WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB EM Validation Report (i)

Mar 24, 2026 – 02:49 PM JST

PDB ID	:	9W2R / pdb_00009w2r
EMDB ID	:	EMD-65577
Title	:	Cryo-EM structure of FoF1-ATPase monomer state 1 on the bovine heart submitochondrial particles (FoF1-1)
Authors	:	Nakano, A.; Masuya, T.; Akisada, S.; Ishikawa-Fukuda, M.; Mitsuoka, K.; Miyoshi, H.; Murai, M.; Yokoyama, K.
Deposited on	:	2025-07-28
Resolution	:	3.40 Å(reported)
Based on initial model	:	6ZPO

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

EMDB validation analysis	:	0.0.1.dev132
Mogul	:	1.8.5 (274361), 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)	:	2.48.1

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 3.40 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.
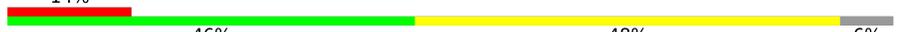
Metric	Percentile Ranks	Value
Clashscore		8
Ramachandran outliers		0.0%
Sidechain outliers		0.3%

Worse   *Better*

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

Metric	Model-Map Fit Percentile Ranks	Value
Q-score		0.4

Worse   *Better*

▮ Percentile relative to all EM structures
▯ Percentile relative to EM structures of similar resolution
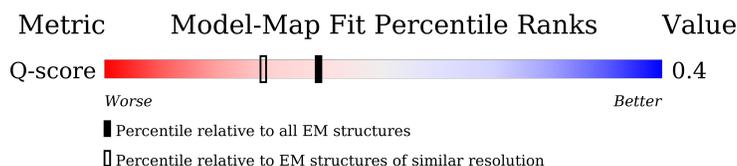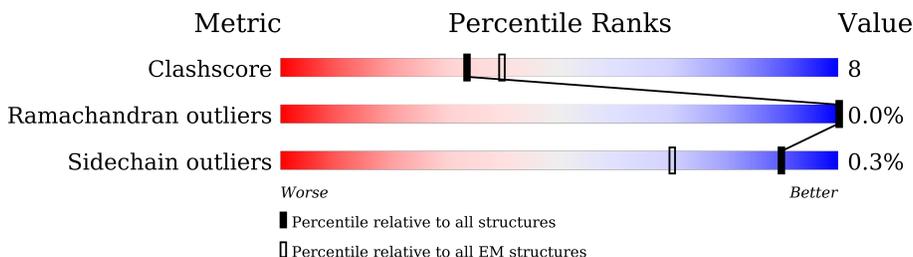
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	14717 (2.90 - 3.90)

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	8	66	39% / 26% 27% 47%
2	A	510	94% 5%
2	B	510	88% 7% 5%
2	C	510	91% 8% •

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Mol	Chain	Length	Quality of chain
3	D	482	88% ... 10%
3	E	482	89% ... 7%
3	F	482	89% ... 8%
4	G	273	92% ... 8%
5	H	146	10% ... 73% ... 16% ... 10%
6	I	50	14% ... 46% ... 48% ... 6%
7	J	60	77% ... 22%
8	K	75	37% ... 77% ... 21%
8	L	75	44% ... 73% ... 25%
8	M	75	41% ... 64% ... 36%
8	N	75	51% ... 65% ... 35%
8	O	75	64% ... 61% ... 39%
8	P	75	67% ... 67% ... 33%
8	Q	75	51% ... 68% ... 32%
8	R	75	32% ... 63% ... 37%
9	S	190	88% ... 11%
10	a	226	62% ... 67% ... 33%
11	b	214	45% ... 75% ... 21%
12	d	160	45% ... 76% ... 21%
13	e	70	36% ... 40% ... 57%
14	f	87	48% ... 79% ... 11% ... 9%
15	g	102	59% ... 66% ... 12% ... 23%
16	h	76	12% ... 57% ... 25% ... 18%
17	j	60	47% ... 53% ... 22% ... 5% ... 20%
18	k	57	49% ... 54% ... 5% ... 40%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
19	ATP	B	601	-	-	X	-

2 Entity composition (i)

There are 21 unique types of molecules in this entry. The entry contains 39088 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 ATP synthase F(0) complex subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	8	35	Total 298	C 202	N 45	O 48	S 3	0	0

- Molecule 2 is a protein called ATP synthase F(1) complex subunit alpha, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	508	Total 3870	C 2435	N 681	O 742	S 12	0	0
2	B	486	Total 3710	C 2339	N 655	O 704	S 12	0	0
2	C	503	Total 3834	C 2414	N 675	O 733	S 12	0	0

- Molecule 3 is a protein called ATP synthase F(1) complex catalytic subunit beta, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	469	Total 3558	C 2254	N 605	O 688	S 11	0	0
3	E	467	Total 3539	C 2243	N 601	O 684	S 11	0	0
3	F	467	Total 3539	C 2243	N 601	O 684	S 11	0	0

- Molecule 4 is a protein called ATP synthase F(1) complex subunit gamma, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	G	272	Total 2115	C 1330	N 368	O 409	S 8	0	0

- Molecule 5 is a protein called ATP synthase F(1) complex subunit delta, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	H	131	Total 970	C 609	N 164	O 195	S 2	0	0

- Molecule 6 is a protein called ATP synthase F(1) complex subunit epsilon, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	I	47	Total 369	C 237	N 66	O 64	S 2	0	0

- Molecule 7 is a protein called ATPase inhibitor, mitochondrial.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	J	47	Total 370	C 224	N 76	O 70	0	0

- Molecule 8 is a protein called ATP synthase F(0) complex subunit C1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	K	74	Total 529	C 351	N 82	O 93	S 3	0	0
8	L	74	Total 529	C 351	N 82	O 93	S 3	0	0
8	M	75	Total 525	C 349	N 79	O 93	S 4	0	0
8	N	75	Total 528	C 352	N 79	O 93	S 4	0	0
8	O	75	Total 528	C 352	N 79	O 93	S 4	0	0
8	P	75	Total 537	C 356	N 83	O 94	S 4	0	0
8	Q	75	Total 534	C 353	N 83	O 94	S 4	0	0
8	R	75	Total 538	C 356	N 83	O 95	S 4	0	0

- Molecule 9 is a protein called ATP synthase peripheral stalk subunit OSCP, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	S	188	Total 1447	C 920	N 249	O 269	S 9	0	0

- Molecule 10 is a protein called ATP synthase F(0) complex subunit a.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	a	226	Total 1694	C 1122	N 271	O 289	S 12	0	0

- Molecule 11 is a protein called ATP synthase peripheral stalk subunit b, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	b	205	Total 1619	C 1031	N 287	O 295	S 6	0	0

- Molecule 12 is a protein called ATP synthase peripheral stalk subunit d, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	d	154	Total 1224	C 790	N 201	O 232	S 1	0	0

- Molecule 13 is a protein called ATP synthase F(0) complex subunit e, mitochondrial.

Mol	Chain	Residues	Atoms				AltConf	Trace
13	e	30	Total 207	C 133	N 40	O 34	0	0

- Molecule 14 is a protein called ATP synthase F(0) complex subunit f, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	f	79	Total 624	C 402	N 114	O 106	S 2	0	0

- Molecule 15 is a protein called ATP synthase F(0) complex subunit g, mitochondrial.

Mol	Chain	Residues	Atoms				AltConf	Trace
15	g	79	Total 570	C 370	N 98	O 102	0	0

- Molecule 16 is a protein called ATP synthase peripheral stalk subunit F6, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	h	62	Total 514	C 326	N 87	O 99	S 2	0	0

- Molecule 17 is a protein called ATP synthase F(0) complex subunit j, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	j	48	Total 352	C 230	N 63	O 58	S 1	0	0

- Molecule 18 is a protein called ATP synthase F(0) complex subunit k, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	k	34	Total 261	C 171	N 45	O 43	S 2	0	0

- Molecule 19 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).
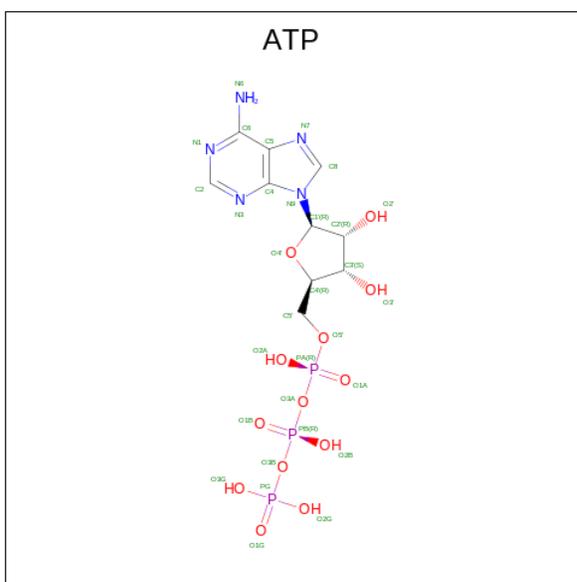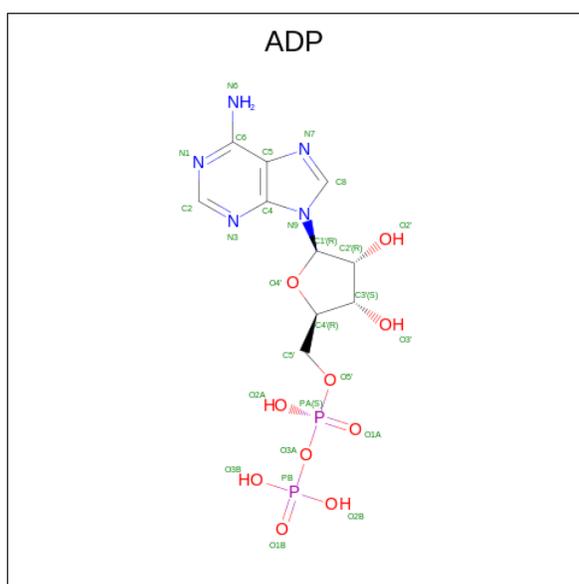

Mol	Chain	Residues	Atoms					AltConf
19	A	1	Total 31	C 10	N 5	O 13	P 3	0
19	B	1	Total 31	C 10	N 5	O 13	P 3	0
19	C	1	Total 31	C 10	N 5	O 13	P 3	0
19	D	1	Total 31	C 10	N 5	O 13	P 3	0

- Molecule 20 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
20	A	1	Total 1	Mg 1	0
20	B	1	Total 1	Mg 1	0
20	C	1	Total 1	Mg 1	0
20	D	1	Total 1	Mg 1	0
20	F	1	Total 1	Mg 1	0

- Molecule 21 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).
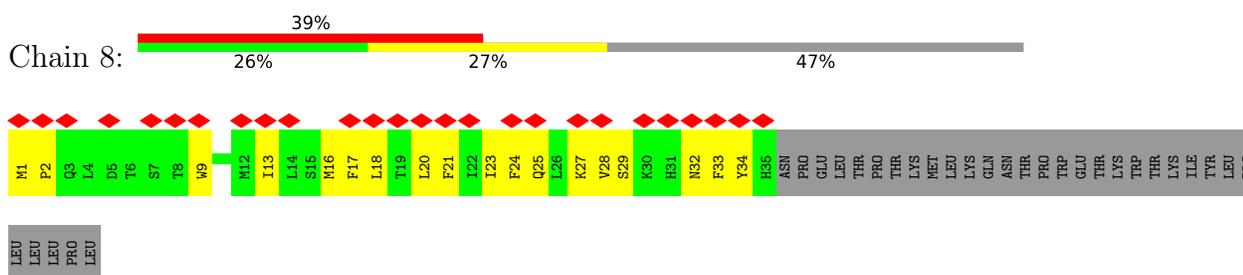

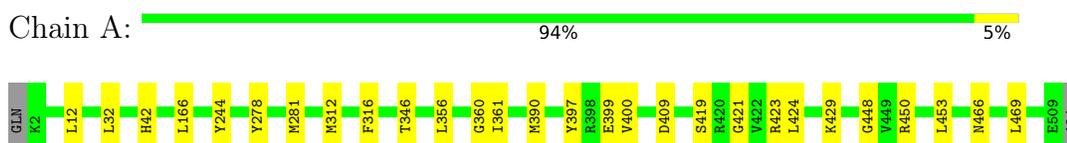| Mol	Chain	Residues	Atoms					AltConf
21	F	1	Total 27	C 10	N 5	O 10	P 2	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
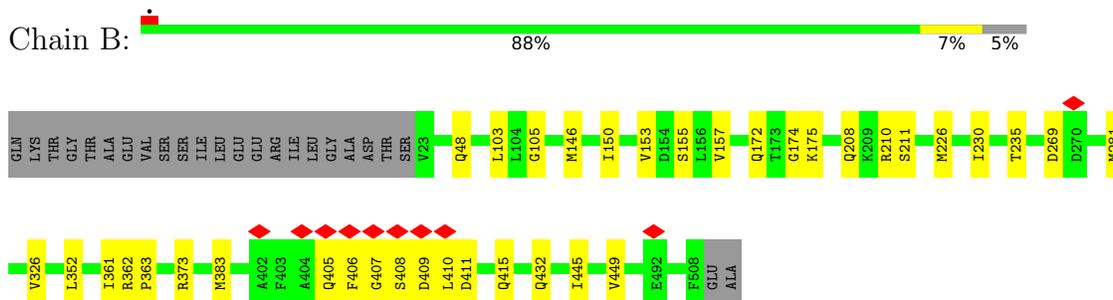
• Molecule 1: ATP synthase F(0) complex subunit 8

Chain 8:
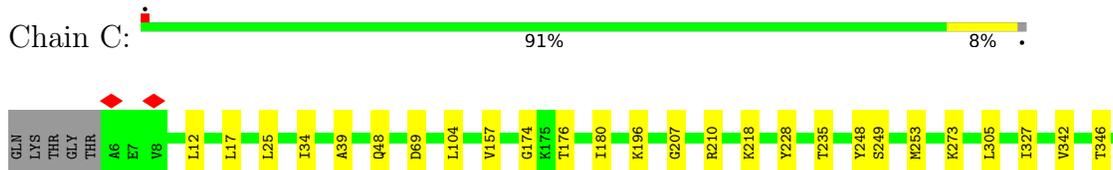

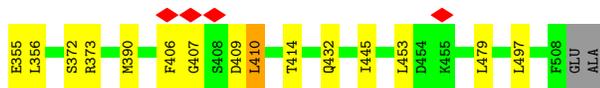• Molecule 2: ATP synthase F(1) complex subunit alpha, mitochondrial

Chain A:
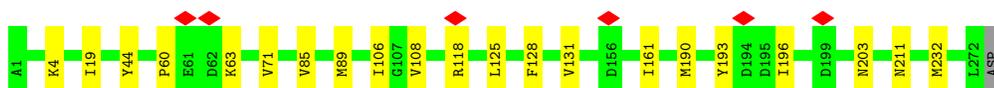

• Molecule 2: ATP synthase F(1) complex subunit alpha, mitochondrial

Chain B:

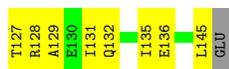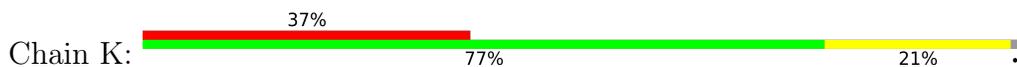• Molecule 2: ATP synthase F(1) complex subunit alpha, mitochondrial

Chain C:

E355 L356 S372 R373 M390 F406 G407 S408 D409 L410 T414 Q432 I445 L453 D454 K455 L479 L497 F508 GLU ALA

• Molecule 3: ATP synthase F(1) complex catalytic subunit beta, mitochondrial

Chain D: 88% 10%

ALA ALA GLN ALA SER PRO SER PRO LYS ALA GLY ALA T9 E27 G28 L29 S56 M63 V70 L76 D77 G159 V160 G161 K162 T163 V164 V186 R189 H198 I201 R231 V232 E247 G248 Q249 I255 I258 T298 S303 S336 I339

A340 E341 L342 G343 I344 Y345 P346 I377 I387 L391 T403 Q411 F418 A421 F424 P433 L434 K435 E436 T437 P462 E465 H477 SER

• Molecule 3: ATP synthase F(1) complex catalytic subunit beta, mitochondrial

Chain E: 89% 7%

ALA ALA GLN ALA SER PRO SER PRO LYS ALA GLY ALA T9 A15 D22 L29 S56 V97 I98 M126 S127 V139 V186 Y197 I201 E202 V232 N257 V279 I296 I304 I310 Y311 T325 Y345 R356 I388 M393 D394

K401 R408 R412 F413 L414 F441 I444 L452 V460 G461 P462 E465 A466 A470 E475 GLU HIS SER

• Molecule 3: ATP synthase F(1) complex catalytic subunit beta, mitochondrial

Chain F: 89% 8%

ALA ALA GLN ALA SER PRO SER PRO LYS ALA GLY ALA T9 L29 I32 L33 V49 S56 T60 V70 M95 I98 G99 E100 V128 G153 G161 R191 Y197 H198 I201 A233 L237 L272 M292 T298 S303 L329

L335 S336 I339 G343 I344 Y345 P346 A347 I387 I388 A389 I390 S415 F424 E475 GLU HIS SER

• Molecule 4: ATP synthase F(1) complex subunit gamma, mitochondrial

Chain G: 92% 8%

A1 K4 I19 Y44 P60 E61 D62 K63 V71 V85 M89 I106 G107 V108 R118 L125 F128 V131 D156 I161 M190 Y193 D194 D195 I196 D199 N203 N211 M232 L272 ASP

• Molecule 5: ATP synthase F(1) complex subunit delta, mitochondrial

Chain H: 10% 73% 16% 10%

ALA GLU ALA ALA ALA ALA GLN ALA PRO ALA ALA GLY PRO GLY Q15 N32 V33 R34 Q35 V36 D37 T40 G43 L48 V57 E68 D69 G70 T71 T72 S88 T99 M102 L103 D104 L105 G106 K109 E113 K114 E118 L119 L120 G121 A122 A123 D124

T127 R128 A129 E130 I131 Q132 I135 E136 L145 GLU

• Molecule 6: ATP synthase F(1) complex subunit epsilon, mitochondrial

Chain I:

14%

46%   48%   6%

V1 A2 Y3 W4 R5 Q6 A7 G8 L9 I12 R13 Q16 I17 R23 D24 T28 E29 F30 K31 A32 N33 A34 M35 K36 T37 I42 K43 K46 V47 LYS LYS GLU

• Molecule 7: ATPase inhibitor, mitochondrial

Chain J:

77%   •   22%

GLY SER GLU SER GLY ASP ASN V8 E40 S54 HIS HIS ALA LYS GLU ILE

• Molecule 8: ATP synthase F(0) complex subunit C1, mitochondrial

Chain K:

37%

77%   21%   •

D1 I2 D3 T4 A11 G12 A13 V16 G17 V18 A19 G20 S21 G22 A23 G24 I25 G26 T27 V28 F29 G30 S31 L32 I33 I34 L42 A50 I51 L52 A55 L56 S57 E58 A59 M60 G61 L62 F63 C64 L65 M66 V67 L70 I71 L72 F73 A74 MET

• Molecule 8: ATP synthase F(0) complex subunit C1, mitochondrial

Chain L:

44%

73%   25%   •

D1 I2 D3 T4 A5 A6 K7 F8 I9 G10 A11 G12 A13 A14 T15 V16 G17 V18 A19 G20 S21 G22 A23 G24 I25 G26 T27 V28 F29 L32 I33 I34 Q44 F47 I51 F54 A55 L56 S57 E58 A59 M60 G61 L62 F63 C64 L65 M66 V67 A68 F69 L70 I71 L72 F73

A74 MET

• Molecule 8: ATP synthase F(0) complex subunit C1, mitochondrial

Chain M:

41%

64%   36%

D1 I2 D3 T4 A5 A6 K7 F8 I9 G10 A11 G12 A13 V16 G17 V18 A19 G20 A23 T27 V28 F29 G30 S31 I34 G35 Y36 A37 R38 N39 P40 S41 L42 K43 Q44 Q45 L46 A50 I51 L52 G53 F54 A55 L56 S57 E58 A59 M60 G61 L62 F63 C64 L65 M66 V67

A68 F69 L70 I71 L72 F73 A74 M75

• Molecule 8: ATP synthase F(0) complex subunit C1, mitochondrial

Chain N:

51%

65%

35%

D1 I2 D3 T4 A5 A6 K7 F8 I9 G10 A11 G12 A13 A14 T15 V16 G17 V18 A19 G20 S21 I25 F29 G30 S31 L32 I33 I34 G35 Y36 A37 R38 N39 P40 S41 L42 K43 Q44 Q45 L46 Y49 L52 G53 F54 A55 L56 S57 E58 A59 M60 G61 L62 F63 C64 L65 M66

V67 A68 F69 L70 I71 L72 F73 A74 M75

• Molecule 8: ATP synthase F(0) complex subunit C1, mitochondrial

Chain O:

64%

61%

39%

D1 I2 D3 T4 A5 A6 K7 F8 I9 G10 A11 G12 A13 A14 T15 V16 G17 V18 A19 G20 S21 L32 I33 I34 G35 Y36 A37 R38 N39 P40 S41 L42 K43 Q44 Q45 L46 F47 S48 Y49 A50 I51 L52 G53 F54 A55 L56 S57 E58 A59 M60 G61 L62 F63 C64 L65 M66 V67 A68 F69

L70 I71 L72 F73 A74 M75

• Molecule 8: ATP synthase F(0) complex subunit C1, mitochondrial

Chain P:

67%

67%

33%

D1 I2 D3 T4 A5 A6 K7 F8 I9 G10 A11 G12 A13 A14 T15 V16 G17 V18 A19 G20 S21 G22 I25 G26 T27 V28 F29 G30 S31 L32 I33 I34 G35 R38 N39 P40 S41 L42 K43 Q44 Q45 L46 F47 S48 I51 L52 G53 F54 A55 L56 S57 E58 A59 M60 G61 L62 F63

C64 L65 M66 V67 A68 F69 L70 I71 L72 F73 A74 M75

• Molecule 8: ATP synthase F(0) complex subunit C1, mitochondrial

Chain Q:

51%

68%

32%

D1 I2 D3 T4 A5 F8 I9 G10 A11 G12 A13 A14 T15 V16 G17 V18 A19 G20 S21 G22 A23 G24 I25 G26 T27 V28 F29 G30 S31 L32 I33 I34 G35 Y36 S41 L42 K43 Q44 Q45 L46 F47 S48 Y49 A50 I51 L52 G53 F54 A55 L56 S57 E58 A59 M60 G61 L62 F63 C64

L65 M66 V67 A68 F69 L70 I71 L72 F73 A74 M75

• Molecule 8: ATP synthase F(0) complex subunit C1, mitochondrial

Chain R:

32%

63%

37%

D1 I2 D3 K7 F8 I9 G10 A11 G12 A13 A14 T15 V16 A19 G20 S21 G22 A23 G24 I25 G26 T27 V28 F29 I33 I34 N39 L42 Q45 L46 F47 I51 A55 E58 A59 M60 G61 L62 F63 C64 L65 M66 V67 A68 F69 L70 I71 L72 F73 A74 M75

• Molecule 9: ATP synthase peripheral stalk subunit OSCP, mitochondrial

Chain S:

88%   11%

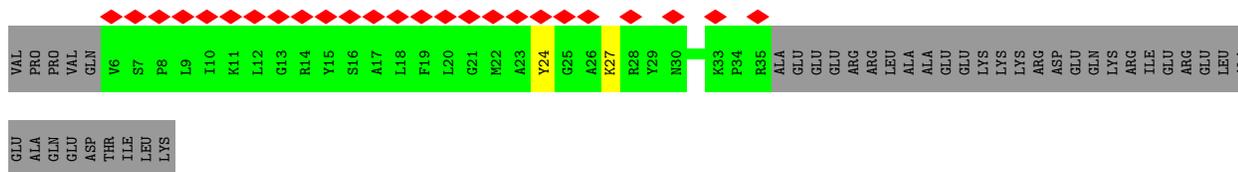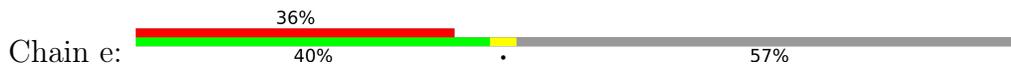F1 Y12 E15 G16 L39 V42 I45 L88 T122 L126 L134 V137 S143 Q146 I163 V171 D172 M173 S174 A175 K176 T177 K178 I179 Q180 M186 R187 E188 ILE LEU

• Molecule 10: ATP synthase F(0) complex subunit a

62%

Chain a:

67%   33%

M1 N2 E3 N4 L5 F6 T7 S8 F9 I10 T11 P12 V13 I14 L15 G16 L17 P18 L19 V20 T21 L22 I23 V24 L25 F26 P27 S28 L29 L30 F31 P32 T33 S34 N35 R36 L37 V38 S39 N40 R41 F42 V43 T44 L45 Q46 Q47 W48 M49 L50 Q51 L52 K55 M58 S59 I60 H61

K64 G65 Q66 T67 W68 T69 L70 M71 L72 M73 S74 L75 I76 L77 F78 I79 G80 S81 T82 N83 L84 L85 G86 L87 L88 P89 H90 S91 F92 T93 P94 T95 Q96 Q97 L98 S99 M100 N101 M104 A105 I106 P107 L108 W109 A110 G111 A112 V113 I114 T115 G116 F117 R118 N119 K120 T121 K122 A123 S124

L125 A126 H127 F128 L129 P130 Q131 G132 T133 L137 I138 P139 M140 L141 V142 I143 I144 E145 T146 I147 S148 L149 F150 I151 Q152 P153 M154 A155 L156 A157 V158 R159 L160 T161 A162 N163 I164 T165 A166 G167 H168 L169 L170 I171 H172 L173 I174 G175 G176 A177 T178 L179 A180 L181 M182 S183 I184 S185 T186

T187 T188 A189 L190 I191 I192 F193 T194 I195 L196 I197 L198 L199 T200 I201 L202 E203 F204 A205 V206 A207 M208 I209 Q210 T215 L216 L217 V218 L222 H223 D224 N225 T226

• Molecule 11: ATP synthase peripheral stalk subunit b, mitochondrial

45%

Chain b:

75%   21%

PRO VAL PRO PRO L5 P6 E7 H8 G9 G10 K11 V12 R13 F14 G15 L16 I17 P18 E19 E20 F21 F22 Q23 Y26 G30 V31 T32 G33 P34 Y35 V36 L37 G38 T39 G40 L41 I42 L43 Y44 L45 L46 S47 K48 E49 I50 Y51 V52 I53 T54 P55 E56 T57 F58 S59 A60 I61 S62 T63

I64 G65 F66 L67 V68 Y69 I70 V71 K72 K73 Y74 G75 A76 S77 V78 G79 E80 F81 A82 D83 K84 L85 N86 E87 Q88 K89 I90 A91 Q92 L93 E94 E95 V96 K97 Q98 A99 S100 I101 K102 Q103 I104 Q105 D106 A107 I108 D109 M110 E111 K112 S113 Q114 Q115 A116 L117 V118 L124 F125 N130

M134 H145 R146 R149 L155 V161 M164 M165 Q166 K168 E169 Q170 M173 I174 N175 W176 R180 V181 E190 Q209 ALA GLN PRO VAL MET

• Molecule 12: ATP synthase peripheral stalk subunit d, mitochondrial

45%

Chain d:

76%   21%

ALA GLY ARG K4 L5 A6 L7 K8 T9 I10 D11 F15 I19 P20 R21 N22 Q23 K24 A27 N28 T36 L37 T38 S39 R40 T43 L44 P45 E46 K47 P48 P49 A50 I51 D52 K62 A63 V66 F69 A75 L76 I80 P81 E82 A87 Q88 A91

K94 E95 D96 S99 C100 F103 L104 T105 Q106 S107 K108 T109 R110 I111 Q112 E113 Y114 E115 K116 E117 L118 E119 K120 M121 R122 N123 I124 I125 P126 F127 D128 Q129 M130 T131 I132 E133 D134 L135 N136 E137 V138 F139 P140 E141 T142 K143 L144 D145 K146 K147 K148 Y149 P150 Y151 W152 P153 H154 R155

P156 I157 GLU THR LEU

• Molecule 13: ATP synthase F(0) complex subunit e, mitochondrial

Chain e:

36%

40%   ·   57%

VAL PRO PRO VAL GLN V6 S7 P8 L9 I10 K11 L12 G13 R14 Y15 S16 A17 L18 F19 L20 G21 M22 A23 Y24 G25 A26 K27 R28 Y29 N30 K33 P34 R35 ALA GLU GLU ARG LEU ALA ALA GLU GLU LYS LYS ARG ASP GLN GLN LYS ARG ILE GLU ARG GLU LEU ALA

GLU ALA GLN GLU ASP THR ILE LEU LYS

• Molecule 14: ATP synthase F(0) complex subunit f, mitochondrial

Chain f:

48%

79%   11%   9%

ALA SER VAL VAL PRO LEU LYS GLU K9 K10 L11 L12 E13 V14 K15 L16 G17 E18 L19 W22 I23 L24 M25 R26 D27 F28 S31 G32 I33 A34 Q38 Y41 Y42 Y45 N46 K47 Y48 V49 K53 G54 S55 I56 A57 G58 L59 S60 M61 V62 L63 A64 A65 Y66 V67 F68

L69 N70 Y71 G72 R73 S74 Y75 L78 R84 K85 Y86 H87

• Molecule 15: ATP synthase F(0) complex subunit g, mitochondrial

Chain g:

59%

66%   12%   23%

ALA GLU PHE VAL ARG ASN LEU ALA GLU LYS ALA PRO ALA LEU VAL ASN ALA ALA VAL T20 Y21 S22 K23 P24 R25 L26 A27 T28 F29 W30 Y31 Y32 A33 K34 V35 E36 L37 V38 P39 P40 T41 P42 A43 E44 I45 P46 T47 A48 I49 Q50 S51 L52 K53 K54 I55 I56 N57 S58 A59 K60

T61 G62 S63 F64 K65 Q66 L67 T68 V69 K70 E71 A72 L73 L74 N75 G76 L77 V78 A79 T80 E81 V82 W83 M84 W85 F86 Y87 V88 G89 E90 I91 I92 G93 K94 R95 G96 I97 I98 GLY TYR ASP VAL

• Molecule 16: ATP synthase peripheral stalk subunit F6, mitochondrial

Chain h:

12%

57%   25%   18%

ASN LYS GLU LEU D5 Q8 K9 L10 F11 V12 D13 K14 I15 R16 R19 T20 K21 R22 G26 A31 G32 P33 E34 D38 L39 E42 L43 F44 K45 L46 K47 Q48 M49 K52 A53 D54 N60 P66 LYS PHE GLU VAL VAL GLU LYS PRO GLN SER

• Molecule 17: ATP synthase F(0) complex subunit j, mitochondrial

Chain j:

47%

53%   22%   5%   20%

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MET L2 Q3 S4 L5 I6 V9 W10 I11 P12 M13 K14 P15 Y16 Y17 T18 Q19 A20 Y21 Q22 E23 I24 W25 V26 G27 T28 G29 L30 M31 A32 Y33 I34 V35 Y36 K37 R44 S45 K46 A47 L48 K49 ALA SER SER ALA ALA PRO ALA HIS GLY HIS HIS

• Molecule 18: ATP synthase F(0) complex subunit k, mitochondrial

49%

Chain k:

54%   5%   40%

ALA GLY PRO GLU ALA ASP ALA GLN PHE HIS PHE THR GLY I14 K15 K16 Y17 F18 N19 S20 Y21 T22 L23 T24 G25 R26 M27 N28 C29 V30 L31 A32 T33 Y34 G35 S36 I37 A38 L39 I40 V41 L42 Y43 F44 K45 L46 R47 SER LYS LYS THR PRO ALA VAL LYS ALA THR
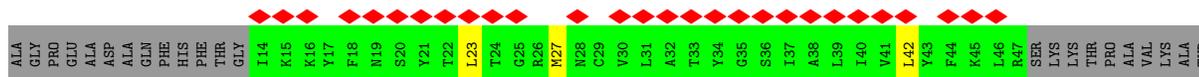
4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	328822	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 $(e^-/\text{Å}^2)$	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.956	Depositor
Minimum map value	-1.382	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.033	Depositor
Recommended contour level	0.2	Depositor
Map size (Å)	654.0, 654.0, 654.0	wwPDB
Map dimensions	450, 450, 450	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.4533334, 1.4533334, 1.4533334	Depositor

5   Model quality ⓘ

5.1   Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ATP, MG, ADP, M3L

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	8	0.15	0/307	0.56	0/415
2	A	0.27	0/3921	0.53	0/5290
2	B	0.17	0/3761	0.42	0/5074
2	C	0.20	0/3885	0.43	0/5242
3	D	0.24	0/3616	0.47	0/4906
3	E	0.21	0/3596	0.46	0/4879
3	F	0.18	0/3596	0.40	0/4879
4	G	0.15	0/2141	0.38	0/2876
5	H	0.18	0/982	0.58	0/1337
6	I	0.17	0/374	0.51	0/501
7	J	0.22	0/374	0.63	0/495
8	K	0.14	0/526	0.41	0/711
8	L	0.15	0/526	0.41	0/711
8	M	0.19	0/522	0.60	0/705
8	N	0.14	0/525	0.38	0/709
8	O	0.42	0/525	0.60	0/709
8	P	0.17	0/534	0.48	0/720
8	Q	0.19	0/531	0.54	0/716
8	R	0.13	0/535	0.36	0/721
9	S	0.12	0/1464	0.36	0/1969
10	a	0.16	0/1731	0.47	0/2369
11	b	0.16	0/1646	0.45	0/2214
12	d	0.13	0/1254	0.38	0/1705
13	e	0.13	0/210	0.40	0/283
14	f	0.13	0/639	0.40	0/857
15	g	0.13	0/581	0.43	0/790
16	h	0.19	0/526	0.63	0/707
17	j	0.71	0/358	1.03	1/482 (0.2%)
18	k	0.09	0/265	0.34	0/356
All	All	0.21	0/39451	0.47	1/53328 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
17	j	13	MET	CA-CB-CG	7.17	128.44	114.10

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	8	298	0	308	24	0
2	A	3870	0	3973	20	0
2	B	3710	0	3814	72	0
2	C	3834	0	3937	46	0
3	D	3558	0	3606	41	0
3	E	3539	0	3593	24	0
3	F	3539	0	3592	43	0
4	G	2115	0	2185	19	0
5	H	970	0	972	25	0
6	I	369	0	395	21	0
7	J	370	0	361	1	0
8	K	529	0	550	13	0
8	L	529	0	550	18	0
8	M	525	0	532	20	0
8	N	528	0	541	42	0
8	O	528	0	541	49	0
8	P	537	0	556	28	0
8	Q	534	0	547	38	0
8	R	538	0	559	29	0
9	S	1447	0	1557	20	0
10	a	1694	0	1755	66	0
11	b	1619	0	1609	35	0
12	d	1224	0	1198	35	0
13	e	207	0	200	1	0
14	f	624	0	603	8	0
15	g	570	0	564	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
16	h	514	0	495	19	0
17	j	352	0	353	13	0
18	k	261	0	260	2	0
19	A	31	0	12	0	0
19	B	31	0	11	28	0
19	C	31	0	12	6	0
19	D	31	0	12	6	0
20	A	1	0	0	0	0
20	B	1	0	0	0	0
20	C	1	0	0	0	0
20	D	1	0	0	0	0
20	F	1	0	0	0	0
21	F	27	0	12	4	0
All	All	39088	0	39765	637	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 8.

All (637) 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)
2:B:373:ARG:HG3	3:F:424:PHE:CE1	1.12	1.60
8:R:47:PHE:CE1	8:R:51:ILE:HD11	1.38	1.54
2:B:373:ARG:HG3	3:F:424:PHE:CZ	1.51	1.45
8:R:47:PHE:CZ	8:R:51:ILE:HD11	1.57	1.39
2:B:174:GLY:CA	19:B:601:ATP:H5'2	1.49	1.37
2:B:373:ARG:CG	3:F:424:PHE:CE1	2.07	1.35
2:B:174:GLY:HA2	19:B:601:ATP:C5'	1.57	1.33
2:B:373:ARG:CG	3:F:424:PHE:CZ	2.13	1.26
8:N:29:PHE:CZ	8:O:49:TYR:O	1.92	1.22
2:B:373:ARG:CD	21:F:501:ADP:O3'	1.88	1.21
2:C:25:LEU:HD12	9:S:171:VAL:CG2	1.72	1.20
8:R:47:PHE:CE1	8:R:51:ILE:CD1	2.25	1.18
12:d:19:ILE:HD13	12:d:27:ALA:CB	1.76	1.16
8:Q:32:LEU:HD21	8:Q:50:ALA:CB	1.76	1.15
2:B:174:GLY:CA	19:B:601:ATP:C5'	2.18	1.13
6:I:6:GLN:CD	8:N:40:PRO:HG2	1.74	1.13
8:Q:32:LEU:CD2	8:Q:50:ALA:HB2	1.79	1.12
2:B:174:GLY:HA2	19:B:601:ATP:PA	1.91	1.10
2:B:373:ARG:HD3	21:F:501:ADP:O3'	0.95	1.10
2:C:25:LEU:CD1	9:S:171:VAL:HG23	1.80	1.10

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:d:19:ILE:HD13	12:d:27:ALA:HB2	1.23	1.09
2:B:432:GLN:HB2	19:B:601:ATP:N6	1.67	1.09
2:C:25:LEU:HD12	9:S:171:VAL:HG23	1.29	1.08
2:C:25:LEU:CD1	9:S:171:VAL:CG2	2.30	1.08
2:B:175:LYS:N	19:B:601:ATP:O1A	1.87	1.07
2:B:432:GLN:OE1	19:B:601:ATP:N7	1.88	1.05
8:Q:32:LEU:CD2	8:Q:50:ALA:CB	2.32	1.05
2:B:373:ARG:CD	3:F:424:PHE:CZ	2.41	1.01
2:B:373:ARG:CG	3:F:424:PHE:HE1	1.59	1.01
1:8:34:TYR:OH	12:d:132:ILE:HG21	1.59	1.01
2:B:432:GLN:CD	19:B:601:ATP:N7	2.20	0.99
8:N:29:PHE:CE2	8:N:33:ILE:HD11	1.97	0.99
2:B:174:GLY:CA	19:B:601:ATP:PA	2.51	0.99
6:I:6:GLN:NE2	8:N:40:PRO:HG2	1.76	0.99
8:R:47:PHE:CZ	8:R:51:ILE:CD1	2.41	0.98
2:B:174:GLY:N	19:B:601:ATP:O2A	1.95	0.97
2:B:174:GLY:HA3	19:B:601:ATP:H5'2	1.45	0.96
2:B:373:ARG:HD2	3:F:424:PHE:CZ	2.00	0.96
8:N:29:PHE:HZ	8:O:49:TYR:O	1.48	0.96
2:B:373:ARG:CG	3:F:424:PHE:HZ	1.72	0.95
3:F:161:GLY:N	21:F:501:ADP:O1A	1.90	0.95
2:B:432:GLN:OE1	19:B:601:ATP:C8	2.20	0.95
8:N:29:PHE:HZ	8:O:49:TYR:C	1.75	0.95
2:B:174:GLY:HA2	19:B:601:ATP:O5'	1.67	0.94
8:Q:32:LEU:HD21	8:Q:50:ALA:HB2	1.40	0.93
1:8:34:TYR:OH	12:d:132:ILE:CG2	2.15	0.93
2:B:373:ARG:HD3	21:F:501:ADP:C3'	1.98	0.93
8:N:25:ILE:HD12	8:N:54:PHE:CD1	2.03	0.93
2:C:432:GLN:NE2	19:C:601:ATP:C6	2.37	0.92
2:C:174:GLY:HA2	19:C:601:ATP:O2A	1.71	0.91
8:N:25:ILE:HD12	8:N:54:PHE:CE1	2.06	0.89
12:d:19:ILE:CD1	12:d:27:ALA:CB	2.50	0.89
8:Q:32:LEU:HD22	8:Q:50:ALA:HB2	1.55	0.88
2:B:174:GLY:N	19:B:601:ATP:H5'2	1.88	0.88
2:C:25:LEU:HD12	9:S:171:VAL:HG22	1.56	0.86
8:O:72:LEU:HD11	8:O:73:PHE:CE2	2.10	0.86
2:C:390:MET:HE1	2:C:445:ILE:HD12	1.57	0.85
2:B:174:GLY:H	19:B:601:ATP:PA	2.00	0.84
8:N:29:PHE:CE2	8:O:49:TYR:O	2.30	0.84
2:B:174:GLY:N	19:B:601:ATP:PA	2.52	0.83
2:B:174:GLY:C	19:B:601:ATP:O1A	2.20	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:N:29:PHE:CZ	8:O:49:TYR:C	2.52	0.83
8:Q:32:LEU:CD2	8:Q:50:ALA:HB1	2.09	0.82
2:B:174:GLY:CA	19:B:601:ATP:O1A	2.27	0.82
2:B:432:GLN:HB2	19:B:601:ATP:C6	2.13	0.82
12:d:19:ILE:CD1	12:d:27:ALA:HB1	2.10	0.82
2:B:411:ASP:HB3	2:B:415:GLN:HG2	1.60	0.81
8:Q:32:LEU:CD1	8:Q:50:ALA:HB1	2.10	0.80
8:O:7:LYS:HB3	8:O:72:LEU:HA	1.64	0.80
2:B:373:ARG:CD	3:F:424:PHE:HZ	1.87	0.79
10:a:156:LEU:HD21	10:a:217:LEU:HD22	1.64	0.79
5:H:105:LEU:HG	5:H:109:LYS:HZ1	1.47	0.78
2:B:432:GLN:OE1	19:B:601:ATP:C5	2.36	0.78
3:E:279:VAL:HG12	3:E:279:VAL:O	1.85	0.77
8:L:33:ILE:HG13	8:M:28:VAL:HG22	1.65	0.77
6:I:6:GLN:NE2	8:N:40:PRO:CG	2.48	0.77
10:a:71:MET:HA	10:a:71:MET:HE2	1.67	0.77
2:B:432:GLN:HB2	19:B:601:ATP:HN61	1.48	0.76
2:C:432:GLN:NE2	19:C:601:ATP:C5	2.54	0.75
3:F:198:HIS:HA	3:F:201:ILE:HG12	1.69	0.75
2:B:373:ARG:HD2	3:F:424:PHE:HZ	1.44	0.75
2:B:210:ARG:HB3	3:E:126:MET:HE1	1.66	0.75
8:Q:32:LEU:HD22	8:Q:50:ALA:CB	2.13	0.74
8:O:72:LEU:HD11	8:O:73:PHE:CZ	2.22	0.74
10:a:32:PRO:HD2	10:a:46:GLN:OE1	1.86	0.74
8:P:16:VAL:HG22	8:Q:13:ALA:O	1.88	0.73
8:Q:19:ALA:HB1	8:R:20:GLY:HA3	1.69	0.73
8:O:11:ALA:HB2	8:O:72:LEU:HB3	1.69	0.73
2:C:25:LEU:HD13	9:S:171:VAL:CG2	2.18	0.72
8:Q:32:LEU:HD11	8:Q:50:ALA:HB1	1.71	0.72
3:D:63:MET:HE1	3:D:231:ARG:HG3	1.71	0.72
2:C:406:PHE:CD1	2:C:407:GLY:N	2.58	0.71
3:D:421:ALA:HB2	19:D:501:ATP:N6	2.05	0.71
2:B:432:GLN:CB	19:B:601:ATP:N6	2.51	0.71
3:D:164:VAL:HG11	19:D:501:ATP:N7	2.06	0.71
2:B:432:GLN:CD	19:B:601:ATP:C8	2.70	0.69
3:F:346:PRO:HG2	3:F:415:SER:HA	1.74	0.69
8:N:25:ILE:CD1	8:N:54:PHE:CE1	2.76	0.69
2:B:210:ARG:HD3	2:B:235:THR:HG21	1.75	0.69
12:d:109:THR:HA	12:d:112:GLN:HE21	1.58	0.69
3:D:435:LYS:HE2	3:D:435:LYS:H	1.58	0.68
8:O:11:ALA:HB1	8:O:72:LEU:HD23	1.75	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:P:35:GLY:HA2	8:P:38:ARG:HB2	1.76	0.68
3:F:237:LEU:HD11	3:F:292:MET:SD	2.34	0.68
2:C:373:ARG:NH2	3:D:189:ARG:HH22	1.92	0.67
2:A:12:LEU:HD22	9:S:88:LEU:HD21	1.76	0.67
1:8:21:PHE:CD1	10:a:71:MET:HE1	2.30	0.67
8:L:34:ILE:HD13	8:M:31:SER:HB3	1.76	0.67
11:b:161:VAL:HG12	11:b:165:MET:HE3	1.76	0.67
2:B:174:GLY:HA2	19:B:601:ATP:O1A	1.94	0.67
15:g:22:SER:O	15:g:26:LEU:HD12	1.95	0.66
17:j:14:LYS:HA	17:j:17:TYR:CE1	2.30	0.66
2:B:281:MET:HA	2:B:281:MET:HE3	1.78	0.66
8:N:29:PHE:HZ	8:O:49:TYR:CA	2.07	0.66
1:8:21:PHE:HD1	10:a:71:MET:HE1	1.61	0.66
8:Q:32:LEU:HD21	8:Q:50:ALA:HB1	1.68	0.66
8:O:33:ILE:HD11	8:P:46:LEU:HB3	1.78	0.65
3:E:393:MET:HE1	3:E:401:LYS:HE2	1.79	0.65
17:j:16:TYR:HA	17:j:20:ALA:HB3	1.78	0.65
3:F:95:MET:HE2	3:F:99:GLY:HA2	1.78	0.65
5:H:40:THR:OG1	5:H:43:GLY:O	2.15	0.65
3:E:460:VAL:HG21	3:E:466:ALA:HB2	1.79	0.65
2:B:373:ARG:CB	3:F:424:PHE:HE1	2.10	0.65
2:A:244:TYR:HB2	2:A:281:MET:HE1	1.77	0.64
2:B:373:ARG:HG3	3:F:424:PHE:HE1	0.82	0.64
8:L:7:LYS:HD2	8:L:72:LEU:HA	1.78	0.64
10:a:98:LEU:HD11	10:a:157:ALA:HB1	1.78	0.64
2:B:373:ARG:HG2	2:B:373:ARG:O	1.97	0.64
10:a:100:MET:HB3	10:a:104:MET:HE1	1.80	0.63
6:I:36:LYS:HG3	6:I:37:THR:HG23	1.79	0.63
17:j:14:LYS:HA	17:j:17:TYR:HE1	1.63	0.63
8:K:56:LEU:HD13	8:R:29:PHE:HE2	1.62	0.63
8:N:25:ILE:HD12	8:N:54:PHE:HD1	1.61	0.63
8:O:17:GLY:HA3	8:O:64:CYS:SG	2.38	0.63
11:b:170:GLN:O	11:b:174:ILE:HG12	1.98	0.63
2:A:244:TYR:CB	2:A:281:MET:HE1	2.28	0.63
2:C:174:GLY:HA2	19:C:601:ATP:H5'1	1.80	0.62
10:a:23:ILE:HG23	10:a:85:LEU:HD13	1.81	0.62
8:O:72:LEU:HD12	8:O:73:PHE:CG	2.34	0.62
11:b:181:VAL:HG11	16:h:14:LYS:HE3	1.80	0.62
1:8:32:ASN:HB3	12:d:144:LEU:HD22	1.80	0.62
8:O:11:ALA:CB	8:O:72:LEU:HD23	2.29	0.62
8:O:19:ALA:HB1	8:P:20:GLY:H	1.64	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
16:h:42:GLU:O	16:h:46:LEU:HD12	1.99	0.62
8:R:24:GLY:O	8:R:28:VAL:HG13	2.00	0.62
10:a:70:LEU:HA	10:a:73:MET:HB2	1.82	0.62
2:C:218:LYS:HD3	3:F:128:VAL:HG21	1.83	0.61
2:C:373:ARG:NH1	3:D:159:GLY:CA	2.63	0.61
8:Q:21:SER:HA	8:Q:60:MET:HE2	1.82	0.61
8:P:26:GLY:HA2	8:P:29:PHE:CE1	2.35	0.61
5:H:122:ALA:HB3	5:H:128:ARG:HE	1.64	0.61
8:P:51:ILE:HA	8:P:54:PHE:CE2	2.36	0.61
8:R:70:LEU:HA	8:R:74:ALA:HB3	1.81	0.61
3:D:164:VAL:HG11	19:D:501:ATP:C8	2.36	0.61
5:H:105:LEU:HG	5:H:109:LYS:NZ	2.16	0.61
5:H:132:GLN:HA	5:H:135:ILE:HG12	1.83	0.61
11:b:181:VAL:HG21	16:h:14:LYS:HD3	1.82	0.61
9:S:163:ILE:HD11	9:S:174:SER:HB3	1.82	0.60
2:B:211:SER:HA	3:E:126:MET:SD	2.42	0.60
2:C:373:ARG:HH21	3:D:189:ARG:HH22	1.47	0.60
8:K:52:LEU:O	8:K:56:LEU:HD12	2.01	0.60
12:d:39:SER:O	12:d:43:THR:HG23	2.01	0.60
10:a:184:ILE:HG22	10:a:185:SER:H	1.66	0.60
3:D:164:VAL:HG21	3:D:345:TYR:CE2	2.37	0.60
17:j:11:ILE:HG13	17:j:12:PRO:HD3	1.83	0.59
1:8:17:PHE:HA	1:8:21:PHE:CE2	2.38	0.59
8:O:72:LEU:HD12	8:O:73:PHE:CD1	2.37	0.59
8:L:51:ILE:HG13	10:a:133:THR:HG22	1.84	0.59
8:Q:33:ILE:HG23	8:R:46:LEU:HD22	1.84	0.59
3:D:462:PRO:HG2	3:D:465:GLU:HG3	1.85	0.59
3:E:310:ILE:HD11	3:E:325:THR:HG21	1.85	0.59
8:N:8:PHE:HB2	8:O:6:ALA:HB1	1.85	0.59
10:a:98:LEU:HD12	10:a:101:ASN:HB2	1.84	0.59
3:F:298:THR:HG23	3:F:303:SER:HA	1.84	0.58
1:8:34:TYR:OH	12:d:132:ILE:HG23	2.00	0.58
8:M:5:ALA:HA	8:N:6:ALA:HB2	1.83	0.58
8:Q:57:SER:O	8:Q:60:MET:HG2	2.03	0.58
11:b:173:MET:HG3	16:h:21:LYS:HE2	1.85	0.58
5:H:109:LYS:O	5:H:113:GLU:HG2	2.03	0.58
10:a:76:ILE:HG12	10:a:215:THR:HG21	1.85	0.58
8:N:5:ALA:HA	8:O:6:ALA:HB2	1.85	0.58
10:a:167:GLY:HA3	10:a:203:GLU:HG3	1.85	0.58
8:Q:36:TYR:CE1	8:Q:43:M3L:HG2	2.39	0.58
1:8:17:PHE:HA	1:8:21:PHE:CD2	2.38	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:H:106:GLY:HA2	5:H:109:LYS:HE2	1.85	0.58
8:N:25:ILE:HD12	8:N:54:PHE:HE1	1.66	0.58
8:K:23:ALA:O	8:K:27:THR:HG23	2.04	0.58
8:N:65:LEU:HD13	8:O:63:PHE:HB3	1.85	0.58
8:P:33:ILE:HD13	8:Q:32:LEU:HD23	1.86	0.58
10:a:61:HIS:CE1	10:a:223:HIS:HB2	2.38	0.58
2:B:269:ASP:HA	2:B:326:VAL:HB	1.86	0.57
3:D:29:LEU:HD21	3:D:56:SER:HA	1.86	0.57
8:M:67:VAL:O	8:M:71:ILE:HD12	2.04	0.57
11:b:80:GLU:O	11:b:84:LYS:HG2	2.04	0.57
3:E:15:ALA:HB3	3:E:22:ASP:HB3	1.86	0.57
2:C:210:ARG:HG3	2:C:235:THR:HG21	1.85	0.57
11:b:155:LEU:HD13	12:d:69:PHE:HD2	1.70	0.57
10:a:42:PHE:HE2	14:f:59:LEU:HB3	1.70	0.56
10:a:106:ILE:HG12	10:a:153:PRO:HB2	1.87	0.56
1:8:33:PHE:HZ	10:a:47:GLN:HB3	1.70	0.56
2:B:432:GLN:CB	19:B:601:ATP:HN61	2.14	0.56
2:C:207:GLY:HA3	2:C:273:LYS:HD3	1.87	0.56
5:H:124:ASP:HB3	5:H:127:THR:HG23	1.87	0.56
8:N:29:PHE:CZ	8:O:49:TYR:HB3	2.40	0.56
8:P:25:ILE:HG13	8:P:29:PHE:CE2	2.40	0.56
8:Q:25:ILE:HA	8:Q:28:VAL:HG12	1.87	0.56
2:C:12:LEU:HD21	9:S:186:MET:HE3	1.87	0.56
2:B:383:MET:HE1	2:B:445:ILE:CD1	2.36	0.56
2:A:356:LEU:HB3	2:A:361:ILE:HG13	1.87	0.56
8:O:72:LEU:CD1	8:O:73:PHE:CE1	2.89	0.56
12:d:15:PHE:CE2	12:d:19:ILE:HD11	2.40	0.56
8:M:19:ALA:HB2	8:N:17:GLY:HA2	1.87	0.56
2:C:406:PHE:CG	2:C:407:GLY:N	2.73	0.55
8:R:47:PHE:CE1	8:R:51:ILE:CG1	2.89	0.55
10:a:19:LEU:HD12	14:f:73:ARG:HG3	1.88	0.55
1:8:13:ILE:HA	10:a:100:MET:HE1	1.89	0.55
2:A:166:LEU:HB2	2:A:346:THR:HG21	1.88	0.54
3:D:298:THR:HG23	3:D:303:SER:HA	1.90	0.54
8:O:10:GLY:HA3	8:O:71:ILE:HG21	1.88	0.54
10:a:92:PHE:HZ	10:a:97:GLN:HE22	1.53	0.54
2:B:373:ARG:NH1	3:F:191:ARG:HH12	2.05	0.54
8:N:25:ILE:CD1	8:N:54:PHE:HE1	2.20	0.54
2:B:105:GLY:HA2	2:B:226:MET:HE3	1.89	0.54
18:k:23:LEU:HD11	18:k:27:MET:HE2	1.89	0.54
5:H:105:LEU:HD13	5:H:145:LEU:HB2	1.88	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:I:6:GLN:CD	8:N:40:PRO:CG	2.65	0.54
2:B:157:VAL:O	2:B:157:VAL:HG23	2.08	0.54
10:a:43:VAL:O	10:a:46:GLN:HG2	2.07	0.54
3:D:164:VAL:HG21	3:D:345:TYR:HE2	1.72	0.54
4:G:108:VAL:HG22	4:G:128:PHE:HD1	1.73	0.54
11:b:50:ILE:HD12	11:b:50:ILE:H	1.72	0.54
4:G:71:VAL:HG22	4:G:108:VAL:HB	1.90	0.54
10:a:108:LEU:HD13	10:a:218:VAL:HG11	1.90	0.54
2:B:373:ARG:CD	3:F:424:PHE:CE1	2.83	0.53
2:B:174:GLY:HA3	19:B:601:ATP:C5'	2.14	0.53
3:D:345:TYR:O	3:D:346:PRO:C	2.51	0.53
3:E:279:VAL:O	3:E:279:VAL:CG1	2.56	0.53
8:N:16:VAL:HG13	8:O:16:VAL:HG21	1.90	0.53
8:N:62:LEU:HD12	10:a:206:VAL:HG21	1.91	0.53
8:R:29:PHE:O	8:R:33:ILE:HG23	2.08	0.53
2:C:373:ARG:HH11	3:D:159:GLY:HA3	1.72	0.53
11:b:134:MET:SD	12:d:37:LEU:HB3	2.48	0.53
6:I:29:GLU:HG2	6:I:30:PHE:CD1	2.43	0.53
3:D:247:GLU:HB3	3:D:249:GLN:HG2	1.91	0.53
8:O:72:LEU:HD11	8:O:73:PHE:CD2	2.43	0.53
10:a:68:TRP:CZ3	10:a:222:LEU:HD13	2.43	0.52
8:K:57:SER:HA	8:R:25:ILE:HD11	1.91	0.52
8:N:19:ALA:HA	8:O:20:GLY:HA3	1.90	0.52
8:N:36:TYR:HE1	8:N:43:M3L:HB3	1.74	0.52
8:N:63:PHE:O	8:N:67:VAL:HG23	2.09	0.52
10:a:170:LEU:HB3	10:a:199:LEU:HD21	1.91	0.52
11:b:84:LYS:HA	11:b:87:GLU:HB3	1.90	0.52
1:8:25:GLN:HG2	10:a:70:LEU:HD23	1.92	0.52
5:H:32:ASN:HB3	5:H:34:ARG:HH22	1.74	0.52
8:Q:62:LEU:O	8:Q:66:MET:HG2	2.10	0.52
2:B:150:ILE:HB	2:B:153:VAL:HG12	1.92	0.52
2:C:176:THR:O	2:C:180:ILE:HG12	2.10	0.52
10:a:203:GLU:HA	10:a:206:VAL:HG12	1.90	0.52
2:C:373:ARG:NH1	3:D:159:GLY:HA2	2.24	0.52
3:F:198:HIS:CA	3:F:201:ILE:HG12	2.38	0.52
8:P:31:SER:HA	8:P:34:ILE:HG12	1.92	0.52
12:d:155:ARG:HH22	12:d:157:ILE:HG22	1.75	0.52
3:F:387:ILE:HG23	3:F:388:ILE:HD12	1.91	0.52
6:I:1:VAL:HB	8:N:39:ASN:HA	1.91	0.52
3:F:198:HIS:O	3:F:201:ILE:HG12	2.08	0.52
8:Q:36:TYR:HE1	8:Q:43:M3L:HG2	1.74	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
16:h:43:LEU:O	16:h:47:LYS:HG3	2.10	0.52
1:8:18:LEU:O	1:8:23:ILE:HG22	2.10	0.52
2:A:360:GLY:O	2:A:429:LYS:HE2	2.10	0.52
17:j:6:ILE:O	17:j:10:TRP:HB3	2.08	0.52
3:F:198:HIS:HA	3:F:201:ILE:CG1	2.39	0.51
8:L:29:PHE:O	8:L:33:ILE:HG12	2.11	0.51
8:O:36:TYR:CD1	8:O:40:PRO:HA	2.45	0.51
12:d:19:ILE:HG22	12:d:20:PRO:O	2.10	0.51
1:8:16:MET:HE1	1:8:20:LEU:HD13	1.93	0.51
4:G:44:TYR:HE1	4:G:211:ASN:OD1	1.92	0.51
8:M:30:GLY:O	8:M:34:ILE:HG22	2.10	0.51
2:B:208:GLN:NE2	19:B:601:ATP:O2G	2.43	0.51
2:C:406:PHE:HB3	4:G:118:ARG:NH1	2.25	0.51
9:S:176:LYS:O	9:S:180:GLN:HG2	2.11	0.51
12:d:36:THR:O	12:d:40:ARG:HG3	2.10	0.51
8:P:22:GLY:HA3	8:Q:60:MET:HE1	1.92	0.51
10:a:43:VAL:O	10:a:47:GLN:HG2	2.10	0.51
2:C:48:GLN:HG2	3:D:70:VAL:HG22	1.93	0.51
2:C:479:LEU:HD21	2:C:497:LEU:HD22	1.91	0.51
8:O:72:LEU:CD1	8:O:73:PHE:CD1	2.93	0.51
8:Q:41:SER:C	8:Q:43:M3L:H	2.18	0.51
8:R:42:LEU:O	8:R:46:LEU:HG	2.11	0.51
2:A:399:GLU:HG3	2:A:400:VAL:HG13	1.91	0.51
10:a:50:LEU:O	10:a:73:MET:HE1	2.11	0.51
3:D:377:ILE:HD11	3:D:403:THR:HG23	1.93	0.51
15:g:52:LEU:O	15:g:56:ILE:HG22	2.11	0.51
4:G:203:ASN:HB2	5:H:57:VAL:HG21	1.93	0.50
5:H:132:GLN:O	5:H:135:ILE:HG13	2.10	0.50
8:L:22:GLY:HA3	8:M:64:CYS:SG	2.51	0.50
2:C:342:VAL:O	2:C:346:THR:HG23	2.10	0.50
5:H:34:ARG:HB2	5:H:35:GLN:OE1	2.11	0.50
8:K:21:SER:OG	8:K:61:GLY:HA3	2.11	0.50
10:a:43:VAL:HA	10:a:46:GLN:HG2	1.93	0.50
3:D:340:ALA:O	3:D:341:GLU:C	2.54	0.50
10:a:42:PHE:CE2	14:f:59:LEU:HB3	2.45	0.50
10:a:137:LEU:O	10:a:141:LEU:HG	2.11	0.50
14:f:19:LEU:O	14:f:23:ILE:HG23	2.11	0.50
3:D:255:ILE:HG21	3:D:258:ILE:HD13	1.94	0.50
8:M:19:ALA:HB1	8:N:20:GLY:HA3	1.94	0.50
8:N:12:GLY:N	8:O:71:ILE:CD1	2.75	0.50
5:H:129:ALA:HA	5:H:132:GLN:NE2	2.25	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:b:134:MET:HB3	12:d:7:LEU:HD21	1.94	0.50
8:O:72:LEU:CD1	8:O:73:PHE:CZ	2.91	0.50
6:I:2:ALA:HB3	6:I:4:TRP:CE2	2.46	0.50
6:I:23:ARG:HE	6:I:34:ALA:HB1	1.77	0.50
8:M:52:LEU:O	8:M:56:LEU:HG	2.12	0.50
8:Q:30:GLY:O	8:Q:34:ILE:HG12	2.11	0.50
3:E:197:TYR:CZ	3:E:201:ILE:HD11	2.47	0.49
8:L:32:LEU:HD23	8:L:33:ILE:HD13	1.94	0.49
10:a:198:LEU:O	10:a:202:LEU:HG	2.12	0.49
2:C:410:LEU:HB2	2:C:414:THR:HB	1.94	0.49
8:O:72:LEU:HD12	8:O:72:LEU:C	2.38	0.49
10:a:58:MET:HE1	10:a:61:HIS:HB2	1.94	0.49
3:E:257:ASN:HD21	3:E:311:TYR:HB2	1.77	0.49
8:L:60:MET:N	8:L:60:MET:HE2	2.28	0.49
8:O:14:ALA:HB3	8:O:68:ALA:HB2	1.94	0.49
15:g:90:GLU:O	15:g:94:LYS:HB2	2.12	0.49
16:h:46:LEU:HA	16:h:49:MET:SD	2.52	0.49
3:D:346:PRO:HG3	3:D:418:PHE:CZ	2.48	0.49
4:G:232:MET:HE2	4:G:232:MET:HA	1.93	0.49
8:Q:32:LEU:HD21	8:Q:50:ALA:CA	2.40	0.49
10:a:48:TRP:CD2	11:b:81:PHE:HZ	2.31	0.49
2:A:390:MET:HE2	2:A:390:MET:HA	1.94	0.49
11:b:176:TRP:CZ3	16:h:21:LYS:HB2	2.47	0.49
9:S:178:LYS:HB2	16:h:10:LEU:HD11	1.94	0.49
16:h:19:ARG:HG3	16:h:22:ARG:HH12	1.78	0.49
17:j:14:LYS:HD2	17:j:17:TYR:HE1	1.77	0.49
4:G:60:PRO:HG2	4:G:63:LYS:HG3	1.95	0.49
6:I:46:LYS:HD3	6:I:47:VAL:H	1.78	0.49
8:P:16:VAL:CG2	8:Q:13:ALA:O	2.59	0.49
5:H:48:LEU:HD23	8:R:39:ASN:HD21	1.77	0.49
8:M:23:ALA:O	8:M:27:THR:HG22	2.12	0.49
8:O:5:ALA:O	8:O:9:ILE:HD12	2.12	0.49
11:b:130:ASN:HB3	12:d:7:LEU:HD22	1.95	0.49
2:C:432:GLN:NE2	19:C:601:ATP:N6	2.59	0.48
11:b:168:LYS:HG2	16:h:39:LEU:HD21	1.94	0.48
8:K:20:GLY:H	8:R:19:ALA:HB1	1.78	0.48
8:Q:22:GLY:HA2	8:Q:25:ILE:HG12	1.95	0.48
10:a:32:PRO:HG2	10:a:43:VAL:HG22	1.94	0.48
12:d:135:LEU:HA	12:d:138:VAL:HG22	1.94	0.48
18:k:42:LEU:HD12	18:k:42:LEU:H	1.77	0.48
8:O:48:SER:O	8:O:52:LEU:HG	2.14	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:P:52:LEU:O	8:P:56:LEU:HD13	2.14	0.48
1:8:34:TYR:CZ	12:d:132:ILE:HD12	2.48	0.48
8:N:43:M3L:HA	8:N:46:LEU:HD12	1.95	0.48
12:d:62:LYS:O	12:d:66:VAL:HG22	2.13	0.48
4:G:89:MET:HE1	4:G:161:ILE:HB	1.96	0.48
12:d:108:LYS:HG3	12:d:112:GLN:NE2	2.29	0.48
2:C:453:LEU:HD12	2:C:453:LEU:H	1.79	0.48
3:E:97:VAL:HG13	3:E:98:ILE:HG23	1.95	0.48
11:b:145:HIS:NE2	12:d:45:PRO:HG2	2.28	0.48
9:S:42:VAL:HA	9:S:45:ILE:HG22	1.96	0.48
2:A:312:MET:HE3	2:A:316:PHE:HB3	1.96	0.48
10:a:163:ASN:HB2	10:a:210:GLN:OE1	2.14	0.48
2:A:278:TYR:HA	2:A:281:MET:HE3	1.96	0.48
8:L:9:ILE:HG21	8:M:6:ALA:C	2.39	0.47
8:P:26:GLY:HA2	8:P:29:PHE:CZ	2.49	0.47
11:b:68:VAL:HA	11:b:71:VAL:HG22	1.97	0.47
2:C:174:GLY:CA	19:C:601:ATP:H5'1	2.44	0.47
3:D:76:LEU:HG	3:D:77:ASP:N	2.29	0.47
7:J:40:GLU:HA	7:J:40:GLU:OE1	2.14	0.47
8:N:42:LEU:O	8:N:46:LEU:HG	2.14	0.47
8:O:11:ALA:CB	8:O:72:LEU:HB3	2.42	0.47
11:b:107:ALA:O	11:b:110:MET:HG3	2.15	0.47
2:C:406:PHE:HB3	4:G:118:ARG:HH11	1.79	0.47
8:N:12:GLY:N	8:O:71:ILE:HD13	2.30	0.47
9:S:122:THR:HG21	9:S:126:LEU:HD21	1.95	0.47
2:B:175:LYS:HG2	2:B:352:LEU:HD22	1.95	0.47
14:f:55:SER:O	14:f:59:LEU:HG	2.14	0.47
1:8:9:TRP:CD1	10:a:97:GLN:HB3	2.50	0.47
2:A:32:LEU:HD11	2:A:42:HIS:HB2	1.97	0.47
3:D:163:THR:O	3:D:164:VAL:C	2.58	0.47
3:E:408:ARG:O	3:E:412:ARG:HG2	2.15	0.47
3:F:198:HIS:O	3:F:201:ILE:CG1	2.63	0.47
3:F:233:ALA:O	3:F:237:LEU:HG	2.15	0.47
8:L:25:ILE:HA	8:L:28:VAL:HG22	1.96	0.47
8:P:18:VAL:HG12	8:Q:60:MET:HE3	1.96	0.47
8:Q:29:PHE:O	8:Q:33:ILE:HG13	2.13	0.47
10:a:44:THR:HB	11:b:85:LEU:HD23	1.97	0.47
11:b:69:TYR:HE1	11:b:73:LYS:HD2	1.79	0.47
13:e:24:TYR:HA	13:e:27:LYS:HG2	1.97	0.47
15:g:50:GLN:O	15:g:53:LYS:HG3	2.14	0.47
2:A:244:TYR:CG	2:A:281:MET:HE1	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:d:19:ILE:HG22	12:d:24:LYS:HG3	1.97	0.47
8:K:20:GLY:HA3	8:R:19:ALA:O	2.15	0.47
8:P:56:LEU:O	8:P:60:MET:HE2	2.14	0.47
10:a:148:SER:HA	10:a:151:ILE:HG22	1.96	0.47
10:a:162:ALA:HA	10:a:165:THR:HG22	1.96	0.47
8:P:18:VAL:CG1	8:Q:60:MET:HE3	2.45	0.46
10:a:1:MET:HE1	10:a:173:LEU:HD22	1.96	0.46
2:A:453:LEU:H	2:A:453:LEU:HD12	1.80	0.46
8:N:29:PHE:CD2	8:N:33:ILE:HD11	2.47	0.46
8:P:33:ILE:HD13	8:Q:32:LEU:CD2	2.45	0.46
2:B:411:ASP:CB	2:B:415:GLN:HG2	2.39	0.46
8:M:56:LEU:O	8:M:60:MET:HG2	2.14	0.46
14:f:10:LYS:O	14:f:14:VAL:HG23	2.15	0.46
2:B:155:SER:HA	2:B:383:MET:HE2	1.97	0.46
2:B:362:ARG:HB3	2:B:363:PRO:HD3	1.96	0.46
3:F:98:ILE:HG13	3:F:100:GLU:HG3	1.98	0.46
3:F:197:TYR:O	3:F:201:ILE:HG23	2.15	0.46
10:a:153:PRO:HA	10:a:156:LEU:HD12	1.97	0.46
3:D:164:VAL:HG21	3:D:345:TYR:OH	2.16	0.46
3:D:387:ILE:HG23	3:D:391:LEU:HD13	1.97	0.46
1:8:20:LEU:HD11	10:a:75:LEU:HA	1.97	0.46
5:H:132:GLN:O	5:H:136:GLU:HG2	2.16	0.46
8:L:22:GLY:HA2	8:L:25:ILE:HG12	1.98	0.46
8:M:66:MET:HA	8:M:69:PHE:CD2	2.51	0.46
8:O:36:TYR:HD1	8:O:40:PRO:HA	1.81	0.46
17:j:5:LEU:O	17:j:9:VAL:HG22	2.15	0.46
8:R:72:LEU:HG	8:R:73:PHE:CD2	2.50	0.46
2:C:327:ILE:HD11	2:C:342:VAL:HG21	1.97	0.46
8:O:56:LEU:HD12	8:O:57:SER:N	2.30	0.46
8:P:21:SER:O	8:P:25:ILE:HG22	2.15	0.46
15:g:29:PHE:HA	15:g:32:TYR:CD2	2.51	0.46
8:O:52:LEU:O	8:O:56:LEU:HG	2.15	0.45
9:S:173:MET:HE3	9:S:173:MET:HB2	1.79	0.45
10:a:87:LEU:HD13	10:a:203:GLU:OE2	2.16	0.45
2:A:424:LEU:HD13	2:A:424:LEU:HA	1.72	0.45
2:B:405:GLN:HG2	2:B:406:PHE:N	2.32	0.45
9:S:143:SER:HB3	9:S:146:GLN:HE22	1.81	0.45
6:I:43:LYS:HA	6:I:43:LYS:HD3	1.62	0.45
8:L:47:PHE:O	8:L:51:ILE:HG12	2.17	0.45
8:M:36:TYR:CZ	8:M:43:M3L:HD2	2.52	0.45
5:H:132:GLN:HA	5:H:135:ILE:CG1	2.46	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:a:61:HIS:HB3	10:a:65:GLY:HA3	1.99	0.45
10:a:87:LEU:HD12	10:a:87:LEU:O	2.17	0.45
10:a:155:ALA:O	10:a:159:ARG:HG2	2.16	0.45
2:A:244:TYR:HB2	2:A:281:MET:CE	2.43	0.45
2:C:248:TYR:HE1	2:C:305:LEU:HB2	1.81	0.45
6:I:1:VAL:HG11	8:N:40:PRO:HD2	1.98	0.45
11:b:14:PHE:HD2	11:b:17:ILE:HD12	1.81	0.45
4:G:106:ILE:HD11	4:G:125:LEU:HB2	1.98	0.45
15:g:46:PRO:HA	15:g:49:ILE:HD12	1.98	0.45
3:D:424:PHE:CD1	19:D:501:ATP:H2'	2.52	0.45
3:E:186:VAL:HG22	3:E:232:VAL:HG23	1.98	0.45
8:L:13:ALA:HB2	8:M:10:GLY:HA2	1.98	0.45
3:D:9:THR:HG23	3:D:27:GLU:HB2	1.98	0.45
3:F:198:HIS:C	3:F:201:ILE:HG12	2.41	0.45
8:L:21:SER:O	8:L:25:ILE:HG12	2.17	0.45
1:8:34:TYR:CZ	12:d:132:ILE:HG23	2.52	0.45
3:D:336:SER:HB3	3:D:339:ILE:HG12	1.98	0.45
3:D:341:GLU:O	3:D:342:LEU:C	2.59	0.45
8:M:59:ALA:O	8:M:62:LEU:HG	2.17	0.45
2:B:146:MET:HE3	2:B:146:MET:HB3	1.86	0.45
8:N:42:LEU:HG	8:N:46:LEU:HG	1.99	0.45
10:a:120:LYS:HG3	10:a:123:ALA:HB3	1.98	0.45
10:a:130:PRO:HG2	10:a:141:LEU:HD13	1.99	0.45
11:b:65:GLY:O	11:b:68:VAL:HG12	2.16	0.45
11:b:155:LEU:HD13	12:d:69:PHE:CD2	2.49	0.45
3:F:49:VAL:HA	3:F:60:THR:HG22	1.99	0.44
8:Q:26:GLY:HA2	8:R:28:VAL:HG12	1.98	0.44
17:j:16:TYR:O	17:j:17:TYR:C	2.60	0.44
17:j:13:MET:CE	17:j:16:TYR:HB2	2.48	0.44
3:D:161:GLY:O	3:D:164:VAL:HG22	2.17	0.44
4:G:85:VAL:O	4:G:89:MET:HG2	2.17	0.44
6:I:4:TRP:HB2	6:I:9:LEU:HB2	1.98	0.44
8:L:54:PHE:CD1	8:L:54:PHE:C	2.95	0.44
8:P:29:PHE:HA	8:P:32:LEU:HB3	1.99	0.44
2:C:104:LEU:HD22	2:C:228:TYR:HA	1.98	0.44
5:H:128:ARG:HA	5:H:128:ARG:HD3	1.81	0.44
8:N:21:SER:O	8:N:25:ILE:HG22	2.17	0.44
2:A:397:TYR:CG	2:A:421:GLY:HA3	2.52	0.44
3:F:343:GLY:O	3:F:344:ILE:C	2.58	0.44
4:G:19:ILE:HD13	4:G:19:ILE:HA	1.85	0.44
9:S:134:LEU:HA	9:S:137:VAL:HG12	2.00	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:198:HIS:HA	3:D:201:ILE:HG22	1.99	0.44
8:P:19:ALA:CB	8:Q:20:GLY:HA3	2.47	0.44
10:a:101:ASN:HB3	10:a:160:LEU:HD21	1.99	0.44
16:h:19:ARG:HG3	16:h:22:ARG:NH1	2.33	0.44
2:B:383:MET:HE1	2:B:445:ILE:HD12	1.99	0.44
3:E:139:VAL:HB	3:E:414:LEU:HD22	1.99	0.44
8:L:23:ALA:HA	8:M:20:GLY:HA3	1.99	0.44
3:F:153:GLY:HA3	3:F:329:LEU:HD13	2.00	0.44
1:8:24:PHE:O	1:8:28:VAL:HG13	2.17	0.44
3:D:435:LYS:H	3:D:435:LYS:CE	2.29	0.44
3:E:310:ILE:HD13	3:E:310:ILE:HA	1.93	0.44
8:Q:36:TYR:HE1	8:Q:43:M3L:HE3	1.83	0.44
3:D:186:VAL:HG22	3:D:232:VAL:HG13	1.99	0.43
8:O:72:LEU:CD1	8:O:73:PHE:CG	3.00	0.43
11:b:98:GLN:HA	11:b:101:ILE:HD12	2.00	0.43
3:E:296:ILE:HG23	3:E:304:ILE:HG22	2.00	0.43
4:G:131:VAL:HG22	6:I:42:ILE:HD12	2.00	0.43
2:B:445:ILE:O	2:B:449:VAL:HG12	2.18	0.43
3:E:126:MET:HG2	3:E:127:SER:N	2.33	0.43
3:F:29:LEU:HD21	3:F:56:SER:HA	2.00	0.43
8:O:72:LEU:CD1	8:O:73:PHE:CD2	3.01	0.43
8:Q:5:ALA:HA	8:Q:8:PHE:CE2	2.54	0.43
1:8:34:TYR:HB3	12:d:142:THR:HB	2.01	0.43
2:B:373:ARG:CG	2:B:373:ARG:O	2.63	0.43
2:C:17:LEU:HA	16:h:11:PHE:HZ	1.83	0.43
2:C:406:PHE:O	2:C:407:GLY:C	2.60	0.43
3:D:345:TYR:HB3	3:D:346:PRO:HD3	2.01	0.43
8:K:30:GLY:O	8:K:34:ILE:HG12	2.18	0.43
12:d:108:LYS:O	12:d:112:GLN:HG2	2.18	0.43
17:j:17:TYR:HD1	17:j:18:THR:H	1.67	0.43
2:C:69:ASP:HB3	9:S:12:TYR:CD2	2.53	0.43
3:D:345:TYR:CD2	19:D:501:ATP:C6	3.07	0.43
8:Q:36:TYR:CE2	8:R:45:GLN:HG2	2.53	0.43
11:b:7:GLU:O	14:f:53:LYS:HB2	2.19	0.43
1:8:29:SER:HA	12:d:152:TRP:CD1	2.54	0.43
3:D:344:ILE:HD11	3:D:411:GLN:HG2	2.00	0.43
3:D:433:PRO:O	3:D:437:THR:HG23	2.18	0.43
3:E:393:MET:HE3	3:E:393:MET:C	2.43	0.43
8:K:16:VAL:HG21	8:R:16:VAL:HG23	2.01	0.43
8:N:25:ILE:CD1	8:N:54:PHE:CD1	2.90	0.43
8:Q:21:SER:O	8:Q:25:ILE:HG12	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:R:23:ALA:O	8:R:27:THR:HG23	2.19	0.43
10:a:152:GLN:O	10:a:156:LEU:HD12	2.18	0.43
11:b:7:GLU:OE1	11:b:8:HIS:HB2	2.19	0.43
16:h:8:GLN:HB2	16:h:11:PHE:HB2	2.00	0.43
2:A:448:GLY:HA2	2:A:453:LEU:HD13	2.01	0.43
3:F:335:LEU:HD22	3:F:347:ALA:O	2.19	0.43
8:O:33:ILE:HD13	8:P:32:LEU:HA	2.01	0.43
8:O:73:PHE:O	8:O:74:ALA:C	2.61	0.43
10:a:139:PRO:HG2	10:a:140:MET:SD	2.58	0.43
3:E:29:LEU:HD11	3:E:56:SER:HA	2.01	0.43
5:H:119:LEU:HA	5:H:131:ILE:HG21	2.01	0.43
6:I:13:ARG:O	6:I:17:ILE:HG12	2.18	0.43
5:H:48:LEU:HG	8:R:42:LEU:HD11	2.00	0.43
8:O:40:PRO:HB3	8:P:42:LEU:HD21	2.00	0.42
8:P:16:VAL:O	8:P:16:VAL:HG12	2.19	0.42
11:b:164:MET:O	11:b:167:GLN:HG3	2.19	0.42
2:C:157:VAL:HG12	2:C:157:VAL:O	2.17	0.42
8:P:63:PHE:O	8:P:66:MET:HE3	2.19	0.42
10:a:68:TRP:O	10:a:71:MET:HB3	2.19	0.42
1:8:1:MET:HE1	10:a:169:LEU:HD11	2.02	0.42
8:K:71:ILE:HD11	8:R:8:PHE:HB3	2.00	0.42
8:R:12:GLY:O	8:R:15:THR:HG22	2.19	0.42
12:d:15:PHE:HE2	12:d:19:ILE:HD11	1.81	0.42
16:h:43:LEU:HD12	16:h:44:PHE:N	2.34	0.42
2:C:249:SER:O	2:C:253:MET:HE3	2.19	0.42
6:I:5:ARG:HA	6:I:5:ARG:HD3	1.88	0.42
12:d:144:LEU:HD23	12:d:154:HIS:ND1	2.35	0.42
3:F:32:ILE:HG22	3:F:33:LEU:HG	2.02	0.42
2:B:361:ILE:HD12	2:B:361:ILE:H	1.85	0.42
2:B:432:GLN:HB2	19:B:601:ATP:C5	2.55	0.42
2:C:25:LEU:HD13	9:S:171:VAL:HG21	1.97	0.42
3:E:452:LEU:HD22	3:E:470:ALA:HB1	2.02	0.42
3:F:198:HIS:CD2	3:F:201:ILE:HD11	2.54	0.42
10:a:55:LYS:O	10:a:59:SER:HB3	2.19	0.42
2:B:373:ARG:NH1	3:F:191:ARG:NH1	2.67	0.42
2:A:450:ARG:HA	2:A:450:ARG:HD3	1.70	0.42
2:B:48:GLN:HG2	3:F:70:VAL:HG22	2.02	0.42
6:I:12:ILE:O	6:I:16:GLN:HG3	2.20	0.42
8:O:75:MET:HE2	8:O:75:MET:HB3	1.99	0.42
10:a:32:PRO:HG3	10:a:42:PHE:HB3	2.02	0.42
12:d:108:LYS:O	12:d:111:ILE:HG12	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:8:23:ILE:O	1:8:27:LYS:HG3	2.19	0.42
4:G:108:VAL:HG22	4:G:128:PHE:CD1	2.54	0.42
8:K:17:GLY:HA2	8:R:19:ALA:HB2	2.01	0.42
2:C:196:LYS:HA	2:C:196:LYS:HD3	1.87	0.42
2:C:373:ARG:HH11	3:D:159:GLY:CA	2.29	0.42
4:G:190:MET:HE2	4:G:190:MET:O	2.20	0.42
5:H:35:GLN:OE1	5:H:35:GLN:N	2.53	0.42
5:H:129:ALA:HA	5:H:132:GLN:HE21	1.83	0.42
5:H:129:ALA:O	5:H:132:GLN:HG2	2.20	0.42
8:K:25:ILE:HA	8:K:28:VAL:HG12	2.02	0.42
8:R:7:LYS:HA	8:R:7:LYS:HD3	1.67	0.42
14:f:42:TYR:HA	14:f:45:TYR:HB3	2.02	0.42
4:G:193:TYR:HB3	4:G:196:ILE:HD11	2.02	0.41
8:L:23:ALA:O	8:L:27:THR:HG23	2.20	0.41
8:Q:26:GLY:HA2	8:Q:29:PHE:CD2	2.55	0.41
11:b:125:PHE:CE1	12:d:88:GLN:HB2	2.54	0.41
3:F:336:SER:HB3	3:F:339:ILE:HB	2.03	0.41
6:I:3:TYR:HB3	8:O:42:LEU:CD1	2.50	0.41
6:I:29:GLU:HG2	6:I:30:PHE:HD1	1.83	0.41
6:I:31:LYS:O	6:I:35:MET:HG2	2.20	0.41
16:h:43:LEU:HA	16:h:46:LEU:HD12	2.01	0.41
1:8:2:PRO:HD2	10:a:9:PHE:HB2	2.03	0.41
2:C:355:GLU:OE1	2:C:356:LEU:HD22	2.20	0.41
3:F:390:ILE:HD13	3:F:390:ILE:HA	1.87	0.41
12:d:103:PHE:O	12:d:106:GLN:HG2	2.20	0.41
8:R:68:ALA:HA	8:R:71:ILE:HG22	2.01	0.41
9:S:39:LEU:HA	9:S:42:VAL:HG22	2.03	0.41
10:a:201:ILE:HD11	11:b:66:PHE:CE2	2.55	0.41
16:h:43:LEU:HA	16:h:46:LEU:CD1	2.50	0.41
2:A:466:ASN:O	2:A:469:LEU:HG	2.20	0.41
2:B:406:PHE:CD1	2:B:406:PHE:C	2.98	0.41
3:F:198:HIS:HA	3:F:201:ILE:CD1	2.50	0.41
5:H:99:THR:H	5:H:102:MET:CE	2.34	0.41
8:N:36:TYR:CE1	8:N:43:M3L:HB3	2.53	0.41
10:a:64:LYS:O	10:a:64:LYS:HD3	2.21	0.41
11:b:11:LYS:HG3	11:b:19:GLU:OE1	2.20	0.41
11:b:48:LYS:HB3	11:b:50:ILE:HD11	2.03	0.41
11:b:80:GLU:HA	11:b:83:ASP:HB2	2.03	0.41
3:F:272:LEU:HD23	3:F:272:LEU:HA	1.91	0.41
8:M:61:GLY:O	8:M:65:LEU:HG	2.20	0.41
8:M:18:VAL:HG23	8:M:65:LEU:HD21	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:O:19:ALA:HB1	8:P:20:GLY:N	2.32	0.41
8:P:54:PHE:HB2	8:P:58:GLU:OE2	2.21	0.41
11:b:115:GLN:HA	11:b:118:VAL:HB	2.03	0.41
8:N:31:SER:HA	8:N:34:ILE:HD12	2.03	0.41
8:O:42:LEU:HB3	8:O:45:GLN:HG3	2.03	0.41
10:a:92:PHE:O	10:a:94:PRO:HD3	2.21	0.41
10:a:170:LEU:HD13	10:a:170:LEU:HA	1.84	0.41
11:b:176:TRP:O	11:b:180:ARG:HG2	2.21	0.41
16:h:13:ASP:O	16:h:16:ARG:HG3	2.21	0.41
16:h:34:GLU:O	16:h:38:ASP:OD1	2.38	0.41
16:h:52:LYS:HA	16:h:52:LYS:HD3	1.75	0.41
1:8:32:ASN:HB2	1:8:34:TYR:CZ	2.56	0.41
4:G:106:ILE:HD13	4:G:106:ILE:HA	1.83	0.41
8:N:69:PHE:CZ	10:a:170:LEU:HD21	2.55	0.41
2:A:419:SER:O	2:A:423:ARG:HG2	2.21	0.40
3:D:343:GLY:O	3:D:344:ILE:C	2.64	0.40
4:G:4:LYS:HE2	4:G:4:LYS:HB2	1.94	0.40
8:L:5:ALA:HB2	8:M:3:ASP:OD1	2.21	0.40
8:R:34:ILE:HD13	8:R:34:ILE:HA	1.88	0.40
2:C:34:ILE:HD13	2:C:39:ALA:HB2	2.04	0.40
2:C:157:VAL:HG13	2:C:372:SER:HB2	2.02	0.40
3:E:388:ILE:HD13	3:E:388:ILE:HA	1.91	0.40
3:E:441:PHE:HA	3:E:444:ILE:HG22	2.02	0.40
8:Q:60:MET:HA	8:Q:63:PHE:CD2	2.57	0.40
8:R:60:MET:H	8:R:60:MET:HG2	1.64	0.40
17:j:10:TRP:NE1	17:j:14:LYS:HD3	2.36	0.40
5:H:43:GLY:HA3	8:P:38:ARG:HG2	2.03	0.40
8:O:33:ILE:HG13	8:P:46:LEU:HD22	2.02	0.40
2:B:103:LEU:HB3	2:B:230:ILE:HD13	2.03	0.40
2:B:172:GLN:CD	3:E:356:ARG:HD3	2.46	0.40
2:B:405:GLN:H	2:B:405:GLN:CD	2.30	0.40
3:D:345:TYR:CE1	19:D:501:ATP:C4	3.09	0.40
3:E:462:PRO:HD2	3:E:465:GLU:HG3	2.03	0.40
6:I:33:ASN:C	6:I:33:ASN:OD1	2.64	0.40
8:K:17:GLY:HA3	8:K:64:CYS:SG	2.61	0.40
10:a:58:MET:HG3	10:a:69:THR:HA	2.03	0.40
11:b:75:GLY:O	11:b:78:VAL:HG12	2.22	0.40
4:G:89:MET:HE1	4:G:161:ILE:HD13	2.04	0.40
9:S:15:GLU:HG2	9:S:16:GLY:N	2.36	0.40
10:a:68:TRP:CE3	10:a:222:LEU:HD22	2.56	0.40
12:d:48:PRO:HA	12:d:49:PRO:HD3	1.96	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
17:j:37:LYS:H	17:j:37:LYS:HG2	1.53	0.40
17:j:44:ARG:O	17:j:48:LEU:HD13	2.21	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	8	33/66 (50%)	31 (94%)	2 (6%)	0	100	100
2	A	506/510 (99%)	489 (97%)	17 (3%)	0	100	100
2	B	484/510 (95%)	473 (98%)	10 (2%)	1 (0%)	44	72
2	C	501/510 (98%)	486 (97%)	15 (3%)	0	100	100
3	D	467/482 (97%)	450 (96%)	17 (4%)	0	100	100
3	E	465/482 (96%)	450 (97%)	15 (3%)	0	100	100
3	F	465/482 (96%)	452 (97%)	13 (3%)	0	100	100
4	G	270/273 (99%)	266 (98%)	4 (2%)	0	100	100
5	H	129/146 (88%)	126 (98%)	3 (2%)	0	100	100
6	I	45/50 (90%)	44 (98%)	1 (2%)	0	100	100
7	J	45/60 (75%)	44 (98%)	1 (2%)	0	100	100
8	K	71/75 (95%)	70 (99%)	1 (1%)	0	100	100
8	L	71/75 (95%)	68 (96%)	3 (4%)	0	100	100
8	M	72/75 (96%)	71 (99%)	1 (1%)	0	100	100
8	N	72/75 (96%)	71 (99%)	1 (1%)	0	100	100
8	O	72/75 (96%)	68 (94%)	4 (6%)	0	100	100
8	P	72/75 (96%)	71 (99%)	1 (1%)	0	100	100
8	Q	72/75 (96%)	70 (97%)	2 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
8	R	72/75 (96%)	72 (100%)	0	0	100	100
9	S	186/190 (98%)	184 (99%)	2 (1%)	0	100	100
10	a	224/226 (99%)	214 (96%)	10 (4%)	0	100	100
11	b	203/214 (95%)	199 (98%)	4 (2%)	0	100	100
12	d	152/160 (95%)	148 (97%)	4 (3%)	0	100	100
13	e	28/70 (40%)	28 (100%)	0	0	100	100
14	f	77/87 (88%)	75 (97%)	2 (3%)	0	100	100
15	g	77/102 (76%)	74 (96%)	3 (4%)	0	100	100
16	h	60/76 (79%)	59 (98%)	1 (2%)	0	100	100
17	j	46/60 (77%)	39 (85%)	7 (15%)	0	100	100
18	k	32/57 (56%)	32 (100%)	0	0	100	100
All	All	5069/5413 (94%)	4924 (97%)	144 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	407	GLY

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	8	35/66 (53%)	35 (100%)	0	100	100
2	A	412/413 (100%)	411 (100%)	1 (0%)	92	96
2	B	394/413 (95%)	391 (99%)	3 (1%)	79	87
2	C	408/413 (99%)	406 (100%)	2 (0%)	86	91
3	D	379/386 (98%)	379 (100%)	0	100	100
3	E	377/386 (98%)	376 (100%)	1 (0%)	91	95
3	F	377/386 (98%)	376 (100%)	1 (0%)	91	95

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	G	230/231 (100%)	230 (100%)	0	100	100
5	H	104/109 (95%)	104 (100%)	0	100	100
6	I	38/41 (93%)	38 (100%)	0	100	100
7	J	34/44 (77%)	34 (100%)	0	100	100
8	K	49/50 (98%)	49 (100%)	0	100	100
8	L	49/50 (98%)	49 (100%)	0	100	100
8	M	46/50 (92%)	46 (100%)	0	100	100
8	N	47/50 (94%)	47 (100%)	0	100	100
8	O	47/50 (94%)	47 (100%)	0	100	100
8	P	49/50 (98%)	49 (100%)	0	100	100
8	Q	48/50 (96%)	48 (100%)	0	100	100
8	R	50/50 (100%)	50 (100%)	0	100	100
9	S	163/165 (99%)	163 (100%)	0	100	100
10	a	182/200 (91%)	182 (100%)	0	100	100
11	b	166/190 (87%)	166 (100%)	0	100	100
12	d	127/142 (89%)	127 (100%)	0	100	100
13	e	16/59 (27%)	16 (100%)	0	100	100
14	f	58/75 (77%)	58 (100%)	0	100	100
15	g	53/83 (64%)	53 (100%)	0	100	100
16	h	56/70 (80%)	56 (100%)	0	100	100
17	j	31/49 (63%)	28 (90%)	3 (10%)	6	24
18	k	25/46 (54%)	25 (100%)	0	100	100
All	All	4050/4367 (93%)	4039 (100%)	11 (0%)	90	95

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	409	ASP
2	B	408	SER
2	B	409	ASP
2	B	410	LEU
2	C	409	ASP
2	C	410	LEU
3	E	202	GLU

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Mol	Chain	Res	Type
3	F	345	TYR
17	j	17	TYR
17	j	34	ILE
17	j	37	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	48	GLN
2	A	302	HIS
2	B	65	ASN
2	C	215	GLN
2	C	349	GLN
2	C	432	GLN
3	D	249	GLN
3	D	411	GLN
3	F	198	HIS
8	R	39	ASN
9	S	92	ASN
10	a	172	HIS
11	b	103	GLN
12	d	112	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

8 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	$\#|Z| > 2$
8	M3L	L	43	8	10,11,12	0.38	0	9,14,16	0.32	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
8	M3L	O	43	8	10,11,12	0.35	0	9,14,16	0.31	0
8	M3L	R	43	8	10,11,12	0.35	0	9,14,16	0.32	0
8	M3L	M	43	8	10,11,12	0.36	0	9,14,16	0.25	0
8	M3L	K	43	8	10,11,12	0.37	0	9,14,16	0.34	0
8	M3L	N	43	8	10,11,12	0.32	0	9,14,16	0.29	0
8	M3L	P	43	8	10,11,12	0.31	0	9,14,16	0.31	0
8	M3L	Q	43	8	10,11,12	0.31	0	9,14,16	0.25	0

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
8	M3L	L	43	8	-	1/9/10/12	-
8	M3L	O	43	8	-	6/9/10/12	-
8	M3L	R	43	8	-	0/9/10/12	-
8	M3L	M	43	8	-	0/9/10/12	-
8	M3L	K	43	8	-	0/9/10/12	-
8	M3L	N	43	8	-	2/9/10/12	-
8	M3L	P	43	8	-	1/9/10/12	-
8	M3L	Q	43	8	-	3/9/10/12	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	N	43	M3L	C-CA-CB-CG
8	P	43	M3L	C-CA-CB-CG
8	Q	43	M3L	O-C-CA-CB
8	L	43	M3L	CG-CD-CE-NZ
8	O	43	M3L	CA-CB-CG-CD
8	O	43	M3L	CG-CD-CE-NZ
8	Q	43	M3L	CA-CB-CG-CD
8	N	43	M3L	CE-CD-CG-CB
8	O	43	M3L	CD-CE-NZ-CM3
8	Q	43	M3L	CE-CD-CG-CB
8	O	43	M3L	CD-CE-NZ-CM1

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Mol	Chain	Res	Type	Atoms
8	O	43	M3L	CD-CE-NZ-CM2
8	O	43	M3L	CE-CD-CG-CB

There are no ring outliers.

3 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	M	43	M3L	1	0
8	N	43	M3L	3	0
8	Q	43	M3L	4	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 10 ligands modelled in this entry, 5 are monoatomic - leaving 5 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	$\#|Z| > 2$
19	ATP	D	501	20	26,33,33	0.70	0	31,52,52	0.90	2 (6%)
19	ATP	B	601	20	26,33,33	0.72	0	31,52,52	0.86	1 (3%)
19	ATP	A	601	20	26,33,33	1.18	3 (11%)	31,52,52	1.57	4 (12%)
21	ADP	F	501	20	24,29,29	0.86	1 (4%)	29,45,45	0.99	2 (6%)
19	ATP	C	601	20	26,33,33	0.99	1 (3%)	31,52,52	1.45	4 (12%)

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
19	ATP	D	501	20	-	5/18/38/38	0/3/3/3
19	ATP	B	601	20	-	4/18/38/38	0/3/3/3
19	ATP	A	601	20	-	1/18/38/38	0/3/3/3
21	ADP	F	501	20	-	2/12/32/32	0/3/3/3
19	ATP	C	601	20	-	3/18/38/38	0/3/3/3

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
19	C	601	ATP	O5'-C5'	-2.80	1.34	1.44
19	A	601	ATP	O4'-C1'	2.68	1.44	1.41
19	A	601	ATP	C5-C4	-2.21	1.35	1.40
21	F	501	ADP	C8-N7	-2.11	1.30	1.34
19	A	601	ATP	PG-O3G	-2.02	1.47	1.54

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
19	C	601	ATP	O5'-C5'-C4'	-5.77	89.12	108.99
19	A	601	ATP	C4-C5-N7	4.37	113.95	109.40
19	A	601	ATP	O3G-PG-O3B	3.31	115.74	104.64
19	A	601	ATP	PA-O3A-PB	-2.79	123.26	132.83
21	F	501	ADP	C3'-C2'-C1'	2.78	105.17	100.98
19	A	601	ATP	PB-O3B-PG	-2.58	123.96	132.83
19	D	501	ATP	PB-O3B-PG	-2.41	124.54	132.83
19	C	601	ATP	O3G-PG-O2G	2.32	116.50	107.64
19	C	601	ATP	O2G-PG-O3B	-2.24	97.11	104.64
19	B	601	ATP	C5-C6-N6	2.22	123.73	120.35
19	C	601	ATP	C5-C6-N6	2.21	123.72	120.35
21	F	501	ADP	C5-C6-N6	2.12	123.58	120.35
19	D	501	ATP	C5-C6-N6	2.11	123.56	120.35

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
19	B	601	ATP	C5'-O5'-PA-O1A
21	F	501	ADP	O4'-C4'-C5'-O5'
21	F	501	ADP	C3'-C4'-C5'-O5'
19	D	501	ATP	C3'-C4'-C5'-O5'
19	C	601	ATP	O4'-C4'-C5'-O5'

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Mol	Chain	Res	Type	Atoms
19	D	501	ATP	PA-O3A-PB-O2B
19	C	601	ATP	PG-O3B-PB-O2B
19	D	501	ATP	C4'-C5'-O5'-PA
19	B	601	ATP	O4'-C4'-C5'-O5'
19	B	601	ATP	C4'-C5'-O5'-PA
19	D	501	ATP	O4'-C4'-C5'-O5'
19	B	601	ATP	C5'-O5'-PA-O3A
19	A	601	ATP	PA-O3A-PB-O1B
19	C	601	ATP	PG-O3B-PB-O1B
19	D	501	ATP	PA-O3A-PB-O1B

There are no ring outliers.

4 monomers are involved in 44 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
19	D	501	ATP	6	0
19	B	601	ATP	28	0
21	F	501	ADP	4	0
19	C	601	ATP	6	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 ATP D 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP B 601

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP A 601

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP F 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP C 601

Bond lengths

Bond angles

Torsions

Rings
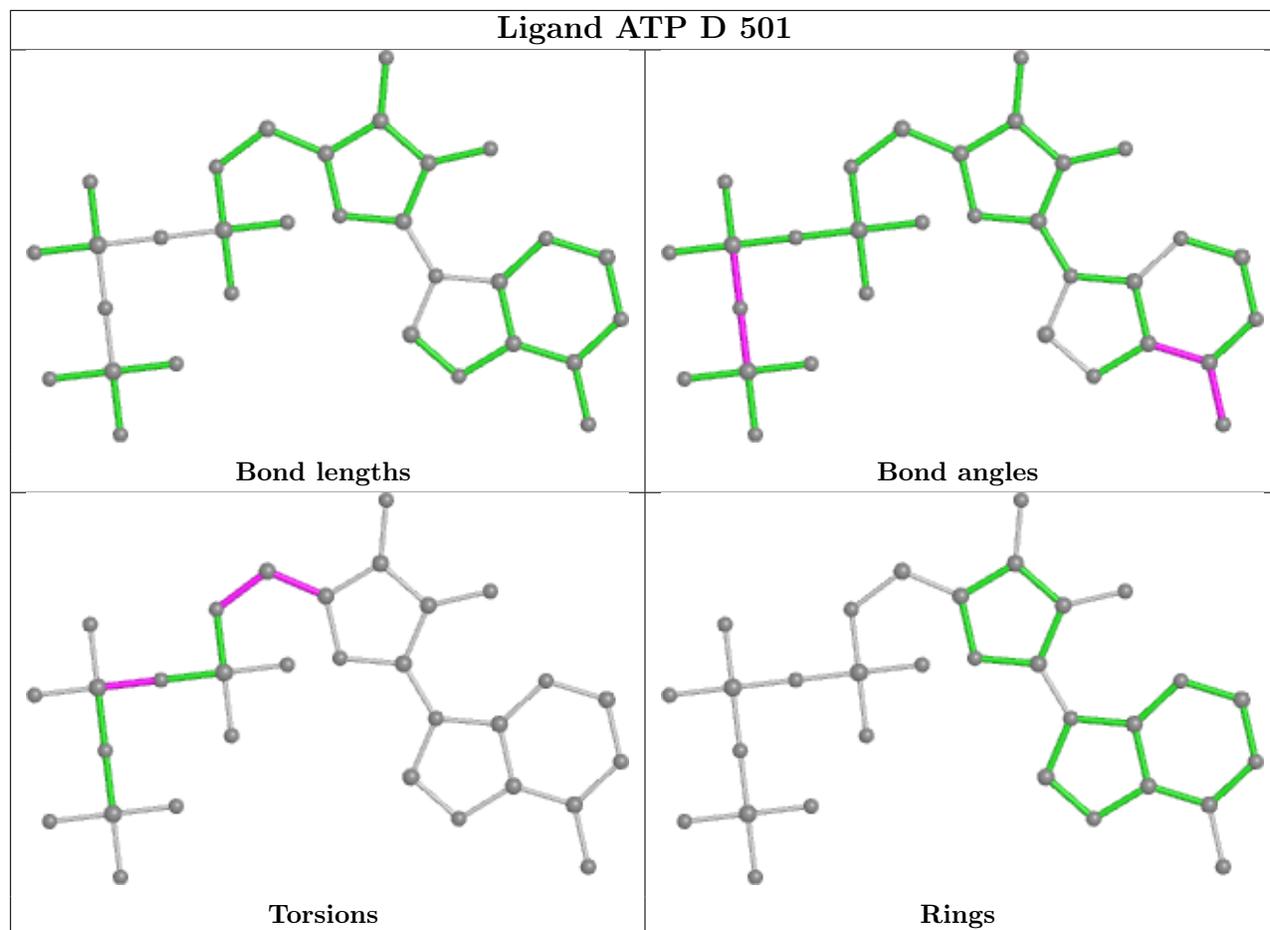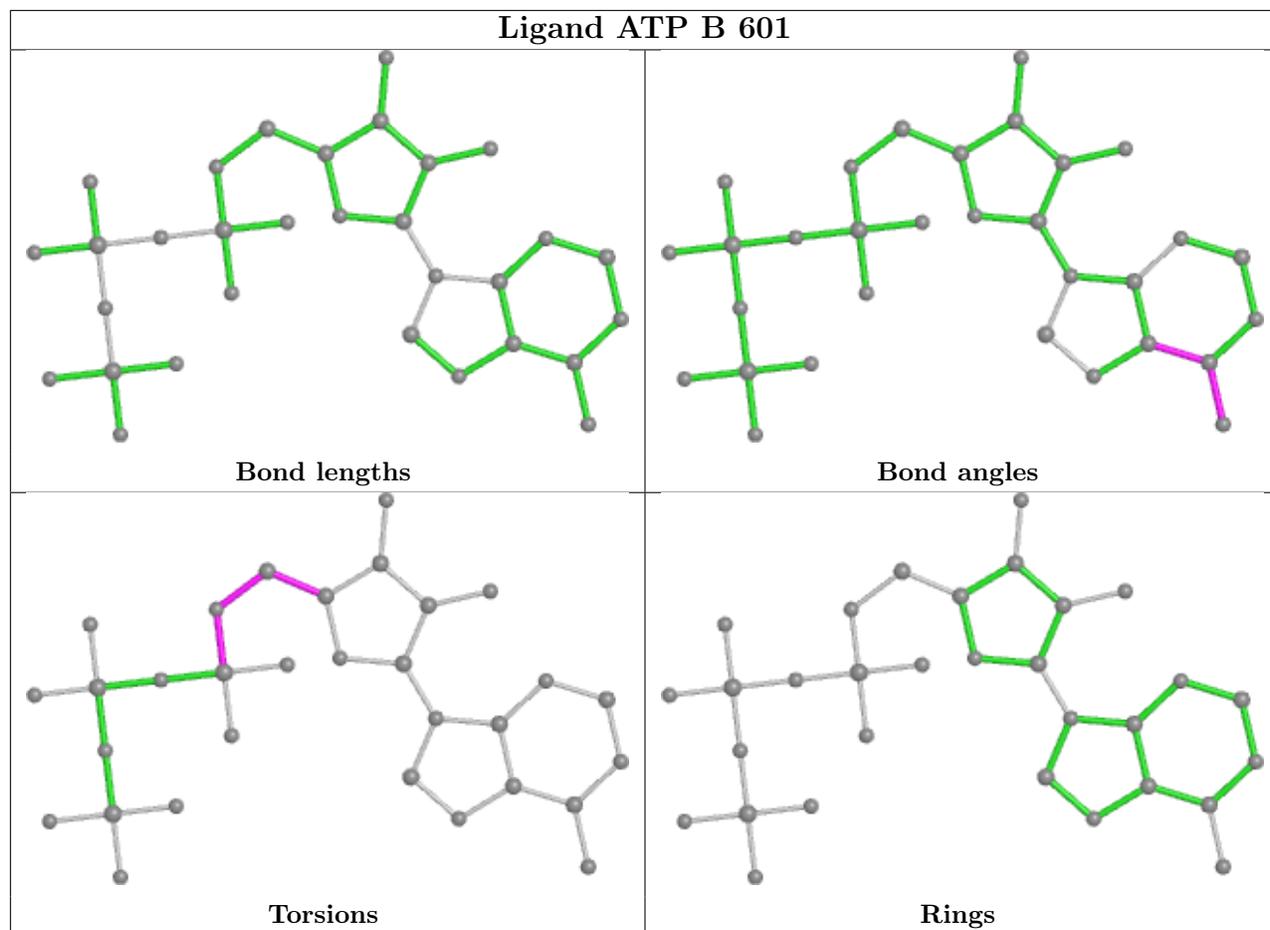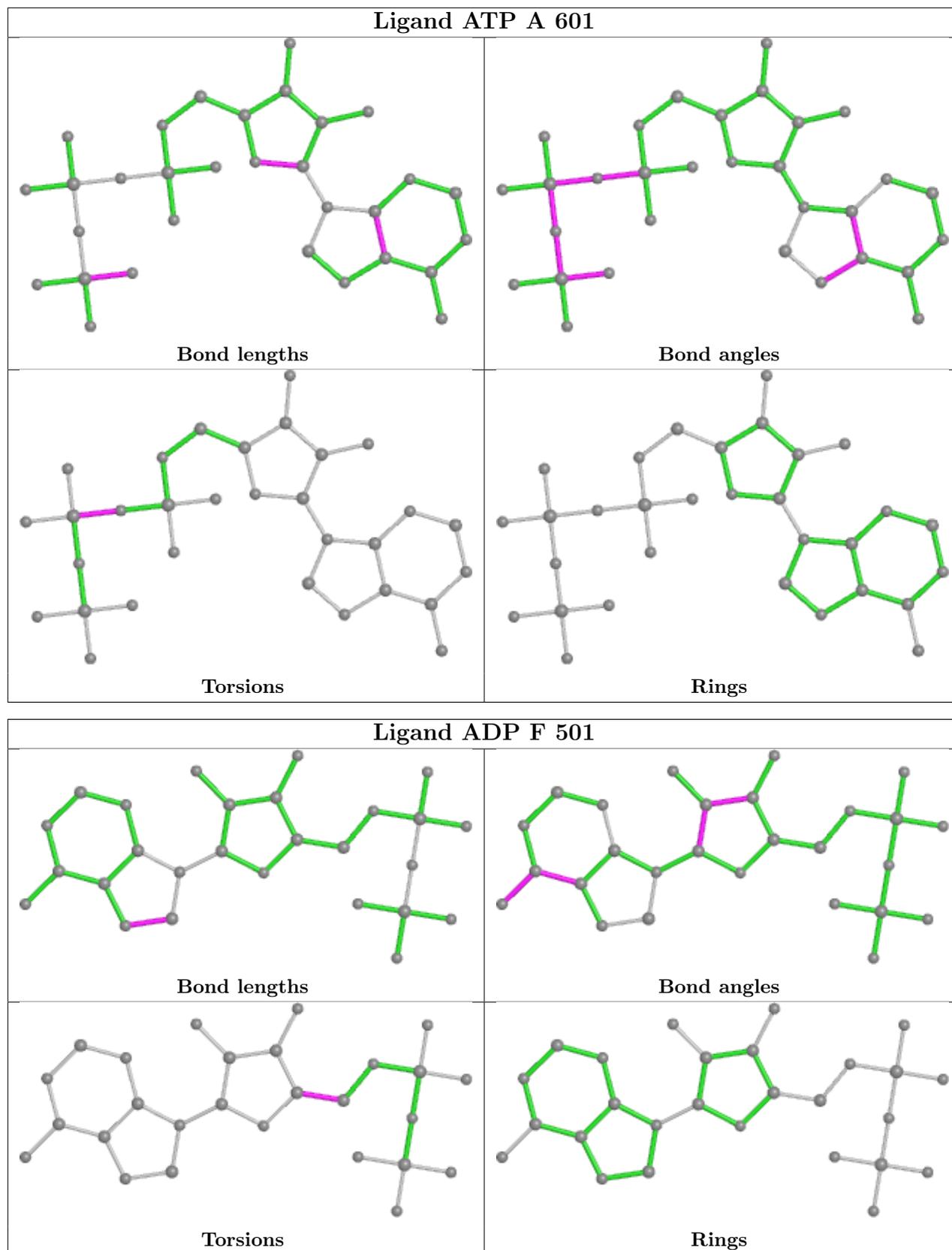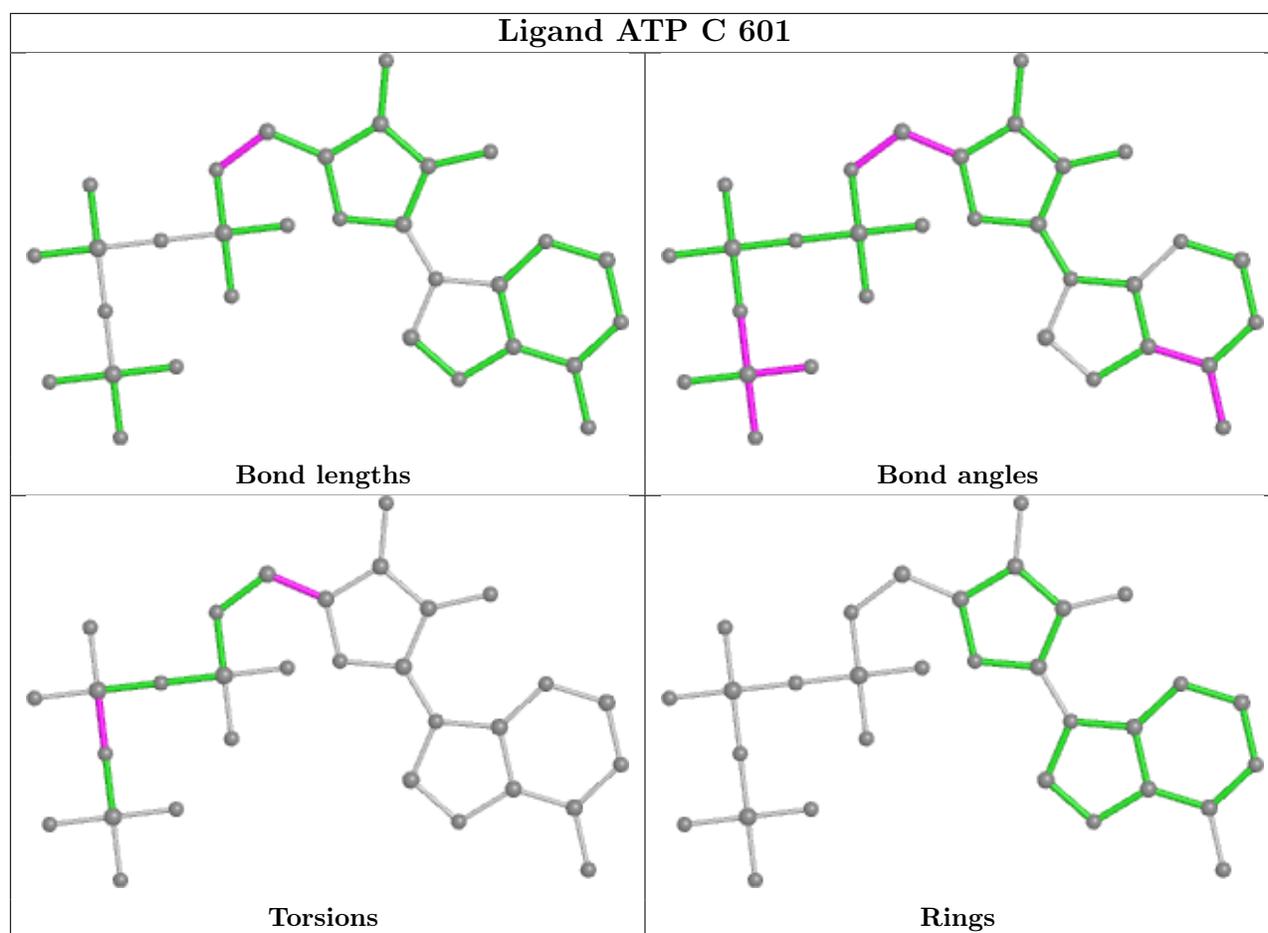
5.7 Other polymers ⓘ

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-65577. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

6.1 Orthogonal projections ⓘ
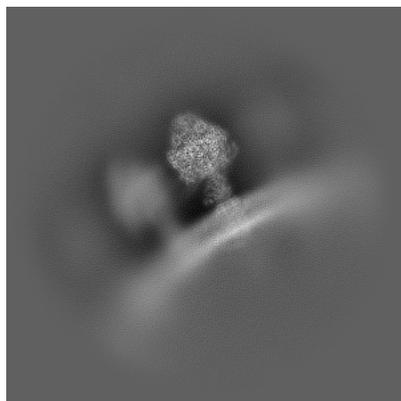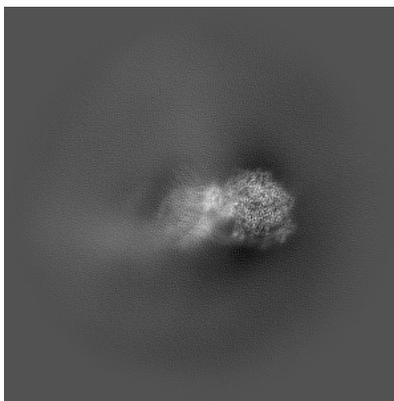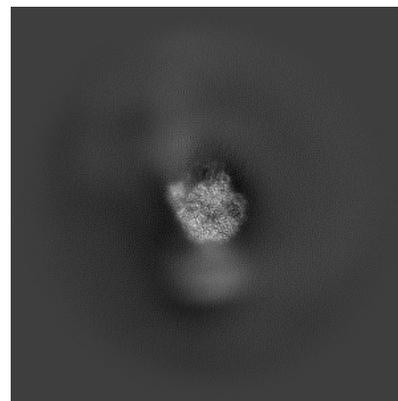
6.1.1 Primary map

X   Y   Z

6.1.2 Raw map

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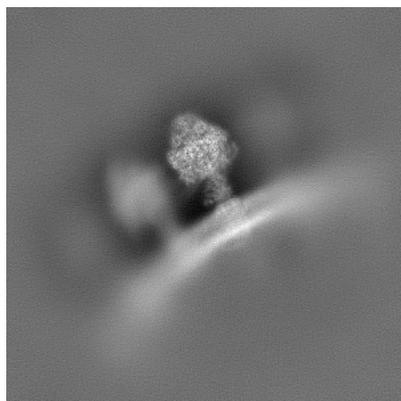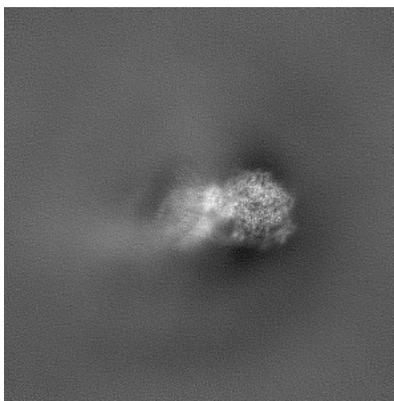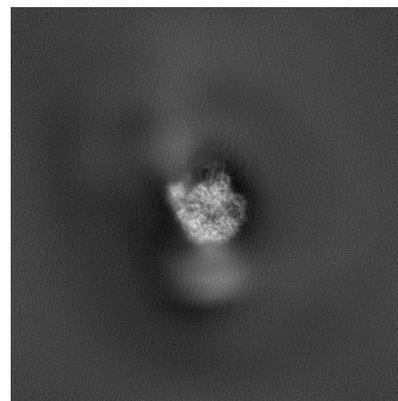
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
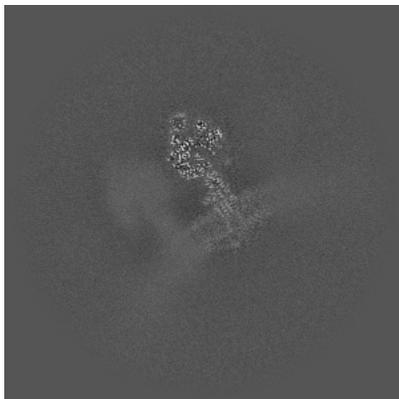
6.2.1 Primary map
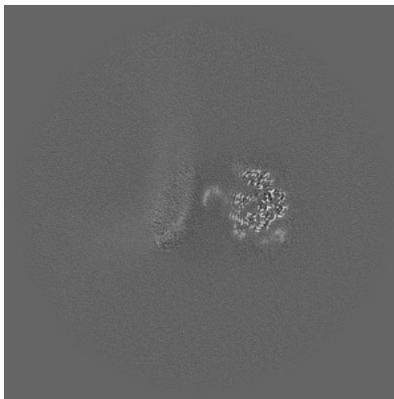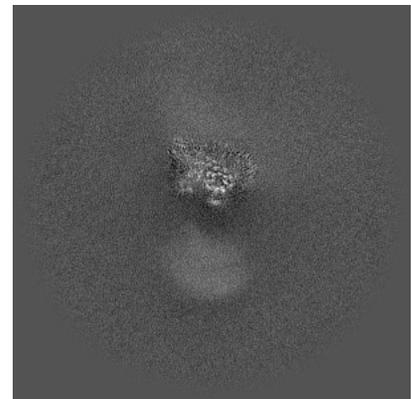
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6.2.2 Raw map
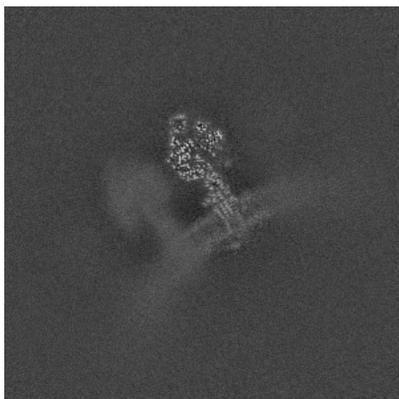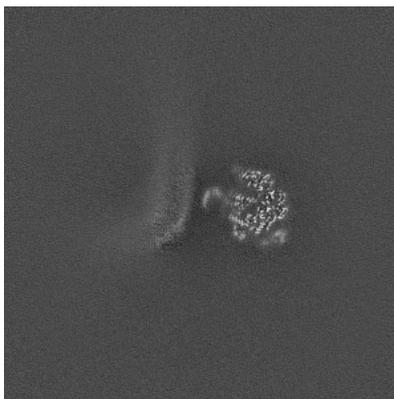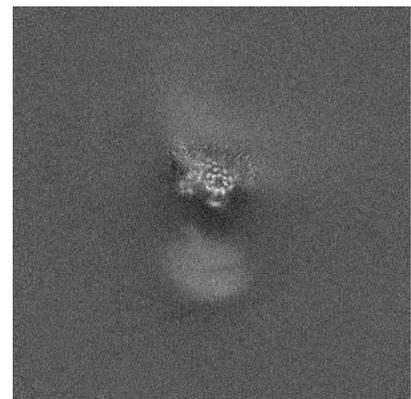
X Index: 225   Y Index: 225   Z Index: 225

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

6.3 Largest variance slices ⓘ

6.3.1 Primary map
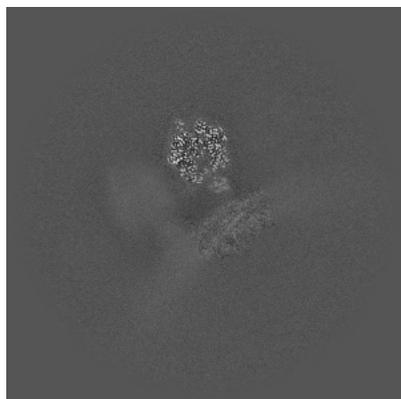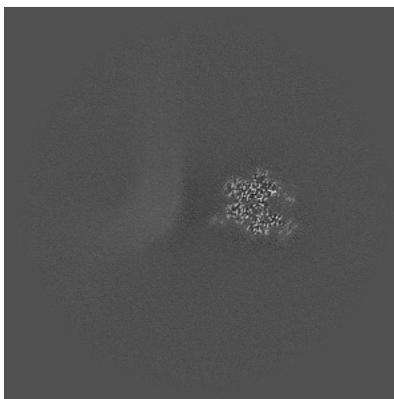
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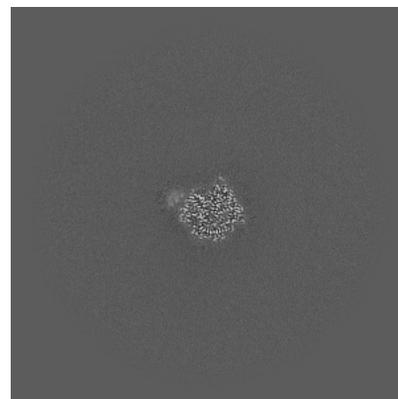
6.3.2 Raw map
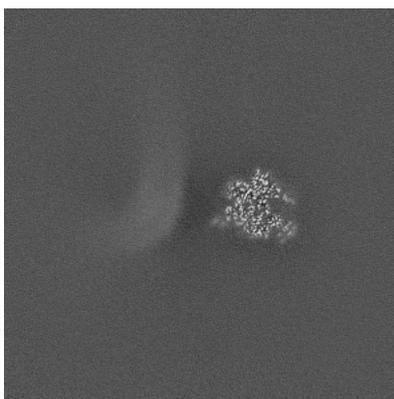
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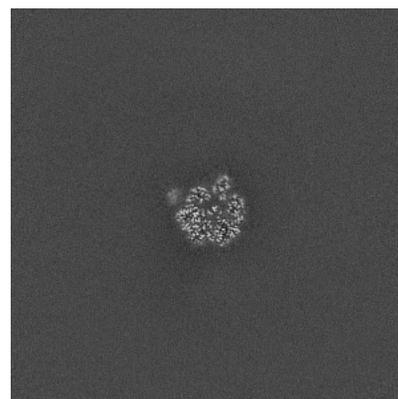
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1　Primary map
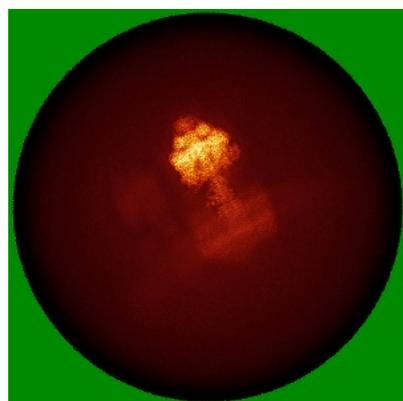
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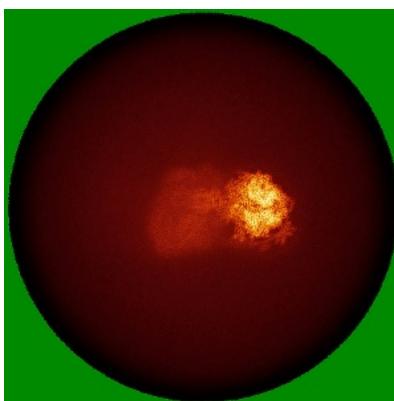
Y
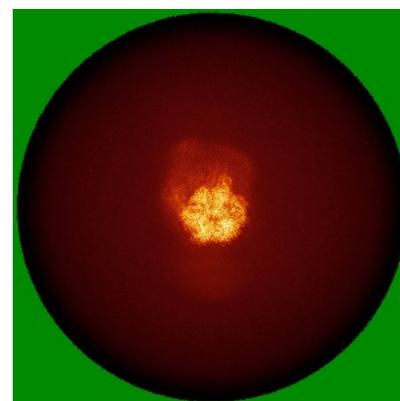
Z

6.4.2　Raw map

X

Y

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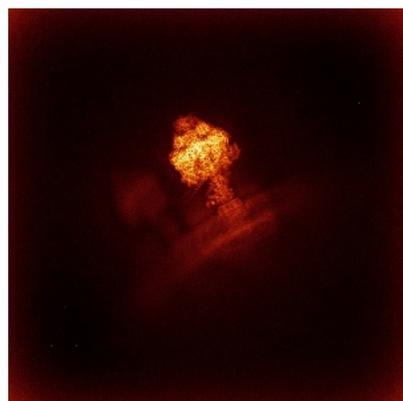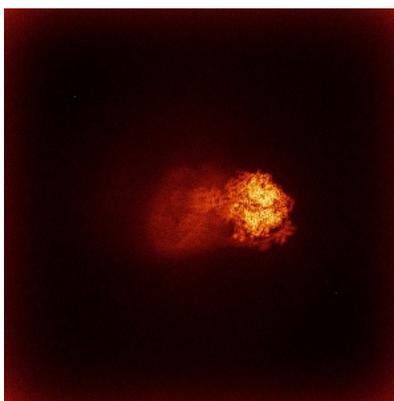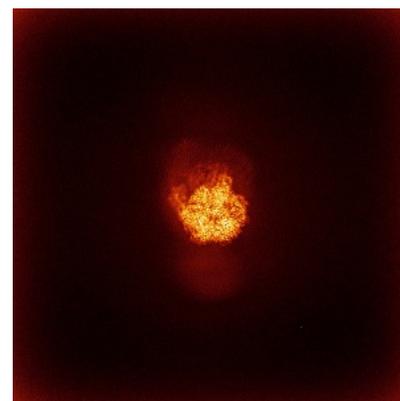
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ

6.5.1 Primary map

| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.2. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

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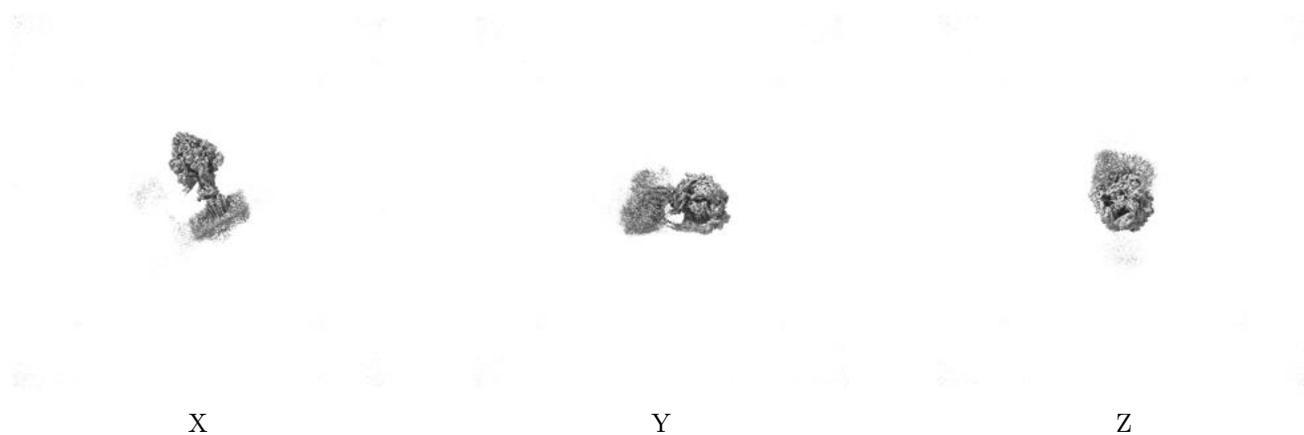
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

6.6 Mask visualisation ⓘ

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

A mask typically either:

- Encompasses the whole structure

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

6.6.1 emd_65577_msk_1.map ⓘ

X   Y   Z
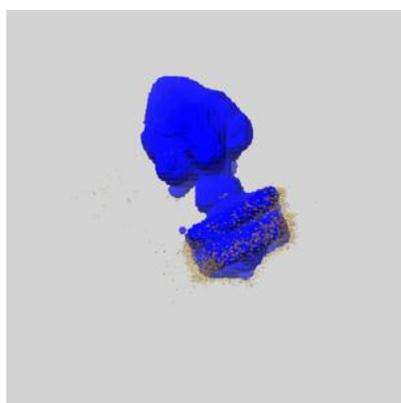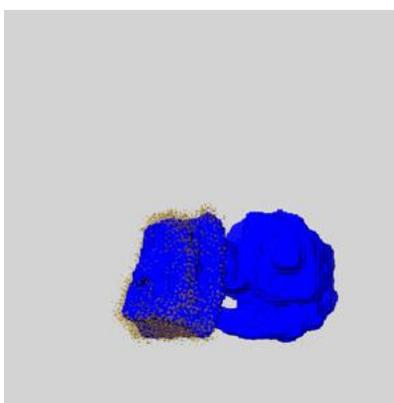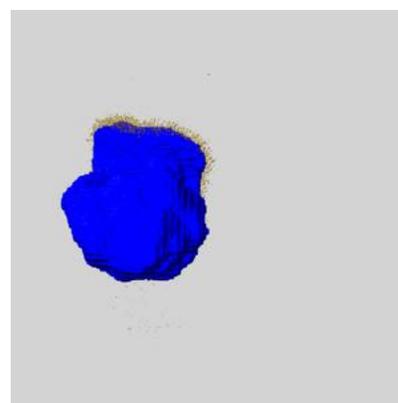
7 Map analysis ⓘ

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

7.1 Map-value distribution ⓘ

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

7.2 Volume estimate (i)
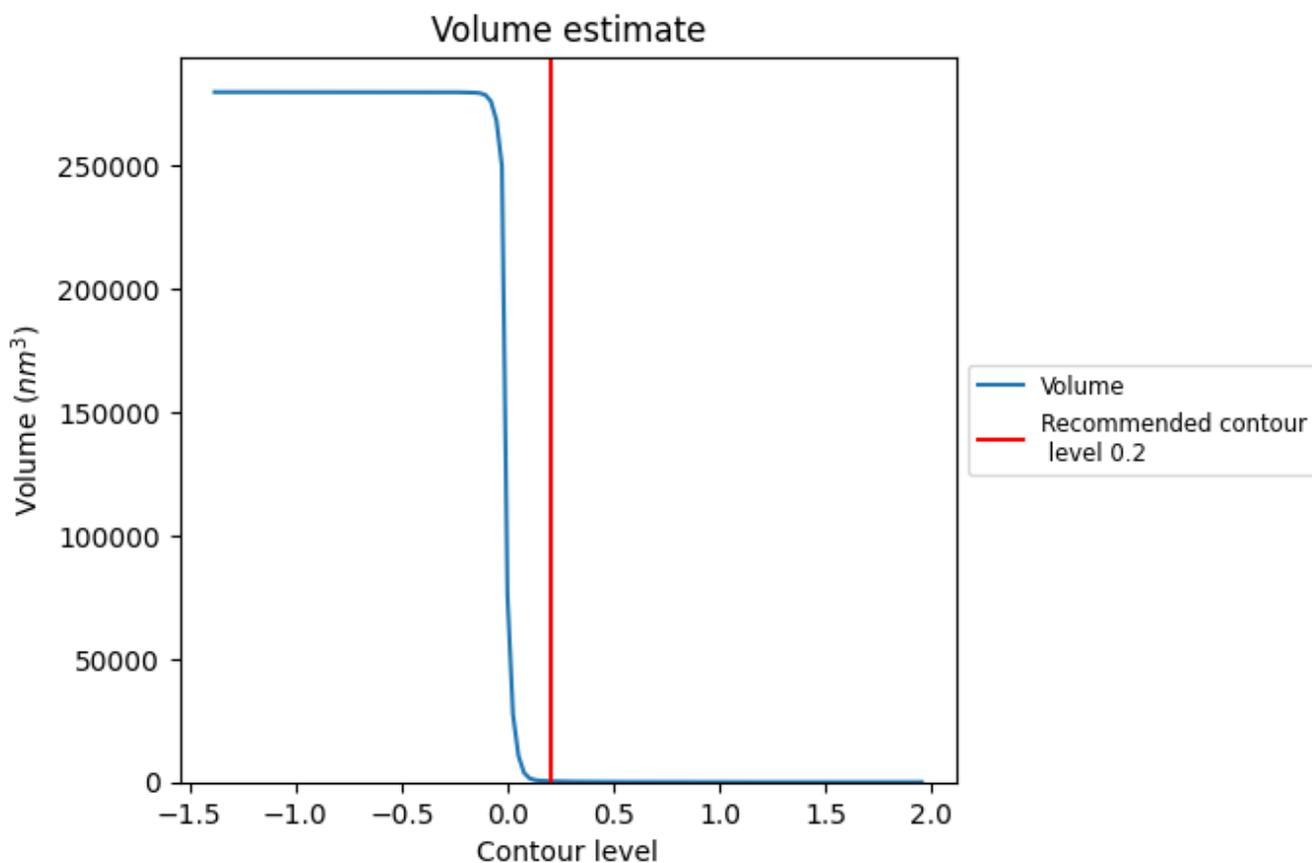
The volume at the recommended contour level is 377 nm³; this corresponds to an approximate mass of 341 kDa.

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

7.3 Rotationally averaged power spectrum ⓘ
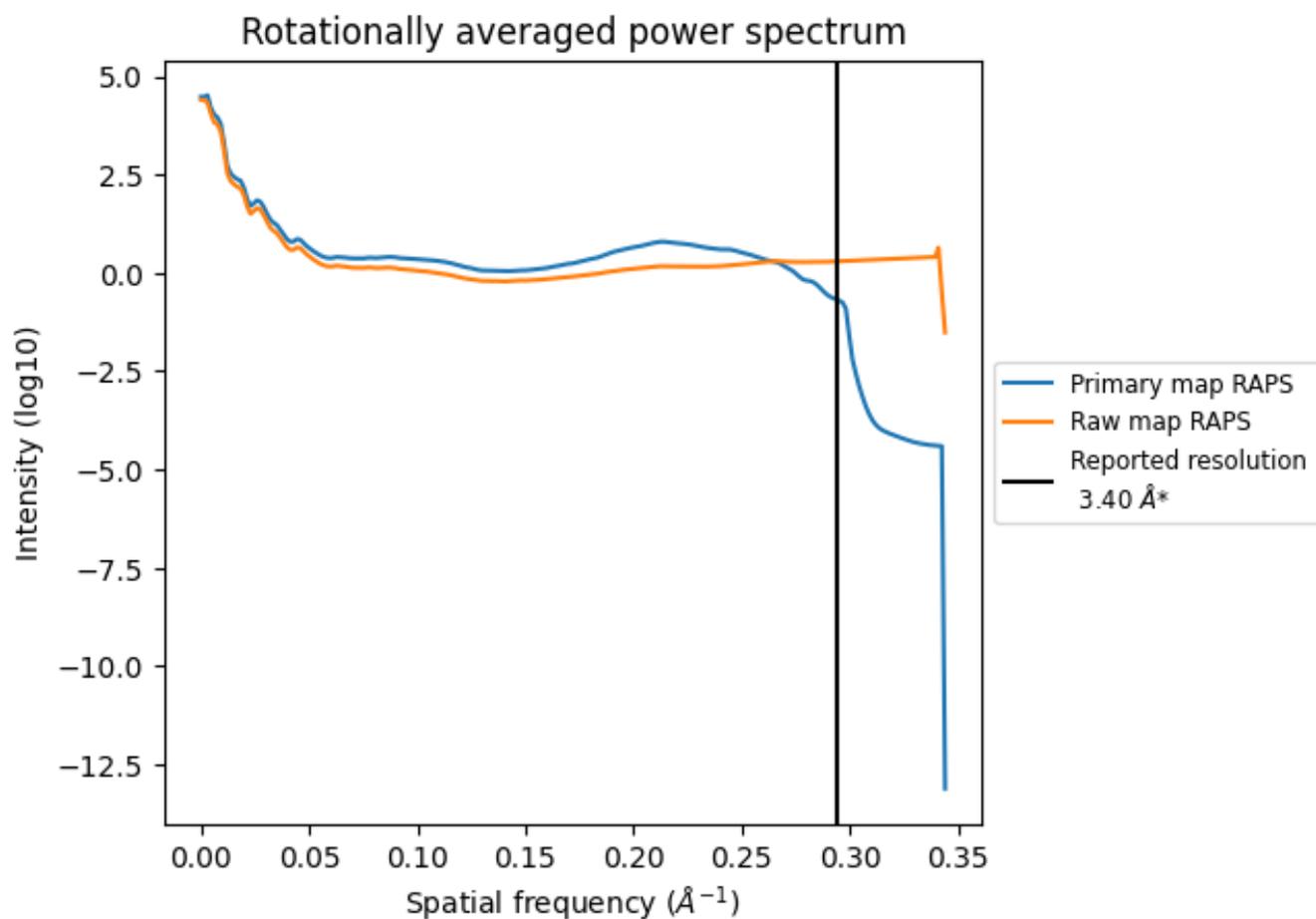
*Reported resolution corresponds to spatial frequency of 0.294 Å^{-1}

8 Fourier-Shell correlation ⓘ

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

8.1 FSC ⓘ
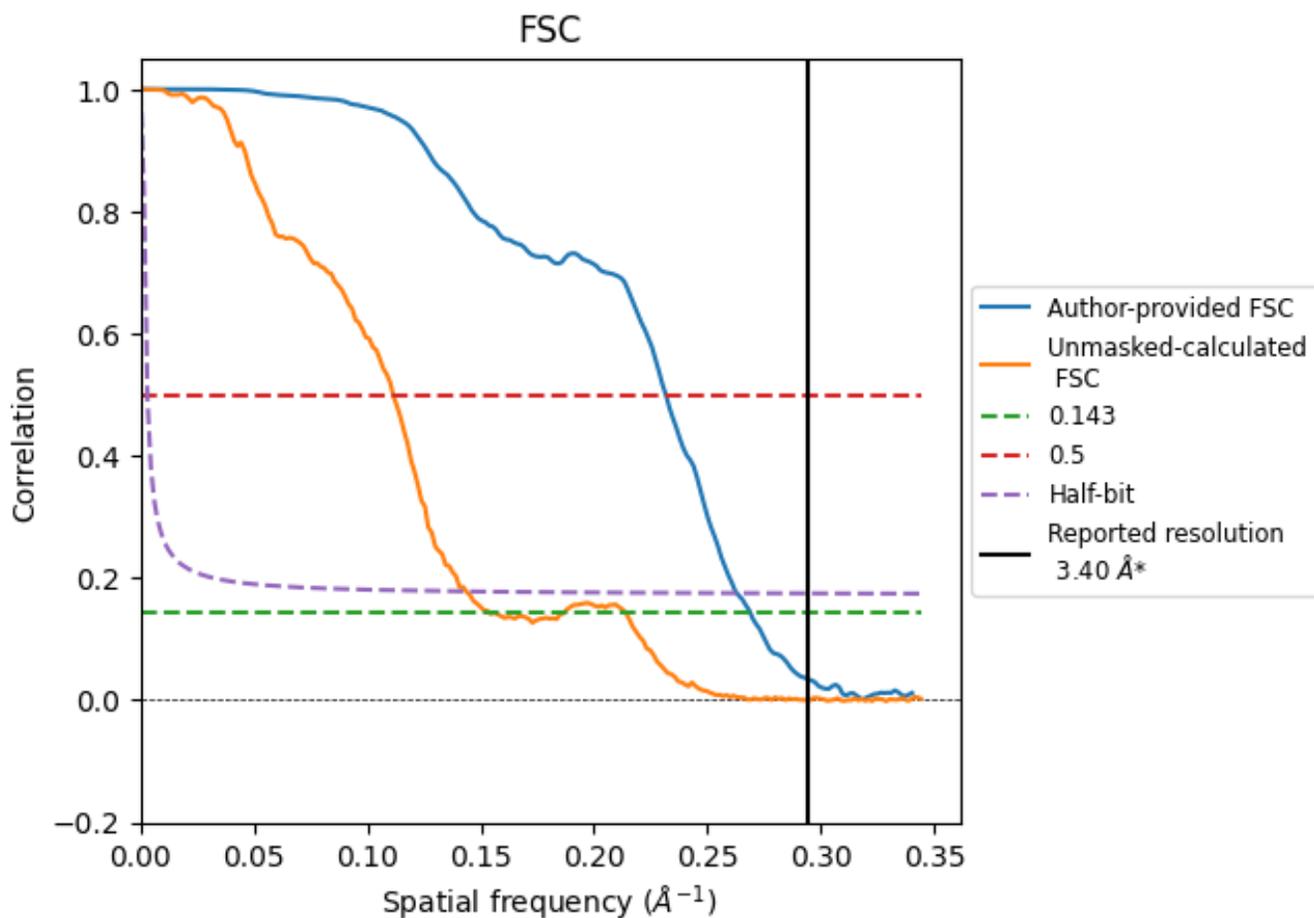
*Reported resolution corresponds to spatial frequency of 0.294 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.40	-	-
Author-provided FSC curve	3.72	4.32	3.80
Unmasked-calculated*	6.50	8.98	6.96

*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 6.50 differs from the reported value 3.4 by more than 10 %

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-65577 and PDB model 9W2R. Per-residue inclusion information can be found in section 3 on page 10.

9.1 Map-model overlay ⓘ

| X | Y | Z |
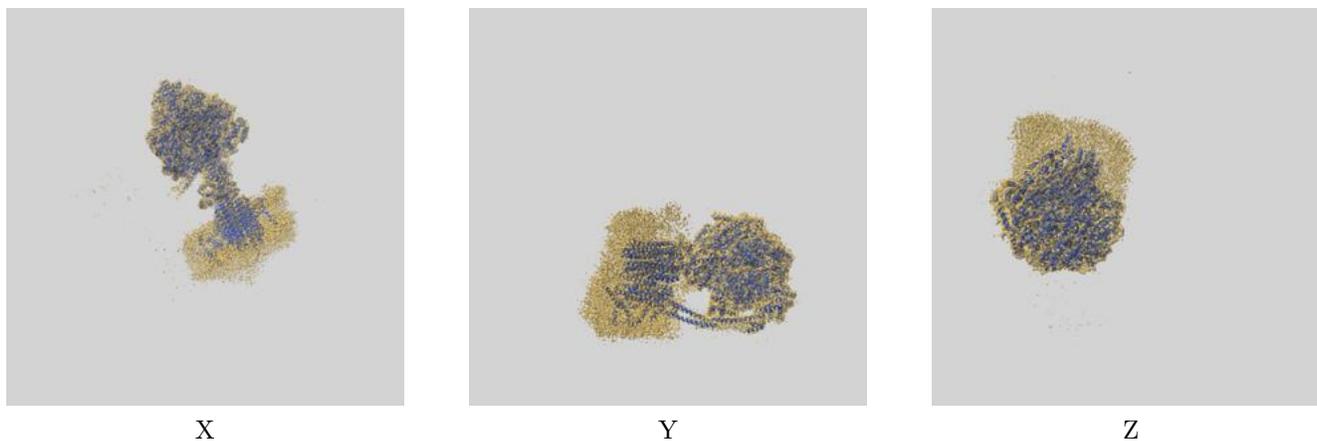
The images above show the 3D surface view of the map at the recommended contour level 0.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model ⓘ

X   Y   Z
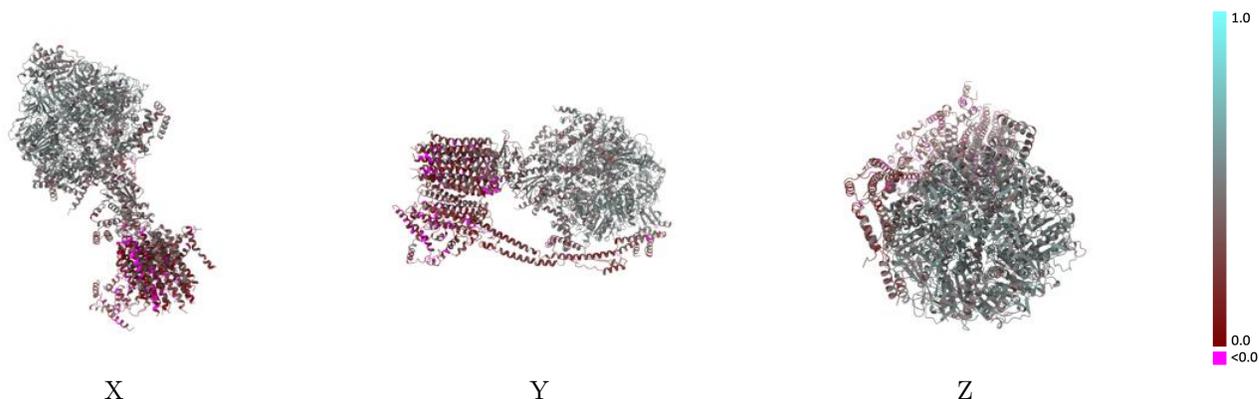
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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
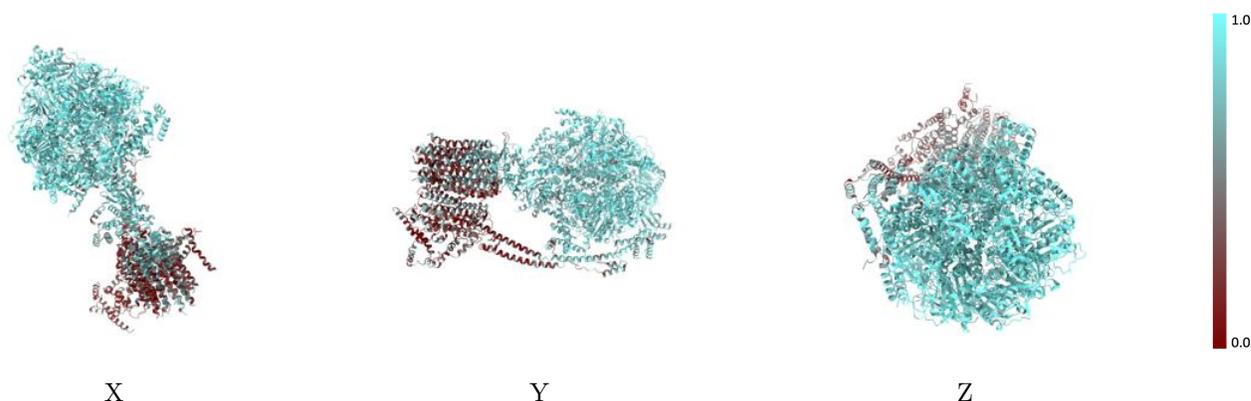
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.2).

9.4   Atom inclusion   ⓘ
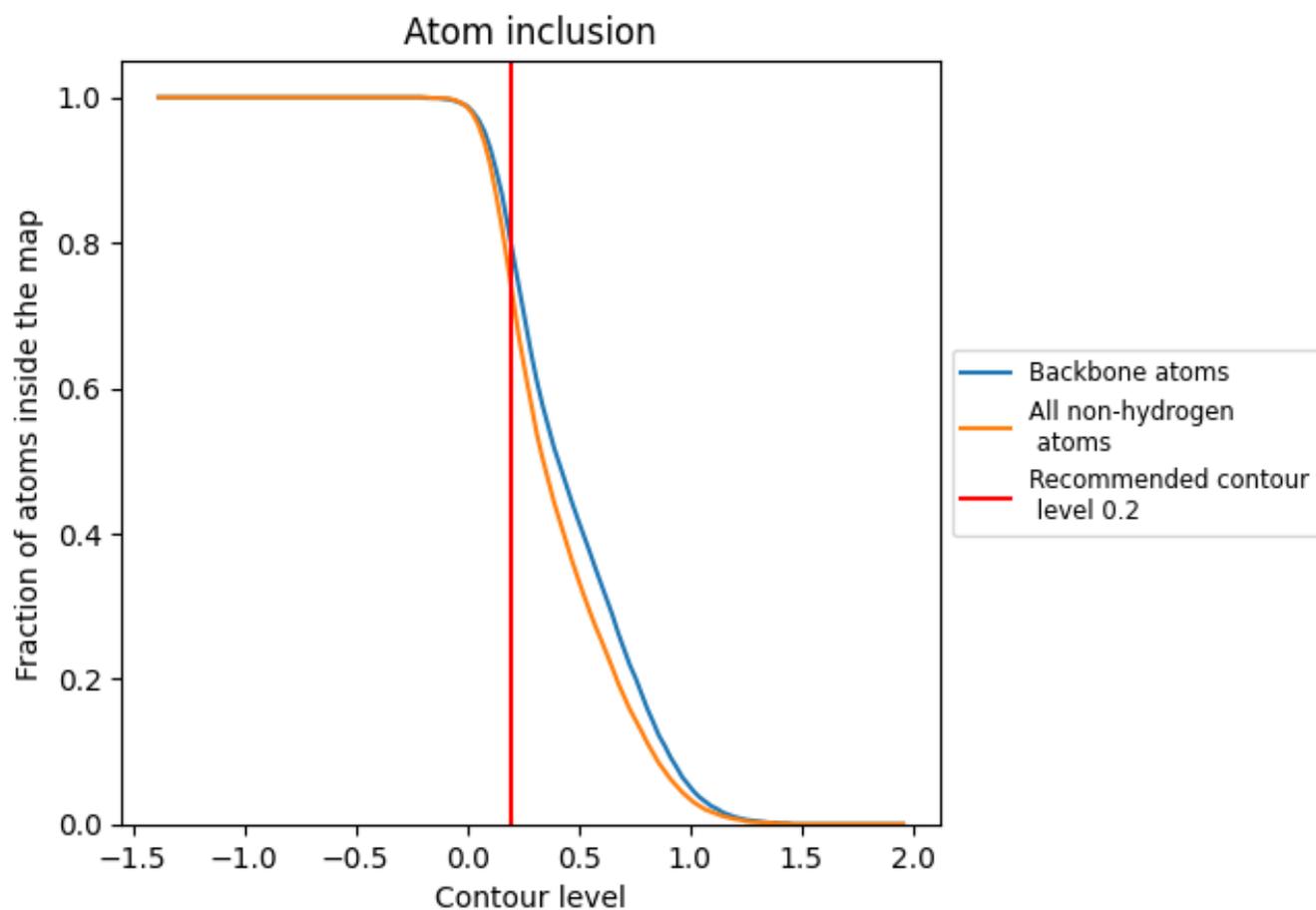
At the recommended contour level, 79% of all backbone atoms, 74% of all non-hydrogen atoms, are inside the map.

9.5   Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7350	0.4000
8	0.2940	0.1550
A	0.8950	0.4930
B	0.8830	0.4800
C	0.8750	0.4820
D	0.8850	0.4970
E	0.8960	0.4870
F	0.8870	0.4990
G	0.8220	0.4240
H	0.7020	0.3560
I	0.7270	0.3520
J	0.8120	0.4430
K	0.5120	0.3200
L	0.4690	0.2760
M	0.4720	0.2190
N	0.3990	0.1570
O	0.3440	0.1590
P	0.3270	0.1270
Q	0.4090	0.1400
R	0.5260	0.3130
S	0.8460	0.4540
a	0.3740	0.2350
b	0.4760	0.2410
d	0.4240	0.2330
e	0.2440	0.1350
f	0.3800	0.1920
g	0.2860	0.2020
h	0.6680	0.2900
j	0.3690	0.2050
k	0.2480	0.2390

1.0

0.0
<0.0