



Full wwPDB EM Validation Report ⓘ

Nov 27, 2023 – 07:33 pm GMT

PDB ID : 8PVL
EMDB ID : EMD-17970
Title : Chaetomium thermophilum pre-60S State 7 - pre-5S rotation lacking
Utp30/ITS2 - composite structure
Authors : Thoms, M.; Cheng, J.; Denk, T.; Berninghausen, O.; Beckmann, R.
Deposited on : 2023-07-17
Resolution : 2.19 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:

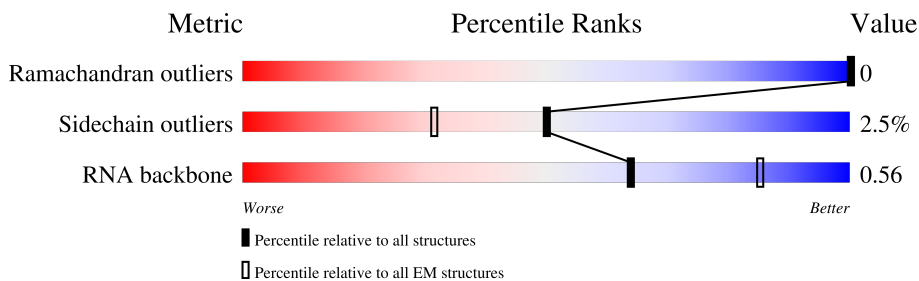
EMDB validation analysis : 0.0.1.dev70
Mogul : 1.8.4, CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

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 2.19 Å.

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






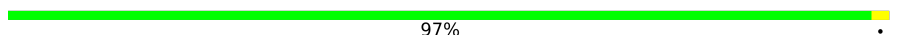
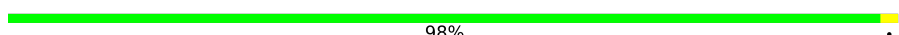






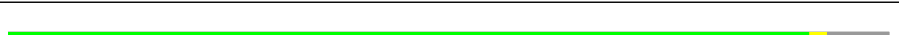

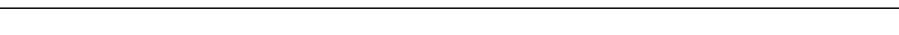
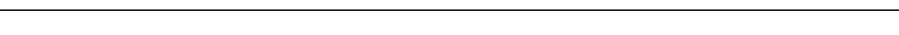
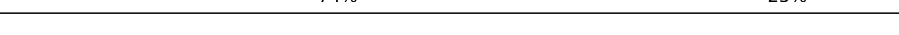
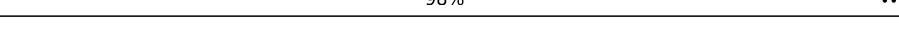
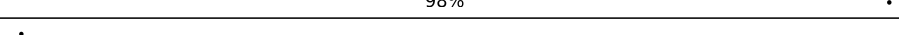
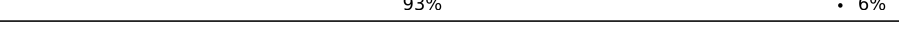
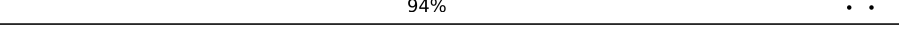


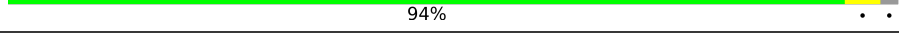
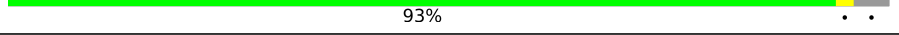
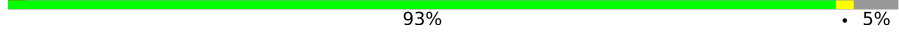
Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	C1	3342	 74% 17% 8%
2	C2	156	 84% 15%
3	C3	162	 98%
4	C4	119	 77% 22%
5	CF	270	 87% 9%
6	CH	661	 92% 5%
7	CI	414	 21% 78%
8	CJ	679	 55% 44%

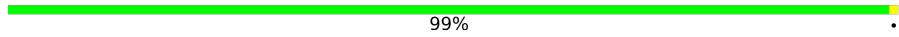
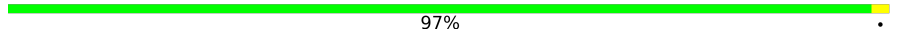


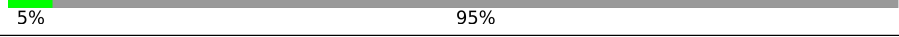
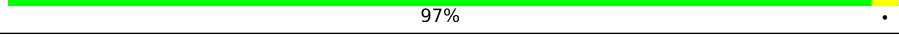


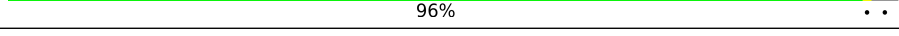

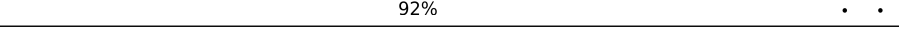
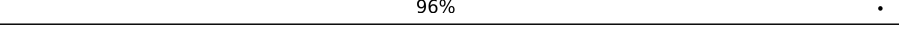

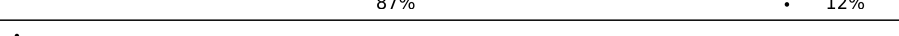
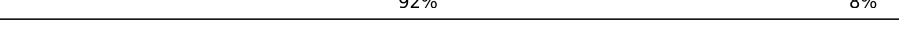
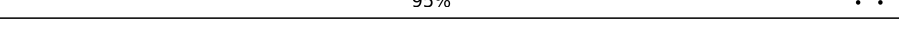
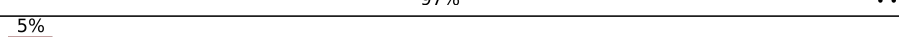
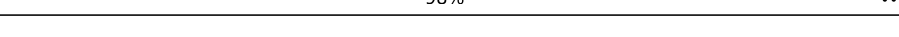
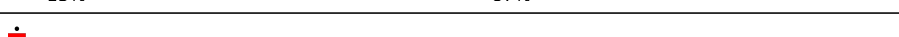






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Mol	Chain	Length	Quality of chain
9	CK	261	 89% 9%
10	CL	558	 14% 86%
11	CM	249	 86% 13%
11	LF	249	 97%
12	CN	246	 98%
13	CO	120	 52% 48%
14	CQ	225	 80% 19%
15	Cb	117	 83% 14%
16	Cd	627	 72% 26%
17	Ce	443	 52% 46%
18	Cf	350	 79% 19%
19	Cg	202	 90% 7%
20	Ch	517	 91% 6%
21	Cz	123	 78% 18%
22	LA	254	 74% 25%
23	LB	392	 98%
24	LC	365	 98%
25	LD	304	 93% 6%
26	LE	200	 94%
27	LG	262	 89% 10%
28	LH	229	 81% 17%
29	LJ	173	 94%
30	LK	165	 93%
31	LL	213	 93% 5%
32	LM	142	 98%

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Mol	Chain	Length	Quality of chain
33	LN	203	 99%
34	LO	204	 97%
35	LP	187	 91% 9%
36	LQ	213	 69% 30%
37	LR	2898	 5% 95%
38	LS	174	 97%
39	LT	160	 79% 19%
40	LU	127	 80% 17%
41	LV	139	 96%
42	LX	156	 90% 7%
43	LY	138	 92%
44	LZ	135	 96%
45	La	149	 72% 28%
46	Lc	108	 87% 12%
47	Ld	120	 92% 8%
48	Le	131	 95%
49	Lf	109	 97%
50	Lg	119	 5% 98%
51	Lh	935	 13% 87%
52	Li	110	 88% 8%
53	Lj	95	 92% 7%
54	Lk	94	 79% 19%
55	Ll	51	 96%
56	Lp	92	 97%
57	Lq	147	 94% 5%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
1	OMC	C1	1420	X	-	-	-
1	OMG	C1	1433	X	-	-	-
1	OMC	C1	1491	X	-	-	-
1	OMC	C1	1812	X	-	-	-
1	OMC	C1	1836	X	-	-	-
1	OMC	C1	2300	X	-	-	-
1	OMG	C1	2358	X	-	-	-
1	OMG	C1	2578	X	-	-	-
1	OMG	C1	2774	X	-	-	-
1	OMC	C1	2838	X	-	-	-
1	OMG	C1	2876	X	-	-	-
1	OMG	C1	2881	X	-	-	-
1	OMC	C1	2918	X	-	-	-
1	OMG	C1	385	X	-	-	-
1	OMG	C1	627	X	-	-	-
1	OMG	C1	646	X	-	-	-
1	OMC	C1	778	X	-	-	-
1	OMG	C1	787	X	-	-	-

2 Entry composition [i](#)

There are 61 unique types of molecules in this entry. The entry contains 152760 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 26S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	C1	3078	65888	29429	11926	21455	3078	0	0

- Molecule 2 is a RNA chain called 5.8S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	C2	156	3319	1484	589	1090	156	0	0

- Molecule 3 is a RNA chain called ITS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	C3	3	60	27	7	23	3	0	0

- Molecule 4 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	C4	119	2536	1131	453	833	119	0	0

- Molecule 5 is a protein called Large ribosomal subunit protein uL10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	CF	245	1934	1215	350	360	9	0	0

- Molecule 6 is a protein called Nucleolar GTP-binding protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	CH	627	5063	3181	924	939	19	0	0

- Molecule 7 is a protein called Putative RNA-binding protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	CI	91	720	467	130	120	3	0	0

- Molecule 8 is a protein called Pescadillo homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	CJ	382	3116	2008	548	550	10	0	0

- Molecule 9 is a protein called Ribosome biogenesis protein NSA2 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	CK	237	1903	1198	368	333	4	0	0

- Molecule 10 is a protein called Putative GTP binding protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
10	CL	79	622	389	125	108	0	0

- Molecule 11 is a protein called 60S ribosomal protein l7-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	CM	216	1769	1142	328	296	3	0	0
11	LF	248	2023	1297	377	346	3	0	0

- Molecule 12 is a protein called Eukaryotic translation initiation factor 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	CN	246	1853	1156	322	368	7	0	0

- Molecule 13 is a protein called DUF2423 domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	CO	62	468	290	94	82	2	0	0

- Molecule 14 is a protein called Ribosome biogenesis protein RLP24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	CQ	183	1480	925	304	241	10	0	0

- Molecule 15 is a protein called Zinc finger domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	Cb	101	830	517	161	148	4	0	0

- Molecule 16 is a protein called Nucleolar GTP-binding protein 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	Cd	462	3691	2350	671	659	11	0	0

- Molecule 17 is a protein called Ribosome biogenesis protein NOP53.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	Ce	239	1977	1231	378	364	4	0	0

- Molecule 18 is a protein called Ribosome production factor 2 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	Cf	285	2282	1443	417	401	21	0	0

- Molecule 19 is a protein called Ribosome biogenesis regulatory protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	Cg	188	1478	924	283	270	1	0	0

- Molecule 20 is a protein called Ribosome assembly protein 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	Ch	485	3812	2396	696	710	10	1	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Ch	117	ASP	GLU	engineered mutation	UNP G0SC29

- Molecule 21 is a protein called rRNA-processing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	Cz	101	869	541	180	144	4	0	0

- Molecule 22 is a protein called 60S ribosomal protein L2-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	LA	191	1454	917	278	256	3	0	0

- Molecule 23 is a protein called 60S ribosomal protein L3-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	LB	389	3104	1973	579	539	13	0	0

- Molecule 24 is a protein called 60S ribosomal protein L4-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	LC	363	2751	1737	527	478	9	0	0

- Molecule 25 is a protein called 60S ribosomal protein l5-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	LD	286	2266	1434	407	422	3	0	0

- Molecule 26 is a protein called 60S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	LE	191	1477	944	267	263	3	0	0

- Molecule 27 is a protein called 60S ribosomal protein L8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	LG	235	1889	1210	350	324	5	0	0

- Molecule 28 is a protein called 60S ribosomal protein l9-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	LH	190	1495	949	268	272	6	0	0

- Molecule 29 is a protein called Putative ribosomal protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	LJ	169	1357	850	266	235	6	0	0

- Molecule 30 is a protein called 60S ribosomal protein L12-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	LK	158	1184	743	215	224	2	0	0

- Molecule 31 is a protein called 60S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	LL	203	1587	989	325	271	2	0	0

- Molecule 32 is a protein called 60S ribosomal protein L14-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	LM	141	1126	714	216	195	1	0	0

- Molecule 33 is a protein called Ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	LN	202	1704	1062	360	278	4	0	0

- Molecule 34 is a protein called 60S ribosomal protein L16-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	LO	203	Total	C	N	O	S	0	0
			1611	1034	305	267	5		

- Molecule 35 is a protein called 60S ribosomal protein l17-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	LP	171	Total	C	N	O	S	0	0
			1343	834	274	232	3		

- Molecule 36 is a protein called Ribosomal protein L18-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	LQ	150	Total	C	N	O	S	0	0
			1200	759	239	200	2		

- Molecule 37 is a protein called Ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	LR	155	Total	C	N	O	S	0	0
			1241	772	262	203	4		

- Molecule 38 is a protein called 60S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	LS	174	Total	C	N	O	S	0	0
			1426	917	266	238	5		

- Molecule 39 is a protein called 60S ribosomal protein l21-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	LT	129	Total	C	N	O	S	0	0
			1027	651	195	179	2		

- Molecule 40 is a protein called 60S ribosomal protein L22-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	LU	105	Total	C	N	O	S	0	0
			846	548	146	151	1		

- Molecule 41 is a protein called 60S ribosomal protein l23-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
41	LV	135	991	630	184	170	7	0	0

- Molecule 42 is a protein called 60S ribosomal protein L25-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
42	LX	145	1133	723	211	199		0	0

- Molecule 43 is a protein called 60S ribosomal protein L26-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
43	LY	133	1056	658	213	183	2	0	0

- Molecule 44 is a protein called 60S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
44	LZ	135	1112	713	207	188	4	0	0

- Molecule 45 is a protein called 60S ribosomal protein L28-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
45	La	108	872	556	168	147	1	0	0

- Molecule 46 is a protein called 60S ribosomal protein l30-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
46	Lc	95	705	449	122	129	5	0	0

- Molecule 47 is a protein called Putative 60S ribosomal protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
47	Ld	110	875	555	171	148	1	0	0

- Molecule 48 is a protein called 60S ribosomal protein L32-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
48	Le	126	1017	640	208	163	6	0	0

- Molecule 49 is a protein called 60S ribosomal protein l33-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	Lf	108	862	546	171	144	1	0	0

- Molecule 50 is a protein called Ribosomal protein l34-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
50	Lg	118	914	567	186	157	4	0	0

- Molecule 51 is a protein called dolichyl-diphosphooligosaccharide--protein glycotransferase.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
51	Lh	122	1003	637	198	168	0	0

- Molecule 52 is a protein called 60S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
52	Li	101	827	509	181	136	1	0	0

- Molecule 53 is a protein called Ribosomal protein L37.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
53	Lj	88	698	427	154	112	5	0	0

- Molecule 54 is a protein called 60S ribosomal protein L38-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
54	Lk	76	632	400	121	109	2	0	0

- Molecule 55 is a protein called Ribosomal protein eL39.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
55	Ll	50	436	275	97	64	0	0

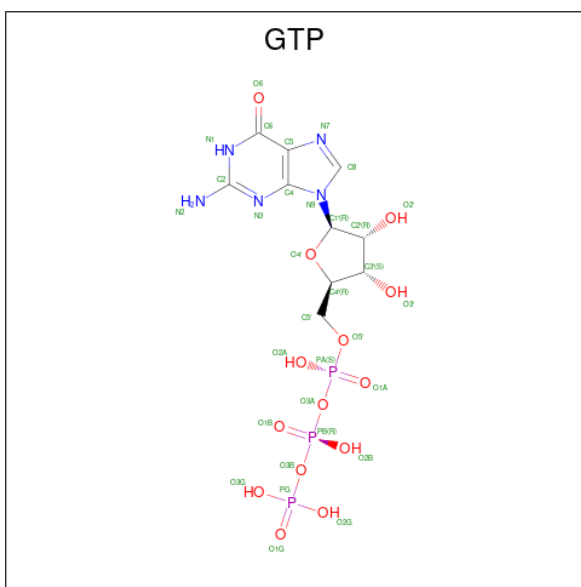
- Molecule 56 is a protein called 60S ribosomal protein L43-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
56	Lp	91	698	430	138	124	6	0	0

- Molecule 57 is a protein called Putative 60S ribosomal protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
57	Lq	139	1073	672	213	188	0	0

- Molecule 58 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
58	CH	1	32	10	5	14	3	0
58	Cd	1	32	10	5	14	3	0

- Molecule 59 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	AltConf
59	CH	1	Total Mg 1 1	0
59	Cd	2	Total Mg 2 2	0

- Molecule 60 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	AltConf
60	CQ	1	Total Zn 1 1	0
60	Cb	1	Total Zn 1 1	0
60	Lg	1	Total Zn 1 1	0
60	Lj	1	Total Zn 1 1	0
60	Lp	1	Total Zn 1 1	0

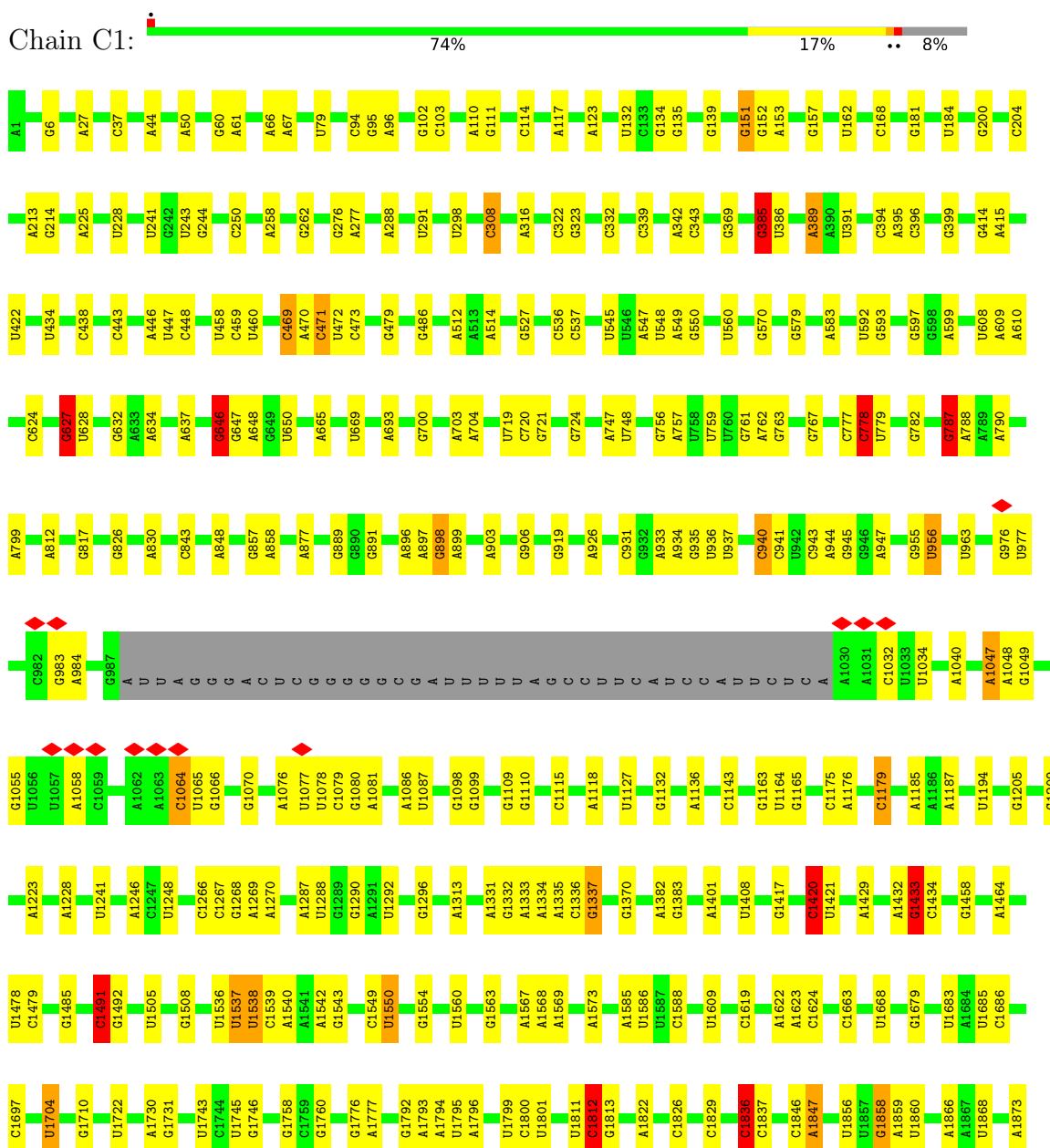
- Molecule 61 is water.

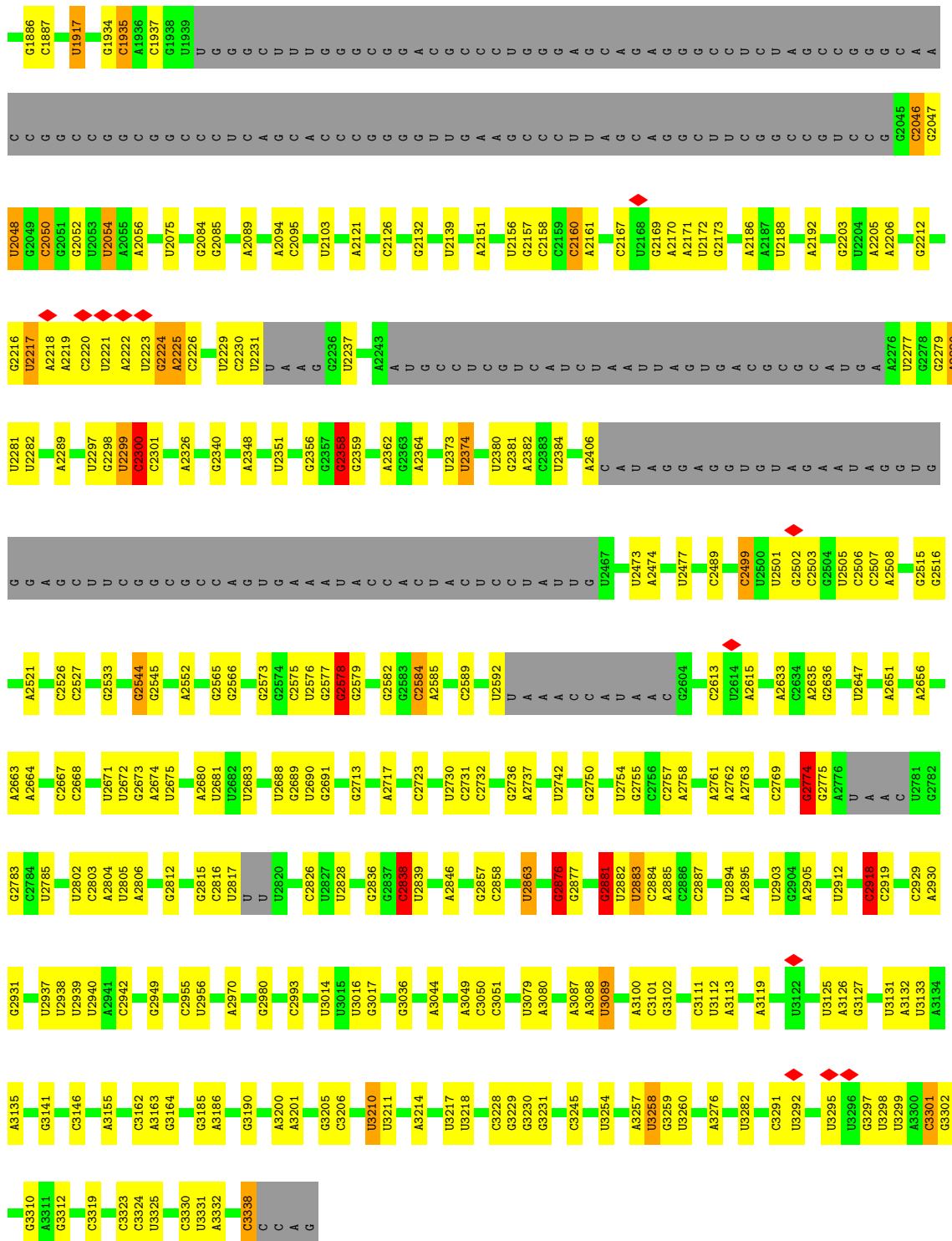
Mol	Chain	Residues	Atoms	AltConf
61	CH	1	Total O 1 1	0
61	Cd	2	Total O 2 2	0

3 Residue-property plots

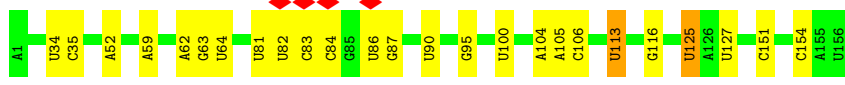
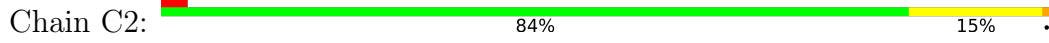
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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.

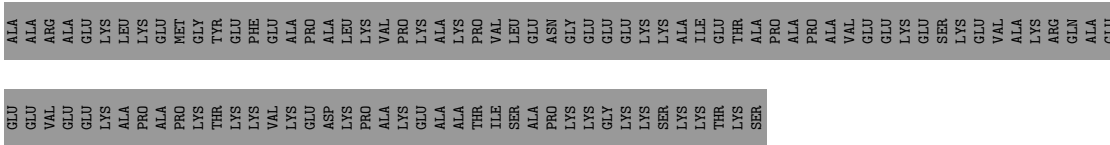
- Molecule 1: 26S rRNA



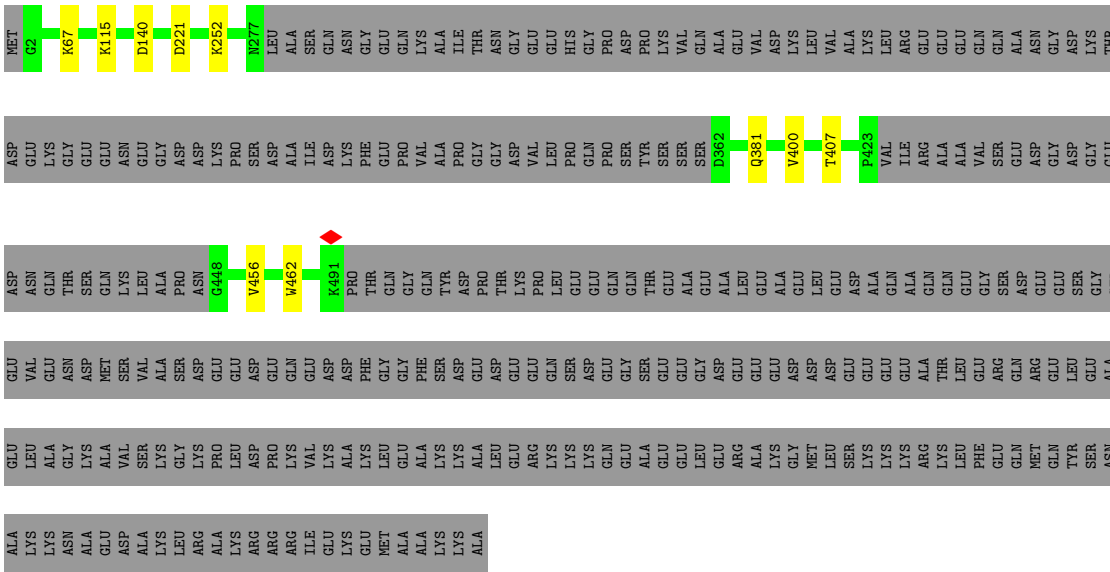


• Molecule 2: 5.8S rRNA

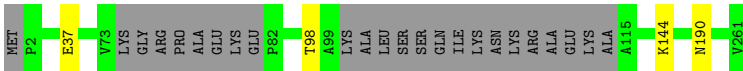




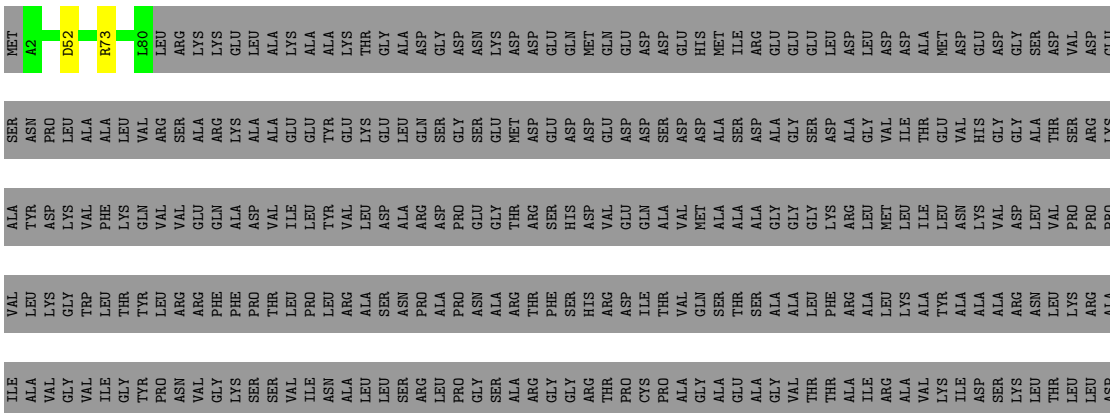
● Molecule 8: Pescadillo homolog

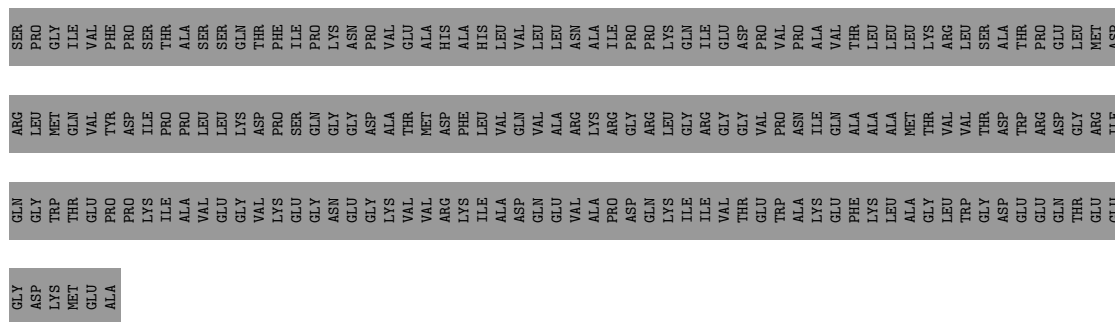


● Molecule 9: Ribosome biogenesis protein NSA2 homolog

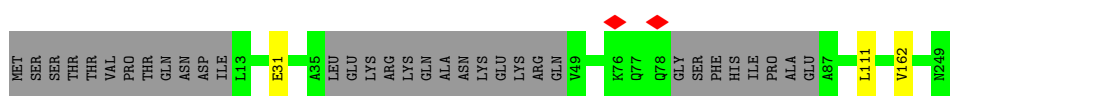


● Molecule 10: Putative GTP binding protein

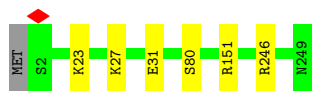




• Molecule 11: 60S ribosomal protein l7-like protein



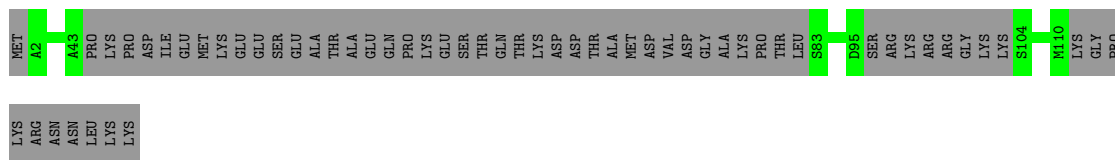
• Molecule 11: 60S ribosomal protein l7-like protein



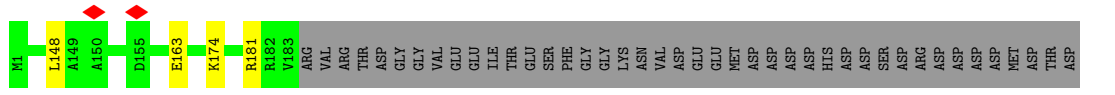
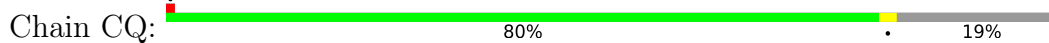
• Molecule 12: Eukaryotic translation initiation factor 6



• Molecule 13: DUF2423 domain-containing protein



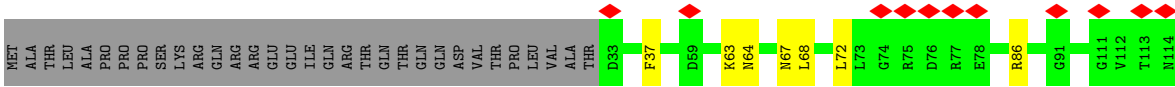
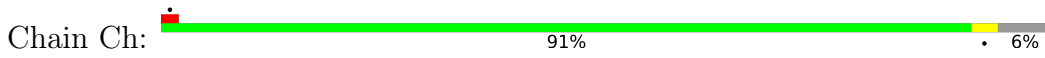
• Molecule 14: Ribosome biogenesis protein RLP24



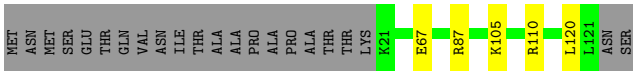
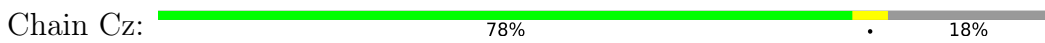
• Molecule 15: Zinc finger domain-containing protein



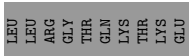
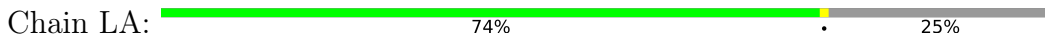
- Molecule 20: Ribosome assembly protein 4



- Molecule 21: rRNA-processing protein



- Molecule 22: 60S ribosomal protein L2-like protein



- Molecule 23: 60S ribosomal protein L3-like protein



- Molecule 24: 60S ribosomal protein L4-like protein



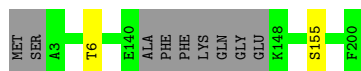
- Molecule 25: 60S ribosomal protein l5-like protein





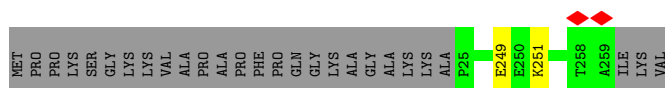
- Molecule 26: 60S ribosomal protein L6

Chain LE: 94%



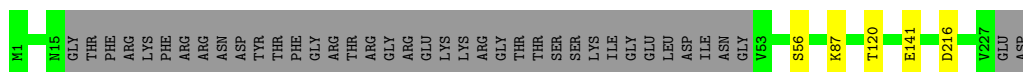
- Molecule 27: 60S ribosomal protein L8

Chain LG: 89% 10%



- Molecule 28: 60S ribosomal protein I9-like protein

Chain LH: 81% 17%



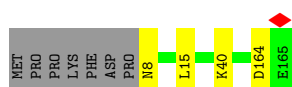
- Molecule 29: Putative ribosomal protein

Chain LJ: 94%



- Molecule 30: 60S ribosomal protein L12-like protein

Chain LK: 93%



- Molecule 31: 60S ribosomal protein L13

Chain LL: 93% 5%



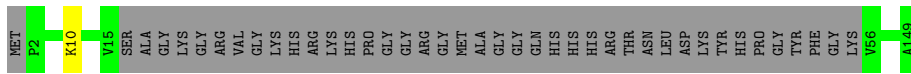
- Molecule 32: 60S ribosomal protein L14-like protein

Chain LZ:  96%




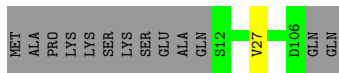
- Molecule 45: 60S ribosomal protein L28-like protein

Chain La:  72% 28%



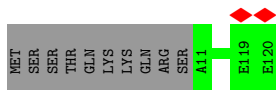
- Molecule 46: 60S ribosomal protein l30-like protein

Chain Lc:  87% 12%



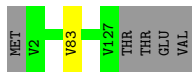
- Molecule 47: Putative 60S ribosomal protein

Chain Ld:  92% 8%



- Molecule 48: 60S ribosomal protein L32-like protein

Chain Le:  95%



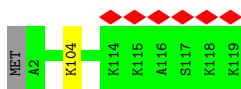
- Molecule 49: 60S ribosomal protein l33-like protein

Chain Lf:  97%

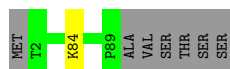


- Molecule 50: Ribosomal protein l34-like protein

Chain Lg:  5% 98%

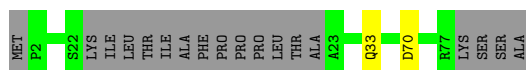


- Molecule 51: dolichyl-diphosphooligosaccharide--protein glycotransferase



- Molecule 54: 60S ribosomal protein L38-like protein

Chain Lk: 79% 19%



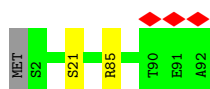
- Molecule 55: Ribosomal protein eL39

Chain Ll: 96% ..



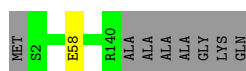
- Molecule 56: 60S ribosomal protein L43-like protein

Chain Lp: 97% ..



- Molecule 57: Putative 60S ribosomal protein

Chain Lq: 94% 5%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	276213	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	45.6	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	7.906	Depositor
Minimum map value	0.000	Depositor
Average map value	0.017	Depositor
Map value standard deviation	0.160	Depositor
Recommended contour level	0.5	Depositor
Map size (Å)	522.5, 522.5, 522.5	wwPDB
Map dimensions	500, 500, 500	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.045, 1.045, 1.045	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: OMC, A2M, OMG, MG, OMU, ZN, GTP

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	C1	0.33	0/72882	0.93	143/113631 (0.1%)
2	C2	0.32	0/3710	0.89	8/5778 (0.1%)
3	C3	0.16	0/65	0.71	0/98
4	C4	0.32	0/2833	0.99	5/4414 (0.1%)
5	CF	0.26	0/1972	0.54	1/2660 (0.0%)
6	CH	0.28	0/5147	0.56	1/6926 (0.0%)
7	CI	0.30	0/740	0.61	1/1001 (0.1%)
8	CJ	0.28	0/3196	0.51	0/4319
9	CK	0.27	0/1939	0.55	0/2608
10	CL	0.30	0/631	0.57	0/843
11	CM	0.31	0/1801	0.60	1/2412 (0.0%)
11	LF	0.27	0/2061	0.52	0/2765
12	CN	0.27	0/1878	0.56	0/2555
13	CO	0.26	0/470	0.50	0/619
14	CQ	0.30	0/1504	0.61	0/2000
15	Cb	0.29	0/845	0.58	0/1128
16	Cd	0.26	0/3770	0.50	0/5082
17	Ce	0.28	0/2002	0.55	0/2662
18	Cf	0.26	0/2326	0.54	0/3113
19	Cg	0.27	0/1508	0.58	1/2051 (0.0%)
20	Ch	0.26	0/3914	0.60	2/5319 (0.0%)
21	Cz	0.32	0/877	0.64	1/1148 (0.1%)
22	LA	0.27	0/1488	0.56	0/2009
23	LB	0.27	0/3172	0.55	0/4260
24	LC	0.27	0/2808	0.52	0/3785
25	LD	0.27	0/2308	0.51	0/3105
26	LE	0.27	0/1504	0.53	0/2027
27	LG	0.27	0/1918	0.51	0/2565
28	LH	0.27	0/1515	0.54	0/2037
29	LJ	0.30	0/1379	0.66	2/1844 (0.1%)
30	LK	0.30	0/1198	0.56	0/1611
31	LL	0.27	0/1614	0.57	0/2168

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
32	LM	0.26	0/1145	0.57	1/1539 (0.1%)
33	LN	0.26	0/1741	0.59	0/2332
34	LO	0.30	0/1645	0.57	1/2205 (0.0%)
35	LP	0.26	0/1364	0.56	0/1835
36	LQ	0.27	0/1218	0.59	0/1639
37	LR	0.25	0/1260	0.54	0/1683
38	LS	0.28	0/1461	0.55	0/1966
39	LT	0.30	0/1046	0.61	1/1409 (0.1%)
40	LU	0.29	0/859	0.53	0/1151
41	LV	0.27	0/1009	0.56	0/1357
42	LX	0.27	0/1151	0.53	0/1547
43	LY	0.27	0/1070	0.61	1/1432 (0.1%)
44	LZ	0.29	0/1135	0.58	0/1519
45	La	0.27	0/892	0.53	0/1200
46	Lc	0.27	0/714	0.49	0/960
47	Ld	0.25	0/889	0.54	0/1192
48	Le	0.25	0/1035	0.54	0/1379
49	Lf	0.26	0/883	0.56	0/1187
50	Lg	0.27	0/927	0.59	0/1244
51	Lh	0.31	0/1014	0.57	0/1349
52	Li	0.27	0/834	0.63	0/1099
53	Lj	0.26	0/712	0.62	0/944
54	Lk	0.26	0/640	0.54	0/850
55	Ll	0.24	0/446	0.56	0/593
56	Lp	0.28	0/706	0.63	0/940
57	Lq	0.27	0/1091	0.59	0/1468
All	All	0.30	0/161862	0.78	170/234562 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C1	36	0
6	CH	0	1
All	All	36	1

There are no bond length outliers.

All (170) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	1179	C	C2-N1-C1'	9.85	129.64	118.80
1	C1	1179	C	N1-C2-O2	9.44	124.57	118.90
1	C1	1538	U	N1-C2-O2	9.22	129.25	122.80
1	C1	2299	U	N3-C2-O2	-9.22	115.75	122.20
1	C1	1538	U	C2-N1-C1'	9.06	128.58	117.70
1	C1	1538	U	N3-C2-O2	-8.91	115.96	122.20
1	C1	1478	U	C2-N1-C1'	8.63	128.06	117.70
1	C1	250	C	N3-C2-O2	-8.38	116.03	121.90
34	LO	197	GLU	CA-CB-CG	8.34	131.74	113.40
1	C1	2730	U	C2-N1-C1'	8.33	127.69	117.70
1	C1	2730	U	N1-C2-O2	8.17	128.52	122.80
1	C1	1478	U	N3-C2-O2	-7.98	116.61	122.20
1	C1	2584	C	C2-N1-C1'	7.90	127.48	118.80
1	C1	2584	C	N1-C2-O2	7.89	123.63	118.90
1	C1	1478	U	N1-C2-O2	7.85	128.30	122.80
1	C1	2730	U	N3-C2-O2	-7.74	116.78	122.20
1	C1	250	C	N1-C2-O2	7.50	123.40	118.90
1	C1	2681	U	N3-C2-O2	-7.47	116.97	122.20
39	LT	125	PRO	CA-N-CD	-7.45	101.07	111.50
1	C1	1179	C	N3-C2-O2	-7.40	116.72	121.90
19	Cg	49	GLN	CA-CB-CG	7.39	129.65	113.40
1	C1	2299	U	N1-C2-O2	7.28	127.90	122.80
1	C1	3089	U	C2-N1-C1'	7.27	126.42	117.70
1	C1	443	C	C2-N1-C1'	7.20	126.72	118.80
1	C1	1087	U	N1-C2-O2	7.08	127.75	122.80
1	C1	1479	C	C2-N1-C1'	7.07	126.58	118.80
1	C1	936	U	C2-N1-C1'	7.07	126.18	117.70
1	C1	1087	U	C2-N1-C1'	7.05	126.17	117.70
1	C1	2351	U	N3-C2-O2	-6.85	117.41	122.20
1	C1	1179	C	C6-N1-C1'	-6.82	112.61	120.80
2	C2	125	U	C2-N1-C1'	6.78	125.83	117.70
1	C1	3016	U	C2-N1-C1'	6.69	125.72	117.70
1	C1	399	G	O4'-C1'-N9	6.68	113.54	108.20
2	C2	125	U	N1-C2-O2	6.67	127.47	122.80
1	C1	469	C	N1-C2-O2	6.61	122.87	118.90
1	C1	2912	U	C2-N1-C1'	6.60	125.62	117.70
1	C1	1087	U	N3-C2-O2	-6.58	117.59	122.20
1	C1	2912	U	N1-C2-O2	6.58	127.40	122.80
1	C1	79	U	N3-C2-O2	-6.45	117.69	122.20
6	CH	298	ASP	CB-CG-OD1	6.41	124.07	118.30
1	C1	2544	G	N3-C4-C5	-6.40	125.40	128.60
1	C1	1179	C	C6-N1-C2	-6.38	117.75	120.30
1	C1	103	C	N1-C2-O2	6.33	122.70	118.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	936	U	N1-C2-O2	6.33	127.23	122.80
1	C1	1064	C	P-O3'-C3'	6.29	127.25	119.70
1	C1	2160	C	P-O3'-C3'	6.29	127.25	119.70
1	C1	2584	C	N3-C2-O2	-6.26	117.52	121.90
4	C4	50	U	N1-C2-O2	6.26	127.19	122.80
1	C1	2048	U	C2-N1-C1'	6.25	125.20	117.70
1	C1	2544	G	N3-C4-N9	6.23	129.74	126.00
20	Ch	72	LEU	CA-CB-CG	6.19	129.55	115.30
20	Ch	68	LEU	CA-CB-CG	6.16	129.47	115.30
2	C2	125	U	N3-C2-O2	-6.14	117.90	122.20
4	C4	42	C	N1-C2-O2	6.13	122.58	118.90
1	C1	2912	U	N3-C2-O2	-6.13	117.91	122.20
2	C2	113	U	C2-N1-C1'	6.11	125.03	117.70
4	C4	50	U	N3-C2-O2	-6.11	117.93	122.20
1	C1	2689	G	C4-N9-C1'	6.10	134.44	126.50
1	C1	560	U	N1-C2-O2	6.10	127.07	122.80
1	C1	560	U	C2-N1-C1'	6.09	125.00	117.70
1	C1	469	C	C2-N1-C1'	6.07	125.48	118.80
1	C1	2681	U	N1-C2-O2	6.06	127.04	122.80
1	C1	94	C	N1-C2-O2	5.99	122.50	118.90
1	C1	308	C	C2-N1-C1'	5.98	125.38	118.80
1	C1	2374	U	N3-C2-O2	-5.98	118.01	122.20
1	C1	936	U	N3-C2-O2	-5.97	118.02	122.20
1	C1	1537	U	P-O3'-C3'	5.96	126.85	119.70
1	C1	103	C	N3-C2-O2	-5.94	117.74	121.90
29	LJ	40	GLN	CA-CB-CG	5.92	126.43	113.40
1	C1	940	C	C2-N1-C1'	5.89	125.28	118.80
1	C1	94	C	C2-N1-C1'	5.88	125.27	118.80
1	C1	1811	U	C2-N1-C1'	5.86	124.73	117.70
43	LY	111	ASP	CB-CG-OD1	5.81	123.53	118.30
1	C1	940	C	N1-C2-O2	5.80	122.38	118.90
1	C1	1337	G	C4-N9-C1'	5.80	134.04	126.50
1	C1	3258	U	P-O3'-C3'	5.79	126.65	119.70
1	C1	2217	U	C2-N1-C1'	5.77	124.62	117.70
1	C1	2544	G	C4-N9-C1'	5.76	133.99	126.50
2	C2	64	U	N3-C2-O2	-5.73	118.19	122.20
1	C1	1538	U	C6-N1-C1'	-5.73	113.18	121.20
1	C1	777	C	N1-C2-O2	5.72	122.33	118.90
1	C1	2217	U	N1-C2-O2	5.71	126.80	122.80
1	C1	1686	C	N1-C2-O2	5.70	122.32	118.90
1	C1	1811	U	N1-C2-O2	5.69	126.78	122.80
1	C1	2505	U	C2-N1-C1'	5.69	124.53	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	1704	U	O4'-C1'-N1	5.68	112.75	108.20
1	C1	2883	U	P-O3'-C3'	5.65	126.47	119.70
1	C1	1478	U	C6-N1-C1'	-5.63	113.31	121.20
1	C1	1811	U	N3-C2-O2	-5.63	118.26	122.20
32	LM	47	ASP	CB-CG-OD2	5.62	123.36	118.30
1	C1	37	C	N1-C2-O2	5.62	122.27	118.90
2	C2	113	U	N1-C2-O2	5.61	126.73	122.80
1	C1	1935	C	C2-N1-C1'	5.58	124.94	118.80
1	C1	1179	C	C5-C6-N1	5.56	123.78	121.00
1	C1	560	U	N3-C2-O2	-5.55	118.32	122.20
1	C1	2217	U	N3-C2-O2	-5.54	118.32	122.20
1	C1	3111	C	C2-N1-C1'	5.54	124.90	118.80
1	C1	162	U	N3-C2-O2	-5.50	118.35	122.20
1	C1	2584	C	C6-N1-C1'	-5.50	114.20	120.80
1	C1	3338	C	C2-N1-C1'	5.47	124.81	118.80
1	C1	1266	C	N1-C2-O2	5.46	122.17	118.90
11	CM	111	LEU	CA-CB-CG	5.46	127.86	115.30
1	C1	2046	C	C2-N1-C1'	5.46	124.80	118.80
29	LJ	118	ASP	CB-CG-OD2	5.43	123.19	118.30
1	C1	2170	A	P-O3'-C3'	5.42	126.21	119.70
1	C1	1668	U	N1-C2-O2	5.42	126.59	122.80
1	C1	3016	U	N1-C2-O2	5.41	126.59	122.80
1	C1	1588	C	C2-N1-C1'	5.40	124.74	118.80
1	C1	2993	C	N1-C2-O2	5.39	122.13	118.90
1	C1	2351	U	N1-C2-O2	5.37	126.56	122.80
1	C1	471	C	N1-C2-O2	5.37	122.12	118.90
1	C1	2689	G	N3-C4-N9	5.37	129.22	126.00
1	C1	3111	C	N1-C2-O2	5.35	122.11	118.90
1	C1	2048	U	N1-C2-O2	5.33	126.53	122.80
1	C1	2280	A	P-O3'-C3'	5.33	126.10	119.70
1	C1	2730	U	C6-N1-C1'	-5.32	113.75	121.20
1	C1	1047	A	P-O3'-C3'	5.32	126.08	119.70
1	C1	2054	U	C2-N1-C1'	5.31	124.07	117.70
1	C1	2863	U	C2-N1-C1'	5.31	124.07	117.70
7	CI	216	LEU	CA-CB-CG	5.31	127.50	115.30
1	C1	2499	C	C2-N1-C1'	5.30	124.63	118.80
1	C1	2689	G	N3-C4-C5	-5.29	125.96	128.60
1	C1	3301	C	P-O3'-C3'	5.28	126.04	119.70
1	C1	102	G	C4-N9-C1'	5.27	133.35	126.50
2	C2	100	U	C2-N1-C1'	5.27	124.02	117.70
1	C1	3210	U	P-O3'-C3'	5.26	126.01	119.70
1	C1	1937	C	N1-C2-O2	5.24	122.05	118.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	168	C	C2-N1-C1'	5.24	124.56	118.80
1	C1	469	C	N3-C2-O2	-5.23	118.24	121.90
1	C1	102	G	C8-N9-C1'	-5.23	120.21	127.00
1	C1	473	C	C2-N1-C1'	5.22	124.55	118.80
1	C1	1858	G	C4-N9-C1'	5.22	133.29	126.50
1	C1	1408	U	N3-C2-O2	-5.21	118.55	122.20
1	C1	2050	C	C2-N1-C1'	5.20	124.52	118.80
2	C2	113	U	N3-C2-O2	-5.20	118.56	122.20
1	C1	2668	C	C2-N1-C1'	5.19	124.51	118.80
1	C1	443	C	C6-N1-C1'	-5.18	114.58	120.80
1	C1	1337	G	C8-N9-C1'	-5.18	120.26	127.00
1	C1	471	C	C2-N1-C1'	5.18	124.50	118.80
1	C1	1479	C	C6-N1-C2	-5.17	118.23	120.30
21	Cz	120	LEU	CA-CB-CG	5.17	127.19	115.30
1	C1	250	C	C6-N1-C2	-5.15	118.24	120.30
1	C1	1668	U	N3-C2-O2	-5.14	118.60	122.20
5	CF	111	ASP	CB-CG-OD1	5.14	122.93	118.30
1	C1	2689	G	C8-N9-C1'	-5.14	120.32	127.00
1	C1	94	C	N3-C2-O2	-5.14	118.30	121.90
1	C1	2742	U	N3-C2-O2	-5.13	118.61	122.20
4	C4	99	C	C2-N1-C1'	5.13	124.45	118.80
1	C1	2224	G	C4-N9-C1'	5.13	133.17	126.50
1	C1	114	C	C2-N1-C1'	5.12	124.43	118.80
1	C1	1266	C	N3-C2-O2	-5.12	118.32	121.90
1	C1	1686	C	N3-C2-O2	-5.11	118.32	121.90
1	C1	162	U	N1-C2-O2	5.10	126.37	122.80
1	C1	228	U	N1-C2-O2	5.10	126.37	122.80
1	C1	1508	G	C4-N9-C1'	5.09	133.12	126.50
1	C1	2374	U	N1-C2-O2	5.08	126.36	122.80
1	C1	2883	U	OP2-P-O3'	5.08	116.39	105.20
1	C1	817	G	O4'-C1'-N9	5.08	112.27	108.20
1	C1	1550	U	N1-C2-O2	5.08	126.36	122.80
1	C1	898	G	P-O3'-C3'	5.08	125.79	119.70
1	C1	438	C	C2-N1-C1'	5.07	124.37	118.80
1	C1	956	U	C2-N1-C1'	5.07	123.78	117.70
4	C4	104	C	N1-C2-O2	5.07	121.94	118.90
1	C1	2584	C	C6-N1-C2	-5.06	118.28	120.30
1	C1	2095	C	C6-N1-C2	-5.06	118.28	120.30
1	C1	1663	C	N1-C2-O2	5.06	121.94	118.90
1	C1	151	G	P-O3'-C3'	5.05	125.76	119.70
1	C1	3291	C	C6-N1-C2	-5.04	118.28	120.30
1	C1	2054	U	N1-C2-O2	5.01	126.31	122.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	2225	A	P-O3'-C3'	5.00	125.70	119.70

All (36) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	C1	385	OMG	C4',C3'
1	C1	627	OMG	C4',C3'
1	C1	646	OMG	C4',C3'
1	C1	778	OMC	C4',C3'
1	C1	787	OMG	C4',C3'
1	C1	1420	OMC	C4',C3'
1	C1	1433	OMG	C4',C3'
1	C1	1491	OMC	C4',C3'
1	C1	1812	OMC	C4',C3'
1	C1	1836	OMC	C4',C3'
1	C1	2300	OMC	C4',C3'
1	C1	2358	OMG	C4',C3'
1	C1	2578	OMG	C4',C3'
1	C1	2774	OMG	C4',C3'
1	C1	2838	OMC	C4',C3'
1	C1	2876	OMG	C4',C3'
1	C1	2881	OMG	C4',C3'
1	C1	2918	OMC	C4',C3'

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	CH	298	ASP	Peptide

5.2 Too-close contacts [i](#)

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

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	CF	243/270 (90%)	240 (99%)	3 (1%)	0	100	100
6	CH	621/661 (94%)	616 (99%)	5 (1%)	0	100	100
7	CI	89/414 (22%)	87 (98%)	2 (2%)	0	100	100
8	CJ	376/679 (55%)	371 (99%)	5 (1%)	0	100	100
9	CK	231/261 (88%)	225 (97%)	6 (3%)	0	100	100
10	CL	77/558 (14%)	77 (100%)	0	0	100	100
11	CM	210/249 (84%)	206 (98%)	4 (2%)	0	100	100
11	LF	246/249 (99%)	239 (97%)	7 (3%)	0	100	100
12	CN	244/246 (99%)	239 (98%)	5 (2%)	0	100	100
13	CO	56/120 (47%)	56 (100%)	0	0	100	100
14	CQ	181/225 (80%)	179 (99%)	2 (1%)	0	100	100
15	Cb	99/117 (85%)	98 (99%)	1 (1%)	0	100	100
16	Cd	458/627 (73%)	449 (98%)	9 (2%)	0	100	100
17	Ce	231/443 (52%)	229 (99%)	2 (1%)	0	100	100
18	Cf	281/350 (80%)	280 (100%)	1 (0%)	0	100	100
19	Cg	186/202 (92%)	186 (100%)	0	0	100	100
20	Ch	484/517 (94%)	468 (97%)	16 (3%)	0	100	100
21	Cz	99/123 (80%)	98 (99%)	1 (1%)	0	100	100
22	LA	189/254 (74%)	186 (98%)	3 (2%)	0	100	100
23	LB	387/392 (99%)	380 (98%)	7 (2%)	0	100	100
24	LC	361/365 (99%)	355 (98%)	6 (2%)	0	100	100
25	LD	282/304 (93%)	280 (99%)	2 (1%)	0	100	100
26	LE	187/200 (94%)	183 (98%)	4 (2%)	0	100	100
27	LG	233/262 (89%)	229 (98%)	4 (2%)	0	100	100
28	LH	188/229 (82%)	185 (98%)	3 (2%)	0	100	100
29	LJ	167/173 (96%)	165 (99%)	2 (1%)	0	100	100
30	LK	156/165 (94%)	156 (100%)	0	0	100	100
31	LL	201/213 (94%)	200 (100%)	1 (0%)	0	100	100
32	LM	139/142 (98%)	135 (97%)	4 (3%)	0	100	100
33	LN	200/203 (98%)	195 (98%)	5 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
34	LO	201/204 (98%)	199 (99%)	2 (1%)	0	100	100
35	LP	167/187 (89%)	164 (98%)	3 (2%)	0	100	100
36	LQ	148/213 (70%)	146 (99%)	2 (1%)	0	100	100
37	LR	153/2898 (5%)	152 (99%)	1 (1%)	0	100	100
38	LS	172/174 (99%)	170 (99%)	2 (1%)	0	100	100
39	LT	127/160 (79%)	125 (98%)	2 (2%)	0	100	100
40	LU	103/127 (81%)	100 (97%)	3 (3%)	0	100	100
41	LV	133/139 (96%)	132 (99%)	1 (1%)	0	100	100
42	LX	143/156 (92%)	141 (99%)	2 (1%)	0	100	100
43	LY	131/138 (95%)	126 (96%)	5 (4%)	0	100	100
44	LZ	133/135 (98%)	131 (98%)	2 (2%)	0	100	100
45	La	104/149 (70%)	104 (100%)	0	0	100	100
46	Lc	93/108 (86%)	93 (100%)	0	0	100	100
47	Ld	108/120 (90%)	107 (99%)	1 (1%)	0	100	100
48	Le	124/131 (95%)	123 (99%)	1 (1%)	0	100	100
49	Lf	106/109 (97%)	106 (100%)	0	0	100	100
50	Lg	116/119 (98%)	115 (99%)	1 (1%)	0	100	100
51	Lh	120/935 (13%)	118 (98%)	2 (2%)	0	100	100
52	Li	99/110 (90%)	98 (99%)	1 (1%)	0	100	100
53	Lj	86/95 (90%)	85 (99%)	1 (1%)	0	100	100
54	Lk	74/94 (79%)	74 (100%)	0	0	100	100
55	Ll	48/51 (94%)	46 (96%)	2 (4%)	0	100	100
56	Lp	89/92 (97%)	87 (98%)	2 (2%)	0	100	100
57	Lq	137/147 (93%)	133 (97%)	4 (3%)	0	100	100
All	All	10017/16004 (63%)	9867 (98%)	150 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	
5	CF	212/236 (90%)	203 (96%)	9 (4%)	30	38
6	CH	549/575 (96%)	530 (96%)	19 (4%)	36	46
7	CI	70/336 (21%)	66 (94%)	4 (6%)	20	24
8	CJ	331/579 (57%)	321 (97%)	10 (3%)	41	53
9	CK	206/225 (92%)	202 (98%)	4 (2%)	57	71
10	CL	61/458 (13%)	59 (97%)	2 (3%)	38	49
11	CM	185/215 (86%)	183 (99%)	2 (1%)	73	85
11	LF	213/215 (99%)	207 (97%)	6 (3%)	43	56
12	CN	205/206 (100%)	199 (97%)	6 (3%)	42	54
13	CO	48/99 (48%)	48 (100%)	0	100	100
14	CQ	144/192 (75%)	140 (97%)	4 (3%)	43	56
15	Cb	85/101 (84%)	81 (95%)	4 (5%)	26	33
16	Cd	403/541 (74%)	393 (98%)	10 (2%)	47	60
17	Ce	206/383 (54%)	199 (97%)	7 (3%)	37	47
18	Cf	250/310 (81%)	242 (97%)	8 (3%)	39	50
19	Cg	158/176 (90%)	152 (96%)	6 (4%)	33	42
20	Ch	408/436 (94%)	396 (97%)	12 (3%)	42	54
21	Cz	89/107 (83%)	85 (96%)	4 (4%)	27	34
22	LA	150/198 (76%)	148 (99%)	2 (1%)	69	81
23	LB	329/331 (99%)	325 (99%)	4 (1%)	71	83
24	LC	282/285 (99%)	276 (98%)	6 (2%)	53	67
25	LD	221/253 (87%)	217 (98%)	4 (2%)	59	72
26	LE	157/166 (95%)	155 (99%)	2 (1%)	69	81
27	LG	200/222 (90%)	198 (99%)	2 (1%)	76	86
28	LH	167/200 (84%)	162 (97%)	5 (3%)	41	53
29	LJ	140/150 (93%)	135 (96%)	5 (4%)	35	45
30	LK	127/136 (93%)	123 (97%)	4 (3%)	40	51
31	LL	158/176 (90%)	154 (98%)	4 (2%)	47	60
32	LM	116/117 (99%)	115 (99%)	1 (1%)	78	88
33	LN	179/180 (99%)	177 (99%)	2 (1%)	73	85

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
34	LO	162/163 (99%)	157 (97%)	5 (3%)	40	51
35	LP	133/152 (88%)	132 (99%)	1 (1%)	81	90
36	LQ	128/178 (72%)	125 (98%)	3 (2%)	50	63
37	LR	125/2396 (5%)	121 (97%)	4 (3%)	39	50
38	LS	152/154 (99%)	147 (97%)	5 (3%)	38	49
39	LT	110/135 (82%)	108 (98%)	2 (2%)	59	72
40	LU	92/108 (85%)	88 (96%)	4 (4%)	29	36
41	LV	98/102 (96%)	96 (98%)	2 (2%)	55	69
42	LX	122/129 (95%)	118 (97%)	4 (3%)	38	49
43	LY	116/119 (98%)	111 (96%)	5 (4%)	29	36
44	LZ	121/121 (100%)	115 (95%)	6 (5%)	24	30
45	La	93/122 (76%)	92 (99%)	1 (1%)	73	85
46	Lc	76/88 (86%)	75 (99%)	1 (1%)	69	81
47	Ld	90/105 (86%)	90 (100%)	0	100	100
48	Le	109/114 (96%)	108 (99%)	1 (1%)	78	88
49	Lf	89/90 (99%)	87 (98%)	2 (2%)	52	65
50	Lg	95/102 (93%)	94 (99%)	1 (1%)	73	85
51	Lh	109/781 (14%)	108 (99%)	1 (1%)	78	88
52	Li	85/93 (91%)	81 (95%)	4 (5%)	26	33
53	Lj	72/78 (92%)	71 (99%)	1 (1%)	67	80
54	Lk	73/88 (83%)	71 (97%)	2 (3%)	44	57
55	Ll	45/46 (98%)	44 (98%)	1 (2%)	52	65
56	Lp	73/74 (99%)	71 (97%)	2 (3%)	44	57
57	Lq	109/112 (97%)	108 (99%)	1 (1%)	78	88
All	All	8526/13454 (63%)	8309 (98%)	217 (2%)	50	60

All (217) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	CF	8	ARG
5	CF	64	ARG
5	CF	91	ARG
5	CF	97	THR
5	CF	122	VAL

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Mol	Chain	Res	Type
5	CF	183	ASP
5	CF	210	LYS
5	CF	242	THR
5	CF	245	LYS
6	CH	79	ASP
6	CH	85	TYR
6	CH	128	LYS
6	CH	168	THR
6	CH	191	THR
6	CH	264	LYS
6	CH	301	MET
6	CH	310	LYS
6	CH	325	GLU
6	CH	360	ARG
6	CH	374	MET
6	CH	388	LYS
6	CH	469	GLU
6	CH	509	ARG
6	CH	525	LYS
6	CH	536	GLN
6	CH	547	ARG
6	CH	593	ARG
6	CH	627	MET
7	CI	198	PHE
7	CI	204	ARG
7	CI	214	THR
7	CI	228	ARG
8	CJ	67	LYS
8	CJ	115	LYS
8	CJ	140	ASP
8	CJ	221	ASP
8	CJ	252	LYS
8	CJ	381	GLN
8	CJ	400	VAL
8	CJ	407	THR
8	CJ	456	VAL
8	CJ	462	TRP
9	CK	37	GLU
9	CK	98	THR
9	CK	144	LYS
9	CK	190	ASN
10	CL	52	ASP

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Mol	Chain	Res	Type
10	CL	73	ARG
11	CM	31	GLU
11	CM	162	VAL
12	CN	51	THR
12	CN	61	ARG
12	CN	91	ASP
12	CN	114	THR
12	CN	152	MET
12	CN	188	ARG
14	CQ	148	LEU
14	CQ	163	GLU
14	CQ	174	LYS
14	CQ	181	ARG
15	Cb	9	MET
15	Cb	27	ARG
15	Cb	28	SER
15	Cb	68	HIS
16	Cd	16	ARG
16	Cd	69	VAL
16	Cd	86	ASP
16	Cd	97	GLU
16	Cd	100	LYS
16	Cd	133	LYS
16	Cd	238	HIS
16	Cd	324	ARG
16	Cd	364	TRP
16	Cd	458	ASP
17	Ce	157	TYR
17	Ce	221	ASP
17	Ce	227	MET
17	Ce	297	ARG
17	Ce	324	LYS
17	Ce	345	ARG
17	Ce	369	LYS
18	Cf	87	MET
18	Cf	91	SER
18	Cf	112	ASP
18	Cf	139	ARG
18	Cf	166	ASP
18	Cf	261	ARG
18	Cf	284	LYS
18	Cf	319	ARG

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Mol	Chain	Res	Type
19	Cg	15	VAL
19	Cg	22	THR
19	Cg	49	GLN
19	Cg	56	ARG
19	Cg	62	LEU
19	Cg	156	SER
20	Ch	37	PHE
20	Ch	63	LYS
20	Ch	64	ASN
20	Ch	67	ASN
20	Ch	86	ARG
20	Ch	285	CYS
20	Ch	292	ASP
20	Ch	345	GLU
20	Ch	351	GLU
20	Ch	363	LYS
20	Ch	395	LYS
20	Ch	426	ASN
21	Cz	67	GLU
21	Cz	87	ARG
21	Cz	105	LYS
21	Cz	110	ARG
22	LA	106	SER
22	LA	161	SER
23	LB	5	LYS
23	LB	34	LYS
23	LB	197	ARG
23	LB	352	LEU
24	LC	61	THR
24	LC	64	GLU
24	LC	121	PHE
24	LC	289	ARG
24	LC	340	LYS
24	LC	354	VAL
25	LD	50	ARG
25	LD	95	TRP
25	LD	129	TYR
25	LD	237	ASP
26	LE	6	THR
26	LE	155	SER
11	LF	23	LYS
11	LF	27	LYS

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Mol	Chain	Res	Type
11	LF	31	GLU
11	LF	80	SER
11	LF	151	ARG
11	LF	246	ARG
27	LG	249	GLU
27	LG	251	LYS
28	LH	56	SER
28	LH	87	LYS
28	LH	120	THR
28	LH	141	GLU
28	LH	216	ASP
29	LJ	14	ARG
29	LJ	45	THR
29	LJ	61	ARG
29	LJ	94	ARG
29	LJ	127	ASP
30	LK	8	ASN
30	LK	15	LEU
30	LK	40	LYS
30	LK	164	ASP
31	LL	135	LYS
31	LL	141	ASP
31	LL	158	GLU
31	LL	183	ARG
32	LM	14	VAL
33	LN	9	GLU
33	LN	122	ASN
34	LO	3	SER
34	LO	76	ARG
34	LO	169	TYR
34	LO	181	SER
34	LO	197	GLU
35	LP	115	LYS
36	LQ	35	ARG
36	LQ	122	GLN
36	LQ	126	MET
37	LR	30	SER
37	LR	76	ARG
37	LR	88	ARG
37	LR	134	HIS
38	LS	3	ARG
38	LS	57	GLU

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Mol	Chain	Res	Type
38	LS	115	ARG
38	LS	119	ARG
38	LS	158	LYS
39	LT	145	ASP
39	LT	157	GLU
40	LU	31	ASP
40	LU	61	LYS
40	LU	106	SER
40	LU	107	LYS
41	LV	95	LEU
41	LV	114	SER
42	LX	21	LYS
42	LX	37	THR
42	LX	83	GLU
42	LX	124	ASN
43	LY	2	LYS
43	LY	37	GLU
43	LY	73	TYR
43	LY	78	VAL
43	LY	112	LYS
44	LZ	1	MET
44	LZ	5	LYS
44	LZ	14	ARG
44	LZ	30	GLN
44	LZ	34	SER
44	LZ	62	GLU
45	La	10	LYS
46	Lc	27	VAL
48	Le	83	VAL
49	Lf	58	GLN
49	Lf	72	LYS
50	Lg	104	LYS
51	Lh	11	GLN
52	Li	12	GLU
52	Li	32	LYS
52	Li	65	ARG
52	Li	106	SER
53	Lj	84	LYS
54	Lk	33	GLN
54	Lk	70	ASP
55	Ll	45	ARG
56	Lp	21	SER

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Mol	Chain	Res	Type
56	Lp	85	ARG
57	Lq	58	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
6	CH	226	HIS
8	CJ	365	GLN
20	Ch	56	ASN
51	Lh	16	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	C1	3069/3342 (91%)	550 (17%)	43 (1%)
2	C2	155/156 (99%)	23 (14%)	0
3	C3	2/162 (1%)	2 (100%)	0
4	C4	118/119 (99%)	24 (20%)	0
All	All	3344/3779 (88%)	599 (17%)	43 (1%)

All (599) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	C1	6	G
1	C1	27	A
1	C1	44	A
1	C1	50	A
1	C1	60	G
1	C1	61	A
1	C1	66	A
1	C1	67	A
1	C1	95	G
1	C1	96	A
1	C1	110	A
1	C1	111	G
1	C1	117	A
1	C1	123	A
1	C1	132	U
1	C1	134	G
1	C1	135	G

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Mol	Chain	Res	Type
1	C1	139	G
1	C1	152	G
1	C1	153	A
1	C1	157	G
1	C1	181	G
1	C1	184	U
1	C1	200	G
1	C1	204	C
1	C1	213	A
1	C1	214	G
1	C1	225	A
1	C1	241	U
1	C1	244	G
1	C1	258	A
1	C1	262	G
1	C1	276	G
1	C1	277	A
1	C1	288	A
1	C1	291	U
1	C1	298	U
1	C1	308	C
1	C1	316	A
1	C1	322	C
1	C1	323	G
1	C1	332	C
1	C1	339	C
1	C1	342	A
1	C1	343	C
1	C1	369	G
1	C1	385	OMG
1	C1	386	U
1	C1	389	A2M
1	C1	391	U
1	C1	394	C
1	C1	395	A
1	C1	396	C
1	C1	414	G
1	C1	415	A
1	C1	422	U
1	C1	434	U
1	C1	446	A
1	C1	447	U

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Mol	Chain	Res	Type
1	C1	448	C
1	C1	458	U
1	C1	459	C
1	C1	460	U
1	C1	469	C
1	C1	470	A
1	C1	471	C
1	C1	472	U
1	C1	479	G
1	C1	486	G
1	C1	512	A
1	C1	514	A
1	C1	527	G
1	C1	536	C
1	C1	537	C
1	C1	545	U
1	C1	547	A
1	C1	548	U
1	C1	549	A
1	C1	550	G
1	C1	570	G
1	C1	583	A
1	C1	592	U
1	C1	593	G
1	C1	597	G
1	C1	599	A
1	C1	608	U
1	C1	609	A
1	C1	610	A
1	C1	624	C
1	C1	627	OMG
1	C1	628	U
1	C1	632	G
1	C1	634	A
1	C1	646	OMG
1	C1	647	G
1	C1	648	A
1	C1	650	U
1	C1	665	A
1	C1	669	U
1	C1	693	A
1	C1	700	G

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Mol	Chain	Res	Type
1	C1	703	A
1	C1	704	A
1	C1	719	U
1	C1	720	C
1	C1	721	G
1	C1	724	G
1	C1	747	A
1	C1	748	U
1	C1	756	G
1	C1	757	A
1	C1	759	U
1	C1	761	G
1	C1	762	A
1	C1	763	G
1	C1	767	G
1	C1	778	OMC
1	C1	779	U
1	C1	782	G
1	C1	787	OMG
1	C1	788	A
1	C1	790	A
1	C1	799	A
1	C1	812	A
1	C1	826	G
1	C1	830	A
1	C1	843	C
1	C1	857	G
1	C1	877	A
1	C1	889	G
1	C1	891	G
1	C1	896	A
1	C1	897	A
1	C1	898	G
1	C1	899	A
1	C1	903	A
1	C1	906	G
1	C1	919	G
1	C1	926	A
1	C1	931	C
1	C1	933	A
1	C1	934	A
1	C1	935	G

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Mol	Chain	Res	Type
1	C1	937	U
1	C1	940	C
1	C1	941	C
1	C1	943	C
1	C1	944	A
1	C1	945	G
1	C1	947	A
1	C1	955	G
1	C1	956	U
1	C1	963	U
1	C1	976	G
1	C1	977	U
1	C1	983	G
1	C1	984	A
1	C1	1032	C
1	C1	1034	U
1	C1	1040	A
1	C1	1047	A
1	C1	1048	A
1	C1	1049	G
1	C1	1055	G
1	C1	1058	A
1	C1	1064	C
1	C1	1065	U
1	C1	1066	G
1	C1	1070	G
1	C1	1076	A
1	C1	1077	U
1	C1	1078	U
1	C1	1079	C
1	C1	1080	G
1	C1	1081	A
1	C1	1086	A
1	C1	1098	G
1	C1	1099	G
1	C1	1109	G
1	C1	1110	G
1	C1	1115	C
1	C1	1118	A
1	C1	1127	U
1	C1	1132	G
1	C1	1136	A

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Mol	Chain	Res	Type
1	C1	1143	C
1	C1	1163	G
1	C1	1164	U
1	C1	1165	G
1	C1	1175	C
1	C1	1176	A
1	C1	1179	C
1	C1	1185	A
1	C1	1187	A
1	C1	1194	U
1	C1	1205	G
1	C1	1209	G
1	C1	1228	A
1	C1	1241	U
1	C1	1246	A
1	C1	1248	U
1	C1	1268	G
1	C1	1269	A
1	C1	1270	A
1	C1	1287	A
1	C1	1288	U
1	C1	1290	G
1	C1	1292	U
1	C1	1296	G
1	C1	1313	A
1	C1	1331	A
1	C1	1332	G
1	C1	1333	A
1	C1	1334	A
1	C1	1335	A
1	C1	1336	C
1	C1	1337	G
1	C1	1370	G
1	C1	1382	A
1	C1	1383	G
1	C1	1401	A
1	C1	1417	G
1	C1	1420	OMC
1	C1	1421	U
1	C1	1429	A
1	C1	1433	OMG
1	C1	1434	C

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Mol	Chain	Res	Type
1	C1	1458	G
1	C1	1464	A
1	C1	1485	G
1	C1	1491	OMC
1	C1	1492	G
1	C1	1505	U
1	C1	1536	U
1	C1	1538	U
1	C1	1539	C
1	C1	1540	A
1	C1	1542	A
1	C1	1543	G
1	C1	1549	C
1	C1	1550	U
1	C1	1554	G
1	C1	1560	U
1	C1	1563	G
1	C1	1567	A
1	C1	1568	A
1	C1	1569	A
1	C1	1573	A
1	C1	1585	A
1	C1	1586	U
1	C1	1609	U
1	C1	1619	C
1	C1	1622	A
1	C1	1623	A
1	C1	1624	C
1	C1	1679	G
1	C1	1683	U
1	C1	1685	U
1	C1	1697	C
1	C1	1704	U
1	C1	1710	G
1	C1	1722	U
1	C1	1730	A
1	C1	1731	G
1	C1	1743	U
1	C1	1745	U
1	C1	1746	G
1	C1	1758	G
1	C1	1760	G

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Mol	Chain	Res	Type
1	C1	1776	G
1	C1	1777	A
1	C1	1792	G
1	C1	1793	A
1	C1	1794	A
1	C1	1795	U
1	C1	1796	A
1	C1	1799	U
1	C1	1800	C
1	C1	1801	U
1	C1	1812	OMC
1	C1	1813	G
1	C1	1822	A
1	C1	1826	C
1	C1	1829	C
1	C1	1836	OMC
1	C1	1837	C
1	C1	1846	C
1	C1	1847	A2M
1	C1	1856	U
1	C1	1858	G
1	C1	1859	A
1	C1	1860	U
1	C1	1866	A
1	C1	1873	A
1	C1	1886	G
1	C1	1887	C
1	C1	1917	OMU
1	C1	1934	G
1	C1	1935	C
1	C1	2046	C
1	C1	2047	G
1	C1	2048	U
1	C1	2050	C
1	C1	2052	G
1	C1	2054	U
1	C1	2056	A
1	C1	2075	U
1	C1	2084	G
1	C1	2085	G
1	C1	2089	A
1	C1	2094	A

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Mol	Chain	Res	Type
1	C1	2103	U
1	C1	2121	A
1	C1	2126	C
1	C1	2132	G
1	C1	2139	U
1	C1	2151	A
1	C1	2156	U
1	C1	2157	G
1	C1	2158	C
1	C1	2161	A
1	C1	2167	C
1	C1	2169	G
1	C1	2171	A
1	C1	2172	U
1	C1	2173	G
1	C1	2186	A
1	C1	2188	U
1	C1	2192	A
1	C1	2203	G
1	C1	2205	A
1	C1	2206	A
1	C1	2212	G
1	C1	2216	G
1	C1	2217	U
1	C1	2218	A
1	C1	2219	A
1	C1	2220	C
1	C1	2221	U
1	C1	2222	A
1	C1	2223	U
1	C1	2224	G
1	C1	2225	A
1	C1	2226	C
1	C1	2229	U
1	C1	2230	C
1	C1	2231	U
1	C1	2237	U
1	C1	2279	G
1	C1	2281	U
1	C1	2282	U
1	C1	2297	U
1	C1	2298	G

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Mol	Chain	Res	Type
1	C1	2299	U
1	C1	2300	OMC
1	C1	2301	C
1	C1	2326	A
1	C1	2340	G
1	C1	2348	A
1	C1	2356	G
1	C1	2358	OMG
1	C1	2359	G
1	C1	2362	A
1	C1	2364	A
1	C1	2373	U
1	C1	2374	U
1	C1	2381	G
1	C1	2382	A
1	C1	2406	A
1	C1	2473	U
1	C1	2474	A
1	C1	2477	U
1	C1	2489	C
1	C1	2499	C
1	C1	2501	U
1	C1	2502	G
1	C1	2503	C
1	C1	2506	C
1	C1	2507	C
1	C1	2508	A
1	C1	2515	G
1	C1	2516	G
1	C1	2521	A
1	C1	2526	C
1	C1	2527	C
1	C1	2533	G
1	C1	2544	G
1	C1	2545	G
1	C1	2552	A
1	C1	2565	G
1	C1	2566	G
1	C1	2573	G
1	C1	2575	C
1	C1	2576	U
1	C1	2577	G

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Mol	Chain	Res	Type
1	C1	2578	OMG
1	C1	2579	G
1	C1	2582	G
1	C1	2584	C
1	C1	2585	A
1	C1	2589	C
1	C1	2592	U
1	C1	2613	C
1	C1	2615	A
1	C1	2633	A
1	C1	2635	A
1	C1	2636	G
1	C1	2647	U
1	C1	2651	A
1	C1	2656	A
1	C1	2663	A
1	C1	2664	A
1	C1	2667	C
1	C1	2671	U
1	C1	2672	U
1	C1	2673	G
1	C1	2674	A
1	C1	2675	U
1	C1	2680	A
1	C1	2691	G
1	C1	2713	G
1	C1	2717	A
1	C1	2723	C
1	C1	2731	C
1	C1	2732	C
1	C1	2736	G
1	C1	2737	A
1	C1	2750	G
1	C1	2754	U
1	C1	2755	G
1	C1	2757	C
1	C1	2758	A
1	C1	2761	A
1	C1	2762	A
1	C1	2763	A
1	C1	2769	C
1	C1	2774	OMG

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Mol	Chain	Res	Type
1	C1	2775	G
1	C1	2783	G
1	C1	2785	U
1	C1	2802	U
1	C1	2803	C
1	C1	2804	A
1	C1	2805	U
1	C1	2806	A
1	C1	2812	G
1	C1	2815	G
1	C1	2816	C
1	C1	2817	U
1	C1	2826	C
1	C1	2828	U
1	C1	2836	G
1	C1	2838	OMC
1	C1	2839	U
1	C1	2846	A
1	C1	2857	G
1	C1	2858	C
1	C1	2863	U
1	C1	2876	OMG
1	C1	2877	G
1	C1	2881	OMG
1	C1	2882	U
1	C1	2883	U
1	C1	2884	C
1	C1	2885	A
1	C1	2887	C
1	C1	2894	U
1	C1	2895	A
1	C1	2903	U
1	C1	2905	A
1	C1	2918	OMC
1	C1	2919	C
1	C1	2929	C
1	C1	2930	A
1	C1	2931	G
1	C1	2937	U
1	C1	2938	U
1	C1	2939	U
1	C1	2940	U

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Mol	Chain	Res	Type
1	C1	2942	C
1	C1	2949	G
1	C1	2955	C
1	C1	2956	U
1	C1	2970	A
1	C1	2980	G
1	C1	3014	U
1	C1	3017	G
1	C1	3036	G
1	C1	3044	A
1	C1	3049	A
1	C1	3050	C
1	C1	3051	C
1	C1	3080	A
1	C1	3087	A
1	C1	3088	A
1	C1	3089	U
1	C1	3100	A
1	C1	3101	C
1	C1	3102	G
1	C1	3112	U
1	C1	3113	A
1	C1	3119	A
1	C1	3125	U
1	C1	3126	A
1	C1	3127	G
1	C1	3131	U
1	C1	3133	U
1	C1	3135	A
1	C1	3141	G
1	C1	3146	C
1	C1	3155	A
1	C1	3162	C
1	C1	3163	A
1	C1	3164	G
1	C1	3185	G
1	C1	3186	A
1	C1	3190	G
1	C1	3200	A
1	C1	3201	A
1	C1	3206	C
1	C1	3210	U

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Mol	Chain	Res	Type
1	C1	3211	U
1	C1	3214	A
1	C1	3217	U
1	C1	3218	U
1	C1	3228	C
1	C1	3229	G
1	C1	3231	G
1	C1	3245	C
1	C1	3254	U
1	C1	3257	A
1	C1	3258	U
1	C1	3259	G
1	C1	3260	U
1	C1	3276	A
1	C1	3282	U
1	C1	3292	U
1	C1	3295	U
1	C1	3297	G
1	C1	3299	U
1	C1	3302	G
1	C1	3310	G
1	C1	3312	G
1	C1	3319	C
1	C1	3323	C
1	C1	3324	C
1	C1	3325	U
1	C1	3331	U
1	C1	3332	A
1	C1	3338	C
2	C2	34	U
2	C2	35	C
2	C2	52	A
2	C2	59	A
2	C2	62	A
2	C2	63	G
2	C2	81	U
2	C2	82	U
2	C2	83	C
2	C2	84	C
2	C2	86	U
2	C2	87	G
2	C2	90	U

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Mol	Chain	Res	Type
2	C2	95	G
2	C2	104	A
2	C2	105	A
2	C2	106	C
2	C2	113	U
2	C2	116	G
2	C2	125	U
2	C2	127	U
2	C2	151	C
2	C2	154	C
3	C3	2	U
3	C3	3	C
4	C4	7	G
4	C4	29	G
4	C4	52	G
4	C4	54	U
4	C4	55	A
4	C4	64	A
4	C4	66	G
4	C4	75	A
4	C4	76	G
4	C4	78	A
4	C4	81	U
4	C4	82	G
4	C4	83	G
4	C4	84	G
4	C4	85	U
4	C4	86	C
4	C4	89	U
4	C4	90	G
4	C4	93	G
4	C4	97	A
4	C4	99	C
4	C4	101	A
4	C4	111	G
4	C4	112	U

All (43) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	C1	151	G
1	C1	243	U

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Mol	Chain	Res	Type
1	C1	385	OMG
1	C1	579	G
1	C1	627	OMG
1	C1	646	OMG
1	C1	778	OMC
1	C1	787	OMG
1	C1	898	G
1	C1	1047	A
1	C1	1064	C
1	C1	1077	U
1	C1	1267	C
1	C1	1420	OMC
1	C1	1433	OMG
1	C1	1491	OMC
1	C1	1537	U
1	C1	1812	OMC
1	C1	1836	OMC
1	C1	2157	G
1	C1	2160	C
1	C1	2225	A
1	C1	2280	A
1	C1	2300	OMC
1	C1	2358	OMG
1	C1	2575	C
1	C1	2578	OMG
1	C1	2774	OMG
1	C1	2838	OMC
1	C1	2876	OMG
1	C1	2881	OMG
1	C1	2883	U
1	C1	2918	OMC
1	C1	3079	U
1	C1	3132	A
1	C1	3205	G
1	C1	3210	U
1	C1	3230	G
1	C1	3258	U
1	C1	3298	U
1	C1	3301	C
1	C1	3324	C
1	C1	3330	C

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

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

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	A2M	C1	389	1	18,25,26	4.30	9 (50%)	18,36,39	3.86	4 (22%)
1	OMG	C1	646	1	18,26,27	2.54	8 (44%)	19,38,41	2.50	9 (47%)
1	OMU	C1	2384	1	19,22,23	3.07	6 (31%)	26,31,34	1.67	4 (15%)
1	A2M	C1	1223	1	18,25,26	4.31	8 (44%)	18,36,39	3.83	4 (22%)
1	OMU	C1	1917	1	19,22,23	3.10	6 (31%)	26,31,34	1.73	5 (19%)
1	OMC	C1	778	1	19,22,23	3.09	8 (42%)	26,31,34	2.53	9 (34%)
1	OMG	C1	2358	1	18,26,27	2.60	8 (44%)	19,38,41	2.51	10 (52%)
1	OMU	C1	2380	1	19,22,23	3.03	6 (31%)	26,31,34	1.70	5 (19%)
1	OMU	C1	2683	1	19,22,23	3.02	6 (31%)	26,31,34	1.58	4 (15%)
1	OMC	C1	2918	1	19,22,23	3.10	8 (42%)	26,31,34	2.61	9 (34%)
1	OMC	C1	1491	1	19,22,23	2.92	8 (42%)	26,31,34	2.65	11 (42%)
1	OMG	C1	627	1	18,26,27	2.55	8 (44%)	19,38,41	2.52	9 (47%)
1	A2M	C1	858	1	18,25,26	4.37	8 (44%)	18,36,39	3.90	4 (22%)
1	OMC	C1	2838	1	19,22,23	3.07	8 (42%)	26,31,34	2.52	9 (34%)
1	OMG	C1	1433	1	18,26,27	2.59	8 (44%)	19,38,41	2.58	10 (52%)
1	A2M	C1	848	1	18,25,26	4.35	9 (50%)	18,36,39	3.76	4 (22%)
1	OMG	C1	787	1	18,26,27	2.51	8 (44%)	19,38,41	2.48	9 (47%)
1	OMG	C1	2774	1	18,26,27	2.59	8 (44%)	19,38,41	2.49	10 (52%)
1	OMG	C1	2881	1	18,26,27	2.52	8 (44%)	19,38,41	2.54	8 (42%)
1	A2M	C1	1847	1	18,25,26	4.35	9 (50%)	18,36,39	3.97	4 (22%)
1	OMG	C1	2876	1	18,26,27	2.59	7 (38%)	19,38,41	2.68	9 (47%)
1	A2M	C1	1432	1	18,25,26	4.36	9 (50%)	18,36,39	3.84	4 (22%)
1	OMG	C1	2578	1	18,26,27	2.61	8 (44%)	19,38,41	2.57	10 (52%)
1	OMC	C1	1420	1	19,22,23	2.99	8 (42%)	26,31,34	2.46	9 (34%)
1	A2M	C1	2289	1	18,25,26	4.34	8 (44%)	18,36,39	3.80	4 (22%)
1	OMU	C1	1868	1	19,22,23	3.07	6 (31%)	26,31,34	1.78	5 (19%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	OMC	C1	2300	1	19,22,23	3.01	8 (42%)	26,31,34	2.67	9 (34%)
1	OMU	C1	2277	1	19,22,23	3.07	6 (31%)	26,31,34	1.66	4 (15%)
1	OMU	C1	2690	1	19,22,23	3.05	6 (31%)	26,31,34	1.69	5 (19%)
1	OMC	C1	1836	1	19,22,23	3.03	8 (42%)	26,31,34	2.64	11 (42%)
1	A2M	C1	637	1	18,25,26	4.32	9 (50%)	18,36,39	3.96	5 (27%)
1	OMG	C1	385	1	18,26,27	2.65	8 (44%)	19,38,41	2.60	11 (57%)
1	OMU	C1	2688	1	19,22,23	3.07	6 (31%)	26,31,34	1.69	5 (19%)
1	OMC	C1	1812	1	19,22,23	3.04	8 (42%)	26,31,34	2.52	11 (42%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	A2M	C1	389	1	-	3/5/27/28	0/3/3/3
1	OMG	C1	646	1	2/2/5/5	3/5/27/28	0/3/3/3
1	OMU	C1	2384	1	-	1/9/27/28	0/2/2/2
1	A2M	C1	1223	1	-	1/5/27/28	0/3/3/3
1	OMU	C1	1917	1	-	2/9/27/28	0/2/2/2
1	OMC	C1	778	1	2/2/5/5	4/9/27/28	0/2/2/2
1	OMC	C1	2918	1	2/2/5/5	5/9/27/28	0/2/2/2
1	OMG	C1	2358	1	2/2/5/5	3/5/27/28	0/3/3/3
1	OMU	C1	2380	1	-	1/9/27/28	0/2/2/2
1	OMU	C1	2683	1	-	1/9/27/28	0/2/2/2
1	OMC	C1	1491	1	2/2/5/5	6/9/27/28	0/2/2/2
1	OMG	C1	627	1	2/2/5/5	2/5/27/28	0/3/3/3
1	A2M	C1	858	1	-	0/5/27/28	0/3/3/3
1	OMC	C1	2838	1	2/2/5/5	5/9/27/28	0/2/2/2
1	OMG	C1	1433	1	2/2/5/5	3/5/27/28	0/3/3/3
1	A2M	C1	848	1	-	1/5/27/28	0/3/3/3
1	OMG	C1	787	1	2/2/5/5	4/5/27/28	0/3/3/3
1	OMG	C1	2774	1	2/2/5/5	3/5/27/28	0/3/3/3
1	OMG	C1	2881	1	2/2/5/5	3/5/27/28	0/3/3/3
1	A2M	C1	1847	1	-	3/5/27/28	0/3/3/3
1	OMG	C1	2876	1	2/2/5/5	3/5/27/28	0/3/3/3
1	A2M	C1	1432	1	-	0/5/27/28	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	OMG	C1	2578	1	2/2/5/5	3/5/27/28	0/3/3/3
1	OMC	C1	1420	1	2/2/5/5	5/9/27/28	0/2/2/2
1	A2M	C1	2289	1	-	0/5/27/28	0/3/3/3
1	OMU	C1	1868	1	-	0/9/27/28	0/2/2/2
1	OMC	C1	2300	1	2/2/5/5	5/9/27/28	0/2/2/2
1	OMU	C1	2277	1	-	0/9/27/28	0/2/2/2
1	OMU	C1	2690	1	-	0/9/27/28	0/2/2/2
1	OMC	C1	1836	1	2/2/5/5	4/9/27/28	0/2/2/2
1	OMG	C1	385	1	2/2/5/5	4/5/27/28	0/3/3/3
1	A2M	C1	637	1	-	0/5/27/28	0/3/3/3
1	OMU	C1	2688	1	-	0/9/27/28	0/2/2/2
1	OMC	C1	1812	1	2/2/5/5	4/9/27/28	0/2/2/2

All (260) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C1	858	A2M	C3'-C2'	-12.89	1.24	1.52
1	C1	2289	A2M	C3'-C2'	-12.76	1.24	1.52
1	C1	1432	A2M	C3'-C2'	-12.73	1.24	1.52
1	C1	848	A2M	C3'-C2'	-12.71	1.24	1.52
1	C1	1847	A2M	C3'-C2'	-12.69	1.24	1.52
1	C1	637	A2M	C3'-C2'	-12.68	1.24	1.52
1	C1	1223	A2M	C3'-C2'	-12.68	1.24	1.52
1	C1	389	A2M	C3'-C2'	-12.40	1.25	1.52
1	C1	1847	A2M	O4'-C1'	8.20	1.52	1.41
1	C1	848	A2M	O4'-C1'	8.07	1.52	1.41
1	C1	2289	A2M	O4'-C1'	8.00	1.52	1.41
1	C1	858	A2M	O4'-C1'	7.99	1.52	1.41
1	C1	1432	A2M	O4'-C1'	7.92	1.52	1.41
1	C1	637	A2M	O4'-C1'	7.89	1.52	1.41
1	C1	389	A2M	O4'-C1'	7.86	1.52	1.41
1	C1	1223	A2M	O4'-C1'	7.70	1.51	1.41
1	C1	1917	OMU	C2-N1	7.51	1.50	1.38
1	C1	2384	OMU	C2-N1	7.38	1.50	1.38
1	C1	1868	OMU	C2-N1	7.34	1.50	1.38
1	C1	2277	OMU	C2-N1	7.32	1.50	1.38
1	C1	2688	OMU	C2-N1	7.31	1.50	1.38
1	C1	2690	OMU	C2-N1	7.25	1.50	1.38
1	C1	2688	OMU	C2-N3	7.19	1.50	1.38
1	C1	2683	OMU	C2-N1	7.18	1.50	1.38
1	C1	2380	OMU	C2-N1	7.13	1.49	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C1	2277	OMU	C2-N3	7.12	1.50	1.38
1	C1	1868	OMU	C2-N3	7.11	1.50	1.38
1	C1	2384	OMU	C2-N3	7.09	1.50	1.38
1	C1	1917	OMU	C2-N3	7.08	1.50	1.38
1	C1	2380	OMU	C2-N3	7.04	1.50	1.38
1	C1	2683	OMU	C2-N3	7.02	1.50	1.38
1	C1	2690	OMU	C2-N3	6.99	1.50	1.38
1	C1	637	A2M	O4'-C4'	-6.53	1.30	1.45
1	C1	389	A2M	O4'-C4'	-6.50	1.30	1.45
1	C1	1223	A2M	O4'-C4'	-6.50	1.30	1.45
1	C1	1847	A2M	O4'-C4'	-6.47	1.30	1.45
1	C1	858	A2M	O4'-C4'	-6.39	1.30	1.45
1	C1	1432	A2M	O4'-C4'	-6.37	1.30	1.45
1	C1	848	A2M	O4'-C4'	-6.35	1.30	1.45
1	C1	2289	A2M	O4'-C4'	-6.30	1.30	1.45
1	C1	1917	OMU	C6-C5	6.22	1.49	1.35
1	C1	1868	OMU	C6-C5	6.21	1.49	1.35
1	C1	2690	OMU	C6-C5	6.20	1.49	1.35
1	C1	2277	OMU	C6-C5	6.18	1.49	1.35
1	C1	2918	OMC	C4-N4	6.18	1.48	1.33
1	C1	2380	OMU	C6-C5	6.17	1.49	1.35
1	C1	2384	OMU	C6-C5	6.16	1.49	1.35
1	C1	2688	OMU	C6-C5	6.15	1.49	1.35
1	C1	2683	OMU	C6-C5	6.15	1.49	1.35
1	C1	778	OMC	C4-N4	6.15	1.48	1.33
1	C1	2300	OMC	C4-N4	6.08	1.48	1.33
1	C1	1836	OMC	C4-N4	6.00	1.48	1.33
1	C1	2838	OMC	C4-N4	5.93	1.47	1.33
1	C1	1812	OMC	C4-N4	5.85	1.47	1.33
1	C1	1420	OMC	C4-N4	5.84	1.47	1.33
1	C1	778	OMC	C2-N3	5.83	1.48	1.36
1	C1	1836	OMC	C2-N3	5.80	1.48	1.36
1	C1	2918	OMC	C2-N3	5.80	1.48	1.36
1	C1	1812	OMC	C2-N3	5.74	1.48	1.36
1	C1	2300	OMC	C2-N3	5.56	1.47	1.36
1	C1	1491	OMC	C4-N4	5.47	1.46	1.33
1	C1	2838	OMC	C2-N1	5.46	1.51	1.40
1	C1	2838	OMC	C6-C5	5.43	1.47	1.35
1	C1	1432	A2M	C3'-C4'	5.41	1.66	1.53
1	C1	2876	OMG	C2-N3	5.40	1.46	1.33
1	C1	1491	OMC	C2-N3	5.39	1.47	1.36
1	C1	646	OMG	C2-N3	5.33	1.46	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C1	848	A2M	C3'-C4'	5.30	1.66	1.53
1	C1	2289	A2M	C3'-C4'	5.29	1.66	1.53
1	C1	858	A2M	C3'-C4'	5.25	1.66	1.53
1	C1	1420	OMC	C2-N3	5.23	1.47	1.36
1	C1	1223	A2M	C3'-C4'	5.21	1.66	1.53
1	C1	2774	OMG	C2-N3	5.20	1.45	1.33
1	C1	627	OMG	C2-N3	5.19	1.45	1.33
1	C1	787	OMG	C2-N3	5.19	1.45	1.33
1	C1	2578	OMG	C2-N3	5.16	1.45	1.33
1	C1	385	OMG	C2-N3	5.12	1.45	1.33
1	C1	2838	OMC	C2-N3	5.11	1.46	1.36
1	C1	389	A2M	C3'-C4'	5.10	1.66	1.53
1	C1	2918	OMC	C6-C5	5.10	1.46	1.35
1	C1	2881	OMG	C2-N3	5.10	1.45	1.33
1	C1	2358	OMG	C2-N3	5.09	1.45	1.33
1	C1	2774	OMG	C2-N2	5.09	1.46	1.34
1	C1	1433	OMG	C2-N3	5.07	1.45	1.33
1	C1	2578	OMG	C4-N3	5.06	1.49	1.37
1	C1	2578	OMG	C2-N2	5.06	1.46	1.34
1	C1	2876	OMG	C2-N2	5.06	1.46	1.34
1	C1	385	OMG	C2-N2	5.05	1.46	1.34
1	C1	2881	OMG	C2-N2	5.04	1.46	1.34
1	C1	2358	OMG	C2-N2	5.04	1.46	1.34
1	C1	627	OMG	C2-N2	5.04	1.46	1.34
1	C1	2358	OMG	C4-N3	5.02	1.49	1.37
1	C1	385	OMG	C4-N3	5.00	1.49	1.37
1	C1	2918	OMC	C2-N1	5.00	1.50	1.40
1	C1	637	A2M	C3'-C4'	5.00	1.65	1.53
1	C1	2876	OMG	C4-N3	5.00	1.49	1.37
1	C1	1847	A2M	C3'-C4'	4.98	1.65	1.53
1	C1	1420	OMC	C6-C5	4.98	1.46	1.35
1	C1	2774	OMG	C4-N3	4.97	1.49	1.37
1	C1	778	OMC	C6-C5	4.97	1.46	1.35
1	C1	1433	OMG	C2-N2	4.95	1.46	1.34
1	C1	2881	OMG	C4-N3	4.95	1.49	1.37
1	C1	646	OMG	C4-N3	4.95	1.49	1.37
1	C1	1812	OMC	C2-N1	4.94	1.50	1.40
1	C1	2300	OMC	C2-N1	4.92	1.50	1.40
1	C1	778	OMC	C2-N1	4.91	1.50	1.40
1	C1	1491	OMC	C2-N1	4.91	1.50	1.40
1	C1	627	OMG	C4-N3	4.87	1.49	1.37
1	C1	787	OMG	C2-N2	4.86	1.45	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C1	787	OMG	C4-N3	4.85	1.49	1.37
1	C1	646	OMG	C2-N2	4.85	1.45	1.34
1	C1	1433	OMG	C4-N3	4.79	1.49	1.37
1	C1	1812	OMC	C4-N3	4.79	1.44	1.34
1	C1	1836	OMC	C2-N1	4.78	1.50	1.40
1	C1	1420	OMC	C2-N1	4.77	1.50	1.40
1	C1	1836	OMC	C6-C5	4.76	1.46	1.35
1	C1	778	OMC	C4-N3	4.76	1.44	1.34
1	C1	1812	OMC	C6-C5	4.73	1.46	1.35
1	C1	1836	OMC	C4-N3	4.72	1.44	1.34
1	C1	2300	OMC	C6-C5	4.66	1.45	1.35
1	C1	2918	OMC	C4-N3	4.63	1.43	1.34
1	C1	1491	OMC	C6-C5	4.58	1.45	1.35
1	C1	2300	OMC	C4-N3	4.56	1.43	1.34
1	C1	1420	OMC	C4-N3	4.46	1.43	1.34
1	C1	1491	OMC	C4-N3	4.35	1.43	1.34
1	C1	2838	OMC	O2-C2	-4.32	1.15	1.23
1	C1	2300	OMC	O2-C2	-4.31	1.15	1.23
1	C1	1420	OMC	O2-C2	-4.27	1.15	1.23
1	C1	2688	OMU	C4-N3	4.25	1.46	1.38
1	C1	1491	OMC	O2-C2	-4.25	1.15	1.23
1	C1	2277	OMU	C4-N3	4.22	1.46	1.38
1	C1	2384	OMU	C4-N3	4.20	1.46	1.38
1	C1	1836	OMC	O2-C2	-4.19	1.16	1.23
1	C1	778	OMC	O2-C2	-4.16	1.16	1.23
1	C1	1917	OMU	C4-N3	4.16	1.46	1.38
1	C1	2918	OMC	O2-C2	-4.15	1.16	1.23
1	C1	2690	OMU	C4-N3	4.13	1.46	1.38
1	C1	1812	OMC	O2-C2	-4.10	1.16	1.23
1	C1	1868	OMU	C4-N3	4.09	1.45	1.38
1	C1	2380	OMU	C4-N3	4.07	1.45	1.38
1	C1	2683	OMU	C4-N3	4.02	1.45	1.38
1	C1	2838	OMC	C4-N3	3.91	1.42	1.34
1	C1	1433	OMG	C6-N1	3.85	1.43	1.37
1	C1	385	OMG	C6-N1	3.82	1.43	1.37
1	C1	389	A2M	O2'-C2'	3.80	1.52	1.42
1	C1	2774	OMG	C6-N1	3.75	1.43	1.37
1	C1	2358	OMG	C6-N1	3.63	1.43	1.37
1	C1	2876	OMG	C6-N1	3.63	1.43	1.37
1	C1	2578	OMG	C6-N1	3.53	1.43	1.37
1	C1	1432	A2M	O2'-C2'	3.51	1.51	1.42
1	C1	2289	A2M	O2'-C2'	3.50	1.51	1.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C1	858	A2M	O2'-C2'	3.49	1.51	1.42
1	C1	848	A2M	O2'-C2'	3.48	1.51	1.42
1	C1	627	OMG	C6-N1	3.46	1.43	1.37
1	C1	1223	A2M	O2'-C2'	3.46	1.51	1.42
1	C1	637	A2M	O2'-C2'	3.45	1.51	1.42
1	C1	1847	A2M	O2'-C2'	3.43	1.51	1.42
1	C1	787	OMG	C6-N1	3.37	1.42	1.37
1	C1	385	OMG	C5-C6	3.25	1.54	1.47
1	C1	2838	OMC	C5-C4	3.18	1.50	1.42
1	C1	2881	OMG	C6-N1	3.15	1.42	1.37
1	C1	637	A2M	C6-N6	3.14	1.45	1.34
1	C1	848	A2M	C6-N6	3.11	1.45	1.34
1	C1	389	A2M	C6-N6	3.10	1.45	1.34
1	C1	858	A2M	C6-N6	3.10	1.45	1.34
1	C1	1223	A2M	C6-N6	3.10	1.45	1.34
1	C1	2289	A2M	C6-N6	3.10	1.45	1.34
1	C1	1432	A2M	C6-N6	3.10	1.45	1.34
1	C1	1847	A2M	C6-N6	3.09	1.45	1.34
1	C1	646	OMG	C6-N1	3.03	1.42	1.37
1	C1	2838	OMC	C6-N1	2.91	1.45	1.38
1	C1	646	OMG	C5-C4	-2.88	1.35	1.43
1	C1	2918	OMC	C5-C4	2.85	1.49	1.42
1	C1	778	OMC	C5-C4	2.84	1.49	1.42
1	C1	1433	OMG	C5-C6	2.84	1.53	1.47
1	C1	2358	OMG	C5-C4	-2.81	1.35	1.43
1	C1	2578	OMG	C5-C6	2.80	1.53	1.47
1	C1	1433	OMG	C5-C4	-2.80	1.35	1.43
1	C1	627	OMG	C5-C4	-2.79	1.36	1.43
1	C1	1917	OMU	C6-N1	2.78	1.44	1.38
1	C1	1420	OMC	C6-N1	2.76	1.44	1.38
1	C1	2918	OMC	C6-N1	2.75	1.44	1.38
1	C1	2578	OMG	C5-C4	-2.75	1.36	1.43
1	C1	1420	OMC	C5-C4	2.74	1.49	1.42
1	C1	2690	OMU	C6-N1	2.73	1.44	1.38
1	C1	2688	OMU	C6-N1	2.73	1.44	1.38
1	C1	2289	A2M	C5-C4	-2.72	1.33	1.40
1	C1	1223	A2M	C5-C4	-2.71	1.33	1.40
1	C1	646	OMG	O6-C6	-2.71	1.17	1.23
1	C1	2277	OMU	C6-N1	2.70	1.44	1.38
1	C1	385	OMG	C5-C4	-2.70	1.36	1.43
1	C1	2774	OMG	C5-C6	2.69	1.52	1.47
1	C1	2774	OMG	C5-C4	-2.68	1.36	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C1	858	A2M	C5-C4	-2.68	1.33	1.40
1	C1	1432	A2M	C5-C4	-2.68	1.33	1.40
1	C1	2380	OMU	C6-N1	2.67	1.44	1.38
1	C1	1812	OMC	C5-C4	2.67	1.49	1.42
1	C1	2876	OMG	O6-C6	-2.67	1.17	1.23
1	C1	2881	OMG	O6-C6	-2.67	1.17	1.23
1	C1	848	A2M	C5-C4	-2.67	1.33	1.40
1	C1	778	OMC	C6-N1	2.66	1.44	1.38
1	C1	385	OMG	C2-N1	2.65	1.44	1.37
1	C1	2683	OMU	C6-N1	2.65	1.44	1.38
1	C1	1868	OMU	C6-N1	2.64	1.44	1.38
1	C1	389	A2M	C5-C4	-2.64	1.33	1.40
1	C1	2384	OMU	C6-N1	2.63	1.44	1.38
1	C1	2876	OMG	C2-N1	2.63	1.44	1.37
1	C1	1847	A2M	C5-C4	-2.62	1.34	1.40
1	C1	2881	OMG	C5-C6	2.62	1.52	1.47
1	C1	1836	OMC	C5-C4	2.60	1.48	1.42
1	C1	1433	OMG	C2-N1	2.60	1.44	1.37
1	C1	2300	OMC	C5-C4	2.60	1.48	1.42
1	C1	2881	OMG	C5-C4	-2.59	1.36	1.43
1	C1	1491	OMC	C5-C4	2.59	1.48	1.42
1	C1	2358	OMG	C5-C6	2.59	1.52	1.47
1	C1	637	A2M	C5-C4	-2.59	1.34	1.40
1	C1	2358	OMG	O6-C6	-2.57	1.18	1.23
1	C1	2876	OMG	C5-C4	-2.57	1.36	1.43
1	C1	787	OMG	C5-C4	-2.56	1.36	1.43
1	C1	627	OMG	O6-C6	-2.55	1.18	1.23
1	C1	1433	OMG	O6-C6	-2.54	1.18	1.23
1	C1	1432	A2M	O3'-C3'	2.53	1.48	1.43
1	C1	1836	OMC	C6-N1	2.52	1.44	1.38
1	C1	1812	OMC	C6-N1	2.50	1.44	1.38
1	C1	787	OMG	O6-C6	-2.50	1.18	1.23
1	C1	2300	OMC	C6-N1	2.49	1.44	1.38
1	C1	2578	OMG	O6-C6	-2.47	1.18	1.23
1	C1	2578	OMG	C2-N1	2.47	1.43	1.37
1	C1	385	OMG	O6-C6	-2.46	1.18	1.23
1	C1	2774	OMG	O6-C6	-2.45	1.18	1.23
1	C1	2774	OMG	C2-N1	2.45	1.43	1.37
1	C1	1491	OMC	C6-N1	2.44	1.43	1.38
1	C1	787	OMG	C5-C6	2.44	1.52	1.47
1	C1	2358	OMG	C2-N1	2.44	1.43	1.37
1	C1	646	OMG	C2-N1	2.39	1.43	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C1	787	OMG	C2-N1	2.39	1.43	1.37
1	C1	627	OMG	C2-N1	2.38	1.43	1.37
1	C1	1868	OMU	C5-C4	2.37	1.48	1.43
1	C1	2881	OMG	C2-N1	2.33	1.43	1.37
1	C1	2690	OMU	C5-C4	2.31	1.48	1.43
1	C1	646	OMG	C5-C6	2.25	1.52	1.47
1	C1	2380	OMU	C5-C4	2.23	1.48	1.43
1	C1	2688	OMU	C5-C4	2.22	1.48	1.43
1	C1	2683	OMU	C5-C4	2.21	1.48	1.43
1	C1	2384	OMU	C5-C4	2.21	1.48	1.43
1	C1	848	A2M	C2-N3	2.20	1.35	1.32
1	C1	1917	OMU	C5-C4	2.19	1.48	1.43
1	C1	2277	OMU	C5-C4	2.19	1.48	1.43
1	C1	848	A2M	O3'-C3'	2.18	1.48	1.43
1	C1	389	A2M	C2-N3	2.16	1.35	1.32
1	C1	858	A2M	O3'-C3'	2.14	1.48	1.43
1	C1	627	OMG	C5-C6	2.12	1.51	1.47
1	C1	389	A2M	O3'-C3'	2.12	1.48	1.43
1	C1	2289	A2M	O3'-C3'	2.11	1.47	1.43
1	C1	1847	A2M	O3'-C3'	2.10	1.47	1.43
1	C1	637	A2M	O3'-C3'	2.10	1.47	1.43
1	C1	1847	A2M	C2-N3	2.08	1.35	1.32
1	C1	1223	A2M	O3'-C3'	2.07	1.47	1.43
1	C1	637	A2M	C2-N3	2.07	1.35	1.32
1	C1	1432	A2M	C2-N3	2.07	1.35	1.32

All (243) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	1847	A2M	C1'-N9-C4	10.91	145.82	126.64
1	C1	637	A2M	C1'-N9-C4	10.91	145.81	126.64
1	C1	1432	A2M	C1'-N9-C4	10.39	144.90	126.64
1	C1	389	A2M	C1'-N9-C4	10.36	144.84	126.64
1	C1	858	A2M	C1'-N9-C4	10.34	144.81	126.64
1	C1	1223	A2M	C1'-N9-C4	10.06	144.31	126.64
1	C1	848	A2M	C1'-N9-C4	9.82	143.89	126.64
1	C1	2289	A2M	C5-C6-N6	9.39	134.63	120.35
1	C1	2289	A2M	C1'-N9-C4	9.28	142.94	126.64
1	C1	858	A2M	C5-C6-N6	9.22	134.37	120.35
1	C1	1223	A2M	C5-C6-N6	9.14	134.24	120.35
1	C1	637	A2M	C5-C6-N6	9.13	134.22	120.35
1	C1	1847	A2M	C5-C6-N6	9.10	134.19	120.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	848	A2M	C5-C6-N6	8.96	133.97	120.35
1	C1	1432	A2M	C5-C6-N6	8.96	133.97	120.35
1	C1	389	A2M	C5-C6-N6	8.95	133.95	120.35
1	C1	858	A2M	N6-C6-N1	-6.19	105.72	118.57
1	C1	2918	OMC	C2'-C1'-N1	6.16	126.19	114.22
1	C1	2289	A2M	N6-C6-N1	-6.16	105.80	118.57
1	C1	1847	A2M	N6-C6-N1	-6.15	105.81	118.57
1	C1	637	A2M	N6-C6-N1	-6.15	105.81	118.57
1	C1	1223	A2M	N6-C6-N1	-6.10	105.91	118.57
1	C1	848	A2M	N6-C6-N1	-6.07	105.98	118.57
1	C1	2918	OMC	O2'-C2'-C1'	6.06	120.89	109.08
1	C1	2300	OMC	O2'-C2'-C1'	6.03	120.85	109.08
1	C1	1432	A2M	N6-C6-N1	-6.02	106.07	118.57
1	C1	2289	A2M	N3-C2-N1	-6.01	119.29	128.68
1	C1	389	A2M	N6-C6-N1	-5.98	106.16	118.57
1	C1	778	OMC	O2'-C2'-C1'	5.97	120.72	109.08
1	C1	858	A2M	N3-C2-N1	-5.96	119.36	128.68
1	C1	1491	OMC	O2'-C2'-C1'	5.89	120.56	109.08
1	C1	1836	OMC	O2'-C2'-C1'	5.87	120.53	109.08
1	C1	2838	OMC	O2'-C2'-C1'	5.87	120.52	109.08
1	C1	1420	OMC	O2'-C2'-C1'	5.86	120.51	109.08
1	C1	1847	A2M	N3-C2-N1	-5.79	119.63	128.68
1	C1	1223	A2M	N3-C2-N1	-5.71	119.76	128.68
1	C1	389	A2M	N3-C2-N1	-5.70	119.76	128.68
1	C1	848	A2M	N3-C2-N1	-5.69	119.78	128.68
1	C1	778	OMC	C2'-C1'-N1	5.65	125.19	114.22
1	C1	1432	A2M	N3-C2-N1	-5.57	119.97	128.68
1	C1	627	OMG	O2'-C2'-C1'	5.53	120.05	109.09
1	C1	1812	OMC	O2'-C2'-C1'	5.52	119.86	109.08
1	C1	2881	OMG	O2'-C2'-C1'	5.52	120.03	109.09
1	C1	385	OMG	O2'-C2'-C1'	5.51	120.01	109.09
1	C1	637	A2M	N3-C2-N1	-5.49	120.09	128.68
1	C1	1868	OMU	C4-N3-C2	-5.49	119.33	126.58
1	C1	2300	OMC	C2'-C1'-N1	5.48	124.87	114.22
1	C1	2876	OMG	O2'-C2'-C1'	5.48	119.96	109.09
1	C1	787	OMG	O2'-C2'-C1'	5.43	119.86	109.09
1	C1	2578	OMG	O2'-C2'-C1'	5.40	119.80	109.09
1	C1	1836	OMC	C2'-C1'-N1	5.33	124.57	114.22
1	C1	2774	OMG	O2'-C2'-C1'	5.29	119.59	109.09
1	C1	2690	OMU	C4-N3-C2	-5.26	119.64	126.58
1	C1	2358	OMG	O2'-C2'-C1'	5.23	119.46	109.09
1	C1	2380	OMU	C4-N3-C2	-5.19	119.73	126.58

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	1433	OMG	O2'-C2'-C1'	5.16	119.33	109.09
1	C1	2688	OMU	C4-N3-C2	-5.14	119.80	126.58
1	C1	646	OMG	O2'-C2'-C1'	5.14	119.28	109.09
1	C1	2838	OMC	C2'-C1'-N1	5.11	124.15	114.22
1	C1	1491	OMC	C2'-C1'-N1	5.11	124.14	114.22
1	C1	2384	OMU	C4-N3-C2	-5.05	119.92	126.58
1	C1	2277	OMU	C4-N3-C2	-5.01	119.97	126.58
1	C1	1917	OMU	C4-N3-C2	-4.96	120.03	126.58
1	C1	2838	OMC	O4'-C1'-N1	4.82	119.37	108.36
1	C1	1420	OMC	C2'-C1'-N1	4.77	123.48	114.22
1	C1	2683	OMU	C4-N3-C2	-4.72	120.36	126.58
1	C1	646	OMG	O3'-C3'-C4'	4.50	124.06	111.05
1	C1	2358	OMG	O3'-C3'-C4'	4.42	123.84	111.05
1	C1	2578	OMG	O3'-C3'-C4'	4.41	123.81	111.05
1	C1	2300	OMC	C1'-N1-C6	-4.38	111.29	120.84
1	C1	1491	OMC	C1'-N1-C6	-4.36	111.34	120.84
1	C1	1433	OMG	O3'-C3'-C4'	4.33	123.56	111.05
1	C1	2876	OMG	C5'-C4'-C3'	4.30	131.28	115.18
1	C1	627	OMG	O3'-C3'-C4'	4.29	123.46	111.05
1	C1	2881	OMG	O3'-C3'-C2'	4.28	123.32	111.17
1	C1	2300	OMC	C1'-N1-C2	4.28	127.96	118.42
1	C1	1812	OMC	C1'-N1-C6	-4.26	111.56	120.84
1	C1	1836	OMC	C1'-N1-C6	-4.21	111.65	120.84
1	C1	1836	OMC	C1'-N1-C2	4.19	127.78	118.42
1	C1	1812	OMC	O3'-C3'-C4'	4.15	123.05	111.05
1	C1	2774	OMG	O3'-C3'-C4'	4.12	122.95	111.05
1	C1	2876	OMG	O3'-C3'-C2'	4.09	122.78	111.17
1	C1	2918	OMC	O3'-C3'-C2'	4.06	122.70	111.17
1	C1	787	OMG	O3'-C3'-C2'	4.06	122.69	111.17
1	C1	2881	OMG	O3'-C3'-C4'	4.05	122.77	111.05
1	C1	1491	OMC	O3'-C3'-C4'	4.01	122.66	111.05
1	C1	385	OMG	O3'-C3'-C4'	4.01	122.64	111.05
1	C1	2380	OMU	N3-C2-N1	4.01	120.21	114.89
1	C1	1812	OMC	C2'-C1'-N1	4.01	122.00	114.22
1	C1	1836	OMC	O3'-C3'-C4'	3.99	122.60	111.05
1	C1	2300	OMC	O3'-C3'-C4'	3.99	122.59	111.05
1	C1	787	OMG	O3'-C3'-C4'	3.98	122.57	111.05
1	C1	2876	OMG	O3'-C3'-C4'	3.98	122.56	111.05
1	C1	2918	OMC	O4'-C1'-N1	3.97	117.44	108.36
1	C1	1868	OMU	N3-C2-N1	3.95	120.13	114.89
1	C1	1420	OMC	O3'-C3'-C4'	3.93	122.42	111.05
1	C1	2690	OMU	N3-C2-N1	3.92	120.10	114.89

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	778	OMC	O3'-C3'-C4'	3.91	122.34	111.05
1	C1	1917	OMU	N3-C2-N1	3.90	120.06	114.89
1	C1	1420	OMC	O3'-C3'-C2'	3.89	122.21	111.17
1	C1	778	OMC	O4'-C1'-N1	3.89	117.24	108.36
1	C1	1812	OMC	O4'-C1'-N1	3.88	117.23	108.36
1	C1	1491	OMC	C1'-N1-C2	3.84	126.99	118.42
1	C1	1812	OMC	C1'-N1-C2	3.84	126.99	118.42
1	C1	2838	OMC	O3'-C3'-C2'	3.81	122.00	111.17
1	C1	627	OMG	C5'-C4'-C3'	3.80	129.44	115.18
1	C1	2838	OMC	O3'-C3'-C4'	3.80	122.04	111.05
1	C1	385	OMG	O3'-C3'-C2'	3.77	121.88	111.17
1	C1	2384	OMU	N3-C2-N1	3.75	119.87	114.89
1	C1	2774	OMG	O3'-C3'-C2'	3.72	121.72	111.17
1	C1	2876	OMG	O6-C6-C5	-3.72	117.11	124.37
1	C1	646	OMG	C5'-C4'-C3'	3.71	129.09	115.18
1	C1	1836	OMC	C5'-C4'-C3'	3.71	129.09	115.18
1	C1	2918	OMC	O3'-C3'-C4'	3.71	121.78	111.05
1	C1	2683	OMU	N3-C2-N1	3.70	119.81	114.89
1	C1	1420	OMC	O4'-C1'-N1	3.70	116.82	108.36
1	C1	2838	OMC	O2-C2-N3	-3.69	116.34	122.33
1	C1	2277	OMU	N3-C2-N1	3.68	119.78	114.89
1	C1	1491	OMC	O3'-C3'-C2'	3.68	121.61	111.17
1	C1	2688	OMU	N3-C2-N1	3.68	119.77	114.89
1	C1	778	OMC	O3'-C3'-C2'	3.67	121.59	111.17
1	C1	1433	OMG	O3'-C3'-C2'	3.67	121.59	111.17
1	C1	1491	OMC	C5'-C4'-C3'	3.66	128.88	115.18
1	C1	2300	OMC	C5'-C4'-C3'	3.65	128.86	115.18
1	C1	1836	OMC	O3'-C3'-C2'	3.65	121.52	111.17
1	C1	385	OMG	O4'-C4'-C5'	3.62	121.30	109.37
1	C1	2358	OMG	C5'-C4'-C3'	3.60	128.67	115.18
1	C1	1491	OMC	O4'-C1'-N1	3.60	116.59	108.36
1	C1	778	OMC	C5'-C4'-C3'	3.59	128.64	115.18
1	C1	2774	OMG	C5'-C4'-C3'	3.57	128.57	115.18
1	C1	2300	OMC	O3'-C3'-C2'	3.56	121.28	111.17
1	C1	1812	OMC	C5'-C4'-C3'	3.56	128.52	115.18
1	C1	1433	OMG	C5'-C4'-C3'	3.56	128.51	115.18
1	C1	2881	OMG	C5'-C4'-C3'	3.56	128.50	115.18
1	C1	2578	OMG	C5'-C4'-C3'	3.55	128.49	115.18
1	C1	2918	OMC	C5'-C4'-C3'	3.55	128.48	115.18
1	C1	2838	OMC	C5'-C4'-C3'	3.54	128.46	115.18
1	C1	787	OMG	C5'-C4'-C3'	3.52	128.36	115.18
1	C1	2578	OMG	O3'-C3'-C2'	3.51	121.14	111.17

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	627	OMG	O3'-C3'-C2'	3.51	121.14	111.17
1	C1	1836	OMC	O4'-C1'-N1	3.46	116.28	108.36
1	C1	787	OMG	O4'-C4'-C5'	3.46	120.75	109.37
1	C1	646	OMG	O3'-C3'-C2'	3.44	120.94	111.17
1	C1	2578	OMG	O4'-C4'-C5'	3.44	120.69	109.37
1	C1	2578	OMG	C5-C6-N1	3.43	120.01	113.95
1	C1	385	OMG	C5-C6-N1	3.41	119.97	113.95
1	C1	2881	OMG	O4'-C4'-C5'	3.40	120.56	109.37
1	C1	1433	OMG	C5-C6-N1	3.39	119.94	113.95
1	C1	2300	OMC	O4'-C1'-N1	3.38	116.09	108.36
1	C1	1868	OMU	C5-C4-N3	3.38	119.89	114.84
1	C1	1420	OMC	C5'-C4'-C3'	3.38	127.84	115.18
1	C1	1491	OMC	O4'-C4'-C5'	3.36	120.44	109.37
1	C1	2688	OMU	C5-C4-N3	3.35	119.85	114.84
1	C1	2774	OMG	O4'-C4'-C5'	3.34	120.35	109.37
1	C1	385	OMG	C5'-C4'-C3'	3.32	127.63	115.18
1	C1	2690	OMU	C5-C4-N3	3.32	119.81	114.84
1	C1	2358	OMG	O3'-C3'-C2'	3.28	120.48	111.17
1	C1	2918	OMC	O4'-C4'-C5'	3.27	120.14	109.37
1	C1	2838	OMC	O4'-C4'-C5'	3.27	120.14	109.37
1	C1	1812	OMC	O3'-C3'-C2'	3.25	120.41	111.17
1	C1	2358	OMG	O4'-C4'-C5'	3.25	120.08	109.37
1	C1	1433	OMG	O4'-C4'-C5'	3.25	120.07	109.37
1	C1	2277	OMU	C5-C4-N3	3.25	119.70	114.84
1	C1	2384	OMU	C5-C4-N3	3.25	119.70	114.84
1	C1	2380	OMU	C5-C4-N3	3.24	119.69	114.84
1	C1	1420	OMC	O4'-C4'-C5'	3.23	120.02	109.37
1	C1	2918	OMC	C1'-N1-C2	3.20	125.57	118.42
1	C1	2358	OMG	C5-C6-N1	3.19	119.59	113.95
1	C1	1917	OMU	C5-C4-N3	3.18	119.60	114.84
1	C1	1420	OMC	C1'-N1-C6	-3.17	113.94	120.84
1	C1	646	OMG	C5-C6-N1	3.16	119.53	113.95
1	C1	778	OMC	O4'-C4'-C5'	3.16	119.76	109.37
1	C1	1836	OMC	O4'-C4'-C5'	3.15	119.73	109.37
1	C1	1812	OMC	O4'-C4'-C5'	3.15	119.73	109.37
1	C1	627	OMG	O4'-C4'-C5'	3.15	119.72	109.37
1	C1	2876	OMG	C5-C6-N1	3.11	119.44	113.95
1	C1	646	OMG	O4'-C4'-C5'	3.11	119.59	109.37
1	C1	778	OMC	C1'-N1-C2	3.10	125.33	118.42
1	C1	1420	OMC	C1'-N1-C2	3.09	125.31	118.42
1	C1	778	OMC	C1'-N1-C6	-3.04	114.22	120.84
1	C1	2300	OMC	O4'-C4'-C5'	3.01	119.29	109.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	2683	OMU	C5-C4-N3	3.00	119.33	114.84
1	C1	2774	OMG	C5-C6-N1	2.98	119.21	113.95
1	C1	2688	OMU	O4-C4-C5	-2.97	119.93	125.16
1	C1	2881	OMG	C5-C6-N1	2.95	119.15	113.95
1	C1	1917	OMU	C1'-N1-C2	2.93	122.88	117.57
1	C1	627	OMG	C5-C6-N1	2.90	119.07	113.95
1	C1	385	OMG	C2-N1-C6	-2.82	119.90	125.10
1	C1	1433	OMG	C2-N1-C6	-2.82	119.90	125.10
1	C1	2918	OMC	C1'-N1-C6	-2.81	114.72	120.84
1	C1	2384	OMU	O4-C4-C5	-2.80	120.23	125.16
1	C1	2876	OMG	O4'-C4'-C5'	2.79	118.55	109.37
1	C1	1868	OMU	O4-C4-C5	-2.78	120.27	125.16
1	C1	787	OMG	C5-C6-N1	2.78	118.86	113.95
1	C1	385	OMG	C8-N7-C5	2.78	108.28	102.99
1	C1	2277	OMU	O4-C4-C5	-2.75	120.33	125.16
1	C1	646	OMG	O6-C6-C5	-2.74	119.02	124.37
1	C1	2380	OMU	O4-C4-C5	-2.71	120.39	125.16
1	C1	1917	OMU	O4-C4-C5	-2.70	120.42	125.16
1	C1	1433	OMG	C8-N7-C5	2.66	108.06	102.99
1	C1	2690	OMU	O4-C4-C5	-2.63	120.54	125.16
1	C1	2876	OMG	C2-N1-C6	-2.60	120.30	125.10
1	C1	2578	OMG	C8-N7-C5	2.59	107.93	102.99
1	C1	627	OMG	O6-C6-C5	-2.59	119.31	124.37
1	C1	2683	OMU	O4-C4-C5	-2.58	120.62	125.16
1	C1	2578	OMG	C2-N1-C6	-2.57	120.36	125.10
1	C1	1836	OMC	N4-C4-N3	2.55	122.45	117.97
1	C1	2358	OMG	C8-N7-C5	2.54	107.84	102.99
1	C1	646	OMG	C2-N1-C6	-2.50	120.49	125.10
1	C1	2774	OMG	C8-N7-C5	2.50	107.75	102.99
1	C1	2881	OMG	C8-N7-C5	2.49	107.73	102.99
1	C1	1433	OMG	O6-C6-C5	-2.44	119.61	124.37
1	C1	1812	OMC	C5-C4-N4	-2.38	116.82	120.57
1	C1	627	OMG	C8-N7-C5	2.38	107.52	102.99
1	C1	1812	OMC	N4-C4-N3	2.37	122.12	117.97
1	C1	2358	OMG	N1-C2-N3	-2.36	118.90	123.32
1	C1	2876	OMG	O6-C6-N1	2.36	123.44	120.65
1	C1	2358	OMG	O6-C6-C5	-2.33	119.82	124.37
1	C1	646	OMG	C8-N7-C5	2.33	107.43	102.99
1	C1	1836	OMC	C5-C4-N4	-2.32	116.92	120.57
1	C1	2380	OMU	O2-C2-N1	-2.29	119.75	122.79
1	C1	2774	OMG	O6-C6-C5	-2.28	119.93	124.37
1	C1	1491	OMC	C5-C4-N4	-2.27	117.01	120.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	787	OMG	C2-N1-C6	-2.26	120.93	125.10
1	C1	1433	OMG	N2-C2-N1	2.26	121.53	116.71
1	C1	627	OMG	N1-C2-N3	-2.25	119.11	123.32
1	C1	787	OMG	C8-N7-C5	2.24	107.25	102.99
1	C1	2578	OMG	O6-C6-C5	-2.23	120.01	124.37
1	C1	2774	OMG	C2-N1-C6	-2.23	121.00	125.10
1	C1	787	OMG	O6-C6-C5	-2.21	120.06	124.37
1	C1	2358	OMG	C2-N1-C6	-2.20	121.05	125.10
1	C1	2578	OMG	N1-C2-N3	-2.17	119.27	123.32
1	C1	2881	OMG	N1-C2-N3	-2.14	119.33	123.32
1	C1	2838	OMC	O2-C2-N1	2.12	123.28	118.89
1	C1	637	A2M	O4'-C1'-C2'	-2.12	102.91	106.59
1	C1	385	OMG	O6-C6-C5	-2.09	120.29	124.37
1	C1	385	OMG	N2-C2-N1	2.09	121.16	116.71
1	C1	2774	OMG	N1-C2-N3	-2.07	119.45	123.32
1	C1	1868	OMU	O2-C2-N1	-2.04	120.07	122.79
1	C1	2688	OMU	O2-C2-N1	-2.03	120.08	122.79
1	C1	385	OMG	N1-C2-N3	-2.03	119.53	123.32
1	C1	1491	OMC	O2-C2-N1	2.01	123.05	118.89
1	C1	2690	OMU	O2-C2-N1	-2.01	120.12	122.79

All (36) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	C1	385	OMG	C4'
1	C1	385	OMG	C3'
1	C1	627	OMG	C4'
1	C1	627	OMG	C3'
1	C1	646	OMG	C4'
1	C1	646	OMG	C3'
1	C1	778	OMC	C4'
1	C1	778	OMC	C3'
1	C1	787	OMG	C4'
1	C1	787	OMG	C3'
1	C1	1420	OMC	C4'
1	C1	1420	OMC	C3'
1	C1	1433	OMG	C4'
1	C1	1433	OMG	C3'
1	C1	1491	OMC	C4'
1	C1	1491	OMC	C3'
1	C1	1812	OMC	C4'
1	C1	1812	OMC	C3'

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Mol	Chain	Res	Type	Atom
1	C1	1836	OMC	C4'
1	C1	1836	OMC	C3'
1	C1	2300	OMC	C4'
1	C1	2300	OMC	C3'
1	C1	2358	OMG	C4'
1	C1	2358	OMG	C3'
1	C1	2578	OMG	C4'
1	C1	2578	OMG	C3'
1	C1	2774	OMG	C4'
1	C1	2774	OMG	C3'
1	C1	2838	OMC	C4'
1	C1	2838	OMC	C3'
1	C1	2876	OMG	C4'
1	C1	2876	OMG	C3'
1	C1	2881	OMG	C4'
1	C1	2881	OMG	C3'
1	C1	2918	OMC	C4'
1	C1	2918	OMC	C3'

All (82) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	C1	385	OMG	O4'-C4'-C5'-O5'
1	C1	385	OMG	C3'-C4'-C5'-O5'
1	C1	385	OMG	C3'-C2'-O2'-CM2
1	C1	389	A2M	C1'-C2'-O2'-CM2
1	C1	627	OMG	C3'-C2'-O2'-CM2
1	C1	646	OMG	C4'-C5'-O5'-P
1	C1	646	OMG	C3'-C4'-C5'-O5'
1	C1	646	OMG	C3'-C2'-O2'-CM2
1	C1	778	OMC	C3'-C2'-O2'-CM2
1	C1	778	OMC	C3'-C4'-C5'-O5'
1	C1	787	OMG	C3'-C4'-C5'-O5'
1	C1	787	OMG	C3'-C2'-O2'-CM2
1	C1	1420	OMC	C3'-C2'-O2'-CM2
1	C1	1420	OMC	O4'-C4'-C5'-O5'
1	C1	1433	OMG	C3'-C2'-O2'-CM2
1	C1	1491	OMC	C3'-C2'-O2'-CM2
1	C1	1812	OMC	C3'-C2'-O2'-CM2
1	C1	1812	OMC	C3'-C4'-C5'-O5'
1	C1	1812	OMC	C4'-C5'-O5'-P
1	C1	1836	OMC	C3'-C2'-O2'-CM2

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Mol	Chain	Res	Type	Atoms
1	C1	1836	OMC	C3'-C4'-C5'-O5'
1	C1	1836	OMC	C4'-C5'-O5'-P
1	C1	1847	A2M	C3'-C4'-C5'-O5'
1	C1	1917	OMU	C3'-C4'-C5'-O5'
1	C1	1917	OMU	O4'-C4'-C5'-O5'
1	C1	2300	OMC	C3'-C2'-O2'-CM2
1	C1	2300	OMC	C3'-C4'-C5'-O5'
1	C1	2358	OMG	C4'-C5'-O5'-P
1	C1	2358	OMG	C3'-C4'-C5'-O5'
1	C1	2358	OMG	C3'-C2'-O2'-CM2
1	C1	2380	OMU	C1'-C2'-O2'-CM2
1	C1	2384	OMU	C1'-C2'-O2'-CM2
1	C1	2578	OMG	C3'-C2'-O2'-CM2
1	C1	2683	OMU	C1'-C2'-O2'-CM2
1	C1	2774	OMG	C4'-C5'-O5'-P
1	C1	2774	OMG	C3'-C4'-C5'-O5'
1	C1	2774	OMG	C3'-C2'-O2'-CM2
1	C1	2838	OMC	O4'-C1'-N1-C2
1	C1	2838	OMC	O4'-C1'-N1-C6
1	C1	2838	OMC	C3'-C2'-O2'-CM2
1	C1	2838	OMC	C3'-C4'-C5'-O5'
1	C1	2876	OMG	C3'-C2'-O2'-CM2
1	C1	2881	OMG	C4'-C5'-O5'-P
1	C1	2881	OMG	C3'-C4'-C5'-O5'
1	C1	2881	OMG	C3'-C2'-O2'-CM2
1	C1	2918	OMC	C3'-C2'-O2'-CM2
1	C1	2918	OMC	C3'-C4'-C5'-O5'
1	C1	2300	OMC	C4'-C5'-O5'-P
1	C1	389	A2M	O4'-C4'-C5'-O5'
1	C1	1491	OMC	C3'-C4'-C5'-O5'
1	C1	1847	A2M	O4'-C4'-C5'-O5'
1	C1	2578	OMG	O4'-C4'-C5'-O5'
1	C1	1420	OMC	C3'-C4'-C5'-O5'
1	C1	1433	OMG	C3'-C4'-C5'-O5'
1	C1	1491	OMC	O4'-C4'-C5'-O5'
1	C1	778	OMC	C4'-C5'-O5'-P
1	C1	1433	OMG	C4'-C5'-O5'-P
1	C1	1491	OMC	C4'-C5'-O5'-P
1	C1	2838	OMC	C4'-C5'-O5'-P
1	C1	2918	OMC	C4'-C5'-O5'-P
1	C1	627	OMG	C3'-C4'-C5'-O5'
1	C1	787	OMG	C4'-C5'-O5'-P

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Mol	Chain	Res	Type	Atoms
1	C1	1223	A2M	O4'-C4'-C5'-O5'
1	C1	2300	OMC	C2'-C1'-N1-C2
1	C1	385	OMG	C4'-C5'-O5'-P
1	C1	1420	OMC	C4'-C5'-O5'-P
1	C1	2578	OMG	C4'-C5'-O5'-P
1	C1	787	OMG	O4'-C4'-C5'-O5'
1	C1	848	A2M	O4'-C4'-C5'-O5'
1	C1	1491	OMC	C2'-C1'-N1-C2
1	C1	1847	A2M	C4'-C5'-O5'-P
1	C1	2876	OMG	C3'-C4'-C5'-O5'
1	C1	2300	OMC	C2'-C1'-N1-C6
1	C1	1491	OMC	C2'-C1'-N1-C6
1	C1	2918	OMC	C2'-C1'-N1-C6
1	C1	389	A2M	C3'-C4'-C5'-O5'
1	C1	2876	OMG	O4'-C4'-C5'-O5'
1	C1	778	OMC	C2'-C1'-N1-C2
1	C1	1420	OMC	C2'-C1'-N1-C2
1	C1	1812	OMC	C2'-C1'-N1-C2
1	C1	1836	OMC	C2'-C1'-N1-C2
1	C1	2918	OMC	C2'-C1'-N1-C2

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 10 ligands modelled in this entry, 8 are monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
58	GTP	CH	701	59	26,34,34	1.14	2 (7%)	32,54,54	1.64	7 (21%)
58	GTP	Cd	703	59	26,34,34	1.15	1 (3%)	32,54,54	1.53	7 (21%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
58	GTP	CH	701	59	-	6/18/38/38	0/3/3/3
58	GTP	Cd	703	59	-	3/18/38/38	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
58	CH	701	GTP	C5-C6	-4.06	1.39	1.47
58	Cd	703	GTP	C5-C6	-4.03	1.39	1.47
58	CH	701	GTP	C2-N3	2.12	1.38	1.33

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
58	CH	701	GTP	PB-O3B-PG	-3.86	119.59	132.83
58	CH	701	GTP	PA-O3A-PB	-3.79	119.81	132.83
58	Cd	703	GTP	PB-O3B-PG	-3.39	121.18	132.83
58	CH	701	GTP	C5-C6-N1	3.20	119.59	113.95
58	Cd	703	GTP	C5-C6-N1	3.20	119.59	113.95
58	Cd	703	GTP	C8-N7-C5	3.01	108.72	102.99
58	CH	701	GTP	C3'-C2'-C1'	3.00	105.49	100.98
58	CH	701	GTP	C8-N7-C5	2.97	108.64	102.99
58	CH	701	GTP	C2-N1-C6	-2.86	119.83	125.10
58	Cd	703	GTP	C2-N1-C6	-2.82	119.90	125.10
58	Cd	703	GTP	C3'-C2'-C1'	2.55	104.82	100.98
58	Cd	703	GTP	PA-O3A-PB	-2.42	124.51	132.83
58	Cd	703	GTP	O6-C6-C5	-2.15	120.18	124.37
58	CH	701	GTP	O6-C6-C5	-2.10	120.26	124.37

There are no chirality outliers.

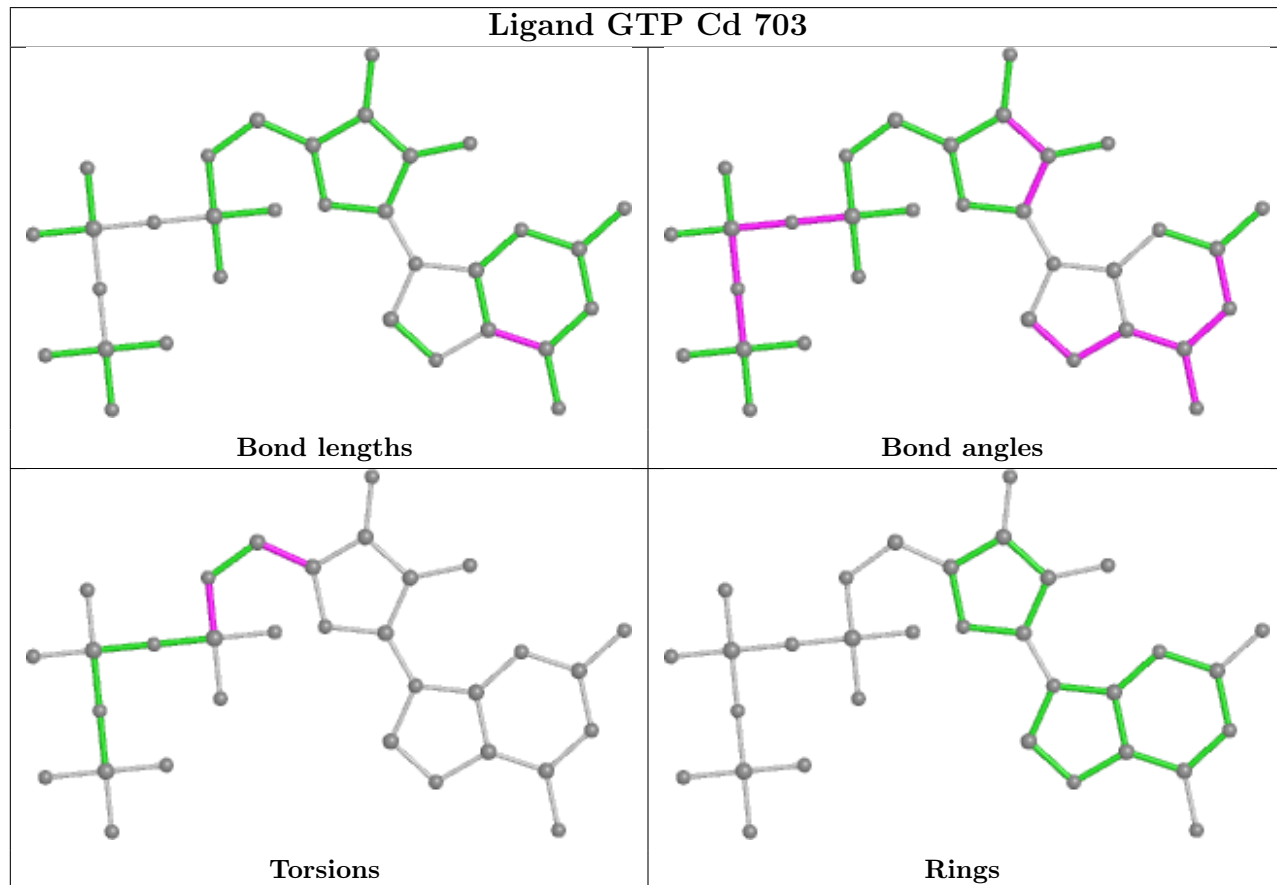
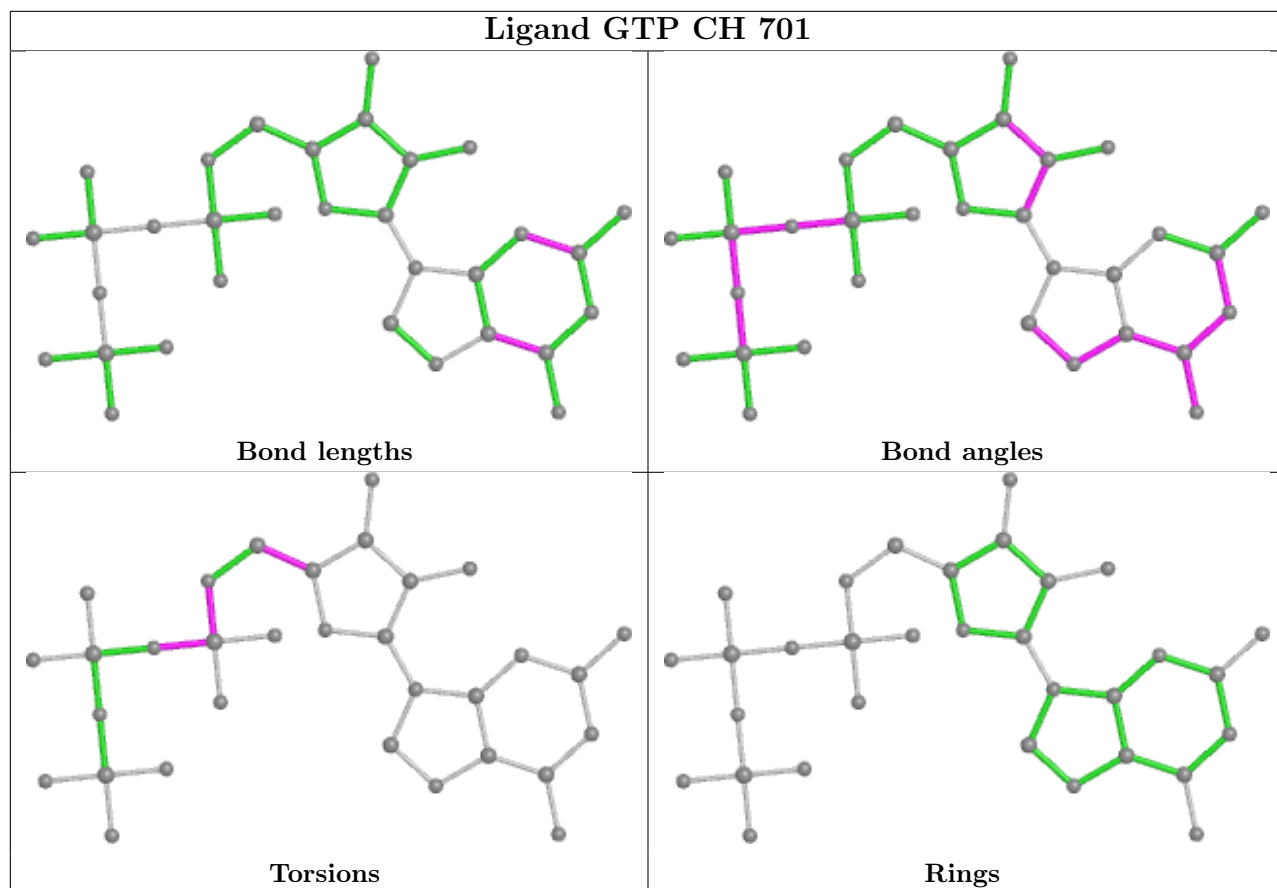
All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
58	CH	701	GTP	C5'-O5'-PA-O3A
58	CH	701	GTP	C5'-O5'-PA-O1A
58	CH	701	GTP	C5'-O5'-PA-O2A
58	Cd	703	GTP	C5'-O5'-PA-O1A
58	CH	701	GTP	O4'-C4'-C5'-O5'
58	CH	701	GTP	C3'-C4'-C5'-O5'
58	Cd	703	GTP	O4'-C4'-C5'-O5'
58	Cd	703	GTP	C3'-C4'-C5'-O5'
58	CH	701	GTP	PB-O3A-PA-O2A

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

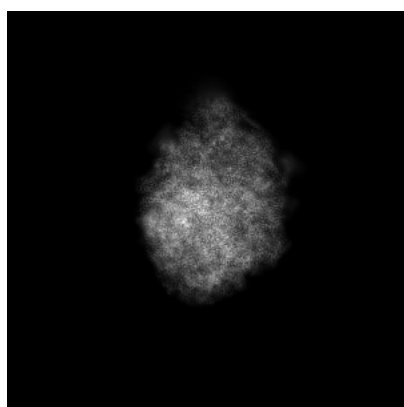
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-17970. These allow visual inspection of the internal detail of the map and identification of artifacts.

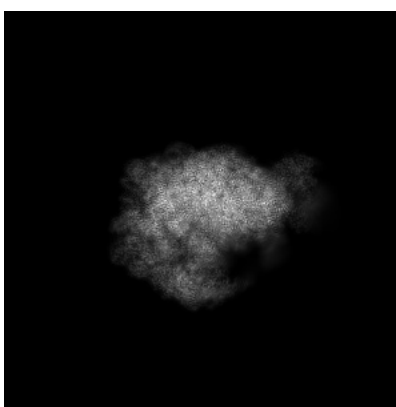
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

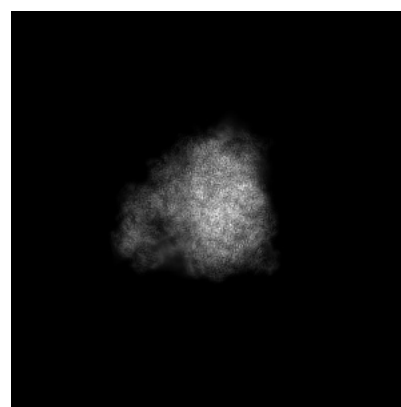
6.1.1 Primary map



X



Y

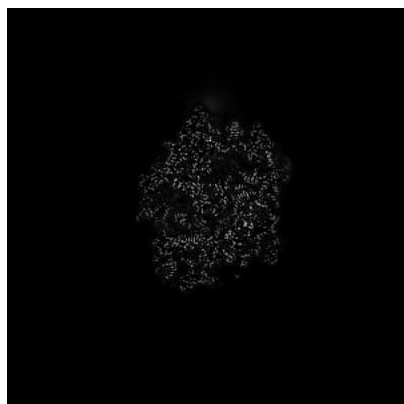


Z

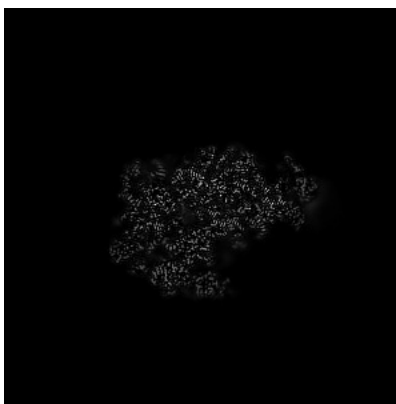
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

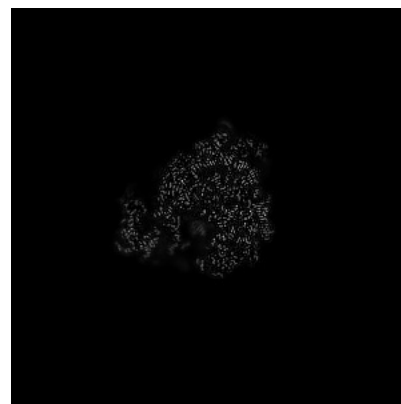
6.2.1 Primary map



X Index: 250



Y Index: 250

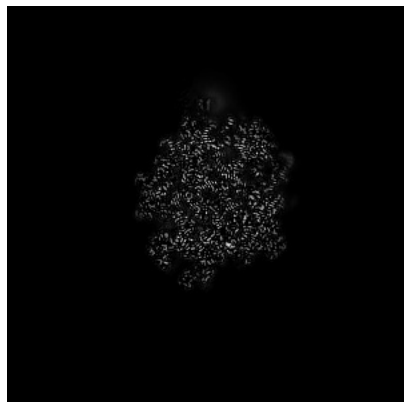


Z Index: 250

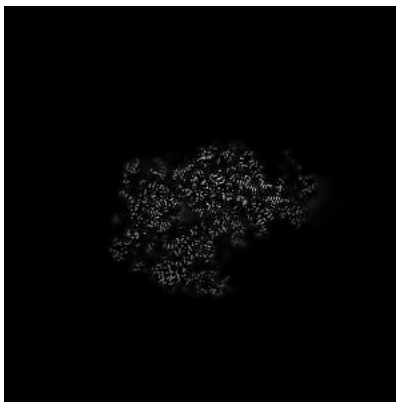
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

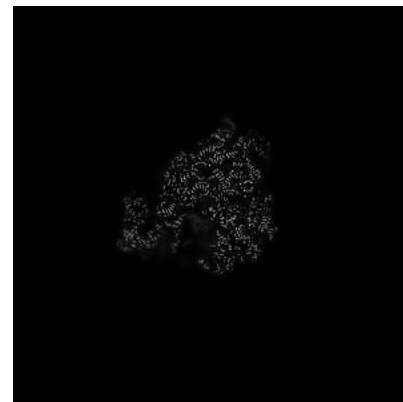
6.3.1 Primary map



X Index: 259



Y Index: 248

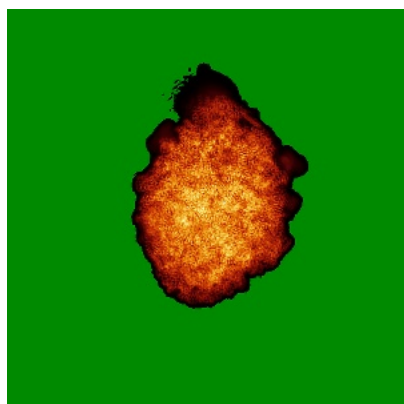


Z Index: 252

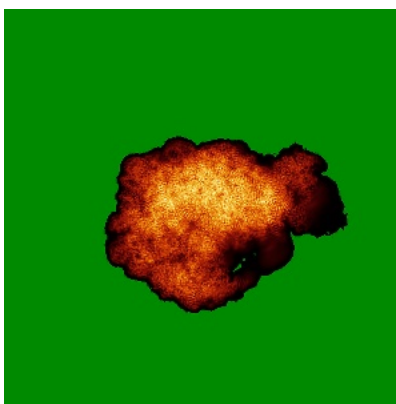
The images above show the largest variance slices of the map in three orthogonal directions.

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

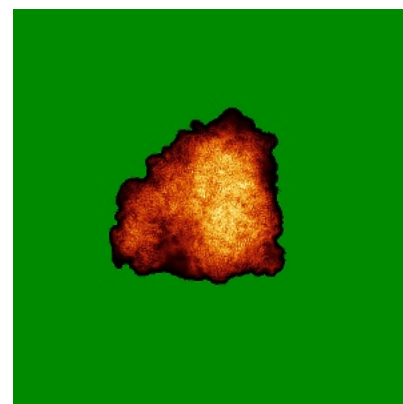
6.4.1 Primary map



X



Y



Z

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

6.5 Orthogonal surface views [i](#)

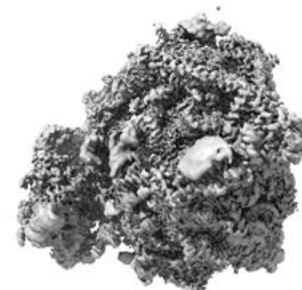
6.5.1 Primary map



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.

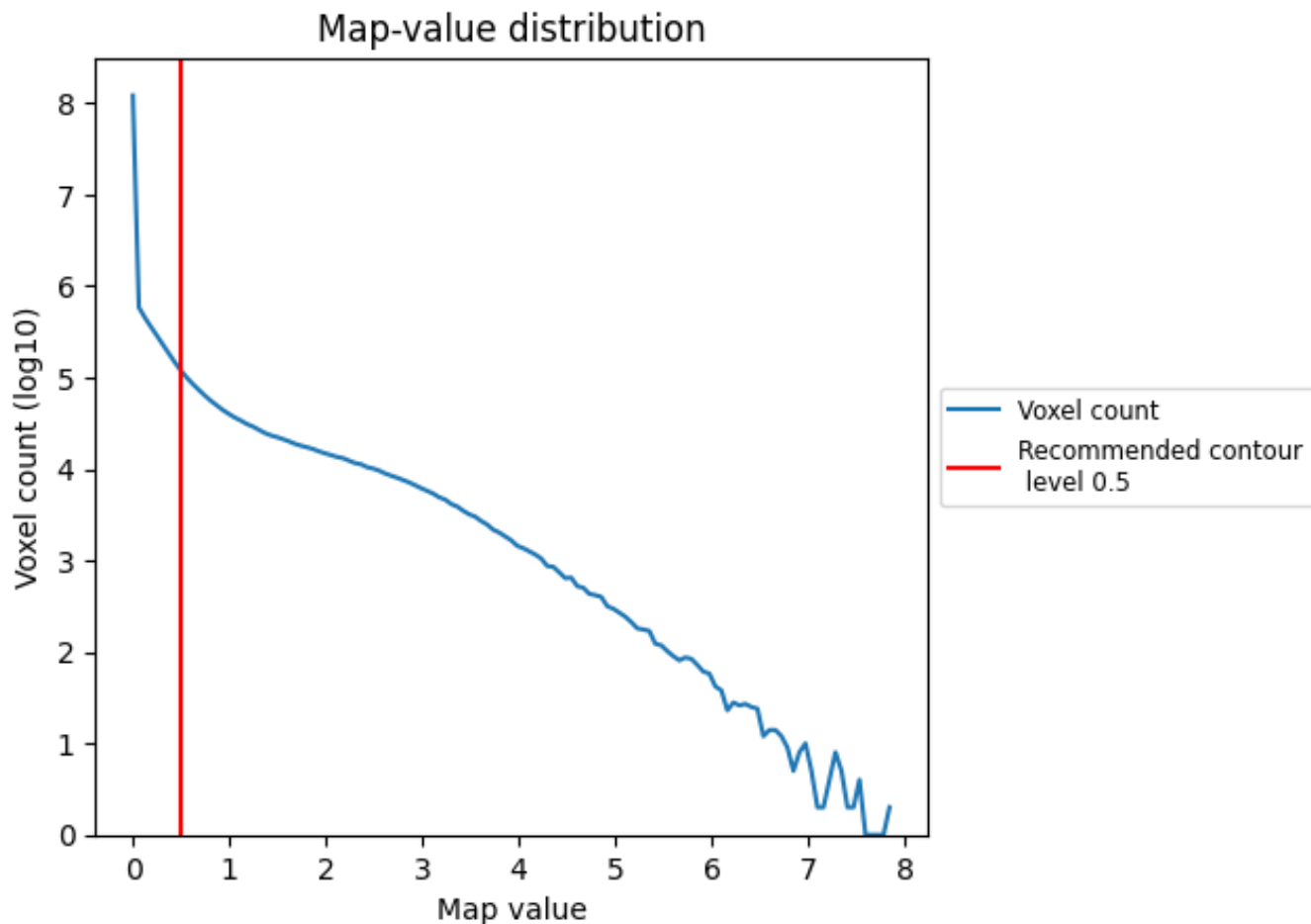
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

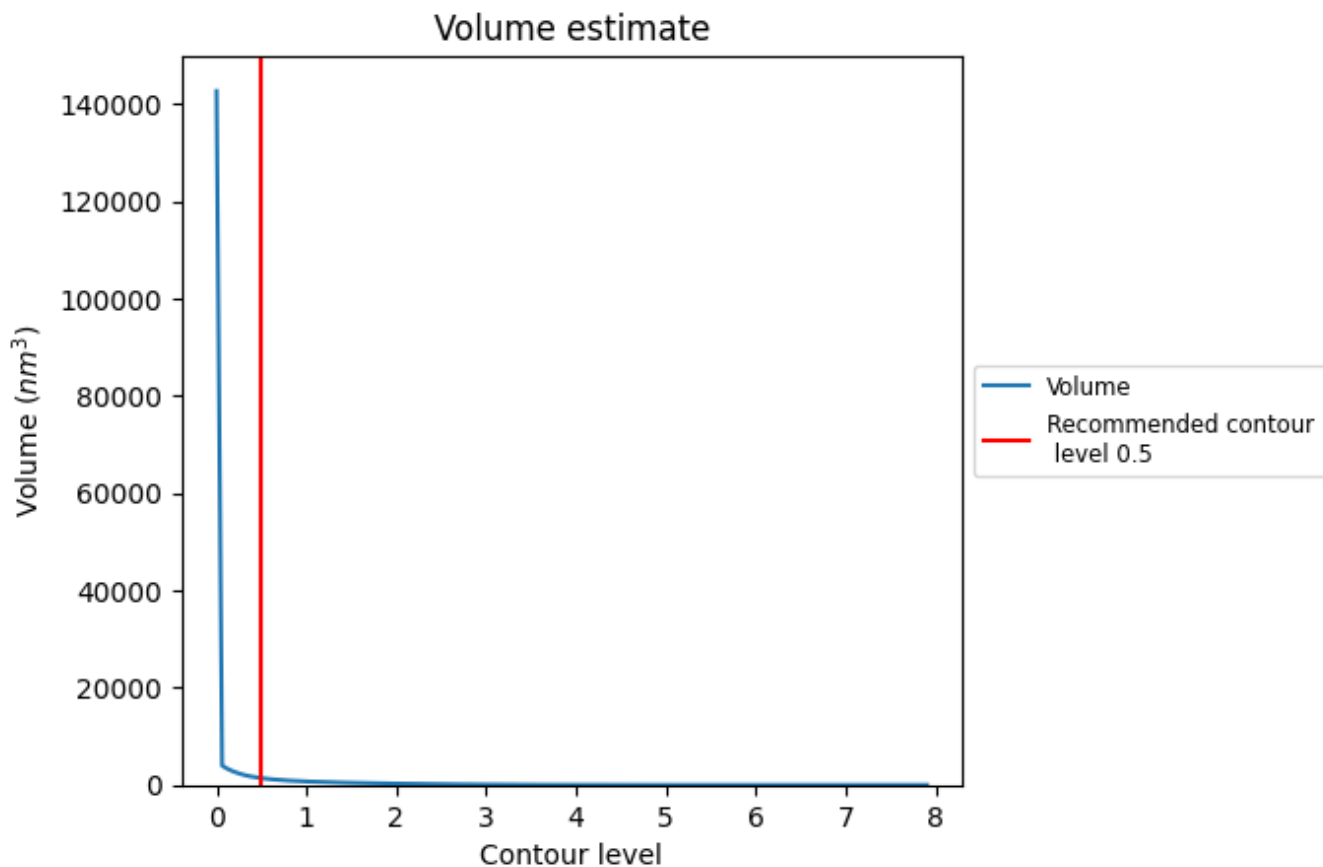
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

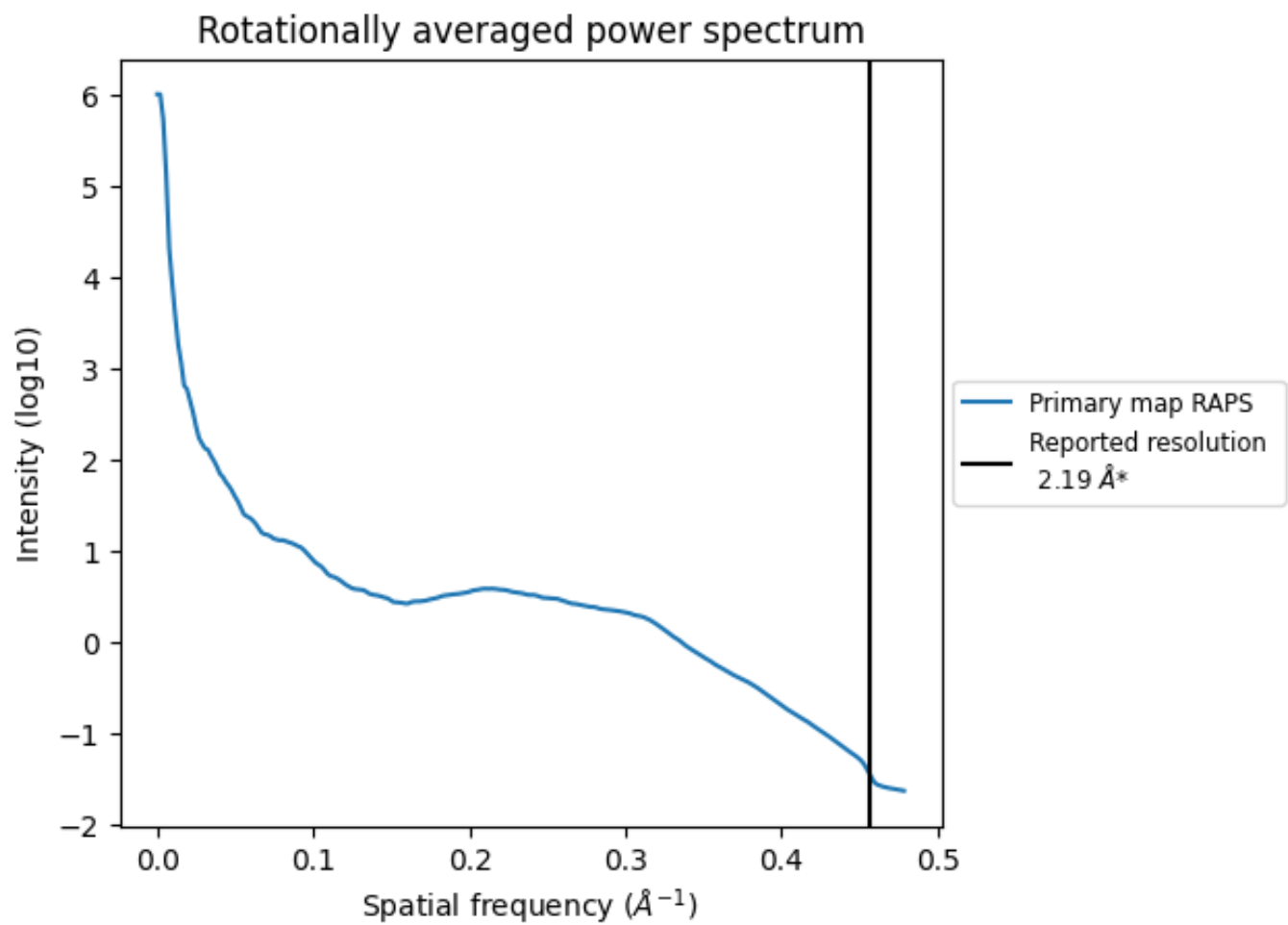
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1395 nm^3 ; this corresponds to an approximate mass of 1260 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 0.457 \AA^{-1}

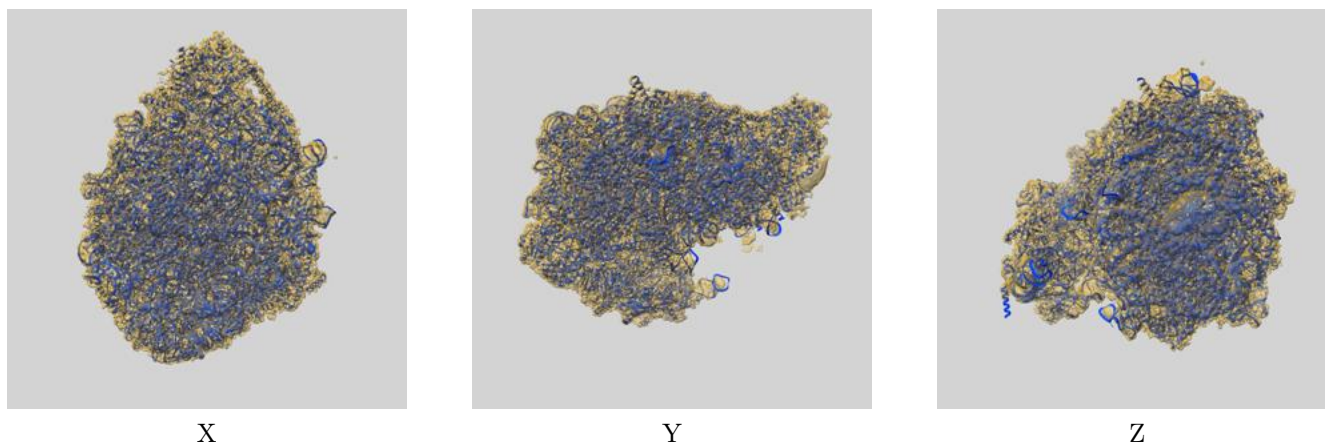
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

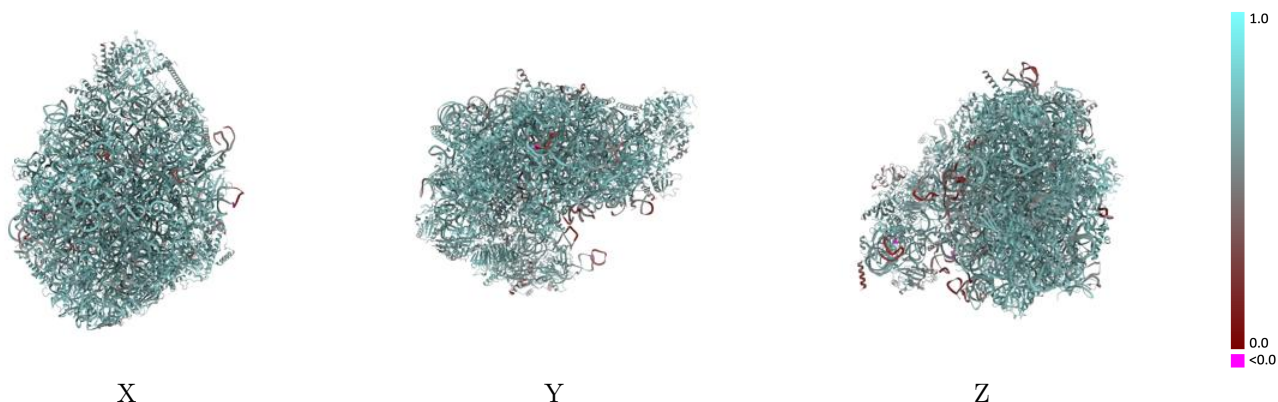
This section contains information regarding the fit between EMDB map EMD-17970 and PDB model 8PVL. Per-residue inclusion information can be found in section 3 on page 16.

9.1 Map-model overlay [i](#)



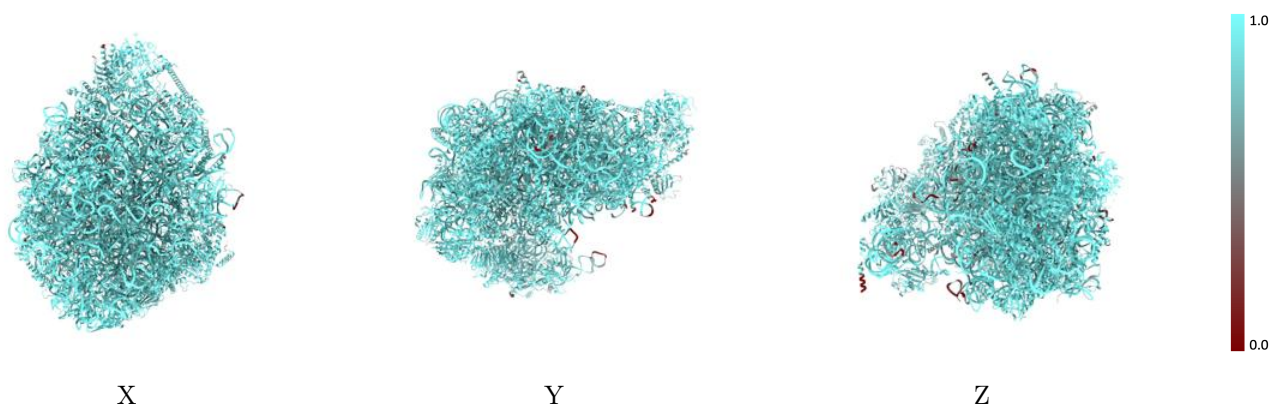
The images above show the 3D surface view of the map at the recommended contour level 0.5 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



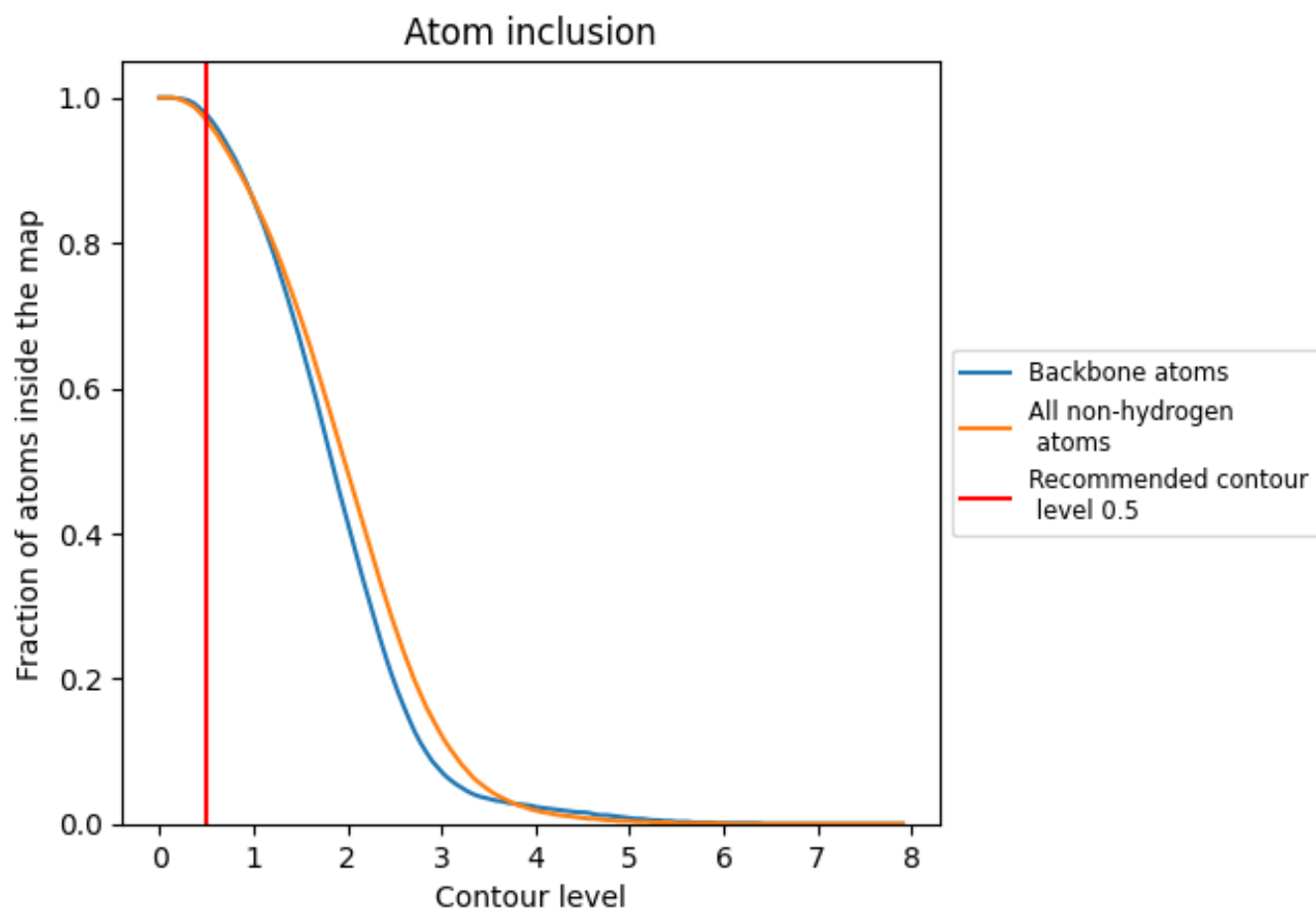
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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



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, 98% of all backbone atoms, 97% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

















































The table lists the average atom inclusion at the recommended contour level (0.5) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9690	 0.6620
C1	 0.9800	 0.6510
C2	 0.9780	 0.6760
C3	 0.8670	 0.5710
C4	 0.9330	 0.5790
CF	 0.9470	 0.6370
CH	 0.9490	 0.6660
CI	 0.8830	 0.6030
CJ	 0.9790	 0.6670
CK	 0.9850	 0.7000
CL	 0.9520	 0.6360
CM	 0.9040	 0.6030
CN	 0.9740	 0.6950
CO	 0.9560	 0.6790
CQ	 0.9370	 0.6650
Cb	 0.9850	 0.6930
Cd	 0.9740	 0.6850
Ce	 0.8950	 0.6110
Cf	 0.9650	 0.6480
Cg	 0.9620	 0.6320
Ch	 0.9340	 0.6380
Cz	 0.8850	 0.5770
LA	 0.9890	 0.7000
LB	 0.9890	 0.7190
LC	 0.9860	 0.7170
LD	 0.9390	 0.6360
LE	 0.9590	 0.6730
LF	 0.9740	 0.7010
LG	 0.9700	 0.6730
LH	 0.9690	 0.6870
LJ	 0.9360	 0.5660
LK	 0.9290	 0.6040
LL	 0.9620	 0.6900
LM	 0.9730	 0.6900
LN	 0.9970	 0.7180



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Chain	Atom inclusion	Q-score
LO	 0.9890	 0.7170
LP	 0.9940	 0.7130
LQ	 0.9780	 0.6950
LR	 0.9750	 0.7060
LS	 0.9830	 0.6900
LT	 0.9310	 0.5880
LU	 0.9580	 0.6480
LV	 0.9960	 0.7150
LX	 0.9690	 0.6770
LY	 0.9800	 0.6990
LZ	 0.9740	 0.6880
La	 0.9700	 0.6960
Lc	 0.9610	 0.6770
Ld	 0.9740	 0.7070
Le	 0.9920	 0.7240
Lf	 0.9960	 0.7330
Lg	 0.9430	 0.6850
Lh	 0.9560	 0.6460
Li	 0.9540	 0.6590
Lj	 0.9930	 0.7280
Lk	 0.9370	 0.6590
Ll	 1.0000	 0.7330
Lp	 0.9500	 0.6840
Lq	 0.9720	 0.6880