



Full wwPDB EM Validation Report ⓘ

Dec 17, 2024 – 12:40 PM EST

PDB ID : 9EH2
EMDB ID : EMD-48044
Title : RNA polymerase II-DSIF-SPT6-PAF1c-TFIIS-IWS1-SETD2-FACT nucleosome upstream
Authors : Markert, J.; Farnung, L.
Deposited on : 2024-11-21
Resolution : 3.10 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:

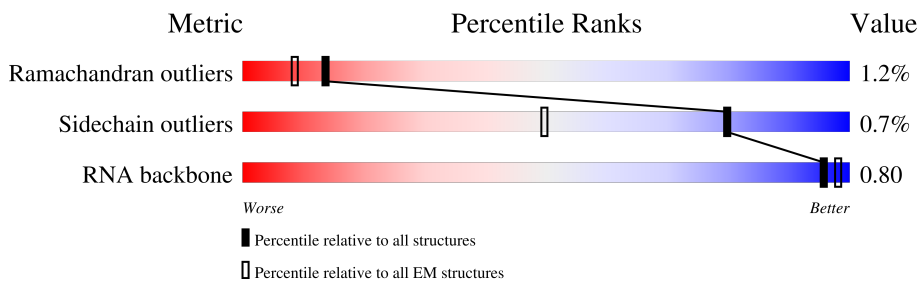
EMDB validation analysis : 0.0.1.dev113
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4.02b-467
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

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 3.10 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	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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	1984	
2	B	1251	
3	C	275	
4	D	142	
5	E	210	
6	F	127	
7	G	172	
8	H	150	



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Mol	Chain	Length	Quality of chain
9	I	125	92% 7%
10	J	67	94%
11	K	117	97%
12	L	58	76% 5% 19%
13	M	1729	10% 66% 32%
14	N	205	26% 74%
15	O	821	9% 16% 84%
16	P	11	9% 64% 36%
17	Q	1179	33% 74% 25%
18	R	713	11% 39% 60%
19	S	304	13% 52% 47%
20	T	215	30% 70%
21	U	666	15% 18% 81%
22	V	531	36% 45% 54%
23	W	305	21% 98%
24	X	531	5% 8% 92%
25	Y	121	17% 96%
26	Z	1087	16% 46% 53%
27	a	136	56% 44%
27	e	136	55% 45%
28	b	103	74% 24%
28	f	103	68% 30%
29	g	130	68% 31%
30	h	123	72% 28%
31	l	1133	98%

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Mol	Chain	Length	Quality of chain
32	x	1049	 <p>44% 54%</p>
33	y	709	 <p>8% 59% 40%</p>

2 Entry composition [i](#)

There are 35 unique types of molecules in this entry. The entry contains 148010 atoms, of which 72095 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	H	N	O	P	S		
1	A	1426	22643	7074	11388	2014	2095	2	70	0	0

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
2	B	1122	18007	5684	9027	1576	1656	64	0	0

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
3	C	258	4096	1300	2024	356	410	6	0	0

- Molecule 4 is a protein called RNA polymerase Rpb4/RPC9 core domain-containing protein.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
4	D	126	1985	630	981	170	200	4	0	0

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
5	E	209	3458	1089	1738	300	323	8	0	0

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

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
6	F	78	1284	401	658	106	114	5	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
7	G	171	2654	866	1321	214	245	8	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
8	H	149	2354	759	1157	195	238	5	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
9	I	116	1822	582	880	168	181	11	0	0

- Molecule 10 is a protein called DNA-directed RNA polymerases I, II, and III subunit RPABC5.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
10	J	66	1068	339	544	88	91	6	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
11	K	115	1862	593	942	152	173	2	0	0

- Molecule 12 is a protein called RNA polymerase II subunit K.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
12	L	47	803	246	406	77	68	6	0	0

- Molecule 13 is a protein called Transcription elongation factor SPT6.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
13	M	1172	18977	6063	9394	1658	1815	47	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
M	-2	SER	-	expression tag	UNP Q7KZ85
M	-1	ASN	-	expression tag	UNP Q7KZ85
M	0	ALA	-	expression tag	UNP Q7KZ85

- Molecule 14 is a DNA chain called non-template DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	54	Total	C	N	O	P	0	0
			1106	526	182	344	54		

- Molecule 15 is a protein called Protein IWS1 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace	
15	O	132	Total	C	H	N	O	S	0	0
			2143	663	1097	181	196	6		

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
O	-1	SER	-	expression tag	UNP Q96ST2
O	0	ASN	-	expression tag	UNP Q96ST2
O	1	ALA	-	expression tag	UNP Q96ST2

- Molecule 16 is a RNA chain called RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	P	11	Total	C	N	O	P	0	0
			232	103	35	83	11		

- Molecule 17 is a protein called RNA polymerase-associated protein CTR9 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace	
17	Q	890	Total	C	H	N	O	S	0	0
			14396	4579	7170	1264	1352	31		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Q	1174	GLU	-	expression tag	UNP Q6PD62
Q	1175	ASN	-	expression tag	UNP Q6PD62
Q	1176	LEU	-	expression tag	UNP Q6PD62
Q	1177	TYR	-	expression tag	UNP Q6PD62

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Chain	Residue	Modelled	Actual	Comment	Reference
Q	1178	PHE	-	expression tag	UNP Q6PD62
Q	1179	GLN	-	expression tag	UNP Q6PD62

- Molecule 18 is a protein called RNA polymerase-associated protein RTF1 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
18	R	283	4222	1349	2056	409	400	8	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R	-2	SER	-	expression tag	UNP Q92541
R	-1	ASN	-	expression tag	UNP Q92541
R	0	ALA	-	expression tag	UNP Q92541

- Molecule 19 is a protein called Transcription elongation factor A protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
19	S	161	858	334	201	161	162	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
S	-2	SER	-	expression tag	UNP P23193
S	-1	ASN	-	expression tag	UNP P23193
S	0	ALA	-	expression tag	UNP P23193

- Molecule 20 is a DNA chain called Template DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
20	T	65	1335	627	279	364	65	0	0

- Molecule 21 is a protein called RNA polymerase-associated protein LEO1.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
21	U	125	1540	538	684	151	166	1	0	0

- Molecule 22 is a protein called RNA polymerase II-associated factor 1 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
22	V	244	3150	1065	1443	305	333	4	0	0

- Molecule 23 is a protein called WDR61.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
23	W	300	4582	1483	2249	392	454	4	0	0

- Molecule 24 is a protein called Parafibromin.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			
24	X	43	725	220	372	69	64		0	0

- Molecule 25 is a protein called Transcription elongation factor SPT4.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
25	Y	116	1820	570	909	159	173	9	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Y	-3	GLY	-	expression tag	UNP P63272
Y	-2	PRO	-	expression tag	UNP P63272
Y	-1	GLY	-	expression tag	UNP P63272
Y	0	SER	-	expression tag	UNP P63272

- Molecule 26 is a protein called Transcription elongation factor SPT5.

Mol	Chain	Residues	Atoms						AltConf	Trace	
			Total	C	H	N	O	P			S
26	Z	510	8071	2552	4046	709	745	1	18	0	0

- Molecule 27 is a protein called Histone H3.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
27	a	76	1237	391	621	112	110	3	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
27	e	75	1225	387	617	111	107	3	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	36	MET	LYS	engineered mutation	UNP A0A310TTQ1
e	36	MET	LYS	engineered mutation	UNP A0A310TTQ1

- Molecule 28 is a protein called Histone H4.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
28	b	78	1283	393	661	120	108	1	0	0
28	f	72	1195	361	619	114	100	1	0	0

- Molecule 29 is a protein called Histone H2A type 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
29	g	90	1425	441	721	140	123	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
g	99	ARG	GLY	conflict	UNP P06897
g	123	SER	ALA	conflict	UNP P06897

- Molecule 30 is a protein called Histone H2B 1.1.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
30	h	89	1387	438	693	122	132	2	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
h	3	MET	-	initiating methionine	UNP P02281
h	32	THR	SER	engineered mutation	UNP P02281

- Molecule 31 is a protein called Histone-lysine N-methyltransferase SETD2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
31	1	23	395	119	200	35	41	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1	1432	SER	-	expression tag	UNP Q9BYW2
1	1433	ASN	-	expression tag	UNP Q9BYW2
1	1434	ALA	-	expression tag	UNP Q9BYW2
1	1962	LEU	PRO	conflict	UNP Q9BYW2

- Molecule 32 is a protein called FACT complex subunit SPT16.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
32	x	483	7818	2506	3870	682	743	17	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
x	-1	SER	-	expression tag	UNP Q9Y5B9
x	0	ASN	-	expression tag	UNP Q9Y5B9

- Molecule 33 is a protein called FACT complex subunit SSRP1.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
33	y	422	6842	2201	3406	585	635	15	0	0

- Molecule 34 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
34	A	2	Total	Zn	0
			2	2	
34	B	1	Total	Zn	0
			1	1	
34	C	1	Total	Zn	0
			1	1	
34	I	2	Total	Zn	0
			2	2	

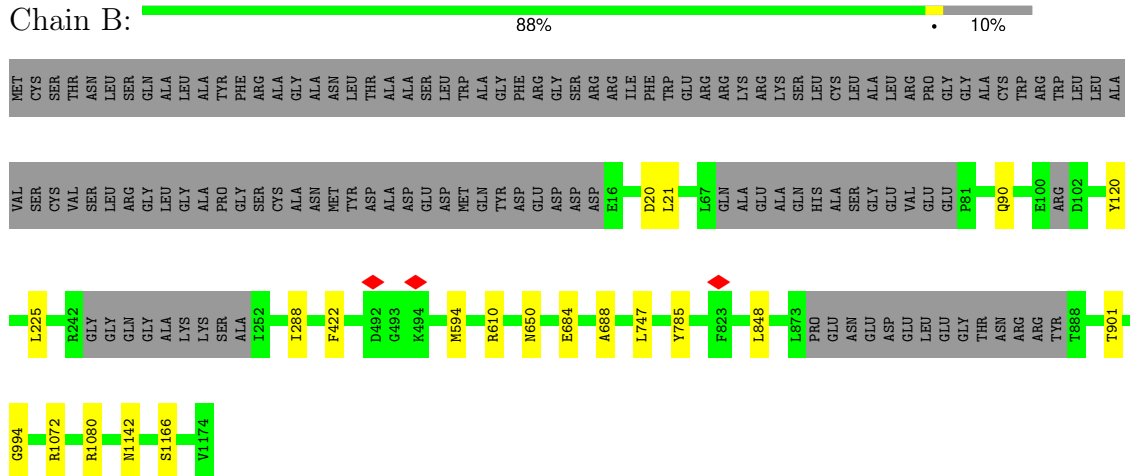
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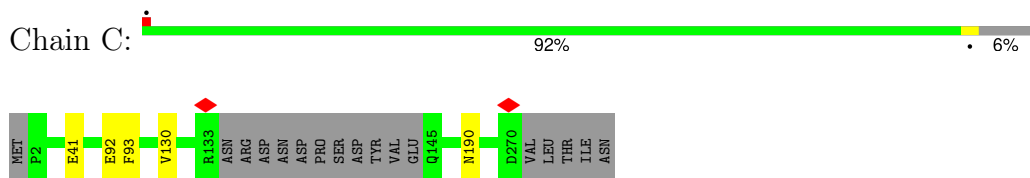
Mol	Chain	Residues	Atoms		AltConf
34	J	1	Total 1	Zn 1	0
34	L	1	Total 1	Zn 1	0
34	Y	1	Total 1	Zn 1	0

- Molecule 35 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

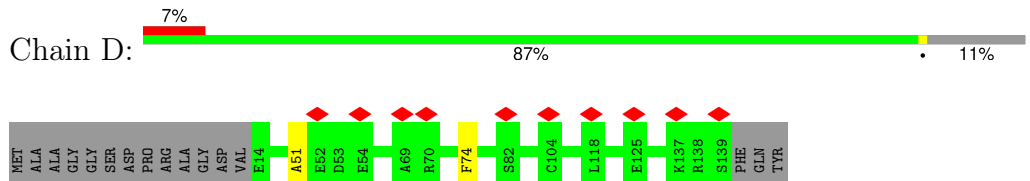
Mol	Chain	Residues	Atoms		AltConf
35	A	1	Total 1	Mg 1	0



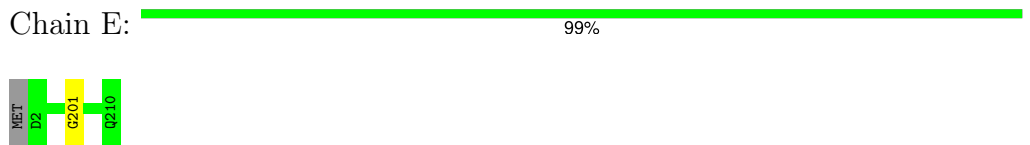
- Molecule 3: DNA-directed RNA polymerase II subunit RPB3



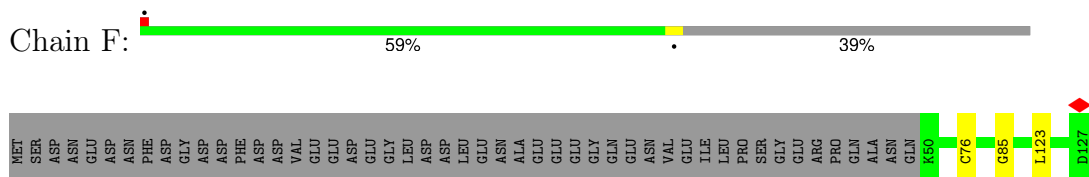
- Molecule 4: RNA polymerase Rpb4/RPC9 core domain-containing protein



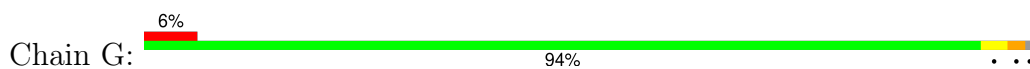
- Molecule 5: DNA-directed RNA polymerase II subunit E

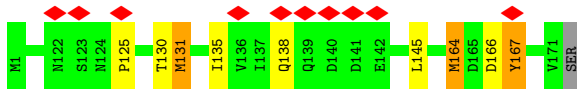


- Molecule 6: DNA-directed RNA polymerases I, II, and III subunit RPABC2



- Molecule 7: DNA-directed RNA polymerase II subunit RPB7

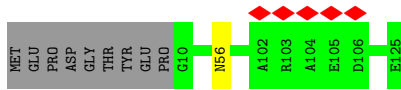
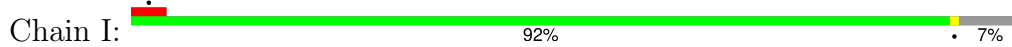




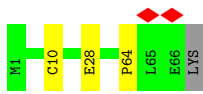
- Molecule 8: DNA-directed RNA polymerases I, II, and III subunit RPABC3



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



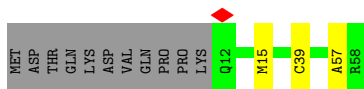
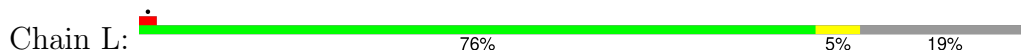
- Molecule 10: DNA-directed RNA polymerases I, II, and III subunit RPABC5



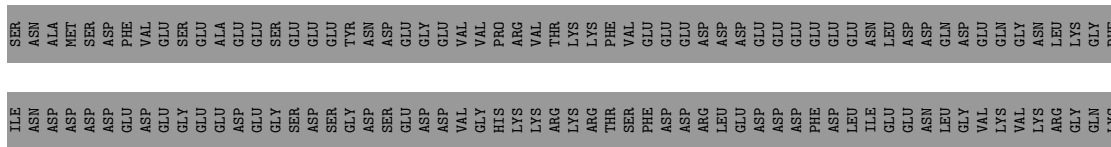
- Molecule 11: RNA polymerase II subunit J

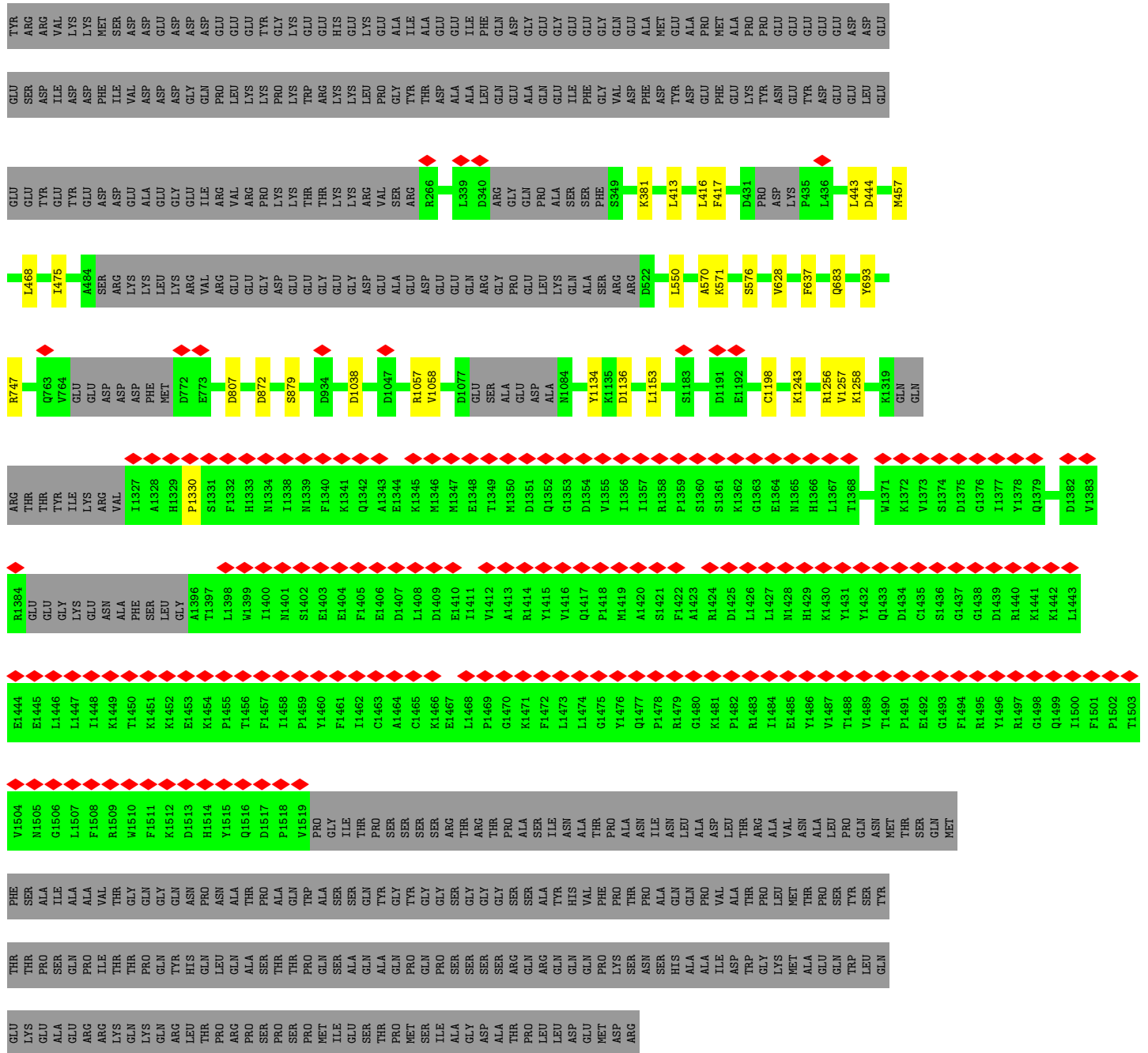


- Molecule 12: RNA polymerase II subunit K

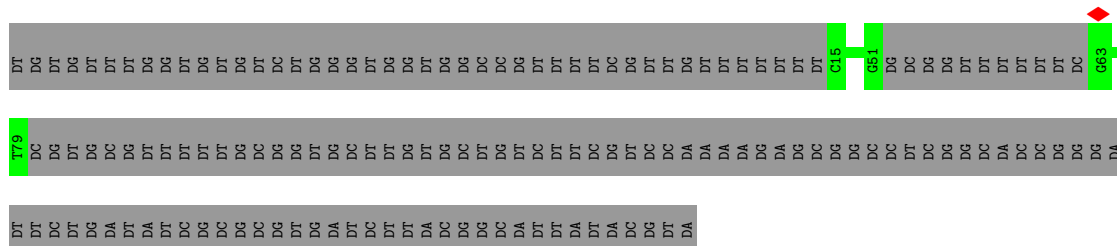


- Molecule 13: Transcription elongation factor SPT6

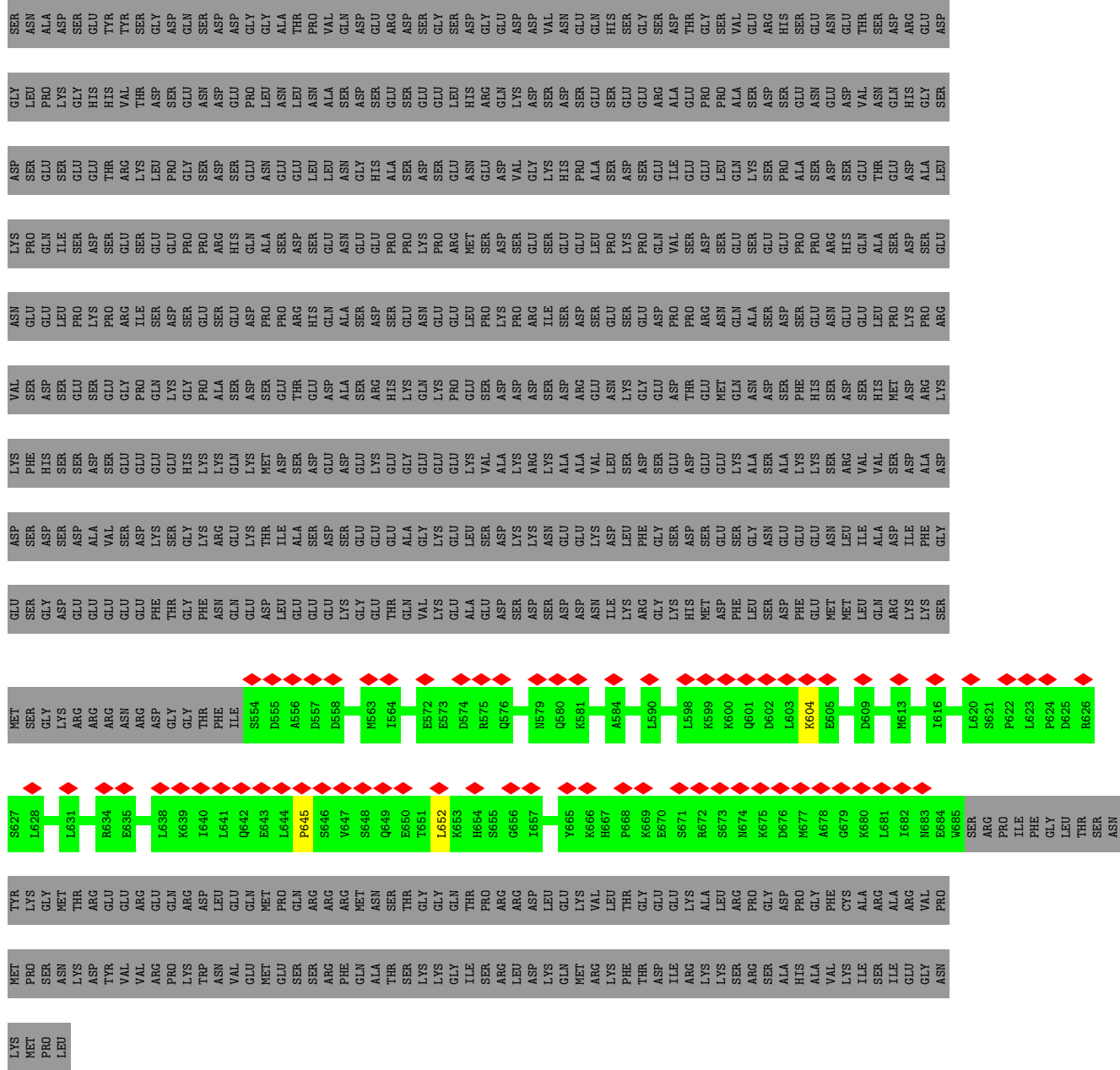




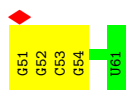
● Molecule 14: non-template DNA



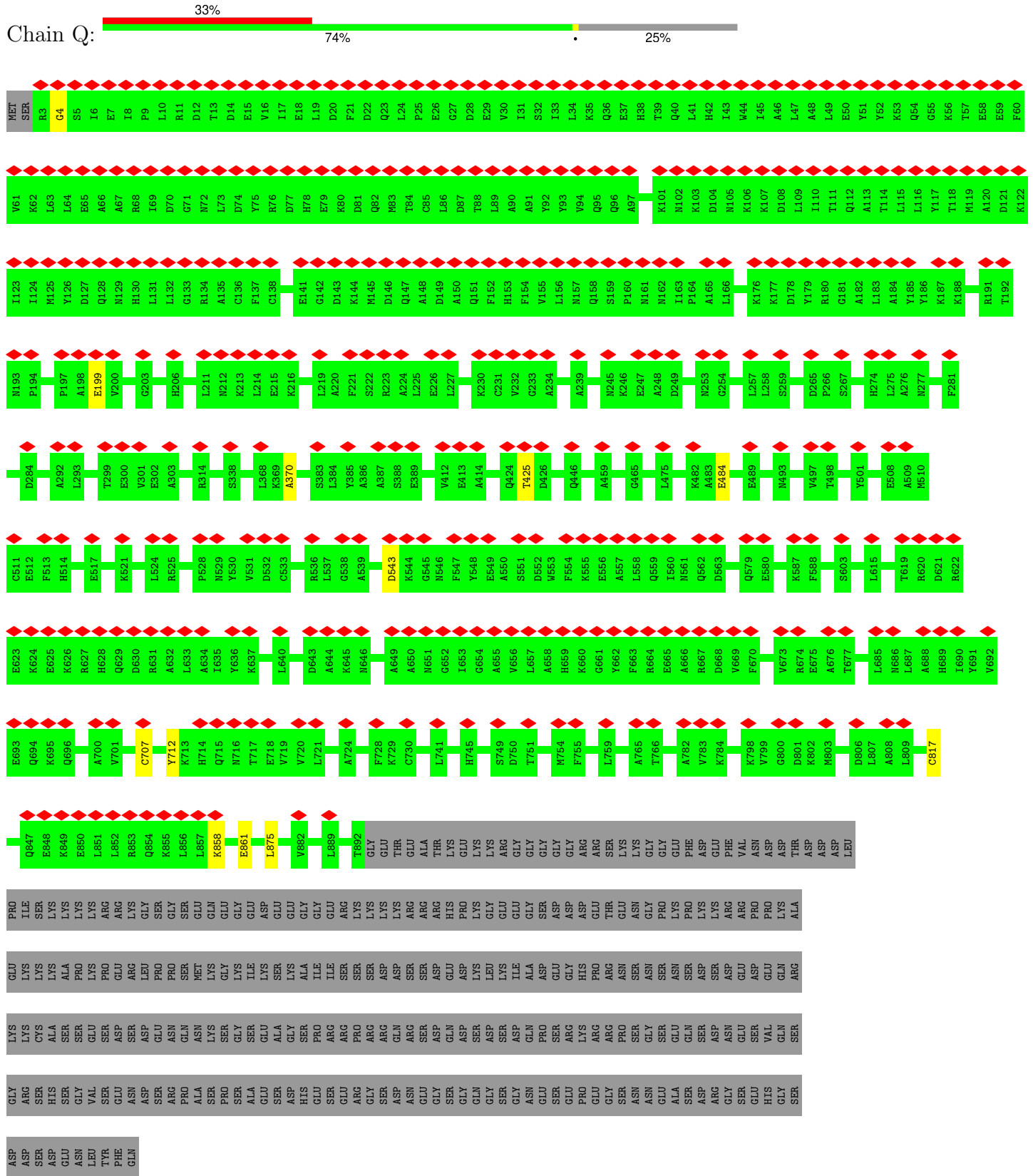
• Molecule 15: Protein IWS1 homolog



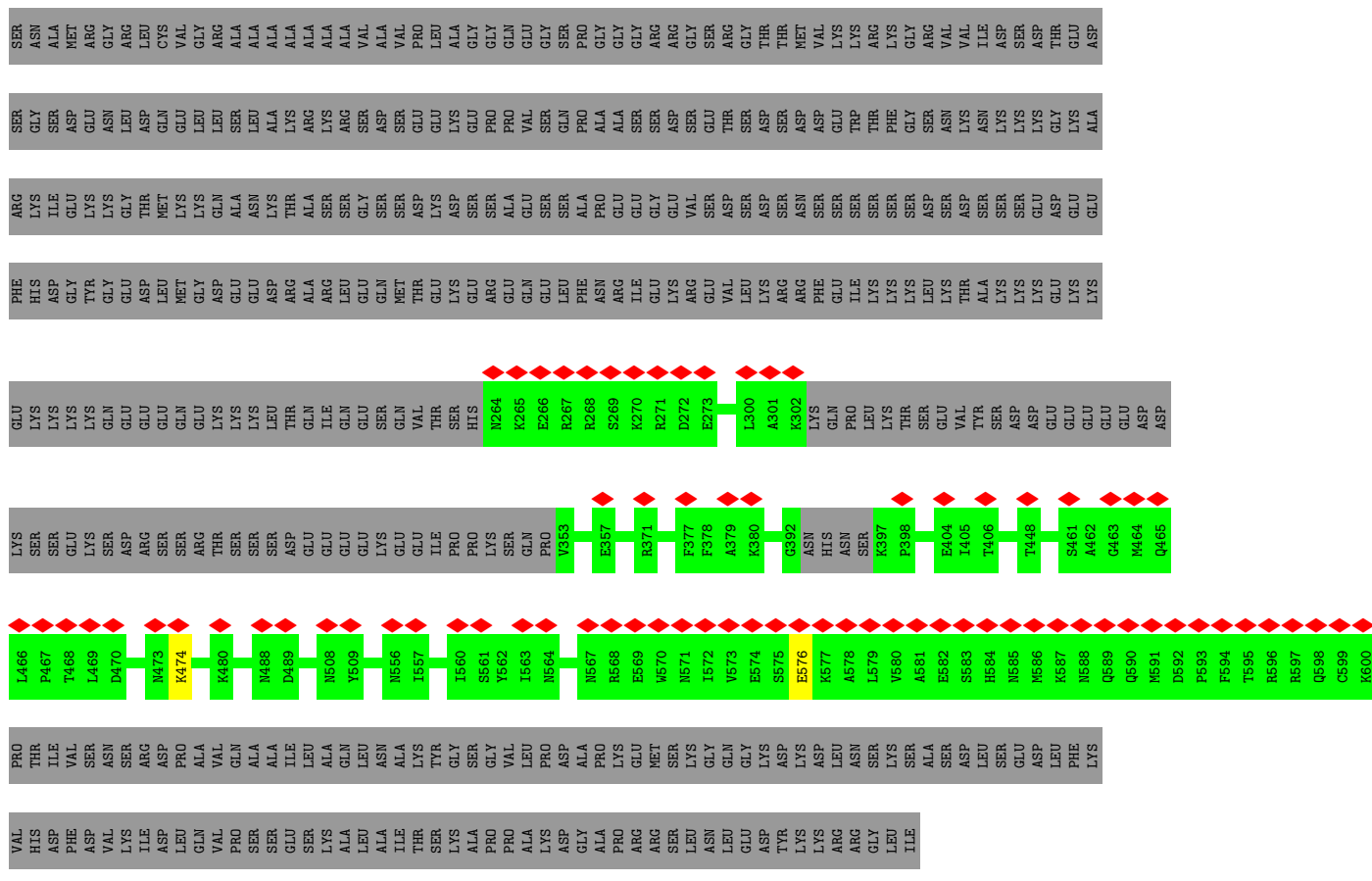
• Molecule 16: RNA



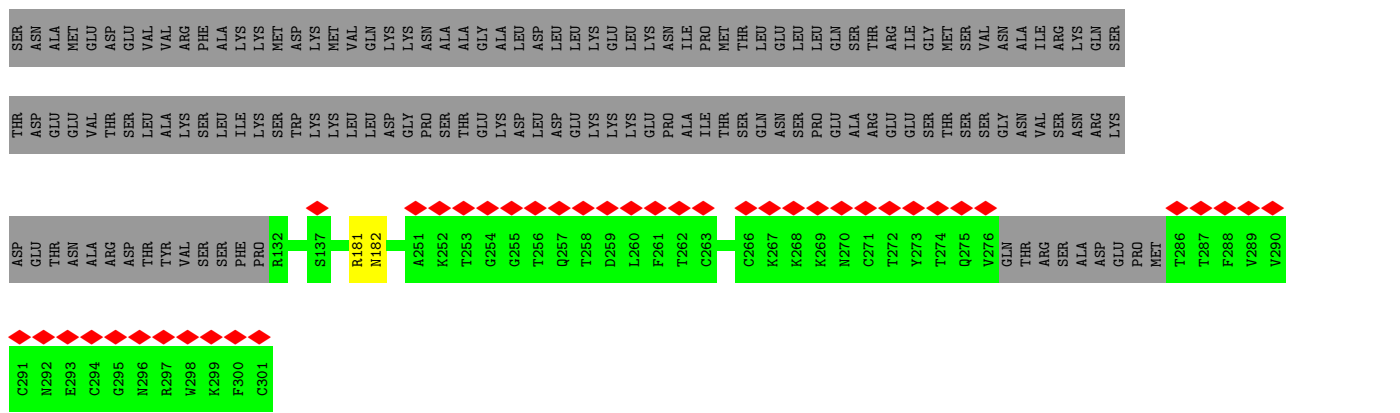
• Molecule 17: RNA polymerase-associated protein CTR9 homolog



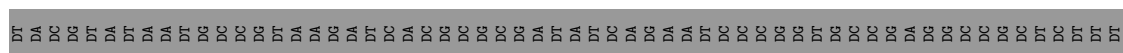
• Molecule 18: RNA polymerase-associated protein RTF1 homolog

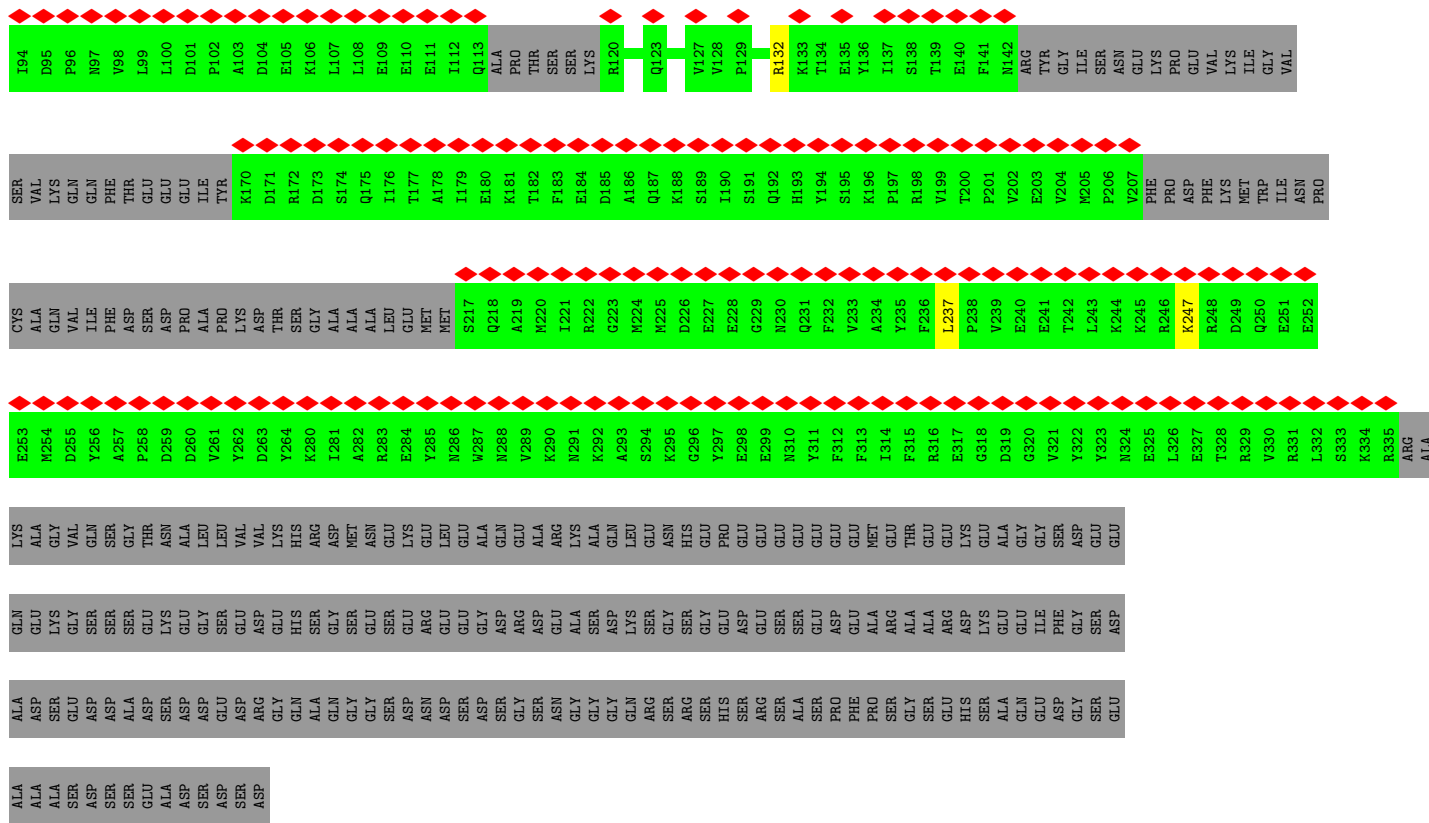


● Molecule 19: Transcription elongation factor A protein 1

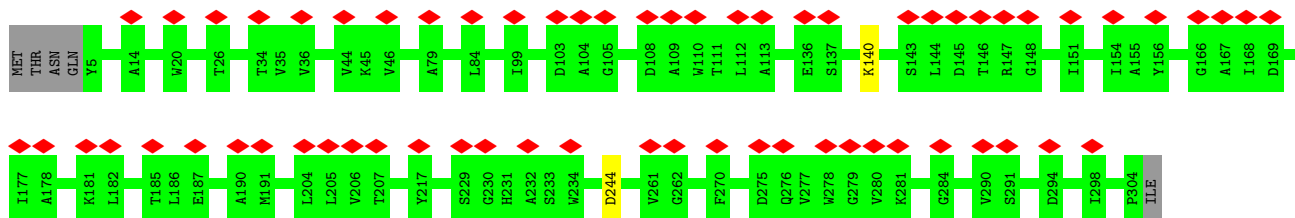


● Molecule 20: Template DNA

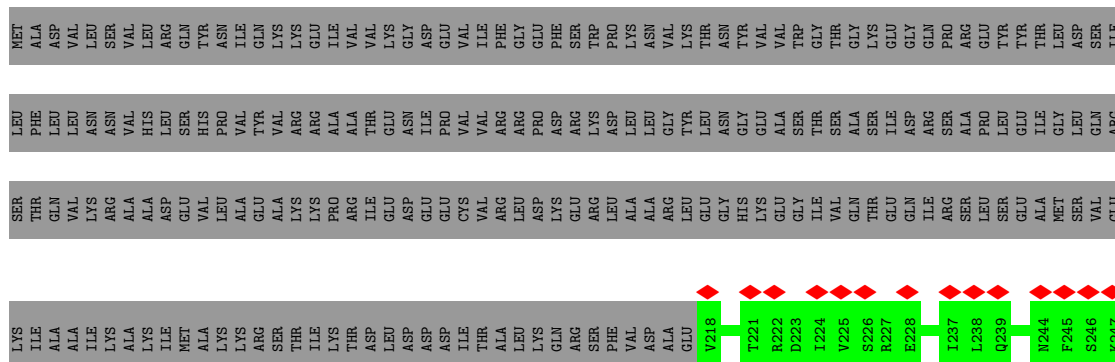


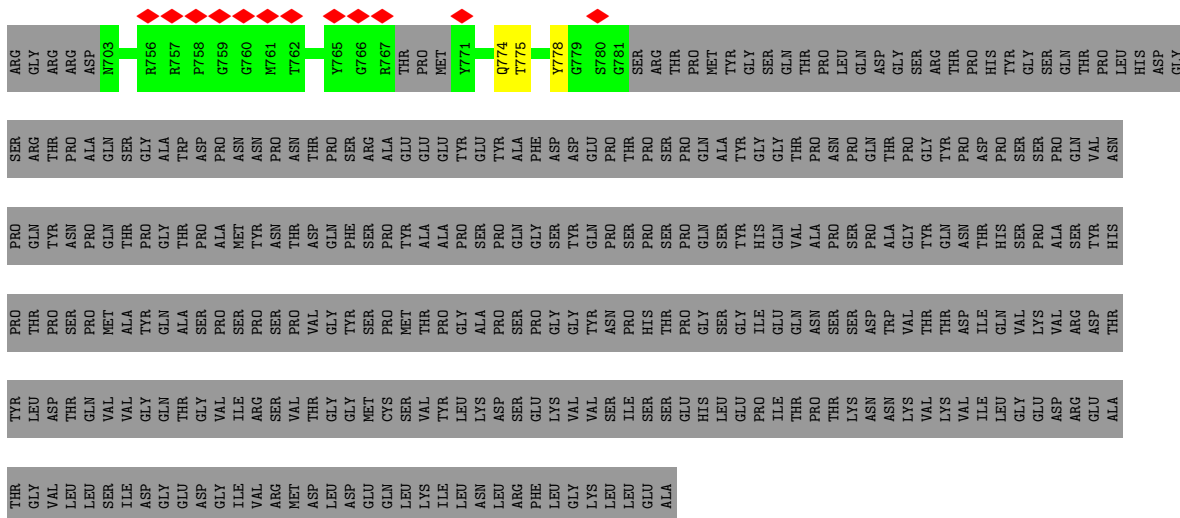


• Molecule 23: WDR61

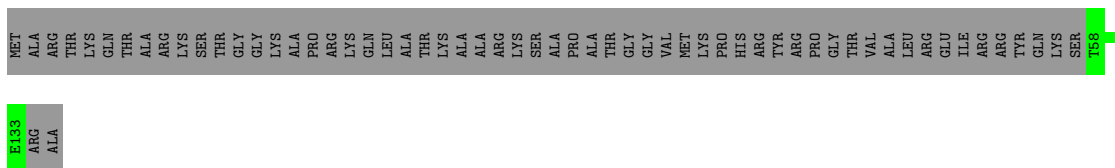


• Molecule 24: Parafibromin

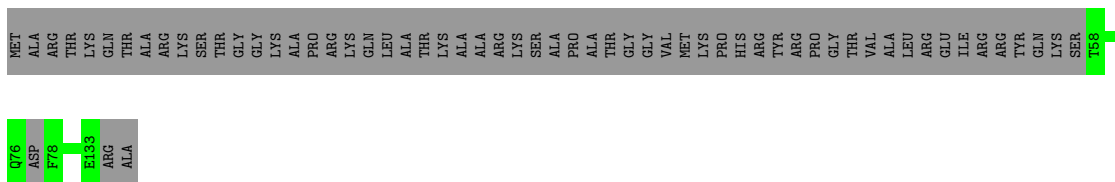




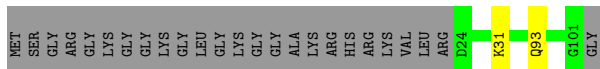
● Molecule 27: Histone H3



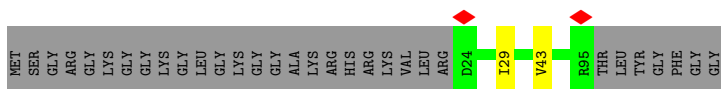
● Molecule 27: Histone H3



● Molecule 28: Histone H4



● Molecule 28: Histone H4



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	74820	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	900	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	2.008	Depositor
Minimum map value	-0.004	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.028	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	535.5, 535.5, 535.5	wwPDB
Map dimensions	450, 450, 450	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.19, 1.19, 1.19	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SEP, MG, ZN, TPO

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	0.36	0/11437	0.58	0/15433
2	B	0.38	0/9158	0.58	0/12360
3	C	0.36	0/2115	0.56	0/2873
4	D	0.30	0/1017	0.51	0/1368
5	E	0.36	0/1751	0.58	0/2366
6	F	0.38	0/636	0.60	0/859
7	G	0.36	0/1364	0.61	0/1853
8	H	0.38	0/1219	0.60	0/1644
9	I	0.34	0/964	0.55	0/1305
10	J	0.39	0/533	0.55	0/719
11	K	0.34	0/939	0.52	0/1271
12	L	0.42	0/403	0.67	0/536
13	M	0.33	0/9783	0.52	0/13201
14	N	0.79	0/1232	1.04	0/1900
15	O	0.23	0/1062	0.41	0/1428
16	P	0.61	0/257	1.03	0/398
17	Q	0.26	0/7365	0.45	0/9927
18	R	0.25	0/2195	0.47	0/2947
19	S	0.23	0/659	0.45	0/827
20	T	0.90	0/1506	0.87	0/2318
21	U	0.25	0/870	0.45	0/1183
22	V	0.25	0/1734	0.48	0/2367
23	W	0.26	0/2392	0.47	0/3257
24	X	0.25	0/356	0.54	0/478
25	Y	0.27	0/927	0.51	0/1250
26	Z	0.27	0/4084	0.51	0/5498
27	a	0.34	0/623	0.57	0/837
27	e	0.34	0/615	0.57	0/826
28	b	0.31	0/629	0.59	0/843
28	f	0.29	0/581	0.59	0/778
29	g	0.32	0/712	0.58	0/959
30	h	0.32	0/705	0.49	0/951

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
31	l	0.29	0/196	0.50	0/261
32	x	0.35	0/4033	0.55	2/5438 (0.0%)
33	y	0.31	0/3513	0.52	0/4734
All	All	0.36	0/77565	0.56	2/105193 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
32	x	463	ARG	NE-CZ-NH1	7.09	123.85	120.30
32	x	463	ARG	N-CA-C	-5.04	97.41	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1525	TPO	Mainchain

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	1408/1984 (71%)	1244 (88%)	148 (10%)	16 (1%)	12	39
2	B	1112/1251 (89%)	972 (87%)	123 (11%)	17 (2%)	8	33
3	C	254/275 (92%)	221 (87%)	28 (11%)	5 (2%)	6	26
4	D	124/142 (87%)	111 (90%)	12 (10%)	1 (1%)	16	48
5	E	207/210 (99%)	187 (90%)	19 (9%)	1 (0%)	25	58
6	F	76/127 (60%)	69 (91%)	5 (7%)	2 (3%)	4	21
7	G	169/172 (98%)	143 (85%)	20 (12%)	6 (4%)	3	16
8	H	147/150 (98%)	125 (85%)	22 (15%)	0	100	100
9	I	114/125 (91%)	98 (86%)	16 (14%)	0	100	100
10	J	64/67 (96%)	55 (86%)	6 (9%)	3 (5%)	2	12
11	K	113/117 (97%)	105 (93%)	7 (6%)	1 (1%)	14	45
12	L	45/58 (78%)	39 (87%)	3 (7%)	3 (7%)	1	6
13	M	1154/1729 (67%)	1045 (91%)	93 (8%)	16 (1%)	9	34
15	O	130/821 (16%)	124 (95%)	5 (4%)	1 (1%)	16	48
17	Q	888/1179 (75%)	804 (90%)	78 (9%)	6 (1%)	19	51
18	R	277/713 (39%)	256 (92%)	21 (8%)	0	100	100
19	S	157/304 (52%)	149 (95%)	6 (4%)	2 (1%)	10	36
21	U	117/666 (18%)	95 (81%)	18 (15%)	4 (3%)	3	17
22	V	234/531 (44%)	194 (83%)	37 (16%)	3 (1%)	10	36
23	W	298/305 (98%)	259 (87%)	37 (12%)	2 (1%)	19	51
24	X	41/531 (8%)	38 (93%)	3 (7%)	0	100	100
25	Y	114/121 (94%)	98 (86%)	16 (14%)	0	100	100
26	Z	497/1087 (46%)	422 (85%)	70 (14%)	5 (1%)	13	42
27	a	74/136 (54%)	71 (96%)	3 (4%)	0	100	100
27	e	73/136 (54%)	70 (96%)	3 (4%)	0	100	100
28	b	76/103 (74%)	73 (96%)	3 (4%)	0	100	100
28	f	70/103 (68%)	65 (93%)	3 (4%)	2 (3%)	3	20
29	g	88/130 (68%)	85 (97%)	3 (3%)	0	100	100
30	h	87/123 (71%)	81 (93%)	6 (7%)	0	100	100
31	l	21/1133 (2%)	19 (90%)	2 (10%)	0	100	100
32	x	479/1049 (46%)	427 (89%)	40 (8%)	12 (2%)	4	22
33	y	418/709 (59%)	386 (92%)	29 (7%)	3 (1%)	19	51

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	9126/16287 (56%)	8130 (89%)	885 (10%)	111 (1%)	14	38

All (111) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
7	G	130	THR
7	G	167	TYR
12	L	39	CYS
13	M	570	ALA
13	M	1057	ARG
13	M	1257	VAL
19	S	181	ARG
22	V	237	LEU
32	x	464	THR
32	x	466	ASN
32	x	750	ASP
32	x	820	THR
33	y	365	PRO
1	A	91	ALA
1	A	1409	GLY
2	B	21	LEU
2	B	90	GLN
2	B	225	LEU
2	B	684	GLU
2	B	785	TYR
2	B	1072	ARG
2	B	1166	SER
3	C	41	GLU
3	C	93	PHE
3	C	190	ASN
7	G	131	MET
7	G	164	MET
12	L	57	ALA
13	M	444	ASP
13	M	576	SER
13	M	1038	ASP
15	O	645	PRO
19	S	182	ASN
28	f	29	ILE
32	x	754	HIS
1	A	121	SER
1	A	786	ALA

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Mol	Chain	Res	Type
1	A	1369	LEU
1	A	1467	GLY
2	B	20	ASP
2	B	650	ASN
2	B	688	ALA
2	B	747	LEU
10	J	28	GLU
13	M	1134	TYR
17	Q	425	THR
21	U	485	PHE
21	U	510	LYS
26	Z	429	CYS
26	Z	525	ALA
26	Z	774	GLN
1	A	319	ASP
1	A	999	ARG
1	A	1184	THR
2	B	901	THR
3	C	92	GLU
10	J	64	PRO
11	K	43	GLY
12	L	15	MET
13	M	571	LYS
13	M	628	VAL
13	M	683	GLN
13	M	807	ASP
13	M	879	SER
13	M	1330	PRO
21	U	523	GLN
23	W	140	LYS
26	Z	445	GLY
32	x	755	GLN
32	x	756	HIS
32	x	822	SER
33	y	204	GLU
1	A	621	ILE
1	A	980	PRO
2	B	120	TYR
2	B	594	MET
4	D	51	ALA
7	G	125	PRO
10	J	10	CYS

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Mol	Chain	Res	Type
13	M	1058	VAL
13	M	1136	ASP
17	Q	199	GLU
17	Q	484	GLU
17	Q	712	TYR
21	U	416	VAL
28	f	43	VAL
32	x	658	SER
32	x	659	ASN
32	x	873	ALA
1	A	788	VAL
1	A	1548	PRO
2	B	1142	ASN
3	C	130	VAL
6	F	76	CYS
13	M	637	PHE
17	Q	370	ALA
22	V	247	LYS
23	W	244	ASP
26	Z	362	GLU
33	y	151	HIS
5	E	201	GLY
7	G	135	ILE
17	Q	4	GLY
2	B	288	ILE
2	B	994	GLY
6	F	85	GLY
22	V	89	PRO
1	A	333	GLY
1	A	911	PRO
1	A	1541	PRO
32	x	608	PRO

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	1245/1761 (71%)	1242 (100%)	3 (0%)	92	96
2	B	986/1084 (91%)	982 (100%)	4 (0%)	89	94
3	C	235/252 (93%)	235 (100%)	0	100	100
4	D	109/126 (86%)	108 (99%)	1 (1%)	75	88
5	E	191/192 (100%)	191 (100%)	0	100	100
6	F	68/111 (61%)	67 (98%)	1 (2%)	60	80
7	G	146/153 (95%)	140 (96%)	6 (4%)	26	57
8	H	130/131 (99%)	130 (100%)	0	100	100
9	I	104/112 (93%)	103 (99%)	1 (1%)	73	86
10	J	55/56 (98%)	55 (100%)	0	100	100
11	K	104/106 (98%)	104 (100%)	0	100	100
12	L	44/55 (80%)	44 (100%)	0	100	100
13	M	1037/1524 (68%)	1020 (98%)	17 (2%)	58	79
15	O	118/737 (16%)	116 (98%)	2 (2%)	56	78
17	Q	761/1011 (75%)	755 (99%)	6 (1%)	79	89
18	R	205/625 (33%)	203 (99%)	2 (1%)	73	86
19	S	4/268 (2%)	4 (100%)	0	100	100
21	U	65/590 (11%)	65 (100%)	0	100	100
22	V	146/462 (32%)	144 (99%)	2 (1%)	62	81
23	W	255/260 (98%)	255 (100%)	0	100	100
24	X	40/467 (9%)	40 (100%)	0	100	100
25	Y	102/105 (97%)	102 (100%)	0	100	100
26	Z	435/939 (46%)	433 (100%)	2 (0%)	86	92
27	a	66/111 (60%)	66 (100%)	0	100	100
27	e	65/111 (59%)	65 (100%)	0	100	100
28	b	64/79 (81%)	62 (97%)	2 (3%)	35	63
28	f	60/79 (76%)	60 (100%)	0	100	100
29	g	71/102 (70%)	70 (99%)	1 (1%)	62	81
30	h	76/103 (74%)	75 (99%)	1 (1%)	65	82
31	l	23/1017 (2%)	23 (100%)	0	100	100
32	x	431/929 (46%)	426 (99%)	5 (1%)	67	83
33	y	379/631 (60%)	379 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	7820/14289 (55%)	7764 (99%)	56 (1%)	80 90

All (56) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	343	LEU
1	A	535	MET
1	A	931	ARG
2	B	422	PHE
2	B	610	ARG
2	B	848	LEU
2	B	1080	ARG
4	D	74	PHE
6	F	123	LEU
7	G	131	MET
7	G	138	GLN
7	G	145	LEU
7	G	164	MET
7	G	166	ASP
7	G	167	TYR
9	I	56	ASN
13	M	381	LYS
13	M	413	LEU
13	M	416	LEU
13	M	417	PHE
13	M	443	LEU
13	M	457	MET
13	M	468	LEU
13	M	475	ILE
13	M	550	LEU
13	M	693	TYR
13	M	747	ARG
13	M	872	ASP
13	M	1153	LEU
13	M	1198	CYS
13	M	1243	LYS
13	M	1256	ARG
13	M	1258	LYS
15	O	604	LYS
15	O	652	LEU
17	Q	543	ASP
17	Q	707	CYS

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Mol	Chain	Res	Type
17	Q	817	CYS
17	Q	858	LYS
17	Q	861	GLU
17	Q	875	LEU
18	R	474	LYS
18	R	576	GLU
22	V	85	ASP
22	V	132	ARG
26	Z	484	ARG
26	Z	778	TYR
28	b	31	LYS
28	b	93	GLN
29	g	99	ARG
30	h	42	TYR
32	x	465	ARG
32	x	469	THR
32	x	497	LYS
32	x	504	LYS
32	x	828	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (77) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	62	GLN
1	A	122	ASN
1	A	188	GLN
1	A	372	ASN
1	A	387	ASN
1	A	423	ASN
1	A	529	GLN
1	A	531	ASN
1	A	700	GLN
1	A	780	ASN
1	A	790	GLN
1	A	791	GLN
1	A	991	GLN
1	A	1044	HIS
1	A	1194	ASN
1	A	1313	GLN
1	A	1422	GLN
1	A	1457	ASN
2	B	227	ASN

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Mol	Chain	Res	Type
2	B	254	GLN
2	B	420	GLN
2	B	471	ASN
2	B	725	GLN
2	B	1053	HIS
2	B	1071	ASN
3	C	60	HIS
3	C	111	GLN
5	E	30	GLN
5	E	148	HIS
7	G	91	GLN
7	G	93	ASN
9	I	56	ASN
10	J	26	GLN
11	K	69	HIS
12	L	13	GLN
12	L	26	ASN
13	M	370	HIS
13	M	561	GLN
13	M	979	HIS
13	M	1176	HIS
13	M	1190	ASN
13	M	1205	ASN
13	M	1264	HIS
13	M	1365	ASN
13	M	1366	HIS
13	M	1433	GLN
17	Q	129	ASN
17	Q	130	HIS
17	Q	268	ASN
17	Q	373	ASN
17	Q	461	HIS
17	Q	466	ASN
17	Q	527	HIS
17	Q	628	HIS
17	Q	651	ASN
17	Q	714	HIS
17	Q	738	GLN
17	Q	775	ASN
17	Q	827	HIS
18	R	264	ASN
22	V	70	HIS

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Mol	Chain	Res	Type
22	V	97	ASN
23	W	27	ASN
23	W	173	ASN
23	W	223	ASN
23	W	273	HIS
26	Z	272	ASN
26	Z	300	GLN
26	Z	301	ASN
26	Z	545	GLN
30	h	67	ASN
32	x	617	ASN
32	x	677	GLN
32	x	826	ASN
32	x	849	GLN
32	x	949	ASN
33	y	60	HIS

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
16	P	11/11 (100%)	2 (18%)	2 (18%)

All (2) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
16	P	52	G
16	P	54	G

All (2) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
16	P	51	G
16	P	53	C

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

3 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The

Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	TPO	A	1525	1	8,10,11	1.09	0	10,14,16	2.97	3 (30%)
1	SEP	A	1547	1	8,9,10	1.61	1 (12%)	7,12,14	1.35	1 (14%)
26	TPO	Z	775	26	8,10,11	1.13	0	10,14,16	1.91	1 (10%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	TPO	A	1525	1	-	1/9/11/13	-
1	SEP	A	1547	1	-	0/6/8/10	-
26	TPO	Z	775	26	-	2/9/11/13	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1547	SEP	P-O1P	3.52	1.61	1.50

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1525	TPO	CG2-CB-CA	-6.50	100.60	113.26
1	A	1525	TPO	P-OG1-CB	-5.65	107.96	123.33
26	Z	775	TPO	P-OG1-CB	-5.29	108.96	123.33
1	A	1525	TPO	O-C-CA	-3.11	116.77	124.77
1	A	1547	SEP	OG-CB-CA	2.97	111.04	108.14

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	1525	TPO	O-C-CA-CB
26	Z	775	TPO	C-CA-CB-CG2
26	Z	775	TPO	CB-OG1-P-O2P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 10 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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
21	U	1
22	V	1
13	M	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	U	497:ASP	C	505:SER	N	27.05
1	V	299:GLU	C	310:ASN	N	12.58
1	M	1334:ASN	C	1338:ILE	N	9.04

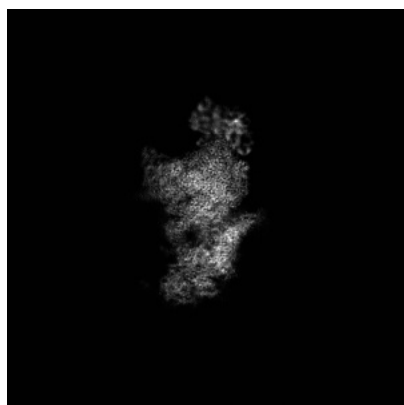
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-48044. These allow visual inspection of the internal detail of the map and identification of artifacts.

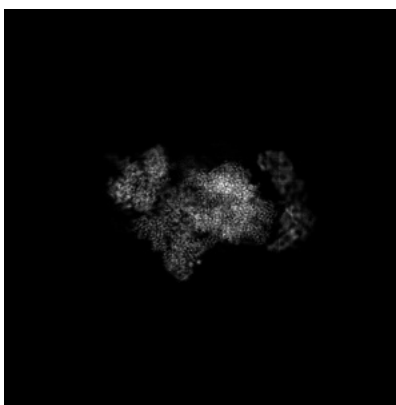
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

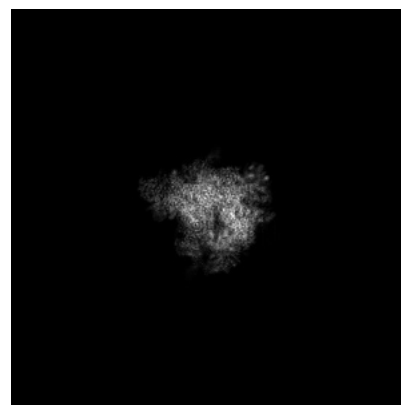
6.1.1 Primary map



X



Y



Z

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

6.2 Central slices [i](#)

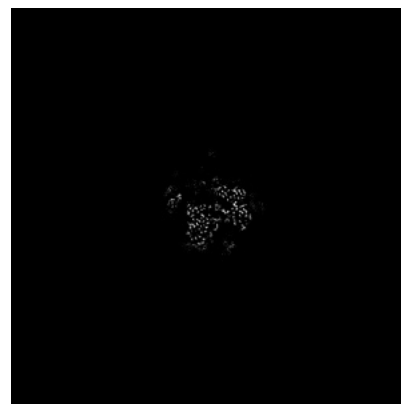
6.2.1 Primary map



X Index: 225



Y Index: 225



Z Index: 225

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: 251



Y Index: 238

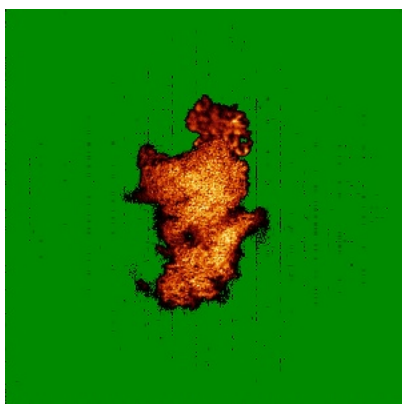


Z Index: 250

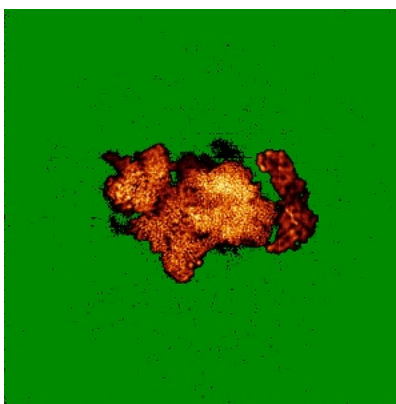
The images above show the largest variance slices of the map in three orthogonal directions.

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

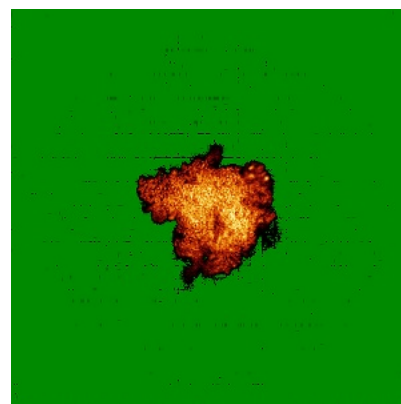
6.4.1 Primary map



X



Y

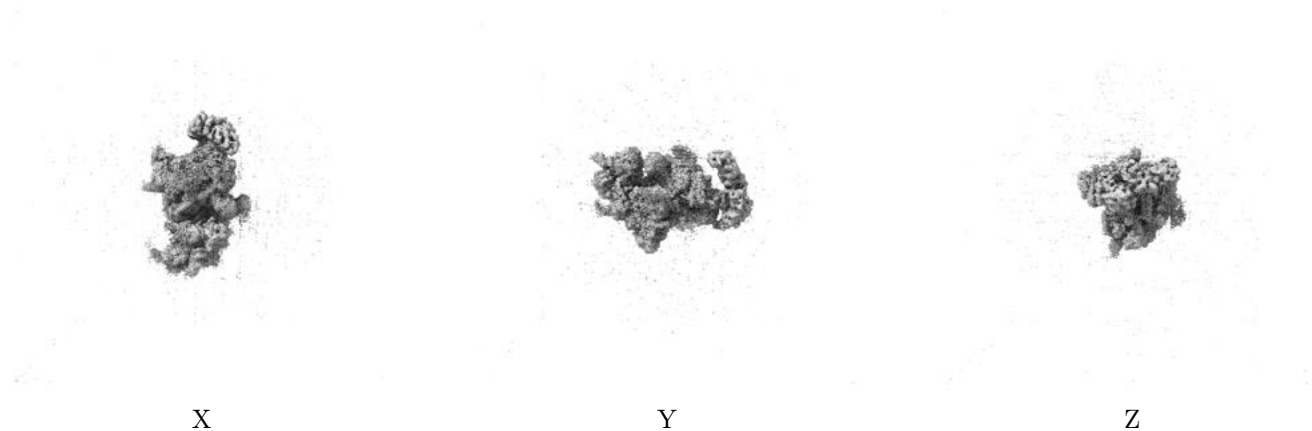


Z

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

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.01. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

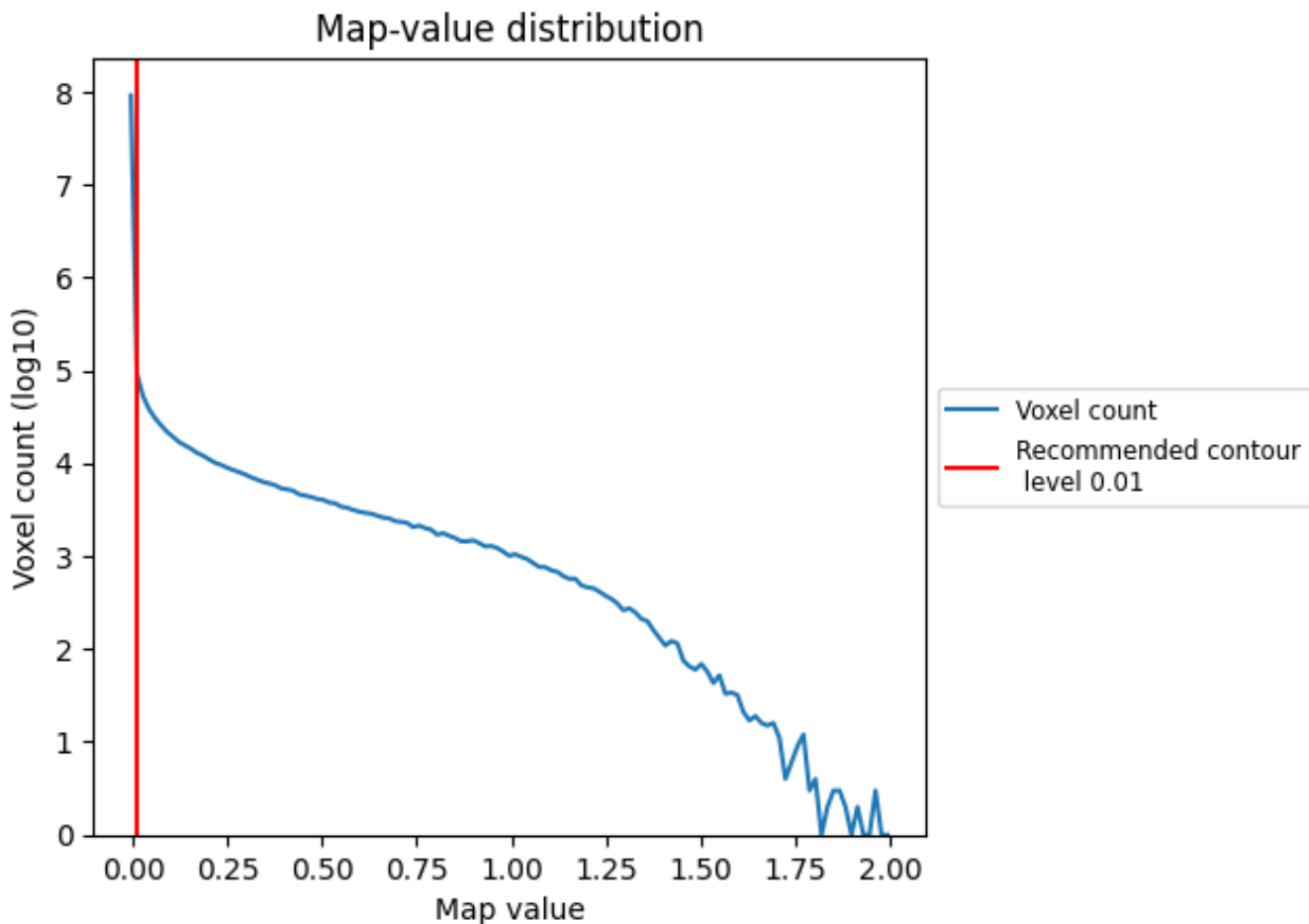
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

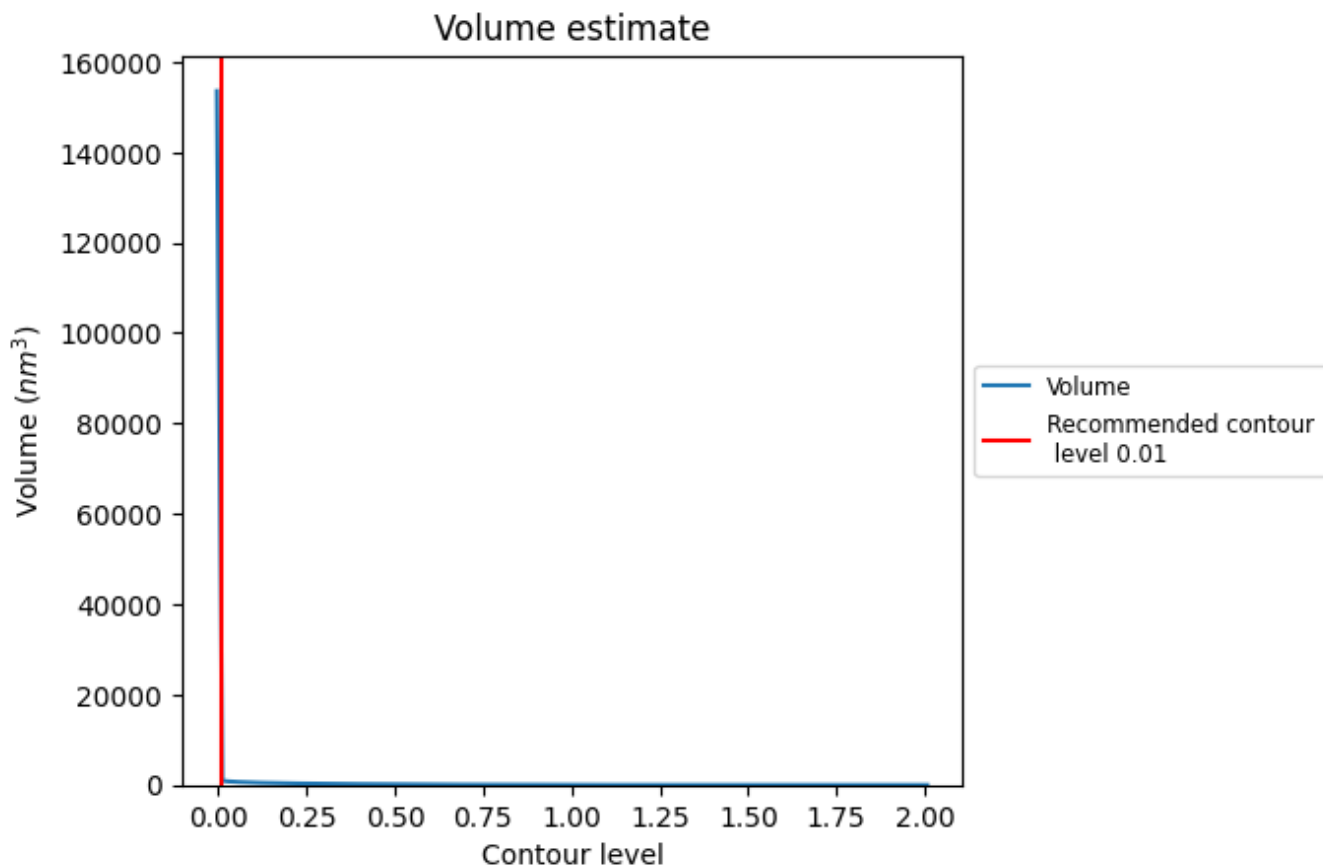
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

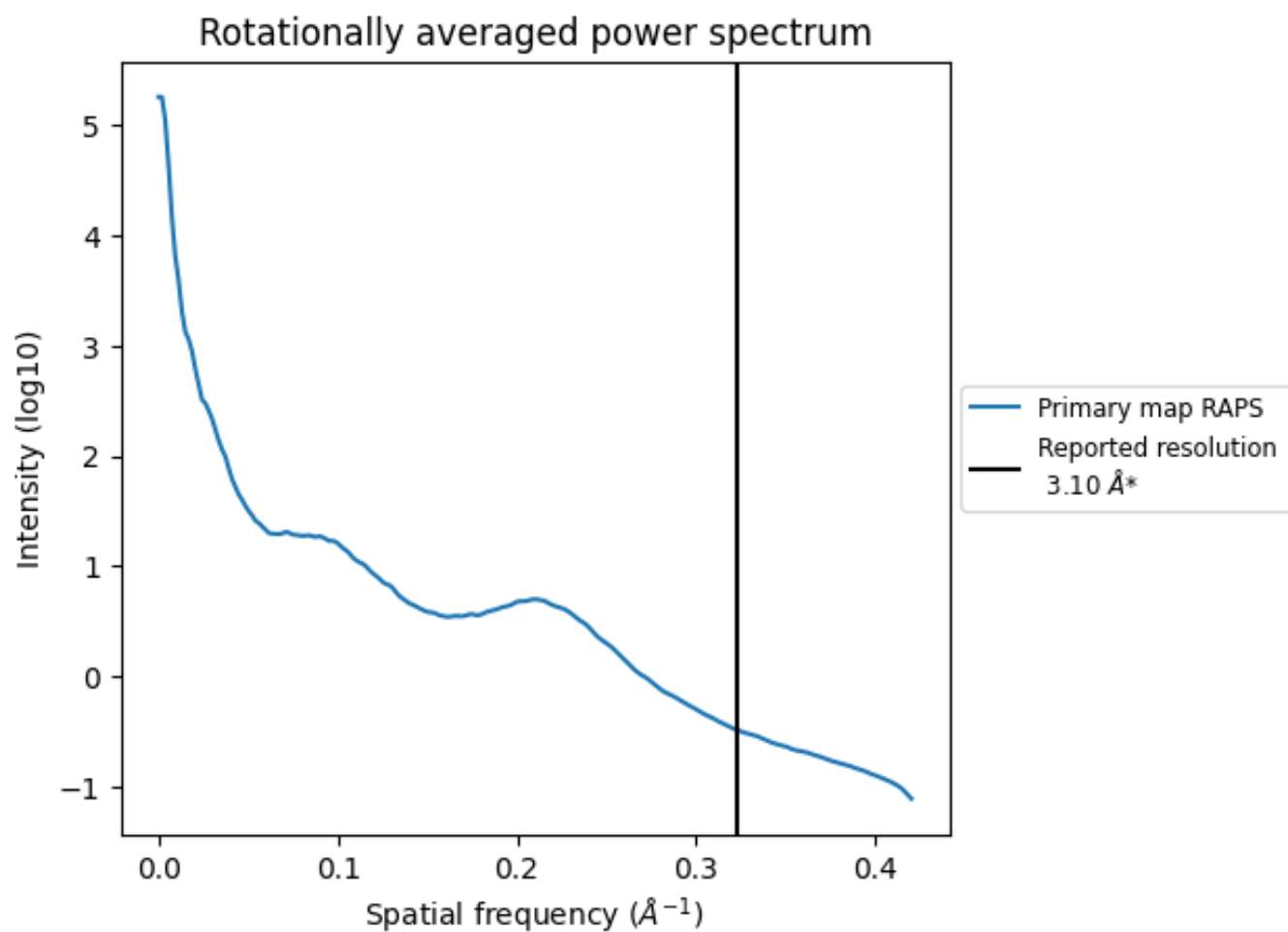
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 14275 nm³; this corresponds to an approximate mass of 12895 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 0.323 Å⁻¹

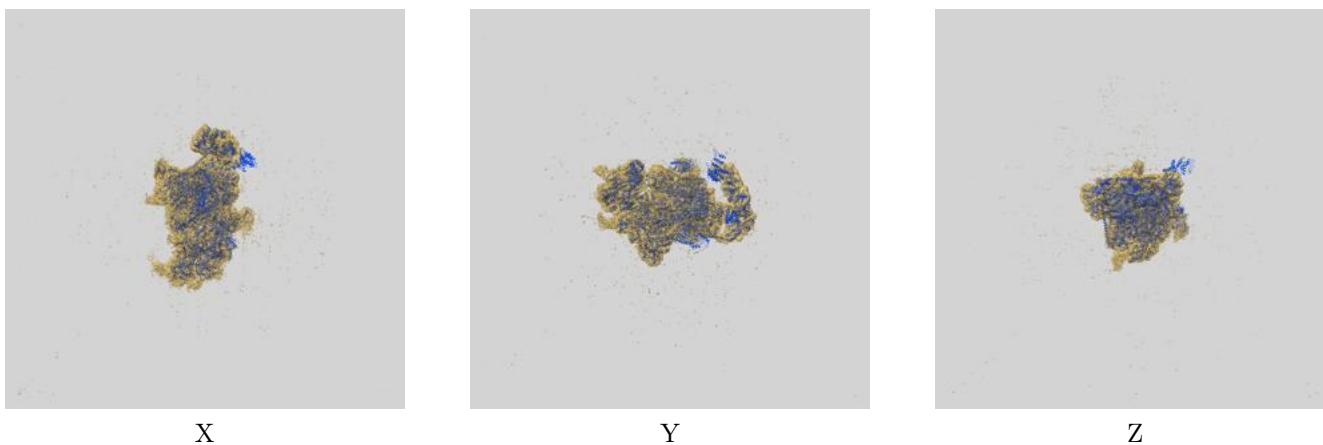
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

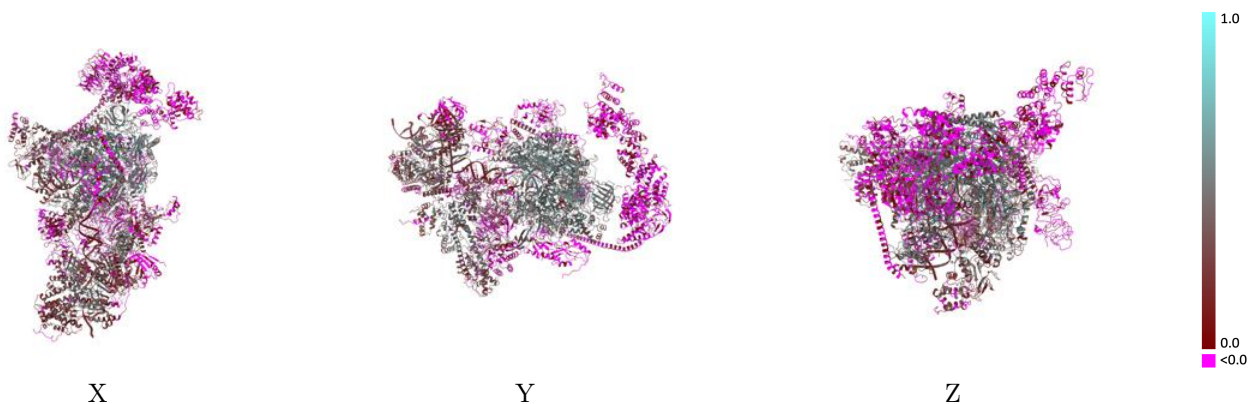
This section contains information regarding the fit between EMDB map EMD-48044 and PDB model 9EH2. Per-residue inclusion information can be found in section 3 on page 13.

9.1 Map-model overlay [i](#)



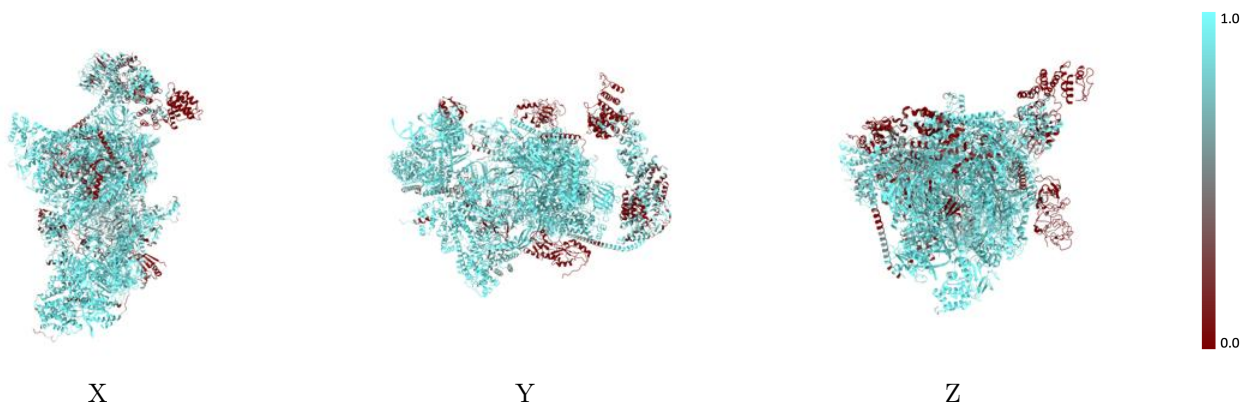
The images above show the 3D surface view of the map at the recommended contour level 0.01 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



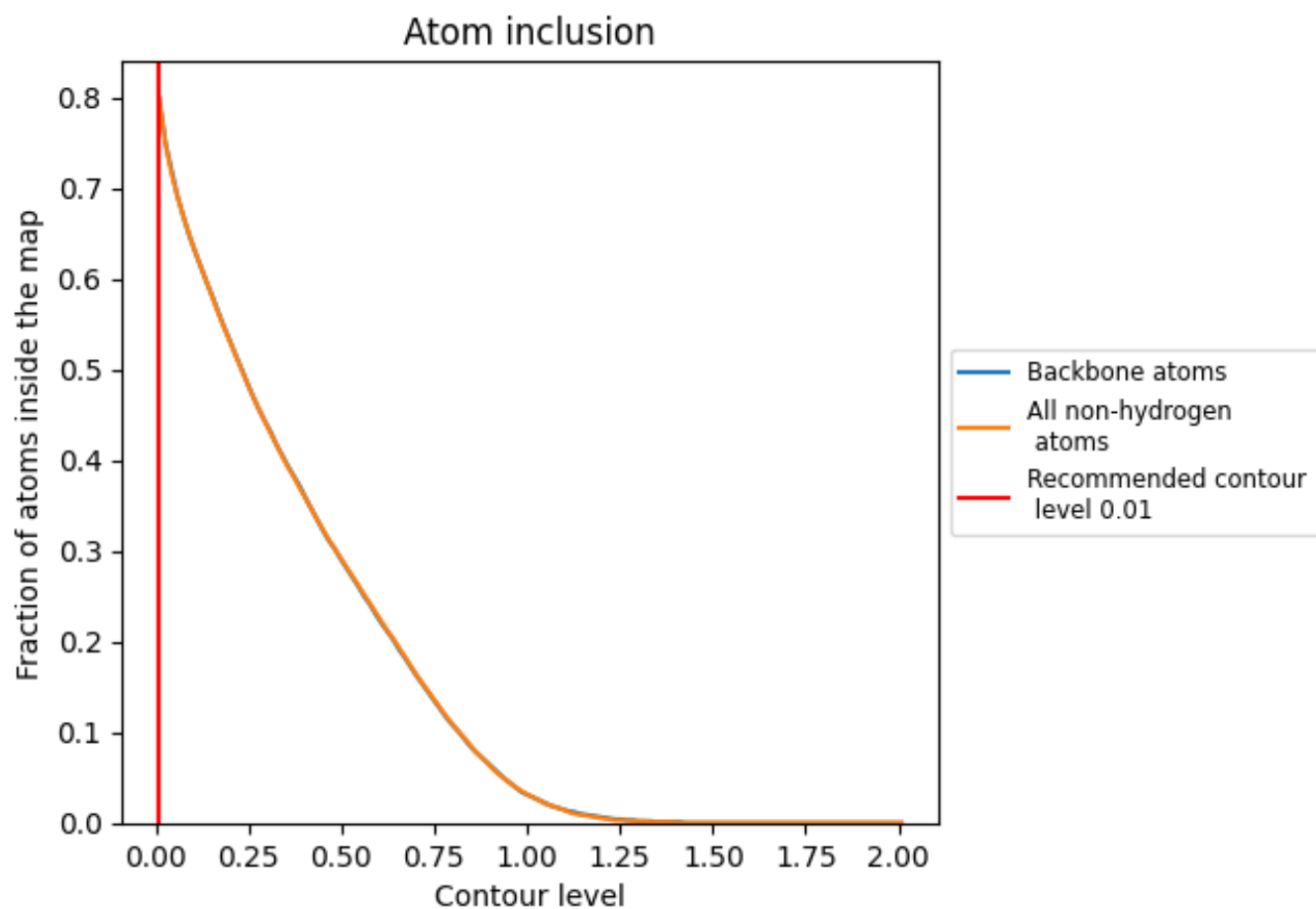
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.01).




































































9.4 Atom inclusion [i](#)



At the recommended contour level, 80% of all backbone atoms, 80% 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 (0.01) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7990	 0.2520
A	 0.9480	 0.4280
B	 0.9690	 0.4570
C	 0.9700	 0.4850
D	 0.7800	 0.0450
E	 0.9630	 0.3890
F	 0.9700	 0.4810
G	 0.8570	 0.1550
H	 0.9660	 0.4480
I	 0.9210	 0.3110
J	 0.9610	 0.4770
K	 0.9800	 0.4840
L	 0.9530	 0.3820
M	 0.8100	 0.2810
N	 0.9540	 0.2330
O	 0.3770	 -0.0500
P	 0.8970	 0.4270
Q	 0.5000	 -0.0160
R	 0.6270	 0.0260
S	 0.7320	 0.1500
T	 0.9550	 0.2770
U	 0.1730	 -0.0050
V	 0.2400	 -0.0400
W	 0.7210	 -0.0180
X	 0.3560	 -0.0690
Y	 0.7060	 -0.0260
Z	 0.5910	 0.0250
a	 0.9530	 0.3440
b	 0.9480	 0.3340
e	 0.9440	 0.3440
f	 0.9080	 0.2680
g	 0.9430	 0.2710
h	 0.9490	 0.2770
l	 0.6530	 0.1300
x	 0.8930	 0.2660
y	 0.8260	 0.2110

