



wwPDB EM Validation Summary Report ⓘ

Oct 5, 2022 – 12:35 PM JST

PDB ID : 7XT7
EMDB ID : EMD-33441
Title : RNA polymerase II elongation complex transcribing a nucleosome (EC49B)
Authors : Ehara, H.; Kujirai, T.; Shirouzu, M.; Kurumizaka, H.; Sekine, S.
Deposited on : 2022-05-16
Resolution : 4.20 Å (reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

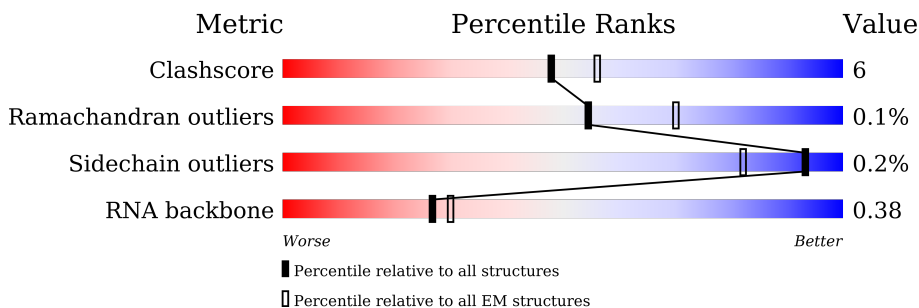
EMDB validation analysis : 0.0.1.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.2

1 Overall quality at a glance

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

The reported resolution of this entry is 4.20 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 ≥ 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	1743	
2	B	1227	
3	C	304	
4	D	186	
5	E	214	
6	F	155	
7	G	171	

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Mol	Chain	Length	Quality of chain
8	H	145	79% 12% 8%
9	I	115	81% 16%
10	J	72	82% 11% 7%
11	K	118	78% 18%
12	L	72	56% 7% 38%
13	M	113	6% 47% 10% 43%
14	N	198	30% 20% 30% 8% 42%
15	P	19	5% 21% 58% 21%
16	T	198	34% 20% 36% 8% 36%
17	V	108	6% 73% 25%
18	W	911	15% 49% 10% 41%
19	m	1503	45% 79% 21%
20	n	417	33% 67%
21	q	1084	30% 86% 14%
22	r	544	25% 49% 51%
23	u	459	18% 45% 55%
24	v	396	47% 88% 12%
25	x	395	8% 52% 48%
26	a	139	41% 66% 34%
26	e	139	42% 69% 30%
27	b	106	32% 76% 24%
27	f	106	31% 73% 26%
28	c	133	29% 72% 28%
28	g	133	46% 74% 26%
29	d	129	32% 71% 29%

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Mol	Chain	Length	Quality of chain
29	h	129	<p>44% 72% 28%</p>
30	j	1008	<p>46% 46% 53%</p>
31	k	531	<p>79% 79% 19%</p>

2 Entry composition [i](#)

There are 33 unique types of molecules in this entry. The entry contains 82079 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	1404	11064	6975	1930	2089	70	0	0

- 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	1164	9284	5848	1639	1739	58	0	0

- Molecule 3 is a protein called RNA polymerase II third largest subunit B44, part of central core.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	263	2098	1319	354	413	12	0	0

- Molecule 4 is a protein called RNA polymerase II subunit B32.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	174	1349	828	244	274	3	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	213	1741	1094	312	325	10	0	0

- Molecule 6 is a protein called RNA polymerase subunit ABC23, common to RNA polymerases I, II, and III.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	84	Total	C	N	O	S	0	0
			677	429	114	131	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	171	Total	C	N	O	S	0	0
			1325	858	214	248	5		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	133	Total	C	N	O	S	0	0
			1053	671	169	209	4		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	111	Total	C	N	O	S	0	0
			917	565	161	180	11		

- Molecule 10 is a protein called RNA polymerase subunit ABC10-beta, common to RNA polymerases I, II, and III.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	67	Total	C	N	O	S	0	0
			554	355	97	96	6		

- Molecule 11 is a protein called RNA polymerase II subunit B12.5.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	113	Total	C	N	O	S	0	0
			932	599	160	169	4		

- Molecule 12 is a protein called RNA polymerase subunit ABC10-alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	45	Total	C	N	O	S	0	0
			359	221	72	61	5		

- Molecule 13 is a protein called Transcription elongation factor 1 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	M	64	505	318	82	99	6	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
M	-2	GLY	-	expression tag	UNP C4QZ45
M	-1	PRO	-	expression tag	UNP C4QZ45
M	0	GLY	-	expression tag	UNP C4QZ45

- Molecule 14 is a DNA chain called DNA (198-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
14	N	115	2377	1124	445	693	115	0	0

- Molecule 15 is a RNA chain called RNA (5'-R(P*GP*AP*CP*CP*CP*GP*GP*GP*UP*G P*UP*CP*UP*UP*CP*CP*CP*CP*A)-3').

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
15	P	19	399	178	66	136	19	0	0

- Molecule 16 is a DNA chain called DNA (198-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
16	T	126	2570	1219	476	749	126	0	0

- Molecule 17 is a protein called Transcription elongation factor SPT4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	V	106	824	512	150	155	7	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
V	7	MET	-	initiating methionine	UNP C4R0E6

- Molecule 18 is a protein called Transcription elongation factor SPT5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	W	533	4232	2666	752	812	2	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
W	-2	GLY	-	expression tag	UNP C4R370
W	-1	PRO	-	expression tag	UNP C4R370
W	0	GLY	-	expression tag	UNP C4R370

- Molecule 19 is a protein called Transcription elongation factor Spt6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	m	1187	9730	6162	1663	1877	28	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
m	-2	GLY	-	expression tag	UNP C4R7H2
m	-1	PRO	-	expression tag	UNP C4R7H2
m	0	GLY	-	expression tag	UNP C4R7H2

- Molecule 20 is a protein called Protein that interacts with Spt6p and copurifies with Spt5p and RNA polymerase II.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	n	139	1115	716	193	202	4	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
n	-2	GLY	-	expression tag	UNP C4R7L8
n	-1	PRO	-	expression tag	UNP C4R7L8
n	0	GLY	-	expression tag	UNP C4R7L8

- Molecule 21 is a protein called Component of the Paf1p complex.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	q	930	7552	4805	1283	1439	25	0	0

There are 40 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
q	-39	MET	-	initiating methionine	UNP C4R6B2
q	-38	LYS	-	expression tag	UNP C4R6B2
q	-37	ASP	-	expression tag	UNP C4R6B2
q	-36	HIS	-	expression tag	UNP C4R6B2
q	-35	LEU	-	expression tag	UNP C4R6B2
q	-34	ILE	-	expression tag	UNP C4R6B2
q	-33	HIS	-	expression tag	UNP C4R6B2
q	-32	ASN	-	expression tag	UNP C4R6B2
q	-31	HIS	-	expression tag	UNP C4R6B2
q	-30	HIS	-	expression tag	UNP C4R6B2
q	-29	LYS	-	expression tag	UNP C4R6B2
q	-28	HIS	-	expression tag	UNP C4R6B2
q	-27	GLU	-	expression tag	UNP C4R6B2
q	-26	HIS	-	expression tag	UNP C4R6B2
q	-25	ALA	-	expression tag	UNP C4R6B2
q	-24	HIS	-	expression tag	UNP C4R6B2
q	-23	ALA	-	expression tag	UNP C4R6B2
q	-22	GLU	-	expression tag	UNP C4R6B2
q	-21	HIS	-	expression tag	UNP C4R6B2
q	-20	ASP	-	expression tag	UNP C4R6B2
q	-19	TYR	-	expression tag	UNP C4R6B2
q	-18	LYS	-	expression tag	UNP C4R6B2
q	-17	ASP	-	expression tag	UNP C4R6B2
q	-16	ASP	-	expression tag	UNP C4R6B2
q	-15	ASP	-	expression tag	UNP C4R6B2
q	-14	ASP	-	expression tag	UNP C4R6B2
q	-13	LYS	-	expression tag	UNP C4R6B2
q	-12	GLU	-	expression tag	UNP C4R6B2
q	-11	HIS	-	expression tag	UNP C4R6B2
q	-10	LEU	-	expression tag	UNP C4R6B2
q	-9	TYR	-	expression tag	UNP C4R6B2
q	-8	PHE	-	expression tag	UNP C4R6B2
q	-7	GLN	-	expression tag	UNP C4R6B2
q	-6	GLY	-	expression tag	UNP C4R6B2
q	-5	SER	-	expression tag	UNP C4R6B2
q	-4	SER	-	expression tag	UNP C4R6B2
q	-3	GLY	-	expression tag	UNP C4R6B2
q	-2	SER	-	expression tag	UNP C4R6B2
q	-1	SER	-	expression tag	UNP C4R6B2
q	0	GLY	-	expression tag	UNP C4R6B2

- Molecule 22 is a protein called RNAPII-associated chromatin remodeling Paf1 complex sub-

unit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	r	266	2139	1342	374	412	11	0	0

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
r	-29	MET	-	initiating methionine	UNP F2QQ42
r	-28	LYS	-	expression tag	UNP F2QQ42
r	-27	ASP	-	expression tag	UNP F2QQ42
r	-26	HIS	-	expression tag	UNP F2QQ42
r	-25	LEU	-	expression tag	UNP F2QQ42
r	-24	ILE	-	expression tag	UNP F2QQ42
r	-23	HIS	-	expression tag	UNP F2QQ42
r	-22	ASN	-	expression tag	UNP F2QQ42
r	-21	HIS	-	expression tag	UNP F2QQ42
r	-20	HIS	-	expression tag	UNP F2QQ42
r	-19	LYS	-	expression tag	UNP F2QQ42
r	-18	HIS	-	expression tag	UNP F2QQ42
r	-17	GLU	-	expression tag	UNP F2QQ42
r	-16	HIS	-	expression tag	UNP F2QQ42
r	-15	ALA	-	expression tag	UNP F2QQ42
r	-14	HIS	-	expression tag	UNP F2QQ42
r	-13	ALA	-	expression tag	UNP F2QQ42
r	-12	GLU	-	expression tag	UNP F2QQ42
r	-11	HIS	-	expression tag	UNP F2QQ42
r	-10	LEU	-	expression tag	UNP F2QQ42
r	-9	TYR	-	expression tag	UNP F2QQ42
r	-8	PHE	-	expression tag	UNP F2QQ42
r	-7	GLN	-	expression tag	UNP F2QQ42
r	-6	GLY	-	expression tag	UNP F2QQ42
r	-5	SER	-	expression tag	UNP F2QQ42
r	-4	SER	-	expression tag	UNP F2QQ42
r	-3	GLY	-	expression tag	UNP F2QQ42
r	-2	SER	-	expression tag	UNP F2QQ42
r	-1	SER	-	expression tag	UNP F2QQ42
r	0	GLY	-	expression tag	UNP F2QQ42

- Molecule 23 is a protein called Leo1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	u	208	1707	1063	304	337	3	0	0

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
u	-29	MET	-	initiating methionine	UNP C4R3K1
u	-28	LYS	-	expression tag	UNP C4R3K1
u	-27	ASP	-	expression tag	UNP C4R3K1
u	-26	HIS	-	expression tag	UNP C4R3K1
u	-25	LEU	-	expression tag	UNP C4R3K1
u	-24	ILE	-	expression tag	UNP C4R3K1
u	-23	HIS	-	expression tag	UNP C4R3K1
u	-22	ASN	-	expression tag	UNP C4R3K1
u	-21	HIS	-	expression tag	UNP C4R3K1
u	-20	HIS	-	expression tag	UNP C4R3K1
u	-19	LYS	-	expression tag	UNP C4R3K1
u	-18	HIS	-	expression tag	UNP C4R3K1
u	-17	GLU	-	expression tag	UNP C4R3K1
u	-16	HIS	-	expression tag	UNP C4R3K1
u	-15	ALA	-	expression tag	UNP C4R3K1
u	-14	HIS	-	expression tag	UNP C4R3K1
u	-13	ALA	-	expression tag	UNP C4R3K1
u	-12	GLU	-	expression tag	UNP C4R3K1
u	-11	HIS	-	expression tag	UNP C4R3K1
u	-10	LEU	-	expression tag	UNP C4R3K1
u	-9	TYR	-	expression tag	UNP C4R3K1
u	-8	PHE	-	expression tag	UNP C4R3K1
u	-7	GLN	-	expression tag	UNP C4R3K1
u	-6	GLY	-	expression tag	UNP C4R3K1
u	-5	SER	-	expression tag	UNP C4R3K1
u	-4	SER	-	expression tag	UNP C4R3K1
u	-3	GLY	-	expression tag	UNP C4R3K1
u	-2	SER	-	expression tag	UNP C4R3K1
u	-1	SER	-	expression tag	UNP C4R3K1
u	0	GLY	-	expression tag	UNP C4R3K1

- Molecule 24 is a protein called RNAP II-associated protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	v	349	2878	1835	510	528	5	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
v	-2	GLY	-	expression tag	UNP C4R997

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Chain	Residue	Modelled	Actual	Comment	Reference
v	-1	SER	-	expression tag	UNP C4R997
v	0	ALA	-	expression tag	UNP C4R997

- Molecule 25 is a protein called Constituent of Paf1 complex with RNA polymerase II, Paf1p, Hpr1p, Ctr9, Leo1, Rtf1 and Ccr4p.

Mol	Chain	Residues	Atoms				AltConf	Trace	
			Total	C	N	O			S
25	x	205	1682	1086	287	307	2	0	0

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
x	-29	MET	-	initiating methionine	UNP C4R1E6
x	-28	LYS	-	expression tag	UNP C4R1E6
x	-27	ASP	-	expression tag	UNP C4R1E6
x	-26	HIS	-	expression tag	UNP C4R1E6
x	-25	LEU	-	expression tag	UNP C4R1E6
x	-24	ILE	-	expression tag	UNP C4R1E6
x	-23	HIS	-	expression tag	UNP C4R1E6
x	-22	ASN	-	expression tag	UNP C4R1E6
x	-21	HIS	-	expression tag	UNP C4R1E6
x	-20	HIS	-	expression tag	UNP C4R1E6
x	-19	LYS	-	expression tag	UNP C4R1E6
x	-18	HIS	-	expression tag	UNP C4R1E6
x	-17	GLU	-	expression tag	UNP C4R1E6
x	-16	HIS	-	expression tag	UNP C4R1E6
x	-15	ALA	-	expression tag	UNP C4R1E6
x	-14	HIS	-	expression tag	UNP C4R1E6
x	-13	ALA	-	expression tag	UNP C4R1E6
x	-12	GLU	-	expression tag	UNP C4R1E6
x	-11	HIS	-	expression tag	UNP C4R1E6
x	-10	LEU	-	expression tag	UNP C4R1E6
x	-9	TYR	-	expression tag	UNP C4R1E6
x	-8	PHE	-	expression tag	UNP C4R1E6
x	-7	GLN	-	expression tag	UNP C4R1E6
x	-6	GLY	-	expression tag	UNP C4R1E6
x	-5	SER	-	expression tag	UNP C4R1E6
x	-4	SER	-	expression tag	UNP C4R1E6
x	-3	GLY	-	expression tag	UNP C4R1E6
x	-2	SER	-	expression tag	UNP C4R1E6
x	-1	SER	-	expression tag	UNP C4R1E6

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Chain	Residue	Modelled	Actual	Comment	Reference
x	0	GLY	-	expression tag	UNP C4R1E6

- Molecule 26 is a protein called Histone H3.3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	a	92	746	471	142	131	2	0	0
26	e	97	795	501	155	137	2	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	-3	GLY	-	expression tag	UNP P84243
a	-2	SER	-	expression tag	UNP P84243
a	-1	HIS	-	expression tag	UNP P84243
e	-3	GLY	-	expression tag	UNP P84243
e	-2	SER	-	expression tag	UNP P84243
e	-1	HIS	-	expression tag	UNP P84243

- Molecule 27 is a protein called Histone H4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	b	81	646	407	126	112	1	0	0
27	f	78	619	391	120	107	1	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
b	-3	GLY	-	expression tag	UNP P62805
b	-2	SER	-	expression tag	UNP P62805
b	-1	HIS	-	expression tag	UNP P62805
f	-3	GLY	-	expression tag	UNP P62805
f	-2	SER	-	expression tag	UNP P62805
f	-1	HIS	-	expression tag	UNP P62805

- Molecule 28 is a protein called Histone H2A type 1-B/E.

Mol	Chain	Residues	Atoms				AltConf	Trace
28	c	96	Total	C	N	O	0	0
			743	466	146	131		
28	g	98	Total	C	N	O	0	0
			757	475	149	133		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
c	-3	GLY	-	expression tag	UNP P04908
c	-2	SER	-	expression tag	UNP P04908
c	-1	HIS	-	expression tag	UNP P04908
g	-3	GLY	-	expression tag	UNP P04908
g	-2	SER	-	expression tag	UNP P04908
g	-1	HIS	-	expression tag	UNP P04908

- Molecule 29 is a protein called Histone H2B type 1-J.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	d	92	Total	C	N	O	S	0	0
			718	453	127	136	2		
29	h	93	Total	C	N	O	S	0	0
			725	456	130	137	2		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
d	-6	GLY	-	expression tag	UNP P06899
d	-5	SER	-	expression tag	UNP P06899
d	-4	HIS	-	expression tag	UNP P06899
h	-6	GLY	-	expression tag	UNP P06899
h	-5	SER	-	expression tag	UNP P06899
h	-4	HIS	-	expression tag	UNP P06899

- Molecule 30 is a protein called FACT complex subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	j	472	Total	C	N	O	S	0	0
			3754	2382	658	701	13		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
j	-2	GLY	-	expression tag	UNP F2QPX0
j	-1	PRO	-	expression tag	UNP F2QPX0
j	0	GLY	-	expression tag	UNP F2QPX0

- Molecule 31 is a protein called FACT complex subunit POB3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	k	429	3502	2215	613	664	10	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
k	-2	GLY	-	expression tag	UNP F2QNN8
k	-1	PRO	-	expression tag	UNP F2QNN8
k	0	GLY	-	expression tag	UNP F2QNN8

- Molecule 32 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
32	A	2	2	2	0
32	B	1	1	1	0
32	C	1	1	1	0
32	I	2	2	2	0
32	J	1	1	1	0
32	L	1	1	1	0
32	M	1	1	1	0
32	V	1	1	1	0

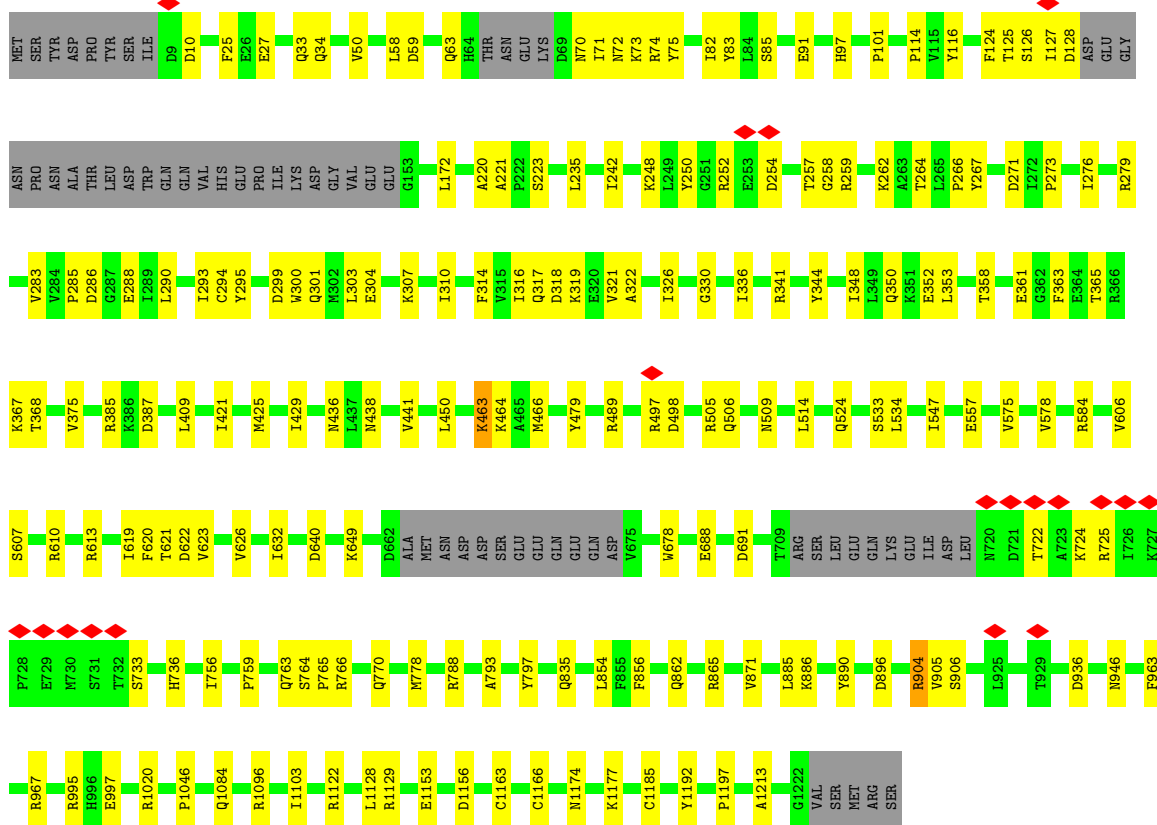
- Molecule 33 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

SER PRO ALA SER ASP PRO PRO LEU TYR SER SER PRO SER SER PRO ASN ASN GLY GLU LYS LYS LYS GLY GLU

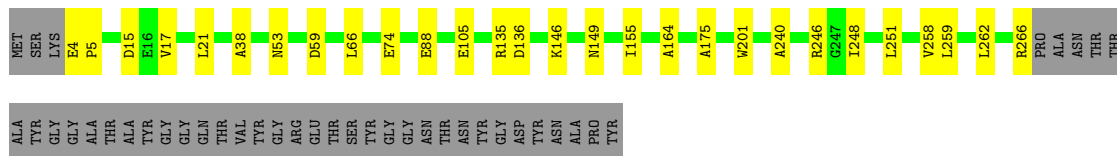
● Molecule 2: DNA-directed RNA polymerase subunit beta

Chain B:



● Molecule 3: RNA polymerase II third largest subunit B44, part of central core

Chain C:



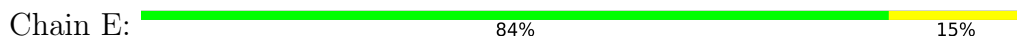
● Molecule 4: RNA polymerase II subunit B32

Chain D:





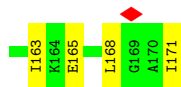
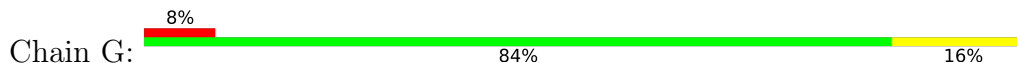
- Molecule 5: DNA-directed RNA polymerases I, II, and III subunit RPABC1



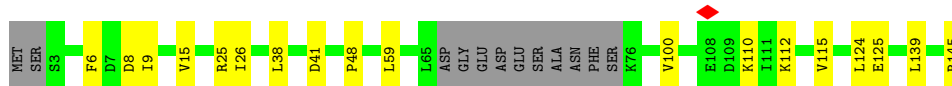
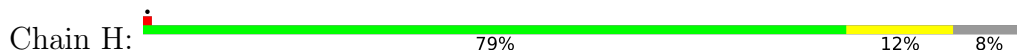
- Molecule 6: RNA polymerase subunit ABC23, common to RNA polymerases I, II, and III



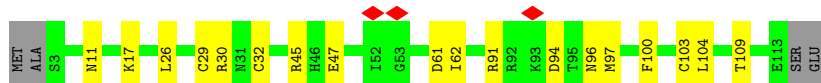
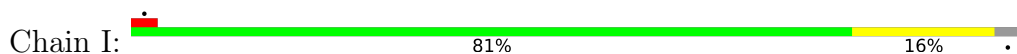
- Molecule 7: RNA polymerase II subunit



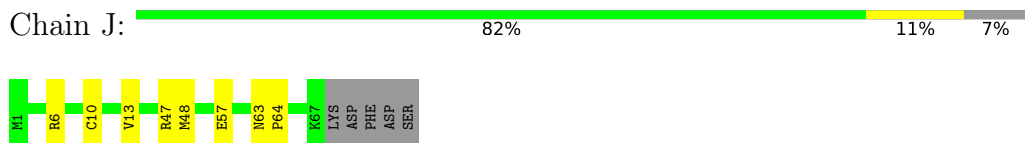
- Molecule 8: DNA-directed RNA polymerases I, II, and III subunit RPABC3



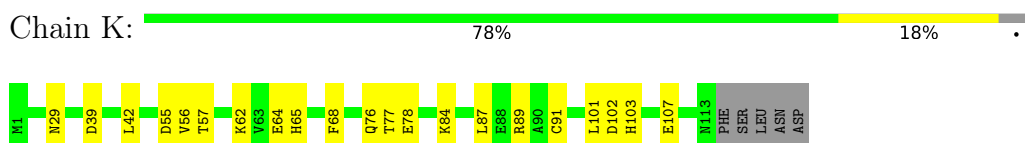
- Molecule 9: DNA-directed RNA polymerase subunit



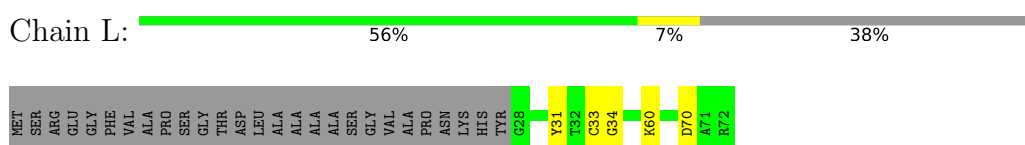
- Molecule 10: RNA polymerase subunit ABC10-beta, common to RNA polymerases I, II, and III



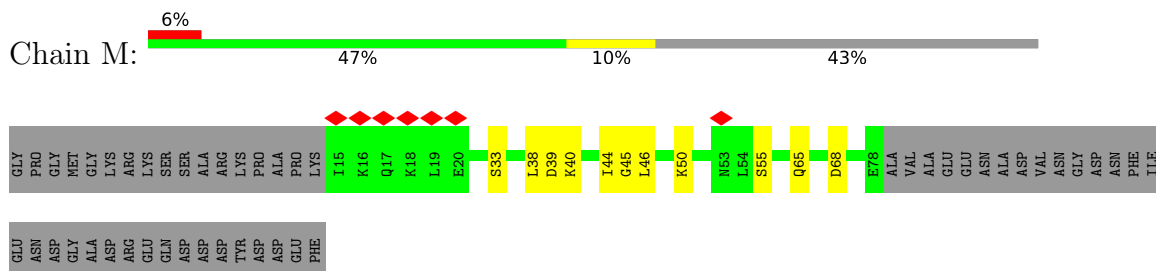
- Molecule 11: RNA polymerase II subunit B12.5



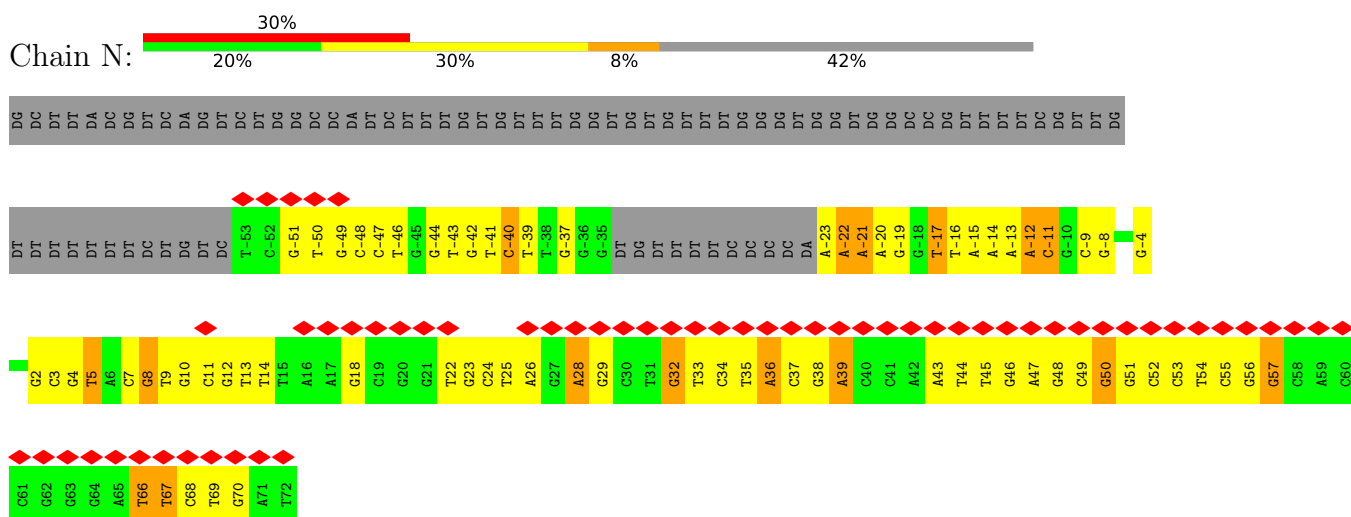
- Molecule 12: RNA polymerase subunit ABC10-alpha



- Molecule 13: Transcription elongation factor 1 homolog



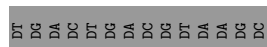
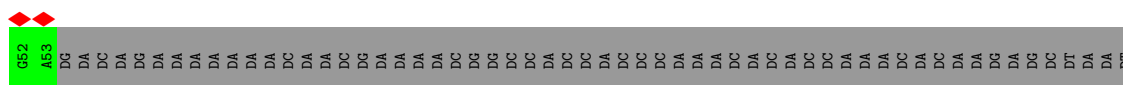
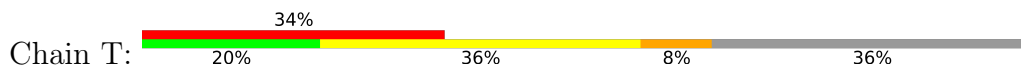
- Molecule 14: DNA (198-MER)



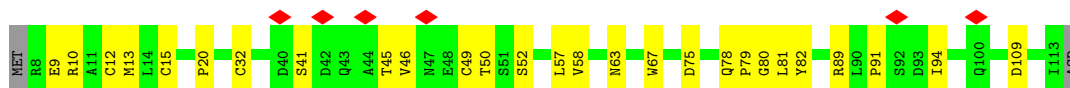
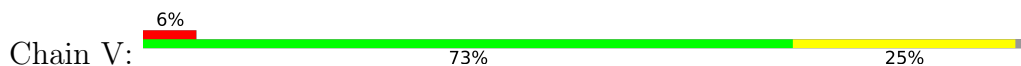
- Molecule 15: RNA (5'-R(P*GP*AP*CP*CP*CP*GP*GP*GP*UP*GP*UP*CP*UP*UP*CP*CP*CP*CP*A)-3')



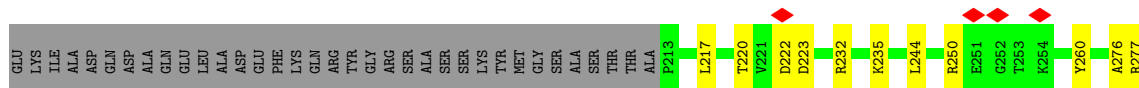
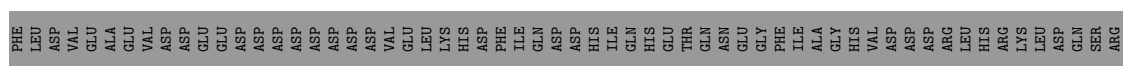
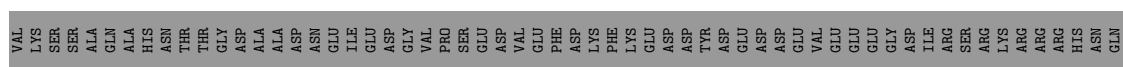
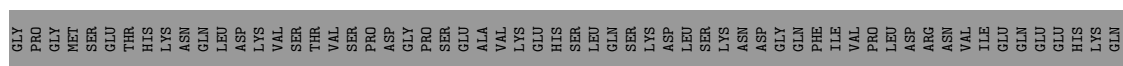
- Molecule 16: DNA (198-MER)



- Molecule 17: Transcription elongation factor SPT4



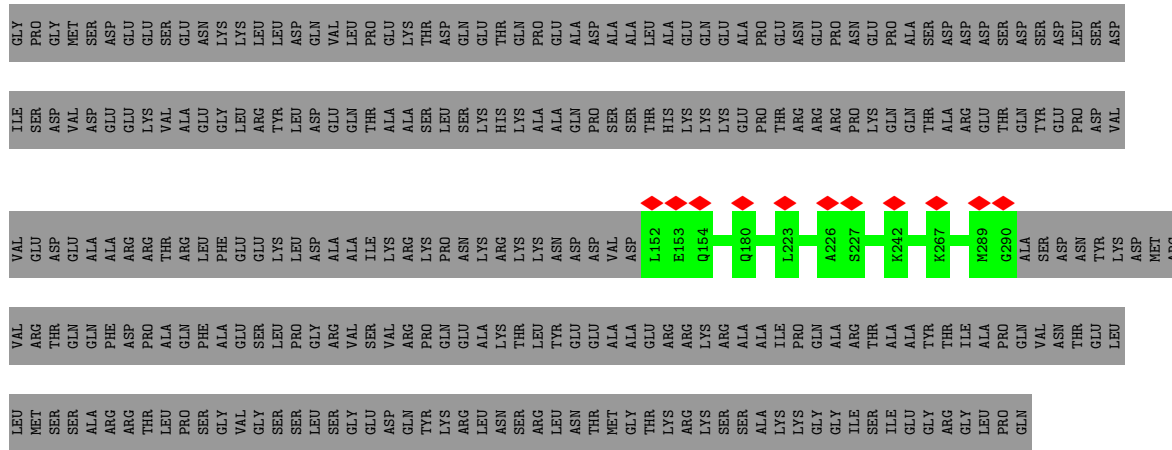
- Molecule 18: Transcription elongation factor SPT5




S435	S436	I437	Y438	K439	Q440	L441	D442	L443	D444	V445	V446	D447	P448	T449	Y450	E451	E452	F453	F454	G455	L460	Q464	D467	D468	Y469	L470	T471	S476	Q477	V478	K479	M480	L481	T482	A483	V484	ALA	GLU	LEU	SER	SER	ILE	GLU	GLY	ASN	SER	GLY	GLU	GLY	ASP	GLU	GLU	GLN	THR	THR	LYS			
SER	SER	PHE	ALA	GLU	VAL	LYS	M511	K512	R513	K514	Y515	S516	K517	Y518	A519	I520	Y521	D522	R523	I524	R525	Q526	D527	A528	I529	Y530	P531	V532	V533	Q534	S535	I536	A537	N538	I539	Q540	Q541	R542	R543	E544	N545	L546	Q547	Q548	S549	K550	R551	L552	H553	Q554	Q555	E556	D557	F558	I559	E560	S561	P562	
D564	M565	I566	A567	D568	I569	M570	S571	L572	E573	K574	D575	K576	T577	T578	F579	I580	D581	S582	E583	K584	A585	Y586	Q587	A588	V589	K590	Q591	S598	Y599	E600	P601	I603	R604	K605	T606	I607	R608	F611	Q612	S613	F614	G615	E620	E623	K625	L627	Q628	E632	S633	P634	Y635	F636							
D637	F638	K639	Y640	A641	S647	A648	L649	T650	Y656	Q661	A662	E663	N664	D665	G666	N669	I670	K671	V672	E673	Q687	A588	V589	K590	Q591	S598	Y599	E600	P601	I603	R604	K605	T606	I607	R608	F611	Q612	S613	F614	G615	E620	E623	K625	L627	Q628	E632	S633	P634	Y635	F636									
Q710	S711	L712	D713	K714	L715	I716	P717	L718	V719	Q720	L721	M722	V723	K724	E725	S726	I727	R728	R729	E732	L735	F743	I747	A758	K759	G760	T761	R775	D786	S787	G788	L788	K789	S791	S792	K795	F796	D797	R803	S808	R811	Y812	S815	N816	N817	E851													
Y853	D853	N854	GLU	GLY	TYR	ASP	ARG	GLU	GLU	ASP	GLY	ARG	S866	D867	K868	H869	T880	K889	S890	S891	A892	E893	F894	P895	N896	R897	A901	L919	A920	L921	D922	N935	L936	L937	P938	R939	E940	D944	D960	I961	N962	E963	A964	V965	R966	A967	P968	H970	A971	L972									
A973	Y976	G979	L980	G981	P982	R983	K984	L985	A986	G987	L988	I989	Q990	S991	I992	Q993	R994	I995	G996	S997	N998	L999	V1000	N1001	T1007	E1008	Q1009	L1010	T1011	V1015	M1019	V1023	Y1024	I1025	V1026	F1027	D1028	P1029	D1030	V1031	E1032	R1033	M1034	P1035	Q1036	G1037	E1038	M1039	D1040	L1041	D1051								
A1063	L1063	D1064	I1065	E1066	D1067	I1068	D1069	D1070	D1071	D1072	E1073	S1074	A1075	M1076	R1077	N1078	Y1081	E1082	M1083	V1084	F1085	P1086	R1087	S1088	P1089	P1090	K1091	D1092	E1093	D1094	D1095	F1098	K1099	L1100	D1101	D1107	E1111	R1114	K1115	H1116	Q1117	L1118	L1124	L1131	Q1132	R1136	E1137	I1138	R1139	D1160									
Q1195	P1200	N1201	D1202	R1203	R1204	E1208	R1217	Q1237	N1241	Q1242	V1243	A1244	G1245	L1246	N1247	V1248	N1249	R1250	E1258	N1261	R1262	D1263	R1264	Q1265	E1266	I1268	D1269	K1270	R1271	R1272	E1273	E1274	S1275	R1276	E1277	S1278	R1279	V1280	I1281	K1282	H1283	P1284	F1285	F1286	H1287	N1288	M1289	K1290	S1291	K1292									
E1293	A1294	E1295	D1296	Y1297	L1298	A1299	A1300	L1301	P1302	V1303	G1304	D1305	V1306	V1307	I1308	A1309	P1310	S1311	S1312	K1313	G1314	S1315	M1316	H1317	I1318	T1319	I1320	S1321	W1322	K1323	V1324	A1325	P1326	Q1327	L1328	Y1329	H1331	I1332	D1333	V1334	L1335	E1336	E1337	M1338	K1339	D1340	D1341	A1342	M1343	A1344	I1345	G1346	H1347	V1348	L1349	L1350	V1351	G1352	
K1353	Y1354	R1355	Y1356	H1357	D1358	L1359	D1360	E1361	L1362	L1363	V1364	E1365	Y1366	V1367	M1368	M1369	V1370	A1371	M1372	K1373	V1374	E1375	L1376	M1377	V1378	S1379	H1380	D1381	K1382	F1383	M1384	S1385	D1386	S1387	L1388	D1389	Y1390	V1391	K1392	E1393	M1394	L1395	E1396	R1397	Y1398	S1399	K1400	A1401	M1402	G1403	N1404	R1405	S1406	H1407	Y1408	I1409	F1410	T1411	F1412
N1413	R1414	K1415	A1416	P1417	G1418	W1419	F1420	F1421	L1422	L1423	F1424	K1425	L1426	N1427	P1428	T1429	S1430	E1431	I4432	K1433	I4434	W1435	M1436	V1437	K1438	A1439	L1440	P1441	D1442	G1443	Y1444	L1445	L1446	A1447	M1448	M1449	Y1450	Y1451	D1452	D1453	T1454	M1455	S1456	L1457	C1458	M1459	G1460	F1461	T1462	L1463	L1464	M1465	S1466	S1467	R1468	R1469	GLN	ILE	LYS
GLN	ARG	SER	ASN	ARG	ALA	GLY	GLY	TYR	VAL	ASP	ASN	ASN	HIS	ALA	ALA	ALA	PRO	ARG	TYR																																								

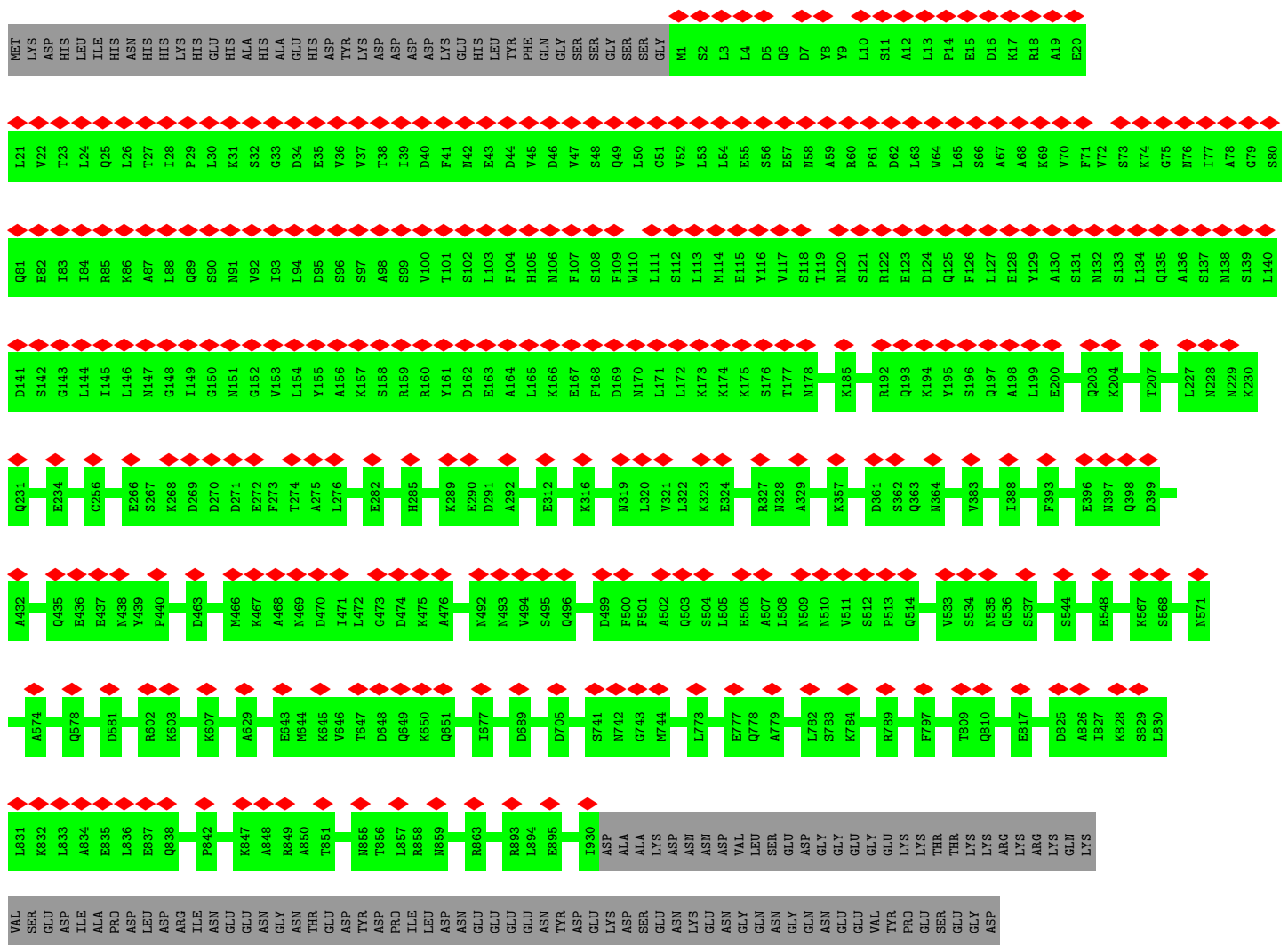
- Molecule 20: Protein that interacts with Spt6p and copurifies with Spt5p and RNA polymerase II

Chain n:  33% 67%



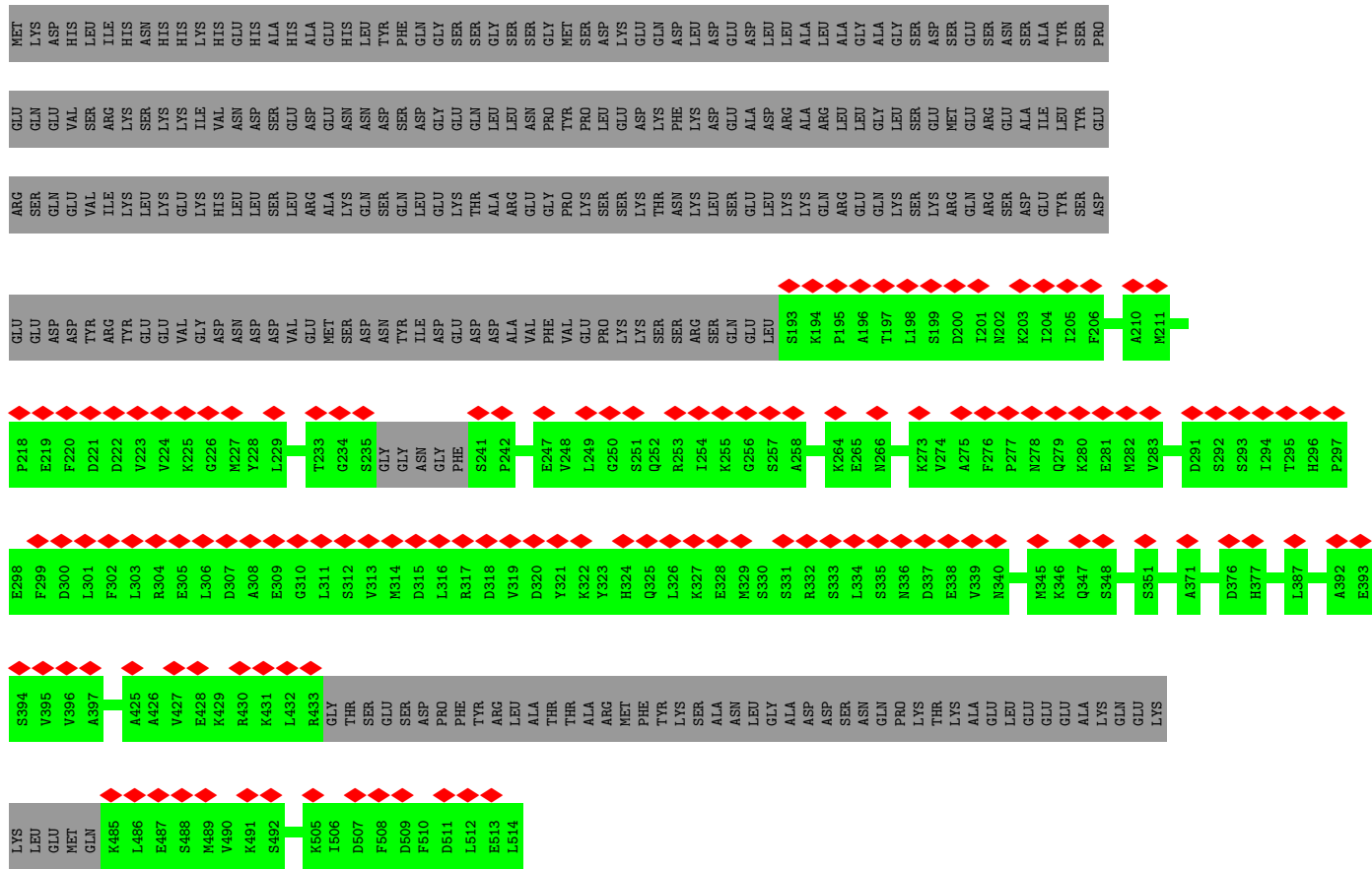
• Molecule 21: Component of the Paf1p complex

Chain q:  30% 86% 14%

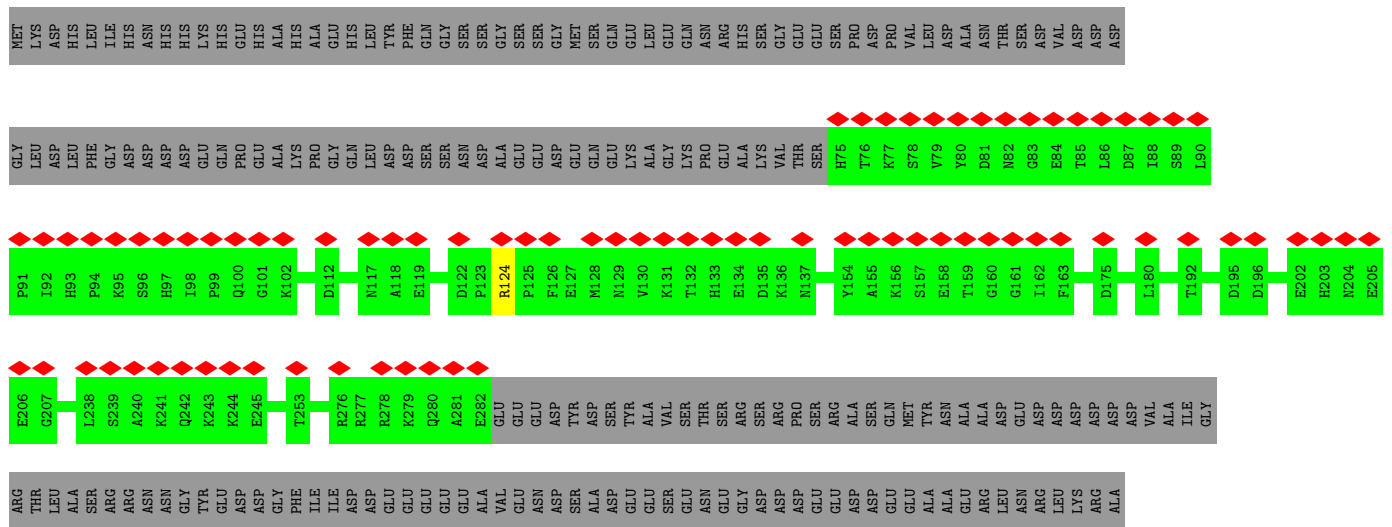


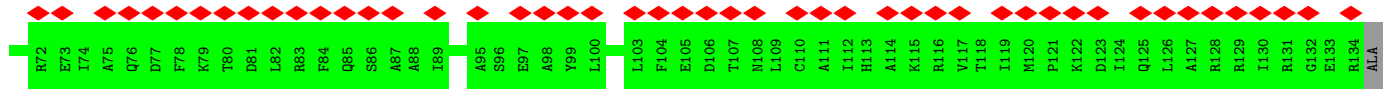
ASP
GLU
ASP
ASP
VAL
THR
THR
ASN
THR
THR
LYS
GLY
LEU
ILE
VAL
ASP
GLU
GLU
ASP
SER

• Molecule 22: RNAPII-associated chromatin remodeling Paf1 complex subunit

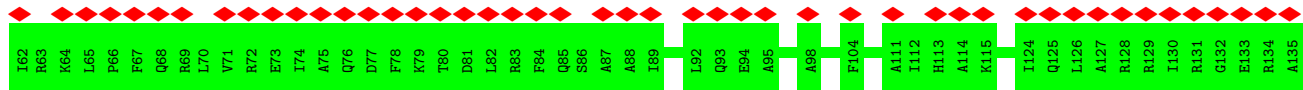
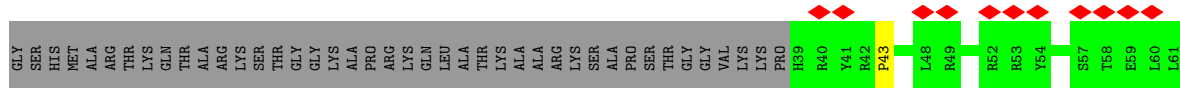
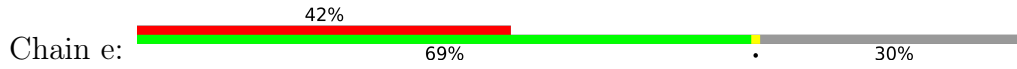


• Molecule 23: Leo1

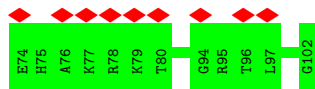
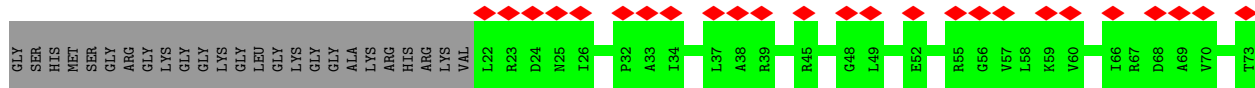
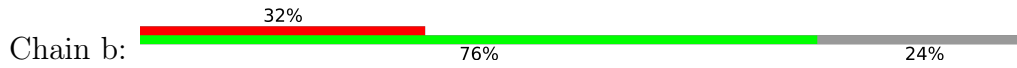




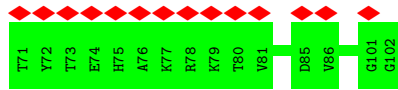
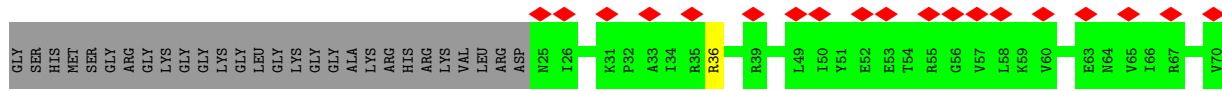
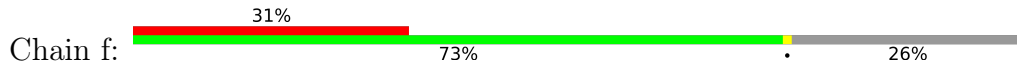
• Molecule 26: Histone H3.3



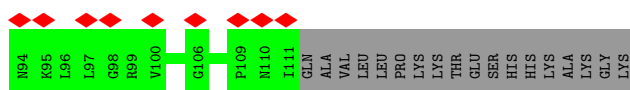
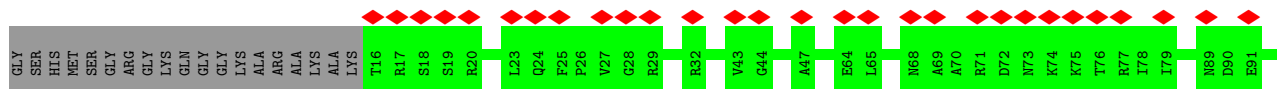
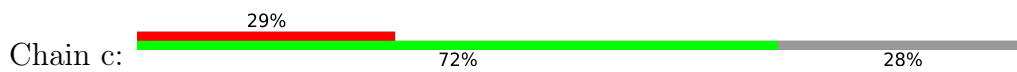
• Molecule 27: Histone H4



• Molecule 27: Histone H4



• Molecule 28: Histone H2A type 1-B/E



• Molecule 28: Histone H2A type 1-B/E

ALA	Q420	H360	F300	S240	V178	T118
GLY	F421	M361	D301	M241	P179	R119
GLU	S422	Q362	R302	Y242	P180	A120
ASP	G423	P363	N303	A243	G181	E121
GLU	G424	G364	E304	N244	ILE	L122
SER	S425	V365	E305	N245	ASP	V123
VAL	H426	N366	L306	L246	LYS	F124
ASP	T427	C367	E307	R247	GLU	N125
ASP	F428	S368	V308	L248	ASP	V126
PHE	A429	L369	E309	R249	SER	M127
ASN	M430	K370	L310	G250	THR	N128
ALA	I431	A371	N311	Q251	GLY	R129
GLY	I432	S372	L312	S252	GLN	P130
SER	M433	E373	S313	Y253	ASP	A131
ASP	K434	G374	D314	D254	THR	W132
ASP	D434	G374	E315	Y255	THR	W132
VAL	E435	Q375	E316	K256	GLU	E133
ALA	Q436	I376	E317	K256	GLU	E133
GLU	Q437	Y377	Y317	I257	ALA	I134
GLU	K437	Y377	Y317	I257	ALA	I134
TYR	P438	L378	K318	Q258	LYS	P135
ASP	I439	L379	S319	Q258	SER	Y136
SER	E440	D380	K320	N259	K201	S137
ASN	D441	K381	Y321	K260	S202	E138
ALA	D441	C382	E322	N261	Q203	I139
GLY	F442	C382	E322	V262	Q203	I139
SER	F442	L383	G323	V262	L204	S140
GLU	L443	F384	K324	L263	F205	S140
ASP	K444	F384	K324	R264	F205	M141
ASP	G445	F385	L325	I265	Y206	M142
GLU	G445	F385	L325	I265	E207	M142
ASP	Q446	A386	N326	F266	Q208	L144
SER	Q446	A386	N326	F266	Q208	L144
ASP	G447	T387	R327	S267	L209	T145
ASP	G447	T387	R327	S267	L209	T145
ALA	V448	K388	S328	L268	K210	G146
SER	R449	P389	Y329	P269	D211	R147
SER	R449	P389	Y329	P269	D211	R147
SER	V450	C390	G330	R270	K212	H148
GLY	V450	C390	G330	R270	K212	H148
GLU	K451	V391	T331	L271	A213	E149
PRO	M452	Y392	D332	D272	D214	I150
PRO	M452	Y392	D332	D272	D214	I150
GLU	M452	Y392	D332	D272	D214	I150
LYS	E453	L393	S333	D273	F215	S151
LYS	E453	L393	S333	D273	F215	S151
LYS	PRO	P394	T334	R274	D216	M152
PRO	ALA	Y395	Y335	H275	T217	E153
PRO	ALA	Y395	Y335	H275	T217	E153
PRO	GLU	S396	K336	H276	T218	L154
LYS	PHE	G397	I337	L277	S219	M155
LYS	PHE	G397	I337	L277	S219	M155
HIS	LEU	I398	L338	V278	E220	P156
HIS	LEU	I398	L338	V278	E220	P156
	GLY	I399	S339	I279	A221	K157
	ASN	I399	S339	I279	A221	K157
	ALA	S400	H340	L280	I222	T158
	ALA	S400	H340	L280	I222	T158
	LEU	V401	C341	Q281	V223	V159
	LEU	V401	C341	Q281	V223	V159
	VAL	V402	L342	V282	S224	D160
	ASP	T403	R343	P283	F225	E161
	ASP	T403	R343	P283	F225	E161
	ASP	S404	G344	P284	E226	M162
	ASP	S404	G344	P284	E226	M162
	ASP	R405	L345	P285	D227	H163
	ASP	R405	L345	P285	D227	H163
	SER	G406	T346	L286	I228	Y164
	SER	G406	T346	L286	I228	Y164
	THR	GLY	E347	R287	L229	E165
	THR	GLY	E347	R287	L229	E165
	GLY	GLN	R348	Q288	T232	T166
	GLY	GLN	R348	Q288	T232	T166
	SER	SER	R349	G289	P233	L167
	SER	SER	R349	G289	P233	L167
	ASP	THR	V350	Q290	R236	G168
	ASP	THR	V350	Q290	R236	G168
	ILE	S412	I351	T291	E170	D169
	ILE	S412	I351	T291	E170	D169
	ALA	R413	T352	R292	F237	E171
	ALA	R413	T352	R292	F237	E171
	MET	T414	P353	Y293	E238	V172
	MET	T414	P353	Y293	E238	V172
	GLY	F415	G354	P294	I239	L171
	GLY	F415	G354	P294	I239	L171
	SER	D416	S355	F295	R297	E173
	SER	D416	S355	F295	R297	E173
		I417	F356	L296	V174	V174
		I417	F356	L296	V174	V174
		E418	Q357	M298	R175	R175
		E418	Q357	M298	R175	R175
		V419	S358	Q299	L176	L176
		V419	S358	Q299	L176	L176
			Q359		Y177	Y177

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	28511	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	51	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.089	Depositor
Minimum map value	-0.032	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.014	Depositor
Map size (\AA)	356.16, 356.16, 356.16	wwPDB
Map dimensions	240, 240, 240	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.484, 1.484, 1.484	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, 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	0.32	0/11267	0.49	0/15222
2	B	0.33	0/9464	0.52	0/12763
3	C	0.33	0/2139	0.49	0/2895
4	D	0.24	0/1361	0.46	0/1837
5	E	0.31	0/1773	0.50	0/2385
6	F	0.34	0/687	0.50	0/931
7	G	0.28	0/1354	0.48	0/1837
8	H	0.34	0/1070	0.49	0/1444
9	I	0.25	0/934	0.50	0/1257
10	J	0.36	0/563	0.50	0/753
11	K	0.32	0/953	0.50	0/1291
12	L	0.33	0/365	0.56	0/484
13	M	0.25	0/513	0.41	0/693
14	N	1.10	20/2668 (0.7%)	1.22	21/4119 (0.5%)
15	P	0.52	0/443	1.14	6/687 (0.9%)
16	T	1.19	29/2882 (1.0%)	1.23	21/4441 (0.5%)
17	V	0.24	0/840	0.50	0/1140
18	W	0.25	0/4300	0.49	0/5812
19	m	0.24	0/9925	0.45	0/13424
20	n	0.24	0/1132	0.42	0/1526
21	q	0.24	0/7689	0.40	0/10368
22	r	0.24	0/2169	0.45	0/2901
23	u	0.24	0/1740	0.48	0/2347
24	v	0.25	0/2944	0.47	0/3973
25	x	0.26	0/1716	0.45	0/2310
26	a	0.29	0/755	0.55	0/1012
26	e	0.33	0/806	0.58	0/1081
27	b	0.30	0/653	0.59	0/873
27	f	0.33	0/626	0.57	0/837
28	c	0.28	0/752	0.56	0/1015
28	g	0.27	0/766	0.54	0/1033
29	d	0.29	0/729	0.49	0/979

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
29	h	0.27	0/736	0.47	0/990
30	j	0.69	0/3827	0.85	5/5159 (0.1%)
31	k	0.69	0/3579	0.87	5/4833 (0.1%)
All	All	0.44	49/84120 (0.1%)	0.61	58/114652 (0.1%)

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
14	N	0	4
16	T	0	4
27	f	0	1
30	j	0	1
31	k	0	1
All	All	0	11

The worst 5 of 49 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
16	T	-33	DA	C1'-N9	-7.85	1.36	1.47
14	N	68	DC	C1'-N1	7.78	1.59	1.49
16	T	-53	DG	C1'-N9	-7.74	1.36	1.47
14	N	50	DG	C1'-N9	-7.68	1.36	1.47
16	T	-37	DG	C1'-N9	-7.53	1.36	1.47

The worst 5 of 58 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
30	j	684	ARG	NE-CZ-NH1	9.37	124.99	120.30
30	j	836	ARG	NE-CZ-NH1	9.30	124.95	120.30
15	P	-4	C	C2-N1-C1'	8.58	128.24	118.80
15	P	-4	C	N1-C2-O2	8.42	123.95	118.90
14	N	-14	DA	N1-C6-N6	-8.40	113.56	118.60

There are no chirality outliers.

5 of 11 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
14	N	-11	DC	Sidechain

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Mol	Chain	Res	Type	Group
14	N	-12	DA	Sidechain
14	N	-17	DT	Sidechain
14	N	-9	DC	Sidechain
16	T	11	DG	Sidechain

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	11064	0	11090	112	0
2	B	9284	0	9282	115	0
3	C	2098	0	2057	21	0
4	D	1349	0	1345	9	0
5	E	1741	0	1754	21	0
6	F	677	0	693	6	0
7	G	1325	0	1342	17	0
8	H	1053	0	1050	10	0
9	I	917	0	867	15	0
10	J	554	0	573	5	0
11	K	932	0	944	14	0
12	L	359	0	358	4	0
13	M	505	0	495	5	0
14	N	2377	0	1293	87	0
15	P	399	0	205	10	0
16	T	2570	0	1411	62	0
17	V	824	0	795	16	0
18	W	4232	0	4278	57	0
19	m	9730	0	9588	0	0
20	n	1115	0	1186	0	0
21	q	7552	0	7545	0	0
22	r	2139	0	2155	0	0
23	u	1707	0	1676	0	0
24	v	2878	0	2873	0	0
25	x	1682	0	1731	0	0
26	a	746	0	786	0	0
26	e	795	0	832	0	0
27	b	646	0	687	0	0
27	f	619	0	659	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
28	c	743	0	784	0	0
28	g	757	0	802	0	0
29	d	718	0	740	0	0
29	h	725	0	745	0	0
30	j	3754	0	3654	0	0
31	k	3502	0	3436	0	0
32	A	2	0	0	0	0
32	B	1	0	0	0	0
32	C	1	0	0	0	0
32	I	2	0	0	0	0
32	J	1	0	0	0	0
32	L	1	0	0	0	0
32	M	1	0	0	0	0
32	V	1	0	0	0	0
33	A	1	0	0	0	0
All	All	82079	0	79711	518	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 6.

The worst 5 of 518 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)
14:N:-49:DG:H2''	14:N:-48:DC:C5	2.00	0.97
14:N:24:DC:C2'	14:N:25:DT:H71	2.00	0.92
14:N:33:DT:H2''	14:N:34:DC:C5	2.08	0.89
16:T:-21:DC:H2''	16:T:-20:DC:C5	2.11	0.86
14:N:57:DG:N2	16:T:-56:DC:C2	2.45	0.85

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	1392/1743 (80%)	1355 (97%)	36 (3%)	1 (0%)	51	85
2	B	1154/1227 (94%)	1119 (97%)	35 (3%)	0	100	100
3	C	261/304 (86%)	259 (99%)	2 (1%)	0	100	100
4	D	170/186 (91%)	167 (98%)	3 (2%)	0	100	100
5	E	211/214 (99%)	205 (97%)	6 (3%)	0	100	100
6	F	82/155 (53%)	80 (98%)	2 (2%)	0	100	100
7	G	169/171 (99%)	167 (99%)	2 (1%)	0	100	100
8	H	129/145 (89%)	125 (97%)	4 (3%)	0	100	100
9	I	109/115 (95%)	107 (98%)	2 (2%)	0	100	100
10	J	65/72 (90%)	65 (100%)	0	0	100	100
11	K	111/118 (94%)	110 (99%)	1 (1%)	0	100	100
12	L	43/72 (60%)	41 (95%)	2 (5%)	0	100	100
13	M	62/113 (55%)	62 (100%)	0	0	100	100
17	V	104/108 (96%)	100 (96%)	4 (4%)	0	100	100
18	W	527/911 (58%)	508 (96%)	19 (4%)	0	100	100
19	m	1179/1503 (78%)	1158 (98%)	21 (2%)	0	100	100
20	n	137/417 (33%)	136 (99%)	1 (1%)	0	100	100
21	q	928/1084 (86%)	922 (99%)	6 (1%)	0	100	100
22	r	260/544 (48%)	254 (98%)	6 (2%)	0	100	100
23	u	206/459 (45%)	204 (99%)	2 (1%)	0	100	100
24	v	341/396 (86%)	327 (96%)	14 (4%)	0	100	100
25	x	201/395 (51%)	200 (100%)	1 (0%)	0	100	100
26	a	90/139 (65%)	86 (96%)	4 (4%)	0	100	100
26	e	95/139 (68%)	93 (98%)	1 (1%)	1 (1%)	14	52
27	b	79/106 (74%)	76 (96%)	3 (4%)	0	100	100
27	f	76/106 (72%)	73 (96%)	3 (4%)	0	100	100
28	c	94/133 (71%)	93 (99%)	1 (1%)	0	100	100
28	g	96/133 (72%)	93 (97%)	3 (3%)	0	100	100
29	d	90/129 (70%)	86 (96%)	4 (4%)	0	100	100
29	h	91/129 (70%)	90 (99%)	1 (1%)	0	100	100
30	j	466/1008 (46%)	433 (93%)	28 (6%)	5 (1%)	14	52
31	k	423/531 (80%)	404 (96%)	18 (4%)	1 (0%)	47	80

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	9441/13005 (73%)	9198 (97%)	235 (2%)	8 (0%)	54	85

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	960	VAL
30	j	964	PRO
30	j	939	PHE
30	j	951	GLU
30	j	969	VAL

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	1219/1528 (80%)	1216 (100%)	3 (0%)	93	96
2	B	1018/1077 (94%)	1016 (100%)	2 (0%)	93	96
3	C	236/264 (89%)	236 (100%)	0	100	100
4	D	149/160 (93%)	149 (100%)	0	100	100
5	E	196/197 (100%)	194 (99%)	2 (1%)	76	86
6	F	75/137 (55%)	75 (100%)	0	100	100
7	G	148/148 (100%)	148 (100%)	0	100	100
8	H	120/130 (92%)	120 (100%)	0	100	100
9	I	106/109 (97%)	106 (100%)	0	100	100
10	J	61/66 (92%)	61 (100%)	0	100	100
11	K	104/109 (95%)	104 (100%)	0	100	100
12	L	38/56 (68%)	38 (100%)	0	100	100
13	M	61/99 (62%)	60 (98%)	1 (2%)	62	79
17	V	90/92 (98%)	90 (100%)	0	100	100
18	W	480/796 (60%)	480 (100%)	0	100	100
19	m	1087/1354 (80%)	1086 (100%)	1 (0%)	93	97

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
20	n	125/361 (35%)	125 (100%)	0	100	100
21	q	824/962 (86%)	824 (100%)	0	100	100
22	r	239/485 (49%)	239 (100%)	0	100	100
23	u	192/406 (47%)	191 (100%)	1 (0%)	88	93
24	v	325/369 (88%)	325 (100%)	0	100	100
25	x	190/354 (54%)	190 (100%)	0	100	100
26	a	78/112 (70%)	78 (100%)	0	100	100
26	e	82/112 (73%)	82 (100%)	0	100	100
27	b	66/81 (82%)	66 (100%)	0	100	100
27	f	63/81 (78%)	63 (100%)	0	100	100
28	c	76/102 (74%)	76 (100%)	0	100	100
28	g	77/102 (76%)	77 (100%)	0	100	100
29	d	78/107 (73%)	78 (100%)	0	100	100
29	h	79/107 (74%)	79 (100%)	0	100	100
30	j	400/910 (44%)	398 (100%)	2 (0%)	88	93
31	k	392/474 (83%)	389 (99%)	3 (1%)	81	89
All	All	8474/11447 (74%)	8459 (100%)	15 (0%)	93	96

5 of 15 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
13	M	40	LYS
31	k	253	TYR
19	m	514	LYS
31	k	287	ARG
30	j	940	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
27	b	25	ASN
28	c	73	ASN
31	k	127	ASN
30	j	750	GLN
18	W	433	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
15	P	19/19 (100%)	6 (31%)	1 (5%)

5 of 6 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
15	P	-6	A
15	P	-5	C
15	P	-4	C
15	P	-3	C
15	P	-2	G

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
15	P	-7	G

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 11 ligands modelled in this entry, 11 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.

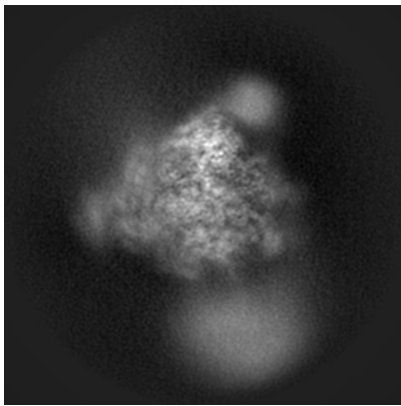
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-33441. These allow visual inspection of the internal detail of the map and identification of artifacts.

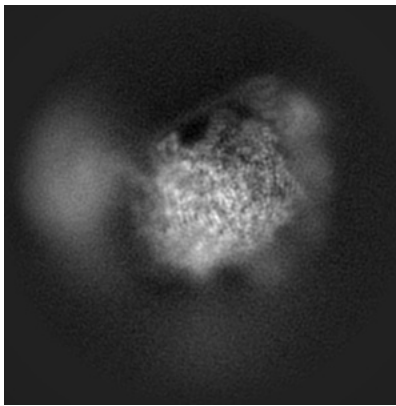
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

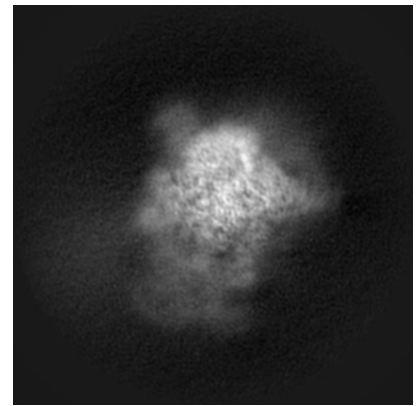
6.1.1 Primary map



X

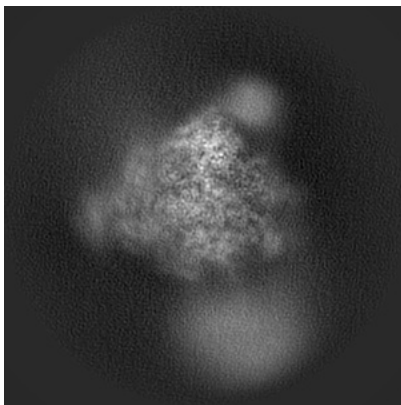


Y

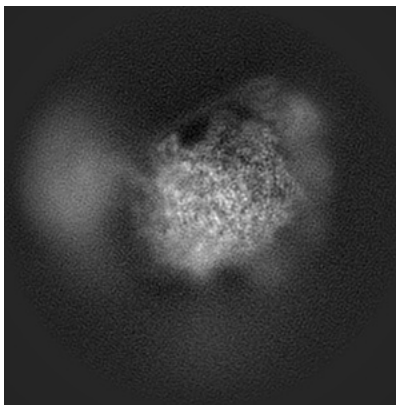


Z

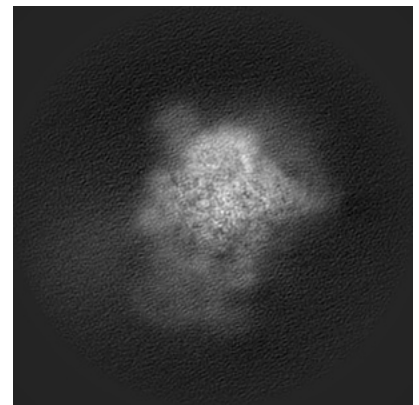
6.1.2 Raw map



X



Y

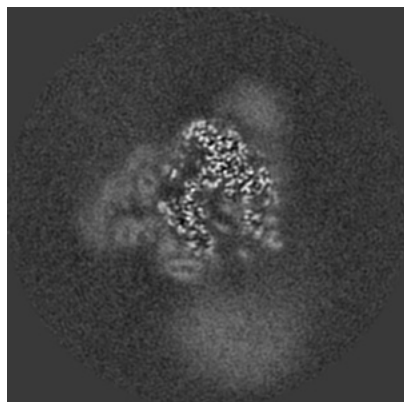


Z

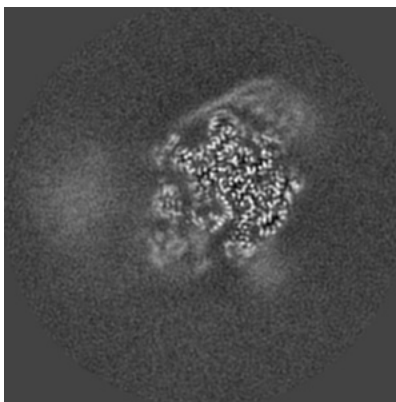
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

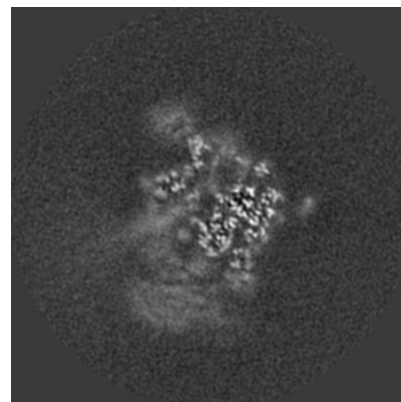
6.2.1 Primary map



X Index: 120

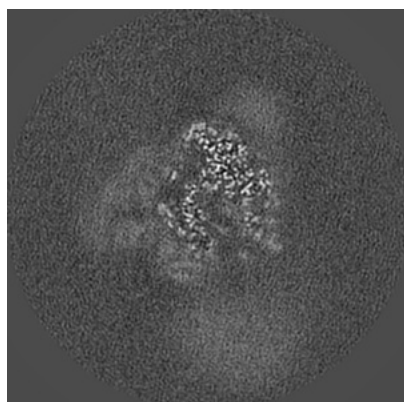


Y Index: 120

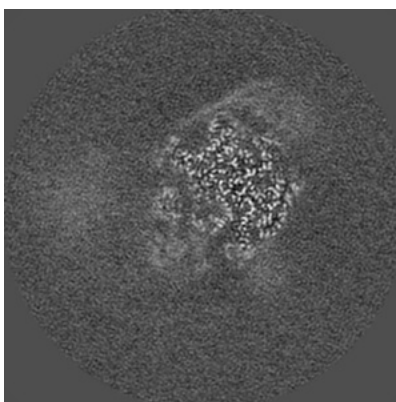


Z Index: 120

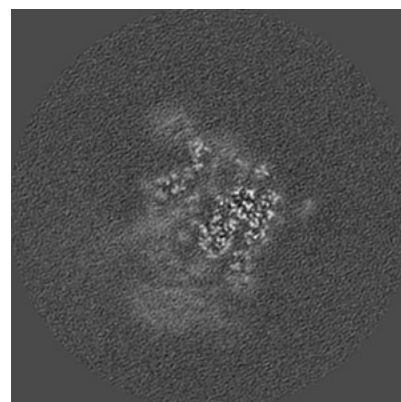
6.2.2 Raw map



X Index: 120



Y Index: 120

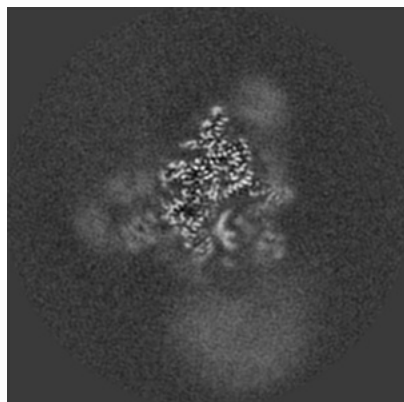


Z Index: 120

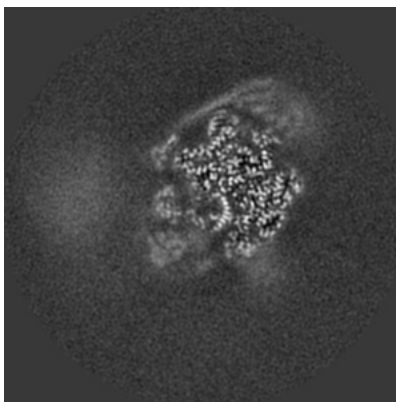
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

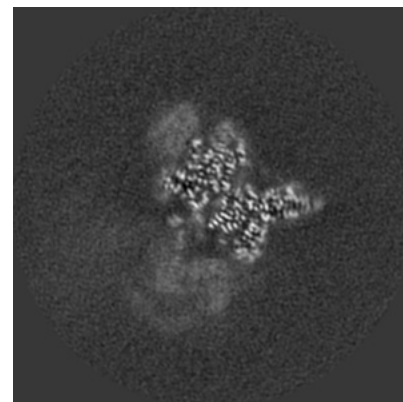
6.3.1 Primary map



X Index: 127

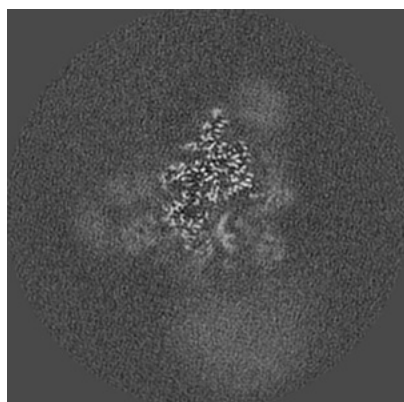


Y Index: 121

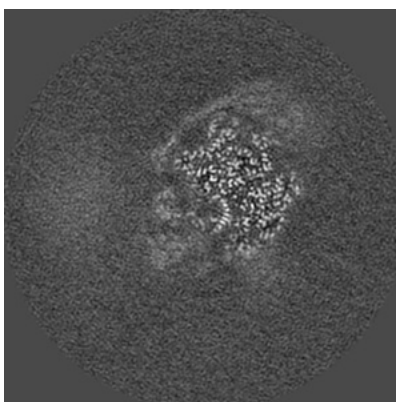


Z Index: 129

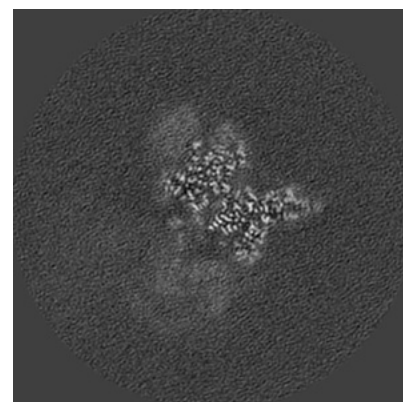
6.3.2 Raw map



X Index: 127



Y Index: 121

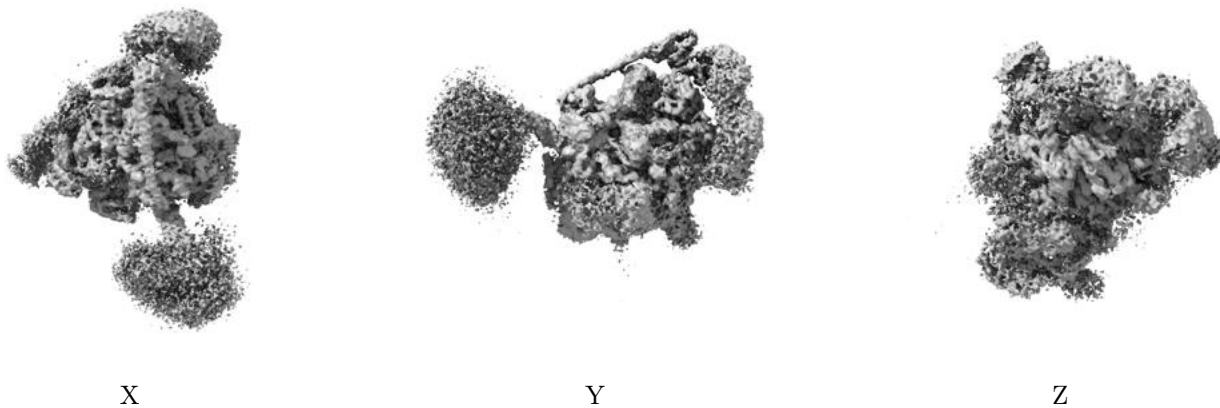


Z Index: 129

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

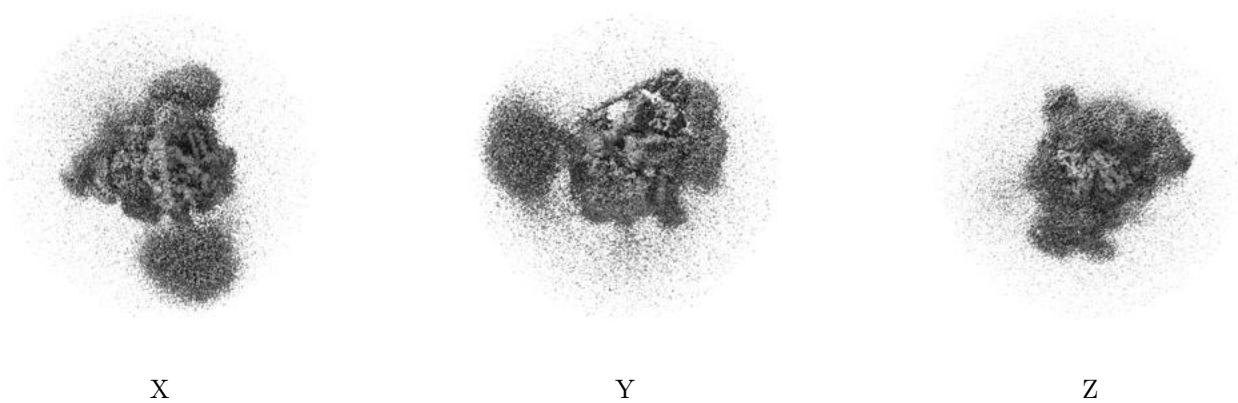
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.014. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 Raw map



These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

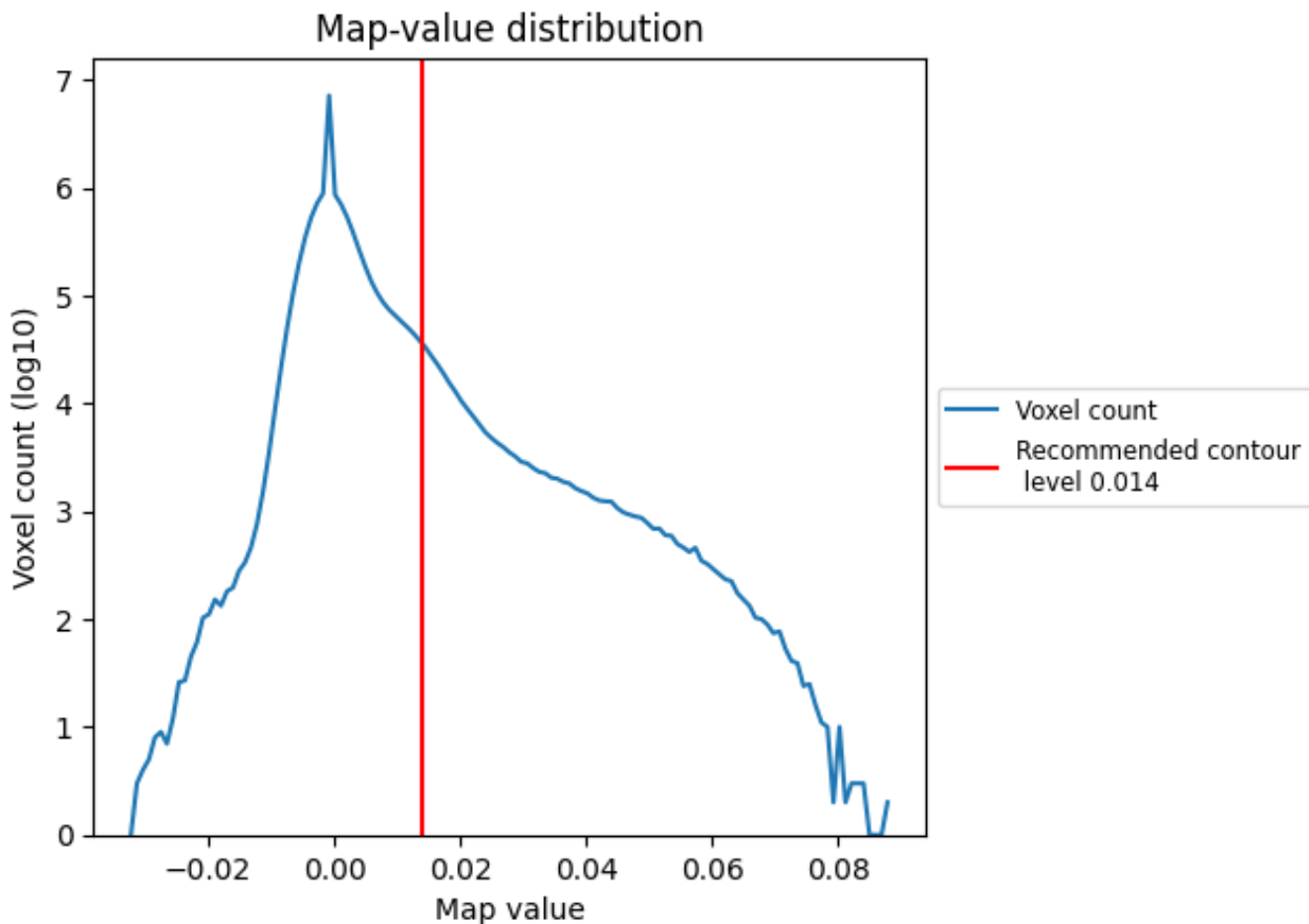
6.5 Mask visualisation [i](#)

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

7 Map analysis [i](#)

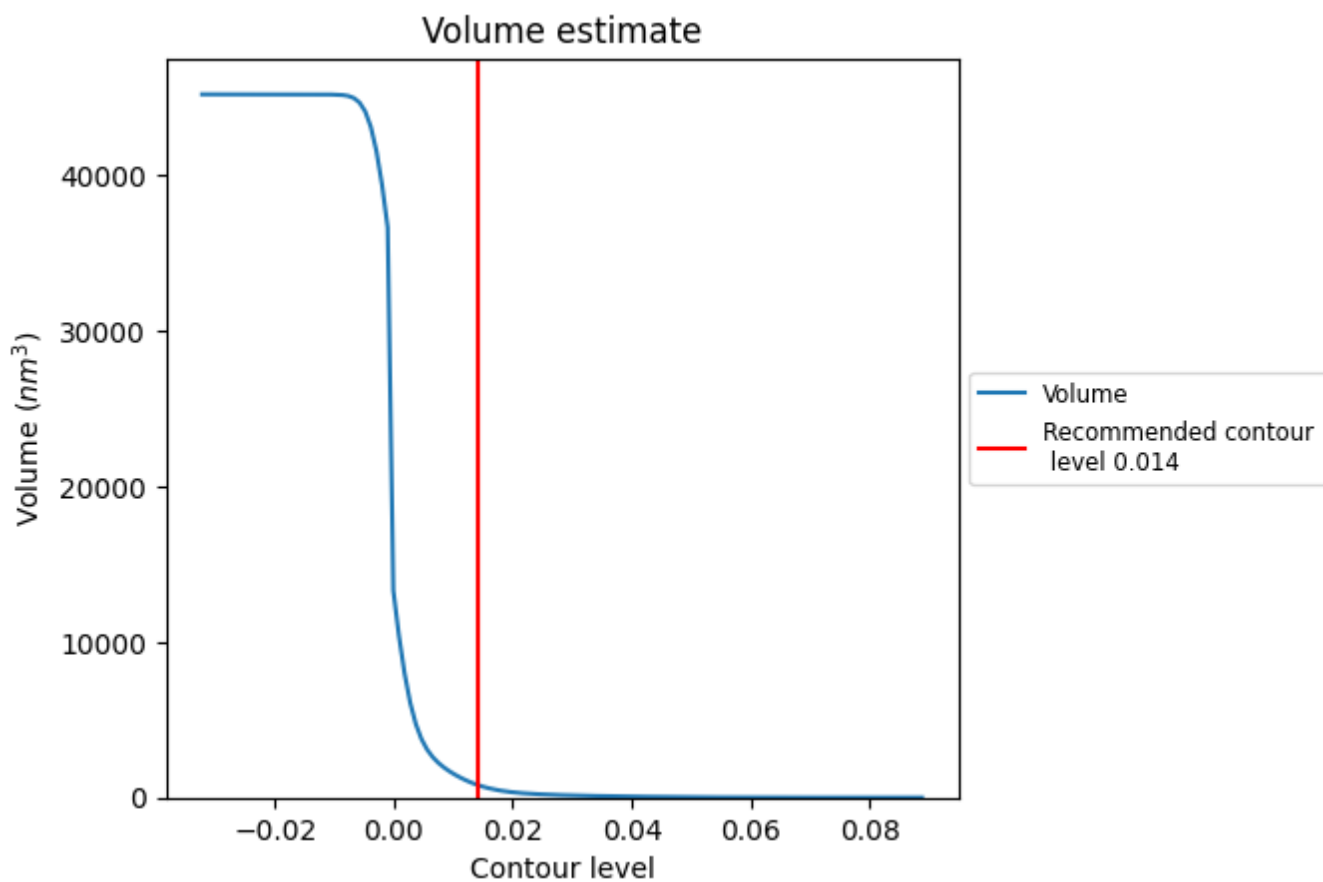
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

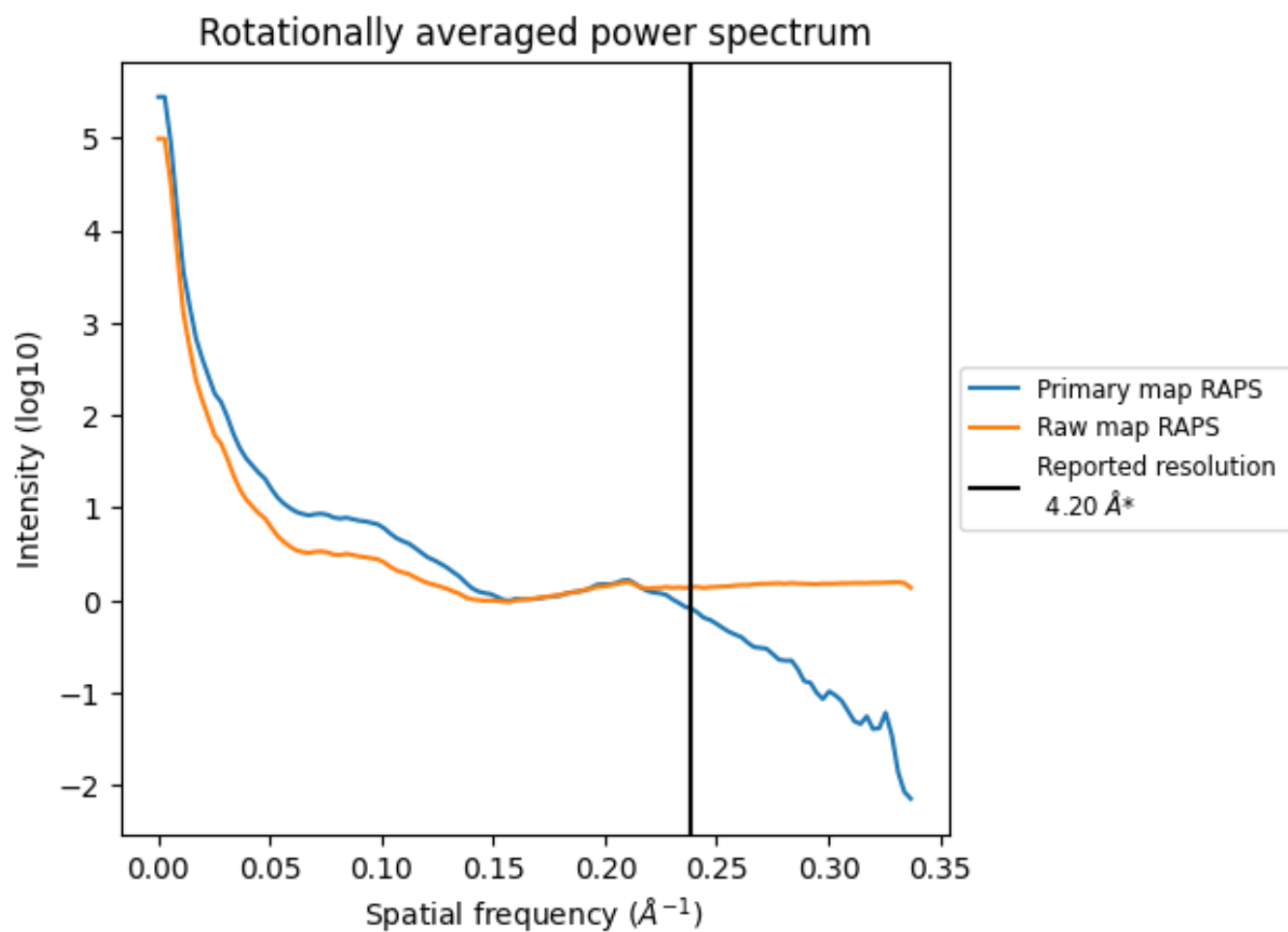
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 822 nm³; this corresponds to an approximate mass of 743 kDa.

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

7.3 Rotationally averaged power spectrum i

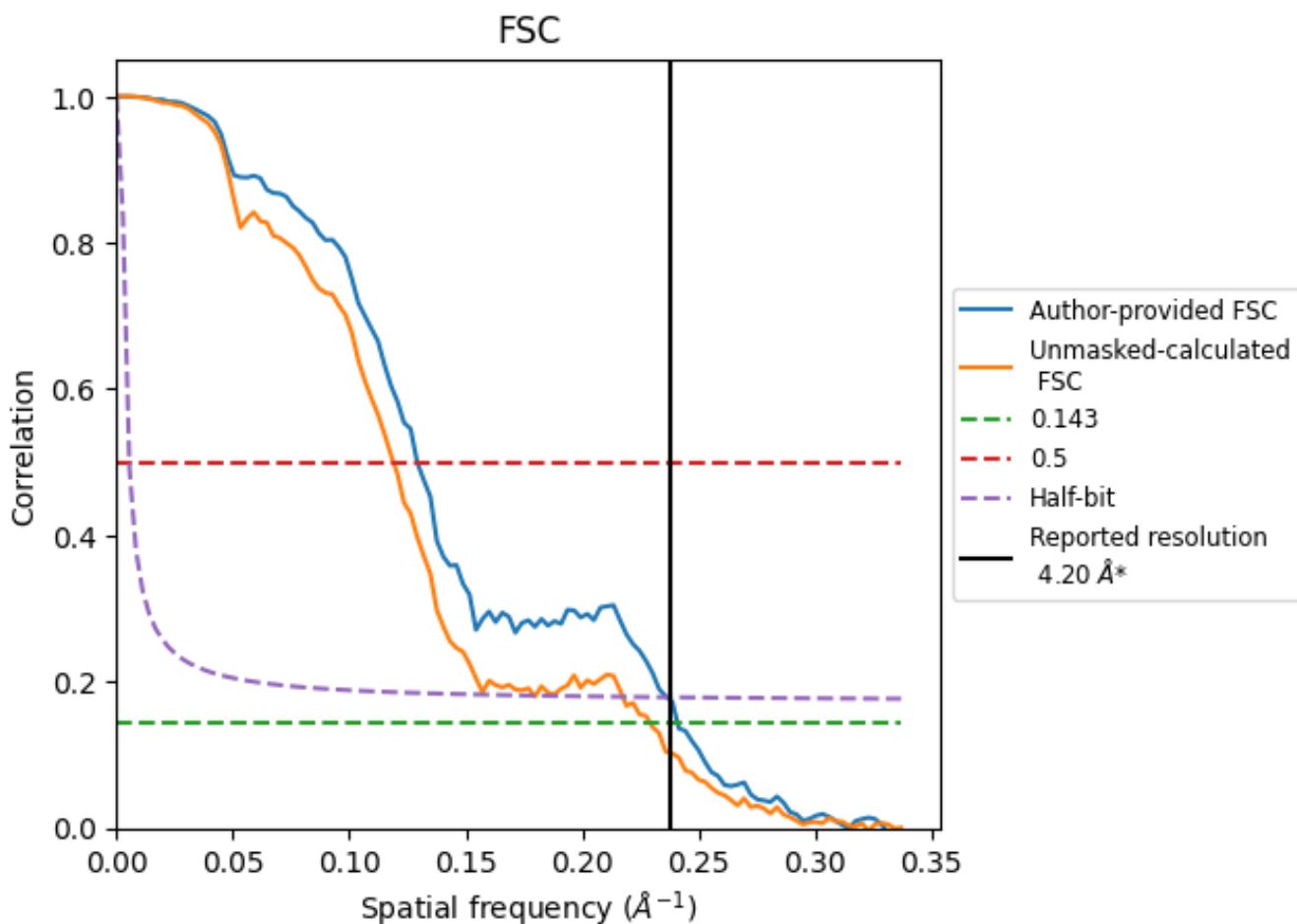


*Reported resolution corresponds to spatial frequency of 0.238 Å⁻¹

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.238 Å⁻¹

8.2 Resolution estimates [i](#)

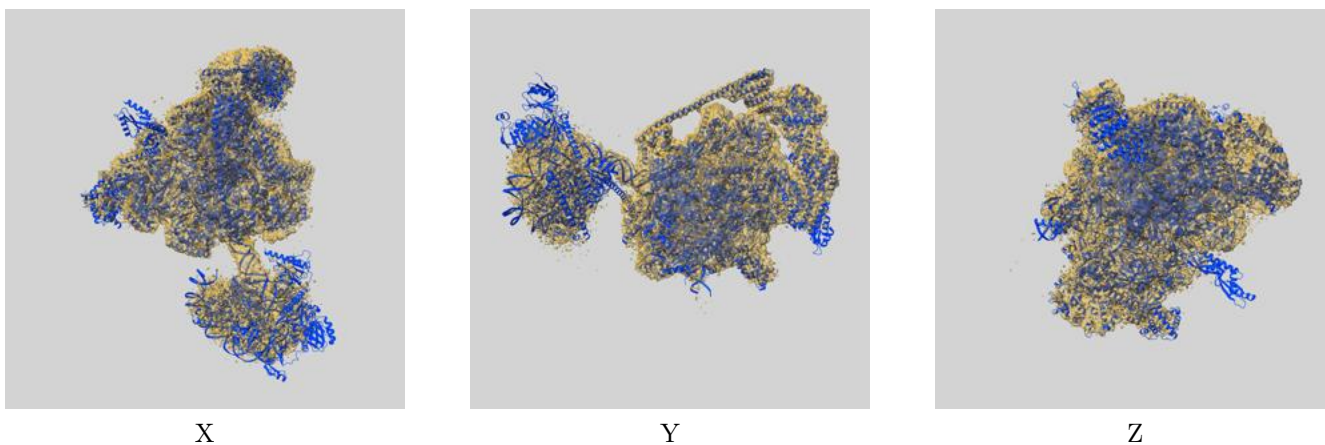
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.20	-	-
Author-provided FSC curve	4.15	7.75	4.23
Unmasked-calculated*	4.36	8.40	5.57

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

9 Map-model fit [i](#)

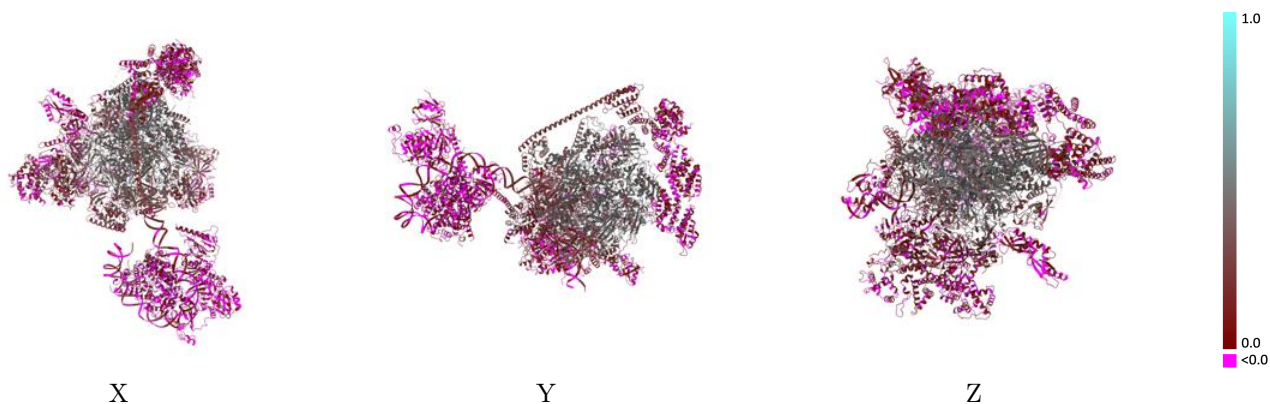
This section contains information regarding the fit between EMDB map EMD-33441 and PDB model 7XT7. Per-residue inclusion information can be found in section 3 on page 16.

9.1 Map-model overlay [i](#)



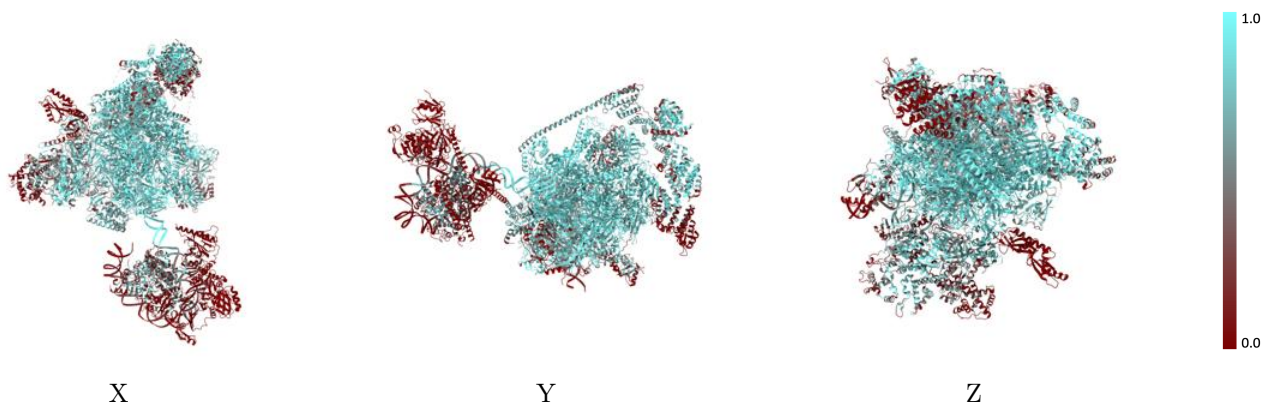
The images above show the 3D surface view of the map at the recommended contour level 0.014 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



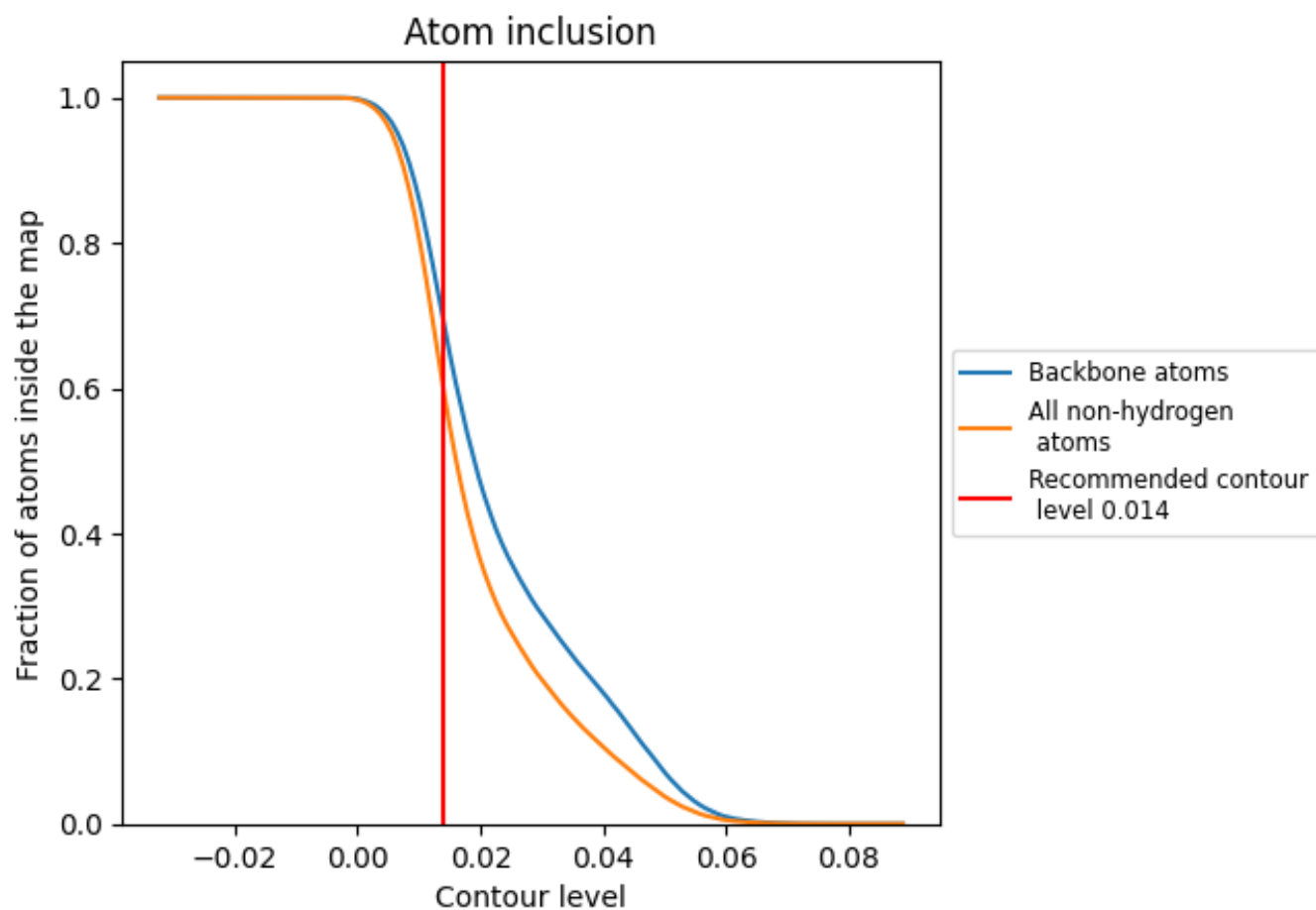
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.014).









































































9.4 Atom inclusion [i](#)



At the recommended contour level, 69% of all backbone atoms, 60% 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 (0.014) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.5990	 0.2070
A	 0.8990	 0.4130
B	 0.8985	 0.4220
C	 0.8982	 0.4370
D	 0.7313	 0.1980
E	 0.9274	 0.3900
F	 0.9271	 0.4500
G	 0.7916	 0.2670
H	 0.8792	 0.4240
I	 0.8237	 0.2600
J	 0.8961	 0.4370
K	 0.9213	 0.4320
L	 0.9195	 0.4140
M	 0.7540	 0.1560
N	 0.4215	 0.0810
P	 0.8672	 0.2980
T	 0.4280	 0.1120
V	 0.8423	 0.1120
W	 0.6315	 0.1700
a	 0.3403	 -0.0220
b	 0.5016	 0.0350
c	 0.4694	 0.0370
d	 0.4467	 -0.0070
e	 0.3508	 0.0080
f	 0.4756	 0.0200
g	 0.3511	 0.0400
h	 0.3263	 0.0350
j	 0.0402	 0.0170
k	 0.0304	 0.0040
m	 0.3720	 0.0820
n	 0.6928	 0.1790
q	 0.5490	 0.0930
r	 0.3988	 0.1240
u	 0.5084	 0.1530
v	 0.4214	 0.0850
x	 0.6521	 0.2290

