Full wwPDB EM Validation Report

Mar 30, 2023 – 07:58 pm BST

PDB ID	:	8C8Z
EMDB ID	:	EMD-16496
Title	:	Cryo-EM captures early ribosome assembly in action
Authors	:	Lauer, S.; Nikolay, R.; Qin, B.
Deposited on	:	2023-01-21
Resolution	:	3.12 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 (i) 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 (i)) were used in the production of this report:

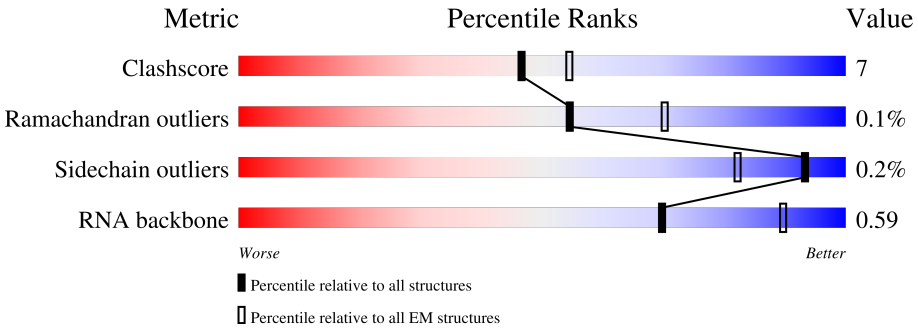
EMDB validation analysis	:	0.0.1.dev50
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.32.2

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.12 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	V	94	67% 83% 17%
2	A	2904	11% 51% 21% 24%
3	D	209	6% 78% 10% 12%
4	E	201	5% 83% 16%
5	J	142	88% 12%
6	K	123	51% 85% 15%
7	L	144	10% 67% 15% 18%

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Mol	Chain	Length	Quality of chain
8	N	127	77% 17% 6%
9	P	115	19% 80% 19%
10	Q	118	81% 18%
11	R	103	81% 19%
12	S	110	8% 77% 16% 6%
13	T	100	79% 14% 7%
14	U	104	79% 19%
15	X	78	38% 68% 27% 5%
16	Y	63	70% 27%
17	0	57	7% 79% 19%
18	2	46	7% 72% 13% 13%
19	O	117	37% 71% 28%
20	F	179	93% 68% 31%
21	B	119	6% 63% 32% 5%
22	Z	59	5% 86% 12%
23	H	149	30% 21% 11% 66%
24	W	85	11% 75% 6% 19%

2 Entry composition

There are 24 unique types of molecules in this entry. The entry contains 67990 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called 50S ribosomal protein L25.

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

- Molecule 2 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	A	2205	47374	21131	8752	15286	2205	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	D	184	1379	871	248	256	4	0	0

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	E	198	1537	966	280	286	5	0	0

- Molecule 5 is a protein called 50S ribosomal protein L13.

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

- Molecule 6 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	K	122	938	587	180	165	6	0	0

- Molecule 7 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	L	118	Total	C	N	O	0	0
			850	530	163	157		

- Molecule 8 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	N	120	Total	C	N	O	S	0	0
			960	593	196	166	5		

- Molecule 9 is a protein called 50S ribosomal protein L19.

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

- Molecule 10 is a protein called 50S ribosomal protein L20.

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

- Molecule 11 is a protein called 50S ribosomal protein L21.

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

- Molecule 12 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	S	103	Total	C	N	O	S	0	0
			804	502	152	147	3		

- Molecule 13 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	T	93	Total	C	N	O	S	0	0
			738	466	139	131	2		

- Molecule 14 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms				AltConf	Trace
14	U	102	Total 779	C 492	N 146	O 141	0	0

- Molecule 15 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	X	74	Total 598	C 373	N 121	O 102	S 2	0	0

- Molecule 16 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	Y	61	Total 499	C 308	N 97	O 92	S 2	0	0

- Molecule 17 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	0	56	Total 444	C 269	N 94	O 80	S 1	0	0

- Molecule 18 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	2	40	Total 322	C 193	N 79	O 49	S 1	0	0

- Molecule 19 is a protein called 50S ribosomal protein L18.

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

- Molecule 20 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	F	177	Total 1410	C 899	N 249	O 256	S 6	0	0

- Molecule 21 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	B	119	Total	C	N	O	P	0	0
			2549	1135	466	829	119		

- Molecule 22 is a protein called 50S ribosomal protein L30.

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

- Molecule 23 is a protein called 50S ribosomal protein L9.

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

- Molecule 24 is a protein called 50S ribosomal protein L27.

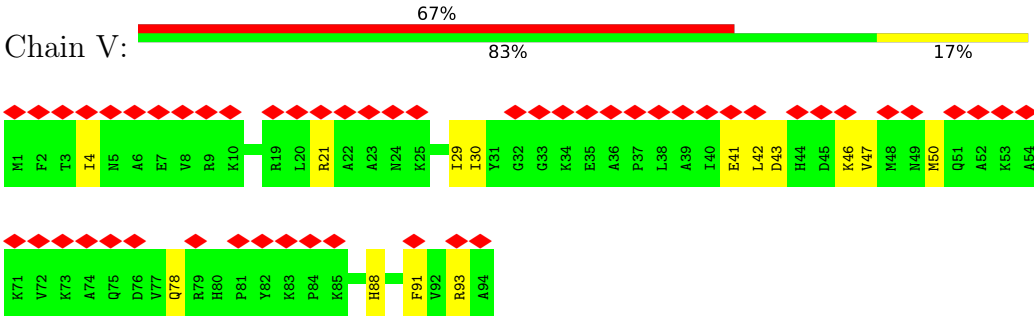
Mol	Chain	Residues	Atoms					AltConf	Trace
24	W	69	Total	C	N	O	S	0	0
			522	328	103	90	1		

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.

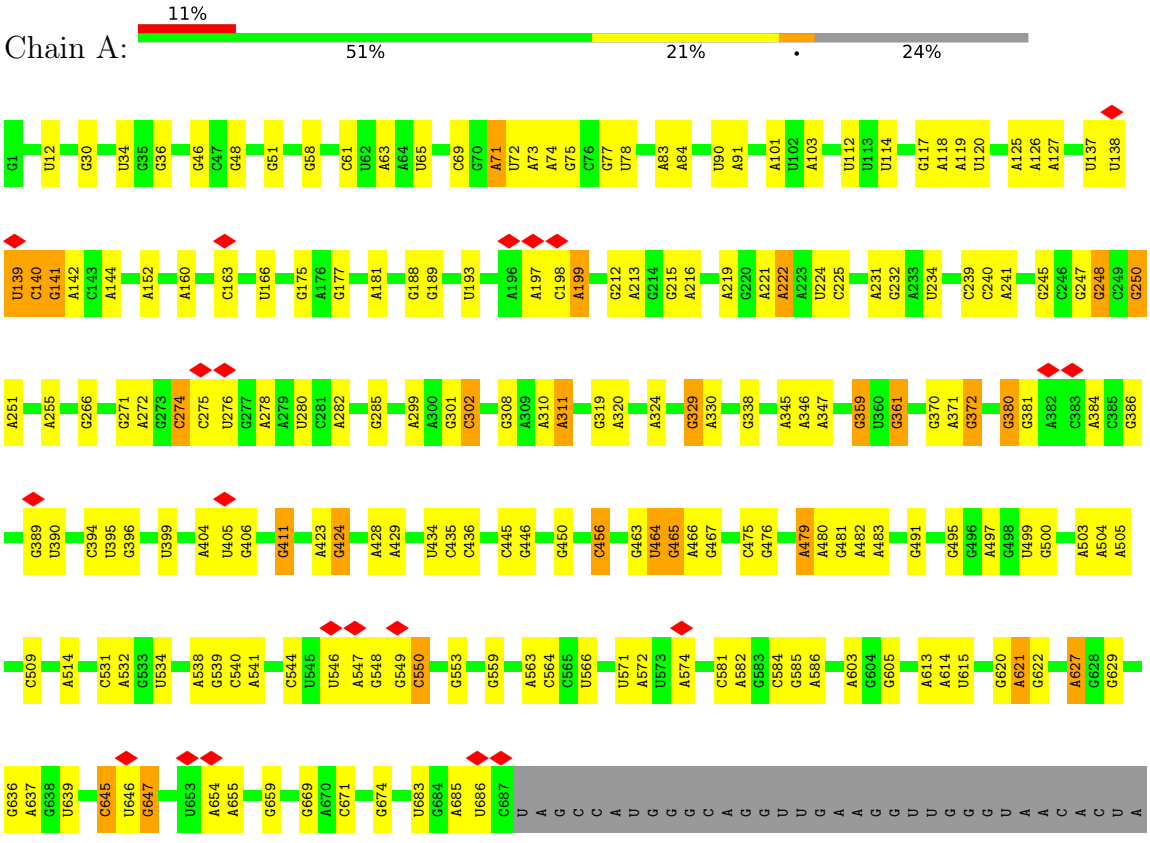
- Molecule 1: 50S ribosomal protein L25

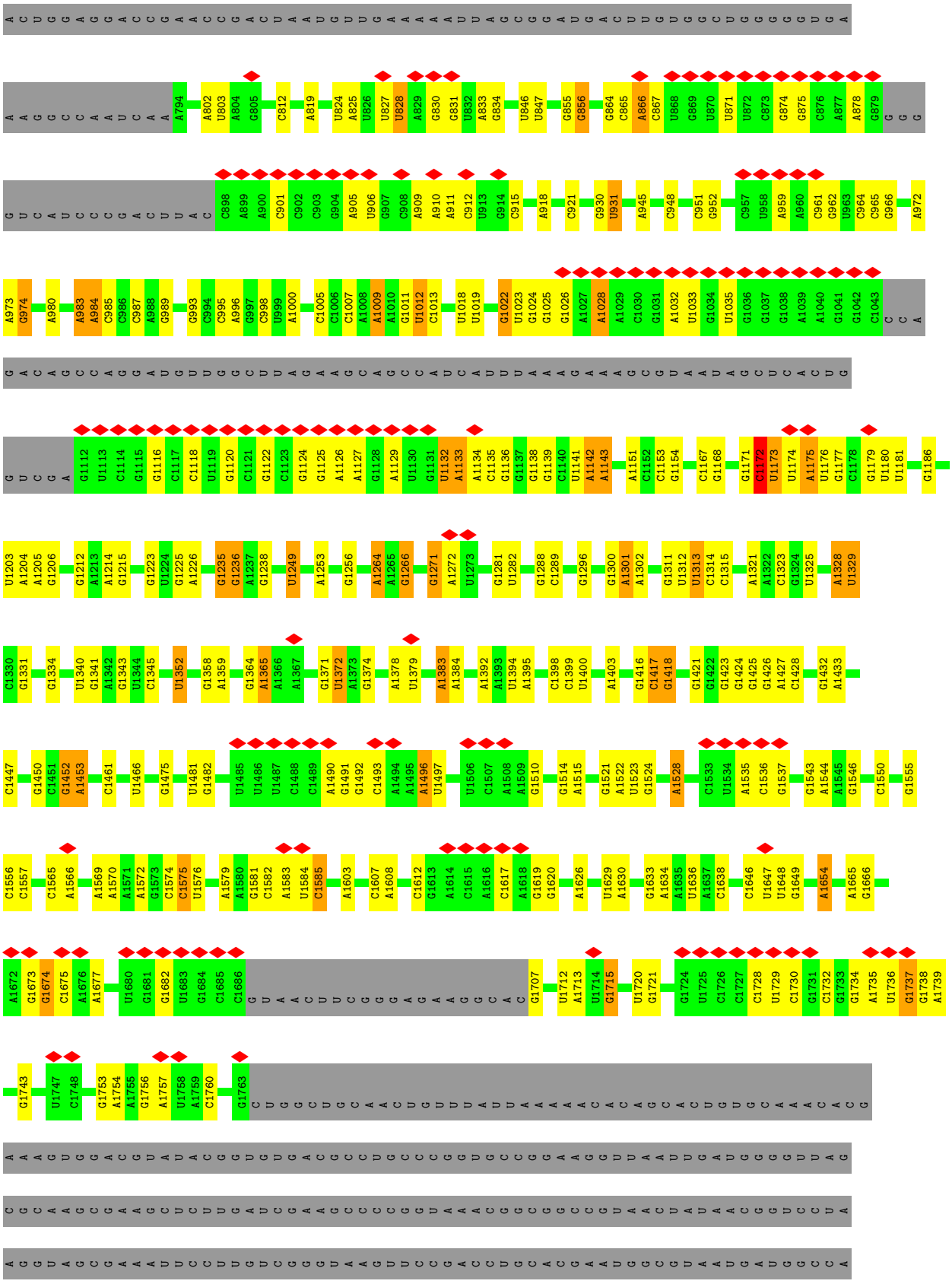
Chain V:

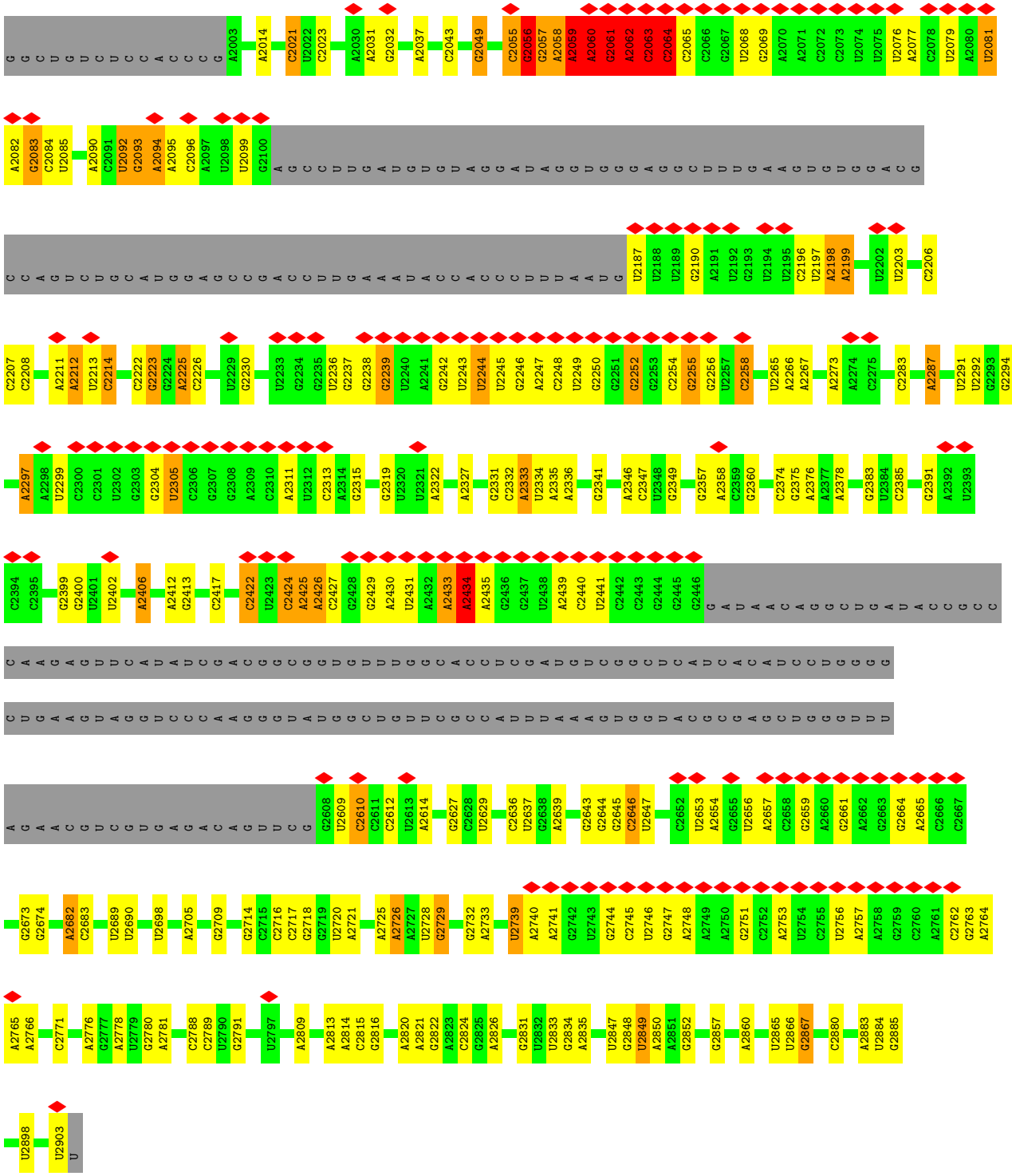


- Molecule 2: 23S rRNA

Chain A:

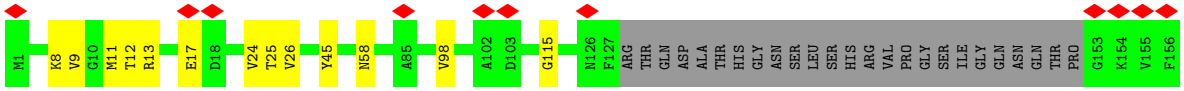


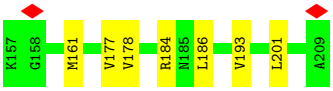




• Molecule 3: 50S ribosomal protein L3

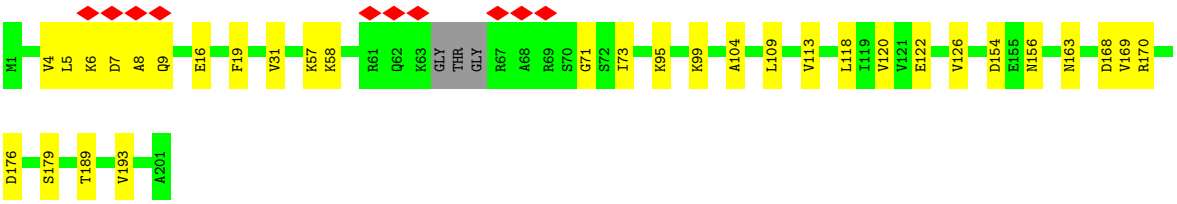
Chain D:





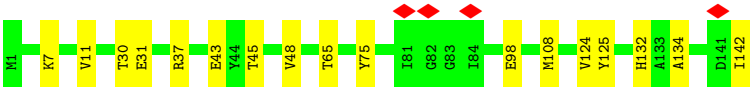
• Molecule 4: 50S ribosomal protein L4

Chain E:



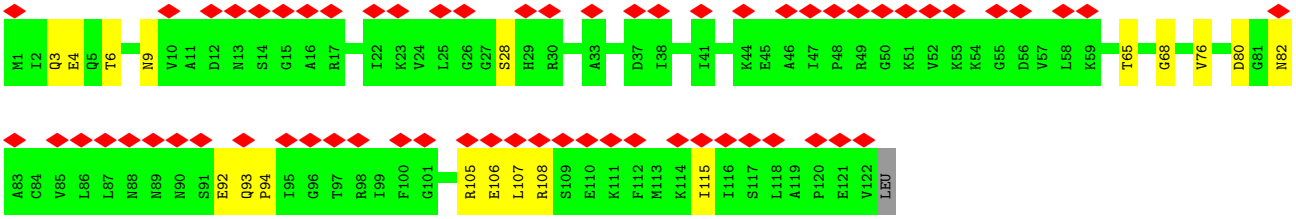
• Molecule 5: 50S ribosomal protein L13

Chain J:



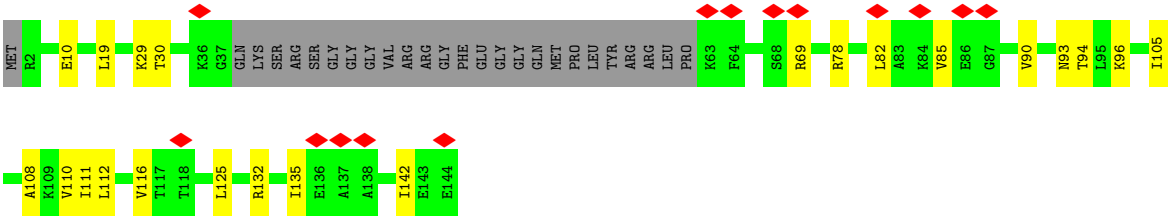
• Molecule 6: 50S ribosomal protein L14

Chain K:



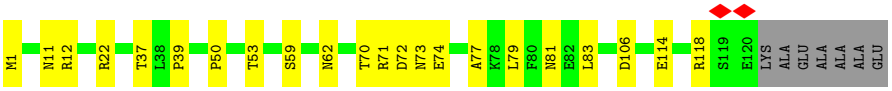
• Molecule 7: 50S ribosomal protein L15

Chain L:

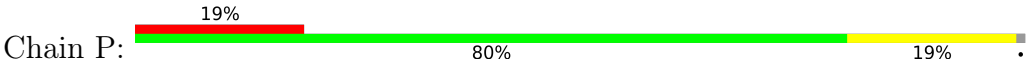


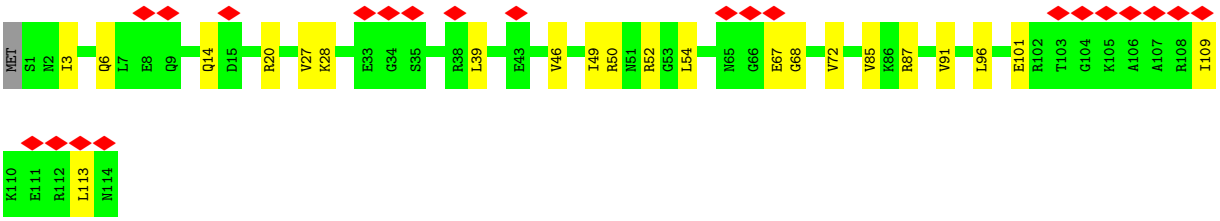
• Molecule 8: 50S ribosomal protein L17

Chain N:

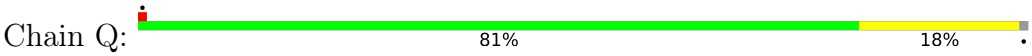


• Molecule 9: 50S ribosomal protein L19

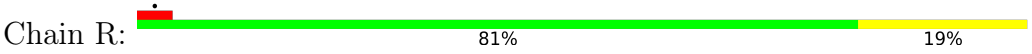


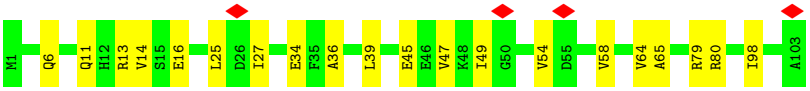


• Molecule 10: 50S ribosomal protein L20

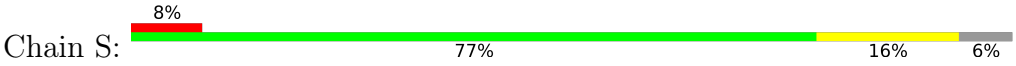


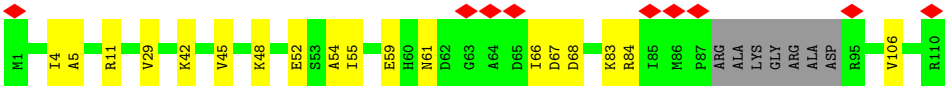
• Molecule 11: 50S ribosomal protein L21



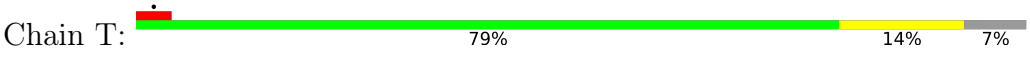


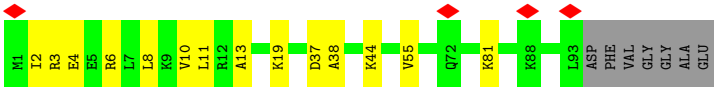
• Molecule 12: 50S ribosomal protein L22



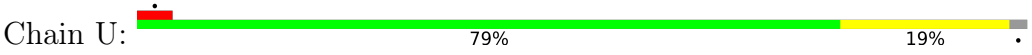


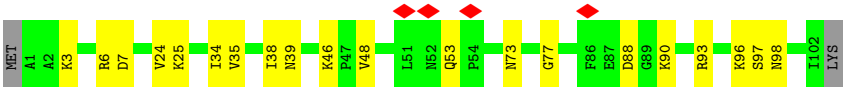
• Molecule 13: 50S ribosomal protein L23



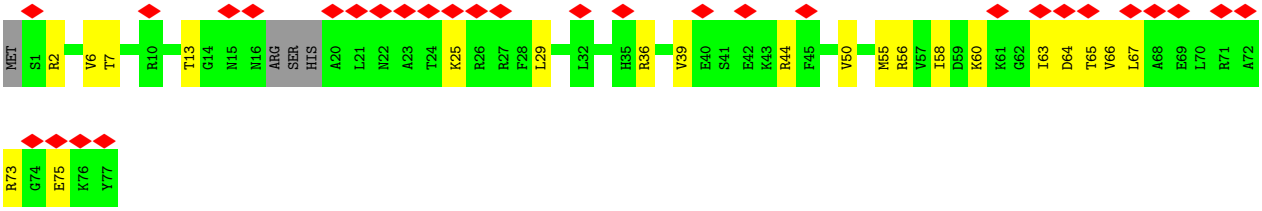


• Molecule 14: 50S ribosomal protein L24

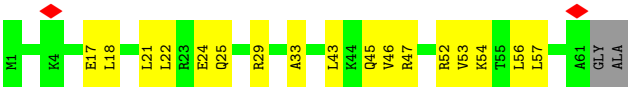




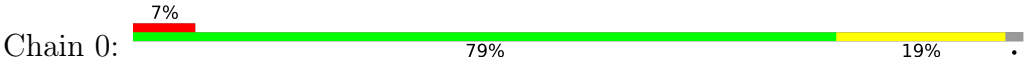
• Molecule 15: 50S ribosomal protein L28

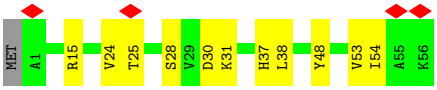


• Molecule 16: 50S ribosomal protein L29



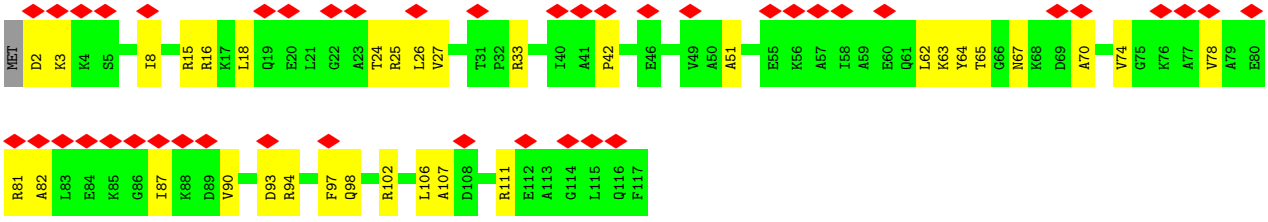
• Molecule 17: 50S ribosomal protein L32





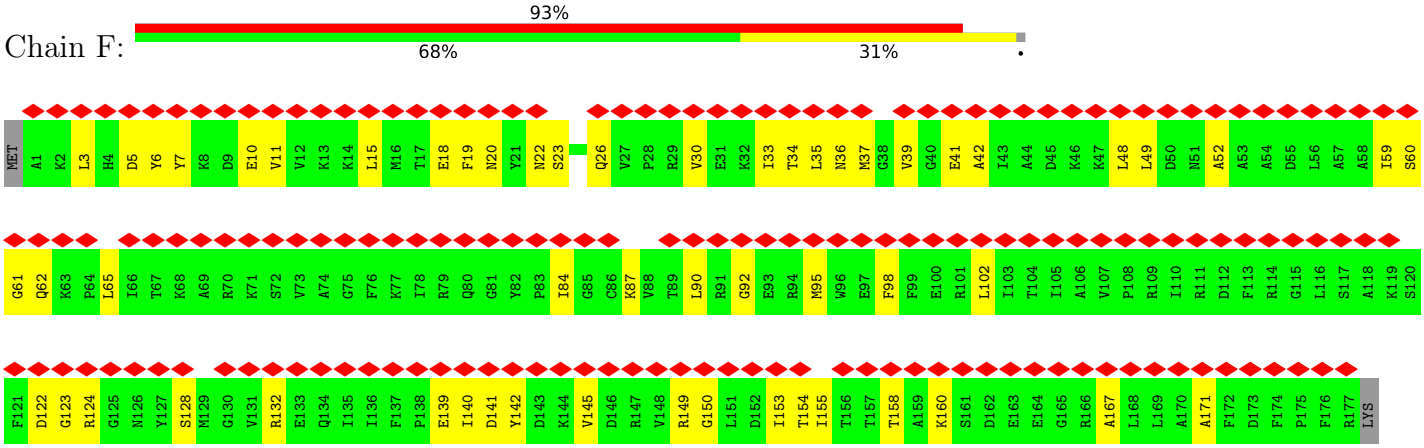
• Molecule 18: 50S ribosomal protein L34

• Molecule 19: 50S ribosomal protein L18



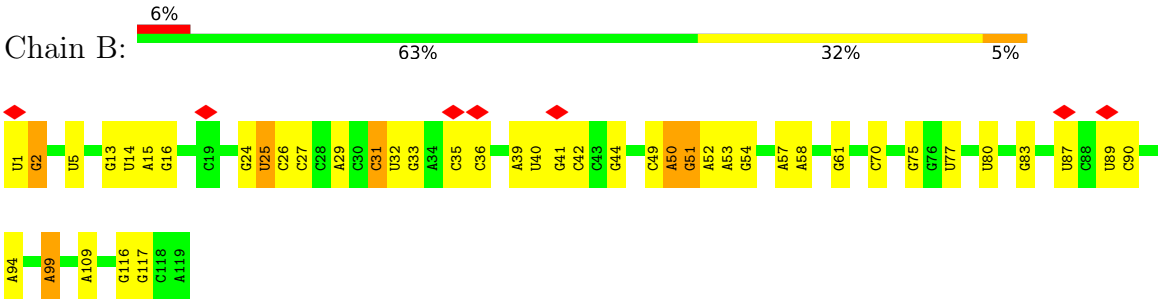
• Molecule 20: 50S ribosomal protein L5

Chain F:



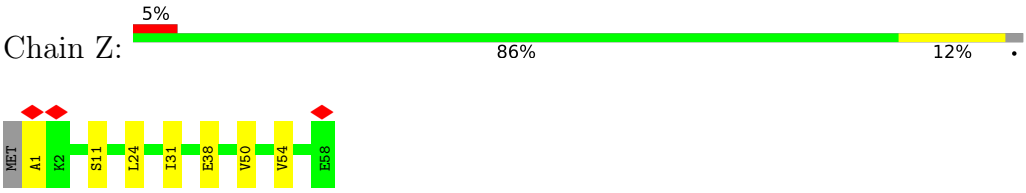
- Molecule 21: 5S rRNA

Chain B:



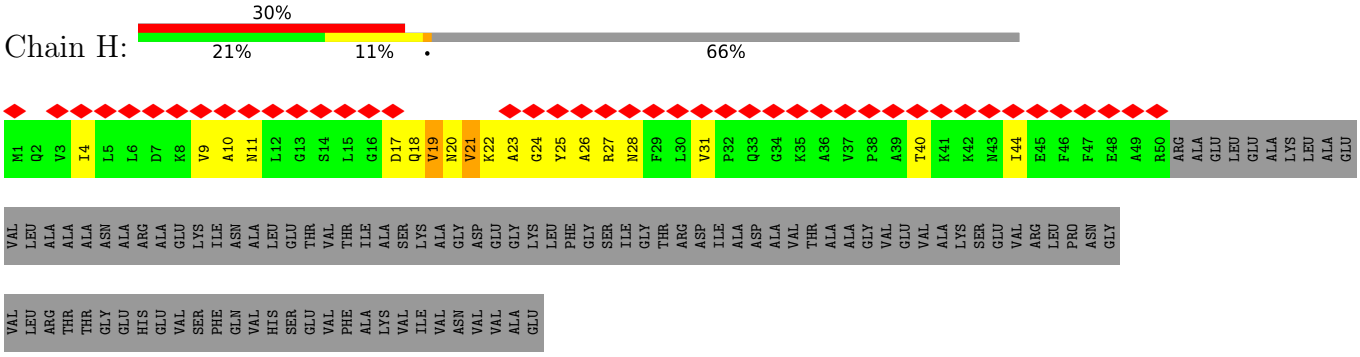
- Molecule 22: 50S ribosomal protein L30

Chain Z:



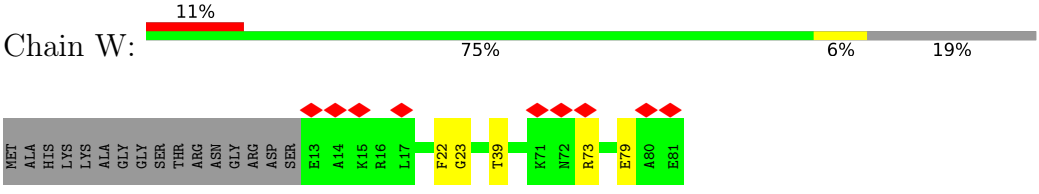
- Molecule 23: 50S ribosomal protein L9

Chain H:



- Molecule 24: 50S ribosomal protein L27

Chain W:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	37448	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 ($e^-/Å^2$)	62	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	31000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	2.881	Depositor
Minimum map value	-0.980	Depositor
Average map value	0.007	Depositor
Map value standard deviation	0.120	Depositor
Recommended contour level	0.5	Depositor
Map size (Å)	375.0, 375.0, 375.0	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.25, 1.25, 1.25	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	V	0.24	0/766	0.49	0/1025
2	A	0.19	0/53062	0.73	25/82772 (0.0%)
3	D	0.25	0/1395	0.51	0/1872
4	E	0.24	0/1555	0.49	0/2090
5	J	0.25	0/1152	0.49	0/1551
6	K	0.25	0/947	0.55	0/1268
7	L	0.24	0/854	0.57	0/1137
8	N	0.24	0/973	0.57	0/1301
9	P	0.24	0/929	0.54	0/1242
10	Q	0.27	0/960	0.54	0/1278
11	R	0.26	0/829	0.56	0/1107
12	S	0.24	0/810	0.50	0/1084
13	T	0.26	0/744	0.51	0/994
14	U	0.26	0/787	0.51	0/1051
15	X	0.23	0/606	0.56	0/808
16	Y	0.24	0/500	0.53	0/665
17	0	0.23	0/450	0.55	0/599
18	2	0.23	0/324	0.65	0/424
19	O	0.24	0/902	0.55	0/1209
20	F	0.25	0/1434	0.52	0/1926
21	B	0.15	0/2850	0.72	0/4444
22	Z	0.24	0/453	0.53	0/605
23	H	0.35	0/389	0.56	0/523
24	W	0.25	0/529	0.52	0/699
All	All	0.20	0/74200	0.69	25/111674 (0.0%)

There are no bond length outliers.

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	2056	G	P-O3'-C3'	-12.20	105.06	119.70
2	A	2057	G	P-O3'-C3'	-9.85	107.88	119.70
2	A	2058	A	P-O3'-C3'	-8.78	109.16	119.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	2061	G	P-O3'-C3'	-8.38	109.64	119.70
2	A	1575	C	N3-C2-O2	-8.35	116.05	121.90
2	A	2060	A	P-O3'-C3'	-8.24	109.82	119.70
2	A	2062	A	P-O3'-C3'	-8.11	109.96	119.70
2	A	2243	U	P-O3'-C3'	-6.90	111.42	119.70
2	A	2417	C	N3-C2-O2	-6.89	117.08	121.90
2	A	2434	A	P-O3'-C3'	-6.73	111.63	119.70
2	A	2771	C	N3-C2-O2	-6.67	117.23	121.90
2	A	2063	C	P-O3'-C3'	-6.42	111.99	119.70
2	A	394	C	N3-C2-O2	-6.35	117.46	121.90
2	A	1612	C	N3-C2-O2	-6.33	117.47	121.90
2	A	2059	A	P-O3'-C3'	-6.29	112.15	119.70
2	A	1575	C	N1-C2-O2	6.00	122.50	118.90
2	A	2064	C	P-O3'-C3'	-5.88	112.64	119.70
2	A	2242	G	P-O3'-C3'	-5.80	112.74	119.70
2	A	1172	C	N1-C2-O2	5.74	122.34	118.90
2	A	2417	C	N1-C2-O2	5.53	122.22	118.90
2	A	274	C	N1-C2-O2	5.40	122.14	118.90
2	A	1313	U	C2-N1-C1'	5.39	124.17	117.70
2	A	2433	A	P-O3'-C3'	-5.30	113.33	119.70
2	A	921	C	N3-C2-O2	-5.21	118.25	121.90
2	A	1172	C	N3-C2-O2	-5.17	118.28	121.90

There are no chirality outliers.

There are no planarity outliers.

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	V	753	0	780	11	0
2	A	47374	0	23828	398	0
3	D	1379	0	1440	19	0
4	E	1537	0	1605	23	0
5	J	1129	0	1162	14	0
6	K	938	0	1012	15	0
7	L	850	0	916	18	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	N	960	0	1000	16	0
9	P	917	0	965	20	0
10	Q	947	0	1022	19	0
11	R	816	0	839	17	0
12	S	804	0	865	11	0
13	T	738	0	807	14	0
14	U	779	0	834	14	0
15	X	598	0	629	19	0
16	Y	499	0	535	15	0
17	0	444	0	461	8	0
18	2	322	0	357	5	0
19	O	892	0	923	27	0
20	F	1410	0	1447	49	0
21	B	2549	0	1291	37	0
22	Z	449	0	491	5	0
23	H	384	0	405	41	0
24	W	522	0	543	6	0
All	All	67990	0	44157	697	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 7.

All (697) 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)
23:H:19:VAL:HG12	23:H:20:ASN:H	1.22	1.02
2:A:2094:A:O4'	23:H:21:VAL:HB	1.69	0.92
21:B:51:G:O2'	21:B:52:A:O4'	1.88	0.90
21:B:52:A:O2'	21:B:54:G:N7	2.07	0.88
23:H:24:GLY:O	23:H:27:ARG:O	1.92	0.86
2:A:2094:A:H5"	23:H:22:LYS:O	1.75	0.86
21:B:14:U:OP2	21:B:70:C:O2'	1.93	0.85
2:A:1125:G:OP2	2:A:1126:A:O2'	1.92	0.85
2:A:2199:A:OP1	15:X:36:ARG:NE	2.09	0.85
2:A:177:G:OP2	2:A:177:G:N2	2.11	0.84
20:F:35:LEU:HD11	20:F:90:LEU:HD11	1.58	0.84
2:A:834:G:O2'	2:A:2358:A:O2'	1.95	0.84
2:A:1124:G:O2'	2:A:1125:G:O4'	1.95	0.84
2:A:1323:C:O2	2:A:1331:G:N2	2.10	0.84
2:A:983:A:O2'	2:A:984:A:O5'	1.96	0.84
2:A:948:C:HO2'	2:A:984:A:HO2'	1.04	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:2265:U:OP2	2:A:2266:A:O2'	1.95	0.83
2:A:2331:G:HO2'	24:W:39:THR:HG1	1.25	0.83
2:A:1203:U:OP2	2:A:1204:A:O2'	1.96	0.83
21:B:26:C:HO2'	21:B:116:G:HO2'	1.22	0.83
4:E:176:ASP:OD1	4:E:179:SER:OG	1.97	0.82
2:A:1315:C:O2'	2:A:1392:A:N3	2.11	0.82
2:A:1450:G:N2	2:A:1452:G:O6	2.12	0.82
2:A:1712:U:OP2	2:A:1713:A:O2'	1.98	0.82
2:A:828:U:O2'	2:A:831:G:O6	1.98	0.81
2:A:2898:U:O2'	5:J:134:ALA:O	1.97	0.81
2:A:1649:G:O2'	8:N:106:ASP:OD2	1.96	0.81
2:A:2094:A:H8	23:H:22:LYS:C	1.82	0.81
2:A:320:A:N3	4:E:163:ASN:ND2	2.29	0.81
2:A:2099:U:O2	2:A:2190:G:O6	1.99	0.80
2:A:2865:U:OP2	2:A:2866:U:O2'	1.99	0.80
2:A:2081:U:O2	2:A:2239:G:O6	1.98	0.80
11:R:14:VAL:HG21	11:R:98:ILE:HD13	1.62	0.80
2:A:2021:C:OP1	10:Q:24:TYR:OH	1.99	0.79
2:A:867:C:N4	2:A:912:C:O2	2.14	0.79
14:U:3:LYS:O	14:U:93:ARG:NH1	2.15	0.79
2:A:1654:A:OP2	8:N:1:MET:N	2.15	0.79
2:A:2645:G:OP2	2:A:2645:G:N2	2.15	0.79
2:A:855:G:N2	24:W:23:GLY:O	2.16	0.79
21:B:31:C:O2'	21:B:32:U:O4'	2.00	0.78
2:A:1035:U:O2	2:A:1120:G:O6	1.99	0.78
21:B:26:C:O2'	21:B:116:G:O2'	2.01	0.78
2:A:77:G:OP1	16:Y:52:ARG:NH1	2.16	0.78
2:A:372:G:N7	23:H:11:ASN:ND2	2.32	0.78
2:A:1447:C:O2'	2:A:1544:A:N3	2.16	0.78
15:X:58:ILE:HG22	15:X:66:VAL:HG21	1.66	0.78
2:A:2212:A:O2'	2:A:2214:C:N4	2.16	0.77
23:H:19:VAL:HG12	23:H:20:ASN:N	2.00	0.77
2:A:2705:A:O2'	2:A:2852:G:OP1	2.01	0.77
2:A:2659:G:O2'	2:A:2661:G:N7	2.18	0.76
2:A:1142:A:O2'	2:A:1143:A:OP2	2.04	0.76
2:A:2647:U:O2	2:A:2673:G:O6	2.04	0.76
21:B:49:C:N4	21:B:50:A:N6	2.34	0.76
2:A:247:G:O2'	2:A:250:G:O6	2.00	0.76
2:A:2399:G:O2'	2:A:2400:G:O4'	2.03	0.75
2:A:2094:A:C5'	23:H:26:ALA:HB2	2.17	0.74
2:A:918:A:N3	21:B:80:U:O2'	2.20	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:627:A:OP1	7:L:78:ARG:NH1	2.21	0.74
2:A:2094:A:C8	23:H:22:LYS:HA	2.22	0.74
2:A:1132:U:OP2	2:A:1133:A:O2'	2.04	0.74
2:A:1636:U:O2'	2:A:1760:C:O2	2.06	0.74
2:A:2313:C:O3'	20:F:36:ASN:ND2	2.21	0.74
2:A:2357:G:N2	2:A:2360:G:OP2	2.21	0.74
2:A:399:U:OP2	15:X:56:ARG:NH1	2.21	0.74
2:A:2857:G:N2	2:A:2860:A:OP2	2.20	0.74
2:A:197:A:N6	2:A:2431:U:C2	2.55	0.73
2:A:514:A:N3	2:A:581:C:O2'	2.19	0.73
2:A:2093:G:C6	23:H:22:LYS:HD3	2.23	0.73
13:T:6:ARG:O	13:T:10:VAL:HG23	1.88	0.73
1:V:21:ARG:NH1	21:B:77:U:OP1	2.21	0.73
2:A:1154:G:OP2	10:Q:57:ARG:NH1	2.21	0.73
2:A:993:G:OP1	10:Q:49:ARG:NH1	2.22	0.73
2:A:1323:C:OP2	12:S:11:ARG:NH2	2.21	0.73
2:A:125:A:OP2	18:2:19:ARG:NH1	2.21	0.73
2:A:1341:G:OP2	2:A:1394:U:O2'	2.07	0.72
2:A:2196:C:O2'	2:A:2198:A:N6	2.23	0.72
5:J:31:GLU:HB3	5:J:142:ILE:HD11	1.71	0.72
2:A:2848:G:O2'	2:A:2867:G:N2	2.23	0.71
2:A:2222:C:N4	2:A:2223:G:O6	2.23	0.71
14:U:6:ARG:NH1	14:U:25:LYS:O	2.23	0.71
2:A:1426:G:OP2	2:A:1427:A:O2'	2.01	0.71
2:A:2332:C:OP1	24:W:73:ARG:NH2	2.22	0.71
2:A:250:G:O2'	2:A:251:A:O4'	2.06	0.71
2:A:987:C:O2'	2:A:1000:A:N3	2.21	0.71
2:A:1521:G:OP2	2:A:1522:A:O2'	2.03	0.71
15:X:73:ARG:NH1	15:X:75:GLU:OE2	2.24	0.71
2:A:1009:A:N3	2:A:1153:C:O2'	2.23	0.70
2:A:2304:G:O2'	20:F:132:ARG:NH2	2.22	0.70
20:F:62:GLN:NE2	21:B:42:C:O2	2.23	0.70
2:A:629:G:N3	2:A:639:U:O2'	2.23	0.70
16:Y:25:GLN:O	16:Y:29:ARG:NH1	2.25	0.70
20:F:149:ARG:NH1	20:F:150:GLY:O	2.25	0.70
2:A:1296:G:OP1	2:A:2709:G:O2'	2.06	0.70
13:T:3:ARG:HB3	13:T:6:ARG:HB3	1.74	0.70
2:A:2055:C:OP1	2:A:2056:G:H8	1.74	0.69
2:A:1418:G:N2	2:A:1581:G:O6	2.25	0.69
2:A:1153:C:OP1	10:Q:91:ARG:NH2	2.26	0.69
2:A:1428:C:N4	2:A:1570:A:OP2	2.25	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:2646:C:OP2	2:A:2732:G:O2'	2.10	0.69
2:A:1012:U:OP2	10:Q:69:ARG:NH2	2.26	0.68
2:A:1359:A:OP2	2:A:1371:G:N2	2.27	0.68
2:A:1394:U:O2	13:T:19:LYS:NZ	2.25	0.68
2:A:2064:C:H2'	2:A:2065:C:H6	1.58	0.68
8:N:37:THR:HG22	8:N:39:PRO:HD2	1.74	0.68
2:A:2833:U:O2	3:D:58:ASN:ND2	2.27	0.67
2:A:117:G:OP2	2:A:119:A:O2'	2.10	0.67
2:A:1528:A:N6	2:A:1543:G:O2'	2.26	0.67
2:A:2266:A:N6	2:A:2273:A:OP2	2.27	0.67
2:A:139:U:HO2'	2:A:141:G:H1	1.41	0.67
2:A:239:C:O2'	2:A:622:G:O2'	2.11	0.67
2:A:1328:A:O2'	2:A:1329:U:O5'	2.13	0.67
2:A:2291:U:O2'	2:A:2374:C:O2	2.12	0.67
2:A:1225:G:O2'	2:A:1226:A:O4'	2.09	0.67
2:A:61:C:H5"	16:Y:43:LEU:HD12	1.77	0.66
2:A:1032:A:N1	2:A:1122:G:O6	2.27	0.66
20:F:141:ASP:O	20:F:145:VAL:HG13	1.94	0.66
2:A:324:A:OP2	2:A:1205:A:N6	2.28	0.66
2:A:1492:G:N1	2:A:1496:A:N7	2.43	0.66
19:O:67:ASN:OD1	19:O:70:ALA:N	2.28	0.66
2:A:219:A:N3	2:A:234:U:O2'	2.25	0.66
2:A:824:U:O2'	2:A:2358:A:OP1	2.12	0.66
12:S:67:ASP:OD1	12:S:68:ASP:N	2.28	0.66
2:A:160:A:N3	2:A:2208:C:O2'	2.24	0.66
2:A:2055:C:P	2:A:2056:G:H5'	2.36	0.66
13:T:11:LEU:O	16:Y:29:ARG:NH2	2.29	0.66
2:A:2064:C:H2'	2:A:2065:C:C6	2.31	0.66
8:N:77:ALA:O	8:N:81:ASN:ND2	2.28	0.66
2:A:2376:A:N3	19:O:111:ARG:NH2	2.43	0.66
2:A:411:G:OP2	2:A:2406:A:O2'	2.12	0.66
2:A:2094:A:H8	23:H:22:LYS:CA	2.08	0.66
2:A:534:U:O2'	10:Q:48:ASP:OD2	2.15	0.65
2:A:2885:G:O6	17:0:28:SER:OG	2.14	0.65
2:A:475:C:O2	2:A:479:A:N6	2.29	0.65
2:A:1288:G:OP2	2:A:1288:G:N2	2.30	0.65
2:A:2094:A:C8	23:H:22:LYS:CA	2.80	0.65
2:A:126:A:O2'	2:A:127:A:O4'	2.10	0.65
2:A:571:U:OP1	11:R:80:ARG:NH2	2.30	0.65
2:A:2331:G:O2'	24:W:39:THR:OG1	2.04	0.65
2:A:2094:A:O5'	23:H:22:LYS:N	2.29	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:137:U:O2'	2:A:140:C:O2	2.02	0.65
3:D:9:VAL:HG21	9:P:3:ILE:HD11	1.78	0.64
11:R:45:GLU:N	11:R:45:GLU:OE1	2.31	0.64
2:A:2728:U:HO2'	2:A:2729:G:H8	1.44	0.64
9:P:28:LYS:HB3	9:P:39:LEU:HD12	1.80	0.64
4:E:57:LYS:NZ	4:E:58:LYS:O	2.30	0.64
2:A:2748:A:N7	2:A:2753:A:N6	2.45	0.64
20:F:59:ILE:HG22	20:F:139:GLU:HB2	1.80	0.64
2:A:2059:A:H2	2:A:2610:C:O4'	1.81	0.64
2:A:482:A:O2'	2:A:497:A:N1	2.30	0.64
16:Y:45:GLN:O	16:Y:47:ARG:N	2.31	0.63
2:A:1323:C:N3	2:A:1331:G:N1	2.46	0.63
7:L:29:LYS:O	7:L:30:THR:OG1	2.12	0.63
1:V:4:ILE:HG21	1:V:63:ILE:HD13	1.80	0.63
2:A:2374:C:N4	2:A:2375:G:O6	2.32	0.63
2:A:2422:C:O2'	2:A:2424:C:OP1	2.15	0.63
21:B:40:U:N3	21:B:44:G:OP2	2.31	0.63
2:A:495:G:O2'	12:S:61:ASN:ND2	2.32	0.63
2:A:2244:U:O2'	2:A:2245:U:H5'	1.99	0.63
6:K:4:GLU:N	6:K:4:GLU:OE1	2.32	0.62
11:R:39:LEU:O	11:R:49:ILE:HG23	1.99	0.62
21:B:77:U:O2	21:B:99:A:N7	2.31	0.62
10:Q:90:ASP:OD1	10:Q:91:ARG:N	2.32	0.62
1:V:46:LYS:HD3	1:V:50:MET:HE3	1.82	0.62
2:A:463:G:N2	2:A:466:A:OP2	2.32	0.62
2:A:2061:G:H1'	2:A:2062:A:C6	2.34	0.62
2:A:2094:A:H5"	23:H:26:ALA:HB2	1.81	0.62
2:A:2287:A:N6	2:A:2346:A:N7	2.48	0.62
2:A:1249:U:H4'	10:Q:3:VAL:HG21	1.81	0.62
20:F:141:ASP:OD1	20:F:142:TYR:N	2.32	0.62
21:B:29:A:N3	21:B:57:A:N6	2.48	0.62
2:A:1023:U:O2'	2:A:1122:G:OP1	2.09	0.62
2:A:2375:G:N2	2:A:2378:A:OP2	2.33	0.62
19:O:24:THR:OG1	19:O:90:VAL:HG12	1.99	0.62
2:A:166:U:O2'	15:X:44:ARG:NH2	2.32	0.62
4:E:16:GLU:N	4:E:16:GLU:OE1	2.31	0.62
21:B:49:C:N4	21:B:50:A:H62	1.98	0.62
2:A:2049:G:N2	3:D:161:MET:SD	2.72	0.61
6:K:106:GLU:OE1	6:K:106:GLU:N	2.32	0.61
20:F:42:ALA:HB3	20:F:84:ILE:HD12	1.82	0.61
2:A:1715:G:O2'	2:A:1743:G:O6	2.10	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:974:G:O2'	2:A:989:G:N2	2.34	0.61
2:A:1383:A:O2'	2:A:1384:A:O4'	2.09	0.61
1:V:42:LEU:HB3	1:V:47:VAL:HG21	1.81	0.61
2:A:2816:G:N3	2:A:2883:A:O2'	2.30	0.61
19:O:87:ILE:HD12	19:O:90:VAL:HG22	1.82	0.61
2:A:2740:A:N6	2:A:2764:A:O5'	2.34	0.61
23:H:24:GLY:O	23:H:27:ARG:C	2.39	0.61
2:A:1007:C:OP1	5:J:37:ARG:NH1	2.34	0.61
1:V:30:ILE:HG22	1:V:91:PHE:HB2	1.83	0.61
20:F:7:TYR:CE1	20:F:11:VAL:HG11	2.36	0.60
2:A:2653:U:H5	2:A:2654:A:HO2'	1.50	0.60
3:D:26:VAL:CG1	3:D:186:LEU:HD12	2.32	0.60
2:A:72:U:OP2	16:Y:54:LYS:NZ	2.34	0.60
5:J:125:TYR:HH	5:J:132:HIS:HE2	1.46	0.60
13:T:37:ASP:O	13:T:81:LYS:NZ	2.34	0.60
2:A:467:G:OP1	18:2:33:ARG:NE	2.34	0.60
2:A:2094:A:H5'	23:H:26:ALA:HB2	1.84	0.60
1:V:4:ILE:HD11	1:V:61:LEU:HD12	1.82	0.60
2:A:1453:A:N6	8:N:74:GLU:OE2	2.34	0.60
2:A:2739:U:O2	2:A:2764:A:N7	2.35	0.60
2:A:2059:A:H8	2:A:2059:A:H5"	1.67	0.59
20:F:48:LEU:HD12	20:F:49:LEU:N	2.16	0.59
2:A:2206:C:N4	2:A:2207:C:N4	2.51	0.59
2:A:1629:U:O4	2:A:1630:A:N6	2.35	0.59
2:A:2831:G:N2	2:A:2884:U:OP2	2.35	0.59
7:L:82:LEU:HD21	7:L:110:VAL:HG13	1.85	0.59
4:E:126:VAL:O	4:E:156:ASN:ND2	2.36	0.59
10:Q:104:ALA:O	10:Q:108:LEU:HD23	2.02	0.59
2:A:2821:A:OP2	3:D:115:GLY:N	2.34	0.59
2:A:2258:C:O2'	2:A:2427:C:OP2	2.19	0.59
3:D:25:THR:HG21	3:D:193:VAL:HG22	1.85	0.59
6:K:76:VAL:HG22	9:P:72:VAL:HG22	1.85	0.59
2:A:395:U:O2'	2:A:396:G:N7	2.34	0.58
2:A:464:U:O2	18:2:16:HIS:NE2	2.36	0.58
2:A:1019:U:OP1	2:A:1035:U:O2'	2.20	0.58
2:A:2094:A:C4'	23:H:21:VAL:HB	2.33	0.58
2:A:2094:A:C8	23:H:22:LYS:C	2.72	0.58
5:J:7:LYS:O	5:J:11:VAL:HG23	2.04	0.58
17:0:37:HIS:ND1	17:0:38:LEU:O	2.35	0.58
2:A:1172:C:O2'	2:A:1173:U:O4'	2.21	0.58
5:J:43:GLU:N	5:J:43:GLU:OE1	2.36	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:T:37:ASP:OD1	13:T:38:ALA:N	2.33	0.58
2:A:931:U:O2	2:A:1167:C:O2'	2.17	0.58
2:A:1028:A:OP2	2:A:1126:A:N6	2.37	0.58
2:A:1528:A:OP2	2:A:1543:G:N2	2.37	0.57
4:E:5:LEU:HD23	4:E:122:GLU:HG3	1.86	0.57
23:H:17:ASP:OD1	23:H:19:VAL:HG23	2.03	0.57
1:V:29:ILE:HD13	21:B:75:G:H1'	1.86	0.57
2:A:1352:U:O2'	2:A:1570:A:N3	2.36	0.57
2:A:2058:A:C2	2:A:2059:A:C2	2.93	0.57
2:A:1673:G:N2	2:A:1675:C:O4'	2.38	0.57
15:X:29:LEU:HD23	15:X:29:LEU:H	1.69	0.57
15:X:50:VAL:HG23	15:X:55:MET:SD	2.44	0.57
12:S:55:ILE:CG2	12:S:66:ILE:HD11	2.34	0.57
19:O:62:LEU:HD13	19:O:70:ALA:CB	2.35	0.57
2:A:864:G:N3	2:A:866:A:N6	2.53	0.57
2:A:370:G:O2'	2:A:424:G:OP1	2.22	0.56
2:A:965:C:N4	2:A:966:G:O6	2.38	0.56
4:E:189:THR:O	4:E:193:VAL:HG23	2.05	0.56
5:J:98:GLU:HB2	5:J:124:VAL:HG13	1.87	0.56
19:O:26:LEU:HD12	19:O:26:LEU:O	2.06	0.56
19:O:102:ARG:NH2	21:B:50:A:OP2	2.38	0.56
23:H:40:THR:HG22	23:H:40:THR:O	2.06	0.56
2:A:2060:A:H1'	2:A:2061:G:N1	2.20	0.56
2:A:2740:A:OP2	2:A:2763:G:N1	2.39	0.56
8:N:59:SER:OG	8:N:62:ASN:OD1	2.23	0.56
20:F:22:ASN:OD1	20:F:23:SER:N	2.38	0.56
22:Z:11:SER:HA	22:Z:31:ILE:HD11	1.86	0.56
2:A:61:C:C5'	16:Y:43:LEU:HD12	2.35	0.56
2:A:1168:G:O6	2:A:1181:U:O2	2.22	0.56
2:A:2304:G:O3'	20:F:132:ARG:NH2	2.38	0.56
2:A:964:C:O2'	2:A:2273:A:N3	2.39	0.56
20:F:5:ASP:OD1	20:F:6:TYR:N	2.39	0.56
2:A:48:G:H22	2:A:177:G:P	2.28	0.56
11:R:6:GLN:HB3	11:R:11:GLN:HB3	1.88	0.56
22:Z:1:ALA:N	22:Z:38:GLU:OE2	2.39	0.56
2:A:222:A:H61	2:A:232:G:H1'	1.71	0.56
2:A:1172:C:O2'	2:A:1173:U:O5'	2.24	0.56
3:D:8:LYS:CG	3:D:201:LEU:HD11	2.36	0.56
2:A:1638:C:O2	2:A:2698:U:O2'	2.22	0.56
2:A:566:U:OP1	7:L:29:LYS:NZ	2.36	0.55
2:A:584:C:N4	2:A:585:G:O6	2.39	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:1582:C:O2'	2:A:1585:C:N3	2.35	0.55
16:Y:21:LEU:HD12	16:Y:25:GLN:HG3	1.87	0.55
20:F:65:LEU:HD22	21:B:42:C:C4	2.42	0.55
23:H:27:ARG:O	23:H:28:ASN:HB2	2.06	0.55
2:A:1466:U:O3'	2:A:1546:G:O2'	2.24	0.55
2:A:1736:U:O4	2:A:1737:G:N2	2.39	0.55
2:A:2061:G:H1'	2:A:2062:A:N6	2.21	0.55
6:K:9:ASN:N	6:K:82:ASN:O	2.37	0.55
7:L:85:VAL:HG12	7:L:85:VAL:O	2.06	0.55
2:A:1301:A:O2'	2:A:1302:A:O5'	2.25	0.55
11:R:49:ILE:HG22	11:R:54:VAL:HG13	1.87	0.55
2:A:1024:G:OP2	2:A:1025:G:O2'	2.07	0.55
9:P:87:ARG:NH2	9:P:109:ILE:O	2.36	0.55
2:A:2406:A:N3	7:L:69:ARG:NH2	2.54	0.55
2:A:30:G:O2'	2:A:1214:A:N3	2.37	0.55
2:A:559:G:N2	10:Q:51:GLN:OE1	2.39	0.55
14:U:96:LYS:O	14:U:97:SER:OG	2.23	0.55
20:F:37:MET:O	20:F:37:MET:SD	2.65	0.55
14:U:73:ASN:O	14:U:77:GLY:N	2.39	0.55
19:O:106:LEU:HD12	19:O:107:ALA:N	2.22	0.55
2:A:299:A:N3	2:A:319:G:O2'	2.32	0.54
3:D:17:GLU:N	3:D:17:GLU:OE1	2.38	0.54
5:J:31:GLU:CB	5:J:142:ILE:HD11	2.36	0.54
2:A:1682:G:N1	2:A:1757:A:N3	2.54	0.54
2:A:188:G:O2'	2:A:1365:A:N6	2.40	0.54
2:A:2294:G:OP1	19:O:98:GLN:NE2	2.40	0.54
8:N:72:ASP:OD1	8:N:73:ASN:N	2.40	0.54
20:F:3:LEU:HD23	20:F:3:LEU:O	2.07	0.54
4:E:31:VAL:HG21	4:E:104:ALA:HB2	1.90	0.54
20:F:122:ASP:OD1	20:F:123:GLY:N	2.40	0.54
21:B:50:A:O2'	21:B:51:G:O4'	2.23	0.54
2:A:856:G:H21	24:W:22:PHE:CB	2.19	0.54
7:L:110:VAL:HG12	7:L:110:VAL:O	2.08	0.54
2:A:2334:U:O2	19:O:16:ARG:NH1	2.41	0.54
2:A:2305:U:O4	20:F:39:VAL:HG23	2.08	0.54
22:Z:50:VAL:HG12	22:Z:50:VAL:O	2.08	0.54
2:A:224:U:O4	2:A:232:G:N2	2.41	0.53
2:A:1022:G:O2'	2:A:1023:U:OP2	2.23	0.53
11:R:47:VAL:HG13	11:R:47:VAL:O	2.07	0.53
2:A:1423:G:H2'	2:A:1424:G:C8	2.43	0.53
2:A:1343:G:O2'	2:A:1384:A:N1	2.33	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:E:7:ASP:OD1	4:E:8:ALA:N	2.37	0.53
23:H:22:LYS:HD2	23:H:23:ALA:H	1.73	0.53
2:A:2093:G:H2'	23:H:21:VAL:N	2.24	0.53
7:L:93:ASN:O	7:L:94:THR:OG1	2.22	0.53
2:A:434:U:O2	2:A:436:C:N4	2.41	0.53
2:A:1288:G:OP1	2:A:1289:C:N4	2.36	0.53
2:A:2292:U:N3	2:A:2341:G:O6	2.42	0.53
20:F:140:ILE:HG22	20:F:145:VAL:HG12	1.90	0.53
2:A:160:A:N7	2:A:166:U:O4	2.41	0.53
21:B:50:A:O2'	21:B:51:G:O5'	2.24	0.53
18:2:34:ARG:NH2	18:2:41:ARG:O	2.42	0.53
19:O:82:ALA:HB1	19:O:87:ILE:HG21	1.91	0.53
2:A:310:A:O2'	2:A:311:A:OP2	2.24	0.52
2:A:2063:C:H3'	2:A:2064:C:C6	2.44	0.52
11:R:14:VAL:HG21	11:R:98:ILE:CD1	2.35	0.52
2:A:476:G:N1	2:A:479:A:OP2	2.41	0.52
4:E:168:ASP:OD2	4:E:170:ARG:NH2	2.43	0.52
20:F:26:GLN:OE1	21:B:57:A:O2'	2.20	0.52
2:A:867:C:N3	2:A:912:C:O2'	2.41	0.52
5:J:125:TYR:OH	5:J:132:HIS:NE2	2.37	0.52
2:A:1018:U:O2'	2:A:1120:G:N2	2.42	0.52
2:A:2643:G:H2'	2:A:2644:G:C8	2.45	0.52
13:T:4:GLU:CG	16:Y:18:LEU:HD11	2.39	0.52
13:T:44:LYS:NZ	13:T:55:VAL:O	2.43	0.52
2:A:1173:U:O2	2:A:1177:G:N1	2.42	0.52
2:A:324:A:N6	2:A:338:G:O2'	2.41	0.52
12:S:59:GLU:OE1	12:S:66:ILE:HD12	2.09	0.52
2:A:231:A:H2'	2:A:232:G:O4'	2.10	0.52
2:A:972:A:OP2	2:A:973:A:O2'	2.22	0.52
2:A:1358:G:N1	2:A:1372:U:OP2	2.39	0.52
2:A:2063:C:H5"	2:A:2064:C:C5	2.44	0.52
2:A:2063:C:H5"	2:A:2064:C:C4	2.45	0.52
1:V:78:GLN:OE1	1:V:88:HIS:ND1	2.44	0.51
2:A:1141:U:OP2	5:J:65:THR:OG1	2.27	0.51
8:N:50:PRO:HA	8:N:53:THR:HG22	1.93	0.51
16:Y:17:GLU:HB2	16:Y:53:VAL:HG21	1.91	0.51
2:A:980:A:N3	2:A:2037:A:O2'	2.31	0.51
18:2:12:ARG:NH2	18:2:43:THR:O	2.43	0.51
2:A:930:G:H1'	22:Z:24:LEU:HD21	1.92	0.51
2:A:2683:C:OP1	9:P:50:ARG:NH2	2.41	0.51
4:E:4:VAL:HG22	4:E:6:LYS:H	1.74	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:N:79:LEU:HD23	8:N:83:LEU:HD12	1.92	0.51
2:A:951:C:N4	2:A:952:G:O6	2.44	0.51
2:A:1266:G:OP1	17:0:15:ARG:NE	2.35	0.51
2:A:2391:G:N2	2:A:2425:A:OP1	2.39	0.51
9:P:101:GLU:OE1	9:P:101:GLU:N	2.44	0.51
9:P:113:LEU:HD12	9:P:113:LEU:O	2.10	0.51
23:H:20:ASN:O	23:H:21:VAL:HG13	2.09	0.51
2:A:282:A:N6	2:A:359:G:O6	2.43	0.51
2:A:2056:G:H2'	2:A:2057:G:C8	2.46	0.51
2:A:1754:A:N1	2:A:2716:C:O2'	2.42	0.51
9:P:67:GLU:N	9:P:67:GLU:OE1	2.43	0.51
5:J:45:THR:HB	5:J:48:VAL:HG22	1.93	0.51
2:A:646:U:H3'	2:A:647:G:C5'	2.40	0.51
19:O:87:ILE:HB	19:O:90:VAL:HG13	1.92	0.51
2:A:90:U:OP2	2:A:91:A:O2'	2.16	0.50
2:A:1340:U:OP1	13:T:19:LYS:NZ	2.41	0.50
2:A:2315:G:O3'	20:F:124:ARG:NH2	2.44	0.50
20:F:155:ILE:HG23	20:F:155:ILE:O	2.11	0.50
21:B:1:U:N3	21:B:2:G:O6	2.44	0.50
3:D:177:VAL:HG23	3:D:177:VAL:O	2.11	0.50
21:B:25:U:O2	21:B:117:G:O2'	2.17	0.50
9:P:54:LEU:HD23	9:P:54:LEU:O	2.11	0.50
13:T:4:GLU:HG2	16:Y:18:LEU:HD11	1.91	0.50
20:F:41:GLU:OE1	20:F:41:GLU:N	2.45	0.50
22:Z:50:VAL:O	22:Z:54:VAL:HG22	2.12	0.50
2:A:1753:G:N2	2:A:1756:G:O5'	2.44	0.50
2:A:2741:A:N6	2:A:2763:G:O2'	2.43	0.50
7:L:132:ARG:O	7:L:135:ILE:HG22	2.12	0.50
2:A:2094:A:P	23:H:22:LYS:H	2.35	0.50
15:X:63:ILE:O	15:X:67:LEU:HD23	2.11	0.50
2:A:188:G:H5'	15:X:13:THR:HG21	1.94	0.50
10:Q:49:ARG:O	10:Q:53:LYS:NZ	2.45	0.50
14:U:88:ASP:O	14:U:90:LYS:N	2.45	0.50
21:B:49:C:H42	21:B:50:A:N6	2.09	0.50
2:A:1141:U:H4'	2:A:1142:A:O4'	2.11	0.50
2:A:1235:G:O3'	2:A:1236:G:O4'	2.30	0.50
15:X:2:ARG:HD2	15:X:29:LEU:HD12	1.94	0.50
20:F:35:LEU:HD22	20:F:153:ILE:HD12	1.93	0.50
14:U:38:ILE:HG13	14:U:39:ASN:N	2.26	0.49
2:A:152:A:N6	2:A:175:G:O6	2.45	0.49
2:A:2297:A:N6	2:A:2319:G:O4'	2.44	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:2821:A:O2'	2:A:2826:A:N1	2.43	0.49
2:A:2849:U:O4	9:P:20:ARG:NH1	2.45	0.49
2:A:2059:A:N1	2:A:2610:C:C6	2.80	0.49
9:P:14:GLN:OE1	9:P:14:GLN:N	2.45	0.49
21:B:5:U:P	21:B:61:G:HO2'	2.35	0.49
1:V:43:ASP:OD1	1:V:47:VAL:HG23	2.11	0.49
2:A:144:A:H5'	13:T:3:ARG:HD2	1.92	0.49
2:A:1550:C:OP1	2:A:1720:U:O2'	2.27	0.49
2:A:1565:C:O2'	2:A:1566:A:O5'	2.27	0.49
2:A:2082:A:H2'	2:A:2083:G:O4'	2.11	0.49
2:A:2718:G:O2'	2:A:2847:U:OP1	2.26	0.49
2:A:2822:G:O2'	2:A:2824:C:OP2	2.17	0.49
3:D:8:LYS:HG3	3:D:201:LEU:HD11	1.94	0.49
11:R:49:ILE:HG13	11:R:49:ILE:O	2.13	0.49
20:F:33:ILE:HB	20:F:90:LEU:HD12	1.93	0.49
2:A:197:A:C6	2:A:2431:U:N3	2.81	0.49
2:A:2341:G:N2	2:A:2374:C:O3'	2.45	0.49
20:F:39:VAL:HG22	20:F:41:GLU:OE1	2.13	0.49
20:F:10:GLU:OE2	20:F:11:VAL:HG23	2.13	0.49
2:A:1721:G:O2'	2:A:1739:A:N6	2.44	0.49
2:A:2674:G:O2'	6:K:28:SER:O	2.30	0.49
2:A:1418:G:N1	2:A:1579:A:N7	2.61	0.48
2:A:2883:A:OP1	17:0:48:TYR:OH	2.30	0.48
10:Q:64:ILE:HD11	10:Q:95:ALA:N	2.28	0.48
8:N:79:LEU:CD2	8:N:83:LEU:HD12	2.42	0.48
2:A:274:C:H2'	2:A:275:C:C1'	2.42	0.48
6:K:65:THR:HG23	6:K:68:GLY:H	1.77	0.48
2:A:71:A:OP2	2:A:112:U:O2'	2.18	0.48
2:A:1665:A:N6	2:A:1666:G:O6	2.47	0.48
4:E:154:ASP:OD1	4:E:154:ASP:N	2.46	0.48
6:K:76:VAL:HG22	9:P:72:VAL:CG2	2.43	0.48
2:A:500:G:N1	2:A:503:A:OP2	2.37	0.48
2:A:1300:G:O6	2:A:1626:A:O2'	2.18	0.48
15:X:60:LYS:N	23:H:11:ASN:OD1	2.47	0.48
19:O:51:ALA:HB2	19:O:81:ARG:NH2	2.28	0.48
20:F:65:LEU:HD23	20:F:87:LYS:O	2.14	0.48
2:A:65:U:O2'	2:A:456:C:N3	2.43	0.48
2:A:2637:U:O4	2:A:2776:A:N7	2.46	0.48
14:U:25:LYS:N	14:U:34:ILE:O	2.41	0.48
2:A:240:C:OP2	2:A:241:A:O2'	2.06	0.48
13:T:2:ILE:O	13:T:3:ARG:C	2.51	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
20:F:19:PHE:O	20:F:20:ASN:OD1	2.32	0.48
2:A:464:U:H2'	2:A:465:G:O5'	2.14	0.47
2:A:2093:G:O3'	23:H:21:VAL:HA	2.14	0.47
6:K:3:GLN:O	6:K:6:THR:HG22	2.13	0.47
7:L:135:ILE:HG21	7:L:142:ILE:HD11	1.96	0.47
2:A:1475:G:O2'	2:A:1514:G:O6	2.32	0.47
21:B:83:G:O6	21:B:94:A:N6	2.47	0.47
2:A:605:G:OP1	4:E:99:LYS:NZ	2.48	0.47
2:A:620:G:H4'	2:A:621:A:H5'	1.97	0.47
19:O:33:ARG:O	19:O:65:THR:OG1	2.25	0.47
20:F:15:LEU:HD22	20:F:167:ALA:HB1	1.96	0.47
2:A:2092:U:O2	2:A:2225:A:O2'	2.31	0.47
2:A:2094:A:C8	23:H:23:ALA:N	2.82	0.47
13:T:8:LEU:HD21	16:Y:22:LEU:HG	1.95	0.47
20:F:30:VAL:HG21	20:F:155:ILE:HD11	1.95	0.47
20:F:158:THR:O	20:F:160:LYS:NZ	2.35	0.47
17:0:53:VAL:HG12	17:0:54:ILE:N	2.29	0.47
2:A:1364:G:OP1	15:X:2:ARG:NH1	2.48	0.47
2:A:36:G:N3	2:A:450:G:O2'	2.48	0.47
2:A:2206:C:N4	2:A:2207:C:H41	2.13	0.47
2:A:2627:G:O2'	2:A:2781:A:N1	2.38	0.47
2:A:2636:C:O2'	3:D:45:TYR:OH	2.33	0.47
3:D:98:VAL:HG22	3:D:98:VAL:O	2.14	0.47
6:K:80:ASP:OD2	9:P:68:GLY:N	2.43	0.47
17:0:53:VAL:HG12	17:0:54:ILE:H	1.79	0.47
20:F:11:VAL:HG13	20:F:171:ALA:CB	2.44	0.47
21:B:36:C:N4	21:B:49:C:O2	2.46	0.47
21:B:49:C:C4	21:B:50:A:N6	2.81	0.47
2:A:1328:A:O2'	2:A:1329:U:P	2.72	0.47
2:A:2682:A:C8	3:D:11:MET:HE2	2.49	0.47
20:F:11:VAL:HG13	20:F:171:ALA:HB1	1.96	0.47
21:B:50:A:HO2'	21:B:51:G:C4'	2.28	0.47
1:V:41:GLU:C	1:V:42:LEU:HD22	2.35	0.47
2:A:2094:A:N7	23:H:22:LYS:HD2	2.30	0.47
7:L:116:VAL:O	7:L:116:VAL:HG13	2.15	0.47
9:P:46:VAL:HG11	9:P:49:ILE:HD11	1.97	0.47
10:Q:96:ASP:OD2	11:R:13:ARG:NH2	2.48	0.47
19:O:78:VAL:HG22	19:O:81:ARG:NH2	2.30	0.47
20:F:35:LEU:CD1	20:F:90:LEU:HD11	2.38	0.47
2:A:198:C:O2'	2:A:199:A:O5'	2.25	0.46
2:A:445:C:H2'	2:A:446:G:O4'	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:983:A:O2'	2:A:984:A:O4'	2.31	0.46
2:A:1417:C:H2'	2:A:1418:G:O4'	2.15	0.46
7:L:10:GLU:OE1	7:L:10:GLU:HA	2.14	0.46
15:X:64:ASP:OD1	15:X:65:THR:N	2.46	0.46
20:F:140:ILE:CG2	20:F:145:VAL:HG12	2.45	0.46
2:A:2057:G:H3'	2:A:2058:A:H8	1.80	0.46
7:L:96:LYS:NZ	7:L:105:ILE:O	2.42	0.46
12:S:4:ILE:HG13	12:S:106:VAL:HG22	1.96	0.46
2:A:564:C:OP2	11:R:79:ARG:NH2	2.48	0.46
2:A:948:C:O2'	2:A:984:A:O2'	1.95	0.46
2:A:1264:A:N6	2:A:2014:A:OP2	2.39	0.46
20:F:59:ILE:HG22	20:F:139:GLU:CB	2.45	0.46
2:A:1432:G:H2'	2:A:1433:A:C8	2.51	0.46
2:A:1619:G:H2'	2:A:1620:G:C1'	2.46	0.46
3:D:184:ARG:NH1	9:P:6:GLN:OE1	2.48	0.46
17:0:30:ASP:OD1	17:0:31:LYS:N	2.49	0.46
2:A:380:G:H2'	2:A:381:G:C8	2.51	0.46
19:O:2:ASP:OD1	19:O:3:LYS:N	2.49	0.46
23:H:19:VAL:CG1	23:H:20:ASN:N	2.71	0.46
2:A:636:G:C6	7:L:111:ILE:HG21	2.50	0.46
23:H:17:ASP:OD1	23:H:18:GLN:N	2.47	0.46
2:A:1223:G:N2	2:A:1226:A:OP2	2.43	0.46
8:N:11:ASN:OD1	8:N:11:ASN:O	2.33	0.46
20:F:30:VAL:CG2	20:F:155:ILE:HD11	2.46	0.46
2:A:2056:G:H1	2:A:2612:C:H42	1.62	0.46
11:R:34:GLU:OE2	11:R:58:VAL:HG13	2.15	0.46
14:U:97:SER:O	14:U:98:ASN:CG	2.54	0.46
2:A:199:A:N6	2:A:2433:A:N7	2.64	0.46
2:A:1005:C:O2'	5:J:30:THR:HG21	2.16	0.46
2:A:2236:U:H2'	2:A:2237:G:O4'	2.16	0.46
2:A:2847:U:H2'	2:A:2848:G:O4'	2.16	0.46
2:A:1321:A:N6	2:A:1334:G:O4'	2.49	0.45
2:A:2399:G:H2'	2:A:2400:G:C8	2.50	0.45
4:E:19:PHE:HE1	4:E:109:LEU:HD13	1.81	0.45
19:O:24:THR:HG22	19:O:42:PRO:HD3	1.98	0.45
19:O:64:TYR:OH	21:B:52:A:OP2	2.33	0.45
2:A:1426:G:C2'	2:A:1572:A:H61	2.30	0.45
2:A:2058:A:N1	2:A:2059:A:N1	2.63	0.45
7:L:19:LEU:HD23	7:L:19:LEU:H	1.81	0.45
8:N:72:ASP:OD1	8:N:74:GLU:N	2.48	0.45
19:O:94:ARG:NH1	19:O:97:PHE:O	2.50	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:V:41:GLU:O	1:V:42:LEU:HD22	2.15	0.45
2:A:1139:G:O2'	2:A:1143:A:N1	2.47	0.45
2:A:2095:A:N7	23:H:23:ALA:HB2	2.31	0.45
21:B:31:C:H2'	21:B:32:U:C5	2.52	0.45
2:A:1132:U:O2'	2:A:1133:A:N3	2.49	0.45
2:A:2055:C:OP1	2:A:2056:G:H5'	2.17	0.45
21:B:24:G:N2	21:B:27:C:N3	2.64	0.45
4:E:176:ASP:OD1	4:E:176:ASP:N	2.49	0.45
10:Q:85:ALA:O	10:Q:86:SER:OG	2.25	0.45
2:A:2094:A:C5'	23:H:22:LYS:O	2.56	0.45
19:O:8:ILE:O	19:O:15:ARG:NH2	2.50	0.45
11:R:16:GLU:OE1	11:R:16:GLU:HA	2.16	0.45
19:O:70:ALA:O	19:O:74:VAL:HG23	2.17	0.45
23:H:17:ASP:CG	23:H:19:VAL:HG23	2.37	0.45
2:A:2657:A:N6	2:A:2664:G:O2'	2.48	0.45
2:A:627:A:N6	7:L:112:LEU:O	2.50	0.45
2:A:2788:C:O2'	2:A:2809:A:N3	2.42	0.45
4:E:5:LEU:N	4:E:5:LEU:HD12	2.32	0.45
12:S:29:VAL:HG13	12:S:55:ILE:HD11	1.99	0.45
21:B:24:G:H21	21:B:26:C:H42	1.63	0.45
2:A:301:G:O2'	2:A:302:C:O5'	2.30	0.44
2:A:534:U:HO2'	10:Q:48:ASP:CG	2.16	0.44
2:A:909:A:O2'	2:A:911:A:OP2	2.33	0.44
2:A:1365:A:OP1	15:X:2:ARG:NE	2.49	0.44
16:Y:56:LEU:O	16:Y:57:LEU:HB2	2.17	0.44
2:A:1398:C:H2'	2:A:1398:C:O2	2.17	0.44
12:S:48:LYS:O	12:S:52:GLU:HG3	2.17	0.44
19:O:27:VAL:HG12	19:O:93:ASP:HB3	1.98	0.44
20:F:65:LEU:HD23	20:F:65:LEU:H	1.83	0.44
2:A:1424:G:H2'	2:A:1425:G:C8	2.53	0.44
19:O:62:LEU:HD13	19:O:70:ALA:HB1	1.99	0.44
2:A:1172:C:O2'	2:A:1173:U:C5'	2.66	0.44
2:A:1574:C:H2'	2:A:1575:C:C6	2.53	0.44
20:F:98:PHE:CE2	20:F:102:LEU:HD11	2.53	0.44
21:B:31:C:H2'	21:B:32:U:C6	2.53	0.44
2:A:483:A:OP1	14:U:46:LYS:NZ	2.47	0.44
2:A:1398:C:O2	2:A:1399:C:C5	2.70	0.44
2:A:2084:C:H2'	2:A:2085:U:O4'	2.18	0.44
2:A:1032:A:N1	2:A:1122:G:C6	2.86	0.44
3:D:12:THR:HG22	3:D:13:ARG:N	2.32	0.44
19:O:74:VAL:O	19:O:78:VAL:HG23	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:58:G:O2'	2:A:73:A:N1	2.37	0.44
2:A:308:G:O2'	2:A:329:G:N2	2.51	0.44
2:A:2057:G:C3'	2:A:2058:A:H8	2.31	0.44
2:A:2788:C:H2'	2:A:2789:C:C6	2.53	0.44
2:A:197:A:N6	2:A:2431:U:N3	2.66	0.43
2:A:464:U:C2'	2:A:465:G:O5'	2.66	0.43
2:A:2093:G:H2'	23:H:21:VAL:CA	2.48	0.43
4:E:73:ILE:HG22	4:E:73:ILE:O	2.18	0.43
6:K:92:GLU:O	6:K:93:GLN:C	2.56	0.43
11:R:64:VAL:HG23	11:R:65:ALA:N	2.33	0.43
14:U:48:VAL:HG22	14:U:53:GLN:OE1	2.18	0.43
2:A:2291:U:C2'	2:A:2374:C:HO2'	2.31	0.43
10:Q:60:TRP:O	10:Q:64:ILE:HG12	2.17	0.43
2:A:345:A:N3	2:A:347:A:N6	2.66	0.43
2:A:659:G:O2'	4:E:95:LYS:O	2.30	0.43
11:R:14:VAL:CG2	11:R:98:ILE:HD13	2.40	0.43
2:A:1035:U:C2	2:A:1120:G:O6	2.71	0.43
2:A:1481:U:O2	2:A:1510:G:O6	2.37	0.43
2:A:1707:G:C8	2:A:1756:G:C4	3.06	0.43
2:A:2720:U:OP1	9:P:52:ARG:NH2	2.51	0.43
2:A:2095:A:OP2	23:H:26:ALA:HB3	2.19	0.43
2:A:2252:G:N2	2:A:2255:G:O4'	2.51	0.43
20:F:92:GLY:O	20:F:95:MET:HG2	2.19	0.43
21:B:5:U:OP1	21:B:61:G:O2'	2.35	0.43
2:A:1735:A:H2'	2:A:1736:U:O4'	2.19	0.43
12:S:83:LYS:O	12:S:84:ARG:NH1	2.46	0.43
2:A:319:G:H2'	2:A:320:A:O4'	2.19	0.43
3:D:25:THR:HG21	3:D:193:VAL:CG2	2.48	0.43
4:E:4:VAL:HG23	4:E:9:GLN:HA	1.99	0.43
8:N:22:ARG:HG3	8:N:70:THR:HA	2.00	0.43
15:X:6:VAL:HG13	15:X:7:THR:N	2.34	0.43
2:A:212:G:H2'	2:A:213:A:C8	2.53	0.43
2:A:581:C:H2'	2:A:582:A:H8	1.84	0.43
17:0:24:VAL:HG23	17:0:25:THR:N	2.34	0.43
2:A:1312:U:H4'	2:A:1313:U:O5'	2.18	0.43
4:E:6:LYS:NZ	4:E:120:VAL:O	2.52	0.43
6:K:107:LEU:HD23	6:K:115:ILE:CD1	2.49	0.43
14:U:35:VAL:HB	14:U:38:ILE:HD11	2.01	0.43
23:H:9:VAL:HG22	23:H:10:ALA:H	1.84	0.42
2:A:1138:G:N2	5:J:108:MET:SD	2.81	0.42
2:A:1175:A:H3'	2:A:1176:U:H5'	1.99	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:1271:G:N2	2:A:1617:C:O3'	2.52	0.42
2:A:2206:C:C4	2:A:2207:C:N4	2.87	0.42
20:F:34:THR:OG1	20:F:154:THR:HB	2.19	0.42
2:A:620:G:H4'	2:A:621:A:C5'	2.49	0.42
2:A:1514:G:O2'	2:A:1557:C:O2'	2.37	0.42
6:K:92:GLU:OE1	6:K:94:PRO:HD3	2.19	0.42
10:Q:78:PHE:CZ	10:Q:82:LEU:HD11	2.54	0.42
2:A:574:A:N6	2:A:2032:G:O2'	2.53	0.42
2:A:2094:A:OP2	23:H:25:TYR:HB3	2.20	0.42
2:A:2412:A:H2'	2:A:2413:G:O4'	2.19	0.42
4:E:113:VAL:HG22	4:E:118:LEU:HD23	1.99	0.42
8:N:114:GLU:OE1	8:N:118:ARG:NE	2.52	0.42
16:Y:24:GLU:N	16:Y:24:GLU:OE1	2.52	0.42
20:F:36:ASN:OD1	20:F:37:MET:N	2.52	0.42
2:A:189:G:OP2	15:X:25:LYS:NZ	2.43	0.42
2:A:2256:G:OP1	2:A:2256:G:N2	2.39	0.42
2:A:2745:C:N4	2:A:2746:U:O4	2.53	0.42
21:B:29:A:O2'	21:B:58:A:N6	2.48	0.42
2:A:2099:U:O2	2:A:2190:G:C6	2.70	0.42
2:A:2230:G:H5"	15:X:29:LEU:HD21	2.01	0.42
7:L:90:VAL:HG12	7:L:125:LEU:HD12	2.01	0.42
2:A:370:G:P	2:A:423:A:H62	2.43	0.42
2:A:541:A:N6	2:A:553:G:O6	2.53	0.42
2:A:1132:U:C5	5:J:75:TYR:HD2	2.38	0.42
2:A:2399:G:C2'	2:A:2400:G:O4'	2.68	0.42
8:N:70:THR:O	8:N:71:ARG:C	2.57	0.42
10:Q:88:GLU:OE1	10:Q:88:GLU:HA	2.19	0.42
14:U:98:ASN:OD1	14:U:98:ASN:C	2.58	0.42
20:F:37:MET:HE3	20:F:52:ALA:HB3	2.00	0.42
2:A:2237:G:O2'	2:A:2239:G:N7	2.45	0.42
4:E:168:ASP:OD1	4:E:169:VAL:N	2.53	0.42
2:A:1425:G:H2'	2:A:1426:G:O4'	2.20	0.42
3:D:26:VAL:HG12	3:D:186:LEU:HD12	2.01	0.42
9:P:91:VAL:HG21	9:P:96:LEU:HD11	2.02	0.42
19:O:18:LEU:HD22	19:O:25:ARG:HD3	2.02	0.42
19:O:78:VAL:HG22	19:O:81:ARG:HH21	1.85	0.42
2:A:197:A:C6	2:A:2431:U:C4	3.08	0.42
2:A:245:G:O2'	2:A:384:A:N1	2.44	0.42
2:A:998:C:OP2	10:Q:57:ARG:NH2	2.53	0.42
2:A:1172:C:O2'	2:A:1173:U:C6	2.72	0.42
2:A:225:C:N3	2:A:231:A:N6	2.67	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:1215:G:O6	2:A:1235:G:C2	2.73	0.41
2:A:1754:A:N6	2:A:2717:C:O4'	2.53	0.41
2:A:2725:A:O2'	2:A:2726:A:OP2	2.34	0.41
2:A:2834:G:O2'	2:A:2835:A:O5'	2.27	0.41
9:P:85:VAL:HG13	9:P:85:VAL:O	2.19	0.41
12:S:5:ALA:HB3	12:S:54:ALA:HB2	2.02	0.41
2:A:2322:A:N6	2:A:2333:A:H62	2.17	0.41
2:A:2720:U:C2	2:A:2721:A:C8	3.08	0.41
6:K:80:ASP:OD1	6:K:80:ASP:N	2.52	0.41
9:P:27:VAL:HG13	9:P:27:VAL:O	2.19	0.41
13:T:13:ALA:HB1	16:Y:33:ALA:CB	2.50	0.41
2:A:2244:U:C2	2:A:2434:A:C8	3.08	0.41
15:X:56:ARG:O	23:H:11:ASN:ND2	2.51	0.41
21:B:32:U:H2'	21:B:33:G:C8	2.55	0.41
2:A:802:A:H2'	2:A:803:U:O4'	2.20	0.41
2:A:1235:G:H4'	2:A:1236:G:OP1	2.20	0.41
3:D:24:VAL:CG1	3:D:178:VAL:HG21	2.49	0.41
8:N:11:ASN:O	8:N:12:ARG:HG3	2.21	0.41
2:A:645:C:N4	2:A:2349:G:N3	2.67	0.41
2:A:1204:A:O4'	2:A:1206:G:C8	2.73	0.41
2:A:2082:A:N6	2:A:2237:G:O2'	2.43	0.41
2:A:1565:C:HO2'	2:A:1566:A:P	2.44	0.41
2:A:540:C:N4	2:A:541:A:H62	2.18	0.41
2:A:1132:U:O2'	2:A:1133:A:O5'	2.39	0.41
2:A:2059:A:C8	2:A:2059:A:H3'	2.55	0.41
15:X:39:VAL:HG23	15:X:39:VAL:O	2.21	0.41
2:A:1753:G:H22	2:A:1756:G:P	2.44	0.41
2:A:2425:A:H4'	2:A:2426:A:O5'	2.19	0.41
2:A:2813:A:C4	2:A:2814:A:C8	3.09	0.41
11:R:25:LEU:HD13	11:R:27:ILE:HD12	2.03	0.41
14:U:7:ASP:OD1	14:U:7:ASP:O	2.38	0.41
2:A:280:U:O4	2:A:361:G:N2	2.54	0.41
2:A:549:G:H5"	2:A:550:C:C6	2.56	0.41
2:A:1011:G:C6	2:A:1151:A:C6	3.08	0.41
2:A:1311:G:N2	2:A:1603:A:H62	2.19	0.41
12:S:42:LYS:O	12:S:45:VAL:HG12	2.20	0.41
14:U:24:VAL:O	14:U:24:VAL:HG23	2.21	0.41
2:A:1674:G:N2	2:A:1677:A:N1	2.68	0.41
6:K:93:GLN:O	6:K:94:PRO:C	2.59	0.41
6:K:105:ARG:O	6:K:108:ARG:NE	2.54	0.41
20:F:15:LEU:HD23	20:F:18:GLU:OE2	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:1399:C:C2	2:A:1400:U:C5	3.09	0.40
2:A:1720:U:H2'	2:A:1721:G:O4'	2.21	0.40
2:A:1734:G:H2'	2:A:1735:A:C8	2.56	0.40
2:A:2815:C:C2	2:A:2816:G:C8	3.10	0.40
3:D:186:LEU:HD11	9:P:3:ILE:HD12	2.04	0.40
20:F:15:LEU:CD2	20:F:167:ALA:HB1	2.52	0.40
2:A:83:A:O2'	2:A:103:A:N6	2.54	0.40
2:A:463:G:O2'	2:A:465:G:O6	2.38	0.40
2:A:499:U:H2'	2:A:500:G:O4'	2.22	0.40
7:L:108:ALA:HB3	7:L:125:LEU:HD22	2.03	0.40
20:F:60:SER:OG	20:F:61:GLY:N	2.54	0.40
2:A:248:G:C5	2:A:250:G:N2	2.89	0.40
2:A:674:G:H5"	4:E:71:GLY:HA3	2.03	0.40
2:A:2656:U:H2'	2:A:2657:A:C8	2.57	0.40
21:B:39:A:H2'	21:B:40:U:C6	2.56	0.40
23:H:4:ILE:HG21	23:H:44:ILE:HA	2.02	0.40
24:W:79:GLU:OE1	24:W:79:GLU:N	2.54	0.40
2:A:69:C:O2	2:A:73:A:O2'	2.28	0.40
2:A:84:A:H62	2:A:101:A:H2	1.67	0.40
2:A:1281:G:H2'	2:A:1282:U:C6	2.56	0.40
20:F:128:SER:HB2	20:F:154:THR:HG23	2.03	0.40
2:A:538:A:H2'	2:A:539:G:O4'	2.22	0.40
2:A:2187:U:H5"	23:H:31:VAL:HG21	2.03	0.40
11:R:34:GLU:OE1	11:R:36:ALA:N	2.55	0.40
19:O:26:LEU:HD23	19:O:90:VAL:HG21	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	V	92/94 (98%)	89 (97%)	3 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	D	180/209 (86%)	172 (96%)	8 (4%)	0	100	100
4	E	194/201 (96%)	184 (95%)	10 (5%)	0	100	100
5	J	140/142 (99%)	137 (98%)	3 (2%)	0	100	100
6	K	120/123 (98%)	112 (93%)	8 (7%)	0	100	100
7	L	114/144 (79%)	94 (82%)	20 (18%)	0	100	100
8	N	118/127 (93%)	109 (92%)	9 (8%)	0	100	100
9	P	112/115 (97%)	110 (98%)	2 (2%)	0	100	100
10	Q	115/118 (98%)	111 (96%)	4 (4%)	0	100	100
11	R	101/103 (98%)	93 (92%)	8 (8%)	0	100	100
12	S	99/110 (90%)	96 (97%)	3 (3%)	0	100	100
13	T	91/100 (91%)	81 (89%)	10 (11%)	0	100	100
14	U	100/104 (96%)	86 (86%)	14 (14%)	0	100	100
15	X	70/78 (90%)	69 (99%)	1 (1%)	0	100	100
16	Y	59/63 (94%)	47 (80%)	11 (19%)	1 (2%)	9	35
17	0	54/57 (95%)	49 (91%)	5 (9%)	0	100	100
18	2	38/46 (83%)	35 (92%)	3 (8%)	0	100	100
19	O	114/117 (97%)	105 (92%)	9 (8%)	0	100	100
20	F	175/179 (98%)	166 (95%)	9 (5%)	0	100	100
22	Z	56/59 (95%)	54 (96%)	2 (4%)	0	100	100
23	H	48/149 (32%)	32 (67%)	15 (31%)	1 (2%)	7	29
24	W	67/85 (79%)	67 (100%)	0	0	100	100
All	All	2257/2523 (90%)	2098 (93%)	157 (7%)	2 (0%)	54	83

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
16	Y	46	VAL
23	H	19	VAL

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	V	78/78 (100%)	77 (99%)	1 (1%)	69 86
3	D	143/164 (87%)	143 (100%)	0	100 100
4	E	164/165 (99%)	164 (100%)	0	100 100
5	J	116/116 (100%)	116 (100%)	0	100 100
6	K	103/104 (99%)	103 (100%)	0	100 100
7	L	83/103 (81%)	83 (100%)	0	100 100
8	N	100/103 (97%)	100 (100%)	0	100 100
9	P	99/100 (99%)	99 (100%)	0	100 100
10	Q	89/90 (99%)	89 (100%)	0	100 100
11	R	84/84 (100%)	84 (100%)	0	100 100
12	S	89/93 (96%)	89 (100%)	0	100 100
13	T	80/84 (95%)	80 (100%)	0	100 100
14	U	83/85 (98%)	83 (100%)	0	100 100
15	X	64/68 (94%)	64 (100%)	0	100 100
16	Y	55/55 (100%)	55 (100%)	0	100 100
17	0	47/48 (98%)	47 (100%)	0	100 100
18	2	32/38 (84%)	31 (97%)	1 (3%)	40 69
19	O	86/87 (99%)	85 (99%)	1 (1%)	71 87
20	F	148/150 (99%)	148 (100%)	0	100 100
22	Z	48/49 (98%)	48 (100%)	0	100 100
23	H	40/114 (35%)	39 (98%)	1 (2%)	47 75
24	W	51/63 (81%)	51 (100%)	0	100 100
All	All	1882/2041 (92%)	1878 (100%)	4 (0%)	93 97

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	V	93	ARG
18	2	12	ARG
19	O	63	LYS
23	H	21	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such

sidechains are listed below:

Mol	Chain	Res	Type
3	D	185	ASN
5	J	77	HIS
5	J	80	HIS
12	S	61	ASN
20	F	62	GLN
23	H	20	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	A	2197/2904 (75%)	320 (14%)	9 (0%)
21	B	118/119 (99%)	16 (13%)	1 (0%)
All	All	2315/3023 (76%)	336 (14%)	10 (0%)

All (336) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	A	12	U
2	A	34	U
2	A	46	G
2	A	51	G
2	A	63	A
2	A	71	A
2	A	74	A
2	A	75	G
2	A	78	U
2	A	114	U
2	A	118	A
2	A	120	U
2	A	138	U
2	A	139	U
2	A	140	C
2	A	141	G
2	A	142	A
2	A	163	C
2	A	181	A
2	A	193	U
2	A	199	A
2	A	215	G
2	A	216	A
2	A	221	A

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Mol	Chain	Res	Type
2	A	222	A
2	A	248	G
2	A	250	G
2	A	255	A
2	A	266	G
2	A	271	G
2	A	272	A
2	A	276	U
2	A	278	A
2	A	285	G
2	A	302	C
2	A	311	A
2	A	329	G
2	A	330	A
2	A	346	A
2	A	359	G
2	A	361	G
2	A	371	A
2	A	372	G
2	A	380	G
2	A	386	G
2	A	389	G
2	A	390	U
2	A	405	U
2	A	406	G
2	A	411	G
2	A	424	G
2	A	429	A
2	A	435	C
2	A	456	C
2	A	464	U
2	A	465	G
2	A	480	A
2	A	481	G
2	A	491	G
2	A	504	A
2	A	505	A
2	A	509	C
2	A	531	C
2	A	532	A
2	A	544	C
2	A	546	U

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Mol	Chain	Res	Type
2	A	547	A
2	A	548	G
2	A	550	C
2	A	563	A
2	A	572	A
2	A	586	A
2	A	603	A
2	A	613	A
2	A	614	A
2	A	615	U
2	A	621	A
2	A	627	A
2	A	637	A
2	A	645	C
2	A	647	G
2	A	654	A
2	A	655	A
2	A	669	G
2	A	671	C
2	A	683	U
2	A	685	A
2	A	686	U
2	A	812	C
2	A	819	A
2	A	825	A
2	A	827	U
2	A	828	U
2	A	830	G
2	A	833	A
2	A	846	U
2	A	847	U
2	A	856	G
2	A	865	C
2	A	866	A
2	A	871	U
2	A	874	G
2	A	875	G
2	A	878	A
2	A	901	C
2	A	905	A
2	A	906	U
2	A	910	A

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Mol	Chain	Res	Type
2	A	915	C
2	A	931	U
2	A	945	A
2	A	959	A
2	A	961	C
2	A	962	G
2	A	974	G
2	A	983	A
2	A	984	A
2	A	985	C
2	A	995	C
2	A	996	A
2	A	1009	A
2	A	1012	U
2	A	1013	C
2	A	1022	G
2	A	1026	G
2	A	1028	A
2	A	1033	U
2	A	1116	G
2	A	1118	C
2	A	1127	A
2	A	1129	A
2	A	1132	U
2	A	1133	A
2	A	1134	A
2	A	1135	C
2	A	1136	G
2	A	1142	A
2	A	1143	A
2	A	1171	G
2	A	1173	U
2	A	1174	U
2	A	1175	A
2	A	1179	G
2	A	1180	U
2	A	1186	G
2	A	1212	G
2	A	1236	G
2	A	1238	G
2	A	1249	U
2	A	1253	A

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Mol	Chain	Res	Type
2	A	1256	G
2	A	1264	A
2	A	1266	G
2	A	1271	G
2	A	1272	A
2	A	1301	A
2	A	1314	C
2	A	1325	U
2	A	1328	A
2	A	1329	U
2	A	1345	C
2	A	1352	U
2	A	1365	A
2	A	1372	U
2	A	1374	G
2	A	1378	A
2	A	1379	U
2	A	1383	A
2	A	1395	A
2	A	1403	A
2	A	1416	G
2	A	1417	C
2	A	1418	G
2	A	1421	G
2	A	1452	G
2	A	1453	A
2	A	1461	C
2	A	1482	G
2	A	1490	A
2	A	1491	G
2	A	1493	C
2	A	1496	A
2	A	1497	U
2	A	1515	A
2	A	1523	U
2	A	1524	G
2	A	1528	A
2	A	1535	A
2	A	1536	C
2	A	1537	G
2	A	1555	G
2	A	1556	C

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Mol	Chain	Res	Type
2	A	1569	A
2	A	1576	U
2	A	1583	A
2	A	1584	U
2	A	1585	C
2	A	1607	C
2	A	1608	A
2	A	1633	G
2	A	1634	A
2	A	1646	C
2	A	1647	U
2	A	1648	U
2	A	1654	A
2	A	1674	G
2	A	1715	G
2	A	1728	C
2	A	1729	U
2	A	1730	C
2	A	1732	C
2	A	1737	G
2	A	1738	G
2	A	2021	C
2	A	2023	C
2	A	2031	A
2	A	2043	C
2	A	2049	G
2	A	2055	C
2	A	2056	G
2	A	2059	A
2	A	2060	A
2	A	2061	G
2	A	2062	A
2	A	2063	C
2	A	2064	C
2	A	2068	U
2	A	2069	G
2	A	2076	U
2	A	2077	A
2	A	2079	U
2	A	2081	U
2	A	2083	G
2	A	2090	A

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Mol	Chain	Res	Type
2	A	2092	U
2	A	2093	G
2	A	2094	A
2	A	2096	C
2	A	2197	U
2	A	2198	A
2	A	2199	A
2	A	2203	U
2	A	2211	A
2	A	2212	A
2	A	2213	U
2	A	2214	C
2	A	2223	G
2	A	2225	A
2	A	2226	C
2	A	2238	G
2	A	2239	G
2	A	2244	U
2	A	2246	G
2	A	2247	A
2	A	2248	C
2	A	2249	U
2	A	2250	G
2	A	2252	G
2	A	2254	C
2	A	2255	G
2	A	2258	C
2	A	2267	A
2	A	2283	C
2	A	2287	A
2	A	2297	A
2	A	2299	U
2	A	2305	U
2	A	2311	A
2	A	2327	A
2	A	2333	A
2	A	2335	A
2	A	2336	A
2	A	2347	C
2	A	2383	G
2	A	2385	C
2	A	2402	U

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Mol	Chain	Res	Type
2	A	2406	A
2	A	2422	C
2	A	2424	C
2	A	2425	A
2	A	2426	A
2	A	2429	G
2	A	2430	A
2	A	2434	A
2	A	2435	A
2	A	2439	A
2	A	2440	C
2	A	2441	U
2	A	2609	U
2	A	2610	C
2	A	2614	A
2	A	2629	U
2	A	2639	A
2	A	2646	C
2	A	2665	A
2	A	2682	A
2	A	2689	U
2	A	2690	U
2	A	2714	G
2	A	2726	A
2	A	2729	G
2	A	2733	A
2	A	2739	U
2	A	2744	G
2	A	2747	G
2	A	2751	G
2	A	2756	U
2	A	2757	A
2	A	2762	C
2	A	2765	A
2	A	2766	A
2	A	2778	A
2	A	2780	G
2	A	2791	G
2	A	2820	A
2	A	2849	U
2	A	2850	A
2	A	2867	G

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Mol	Chain	Res	Type
2	A	2880	C
2	A	2903	U
21	B	2	G
21	B	13	G
21	B	15	A
21	B	16	G
21	B	25	U
21	B	31	C
21	B	35	C
21	B	41	G
21	B	50	A
21	B	51	G
21	B	53	A
21	B	87	U
21	B	89	U
21	B	90	C
21	B	99	A
21	B	109	A

All (10) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	A	271	G
2	A	404	A
2	A	428	A
2	A	479	A
2	A	983	A
2	A	1172	C
2	A	1235	G
2	A	1328	A
2	A	2425	A
21	B	50	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 monosaccharides 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 (i)

There are no chain breaks in this entry.

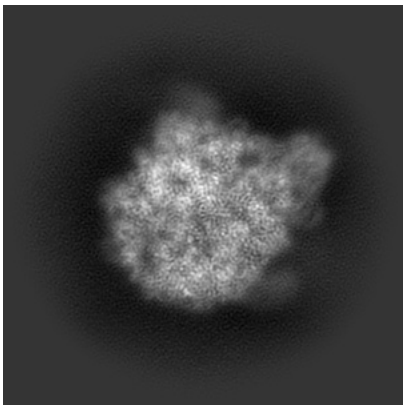
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-16496. These allow visual inspection of the internal detail of the map and identification of artifacts.

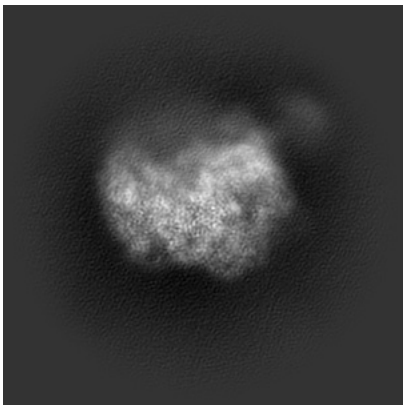
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

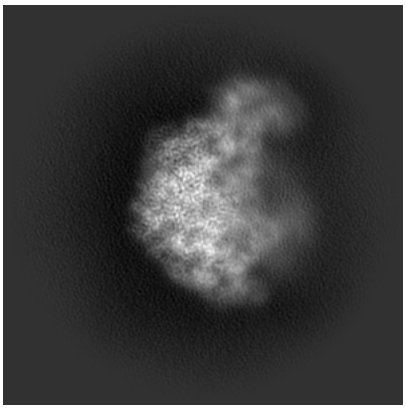
6.1.1 Primary map



X

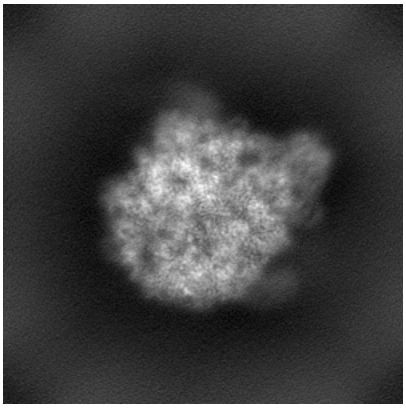


Y

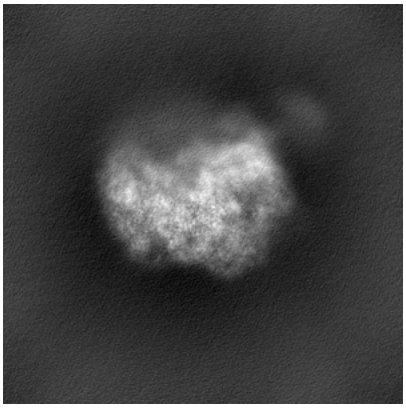


Z

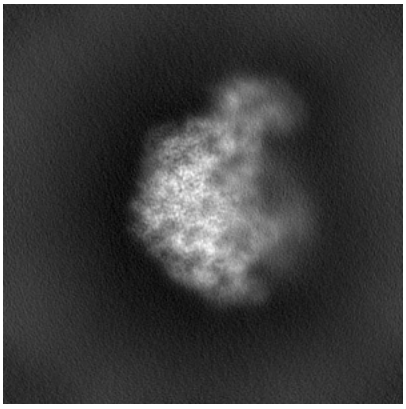
6.1.2 Raw map



X



Y

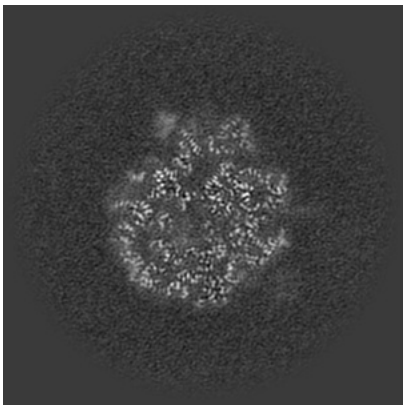


Z

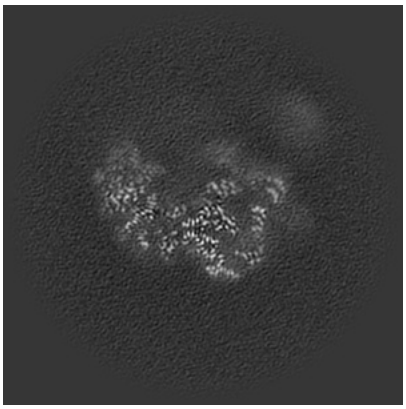
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

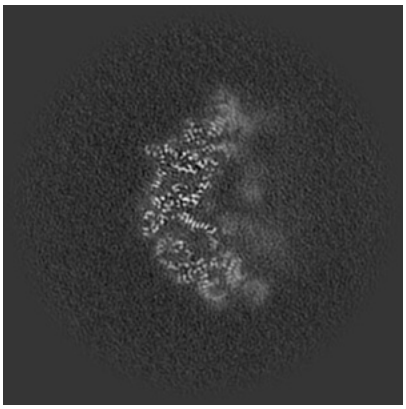
6.2.1 Primary map



X Index: 150

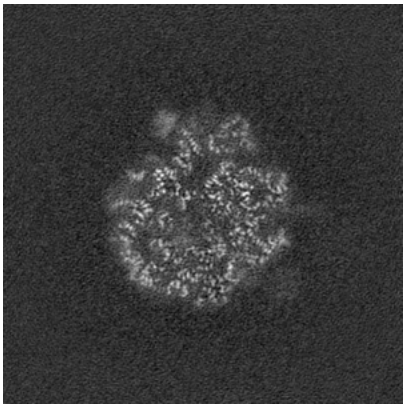


Y Index: 150

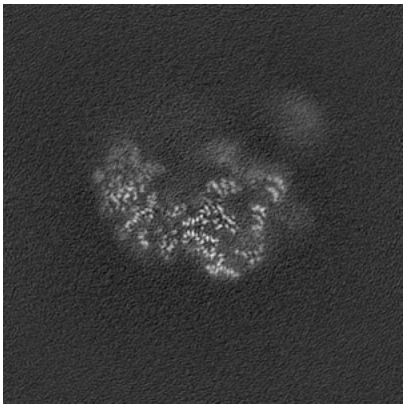


Z Index: 150

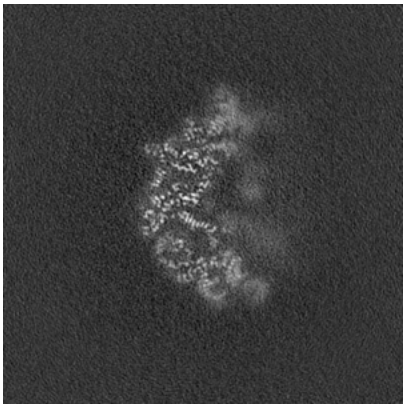
6.2.2 Raw map



X Index: 150



Y Index: 150

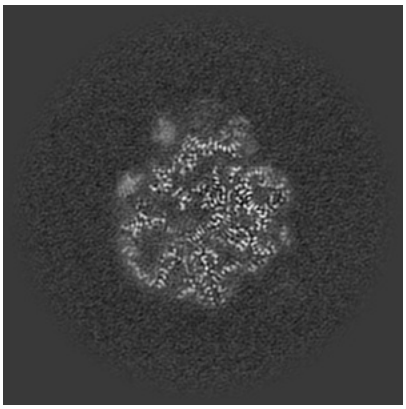


Z Index: 150

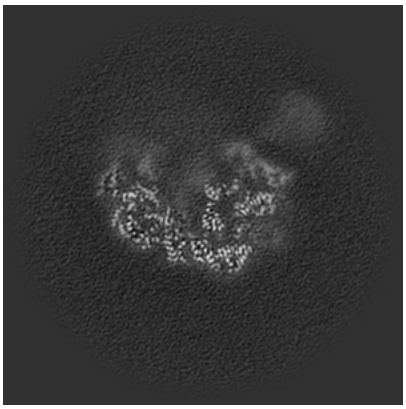
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

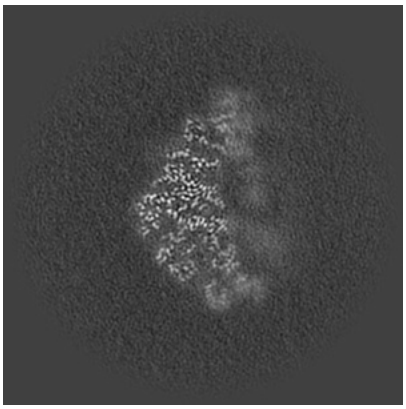
6.3.1 Primary map



X Index: 145

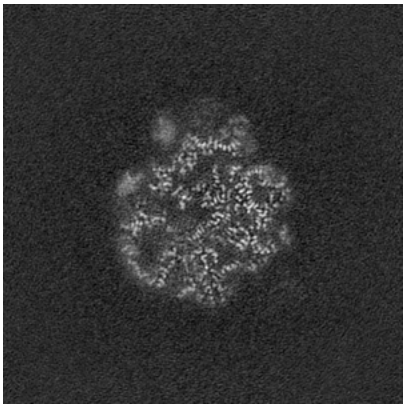


Y Index: 139

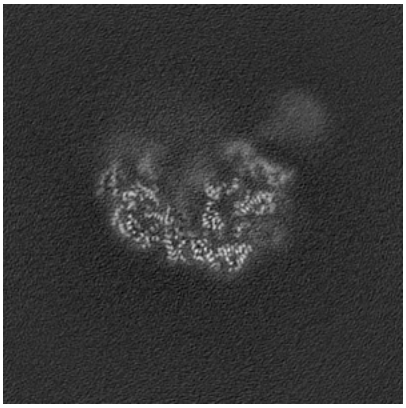


Z Index: 154

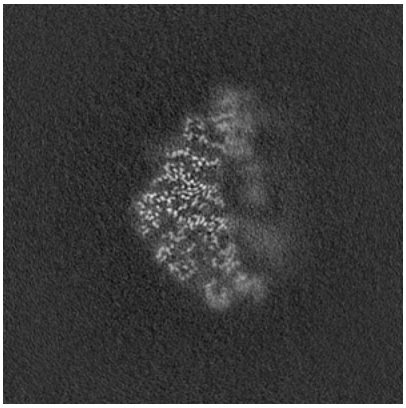
6.3.2 Raw map



X Index: 145



Y Index: 139

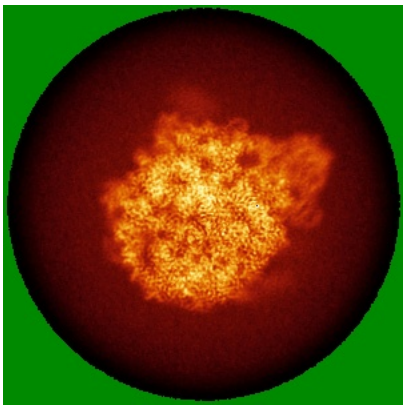


Z Index: 154

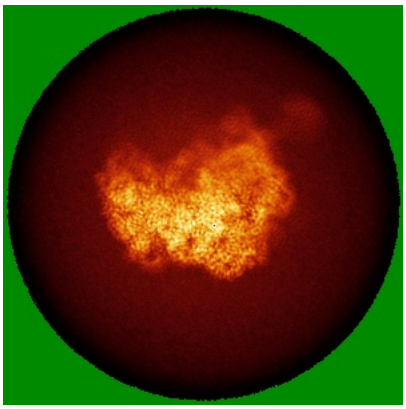
The images above show the largest variance slices of the map in three orthogonal directions.

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

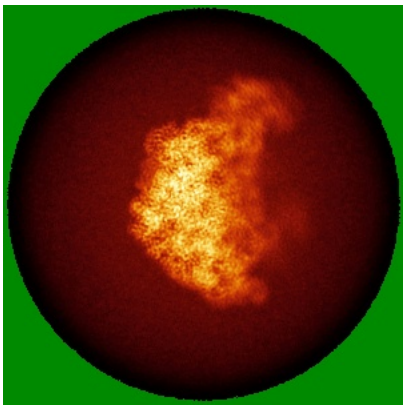
6.4.1 Primary map



X

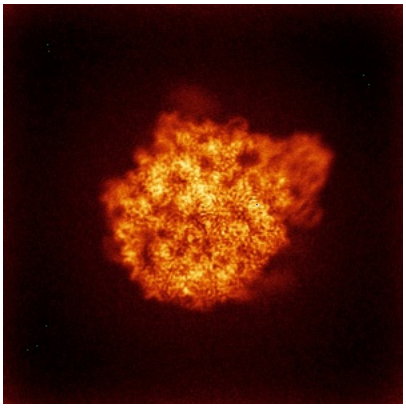


Y

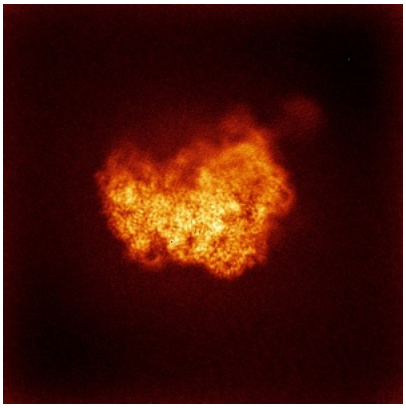


Z

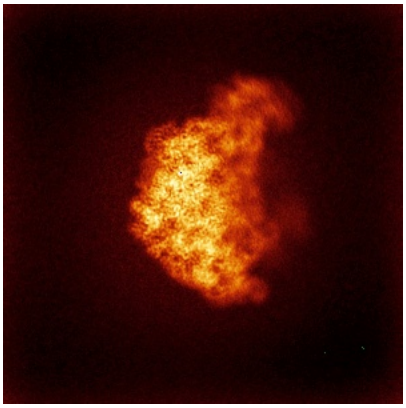
6.4.2 Raw map



X



Y

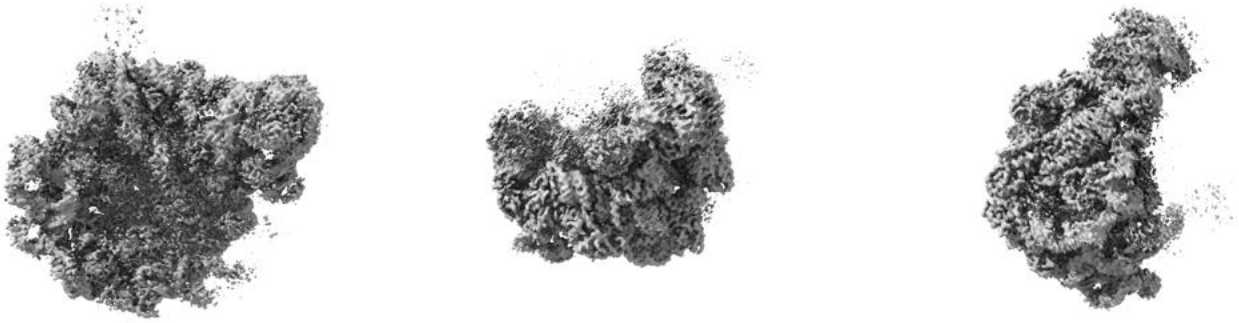


Z

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

6.5 Orthogonal surface views (i)

6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.5. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

X Y Z

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

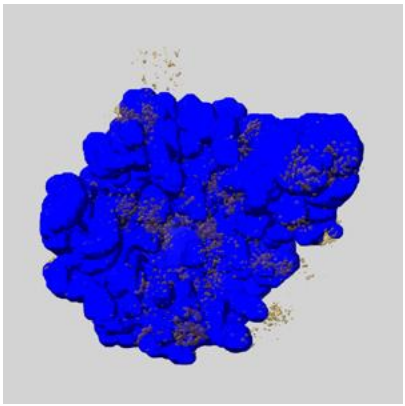
6.6 Mask visualisation (i)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

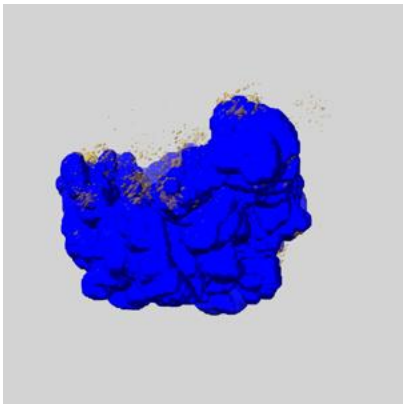
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

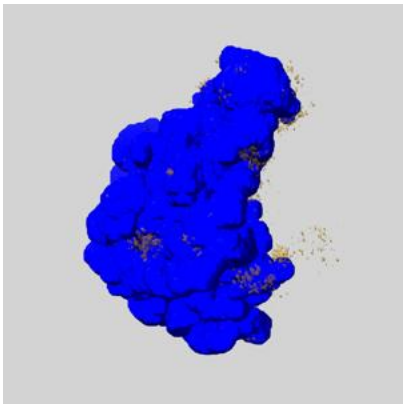
6.6.1 emd_16496_msk_1.map (i)



X



Y

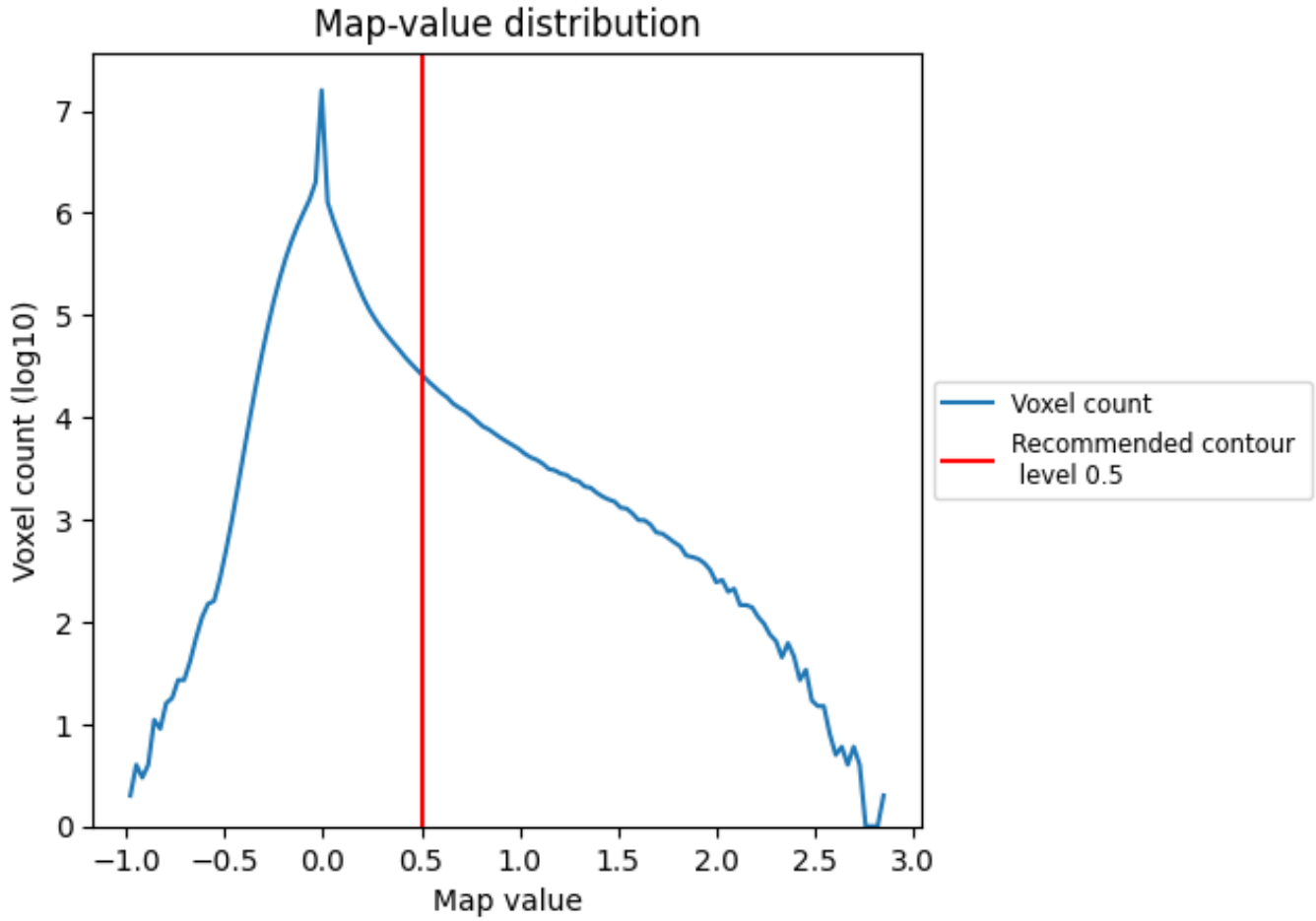


Z

7 Map analysis

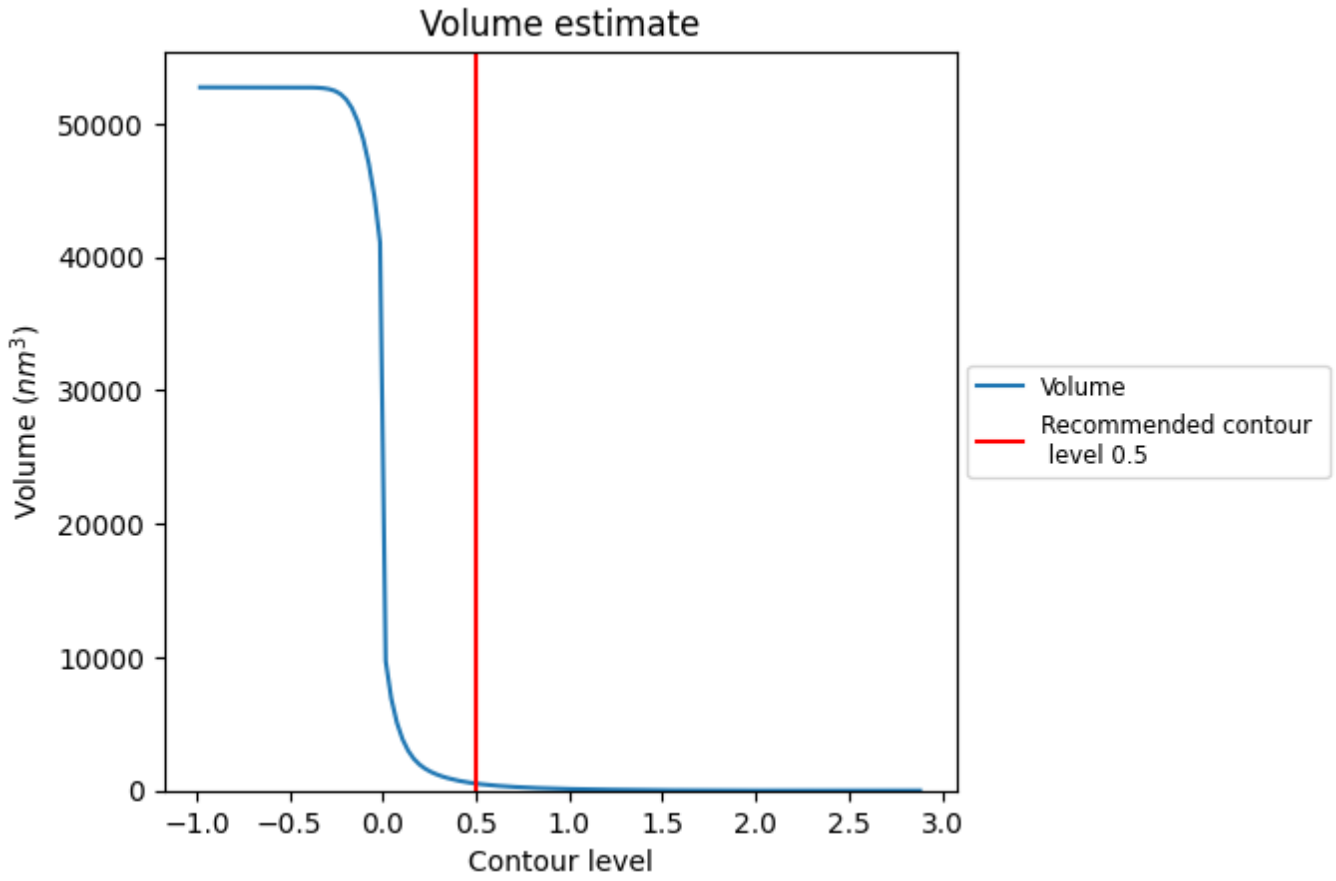
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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

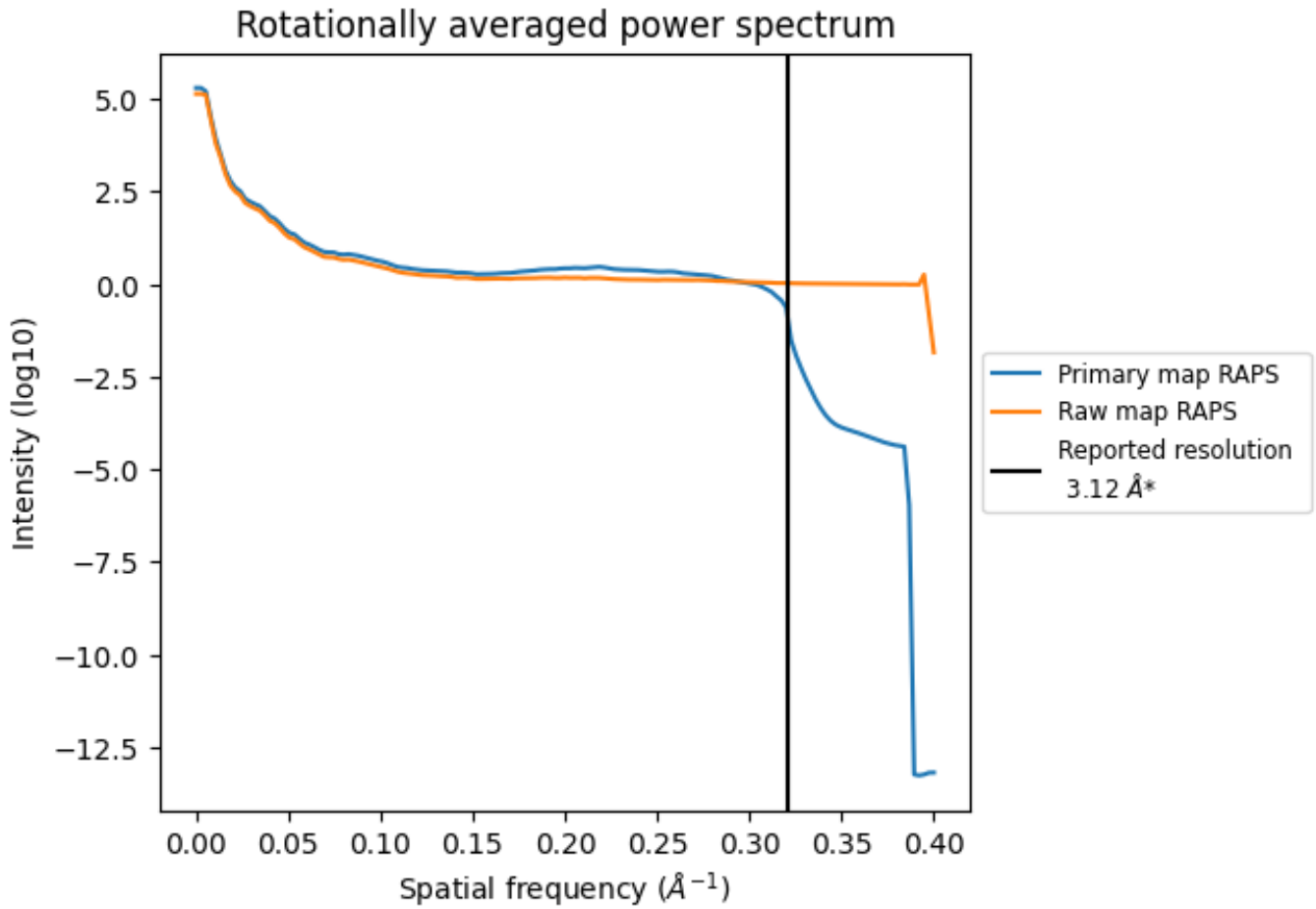
7.2 Volume estimate



The volume at the recommended contour level is 525 nm^3; this corresponds to an approximate mass of 474 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)

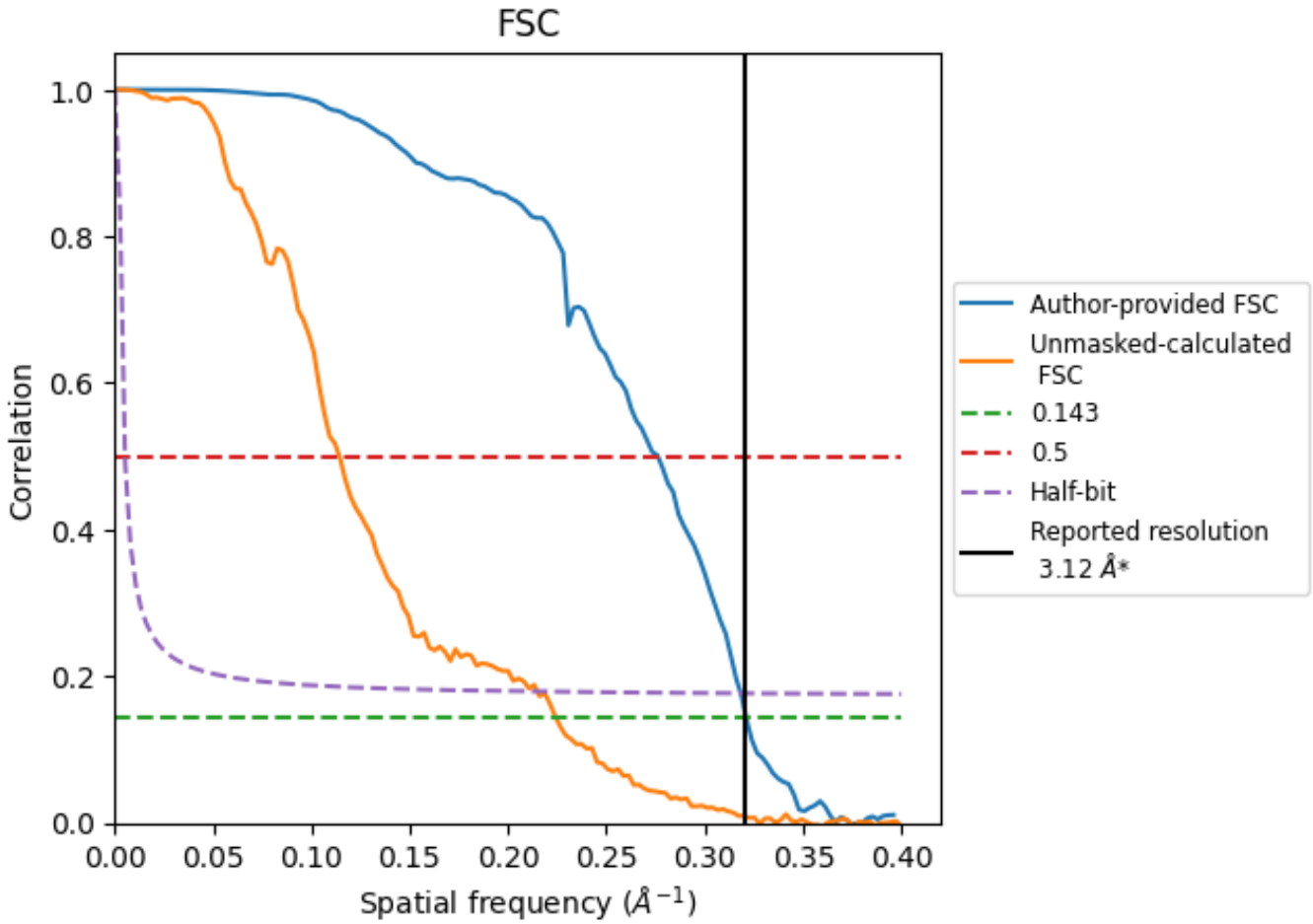


*Reported resolution corresponds to spatial frequency of 0.321 $Å^{-1}$

8 Fourier-Shell correlation

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

8.1 FSC



*Reported resolution corresponds to spatial frequency of 0.321 Å^{-1}

8.2 Resolution estimates (i)

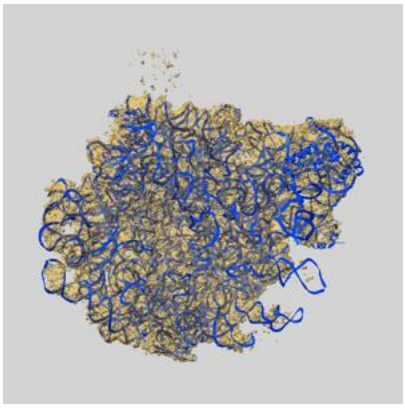
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.12	-	-
Author-provided FSC curve	3.11	3.62	3.14
Unmasked-calculated*	4.46	8.76	4.65

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.46 differs from the reported value 3.12 by more than 10 %

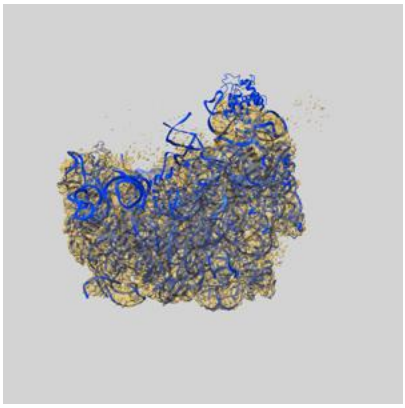
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-16496 and PDB model 8C8Z. Per-residue inclusion information can be found in section 3 on page 8.

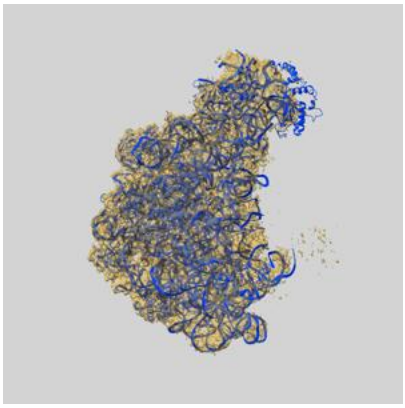
9.1 Map-model overlay



X



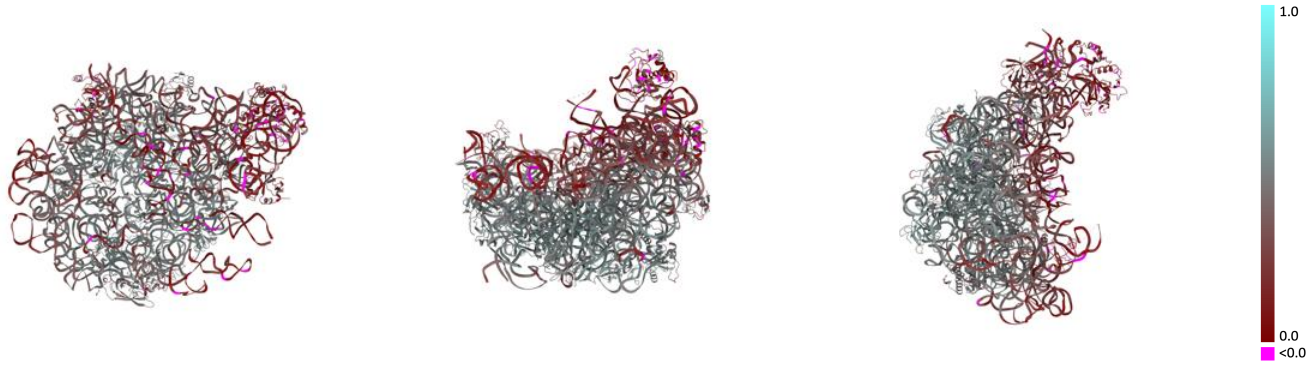
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.5 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.

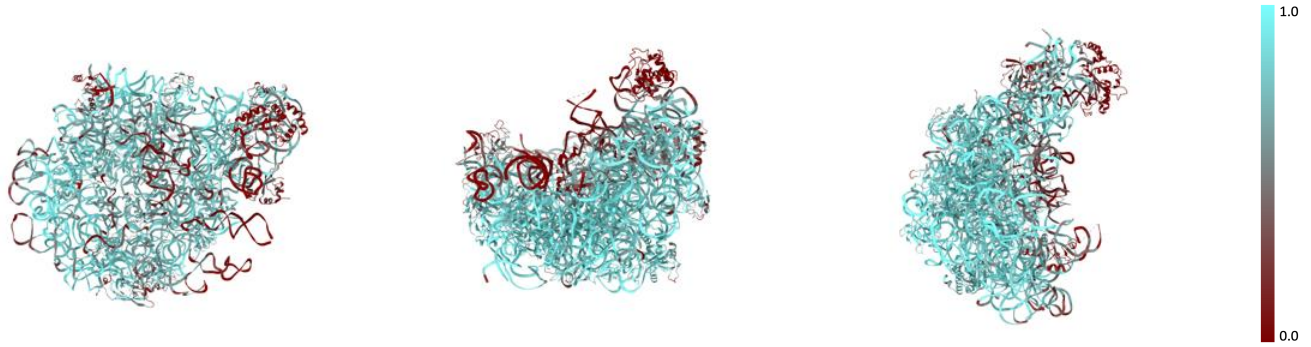
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

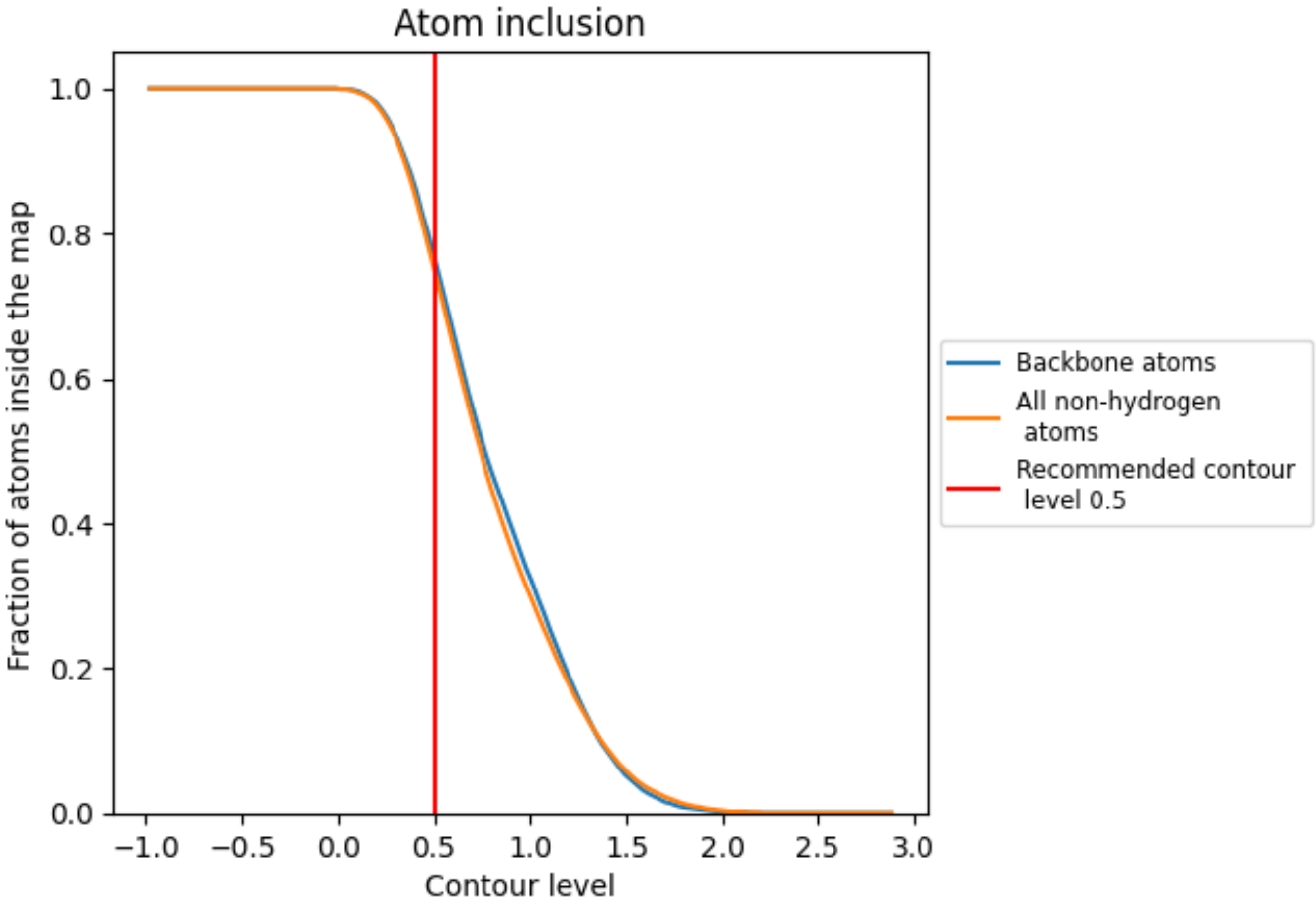
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.5).

9.4 Atom inclusion (i)



At the recommended contour level, 77% of all backbone atoms, 75% 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 (0.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7520	0.3990
0	0.8250	0.5280
2	0.7780	0.4990
A	0.7880	0.3970
B	0.7300	0.2400
D	0.7880	0.5040
E	0.7770	0.4900
F	0.0740	0.1560
H	0.1720	0.1860
J	0.8450	0.5190
K	0.3970	0.3590
L	0.7190	0.4520
N	0.8680	0.5180
O	0.5180	0.2110
P	0.6760	0.4430
Q	0.8920	0.5310
R	0.8180	0.5170
S	0.7700	0.5030
T	0.7840	0.4870
U	0.8290	0.4960
V	0.3010	0.2310
W	0.6840	0.4190
X	0.4530	0.3550
Y	0.8090	0.4410
Z	0.8240	0.5200