Full wwPDB EM Validation Report ⓘ

Jun 26, 2024 – 01:07 PM JST

PDB ID	:	7XTI
EMDB ID	:	EMD-33450
Title	:	RNA polymerase II elongation complex transcribing a nucleosome (EC58hex)
Authors	:	Ehara, H.; Kujirai, T.; Shirouzu, M.; Kurumizaka, H.; Sekine, S.
Deposited on	:	2022-05-17
Resolution	:	3.90 Å(reported)

This is a Full wwPDB EM Validation 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:

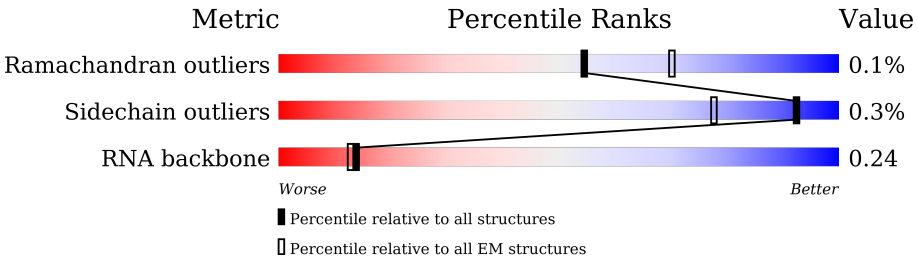
EMDB validation analysis	:	0.0.1.dev92
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 3.90 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
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 <=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	80% 19%
2	B	1227	95% 5%
3	C	304	87% 13%
4	D	186	22% 94% 6%
5	E	214	99%
6	F	155	54% 46%
7	G	171	14% 100%
8	H	145	92% 8%

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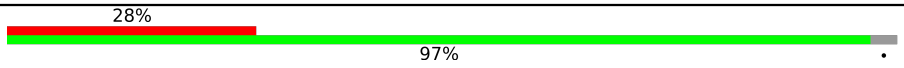
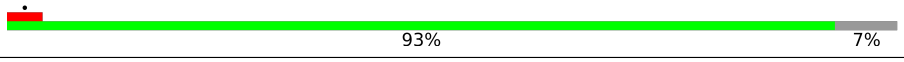
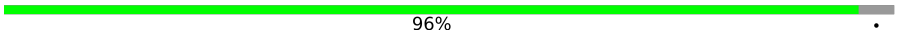
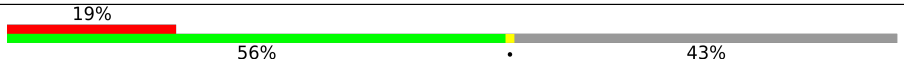
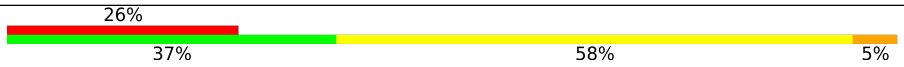
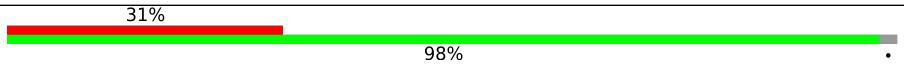
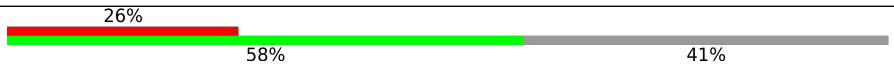
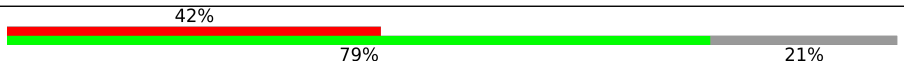
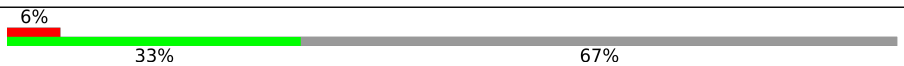
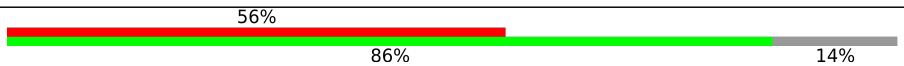
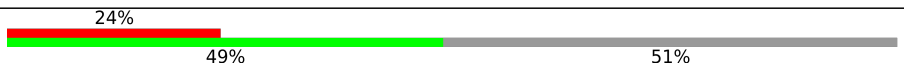
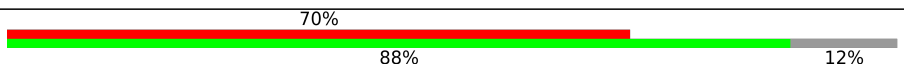
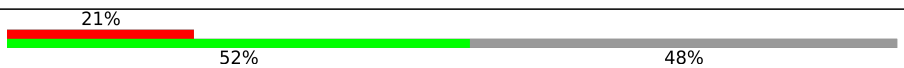
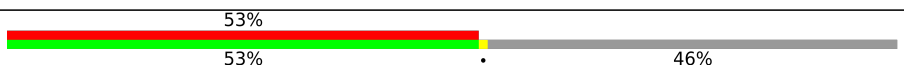
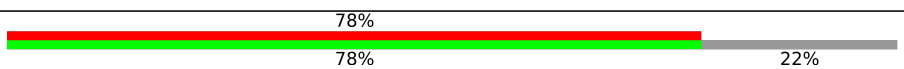
Mol	Chain	Length	Quality of chain
9	I	115	
10	J	72	
11	K	118	
12	L	72	
13	M	113	
14	N	198	
15	P	19	
16	T	198	
17	V	108	
18	W	911	
19	m	1503	
20	n	417	
21	q	1084	
22	r	544	
23	u	459	
24	v	396	
25	x	395	
26	a	139	
26	e	139	
27	b	106	
27	f	106	
28	g	133	
29	h	129	
30	j	1008	
31	k	531	

2 Entry composition

There are 33 unique types of molecules in this entry. The entry contains 78660 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
13	M	64	Total	C	N	O	S	0	0
			505	318	82	99	6		

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
14	N	74	Total	C	N	O	P	0	0
			1516	723	258	461	74		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
15	P	19	Total	C	N	O	P	0	0
			399	178	64	138	19		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
16	T	85	Total	C	N	O	P	0	0
			1744	824	346	489	85		

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

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

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
18	W	533	Total	C	N	O	S	0	0
			4232	2666	752	812	2		

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
19	m	1187	Total	C	N	O	S	0	0
			9730	6162	1663	1877	28		

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
20	n	139	Total	C	N	O	S	0	0
			1115	716	193	202	4		

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
21	q	930	Total	C	N	O	S	0	0
			7552	4805	1283	1439	25		

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
22	r	266	Total	C	N	O	S	0	0
			2139	1342	374	412	11		

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
23	u	208	Total	C	N	O	S	0	0
			1707	1063	304	337	3		

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
24	v	349	Total	C	N	O	S	0	0
			2878	1835	510	528	5		

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
25	x	205	Total	C	N	O	S	0	0
			1682	1086	287	307	2		

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
26	a	75	Total	C	N	O	S	0	0
			606	385	114	105	2		
26	e	77	Total	C	N	O	S	0	0
			620	393	116	109	2		

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
27	b	83	Total	C	N	O	S	0	0
			662	418	129	114	1		
27	f	78	Total	C	N	O	S	0	0
			619	391	120	107	1		

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	g	92	Total	C	N	O	0	0
			715	447	142	126		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
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	h	93	Total	C	N	O	S	0	0
			725	456	130	137	2		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
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	471	Total	C	N	O	S	0	0
			3791	2403	663	712	13		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
j	-2	GLY	-	expression tag	UNP C4QYQ8
j	-1	PRO	-	expression tag	UNP C4QYQ8
j	0	GLY	-	expression tag	UNP C4QYQ8

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

Mol	Chain	Residues	Atoms					AltConf	Trace
31	k	434	Total	C	N	O	S	0	0
			3535	2233	619	673	10		

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
32	A	2	Total Zn 2 2	0
32	B	1	Total Zn 1 1	0
32	C	1	Total Zn 1 1	0
32	I	2	Total Zn 2 2	0
32	J	1	Total Zn 1 1	0
32	L	1	Total Zn 1 1	0
32	M	1	Total Zn 1 1	0
32	V	1	Total Zn 1 1	0

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

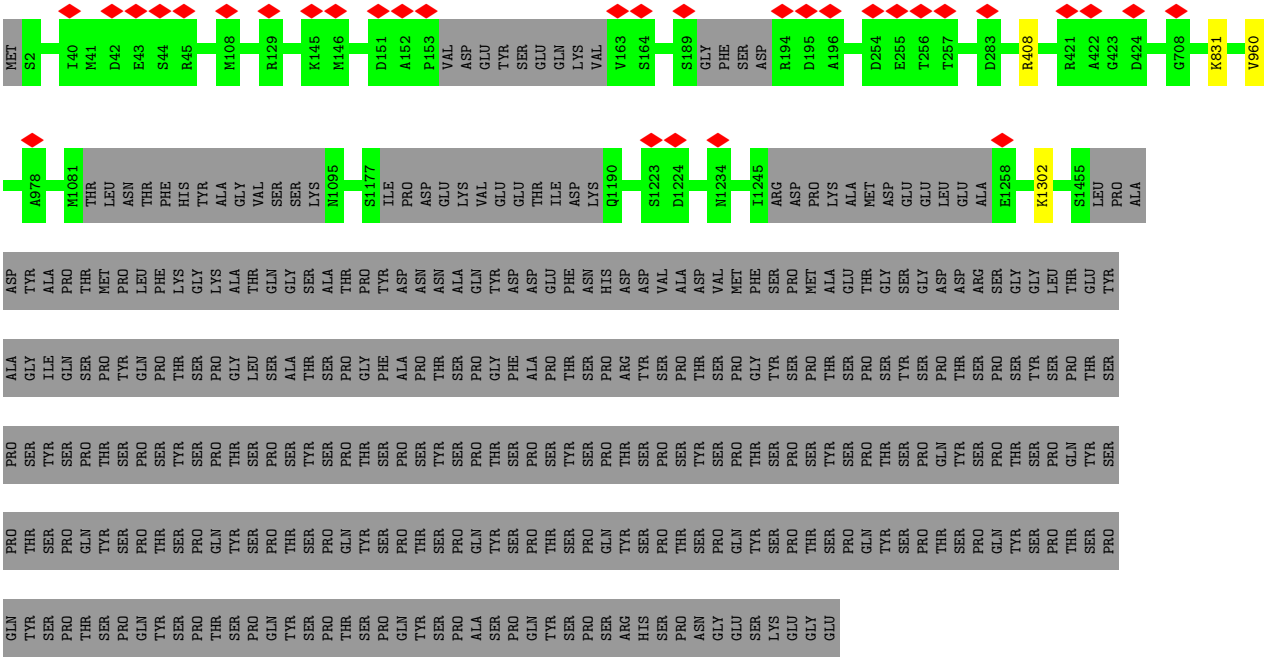
Mol	Chain	Residues	Atoms	AltConf
33	A	1	Total Mg 1 1	0

3 Residue-property plots (i)

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

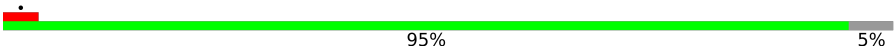
• Molecule 1: DNA-directed RNA polymerase subunit

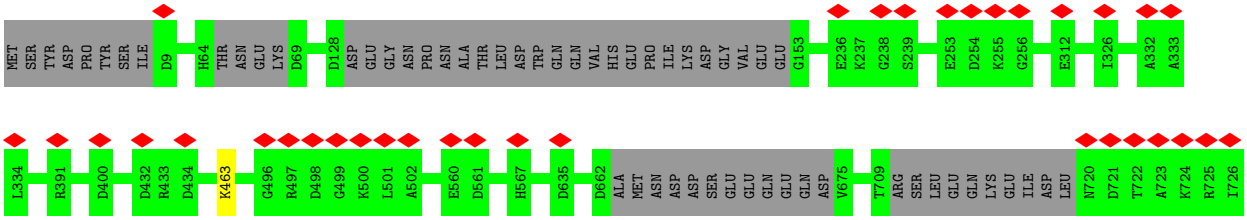
Chain A:

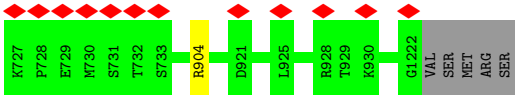


• Molecule 2: DNA-directed RNA polymerase subunit beta

Chain B:

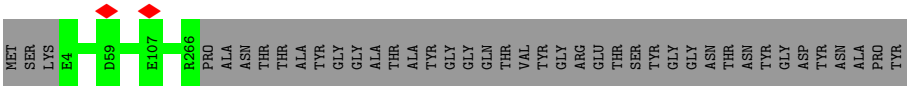






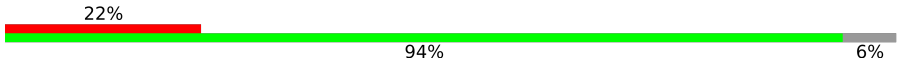
• Molecule 3: RNA polymerase II third largest subunit B44, part of central core

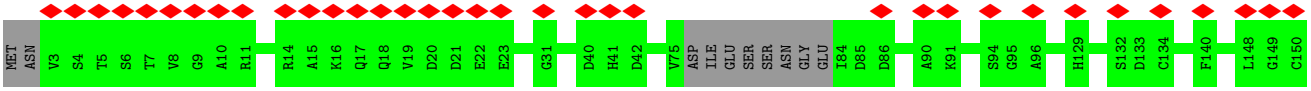
Chain C:

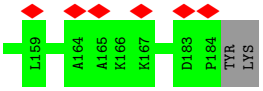


• Molecule 4: RNA polymerase II subunit B32

Chain D:

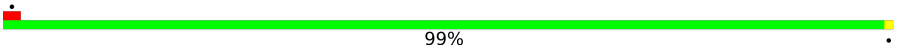


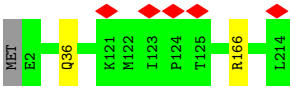




• Molecule 5: DNA-directed RNA polymerases I, II, and III subunit RPABC1

Chain E:



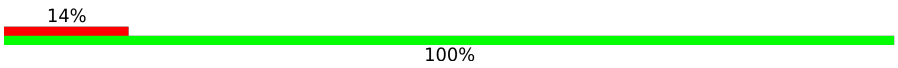


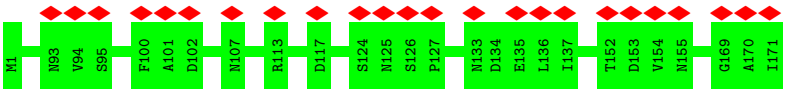
• Molecule 6: RNA polymerase subunit ABC23, common to RNA polymerases I, II, and III

Chain F:

• Molecule 7: RNA polymerase II subunit

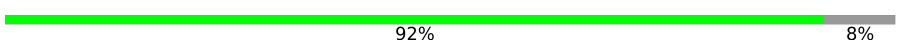
Chain G:





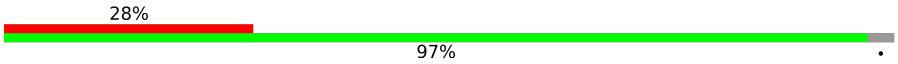
• Molecule 8: DNA-directed RNA polymerases I, II, and III subunit RPABC3

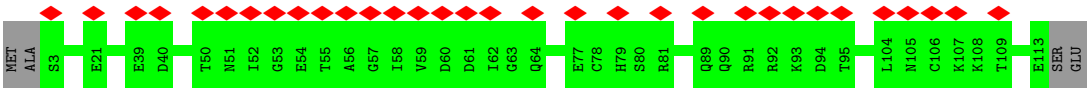
Chain H:



• Molecule 9: DNA-directed RNA polymerase subunit

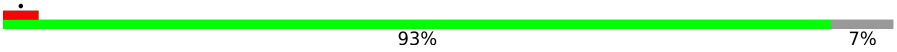
Chain I:

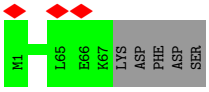




• Molecule 10: RNA polymerase subunit ABC10-beta, common to RNA polymerases I, II, and III

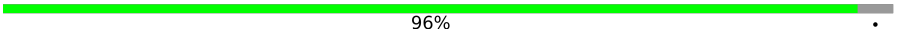
Chain J:





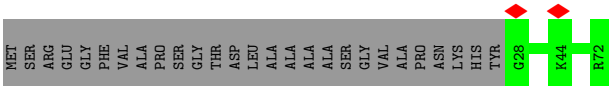
• Molecule 11: RNA polymerase II subunit B12.5

Chain K:



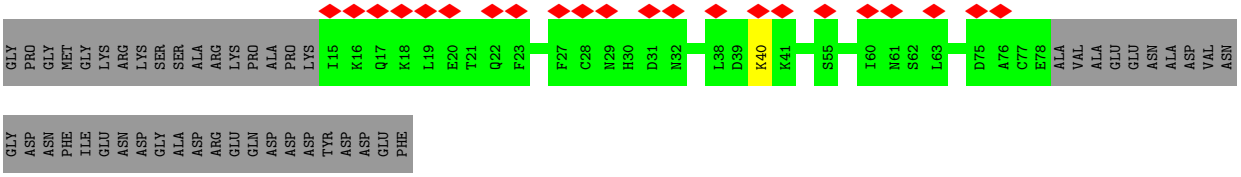
• Molecule 12: RNA polymerase subunit ABC10-alpha

Chain L:



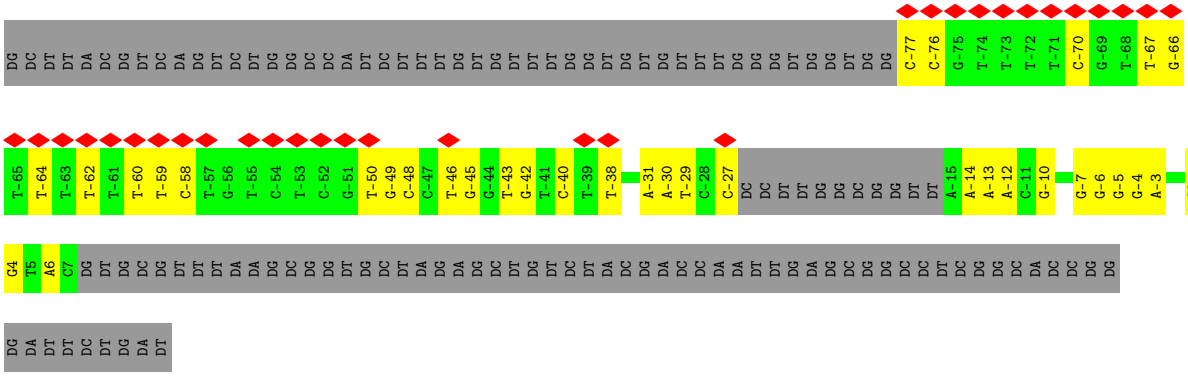
• Molecule 13: Transcription elongation factor 1 homolog

Chain M:

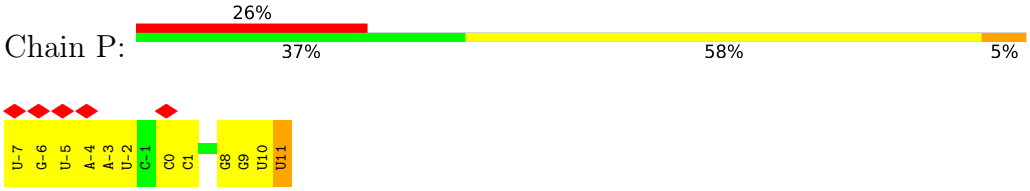


• Molecule 14: DNA (198-MER)

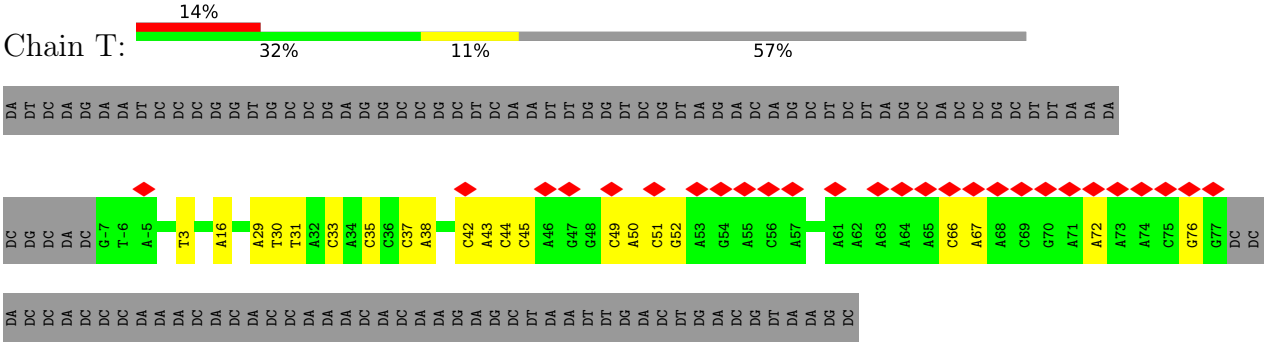
Chain N:



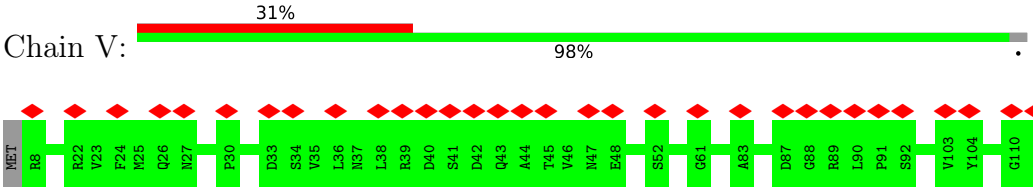
• Molecule 15: RNA (5'-R(P*UP*GP*UP*AP*AP*UP*CP*CP*CP*CP*UP*UP*GP*GP*CP*GP*GP*UP*U)-3')



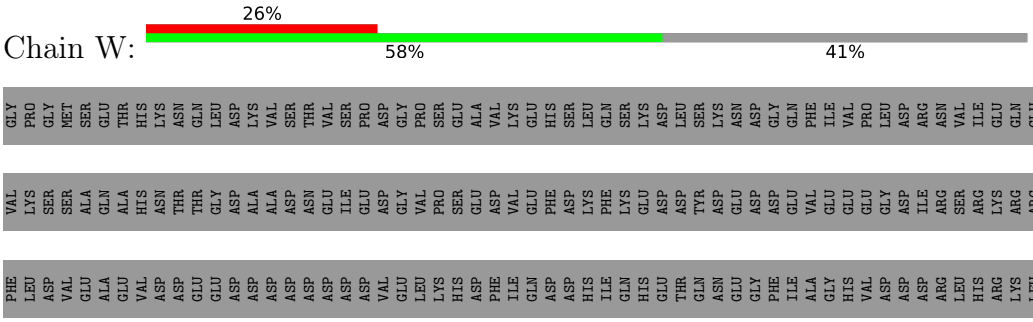
• Molecule 16: DNA (198-MER)

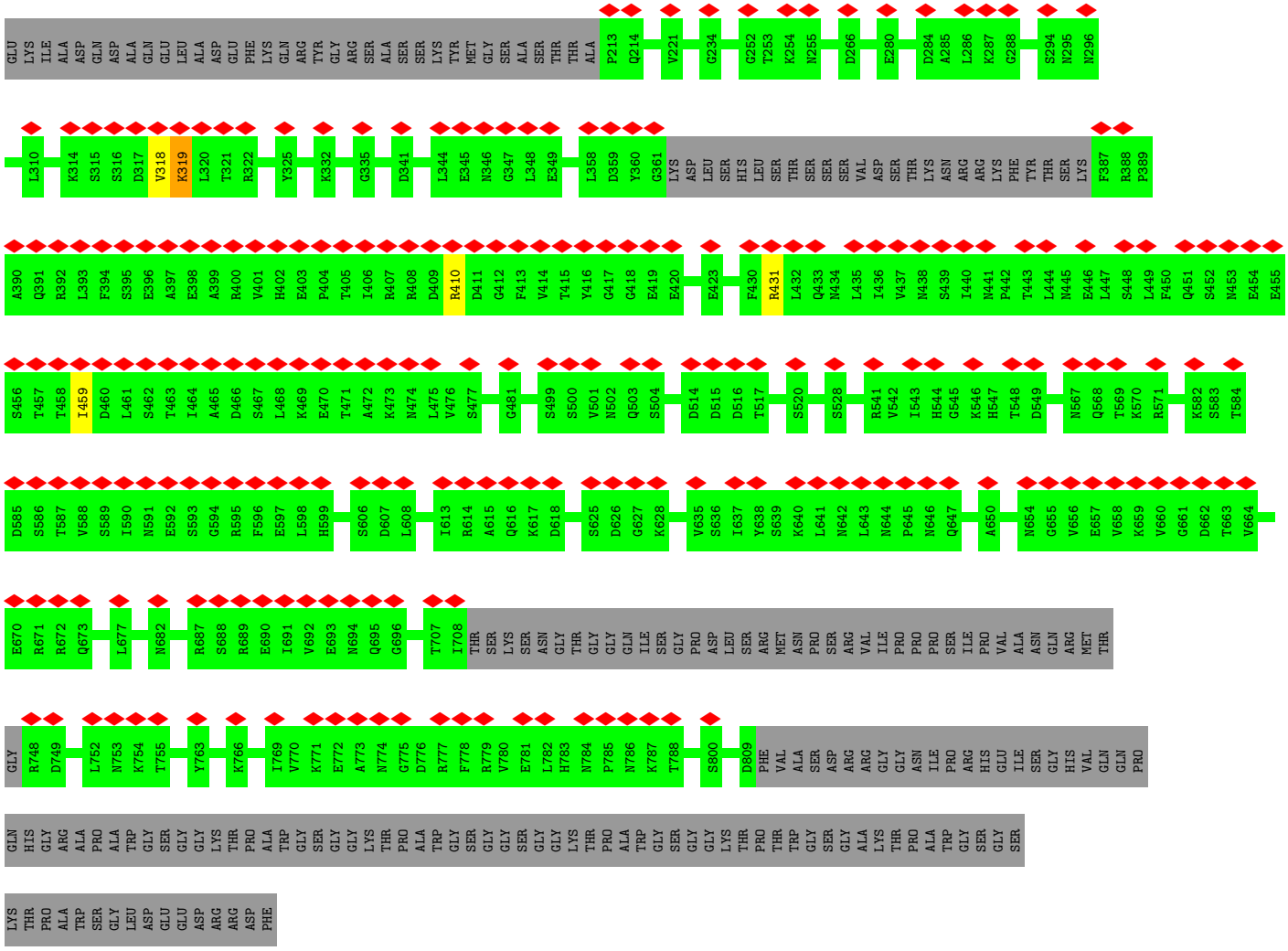


• Molecule 17: Transcription elongation factor SPT4



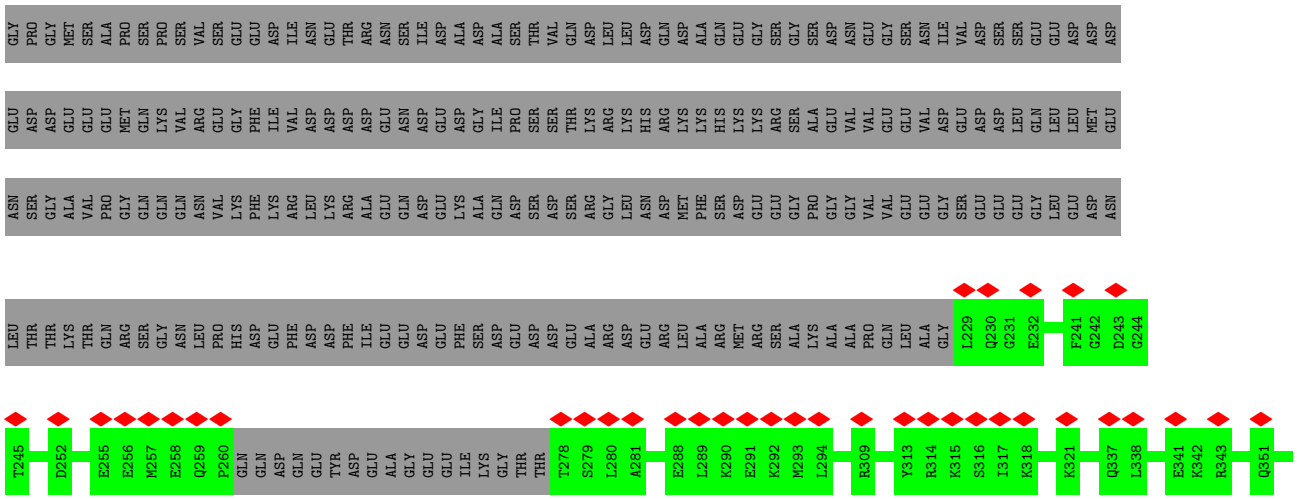
• Molecule 18: Transcription elongation factor SPT5

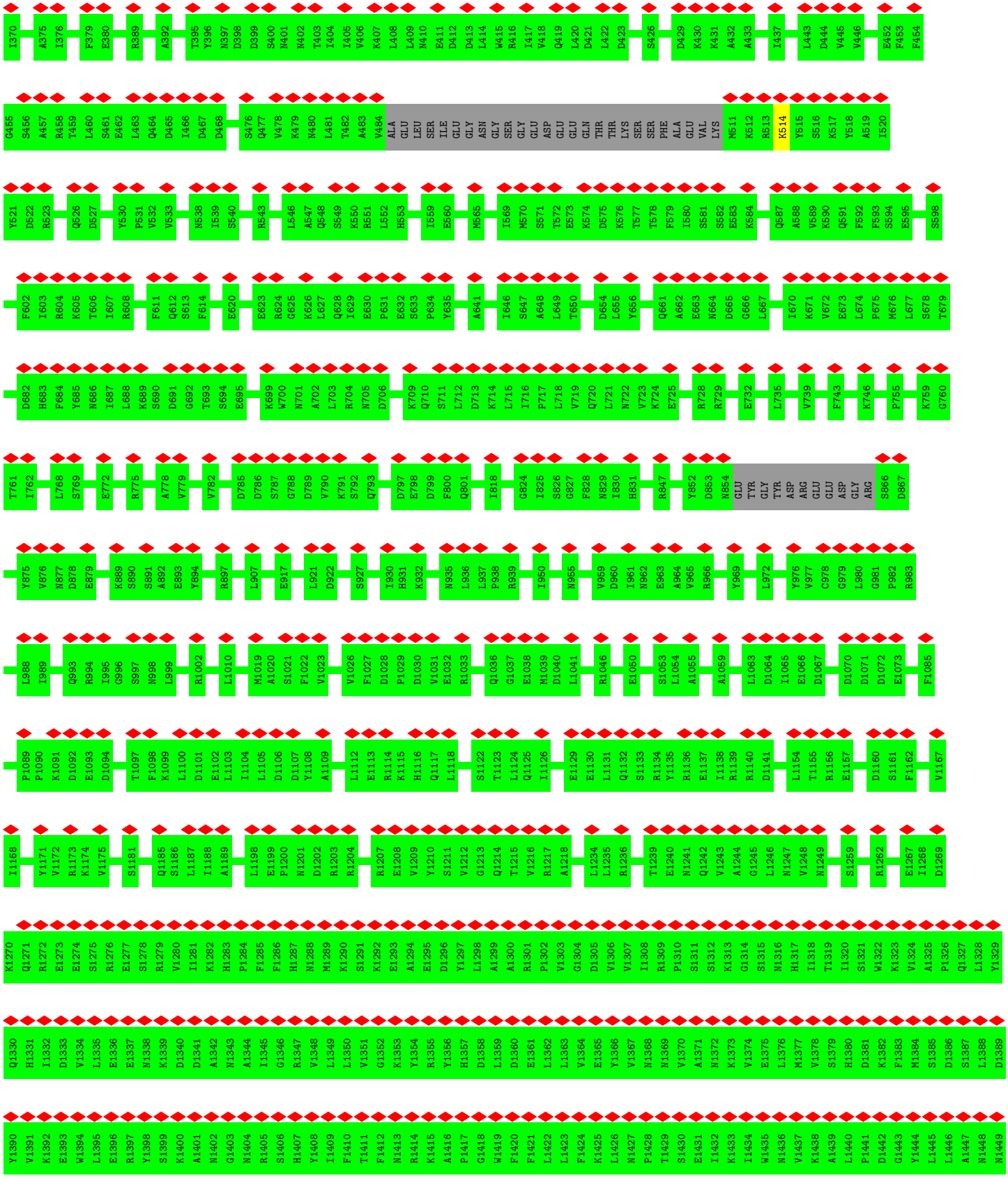


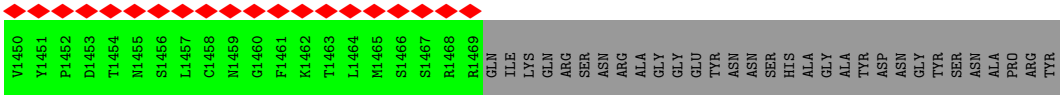


• Molecule 19: Transcription elongation factor Spt6

Chain m:

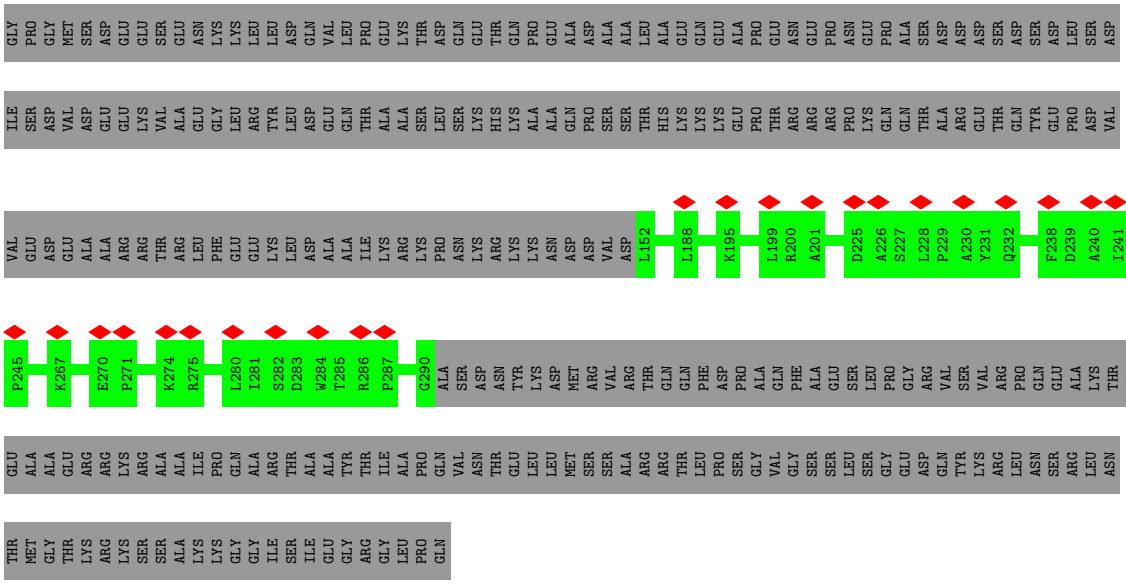



I370 A375 I376 F379 E380 R389 A392 T395 Y396 N397 D398 D399 S400 N401 N402 T403 I404 I405 V406 K407 L408 L409 N410 E411 D412 D413 L414 W415 R416 I417 V418 Q419 L420 D421 L422 D423 S426 D429 K430 K431 A432 A433 I437 L443 D444 V445 V446 E452 F453 F454
G455 S456 A457 R458 T459 L460 S461 E462 L463 Q464 D465 I466 D467 D468 S476 Q477 V478 K479 N480 L481 T482 A483 V484 ALA GLU LEU SER ILE GLU GLY ASN GLY SER GLY GLU 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 Q526 D527 Y530 P531 V532 V533 N538 I539 S540 R543 L546 A547 Q548 S549 K550 R551 L552 H553 I559 E560 M565 I569 M570 S571 T572 E573 K574 D575 K576 T577 T578 F579 I580 S581 S582 E583 K584 Q587 A588 V589 K590 Q591 F592 F593 S594 E595 S598
F602 I603 R604 K605 T606 I607 R608 F611 Q612 S613 F614 E620 E623 R624 G625 K626 L627 Q628 I629 E630 P631 E632 S633 P634 Y635 A641 I646 S647 A648 L649 T650 D654 L655 Y656 Q661 A662 E663 N664 D665 G666 L667 I670 K671 V672 E673 L674 P675 M676 L677 S678 T679
D682 H683 F684 Y685 N686 I687 L688 K689 S690 D691 G692 T693 S694 E695 K699 W700 N701 A702 L703 R704 N705 D706 K709 Q710 S711 L712 D713 K714 L715 I716 P717 L718 V719 Q720 L721 N722 V723 K724 E725 R728 R729 E732 L735 V739 F743 K746 P755 K759 G760
T761 I762 L768 S769 E772 R775 A778 V779 V782 D785 D786 S787 G788 D789 V790 K791 S792 Q793 D797 E798 D799 F800 Q801 I818 G824 I825 S826 G827 F828 N829 I830 H831 R847 Y852 D853 N854 GLU TYR GLY TYR ASP ARG GLU GLU ASP GLY ARG S866 D867
Y875 V876 N877 D878 E879 K889 S890 S891 A892 E893 Y894 R897 L907 E917 L921 D922 S927 I930 H931 K932 N935 L936 L937 P938 R939 I950 N955 V959 D960 I961 N962 E963 A964 V965 R966 Y969 L972 Y976 V977 C978 G979 L980 G981 P982 R983
L988 I989 Q993 R994 I995 G996 S997 N998 L999 R1002 L1010 M1019 A1020 S1021 F1022 V1023 V1026 F1027 D1028 P1029 D1030 V1031 E1032 R1033 Q1036 G1037 E1038 M1039 D1040 L1041 R1046 E1050 S1053 L1054 A1055 A1059 L1063 D1064 I1065 E1066 D1067 D1070 D1071 D1072 E1073 F1085
P1089 P1090 K1091 D1092 E1093 D1094 T1097 F1098 K1099 L1100 D1101 E1102 L1103 I1104 L1105 D1106 D1107 Y1108 A1109 L1112 E1113 R1114 K1115 H1116 Q1117 L1118 S1122 T1123 L1124 Q1125 I1126 E1129 E1130 L1131 Q1132 S1133 R1134 Y1135 R1136 E1137 I1138 R1139 R1140 D1141 L1154 T1155 R1156 E1157 D1160 S1161 F1162 V1167
I1168 Y1171 V1172 R1173 K1174 V1175 S1181 Q1185 S1186 L1187 I1188 A1189 L1198 E1199 P1200 N1201 D1202 R1203 R1204 R1207 E1208 V1209 Y1210 S1211 V1212 G1213 Q1214 T1215 V1216 R1217 A1218 L1234 L1235 R1236 T1239 E1240 N1241 Q1242 V1243 A1244 G1245 L1246 N1247 V1248 N1249 S1259 R1262 E1267 I1268 D1269
K1270 Q1271 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 R1301 P1302 V1303 G1304 D1305 V1306 V1307 I1308 R1309 P1310 S1311 S1312 K1313 G1314 S1315 N1316 H1317 I1318 T1319 I1320 S1321 W1322 K1323 V1324 A1325 P1326 Q1327 L1328 Y1329
Q1330 H1331 I1332 D1333 V1334 L1335 E1336 E1337 N1338 K1339 D1340 D1341 A1342 N1343 A1344 I1345 G1346 R1347 V1348 L1349 L1350 V1351 G1352 K1353 Y1354 R1355 Y1356 H1357 D1358 L1359 D1360 E1361 L1362 L1363 V1364 E1365 Y1366 V1367 N1368 N1369 V1370 A1371 N1372 K1373 V1374 E1375 L1376 M1377 V1378 S1379 H1380 D1381 K1382 F1383 M1384 S1385 D1386 S1387 L1388 D1389
Y1390 V1391 K1392 E1393 W1394 L1395 E1396 R1397 Y1398 S1399 K1400 A1401 N1402 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 I1432 K1433 I1434 W1435 N1436 V1437 K1438 A1439 L1440 P1441 D1442 G1443 Y1444 L1445 L1446 A1447 N1448 N1449



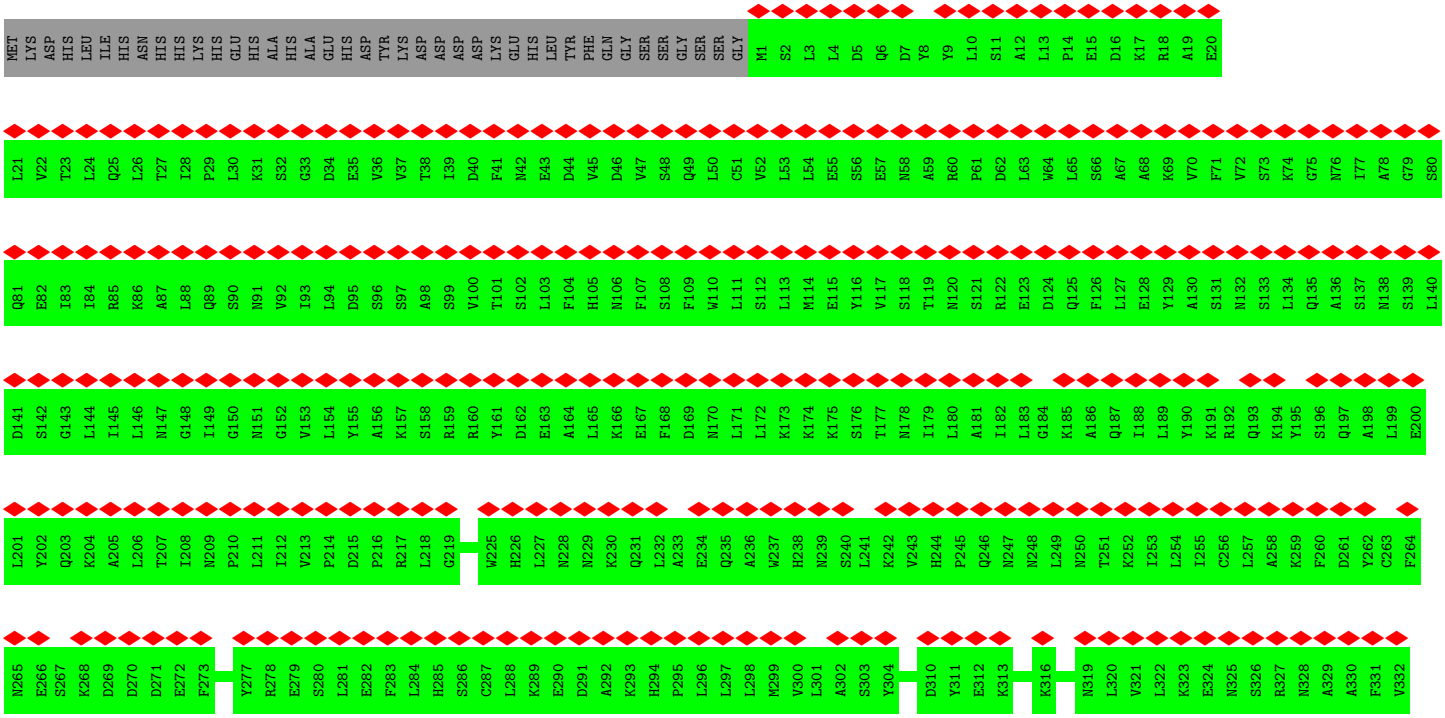
• Molecule 20: Protein that interacts with Spt6p and copurifies with Spt5p and RNA polymerase II

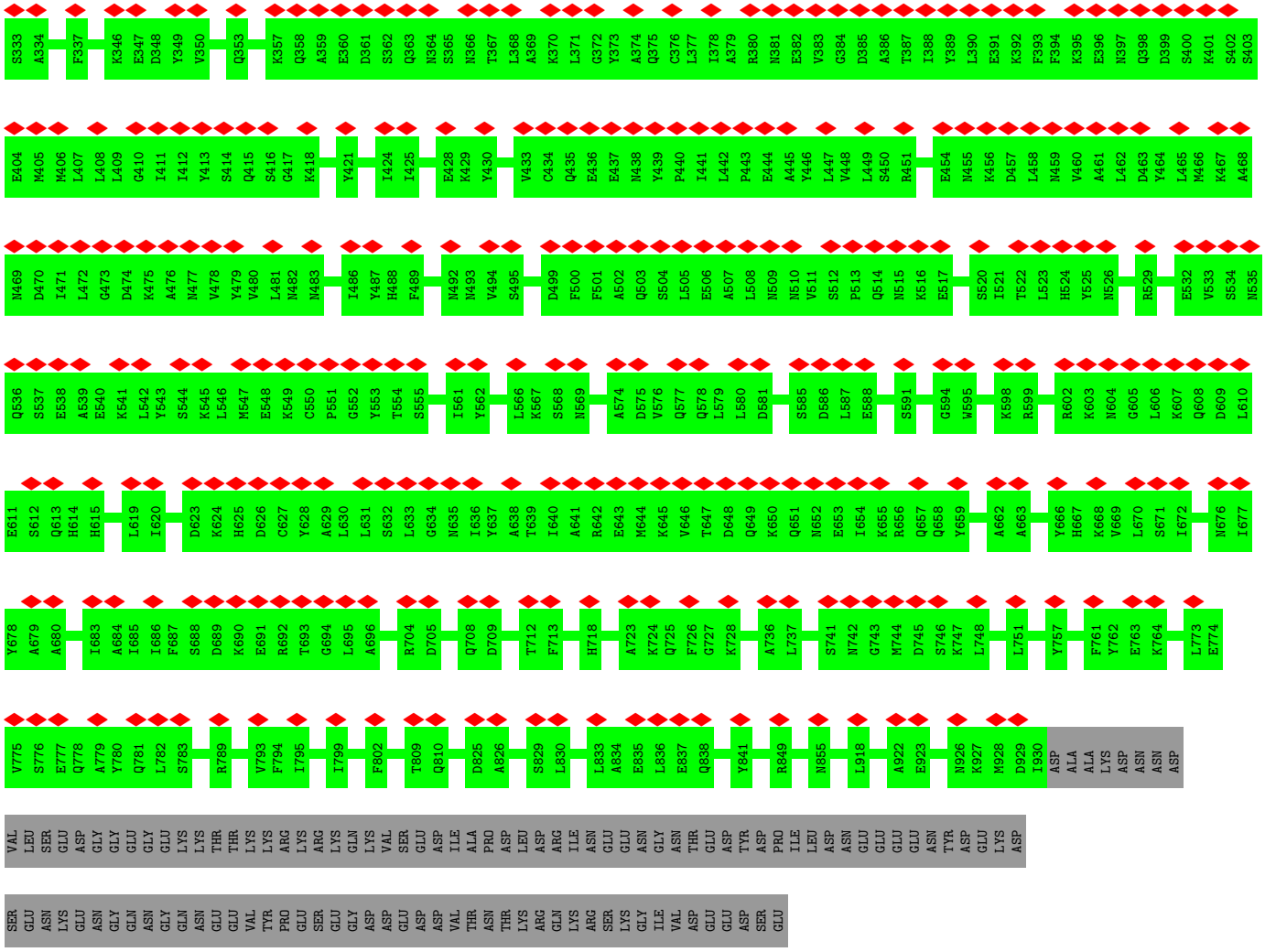
Chain n:



• Molecule 21: Component of the Paf1p complex

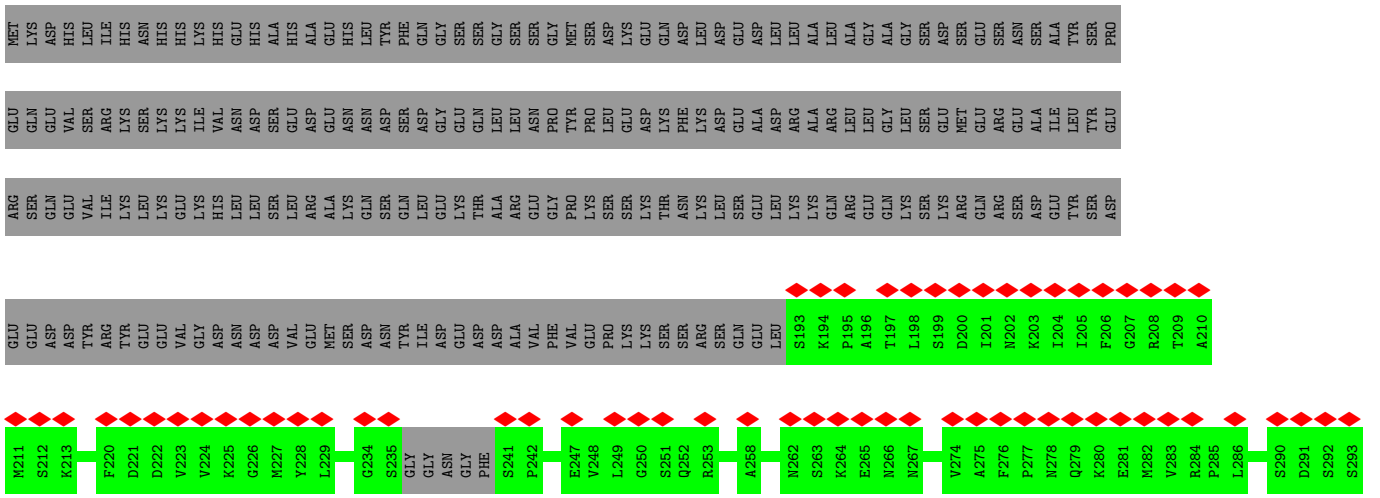
Chain q:

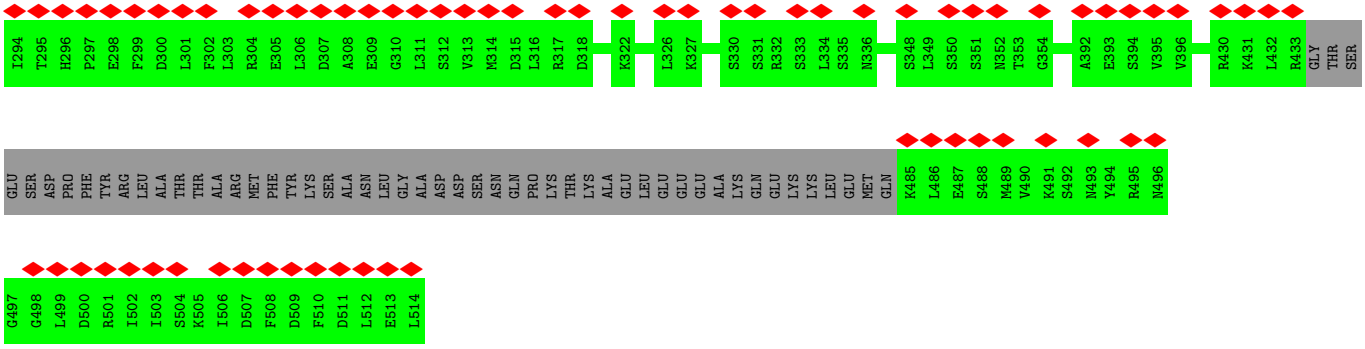




• Molecule 22: RNAPII-associated chromatin remodeling Paf1 complex subunit

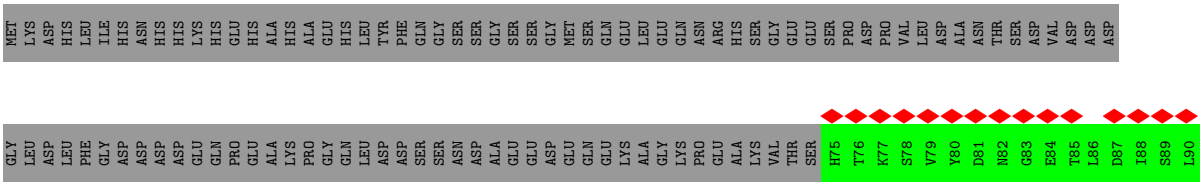
Chain r:





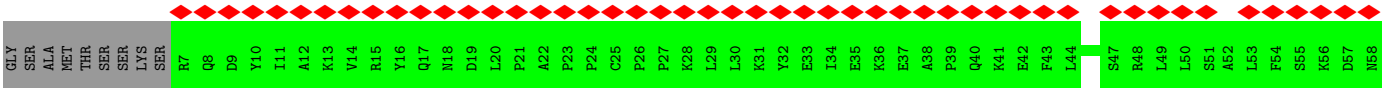
• Molecule 23: Leo1

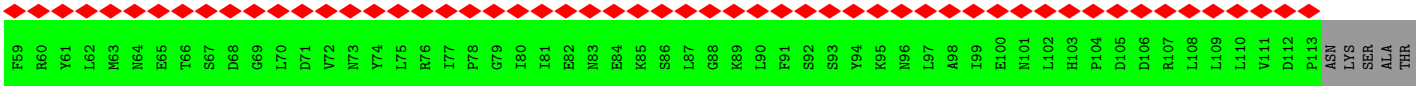
Chain u:

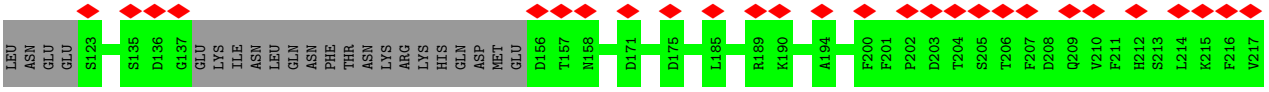


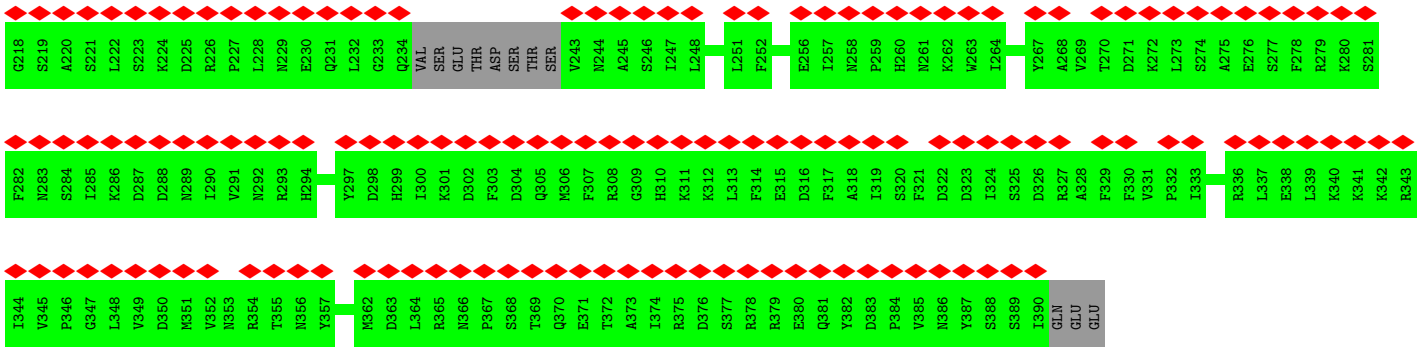
• Molecule 24: RNAP II-associated protein

Chain v:

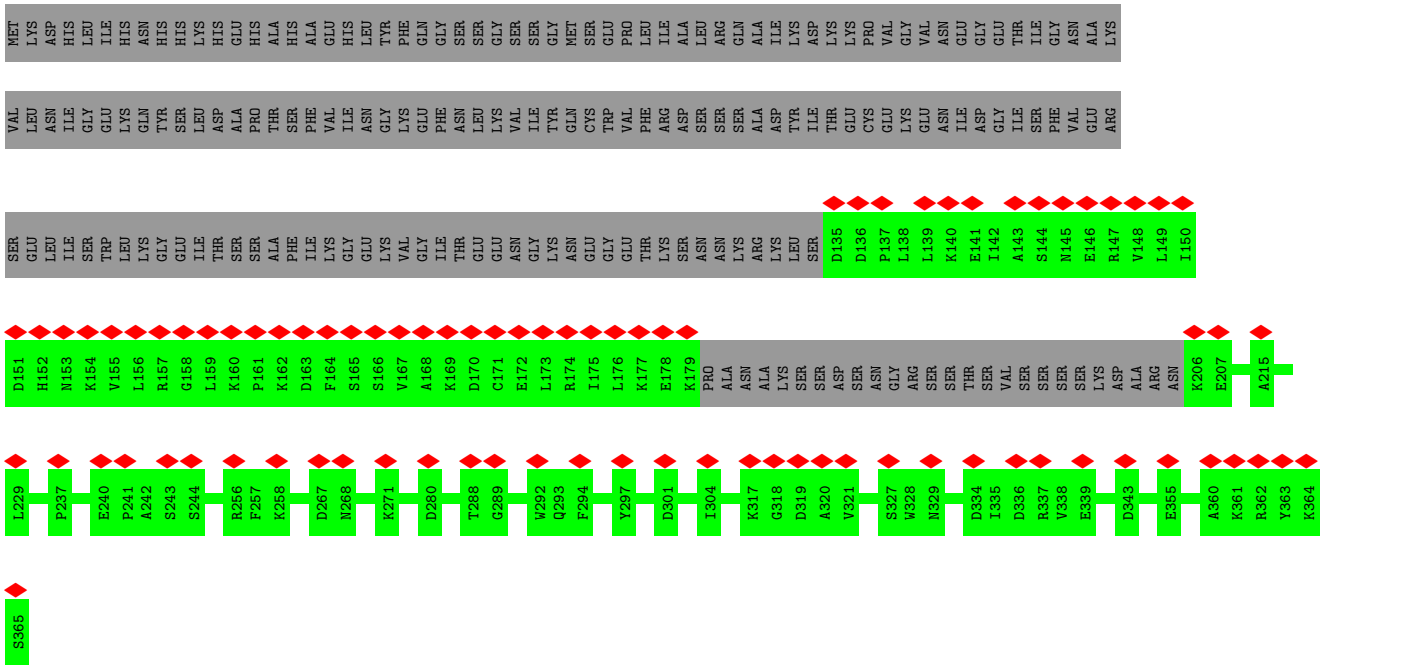




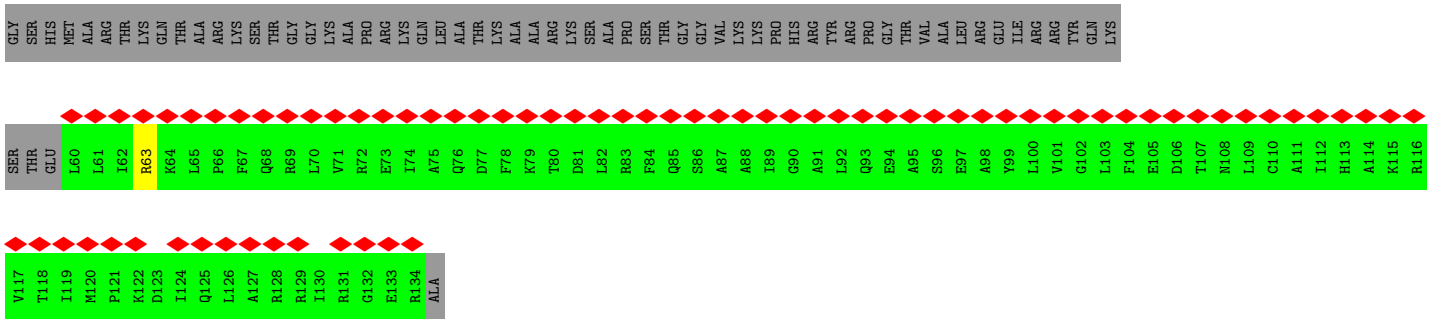




• Molecule 25: Constituent of Paf1 complex with RNA polymerase II, Paf1p, Hpr1p, Ctr9, Leo1, Rtf1 and Ccr4p

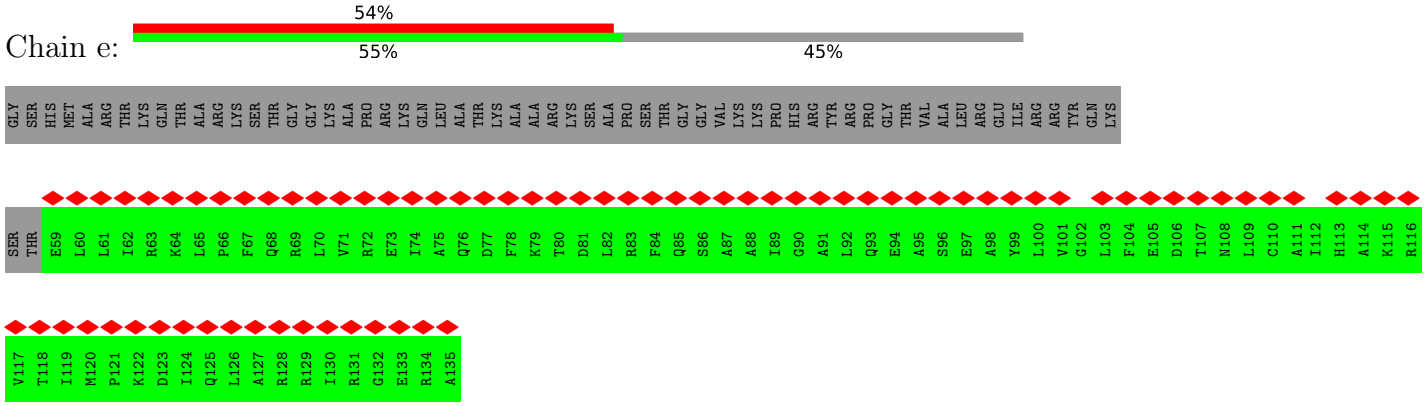


• Molecule 26: Histone H3.3



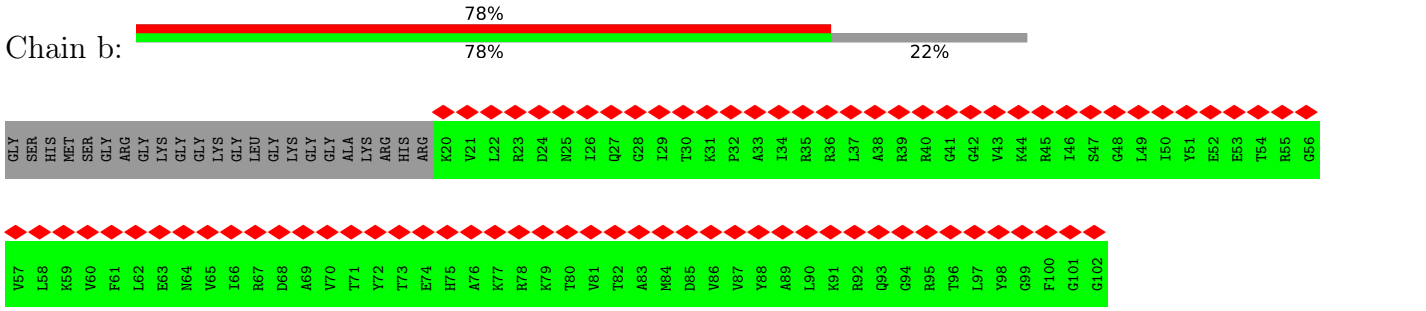
• Molecule 26: Histone H3.3

Chain e:



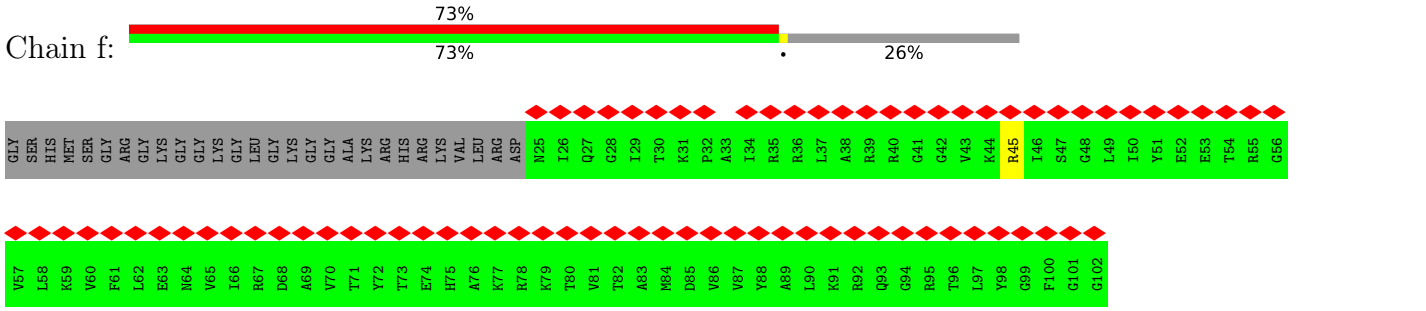
• Molecule 27: Histone H4

Chain b:



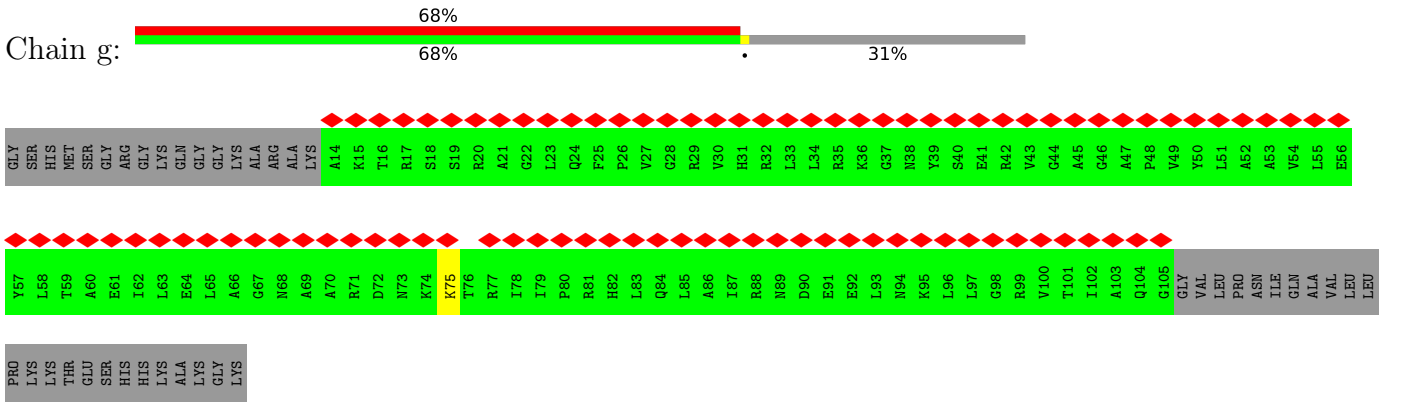
• Molecule 27: Histone H4

Chain f:



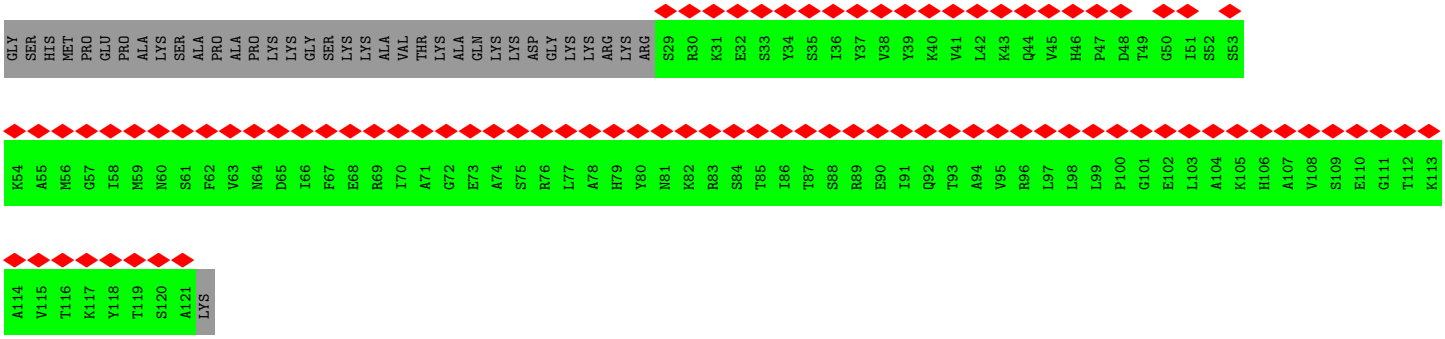
• Molecule 28: Histone H2A type 1-B/E

Chain g:



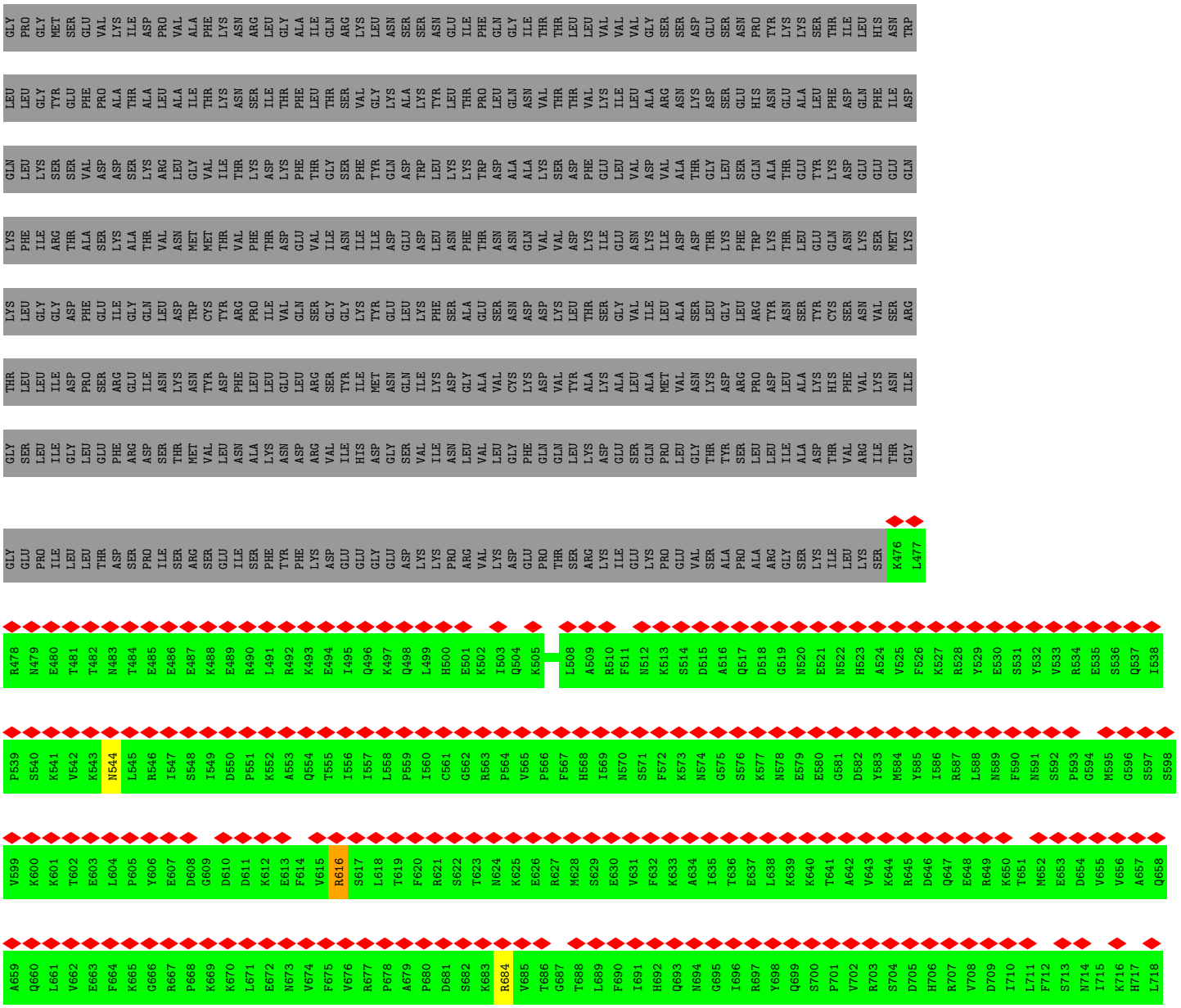
• Molecule 29: Histone H2B type 1-J

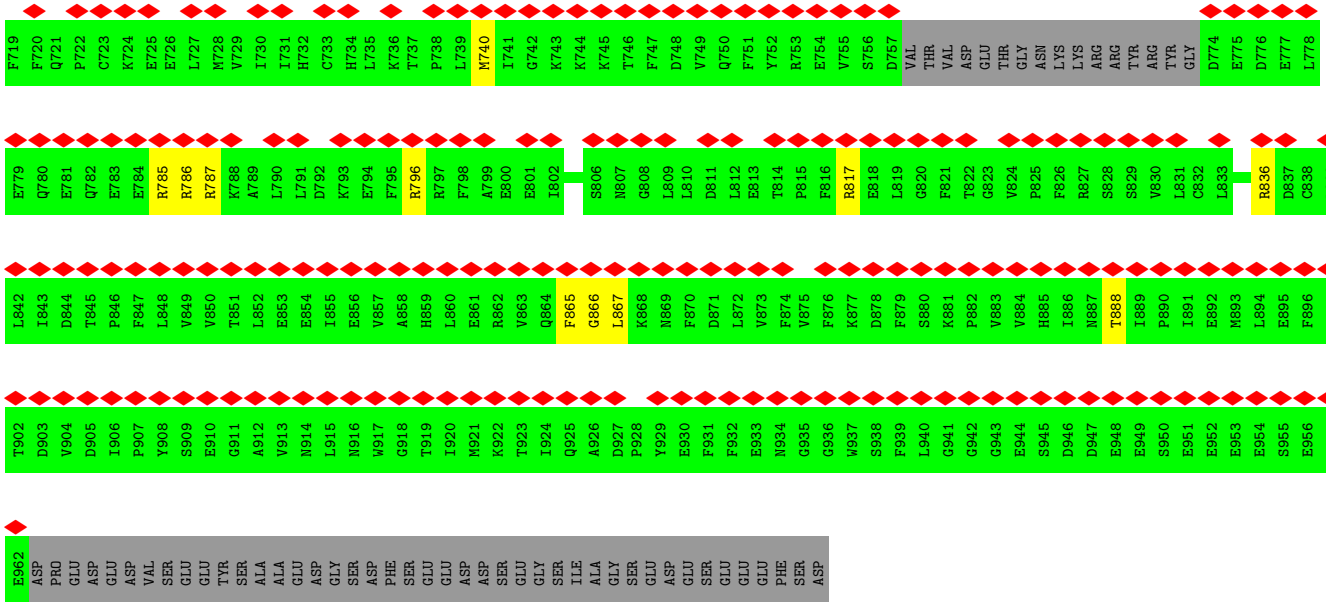
Chain h:



- Molecule 30: FACT complex subunit

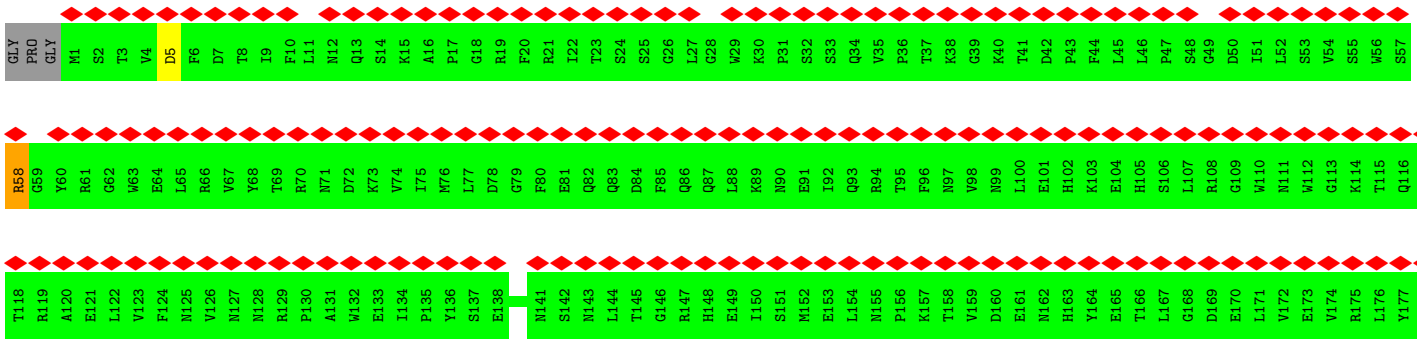
Chain j: 43% 45% 53%





• Molecule 31: FACT complex subunit POB3

Chain k:



SER ALA GLY GLU ASP ASP GLU SER VAL ASP GLU ASP PHE ASN ALA GLY SER ASP SER ASP VAL ALA GLU GLU TYR ASP SER ASN ALA GLY SER GLU ASP GLU ASP SER ASP ALA SER SER GLY GLU PRO GLU LYS LYS LYS PRO LYS HIS

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	29919	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 ($e^-/Å^2$)	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	0.080	Depositor
Minimum map value	-0.052	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.009	Depositor
Map size (Å)	356.16, 356.16, 356.16	wwPDB
Map dimensions	240, 240, 240	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	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: ZN, MG

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|$ >5	RMSZ	#$\|Z\|$ >5
1	A	0.32	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	0.30	0/1773	0.49	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	0.24	0/934	0.50	0/1257
10	J	0.36	0/563	0.50	0/753
11	K	0.32	0/953	0.51	0/1291
12	L	0.33	0/365	0.56	0/484
13	M	0.25	0/513	0.41	0/693
14	N	1.23	25/1693 (1.5%)	1.22	10/2611 (0.4%)
15	P	0.41	0/443	0.83	2/687 (0.3%)
16	T	1.18	14/1963 (0.7%)	1.18	9/3024 (0.3%)
17	V	0.25	0/840	0.50	0/1140
18	W	0.27	0/4300	0.53	2/5812 (0.0%)
19	m	0.24	0/9925	0.45	0/13424
20	n	0.24	0/1132	0.41	0/1526
21	q	0.24	0/7689	0.40	0/10368
22	r	0.24	0/2169	0.45	0/2901
23	u	0.28	0/1740	0.52	1/2347 (0.0%)
24	v	0.25	0/2944	0.47	0/3973
25	x	0.26	0/1716	0.45	0/2310
26	a	0.38	0/613	0.57	0/822
26	e	0.30	0/627	0.58	0/841
27	b	0.36	0/669	0.60	0/894
27	f	0.34	0/626	0.63	1/837 (0.1%)
28	g	0.28	0/723	0.54	0/973
29	h	0.33	0/736	0.48	0/990
30	j	0.68	0/3865	0.84	8/5206 (0.2%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\|>5$	RMSZ	$\#\|Z\|>5$
31	k	0.69	0/3613	0.86	5/4881 (0.1%)
All	All	0.43	39/80469 (0.0%)	0.59	38/109359 (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
14	N	0	3
30	j	0	1
31	k	0	1
All	All	0	5

All (39) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
14	N	-29	DT	C1'-N1	7.24	1.58	1.49
16	T	30	DT	C1'-N1	7.07	1.58	1.49
16	T	42	DC	C1'-N1	7.00	1.58	1.49
16	T	49	DC	C1'-N1	6.93	1.58	1.49
14	N	-27	DC	C1'-N1	6.87	1.58	1.49
16	T	37	DC	C1'-N1	6.83	1.58	1.49
14	N	-60	DT	C1'-N1	6.82	1.58	1.49
14	N	-48	DC	C1'-N1	6.78	1.58	1.49
16	T	51	DC	C1'-N1	6.76	1.58	1.49
14	N	-67	DT	C1'-N1	6.69	1.57	1.49
14	N	-46	DT	C1'-N1	6.68	1.57	1.49
14	N	-59	DT	C1'-N1	6.62	1.57	1.49
16	T	44	DC	C1'-N1	6.41	1.57	1.49
14	N	-64	DT	C1'-N1	6.37	1.57	1.49
16	T	35	DC	C1'-N1	6.37	1.57	1.49
14	N	-76	DC	C1'-N1	6.36	1.57	1.49
14	N	-70	DC	C1'-N1	6.34	1.57	1.49
16	T	45	DC	C1'-N1	6.34	1.57	1.49
14	N	-43	DT	C1'-N1	6.31	1.57	1.49
16	T	66	DC	C1'-N1	6.27	1.57	1.49
14	N	-10	DG	C1'-N9	-6.26	1.38	1.47
14	N	-7	DG	C1'-N9	-6.23	1.38	1.47
16	T	33	DC	C1'-N1	6.19	1.57	1.49
14	N	-50	DT	C1'-N1	6.13	1.57	1.49
14	N	-58	DC	C1'-N1	6.11	1.57	1.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
16	T	31	DT	C1'-N1	6.04	1.57	1.49
14	N	-5	DG	C1'-N9	-5.96	1.39	1.47
14	N	-13	DA	C1'-N9	-5.90	1.39	1.47
16	T	16	DA	C1'-N9	-5.83	1.39	1.47
14	N	-12	DA	C1'-N9	-5.67	1.39	1.47
14	N	2	DG	C1'-N9	-5.59	1.39	1.47
14	N	4	DG	C1'-N9	-5.56	1.39	1.47
14	N	-6	DG	C1'-N9	-5.54	1.39	1.47
14	N	6	DA	C1'-N9	-5.23	1.40	1.47
14	N	-14	DA	C1'-N9	-5.22	1.40	1.47
14	N	-3	DA	C1'-N9	-5.09	1.40	1.47
16	T	76	DG	C1'-N9	-5.07	1.40	1.47
16	T	3	DT	C1'-N1	5.06	1.55	1.49
14	N	-4	DG	C1'-N9	-5.04	1.40	1.47

All (38) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
30	j	836	ARG	NE-CZ-NH1	9.37	124.99	120.30
15	P	10	U	OP1-P-O3'	8.82	124.60	105.20
18	W	431	ARG	NE-CZ-NH1	7.90	124.25	120.30
30	j	684	ARG	NE-CZ-NH1	7.64	124.12	120.30
16	T	43	DA	O4'-C1'-N9	7.49	113.24	108.00
16	T	31	DT	O4'-C1'-N1	7.28	113.09	108.00
14	N	-30	DA	O4'-C1'-N9	7.12	112.98	108.00
30	j	786	ARG	NE-CZ-NH1	7.06	123.83	120.30
14	N	-31	DA	O4'-C1'-N9	7.04	112.93	108.00
15	P	11	U	OP1-P-OP2	-7.04	109.04	119.60
14	N	-49	DG	O4'-C1'-N9	6.93	112.85	108.00
14	N	-38	DT	O4'-C1'-N1	6.86	112.80	108.00
14	N	-43	DT	O4'-C1'-N1	6.83	112.78	108.00
16	T	52	DG	O4'-C1'-N9	6.65	112.66	108.00
14	N	-45	DG	P-O3'-C3'	6.49	127.49	119.70
30	j	817	ARG	NE-CZ-NH1	6.43	123.52	120.30
18	W	410	ARG	NE-CZ-NH1	6.37	123.48	120.30
16	T	29	DA	O4'-C1'-N9	6.28	112.40	108.00
16	T	72	DA	O4'-C1'-N9	6.18	112.33	108.00
16	T	50	DA	O4'-C1'-N9	6.06	112.24	108.00
14	N	-27	DC	O4'-C1'-N1	6.05	112.23	108.00
23	u	273	ARG	NE-CZ-NH1	6.02	123.31	120.30
16	T	33	DC	O4'-C1'-N1	6.00	112.20	108.00
16	T	38	DA	O4'-C1'-N9	5.81	112.07	108.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
30	j	785	ARG	NE-CZ-NH1	5.71	123.15	120.30
27	f	45	ARG	NE-CZ-NH1	5.65	123.12	120.30
30	j	787	ARG	NE-CZ-NH1	5.63	123.12	120.30
14	N	-66	DG	O4'-C1'-N9	5.59	111.92	108.00
31	k	264	ARG	NE-CZ-NH1	5.57	123.08	120.30
31	k	302	ARG	NE-CZ-NH1	5.45	123.03	120.30
30	j	796	ARG	NE-CZ-NH1	5.44	123.02	120.30
14	N	-76	DC	O4'-C1'-N1	5.42	111.79	108.00
31	k	270	ARG	NE-CZ-NH1	5.41	123.01	120.30
31	k	58	ARG	NE-CZ-NH1	5.40	123.00	120.30
14	N	-40	DC	O4'-C1'-N1	5.27	111.69	108.00
30	j	616	ARG	NE-CZ-NH1	5.23	122.91	120.30
16	T	67	DA	O4'-C1'-N9	5.13	111.59	108.00
31	k	5	ASP	CB-CG-OD2	-5.04	113.77	118.30

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
14	N	-42	DG	Sidechain
14	N	-62	DT	Sidechain
14	N	-77	DC	Sidechain
30	j	616	ARG	Sidechain
31	k	58	ARG	Sidechain

5.2 Too-close contacts (i)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

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%)	1354 (97%)	37 (3%)	1 (0%)	51	84
2	B	1154/1227 (94%)	1117 (97%)	37 (3%)	0	100	100
3	C	261/304 (86%)	259 (99%)	2 (1%)	0	100	100
4	D	170/186 (91%)	166 (98%)	4 (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%)	166 (98%)	3 (2%)	0	100	100
8	H	129/145 (89%)	125 (97%)	4 (3%)	0	100	100
9	I	109/115 (95%)	106 (97%)	3 (3%)	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%)	504 (96%)	22 (4%)	1 (0%)	47	79
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	73/139 (52%)	67 (92%)	6 (8%)	0	100	100
26	e	75/139 (54%)	73 (97%)	2 (3%)	0	100	100
27	b	81/106 (76%)	77 (95%)	4 (5%)	0	100	100
27	f	76/106 (72%)	73 (96%)	3 (4%)	0	100	100
28	g	90/133 (68%)	87 (97%)	3 (3%)	0	100	100
29	h	91/129 (70%)	89 (98%)	2 (2%)	0	100	100
30	j	467/1008 (46%)	446 (96%)	19 (4%)	2 (0%)	34	71
31	k	430/531 (81%)	409 (95%)	20 (5%)	1 (0%)	47	79
All	All	9224/12743 (72%)	8982 (97%)	237 (3%)	5 (0%)	54	84

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	960	VAL
30	j	544	ASN
18	W	319	LYS
31	k	410	SER
30	j	866	GLY

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%)	477 (99%)	3 (1%)	86 91
19	m	1087/1354 (80%)	1086 (100%)	1 (0%)	93 97
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

Continued on next page...

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
24	v	325/369 (88%)	325 (100%)	0	100 100
25	x	190/354 (54%)	190 (100%)	0	100 100
26	a	63/112 (56%)	62 (98%)	1 (2%)	62 79
26	e	64/112 (57%)	64 (100%)	0	100 100
27	b	68/81 (84%)	68 (100%)	0	100 100
27	f	63/81 (78%)	63 (100%)	0	100 100
28	g	72/102 (71%)	71 (99%)	1 (1%)	67 81
29	h	79/107 (74%)	79 (100%)	0	100 100
30	j	412/910 (45%)	408 (99%)	4 (1%)	76 86
31	k	396/474 (84%)	393 (99%)	3 (1%)	81 89
All	All	8300/11238 (74%)	8278 (100%)	22 (0%)	92 95

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	408	ARG
1	A	831	LYS
1	A	1302	LYS
2	B	463	LYS
2	B	904	ARG
5	E	36	GLN
5	E	166	ARG
13	M	40	LYS
18	W	318	VAL
18	W	319	LYS
18	W	459	ILE
19	m	514	LYS
23	u	124	ARG
26	a	63	ARG
28	g	75	LYS
30	j	740	MET
30	j	865	PHE
30	j	867	LEU
30	j	888	THR
31	k	236	ARG
31	k	388	LYS
31	k	413	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11)

such sidechains are listed below:

Mol	Chain	Res	Type
1	A	737	ASN
8	H	44	ASN
9	I	11	ASN
18	W	644	ASN
19	m	955	ASN
20	n	232	GLN
21	q	147	ASN
25	x	296	ASN
27	b	25	ASN
30	j	916	ASN
31	k	127	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
15	P	19/19 (100%)	10 (52%)	1 (5%)

All (10) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
15	P	-6	G
15	P	-5	U
15	P	-4	A
15	P	-3	A
15	P	-2	U
15	P	0	C
15	P	1	C
15	P	8	G
15	P	9	G
15	P	11	U

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
15	P	-7	U

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.

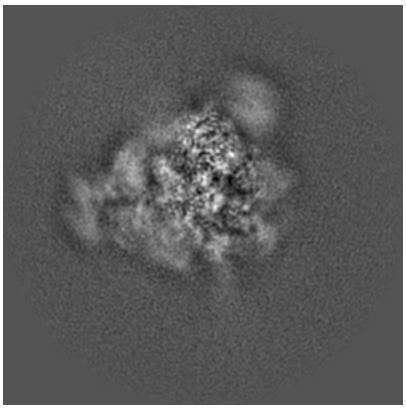
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-33450. These allow visual inspection of the internal detail of the map and identification of artifacts.

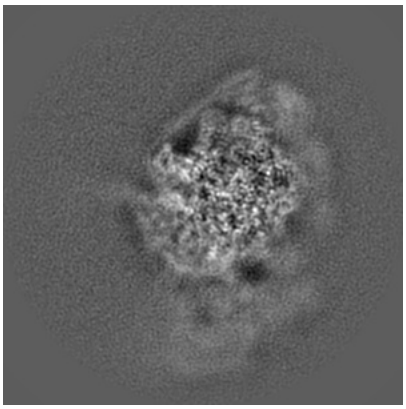
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

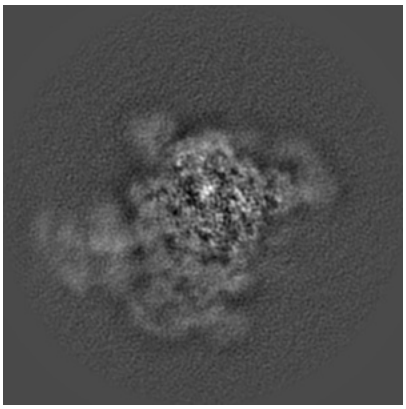
6.1.1 Primary map



X

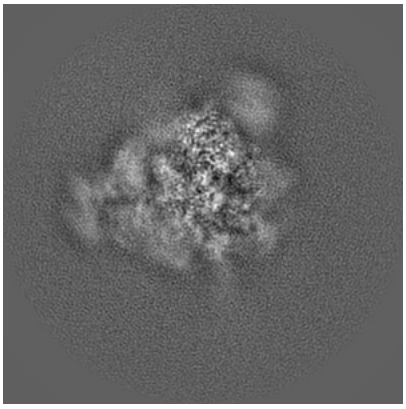


Y

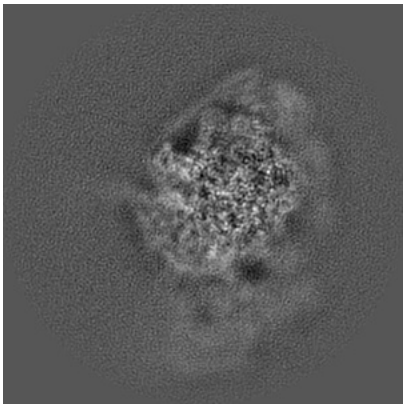


Z

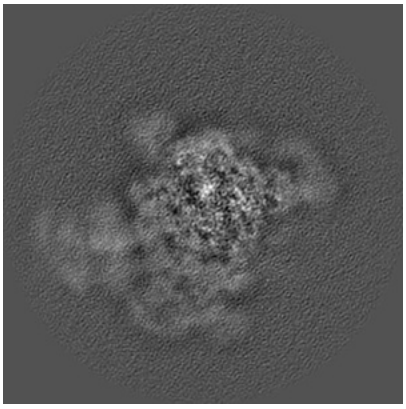
6.1.2 Raw map



X



Y

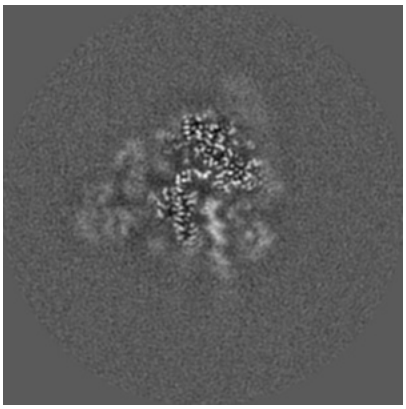


Z

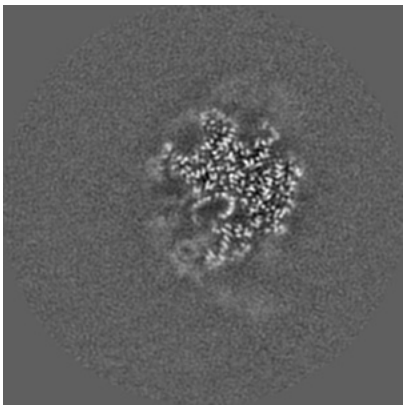
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

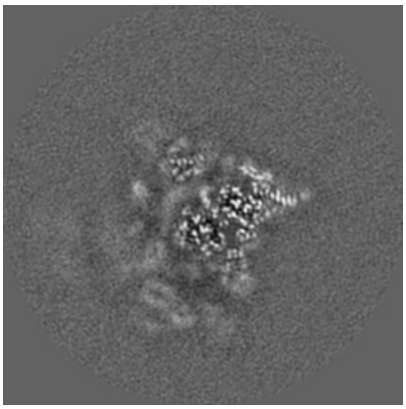
6.2.1 Primary map



X Index: 120

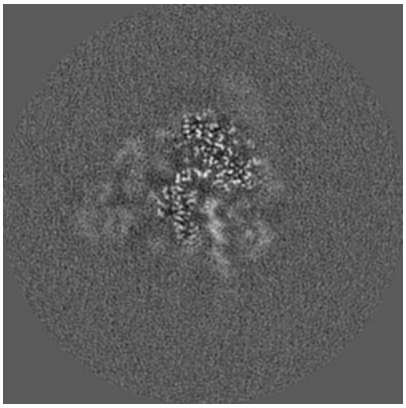


Y Index: 120

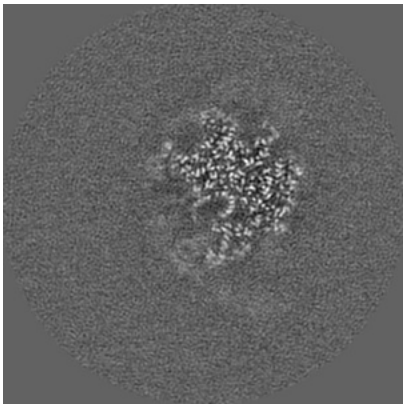


Z Index: 120

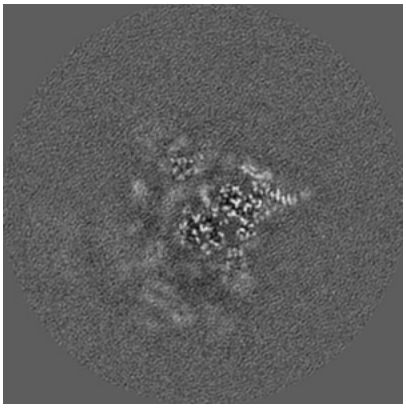
6.2.2 Raw map



X Index: 120



Y Index: 120

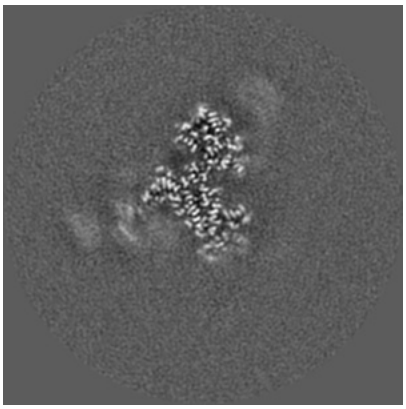


Z Index: 120

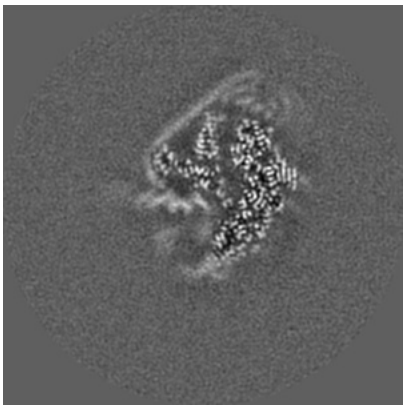
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

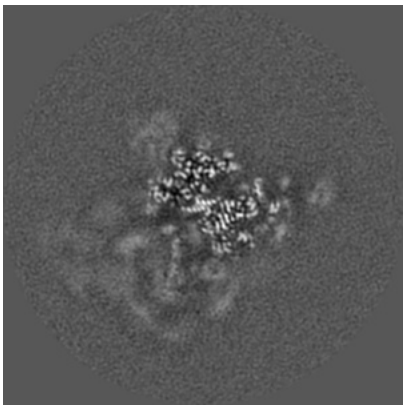
6.3.1 Primary map



X Index: 141

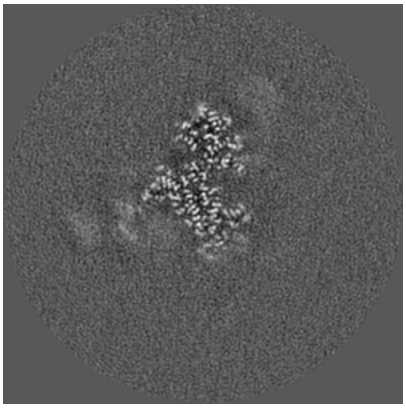


Y Index: 127

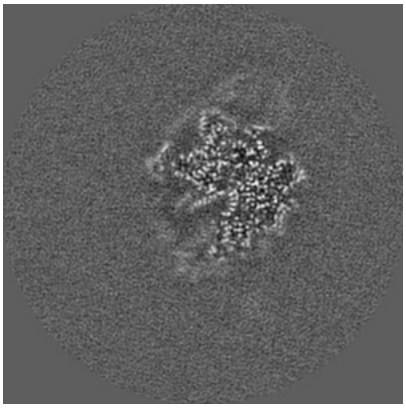


Z Index: 137

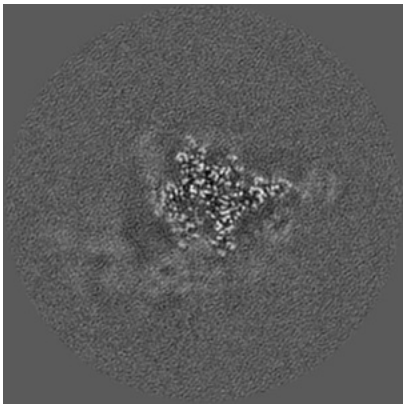
6.3.2 Raw map



X Index: 141



Y Index: 122

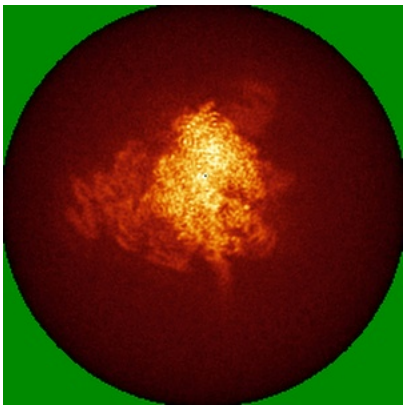


Z Index: 144

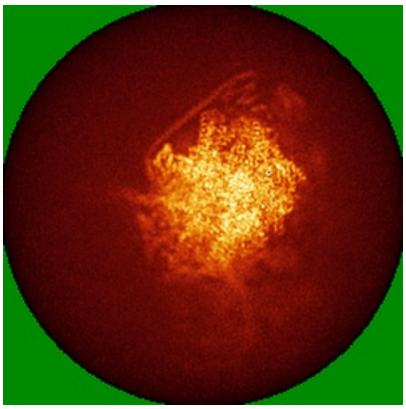
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

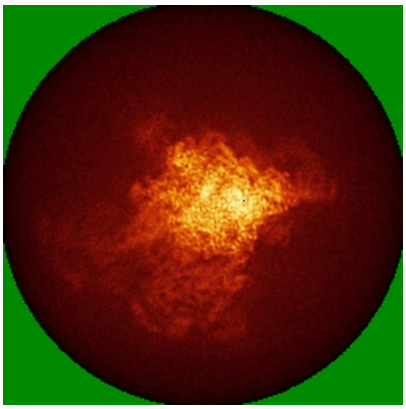
6.4.1 Primary map



X

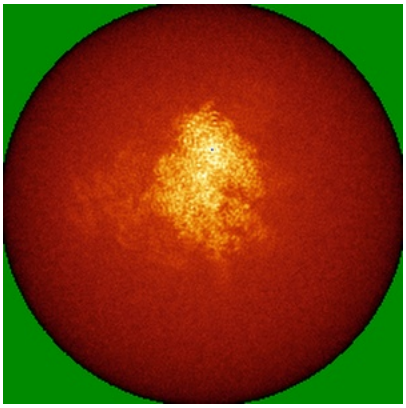


Y

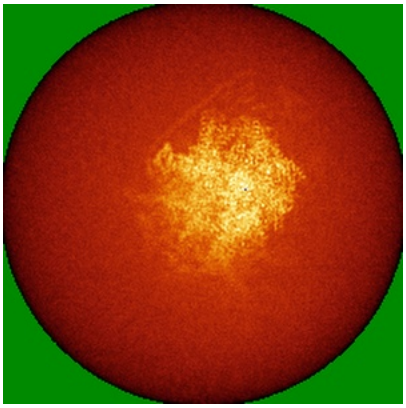


Z

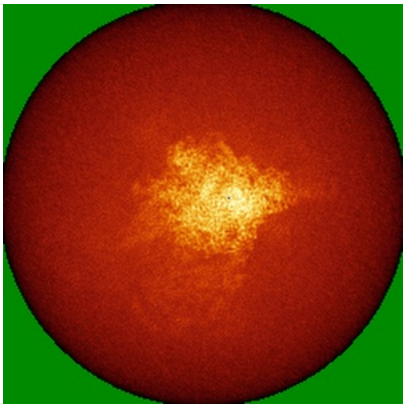
6.4.2 Raw map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.009. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

X Y Z

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

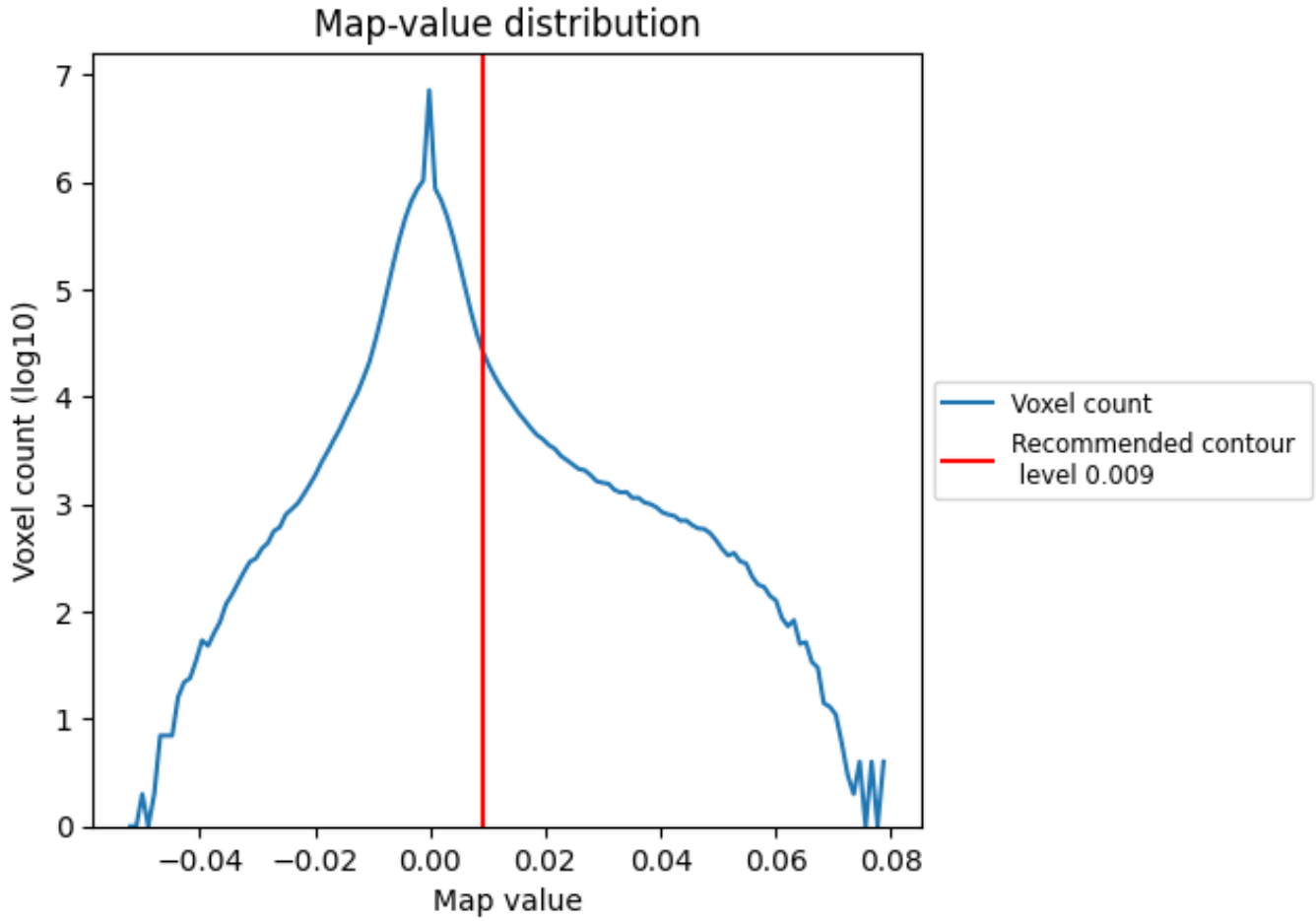
6.6 Mask visualisation (i)

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

7 Map analysis

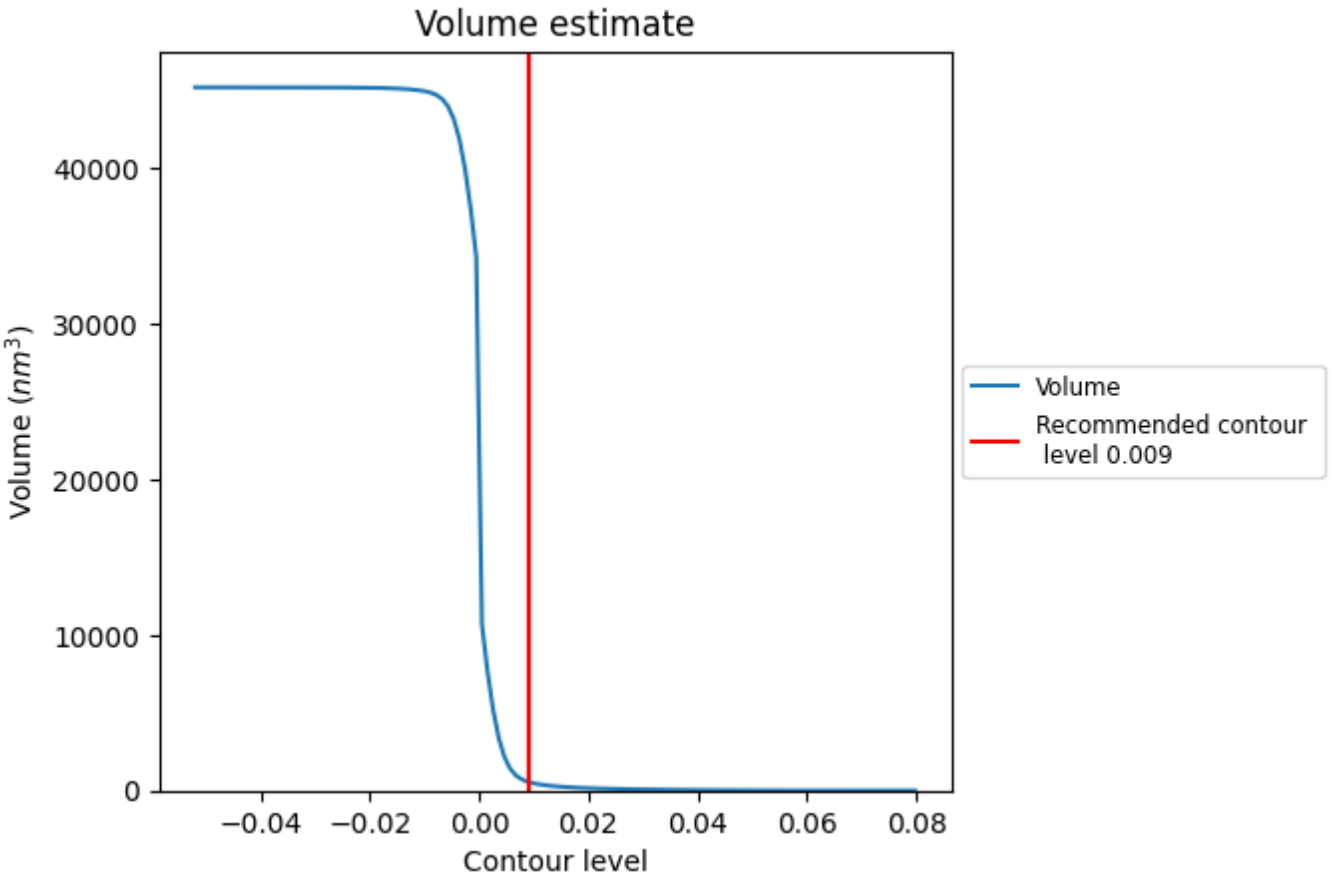
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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.

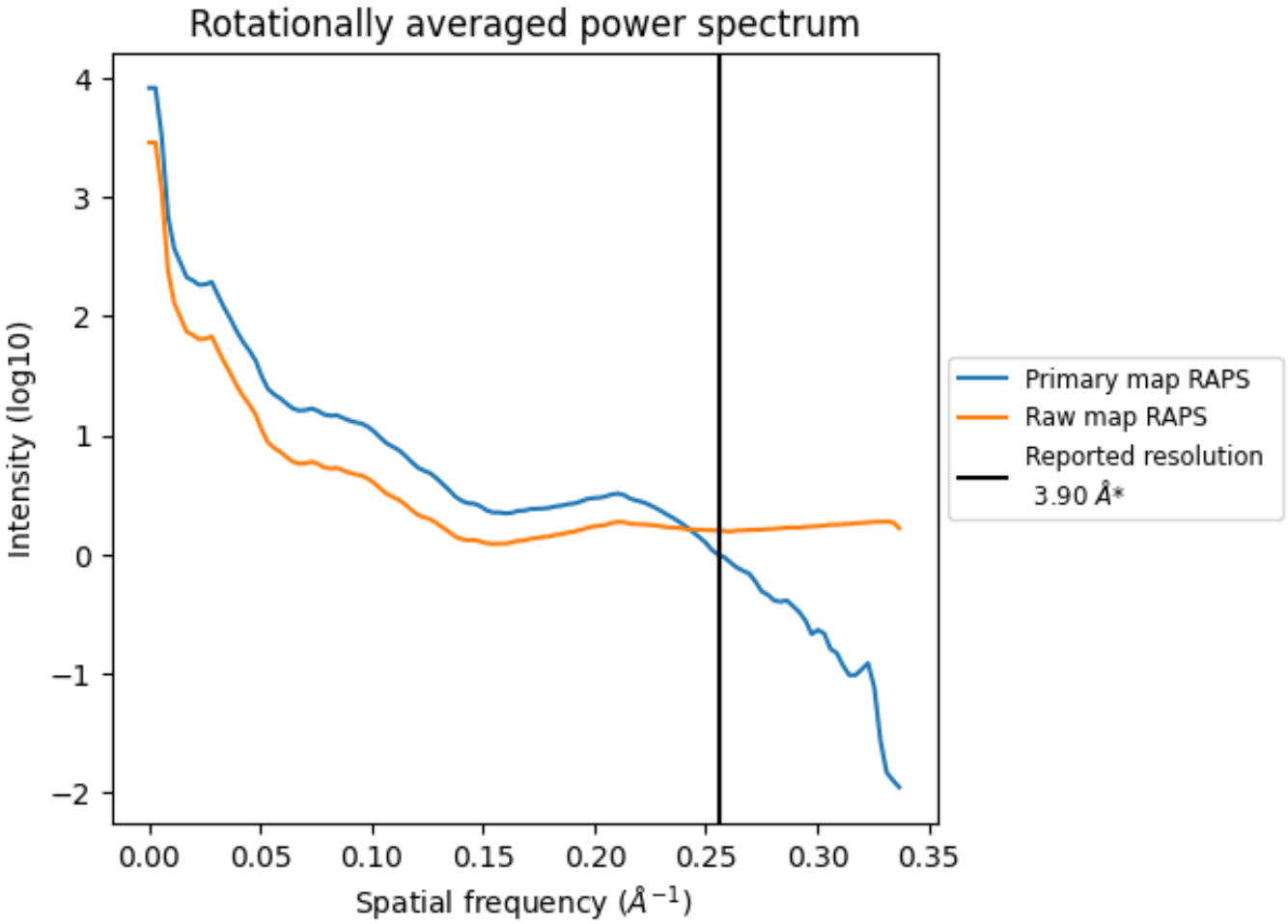
7.2 Volume estimate



The volume at the recommended contour level is 557 nm^3; this corresponds to an approximate mass of 503 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)

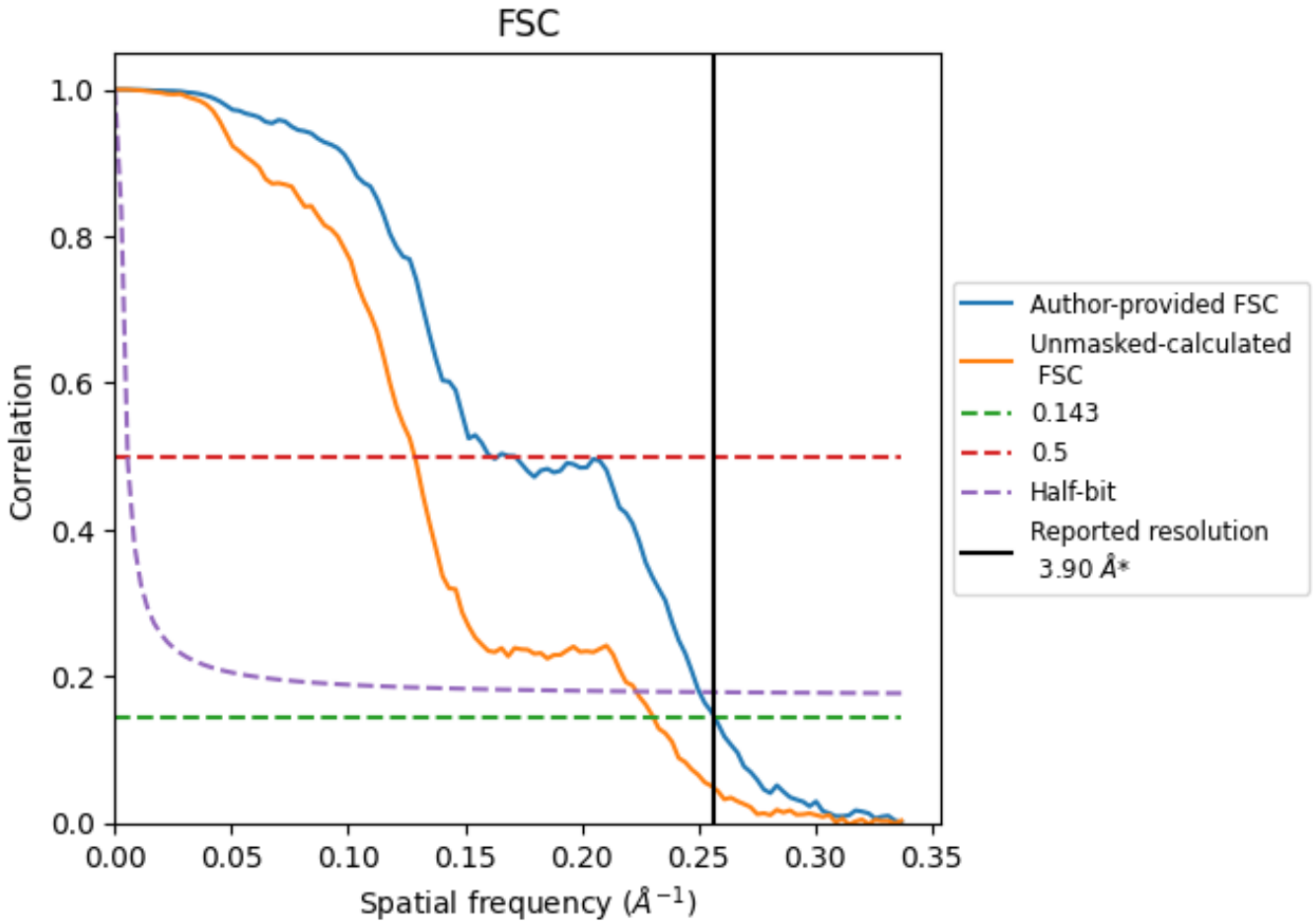


*Reported resolution corresponds to spatial frequency of 0.256 Å^{-1}

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.256 Å^{-1}

8.2 Resolution estimates (i)

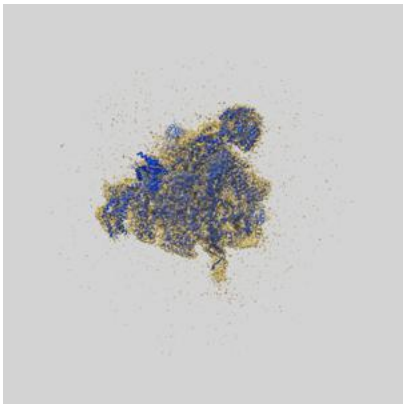
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	3.89	6.21	3.99
Unmasked-calculated*	4.33	7.79	4.48

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.33 differs from the reported value 3.9 by more than 10 %

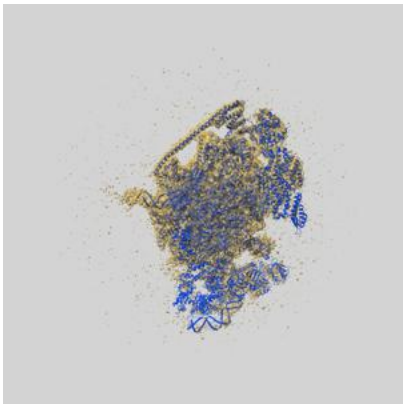
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-33450 and PDB model 7XTI. Per-residue inclusion information can be found in section 3 on page 15.

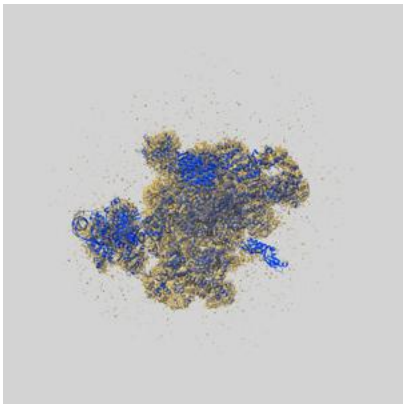
9.1 Map-model overlay



X



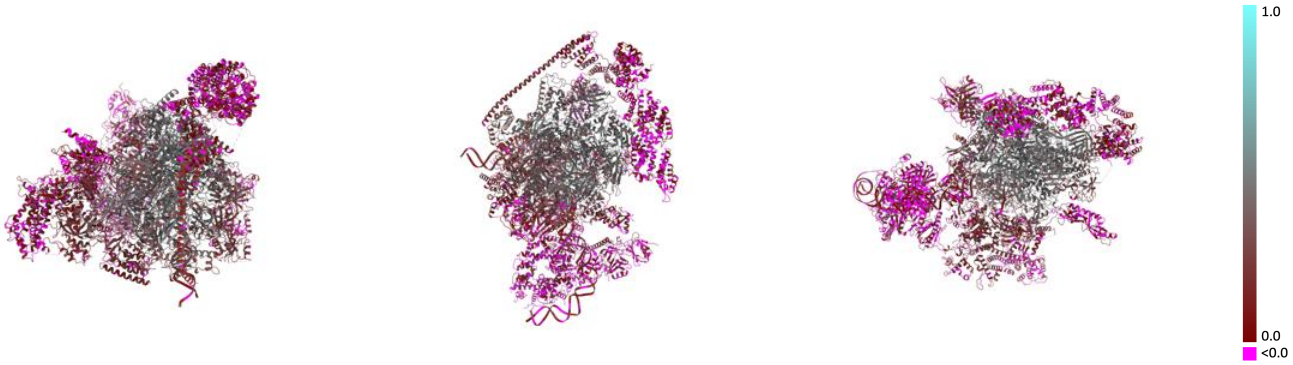
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.009 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.

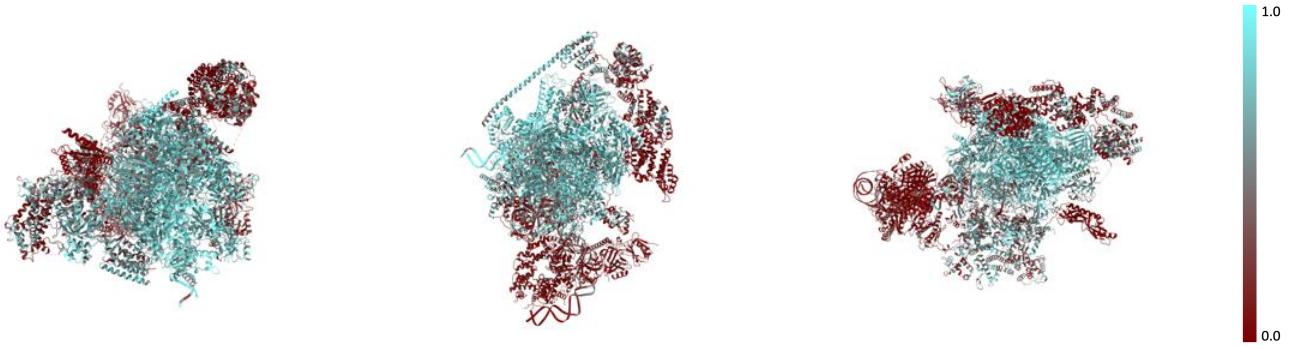
9.2 Q-score mapped to coordinate model



X Y Z

The images above show the model with each residue coloured according 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.

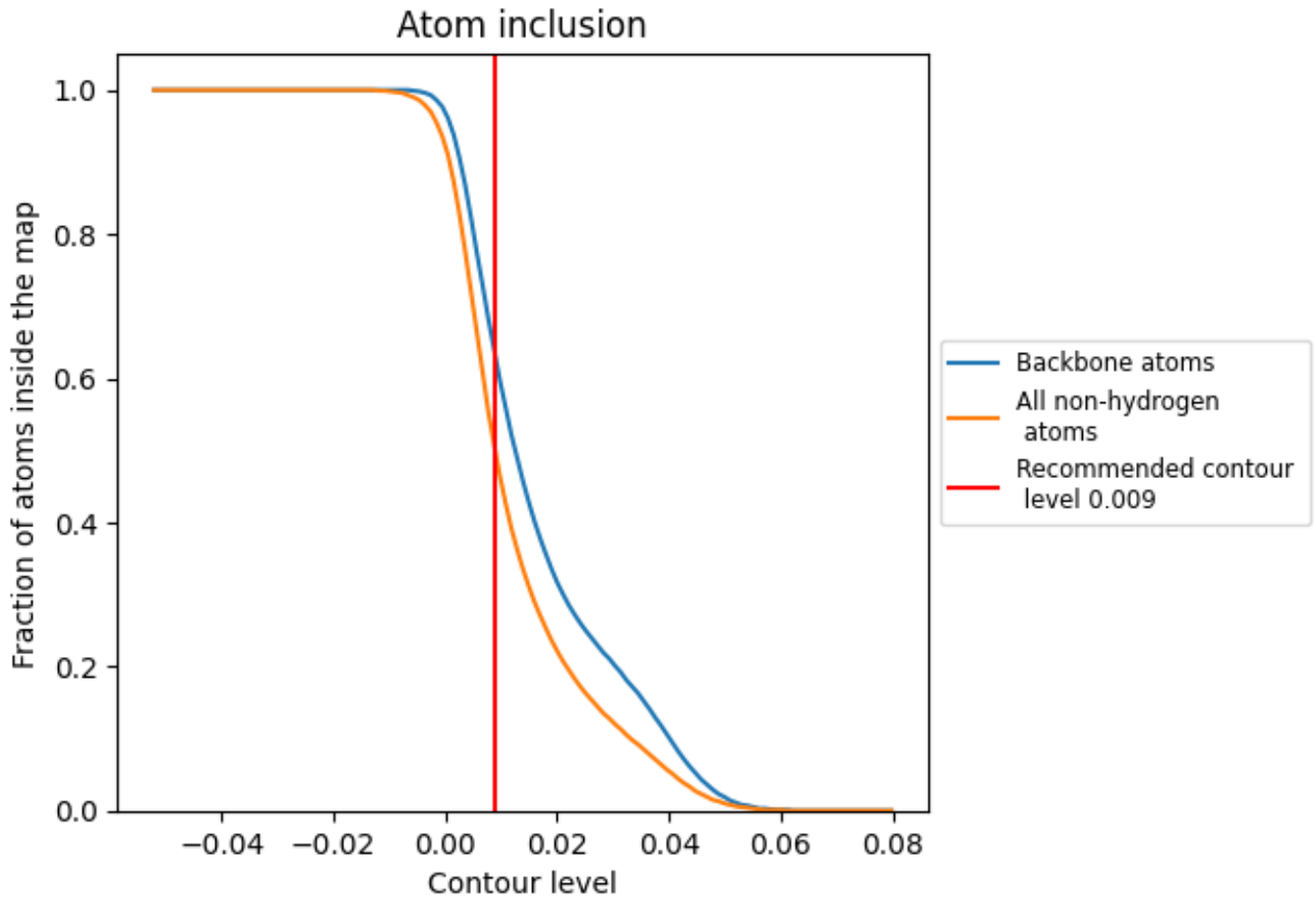
9.3 Atom inclusion mapped to coordinate model



X Y Z

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 (0.009).

9.4 Atom inclusion (i)



At the recommended contour level, 63% of all backbone atoms, 50% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.009) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.4970	0.2230
A	0.8010	0.4150
B	0.7730	0.4240
C	0.8280	0.4490
D	0.5760	0.2200
E	0.8190	0.3930
F	0.8340	0.4540
G	0.6500	0.3110
H	0.8320	0.4370
I	0.5660	0.2580
J	0.8030	0.4390
K	0.8600	0.4490
L	0.7760	0.3940
M	0.4840	0.1560
N	0.5170	0.1350
P	0.7170	0.3150
T	0.5760	0.1810
V	0.5270	0.1470
W	0.4440	0.2020
a	0.0510	0.0260
b	0.0130	-0.0180
e	0.0620	0.0120
f	0.0540	0.0290
g	0.0200	-0.0390
h	0.0110	0.0110
j	0.0970	0.0240
k	0.0470	0.0070
m	0.3840	0.1050
n	0.5920	0.1790
q	0.3060	0.0760
r	0.3890	0.1540
u	0.3300	0.1560
v	0.2050	0.0880
x	0.4290	0.2490