



## Full wwPDB EM Validation Report ⓘ

Dec 14, 2024 – 04:41 PM EST

PDB ID : 8UPO  
EMDB ID : EMD-42453  
Title : Escherichia coli transcription-translation coupled complex class A (TTC-A) containing RfaH bound to ops signal, mRNA with a 21 nt long spacer, and fMet-tRNAs in E-site and P-site of the ribosome  
Authors : Molodtsov, V.; Wang, C.; Ebright, R.H.  
Deposited on : 2023-10-23  
Resolution : 5.50 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

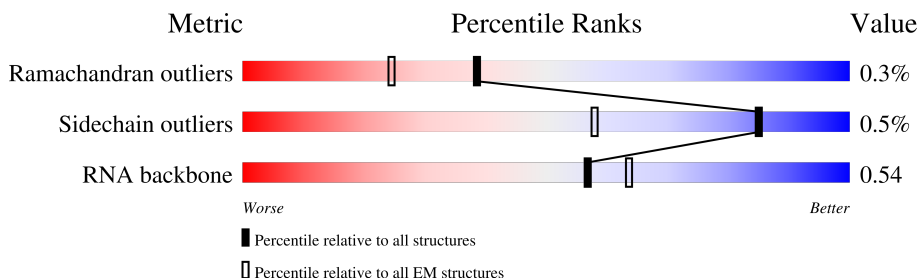
EMDB validation analysis : 0.0.1.dev113  
MolProbity : 4.02b-467  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 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 5.50 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.






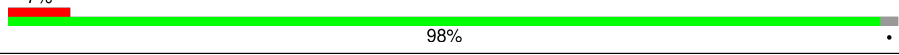

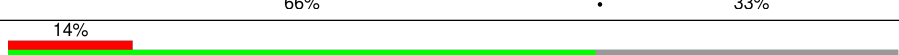
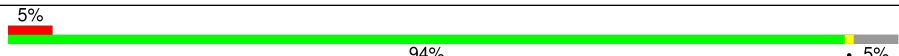


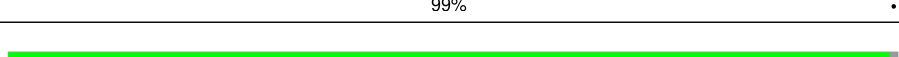
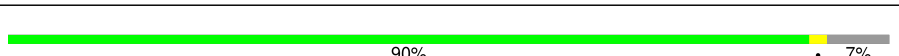


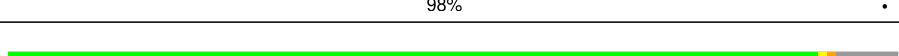
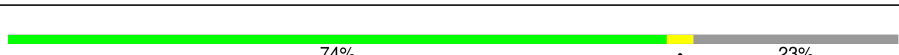

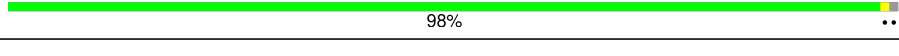
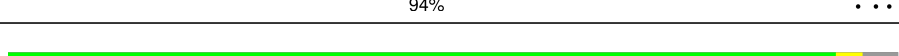

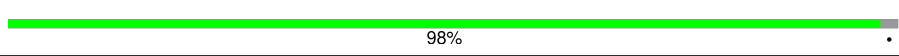
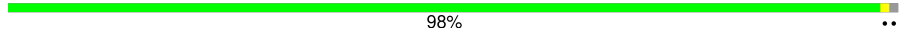



Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion  $< 40\%$ ). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	0	103	
2	1	110	
3	2	100	
4	3	104	
5	4	94	
6	5	38	
7	6	38	
8	7	38	

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Mol	Chain	Length	Quality of chain
9	9	165	 84% 10%
10	A	76	 51% 47%
10	B	76	 49% 47%
11	AA	1342	 7% 98%
12	AB	162	 17% 57% 42%
13	AC	329	 7% 66% 33%
13	AD	329	 14% 66% 34%
14	AE	1407	 5% 94% 5%
15	C	75	 84% 12%
16	D	1542	 79% 20%
17	E	87	 99%
18	F	71	 99%
19	G	241	 90% 7%
20	H	557	 45% 54%
21	I	233	 86% 11%
22	J	206	 98%
23	K	167	 91% 7%
24	L	135	 74% 23%
25	M	179	 83% 16%
26	N	130	 98%
27	O	130	 94%
28	P	103	 93%
29	Q	129	 88% 9%
30	R	124	 98%
31	S	101	98%

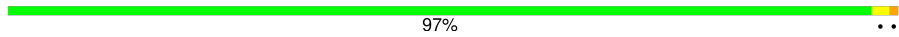
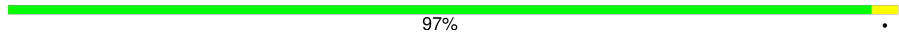
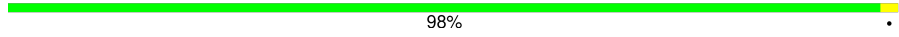
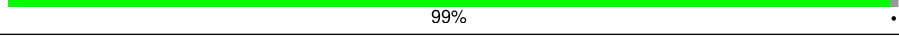
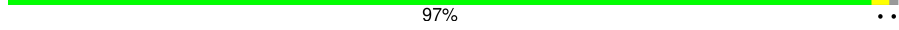
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Mol	Chain	Length	Quality of chain
32	T	89	98%
33	U	82	98%
34	V	84	94%
35	W	92	87%
36	X	118	95%
37	Y	142	98%
38	Z	121	25%
39	a	2904	80%
40	b	85	89%
41	c	78	96%
42	d	120	88%
43	e	63	95%
44	f	59	97%
45	g	70	93%
46	h	273	98%
47	i	57	96%
48	j	209	99%
49	k	55	95%
50	l	201	99%
51	m	46	100%
52	n	179	97%
53	o	65	94%
54	p	177	98%
55	q	38	100%
56	r	149	100%

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Mol	Chain	Length	Quality of chain
57	s	142	 97% ..
58	t	123	 97% .
59	u	144	 98% .
60	v	136	 99% .
61	w	127	 89% 5% 6% .
62	x	117	 99% .
63	y	115	 97% ..
64	z	118	 97% ..

## 2 Entry composition [i](#)

There are 66 unique types of molecules in this entry. The entry contains 274307 atoms, of which 98638 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 Ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
1	0	103	1655	516	839	153	145	2	0	0

- Molecule 2 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
2	1	110	1779	532	922	166	156	3	0	0

- Molecule 3 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
3	2	94	1557	470	811	140	134	2	0	0

- Molecule 4 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
4	3	103	1632	498	844	148	142	0	0

- Molecule 5 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
5	4	94	1533	479	780	137	134	3	0	0

- Molecule 6 is a DNA chain called NT DNA with ops signal.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
6	5	26	543	254	109	154	26	0	0

- Molecule 7 is a DNA chain called T DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	6	26	Total	C	N	O	P	0	0
			517	247	83	161	26		

- Molecule 8 is a RNA chain called mRNA with 21 nt long spacer.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	7	28	Total	C	N	O	P	0	0
			592	264	92	208	28		

- Molecule 9 is a protein called 50S ribosomal protein L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	9	148	Total	C	N	O	S	0	0
			1117	705	196	209	7		

- Molecule 10 is a RNA chain called E-site and P-site tRNA (fMet).

Mol	Chain	Residues	Atoms					AltConf	Trace	
10	A	76	Total	C	H	N	O	P	0	0
			2446	723	826	295	527	75		
10	B	76	Total	C	H	N	O	P	0	0
			2433	723	813	295	527	75		

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

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

- Molecule 12 is a protein called Transcription antitermination protein RfaH.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	AB	94	Total	C	N	O	S	0	0
			754	484	136	131	3		

- Molecule 13 is a protein called DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	AC	221	Total	C	N	O	S	0	0
			1698	1060	299	333	6		

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	AD	218	1677	1048	297	326	6	0	0

- Molecule 14 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	AE	1337	10404	6535	1856	1963	50	0	0

- Molecule 15 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
15	C	66	1103	344	559	102	97	1	0	0

- Molecule 16 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
16	D	1524	49126	14585	16423	6003	10591	1524	0	0

- Molecule 17 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
17	E	86	1388	414	719	138	114	3	0	0

- Molecule 18 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
18	F	70	1218	366	629	125	97	1	0	0

- Molecule 19 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
19	G	225	3545	1113	1785	316	323	8	0	0

- Molecule 20 is a protein called 30S ribosomal protein S1.



Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
20	H	259	3184	1073	1454	305	349	3	0	0

- Molecule 21 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
21	I	208	3346	1036	1710	307	290	3	0	0

- Molecule 22 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
22	J	205	3350	1026	1707	315	298	4	0	0

- Molecule 23 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
23	K	156	2348	717	1196	217	212	6	0	0

- Molecule 24 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
24	L	104	1694	536	846	153	152	7	0	0

- Molecule 25 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
25	M	151	2416	735	1235	227	215	4	0	0

- Molecule 26 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
26	N	129	2010	616	1031	173	184	6	0	0

- Molecule 27 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
27	O	127	2092	634	1070	206	179	3	0	0

- Molecule 28 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
28	P	99	1621	495	831	151	143	1	0	0

- Molecule 29 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
29	Q	117	1764	540	887	174	160	3	0	0

- Molecule 30 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
30	R	121	1940	580	1001	194	161	4	0	0

- Molecule 31 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
31	S	100	1649	499	844	164	139	3	0	0

- Molecule 32 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
32	T	88	1448	439	734	144	130	1	0	0

- Molecule 33 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
33	U	82	1315	406	666	128	114	1	0	0

- Molecule 34 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
34	V	80	1339	411	691	121	113	3	0	0

- Molecule 35 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
35	W	83	1351	424	688	126	111	2	0	0

- Molecule 36 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
36	X	116	1864	558	964	181	158	3	0	0

- Molecule 37 is a protein called 50S ribosomal protein L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	Y	141	1032	651	179	196	6	0	0

- Molecule 38 is a protein called 50S ribosomal protein L7/L12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	Z	30	227	144	33	47	3	0	0

- Molecule 39 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
39	a	2880	92918	27587	31077	11398	19976	2880	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	887	A	U	conflict	GB 937521852

- Molecule 40 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
40	b	76	1181	360	599	117	104	1	0	0

- Molecule 41 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
41	c	77	1277	388	652	129	106	2	0	0

- Molecule 42 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
42	d	120	3870	1144	1301	468	837	120	0	0

- Molecule 43 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
43	e	62	1032	308	531	98	94	1	0	0

- Molecule 44 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
44	f	58	936	281	488	87	78	2	0	0

- Molecule 45 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
45	g	66	1042	323	520	99	94	6	0	0

- Molecule 46 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
46	h	271	4236	1288	2154	423	364	7	0	0

- Molecule 47 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace	
47	i	56	Total	C	H	N	O	S	0	0
			903	269	459	94	80	1		

- Molecule 48 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace	
48	j	209	Total	C	H	N	O	S	0	0
			3182	979	1617	288	294	4		

- Molecule 49 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms					AltConf	Trace	
49	k	52	Total	C	H	N	O	S	0	0
			890	275	464	78	73			

- Molecule 50 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace	
50	l	201	Total	C	H	N	O	S	0	0
			3171	974	1619	283	290	5		

- Molecule 51 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace	
51	m	46	Total	C	H	N	O	S	0	0
			795	228	418	90	57	2		

- Molecule 52 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace	
52	n	177	Total	C	H	N	O	S	0	0
			2853	899	1443	249	256	6		

- Molecule 53 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace	
53	o	64	Total	C	H	N	O	S	0	0
			1076	323	572	105	74	2		

- Molecule 54 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
54	p	175	2671	826	1358	241	244	2	0	0

- Molecule 55 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
55	q	38	645	185	343	65	48	4	0	0

- Molecule 56 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
56	r	149	2259	699	1148	197	214	1	0	0

- Molecule 57 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
57	s	142	2291	714	1162	212	199	4	0	0

- Molecule 58 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
58	t	123	1969	593	1023	181	166	6	0	0

- Molecule 59 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
59	u	144	2182	654	1129	207	190	2	0	0

- Molecule 60 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
60	v	136	2231	686	1157	205	177	6	0	0

- Molecule 61 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
61	w	119	1945	588	994	195	163	5	0	0

- Molecule 62 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
62	x	116	1815	552	923	178	162	0	0

- Molecule 63 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
63	y	114	1879	574	962	179	163	1	0	0

- Molecule 64 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
64	z	117	1967	604	1020	192	151	0	0

- Molecule 65 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
65	AE	1	1	1	0

- Molecule 66 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
66	AE	2	2	2	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: Ribosomal protein L21

Chain 0:  100%

There are no outlier residues recorded for this chain.

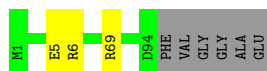
- Molecule 2: 50S ribosomal protein L22

Chain 1:  100%

There are no outlier residues recorded for this chain.

- Molecule 3: 50S ribosomal protein L23

Chain 2:  91% 6%



- Molecule 4: 50S ribosomal protein L24

Chain 3:  99%



- Molecule 5: 50S ribosomal protein L25

Chain 4:  98%

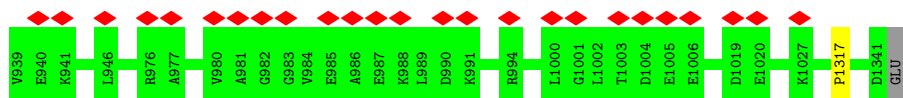


- Molecule 6: NT DNA with ops signal

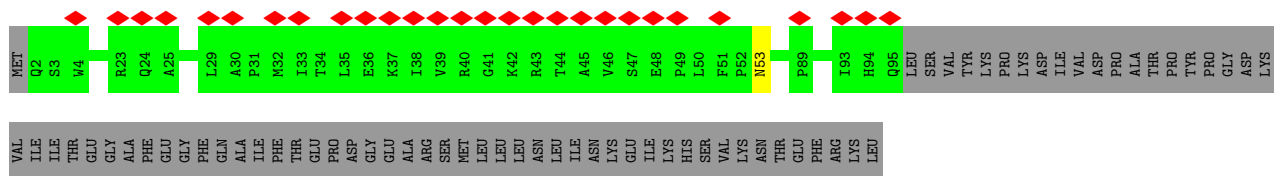
Chain 5:  47% 21% 32%



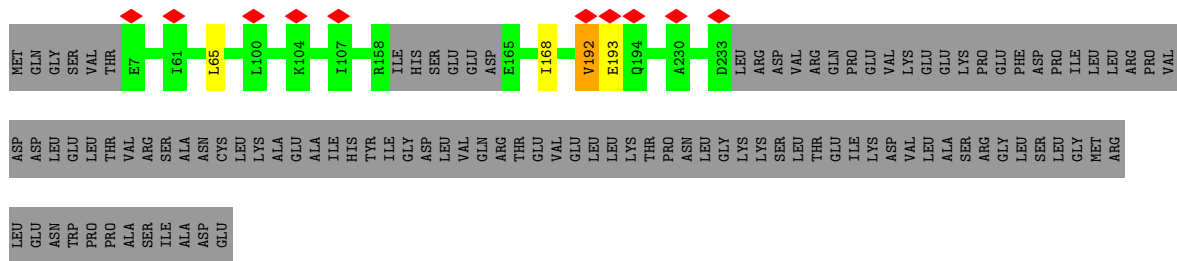




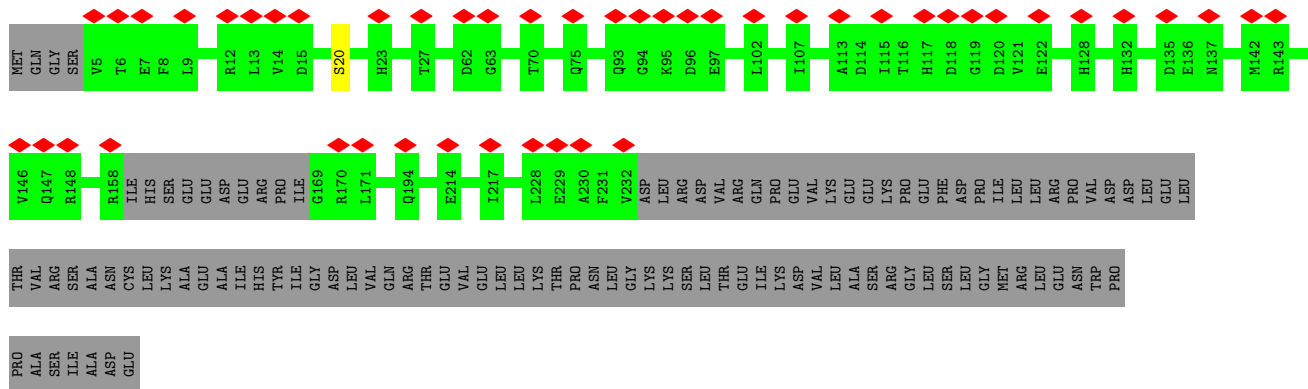
• Molecule 12: Transcription antitermination protein RfaH



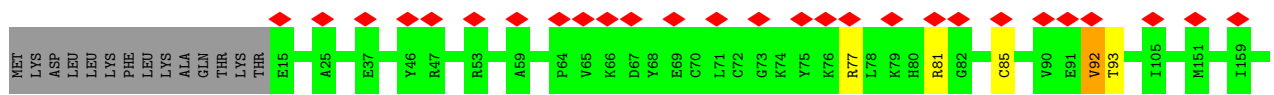
• Molecule 13: DNA-directed RNA polymerase subunit alpha

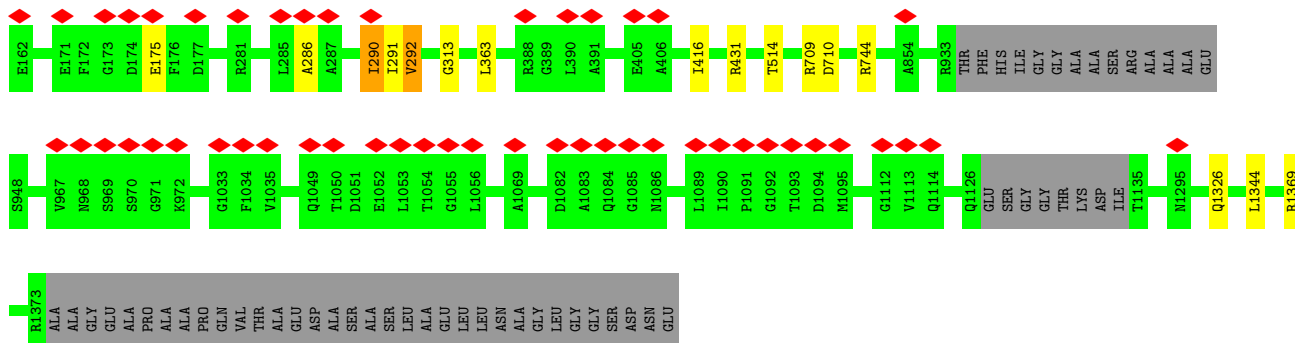


• Molecule 13: DNA-directed RNA polymerase subunit alpha

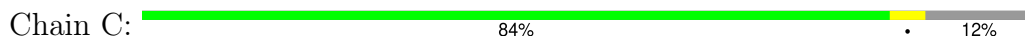


• Molecule 14: DNA-directed RNA polymerase subunit beta'

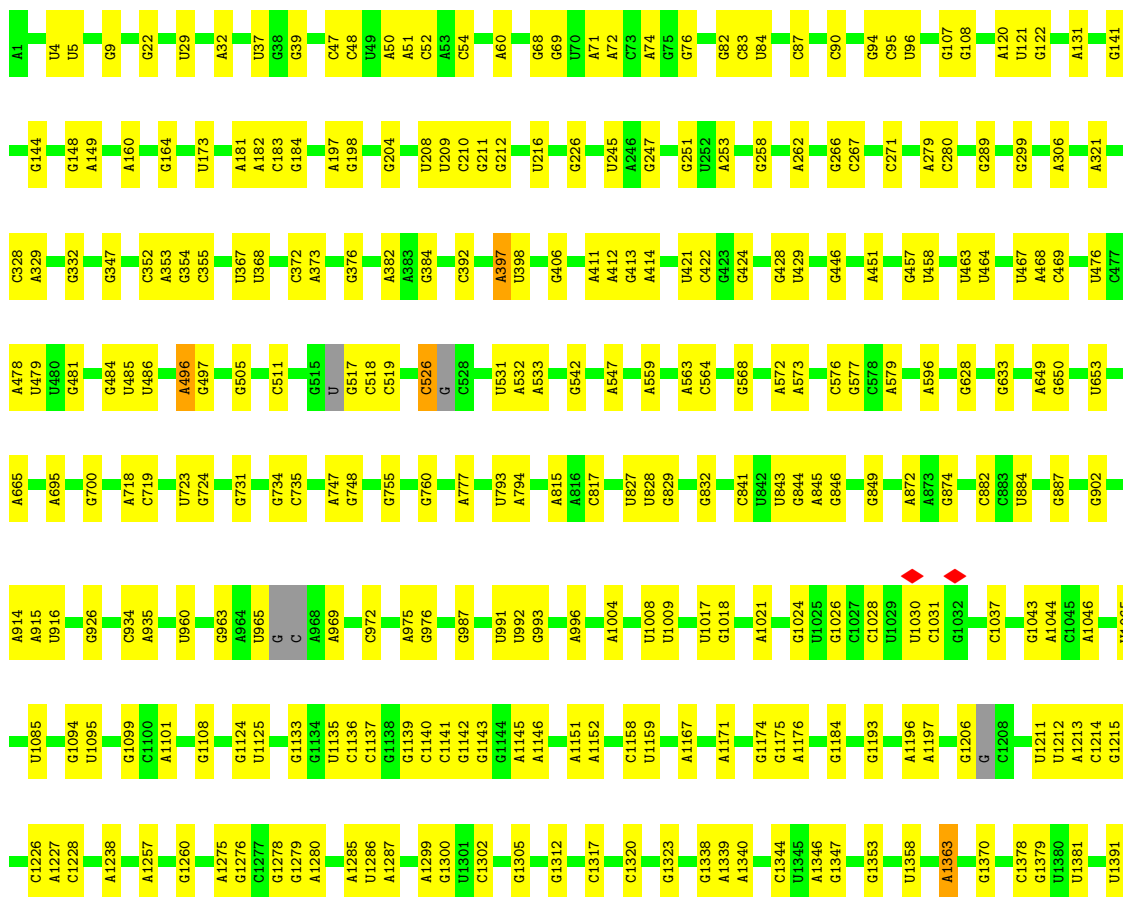
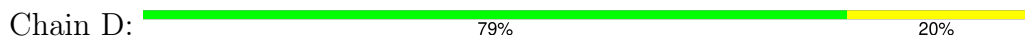





• Molecule 15: 30S ribosomal protein S18

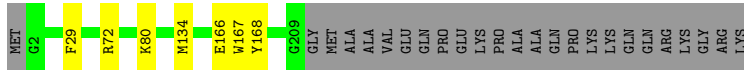


• Molecule 16: 16S rRNA

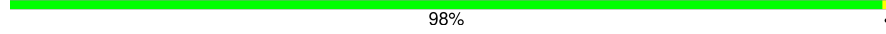




Chain I:  86% 11%



- Molecule 22: 30S ribosomal protein S4

Chain J:  98%



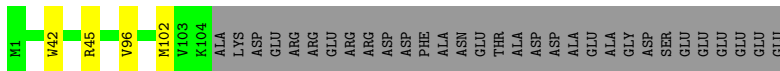
- Molecule 23: 30S ribosomal protein S5

Chain K:  91% 7%




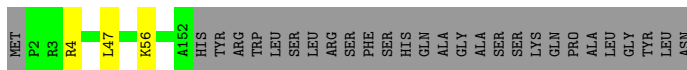
- Molecule 24: 30S ribosomal protein S6

Chain L:  74% 23%



- Molecule 25: 30S ribosomal protein S7

Chain M:  83% 16%



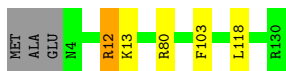
- Molecule 26: 30S ribosomal protein S8

Chain N:  98%



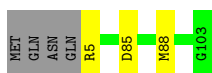
- Molecule 27: 30S ribosomal protein S9

Chain O:  94%




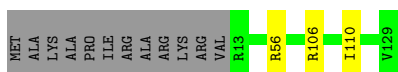
- Molecule 28: 30S ribosomal protein S10

Chain P:  93%



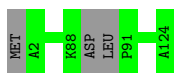
- Molecule 29: 30S ribosomal protein S11

Chain Q:  88% 9%



- Molecule 30: 30S ribosomal protein S12

Chain R:  98%



- Molecule 31: 30S ribosomal protein S14

Chain S:  98%



- Molecule 32: 30S ribosomal protein S15

Chain T:  98%



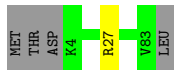
- Molecule 33: 30S ribosomal protein S16

Chain U:  98%



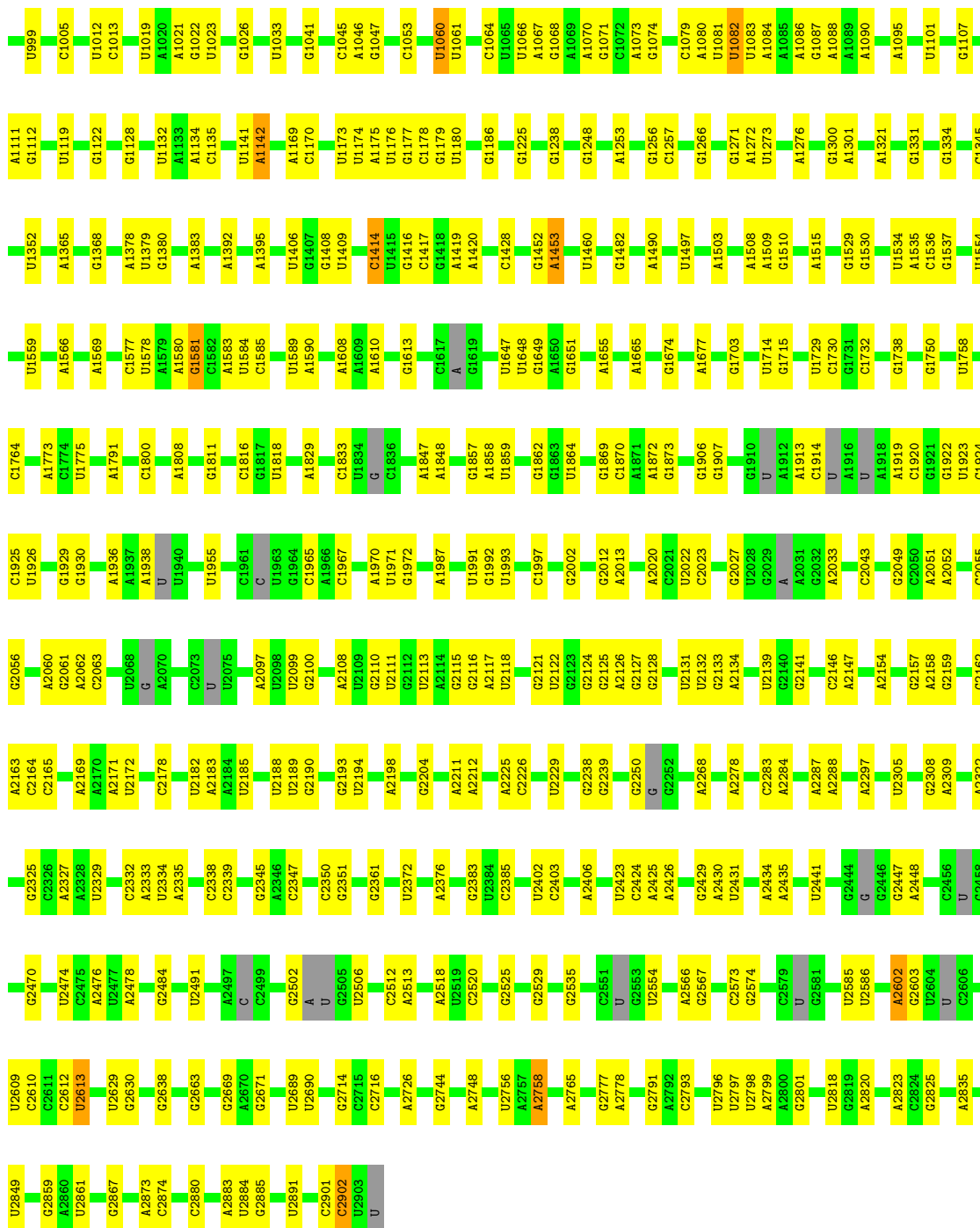
- Molecule 34: 30S ribosomal protein S17

Chain V:  94% 5%

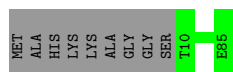
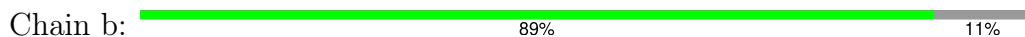


- Molecule 35: 30S ribosomal protein S19





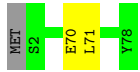
• Molecule 40: 50S ribosomal protein L27




• Molecule 41: 50S ribosomal protein L28



Chain c:  96%



- Molecule 42: 5S rRNA

Chain d:  88%



- Molecule 43: 50S ribosomal protein L29

Chain e:  95%



- Molecule 44: 50S ribosomal protein L30

Chain f:  97%



- Molecule 45: 50S ribosomal protein L31

Chain g:  93%



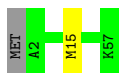
- Molecule 46: 50S ribosomal protein L2

Chain h:  98%



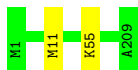
- Molecule 47: 50S ribosomal protein L32

Chain i:  96%



- Molecule 48: 50S ribosomal protein L3

Chain j:  99%



- Molecule 49: 50S ribosomal protein L33

Chain k:  95% 5%



- Molecule 50: 50S ribosomal protein L4

Chain l:  99%



- Molecule 51: 50S ribosomal protein L34

Chain m:  100%

There are no outlier residues recorded for this chain.

- Molecule 52: 50S ribosomal protein L5

Chain n:  97%



- Molecule 53: 50S ribosomal protein L35

Chain o:  94% 5%



- Molecule 54: 50S ribosomal protein L6

Chain p:  98%



- Molecule 55: 50S ribosomal protein L36

Chain q:  100%

There are no outlier residues recorded for this chain.

- Molecule 56: 50S ribosomal protein L9

Chain r:  100%

There are no outlier residues recorded for this chain.

- Molecule 57: 50S ribosomal protein L13

Chain s:  97%



- Molecule 58: 50S ribosomal protein L14

Chain t:  97%



- Molecule 59: 50S ribosomal protein L15

Chain u:  98%



- Molecule 60: 50S ribosomal protein L16

Chain v:  99%



- Molecule 61: 50S ribosomal protein L17

Chain w:  89% 5% 6%



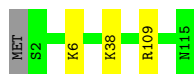
- Molecule 62: 50S ribosomal protein L18

Chain x:  99%



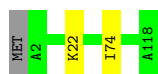
- Molecule 63: 50S ribosomal protein L19

Chain y:  97% ..



- Molecule 64: 50S ribosomal protein L20

Chain z:  97% ..



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	1720	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	28	Depositor
Minimum defocus (nm)	1250	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.033	Depositor
Minimum map value	-0.007	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.0025	Depositor
Map size (Å)	531.968, 531.968, 531.968	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.039, 1.039, 1.039	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	0	0.47	0/829	0.60	0/1107
2	1	0.58	0/864	0.69	0/1156
3	2	0.67	1/752 (0.1%)	0.72	1/1005 (0.1%)
4	3	0.41	0/796	0.55	0/1062
5	4	0.65	2/766 (0.3%)	0.69	0/1025
6	5	1.14	6/611 (1.0%)	1.07	2/943 (0.2%)
7	6	1.17	5/574 (0.9%)	1.02	0/880
8	7	0.39	1/658 (0.2%)	0.83	3/1020 (0.3%)
9	9	0.36	0/1131	0.66	2/1524 (0.1%)
10	A	0.55	1/1810 (0.1%)	1.26	12/2821 (0.4%)
10	B	0.57	2/1810 (0.1%)	1.27	14/2821 (0.5%)
11	AA	0.43	0/10547	0.60	1/14232 (0.0%)
12	AB	0.33	0/773	0.64	0/1051
13	AC	0.41	0/1718	0.62	0/2328
13	AD	0.36	0/1696	0.62	0/2298
14	AE	0.41	0/10561	0.63	3/14258 (0.0%)
15	C	0.70	0/553	0.92	4/743 (0.5%)
16	D	0.59	14/36610 (0.0%)	1.03	67/57091 (0.1%)
17	E	0.57	0/675	0.71	0/895
18	F	0.62	0/597	0.59	0/792
19	G	0.66	2/1791 (0.1%)	0.83	7/2413 (0.3%)
20	H	0.43	0/1746	0.70	0/2382
21	I	0.62	2/1663 (0.1%)	0.71	4/2241 (0.2%)
22	J	0.54	2/1665 (0.1%)	0.59	0/2227
23	K	0.69	1/1165 (0.1%)	0.86	5/1568 (0.3%)
24	L	0.79	3/867 (0.3%)	0.82	3/1171 (0.3%)
25	M	0.54	0/1195	0.70	2/1602 (0.1%)
26	N	0.52	0/989	0.63	1/1326 (0.1%)
27	O	0.67	4/1034 (0.4%)	0.82	4/1375 (0.3%)
28	P	0.52	0/800	0.70	2/1082 (0.2%)
29	Q	0.71	1/893 (0.1%)	0.82	4/1205 (0.3%)
30	R	0.56	0/952	0.65	0/1274

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
31	S	0.63	1/817 (0.1%)	0.64	0/1088
32	T	0.56	0/722	0.72	1/964 (0.1%)
33	U	0.45	0/659	0.65	1/884 (0.1%)
34	V	0.57	0/657	0.70	0/881
35	W	0.56	1/680 (0.1%)	0.69	3/915 (0.3%)
36	X	0.48	0/909	0.72	1/1215 (0.1%)
37	Y	0.42	1/1046 (0.1%)	0.57	1/1410 (0.1%)
38	Z	0.23	0/227	0.38	0/304
39	a	0.61	14/69247 (0.0%)	1.03	129/107985 (0.1%)
40	b	0.47	0/589	0.57	0/779
41	c	0.56	1/635 (0.2%)	0.66	1/848 (0.1%)
42	d	0.50	0/2872	0.95	0/4478
43	e	0.81	2/502 (0.4%)	0.66	0/667
44	f	0.53	0/452	0.72	2/605 (0.3%)
45	g	0.50	1/531 (0.2%)	0.67	1/709 (0.1%)
46	h	0.53	2/2121 (0.1%)	0.67	6/2852 (0.2%)
47	i	0.42	0/450	0.64	1/599 (0.2%)
48	j	0.53	0/1586	0.64	2/2134 (0.1%)
49	k	0.51	0/433	0.68	0/576
50	l	0.54	1/1571 (0.1%)	0.64	1/2113 (0.0%)
51	m	0.43	0/380	0.60	0/498
52	n	0.51	0/1434	0.68	2/1926 (0.1%)
53	o	0.51	0/513	0.85	1/676 (0.1%)
54	p	0.50	0/1333	0.68	3/1805 (0.2%)
55	q	0.46	0/303	0.61	0/397
56	r	0.34	0/1122	0.52	0/1515
57	s	0.83	5/1152 (0.4%)	0.81	4/1551 (0.3%)
58	t	0.55	1/955 (0.1%)	0.89	5/1279 (0.4%)
59	u	0.47	1/1062 (0.1%)	0.63	0/1413
60	v	0.61	1/1093 (0.1%)	0.75	1/1460 (0.1%)
61	w	0.90	5/964 (0.5%)	0.95	9/1289 (0.7%)
62	x	0.42	0/902	0.57	0/1209
63	y	0.46	0/929	0.59	1/1242 (0.1%)
64	z	0.63	1/960 (0.1%)	0.60	0/1278
All	All	0.58	85/188899 (0.0%)	0.92	317/278462 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
9	9	0	3

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Mol	Chain	#Chirality outliers	#Planarity outliers
13	AC	0	1
13	AD	0	1
14	AE	0	4
19	G	0	1
20	H	0	5
21	I	0	1
23	K	0	2
27	O	0	1
36	X	0	1
37	Y	0	1
52	n	0	1
53	o	0	1
57	s	0	1
59	u	0	2
All	All	0	26

All (85) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
61	w	35	LYS	CE-NZ	-15.23	1.10	1.49
24	L	42	TRP	CB-CG	-12.39	1.27	1.50
3	2	5	GLU	CG-CD	-11.56	1.34	1.51
43	e	46	VAL	CB-CG1	-11.29	1.29	1.52
61	w	42	LYS	CD-CE	-10.81	1.24	1.51
23	K	45	ARG	CG-CD	9.52	1.75	1.51
16	D	718	A	N9-C4	-8.98	1.32	1.37
27	O	80	ARG	CD-NE	-8.74	1.31	1.46
57	s	74	TYR	CZ-OH	-8.64	1.23	1.37
57	s	74	TYR	CE2-CZ	-8.50	1.27	1.38
19	G	19	GLN	CB-CG	-8.40	1.29	1.52
39	a	1141	U	N3-C4	-7.97	1.31	1.38
57	s	74	TYR	CD1-CE1	-7.84	1.27	1.39
6	5	25	DA	C1'-N9	-7.66	1.36	1.47
61	w	112	TYR	CG-CD1	-7.56	1.29	1.39
39	a	1453	A	N9-C4	-7.52	1.33	1.37
6	5	18	DG	C1'-N9	-7.27	1.37	1.47
16	D	1339	A	N9-C4	-7.12	1.33	1.37
22	J	182	PHE	CE2-CZ	-7.08	1.23	1.37
35	W	66	MET	CG-SD	-7.05	1.62	1.81
16	D	563	A	C6-N1	-6.98	1.30	1.35
16	D	397	A	C6-N1	-6.91	1.30	1.35
7	6	9	DG	C1'-N9	-6.89	1.37	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
50	l	6	LYS	CE-NZ	-6.84	1.31	1.49
10	B	27	U	O3'-P	6.83	1.69	1.61
6	5	21	DA	C1'-N9	-6.79	1.37	1.47
8	7	2	U	C1'-N1	6.78	1.58	1.48
39	a	1019	U	N3-C4	-6.72	1.32	1.38
37	Y	5	GLN	CB-CG	-6.69	1.34	1.52
16	D	872	A	C6-N1	-6.62	1.30	1.35
27	O	80	ARG	CZ-NH2	6.61	1.41	1.33
7	6	12	DG	C1'-N9	-6.55	1.38	1.47
16	D	1363	A	C6-N1	-6.53	1.30	1.35
39	a	1021	A	C6-N1	-6.52	1.30	1.35
45	g	62	LYS	CE-NZ	-6.49	1.32	1.49
64	z	74	ILE	CB-CG2	-6.47	1.32	1.52
24	L	42	TRP	CZ3-CH2	-6.42	1.29	1.40
21	I	166	GLU	CG-CD	-6.39	1.42	1.51
27	O	118	LEU	CG-CD2	-6.35	1.28	1.51
21	I	29	PHE	CD2-CE2	-6.30	1.26	1.39
39	a	1142	A	C6-N1	-6.28	1.31	1.35
24	L	42	TRP	CE3-CZ3	-6.28	1.27	1.38
6	5	28	DG	C1'-N9	-6.24	1.38	1.47
19	G	158	PRO	CG-CD	6.24	1.71	1.50
16	D	827	U	N3-C4	-6.21	1.32	1.38
16	D	1358	U	N3-C4	-6.21	1.32	1.38
39	a	2013	A	C6-N6	-6.15	1.29	1.33
7	6	5	DG	C1'-N9	-6.14	1.38	1.47
10	A	37	A	N9-C4	-6.14	1.34	1.37
10	B	37	A	N9-C4	-6.10	1.34	1.37
39	a	67	U	C4-O4	-6.07	1.18	1.23
31	S	92	GLU	CD-OE1	-6.06	1.19	1.25
16	D	37	U	N3-C4	-6.06	1.32	1.38
6	5	27	DG	C1'-N9	-6.02	1.38	1.47
46	h	181	MET	CG-SD	-5.93	1.65	1.81
43	e	25	GLN	CB-CG	-5.92	1.36	1.52
16	D	872	A	C6-N6	-5.87	1.29	1.33
39	a	1257	C	N1-C2	-5.87	1.34	1.40
39	a	2613	U	N3-C4	-5.86	1.33	1.38
57	s	92	MET	CG-SD	-5.85	1.66	1.81
61	w	35	LYS	CD-CE	5.83	1.65	1.51
39	a	2756	U	C4-O4	-5.80	1.19	1.23
60	v	45	GLN	CB-CG	-5.69	1.37	1.52
39	a	2013	A	C6-N1	-5.65	1.31	1.35
27	O	103	PHE	CE2-CZ	-5.62	1.26	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	4	56	PHE	CB-CG	-5.59	1.41	1.51
41	c	70	GLU	CG-CD	-5.59	1.43	1.51
16	D	884	U	N3-C4	-5.56	1.33	1.38
59	u	122	VAL	CB-CG1	-5.51	1.41	1.52
39	a	1082	U	C4-O4	-5.51	1.19	1.23
22	J	72	PHE	CB-CG	-5.48	1.42	1.51
46	h	175	ARG	CB-CG	5.46	1.67	1.52
57	s	74	TYR	CD2-CE2	-5.44	1.31	1.39
5	4	75	GLN	CB-CG	-5.41	1.38	1.52
29	Q	106	ARG	CD-NE	-5.35	1.37	1.46
16	D	563	A	C6-N6	-5.34	1.29	1.33
6	5	3	DT	C1'-N1	5.18	1.55	1.49
16	D	397	A	C6-N6	-5.18	1.29	1.33
58	t	18	ARG	CZ-NH1	-5.15	1.26	1.33
61	w	80	PHE	CB-CG	-5.13	1.42	1.51
7	6	25	DT	C1'-N1	5.13	1.55	1.49
39	a	1021	A	C6-N6	-5.13	1.29	1.33
7	6	10	DG	C1'-N9	-5.11	1.40	1.47
39	a	2613	U	C4-O4	-5.10	1.19	1.23
16	D	1363	A	C6-N6	-5.01	1.29	1.33

All (317) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
39	a	1019	U	C5-C4-O4	30.76	144.35	125.90
39	a	1141	U	C5-C4-O4	29.53	143.62	125.90
16	D	37	U	C5-C4-O4	29.49	143.59	125.90
16	D	1358	U	C5-C4-O4	29.24	143.44	125.90
16	D	827	U	C5-C4-O4	28.63	143.08	125.90
16	D	37	U	N3-C4-O4	-28.42	99.51	119.40
16	D	827	U	N3-C4-O4	-27.45	100.19	119.40
39	a	1019	U	N3-C4-O4	-27.33	100.27	119.40
16	D	1358	U	N3-C4-O4	-27.15	100.39	119.40
39	a	2613	U	C5-C4-O4	26.20	141.62	125.90
16	D	884	U	C5-C4-O4	25.46	141.18	125.90
39	a	1082	U	N3-C4-O4	-25.45	101.58	119.40
39	a	2613	U	N3-C4-O4	-25.44	101.59	119.40
16	D	884	U	N3-C4-O4	-24.73	102.09	119.40
39	a	1082	U	C5-C4-O4	23.89	140.23	125.90
39	a	1141	U	N3-C4-O4	-23.77	102.76	119.40
39	a	1257	C	C6-N1-C2	20.02	128.31	120.30
16	D	872	A	N1-C6-N6	-17.71	107.97	118.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
39	a	1021	A	N1-C6-N6	-17.25	108.25	118.60
16	D	563	A	N1-C6-N6	-17.11	108.33	118.60
16	D	397	A	N1-C6-N6	-16.69	108.58	118.60
39	a	1141	U	C2-N3-C4	16.53	136.92	127.00
39	a	1142	A	N1-C6-N6	-16.16	108.90	118.60
39	a	2756	U	N3-C4-O4	-16.13	108.11	119.40
16	D	1363	A	N1-C6-N6	-15.82	109.11	118.60
39	a	67	U	N3-C4-O4	-15.26	108.72	119.40
23	K	71	MET	CG-SD-CE	-15.14	75.98	100.20
61	w	112	TYR	CZ-CE2-CD2	-14.96	106.33	119.80
39	a	2013	A	N1-C6-N6	-14.93	109.64	118.60
10	B	39	C	C4-C5-C6	14.75	124.78	117.40
10	A	39	C	C4-C5-C6	14.73	124.76	117.40
39	a	1019	U	C2-N3-C4	14.68	135.81	127.00
39	a	1086	A	N1-C6-N6	-14.40	109.96	118.60
19	G	113	ARG	NE-CZ-NH2	14.36	127.48	120.30
39	a	1019	U	N1-C2-N3	-12.87	107.18	114.90
53	o	30	ARG	NE-CZ-NH1	-12.75	113.92	120.30
57	s	92	MET	CG-SD-CE	-12.44	80.30	100.20
10	A	39	C	N3-C4-C5	-12.29	116.98	121.90
58	t	18	ARG	NE-CZ-NH2	12.28	126.44	120.30
39	a	1141	U	N1-C2-N3	-12.22	107.57	114.90
10	B	39	C	N3-C4-C5	-12.17	117.03	121.90
58	t	18	ARG	NE-CZ-NH1	-11.72	114.44	120.30
15	C	73	ARG	NE-CZ-NH2	11.20	125.90	120.30
16	D	1358	U	C2-N3-C4	11.12	133.67	127.00
39	a	2756	U	C5-C4-O4	11.07	132.54	125.90
16	D	718	A	N3-C4-C5	11.03	134.52	126.80
39	a	960	A	N1-C6-N6	11.01	125.20	118.60
19	G	158	PRO	N-CD-CG	-10.97	86.75	103.20
24	L	102	MET	CA-CB-CG	-10.82	94.91	113.30
16	D	1358	U	N1-C2-N3	-10.71	108.47	114.90
39	a	1021	A	C5-C6-N6	10.65	132.22	123.70
39	a	1142	A	C5-C6-N6	10.49	132.09	123.70
16	D	397	A	C5-C6-N6	10.34	131.97	123.70
39	a	960	A	C5-C6-N6	-10.13	115.60	123.70
16	D	872	A	C5-C6-N6	9.99	131.69	123.70
16	D	1363	A	C5-C6-N6	9.89	131.61	123.70
16	D	827	U	N1-C2-N3	-9.84	109.00	114.90
61	w	112	TYR	CB-CG-CD2	-9.64	115.22	121.00
16	D	563	A	C5-C6-N6	9.61	131.39	123.70
39	a	67	U	C5-C4-O4	9.54	131.62	125.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
16	D	718	A	C4-C5-C6	-9.25	112.37	117.00
16	D	827	U	C2-N3-C4	9.12	132.47	127.00
27	O	103	PHE	CD1-CE1-CZ	-9.11	109.17	120.10
19	G	157	LEU	C-N-CD	-8.95	100.91	120.60
39	a	1257	C	O4'-C1'-N1	-8.78	101.17	108.20
39	a	1021	A	N1-C2-N3	-8.65	124.98	129.30
39	a	1060	U	N3-C4-O4	8.64	125.45	119.40
39	a	1019	U	C4-C5-C6	-8.48	114.61	119.70
10	B	30	G	C2'-C3'-O3'	8.42	128.02	109.50
29	Q	106	ARG	NE-CZ-NH1	-8.39	116.10	120.30
39	a	1775	U	C5-C4-O4	-8.39	120.87	125.90
39	a	1060	U	C5-C4-O4	-8.38	120.87	125.90
60	v	10	ARG	NE-CZ-NH1	-8.36	116.12	120.30
39	a	1257	C	C5-C6-N1	-8.30	116.85	121.00
32	T	89	ARG	NE-CZ-NH2	-8.26	116.17	120.30
16	D	718	A	N3-C4-N9	-8.21	120.83	127.40
29	Q	56	ARG	NE-CZ-NH1	8.21	124.40	120.30
14	AE	710	ASP	CB-CG-OD1	8.20	125.68	118.30
16	D	1125	U	C5-C4-O4	-8.18	120.99	125.90
39	a	2334	U	OP2-P-O3'	-8.17	87.23	105.20
16	D	718	A	N1-C2-N3	-8.16	125.22	129.30
9	9	129	LEU	C-N-CD	-8.05	102.88	120.60
23	K	78	ASN	N-CA-CB	-8.05	96.10	110.60
39	a	2012	G	O5'-P-OP1	-8.04	98.46	105.70
44	f	45	ARG	NE-CZ-NH1	7.99	124.30	120.30
10	B	76	A	N1-C6-N6	-7.98	113.81	118.60
16	D	884	U	N1-C2-N3	-7.97	110.12	114.90
10	A	76	A	N1-C6-N6	-7.96	113.82	118.60
16	D	37	U	N1-C2-N3	-7.95	110.13	114.90
33	U	31	ARG	NE-CZ-NH2	-7.88	116.36	120.30
27	O	80	ARG	CG-CD-NE	7.83	128.24	111.80
39	a	1257	C	N3-C4-C5	7.83	125.03	121.90
16	D	884	U	C2-N3-C4	7.79	131.67	127.00
39	a	1530	G	C5-C6-O6	-7.78	123.93	128.60
16	D	397	A	N1-C2-N3	-7.65	125.48	129.30
36	X	81	MET	CG-SD-CE	-7.55	88.12	100.20
16	D	718	A	C6-N1-C2	7.53	123.12	118.60
39	a	626	A	N1-C6-N6	-7.51	114.09	118.60
39	a	626	A	N1-C2-N3	7.50	133.05	129.30
10	A	37	A	C2-N3-C4	-7.50	106.85	110.60
39	a	1655	A	C8-N9-C4	7.42	108.77	105.80
16	D	827	U	C4-C5-C6	-7.40	115.26	119.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
61	w	38	LEU	CB-CG-CD1	-7.40	98.42	111.00
10	B	37	A	C2-N3-C4	-7.37	106.91	110.60
61	w	112	TYR	OH-CZ-CE2	-7.36	100.22	120.10
21	I	166	GLU	OE1-CD-OE2	7.34	132.11	123.30
21	I	134	MET	CG-SD-CE	-7.34	88.45	100.20
16	D	1358	U	C4-C5-C6	-7.30	115.32	119.70
19	G	154	MET	CG-SD-CE	-7.29	88.54	100.20
27	O	103	PHE	CG-CD1-CE1	7.29	128.81	120.80
39	a	1276	A	C8-N9-C4	7.28	108.71	105.80
39	a	1086	A	C5-C6-N6	7.26	129.51	123.70
39	a	1530	G	N1-C6-O6	7.22	124.23	119.90
39	a	1581	G	N9-C4-C5	-7.21	102.52	105.40
10	A	37	A	C5-N7-C8	-7.19	100.31	103.90
10	A	39	C	C5-C6-N1	-7.19	117.41	121.00
16	D	1125	U	N3-C4-O4	7.16	124.41	119.40
8	7	1	A	OP2-P-O3'	7.15	120.94	105.20
39	a	1775	U	N3-C4-O4	7.14	124.40	119.40
10	B	39	C	C5-C6-N1	-7.11	117.45	121.00
16	D	37	U	C2-N3-C4	7.10	131.26	127.00
21	I	134	MET	CB-CG-SD	-7.09	91.14	112.40
39	a	2013	A	C5-C6-N6	7.09	129.37	123.70
39	a	2902	C	C2-N1-C1'	-7.07	111.03	118.80
39	a	1453	A	C2-N3-C4	-7.06	107.07	110.60
10	B	37	A	C5-N7-C8	-6.97	100.41	103.90
39	a	2612	C	C6-N1-C2	6.91	123.06	120.30
10	A	37	A	N1-C2-N3	6.90	132.75	129.30
39	a	1453	A	N3-C4-C5	6.88	131.62	126.80
45	g	62	LYS	CD-CE-NZ	-6.85	95.94	111.70
10	B	37	A	N1-C2-N3	6.85	132.72	129.30
39	a	960	A	N9-C4-C5	-6.85	103.06	105.80
8	7	1	A	O3'-P-O5'	-6.84	91.00	104.00
16	D	37	U	C4-C5-C6	-6.76	115.64	119.70
28	P	88	MET	CG-SD-CE	-6.75	89.39	100.20
16	D	1526	G	N3-C2-N2	-6.75	115.18	119.90
39	a	2758	A	N1-C6-N6	-6.75	114.55	118.60
15	C	38	LYS	CD-CE-NZ	-6.74	96.20	111.70
19	G	158	PRO	CA-N-CD	-6.73	102.08	111.50
39	a	542	C	C6-N1-C2	6.71	122.98	120.30
61	w	42	LYS	CD-CE-NZ	6.68	127.07	111.70
19	G	19	GLN	CA-CB-CG	6.68	128.10	113.40
39	a	196	A	O4'-C1'-N9	6.67	113.54	108.20
16	D	280	C	C2-N3-C4	6.62	123.21	119.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
39	a	2013	A	C5-C6-N1	6.58	120.99	117.70
39	a	960	A	C4-C5-N7	6.57	113.98	110.70
39	a	1453	A	C6-N1-C2	6.57	122.54	118.60
39	a	1818	U	C5-C6-N1	6.53	125.97	122.70
16	D	476	U	C5-C4-O4	-6.51	121.99	125.90
39	a	1581	G	C4-C5-N7	6.45	113.38	110.80
39	a	2351	G	C5-C6-O6	-6.45	124.73	128.60
46	h	181	MET	CG-SD-CE	-6.44	89.90	100.20
16	D	718	A	C8-N9-C4	6.42	108.37	105.80
39	a	2188	U	C5-C4-O4	-6.40	122.06	125.90
16	D	280	C	C5-C6-N1	6.39	124.20	121.00
39	a	1082	U	C4-C5-C6	-6.35	115.89	119.70
50	l	1	MET	CG-SD-CE	-6.35	90.03	100.20
39	a	2756	U	N1-C2-N3	-6.35	111.09	114.90
16	D	1339	A	N3-C4-N9	-6.35	122.32	127.40
19	G	154	MET	CA-CB-CG	-6.28	102.62	113.30
39	a	2902	C	C6-N1-C2	6.26	122.81	120.30
35	W	40	ILE	CG1-CB-CG2	6.24	125.12	111.40
16	D	884	U	C4-C5-C6	-6.23	115.96	119.70
27	O	80	ARG	CB-CG-CD	-6.23	95.39	111.60
10	B	31	G	O4'-C1'-N9	6.22	113.18	108.20
57	s	92	MET	CB-CG-SD	-6.22	93.73	112.40
16	D	476	U	N3-C4-O4	6.21	123.75	119.40
10	A	31	G	O4'-C1'-N9	6.19	113.15	108.20
10	B	27	U	P-O3'-C3'	6.18	127.12	119.70
16	D	718	A	P-O5'-C5'	-6.16	111.04	120.90
54	p	152	ARG	NE-CZ-NH1	-6.16	117.22	120.30
39	a	1276	A	N9-C4-C5	-6.16	103.34	105.80
39	a	893	C	C2-N3-C4	-6.16	116.82	119.90
44	f	45	ARG	NE-CZ-NH2	-6.15	117.22	120.30
39	a	942	G	N1-C6-O6	-6.15	116.21	119.90
16	D	60	A	O4'-C1'-N9	6.11	113.09	108.20
47	i	15	MET	CG-SD-CE	-6.10	90.43	100.20
46	h	175	ARG	NE-CZ-NH2	-6.10	117.25	120.30
57	s	120	ARG	NE-CZ-NH1	-6.06	117.27	120.30
39	a	1257	C	N3-C2-O2	6.04	126.13	121.90
39	a	2638	G	O4'-C1'-N9	6.04	113.03	108.20
39	a	2901	C	C6-N1-C2	6.03	122.71	120.30
39	a	2613	U	C4-C5-C6	-6.01	116.09	119.70
61	w	112	TYR	CG-CD1-CE1	-6.01	116.49	121.30
46	h	156	ARG	NE-CZ-NH1	6.00	123.30	120.30
16	D	1363	A	N9-C4-C5	-6.00	103.40	105.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
35	W	40	ILE	CA-CB-CG1	-5.99	99.62	111.00
14	AE	363	LEU	CA-CB-CG	5.97	129.04	115.30
61	w	38	LEU	CB-CG-CD2	5.96	121.13	111.00
39	a	729	G	O4'-C1'-N9	5.95	112.96	108.20
39	a	1257	C	N1-C2-N3	-5.87	115.09	119.20
16	D	280	C	N1-C2-O2	5.87	122.42	118.90
39	a	2602	A	C3'-C2'-C1'	5.87	106.19	101.50
39	a	2351	G	C4-C5-N7	5.85	113.14	110.80
16	D	1344	C	O5'-P-OP1	-5.84	100.44	105.70
39	a	686	U	N3-C4-C5	5.84	118.10	114.60
39	a	2334	U	OP1-P-O3'	5.83	118.02	105.20
25	M	47	LEU	CB-CG-CD2	-5.82	101.10	111.00
48	j	55	LYS	CD-CE-NZ	-5.81	98.34	111.70
16	D	563	A	N9-C4-C5	-5.80	103.48	105.80
39	a	2756	U	C4-C5-C6	-5.79	116.22	119.70
39	a	1581	G	N1-C6-O6	5.78	123.37	119.90
39	a	2049	G	N3-C2-N2	-5.76	115.87	119.90
39	a	1019	U	N3-C2-O2	5.76	126.23	122.20
46	h	175	ARG	NE-CZ-NH1	5.76	123.18	120.30
39	a	136	G	N9-C4-C5	-5.75	103.10	105.40
39	a	1577	C	C6-N1-C2	5.75	122.60	120.30
58	t	18	ARG	CG-CD-NE	-5.73	99.76	111.80
54	p	164	TYR	CB-CG-CD2	5.72	124.44	121.00
39	a	942	G	C5-C6-O6	5.72	132.03	128.60
25	M	4	ARG	NE-CZ-NH1	-5.69	117.45	120.30
16	D	915	A	N9-C4-C5	-5.68	103.53	105.80
39	a	686	U	N3-C4-O4	-5.68	115.42	119.40
15	C	73	ARG	NE-CZ-NH1	-5.67	117.47	120.30
28	P	85	ASP	CB-CG-OD2	-5.66	113.21	118.30
39	a	2329	U	C5-C6-N1	5.66	125.53	122.70
39	a	1857	G	O4'-C1'-N9	5.64	112.71	108.20
39	a	1142	A	N1-C2-N3	-5.63	126.48	129.30
39	a	1334	G	N3-C4-C5	5.63	131.41	128.60
39	a	542	C	N3-C4-C5	5.61	124.14	121.90
39	a	1225	G	N3-C4-C5	5.61	131.41	128.60
46	h	156	ARG	NE-CZ-NH2	-5.60	117.50	120.30
46	h	189	ARG	NE-CZ-NH2	5.60	123.10	120.30
39	a	1086	A	C5-C6-N1	5.60	120.50	117.70
29	Q	110	ILE	CG1-CB-CG2	-5.59	99.11	111.40
24	L	45	ARG	NE-CZ-NH2	-5.58	117.51	120.30
39	a	2188	U	N3-C4-O4	5.57	123.30	119.40
39	a	974	G	O4'-C1'-N9	5.57	112.66	108.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
15	C	60	LYS	CD-CE-NZ	-5.56	98.91	111.70
39	a	1082	U	N1-C2-N3	-5.56	111.57	114.90
39	a	1141	U	C4-C5-C6	-5.56	116.37	119.70
16	D	526	C	C6-N1-C2	5.52	122.51	120.30
39	a	1021	A	C4-C5-C6	-5.51	114.25	117.00
39	a	2338	C	C6-N1-C2	5.51	122.50	120.30
58	t	1	MET	CG-SD-CE	-5.51	91.39	100.20
39	a	544	C	C6-N1-C2	5.50	122.50	120.30
14	AE	709	ARG	C-N-CA	5.49	135.43	121.70
10	A	38	A	C5'-C4'-O4'	5.49	115.68	109.10
16	D	1339	A	C2-N3-C4	-5.48	107.86	110.60
39	a	1414	C	C2-N1-C1'	-5.48	112.77	118.80
41	c	71	LEU	CA-CB-CG	5.46	127.86	115.30
10	A	23	C	N1-C2-O2	5.46	122.17	118.90
39	a	253	C	C6-N1-C2	5.45	122.48	120.30
16	D	280	C	C5-C4-N4	5.43	124.00	120.20
10	B	38	A	C5'-C4'-O4'	5.43	115.61	109.10
39	a	883	G	N3-C2-N2	-5.43	116.10	119.90
48	j	11	MET	CB-CG-SD	-5.41	96.16	112.40
39	a	2332	C	C6-N1-C2	5.41	122.46	120.30
39	a	742	A	C6-N1-C2	-5.41	115.36	118.60
39	a	1142	A	C4-C5-C6	-5.41	114.30	117.00
10	A	37	A	N7-C8-N9	5.41	116.50	113.80
16	D	397	A	C4-C5-N7	5.39	113.40	110.70
16	D	1158	C	O4'-C1'-N1	5.39	112.51	108.20
16	D	719	C	C6-N1-C2	5.39	122.45	120.30
24	L	45	ARG	NE-CZ-NH1	5.38	122.99	120.30
39	a	1141	U	N1-C2-O2	5.38	126.57	122.80
57	s	92	MET	CA-CB-CG	-5.38	104.15	113.30
29	Q	56	ARG	NE-CZ-NH2	-5.38	117.61	120.30
39	a	221	A	O4'-C1'-N9	5.38	112.50	108.20
39	a	1257	C	C6-N1-C1'	-5.38	114.35	120.80
39	a	775	G	O4'-C1'-N9	5.37	112.49	108.20
10	B	23	C	N1-C2-O2	5.36	122.12	118.90
3	2	69	ARG	NE-CZ-NH1	5.35	122.98	120.30
21	I	168	TYR	N-CA-CB	5.35	120.22	110.60
39	a	1019	U	N1-C2-O2	5.34	126.54	122.80
63	y	109	ARG	NE-CZ-NH1	5.33	122.97	120.30
6	5	8	DG	P-O3'-C3'	5.33	126.09	119.70
16	D	476	U	C2-N1-C1'	5.32	124.08	117.70
39	a	1581	G	C6-C5-N7	-5.32	127.21	130.40
39	a	1257	C	O5'-P-OP2	-5.31	100.92	105.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
61	w	112	TYR	CE1-CZ-CE2	5.31	128.29	119.80
39	a	385	C	C6-N1-C2	5.30	122.42	120.30
9	9	130	PRO	CA-N-CD	-5.30	104.08	111.50
39	a	2613	U	C2-N3-C4	5.30	130.18	127.00
39	a	542	C	C2-N1-C1'	-5.30	112.97	118.80
10	B	37	A	N7-C8-N9	5.29	116.44	113.80
39	a	1021	A	C6-N1-C2	5.28	121.77	118.60
39	a	1414	C	C6-N1-C2	5.28	122.41	120.30
39	a	27	G	O4'-C1'-N9	5.27	112.42	108.20
16	D	872	A	C5-C6-N1	5.26	120.33	117.70
37	Y	5	GLN	CB-CA-C	-5.26	99.88	110.40
16	D	496	A	C2-N3-C4	5.25	113.23	110.60
6	5	11	DA	P-O3'-C3'	5.24	125.99	119.70
35	W	62	VAL	CG1-CB-CG2	5.22	119.26	110.90
39	a	67	U	N1-C2-N3	-5.22	111.77	114.90
58	t	20	MET	CA-CB-CG	5.22	122.18	113.30
54	p	152	ARG	NE-CZ-NH2	5.20	122.90	120.30
16	D	397	A	N9-C4-C5	-5.20	103.72	105.80
52	n	26	MET	CG-SD-CE	-5.19	91.89	100.20
39	a	2013	A	N9-C4-C5	-5.18	103.73	105.80
16	D	107	G	N9-C1'-C2'	-5.18	106.30	112.00
39	a	2756	U	N3-C4-C5	5.17	117.70	114.60
39	a	2901	C	C2-N1-C1'	-5.16	113.12	118.80
39	a	1053	C	C6-N1-C2	5.16	122.36	120.30
39	a	2602	A	P-O3'-C3'	5.16	125.89	119.70
39	a	2284	A	C8-N9-C4	5.15	107.86	105.80
8	7	4	U	C2'-C3'-O3'	5.15	121.94	113.70
16	D	563	A	C5-C6-N1	5.14	120.27	117.70
39	a	704	G	O4'-C1'-N9	5.13	112.31	108.20
10	B	30	G	C4'-C3'-C2'	-5.12	97.48	102.60
16	D	882	C	C6-N1-C2	5.12	122.35	120.30
26	N	27	MET	CG-SD-CE	-5.12	92.01	100.20
11	AA	516	ASP	CB-CG-OD2	5.12	122.91	118.30
23	K	45	ARG	CB-CG-CD	-5.10	98.33	111.60
52	n	38	MET	CG-SD-CE	5.09	108.35	100.20
39	a	130	C	C6-N1-C2	5.09	122.33	120.30
39	a	2613	U	N1-C2-N3	-5.08	111.85	114.90
16	D	368	U	C2-N1-C1'	5.07	123.79	117.70
39	a	1331	G	N1-C6-O6	-5.07	116.86	119.90
16	D	280	C	C4-C5-C6	-5.07	114.87	117.40
23	K	45	ARG	NE-CZ-NH2	-5.07	117.77	120.30
16	D	1358	U	N3-C2-O2	5.04	125.73	122.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
16	D	1526	G	C8-N9-C1'	-5.04	120.44	127.00
10	A	39	C	C2-N3-C4	5.04	122.42	119.90
61	w	112	TYR	CG-CD2-CE2	5.04	125.33	121.30
23	K	71	MET	CB-CA-C	5.02	120.44	110.40
39	a	537	G	OP1-P-OP2	5.01	127.11	119.60

There are no chirality outliers.

All (26) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
9	9	107	GLU	Peptide
9	9	79	PRO	Peptide
9	9	92	ALA	Peptide
13	AC	192	VAL	Peptide
13	AD	20	SER	Peptide
14	AE	1326	GLN	Peptide
14	AE	1344	LEU	Peptide
14	AE	313	GLY	Peptide
14	AE	416	ILE	Peptide
19	G	19	GLN	Sidechain
20	H	124	LEU	Peptide
20	H	171	ARG	Peptide
20	H	274	TYR	Peptide
20	H	81	GLU	Peptide
20	H	82	THR	Peptide
21	I	167	TRP	Mainchain
23	K	45	ARG	Mainchain
23	K	77	ASN	Peptide
27	O	12	ARG	Peptide
36	X	65	VAL	Peptide
37	Y	5	GLN	Peptide
52	n	176	PRO	Peptide
53	o	31	HIS	Peptide
57	s	74	TYR	Sidechain
59	u	35	HIS	Peptide
59	u	62	PRO	Peptide

## 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	0	101/103 (98%)	97 (96%)	4 (4%)	0	100	100
2	1	108/110 (98%)	107 (99%)	1 (1%)	0	100	100
3	2	92/100 (92%)	87 (95%)	5 (5%)	0	100	100
4	3	101/104 (97%)	98 (97%)	3 (3%)	0	100	100
5	4	92/94 (98%)	89 (97%)	3 (3%)	0	100	100
9	9	146/165 (88%)	101 (69%)	42 (29%)	3 (2%)	5	29
11	AA	1312/1342 (98%)	1198 (91%)	113 (9%)	1 (0%)	48	83
12	AB	92/162 (57%)	70 (76%)	21 (23%)	1 (1%)	12	46
13	AC	217/329 (66%)	203 (94%)	12 (6%)	2 (1%)	14	51
13	AD	214/329 (65%)	198 (92%)	16 (8%)	0	100	100
14	AE	1331/1407 (95%)	1212 (91%)	114 (9%)	5 (0%)	30	68
15	C	64/75 (85%)	63 (98%)	1 (2%)	0	100	100
17	E	84/87 (97%)	83 (99%)	1 (1%)	0	100	100
18	F	68/71 (96%)	68 (100%)	0	0	100	100
19	G	223/241 (92%)	213 (96%)	9 (4%)	1 (0%)	30	68
20	H	255/557 (46%)	182 (71%)	66 (26%)	7 (3%)	4	25
21	I	206/233 (88%)	193 (94%)	12 (6%)	1 (0%)	25	64
22	J	203/206 (98%)	201 (99%)	2 (1%)	0	100	100
23	K	154/167 (92%)	145 (94%)	8 (5%)	1 (1%)	22	60
24	L	102/135 (76%)	97 (95%)	4 (4%)	1 (1%)	13	49
25	M	149/179 (83%)	140 (94%)	8 (5%)	1 (1%)	19	56
26	N	127/130 (98%)	123 (97%)	4 (3%)	0	100	100
27	O	125/130 (96%)	116 (93%)	8 (6%)	1 (1%)	16	55
28	P	97/103 (94%)	89 (92%)	8 (8%)	0	100	100
29	Q	115/129 (89%)	107 (93%)	8 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
30	R	117/124 (94%)	112 (96%)	5 (4%)	0	100	100
31	S	98/101 (97%)	97 (99%)	1 (1%)	0	100	100
32	T	86/89 (97%)	83 (96%)	3 (4%)	0	100	100
33	U	80/82 (98%)	76 (95%)	4 (5%)	0	100	100
34	V	78/84 (93%)	74 (95%)	4 (5%)	0	100	100
35	W	81/92 (88%)	80 (99%)	1 (1%)	0	100	100
36	X	114/118 (97%)	103 (90%)	9 (8%)	2 (2%)	7	34
37	Y	139/142 (98%)	101 (73%)	38 (27%)	0	100	100
38	Z	28/121 (23%)	22 (79%)	6 (21%)	0	100	100
40	b	74/85 (87%)	73 (99%)	1 (1%)	0	100	100
41	c	75/78 (96%)	72 (96%)	3 (4%)	0	100	100
43	e	60/63 (95%)	57 (95%)	3 (5%)	0	100	100
44	f	56/59 (95%)	52 (93%)	4 (7%)	0	100	100
45	g	64/70 (91%)	62 (97%)	2 (3%)	0	100	100
46	h	269/273 (98%)	254 (94%)	15 (6%)	0	100	100
47	i	54/57 (95%)	49 (91%)	5 (9%)	0	100	100
48	j	207/209 (99%)	198 (96%)	9 (4%)	0	100	100
49	k	50/55 (91%)	50 (100%)	0	0	100	100
50	l	199/201 (99%)	188 (94%)	11 (6%)	0	100	100
51	m	44/46 (96%)	43 (98%)	1 (2%)	0	100	100
52	n	175/179 (98%)	161 (92%)	13 (7%)	1 (1%)	22	60
53	o	62/65 (95%)	57 (92%)	4 (6%)	1 (2%)	8	37
54	p	173/177 (98%)	162 (94%)	11 (6%)	0	100	100
55	q	36/38 (95%)	35 (97%)	1 (3%)	0	100	100
56	r	147/149 (99%)	139 (95%)	8 (5%)	0	100	100
57	s	140/142 (99%)	133 (95%)	7 (5%)	0	100	100
58	t	121/123 (98%)	114 (94%)	7 (6%)	0	100	100
59	u	142/144 (99%)	134 (94%)	8 (6%)	0	100	100
60	v	134/136 (98%)	129 (96%)	5 (4%)	0	100	100
61	w	117/127 (92%)	112 (96%)	5 (4%)	0	100	100
62	x	114/117 (97%)	107 (94%)	7 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
63	y	112/115 (97%)	105 (94%)	7 (6%)	0	100	100
64	z	115/118 (98%)	111 (96%)	4 (4%)	0	100	100
All	All	9339/10467 (89%)	8625 (92%)	685 (7%)	29 (0%)	38	72

All (29) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
19	G	127	ASP
20	H	304	VAL
25	M	56	LYS
53	o	32	ILE
14	AE	92	VAL
14	AE	175	GLU
20	H	171	ARG
20	H	305	HIS
20	H	309	MET
21	I	80	LYS
23	K	78	ASN
24	L	96	VAL
27	O	13	LYS
52	n	177	PHE
13	AC	193	GLU
20	H	82	THR
12	AB	53	ASN
14	AE	286	ALA
20	H	143	ASP
36	X	6	GLY
36	X	66	GLU
9	9	79	PRO
9	9	88	HIS
13	AC	192	VAL
14	AE	290	ILE
20	H	71	ALA
14	AE	292	VAL
9	9	129	LEU
11	AA	1317	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	0	84/84 (100%)	84 (100%)	0	100	100
2	1	93/93 (100%)	93 (100%)	0	100	100
3	2	81/84 (96%)	80 (99%)	1 (1%)	67	78
4	3	84/85 (99%)	84 (100%)	0	100	100
5	4	78/78 (100%)	78 (100%)	0	100	100
9	9	112/123 (91%)	109 (97%)	3 (3%)	40	58
11	AA	1135/1157 (98%)	1133 (100%)	2 (0%)	92	94
12	AB	82/142 (58%)	82 (100%)	0	100	100
13	AC	186/286 (65%)	184 (99%)	2 (1%)	70	80
13	AD	185/286 (65%)	185 (100%)	0	100	100
14	AE	1122/1168 (96%)	1110 (99%)	12 (1%)	70	80
15	C	57/65 (88%)	57 (100%)	0	100	100
17	E	65/66 (98%)	65 (100%)	0	100	100
18	F	60/61 (98%)	60 (100%)	0	100	100
19	G	187/199 (94%)	186 (100%)	1 (0%)	86	89
20	H	137/461 (30%)	137 (100%)	0	100	100
21	I	171/190 (90%)	170 (99%)	1 (1%)	84	88
22	J	172/173 (99%)	171 (99%)	1 (1%)	84	88
23	K	119/126 (94%)	119 (100%)	0	100	100
24	L	91/116 (78%)	91 (100%)	0	100	100
25	M	124/147 (84%)	124 (100%)	0	100	100
26	N	104/105 (99%)	104 (100%)	0	100	100
27	O	105/107 (98%)	104 (99%)	1 (1%)	73	81
28	P	86/90 (96%)	85 (99%)	1 (1%)	67	78
29	Q	90/99 (91%)	90 (100%)	0	100	100
30	R	101/104 (97%)	101 (100%)	0	100	100
31	S	83/84 (99%)	83 (100%)	0	100	100
32	T	76/77 (99%)	76 (100%)	0	100	100
33	U	65/65 (100%)	64 (98%)	1 (2%)	60	75

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
34	V	74/78 (95%)	73 (99%)	1 (1%)	62	75
35	W	72/79 (91%)	72 (100%)	0	100	100
36	X	94/96 (98%)	94 (100%)	0	100	100
37	Y	109/110 (99%)	108 (99%)	1 (1%)	75	83
38	Z	26/85 (31%)	26 (100%)	0	100	100
40	b	58/63 (92%)	58 (100%)	0	100	100
41	c	67/68 (98%)	67 (100%)	0	100	100
43	e	54/55 (98%)	54 (100%)	0	100	100
44	f	48/49 (98%)	48 (100%)	0	100	100
45	g	59/62 (95%)	59 (100%)	0	100	100
46	h	216/218 (99%)	216 (100%)	0	100	100
47	i	47/48 (98%)	47 (100%)	0	100	100
48	j	164/164 (100%)	164 (100%)	0	100	100
49	k	47/49 (96%)	47 (100%)	0	100	100
50	l	165/165 (100%)	164 (99%)	1 (1%)	84	88
51	m	38/38 (100%)	38 (100%)	0	100	100
52	n	148/150 (99%)	148 (100%)	0	100	100
53	o	51/52 (98%)	51 (100%)	0	100	100
54	p	136/138 (99%)	136 (100%)	0	100	100
55	q	34/34 (100%)	34 (100%)	0	100	100
56	r	114/114 (100%)	114 (100%)	0	100	100
57	s	116/116 (100%)	115 (99%)	1 (1%)	75	83
58	t	104/104 (100%)	103 (99%)	1 (1%)	73	81
59	u	103/103 (100%)	103 (100%)	0	100	100
60	v	109/109 (100%)	109 (100%)	0	100	100
61	w	99/103 (96%)	98 (99%)	1 (1%)	73	81
62	x	86/87 (99%)	86 (100%)	0	100	100
63	y	99/100 (99%)	97 (98%)	2 (2%)	50	68
64	z	89/90 (99%)	88 (99%)	1 (1%)	70	80
All	All	7761/8648 (90%)	7726 (100%)	35 (0%)	85	89

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	2	6	ARG
9	9	56	ARG
9	9	73	LYS
9	9	94	ARG
11	AA	872	TYR
11	AA	914	LYS
13	AC	65	LEU
13	AC	168	ILE
14	AE	77	ARG
14	AE	81	ARG
14	AE	85	CYS
14	AE	92	VAL
14	AE	93	THR
14	AE	290	ILE
14	AE	291	ILE
14	AE	292	VAL
14	AE	431	ARG
14	AE	514	THR
14	AE	744	ARG
14	AE	1369	ARG
19	G	105	LYS
21	I	72	ARG
22	J	47	ARG
27	O	12	ARG
28	P	5	ARG
33	U	35	ARG
34	V	27	ARG
37	Y	44	LYS
50	l	57	LYS
57	s	86	GLN
58	t	108	ARG
61	w	73	ASN
63	y	6	LYS
63	y	38	LYS
64	z	22	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (71) such sidechains are listed below:

Mol	Chain	Res	Type
1	0	6	GLN
2	1	7	HIS
3	2	15	HIS
9	9	9	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
11	AA	69	GLN
11	AA	150	HIS
11	AA	314	ASN
11	AA	387	ASN
11	AA	554	HIS
11	AA	580	GLN
11	AA	604	HIS
11	AA	1268	GLN
11	AA	1313	HIS
12	AB	27	ASN
12	AB	65	HIS
13	AC	147	GLN
13	AD	66	HIS
13	AD	84	ASN
13	AD	117	HIS
13	AD	227	GLN
14	AE	80	HIS
14	AE	157	GLN
14	AE	450	HIS
14	AE	777	HIS
14	AE	805	GLN
14	AE	910	ASN
14	AE	1108	GLN
14	AE	1326	GLN
14	AE	1367	GLN
15	C	54	GLN
17	E	13	GLN
17	E	61	GLN
18	F	9	ASN
19	G	18	HIS
19	G	39	HIS
19	G	58	ASN
19	G	109	GLN
21	I	3	GLN
21	I	6	HIS
21	I	32	ASN
21	I	190	HIS
22	J	131	ASN
22	J	198	HIS
23	K	70	ASN
24	L	3	HIS
24	L	68	GLN

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Mol	Chain	Res	Type
25	M	68	ASN
27	O	5	GLN
32	T	80	GLN
33	U	26	ASN
37	Y	5	GLN
43	e	25	GLN
43	e	31	GLN
44	f	20	HIS
46	h	53	HIS
48	j	173	GLN
50	l	92	HIS
51	m	29	GLN
52	n	5	HIS
53	o	24	HIS
55	q	13	ASN
57	s	132	HIS
60	v	45	GLN
60	v	97	GLN
61	w	18	GLN
62	x	19	GLN
62	x	38	GLN
63	y	10	GLN
63	y	77	HIS
64	z	37	GLN
64	z	72	ASN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
10	A	75/76 (98%)	29 (38%)	8 (10%)
10	B	75/76 (98%)	30 (40%)	9 (12%)
16	D	1514/1542 (98%)	290 (19%)	20 (1%)
39	a	2859/2904 (98%)	507 (17%)	0
42	d	119/120 (99%)	15 (12%)	0
8	7	26/38 (68%)	18 (69%)	3 (11%)
All	All	4668/4756 (98%)	889 (19%)	40 (0%)

All (889) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
8	7	3	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
8	7	4	U
8	7	5	U
8	7	7	U
8	7	8	U
8	7	9	U
8	7	10	U
8	7	11	U
8	7	12	U
8	7	13	U
8	7	14	U
8	7	25	A
8	7	26	U
8	7	27	U
8	7	28	U
8	7	32	G
8	7	33	A
8	7	35	A
10	A	2	G
10	A	6	G
10	A	7	G
10	A	8	U
10	A	10	G
10	A	13	C
10	A	14	A
10	A	16	C
10	A	17	C
10	A	18	G
10	A	19	G
10	A	20	U
10	A	21	A
10	A	22	G
10	A	23	C
10	A	30	G
10	A	46	G
10	A	47	U
10	A	48	C
10	A	49	G
10	A	52	G
10	A	57	A
10	A	58	A
10	A	59	A
10	A	61	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
10	A	66	C
10	A	69	C
10	A	71	C
10	A	73	A
10	B	2	G
10	B	6	G
10	B	7	G
10	B	8	U
10	B	10	G
10	B	13	C
10	B	14	A
10	B	16	C
10	B	17	C
10	B	18	G
10	B	19	G
10	B	20	U
10	B	21	A
10	B	22	G
10	B	23	C
10	B	29	G
10	B	31	G
10	B	46	G
10	B	47	U
10	B	48	C
10	B	49	G
10	B	52	G
10	B	57	A
10	B	58	A
10	B	59	A
10	B	61	C
10	B	66	C
10	B	69	C
10	B	71	C
10	B	73	A
16	D	4	U
16	D	5	U
16	D	9	G
16	D	22	G
16	D	29	U
16	D	32	A
16	D	39	G
16	D	47	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
16	D	48	C
16	D	50	A
16	D	51	A
16	D	52	C
16	D	54	C
16	D	68	G
16	D	69	G
16	D	71	A
16	D	72	A
16	D	74	A
16	D	76	G
16	D	82	G
16	D	83	C
16	D	84	U
16	D	87	C
16	D	90	C
16	D	94	G
16	D	95	C
16	D	96	U
16	D	108	G
16	D	120	A
16	D	121	U
16	D	122	G
16	D	131	A
16	D	141	G
16	D	144	G
16	D	148	G
16	D	149	A
16	D	160	A
16	D	164	G
16	D	173	U
16	D	181	A
16	D	182	A
16	D	183	C
16	D	184	G
16	D	197	A
16	D	198	G
16	D	204	G
16	D	208	U
16	D	209	U
16	D	210	C
16	D	211	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
16	D	212	G
16	D	216	U
16	D	226	G
16	D	245	U
16	D	247	G
16	D	251	G
16	D	253	A
16	D	258	G
16	D	262	A
16	D	266	G
16	D	267	C
16	D	271	C
16	D	279	A
16	D	289	G
16	D	299	G
16	D	306	A
16	D	321	A
16	D	328	C
16	D	329	A
16	D	332	G
16	D	347	G
16	D	352	C
16	D	353	A
16	D	354	G
16	D	355	C
16	D	367	U
16	D	372	C
16	D	373	A
16	D	376	G
16	D	382	A
16	D	384	G
16	D	392	C
16	D	397	A
16	D	398	U
16	D	406	G
16	D	411	A
16	D	412	A
16	D	413	G
16	D	414	A
16	D	421	U
16	D	422	C
16	D	424	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
16	D	429	U
16	D	446	G
16	D	451	A
16	D	457	G
16	D	458	U
16	D	463	U
16	D	464	U
16	D	467	U
16	D	468	A
16	D	469	C
16	D	478	A
16	D	479	U
16	D	481	G
16	D	484	G
16	D	485	U
16	D	486	U
16	D	496	A
16	D	497	G
16	D	505	G
16	D	511	C
16	D	518	C
16	D	519	C
16	D	526	C
16	D	531	U
16	D	532	A
16	D	533	A
16	D	542	G
16	D	547	A
16	D	559	A
16	D	564	C
16	D	568	G
16	D	572	A
16	D	573	A
16	D	576	C
16	D	577	G
16	D	579	A
16	D	596	A
16	D	628	G
16	D	633	G
16	D	649	A
16	D	650	G
16	D	653	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
16	D	665	A
16	D	695	A
16	D	700	G
16	D	723	U
16	D	724	G
16	D	731	G
16	D	734	G
16	D	735	C
16	D	747	A
16	D	748	G
16	D	755	G
16	D	760	G
16	D	777	A
16	D	793	U
16	D	794	A
16	D	815	A
16	D	817	C
16	D	828	U
16	D	829	G
16	D	832	G
16	D	841	C
16	D	843	U
16	D	844	G
16	D	845	A
16	D	846	G
16	D	849	G
16	D	874	G
16	D	887	G
16	D	902	G
16	D	914	A
16	D	916	U
16	D	926	G
16	D	934	C
16	D	935	A
16	D	960	U
16	D	963	G
16	D	965	U
16	D	969	A
16	D	972	C
16	D	975	A
16	D	976	G
16	D	987	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
16	D	991	U
16	D	992	U
16	D	993	G
16	D	996	A
16	D	1004	A
16	D	1008	U
16	D	1009	U
16	D	1017	U
16	D	1018	G
16	D	1021	A
16	D	1024	G
16	D	1026	G
16	D	1028	C
16	D	1030	U
16	D	1031	C
16	D	1037	C
16	D	1043	G
16	D	1044	A
16	D	1046	A
16	D	1065	U
16	D	1085	U
16	D	1094	G
16	D	1095	U
16	D	1099	G
16	D	1101	A
16	D	1108	G
16	D	1124	G
16	D	1133	G
16	D	1135	U
16	D	1136	C
16	D	1137	C
16	D	1139	G
16	D	1140	C
16	D	1141	C
16	D	1142	G
16	D	1143	G
16	D	1145	A
16	D	1146	A
16	D	1151	A
16	D	1152	A
16	D	1159	U
16	D	1167	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
16	D	1171	A
16	D	1174	G
16	D	1175	G
16	D	1176	A
16	D	1184	G
16	D	1193	G
16	D	1196	A
16	D	1197	A
16	D	1206	G
16	D	1211	U
16	D	1212	U
16	D	1213	A
16	D	1214	C
16	D	1215	G
16	D	1226	C
16	D	1227	A
16	D	1228	C
16	D	1238	A
16	D	1257	A
16	D	1260	G
16	D	1275	A
16	D	1276	G
16	D	1278	G
16	D	1279	G
16	D	1280	A
16	D	1285	A
16	D	1286	U
16	D	1287	A
16	D	1299	A
16	D	1300	G
16	D	1302	C
16	D	1305	G
16	D	1312	G
16	D	1317	C
16	D	1320	C
16	D	1323	G
16	D	1338	G
16	D	1340	A
16	D	1346	A
16	D	1347	G
16	D	1353	G
16	D	1363	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
16	D	1370	G
16	D	1378	C
16	D	1379	G
16	D	1381	U
16	D	1391	U
16	D	1396	A
16	D	1397	C
16	D	1398	A
16	D	1404	C
16	D	1419	G
16	D	1429	A
16	D	1441	A
16	D	1446	A
16	D	1447	A
16	D	1448	C
16	D	1452	C
16	D	1453	G
16	D	1475	G
16	D	1487	G
16	D	1491	G
16	D	1492	A
16	D	1493	A
16	D	1494	G
16	D	1497	G
16	D	1503	A
16	D	1506	U
16	D	1517	G
16	D	1529	G
16	D	1530	G
16	D	1534	A
39	a	4	U
39	a	10	A
39	a	15	G
39	a	23	G
39	a	34	U
39	a	35	G
39	a	46	G
39	a	58	G
39	a	60	G
39	a	62	U
39	a	63	A
39	a	71	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	74	A
39	a	75	G
39	a	83	A
39	a	84	A
39	a	85	G
39	a	96	C
39	a	101	A
39	a	102	U
39	a	103	A
39	a	110	G
39	a	118	A
39	a	119	A
39	a	120	U
39	a	131	A
39	a	136	G
39	a	139	U
39	a	140	C
39	a	141	G
39	a	163	C
39	a	165	A
39	a	181	A
39	a	196	A
39	a	215	G
39	a	216	A
39	a	222	A
39	a	225	C
39	a	248	G
39	a	249	C
39	a	261	G
39	a	264	C
39	a	265	A
39	a	266	G
39	a	267	C
39	a	271	G
39	a	272	A
39	a	275	C
39	a	276	U
39	a	278	A
39	a	285	G
39	a	291	G
39	a	311	A
39	a	329	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	330	A
39	a	353	C
39	a	361	G
39	a	362	A
39	a	371	A
39	a	372	G
39	a	373	U
39	a	375	G
39	a	383	C
39	a	386	G
39	a	396	G
39	a	405	U
39	a	411	G
39	a	412	A
39	a	420	C
39	a	424	G
39	a	451	U
39	a	457	A
39	a	477	A
39	a	481	G
39	a	491	G
39	a	501	A
39	a	503	A
39	a	504	A
39	a	505	A
39	a	509	C
39	a	522	A
39	a	529	A
39	a	531	C
39	a	532	A
39	a	537	G
39	a	543	G
39	a	545	U
39	a	546	U
39	a	547	A
39	a	549	G
39	a	551	G
39	a	563	A
39	a	569	U
39	a	573	U
39	a	575	A
39	a	588	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	603	A
39	a	609	A
39	a	613	A
39	a	614	A
39	a	615	U
39	a	616	A
39	a	627	A
39	a	637	A
39	a	645	C
39	a	647	G
39	a	654	A
39	a	668	A
39	a	686	U
39	a	710	U
39	a	717	C
39	a	730	A
39	a	738	G
39	a	757	G
39	a	764	A
39	a	765	C
39	a	775	G
39	a	776	G
39	a	782	A
39	a	784	G
39	a	785	G
39	a	800	A
39	a	805	G
39	a	812	C
39	a	819	A
39	a	827	U
39	a	828	U
39	a	845	A
39	a	846	U
39	a	858	G
39	a	859	G
39	a	869	G
39	a	878	A
39	a	881	G
39	a	884	U
39	a	885	C
39	a	888	C
39	a	891	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	895	U
39	a	896	A
39	a	897	C
39	a	899	A
39	a	907	G
39	a	910	A
39	a	914	G
39	a	915	C
39	a	931	U
39	a	941	A
39	a	945	A
39	a	946	C
39	a	953	G
39	a	961	C
39	a	974	G
39	a	983	A
39	a	995	C
39	a	996	A
39	a	999	U
39	a	1005	C
39	a	1012	U
39	a	1013	C
39	a	1022	G
39	a	1023	U
39	a	1026	G
39	a	1033	U
39	a	1041	G
39	a	1045	C
39	a	1046	A
39	a	1047	G
39	a	1060	U
39	a	1061	U
39	a	1064	C
39	a	1066	U
39	a	1067	A
39	a	1068	G
39	a	1070	A
39	a	1071	G
39	a	1073	A
39	a	1074	G
39	a	1079	C
39	a	1080	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	1081	U
39	a	1082	U
39	a	1083	U
39	a	1084	A
39	a	1087	G
39	a	1088	A
39	a	1090	A
39	a	1095	A
39	a	1101	U
39	a	1107	G
39	a	1111	A
39	a	1112	G
39	a	1119	U
39	a	1122	G
39	a	1128	G
39	a	1132	U
39	a	1134	A
39	a	1135	C
39	a	1142	A
39	a	1169	A
39	a	1170	C
39	a	1173	U
39	a	1174	U
39	a	1175	A
39	a	1176	U
39	a	1177	G
39	a	1178	C
39	a	1179	G
39	a	1180	U
39	a	1186	G
39	a	1238	G
39	a	1248	G
39	a	1253	A
39	a	1256	G
39	a	1266	G
39	a	1271	G
39	a	1272	A
39	a	1273	U
39	a	1300	G
39	a	1301	A
39	a	1321	A
39	a	1345	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	1352	U
39	a	1365	A
39	a	1368	G
39	a	1378	A
39	a	1379	U
39	a	1380	G
39	a	1383	A
39	a	1392	A
39	a	1395	A
39	a	1406	U
39	a	1408	G
39	a	1409	U
39	a	1414	C
39	a	1416	G
39	a	1417	C
39	a	1419	A
39	a	1420	A
39	a	1428	C
39	a	1452	G
39	a	1453	A
39	a	1460	U
39	a	1482	G
39	a	1490	A
39	a	1497	U
39	a	1503	A
39	a	1508	A
39	a	1509	A
39	a	1510	G
39	a	1515	A
39	a	1529	G
39	a	1534	U
39	a	1535	A
39	a	1536	C
39	a	1537	G
39	a	1554	U
39	a	1559	U
39	a	1566	A
39	a	1569	A
39	a	1578	U
39	a	1580	A
39	a	1581	G
39	a	1583	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	1584	U
39	a	1585	C
39	a	1589	U
39	a	1590	A
39	a	1608	A
39	a	1610	A
39	a	1613	G
39	a	1647	U
39	a	1648	U
39	a	1649	G
39	a	1651	G
39	a	1665	A
39	a	1674	G
39	a	1677	A
39	a	1703	G
39	a	1714	U
39	a	1715	G
39	a	1729	U
39	a	1730	C
39	a	1732	C
39	a	1738	G
39	a	1750	G
39	a	1758	U
39	a	1764	C
39	a	1773	A
39	a	1791	A
39	a	1800	C
39	a	1808	A
39	a	1811	G
39	a	1816	C
39	a	1829	A
39	a	1833	C
39	a	1847	A
39	a	1848	A
39	a	1858	A
39	a	1859	U
39	a	1862	G
39	a	1864	U
39	a	1869	G
39	a	1870	C
39	a	1872	A
39	a	1873	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	1906	G
39	a	1907	G
39	a	1913	A
39	a	1914	C
39	a	1919	A
39	a	1920	C
39	a	1922	G
39	a	1923	U
39	a	1924	C
39	a	1925	C
39	a	1926	U
39	a	1929	G
39	a	1930	G
39	a	1936	A
39	a	1938	A
39	a	1955	U
39	a	1965	C
39	a	1967	C
39	a	1970	A
39	a	1971	U
39	a	1972	G
39	a	1987	A
39	a	1991	U
39	a	1992	G
39	a	1993	U
39	a	1997	C
39	a	2002	G
39	a	2020	A
39	a	2022	U
39	a	2023	C
39	a	2027	G
39	a	2033	A
39	a	2043	C
39	a	2051	A
39	a	2052	A
39	a	2055	C
39	a	2056	G
39	a	2060	A
39	a	2061	G
39	a	2062	A
39	a	2063	C
39	a	2097	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	2099	U
39	a	2100	G
39	a	2108	A
39	a	2110	G
39	a	2111	U
39	a	2113	U
39	a	2115	G
39	a	2116	G
39	a	2117	A
39	a	2118	U
39	a	2121	G
39	a	2122	U
39	a	2124	G
39	a	2125	G
39	a	2126	A
39	a	2127	G
39	a	2128	G
39	a	2131	U
39	a	2132	U
39	a	2133	G
39	a	2134	A
39	a	2139	U
39	a	2141	G
39	a	2146	C
39	a	2147	A
39	a	2154	A
39	a	2157	G
39	a	2158	A
39	a	2159	G
39	a	2162	G
39	a	2163	A
39	a	2164	C
39	a	2165	C
39	a	2169	A
39	a	2171	A
39	a	2172	U
39	a	2178	C
39	a	2182	U
39	a	2183	A
39	a	2185	U
39	a	2189	U
39	a	2190	G

*Continued on next page...*

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	2193	G
39	a	2194	U
39	a	2198	A
39	a	2204	G
39	a	2211	A
39	a	2212	A
39	a	2225	A
39	a	2226	C
39	a	2229	U
39	a	2238	G
39	a	2239	G
39	a	2250	G
39	a	2268	A
39	a	2278	A
39	a	2283	C
39	a	2287	A
39	a	2288	A
39	a	2297	A
39	a	2305	U
39	a	2308	G
39	a	2309	A
39	a	2322	A
39	a	2325	G
39	a	2327	A
39	a	2333	A
39	a	2335	A
39	a	2339	C
39	a	2345	G
39	a	2347	C
39	a	2350	C
39	a	2361	G
39	a	2372	U
39	a	2376	A
39	a	2383	G
39	a	2385	C
39	a	2402	U
39	a	2403	C
39	a	2406	A
39	a	2423	U
39	a	2424	C
39	a	2425	A
39	a	2426	A

*Continued on next page...*

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	2429	G
39	a	2430	A
39	a	2431	U
39	a	2434	A
39	a	2435	A
39	a	2441	U
39	a	2447	G
39	a	2448	A
39	a	2470	G
39	a	2474	U
39	a	2476	A
39	a	2478	A
39	a	2484	G
39	a	2491	U
39	a	2502	G
39	a	2506	U
39	a	2512	C
39	a	2513	A
39	a	2518	A
39	a	2520	C
39	a	2525	G
39	a	2529	G
39	a	2535	G
39	a	2554	U
39	a	2566	A
39	a	2567	G
39	a	2573	C
39	a	2574	G
39	a	2585	U
39	a	2586	U
39	a	2602	A
39	a	2603	G
39	a	2609	U
39	a	2610	C
39	a	2613	U
39	a	2629	U
39	a	2630	G
39	a	2663	G
39	a	2669	G
39	a	2671	G
39	a	2689	U
39	a	2690	U

*Continued on next page...*

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
39	a	2714	G
39	a	2716	C
39	a	2726	A
39	a	2744	G
39	a	2748	A
39	a	2758	A
39	a	2765	A
39	a	2777	G
39	a	2778	A
39	a	2791	G
39	a	2793	C
39	a	2796	U
39	a	2797	U
39	a	2798	U
39	a	2799	A
39	a	2801	G
39	a	2818	U
39	a	2820	A
39	a	2823	A
39	a	2825	G
39	a	2835	A
39	a	2849	U
39	a	2859	G
39	a	2861	U
39	a	2867	G
39	a	2873	A
39	a	2874	C
39	a	2880	C
39	a	2883	A
39	a	2884	U
39	a	2885	G
39	a	2891	U
39	a	2902	C
42	d	2	G
42	d	13	G
42	d	16	G
42	d	17	C
42	d	35	C
42	d	45	A
42	d	51	G
42	d	56	G
42	d	57	A

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Mol	Chain	Res	Type
42	d	66	A
42	d	88	C
42	d	89	U
42	d	90	C
42	d	99	A
42	d	109	A

All (40) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
8	7	4	U
8	7	7	U
8	7	10	U
10	A	6	G
10	A	7	G
10	A	9	G
10	A	12	G
10	A	21	A
10	A	22	G
10	A	57	A
10	A	60	U
10	B	6	G
10	B	7	G
10	B	9	G
10	B	12	G
10	B	21	A
10	B	22	G
10	B	30	G
10	B	57	A
10	B	60	U
16	D	121	U
16	D	181	A
16	D	183	C
16	D	197	A
16	D	209	U
16	D	428	G
16	D	496	A
16	D	517	G
16	D	991	U
16	D	992	U
16	D	1145	A
16	D	1196	A

*Continued on next page...*



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Mol	Chain	Res	Type
16	D	1211	U
16	D	1212	U
16	D	1213	A
16	D	1214	C
16	D	1447	A
16	D	1491	G
16	D	1492	A
16	D	1493	A

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

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

#### 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

#### 5.6 Ligand geometry [i](#)

Of 3 ligands modelled in this entry, 3 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

#### 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

There are no chain breaks in this entry.

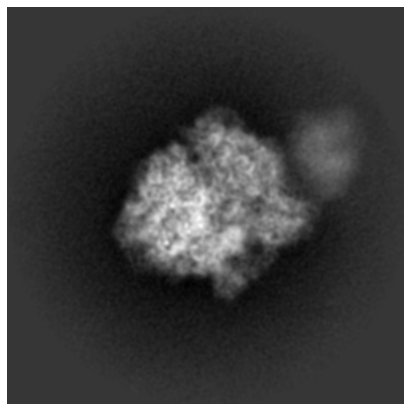
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-42453. These allow visual inspection of the internal detail of the map and identification of artifacts.

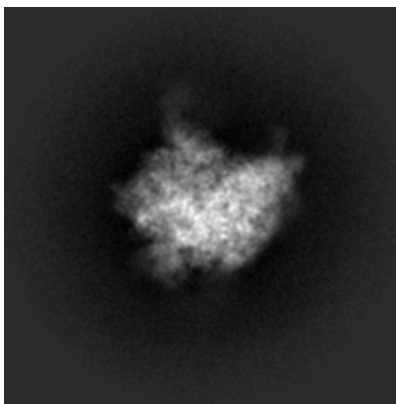
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

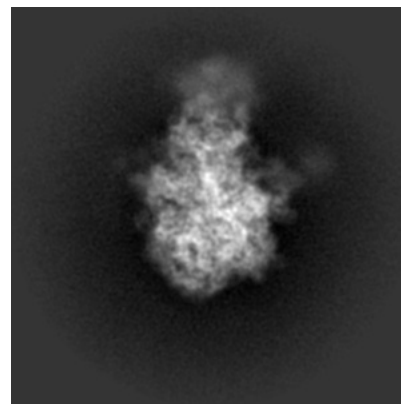
#### 6.1.1 Primary map



X

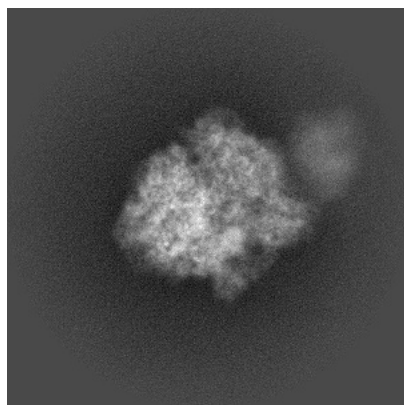


Y

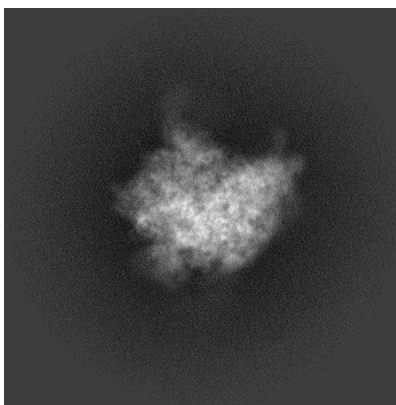


Z

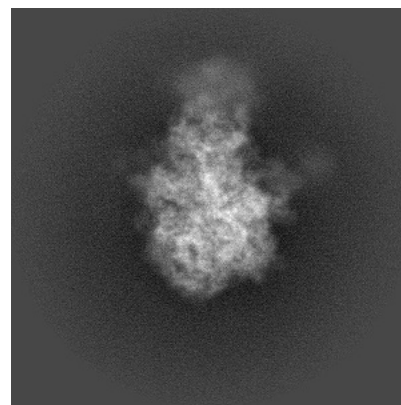
#### 6.1.2 Raw map



X



Y

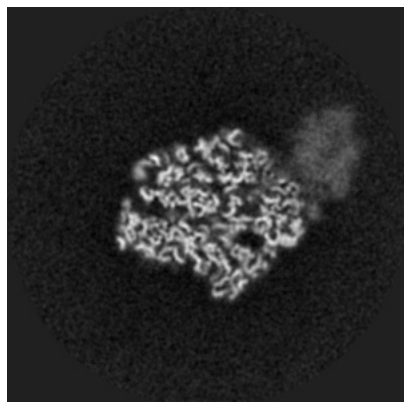


Z

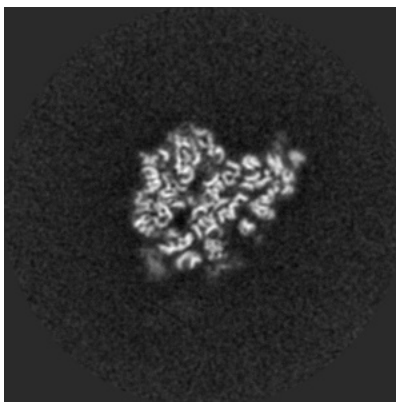
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

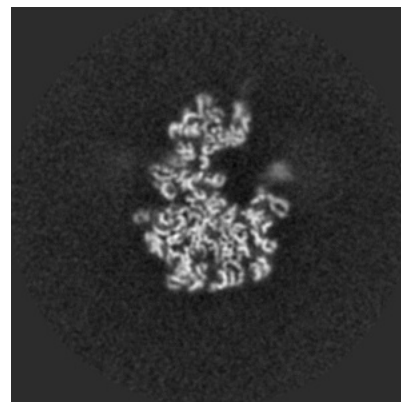
### 6.2.1 Primary map



X Index: 256

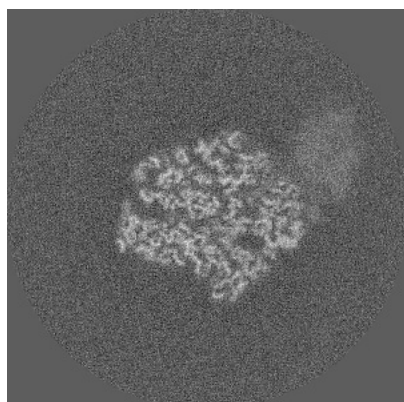


Y Index: 256

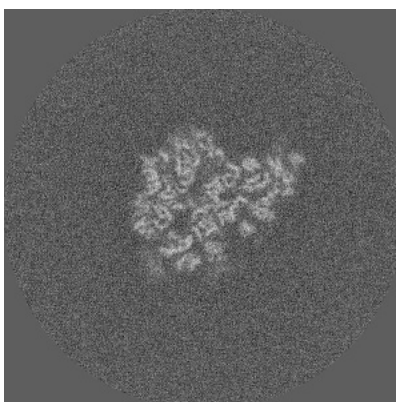


Z Index: 256

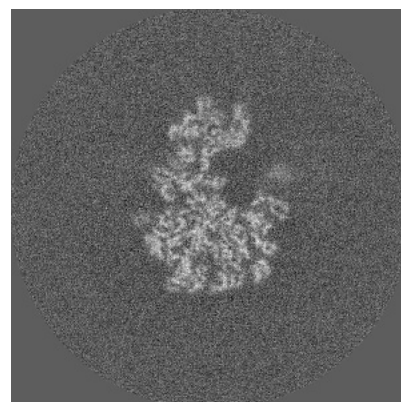
### 6.2.2 Raw map



X Index: 256



Y Index: 256

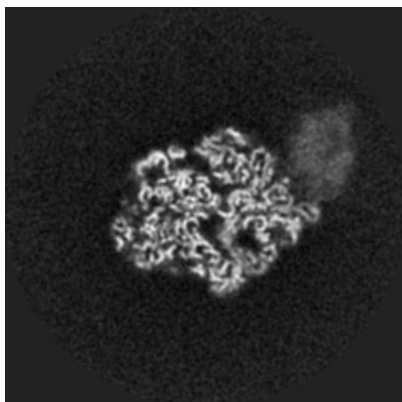


Z Index: 256

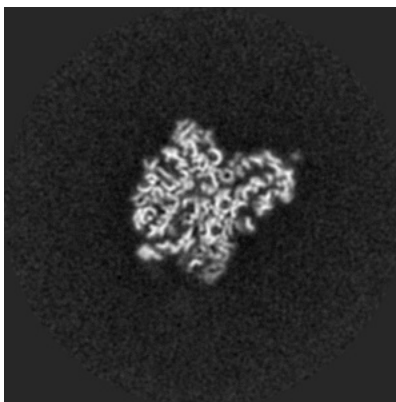
The images above show central slices of the map in three orthogonal directions.

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

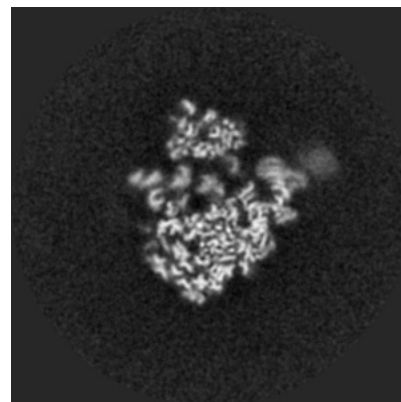
### 6.3.1 Primary map



X Index: 249

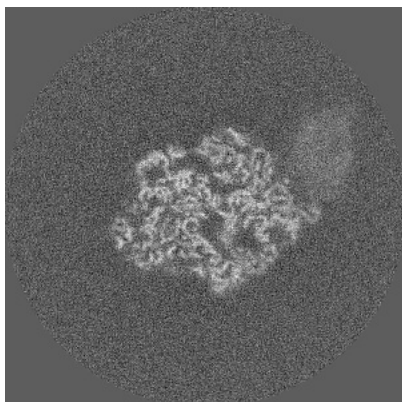


Y Index: 249

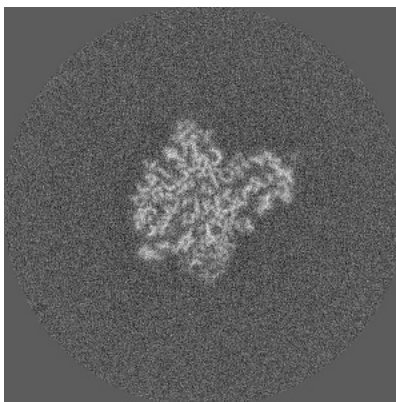


Z Index: 222

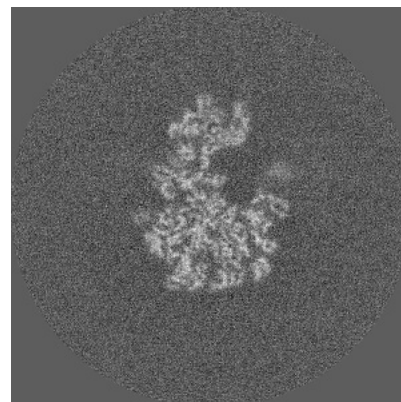
### 6.3.2 Raw map



X Index: 248



Y Index: 248



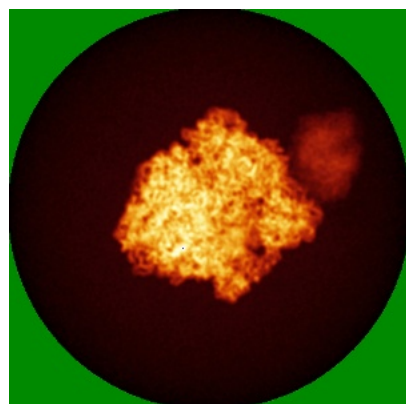
Z Index: 256

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

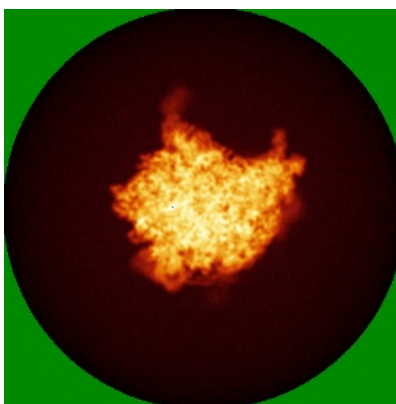


## 6.4 Orthogonal standard-deviation projections (False-color) [i](#)

### 6.4.1 Primary map



X

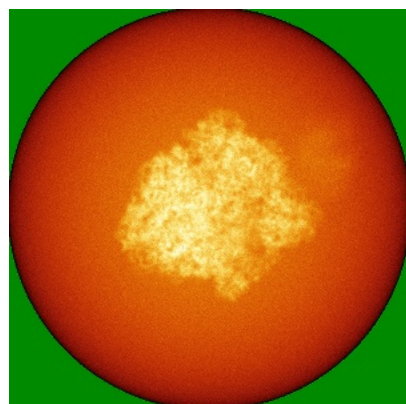


Y

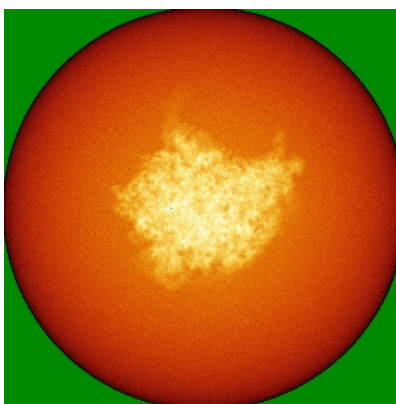


Z

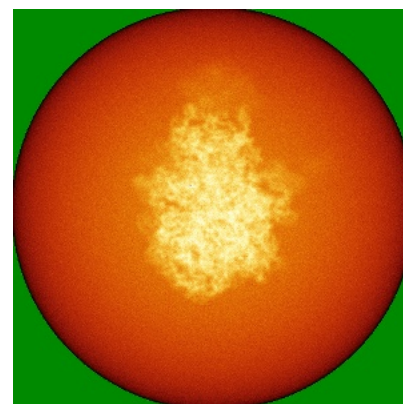
### 6.4.2 Raw map



X



Y

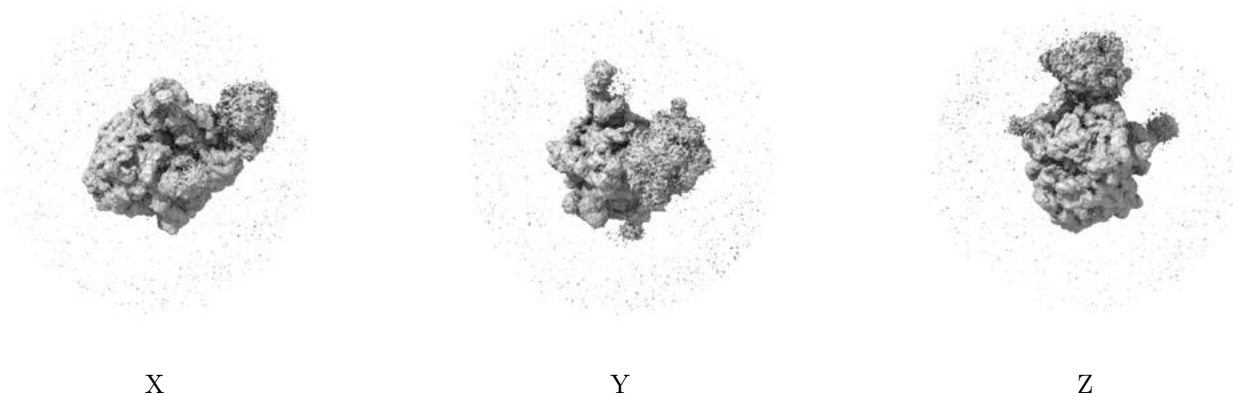


Z

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

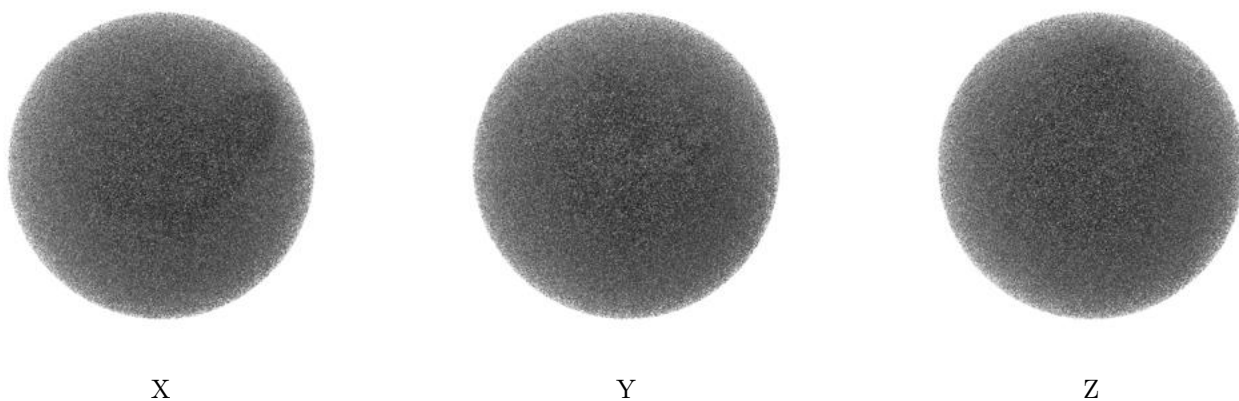
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0025. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.5.2 Raw map



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

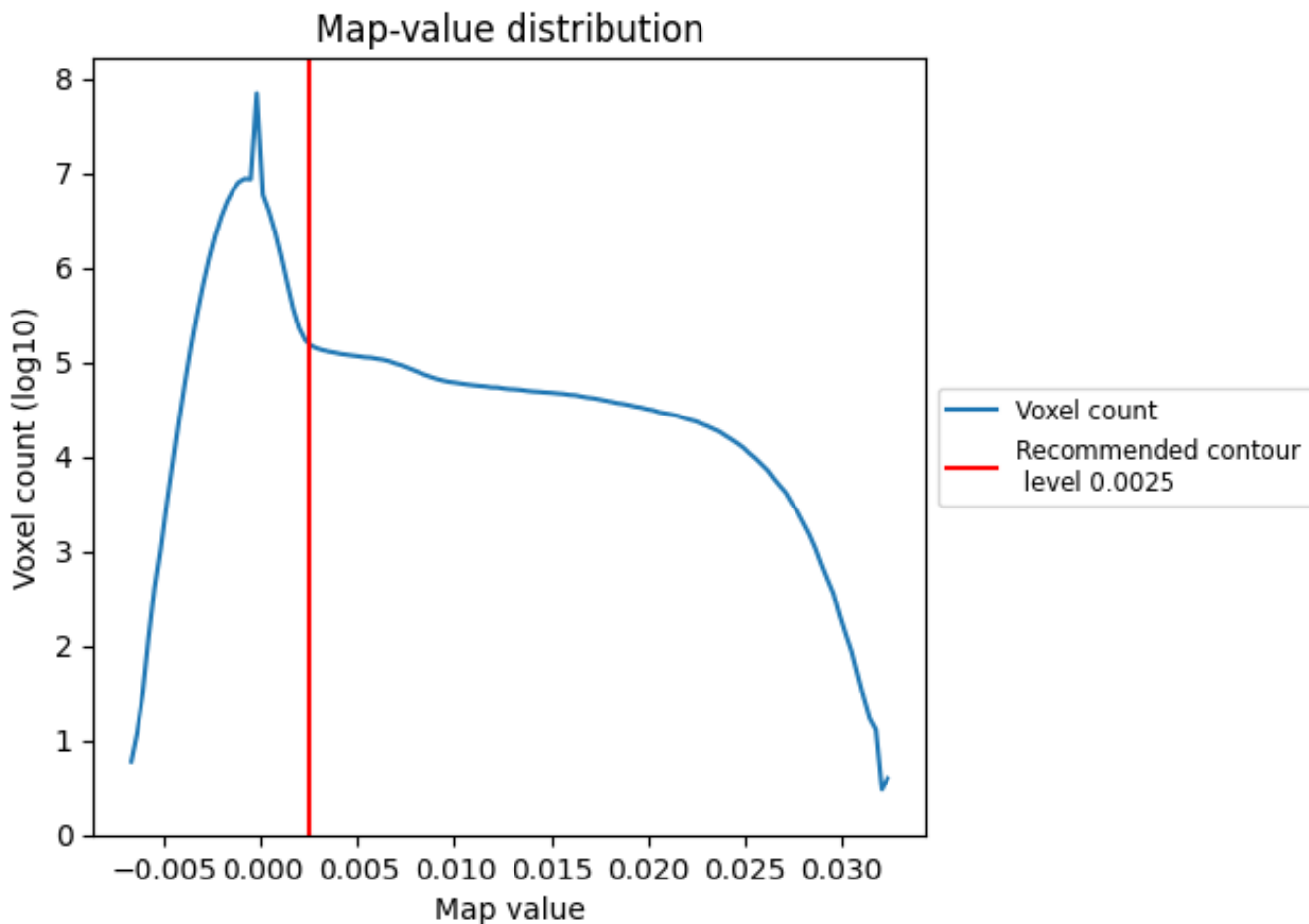
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

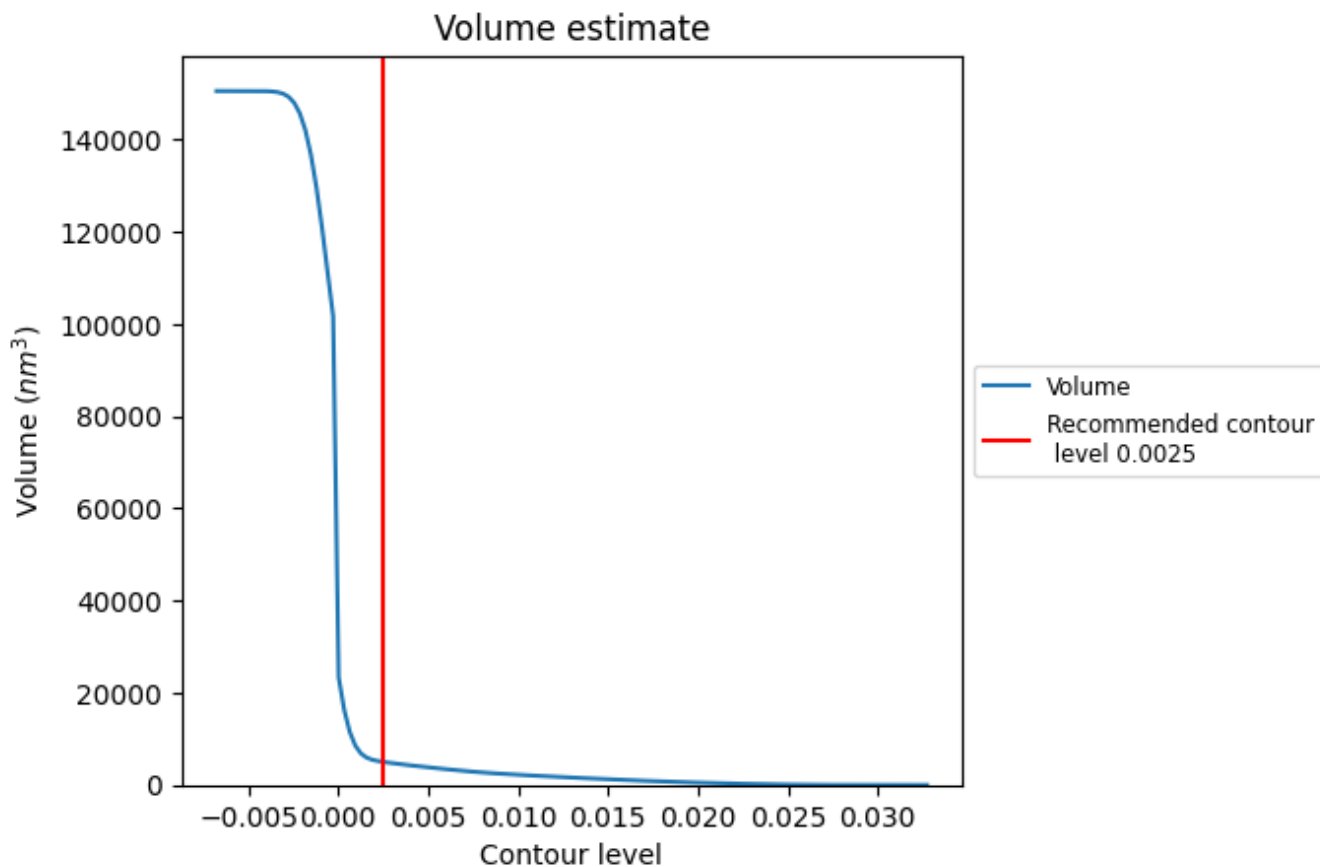
This section contains the results of statistical analysis of the map.

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



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

## 7.2 Volume estimate [\(i\)](#)

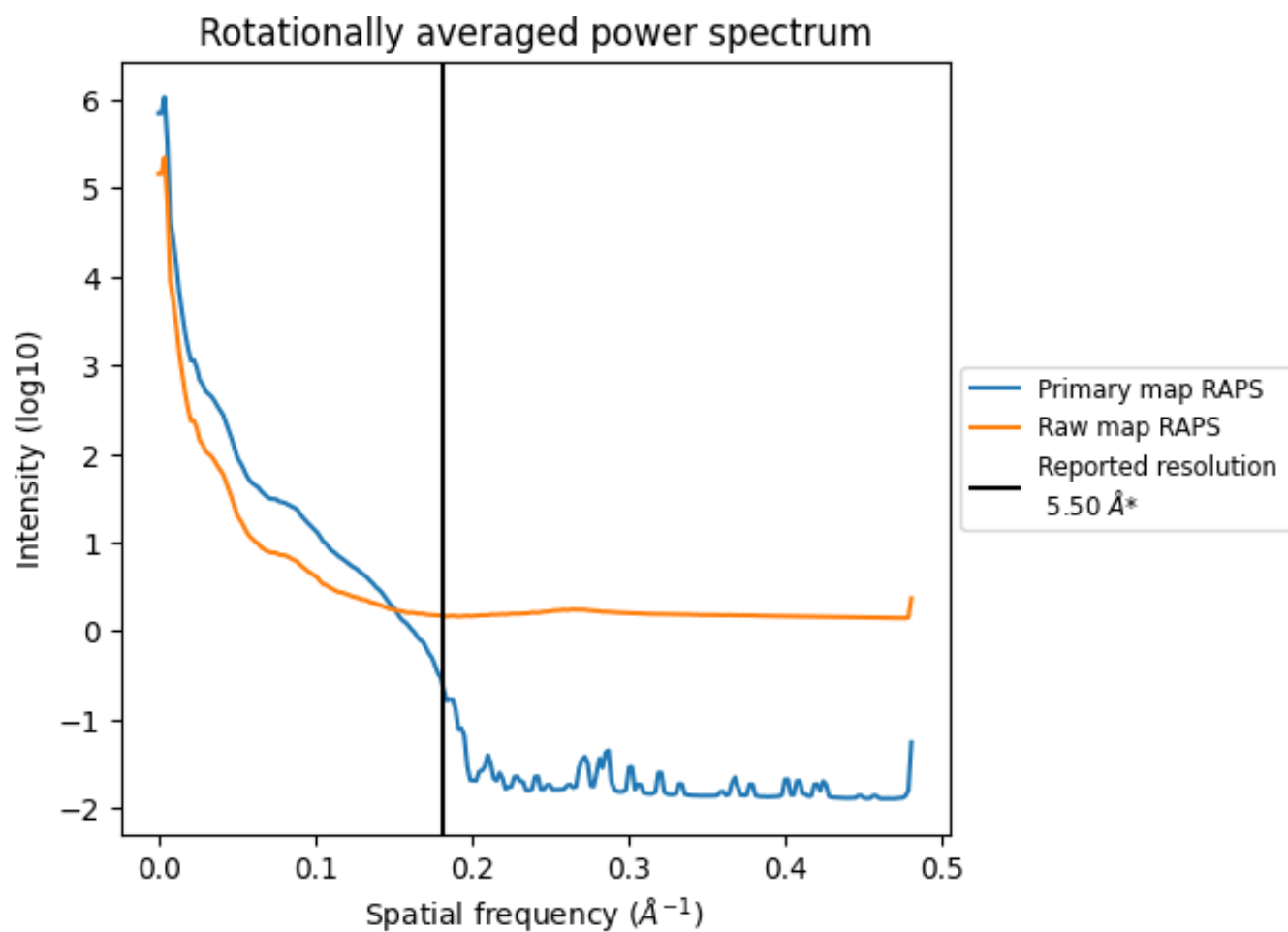


The volume at the recommended contour level is 5004  $\text{nm}^3$ ; this corresponds to an approximate mass of 4521 kDa.

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

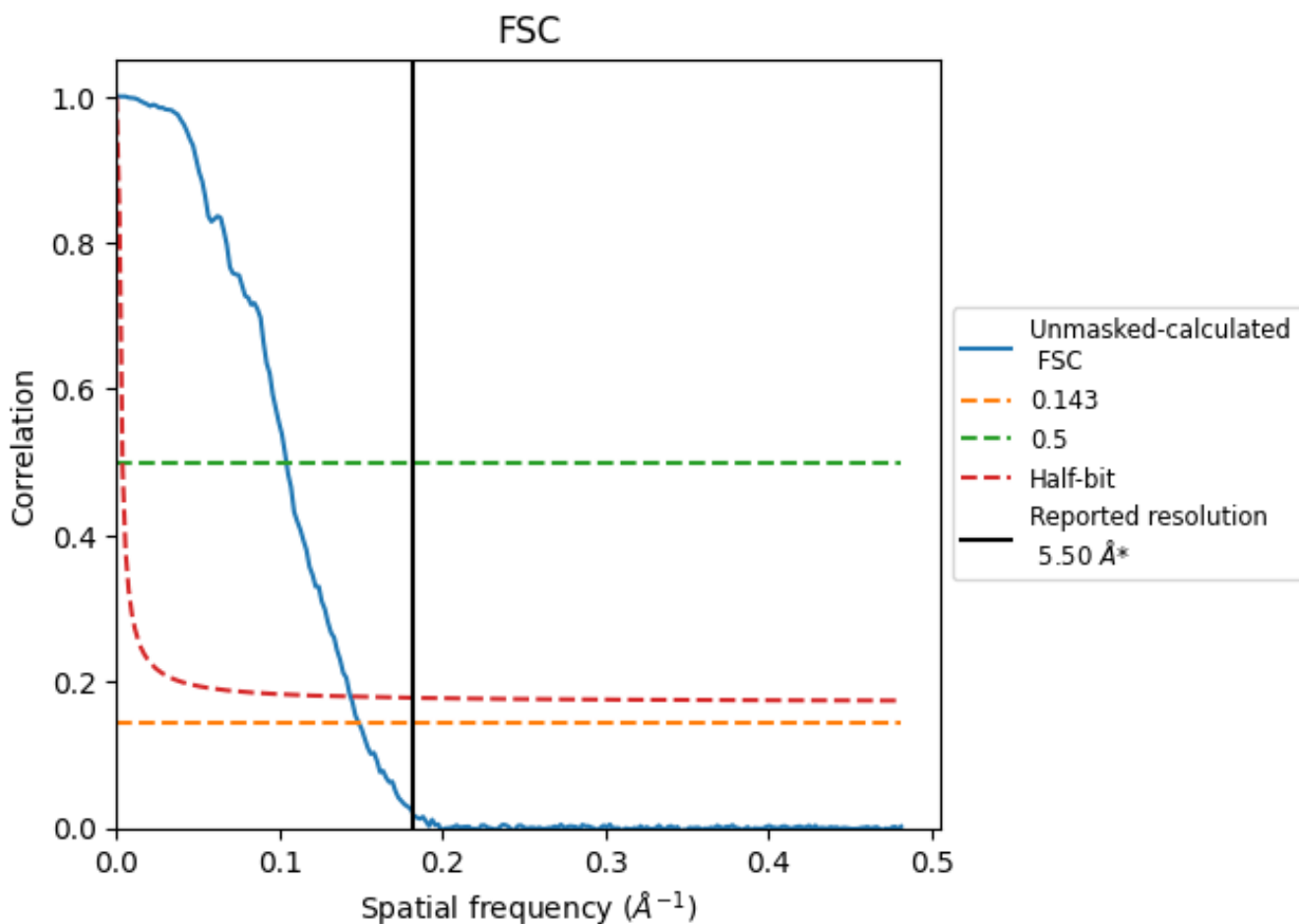


\*Reported resolution corresponds to spatial frequency of 0.182 Å<sup>-1</sup>

## 8 Fourier-Shell correlation [i](#)

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.182 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

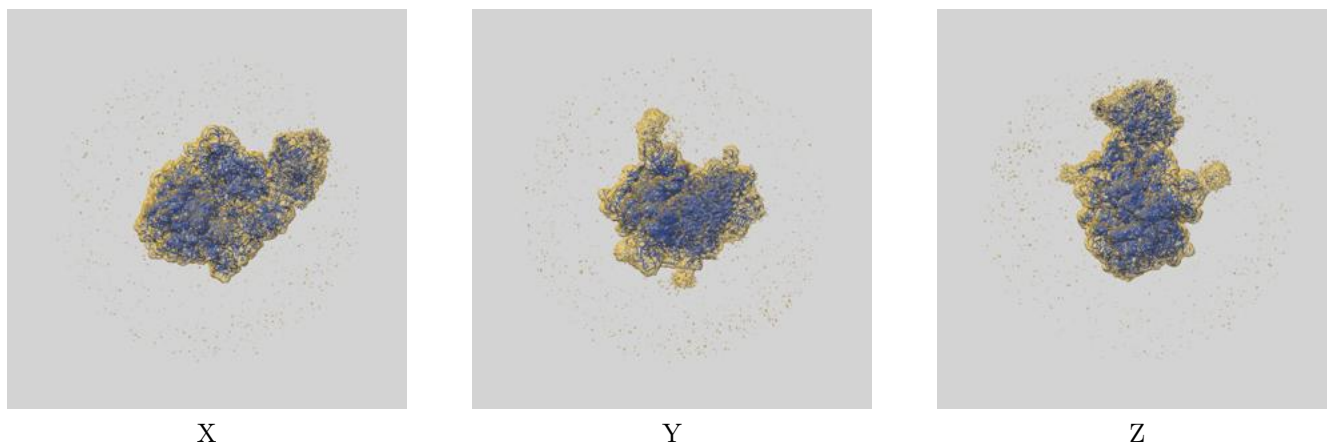
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	5.50	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	6.72	9.60	6.96

\*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 6.72 differs from the reported value 5.5 by more than 10 %

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

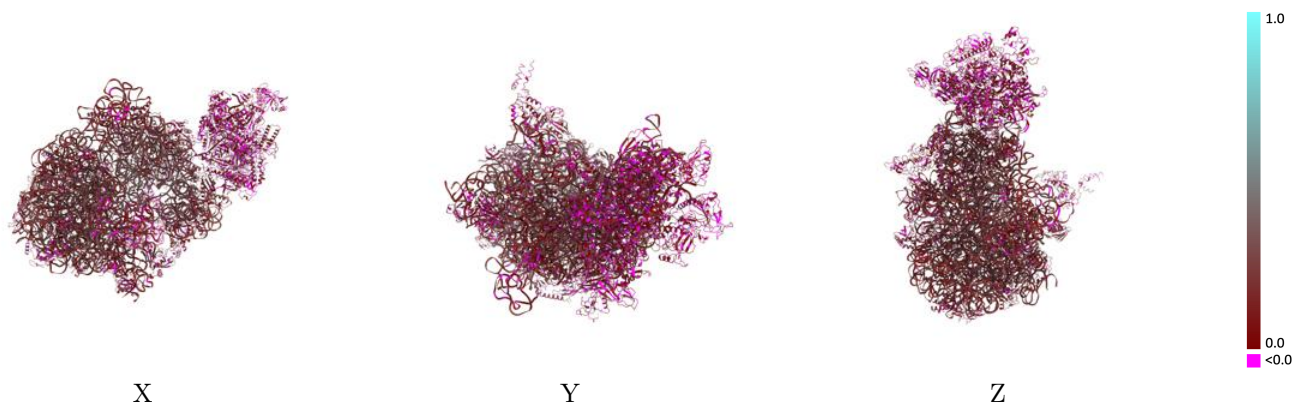
This section contains information regarding the fit between EMDB map EMD-42453 and PDB model 8UPO. Per-residue inclusion information can be found in section 3 on page 16.

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



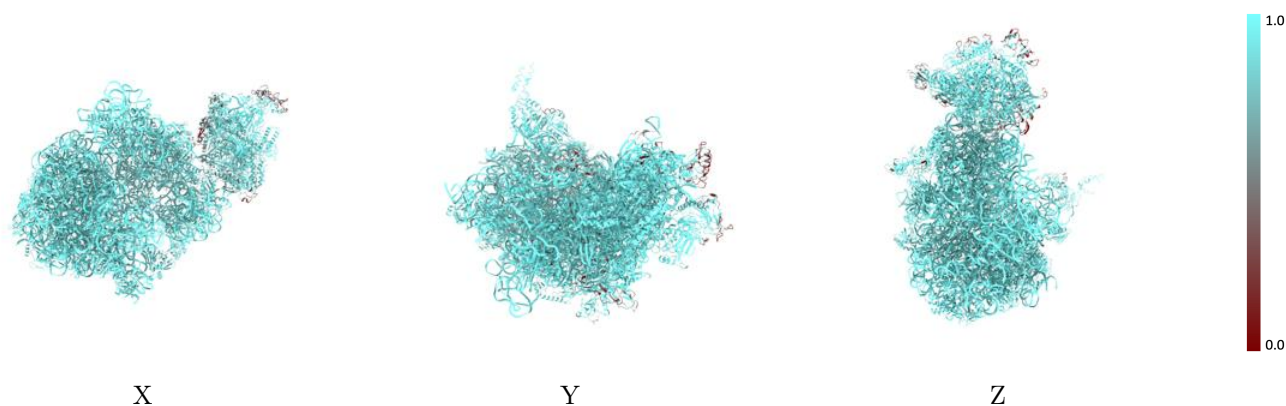
The images above show the 3D surface view of the map at the recommended contour level 0.0025 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



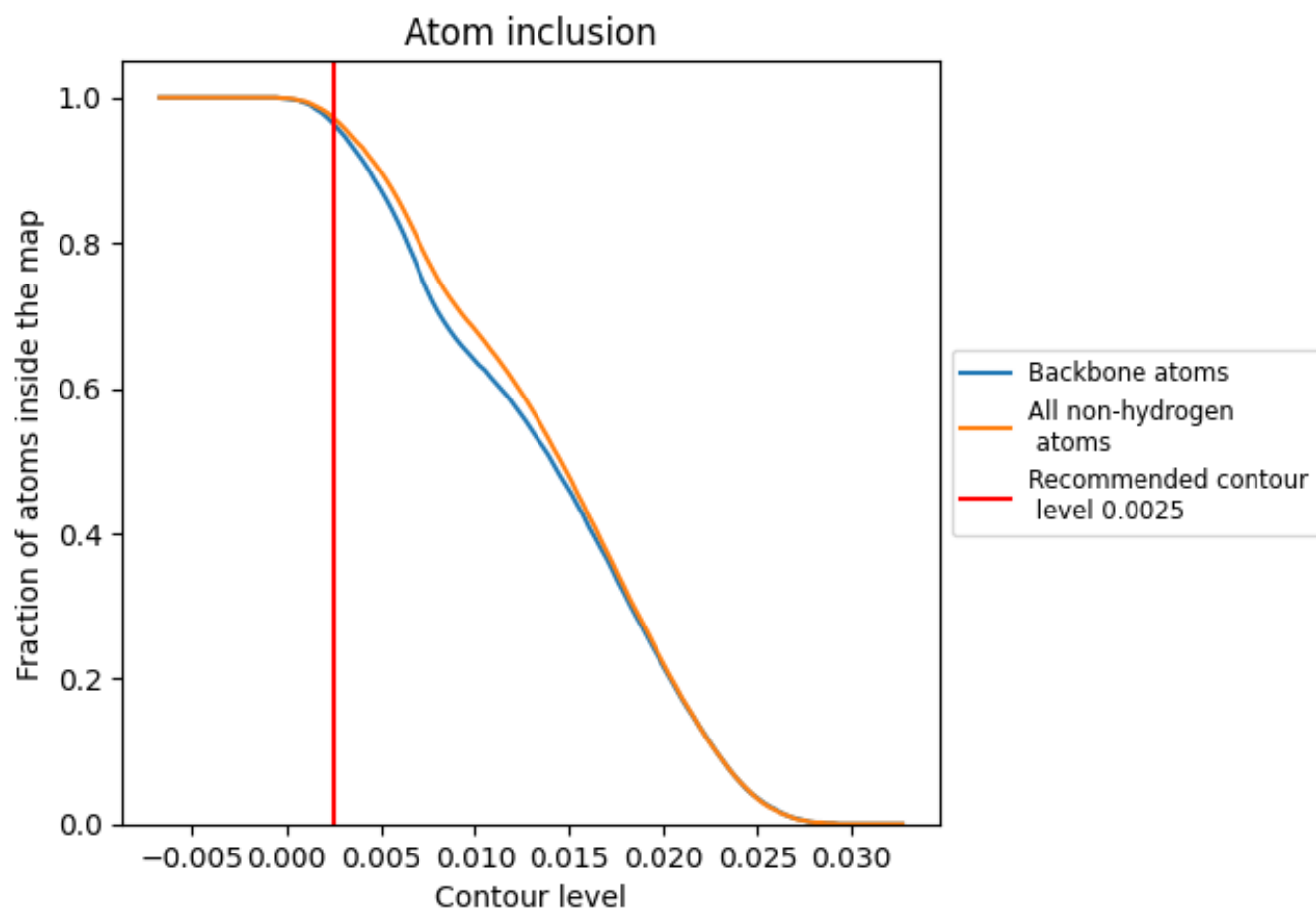
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0025).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 96% of all backbone atoms, 97% 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 (0.0025) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9720	 0.1740
0	 0.9940	 0.1550
1	 0.9960	 0.1780
2	 0.9900	 0.1570
3	 0.9920	 0.1300
4	 0.9960	 0.1560
5	 0.9800	 0.1320
6	 0.9750	 0.1300
7	 0.9880	 0.1180
9	 0.9750	 0.0980
A	 1.0000	 0.1700
AA	 0.9090	 0.0700
AB	 0.6880	 0.0650
AC	 0.8870	 0.0820
AD	 0.7090	 0.0450
AE	 0.9100	 0.0770
B	 0.9760	 0.1080
C	 0.9960	 0.1510
D	 0.9980	 0.2230
E	 0.9950	 0.1520
F	 0.9840	 0.1780
G	 0.9900	 0.1600
H	 0.9090	 0.0730
I	 0.9910	 0.1900
J	 0.9960	 0.1750
K	 0.9970	 0.2140
L	 0.9990	 0.1540
M	 0.9970	 0.1500
N	 0.9850	 0.1750
O	 0.9900	 0.1290
P	 0.9990	 0.1590
Q	 0.9970	 0.1560
R	 0.9990	 0.2050
S	 0.9950	 0.1600
T	 0.9970	 0.1560



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Chain	Atom inclusion	Q-score
U	 0.9980	 0.1540
V	 0.9910	 0.1750
W	 0.9770	 0.1210
X	 0.9910	 0.1390
Y	 0.9040	 0.0660
Z	 0.9910	 0.0450
a	 0.9990	 0.2120
b	 0.9950	 0.1290
c	 0.9870	 0.1560
d	 1.0000	 0.1830
e	 0.9900	 0.1360
f	 0.9980	 0.1730
g	 0.9820	 0.1140
h	 0.9960	 0.1560
i	 0.9910	 0.1850
j	 0.9970	 0.1630
k	 0.9980	 0.1330
l	 0.9890	 0.1310
m	 0.9940	 0.1750
n	 0.9850	 0.1260
o	 0.9940	 0.1270
p	 0.9970	 0.1560
q	 1.0000	 0.1460
r	 0.9760	 0.1150
s	 0.9900	 0.1790
t	 0.9880	 0.1730
u	 0.9910	 0.1380
v	 0.9930	 0.1810
w	 0.9910	 0.1580
x	 0.9920	 0.0970
y	 0.9930	 0.1600
z	 0.9960	 0.1440