



Full wwPDB EM Validation Report ⓘ

Mar 7, 2026 – 11:47 PM UTC

PDB ID : 6GBZ / pdb_00006gbz
EMDB ID : EMD-4378
Title : 50S ribosomal subunit assembly intermediate state 5
Authors : Nikolay, R.; Hilal, T.; Qin, B.; Loerke, J.; Buerger, J.; Mielke, T.; Spahn, C.M.T.
Deposited on : 2018-04-16
Resolution : 3.80 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:

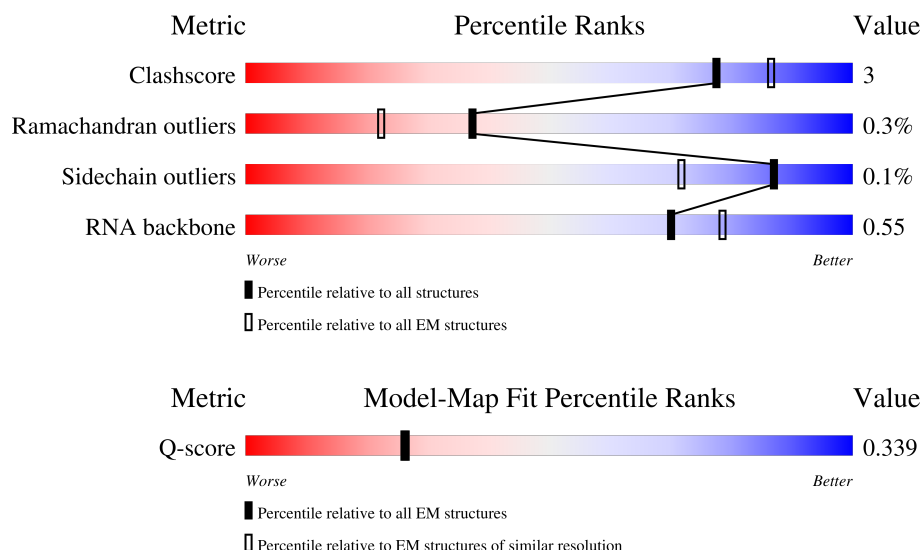
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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 3.80 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	10198 (3.30 - 4.30)

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	2904	
2	C	271	
3	D	209	

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Mol	Chain	Length	Quality of chain
4	E	201	
5	F	177	
6	G	176	
7	H	50	
8	J	142	
9	K	122	
10	L	143	
11	N	120	
12	O	116	
13	P	114	
14	Q	117	
15	R	103	
16	S	110	
17	T	93	
18	U	102	
19	V	94	
20	W	76	
21	X	77	
22	Y	63	
23	Z	58	
24	0	56	
25	1	50	
26	2	46	
27	3	64	
28	B	119	

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Mol	Chain	Length	Quality of chain
29	M	136	15% 77% 12% • 9%

2 Entry composition

There are 29 unique types of molecules in this entry. The entry contains 86401 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	2789	Total	C	N	O	P	0	0
			59885	26715	11034	19347	2789		

- Molecule 2 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	271	Total	C	N	O	S	0	0
			2083	1288	423	365	7		

- Molecule 3 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	209	Total	C	N	O	S	0	0
			1565	979	288	294	4		

- Molecule 4 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	201	Total	C	N	O	S	0	0
			1552	974	283	290	5		

- Molecule 5 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	F	177	Total	C	N	O	S	0	0
			1411	899	249	257	6		

- Molecule 6 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	176	Total	C	N	O	S	0	0
			1323	832	243	246	2		

- Molecule 7 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	H	50	Total	C	N	O	S	0	0
			384	247	68	68	1		

- Molecule 8 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	J	142	Total	C	N	O	S	0	0
			1129	714	212	199	4		

- Molecule 9 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	K	122	Total	C	N	O	S	0	0
			939	587	180	166	6		

- Molecule 10 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	L	143	Total	C	N	O	S	0	0
			1045	649	206	189	1		

- Molecule 11 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	N	120	Total	C	N	O	S	0	0
			961	593	196	167	5		

- Molecule 12 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms				AltConf	Trace
12	O	116	Total	C	N	O	0	0
			892	552	178	162		

- Molecule 13 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	P	114	Total	C	N	O	S	0	0
			917	574	179	163	1		

- Molecule 14 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms				AltConf	Trace
14	Q	117	Total	C	N	O	0	0
			947	604	192	151		

- Molecule 15 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	R	103	Total	C	N	O	S	0	0
			816	516	153	145	2		

- Molecule 16 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	S	110	Total	C	N	O	S	0	0
			857	532	166	156	3		

- Molecule 17 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	T	93	Total	C	N	O	S	0	0
			739	466	139	132	2		

- Molecule 18 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms				AltConf	Trace
18	U	102	Total	C	N	O	0	0
			780	492	146	142		

- Molecule 19 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	V	94	Total	C	N	O	S	0	0
			753	479	137	134	3		

- Molecule 20 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	W	76	Total	C	N	O	S	0	0
			575	356	117	101	1		

- Molecule 21 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	X	77	Total	C	N	O	S	0	0
			625	388	129	106	2		

- Molecule 22 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	Y	63	Total	C	N	O	S	0	0
			509	313	99	95	2		

- Molecule 23 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	Z	58	Total	C	N	O	S	0	0
			449	281	87	79	2		

- Molecule 24 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	0	56	Total	C	N	O	S	0	0
			444	269	94	80	1		

- Molecule 25 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms				AltConf	Trace
25	1	50	Total	C	N	O	0	0
			410	263	75	72		

- Molecule 26 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	2	46	Total	C	N	O	S	0	0
			377	228	90	57	2		

- Molecule 27 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	3	64	Total	C	N	O	S	0	0
			504	323	105	74	2		

- Molecule 28 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	B	119	Total	C	N	O	P	0	0
			2546	1135	466	827	118		

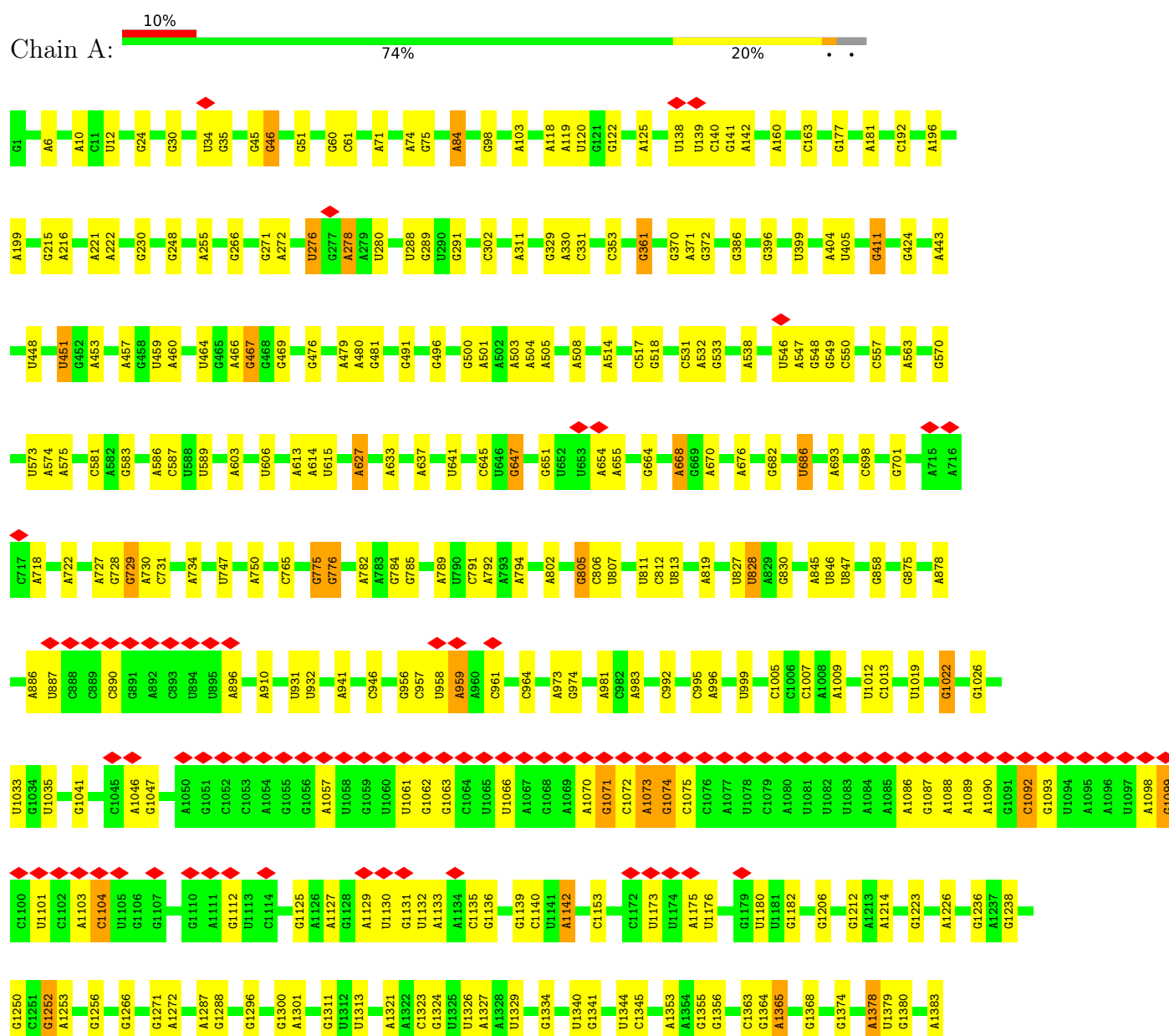
- Molecule 29 is a protein called 50S ribosomal protein L16.

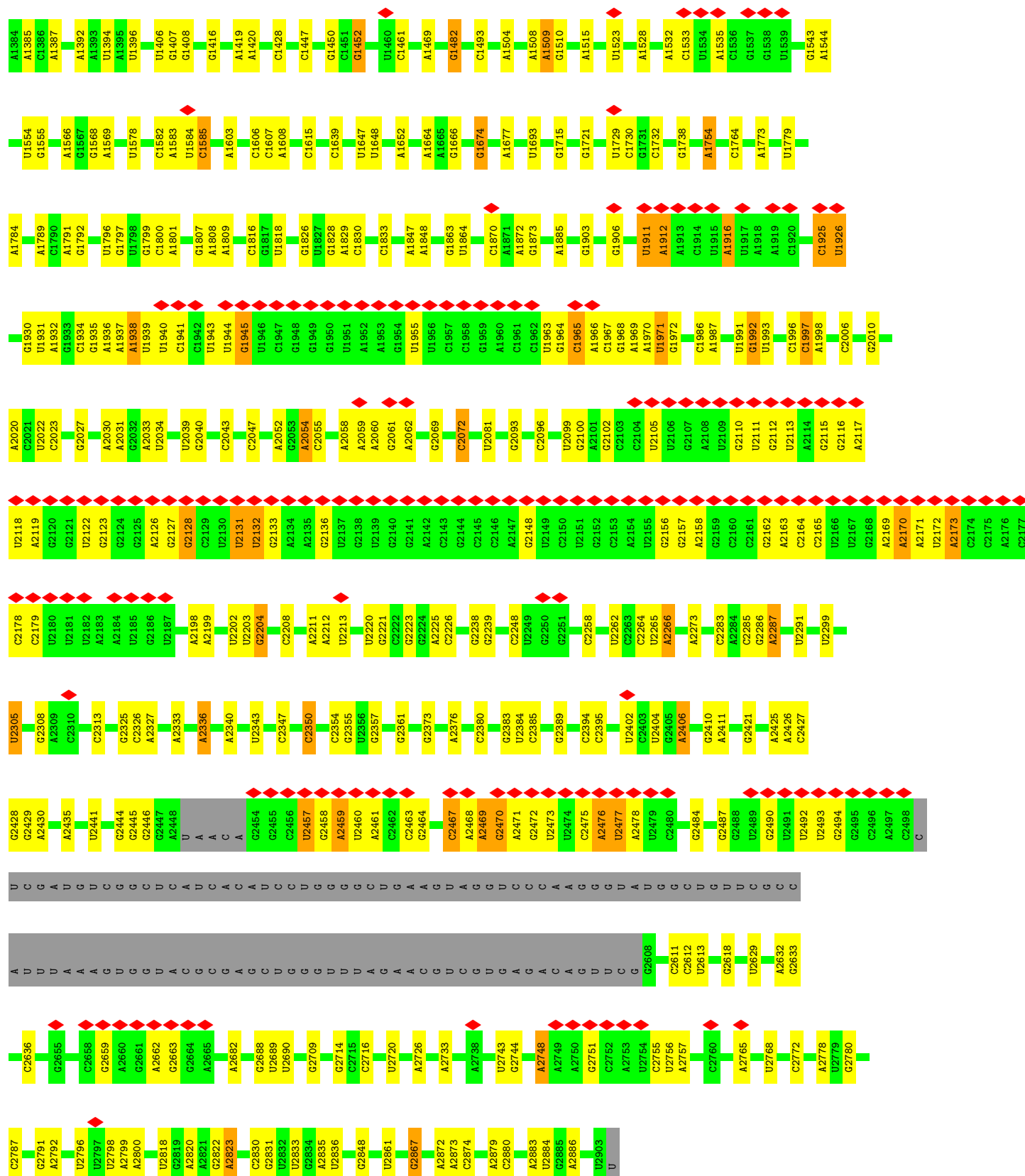
Mol	Chain	Residues	Atoms					AltConf	Trace
29	M	124	Total	C	N	O	S	0	0
			984	629	187	163	5		

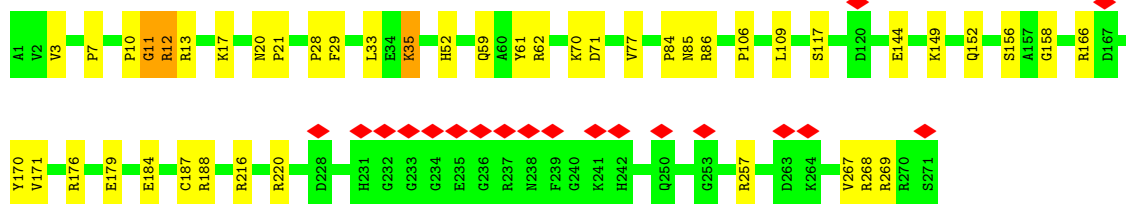
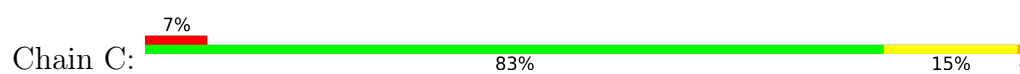
3 Residue-property plots

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

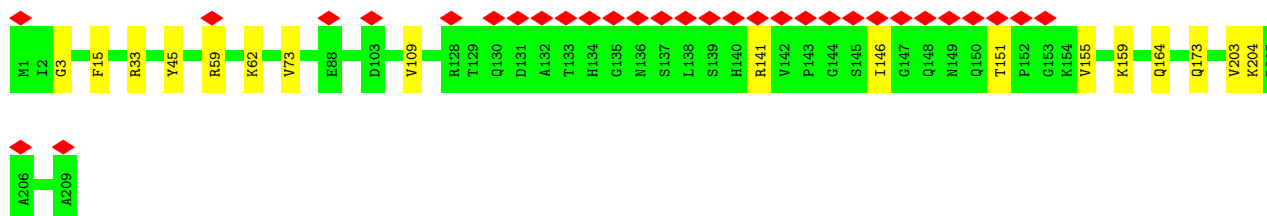
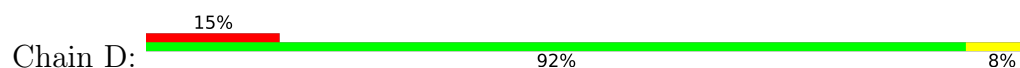
• Molecule 1: 23S ribosomal RNA



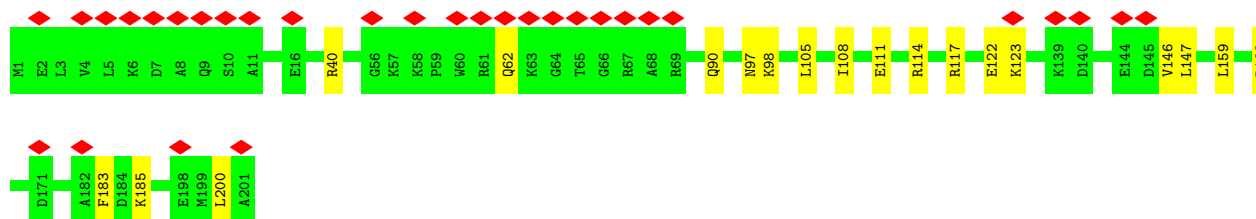




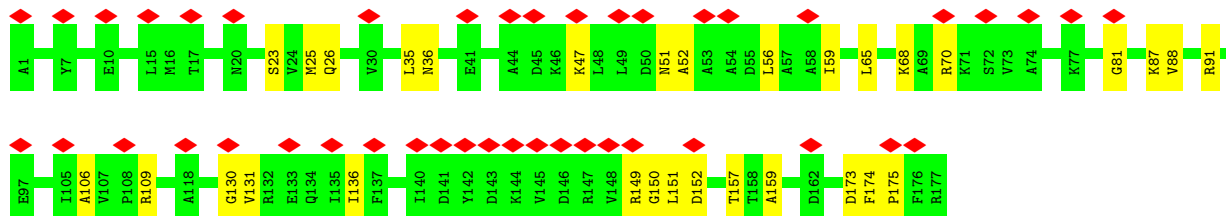
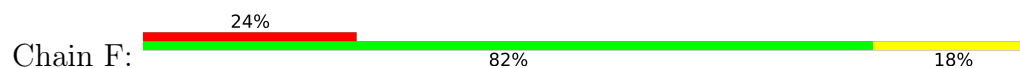
• Molecule 3: 50S ribosomal protein L3



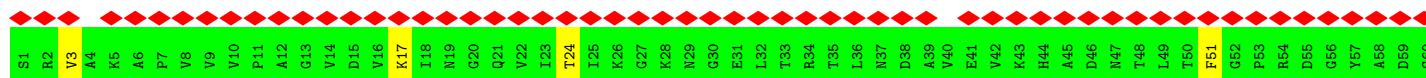
• Molecule 4: 50S ribosomal protein L4

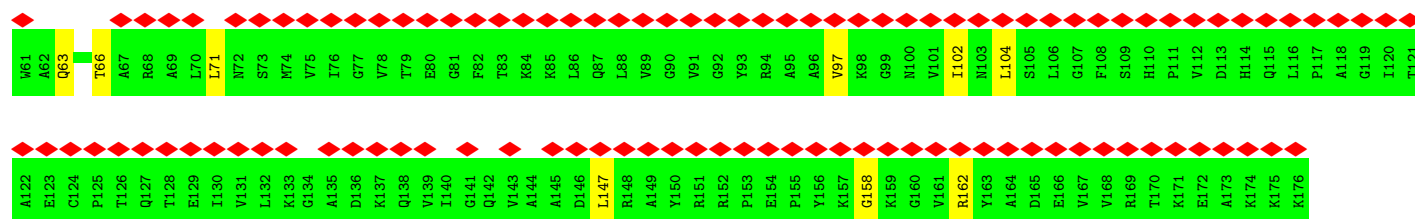


• Molecule 5: 50S ribosomal protein L5

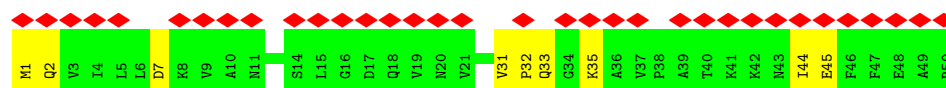
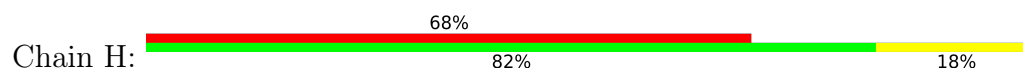


• Molecule 6: 50S ribosomal protein L6

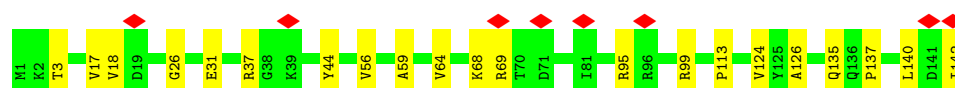
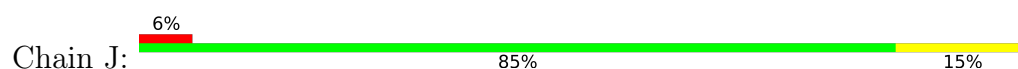




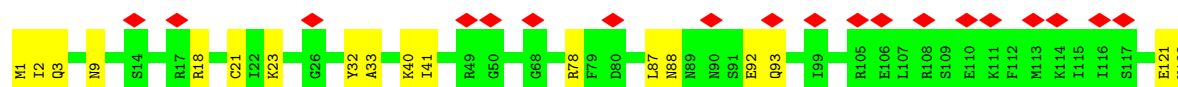
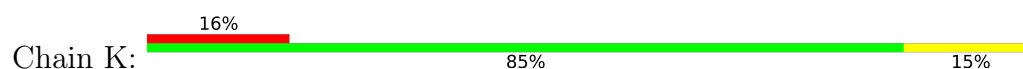
• Molecule 7: 50S ribosomal protein L9



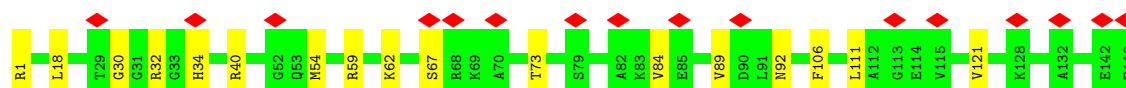
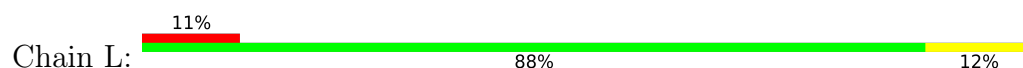
• Molecule 8: 50S ribosomal protein L13



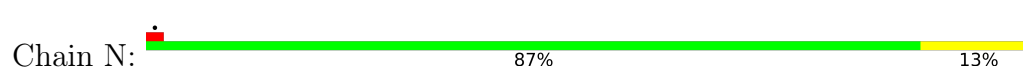
• Molecule 9: 50S ribosomal protein L14



• Molecule 10: 50S ribosomal protein L15

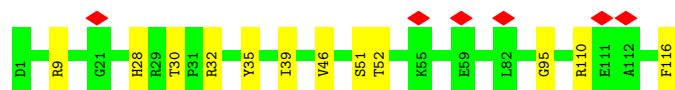


• Molecule 11: 50S ribosomal protein L17

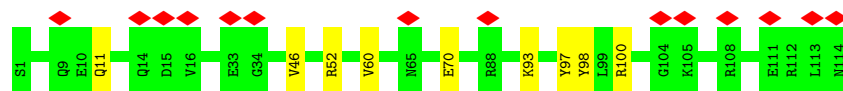


• Molecule 12: 50S ribosomal protein L18





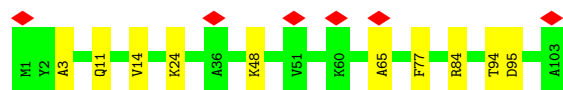
- Molecule 13: 50S ribosomal protein L19



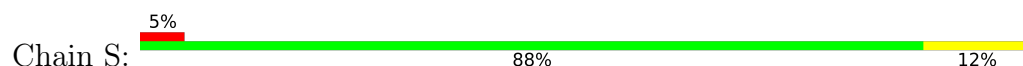
- Molecule 14: 50S ribosomal protein L20



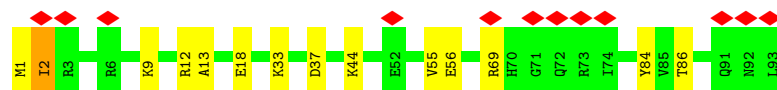
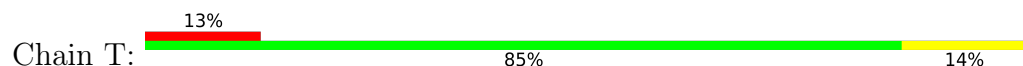
- Molecule 15: 50S ribosomal protein L21



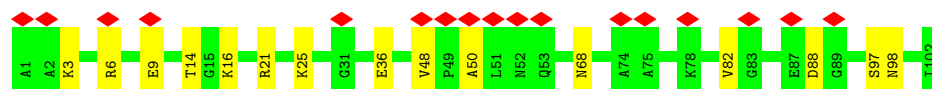
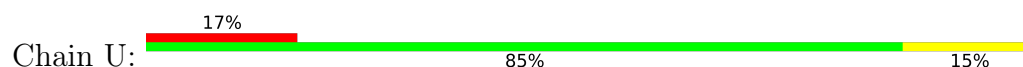
- Molecule 16: 50S ribosomal protein L22



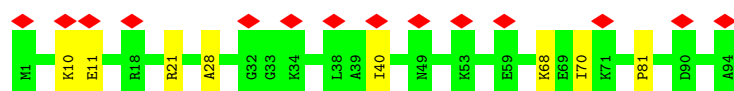
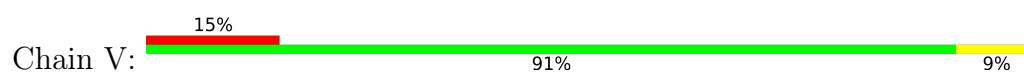
- Molecule 17: 50S ribosomal protein L23



- Molecule 18: 50S ribosomal protein L24



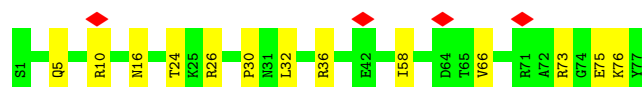
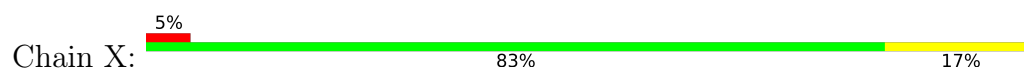
- Molecule 19: 50S ribosomal protein L25



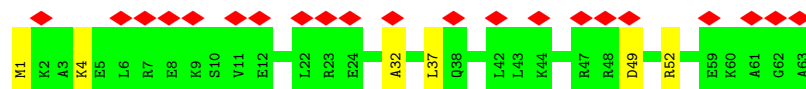
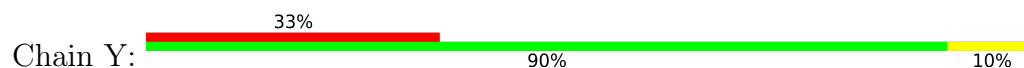
- Molecule 20: 50S ribosomal protein L27



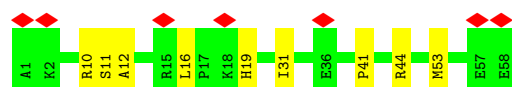
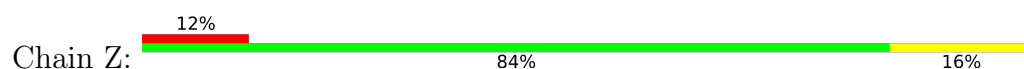
- Molecule 21: 50S ribosomal protein L28



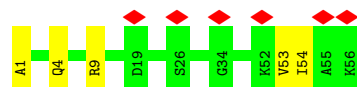
- Molecule 22: 50S ribosomal protein L29



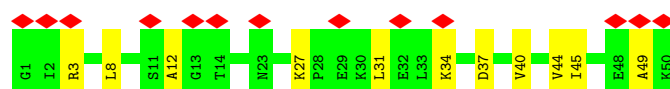
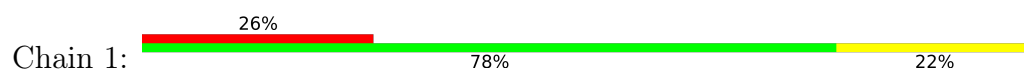
- Molecule 23: 50S ribosomal protein L30



- Molecule 24: 50S ribosomal protein L32



- Molecule 25: 50S ribosomal protein L33



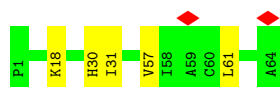
- Molecule 26: 50S ribosomal protein L34

Chain 2:  83% 17%



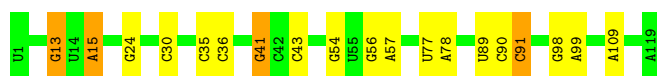
- Molecule 27: 50S ribosomal protein L35

Chain 3:  92% 8%



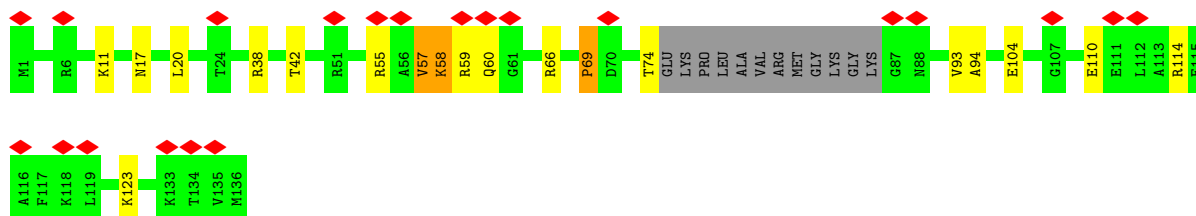
- Molecule 28: 5S ribosomal RNA

Chain B:  84% 13%



- Molecule 29: 50S ribosomal protein L16

Chain M:  15% 77% 12% 9%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	51173	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	25	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	5000	Depositor
Magnification	31000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	33.449	Depositor
Minimum map value	-17.878	Depositor
Average map value	0.158	Depositor
Map value standard deviation	1.483	Depositor
Recommended contour level	4.5	Depositor
Map size ($\text{\AA}$)	334.8, 334.8, 334.8	wwPDB
Map dimensions	270, 270, 270	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.24, 1.24, 1.24	Depositor

5 Model quality

5.1 Standard geometry

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	0.10	0/67074	0.22	3/104638 (0.0%)
2	C	0.26	0/2122	0.69	4/2852 (0.1%)
3	D	0.23	0/1586	0.59	0/2134
4	E	0.19	0/1571	0.55	0/2113
5	F	0.24	0/1435	0.71	2/1926 (0.1%)
6	G	0.22	0/1343	0.58	0/1816
7	H	0.28	0/389	0.97	1/523 (0.2%)
8	J	0.18	0/1152	0.52	0/1551
9	K	0.22	0/948	0.66	0/1268
10	L	0.25	0/1054	0.83	4/1403 (0.3%)
11	N	0.30	0/974	0.78	0/1301
12	O	0.22	0/902	0.67	0/1209
13	P	0.20	0/929	0.59	0/1242
14	Q	0.18	0/960	0.53	0/1278
15	R	0.22	0/829	0.60	0/1107
16	S	0.17	0/864	0.59	0/1156
17	T	0.22	0/745	0.73	2/994 (0.2%)
18	U	0.30	0/788	0.77	2/1051 (0.2%)
19	V	0.24	0/766	0.51	0/1025
20	W	0.19	0/582	0.60	0/769
21	X	0.17	0/635	0.51	0/848
22	Y	0.20	0/510	0.66	0/677
23	Z	0.19	0/453	0.55	0/605
24	0	0.21	0/450	0.67	0/599
25	1	0.22	0/417	0.68	0/554
26	2	0.16	0/380	0.62	0/498
27	3	0.26	0/513	0.61	0/676
28	B	0.09	0/2847	0.18	0/4440
29	M	0.21	0/1001	0.65	2/1338 (0.1%)
All	All	0.14	0/94219	0.36	20/141591 (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
2	C	0	2
3	D	0	1
5	F	0	3
7	H	0	1
9	K	0	1
10	L	0	1
11	N	0	1
18	U	0	1
24	O	0	1
27	3	0	1
29	M	0	1
All	All	0	14

There are no bond length outliers.

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
18	U	97	SER	CA-C-N	7.99	136.79	121.54
18	U	97	SER	C-N-CA	7.99	136.79	121.54
17	T	2	ILE	CA-C-N	6.32	133.08	121.70
17	T	2	ILE	C-N-CA	6.32	133.08	121.70
5	F	106	ALA	CA-C-N	6.10	124.08	120.24
5	F	106	ALA	C-N-CA	6.10	124.08	120.24
7	H	33	GLN	N-CA-C	-5.86	105.98	114.12
1	A	2457	U	P-O3'-C3'	5.38	128.27	120.20
1	A	1938	A	P-O3'-C3'	5.29	128.14	120.20
1	A	1911	U	P-O3'-C3'	5.27	128.11	120.20
2	C	29	PHE	CA-C-N	5.19	126.58	120.09
2	C	29	PHE	C-N-CA	5.19	126.58	120.09
29	M	57	VAL	CA-C-N	5.09	131.26	121.54
29	M	57	VAL	C-N-CA	5.09	131.26	121.54
10	L	84	VAL	CA-C-N	5.05	129.44	121.56
10	L	84	VAL	C-N-CA	5.05	129.44	121.56
2	C	11	GLY	CA-C-N	5.03	131.16	121.54
2	C	11	GLY	C-N-CA	5.03	131.16	121.54
10	L	92	ASN	CA-C-N	5.02	131.12	121.54
10	L	92	ASN	C-N-CA	5.02	131.12	121.54

There are no chirality outliers.

All (14) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
24	0	53	VAL	Peptide
27	3	30	HIS	Peptide
2	C	11	GLY	Peptide
2	C	35	LYS	Peptide
3	D	151	THR	Peptide
5	F	173	ASP	Peptide
5	F	174	PHE	Peptide
5	F	175	PRO	Peptide
7	H	31	VAL	Peptide
9	K	93	GLN	Peptide
10	L	34	HIS	Peptide
29	M	57	VAL	Peptide
11	N	10	LEU	Peptide
18	U	6	ARG	Peptide

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	59885	0	30121	187	0
2	C	2083	0	2157	29	0
3	D	1565	0	1616	13	0
4	E	1552	0	1619	14	0
5	F	1411	0	1447	18	0
6	G	1323	0	1374	7	0
7	H	384	0	405	3	0
8	J	1129	0	1162	15	0
9	K	939	0	1012	10	0
10	L	1045	0	1120	9	0
11	N	961	0	1000	10	0
12	O	892	0	926	6	0
13	P	917	0	965	6	0
14	Q	947	0	1022	10	0
15	R	816	0	839	7	0
16	S	857	0	922	10	0
17	T	739	0	807	9	0
18	U	780	0	834	6	0
19	V	753	0	780	5	0
20	W	575	0	592	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
21	X	625	0	655	9	0
22	Y	509	0	543	3	0
23	Z	449	0	491	5	0
24	0	444	0	461	6	0
25	1	410	0	443	7	0
26	2	377	0	418	6	0
27	3	504	0	574	2	0
28	B	2546	0	1292	9	0
29	M	984	0	1051	12	0
All	All	86401	0	56648	346	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (346) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1693:U:H1'	2:C:13:ARG:HH22	1.59	0.66
1:A:1652:A:H62	11:N:11:ASN:HD21	1.45	0.65
1:A:587:C:N3	10:L:32:ARG:NH1	2.45	0.64
1:A:2054:A:H2'	24:O:4:GLN:HE22	1.62	0.63
1:A:2394:C:H5''	10:L:62:LYS:HE2	1.80	0.62
12:O:30:THR:HG22	12:O:32:ARG:H	1.64	0.61
10:L:73:THR:HG22	10:L:106:PHE:HB2	1.82	0.61
2:C:77:VAL:HG21	2:C:109:LEU:HD11	1.84	0.60
2:C:170:TYR:HA	2:C:184:GLU:HA	1.84	0.60
29:M:42:THR:HG22	29:M:93:VAL:HG12	1.83	0.59
12:O:9:ARG:NH2	12:O:95:GLY:O	2.35	0.59
1:A:1674:G:N2	1:A:1677:A:N1	2.49	0.59
1:A:1311:G:H21	1:A:1603:A:H62	1.50	0.59
28:B:30:C:H1'	28:B:57:A:H61	1.68	0.59
9:K:23:LYS:HB3	9:K:40:LYS:HB3	1.85	0.58
20:W:28:ILE:HG22	20:W:29:VAL:HG23	1.85	0.58
2:C:149:LYS:HE2	2:C:152:GLN:HE22	1.69	0.58
8:J:59:ALA:H	8:J:126:ALA:HA	1.69	0.58
1:A:776:G:H22	1:A:2072:C:H5'	1.68	0.58
1:A:1153:C:OP1	14:Q:91:ARG:NH2	2.37	0.58
2:C:144:GLU:HB3	2:C:187:CYS:HB3	1.86	0.57
5:F:25:MET:HE3	28:B:54:G:H21	1.69	0.57
1:A:1992:G:N2	1:A:1996:C:O2'	2.38	0.57
1:A:957:C:OP1	1:A:2459:A:N6	2.38	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:651:G:H5'	27:3:18:LYS:HG3	1.87	0.57
14:Q:92:LYS:NZ	15:R:11:GLN:O	2.37	0.57
2:C:3:VAL:HB	2:C:17:LYS:HB2	1.87	0.57
1:A:1140:C:OP2	8:J:68:LYS:NZ	2.38	0.57
5:F:35:LEU:HB2	5:F:88:VAL:HB	1.86	0.56
9:K:9:ASN:OD1	9:K:18:ARG:NH1	2.38	0.56
1:A:2266:A:N6	1:A:2273:A:OP2	2.38	0.56
28:B:91:C:OP1	29:M:38:ARG:NH2	2.39	0.56
1:A:2305:U:H5''	5:F:130:GLY:HA3	1.87	0.55
2:C:61:TYR:HA	2:C:85:ASN:HD21	1.71	0.55
13:P:97:TYR:HD1	13:P:100:ARG:HH22	1.53	0.55
17:T:9:LYS:O	17:T:12:ARG:NH1	2.39	0.55
5:F:52:ALA:HB2	5:F:149:ARG:HH12	1.70	0.55
7:H:7:ASP:HB2	7:H:35:LYS:HG3	1.88	0.55
10:L:89:VAL:HB	10:L:121:VAL:HA	1.88	0.55
17:T:44:LYS:NZ	17:T:55:VAL:O	2.39	0.55
29:M:11:LYS:NZ	29:M:74:THR:OG1	2.40	0.55
1:A:1945:G:O2'	1:A:1965:C:O2	2.23	0.54
1:A:2357:G:OP1	20:W:11:ARG:NH1	2.41	0.54
2:C:106:PRO:HD2	2:C:109:LEU:HD22	1.89	0.54
6:G:17:LYS:HB2	6:G:24:THR:HB	1.89	0.54
1:A:1998:A:OP2	3:D:141:ARG:NH1	2.41	0.54
1:A:2469:A:H4'	29:M:55:ARG:HG2	1.90	0.54
1:A:1252:G:H1	14:Q:36:GLN:HE21	1.53	0.54
1:A:2384:U:OP2	20:W:46:ARG:NH1	2.40	0.54
8:J:18:VAL:HG22	8:J:140:LEU:HD22	1.90	0.54
16:S:4:ILE:HG22	16:S:106:VAL:HG22	1.90	0.54
1:A:1364:G:H5'	1:A:1809:A:H1'	1.90	0.54
1:A:1912:A:O2'	1:A:1916:A:N6	2.41	0.54
28:B:78:A:H62	28:B:98:G:H21	1.56	0.54
19:V:10:LYS:HG2	19:V:11:GLU:HG3	1.89	0.54
1:A:1779:U:OP2	1:A:1784:A:N6	2.40	0.53
2:C:158:GLY:O	2:C:176:ARG:NH2	2.41	0.53
2:C:267:VAL:HG12	2:C:268:ARG:HG3	1.90	0.53
11:N:44:LEU:HD23	11:N:113:ILE:HD13	1.90	0.53
1:A:807:U:OP2	10:L:40:ARG:NH1	2.42	0.53
14:Q:111:LYS:HG3	15:R:48:LYS:HD2	1.90	0.53
1:A:2299:U:OP2	5:F:70:ARG:NH2	2.38	0.53
4:E:146:VAL:HG12	4:E:185:LYS:HB2	1.90	0.53
1:A:2830:C:OP2	3:D:59:ARG:NH2	2.41	0.53
1:A:729:G:N2	2:C:10:PRO:O	2.42	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1007:C:OP1	8:J:37:ARG:NH2	2.41	0.53
12:O:110:ARG:NH2	12:O:116:PHE:OXT	2.41	0.53
1:A:676:A:H5'	4:E:62:GLN:HE22	1.74	0.53
29:M:66:ARG:NH1	29:M:104:GLU:OE2	2.41	0.53
10:L:54:MET:O	10:L:59:ARG:NH1	2.41	0.53
1:A:668:A:H2'	1:A:670:A:H62	1.74	0.52
1:A:1826:G:O2'	1:A:1971:U:OP2	2.28	0.52
1:A:1092:C:H42	1:A:1099:G:H1	1.58	0.52
1:A:2285:C:OP2	25:1:3:ARG:NH1	2.43	0.52
1:A:2612:C:O2	24:0:1:ALA:N	2.41	0.52
1:A:500:G:N1	1:A:503:A:OP2	2.42	0.52
12:O:28:HIS:HB3	12:O:35:TYR:HB2	1.91	0.52
16:S:59:GLU:HG3	16:S:66:ILE:HD11	1.91	0.52
1:A:453:A:N3	1:A:457:A:O2'	2.43	0.52
1:A:1326:U:H2'	1:A:1327:A:H8	1.74	0.52
15:R:24:LYS:HA	15:R:94:THR:HG23	1.92	0.52
5:F:36:ASN:HB3	5:F:152:ASP:HB2	1.91	0.52
1:A:1019:U:H3	1:A:1142:A:H62	1.58	0.52
2:C:179:GLU:OE2	2:C:269:ARG:NH1	2.43	0.52
1:A:2258:C:O2'	1:A:2427:C:OP2	2.28	0.52
1:A:1450:G:N2	1:A:1452:G:O6	2.42	0.51
1:A:2128:G:N3	1:A:2173:A:O2'	2.43	0.51
1:A:2313:C:H5''	5:F:87:LYS:HD3	1.93	0.51
1:A:1287:A:O4'	11:N:103:ARG:NH2	2.43	0.51
16:S:73:LYS:HB2	16:S:106:VAL:HB	1.92	0.51
1:A:514:A:N3	1:A:581:C:O2'	2.39	0.51
8:J:37:ARG:NE	8:J:44:TYR:OH	2.41	0.51
1:A:517:C:OP2	24:0:9:ARG:NH2	2.39	0.51
1:A:1789:A:OP2	2:C:220:ARG:NH1	2.43	0.51
2:C:70:LYS:O	2:C:117:SER:OG	2.29	0.51
1:A:411:G:OP2	1:A:2406:A:O2'	2.29	0.50
5:F:131:VAL:HG23	5:F:151:LEU:HB3	1.92	0.50
1:A:2355:G:N3	20:W:30:ARG:NH2	2.59	0.50
1:A:2772:C:H5'	3:D:173:GLN:HE21	1.75	0.50
4:E:111:GLU:HG2	10:L:1:ARG:HH12	1.76	0.50
3:D:146:ILE:HB	3:D:159:LYS:HE2	1.92	0.50
1:A:467:G:OP2	26:2:34:ARG:NH2	2.44	0.50
1:A:2822:G:OP1	3:D:164:GLN:NE2	2.45	0.50
1:A:1086:A:H1'	1:A:1103:A:H61	1.76	0.50
1:A:1582:C:O2'	1:A:1585:C:N3	2.42	0.50
1:A:2787:C:H4'	3:D:62:LYS:HG3	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:192:C:O2'	1:A:802:A:N3	2.42	0.50
1:A:276:U:O2'	1:A:278:A:N7	2.45	0.50
1:A:1323:C:N4	1:A:1324:G:O6	2.44	0.50
1:A:2720:U:OP1	13:P:52:ARG:NH2	2.45	0.50
1:A:2751:G:OP1	1:A:2751:G:N2	2.43	0.50
21:X:16:ASN:OD1	21:X:26:ARG:NH1	2.45	0.50
22:Y:1:MET:HA	22:Y:4:LYS:HE3	1.93	0.50
1:A:570:G:N2	1:A:2030:A:O4'	2.44	0.50
1:A:647:G:N2	1:A:2350:C:O2'	2.42	0.50
1:A:2287:A:OP1	25:1:27:LYS:NZ	2.44	0.50
22:Y:32:ALA:HB2	22:Y:37:LEU:HD23	1.94	0.50
25:1:31:LEU:H	25:1:49:ALA:HB3	1.77	0.50
1:A:24:G:N2	16:S:78:GLU:OE2	2.44	0.50
1:A:84:A:N1	1:A:98:G:O2'	2.40	0.50
1:A:2467:C:O2	29:M:123:LYS:NZ	2.42	0.50
1:A:1791:A:N6	1:A:1828:G:O2'	2.44	0.49
4:E:159:LEU:HD13	4:E:162:ARG:HH22	1.77	0.49
5:F:91:ARG:NH2	28:B:43:C:O2	2.44	0.49
14:Q:29:ARG:HH21	24:0:9:ARG:HH11	1.59	0.49
21:X:5:GLN:O	21:X:73:ARG:NH1	2.45	0.49
2:C:106:PRO:HG2	2:C:109:LEU:HB2	1.93	0.49
16:S:69:LEU:HD12	16:S:107:VAL:HG22	1.93	0.49
18:U:25:LYS:HE3	18:U:36:GLU:HB2	1.92	0.49
1:A:459:U:OP2	26:2:39:ARG:NH1	2.45	0.49
1:A:2659:G:N2	1:A:2662:A:OP2	2.45	0.49
4:E:147:LEU:HB2	4:E:183:PHE:HD2	1.76	0.49
1:A:45:G:H5'	1:A:46:G:H5'	1.93	0.49
1:A:2047:C:O2'	1:A:2823:A:N1	2.45	0.49
5:F:56:LEU:HD23	5:F:59:ILE:HD12	1.94	0.49
18:U:3:LYS:HD2	18:U:82:VAL:HB	1.95	0.49
29:M:42:THR:HA	29:M:93:VAL:HA	1.93	0.49
1:A:682:G:O6	1:A:794:A:N6	2.45	0.49
1:A:1392:A:N6	17:T:18:GLU:OE2	2.46	0.49
1:A:2343:U:O2'	1:A:2373:G:O2'	2.31	0.49
1:A:1223:G:N2	1:A:1226:A:OP2	2.44	0.49
25:1:34:LYS:HG2	25:1:45:ILE:HG13	1.94	0.48
1:A:2748:A:H5'	6:G:3:VAL:HG21	1.95	0.48
3:D:15:PHE:H	13:P:11:GLN:HE22	1.60	0.48
8:J:31:GLU:HG2	8:J:142:ILE:HG21	1.93	0.48
1:A:727:A:O2'	2:C:12:ARG:NH2	2.46	0.48
1:A:698:C:O2'	1:A:734:A:N6	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:E:105:LEU:HA	4:E:108:ILE:HG22	1.94	0.48
4:E:117:ARG:NH2	4:E:183:PHE:O	2.46	0.48
5:F:23:SER:HB3	5:F:26:GLN:HG3	1.94	0.48
28:B:13:G:O2'	28:B:15:A:OP2	2.27	0.48
1:A:728:G:H4'	2:C:12:ARG:HG2	1.95	0.48
1:A:2780:G:O6	8:J:99:ARG:NH1	2.47	0.48
1:A:1792:G:O2'	1:A:1830:C:OP1	2.31	0.48
1:A:2131:U:H5'	1:A:2132:U:H5''	1.96	0.48
18:U:48:VAL:HG22	18:U:50:ALA:H	1.79	0.48
1:A:1103:A:OP2	1:A:1104:C:N4	2.42	0.48
11:N:28:LEU:HD23	11:N:48:VAL:HG21	1.96	0.48
1:A:2831:G:OP2	3:D:59:ARG:NH1	2.46	0.48
1:A:2340:A:OP1	28:B:41:G:N2	2.46	0.48
13:P:93:LYS:HG2	13:P:98:TYR:HE1	1.79	0.48
1:A:1363:C:O2'	1:A:1809:A:N3	2.46	0.48
1:A:2199:A:OP1	21:X:36:ARG:NH1	2.46	0.48
12:O:39:ILE:HG12	12:O:46:VAL:HG12	1.96	0.48
6:G:97:VAL:HG22	6:G:102:ILE:HG12	1.96	0.47
27:3:57:VAL:O	27:3:61:LEU:N	2.45	0.47
1:A:451:U:O2	1:A:453:A:N6	2.47	0.47
1:A:956:G:O2'	1:A:959:A:N6	2.47	0.47
1:A:1140:C:H5'	8:J:26:GLY:HA3	1.95	0.47
9:K:2:ILE:HB	9:K:33:ALA:HB3	1.96	0.47
1:A:2055:C:O4'	24:0:4:GLN:NE2	2.47	0.47
1:A:1378:A:O2'	1:A:1380:G:OP2	2.31	0.47
1:A:1818:U:OP2	2:C:86:ARG:NH1	2.47	0.47
1:A:2874:C:H5''	11:N:4:ARG:HD2	1.96	0.47
29:M:17:ASN:O	29:M:38:ARG:NH1	2.46	0.47
1:A:1925:C:H5''	1:A:1926:U:H5	1.80	0.47
1:A:2395:C:H42	1:A:2421:G:H1	1.63	0.47
11:N:103:ARG:HD3	11:N:108:ALA:HB3	1.95	0.47
1:A:589:U:H4'	4:E:90:GLN:HE22	1.80	0.47
1:A:775:G:H4'	1:A:776:G:H5'	1.96	0.47
1:A:280:U:O4	1:A:361:G:N2	2.48	0.47
1:A:805:G:H22	1:A:828:U:H5''	1.79	0.47
1:A:964:C:O2'	1:A:2273:A:N3	2.42	0.47
1:A:1818:U:H5''	2:C:156:SER:HB2	1.97	0.47
1:A:1996:C:N4	9:K:32:TYR:OH	2.41	0.46
1:A:1799:G:OP1	2:C:257:ARG:NH1	2.48	0.46
1:A:2336:A:H61	20:W:34:THR:HG21	1.79	0.46
22:Y:49:ASP:OD1	22:Y:52:ARG:NH2	2.48	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:24:G:O2'	16:S:78:GLU:O	2.32	0.46
1:A:1326:U:HO2'	1:A:2010:G:HO2'	1.60	0.46
1:A:2354:C:H2'	1:A:2355:G:H8	1.80	0.46
25:1:12:ALA:HB2	25:1:44:VAL:HG21	1.98	0.46
1:A:1334:G:OP1	17:T:69:ARG:NH2	2.48	0.46
5:F:109:ARG:NH1	5:F:136:ILE:O	2.47	0.46
1:A:177:G:OP2	1:A:177:G:N2	2.41	0.46
14:Q:43:GLN:HE21	15:R:77:PHE:HB3	1.80	0.46
1:A:2081:U:H4'	21:X:24:THR:HG21	1.98	0.46
19:V:68:LYS:HE3	19:V:70:ILE:HD11	1.98	0.46
26:2:9:VAL:HG22	26:2:12:ARG:HH21	1.81	0.46
19:V:81:PRO:HG2	29:M:20:LEU:HD23	1.98	0.46
25:1:37:ASP:HB3	25:1:40:VAL:HG12	1.98	0.46
1:A:1022:G:N2	1:A:1142:A:N1	2.64	0.46
17:T:37:ASP:OD1	17:T:37:ASP:N	2.48	0.46
1:A:2006:C:O2'	1:A:2823:A:N3	2.46	0.46
1:A:2618:G:H21	3:D:155:VAL:HG21	1.81	0.46
9:K:121:GLU:HG2	9:K:122:VAL:HG23	1.97	0.46
11:N:24:MET:HE1	11:N:40:LYS:HD3	1.98	0.46
15:R:65:ALA:HB3	15:R:95:ASP:HB2	1.98	0.46
29:M:58:LYS:O	29:M:60:GLN:N	2.49	0.45
1:A:2636:C:O2'	3:D:45:TYR:OH	2.30	0.45
16:S:57:ASN:HD22	16:S:61:ASN:HD22	1.64	0.45
1:A:1796:U:H2'	1:A:1797:G:H8	1.81	0.45
1:A:1863:G:H4'	1:A:2411:A:H4'	1.99	0.45
1:A:2688:G:N1	1:A:2720:U:OP2	2.41	0.45
19:V:21:ARG:NH1	28:B:77:U:OP1	2.49	0.45
1:A:1340:U:OP1	17:T:84:TYR:OH	2.33	0.45
2:C:166:ARG:HA	2:C:171:VAL:HA	1.97	0.45
6:G:104:LEU:HD11	6:G:147:LEU:HD22	1.97	0.45
29:M:69:PRO:HA	29:M:94:ALA:HB2	1.98	0.45
1:A:1864:U:OP1	1:A:2410:G:O2'	2.33	0.45
1:A:1355:G:H2'	1:A:1356:G:H8	1.82	0.45
1:A:1407:G:H2'	1:A:1408:G:H8	1.81	0.45
1:A:2291:U:OP1	1:A:2380:C:O2'	2.34	0.45
18:U:14:THR:OG1	18:U:68:ASN:ND2	2.50	0.45
1:A:1394:U:H4'	1:A:1603:A:H4'	1.98	0.45
1:A:1664:A:H2	9:K:1:MET:HE1	1.82	0.45
1:A:2796:U:H3	1:A:2799:A:H61	1.65	0.45
26:2:22:MET:O	26:2:28:ARG:NH1	2.49	0.45
1:A:1528:A:OP2	1:A:1543:G:N2	2.49	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1932:A:H62	1:A:1968:G:H21	1.65	0.45
10:L:18:LEU:HD13	10:L:30:GLY:HA3	1.98	0.44
1:A:701:G:H1	1:A:731:C:H42	1.64	0.44
1:A:1365:A:O2'	21:X:10:ARG:NH1	2.48	0.44
3:D:33:ARG:HD3	3:D:73:VAL:HB	1.99	0.44
1:A:633:A:O2'	1:A:2404:U:OP1	2.31	0.44
1:A:1833:C:O2'	1:A:1969:A:N1	2.43	0.44
21:X:58:ILE:HG13	21:X:66:VAL:HG21	1.98	0.44
1:A:466:A:OP1	26:2:34:ARG:NH2	2.50	0.44
1:A:1482:G:H1'	1:A:1509:A:H61	1.82	0.44
11:N:28:LEU:HD13	11:N:34:ILE:HG12	2.00	0.44
1:A:981:A:N1	1:A:2027:G:O2'	2.49	0.44
3:D:109:VAL:HG22	3:D:203:VAL:HG22	1.99	0.44
1:A:448:U:O2	1:A:583:G:N2	2.45	0.44
1:A:1992:G:O2'	1:A:1997:C:N4	2.51	0.44
5:F:65:LEU:HD22	28:B:41:G:H5''	2.00	0.44
17:T:1:MET:HB3	17:T:2:ILE:HD12	1.99	0.44
1:A:2313:C:O4'	5:F:36:ASN:ND2	2.50	0.44
4:E:97:ASN:HD22	4:E:98:LYS:H	1.66	0.44
1:A:641:U:O2'	1:A:2350:C:OP1	2.34	0.44
1:A:1288:G:OP2	1:A:1288:G:N2	2.39	0.44
2:C:20:ASN:HD22	2:C:21:PRO:HD2	1.82	0.43
8:J:3:THR:HG21	14:Q:60:TRP:HE1	1.83	0.43
8:J:17:VAL:HG23	8:J:137:PRO:HB2	2.00	0.43
13:P:46:VAL:HG22	13:P:60:VAL:HG22	2.00	0.43
1:A:476:G:N1	1:A:479:A:OP2	2.50	0.43
12:O:51:SER:OG	12:O:52:THR:N	2.50	0.43
21:X:5:GLN:NE2	21:X:76:LYS:O	2.51	0.43
1:A:160:A:N3	1:A:2208:C:O2'	2.48	0.43
1:A:1666:G:N3	9:K:3:GLN:NE2	2.66	0.43
15:R:3:ALA:N	15:R:14:VAL:O	2.44	0.43
1:A:1071:G:N2	1:A:1090:A:OP2	2.42	0.43
1:A:606:U:H5''	4:E:97:ASN:HD21	1.82	0.43
6:G:63:GLN:O	6:G:66:THR:OG1	2.30	0.43
23:Z:10:ARG:HD3	23:Z:53:MET:HA	2.00	0.43
1:A:1296:G:OP1	1:A:2709:G:O2'	2.28	0.43
1:A:1447:C:O2'	1:A:1544:A:N3	2.50	0.43
2:C:7:PRO:HB3	2:C:13:ARG:HG3	2.00	0.43
1:A:574:A:N6	1:A:2034:U:OP1	2.50	0.43
1:A:1568:G:OP2	2:C:62:ARG:NH1	2.51	0.43
1:A:2163:A:OP1	1:A:2170:A:O2'	2.37	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:2477:U:O2'	1:A:2478:A:O4'	2.35	0.43
1:A:1385:A:O2'	1:A:1396:U:O2	2.33	0.43
1:A:2223:G:OP1	2:C:170:TYR:OH	2.31	0.43
26:2:21:ARG:HG3	26:2:43:THR:HG21	1.99	0.43
1:A:460:A:H62	1:A:469:G:H21	1.66	0.43
1:A:518:G:O5'	16:S:18:ARG:NH1	2.51	0.43
2:C:59:GLN:HG2	2:C:84:PRO:HB2	2.01	0.42
6:G:158:GLY:O	6:G:162:ARG:NH2	2.52	0.42
18:U:9:GLU:OE2	18:U:21:ARG:NH2	2.53	0.42
1:A:6:A:N3	8:J:135:GLN:NE2	2.67	0.42
1:A:501:A:OP1	18:U:16:LYS:NZ	2.43	0.42
21:X:73:ARG:HG3	21:X:75:GLU:HG2	2.02	0.42
23:Z:16:LEU:HB2	23:Z:19:HIS:HD2	1.84	0.42
1:A:693:A:O2'	1:A:1353:A:N3	2.49	0.42
1:A:750:A:OP1	1:A:1615:C:N4	2.49	0.42
1:A:2220:U:H2'	1:A:2221:G:H8	1.85	0.42
1:A:2768:U:O3'	8:J:95:ARG:NH2	2.52	0.42
5:F:47:LYS:O	5:F:51:ASN:ND2	2.53	0.42
1:A:2743:U:OP2	1:A:2755:C:N4	2.50	0.42
7:H:1:MET:SD	7:H:2:GLN:N	2.81	0.42
8:J:56:VAL:HB	8:J:124:VAL:HG12	2.01	0.42
29:M:110:GLU:OE2	29:M:114:ARG:NH1	2.52	0.42
1:A:992:C:OP1	14:Q:46:TYR:OH	2.32	0.42
4:E:122:GLU:HG3	4:E:123:LYS:HG2	2.00	0.42
6:G:51:PHE:HZ	6:G:71:LEU:HD22	1.85	0.42
11:N:17:ARG:HA	11:N:20:MET:HG2	2.02	0.42
17:T:13:ALA:HB3	17:T:33:LYS:HE2	2.01	0.42
1:A:813:U:OP1	15:R:84:ARG:NH1	2.53	0.42
7:H:44:ILE:HD12	7:H:45:GLU:HG3	2.02	0.42
23:Z:11:SER:HA	23:Z:31:ILE:HD11	2.02	0.42
25:1:8:LEU:HD21	25:1:31:LEU:HD23	2.02	0.42
9:K:87:LEU:HD22	9:K:92:GLU:HB3	2.02	0.42
1:A:2262:U:H5''	20:W:32:ARG:HH12	1.84	0.41
1:A:557:C:H5''	8:J:113:PRO:HB2	2.01	0.41
2:C:71:ASP:OD2	2:C:188:ARG:NH1	2.53	0.41
5:F:157:THR:HG22	5:F:159:ALA:H	1.85	0.41
8:J:64:VAL:HG12	8:J:69:ARG:HE	1.85	0.41
16:S:37:THR:OG1	16:S:48:LYS:NZ	2.53	0.41
16:S:66:ILE:HA	16:S:69:LEU:HD23	2.01	0.41
21:X:30:PRO:HB2	21:X:32:LEU:HG	2.01	0.41
1:A:464:U:H1'	1:A:686:U:H5	1.86	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1019:U:OP1	1:A:1035:U:O2'	2.30	0.41
1:A:2202:U:O2'	1:A:2204:G:OP1	2.29	0.41
14:Q:29:ARG:HH21	24:O:9:ARG:NH1	2.17	0.41
1:A:2039:U:H2'	1:A:2040:G:C8	2.55	0.41
23:Z:41:PRO:HA	23:Z:44:ARG:HB3	2.03	0.41
2:C:28:PRO:HG2	2:C:33:LEU:HD11	2.01	0.41
1:A:2099:U:H2'	1:A:2100:G:H8	1.85	0.41
1:A:1387:A:H5'	1:A:1469:A:H1'	2.03	0.41
1:A:806:C:O2	1:A:2444:G:O2'	2.38	0.41
1:A:2470:G:N7	1:A:2476:A:N6	2.64	0.41
9:K:21:CYS:HA	9:K:41:ILE:HG22	2.03	0.41
9:K:78:ARG:HB3	13:P:70:GLU:HB2	2.02	0.41
1:A:1073:A:H3'	1:A:1074:G:H5''	2.03	0.41
1:A:1754:A:N1	1:A:2716:C:O2'	2.51	0.41
1:A:1986:C:H2'	1:A:1987:A:H8	1.85	0.41
1:A:2463:C:H2'	1:A:2464:G:C8	2.56	0.41
17:T:56:GLU:HB3	17:T:86:THR:HB	2.03	0.41
23:Z:11:SER:OG	23:Z:12:ALA:N	2.54	0.41
2:C:52:HIS:HA	2:C:216:ARG:HB2	2.02	0.40
11:N:12:ARG:HG2	11:N:16:HIS:ND1	2.36	0.40
14:Q:28:SER:OG	14:Q:29:ARG:NH1	2.54	0.40
1:A:288:U:H2'	1:A:289:G:H8	1.86	0.40
1:A:443:A:H2'	4:E:40:ARG:HH12	1.86	0.40
1:A:2039:U:H2'	1:A:2040:G:H8	1.86	0.40
4:E:105:LEU:HB2	4:E:200:LEU:HD11	2.04	0.40
1:A:30:G:O2'	1:A:1214:A:N3	2.50	0.40
1:A:1406:U:H2'	1:A:1407:G:C8	2.57	0.40
3:D:3:GLY:HA3	3:D:204:LYS:HG2	2.03	0.40
4:E:111:GLU:OE1	4:E:114:ARG:NH1	2.53	0.40
1:A:627:A:N6	10:L:111:LEU:O	2.54	0.40
1:A:2305:U:C2	5:F:150:GLY:HA3	2.57	0.40
1:A:2632:A:H2'	1:A:2633:G:H8	1.85	0.40
1:A:2848:G:O2'	1:A:2867:G:N2	2.40	0.40
5:F:68:LYS:HB3	5:F:81:GLY:HA2	2.04	0.40
19:V:28:ALA:N	19:V:40:ILE:O	2.53	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	
2	C	269/271 (99%)	252 (94%)	15 (6%)	2 (1%)	18	51
3	D	207/209 (99%)	196 (95%)	11 (5%)	0	100	100
4	E	199/201 (99%)	192 (96%)	7 (4%)	0	100	100
5	F	175/177 (99%)	161 (92%)	14 (8%)	0	100	100
6	G	174/176 (99%)	167 (96%)	7 (4%)	0	100	100
7	H	48/50 (96%)	36 (75%)	11 (23%)	1 (2%)	5	31
8	J	140/142 (99%)	134 (96%)	6 (4%)	0	100	100
9	K	120/122 (98%)	106 (88%)	14 (12%)	0	100	100
10	L	141/143 (99%)	121 (86%)	19 (14%)	1 (1%)	18	51
11	N	118/120 (98%)	104 (88%)	14 (12%)	0	100	100
12	O	114/116 (98%)	107 (94%)	7 (6%)	0	100	100
13	P	112/114 (98%)	107 (96%)	5 (4%)	0	100	100
14	Q	115/117 (98%)	113 (98%)	2 (2%)	0	100	100
15	R	101/103 (98%)	98 (97%)	3 (3%)	0	100	100
16	S	108/110 (98%)	103 (95%)	5 (5%)	0	100	100
17	T	91/93 (98%)	81 (89%)	10 (11%)	0	100	100
18	U	100/102 (98%)	86 (86%)	13 (13%)	1 (1%)	12	43
19	V	92/94 (98%)	91 (99%)	1 (1%)	0	100	100
20	W	74/76 (97%)	72 (97%)	2 (3%)	0	100	100
21	X	75/77 (97%)	75 (100%)	0	0	100	100
22	Y	61/63 (97%)	56 (92%)	5 (8%)	0	100	100
23	Z	56/58 (97%)	55 (98%)	1 (2%)	0	100	100
24	0	54/56 (96%)	50 (93%)	3 (6%)	1 (2%)	6	32
25	1	48/50 (96%)	45 (94%)	3 (6%)	0	100	100
26	2	44/46 (96%)	41 (93%)	3 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
27	3	62/64 (97%)	57 (92%)	4 (6%)	1 (2%)	7	35
29	M	120/136 (88%)	114 (95%)	3 (2%)	3 (2%)	4	28
All	All	3018/3086 (98%)	2820 (93%)	188 (6%)	10 (0%)	37	67

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
29	M	58	LYS
2	C	12	ARG
2	C	35	LYS
10	L	67	SER
18	U	98	ASN
29	M	59	ARG
24	0	54	ILE
7	H	32	PRO
27	3	31	ILE
29	M	69	PRO

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C	216/216 (100%)	216 (100%)	0	100	100
3	D	164/164 (100%)	164 (100%)	0	100	100
4	E	165/165 (100%)	165 (100%)	0	100	100
5	F	148/148 (100%)	148 (100%)	0	100	100
6	G	137/137 (100%)	137 (100%)	0	100	100
7	H	40/40 (100%)	40 (100%)	0	100	100
8	J	116/116 (100%)	116 (100%)	0	100	100
9	K	103/103 (100%)	102 (99%)	1 (1%)	68	74
10	L	102/102 (100%)	102 (100%)	0	100	100
11	N	100/100 (100%)	100 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
12	O	86/86 (100%)	86 (100%)	0	100	100
13	P	99/99 (100%)	99 (100%)	0	100	100
14	Q	89/89 (100%)	89 (100%)	0	100	100
15	R	84/84 (100%)	84 (100%)	0	100	100
16	S	93/93 (100%)	93 (100%)	0	100	100
17	T	80/80 (100%)	80 (100%)	0	100	100
18	U	83/83 (100%)	82 (99%)	1 (1%)	63	72
19	V	78/78 (100%)	78 (100%)	0	100	100
20	W	56/58 (97%)	56 (100%)	0	100	100
21	X	67/67 (100%)	67 (100%)	0	100	100
22	Y	55/55 (100%)	55 (100%)	0	100	100
23	Z	48/48 (100%)	48 (100%)	0	100	100
24	0	47/47 (100%)	47 (100%)	0	100	100
25	1	45/45 (100%)	45 (100%)	0	100	100
26	2	38/38 (100%)	38 (100%)	0	100	100
27	3	51/51 (100%)	51 (100%)	0	100	100
29	M	100/109 (92%)	100 (100%)	0	100	100
All	All	2490/2501 (100%)	2488 (100%)	2 (0%)	87	89

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
9	K	88	ASN
18	U	88	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (57) such sidechains are listed below:

Mol	Chain	Res	Type
2	C	20	ASN
2	C	85	ASN
2	C	152	GLN
2	C	199	HIS
2	C	225	ASN
2	C	242	HIS
2	C	250	GLN

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Mol	Chain	Res	Type
3	D	42	ASN
3	D	49	GLN
3	D	149	ASN
3	D	173	GLN
4	E	24	ASN
4	E	62	GLN
4	E	90	GLN
4	E	92	HIS
4	E	97	ASN
4	E	136	GLN
4	E	163	ASN
4	E	195	GLN
5	F	26	GLN
5	F	51	ASN
6	G	19	ASN
6	G	29	ASN
6	G	115	GLN
7	H	28	ASN
7	H	33	GLN
9	K	88	ASN
10	L	37	GLN
10	L	98	ASN
11	N	11	ASN
11	N	31	HIS
13	P	6	GLN
13	P	11	GLN
13	P	55	HIS
14	Q	19	GLN
14	Q	36	GLN
14	Q	43	GLN
14	Q	71	ASN
15	R	12	HIS
15	R	89	HIS
15	R	91	GLN
16	S	9	HIS
16	S	57	ASN
16	S	60	HIS
17	T	28	ASN
18	U	73	ASN
19	V	24	ASN
20	W	3	ASN
20	W	48	HIS

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Mol	Chain	Res	Type
21	X	35	HIS
22	Y	58	ASN
24	0	4	GLN
24	0	5	ASN
25	1	23	ASN
25	1	42	GLN
25	1	43	HIS
29	M	3	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	2786/2904 (95%)	435 (15%)	15 (0%)
28	B	118/119 (99%)	12 (10%)	0
All	All	2904/3023 (96%)	447 (15%)	15 (0%)

All (447) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	10	A
1	A	12	U
1	A	34	U
1	A	35	G
1	A	46	G
1	A	51	G
1	A	61	C
1	A	71	A
1	A	74	A
1	A	75	G
1	A	84	A
1	A	103	A
1	A	118	A
1	A	119	A
1	A	120	U
1	A	122	G
1	A	125	A
1	A	138	U
1	A	139	U
1	A	140	C
1	A	141	G
1	A	142	A

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Mol	Chain	Res	Type
1	A	163	C
1	A	181	A
1	A	196	A
1	A	199	A
1	A	215	G
1	A	216	A
1	A	221	A
1	A	222	A
1	A	230	G
1	A	248	G
1	A	255	A
1	A	266	G
1	A	271	G
1	A	272	A
1	A	276	U
1	A	278	A
1	A	291	G
1	A	302	C
1	A	311	A
1	A	329	G
1	A	330	A
1	A	331	C
1	A	353	C
1	A	361	G
1	A	370	G
1	A	371	A
1	A	372	G
1	A	386	G
1	A	396	G
1	A	399	U
1	A	405	U
1	A	411	G
1	A	424	G
1	A	451	U
1	A	467	G
1	A	480	A
1	A	481	G
1	A	491	G
1	A	496	G
1	A	504	A
1	A	505	A
1	A	508	A

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Mol	Chain	Res	Type
1	A	531	C
1	A	532	A
1	A	533	G
1	A	538	A
1	A	546	U
1	A	547	A
1	A	548	G
1	A	549	G
1	A	550	C
1	A	563	A
1	A	573	U
1	A	575	A
1	A	586	A
1	A	603	A
1	A	613	A
1	A	614	A
1	A	615	U
1	A	627	A
1	A	637	A
1	A	645	C
1	A	647	G
1	A	654	A
1	A	655	A
1	A	664	G
1	A	668	A
1	A	686	U
1	A	718	A
1	A	722	A
1	A	729	G
1	A	730	A
1	A	747	U
1	A	765	C
1	A	775	G
1	A	776	G
1	A	782	A
1	A	784	G
1	A	785	G
1	A	789	A
1	A	791	C
1	A	792	A
1	A	805	G
1	A	811	U

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Mol	Chain	Res	Type
1	A	812	C
1	A	819	A
1	A	827	U
1	A	828	U
1	A	830	G
1	A	845	A
1	A	846	U
1	A	847	U
1	A	858	G
1	A	875	G
1	A	878	A
1	A	886	A
1	A	887	U
1	A	890	C
1	A	896	A
1	A	910	A
1	A	931	U
1	A	932	U
1	A	941	A
1	A	946	C
1	A	958	U
1	A	959	A
1	A	961	C
1	A	973	A
1	A	974	G
1	A	983	A
1	A	995	C
1	A	996	A
1	A	999	U
1	A	1005	C
1	A	1009	A
1	A	1012	U
1	A	1013	C
1	A	1022	G
1	A	1026	G
1	A	1033	U
1	A	1041	G
1	A	1046	A
1	A	1047	G
1	A	1057	A
1	A	1061	U
1	A	1062	G

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Mol	Chain	Res	Type
1	A	1063	G
1	A	1066	U
1	A	1070	A
1	A	1071	G
1	A	1072	C
1	A	1073	A
1	A	1074	G
1	A	1075	C
1	A	1087	G
1	A	1088	A
1	A	1089	A
1	A	1092	C
1	A	1093	G
1	A	1098	A
1	A	1099	G
1	A	1101	U
1	A	1104	C
1	A	1112	G
1	A	1125	G
1	A	1127	A
1	A	1129	A
1	A	1130	U
1	A	1131	G
1	A	1132	U
1	A	1133	A
1	A	1135	C
1	A	1136	G
1	A	1139	G
1	A	1142	A
1	A	1173	U
1	A	1175	A
1	A	1176	U
1	A	1180	U
1	A	1182	G
1	A	1206	G
1	A	1212	G
1	A	1236	G
1	A	1238	G
1	A	1250	G
1	A	1252	G
1	A	1253	A
1	A	1256	G

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Mol	Chain	Res	Type
1	A	1266	G
1	A	1271	G
1	A	1272	A
1	A	1300	G
1	A	1301	A
1	A	1313	U
1	A	1321	A
1	A	1329	U
1	A	1341	G
1	A	1345	C
1	A	1365	A
1	A	1368	G
1	A	1374	G
1	A	1378	A
1	A	1379	U
1	A	1383	A
1	A	1416	G
1	A	1419	A
1	A	1420	A
1	A	1428	C
1	A	1452	G
1	A	1461	C
1	A	1482	G
1	A	1493	C
1	A	1504	A
1	A	1508	A
1	A	1509	A
1	A	1510	G
1	A	1515	A
1	A	1523	U
1	A	1532	A
1	A	1533	C
1	A	1535	A
1	A	1554	U
1	A	1555	G
1	A	1566	A
1	A	1569	A
1	A	1578	U
1	A	1583	A
1	A	1584	U
1	A	1585	C
1	A	1607	C

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Mol	Chain	Res	Type
1	A	1608	A
1	A	1639	C
1	A	1647	U
1	A	1648	U
1	A	1674	G
1	A	1715	G
1	A	1721	G
1	A	1729	U
1	A	1730	C
1	A	1732	C
1	A	1738	G
1	A	1754	A
1	A	1764	C
1	A	1773	A
1	A	1800	C
1	A	1801	A
1	A	1807	G
1	A	1808	A
1	A	1816	C
1	A	1829	A
1	A	1847	A
1	A	1848	A
1	A	1870	C
1	A	1872	A
1	A	1873	G
1	A	1885	A
1	A	1903	G
1	A	1906	G
1	A	1912	A
1	A	1916	A
1	A	1925	C
1	A	1926	U
1	A	1930	G
1	A	1931	U
1	A	1934	C
1	A	1935	G
1	A	1936	A
1	A	1937	A
1	A	1938	A
1	A	1939	U
1	A	1940	U
1	A	1941	C

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Mol	Chain	Res	Type
1	A	1943	U
1	A	1944	U
1	A	1945	G
1	A	1955	U
1	A	1963	U
1	A	1964	G
1	A	1965	C
1	A	1966	A
1	A	1967	C
1	A	1970	A
1	A	1971	U
1	A	1972	G
1	A	1991	U
1	A	1992	G
1	A	1993	U
1	A	1997	C
1	A	2020	A
1	A	2022	U
1	A	2023	C
1	A	2031	A
1	A	2033	A
1	A	2043	C
1	A	2052	A
1	A	2054	A
1	A	2058	A
1	A	2059	A
1	A	2060	A
1	A	2061	G
1	A	2062	A
1	A	2069	G
1	A	2072	C
1	A	2093	G
1	A	2096	C
1	A	2102	G
1	A	2105	U
1	A	2110	G
1	A	2111	U
1	A	2112	G
1	A	2113	U
1	A	2115	G
1	A	2116	G
1	A	2117	A

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Mol	Chain	Res	Type
1	A	2118	U
1	A	2119	A
1	A	2122	U
1	A	2123	G
1	A	2126	A
1	A	2128	G
1	A	2131	U
1	A	2132	U
1	A	2133	G
1	A	2136	G
1	A	2148	G
1	A	2156	G
1	A	2157	G
1	A	2158	A
1	A	2162	G
1	A	2164	C
1	A	2165	C
1	A	2169	A
1	A	2170	A
1	A	2171	A
1	A	2172	U
1	A	2173	A
1	A	2178	C
1	A	2179	C
1	A	2198	A
1	A	2203	U
1	A	2204	G
1	A	2211	A
1	A	2212	A
1	A	2213	U
1	A	2225	A
1	A	2226	C
1	A	2238	G
1	A	2239	G
1	A	2248	C
1	A	2264	C
1	A	2265	U
1	A	2266	A
1	A	2283	C
1	A	2286	G
1	A	2287	A
1	A	2305	U

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Mol	Chain	Res	Type
1	A	2308	G
1	A	2325	G
1	A	2326	C
1	A	2327	A
1	A	2333	A
1	A	2336	A
1	A	2347	C
1	A	2350	C
1	A	2361	G
1	A	2376	A
1	A	2383	G
1	A	2385	C
1	A	2389	G
1	A	2402	U
1	A	2406	A
1	A	2425	A
1	A	2426	A
1	A	2428	G
1	A	2429	G
1	A	2430	A
1	A	2435	A
1	A	2441	U
1	A	2445	G
1	A	2446	G
1	A	2458	G
1	A	2459	A
1	A	2460	U
1	A	2461	A
1	A	2467	C
1	A	2468	A
1	A	2469	A
1	A	2471	A
1	A	2472	G
1	A	2473	U
1	A	2475	C
1	A	2476	A
1	A	2477	U
1	A	2484	G
1	A	2487	G
1	A	2490	G
1	A	2492	U
1	A	2493	U

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Mol	Chain	Res	Type
1	A	2494	G
1	A	2611	C
1	A	2613	U
1	A	2629	U
1	A	2663	G
1	A	2682	A
1	A	2689	U
1	A	2690	U
1	A	2714	G
1	A	2726	A
1	A	2733	A
1	A	2744	G
1	A	2748	A
1	A	2757	A
1	A	2765	A
1	A	2778	A
1	A	2791	G
1	A	2792	A
1	A	2798	U
1	A	2800	A
1	A	2818	U
1	A	2820	A
1	A	2823	A
1	A	2833	U
1	A	2835	A
1	A	2836	U
1	A	2861	U
1	A	2867	G
1	A	2872	A
1	A	2873	A
1	A	2879	A
1	A	2880	C
1	A	2883	A
1	A	2884	U
1	A	2886	A
28	B	13	G
28	B	15	A
28	B	24	G
28	B	35	C
28	B	36	C
28	B	41	G
28	B	56	G

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Mol	Chain	Res	Type
28	B	89	U
28	B	90	C
28	B	91	C
28	B	99	A
28	B	109	A

All (15) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	60	G
1	A	271	G
1	A	404	A
1	A	995	C
1	A	1344	U
1	A	1378	A
1	A	1606	C
1	A	1911	U
1	A	1938	A
1	A	1966	A
1	A	2127	G
1	A	2425	A
1	A	2457	U
1	A	2470	G
1	A	2756	U

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

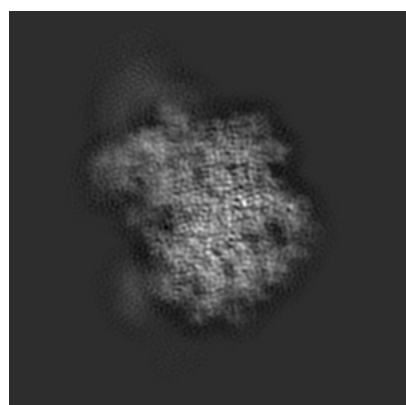
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-4378. These allow visual inspection of the internal detail of the map and identification of artifacts.

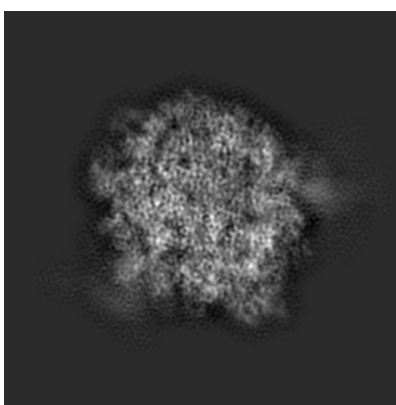
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

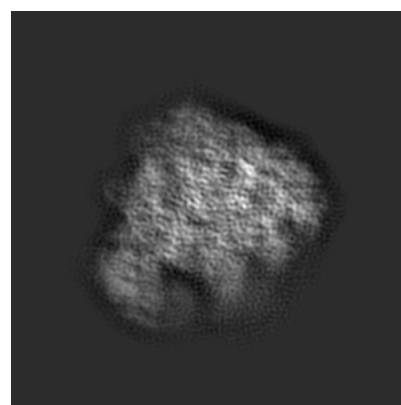
6.1.1 Primary map



X



Y

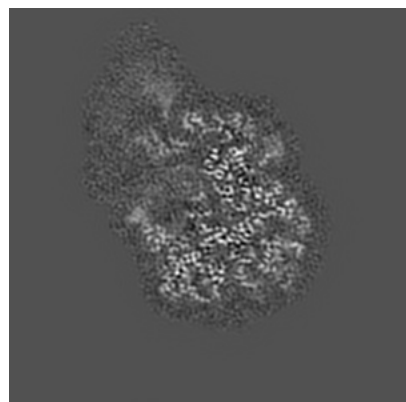


Z

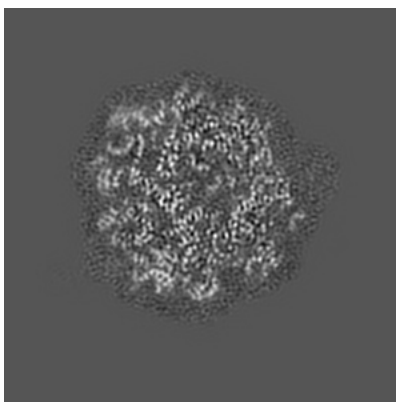
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

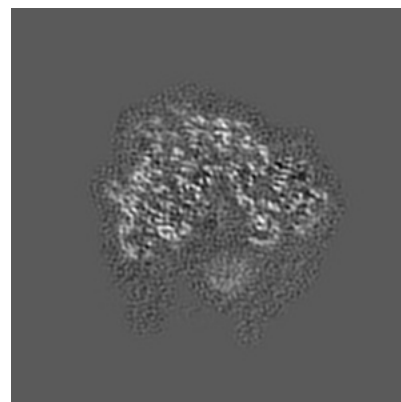
6.2.1 Primary map



X Index: 135



Y Index: 135

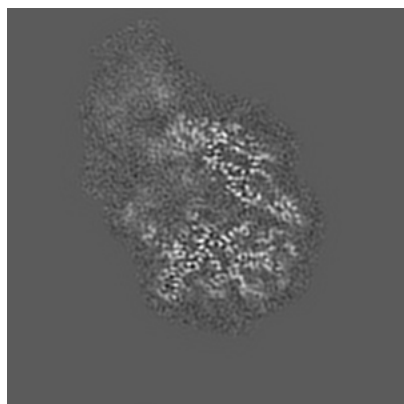


Z Index: 135

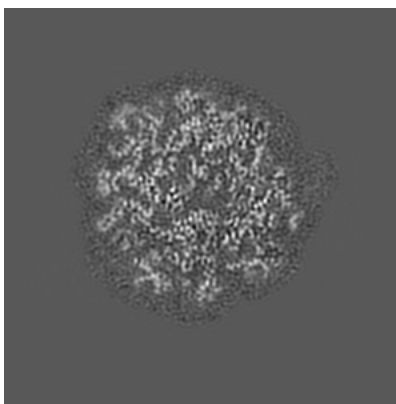
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

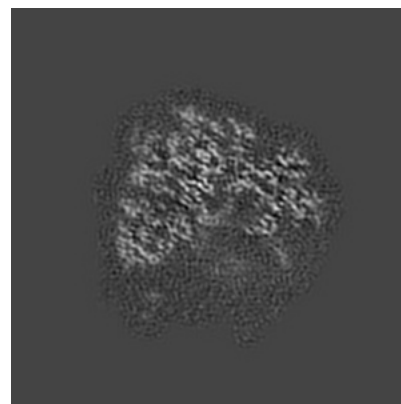
6.3.1 Primary map



X Index: 140



Y Index: 137

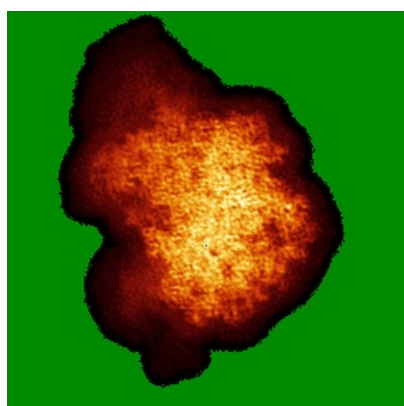


Z Index: 140

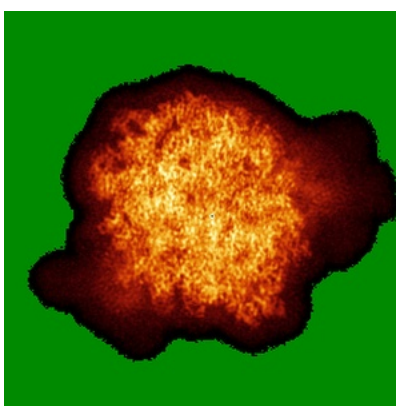
The images above show the largest variance slices of the map in three orthogonal directions.

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

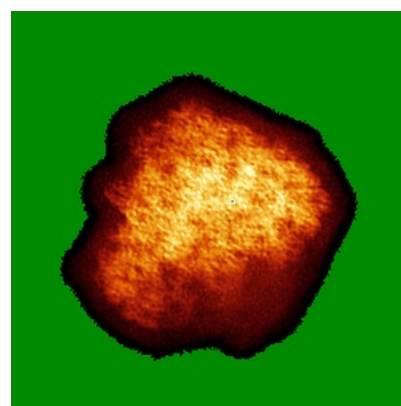
6.4.1 Primary map



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

This section was not generated.

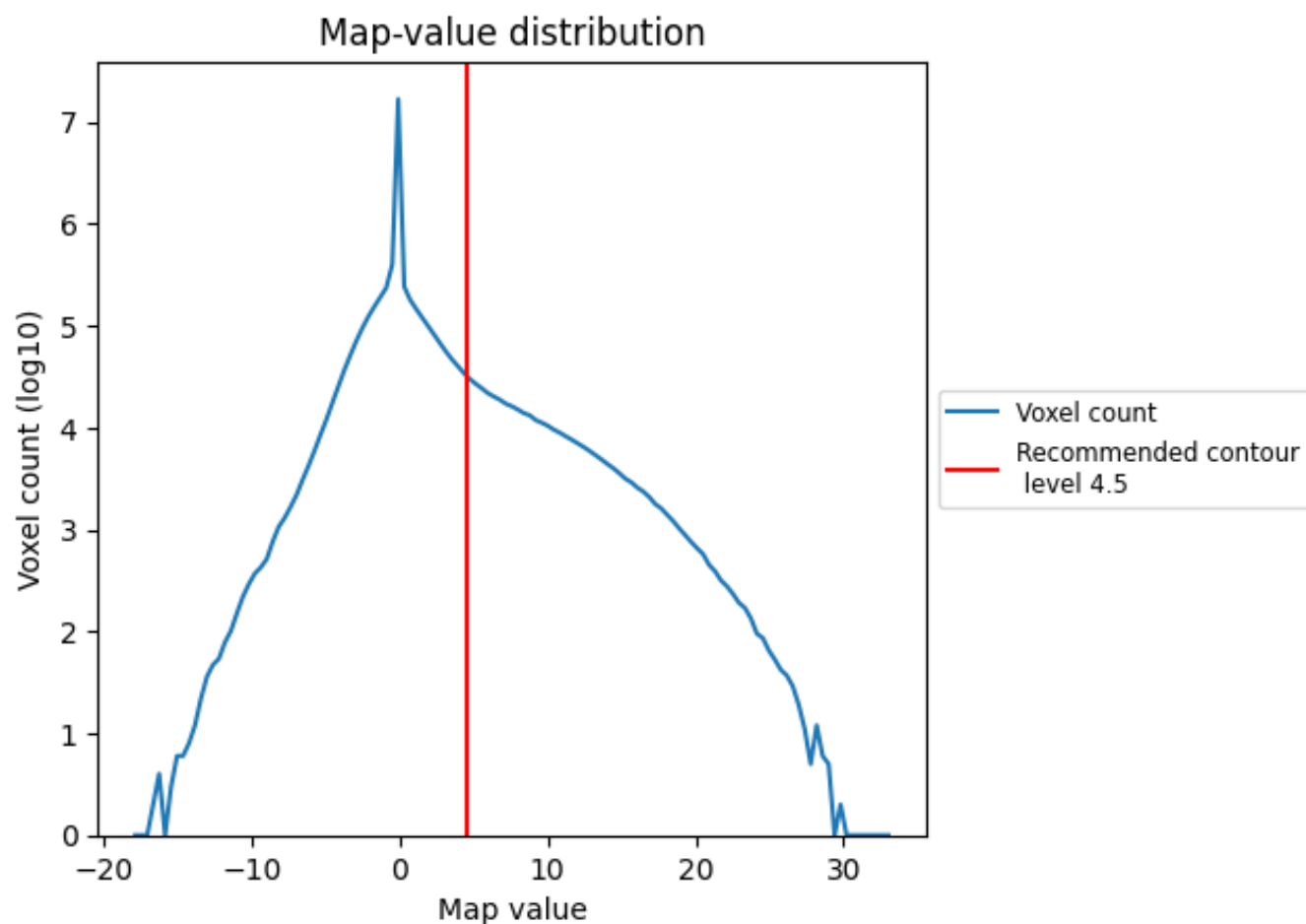
6.6 Mask visualisation

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

7 Map analysis [i](#)

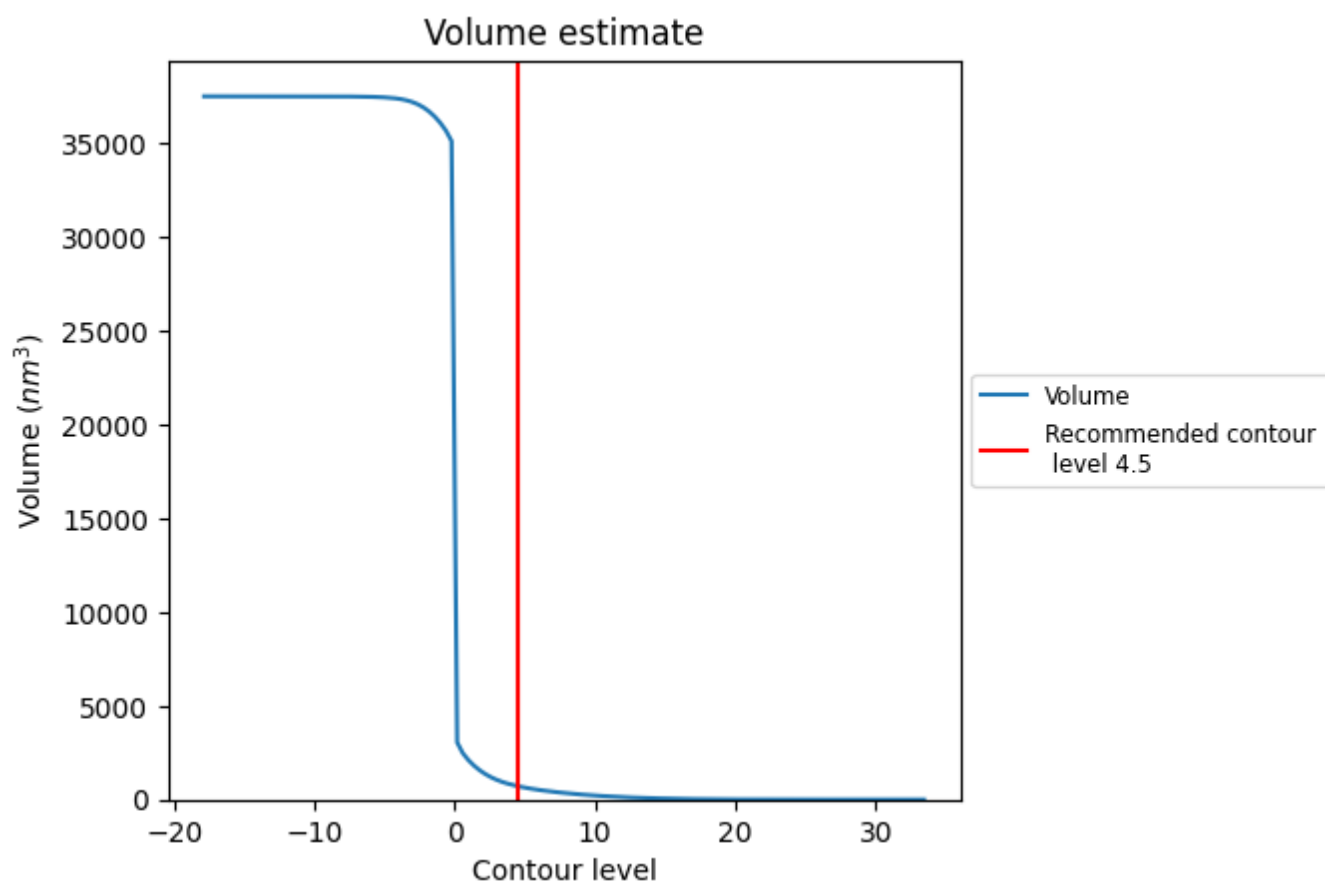
This section contains the results of statistical analysis of the map.

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.

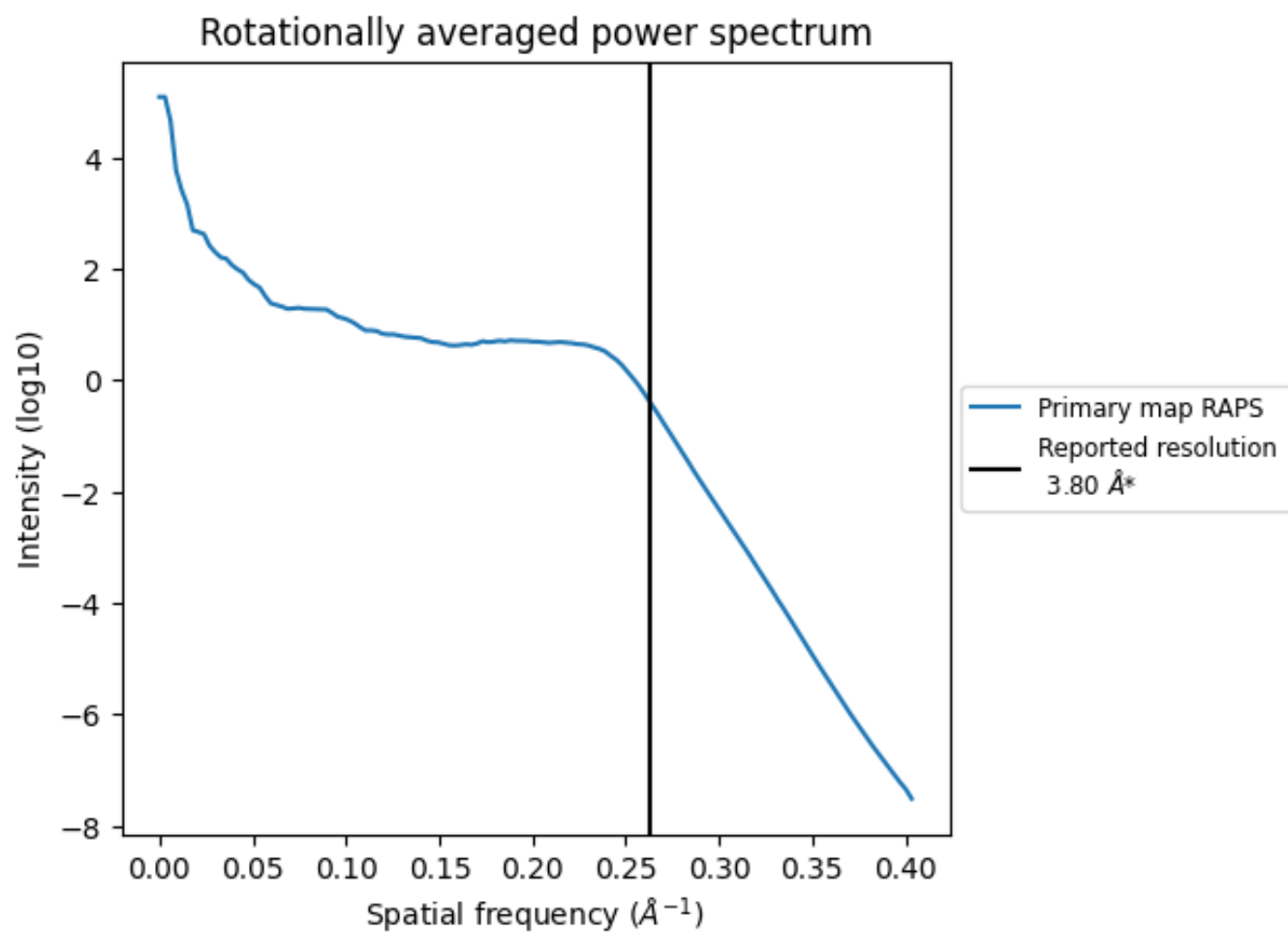
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 712 nm³; this corresponds to an approximate mass of 643 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.263 Å⁻¹

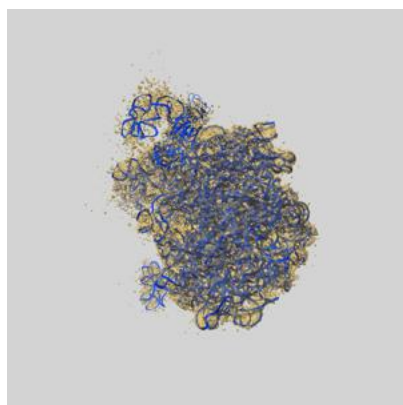
8 Fourier-Shell correlation

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

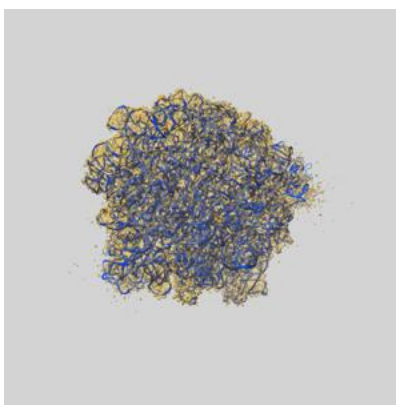
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-4378 and PDB model 6GBZ. Per-residue inclusion information can be found in section 3 on page 10.

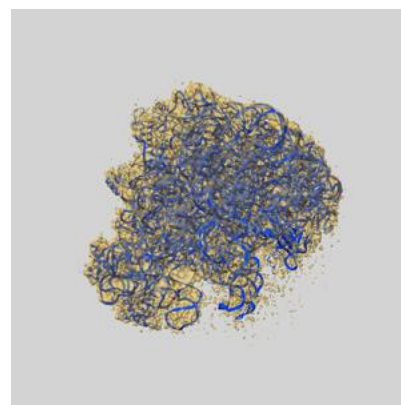
9.1 Map-model overlay [i](#)



X



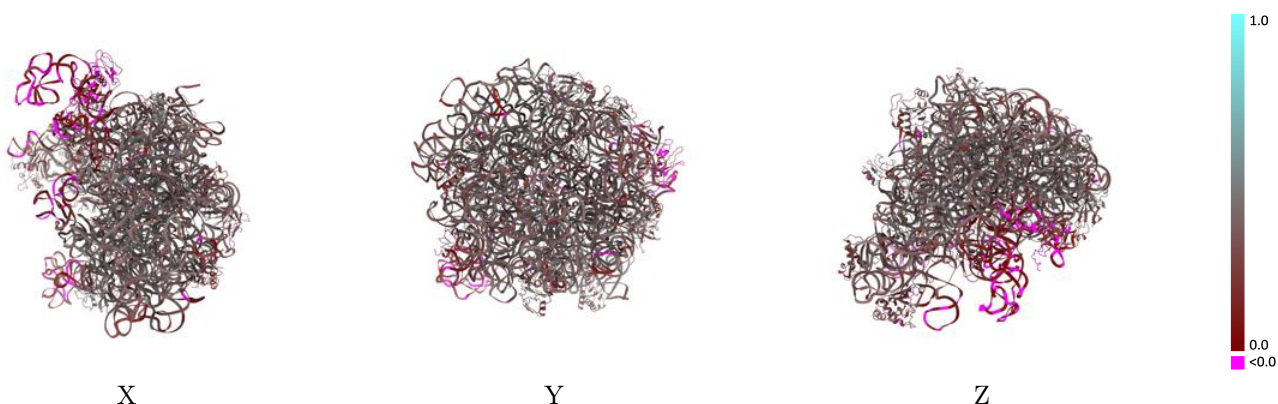
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 4.5 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](#)

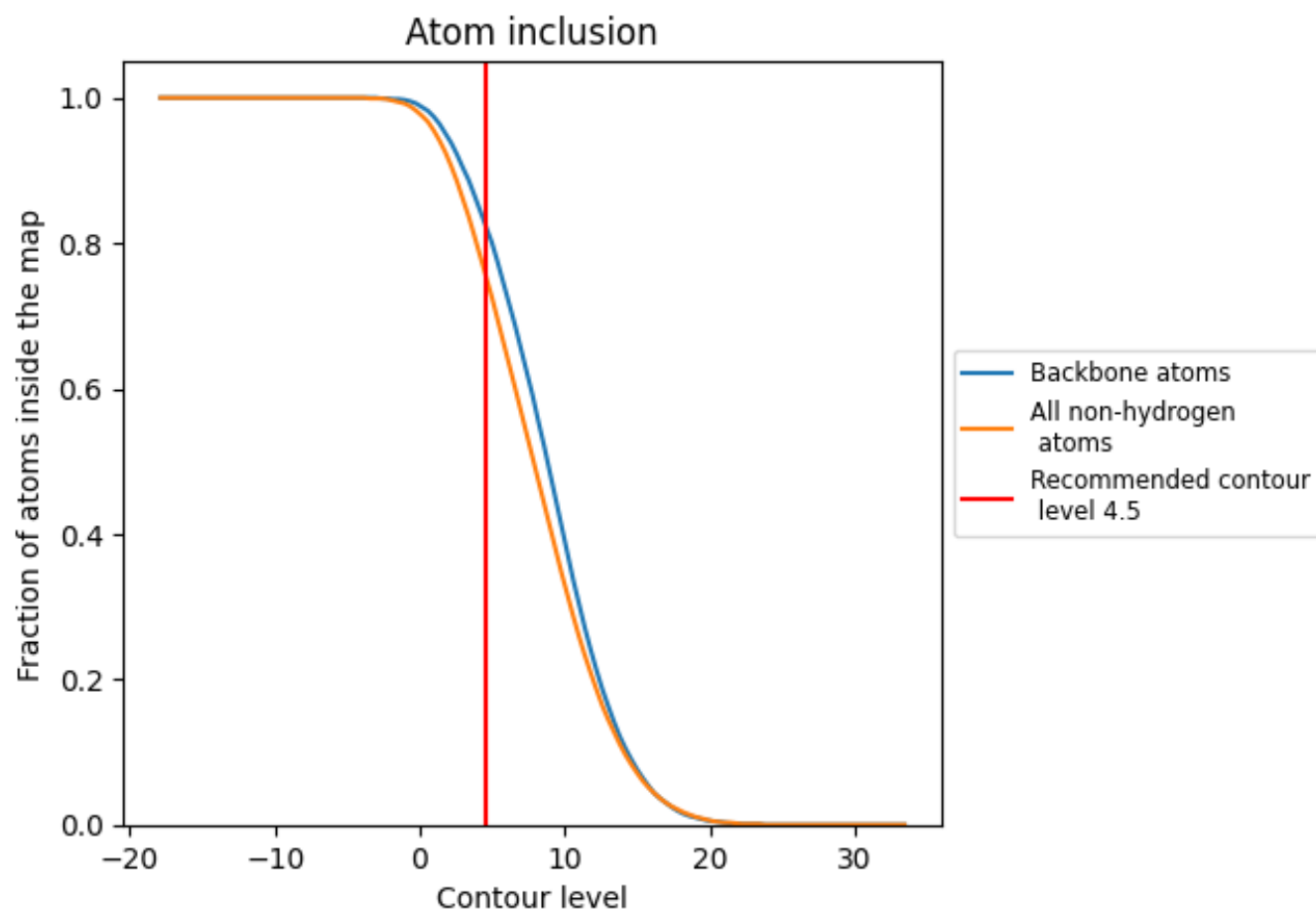


The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

This section was not generated.

9.4 Atom inclusion [i](#)



At the recommended contour level, 83% of all backbone atoms, 76% 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 (4.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7590	 0.3390
0	 0.6450	 0.3290
1	 0.5420	 0.2960
2	 0.7350	 0.3780
3	 0.7500	 0.4200
A	 0.8040	 0.3440
B	 0.8790	 0.3530
C	 0.7240	 0.3820
D	 0.6420	 0.3430
E	 0.6180	 0.3170
F	 0.5560	 0.2380
G	 0.0970	 0.0530
H	 0.2820	 0.1670
J	 0.6960	 0.3650
K	 0.6440	 0.3280
L	 0.6870	 0.3610
M	 0.6290	 0.3110
N	 0.7430	 0.3750
O	 0.6960	 0.3190
P	 0.6820	 0.3350
Q	 0.7460	 0.3930
R	 0.7130	 0.3640
S	 0.7190	 0.3850
T	 0.6690	 0.3180
U	 0.6210	 0.3130
V	 0.6170	 0.3290
W	 0.7170	 0.3990
X	 0.7600	 0.3860
Y	 0.5090	 0.2800
Z	 0.6540	 0.3730

