



Full wwPDB EM Validation Report ⓘ

Jul 12, 2023 – 04:31 PM JST

PDB ID : 8I9Y
EMDB ID : EMD-35288
Title : Cryo-EM structure of a Chaetomium thermophilum pre-60S ribosomal subunit
- Ytm1-2
Authors : Lau, B.; Huang, Z.; Beckmann, R.; Hurt, E.; Cheng, J.
Deposited on : 2023-02-07
Resolution : 3.10 Å(reported)

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

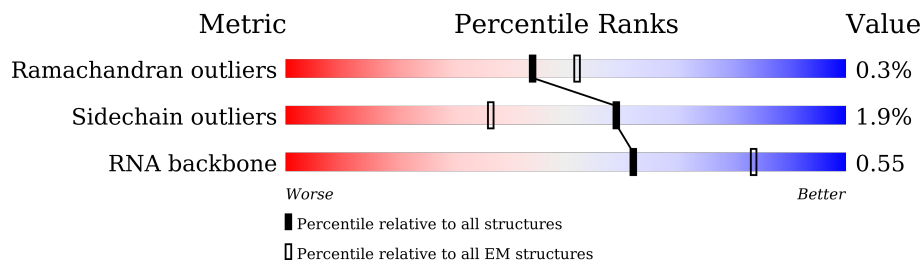
EMDB validation analysis : 0.0.1.dev50
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.34

1 Overall quality at a glance

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

The reported resolution of this entry is 3.10 Å.

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



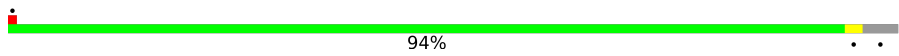






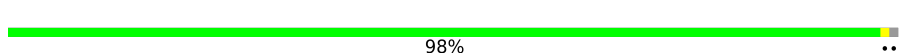
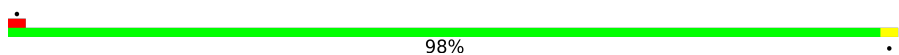



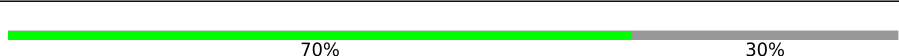
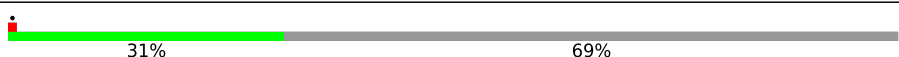
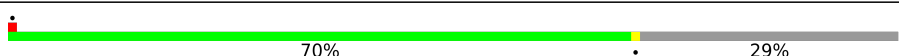
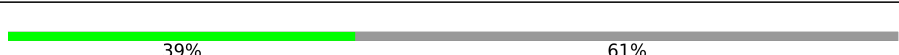
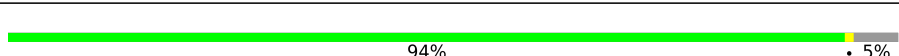


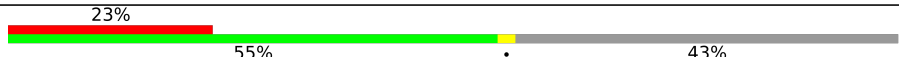
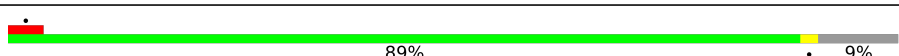
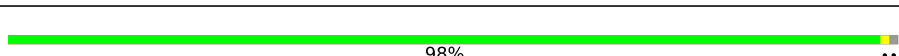
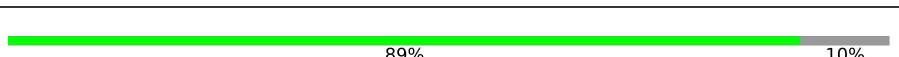

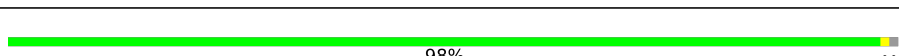
Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	3341	
2	C2	319	
3	CA	316	
4	CB	391	
5	CC	801	
6	CD	495	
7	CE	598	
8	CF	270	

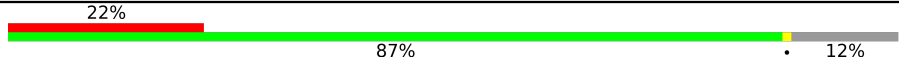

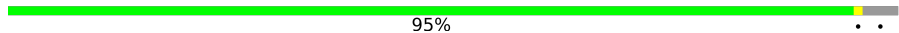

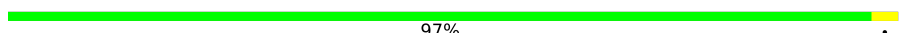






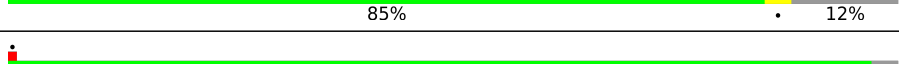

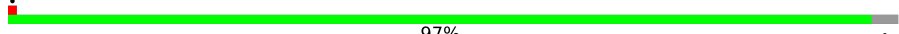
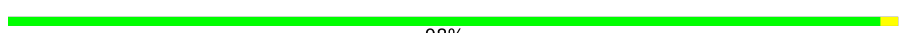




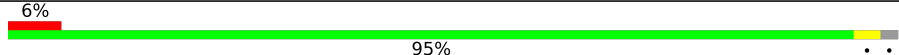





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Mol	Chain	Length	Quality of chain
9	CG	184	 94%
10	CH	661	 80% 18%
11	CI	414	 35% 65%
12	CJ	679	 72% 27%
13	CK	261	 87% 12%
14	CL	558	 57% 71% 29%
15	CM	249	 5% 89% 10%
15	LF	249	 98%
16	CN	246	 98%
17	CO	120	 52% 48%
18	CP	751	 46% 53%
19	CQ	225	 77% 20%
20	CR	237	 70% 30%
21	CS	834	 31% 69%
22	CT	688	 70% 29%
23	CU	451	 39% 61%
24	CV	147	 94% 5%
25	CX	203	 43% 57%
26	CY	788	 23% 52% 47%
27	Cz	123	 23% 55% 43%
28	LB	392	 89% 9%
29	LC	365	 98%
30	LE	200	 89% 10%
31	LG	262	 77% 22%
32	LH	192	 98%

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Mol	Chain	Length	Quality of chain
33	LK	165	
34	LL	213	
35	LM	142	
36	LN	203	
37	LO	204	
38	LP	187	
39	LQ	213	
40	LR	2898	
41	LS	174	
42	LT	160	
43	LU	127	
44	LV	139	
45	LX	156	
46	LY	138	
47	LZ	135	
48	Lc	108	
49	Ld	120	
50	Le	131	
51	Lf	109	
52	Lg	119	
53	Lh	935	
54	Li	110	
55	Lj	95	
56	Lk	81	
57	Ll	51	

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Mol	Chain	Length	Quality of chain
58	Lq	217	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a red segment labeled '41%', a green segment labeled '91%', a yellow segment labeled '5%', and a grey segment labeled '5%'. The segments are stacked from left to right.</p>

2 Entry composition [i](#)

There are 60 unique types of molecules in this entry. The entry contains 156553 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 RNA (3341-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	C1	2609	55815	24911	10105	18190	2609	0	0

- Molecule 2 is a RNA chain called RNA (319-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	C2	256	5456	2435	974	1791	256	0	0

- Molecule 3 is a protein called Brix domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	CA	251	2069	1324	381	357	7	0	0

- Molecule 4 is a protein called Ribosome biogenesis protein C8F11.04.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	CB	260	2063	1322	367	371	3	0	0

- Molecule 5 is a protein called Ribosome biogenesis protein ERB1.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	N	O	P	S		
5	CC	658	5297	3368	931	983	2	13	0	0

- Molecule 6 is a protein called Ribosome biogenesis protein YTM1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	CD	460	3468	2173	610	679	6	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
CD	88	ASP	GLU	conflict	UNP G0SFB5

- Molecule 7 is a protein called RNA helicase.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	CE	462	3669	2350	642	666	11	0	0

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
CE	543	LYS	-	insertion	UNP G0RYU9
CE	544	SER	-	insertion	UNP G0RYU9
CE	545	PHE	-	insertion	UNP G0RYU9
CE	546	GLY	-	insertion	UNP G0RYU9
CE	547	PHE	-	insertion	UNP G0RYU9
CE	548	SER	-	insertion	UNP G0RYU9
CE	549	THR	-	insertion	UNP G0RYU9
CE	550	PRO	-	insertion	UNP G0RYU9
CE	551	PRO	-	insertion	UNP G0RYU9
CE	552	ARG	-	insertion	UNP G0RYU9
CE	553	VAL	-	insertion	UNP G0RYU9
CE	554	ASP	-	insertion	UNP G0RYU9
CE	555	ILE	-	insertion	UNP G0RYU9
CE	556	THR	-	insertion	UNP G0RYU9
CE	557	LEU	-	insertion	UNP G0RYU9
CE	558	SER	-	insertion	UNP G0RYU9
CE	559	ALA	-	insertion	UNP G0RYU9
CE	560	SER	-	insertion	UNP G0RYU9
CE	561	LEU	-	insertion	UNP G0RYU9
CE	562	SER	-	insertion	UNP G0RYU9
CE	563	ARG	-	insertion	UNP G0RYU9
CE	564	ASP	-	insertion	UNP G0RYU9
CE	565	LYS	-	insertion	UNP G0RYU9
CE	566	LYS	-	insertion	UNP G0RYU9
CE	567	PRO	-	insertion	UNP G0RYU9
CE	568	GLN	-	insertion	UNP G0RYU9
CE	569	GLY	-	insertion	UNP G0RYU9
CE	570	ARG	-	insertion	UNP G0RYU9
CE	571	ARG	-	insertion	UNP G0RYU9
CE	572	ALA	-	insertion	UNP G0RYU9

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Chain	Residue	Modelled	Actual	Comment	Reference
CE	573	TYR	-	insertion	UNP G0RYU9
CE	574	GLY	-	insertion	UNP G0RYU9
CE	575	SER	-	insertion	UNP G0RYU9
CE	576	GLN	-	insertion	UNP G0RYU9
CE	577	PRO	-	insertion	UNP G0RYU9
CE	578	ARG	-	insertion	UNP G0RYU9
CE	579	GLN	-	insertion	UNP G0RYU9
CE	580	GLY	-	insertion	UNP G0RYU9
CE	581	GLY	-	insertion	UNP G0RYU9
CE	582	ARG	-	insertion	UNP G0RYU9
CE	583	TYR	-	insertion	UNP G0RYU9
CE	584	LYS	-	insertion	UNP G0RYU9

- Molecule 8 is a protein called Ribosome assembly factor mrt4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	CF	245	1945	1222	352	362	9	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
CF	13	ILE	THR	conflict	UNP G0S616
CF	139	THR	PRO	conflict	UNP G0S616
CF	228	ASN	SER	conflict	UNP G0S616
CF	259	ILE	MET	conflict	UNP G0S616

- Molecule 9 is a protein called 60S ribosome subunit biogenesis protein NIP7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	CG	177	1396	884	247	253	12	0	0

- Molecule 10 is a protein called Nucleolar GTP-binding protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	CH	542	4388	2784	770	818	16	0	0

- Molecule 11 is a protein called Putative RNA-binding protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	CI	146	Total	C	N	O	S	0	0
			1196	763	224	204	5		

- Molecule 12 is a protein called Pescadillo homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	CJ	494	Total	C	N	O	S	0	0
			4040	2575	719	734	12		

- Molecule 13 is a protein called Ribosome biogenesis protein NSA2 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	CK	229	Total	C	N	O	S	0	0
			1835	1149	362	320	4		

- Molecule 14 is a protein called Putative GTP binding protein.

Mol	Chain	Residues	Atoms				AltConf	Trace	
14	CL	397	Total	C	N	O		0	0
			2239	1350	459	430			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
CL	69	ARG	ILE	conflict	UNP G0SEW3

- Molecule 15 is a protein called 60S ribosomal protein l7-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	CM	223	Total	C	N	O	S	0	0
			1820	1169	340	308	3		
15	LF	247	Total	C	N	O	S	0	0
			2017	1294	376	344	3		

- Molecule 16 is a protein called Eukaryotic translation initiation factor 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	CN	246	Total	C	N	O	S	0	0
			1856	1158	322	369	7		

- Molecule 17 is a protein called DUF2423 domain-containing protein.

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

- Molecule 18 is a protein called RNA methyltransferase nop2-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	CP	356	Total	C	N	O	S	0	0
			2798	1777	495	510	16		

- Molecule 19 is a protein called Ribosome biogenesis protein RLP24.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	CQ	179	Total	C	N	O	S	0	0
			1485	926	304	245	10		

- Molecule 20 is a protein called Nucleolar protein 16.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	CR	167	Total	C	N	O	S	0	0
			1354	827	278	247	2		

- Molecule 21 is a protein called AdoMet-dependent rRNA methyltransferase SPB1.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	CS	262	Total	C	N	O	S	0	0
			2105	1322	399	377	7		

- Molecule 22 is a protein called Nucleolar complex-associated protein 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	CT	488	Total	C	N	O	S	0	0
			3911	2486	690	719	16		

- Molecule 23 is a protein called rRNA-processing protein EBP2.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	CU	178	Total	C	N	O	S	0	0
			1415	876	265	271	3		

- Molecule 24 is a protein called Putative 60S ribosomal protein.

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

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

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	CX	88	701	435	128	135	3	0	0

- Molecule 26 is a protein called Putative NOC2 family protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	CY	420	3399	2181	616	590	12	0	0

- Molecule 27 is a protein called rRNA-processing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	Cz	70	592	368	120	101	3	0	0

- Molecule 28 is a protein called 60S ribosomal protein L3-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	LB	356	2829	1798	518	501	12	0	0

- Molecule 29 is a protein called 60S ribosomal protein L4-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	LC	362	2752	1738	526	479	9	0	0

- Molecule 30 is a protein called 60S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	LE	179	1403	898	255	247	3	0	0

- Molecule 31 is a protein called 60S ribosomal protein L8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	LG	204	1644	1060	297	282	5	0	0

- Molecule 32 is a protein called 60S ribosomal protein l9-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	LH	190	1496	950	268	272	6	0	0

There are 37 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
LH	?	-	GLY	deletion	UNP G0S0E5
LH	?	-	THR	deletion	UNP G0S0E5
LH	?	-	PHE	deletion	UNP G0S0E5
LH	?	-	ARG	deletion	UNP G0S0E5
LH	?	-	LYS	deletion	UNP G0S0E5
LH	?	-	PHE	deletion	UNP G0S0E5
LH	?	-	ARG	deletion	UNP G0S0E5
LH	?	-	ARG	deletion	UNP G0S0E5
LH	?	-	ASN	deletion	UNP G0S0E5
LH	?	-	ASP	deletion	UNP G0S0E5
LH	?	-	TYR	deletion	UNP G0S0E5
LH	?	-	THR	deletion	UNP G0S0E5
LH	?	-	PHE	deletion	UNP G0S0E5
LH	?	-	GLY	deletion	UNP G0S0E5
LH	?	-	ARG	deletion	UNP G0S0E5
LH	?	-	THR	deletion	UNP G0S0E5
LH	?	-	ARG	deletion	UNP G0S0E5
LH	?	-	GLY	deletion	UNP G0S0E5
LH	?	-	ARG	deletion	UNP G0S0E5
LH	?	-	GLU	deletion	UNP G0S0E5
LH	?	-	LYS	deletion	UNP G0S0E5
LH	?	-	LYS	deletion	UNP G0S0E5
LH	?	-	ARG	deletion	UNP G0S0E5
LH	?	-	GLY	deletion	UNP G0S0E5
LH	?	-	THR	deletion	UNP G0S0E5
LH	?	-	THR	deletion	UNP G0S0E5
LH	?	-	SER	deletion	UNP G0S0E5
LH	?	-	SER	deletion	UNP G0S0E5
LH	?	-	LYS	deletion	UNP G0S0E5
LH	?	-	ILE	deletion	UNP G0S0E5
LH	?	-	GLY	deletion	UNP G0S0E5

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Chain	Residue	Modelled	Actual	Comment	Reference
LH	?	-	GLU	deletion	UNP G0S0E5
LH	?	-	LEU	deletion	UNP G0S0E5
LH	?	-	ASP	deletion	UNP G0S0E5
LH	?	-	ILE	deletion	UNP G0S0E5
LH	?	-	ASN	deletion	UNP G0S0E5
LH	?	-	GLY	deletion	UNP G0S0E5

- Molecule 33 is a protein called 60S ribosomal protein L12-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	LK	146	1112	701	203	206	2	0	0

- Molecule 34 is a protein called 60S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	LL	117	964	608	206	148	2	0	0

- Molecule 35 is a protein called 60S ribosomal protein L14-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	LM	137	1101	699	211	190	1	0	0

- Molecule 36 is a protein called Ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	LN	183	1563	974	332	253	4	0	0

- Molecule 37 is a protein called 60S ribosomal protein L16-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	LO	204	1618	1039	306	267	6	0	0

- Molecule 38 is a protein called 60S ribosomal protein l17-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	LP	169	Total	C	N	O	S	0	0
			1345	835	273	234	3		

- Molecule 39 is a protein called Ribosomal protein L18-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	LQ	129	Total	C	N	O	S	0	0
			1021	646	200	173	2		

- Molecule 40 is a protein called Ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	LR	119	Total	C	N	O	S	0	0
			969	610	196	159	4		

- Molecule 41 is a protein called 60S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	LS	174	Total	C	N	O	S	0	0
			1433	922	267	239	5		

- Molecule 42 is a protein called 60S ribosomal protein l21-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	LT	126	Total	C	N	O	S	0	0
			1014	643	196	173	2		

- Molecule 43 is a protein called 60S ribosomal protein L22-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	LU	105	Total	C	N	O	S	0	0
			850	551	147	151	1		

- Molecule 44 is a protein called 60S ribosomal protein l23-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	LV	135	Total	C	N	O	S	0	0
			995	633	185	170	7		

- Molecule 45 is a protein called 60S ribosomal protein L25-like protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
45	LX	137	1062	678	194	190	0	0

- Molecule 46 is a protein called 60S ribosomal protein L26-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
46	LY	134	1065	664	215	184	2	0	0

- Molecule 47 is a protein called 60S ribosomal protein L27.

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

- Molecule 48 is a protein called 60S ribosomal protein l30-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
48	Lc	98	731	463	126	137	5	0	0

- Molecule 49 is a protein called Putative 60S ribosomal protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	Ld	109	890	563	171	155	1	0	0

- Molecule 50 is a protein called 60S ribosomal protein L32-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
50	Le	127	1025	645	209	164	7	0	0

- Molecule 51 is a protein called 60S ribosomal protein l33-like protein.

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

- Molecule 52 is a protein called Ribosomal protein l34-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
52	Lg	117	930	578	189	159	4	0	0

- Molecule 53 is a protein called dolichyl-diphosphooligosaccharide--protein glycotransferase.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
53	Lh	121	995	633	196	166		0	0

- Molecule 54 is a protein called 60S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
54	Li	88	731	449	162	119	1	0	0

- Molecule 55 is a protein called Ribosomal protein L37.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
55	Lj	74	595	365	132	93	5	0	0

- Molecule 56 is a protein called 60S ribosomal protein L38-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
56	Lk	75	620	394	117	107	2	0	0

There are 13 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Lk	?	-	SER	deletion	UNP G0SG89
Lk	?	-	LYS	deletion	UNP G0SG89
Lk	?	-	ILE	deletion	UNP G0SG89
Lk	?	-	LEU	deletion	UNP G0SG89
Lk	?	-	THR	deletion	UNP G0SG89
Lk	?	-	ILE	deletion	UNP G0SG89
Lk	?	-	ALA	deletion	UNP G0SG89
Lk	?	-	PHE	deletion	UNP G0SG89
Lk	?	-	PRO	deletion	UNP G0SG89
Lk	?	-	PRO	deletion	UNP G0SG89
Lk	?	-	PRO	deletion	UNP G0SG89
Lk	?	-	LEU	deletion	UNP G0SG89

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Chain	Residue	Modelled	Actual	Comment	Reference
Lk	?	-	THR	deletion	UNP G0SG89

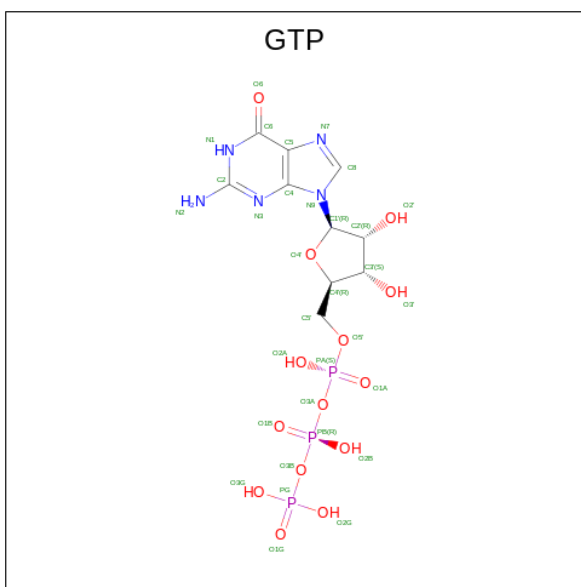
- Molecule 57 is a protein called 60S ribosomal protein L39.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
57	Ll	38	322	204	68	50	0	0

- Molecule 58 is a protein called Ribosomal protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
58	Lq	207	1600	1016	285	291	8	0	0

- Molecule 59 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	
59	CH	1	32	10	5	14	3	0

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

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
60	CQ	1	1	1	0

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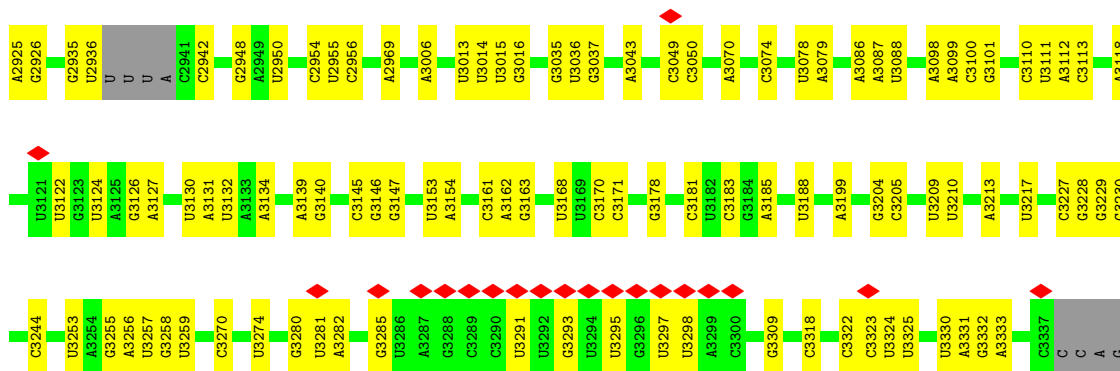
Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
60	Lj	1	1	1	0

3 Residue-property plots [i](#)

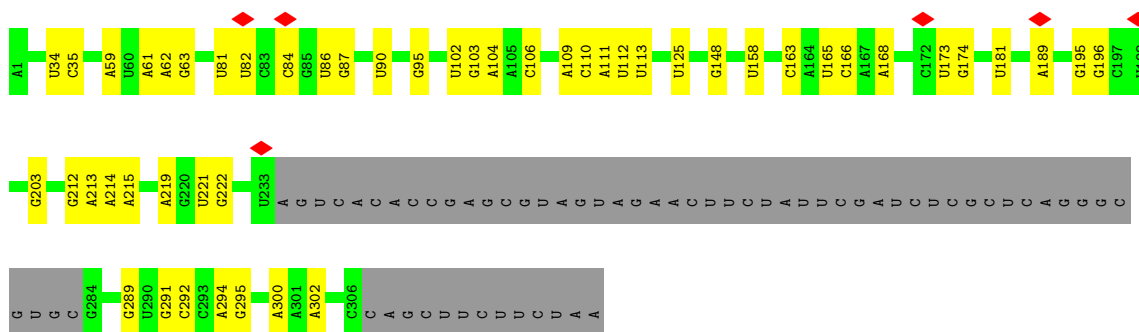
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

- Molecule 1: RNA (3341-MER)

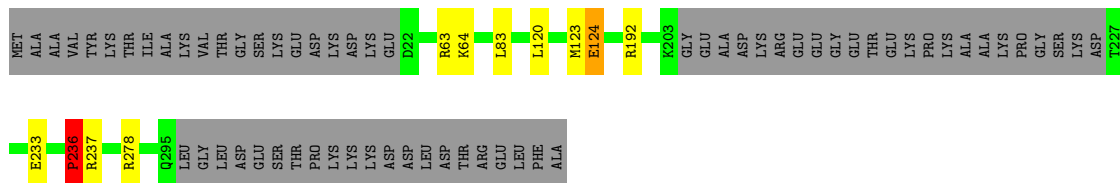
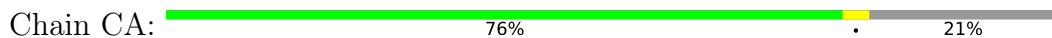




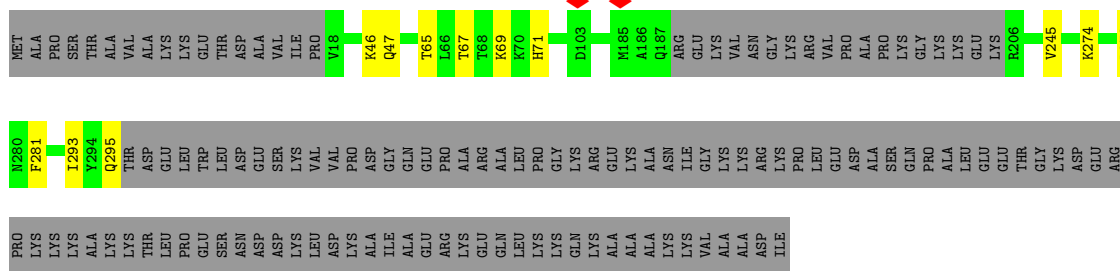
- Molecule 2: RNA (319-MER)



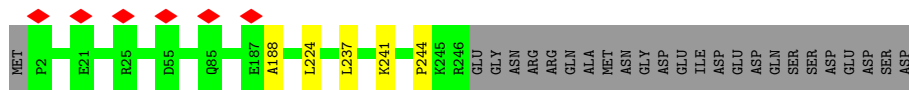
- Molecule 3: Brix domain-containing protein



- Molecule 4: Ribosome biogenesis protein C8F11.04



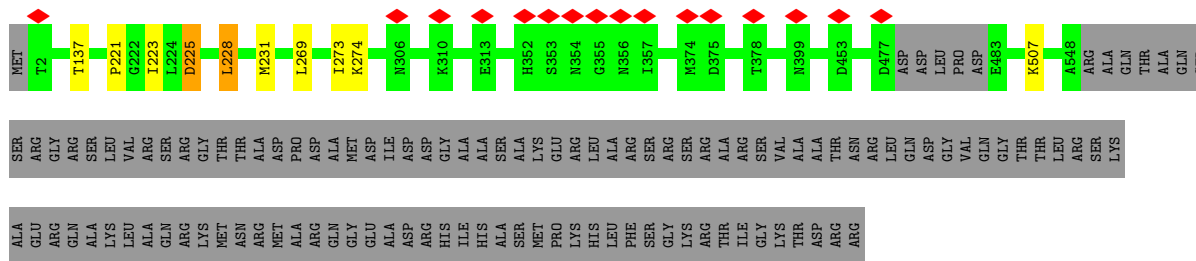
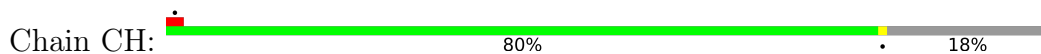
- Molecule 5: Ribosome biogenesis protein ERB1



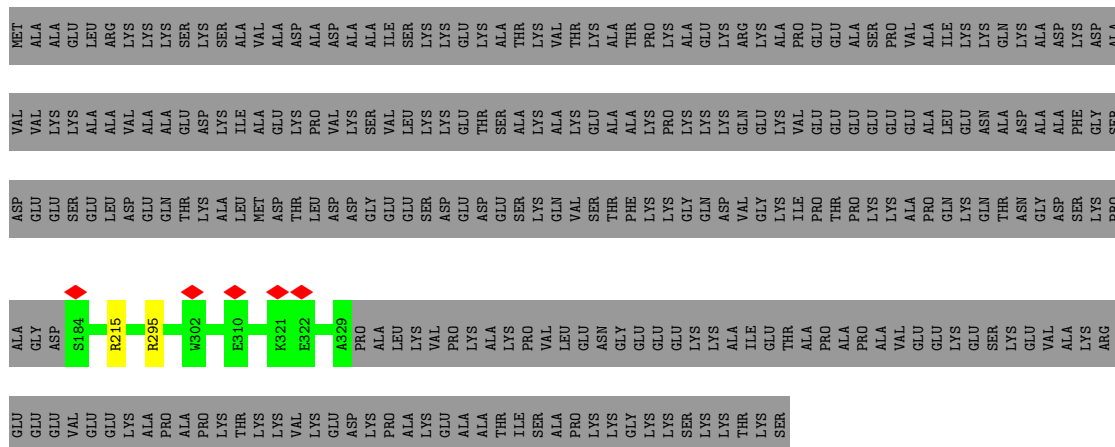
● Molecule 9: 60S ribosome subunit biogenesis protein NIP7



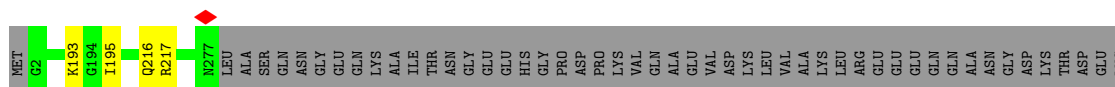
● Molecule 10: Nucleolar GTP-binding protein 1

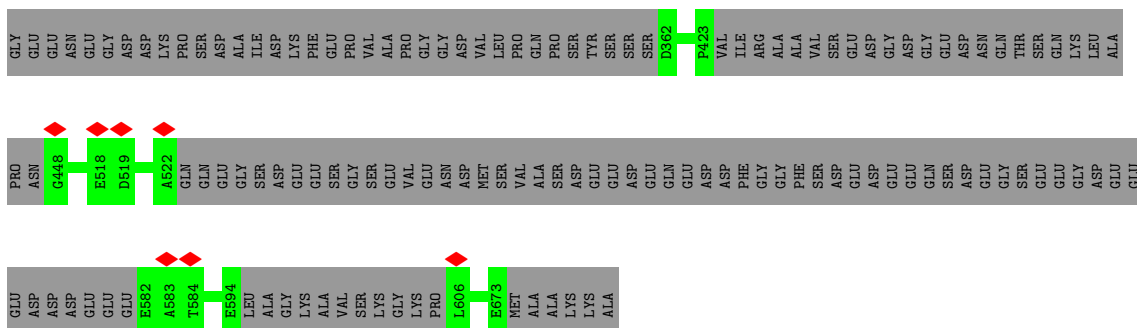


● Molecule 11: Putative RNA-binding protein

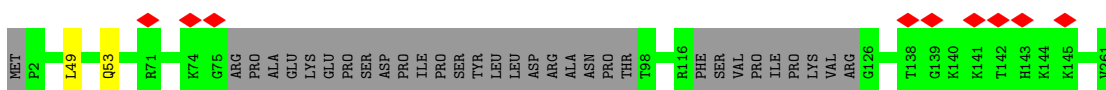


● Molecule 12: Pescadillo homolog

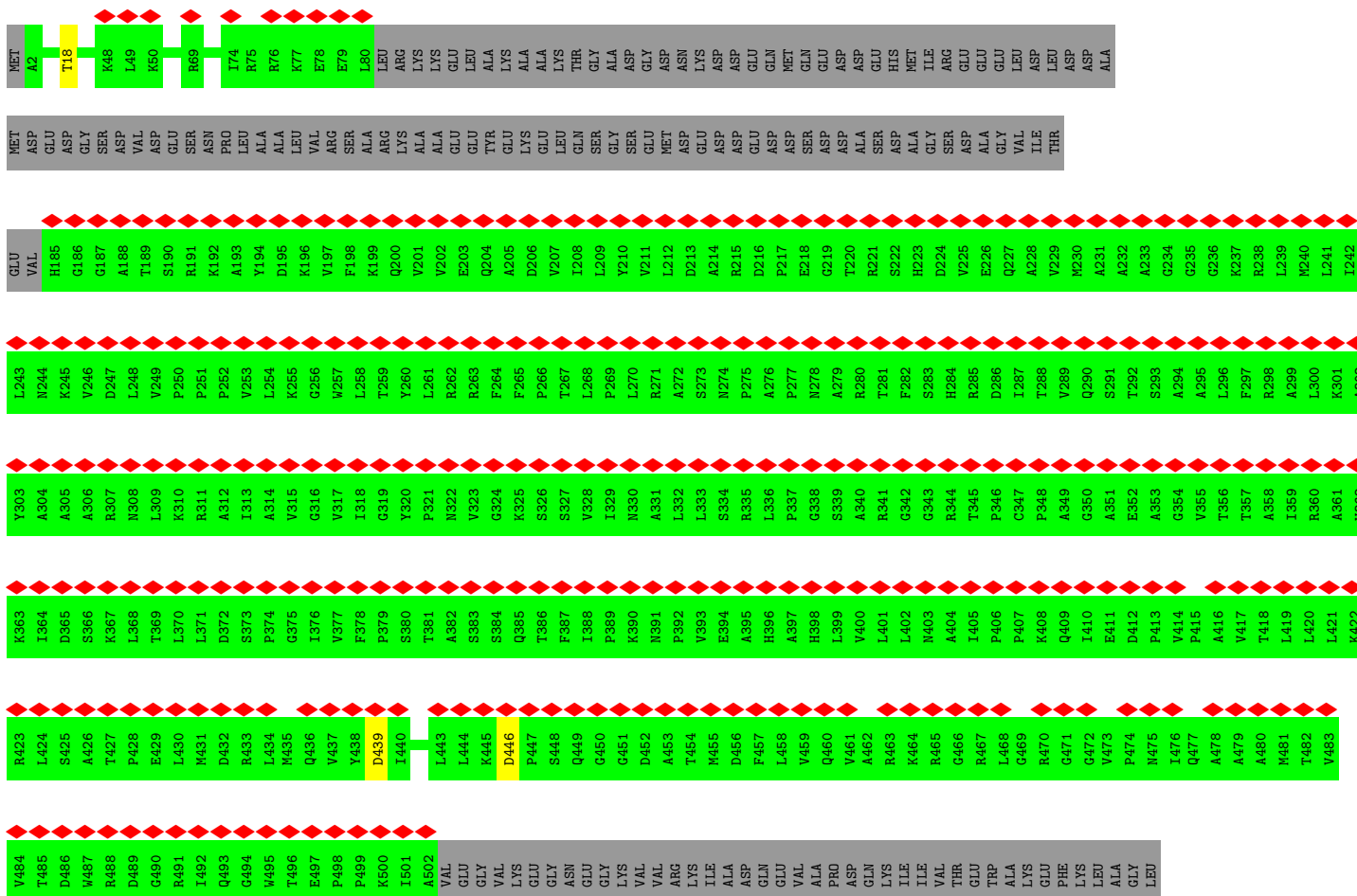
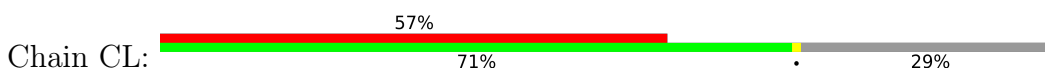




• Molecule 13: Ribosome biogenesis protein NSA2 homolog

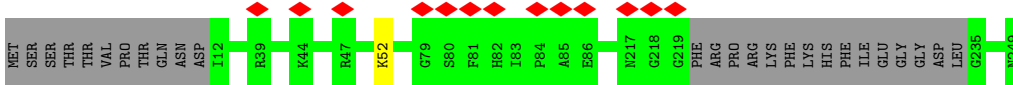
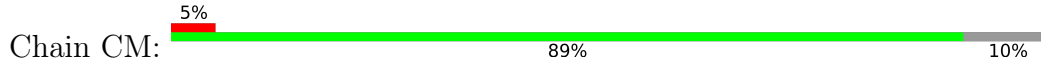


• Molecule 14: Putative GTP binding protein

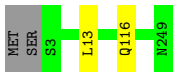


TRP
GLY
ASP
GLU
GLU
GLN
THR
GLU
GLY
ASP
LYS
MET
GLU
ALA

- Molecule 15: 60S ribosomal protein 17-like protein



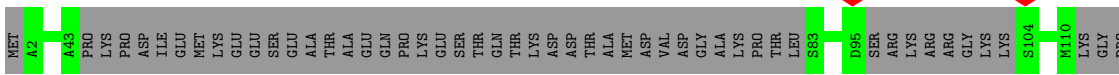
- Molecule 15: 60S ribosomal protein 17-like protein



- Molecule 16: Eukaryotic translation initiation factor 6



- Molecule 17: DUF2423 domain-containing protein



LYS
ARG
ASN
ASN
LEU
LYS
LYS

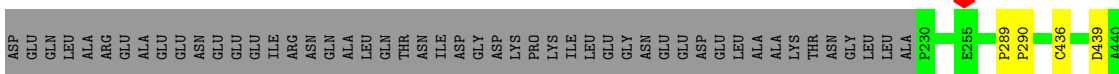
- Molecule 18: RNA methyltransferase nop2-like protein

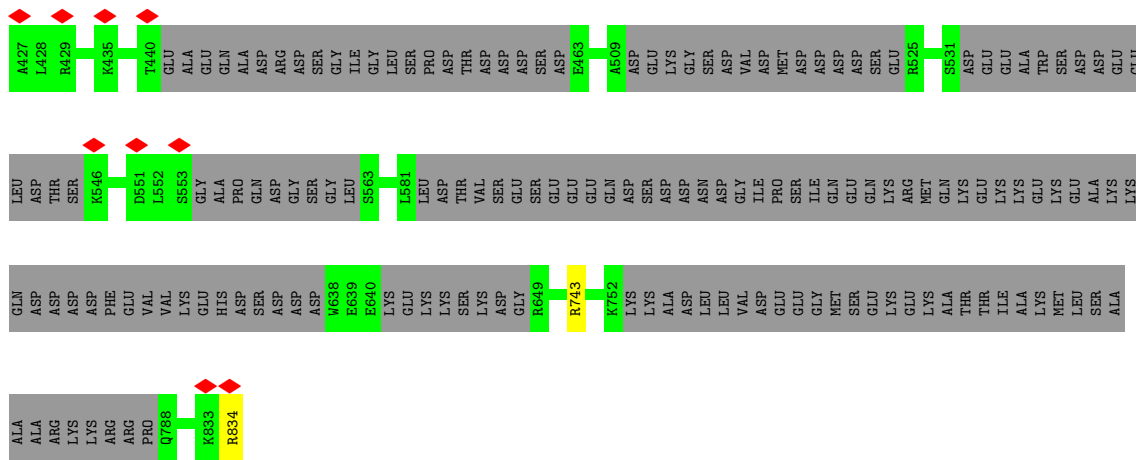


MET
GLY
THR
LYS
THR
ARG
THR
LYS
HIS
LYS
GLY
ALA
PRO
GLU
PRO
PRO
LEU
GLU
TYR
ASN
GLY
GLU
HIS
PHE
LEU
LEU
LYS
LEU
LEU
LEU
VAL
GLU
SER
PRO
THR
THR
ASP
GLU
VAL
ALA
GLU
GLU
ASP
ASP
SER
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THR
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THR
LYS
ASP
ALA
PRO
HIS
ALA

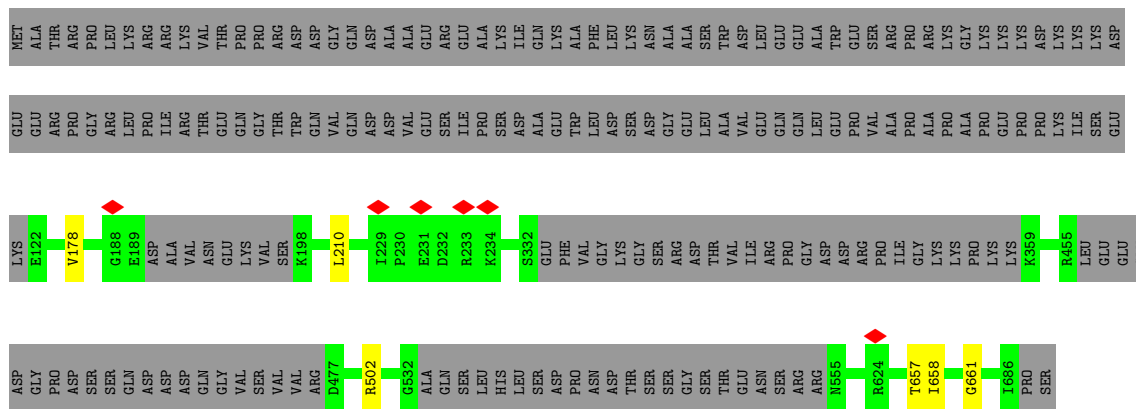
THR
THR
LYS
GLN
THR
THR
ASN
GLY
THR
LYS
LYS
ALA
SER
ASP
GLY
ALA
SER
VAL
TYR
ASN
GLY
SER
GLU
LYS
GLN
ALA
LEU
THR
ASP
ILE
LEU
LEU
LEU
SER
GLU
VAL
PHE
THR
LEU
LEU
GLU
SER
ASP
GLU
GLU
VAL
ASP
GLU
GLU
ALA
GLU
GLU
GLU
PHE
THR
ASN
GLY
LEU
LEU
LEU
ALA
ASP
ALA
PRO
HIS
SER

GLU
PRO
LYS
LEU
ALA
GLY
SER
ASP
PHE
ALA
GLU
ALA
GLU
ASN
SER
GLU
ASP
ASP
SER
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TYR
ASN
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GLU
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GLU
ALA
GLU
GLU
GLU
PHE
THR
ASN
GLY
LEU
LEU
LEU
ALA
ASP
ALA
PRO
HIS
SER





• Molecule 22: Nucleolar complex-associated protein 3



• Molecule 23: rRNA-processing protein EBP2

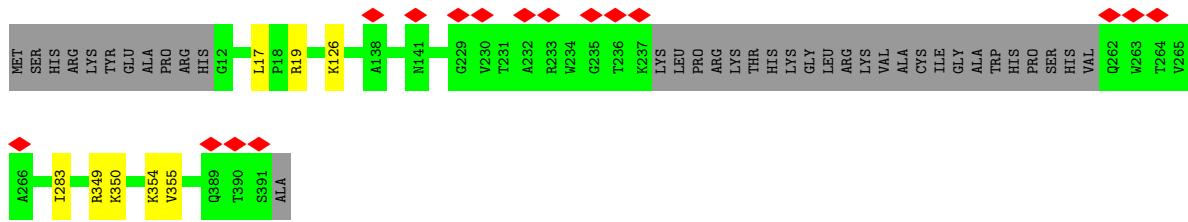


• Molecule 24: Putative 60S ribosomal protein

TYR
GLU
GLN
LEU
ALA
ALA
LYS
MET
HIS
LYS
LYS
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GLU
LYS
ARG
ASN
LYS
LEU
LEU
ASN
SER

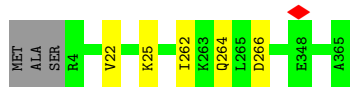
- Molecule 28: 60S ribosomal protein L3-like protein

Chain LB:  89% 9%



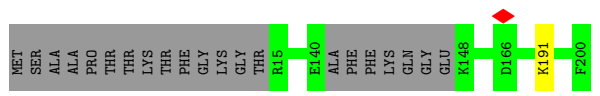
- Molecule 29: 60S ribosomal protein L4-like protein

Chain LC:  98% ..




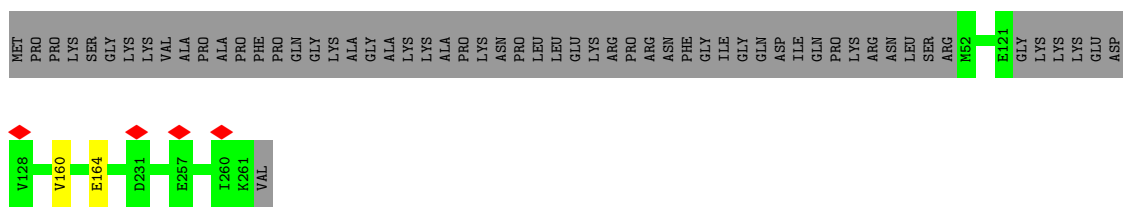
- Molecule 30: 60S ribosomal protein L6

Chain LE:  89% 10%



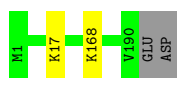
- Molecule 31: 60S ribosomal protein L8

Chain LG:  77% 22%




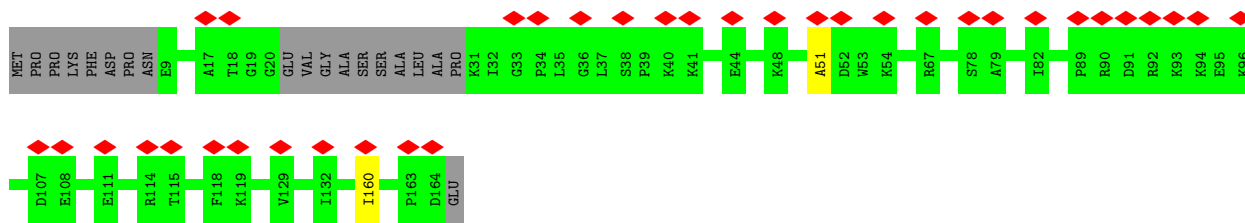
- Molecule 32: 60S ribosomal protein I9-like protein

Chain LH:  98% ..

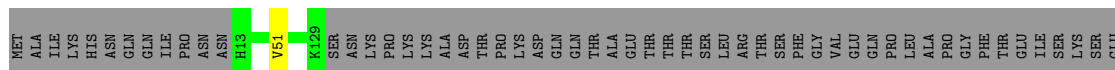


- Molecule 33: 60S ribosomal protein L12-like protein

Chain LK:  22% 87% 12%



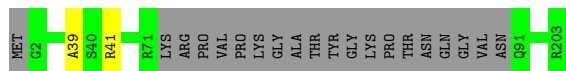
• Molecule 34: 60S ribosomal protein L13



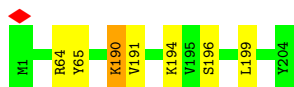
• Molecule 35: 60S ribosomal protein L14-like protein



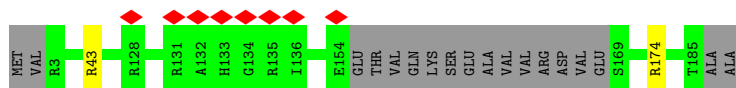
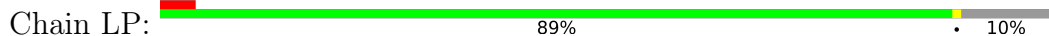
• Molecule 36: Ribosomal protein L15



• Molecule 37: 60S ribosomal protein L16-like protein

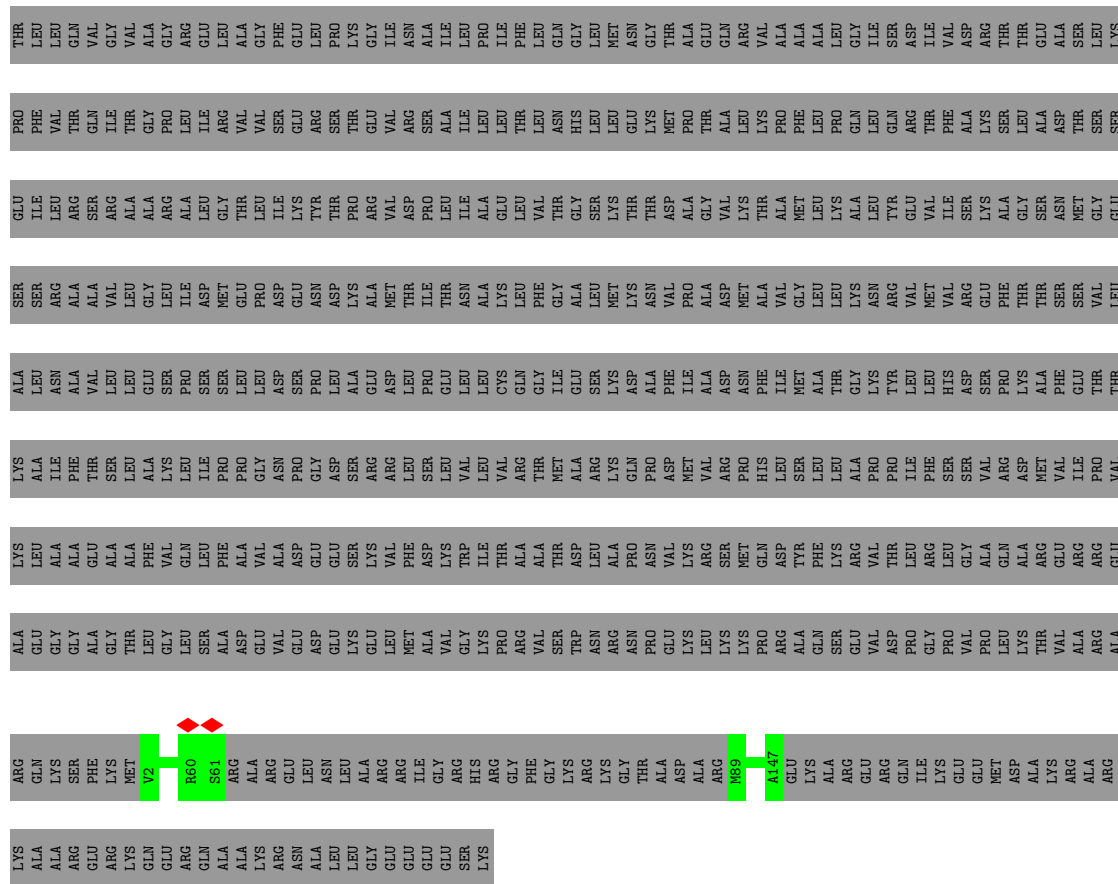


• Molecule 38: 60S ribosomal protein l17-like protein



• Molecule 39: Ribosomal protein L18-like protein

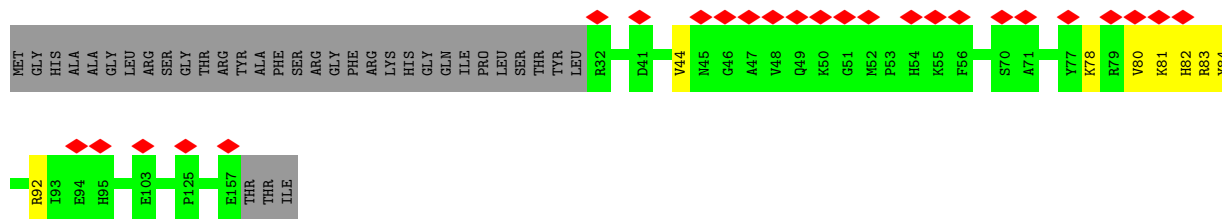
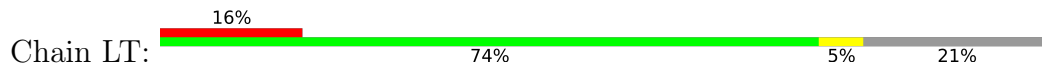




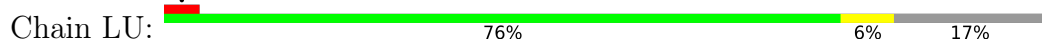
• Molecule 41: 60S ribosomal protein L20

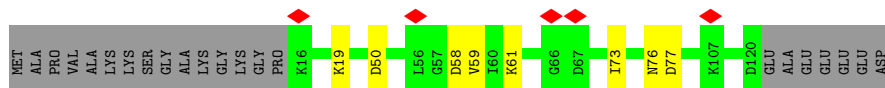


• Molecule 42: 60S ribosomal protein l21-like protein

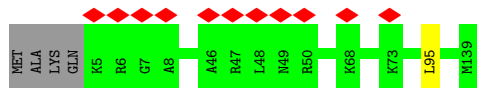


• Molecule 43: 60S ribosomal protein L22-like protein

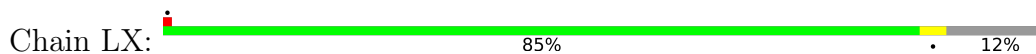




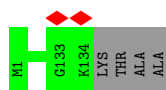
- Molecule 44: 60S ribosomal protein l23-like protein



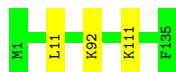
- Molecule 45: 60S ribosomal protein L25-like protein



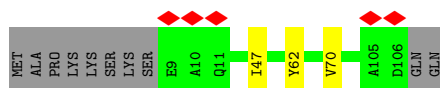
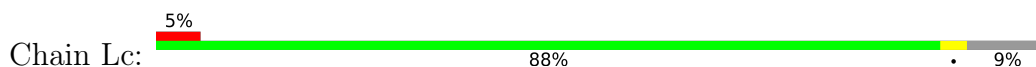
- Molecule 46: 60S ribosomal protein L26-like protein



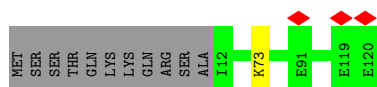
- Molecule 47: 60S ribosomal protein L27



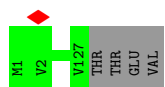
- Molecule 48: 60S ribosomal protein l30-like protein



- Molecule 49: Putative 60S ribosomal protein



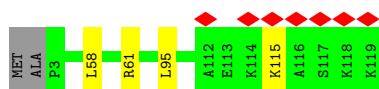
- Molecule 50: 60S ribosomal protein L32-like protein



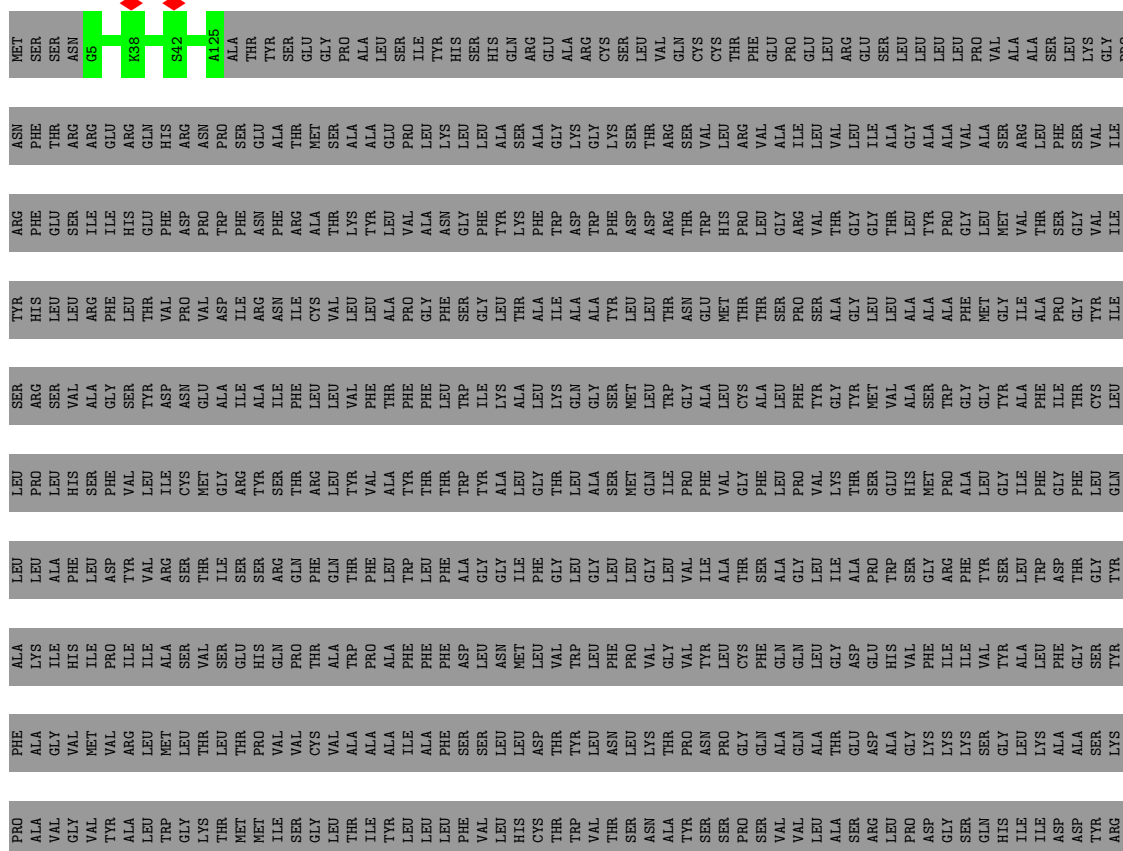
- Molecule 51: 60S ribosomal protein l33-like protein



- Molecule 52: Ribosomal protein l34-like protein

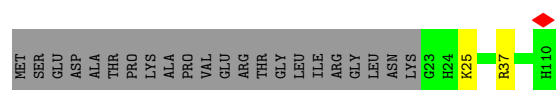
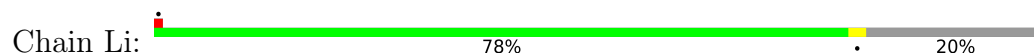


- Molecule 53: dolichyl-diphosphooligosaccharide--protein glycotransferase

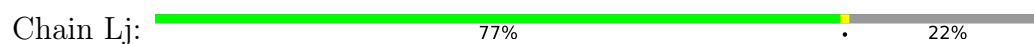


GLU ALA TYR GLN TRP LEU ARG GLN ASN THR THR ARG GLU ASP ALA LYS MET ILE GLY MET SER TRP TRP ASP GLY TYR TYR GLY GLY PHE TYR LEU LEU LEU LEU ASP ASP ILE GLY GLY MET ALA ASP ARG MET PRO THR THR VAL VAL ILE VAL ARG GLY ILE TRP TRP ASN ASN THR THR HIS ILE SER GLU ALA THR THR VAL VAL GLY LYS LEU ALA PHE PHE THR THR MET SER GLY SER ARG GLU VAL VAL SER
TYR PRO ILE MET ARG GLN TRP HIS GLU VAL ASN VAL TYR TYR VAL VAL VAL VAL PHE GLY GLY MET SER TYR TYR GLY SER GLY TYR ASP GLY ASP ILE GLY ASN GLN LYS PHE VAL VAL PHE LEU LEU TRP MET PRO THR VAL ARG GLY PRO GLY ARG VAL ARG LEU VAL VAL LEU ARG VAL VAL GLU
ALA GLU ALA THR THR ASP THR MET LYS ASN SER SER MET LEU MET TYR MET VAL TYR SER CYS MET TYR SER GLY ALA TYR ASN TYR TYR ASN GLU PHE GLY ARG GLY SER ASN LYS PHE LEU PRO PRO GLY GLN GLY ALA VAL THR THR LYS LYS LYS LYS VAL VAL LEU ARG VAL LEU VAL VAL GLU THR THR SER ASN THR LEU ALA GLY PHE PHE THR THR SER SER GLY GLY TRP ILE ILE ARG
ILE TYR LYS VAL VAL ASP ASP LEU ASN SER GLY LEU VAL GLU ASP ASP HIS ALA SER SER SER TYR ALA ALA ALA ALA PHE GLU ASN LYS ARG GLY SER SER LYS LYS LYS LYS VAL VAL LEU VAL VAL GLU VAL VAL VAL GLU

- Molecule 54: 60S ribosomal protein L36



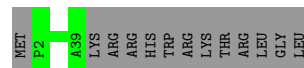
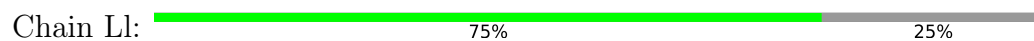
- Molecule 55: Ribosomal protein L37



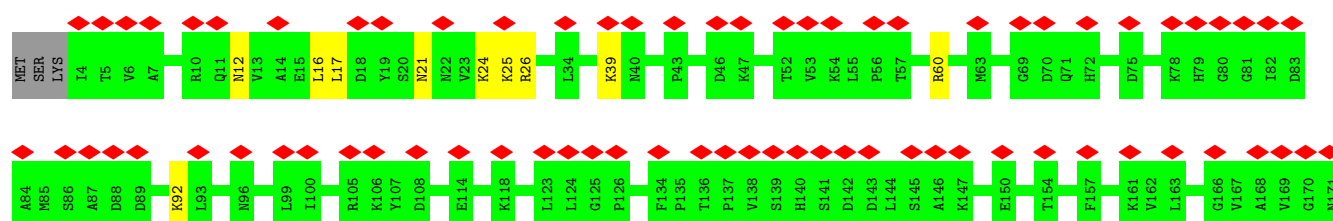
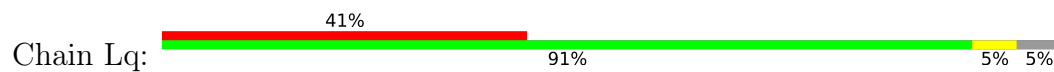
- Molecule 56: 60S ribosomal protein L38-like protein

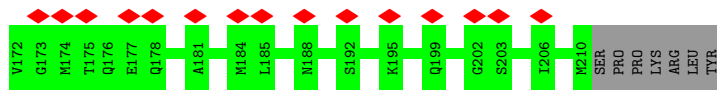


- Molecule 57: 60S ribosomal protein L39



- Molecule 58: Ribosomal protein





4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	70516	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 ($e^-/\text{\AA}^2$)	44	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.520	Depositor
Minimum map value	-0.260	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.011	Depositor
Recommended contour level	0.02	Depositor
Map size (Å)	438.9, 438.9, 438.9	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.045, 1.045, 1.045	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	0.34	0/62448	0.82	37/97346 (0.0%)
2	C2	0.30	0/6097	0.77	0/9499
3	CA	0.35	0/2115	0.63	1/2840 (0.0%)
4	CB	0.36	0/2109	0.65	0/2866
5	CC	0.31	0/5423	0.59	0/7380
6	CD	0.26	0/3543	0.58	0/4824
7	CE	0.33	0/3739	0.58	0/5040
8	CF	0.30	0/1982	0.58	0/2671
9	CG	0.31	0/1422	0.57	0/1920
10	CH	0.32	0/4468	0.57	0/6029
11	CI	0.32	0/1225	0.63	0/1645
12	CJ	0.31	0/4125	0.58	0/5548
13	CK	0.27	0/1863	0.55	0/2494
14	CL	0.29	0/2247	0.51	0/3076
15	CM	0.31	0/1851	0.58	0/2481
15	LF	0.31	0/2055	0.59	1/2758 (0.0%)
16	CN	0.31	0/1881	0.62	0/2560
17	CO	0.26	0/470	0.52	0/619
18	CP	0.32	0/2859	0.59	0/3870
19	CQ	0.32	0/1507	0.64	0/1996
20	CR	0.27	0/1369	0.59	0/1828
21	CS	0.26	0/2127	0.53	0/2817
22	CT	0.29	0/3974	0.57	0/5357
23	CU	0.31	0/1428	0.59	0/1910
24	CV	0.26	0/1091	0.54	0/1468
25	CX	0.29	0/705	0.55	0/938
26	CY	0.31	0/3454	0.63	0/4637
27	Cz	0.30	0/598	0.62	0/785
28	LB	0.32	0/2885	0.61	0/3872
29	LC	0.30	0/2809	0.55	0/3787
30	LE	0.28	0/1428	0.53	0/1921
31	LG	0.32	0/1667	0.55	0/2230

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
32	LH	0.28	0/1516	0.56	0/2038
33	LK	0.25	0/1124	0.54	0/1507
34	LL	0.30	0/983	0.63	0/1318
35	LM	0.32	0/1120	0.59	0/1507
36	LN	0.30	0/1595	0.62	1/2132 (0.0%)
37	LO	0.33	0/1652	0.58	0/2215
38	LP	0.26	0/1367	0.59	0/1838
39	LQ	0.28	0/1033	0.58	0/1391
40	LR	0.26	0/985	0.55	0/1318
41	LS	0.30	0/1468	0.58	0/1975
42	LT	0.29	0/1033	0.53	0/1389
43	LU	0.34	0/863	0.57	0/1155
44	LV	0.29	0/1013	0.54	0/1361
45	LX	0.30	0/1078	0.52	0/1451
46	LY	0.26	0/1079	0.56	0/1443
47	LZ	0.30	0/1135	0.61	0/1519
48	Lc	0.35	0/740	0.59	0/995
49	Ld	0.33	0/904	0.59	0/1209
50	Le	0.25	0/1043	0.54	0/1389
51	Lf	0.33	0/883	0.62	0/1187
52	Lg	0.34	0/943	0.61	0/1258
53	Lh	0.25	0/1006	0.54	0/1338
54	Li	0.28	0/738	0.62	0/971
55	Lj	0.34	0/606	0.68	0/803
56	Lk	0.26	0/628	0.57	0/835
57	Ll	0.24	0/329	0.54	0/440
58	Lq	0.29	0/1621	0.63	0/2180
All	All	0.32	0/165449	0.70	40/237174 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
58	Lq	0	1

There are no bond length outliers.

All (40) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	1050	C	N3-C2-O2	-12.25	113.32	121.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C1	1050	C	N1-C2-O2	10.69	125.31	118.90
1	C1	1583	U	C2-N1-C1'	8.47	127.87	117.70
1	C1	136	C	N3-C2-O2	-8.14	116.20	121.90
1	C1	2723	C	N3-C2-O2	-7.78	116.46	121.90
1	C1	2452	C	N3-C2-O2	-7.68	116.52	121.90
1	C1	1583	U	N1-C2-O2	7.50	128.05	122.80
1	C1	1051	C	N3-C2-O2	-7.22	116.84	121.90
1	C1	1537	U	C2-N1-C1'	7.15	126.28	117.70
1	C1	1051	C	C6-N1-C2	-6.89	117.54	120.30
1	C1	1583	U	N3-C2-O2	-6.64	117.55	122.20
1	C1	1537	U	N3-C2-O2	-6.54	117.62	122.20
1	C1	1537	U	N1-C2-O2	6.44	127.31	122.80
3	CA	236	PRO	N-CA-CB	-6.39	95.58	102.60
1	C1	799	C	N3-C2-O2	-6.38	117.43	121.90
1	C1	1050	C	C6-N1-C2	-6.32	117.77	120.30
1	C1	83	C	C2-N3-C4	-6.08	116.86	119.90
15	LF	13	LEU	CA-CB-CG	6.05	129.21	115.30
1	C1	1157	C	C6-N1-C2	6.00	122.70	120.30
1	C1	127	G	N3-C4-N9	5.97	129.58	126.00
1	C1	1583	U	C6-N1-C1'	-5.74	113.17	121.20
1	C1	249	C	N3-C2-O2	-5.73	117.89	121.90
1	C1	128	G	C5-C6-O6	5.50	131.90	128.60
1	C1	799	C	N1-C2-O2	5.43	122.16	118.90
1	C1	2745	G	N1-C6-O6	-5.41	116.66	119.90
1	C1	2752	G	C5-C6-O6	5.38	131.83	128.60
1	C1	940	C	O4'-C1'-N1	5.36	112.48	108.20
1	C1	83	C	N1-C2-N3	5.32	122.92	119.20
36	LN	39	ALA	O-C-N	5.28	131.14	122.70
1	C1	1073	G	N1-C2-N2	-5.26	111.47	116.20
1	C1	128	G	N3-C4-N9	-5.24	122.86	126.00
1	C1	442	C	C2-N1-C1'	5.19	124.51	118.80
1	C1	2752	G	N1-C6-O6	-5.16	116.80	119.90
1	C1	398	G	O4'-C1'-N9	5.14	112.31	108.20
1	C1	127	G	C4-N9-C1'	5.11	133.14	126.50
1	C1	127	G	C8-N9-C1'	-5.10	120.37	127.00
1	C1	2745	G	C5-C6-O6	5.08	131.65	128.60
1	C1	1072	G	N1-C2-N2	-5.06	111.64	116.20
1	C1	1049	C	N1-C2-O2	5.05	121.93	118.90
1	C1	2413	G	P-O3'-C3'	5.00	125.70	119.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
58	Lq	60	ARG	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	
3	CA	247/316 (78%)	228 (92%)	16 (6%)	3 (1%)	13	44
4	CB	256/391 (66%)	228 (89%)	28 (11%)	0	100	100
5	CC	648/801 (81%)	606 (94%)	38 (6%)	4 (1%)	25	59
6	CD	450/495 (91%)	416 (92%)	34 (8%)	0	100	100
7	CE	458/598 (77%)	428 (93%)	30 (7%)	0	100	100
8	CF	243/270 (90%)	227 (93%)	14 (6%)	2 (1%)	19	54
9	CG	175/184 (95%)	163 (93%)	11 (6%)	1 (1%)	25	59
10	CH	538/661 (81%)	511 (95%)	25 (5%)	2 (0%)	34	69
11	CI	144/414 (35%)	135 (94%)	9 (6%)	0	100	100
12	CJ	484/679 (71%)	462 (96%)	21 (4%)	1 (0%)	47	79
13	CK	223/261 (85%)	212 (95%)	11 (5%)	0	100	100
14	CL	393/558 (70%)	366 (93%)	25 (6%)	2 (0%)	29	64
15	CM	219/249 (88%)	210 (96%)	9 (4%)	0	100	100
15	LF	245/249 (98%)	238 (97%)	7 (3%)	0	100	100
16	CN	244/246 (99%)	227 (93%)	17 (7%)	0	100	100
17	CO	56/120 (47%)	56 (100%)	0	0	100	100
18	CP	354/751 (47%)	330 (93%)	24 (7%)	0	100	100
19	CQ	173/225 (77%)	165 (95%)	8 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
20	CR	159/237 (67%)	157 (99%)	2 (1%)	0	100	100
21	CS	246/834 (30%)	238 (97%)	8 (3%)	0	100	100
22	CT	478/688 (70%)	452 (95%)	24 (5%)	2 (0%)	34	69
23	CU	174/451 (39%)	170 (98%)	3 (2%)	1 (1%)	25	59
24	CV	137/147 (93%)	135 (98%)	1 (1%)	1 (1%)	22	57
25	CX	86/203 (42%)	84 (98%)	2 (2%)	0	100	100
26	CY	406/788 (52%)	371 (91%)	33 (8%)	2 (0%)	29	64
27	Cz	68/123 (55%)	64 (94%)	4 (6%)	0	100	100
28	LB	352/392 (90%)	333 (95%)	19 (5%)	0	100	100
29	LC	360/365 (99%)	344 (96%)	16 (4%)	0	100	100
30	LE	175/200 (88%)	163 (93%)	11 (6%)	1 (1%)	25	59
31	LG	200/262 (76%)	189 (94%)	11 (6%)	0	100	100
32	LH	188/192 (98%)	180 (96%)	8 (4%)	0	100	100
33	LK	142/165 (86%)	129 (91%)	11 (8%)	2 (1%)	11	40
34	LL	115/213 (54%)	107 (93%)	7 (6%)	1 (1%)	17	52
35	LM	135/142 (95%)	129 (96%)	6 (4%)	0	100	100
36	LN	179/203 (88%)	170 (95%)	9 (5%)	0	100	100
37	LO	202/204 (99%)	190 (94%)	9 (4%)	3 (2%)	10	39
38	LP	165/187 (88%)	160 (97%)	5 (3%)	0	100	100
39	LQ	127/213 (60%)	121 (95%)	6 (5%)	0	100	100
40	LR	115/2898 (4%)	115 (100%)	0	0	100	100
41	LS	172/174 (99%)	160 (93%)	12 (7%)	0	100	100
42	LT	124/160 (78%)	117 (94%)	6 (5%)	1 (1%)	19	54
43	LU	103/127 (81%)	96 (93%)	7 (7%)	0	100	100
44	LV	133/139 (96%)	128 (96%)	5 (4%)	0	100	100
45	LX	133/156 (85%)	129 (97%)	4 (3%)	0	100	100
46	LY	132/138 (96%)	130 (98%)	2 (2%)	0	100	100
47	LZ	133/135 (98%)	128 (96%)	5 (4%)	0	100	100
48	Lc	96/108 (89%)	93 (97%)	3 (3%)	0	100	100
49	Ld	107/120 (89%)	101 (94%)	6 (6%)	0	100	100
50	Le	125/131 (95%)	123 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
51	Lf	106/109 (97%)	99 (93%)	5 (5%)	2 (2%)	8	33
52	Lg	115/119 (97%)	113 (98%)	2 (2%)	0	100	100
53	Lh	119/935 (13%)	113 (95%)	6 (5%)	0	100	100
54	Li	86/110 (78%)	84 (98%)	2 (2%)	0	100	100
55	Lj	72/95 (76%)	71 (99%)	1 (1%)	0	100	100
56	Lk	73/81 (90%)	67 (92%)	6 (8%)	0	100	100
57	Ll	36/51 (71%)	33 (92%)	3 (8%)	0	100	100
58	Lq	205/217 (94%)	179 (87%)	25 (12%)	1 (0%)	29	64
All	All	11829/19680 (60%)	11173 (94%)	624 (5%)	32 (0%)	44	73

All (32) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	CA	236	PRO
5	CC	161	ASP
22	CT	502	ARG
26	CY	692	ALA
26	CY	707	PHE
34	LL	51	VAL
9	CG	43	ASP
5	CC	440	PRO
10	CH	225	ASP
10	CH	228	LEU
14	CL	439	ASP
22	CT	661	GLY
24	CV	85	SER
30	LE	191	LYS
33	LK	51	ALA
37	LO	190	LYS
3	CA	123	MET
3	CA	124	GLU
8	CF	188	ALA
37	LO	191	VAL
58	Lq	16	LEU
14	CL	446	ASP
33	LK	160	ILE
51	Lf	3	SER
51	Lf	4	GLU
12	CJ	216	GLN

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Mol	Chain	Res	Type
37	LO	65	TYR
42	LT	44	VAL
8	CF	244	PRO
5	CC	120	PRO
23	CU	357	PRO
5	CC	567	GLY

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	
3	CA	223/276 (81%)	213 (96%)	10 (4%)	27	60
4	CB	222/329 (68%)	210 (95%)	12 (5%)	22	53
5	CC	578/708 (82%)	566 (98%)	12 (2%)	53	79
6	CD	381/410 (93%)	381 (100%)	0	100	100
7	CE	398/517 (77%)	381 (96%)	17 (4%)	29	62
8	CF	214/236 (91%)	211 (99%)	3 (1%)	67	86
9	CG	150/155 (97%)	147 (98%)	3 (2%)	55	80
10	CH	481/575 (84%)	471 (98%)	10 (2%)	53	79
11	CI	121/336 (36%)	119 (98%)	2 (2%)	60	83
12	CJ	428/579 (74%)	425 (99%)	3 (1%)	84	93
13	CK	195/225 (87%)	193 (99%)	2 (1%)	76	90
14	CL	72/458 (16%)	71 (99%)	1 (1%)	67	86
15	CM	191/215 (89%)	190 (100%)	1 (0%)	88	94
15	LF	213/215 (99%)	212 (100%)	1 (0%)	88	94
16	CN	206/206 (100%)	200 (97%)	6 (3%)	42	72
17	CO	48/99 (48%)	48 (100%)	0	100	100
18	CP	302/632 (48%)	295 (98%)	7 (2%)	50	77
19	CQ	150/192 (78%)	145 (97%)	5 (3%)	38	69
20	CR	144/206 (70%)	143 (99%)	1 (1%)	84	93

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
21	CS	209/716 (29%)	207 (99%)	2 (1%)	76	90
22	CT	427/600 (71%)	423 (99%)	4 (1%)	78	91
23	CU	149/376 (40%)	147 (99%)	2 (1%)	69	87
24	CV	109/112 (97%)	109 (100%)	0	100	100
25	CX	76/172 (44%)	76 (100%)	0	100	100
26	CY	364/686 (53%)	358 (98%)	6 (2%)	62	84
27	Cz	60/107 (56%)	58 (97%)	2 (3%)	38	69
28	LB	301/331 (91%)	293 (97%)	8 (3%)	44	74
29	LC	283/285 (99%)	278 (98%)	5 (2%)	59	82
30	LE	151/166 (91%)	151 (100%)	0	100	100
31	LG	175/222 (79%)	173 (99%)	2 (1%)	73	89
32	LH	167/169 (99%)	165 (99%)	2 (1%)	71	88
33	LK	121/136 (89%)	121 (100%)	0	100	100
34	LL	99/176 (56%)	99 (100%)	0	100	100
35	LM	115/117 (98%)	113 (98%)	2 (2%)	60	83
36	LN	164/180 (91%)	163 (99%)	1 (1%)	86	94
37	LO	163/163 (100%)	158 (97%)	5 (3%)	40	70
38	LP	137/152 (90%)	135 (98%)	2 (2%)	65	85
39	LQ	110/178 (62%)	109 (99%)	1 (1%)	78	91
40	LR	104/2396 (4%)	104 (100%)	0	100	100
41	LS	154/154 (100%)	151 (98%)	3 (2%)	57	81
42	LT	109/135 (81%)	102 (94%)	7 (6%)	17	48
43	LU	93/108 (86%)	85 (91%)	8 (9%)	10	37
44	LV	99/102 (97%)	98 (99%)	1 (1%)	76	90
45	LX	114/129 (88%)	110 (96%)	4 (4%)	36	68
46	LY	117/119 (98%)	117 (100%)	0	100	100
47	LZ	121/121 (100%)	118 (98%)	3 (2%)	47	75
48	Lc	79/88 (90%)	76 (96%)	3 (4%)	33	66
49	Ld	95/105 (90%)	94 (99%)	1 (1%)	73	89
50	Le	110/114 (96%)	110 (100%)	0	100	100
51	Lf	89/90 (99%)	88 (99%)	1 (1%)	73	89

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
52	Lg	101/102 (99%)	97 (96%)	4 (4%)	31	65
53	Lh	108/781 (14%)	108 (100%)	0	100	100
54	Li	75/93 (81%)	73 (97%)	2 (3%)	44	74
55	Lj	61/78 (78%)	60 (98%)	1 (2%)	62	84
56	Lk	71/76 (93%)	71 (100%)	0	100	100
57	Ll	34/46 (74%)	34 (100%)	0	100	100
58	Lq	179/189 (95%)	171 (96%)	8 (4%)	27	60
All	All	10010/16639 (60%)	9824 (98%)	186 (2%)	59	81

All (186) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	CA	63	ARG
3	CA	64	LYS
3	CA	83	LEU
3	CA	120	LEU
3	CA	124	GLU
3	CA	192	ARG
3	CA	233	GLU
3	CA	236	PRO
3	CA	237	ARG
3	CA	278	ARG
4	CB	46	LYS
4	CB	47	GLN
4	CB	65	THR
4	CB	67	THR
4	CB	69	LYS
4	CB	71	HIS
4	CB	245	VAL
4	CB	274	LYS
4	CB	279	ARG
4	CB	281	PHE
4	CB	293	ILE
4	CB	295	GLN
5	CC	161	ASP
5	CC	164	ASP
5	CC	353	SER
5	CC	386	LYS
5	CC	388	ASP
5	CC	390	LEU

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Mol	Chain	Res	Type
5	CC	392	LYS
5	CC	437	GLU
5	CC	438	LEU
5	CC	439	LYS
5	CC	564	GLU
5	CC	626	GLN
7	CE	112	GLU
7	CE	134	MET
7	CE	223	ARG
7	CE	279	ARG
7	CE	306	LEU
7	CE	332	LEU
7	CE	334	GLN
7	CE	439	ARG
7	CE	442	ILE
7	CE	447	ARG
7	CE	460	LEU
7	CE	472	HIS
7	CE	473	LEU
7	CE	477	LYS
7	CE	480	VAL
7	CE	482	GLU
7	CE	484	ASP
8	CF	224	LEU
8	CF	237	LEU
8	CF	241	LYS
9	CG	61	ARG
9	CG	63	LYS
9	CG	64	LEU
10	CH	137	THR
10	CH	221	PRO
10	CH	223	ILE
10	CH	225	ASP
10	CH	228	LEU
10	CH	231	MET
10	CH	269	LEU
10	CH	273	ILE
10	CH	274	LYS
10	CH	507	LYS
11	CI	215	ARG
11	CI	295	ARG
12	CJ	193	LYS

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Mol	Chain	Res	Type
12	CJ	195	ILE
12	CJ	217	ARG
13	CK	49	LEU
13	CK	53	GLN
14	CL	18	THR
15	CM	52	LYS
16	CN	109	VAL
16	CN	111	ASN
16	CN	152	MET
16	CN	154	LEU
16	CN	160	LEU
16	CN	223	ARG
18	CP	289	PRO
18	CP	290	PRO
18	CP	436	CYS
18	CP	439	ASP
18	CP	441	ARG
18	CP	443	PHE
18	CP	481	MET
19	CQ	134	LEU
19	CQ	137	LEU
19	CQ	138	ARG
19	CQ	144	ARG
19	CQ	162	GLU
20	CR	60	LYS
21	CS	743	ARG
21	CS	834	ARG
22	CT	178	VAL
22	CT	210	LEU
22	CT	657	THR
22	CT	658	ILE
23	CU	357	PRO
23	CU	359	ASP
26	CY	637	ILE
26	CY	640	PRO
26	CY	690	ARG
26	CY	693	LYS
26	CY	707	PHE
26	CY	747	ARG
27	Cz	52	VAL
27	Cz	53	LYS
28	LB	17	LEU

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Mol	Chain	Res	Type
28	LB	19	ARG
28	LB	126	LYS
28	LB	283	ILE
28	LB	349	ARG
28	LB	350	LYS
28	LB	354	LYS
28	LB	355	VAL
29	LC	22	VAL
29	LC	25	LYS
29	LC	262	ILE
29	LC	264	GLN
29	LC	266	ASP
15	LF	116	GLN
31	LG	160	VAL
31	LG	164	GLU
32	LH	17	LYS
32	LH	168	LYS
35	LM	112	LEU
35	LM	122	ARG
36	LN	41	ARG
37	LO	64	ARG
37	LO	190	LYS
37	LO	194	LYS
37	LO	196	SER
37	LO	199	LEU
38	LP	43	ARG
38	LP	174	ARG
39	LQ	119	ARG
41	LS	131	LYS
41	LS	133	GLU
41	LS	146	LYS
42	LT	78	LYS
42	LT	80	VAL
42	LT	81	LYS
42	LT	82	HIS
42	LT	83	ARG
42	LT	84	TYR
42	LT	92	ARG
43	LU	19	LYS
43	LU	50	ASP
43	LU	58	ASP
43	LU	59	VAL

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Mol	Chain	Res	Type
43	LU	61	LYS
43	LU	73	ILE
43	LU	76	ASN
43	LU	77	ASP
44	LV	95	LEU
45	LX	21	LYS
45	LX	22	LYS
45	LX	28	LEU
45	LX	43	THR
47	LZ	11	LEU
47	LZ	92	LYS
47	LZ	111	LYS
48	Lc	47	ILE
48	Lc	62	TYR
48	Lc	70	VAL
49	Ld	73	LYS
51	Lf	4	GLU
52	Lg	58	LEU
52	Lg	61	ARG
52	Lg	95	LEU
52	Lg	115	LYS
54	Li	25	LYS
54	Li	37	ARG
55	Lj	18	LEU
58	Lq	12	ASN
58	Lq	17	LEU
58	Lq	21	ASN
58	Lq	24	LYS
58	Lq	25	LYS
58	Lq	26	ARG
58	Lq	39	LYS
58	Lq	92	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (43) such sidechains are listed below:

Mol	Chain	Res	Type
3	CA	109	ASN
3	CA	178	HIS
4	CB	277	ASN
4	CB	280	ASN
5	CC	446	GLN
5	CC	626	GLN

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Mol	Chain	Res	Type
5	CC	637	GLN
5	CC	653	GLN
5	CC	716	HIS
9	CG	41	GLN
9	CG	113	ASN
10	CH	237	GLN
10	CH	258	GLN
11	CI	209	GLN
12	CJ	153	ASN
12	CJ	485	HIS
12	CJ	506	GLN
15	CM	203	GLN
16	CN	66	ASN
16	CN	82	GLN
16	CN	86	ASN
16	CN	118	HIS
17	CO	13	ASN
18	CP	437	ASN
18	CP	482	GLN
18	CP	489	GLN
21	CS	744	GLN
22	CT	215	HIS
22	CT	323	ASN
22	CT	436	GLN
23	CU	364	ASN
25	CX	113	GLN
26	CY	636	ASN
15	LF	119	ASN
15	LF	178	ASN
31	LG	212	ASN
34	LL	114	GLN
35	LM	98	ASN
38	LP	118	GLN
38	LP	120	ASN
44	LV	134	ASN
48	Lc	72	HIS
55	Lj	76	ASN

5.3.3 RNA

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	C1	2594/3341 (77%)	571 (22%)	40 (1%)
2	C2	254/319 (79%)	49 (19%)	1 (0%)
All	All	2848/3660 (77%)	620 (21%)	41 (1%)

All (620) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	C1	14	U
1	C1	22	G
1	C1	26	A
1	C1	41	G
1	C1	49	A
1	C1	60	A
1	C1	65	A
1	C1	66	A
1	C1	71	A
1	C1	73	A
1	C1	74	G
1	C1	75	G
1	C1	92	G
1	C1	93	C
1	C1	94	G
1	C1	96	G
1	C1	109	A
1	C1	110	G
1	C1	116	A
1	C1	122	A
1	C1	128	G
1	C1	129	C
1	C1	131	U
1	C1	132	C
1	C1	133	G
1	C1	134	G
1	C1	135	C
1	C1	136	C
1	C1	138	G
1	C1	143	G
1	C1	150	G
1	C1	151	G
1	C1	152	A
1	C1	156	G

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Mol	Chain	Res	Type
1	C1	162	U
1	C1	163	U
1	C1	176	U
1	C1	180	G
1	C1	183	U
1	C1	193	C
1	C1	203	C
1	C1	206	A
1	C1	211	G
1	C1	212	A
1	C1	214	A
1	C1	225	G
1	C1	232	G
1	C1	240	U
1	C1	241	G
1	C1	244	U
1	C1	253	U
1	C1	258	C
1	C1	261	G
1	C1	262	U
1	C1	275	G
1	C1	276	A
1	C1	277	A
1	C1	287	A
1	C1	290	U
1	C1	299	A
1	C1	300	A
1	C1	302	U
1	C1	309	A
1	C1	310	A
1	C1	315	A
1	C1	321	C
1	C1	325	C
1	C1	329	G
1	C1	330	A
1	C1	331	C
1	C1	342	C
1	C1	343	A
1	C1	368	G
1	C1	390	U
1	C1	393	C
1	C1	394	A

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Mol	Chain	Res	Type
1	C1	395	C
1	C1	396	G
1	C1	412	G
1	C1	413	G
1	C1	414	A
1	C1	433	U
1	C1	434	G
1	C1	439	C
1	C1	444	G
1	C1	445	A
1	C1	446	U
1	C1	447	C
1	C1	448	A
1	C1	457	U
1	C1	458	C
1	C1	459	U
1	C1	469	A
1	C1	470	C
1	C1	472	C
1	C1	474	G
1	C1	477	G
1	C1	485	G
1	C1	508	G
1	C1	509	A
1	C1	511	A
1	C1	513	A
1	C1	519	A
1	C1	524	A
1	C1	526	G
1	C1	527	U
1	C1	529	G
1	C1	530	C
1	C1	533	C
1	C1	534	U
1	C1	535	C
1	C1	536	C
1	C1	538	G
1	C1	542	U
1	C1	543	G
1	C1	544	U
1	C1	545	U
1	C1	546	A

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Mol	Chain	Res	Type
1	C1	547	U
1	C1	548	A
1	C1	549	G
1	C1	579	A
1	C1	582	A
1	C1	589	U
1	C1	590	C
1	C1	591	U
1	C1	592	G
1	C1	594	A
1	C1	596	G
1	C1	598	A
1	C1	607	U
1	C1	608	A
1	C1	609	A
1	C1	623	C
1	C1	624	C
1	C1	633	A
1	C1	647	A
1	C1	663	G
1	C1	664	A
1	C1	668	U
1	C1	678	A
1	C1	718	U
1	C1	719	C
1	C1	731	G
1	C1	739	C
1	C1	742	A
1	C1	744	G
1	C1	748	U
1	C1	749	C
1	C1	751	G
1	C1	752	A
1	C1	755	G
1	C1	757	U
1	C1	758	U
1	C1	761	A
1	C1	762	G
1	C1	765	G
1	C1	766	G
1	C1	767	A
1	C1	787	A

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Mol	Chain	Res	Type
1	C1	798	A
1	C1	799	C
1	C1	800	U
1	C1	801	A
1	C1	803	G
1	C1	807	G
1	C1	816	G
1	C1	828	A
1	C1	831	U
1	C1	835	G
1	C1	836	U
1	C1	838	G
1	C1	841	G
1	C1	842	C
1	C1	843	U
1	C1	846	C
1	C1	858	C
1	C1	862	C
1	C1	863	A
1	C1	871	C
1	C1	876	A
1	C1	877	A
1	C1	878	U
1	C1	887	G
1	C1	889	G
1	C1	896	A
1	C1	898	A
1	C1	925	A
1	C1	932	A
1	C1	933	A
1	C1	934	G
1	C1	941	U
1	C1	942	C
1	C1	943	A
1	C1	944	G
1	C1	959	C
1	C1	960	C
1	C1	964	A
1	C1	965	G
1	C1	974	G
1	C1	975	G
1	C1	976	U

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Mol	Chain	Res	Type
1	C1	982	G
1	C1	983	A
1	C1	1031	C
1	C1	1033	U
1	C1	1039	A
1	C1	1046	A
1	C1	1047	A
1	C1	1048	G
1	C1	1049	C
1	C1	1050	C
1	C1	1054	G
1	C1	1057	A
1	C1	1058	C
1	C1	1063	C
1	C1	1064	U
1	C1	1065	G
1	C1	1072	G
1	C1	1073	G
1	C1	1074	C
1	C1	1076	U
1	C1	1079	G
1	C1	1080	A
1	C1	1085	A
1	C1	1086	U
1	C1	1095	G
1	C1	1097	G
1	C1	1098	G
1	C1	1099	G
1	C1	1114	C
1	C1	1124	G
1	C1	1125	A
1	C1	1126	U
1	C1	1135	A
1	C1	1141	A
1	C1	1142	C
1	C1	1157	C
1	C1	1158	C
1	C1	1159	G
1	C1	1160	G
1	C1	1163	U
1	C1	1164	G
1	C1	1167	C

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Mol	Chain	Res	Type
1	C1	1174	C
1	C1	1175	A
1	C1	1178	C
1	C1	1179	A
1	C1	1180	C
1	C1	1184	A
1	C1	1185	A
1	C1	1186	A
1	C1	1187	A
1	C1	1189	G
1	C1	1190	C
1	C1	1191	G
1	C1	1203	U
1	C1	1204	G
1	C1	1214	C
1	C1	1218	G
1	C1	1227	A
1	C1	1228	G
1	C1	1234	A
1	C1	1236	C
1	C1	1240	U
1	C1	1245	A
1	C1	1247	U
1	C1	1254	C
1	C1	1267	G
1	C1	1268	A
1	C1	1269	A
1	C1	1271	G
1	C1	1272	U
1	C1	1286	A
1	C1	1287	U
1	C1	1289	G
1	C1	1291	U
1	C1	1295	G
1	C1	1312	A
1	C1	1314	A
1	C1	1331	G
1	C1	1332	A
1	C1	1333	A
1	C1	1334	A
1	C1	1335	C
1	C1	1336	G

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Mol	Chain	Res	Type
1	C1	1337	A
1	C1	1368	A
1	C1	1374	G
1	C1	1381	A
1	C1	1399	G
1	C1	1401	A
1	C1	1416	G
1	C1	1417	A
1	C1	1419	C
1	C1	1434	A
1	C1	1437	U
1	C1	1438	A
1	C1	1452	U
1	C1	1465	G
1	C1	1478	C
1	C1	1490	C
1	C1	1496	G
1	C1	1535	U
1	C1	1537	U
1	C1	1538	C
1	C1	1541	A
1	C1	1543	G
1	C1	1548	C
1	C1	1549	U
1	C1	1551	G
1	C1	1552	U
1	C1	1553	G
1	C1	1556	C
1	C1	1557	C
1	C1	1560	G
1	C1	1561	U
1	C1	1562	G
1	C1	1566	A
1	C1	1567	A
1	C1	1568	A
1	C1	1575	C
1	C1	1584	A
1	C1	1607	U
1	C1	1608	U
1	C1	1609	G
1	C1	1610	C
1	C1	1618	C

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Mol	Chain	Res	Type
1	C1	1621	A
1	C1	1622	A
1	C1	1623	C
1	C1	1624	U
1	C1	1637	G
1	C1	1662	C
1	C1	1695	A
1	C1	1696	C
1	C1	1703	U
1	C1	1722	G
1	C1	1729	A
1	C1	1730	G
1	C1	1739	A
1	C1	1741	U
1	C1	1742	U
1	C1	1744	U
1	C1	1749	G
1	C1	1759	G
1	C1	1760	C
1	C1	1774	U
1	C1	1775	G
1	C1	1776	A
1	C1	1794	U
1	C1	1795	A
1	C1	1798	U
1	C1	1799	C
1	C1	1800	U
1	C1	1818	A
1	C1	1819	U
1	C1	1820	A
1	C1	1821	A
1	C1	1825	C
1	C1	1828	C
1	C1	1829	A
1	C1	1837	A
1	C1	1842	G
1	C1	1843	A
1	C1	1845	C
1	C1	1857	G
1	C1	1858	A
1	C1	1859	U
1	C1	1861	G

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Mol	Chain	Res	Type
1	C1	1864	C
1	C1	1865	A
1	C1	1866	A
1	C1	1867	U
1	C1	1874	A
1	C1	1875	A
1	C1	2297	G
1	C1	2298	U
1	C1	2302	U
1	C1	2310	A
1	C1	2311	U
1	C1	2325	A
1	C1	2327	C
1	C1	2334	A
1	C1	2335	A
1	C1	2338	G
1	C1	2342	U
1	C1	2343	G
1	C1	2345	C
1	C1	2347	A
1	C1	2350	U
1	C1	2355	G
1	C1	2356	G
1	C1	2359	A
1	C1	2361	A
1	C1	2362	G
1	C1	2363	A
1	C1	2364	A
1	C1	2384	C
1	C1	2396	U
1	C1	2397	G
1	C1	2399	G
1	C1	2407	A
1	C1	2409	A
1	C1	2410	G
1	C1	2413	G
1	C1	2414	G
1	C1	2415	U
1	C1	2422	U
1	C1	2424	G
1	C1	2425	G
1	C1	2428	G

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Mol	Chain	Res	Type
1	C1	2430	A
1	C1	2434	U
1	C1	2435	C
1	C1	2436	G
1	C1	2437	G
1	C1	2438	C
1	C1	2439	G
1	C1	2442	A
1	C1	2443	G
1	C1	2444	U
1	C1	2449	U
1	C1	2453	A
1	C1	2456	A
1	C1	2464	U
1	C1	2465	G
1	C1	2466	U
1	C1	2467	U
1	C1	2484	G
1	C1	2551	A
1	C1	2553	A
1	C1	2558	C
1	C1	2560	G
1	C1	2564	G
1	C1	2730	C
1	C1	2735	G
1	C1	2736	A
1	C1	2738	A
1	C1	2739	U
1	C1	2740	U
1	C1	2749	G
1	C1	2759	A
1	C1	2760	A
1	C1	2761	A
1	C1	2765	U
1	C1	2775	A
1	C1	2777	A
1	C1	2778	A
1	C1	2782	G
1	C1	2783	C
1	C1	2784	U
1	C1	2786	G
1	C1	2806	G

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Mol	Chain	Res	Type
1	C1	2818	U
1	C1	2819	U
1	C1	2820	U
1	C1	2845	A
1	C1	2846	U
1	C1	2847	C
1	C1	2856	G
1	C1	2857	C
1	C1	2862	U
1	C1	2869	A
1	C1	2874	U
1	C1	2889	C
1	C1	2893	U
1	C1	2894	A
1	C1	2899	A
1	C1	2901	G
1	C1	2902	U
1	C1	2917	C
1	C1	2922	G
1	C1	2923	U
1	C1	2926	G
1	C1	2935	G
1	C1	2936	U
1	C1	2942	C
1	C1	2948	G
1	C1	2950	U
1	C1	2954	C
1	C1	2955	U
1	C1	2956	C
1	C1	2969	A
1	C1	3006	A
1	C1	3014	U
1	C1	3015	U
1	C1	3016	G
1	C1	3035	G
1	C1	3036	U
1	C1	3037	G
1	C1	3043	A
1	C1	3049	C
1	C1	3050	C
1	C1	3070	A
1	C1	3074	C

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Mol	Chain	Res	Type
1	C1	3079	A
1	C1	3086	A
1	C1	3087	A
1	C1	3088	U
1	C1	3098	A
1	C1	3099	A
1	C1	3100	C
1	C1	3101	G
1	C1	3110	C
1	C1	3111	U
1	C1	3112	A
1	C1	3113	C
1	C1	3118	A
1	C1	3122	U
1	C1	3124	U
1	C1	3126	G
1	C1	3127	A
1	C1	3130	U
1	C1	3131	A
1	C1	3132	U
1	C1	3134	A
1	C1	3139	A
1	C1	3140	G
1	C1	3145	C
1	C1	3146	G
1	C1	3147	G
1	C1	3153	U
1	C1	3154	A
1	C1	3161	C
1	C1	3162	A
1	C1	3163	G
1	C1	3168	U
1	C1	3170	C
1	C1	3171	C
1	C1	3178	G
1	C1	3181	C
1	C1	3183	C
1	C1	3185	A
1	C1	3188	U
1	C1	3199	A
1	C1	3205	C
1	C1	3209	U

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Mol	Chain	Res	Type
1	C1	3210	U
1	C1	3213	A
1	C1	3217	U
1	C1	3227	C
1	C1	3228	G
1	C1	3229	G
1	C1	3230	G
1	C1	3244	C
1	C1	3253	U
1	C1	3255	G
1	C1	3256	A
1	C1	3258	G
1	C1	3259	U
1	C1	3270	C
1	C1	3274	U
1	C1	3280	G
1	C1	3281	U
1	C1	3282	A
1	C1	3285	G
1	C1	3291	U
1	C1	3293	G
1	C1	3295	U
1	C1	3298	U
1	C1	3309	G
1	C1	3318	C
1	C1	3322	C
1	C1	3323	C
1	C1	3324	U
1	C1	3325	U
1	C1	3330	U
1	C1	3331	A
1	C1	3332	G
1	C1	3333	A
2	C2	34	U
2	C2	35	C
2	C2	59	A
2	C2	61	A
2	C2	62	A
2	C2	63	G
2	C2	81	U
2	C2	82	U
2	C2	84	C

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Mol	Chain	Res	Type
2	C2	86	U
2	C2	87	G
2	C2	90	U
2	C2	95	G
2	C2	103	G
2	C2	104	A
2	C2	106	C
2	C2	109	A
2	C2	110	C
2	C2	111	A
2	C2	112	U
2	C2	113	U
2	C2	125	U
2	C2	148	G
2	C2	158	U
2	C2	163	C
2	C2	165	U
2	C2	166	C
2	C2	168	A
2	C2	173	U
2	C2	174	G
2	C2	181	U
2	C2	189	A
2	C2	195	G
2	C2	196	G
2	C2	203	G
2	C2	212	G
2	C2	213	A
2	C2	214	A
2	C2	215	A
2	C2	219	A
2	C2	221	U
2	C2	222	G
2	C2	289	G
2	C2	291	G
2	C2	292	C
2	C2	294	A
2	C2	295	G
2	C2	300	A
2	C2	302	A

All (41) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	C1	132	C
1	C1	150	G
1	C1	412	G
1	C1	445	A
1	C1	446	U
1	C1	524	A
1	C1	526	G
1	C1	543	G
1	C1	590	C
1	C1	835	G
1	C1	862	C
1	C1	870	U
1	C1	886	U
1	C1	897	G
1	C1	959	C
1	C1	964	A
1	C1	1063	C
1	C1	1134	G
1	C1	1136	A
1	C1	2301	C
1	C1	2333	G
1	C1	2360	A
1	C1	2759	A
1	C1	2777	A
1	C1	2785	U
1	C1	2817	U
1	C1	2898	A
1	C1	2925	A
1	C1	3013	U
1	C1	3014	U
1	C1	3078	U
1	C1	3131	A
1	C1	3162	A
1	C1	3204	G
1	C1	3209	U
1	C1	3229	G
1	C1	3255	G
1	C1	3257	U
1	C1	3297	U
1	C1	3330	U
2	C2	102	U

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

2 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
5	SEP	CC	160	5	8,9,10	1.54	1 (12%)	8,12,14	1.50	2 (25%)
5	TPO	CC	163	5	8,10,11	0.76	0	10,14,16	1.32	2 (20%)

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
5	SEP	CC	160	5	-	0/5/8/10	-
5	TPO	CC	163	5	-	6/9/11/13	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	CC	160	SEP	P-O1P	3.39	1.61	1.50

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	CC	160	SEP	P-OG-CB	-2.81	110.56	118.30
5	CC	163	TPO	O-C-CA	-2.80	117.44	124.78
5	CC	160	SEP	OG-CB-CA	2.61	110.68	108.14
5	CC	163	TPO	P-OG1-CB	2.23	129.94	123.21

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	CC	163	TPO	N-CA-CB-OG1
5	CC	163	TPO	C-CA-CB-CG2
5	CC	163	TPO	O-C-CA-CB
5	CC	163	TPO	CG2-CB-OG1-P
5	CC	163	TPO	CB-OG1-P-O1P
5	CC	163	TPO	CB-OG1-P-O2P

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 3 ligands modelled in this entry, 2 are monoatomic - leaving 1 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
59	GTP	CH	1001	-	26,34,34	1.12	2 (7%)	32,54,54	1.49	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
59	GTP	CH	1001	-	-	4/18/38/38	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
59	CH	1001	GTP	C5-C6	-3.96	1.39	1.47
59	CH	1001	GTP	C2-N3	2.12	1.38	1.33

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
59	CH	1001	GTP	C5-C6-N1	3.22	119.63	113.95
59	CH	1001	GTP	C8-N7-C5	3.08	108.85	102.99
59	CH	1001	GTP	PB-O3B-PG	-3.01	122.51	132.83
59	CH	1001	GTP	PA-O3A-PB	-2.92	122.79	132.83
59	CH	1001	GTP	C2-N1-C6	-2.85	119.85	125.10
59	CH	1001	GTP	C3'-C2'-C1'	2.56	104.83	100.98
59	CH	1001	GTP	O6-C6-C5	-2.01	120.44	124.37

There are no chirality outliers.

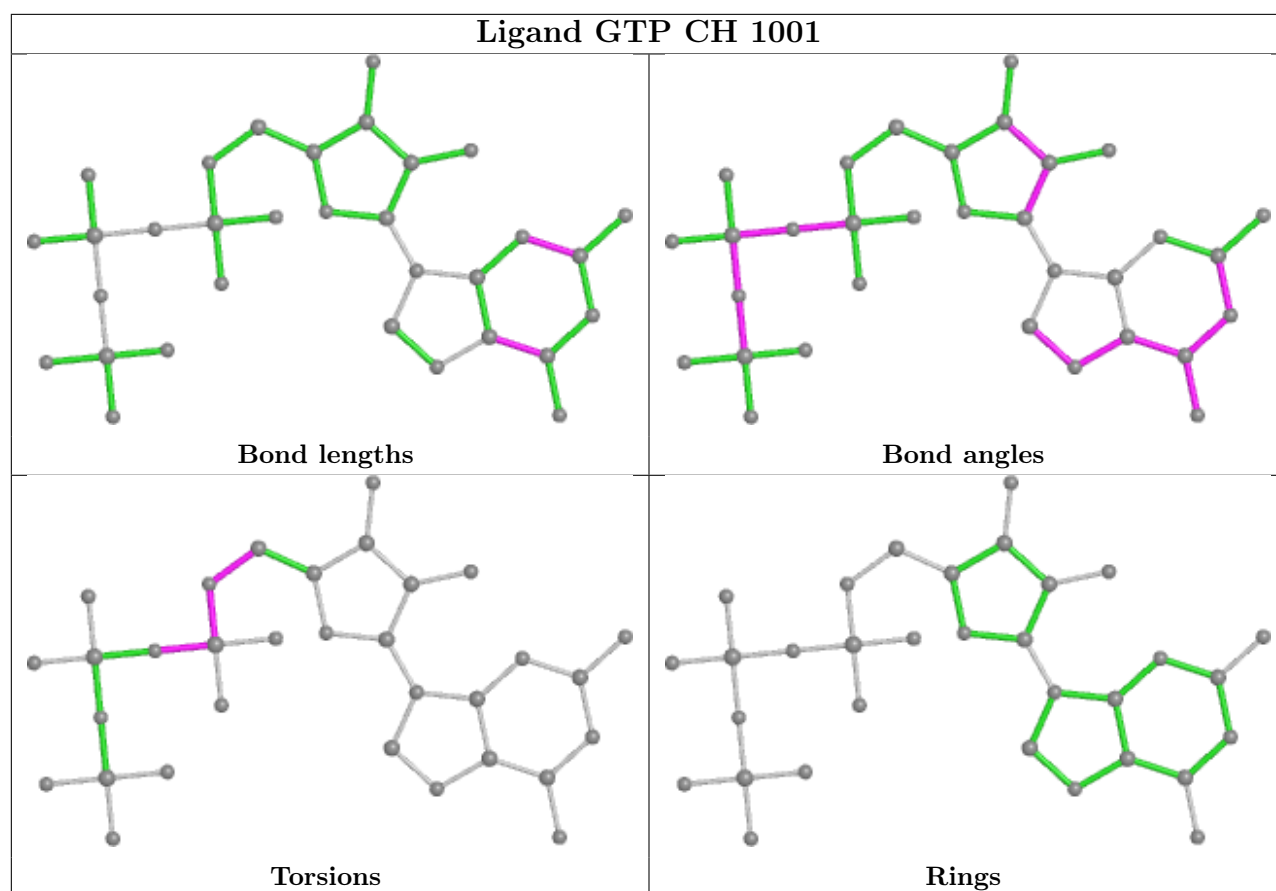
All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
59	CH	1001	GTP	C5'-O5'-PA-O3A
59	CH	1001	GTP	PB-O3A-PA-O2A
59	CH	1001	GTP	C4'-C5'-O5'-PA
59	CH	1001	GTP	C5'-O5'-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.

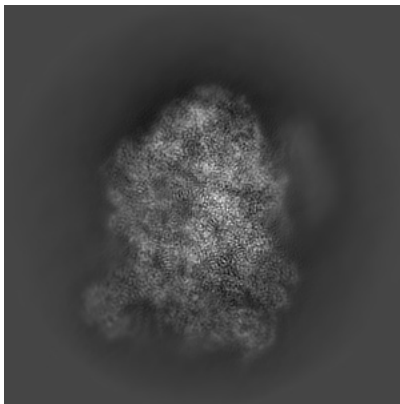
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-35288. These allow visual inspection of the internal detail of the map and identification of artifacts.

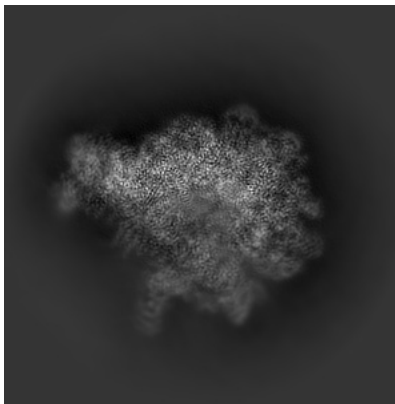
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

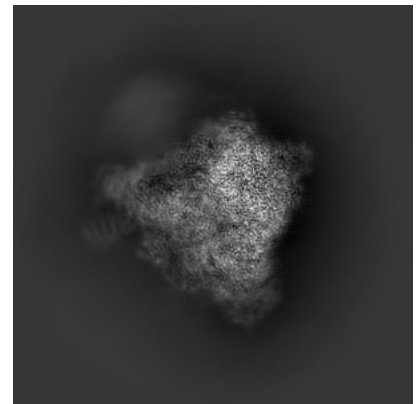
6.1.1 Primary map



X

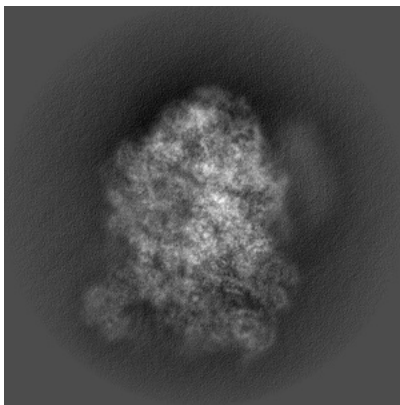


Y

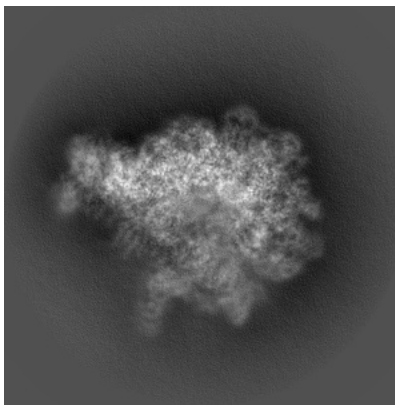


Z

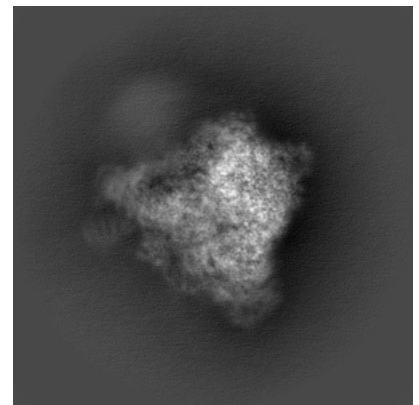
6.1.2 Raw map



X



Y

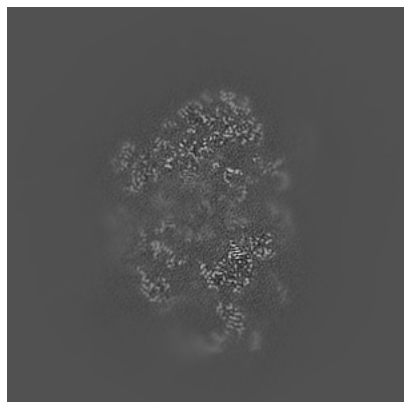


Z

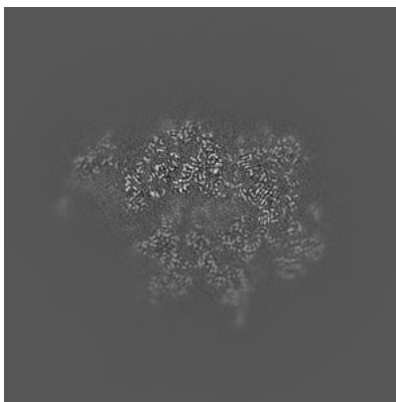
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

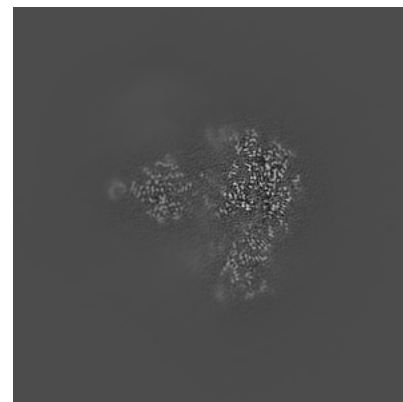
6.2.1 Primary map



X Index: 210

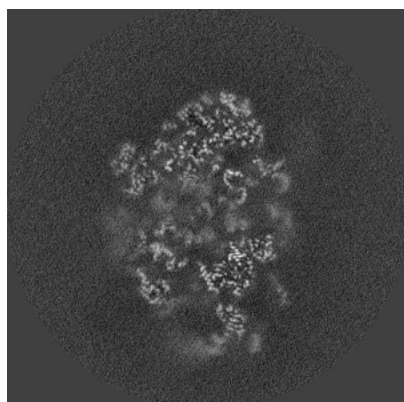


Y Index: 210

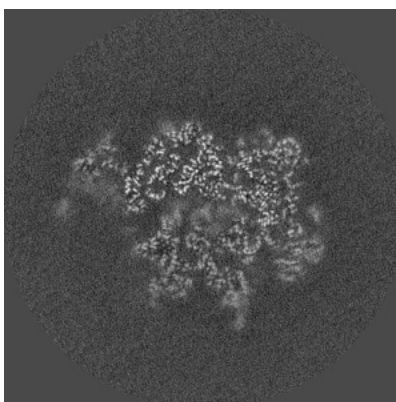


Z Index: 210

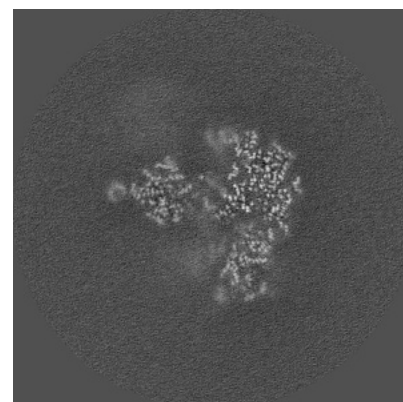
6.2.2 Raw map



X Index: 210



Y Index: 210

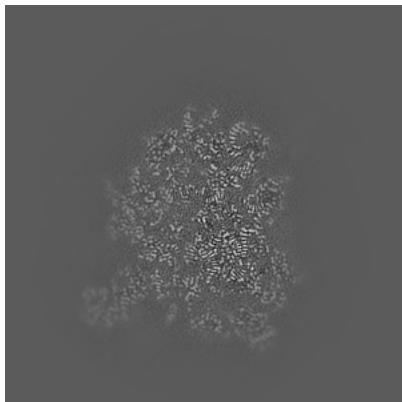


Z Index: 210

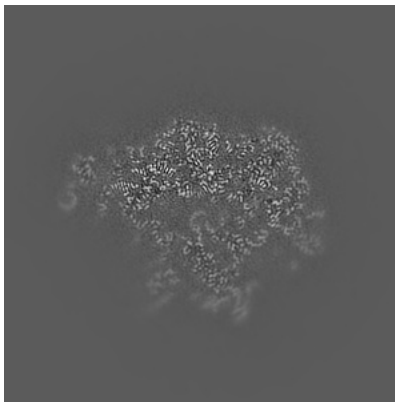
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

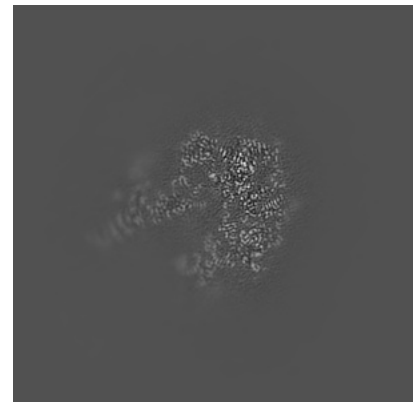
6.3.1 Primary map



X Index: 244

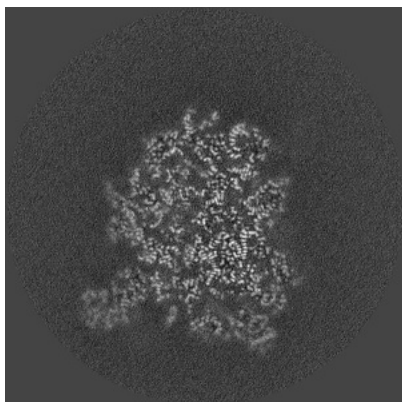


Y Index: 221

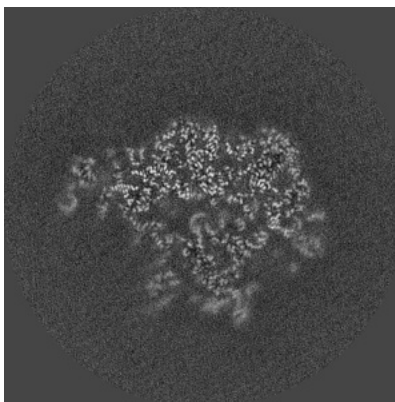


Z Index: 166

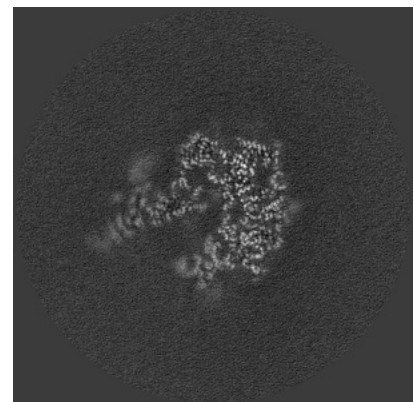
6.3.2 Raw map



X Index: 244



Y Index: 221

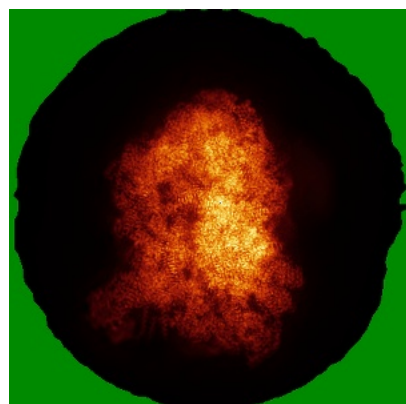


Z Index: 166

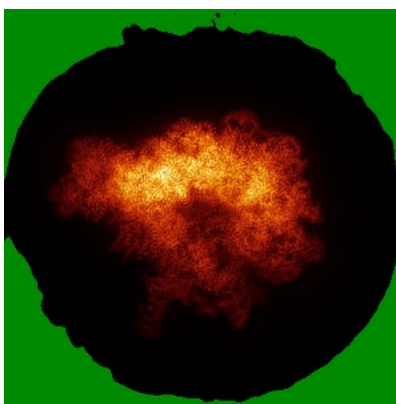
The images above show the largest variance slices of the map in three orthogonal directions.

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

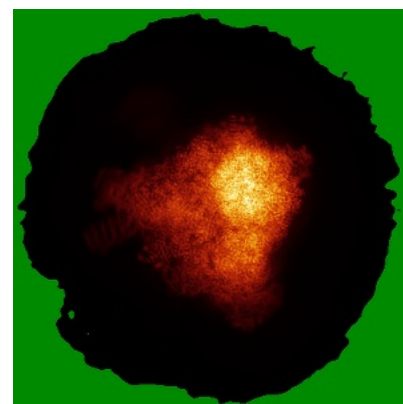
6.4.1 Primary map



X

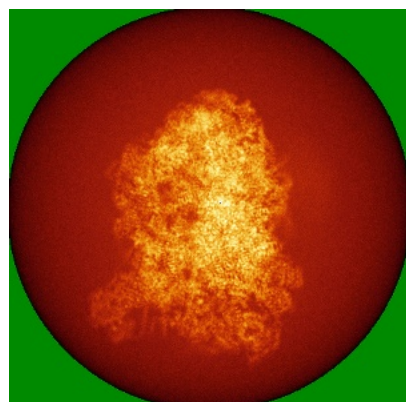


Y

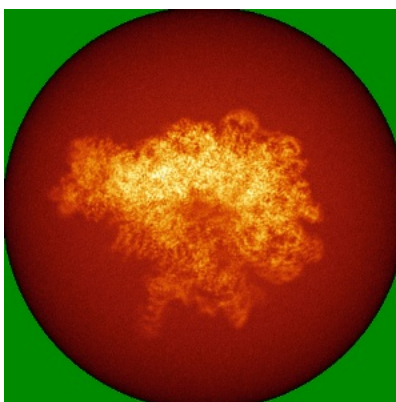


Z

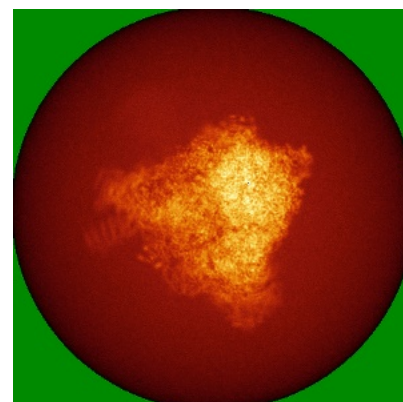
6.4.2 Raw map



X



Y

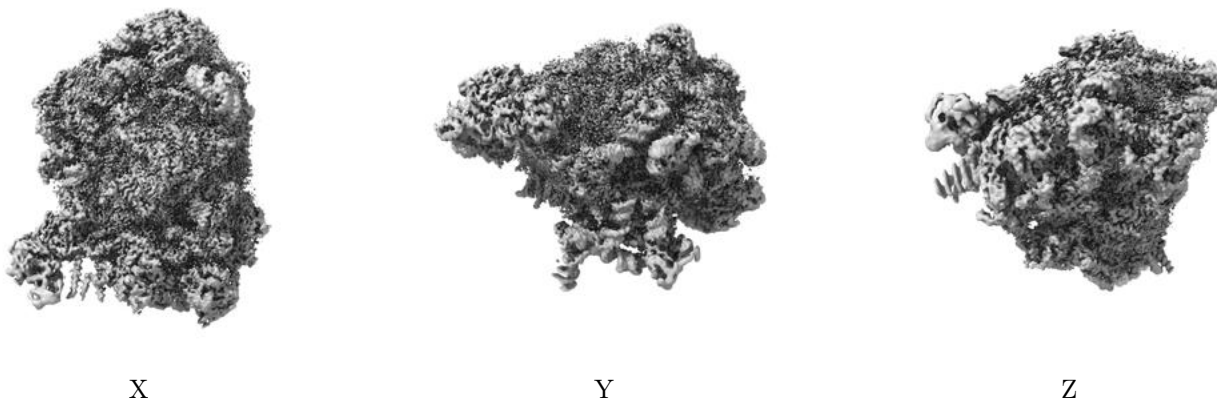


Z

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

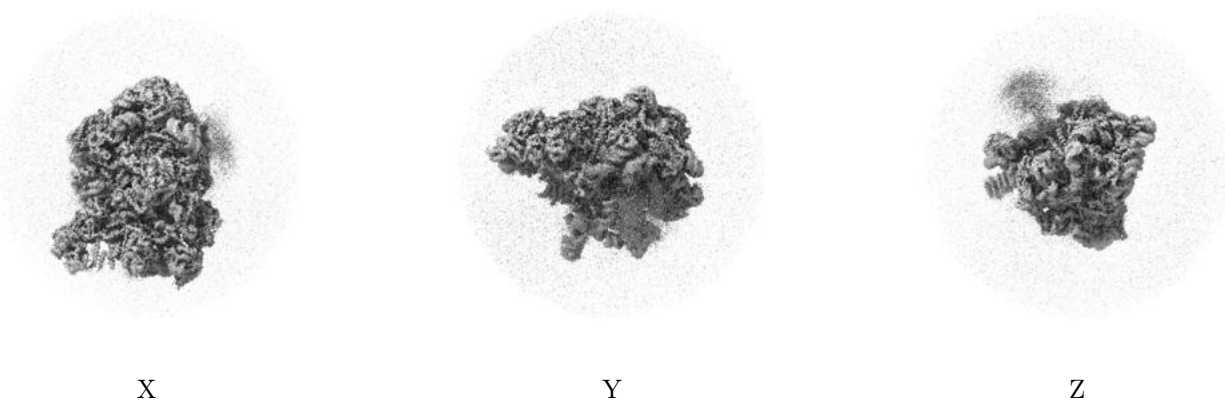
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.02. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



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

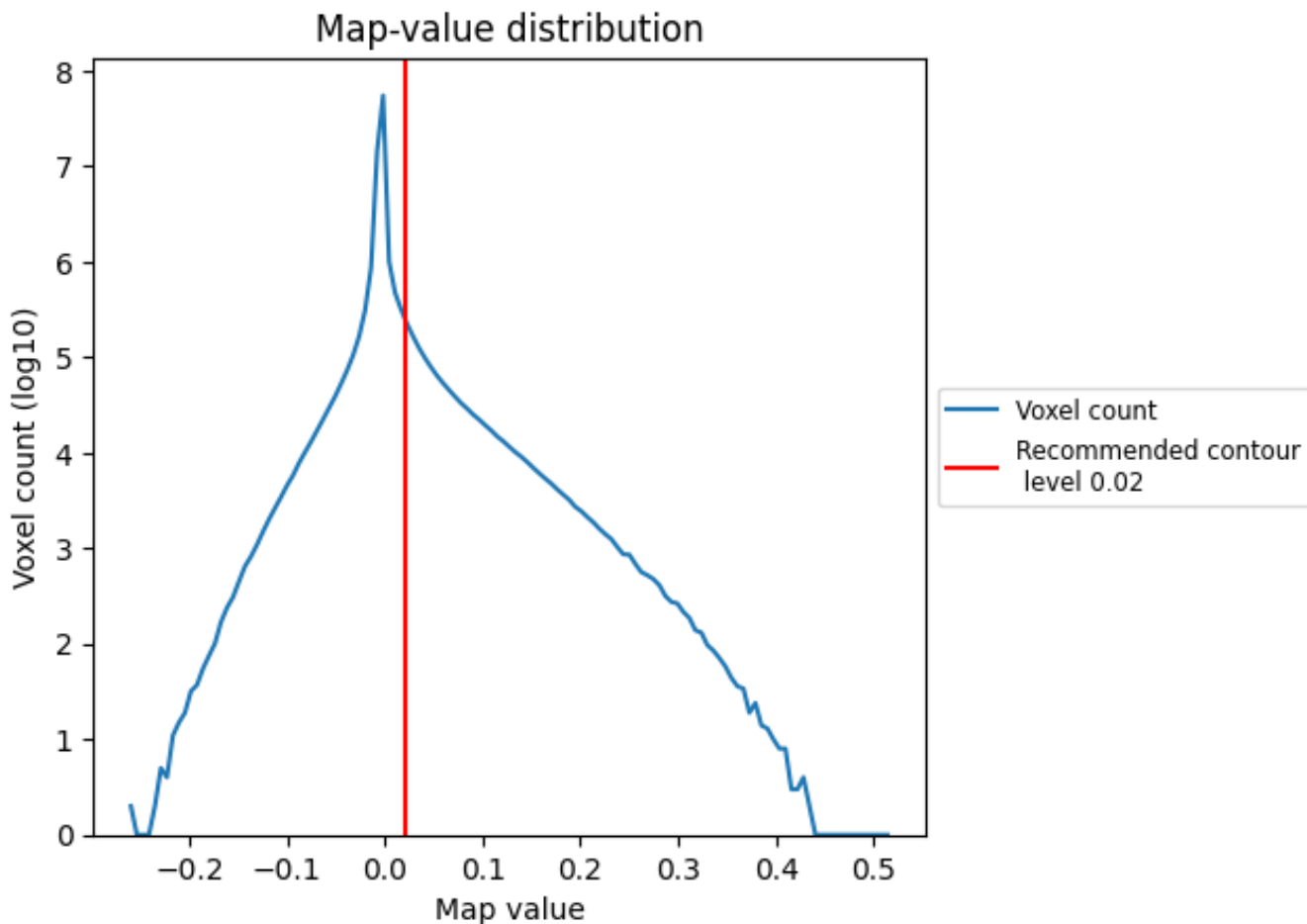
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

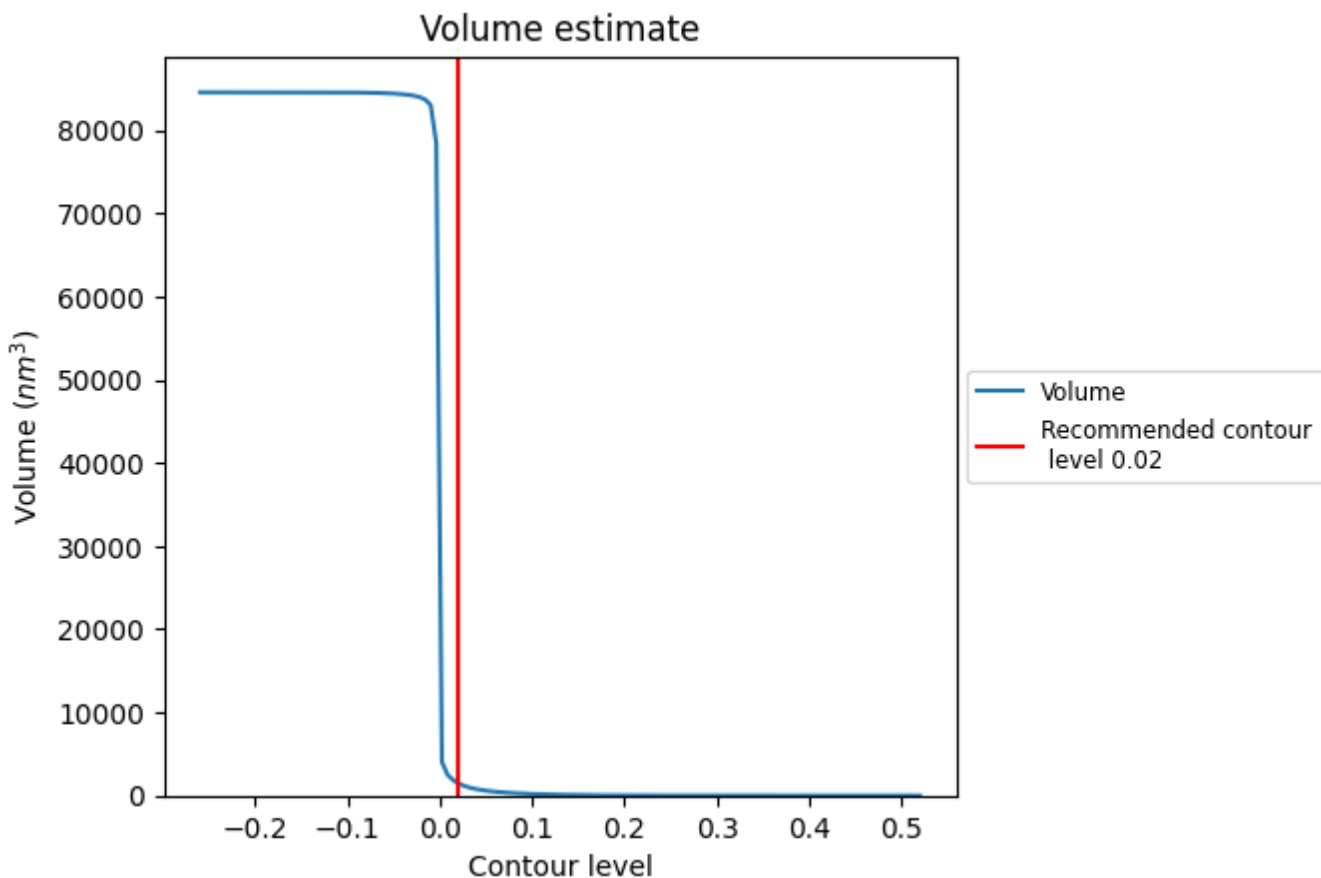
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

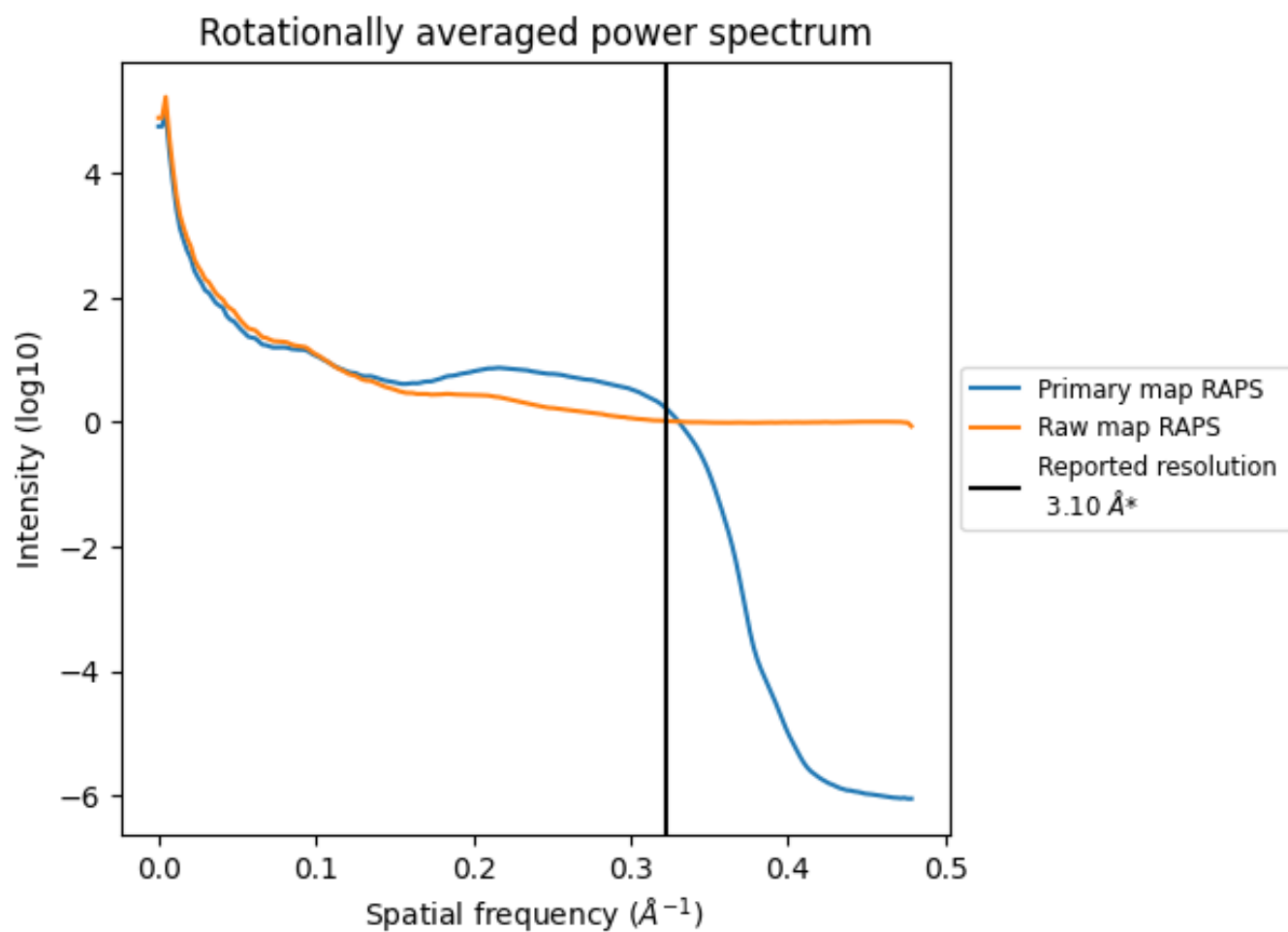
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1474 nm^3 ; this corresponds to an approximate mass of 1331 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum [i](#)

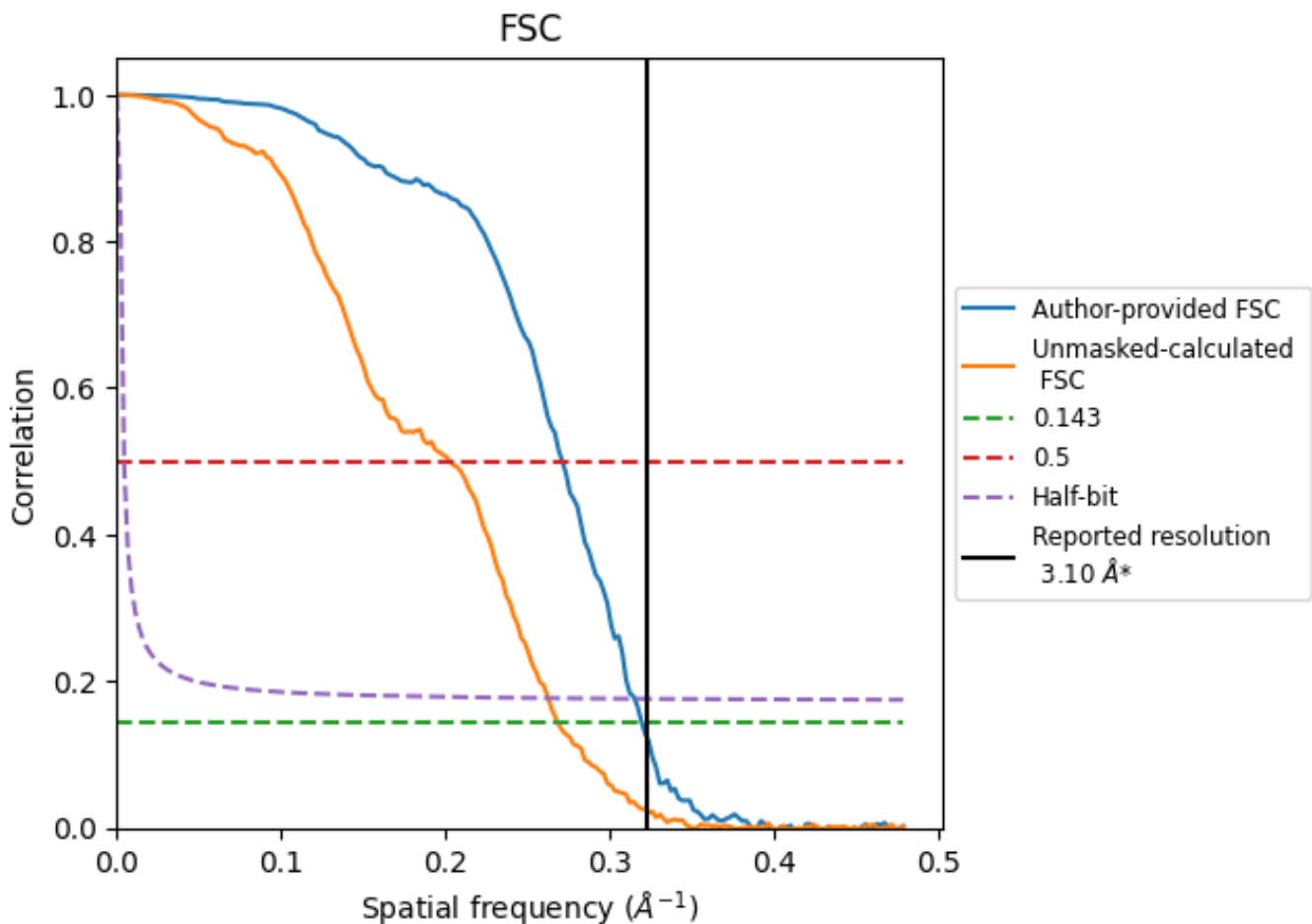


*Reported resolution corresponds to spatial frequency of 0.323 Å⁻¹

8 Fourier-Shell correlation [i](#)

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

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.323 Å⁻¹

8.2 Resolution estimates [i](#)

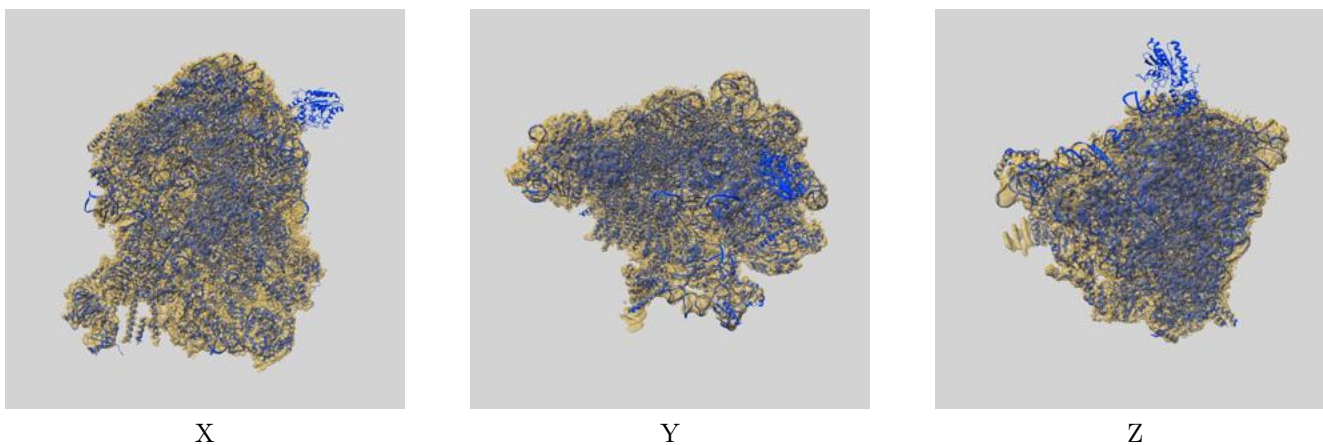
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.10	-	-
Author-provided FSC curve	3.13	3.69	3.17
Unmasked-calculated*	3.73	4.94	3.81

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.73 differs from the reported value 3.1 by more than 10 %

9 Map-model fit [i](#)

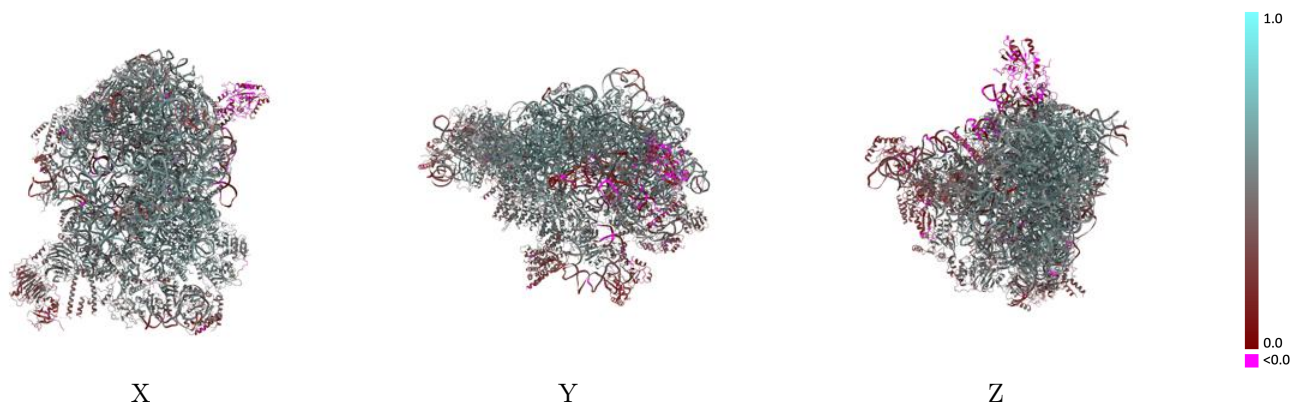
This section contains information regarding the fit between EMDB map EMD-35288 and PDB model 8I9Y. Per-residue inclusion information can be found in section 3 on page 19.

9.1 Map-model overlay [i](#)



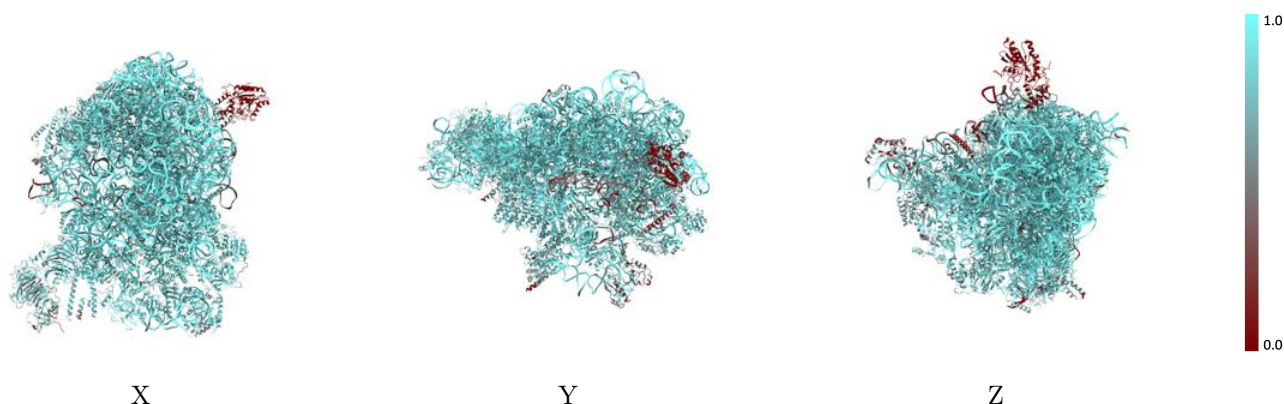
The images above show the 3D surface view of the map at the recommended contour level 0.02 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



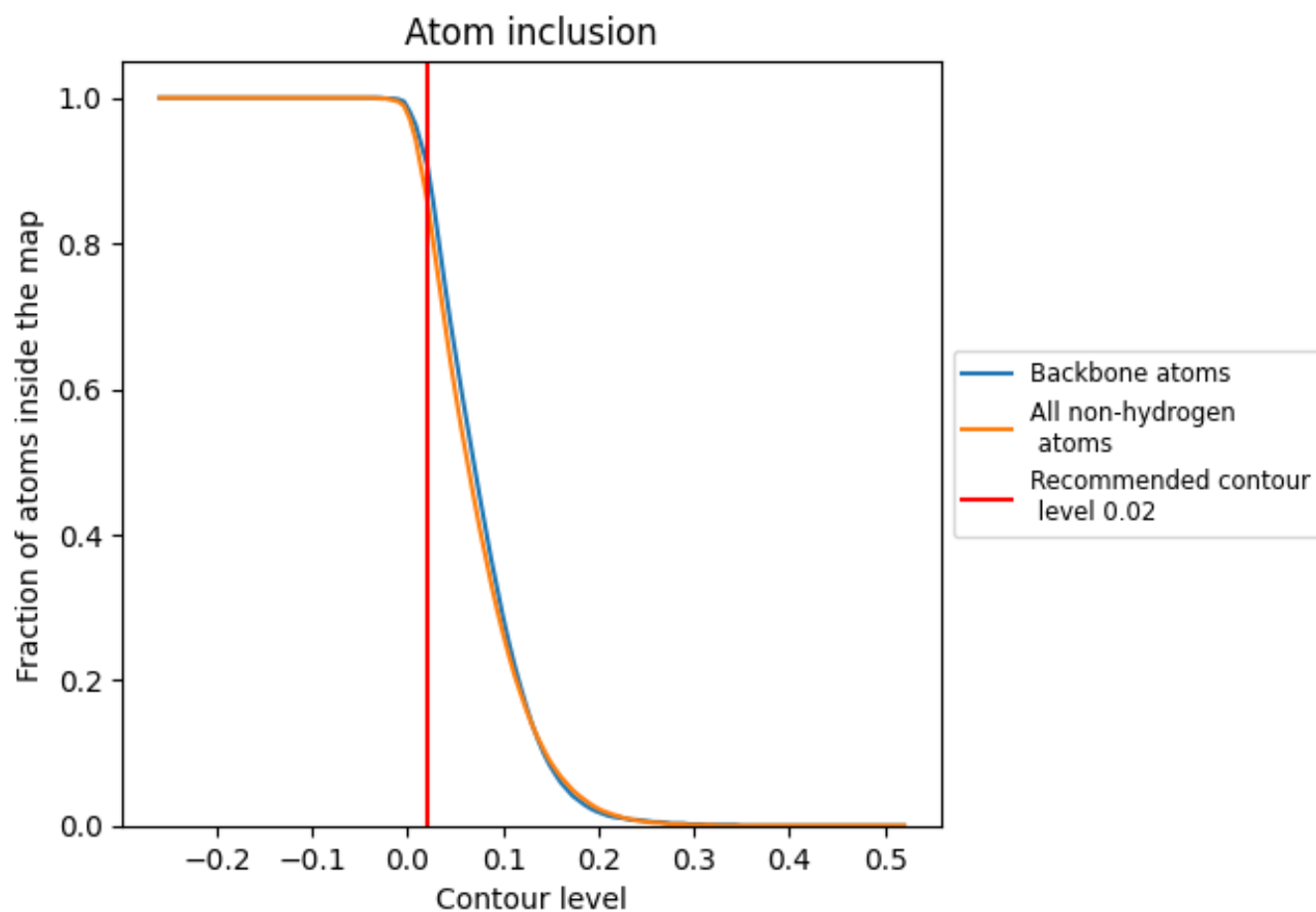
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.02).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 91% of all backbone atoms, 86% 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 (0.02) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8630	 0.4710
C1	 0.9200	 0.4890
C2	 0.9280	 0.4950
CA	 0.9200	 0.5400
CB	 0.8170	 0.4190
CC	 0.8580	 0.4760
CD	 0.6650	 0.3030
CE	 0.8630	 0.4880
CF	 0.8060	 0.4020
CG	 0.8790	 0.5030
CH	 0.8140	 0.4370
CI	 0.8340	 0.4300
CJ	 0.8530	 0.4660
CK	 0.8520	 0.4740
CL	 0.2330	 0.1480
CM	 0.8200	 0.4370
CN	 0.7850	 0.4530
CO	 0.8440	 0.4870
CP	 0.8640	 0.4730
CQ	 0.8070	 0.4290
CR	 0.9080	 0.5300
CS	 0.8090	 0.4480
CT	 0.8600	 0.4680
CU	 0.8710	 0.5000
CV	 0.9380	 0.5550
CX	 0.8250	 0.4730
CY	 0.6990	 0.3240
Cz	 0.4860	 0.2640
LB	 0.8780	 0.5090
LC	 0.9420	 0.5620
LE	 0.8940	 0.4990
LF	 0.9040	 0.5260
LG	 0.9110	 0.5450
LH	 0.8790	 0.4970
LK	 0.6180	 0.2110



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Chain	Atom inclusion	Q-score
LL	 0.9480	 0.5740
LM	 0.9220	 0.5360
LN	 0.9660	 0.5990
LO	 0.9300	 0.5520
LP	 0.8900	 0.5050
LQ	 0.9050	 0.5240
LR	 0.8530	 0.4610
LS	 0.9120	 0.5260
LT	 0.6510	 0.3180
LU	 0.8060	 0.4510
LV	 0.7440	 0.4470
LX	 0.8830	 0.5100
LY	 0.9060	 0.5260
LZ	 0.8660	 0.4930
Lc	 0.7930	 0.4310
Ld	 0.8810	 0.5280
Le	 0.9180	 0.5490
Lf	 0.9470	 0.5740
Lg	 0.8690	 0.5130
Lh	 0.8860	 0.5060
Li	 0.8960	 0.5190
Lj	 0.9520	 0.5840
Lk	 0.8350	 0.4490
Ll	 0.8480	 0.4330
Lq	 0.4710	 0.1900