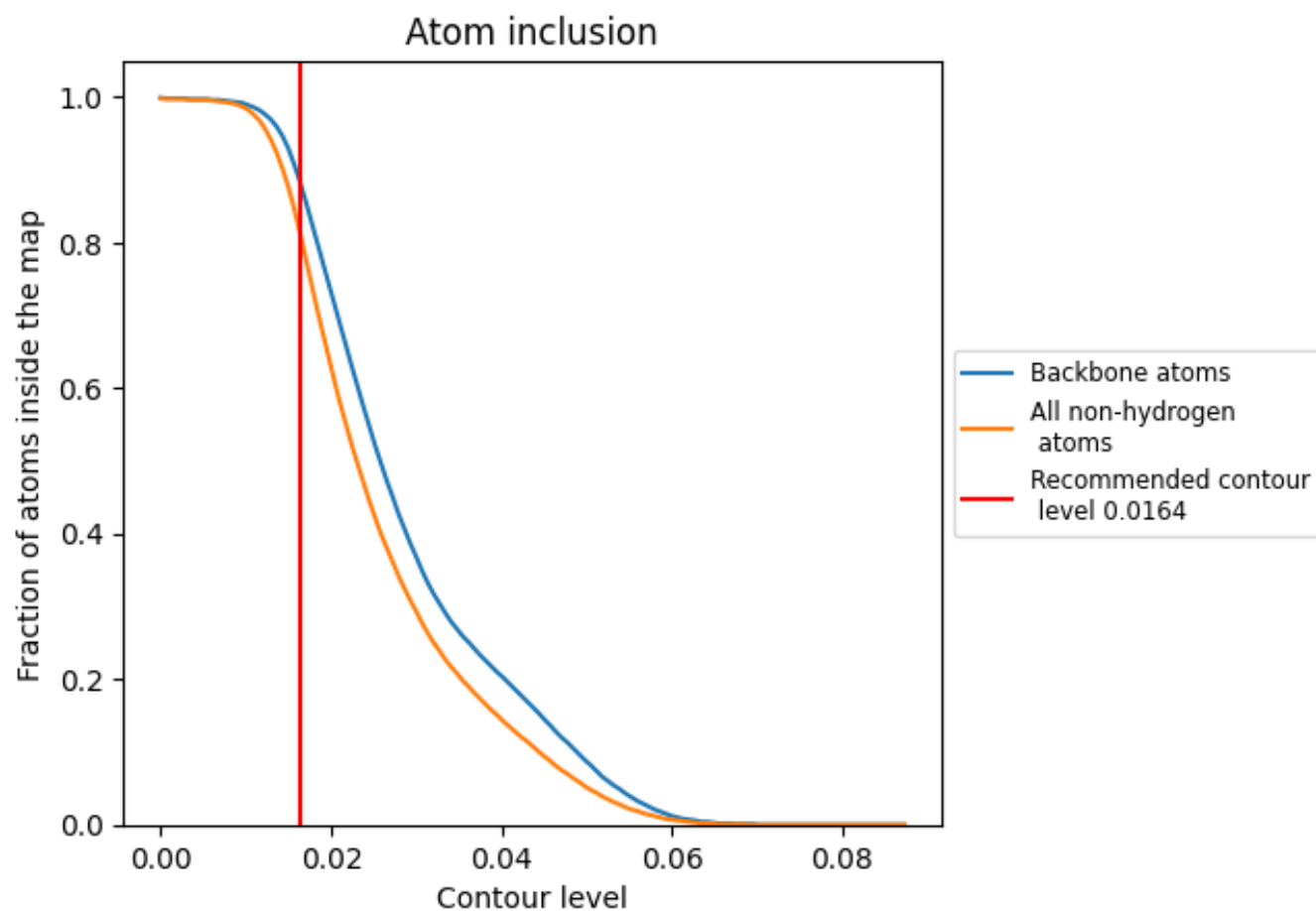
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0164).

9.4 Atom inclusion [i](#)



At the recommended contour level, 88% of all backbone atoms, 81% 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 (0.0164) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8110	 0.4170
0	 0.5870	 0.3220
1	 0.6460	 0.3280
2	 0.7520	 0.3140
3	 0.4590	 0.2560
4	 0.7880	 0.3870
5	 0.6420	 0.2530
6	 0.8190	 0.4040
7	 0.5220	 0.2200
A	 0.9760	 0.5500
B	 0.9760	 0.5650
C	 0.9800	 0.5840
D	 0.8240	 0.3720
E	 0.9650	 0.5270
F	 0.9880	 0.5850
G	 0.9270	 0.4510
H	 0.9570	 0.5370
I	 0.9290	 0.4960
J	 0.9880	 0.5880
K	 0.9270	 0.5450
L	 0.9830	 0.5410
M	 0.6340	 0.3970
N	 0.6520	 0.1870
O	 0.5260	 0.1790
Q	 0.9140	 0.3960
R	 0.8380	 0.3200
T	 0.6510	 0.1850
W	 0.8850	 0.2360
X	 0.7130	 0.2050

