Full wwPDB EM Validation Report (i)

Dec 2, 2025 – 12:54 am GMT

PDB ID	:	9G5D / pdb_00009g5d
EMDB ID	:	EMD-51085
Title	:	Assembly intermediate of human mitochondrial ribosome small subunit (State C)
Authors	:	Finke, A.F.; Heinrichs, M.; Aibara, S.; Richter-Dennerlein, R.; Hillen, H.S.
Deposited on	:	2024-07-16
Resolution	:	3.00 Å(reported)
Based on initial model	:	7PNX

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

EMDB validation analysis	:	0.0.1.dev129
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 3.00 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.
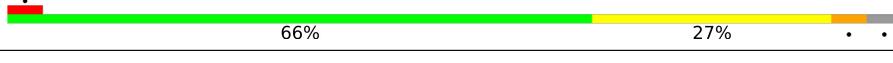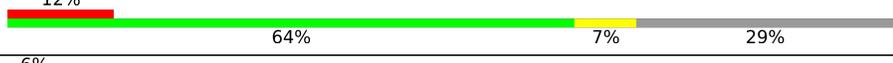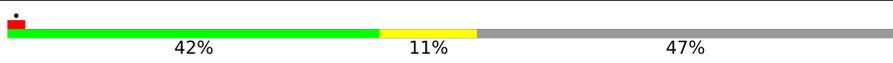
Metric	Percentile Ranks	Value
Clashscore		5
Ramachandran outliers		0.0%
Sidechain outliers		0.0%
RNA backbone		0.59

Worse   *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all EM structures

Metric	Model-Map Fit Percentile Ranks	Value
Q-score		0.44

Worse   *Better*

▮ Percentile relative to all EM structures
▯ Percentile relative to EM structures of similar resolution

Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
RNA backbone	6643	2191	-
Q-score	-	25397	14081 (2.50 - 3.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	0	218	11% / 84% / 14% ·
2	1	323	9% / 77% / 9% / 14%
3	3	199	· / 34% · / 64%

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Mol	Chain	Length	Quality of chain
4	4	689	39% / 71% / 15% / 14%
5	A	955	66% / 27%
6	B	296	65% / 11% / 24%
7	C	167	5% / 59% / 20% / 21%
8	D	430	13% / 69% / 10% / 20%
9	E	125	14% / 85% / 10% / 6%
10	F	242	8% / 74% / 6% / 19%
11	G	396	9% / 66% / 11% / 23%
12	H	201	6% / 58% / 11% / 30%
13	I	194	63% / 8% / 29%
14	J	138	7% / 70% / 9% / 22%
15	K	128	66% / 12% / 21%
16	L	257	8% / 61% / 7% / 32%
17	M	137	6% / 75% / 12% / 13%
18	N	130	74% / 11% / 15%
19	O	258	67% / 8% / 25%
20	P	142	5% / 61% / 8% / 32%
21	Q	87	6% / 86% / 11%
22	R	360	68% / 14% / 18%
23	S	190	12% / 64% / 7% / 29%
24	T	173	6% / 88% / 9%
25	U	205	79% / 7% / 14%
26	V	414	34% / 74% / 14% / 13%
27	W	187	42% / 11% / 47%
28	X	398	6% / 71% / 17% / 12%

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Mol	Chain	Length	Quality of chain
29	Y	395	10% 34% · 62%
30	Z	106	17% 80% 14% 6%
31	a	343	35% 37% 7% 56%
32	b	407	17% 67% 13% 20%

2 Entry composition ⓘ

There are 40 unique types of molecules in this entry. The entry contains 68801 atoms, of which 0 are hydrogens and 0 are deuteriums.

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

- Molecule 1 is a protein called 28S ribosomal protein S34, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	0	215	Total 1787	C 1130	N 339	O 313	S 5	0	0

- Molecule 2 is a protein called 28S ribosomal protein S35, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	1	278	Total 2256	C 1430	N 386	O 429	S 11	0	0

- Molecule 3 is a protein called Aurora kinase A-interacting protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	3	71	Total 629	C 403	N 135	O 90	S 1	0	0

- Molecule 4 is a protein called Pentatricopeptide repeat domain-containing protein 3, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	4	590	Total 4775	C 3056	N 809	O 882	S 28	0	0

- Molecule 5 is a RNA chain called 12S mitochondrial rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	A	917	Total 19474	C 8730	N 3508	O 6319	P 917	0	0

- Molecule 6 is a protein called 28S ribosomal protein S2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	B	225	Total 1828	C 1164	N 331	O 323	S 10	0	0

- Molecule 7 is a protein called 28S ribosomal protein S24, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	C	132	Total	C	N	O	S	0	0
			1083	699	195	185	4		

- Molecule 8 is a protein called 28S ribosomal protein S5, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	D	343	Total	C	N	O	S	0	0
			2731	1713	518	487	13		

- Molecule 9 is a protein called 28S ribosomal protein S6, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	E	118	Total	C	N	O	S	0	0
			936	592	168	172	4		

- Molecule 10 is a protein called 28S ribosomal protein S7, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	F	195	Total	C	N	O	S	0	0
			1604	1020	290	283	11		

- Molecule 11 is a protein called 28S ribosomal protein S9, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	G	304	Total	C	N	O	S	0	0
			2500	1587	444	455	14		

- Molecule 12 is a protein called 28S ribosomal protein S10, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	H	140	Total	C	N	O	S	0	0
			1152	745	194	210	3		

- Molecule 13 is a protein called 28S ribosomal protein S11, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	I	137	Total	C	N	O	S	0	0
			1019	641	193	181	4		

- Molecule 14 is a protein called 28S ribosomal protein S12, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	J	108	Total 839	C 521	N 169	O 143	S 6	0	0

- Molecule 15 is a protein called 28S ribosomal protein S14, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	K	101	Total 862	C 537	N 179	O 141	S 5	0	0

- Molecule 16 is a protein called 28S ribosomal protein S15, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	L	174	Total 1453	C 925	N 270	O 251	S 7	0	0

- Molecule 17 is a protein called 28S ribosomal protein S16, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	M	119	Total 942	C 594	N 185	O 157	S 6	0	0

- Molecule 18 is a protein called 28S ribosomal protein S17, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	N	110	Total 868	C 562	N 156	O 147	S 3	0	0

- Molecule 19 is a protein called 28S ribosomal protein S18b, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	O	193	Total 1592	C 1014	N 294	O 277	S 7	0	0

- Molecule 20 is a protein called 28S ribosomal protein S18c, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	P	97	Total 781	C 501	N 134	O 138	S 8	0	0

- Molecule 21 is a protein called 28S ribosomal protein S21, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	Q	85	Total 736	C 455	N 149	O 124	S 8	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Q	50	ARG	CYS	variant	UNP P82921

- Molecule 22 is a protein called 28S ribosomal protein S22, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	R	295	Total 2409	C 1533	N 413	O 455	S 8	0	0

- Molecule 23 is a protein called 28S ribosomal protein S23, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	S	135	Total 1111	C 716	N 198	O 196	S 1	0	0

- Molecule 24 is a protein called 28S ribosomal protein S25, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	T	168	Total 1371	C 877	N 239	O 244	S 11	0	0

- Molecule 25 is a protein called 28S ribosomal protein S26, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	U	176	Total 1488	C 916	N 301	O 267	S 4	0	0

- Molecule 26 is a protein called 28S ribosomal protein S27, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	V	362	Total 2969	C 1904	N 495	O 558	S 12	0	0

- Molecule 27 is a protein called 28S ribosomal protein S28, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	W	100	Total	C	N	O	S	0	0
			789	498	141	146	4		

- Molecule 28 is a protein called 28S ribosomal protein S29, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	X	352	Total	C	N	O	S	0	0
			2849	1822	499	517	11		

- Molecule 29 is a protein called 28S ribosomal protein S31, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	Y	149	Total	C	N	O	S	0	0
			1246	801	207	234	4		

- Molecule 30 is a protein called 28S ribosomal protein S33, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	Z	100	Total	C	N	O	S	0	0
			839	534	153	148	4		

- Molecule 31 is a protein called Putative ribosome-binding factor A, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	a	150	Total	C	N	O	S	0	0
			1188	743	221	217	7		

- Molecule 32 is a protein called 12S rRNA N4-methylcytidine (m4C) methyltransferase.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	b	326	Total	C	N	O	S	0	0
			2546	1610	456	466	14		

- Molecule 33 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
33	3	1	Total	Mg	0
			1	1	
33	A	8	Total	Mg	0
			8	8	
33	B	1	Total	Mg	0
			1	1	

- Molecule 34 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
34	A	1	Total	K	0
			1	1	

- Molecule 35 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: NAD) (formula: $C_{21}H_{27}N_7O_{14}P_2$).
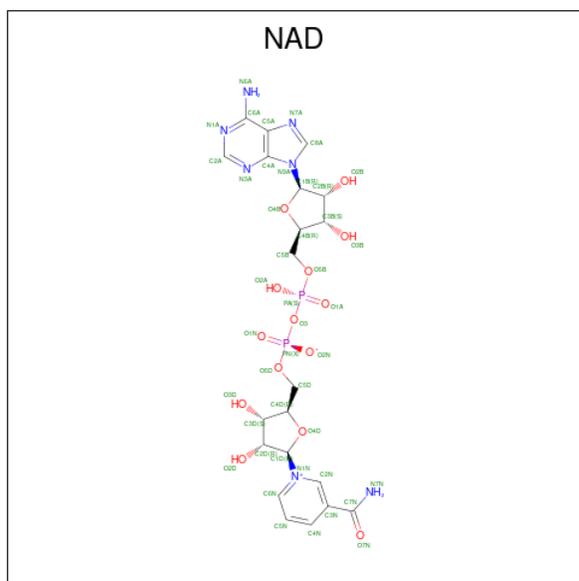
Mol	Chain	Residues	Atoms					AltConf
35	A	1	Total	C	N	O	P	0
			44	21	7	14	2	

- Molecule 36 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
36	O	1	Total	Zn	0
			1	1	

- Molecule 37 is FE2/S2 (INORGANIC) CLUSTER (CCD ID: FES) (formula: Fe_2S_2).

FES

Mol	Chain	Residues	Atoms			AltConf
37	P	1	Total 4	Fe 2	S 2	0
37	T	1	Total 4	Fe 2	S 2	0

- Molecule 38 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).

GDP

Mol	Chain	Residues	Atoms					AltConf
38	X	1	Total 28	C 10	N 5	O 11	P 2	0

- Molecule 39 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).

ATP
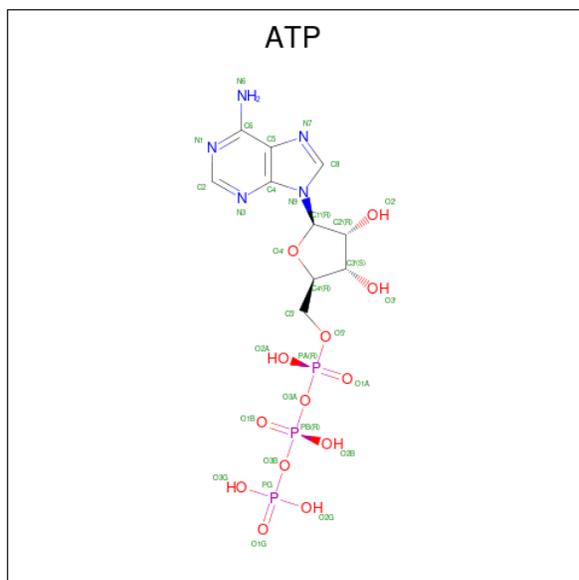
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
39	X	1	31	10	5	13	3	0

- Molecule 40 is S-ADENOSYL-L-HOMOCYSTEINE (CCD ID: SAH) (formula: $C_{14}H_{20}N_6O_5S$).

SAH
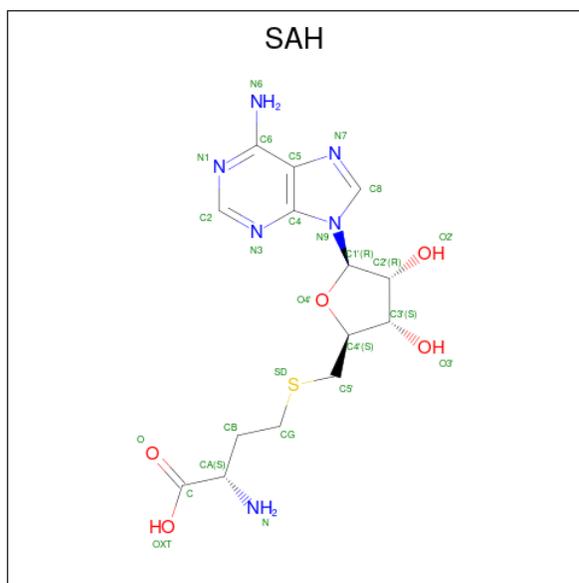
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	S	
40	b	1	26	14	6	5	1	0

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.
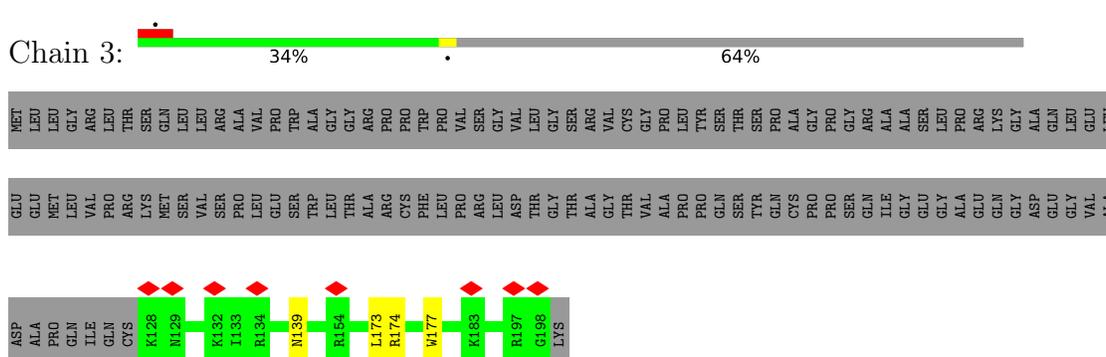
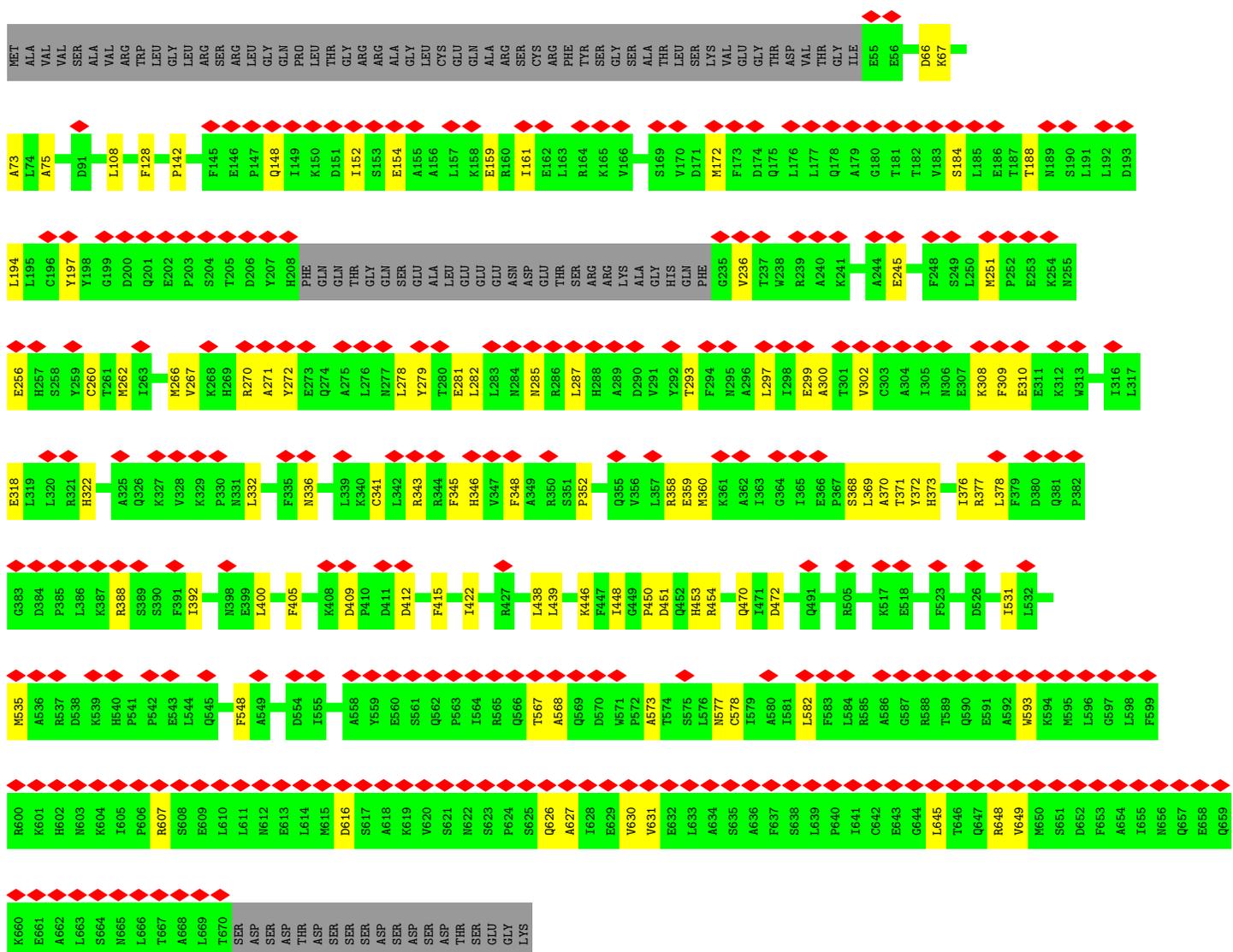- Molecule 1: 28S ribosomal protein S34, mitochondrial
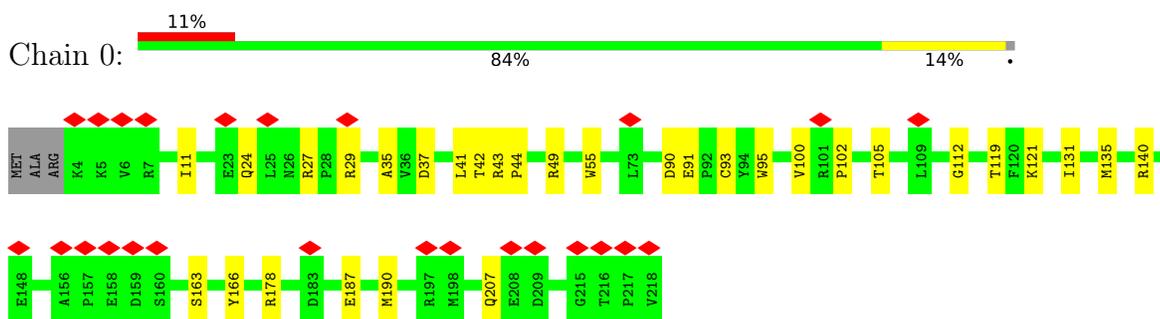
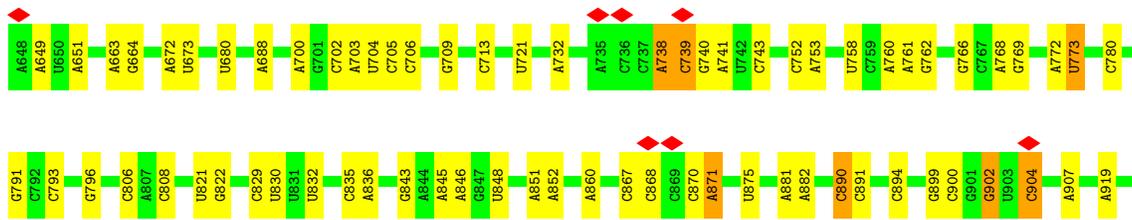- Molecule 2: 28S ribosomal protein S35, mitochondrial
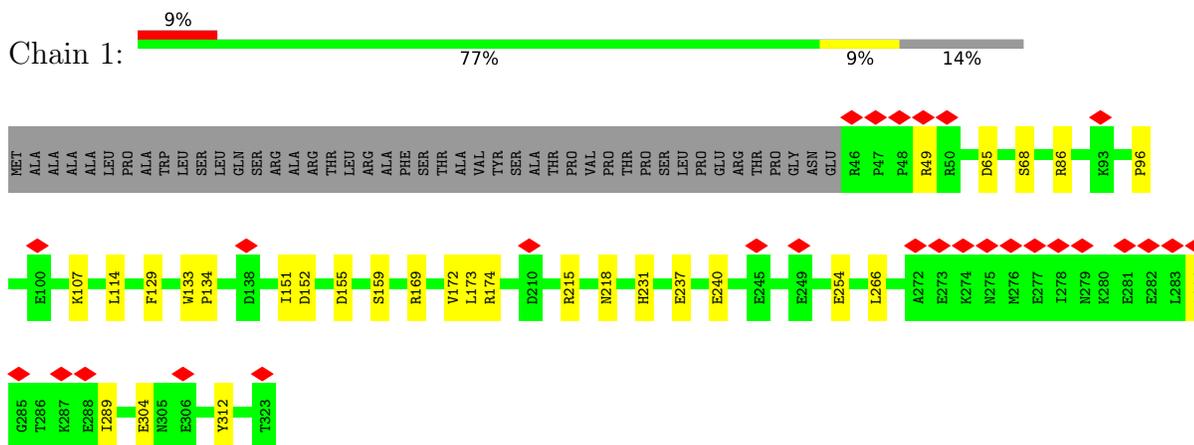
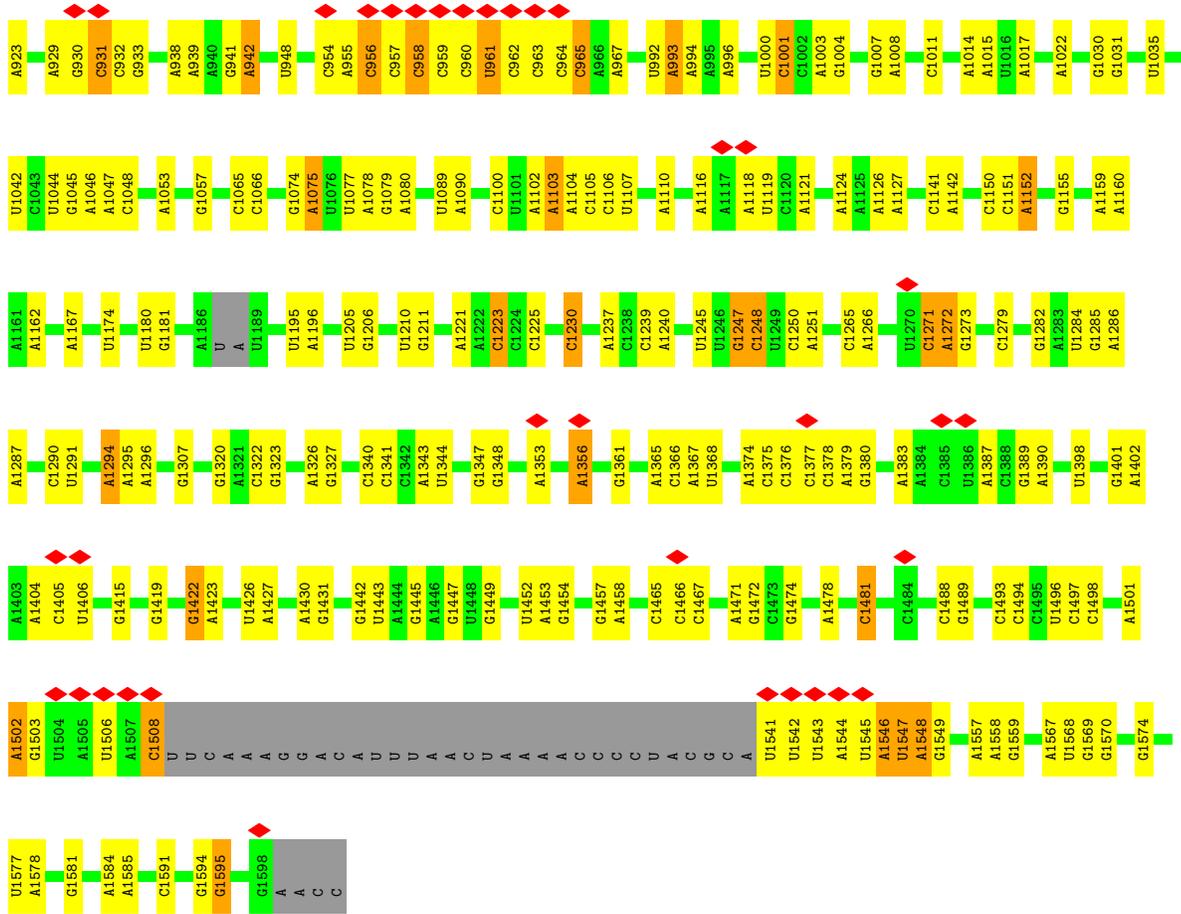- Molecule 3: Aurora kinase A-interacting protein

• Molecule 4: Pentatricopeptide repeat domain-containing protein 3, mitochondrial
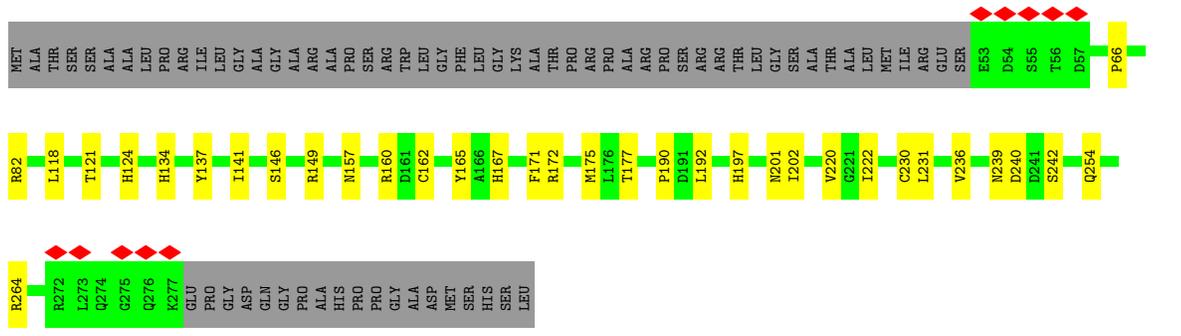
Chain 4:

• Molecule 5: 12S mitochondrial rRNA

Chain A:

• Molecule 6: 28S ribosomal protein S2, mitochondrial

Chain B:

65%   11%   24%

• Molecule 7: 28S ribosomal protein S24, mitochondrial

Chain C:

5%   59%   20%   21%

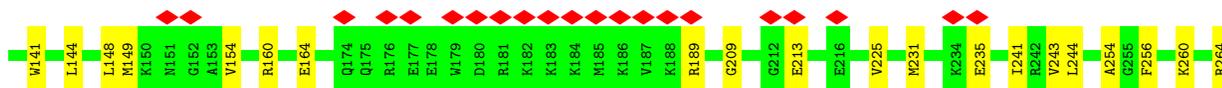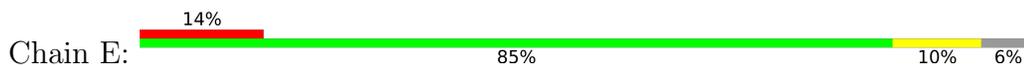E88 D89 L92 F95 M96 F100 C103 L108 V109 L110 K111 R112 N115 Q116 L117 E118 I119 R125 Q126 Y147 K148 C149 R152 L167

• Molecule 8: 28S ribosomal protein S5, mitochondrial

Chain D:

13%
69% 10% 20%

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

ALA SER LEU ARG ALA LEU GLN THR GLN CYS ILE SER SER PRO SER HIS LEU MET SER GLN GLN TYR ARG PRO TYR S88 K92 D96 E97 E105 T106 G107 A108 G109 A110 K111 K112 G113 R114 G115 K116 R117 T118 K119 K120 K121 K122 R123 K124 D125 L126 N127 R128 I132

W141 L144 L148 M149 K150 N151 G152 A153 V154 R160 E164 Q174 Q175 R176 E177 E178 W179 D180 R181 K182 K183 K184 M185 K186 V187 K188 R189 G209 G212 E213 E216 V225 M231 K234 E235 I241 R242 V243 L244 A254 G255 F256 K260 R264

F268 H280 Y281 I282 Y285 T289 L296 K306 C316 Y333 A334 G348 L353 E372 I373 R374 L380 P381 E398 D399 E400 D403 K412 Q415 G416 M417 K418 R419 K426 T430

• Molecule 9: 28S ribosomal protein S6, mitochondrial

Chain E:

14%
85% 10% 6%

MET P2 R3 Y4 E17 I26 D31 V36 R37 D38 L39 E44 H54 R60 D85 Q100 E101 L102 K103 E104 C105 E106 G107 I108 V109 P110 V111 P112 L113 A114 E115 K116 L117 Y118 S119 THR LYS LYS ARG LYS LYS

• Molecule 10: 28S ribosomal protein S7, mitochondrial

Chain F:

8%
74% 6% 19%

MET ALA ALA PRO ALA VAL LYS VAL VAL ALA ARG GLY TRP SER GLY LEU ALA LEU GLY VAL ARG ARG ALA VAL LEU GLN LEU PRO GLY LEU THR GLN VAL ARG TRP S35 K48 E56 E57 L58 T59 E60 E61 Y64 V65 R66 E67 A79 S84 E87 D88 I91 E116

R120 L158 VAL PRO ILE LEU LYS GLY GLY ARG PHE TYR Q169 V170 D176 R177 R178 R179 E190 D193 K194 K195 R198 D225 A235 L236 A237 H238 Y239 ARG TRP TRP
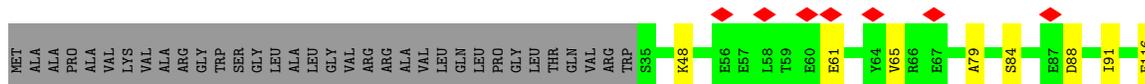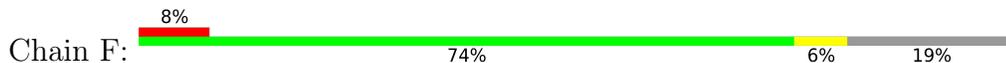
• Molecule 11: 28S ribosomal protein S9, mitochondrial

Chain G:

9%
66% 11% 23%

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

VAL PRO THR SER LYS ARG GLU GLU THR TYR T70 E71 D72 F73 Q77 L88 E97 A107 Y110 G115 E118 R134 Q135 R136 A137 I138 E142 P146 Y149 T153 E173 K174 H175 Q176 SER HIS LEU GLN ALA LYS SER SER LEU LEU PRO GLU GLU LYS THR VAL

THR ARG ASP V194 I195 G196 S197 R198 W199 L200 I201 K202 E206 K212 Y218 E226 L229 T230 S231 Q232 A235 A236 V241 Q242 R243 F244 R245 R246 S247 V248 T249 L250 E251 SER LYS LYS GLN LEU ILE E258 E264 K275 R276 K280 A281 V285 G291 R292

Q301 Q312 H318 G324 D327 V328 V332 R345 R377 K380 E385 K394 K395 R396

• Molecule 12: 28S ribosomal protein S10, mitochondrial

Chain H:

6%
58% 11% 30%

MET ALA ALA ARG THR ALA PHE GLY ALA VAL CYS ARG ARG LEU TRP GLN GLY LEU ASN GLY PHE SER VAL ASN THR SER LYS ASN THR ALA LYS ASN GLY GLY LEU LEU LEU SER THR ASN MET LYS TRP VAL GLN PHE SER ASN L50 D53 K56 D57 L58 T59 K60 P61

D70 I71 D84 Y91 I104 V108 R113 K114 I126 L139 L143 E144 L145 E146 H147 G150 V155 I160 E166 P181 I184 K185 E186 P187 I188 W189 GLU THR LEU SER GLU GLU LYS GLU GLU SER LYS SER

• Molecule 13: 28S ribosomal protein S11, mitochondrial

Chain I:

.
63% 8% 29%

MET GLN ALA VAL ARG ASN ALA GLY SER ARG PHE LEU ARG SER TRP TRP PRO GLN THR ALA GLY ARG VAL VAL ALA ARG THR PRO ALA GLY THR ILE CYS THR GLY ALA ARG GLN LEU GLN ASP ALA ALA LYS GLN LYS VAL GLU GLN ASN ALA ALA PRO SER HIS T58 K59

G68 E69 E70 S71 R74 E81 K89 N94 T95 Q98 F109 A136 H163 G168 I175 N184 R187 R192 K193 L194

• Molecule 14: 28S ribosomal protein S12, mitochondrial

Chain J:

7%
70% 9% 22%

MET SER TRP SER GLY LEU LEU HIS GLY LEU ASN THR SER LEU THR CYS GLY PRO ALA LEU VAL PRO ARG LEU TRP ALA THR CYS SER MET A31 P42 K43 R44 P45 P46 R47 K48 V62 N74 R78 R82 V83 L109 R114 K122 R127 Y130 D131 C132

G133 H134 V135 Q136 K137 K138

• Molecule 15: 28S ribosomal protein S14, mitochondrial

Chain K:

66% 12% 21%

MET ALA ALA PHE MET LEU GLY SER LEU LEU ARG THR PHE LYS GLN MET VAL PRO SER SER ALA SER GLY LEU VAL ARG SER H28 M34 W35 R36 R51 L52 R53 I54 R58 K59 N60 P64 Q68 D72 I75 S95 R112 L120 I123 W128

• Molecule 16: 28S ribosomal protein S15, mitochondrial

Chain L:

8%

61% 7% 32%

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

SER ARG L63 D64 D65 D75 V79 I82 E83 K84 L92 M112 I115 V116 P119 E120 L143 D149 H152 K153 Y175 I181 G184 E188 K206 L209 R223 R224 R225 A226 L227 K228 A229 A230 A231 A232 A233 Q234 K235 Q236 ALA LYS ARG

ARG ASN PRO ASP SER PRO ALA LYS ALA ILE PRO LYS THR LEU LYS ASP SER GLN

• Molecule 17: 28S ribosomal protein S16, mitochondrial

Chain M:

6%

75% 12% 13%

MET VAL HIS LEU THR THR LEU LEU CYS K10 A11 G15 I19 H38 G52 K64 A67 G78 L83 K89 H100 P101 M102 I104 T105 E108 R111 Q123 K124 T125 D126 A127 E128 ALA THR ASP THR GLU ALA THR GLU THR

• Molecule 18: 28S ribosomal protein S17, mitochondrial

Chain N:

74% 11% 15%

MET SER VAL V4 R5 V8 I13 V14 V17 K24 V28 R29 V30 A51 Q57 L66 R67 A68 R73 K87 V88 G89 S111 S112 E113 THR THR GLN LEU SER LYS ASN LEU GLU GLU LEU ASN ILE SER SER ALA GLN

• Molecule 19: 28S ribosomal protein S18b, mitochondrial

Chain O:

67% 8% 25%

MET ALA ALA SER VAL LEU ASN THR VAL LEU ARG ARG LEU PRO MET LEU SER LEU PHE ARG GLY SER HIS ARG VAL GLN VAL PRO LEU GLN THR LEU CYS THR LYS ALA PRO SER GLU GLU ASP SER LEU SER SER VAL P47 I48 P55 W74 N80 Q88 R91 C94

R97 N103 P104 C105 C108 R109 D110 L113 H114 V127 I134 T140 G141 V142 W199 W202 R215 E227 E233 M238 P239 PRO ARG THR PRO ALA GLU ALA SER SER THR GLY GLN THR GLY PRO GLN SER ALA LEU

• Molecule 20: 28S ribosomal protein S18c, mitochondrial

Chain P:

5%

61% 8% 32%

MET ALA ALA VAL VAL ALA VAL CYS GLY GLY LEU GLY ARG LYS LYS LEU THR HIS LEU VAL THR ALA ALA VAL SER LEU THR HIS PRO GLY THR HIS THR VAL LEU TRP ARG ARG GLY CYS SER GLN GLN VAL SER S46 N47 E48 D49 P57 L62 K63 K64 C65 C68 H71

V72 D73 Y74 T108 Y124 K125 D126 Y129 R139 Y140 R141 E142

• Molecule 21: 28S ribosomal protein S21, mitochondrial

Chain Q:

6%

86%

11%

MET ALA K3 A9 E16 V19 E20 R28 D38 I39 K40 R50 R77 K78 N79 D82 P83 W84 C87

• Molecule 22: 28S ribosomal protein S22, mitochondrial

Chain R:

68%

14%

18%

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

GLY SER PRO E64 T65 T69 F70 N71 D72 Q76 L142 K146 I147 T154 K155 I161 S162 R168 E169 R170 P177 K183 R191 V195 Y196 I204 P207 I208 I209 N214 M218 Y219 R223 H224 N229 L230 C231 D238 Y242 D252

I253 D254 K255 R256 Y259 Y267 V272 F275 K279 D282 G283 L284 I294 Y304 P309 Q315 D319 I325 A336 I342 L346 Y349 R355 H356 S357 A358 ALA SER

• Molecule 23: 28S ribosomal protein S23, mitochondrial

Chain S:

12%

64%

7%

29%

MET A2 K26 L41 R50 I63 D68 G79 S80 G81 Q82 F85 D86 N89 P90 N91 F92 F99 K102 L106 L109 G110 E111 T112 D113 E114 E115 K116 L117 T121 G122 K123 A124 L125 L126 A127 E128 G129 V130 I131 L132 R133 R134 V135 G136 GLU ALA

ARG THR GLN HIS GLY GLY SER HIS VAL SER ARG LYS SER GLU HIS LEU SER VAL ARG PRO GLN THR ALA LEU GLU GLU ASN GLU THR GLN LYS GLU VAL PRO GLN ASP GLN HIS LEU GLU ALA PRO ALA ASP GLN SER LYS GLY LEU LEU PRO PRO

• Molecule 24: 28S ribosomal protein S25, mitochondrial

Chain T:

6%

88%

9%

MET P2 V21 E42 G43 A44 R45 K46 F47 V48 I52 Q63 F75 L80 E84 V90 R103 E117 E118 E119 K120 K121 H125 V143 A165 A166 L167 K168 A169 ASP ALA GLN ASP

• Molecule 25: 28S ribosomal protein S26, mitochondrial

Chain U:

79%

7%

14%

MET LEU ARG ALA LEU SER ARG LEU GLY ALA GLY THR PRO CYS ARG PRO ARG ALA PRO LEU VAL LEU PRO ALA ARG GLY R27 E40 R41 V42 N43 L56 R59 Y60 R64 V75 S76 E77 R80 R86 L160 V164 F167 R170 E194 Q201 R202

ARG ASP SER

• Molecule 26: 28S ribosomal protein S27, mitochondrial

Chain V:

34%

74%

14%

13%

• Molecule 27: 28S ribosomal protein S28, mitochondrial

Chain W:

42% 11% 47%

• Molecule 28: 28S ribosomal protein S29, mitochondrial

Chain X:

6% 71% 17% 12%

• Molecule 29: 28S ribosomal protein S31, mitochondrial

Chain Y:

• Molecule 30: 28S ribosomal protein S33, mitochondrial

Chain Z:
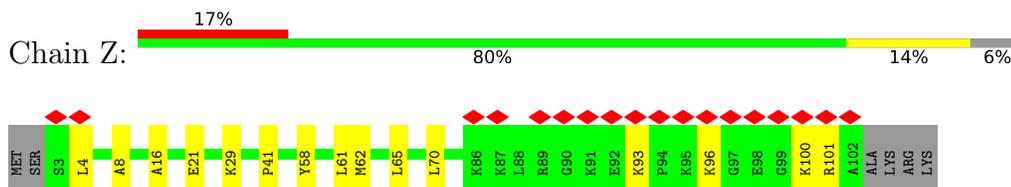
• Molecule 31: Putative ribosome-binding factor A, mitochondrial

Chain a:

GLU CYS TYR ALA PRO ASP THR GLU GLU LEU GLU ALA GLU ARG GLY GLY GLY ARG THR GLU ASP GLY HIS SER CYS GLY ALA SER ARG GLU

• Molecule 32: 12S rRNA N4-methylcytidine (m4C) methyltransferase

Chain b:

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

GLN ASP ARG ASP PHE GLU THR MET ALA LYS L71 H72 I73 P74 V75 M76 V77 D78 E79 C83 L84 S85 P86 Q87 K88 G89 L93 D94 M95 T96 F97 G98 K104 A105 I106 E110 S111 D112 I113 Y116 R120 E129 E133 P136 K137 Q138 I139 R140 Q148

A156 G157 V158 Q159 D169 L170 L177 D178 R182 L192 R195 G199 M204 P205 A208 N212 A213 L214 D215 Q216 Q217 A218 R224 T225 Y226 G227 E228 E229 K230 K233 R243 R270 K271 D272 L273 L274 Q275 I280 I290 N294 E295 L296 N297 E298

L299 Q307 L310 R315 L319 S320 F321 H322 S323 L324 E325 D326 K330 L334 R347 M351 K352 T353 S354 Q355 L356 G357 S358 ASP HIS GLU ASN THR GLU GLU VAL SER MET ARG R370 A371 L377 I378 H379 K380 K381 V382 L383 S384 P385 Q386 D387 Q388 D389 V390 Q391

D392 N393 P394 R395 G396 R397 S398 A399 K400 L401 R402 K406 L407

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	79037	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	40	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	1600	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	2.113	Depositor
Minimum map value	-0.196	Depositor
Average map value	0.015	Depositor
Map value standard deviation	0.054	Depositor
Recommended contour level	0.39	Depositor
Map size (Å)	461.99997, 461.99997, 461.99997	wwPDB
Map dimensions	440, 440, 440	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.05, 1.05, 1.05	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: K, GDP, SAH, MG, FES, ZN, ATP, NAD

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#|Z|>5$	RMSZ	$\#|Z|>5$
1	0	0.13	0/1834	0.27	0/2484
2	1	0.14	0/2304	0.24	0/3117
3	3	0.13	0/640	0.25	0/844
4	4	0.11	0/4883	0.26	0/6608
5	A	0.17	0/21782	0.18	0/33911
6	B	0.18	0/1871	0.31	0/2531
7	C	0.18	0/1113	0.27	0/1505
8	D	0.17	0/2783	0.28	0/3724
9	E	0.17	0/953	0.30	0/1289
10	F	0.12	0/1638	0.24	0/2197
11	G	0.14	0/2553	0.25	0/3420
12	H	0.17	0/1178	0.28	0/1598
13	I	0.14	0/1039	0.28	0/1400
14	J	0.16	0/855	0.26	0/1148
15	K	0.16	0/880	0.26	0/1182
16	L	0.16	0/1477	0.22	0/1974
17	M	0.20	0/963	0.27	0/1295
18	N	0.18	0/886	0.31	0/1199
19	O	0.17	0/1648	0.23	0/2243
20	P	0.15	0/798	0.26	0/1070
21	Q	0.13	0/748	0.21	0/994
22	R	0.15	0/2456	0.23	0/3317
23	S	0.13	0/1138	0.20	0/1533
24	T	0.17	0/1402	0.30	0/1883
25	U	0.15	0/1510	0.24	0/2025
26	V	0.10	0/3030	0.26	0/4093
27	W	0.14	0/801	0.23	0/1079
28	X	0.12	0/2921	0.28	0/3954
29	Y	0.13	0/1280	0.23	0/1725
30	Z	0.14	0/857	0.24	0/1141
31	a	0.08	0/1201	0.22	0/1610
32	b	0.11	0/2590	0.25	0/3492

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$ >5	RMSZ	#$|Z|$ >5
All	All	0.15	0/72012	0.23	0/101585

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	0	1787	0	1796	23	0
2	1	2256	0	2288	23	0
3	3	629	0	702	3	0
4	4	4775	0	4779	65	0
5	A	19474	0	9893	169	0
6	B	1828	0	1815	28	0
7	C	1083	0	1088	24	0
8	D	2731	0	2804	30	0
9	E	936	0	954	9	0
10	F	1604	0	1647	10	0
11	G	2500	0	2476	31	0
12	H	1152	0	1183	15	0
13	I	1019	0	1059	11	0
14	J	839	0	887	9	0
15	K	862	0	885	11	0
16	L	1453	0	1540	12	0
17	M	942	0	965	15	0
18	N	868	0	928	9	0
19	O	1592	0	1557	14	0
20	P	781	0	806	8	0
21	Q	736	0	749	11	0
22	R	2409	0	2428	30	0
23	S	1111	0	1115	10	0
24	T	1371	0	1393	10	0
25	U	1488	0	1499	17	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
26	V	2969	0	2961	32	0
27	W	789	0	802	16	0
28	X	2849	0	2844	42	0
29	Y	1246	0	1197	13	0
30	Z	839	0	858	14	0
31	a	1188	0	1212	16	0
32	b	2546	0	2615	34	0
33	3	1	0	0	0	0
33	A	8	0	0	0	0
33	B	1	0	0	0	0
34	A	1	0	0	0	0
35	A	44	0	26	1	0
36	O	1	0	0	0	0
37	P	4	0	0	0	0
37	T	4	0	0	0	0
38	X	28	0	12	0	0
39	X	31	0	12	0	0
40	b	26	0	19	1	0
All	All	68801	0	59794	619	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (619) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:4:343:ARG:HA	4:4:378:LEU:HD13	1.66	0.75
5:A:1247:G:N7	30:Z:96:LYS:NZ	2.35	0.73
31:a:248:ILE:HG21	32:b:205:PRO:HB3	1.70	0.73
5:A:1294:A:OP1	6:B:201:ASN:ND2	2.22	0.72
5:A:1248:C:O2	15:K:28:HIS:N	2.24	0.71
32:b:195:ARG:NH1	32:b:204:MET:O	2.24	0.70
11:G:394:LYS:O	11:G:396:ARG:NH1	2.25	0.70
5:A:1508:C:O2	5:A:1542:U:N3	2.24	0.69
5:A:1287:A:OP2	8:D:260:LYS:NZ	2.26	0.68
5:A:996:A:N3	5:A:1074:G:O2'	2.27	0.67
4:4:616:ASP:OD1	4:4:648:ARG:NH2	2.24	0.67
7:C:100:PHE:HB3	7:C:103:CYS:HB2	1.76	0.67
22:R:208:ILE:O	22:R:214:ASN:ND2	2.26	0.67
1:0:93:CYS:HA	1:0:119:THR:O	1.95	0.67
5:A:1380:G:N3	28:X:164:ASN:ND2	2.43	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:1508:C:N3	5:A:1542:U:O4	2.28	0.67
32:b:182:ARG:NH2	32:b:195:ARG:O	2.28	0.66
5:A:1501:A:H3'	5:A:1502:A:H5"	1.78	0.65
2:1:49:ARG:NH2	7:C:125:ARG:O	2.30	0.64
15:K:58:ARG:NE	15:K:72:ASP:OD1	2.30	0.64
5:A:1078:A:O2'	32:b:326:ASP:OD2	2.16	0.64
6:B:82:ARG:NH2	27:W:78:GLU:OE1	2.31	0.64
5:A:843:G:N2	5:A:846:A:OP2	2.30	0.64
1:0:140:ARG:NH2	26:V:244:TYR:OH	2.31	0.64
10:F:176:ASP:OD1	10:F:179:ARG:NH2	2.31	0.64
5:A:1230:C:OP2	5:A:1442:G:O2'	2.15	0.64
5:A:930:G:OP1	8:D:419:ARG:NH1	2.30	0.63
11:G:301:GLN:OE1	28:X:385:ASN:ND2	2.27	0.63
5:A:894:C:H41	14:J:78:ARG:HH21	1.46	0.63
8:D:415:GLN:NE2	8:D:417:MET:SD	2.71	0.63
13:I:71:SER:O	13:I:74:ARG:NH1	2.28	0.63
32:b:310:LEU:HD23	32:b:406:LYS:HB2	1.79	0.63
5:A:1581:G:N2	5:A:1584:A:OP2	2.31	0.63
5:A:1078:A:OP2	32:b:330:LYS:NZ	2.32	0.63
17:M:104:ILE:HG23	22:R:147:ILE:HG12	1.80	0.63
26:V:215:GLN:OE1	26:V:217:ASN:ND2	2.32	0.63
5:A:1465:C:O2	5:A:1467:C:N4	2.31	0.62
22:R:309:PRO:O	22:R:315:GLN:NE2	2.33	0.62
5:A:773:U:OP2	16:L:225:ARG:NH1	2.33	0.62
5:A:703:A:OP2	25:U:43:ASN:ND2	2.33	0.62
18:N:57:GLN:O	18:N:87:LYS:NZ	2.32	0.62
5:A:1431:G:O6	11:G:276:ARG:NH2	2.33	0.62
1:0:140:ARG:NH2	26:V:315:GLU:OE2	2.24	0.62
5:A:961:U:O2'	5:A:963:C:N4	2.29	0.62
26:V:48:TYR:N	26:V:78:ASN:OD1	2.29	0.61
5:A:1320:G:OP2	7:C:37:ASN:ND2	2.33	0.61
21:Q:78:LYS:HD3	27:W:162:VAL:HB	1.83	0.61
32:b:116:TYR:OH	32:b:140:ARG:NH1	2.33	0.61
5:A:867:C:O2	5:A:870:C:N4	2.34	0.61
16:L:149:ASP:OD2	16:L:152:HIS:ND1	2.34	0.61
18:N:13:ILE:HD12	18:N:30:VAL:HG21	1.83	0.61
5:A:1496:U:OP1	14:J:82:ARG:NH2	2.34	0.61
8:D:189:ARG:NH1	31:a:295:TYR:O	2.32	0.61
5:A:1341:C:O2	30:Z:93:LYS:NZ	2.33	0.61
6:B:239:ASN:ND2	6:B:242:SER:OG	2.34	0.60
5:A:1077:U:N3	5:A:1080:A:OP2	2.32	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
32:b:290:ILE:HG23	32:b:295:GLU:HB2	1.82	0.60
22:R:325:ILE:HG23	22:R:346:LEU:HD21	1.83	0.60
28:X:108:LEU:HD23	28:X:141:VAL:HG21	1.82	0.60
5:A:1079:G:H2'	5:A:1080:A:H8	1.65	0.60
22:R:69:THR:N	22:R:72:ASP:OD2	2.34	0.60
26:V:74:ARG:O	26:V:78:ASN:ND2	2.35	0.60
1:0:166:TYR:O	19:O:199:TRP:NE1	2.30	0.60
4:4:578:CYS:SG	4:4:607:ARG:NH2	2.70	0.60
32:b:120:ARG:NH2	32:b:298:GLU:OE1	2.35	0.59
5:A:1543:U:H2'	5:A:1544:A:C8	2.37	0.59
5:A:1102:A:OP2	5:A:1104:A:N6	2.30	0.59
10:F:48:LYS:NZ	28:X:375:GLU:OE2	2.31	0.59
15:K:60:ASN:O	15:K:68:GLN:NE2	2.35	0.59
5:A:1245:U:H1'	30:Z:96:LYS:HE3	1.85	0.59
17:M:19:ILE:HB	17:M:83:LEU:HD23	1.84	0.59
26:V:167:VAL:HG13	26:V:172:ALA:HB3	1.85	0.59
9:E:26:ILE:HG23	9:E:36:VAL:HG21	1.85	0.59
16:L:115:ILE:HG21	16:L:181:ILE:HD13	1.84	0.58
11:G:134:ARG:O	11:G:136:ARG:NH1	2.37	0.58
11:G:200:LEU:O	11:G:218:TYR:OH	2.19	0.58
6:B:137:TYR:O	6:B:264:ARG:NH1	2.36	0.58
19:O:94:CYS:HB2	19:O:108:CYS:SG	2.43	0.58
28:X:102:ARG:NH1	28:X:132:THR:O	2.37	0.58
32:b:192:LEU:HB3	32:b:208:ALA:HB2	1.86	0.58
5:A:942:A:N6	5:A:1047:A:OP2	2.25	0.58
26:V:277:ARG:N	26:V:348:GLU:O	2.34	0.58
1:0:24:GLN:O	1:0:27:ARG:NH1	2.36	0.58
5:A:1180:U:OP1	5:A:1570:G:N2	2.24	0.58
5:A:904:C:N4	8:D:116:LYS:O	2.37	0.58
22:R:219:TYR:O	22:R:256:ARG:NH2	2.36	0.58
24:T:21:VAL:HG22	24:T:103:ARG:HB2	1.85	0.58
13:I:163:HIS:NE2	21:Q:20:GLU:OE2	2.37	0.57
4:4:627:ALA:HB1	4:4:649:VAL:HG22	1.85	0.57
5:A:1174:U:O2'	8:D:231:MET:O	2.22	0.57
5:A:1454:G:OP2	11:G:377:ARG:NH1	2.37	0.57
4:4:302:VAL:HG11	4:4:341:CYS:HB3	1.86	0.57
26:V:190:LEU:HD11	26:V:208:LEU:HD11	1.86	0.57
2:1:169:ARG:O	2:1:218:ASN:ND2	2.37	0.57
26:V:36:ASP:OD1	26:V:38:HIS:ND1	2.37	0.57
28:X:319:PRO:HG2	28:X:322:ALA:HB2	1.85	0.57
32:b:208:ALA:O	32:b:212:ASN:ND2	2.38	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:1383:A:H2'	10:F:198:ARG:HD2	1.87	0.56
1:0:135:MET:SD	1:0:135:MET:N	2.76	0.56
4:4:343:ARG:HD3	4:4:377:ARG:HB3	1.87	0.56
26:V:90:TYR:O	26:V:93:TYR:HB3	2.05	0.56
22:R:229:ASN:OD1	22:R:267:TYR:OH	2.19	0.56
26:V:173:PHE:O	26:V:179:GLN:NE2	2.37	0.56
10:F:79:ALA:O	11:G:312:GLN:NE2	2.38	0.56
5:A:1340:C:O2'	30:Z:101:ARG:NH2	2.38	0.56
1:0:42:THR:HG22	1:0:49:ARG:HG2	1.87	0.56
8:D:225:VAL:HG22	8:D:243:VAL:HG22	1.86	0.56
15:K:52:LEU:HD22	30:Z:41:PRO:HG3	1.87	0.56
5:A:1044:U:OP1	5:A:1110:A:O2'	2.24	0.56
5:A:1211:G:N2	5:A:1353:A:OP1	2.39	0.56
7:C:111:LYS:NZ	12:H:166:GLU:OE2	2.31	0.56
21:Q:28:ARG:NH1	31:a:123:GLU:OE2	2.39	0.56
1:0:93:CYS:SG	1:0:121:LYS:N	2.73	0.56
5:A:1079:G:H2'	5:A:1080:A:C8	2.40	0.56
22:R:207:PRO:HB2	22:R:209:ILE:HG22	1.87	0.56
5:A:1543:U:H2'	5:A:1544:A:H8	1.70	0.55
14:J:62:VAL:HA	14:J:83:VAL:HG12	1.86	0.55
22:R:70:PHE:O	22:R:76:GLN:NE2	2.36	0.55
11:G:312:GLN:OE1	11:G:345:ARG:NH1	2.39	0.55
2:1:107:LYS:NZ	7:C:54:GLU:OE1	2.40	0.55
31:a:129:LEU:HD11	31:a:177:PRO:HG2	1.89	0.55
4:4:370:ALA:N	4:4:412:ASP:OD1	2.32	0.55
19:O:105:CYS:HB2	19:O:142:VAL:HA	1.89	0.55
7:C:49:LYS:N	7:C:167:LEU:OXT	2.40	0.54
5:A:1503:G:O6	5:A:1547:U:C2	2.60	0.54
26:V:270:PRO:O	26:V:346:LYS:NZ	2.40	0.54
26:V:81:SER:N	26:V:84:GLU:OE1	2.39	0.54
29:Y:266:LYS:NZ	29:Y:270:GLU:OE2	2.33	0.54
30:Z:16:ALA:HB1	30:Z:21:GLU:HB2	1.88	0.54
5:A:1271:C:O2'	5:A:1272:A:OP1	2.22	0.54
28:X:272:THR:OG1	28:X:282:ILE:O	2.23	0.54
28:X:364:ASN:O	28:X:367:GLN:NE2	2.34	0.54
4:4:439:LEU:HD21	4:4:448:ILE:HD12	1.90	0.54
5:A:1017:A:O2'	20:P:108:THR:OG1	2.21	0.54
5:A:899:G:O2'	5:A:907:A:N1	2.40	0.54
5:A:1481:C:O4'	31:a:281:ARG:NH1	2.40	0.54
5:A:1595:G:O6	21:Q:50:ARG:NH1	2.34	0.54
24:T:42:GLU:OE1	24:T:45:ARG:NH2	2.37	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
32:b:83:CYS:HG	32:b:379:HIS:HE2	1.52	0.54
1:0:207:GLN:O	1:0:207:GLN:NE2	2.41	0.53
4:4:282:LEU:HG	4:4:287:LEU:HB2	1.91	0.53
5:A:700:A:N1	5:A:709:G:O2'	2.39	0.53
5:A:1279:C:O2'	5:A:1296:A:N1	2.41	0.53
5:A:760:A:N1	5:A:780:C:O2'	2.40	0.53
6:B:162:CYS:HB3	6:B:254:GLN:HG3	1.91	0.53
27:W:141:ARG:NH1	27:W:172:ILE:O	2.41	0.53
8:D:372:GLU:OE2	8:D:374:ARG:NE	2.40	0.53
5:A:1004:G:OP1	13:I:89:LYS:NZ	2.37	0.53
1:0:102:PRO:HA	1:0:112:GLY:HA3	1.90	0.53
18:N:14:VAL:O	24:T:63:GLN:NE2	2.38	0.53
5:A:713:C:N3	25:U:27:ARG:N	2.57	0.53
15:K:54:ILE:HG21	15:K:75:ILE:HB	1.91	0.53
4:4:400:LEU:HD22	4:4:405:PHE:HE1	1.74	0.52
4:4:631:VAL:HG22	4:4:645:LEU:HB3	1.90	0.52
8:D:426:LYS:N	19:O:88:GLN:OE1	2.42	0.52
32:b:307:GLN:O	32:b:406:LYS:NZ	2.36	0.52
4:4:236:VAL:HA	4:4:270:ARG:HB2	1.90	0.52
5:A:769:G:N2	5:A:772:A:OP2	2.38	0.52
5:A:1162:A:N3	5:A:1497:C:O2'	2.41	0.52
22:R:254:ASP:OD1	22:R:259:TYR:OH	2.27	0.52
28:X:252:SER:O	28:X:302:HIS:NE2	2.42	0.52
31:a:196:LEU:O	31:a:200:ALA:N	2.42	0.52
5:A:762:G:OP1	16:L:206:LYS:NZ	2.38	0.52
11:G:292:ARG:NH2	11:G:327:ASP:OD2	2.43	0.52
26:V:40:TRP:CD2	26:V:114:ARG:HG2	2.45	0.52
9:E:54:HIS:NE2	9:E:85:ASP:O	2.43	0.52
4:4:451:ASP:OD1	4:4:454:ARG:NH2	2.36	0.52
5:A:1046:A:O2'	5:A:1048:C:OP2	2.19	0.52
28:X:210:TRP:HH2	28:X:225:VAL:HG13	1.74	0.52
2:1:152:ASP:OD2	2:1:174:ARG:NH1	2.33	0.52
11:G:70:THR:HG23	11:G:73:PHE:H	1.75	0.52
32:b:229:GLU:OE1	32:b:230:LYS:N	2.43	0.52
4:4:358:ARG:HB3	29:Y:255:ARG:HG2	1.92	0.51
5:A:1239:C:H2'	5:A:1240:A:C8	2.46	0.51
10:F:237:ALA:HB3	31:a:190:LEU:HD13	1.92	0.51
12:H:71:ILE:O	12:H:150:GLY:N	2.42	0.51
13:I:136:ALA:HB3	13:I:168:GLY:HA3	1.91	0.51
11:G:285:VAL:HG22	11:G:328:VAL:HG22	1.92	0.51
28:X:67:HIS:HB3	28:X:98:CYS:HB3	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
31:a:110:THR:OG1	31:a:112:GLU:OE1	2.28	0.51
4:4:573:ALA:O	4:4:577:ASN:ND2	2.43	0.51
21:Q:77:ARG:NH2	27:W:166:ASN:OD1	2.44	0.51
23:S:63:ILE:HD13	27:W:84:LEU:HD21	1.91	0.51
26:V:156:ASN:ND2	26:V:159:ASP:OD2	2.43	0.51
5:A:1057:G:H4'	5:A:1578:A:H4'	1.92	0.51
5:A:1398:U:OP1	30:Z:29:LYS:NZ	2.35	0.51
6:B:165:TYR:HE2	11:G:146:PRO:HD2	1.76	0.51
20:P:57:PRO:HG3	23:S:68:ASP:HB3	1.93	0.51
4:4:154:GLU:OE2	4:4:184:SER:N	2.34	0.51
4:4:308:LYS:HE3	4:4:310:GLU:HB3	1.93	0.51
5:A:1014:A:O3'	13:I:184:ASN:ND2	2.44	0.51
9:E:31:ASP:OD1	25:U:170:ARG:NH2	2.31	0.51
22:R:294:ILE:HG13	22:R:349:TYR:CZ	2.46	0.51
25:U:77:GLU:OE1	25:U:80:ARG:NH2	2.33	0.51
8:D:148:LEU:HD23	8:D:149:MET:HE2	1.92	0.51
11:G:198:ARG:N	11:G:246:ARG:O	2.36	0.51
1:0:91:GLU:OE1	1:0:91:GLU:N	2.42	0.51
7:C:40:ALA:HB3	7:C:59:PRO:HG3	1.92	0.51
8:D:380:LEU:HD12	8:D:381:PRO:HD2	1.92	0.51
11:G:281:ALA:HB2	11:G:332:VAL:HG23	1.93	0.51
5:A:752:C:O2'	5:A:793:C:N4	2.42	0.50
5:A:1387:A:H61	5:A:1419:G:H1	1.59	0.50
26:V:43:ARG:NH2	26:V:77:ASP:OD1	2.44	0.50
5:A:1237:A:OP1	15:K:36:ARG:NH2	2.44	0.50
7:C:152:ARG:HG3	29:Y:304:TRP:HH2	1.76	0.50
16:L:175:TYR:HB2	18:N:89:GLY:HA3	1.93	0.50
4:4:260:CYS:SG	4:4:293:THR:OG1	2.69	0.50
5:A:1547:U:O2'	5:A:1548:A:O5'	2.29	0.50
19:O:91:ARG:NH1	19:O:103:ASN:O	2.42	0.50
26:V:197:SER:OG	26:V:199:GLU:OE1	2.29	0.50
2:1:155:ASP:OD1	2:1:215:ARG:NH1	2.44	0.50
5:A:845:A:OP1	25:U:64:ARG:NH2	2.43	0.50
23:S:99:PHE:HA	23:S:125:LEU:HD11	1.92	0.50
28:X:129:GLU:O	28:X:134:LYS:NZ	2.45	0.50
4:4:245:GLU:HG2	4:4:262:MET:HE1	1.94	0.50
22:R:224:HIS:NE2	22:R:252:ASP:OD2	2.33	0.50
24:T:44:ALA:O	24:T:47:PHE:HB3	2.12	0.50
5:A:741:A:OP1	25:U:86:ARG:NH2	2.38	0.50
5:A:992:U:O2'	5:A:994:A:N7	2.35	0.50
5:A:1402:A:OP1	15:K:51:ARG:NH2	2.40	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:B:197:HIS:NE2	6:B:240:ASP:O	2.42	0.50
5:A:1265:C:OP1	15:K:112:ARG:NH2	2.44	0.50
6:B:167:HIS:CD2	11:G:153:THR:HA	2.46	0.50
1:0:41:LEU:HD13	1:0:55:TRP:CG	2.47	0.49
9:E:102:LEU:HD11	20:P:71:HIS:HB2	1.94	0.49
11:G:291:GLY:HA3	11:G:324:GLY:HA2	1.94	0.49
16:L:92:LEU:HD13	25:U:160:LEU:HD11	1.94	0.49
23:S:85:PHE:HB2	27:W:100:VAL:HG12	1.93	0.49
5:A:1205:U:H2'	5:A:1206:G:H8	1.77	0.49
5:A:1282:G:N2	5:A:1286:A:OP2	2.34	0.49
5:A:1497:C:H2'	5:A:1498:C:C6	2.48	0.49
22:R:209:ILE:HD11	22:R:218:MET:HG3	1.95	0.49
1:0:178:ARG:NH1	1:0:187:GLU:O	2.43	0.49
5:A:1089:U:H2'	5:A:1090:A:H8	1.78	0.49
5:A:1567:A:H5'	5:A:1569:G:N7	2.27	0.49
28:X:203:LYS:O	28:X:250:GLN:NE2	2.45	0.49
21:Q:83:PRO:HG2	21:Q:84:TRP:CD1	2.48	0.49
32:b:321:PHE:N	32:b:325:GLU:OE2	2.44	0.49
8:D:141:TRP:CD1	30:Z:70:LEU:HD21	2.48	0.49
25:U:160:LEU:O	25:U:164:VAL:HG23	2.13	0.49
26:V:226:TYR:HE1	26:V:282:VAL:HG21	1.77	0.49
5:A:1452:U:OP2	11:G:380:LYS:NZ	2.37	0.49
5:A:1488:C:H2'	5:A:1489:G:C8	2.48	0.49
5:A:738:A:H2'	5:A:740:G:C5	2.47	0.49
12:H:181:PRO:HD2	12:H:184:ILE:HD12	1.95	0.49
22:R:162:SER:O	22:R:170:ARG:NH1	2.35	0.49
1:0:43:ARG:NE	5:A:706:C:OP1	2.35	0.48
22:R:155:LYS:HB3	22:R:177:PRO:HD3	1.94	0.48
32:b:75:VAL:HG21	32:b:396:GLY:HA3	1.95	0.48
5:A:1376:C:H4'	5:A:1377:C:H5'	1.95	0.48
21:Q:28:ARG:HH22	31:a:121:ASN:HD21	1.61	0.48
28:X:349:ASN:ND2	28:X:352:GLU:OE1	2.46	0.48
4:4:318:GLU:OE2	4:4:322:HIS:NE2	2.46	0.48
4:4:197:TYR:CZ	29:Y:281:GLU:HG3	2.49	0.48
5:A:1104:A:OP1	5:A:1591:C:O2'	2.28	0.48
17:M:67:ALA:HB2	22:R:196:TYR:CZ	2.48	0.48
5:A:900:C:N4	14:J:74:ASN:OD1	2.34	0.48
5:A:702:C:OP1	5:A:848:U:O2'	2.30	0.48
5:A:993:A:H1'	32:b:353:THR:HG21	1.95	0.48
6:B:165:TYR:OH	11:G:146:PRO:O	2.27	0.48
32:b:322:HIS:CE1	32:b:325:GLU:H	2.32	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:0:43:ARG:NH2	5:A:705:C:O2'	2.47	0.48
5:A:769:G:OP2	18:N:73:ARG:NH2	2.47	0.48
5:A:1431:G:O2'	5:A:1457:G:O6	2.27	0.48
11:G:275:LYS:HG2	11:G:280:LYS:HG3	1.96	0.48
14:J:127:ARG:NE	14:J:132:CYS:SG	2.87	0.48
32:b:83:CYS:SG	32:b:379:HIS:NE2	2.80	0.48
3:3:139:ASN:ND2	5:A:1141:C:OP1	2.34	0.48
5:A:743:C:O2'	17:M:38:HIS:NE2	2.45	0.48
5:A:1426:U:H2'	5:A:1427:A:H8	1.78	0.48
28:X:276:ARG:NH1	28:X:281:PRO:O	2.46	0.48
2:1:151:ILE:HD11	2:1:173:LEU:HD12	1.95	0.48
4:4:548:PHE:HB3	4:4:582:LEU:HD22	1.96	0.48
5:A:1542:U:H2'	5:A:1543:U:C6	2.48	0.48
5:A:1577:U:H2'	5:A:1578:A:C8	2.49	0.48
6:B:172:ARG:O	6:B:175:MET:HG2	2.14	0.48
13:I:98:GLN:HB2	13:I:109:PHE:HD1	1.79	0.48
22:R:168:ARG:NH1	22:R:238:ASP:OD2	2.35	0.48
22:R:336:ALA:HB1	22:R:342:ILE:HD12	1.96	0.48
18:N:8:VAL:HB	18:N:68:ALA:HB1	1.96	0.47
22:R:161:ILE:O	24:T:125:HIS:NE2	2.43	0.47
5:A:713:C:O2'	5:A:852:A:O2'	2.25	0.47
32:b:86:PRO:HB3	32:b:113:ILE:HD12	1.95	0.47
4:4:256:GLU:HG2	4:4:287:LEU:HB3	1.96	0.47
22:R:231:CYS:SG	22:R:242:TYR:HA	2.54	0.47
31:a:239:ILE:HD13	32:b:226:TYR:HE2	1.79	0.47
6:B:239:ASN:HD21	27:W:119:LYS:HG3	1.79	0.47
26:V:212:GLY:O	26:V:224:GLN:NE2	2.43	0.47
4:4:281:GLU:O	4:4:285:ASN:ND2	2.40	0.47
12:H:104:ILE:HG21	12:H:145:LEU:HD23	1.95	0.47
20:P:124:TYR:HB3	21:Q:9:ALA:HB2	1.95	0.47
7:C:88:GLU:HG2	7:C:147:TYR:CE1	2.49	0.47
1:0:37:ASP:O	1:0:41:LEU:N	2.45	0.47
2:1:65:ASP:OD2	2:1:68:SER:OG	2.27	0.47
4:4:161:ILE:HA	4:4:194:LEU:HD22	1.96	0.47
6:B:165:TYR:CD1	11:G:149:TYR:HA	2.50	0.47
15:K:120:LEU:HB3	15:K:123:ILE:HD12	1.97	0.47
24:T:48:VAL:HA	24:T:52:ILE:HG12	1.95	0.47
24:T:80:LEU:HD12	24:T:84:GLU:HB2	1.95	0.47
3:3:174:ARG:HA	3:3:177:TRP:CE2	2.49	0.47
5:A:1366:C:H3'	5:A:1367:A:H5'	1.96	0.47
8:D:132:ILE:HG22	8:D:144:LEU:HD21	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:4:336:ASN:ND2	4:4:409:ASP:OD2	2.48	0.47
5:A:845:A:H4'	25:U:60:TYR:CE2	2.50	0.47
6:B:66:PRO:HB2	6:B:134:HIS:HE1	1.79	0.47
21:Q:28:ARG:HH22	31:a:121:ASN:ND2	2.13	0.47
5:A:957:C:H3'	5:A:958:C:H2'	1.97	0.47
15:K:34:MET:HE3	15:K:95:SER:HB2	1.97	0.47
28:X:163:LYS:NZ	28:X:314:GLY:O	2.44	0.47
1:0:163:SER:HB2	1:0:190:MET:HB3	1.96	0.46
5:A:948:U:OP2	5:A:1045:G:N1	2.48	0.46
5:A:1443:U:O2'	5:A:1445:G:N7	2.41	0.46
6:B:149:ARG:NH2	21:Q:82:ASP:OD1	2.35	0.46
2:1:86:ARG:NH1	2:1:96:PRO:O	2.43	0.46
6:B:141:ILE:HB	6:B:190:PRO:HA	1.97	0.46
11:G:318:HIS:NE2	28:X:379:GLU:OE2	2.49	0.46
12:H:70:ASP:OD1	12:H:71:ILE:N	2.48	0.46
4:4:626:GLN:O	4:4:630:VAL:HG23	2.15	0.46
5:A:663:A:H2'	5:A:664:G:C8	2.49	0.46
2:1:114:LEU:O	11:G:110:TYR:OH	2.22	0.46
2:1:266:LEU:HD11	2:1:289:ILE:HD11	1.97	0.46
5:A:1000:U:H5"	5:A:1001:C:H5'	1.98	0.46
6:B:118:LEU:HA	6:B:121:THR:HB	1.97	0.46
6:B:146:SER:OG	6:B:197:HIS:ND1	2.37	0.46
12:H:57:ASP:OD1	12:H:58:LEU:N	2.48	0.46
27:W:152:ARG:NE	27:W:159:ASP:OD1	2.39	0.46
28:X:162:VAL:HB	28:X:272:THR:HG22	1.97	0.46
31:a:183:GLN:HG2	31:a:185:LYS:HG3	1.97	0.46
6:B:124:HIS:CE1	23:S:41:LEU:HD12	2.51	0.46
6:B:230:CYS:SG	6:B:231:LEU:N	2.89	0.46
14:J:109:LEU:HD13	14:J:130:TYR:HE2	1.80	0.46
32:b:96:THR:HG21	32:b:169:ASP:O	2.16	0.46
4:4:446:LYS:HA	29:Y:292:GLN:HG3	1.98	0.46
5:A:732:A:O2'	17:M:15:GLY:O	2.30	0.46
26:V:149:ASP:HA	26:V:152:ILE:HB	1.98	0.46
6:B:66:PRO:HB2	6:B:134:HIS:CE1	2.50	0.46
6:B:165:TYR:CE2	11:G:146:PRO:HD2	2.51	0.46
23:S:106:LEU:HB3	23:S:117:LEU:HD11	1.98	0.46
24:T:75:PHE:HA	24:T:90:VAL:HG22	1.97	0.46
5:A:1225:C:H5	5:A:1361:G:H21	1.64	0.46
26:V:250:ILE:HG23	26:V:252:LYS:H	1.81	0.46
32:b:383:LEU:HD12	32:b:401:LEU:HD22	1.97	0.46
4:4:400:LEU:HD22	4:4:405:PHE:CE1	2.51	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:1035:U:OP1	9:E:4:TYR:OH	2.31	0.46
7:C:92:LEU:HD22	7:C:119:ILE:HD11	1.98	0.46
28:X:210:TRP:CE2	28:X:228:GLN:HG2	2.51	0.45
1:0:29:ARG:HE	1:0:105:THR:HG21	1.81	0.45
4:4:309:PHE:CZ	4:4:352:PRO:HG2	2.52	0.45
4:4:567:THR:HG22	4:4:568:ALA:H	1.82	0.45
5:A:1210:U:H1'	5:A:1356:A:H62	1.82	0.45
19:O:127:VAL:HG22	19:O:134:ILE:HG12	1.98	0.45
28:X:273:THR:HG23	28:X:316:LEU:HD13	1.98	0.45
2:1:312:TYR:OH	28:X:338:ASP:OD1	2.21	0.45
15:K:64:PRO:HG3	29:Y:392:ILE:HD12	1.99	0.45
16:L:143:LEU:HD11	16:L:153:LYS:HA	1.97	0.45
32:b:214:LEU:O	32:b:243:ARG:NH1	2.46	0.45
4:4:373:HIS:HB2	4:4:415:PHE:HA	1.98	0.45
4:4:450:PRO:HD2	4:4:453:HIS:ND1	2.31	0.45
5:A:942:A:C6	5:A:1047:A:H5'	2.52	0.45
5:A:1368:U:O4	5:A:1383:A:O2'	2.28	0.45
7:C:42:VAL:HG11	7:C:51:VAL:HG11	1.97	0.45
7:C:89:ASP:OD1	7:C:112:ARG:NH2	2.43	0.45
8:D:282:ILE:HG23	8:D:353:LEU:HB3	1.98	0.45
16:L:79:VAL:HG23	16:L:82:ILE:HB	1.99	0.45
26:V:58:ASP:OD2	26:V:91:TYR:OH	2.21	0.45
4:4:272:TYR:CD1	4:4:300:ALA:HA	2.51	0.45
7:C:92:LEU:HD11	7:C:117:LEU:HD21	1.99	0.45
9:E:44:GLU:OE2	9:E:60:ARG:NE	2.43	0.45
11:G:88:LEU:HD21	11:G:107:ALA:HB3	1.98	0.45
13:I:94:ASN:OD1	13:I:95:THR:N	2.47	0.45
27:W:110:ASN:O	27:W:126:ARG:N	2.47	0.45
5:A:1089:U:H2'	5:A:1090:A:C8	2.52	0.45
7:C:96:MET:HB2	7:C:108:LEU:HD11	1.99	0.45
11:G:197:SER:HB2	11:G:245:ARG:HB3	1.99	0.45
22:R:282:ASP:HB3	22:R:342:ILE:HD11	1.99	0.45
29:Y:323:ASP:OD1	29:Y:323:ASP:N	2.50	0.45
4:4:372:TYR:CD2	4:4:400:LEU:HD11	2.51	0.45
5:A:1545:U:H2'	5:A:1546:A:C8	2.51	0.45
8:D:285:TYR:OH	8:D:372:GLU:OE1	2.24	0.45
10:F:116:GLU:OE2	10:F:120:ARG:NH2	2.46	0.45
26:V:30:LEU:HD13	26:V:34:TYR:CD1	2.51	0.45
26:V:95:PHE:O	26:V:98:SER:OG	2.33	0.45
27:W:162:VAL:HG23	27:W:164:GLU:HG2	1.98	0.45
28:X:206:GLU:OE2	28:X:249:ARG:NH1	2.50	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
29:Y:316:ASN:HB3	29:Y:319:ALA:HB2	1.98	0.45
4:4:531:ILE:HG22	4:4:535:MET:HE2	1.99	0.45
5:A:1279:C:O2'	6:B:177:THR:OG1	2.28	0.45
8:D:285:TYR:N	8:D:289:THR:O	2.47	0.45
17:M:100:HIS:H	17:M:103:MET:HE3	1.81	0.45
26:V:40:TRP:O	26:V:43:ARG:NH1	2.38	0.45
28:X:268:LEU:HD21	28:X:293:LEU:HD23	1.98	0.45
5:A:1307:G:O2'	11:G:118:GLU:OE1	2.35	0.45
10:F:170:VAL:HG21	10:F:239:TYR:HB2	1.98	0.45
11:G:196:GLY:HA2	11:G:248:VAL:HG12	1.98	0.45
2:1:49:ARG:HH22	7:C:126:GLN:HA	1.81	0.45
2:1:159:SER:HB2	7:C:112:ARG:HB3	1.98	0.45
13:I:81:GLU:OE1	13:I:81:GLU:N	2.47	0.45
26:V:123:ASP:OD1	26:V:123:ASP:N	2.49	0.45
1:0:95:TRP:CE2	1:0:131:ILE:HG23	2.52	0.44
23:S:89:ASN:HB3	23:S:92:PHE:HB2	1.99	0.44
4:4:73:ALA:HB2	12:H:61:PRO:HG3	1.99	0.44
4:4:593:TRP:CH2	4:4:626:GLN:HB3	2.52	0.44
30:Z:4:LEU:HB3	30:Z:8:ALA:HB3	1.99	0.44
32:b:212:ASN:HA	32:b:243:ARG:HD2	1.99	0.44
3:3:173:LEU:HB3	16:L:209:LEU:HD22	1.98	0.44
5:A:1503:G:O6	5:A:1547:U:O2	2.35	0.44
6:B:239:ASN:ND2	27:W:119:LYS:HG3	2.33	0.44
8:D:243:VAL:HG11	8:D:268:PHE:CD1	2.52	0.44
9:E:37:ARG:HG3	25:U:167:PHE:CE1	2.52	0.44
17:M:64:LYS:HE3	22:R:154:THR:HB	1.98	0.44
28:X:56:PRO:HB2	28:X:144:PHE:HD1	1.82	0.44
28:X:211:ASN:ND2	28:X:214:GLU:OE1	2.51	0.44
5:A:931:C:H2'	14:J:42:PRO:HG2	2.00	0.44
32:b:322:HIS:CE1	32:b:324:LEU:HB2	2.53	0.44
4:4:345:PHE:HB3	4:4:348:PHE:HB2	1.99	0.44
7:C:77:ASP:OD2	12:H:114:LYS:HD3	2.17	0.44
8:D:296:LEU:HD11	8:D:348:GLY:O	2.18	0.44
10:F:84:SER:OG	28:X:379:GLU:OE1	2.31	0.44
22:R:142:LEU:HD21	22:R:183:LYS:HE3	1.99	0.44
26:V:128:THR:HB	26:V:137:ILE:HG13	1.99	0.44
26:V:205:GLY:HA2	26:V:227:GLY:HA2	1.99	0.44
31:a:138:ALA:O	31:a:182:VAL:N	2.43	0.44
5:A:1003:A:H2'	5:A:1004:G:C8	2.53	0.44
5:A:1225:C:O2'	5:A:1449:G:O2'	2.33	0.44
7:C:115:ASN:ND2	29:Y:309:LYS:O	2.50	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
16:L:112:MET:HE3	16:L:119:PRO:HA	2.00	0.44
5:A:1389:G:O6	5:A:1415:G:O2'	2.29	0.44
11:G:73:PHE:O	11:G:77:GLN:HG2	2.17	0.44
26:V:270:PRO:HD2	26:V:273:ILE:HD12	1.99	0.44
28:X:109:LEU:HD22	28:X:144:PHE:CD2	2.53	0.44
32:b:330:LYS:HB2	32:b:402:ARG:CZ	2.47	0.44
4:4:66:ASP:OD1	4:4:67:LYS:N	2.49	0.44
5:A:702:C:OP1	25:U:41:ARG:NH2	2.44	0.44
6:B:192:LEU:HD11	6:B:220:VAL:HG23	1.99	0.44
7:C:110:LEU:HD22	7:C:119:ILE:HG12	1.99	0.44
4:4:278:LEU:HD12	4:4:278:LEU:HA	1.86	0.43
4:4:405:PHE:HZ	4:4:438:LEU:HD21	1.82	0.43
5:A:890:C:H4'	5:A:891:C:H5"	1.99	0.43
19:O:91:ARG:HD2	19:O:94:CYS:SG	2.58	0.43
28:X:55:ASP:HB3	28:X:58:LYS:HB2	2.00	0.43
2:1:133:TRP:CD2	2:1:134:PRO:HD2	2.53	0.43
4:4:567:THR:HG22	4:4:568:ALA:N	2.33	0.43
8:D:235:GLU:OE1	8:D:235:GLU:N	2.48	0.43
28:X:159:HIS:ND1	28:X:267:ALA:HB2	2.33	0.43
32:b:74:PRO:HB2	32:b:77:VAL:HB	1.99	0.43
4:4:75:ALA:HB2	29:Y:298:PHE:HB3	2.01	0.43
5:A:1150:C:H2'	5:A:1152:A:C8	2.53	0.43
27:W:97:ASP:N	27:W:144:LEU:O	2.50	0.43
30:Z:61:LEU:O	30:Z:65:LEU:HG	2.18	0.43
32:b:270:ARG:HD2	32:b:280:ILE:HG13	2.00	0.43
32:b:334:LEU:HD21	32:b:377:LEU:HD11	1.99	0.43
5:A:738:A:H5'	5:A:739:C:O4'	2.17	0.43
5:A:1048:C:C4	35:A:1710:NAD:H52A	2.53	0.43
17:M:101:PRO:HB3	25:U:59:ARG:HB3	1.99	0.43
28:X:70:ILE:HB	28:X:97:ALA:HB3	2.00	0.43
4:4:267:VAL:HG22	4:4:300:ALA:HB2	2.01	0.43
19:O:55:PRO:HB3	19:O:114:HIS:HB2	2.00	0.43
22:R:191:ARG:HG3	22:R:204:ILE:HG23	2.01	0.43
26:V:241:ARG:HA	26:V:244:TYR:CE2	2.54	0.43
4:4:332:LEU:HD21	4:4:368:SER:HB3	2.01	0.43
5:A:993:A:OP1	13:I:192:ARG:NH1	2.45	0.43
5:A:845:A:H2'	5:A:846:A:C8	2.53	0.43
5:A:994:A:N1	5:A:1075:A:O2'	2.51	0.43
5:A:1422:G:H2'	5:A:1423:A:C8	2.54	0.43
6:B:222:ILE:HD13	6:B:236:VAL:HB	2.01	0.43
4:4:152:ILE:HA	4:4:172:MET:SD	2.58	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:875:U:O2'	5:A:882:A:N1	2.43	0.43
5:A:1119:U:H5'	23:S:50:ARG:HH12	1.83	0.43
28:X:192:LYS:HB2	28:X:226:VAL:HG11	2.01	0.43
31:a:125:SER:N	31:a:139:TYR:O	2.49	0.43
1:0:35:ALA:O	1:0:44:PRO:HD2	2.19	0.43
4:4:148:GLN:N	4:4:159:GLU:OE2	2.39	0.43
5:A:890:C:H2'	5:A:902:G:C8	2.54	0.43
26:V:177:SER:HB2	26:V:367:CYS:HB3	2.00	0.43
1:0:100:VAL:HG12	1:0:102:PRO:HD3	2.00	0.43
9:E:26:ILE:HD11	9:E:39:LEU:HD22	2.00	0.43
28:X:50:ARG:NE	28:X:362:GLU:OE2	2.52	0.43
28:X:109:LEU:HD21	28:X:141:VAL:HA	2.01	0.43
28:X:368:HIS:N	28:X:398:LEU:OXT	2.52	0.43
2:1:152:ASP:HB2	2:1:172:VAL:HB	2.00	0.42
5:A:743:C:HO2'	17:M:38:HIS:HE2	1.66	0.42
5:A:1195:U:H2'	5:A:1196:A:C8	2.54	0.42
23:S:117:LEU:HD12	23:S:117:LEU:HA	1.86	0.42
24:T:48:VAL:HA	24:T:52:ILE:CG1	2.49	0.42
27:W:150:THR:HG22	27:W:161:THR:HB	2.01	0.42
5:A:1180:U:H2'	5:A:1181:G:H8	1.84	0.42
5:A:1344:U:OP1	30:Z:101:ARG:NH1	2.52	0.42
27:W:104:ILE:HD12	27:W:138:THR:HB	2.01	0.42
5:A:1401:G:N2	5:A:1404:A:O5'	2.44	0.42
20:P:126:ASP:HB3	20:P:129:TYR:CD2	2.55	0.42
22:R:254:ASP:HB2	22:R:275:PHE:CZ	2.53	0.42
27:W:144:LEU:HD23	27:W:167:ALA:HB2	2.02	0.42
4:4:372:TYR:CE2	4:4:400:LEU:HD21	2.54	0.42
5:A:871:A:OP1	19:O:97:ARG:NH1	2.52	0.42
8:D:244:LEU:HD11	8:D:256:PHE:HD2	1.85	0.42
8:D:316:CYS:HB3	8:D:334:ALA:HB3	2.00	0.42
28:X:117:PHE:HB3	28:X:303:GLY:HA2	2.01	0.42
32:b:177:LEU:HD23	32:b:395:ARG:NH1	2.33	0.42
5:A:1142:A:N1	5:A:1160:A:H5"	2.34	0.42
5:A:1271:C:HO2'	5:A:1272:A:P	2.42	0.42
5:A:1497:C:H2'	5:A:1498:C:H6	1.83	0.42
6:B:157:ASN:OD1	6:B:160:ARG:NH2	2.52	0.42
12:H:108:VAL:HG13	12:H:143:LEU:HD23	2.02	0.42
17:M:105:THR:OG1	25:U:56:LEU:HD13	2.19	0.42
20:P:65:CYS:SG	20:P:68:CYS:HB2	2.60	0.42
22:R:195:VAL:HG13	24:T:143:VAL:HG11	2.01	0.42
5:A:1341:C:OP1	30:Z:100:LYS:N	2.53	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:A:1377:C:H5"	28:X:320:ARG:HD3	2.02	0.42
8:D:209:GLY:N	8:D:213:GLU:O	2.33	0.42
9:E:17:GLU:OE1	9:E:17:GLU:N	2.51	0.42
28:X:153:LEU:HD21	28:X:244:LEU:HD23	2.01	0.42
40:b:501:SAH:H4'	40:b:501:SAH:HG1	1.56	0.42
7:C:58:ALA:HB3	7:C:60:HIS:CE1	2.55	0.42
11:G:229:LEU:HD11	11:G:241:VAL:HG11	2.01	0.42
4:4:266:MET:O	4:4:271:ALA:N	2.45	0.42
5:A:758:U:O4	5:A:1159:A:H1'	2.19	0.42
5:A:1347:G:H2'	5:A:1348:G:H8	1.85	0.42
8:D:412:LYS:HG3	8:D:417:MET:HB2	2.02	0.42
11:G:200:LEU:HD22	11:G:244:PHE:HB3	2.01	0.42
2:1:304:GLU:HB3	28:X:324:LEU:HD13	2.02	0.42
5:A:1066:C:O2'	13:I:187:ARG:O	2.36	0.42
7:C:95:PHE:HD2	30:Z:62:MET:HE1	1.84	0.42
11:G:115:GLY:N	12:H:84:ASP:OD2	2.50	0.42
26:V:44:GLU:HB2	26:V:383:HIS:NE2	2.34	0.42
2:1:254:GLU:OE1	2:1:254:GLU:N	2.51	0.41
28:X:81:HIS:CD2	28:X:154:HIS:HD2	2.38	0.41
2:1:133:TRP:CE2	12:H:147:HIS:HB3	2.56	0.41
5:A:821:U:H2'	5:A:822:G:H8	1.85	0.41
5:A:955:A:H3'	5:A:956:C:H5"	2.02	0.41
5:A:1379:A:H2'	5:A:1380:G:C8	2.55	0.41
14:J:114:ARG:HA	14:J:122:LYS:HA	2.01	0.41
19:O:110:ASP:HB3	19:O:113:LEU:HD12	2.02	0.41
23:S:102:LYS:HB3	23:S:121:THR:HG23	2.02	0.41
31:a:130:THR:HG22	31:a:137:ARG:NH2	2.35	0.41
4:4:470:GLN:NE2	4:4:472:ASP:OD2	2.45	0.41
5:A:1322:C:H2'	5:A:1323:G:O4'	2.19	0.41
10:F:61:GLU:O	10:F:65:VAL:HG23	2.20	0.41
22:R:272:VAL:HG22	22:R:284:LEU:HD21	2.03	0.41
4:4:279:TYR:HB2	4:4:297:LEU:HD21	2.01	0.41
4:4:376:ILE:HG23	4:4:422:ILE:HD12	2.02	0.41
5:A:1003:A:H2'	5:A:1004:G:H8	1.86	0.41
5:A:1053:A:N1	5:A:1100:C:O2'	2.38	0.41
5:A:1103:A:N7	5:A:1574:G:O2'	2.46	0.41
2:1:284:LEU:HA	2:1:289:ILE:HG21	2.03	0.41
5:A:1266:A:OP2	7:C:36:LYS:N	2.54	0.41
5:A:1430:A:N1	5:A:1458:A:H5"	2.35	0.41
8:D:241:ILE:HG21	8:D:264:ARG:HG3	2.02	0.41
8:D:254:ALA:O	8:D:280:HIS:N	2.53	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:I:175:ILE:HD11	21:Q:19:VAL:HG13	2.01	0.41
2:1:237:GLU:HB2	2:1:240:GLU:HG3	2.01	0.41
5:A:965:C:C4	5:A:1022:A:H4'	2.56	0.41
5:A:1426:U:H2'	5:A:1427:A:C8	2.56	0.41
5:A:1541:U:H2'	5:A:1542:U:C2	2.55	0.41
16:L:115:ILE:HD11	16:L:184:GLY:HA3	2.02	0.41
18:N:51:ALA:HB2	18:N:66:LEU:HD13	2.02	0.41
28:X:61:ASP:HA	28:X:64:GLU:HB2	2.02	0.41
4:4:128:PHE:HB2	4:4:142:PRO:HG3	2.02	0.41
5:A:845:A:P	25:U:64:ARG:HH22	2.43	0.41
5:A:881:A:H1'	19:O:80:ASN:HB3	2.03	0.41
5:A:904:C:H42	8:D:117:ARG:HA	1.84	0.41
5:A:1295:A:C5	6:B:202:ILE:HG21	2.55	0.41
8:D:160:ARG:HB3	8:D:164:GLU:HG3	2.02	0.41
18:N:17:VAL:HG22	18:N:28:VAL:HG22	2.02	0.41
19:O:74:TRP:CD2	19:O:140:THR:HG22	2.55	0.41
1:0:90:ASP:CG	19:O:215:ARG:HH22	2.29	0.41
2:1:129:PHE:HB3	12:H:155:VAL:HG21	2.02	0.41
4:4:376:ILE:HG23	4:4:422:ILE:CD1	2.51	0.41
10:F:88:ASP:HB3	10:F:91:ILE:HB	2.01	0.41
17:M:108:GLU:OE2	25:U:59:ARG:NH2	2.36	0.41
17:M:111:ARG:NH2	22:R:146:LYS:O	2.53	0.41
20:P:49:ASP:HA	27:W:85:ARG:HH11	1.85	0.41
20:P:73:ASP:OD1	20:P:74:TYR:N	2.54	0.41
28:X:269:TRP:HA	28:X:294:ARG:HH21	1.86	0.41
32:b:76:MET:HE2	32:b:79:GLU:HG3	2.03	0.41
32:b:85:SER:HB2	32:b:315:ARG:HH12	1.84	0.41
4:4:299:GLU:HA	4:4:341:CYS:SG	2.61	0.41
5:A:672:A:H2'	5:A:673:U:C6	2.56	0.41
5:A:768:A:H4'	18:N:24:LYS:HB2	2.02	0.41
5:A:1471:A:H2'	5:A:1472:G:C8	2.56	0.41
7:C:38:ARG:HD2	7:C:43:ARG:NH1	2.35	0.41
7:C:115:ASN:O	7:C:149:CYS:HB2	2.21	0.41
12:H:91:TYR:OH	12:H:160:ILE:O	2.28	0.41
17:M:89:LYS:HA	17:M:103:MET:HE2	2.03	0.41
19:O:202:TRP:CD1	19:O:202:TRP:H	2.38	0.41
28:X:132:THR:HA	28:X:388:PRO:HD2	2.03	0.41
29:Y:286:LEU:O	29:Y:289:VAL:HG22	2.21	0.41
30:Z:58:TYR:O	30:Z:62:MET:HG2	2.21	0.41
31:a:111:PRO:HA	31:a:118:TYR:HB2	2.03	0.41
4:4:369:LEU:HD22	4:4:415:PHE:CD2	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:4:470:GLN:HG2	4:4:472:ASP:H	1.86	0.41
5:A:867:C:H1'	5:A:870:C:H41	1.85	0.41
12:H:113:ARG:HB3	12:H:139:LEU:HD23	2.02	0.41
16:L:112:MET:O	16:L:116:VAL:HG22	2.20	0.41
1:0:11:ILE:HB	5:A:806:C:C2	2.56	0.40
8:D:412:LYS:HE3	8:D:418:LYS:HD3	2.02	0.40
2:1:231:HIS:O	12:H:189:TRP:NE1	2.54	0.40
4:4:108:LEU:HD22	8:D:154:VAL:HG21	2.03	0.40
4:4:188:THR:HB	4:4:251:MET:HE3	2.02	0.40
5:A:1007:G:H2'	5:A:1008:A:C8	2.57	0.40
5:A:1221:A:OP1	5:A:1223:C:H5'	2.20	0.40
6:B:167:HIS:HE1	6:B:171:PHE:HA	1.85	0.40
5:A:845:A:H4'	25:U:60:TYR:CZ	2.56	0.40
5:A:1452:U:H2'	5:A:1453:A:C8	2.55	0.40
17:M:52:GLY:HA3	17:M:67:ALA:O	2.21	0.40
4:4:388:ARG:O	4:4:392:ILE:HG12	2.22	0.40
5:A:740:G:H2'	5:A:741:A:H8	1.86	0.40
5:A:1124:A:N6	5:A:1127:A:OP1	2.53	0.40
22:R:279:LYS:HA	22:R:304:TYR:HE2	1.87	0.40
32:b:229:GLU:OE2	32:b:270:ARG:NH1	2.41	0.40
2:1:86:ARG:HB3	2:1:96:PRO:HB2	2.02	0.40
4:4:197:TYR:CE2	29:Y:281:GLU:HG3	2.57	0.40
4:4:346:HIS:HA	4:4:378:LEU:HD12	2.04	0.40
4:4:359:GLU:OE1	29:Y:257:ASN:N	2.47	0.40
4:4:360:MET:HE1	4:4:371:THR:HG21	2.03	0.40
5:A:894:C:H41	14:J:78:ARG:NH2	2.14	0.40
5:A:1374:A:H2'	5:A:1375:C:O4'	2.22	0.40
8:D:306:LYS:HB2	8:D:333:TYR:HB3	2.04	0.40
17:M:78:GLY:O	25:U:75:VAL:HG22	2.20	0.40
22:R:218:MET:SD	22:R:223:ARG:NH1	2.95	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	0	213/218 (98%)	211 (99%)	2 (1%)	0	100	100
2	1	276/323 (85%)	271 (98%)	5 (2%)	0	100	100
3	3	69/199 (35%)	68 (99%)	1 (1%)	0	100	100
4	4	586/689 (85%)	574 (98%)	12 (2%)	0	100	100
6	B	223/296 (75%)	219 (98%)	4 (2%)	0	100	100
7	C	130/167 (78%)	128 (98%)	2 (2%)	0	100	100
8	D	341/430 (79%)	334 (98%)	7 (2%)	0	100	100
9	E	116/125 (93%)	114 (98%)	2 (2%)	0	100	100
10	F	191/242 (79%)	190 (100%)	1 (0%)	0	100	100
11	G	298/396 (75%)	290 (97%)	8 (3%)	0	100	100
12	H	138/201 (69%)	135 (98%)	2 (1%)	1 (1%)	19	54
13	I	135/194 (70%)	132 (98%)	3 (2%)	0	100	100
14	J	106/138 (77%)	100 (94%)	6 (6%)	0	100	100
15	K	99/128 (77%)	99 (100%)	0	0	100	100
16	L	172/257 (67%)	170 (99%)	2 (1%)	0	100	100
17	M	117/137 (85%)	116 (99%)	1 (1%)	0	100	100
18	N	108/130 (83%)	105 (97%)	3 (3%)	0	100	100
19	O	191/258 (74%)	188 (98%)	3 (2%)	0	100	100
20	P	95/142 (67%)	93 (98%)	2 (2%)	0	100	100
21	Q	83/87 (95%)	83 (100%)	0	0	100	100
22	R	293/360 (81%)	284 (97%)	9 (3%)	0	100	100
23	S	133/190 (70%)	130 (98%)	3 (2%)	0	100	100
24	T	166/173 (96%)	163 (98%)	3 (2%)	0	100	100
25	U	174/205 (85%)	173 (99%)	1 (1%)	0	100	100
26	V	358/414 (86%)	352 (98%)	6 (2%)	0	100	100
27	W	98/187 (52%)	97 (99%)	1 (1%)	0	100	100
28	X	350/398 (88%)	341 (97%)	9 (3%)	0	100	100
29	Y	147/395 (37%)	142 (97%)	5 (3%)	0	100	100
30	Z	98/106 (92%)	97 (99%)	1 (1%)	0	100	100
31	a	138/343 (40%)	137 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
32	b	322/407 (79%)	317 (98%)	5 (2%)	0	100	100
All	All	5964/7935 (75%)	5853 (98%)	110 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
12	H	126	ILE

5.3.2　Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	0	188/190 (99%)	188 (100%)	0	100	100
2	1	256/291 (88%)	256 (100%)	0	100	100
3	3	65/166 (39%)	65 (100%)	0	100	100
4	4	527/609 (86%)	527 (100%)	0	100	100
6	B	198/249 (80%)	198 (100%)	0	100	100
7	C	115/143 (80%)	115 (100%)	0	100	100
8	D	286/357 (80%)	286 (100%)	0	100	100
9	E	100/107 (94%)	100 (100%)	0	100	100
10	F	174/209 (83%)	174 (100%)	0	100	100
11	G	263/342 (77%)	263 (100%)	0	100	100
12	H	130/180 (72%)	130 (100%)	0	100	100
13	I	105/147 (71%)	105 (100%)	0	100	100
14	J	93/118 (79%)	93 (100%)	0	100	100
15	K	91/113 (80%)	91 (100%)	0	100	100
16	L	158/226 (70%)	158 (100%)	0	100	100
17	M	97/113 (86%)	97 (100%)	0	100	100
18	N	96/115 (84%)	96 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
19	O	174/230 (76%)	174 (100%)	0	100	100
20	P	88/123 (72%)	88 (100%)	0	100	100
21	Q	78/79 (99%)	78 (100%)	0	100	100
22	R	264/318 (83%)	264 (100%)	0	100	100
23	S	116/164 (71%)	116 (100%)	0	100	100
24	T	153/157 (98%)	153 (100%)	0	100	100
25	U	152/174 (87%)	152 (100%)	0	100	100
26	V	325/364 (89%)	325 (100%)	0	100	100
27	W	87/158 (55%)	87 (100%)	0	100	100
28	X	311/351 (89%)	311 (100%)	0	100	100
29	Y	137/357 (38%)	137 (100%)	0	100	100
30	Z	90/95 (95%)	90 (100%)	0	100	100
31	a	127/288 (44%)	127 (100%)	0	100	100
32	b	275/350 (79%)	274 (100%)	1 (0%)	89	95
All	All	5319/6883 (77%)	5318 (100%)	1 (0%)	100	100

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
32	b	294	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	0	207	GLN
4	4	545	GLN
6	B	74	ASN
6	B	167	HIS
6	B	201	ASN
7	C	60	HIS
8	D	175	GLN
9	E	59	ASN
10	F	147	GLN
10	F	207	HIS
11	G	288	HIS
19	O	204	ASN

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Mol	Chain	Res	Type
20	P	71	HIS
20	P	78	GLN
21	Q	53	GLN
22	R	139	ASN
22	R	278	ASN
25	U	43	ASN
25	U	147	GLN
27	W	91	GLN
28	X	154	HIS
28	X	347	ASN
29	Y	295	GLN
31	a	115	GLN
31	a	187	ASN
32	b	102	HIS
32	b	294	ASN
32	b	297	ASN
32	b	343	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
5	A	914/955 (95%)	113 (12%)	1 (0%)

All (113) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
5	A	649	A
5	A	651	A
5	A	680	U
5	A	688	A
5	A	704	U
5	A	721	U
5	A	738	A
5	A	739	C
5	A	753	A
5	A	761	A
5	A	766	G
5	A	773	U
5	A	791	G
5	A	796	G
5	A	808	C

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Mol	Chain	Res	Type
5	A	829	C
5	A	830	U
5	A	832	U
5	A	835	C
5	A	836	A
5	A	851	A
5	A	860	A
5	A	868	C
5	A	871	A
5	A	890	C
5	A	902	G
5	A	904	C
5	A	919	A
5	A	923	A
5	A	929	A
5	A	931	C
5	A	932	C
5	A	933	G
5	A	938	A
5	A	939	A
5	A	941	G
5	A	942	A
5	A	954	C
5	A	956	C
5	A	958	C
5	A	959	C
5	A	960	C
5	A	961	U
5	A	962	C
5	A	964	C
5	A	965	C
5	A	967	A
5	A	993	A
5	A	1001	C
5	A	1011	C
5	A	1015	A
5	A	1030	G
5	A	1031	G
5	A	1042	U
5	A	1065	C
5	A	1075	A
5	A	1103	A

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Mol	Chain	Res	Type
5	A	1105	C
5	A	1106	C
5	A	1107	U
5	A	1116	A
5	A	1118	A
5	A	1121	A
5	A	1126	A
5	A	1151	C
5	A	1152	A
5	A	1155	G
5	A	1167	A
5	A	1223	C
5	A	1230	C
5	A	1247	G
5	A	1248	C
5	A	1250	C
5	A	1251	A
5	A	1271	C
5	A	1272	A
5	A	1273	G
5	A	1284	U
5	A	1285	G
5	A	1290	C
5	A	1291	U
5	A	1294	A
5	A	1326	A
5	A	1327	G
5	A	1343	A
5	A	1356	A
5	A	1365	A
5	A	1378	C
5	A	1390	A
5	A	1405	C
5	A	1406	U
5	A	1422	G
5	A	1447	G
5	A	1466	C
5	A	1474	G
5	A	1478	A
5	A	1481	C
5	A	1493	C
5	A	1494	C

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Mol	Chain	Res	Type
5	A	1502	A
5	A	1506	U
5	A	1508	C
5	A	1546	A
5	A	1547	U
5	A	1548	A
5	A	1549	G
5	A	1557	A
5	A	1558	A
5	A	1559	G
5	A	1568	U
5	A	1585	A
5	A	1594	G
5	A	1595	G

All (1) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
5	A	1271	C

5.4　Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5　Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6　Ligand geometry ⓘ

Of 18 ligands modelled in this entry, 12 are monoatomic - leaving 6 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
37	FES	T	201	17,24	0,4,4	-	-	-		
35	NAD	A	1710	-	42,48,48	0.93	2 (4%)	50,73,73	0.90	3 (6%)
37	FES	P	201	20,9	0,4,4	-	-	-		
38	GDP	X	401	-	24,30,30	0.95	1 (4%)	30,47,47	1.41	4 (13%)
40	SAH	b	501	-	24,28,28	0.86	1 (4%)	25,40,40	0.77	0
39	ATP	X	402	-	26,33,33	0.61	0	31,52,52	0.85	2 (6%)

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
37	FES	T	201	17,24	-	-	0/1/1/1
35	NAD	A	1710	-	-	6/26/62/62	0/5/5/5
38	GDP	X	401	-	-	7/12/32/32	0/3/3/3
37	FES	P	201	20,9	-	-	0/1/1/1
40	SAH	b	501	-	-	8/11/31/31	0/3/3/3
39	ATP	X	402	-	-	3/18/38/38	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
35	A	1710	NAD	C8A-N7A	-2.64	1.30	1.34
38	X	401	GDP	C6-N1	-2.47	1.34	1.37
35	A	1710	NAD	O4D-C1D	-2.46	1.37	1.41
40	b	501	SAH	C8-N7	-2.45	1.30	1.34

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
38	X	401	GDP	PA-O3A-PB	-4.17	118.51	132.83
38	X	401	GDP	C3'-C2'-C1'	3.31	105.97	100.98
35	A	1710	NAD	PN-O3-PA	-2.33	124.85	132.83
39	X	402	ATP	C5-C6-N6	2.26	123.79	120.35
38	X	401	GDP	C5-C6-N1	2.24	117.91	113.95
39	X	402	ATP	C3'-C2'-C1'	2.20	104.29	100.98
38	X	401	GDP	C8-N7-C5	2.18	107.15	102.99
35	A	1710	NAD	O2A-PA-O1A	2.14	122.81	112.24
35	A	1710	NAD	O7N-C7N-N7N	2.02	125.44	122.58

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
35	A	1710	NAD	C5B-O5B-PA-O1A
35	A	1710	NAD	O4B-C4B-C5B-O5B
35	A	1710	NAD	C3B-C4B-C5B-O5B
35	A	1710	NAD	C5D-O5D-PN-O3
38	X	401	GDP	C5'-O5'-PA-O3A
38	X	401	GDP	C5'-O5'-PA-O2A
38	X	401	GDP	C3'-C4'-C5'-O5'
39	X	402	ATP	O4'-C4'-C5'-O5'
39	X	402	ATP	C3'-C4'-C5'-O5'
40	b	501	SAH	N-CA-CB-CG
40	b	501	SAH	C-CA-CB-CG
40	b	501	SAH	C4'-C5'-SD-CG
40	b	501	SAH	OXT-C-CA-N
38	X	401	GDP	O4'-C4'-C5'-O5'
40	b	501	SAH	O-C-CA-CB
40	b	501	SAH	OXT-C-CA-CB
40	b	501	SAH	O-C-CA-N
39	X	402	ATP	PB-O3A-PA-O1A
35	A	1710	NAD	C5D-O5D-PN-O1N
35	A	1710	NAD	C5D-O5D-PN-O2N
38	X	401	GDP	C5'-O5'-PA-O1A
40	b	501	SAH	CB-CG-SD-C5'
38	X	401	GDP	PB-O3A-PA-O1A
38	X	401	GDP	PB-O3A-PA-O2A

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
35	A	1710	NAD	1	0
40	b	501	SAH	1	0

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 then 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.

Ligand NAD A 1710

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP X 401

Bond lengths

Bond angles

Torsions

Rings

Ligand SAH b 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP X 402

Bond lengths

Bond angles

Torsions

Rings
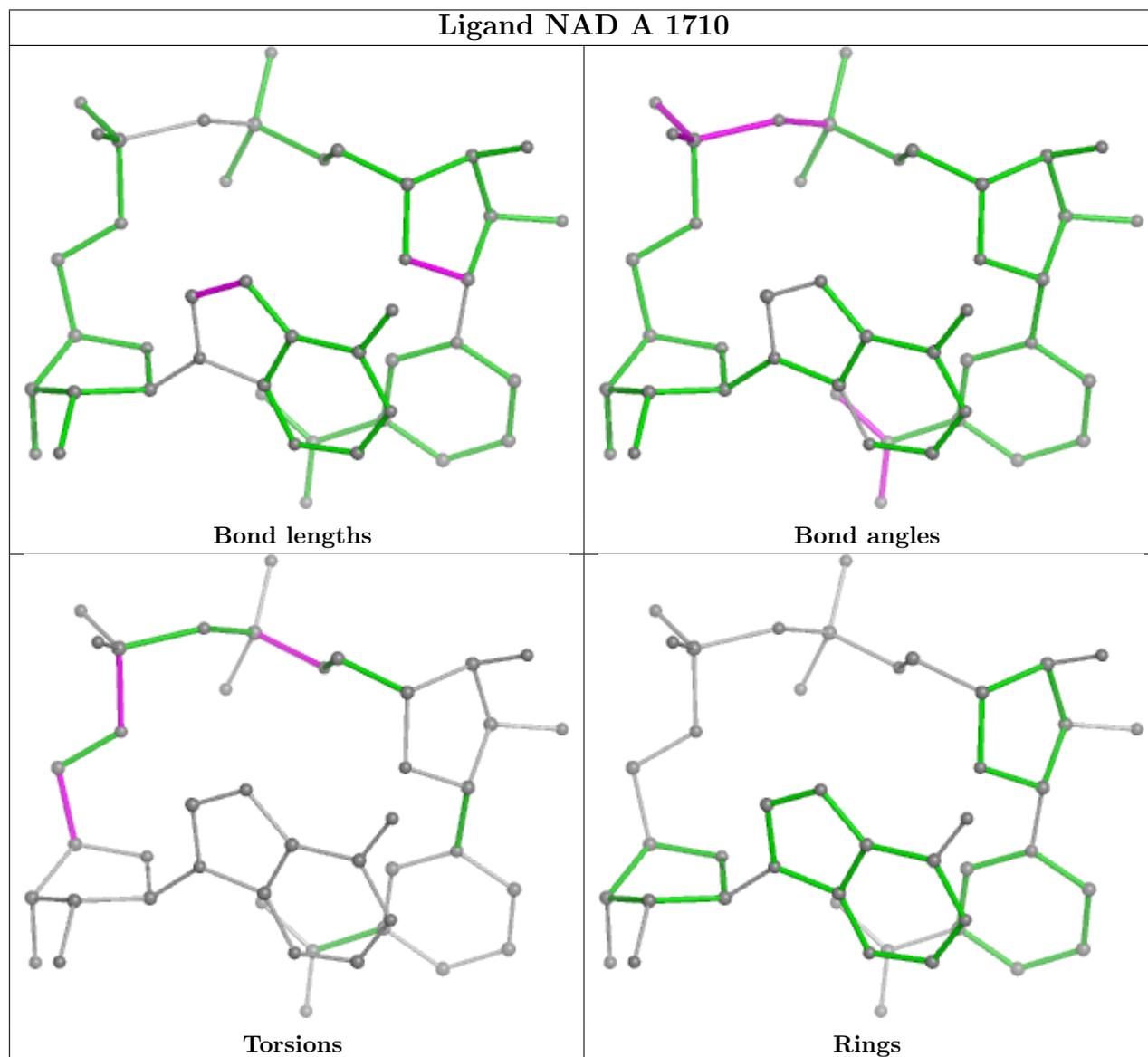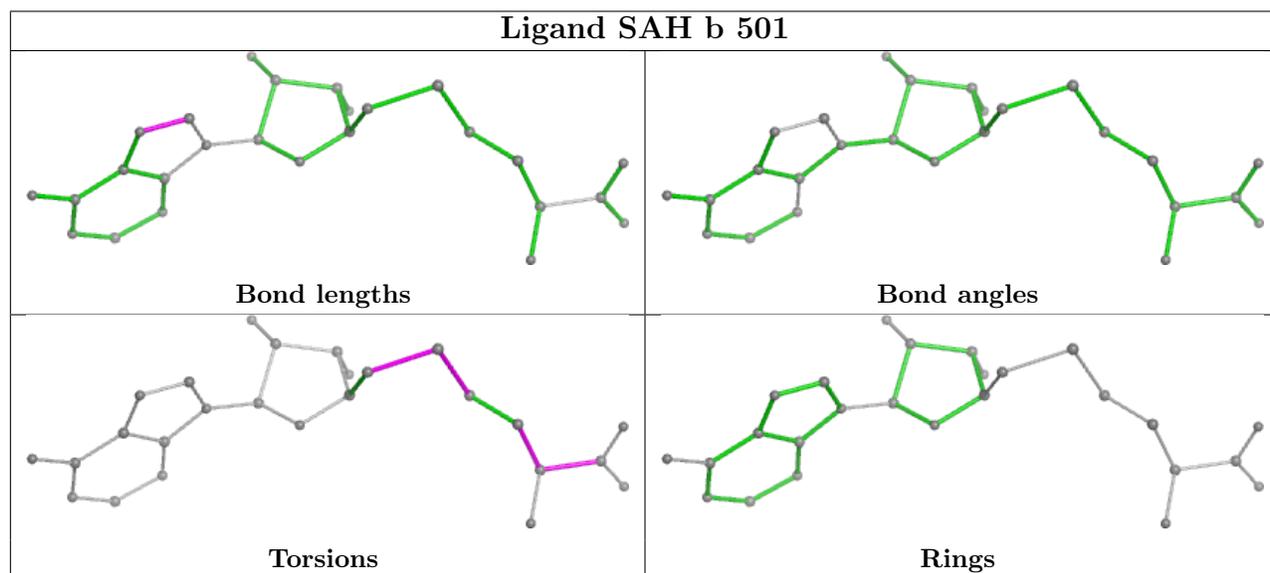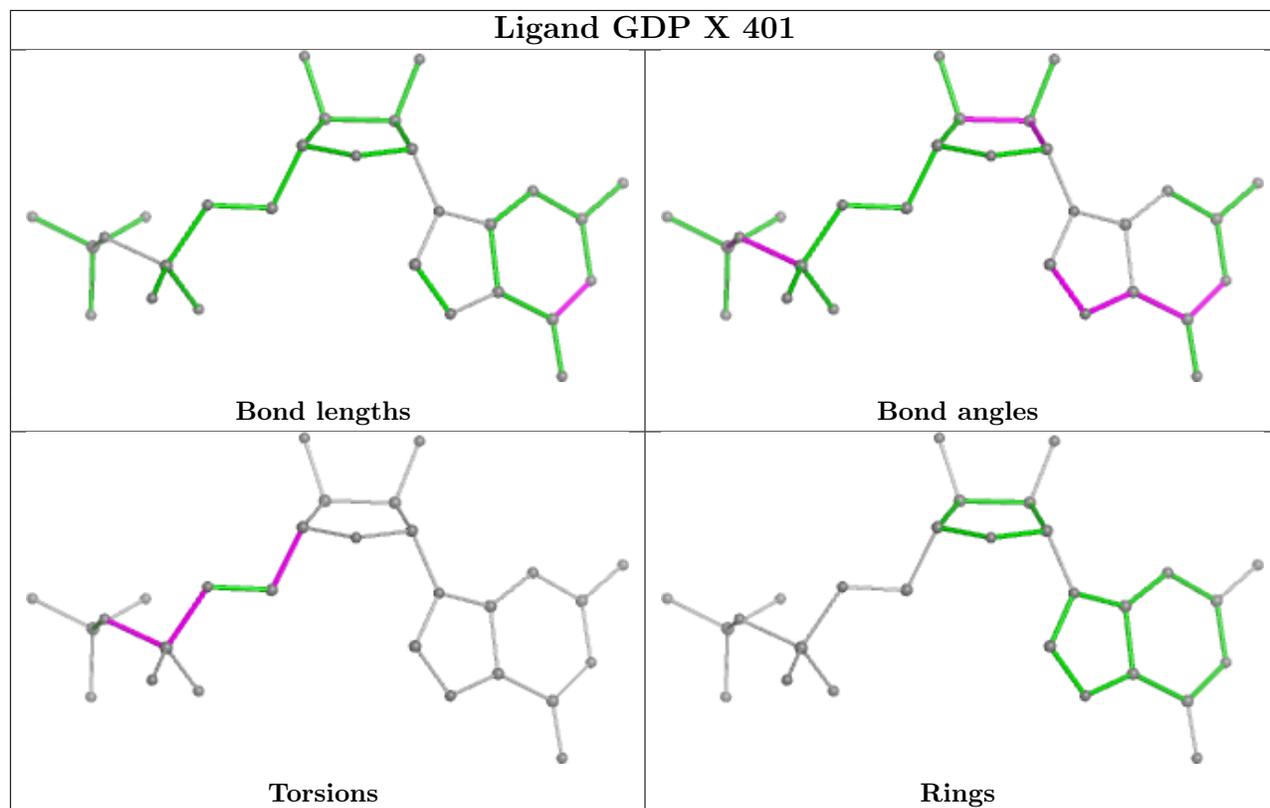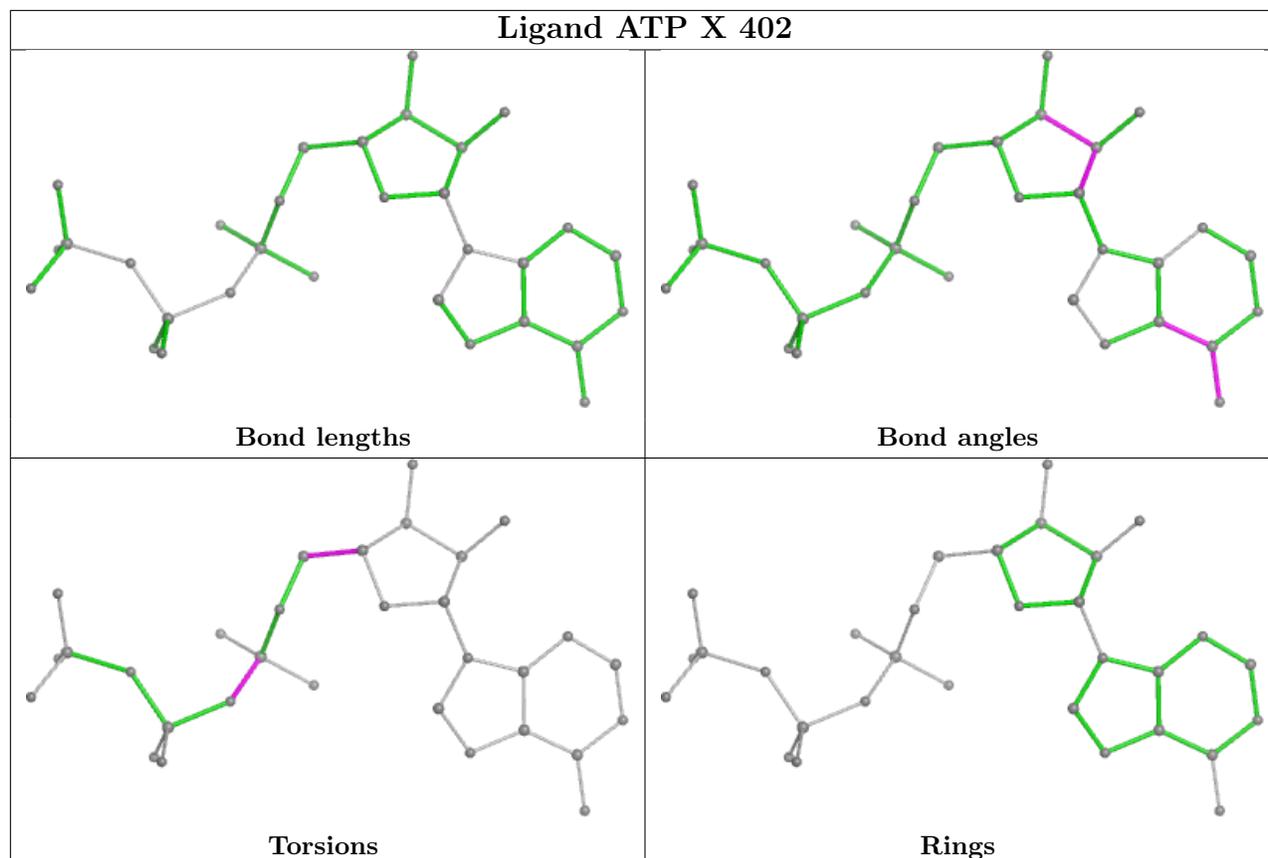
5.7　Other polymers ⓘ

There are no such residues in this entry.

5.8　Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-51085. 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 ⓘ

6.1.1 Primary map

| X | Y | Z |
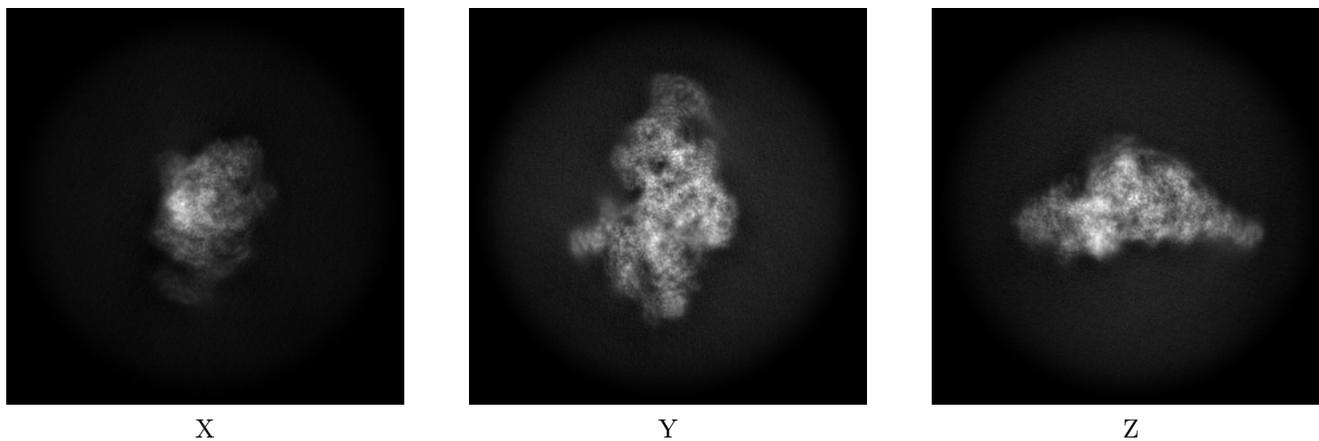
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ

6.2.1 Primary map

| X Index: 220 | Y Index: 220 | Z Index: 220 |
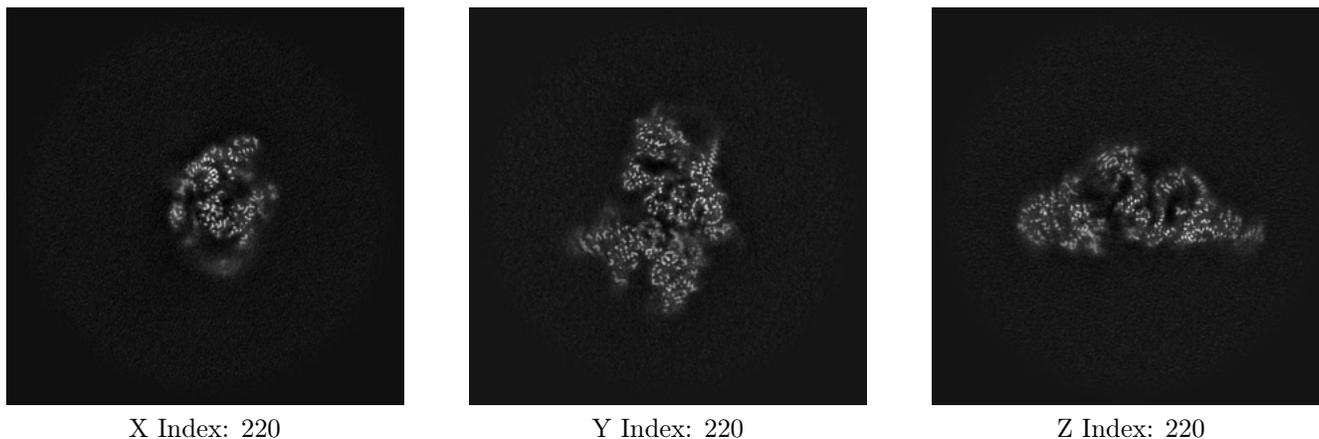
The images above show central slices of the map in three orthogonal directions.

6.3　Largest variance slices　ⓘ
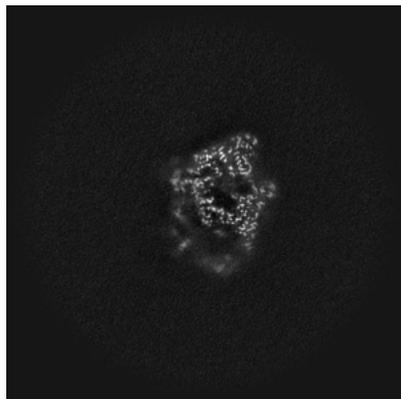
6.3.1　Primary map
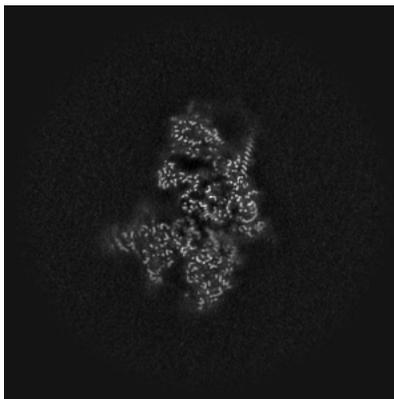
| X Index: 214 | Y Index: 219 | Z Index: 222 |
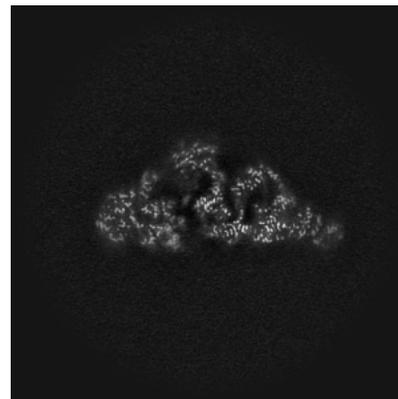
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1　Primary map

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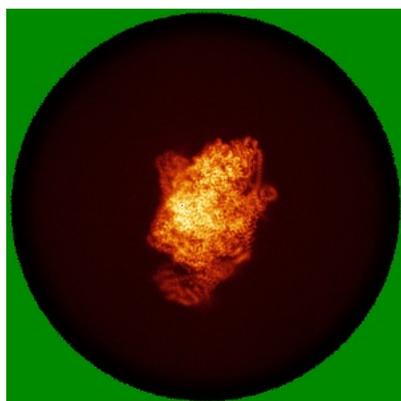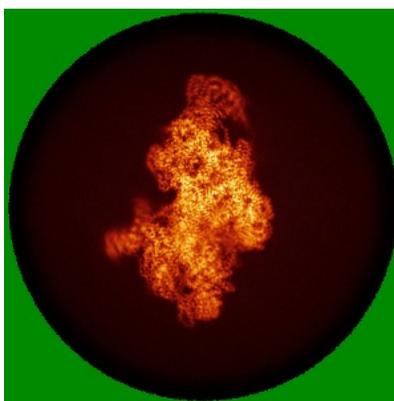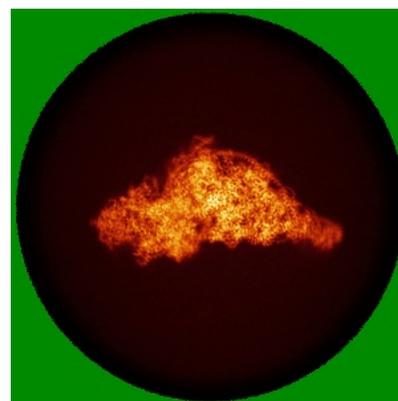
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ
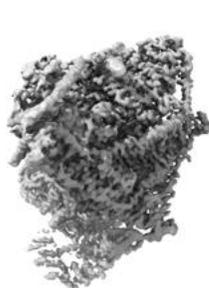
6.5.1 Primary map

| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.39. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.6 Mask visualisation ⓘ

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

7 Map analysis ⓘ

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

7.1 Map-value distribution ⓘ

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

7.2 Volume estimate ⓘ
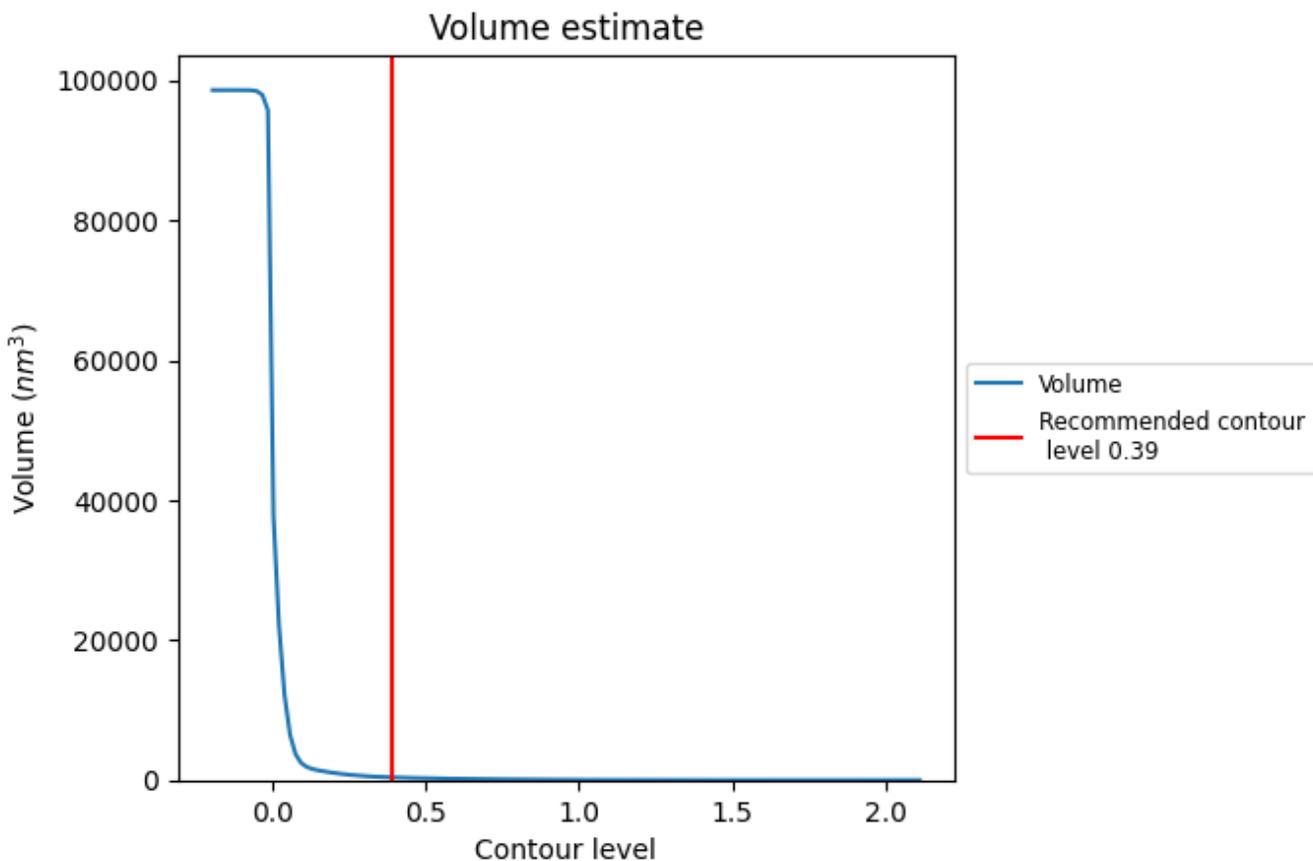
The volume at the recommended contour level is 390 nm^3; this corresponds to an approximate mass of 352 kDa.

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)
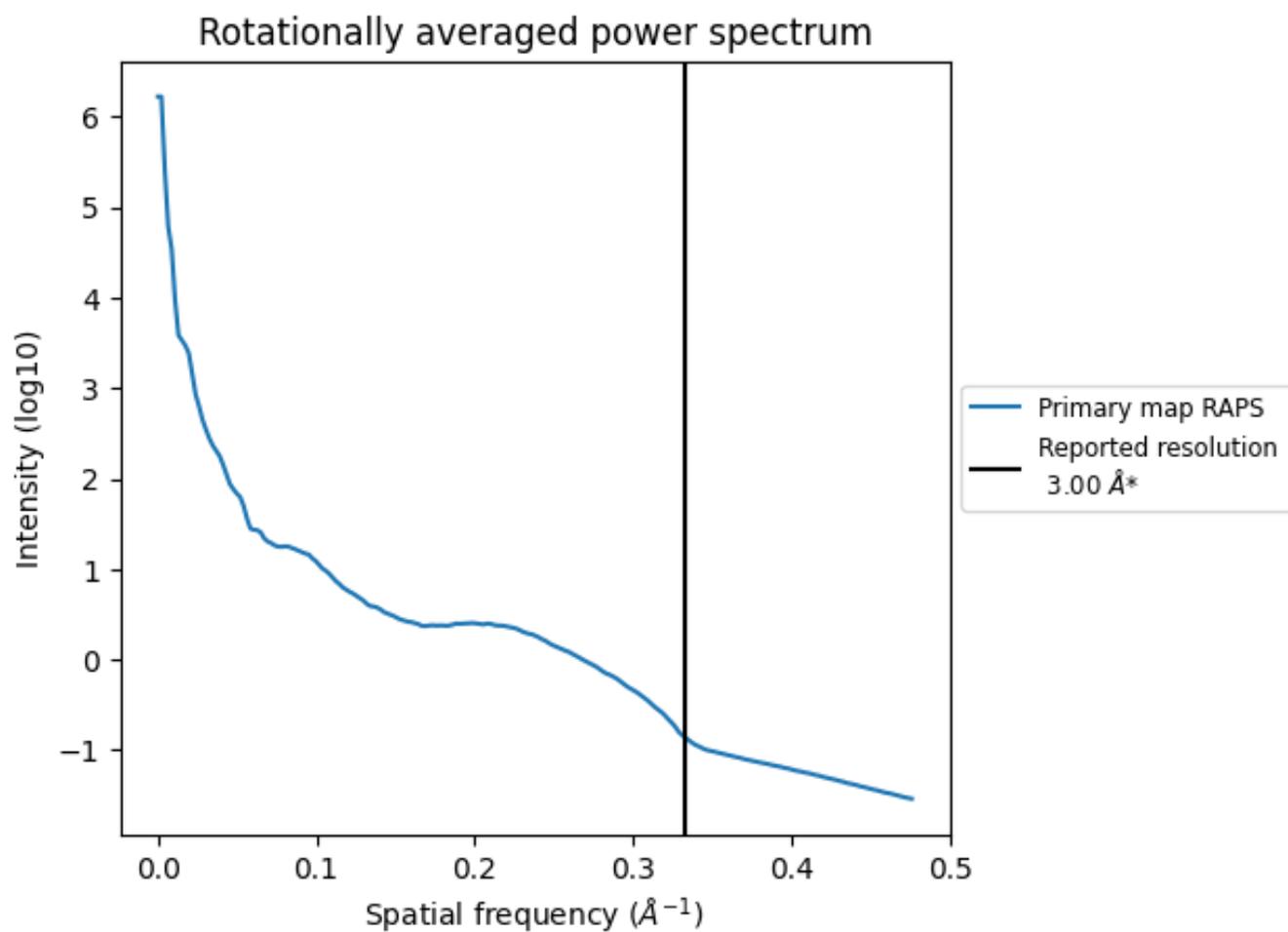
*Reported resolution corresponds to spatial frequency of 0.333 Å^{-1}

8 Fourier-Shell correlation ⓘ

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

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-51085 and PDB model 9G5D. Per-residue inclusion information can be found in section 3 on page 13.

9.1 Map-model overlay ⓘ

| X | Y | Z |
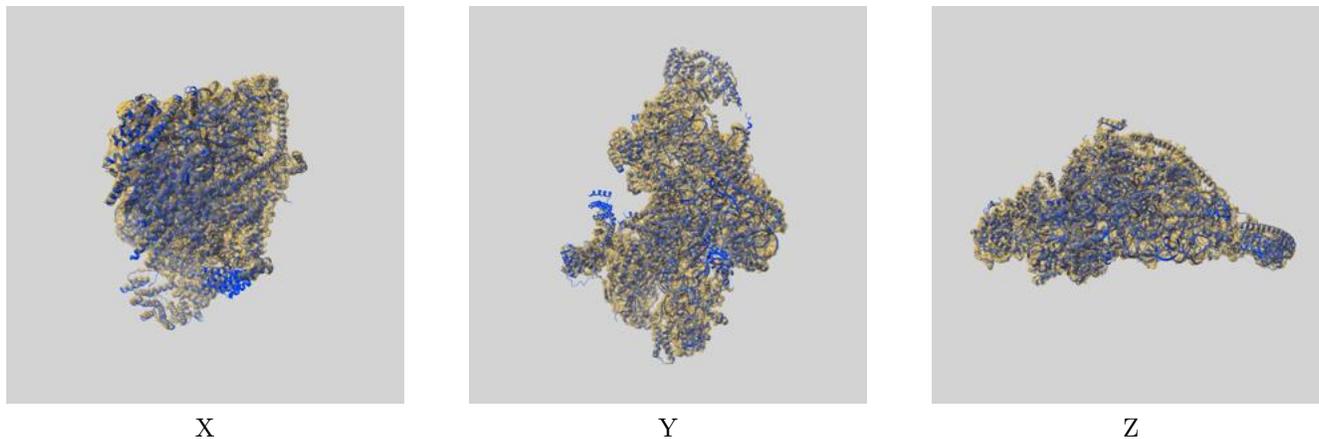
The images above show the 3D surface view of the map at the recommended contour level 0.39 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model ⓘ


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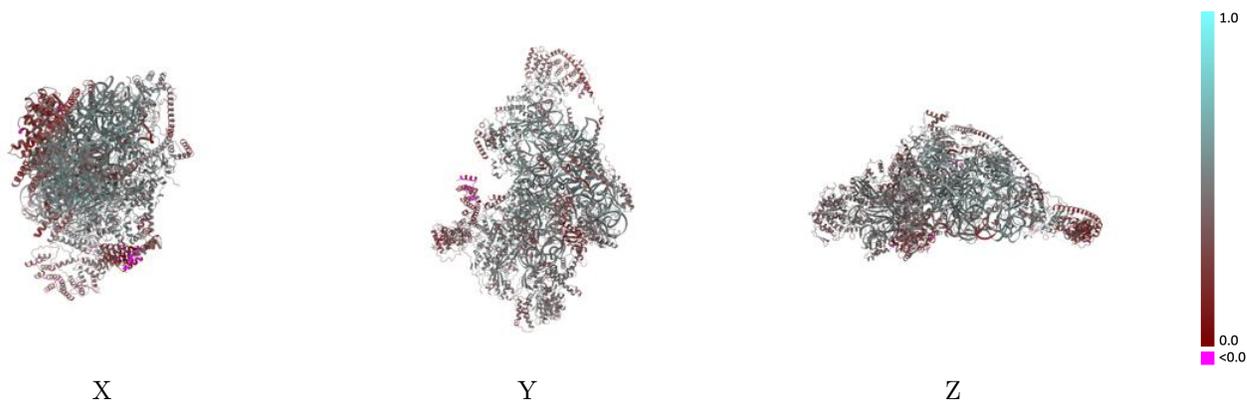
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

9.3 Atom inclusion mapped to coordinate model ⓘ

X   Y   Z
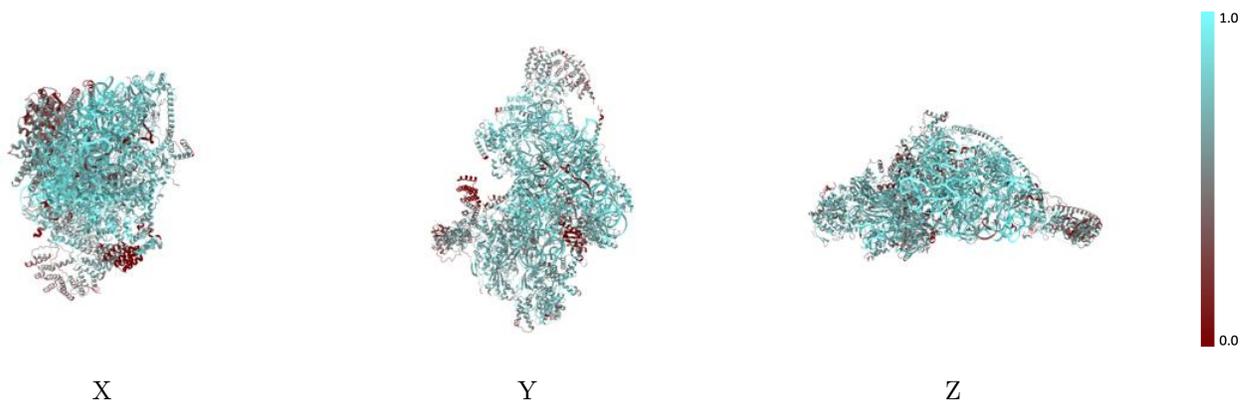
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.39).

9.4 Atom inclusion ⓘ
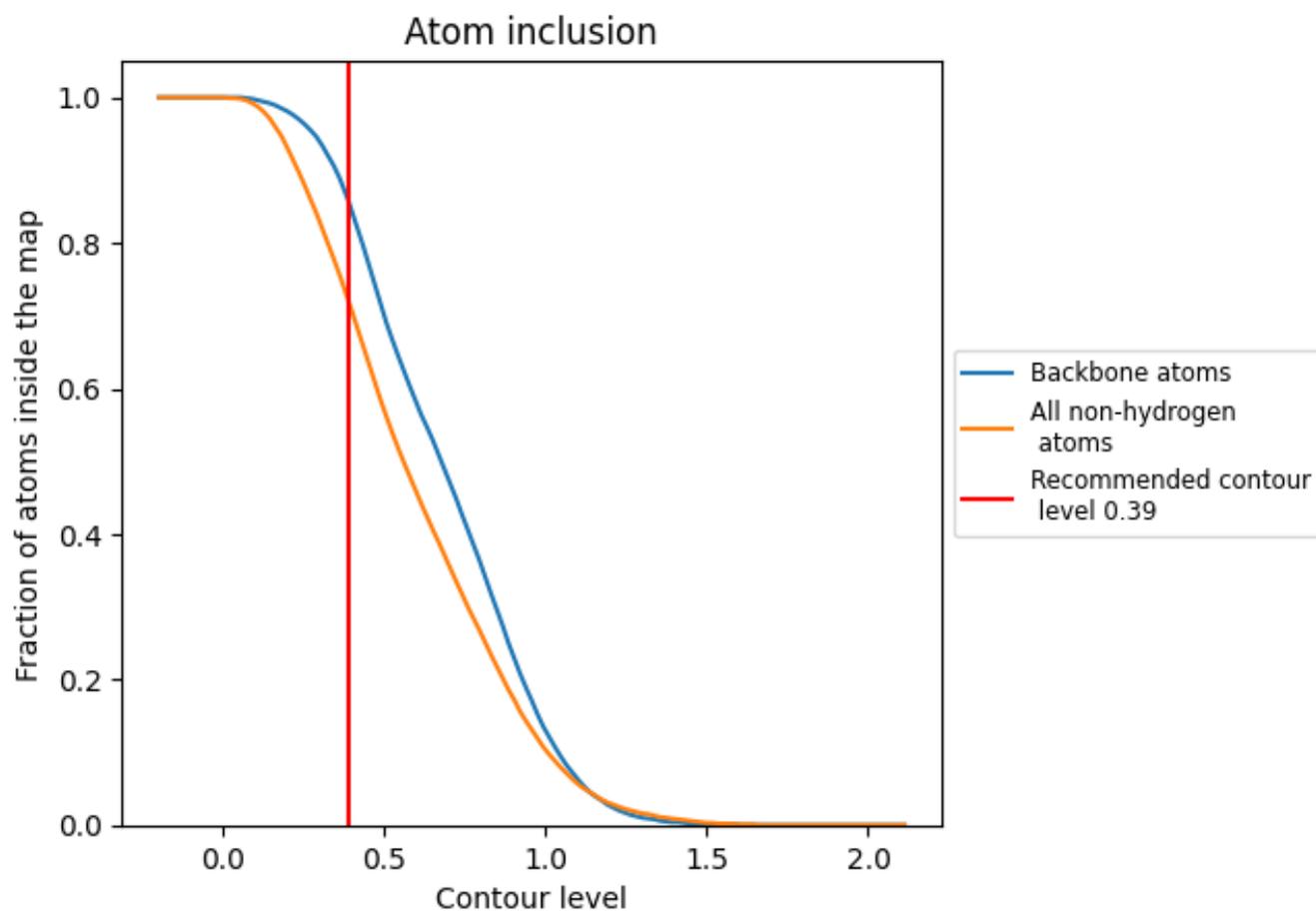
At the recommended contour level, 86% of all backbone atoms, 72% of all non-hydrogen atoms, are inside the map.

9.5   Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.39) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7210	0.4400
0	0.6720	0.4550
1	0.6760	0.4240
3	0.6920	0.4670
4	0.4150	0.2790
A	0.8970	0.4970
B	0.8040	0.4900
C	0.7380	0.5020
D	0.6780	0.4670
E	0.6860	0.4510
F	0.6660	0.4270
G	0.6780	0.4240
H	0.6840	0.4650
I	0.7500	0.4600
J	0.7370	0.4880
K	0.8030	0.4850
L	0.7270	0.4690
M	0.8100	0.5080
N	0.8270	0.5200
O	0.8220	0.5140
P	0.7590	0.4810
Q	0.7040	0.4590
R	0.7720	0.4650
S	0.6700	0.4300
T	0.7890	0.5060
U	0.7160	0.4380
V	0.4580	0.2890
W	0.7100	0.4710
X	0.6820	0.4280
Y	0.5800	0.3840
Z	0.6210	0.3920
a	0.1880	0.2600
b	0.5470	0.3140

1.0

0.0
<0.0