WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB EM Validation Summary Report (i)

Jun 22, 2023 – 10:59 AM JST

PDB ID	:	7VYH
EMDB ID	:	EMD-32205
Title	:	Matrix arm of deactive state CI from Rotenone dataset
Authors	:	Gu, J.K.; Yang, M.J.
Deposited on	:	2021-11-14
Resolution	:	2.90 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

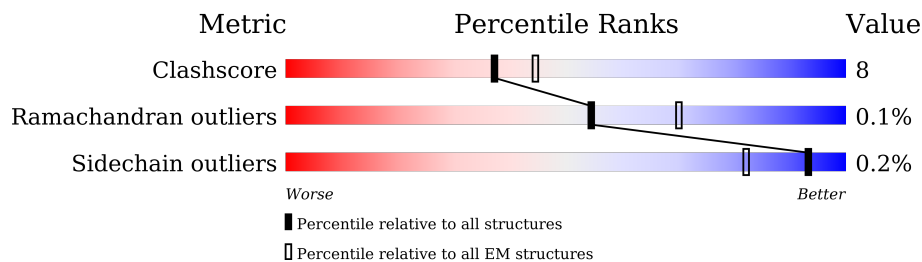|		
EMDB validation analysis	:	0.0.1.dev50
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.33

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 2.90 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.
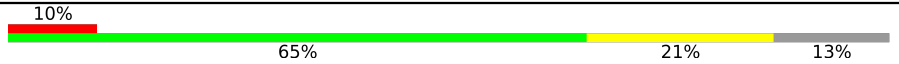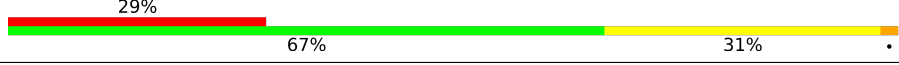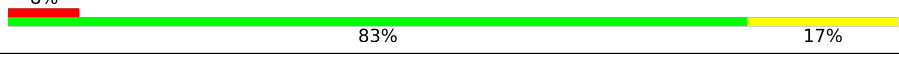
Metric	Percentile Ranks	Value
Clashscore		8
Ramachandran outliers		0.1%
Sidechain outliers		0.2%

Worse   *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all EM structures
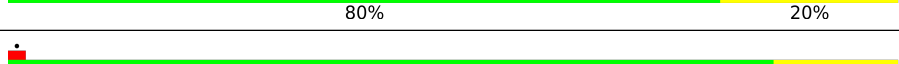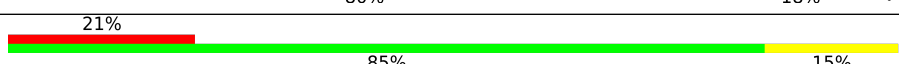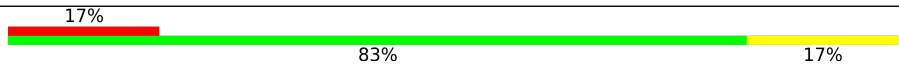
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

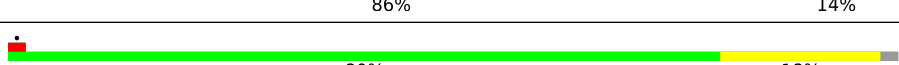The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment 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	A	431	5% / 78% / 22%
2	B	176	• / 80% / 20%
3	C	156	• / 75% / 24% / •
4	E	115	9% / 83% / 17%
5	F	86	13% / 85% / 15%
6	G	88	56% / 75% / 25%
7	H	112	• / 82% / 18%
8	I	112	7% / 77% / 10% / 13%

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Mol	Chain	Length	Quality of chain
9	J	341	10% ... 65% ... 21% ... 13%
10	K	42	29% ... 67% ... 31% ...
11	L	125	8% ... 83% ... 17%
12	M	690	81% ... 19%
13	N	144	13% ... 83% ... 17%
14	O	217	13% ... 80% ... 20%
15	P	208	86% ... 14%
16	Q	385	80% ... 18% ...
17	T	96	21% ... 85% ... 15%
18	W	29	17% ... 83% ... 17%

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	SF4	A	501	-	-	X	-
19	SF4	C	301	-	-	X	-

2   Entry composition ⓘ

There are 28 unique types of molecules in this entry. The entry contains 27933 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 NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	431	Total 3318	C 2095	N 591	O 612	S 20	0	0

- Molecule 2 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	176	Total 1412	C 887	N 243	O 269	S 13	0	0

- Molecule 3 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	156	Total 1244	C 792	N 227	O 211	S 14	0	0

- Molecule 4 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	115	Total 971	C 619	N 179	O 168	S 5	0	0

- Molecule 5 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	F	86	Total 691	C 434	N 129	O 126	S 2	0	0

- Molecule 6 is a protein called Acyl carrier protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	88	Total 664	C 425	N 102	O 132	S 5	0	0

- Molecule 7 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	H	112	Total 910	C 588	N 154	O 165	S 3	0	0

- Molecule 8 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	I	97	Total 780	C 491	N 147	O 139	S 3	0	0

- Molecule 9 is a protein called NADH dehydrogenase ubiquinone 1 alpha subcomplex subunit 9, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	J	297	Total 2352	C 1511	N 421	O 412	S 8	0	0

- Molecule 10 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 3, mitochondrial.

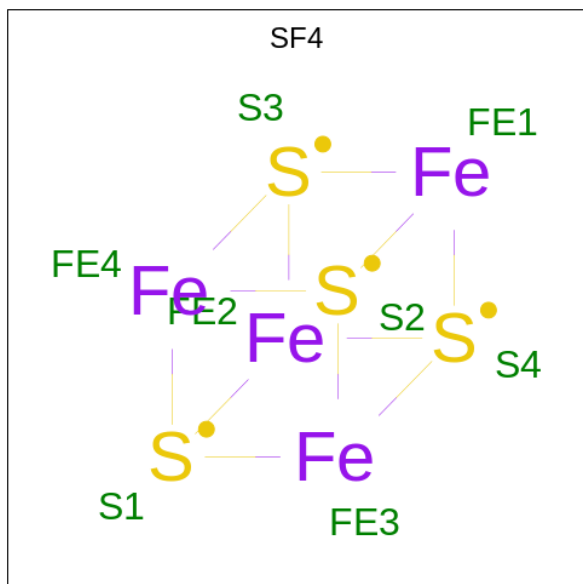| Mol	Chain	Residues	Atoms					AltConf	Trace
10	K	42	Total 355	C 219	N 67	O 68	S 1	0	0

- Molecule 11 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	L	125	Total 1016	C 642	N 181	O 190	S 3	0	0

- Molecule 12 is a protein called NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	M	690	Total 5293	C 3319	N 923	O 1012	S 39	0	0

- Molecule 13 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	N	144	Total 1204	C 770	N 218	O 212	S 4	0	0

- Molecule 14 is a protein called NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	O	217	Total 1660	C 1057	N 281	O 312	S 10	0	0

- Molecule 15 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 3, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	P	208	Total 1738	C 1124	N 298	O 314	S 2	0	0

- Molecule 16 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	Q	379	Total 3044	C 1945	N 522	O 554	S 23	0	0

- Molecule 17 is a protein called NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	T	96	Total 741	C 452	N 140	O 146	S 3	0	0

- Molecule 18 is a protein called NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	W	29	218	138	40	39	1	0	0

- Molecule 19 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4) (labeled as "Ligand of Interest" by depositor).
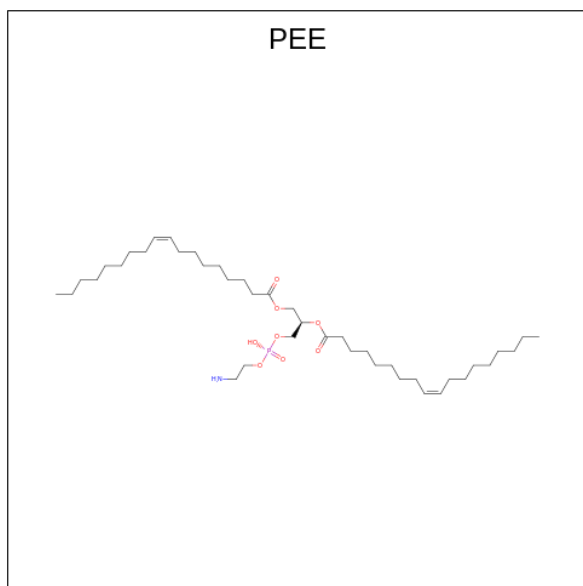

Mol	Chain	Residues	Atoms			AltConf
19	A	1	Total	Fe	S	0
			8	4	4	
19	B	1	Total	Fe	S	0
			8	4	4	
19	B	1	Total	Fe	S	0
			8	4	4	
19	C	1	Total	Fe	S	0
			8	4	4	
19	M	1	Total	Fe	S	0
			8	4	4	
19	M	1	Total	Fe	S	0
			8	4	4	

- Molecule 20 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: $C_{17}H_{21}N_4O_9P$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms					AltConf
20	A	1	Total	C	N	O	P	0
			31	17	4	9	1	

- Molecule 21 is 1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (three-letter code: PEE) (formula: $C_{41}H_{78}NO_8P$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms					AltConf
21	C	1	Total	C	N	O	P	0
			47	37	1	8	1	

- Molecule 22 is (9R,11S)-9-({[(1S)-1-HYDROXYHEXADECYL]OXY}METHYL)-2,2-DI METHYL-5,7,10-TRIOXA-2LAMBDA 5 -AZA-6LAMBDA 5 -PHOSPHAOCTACOSA

NE-6,6,11-TRIOL (three-letter code: PLX) (formula: $C_{42}H_{89}NO_8P$) (labeled as "Ligand of Interest" by depositor).
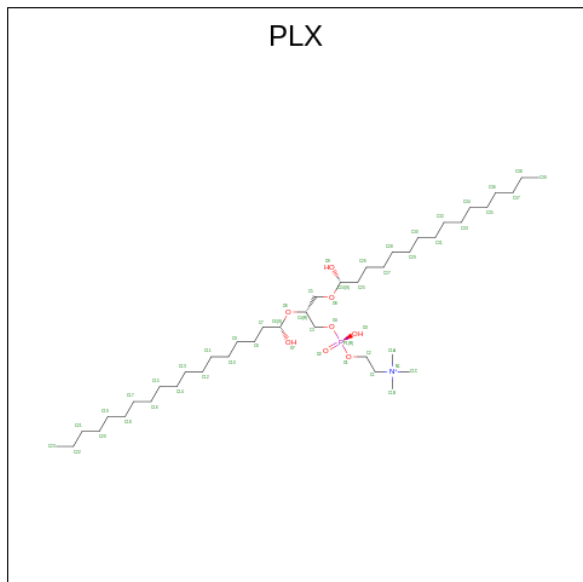
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
22	C	1	52	42	1	8	1	0

- Molecule 23 is S-[2-({N-[(2R)-2-hydroxy-3,3-dimethyl-4-(phosphonooxy)butanoyl]-beta -alanyl}amino)ethyl] dodecanethioate (three-letter code: 8Q1) (formula: $C_{23}H_{45}N_2O_8PS$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms						AltConf
23	G	1	Total	C	N	O	P	S	0
			35	23	2	8	1	1	

- Molecule 24 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).

NDP

Mol	Chain	Residues	Atoms					AltConf
24	J	1	Total	C	N	O	P	0
			48	21	7	17	3	

- Molecule 25 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2) (labeled as "Ligand of Interest" by depositor).
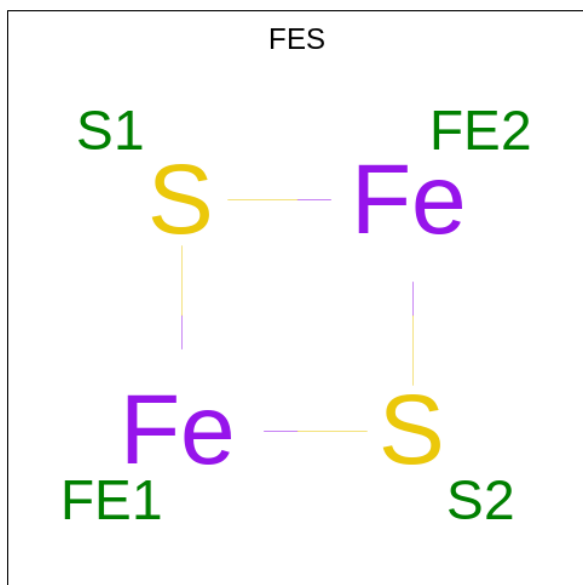
Mol	Chain	Residues	Atoms			AltConf
25	M	1	Total	Fe	S	0
			4	2	2	
25	O	1	Total	Fe	S	0
			4	2	2	

- Molecule 26 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
26	M	1	Total	Mg	0
			1	1	

- Molecule 27 is CARDIOLIPIN (three-letter code: CDL) (formula: $C_{81}H_{156}O_{17}P_2$) (labeled as "Ligand of Interest" by depositor).

CDL
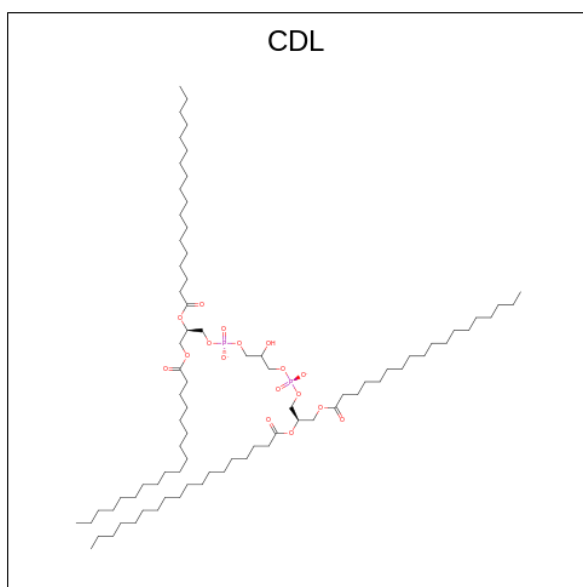
Mol	Chain	Residues	Atoms				AltConf
27	N	1	Total 51	C 32	O 17	P 2	0

- Molecule 28 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
28	T	1	Total 1	Zn 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: NADH dehydrogenase [ubiquinone] flavoprotein 1, mitochondrial
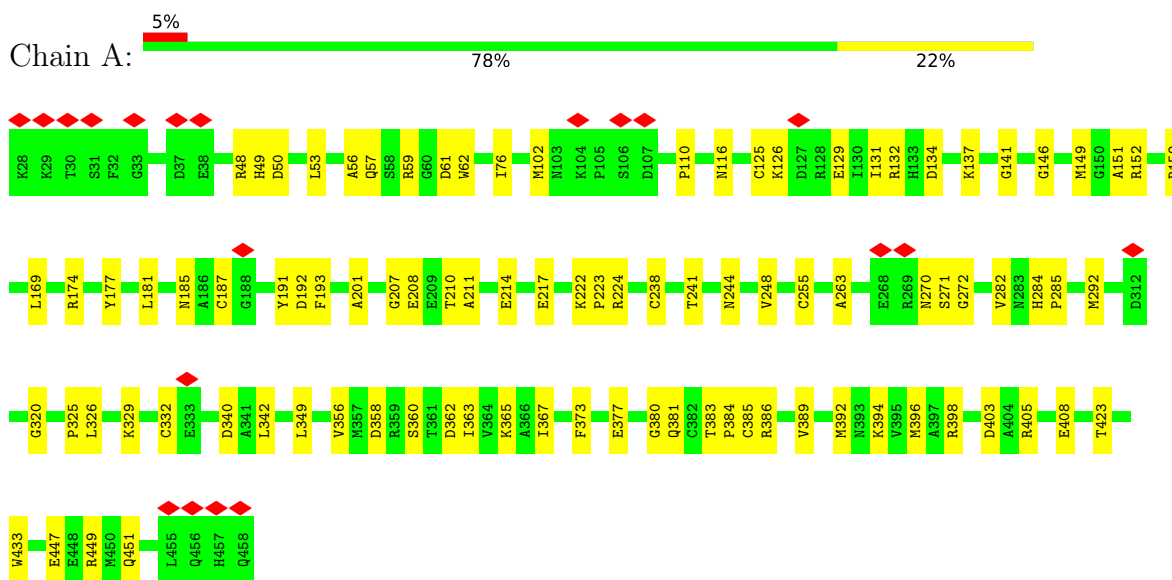
- Molecule 2: NADH dehydrogenase [ubiquinone] iron-sulfur protein 8, mitochondrial
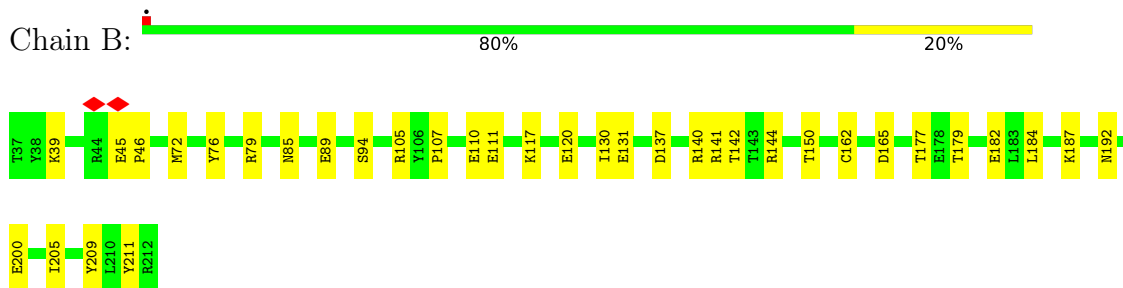
- Molecule 3: NADH dehydrogenase [ubiquinone] iron-sulfur protein 7, mitochondrial

I184 E187 K188 R189 L190 R191 R195 R196
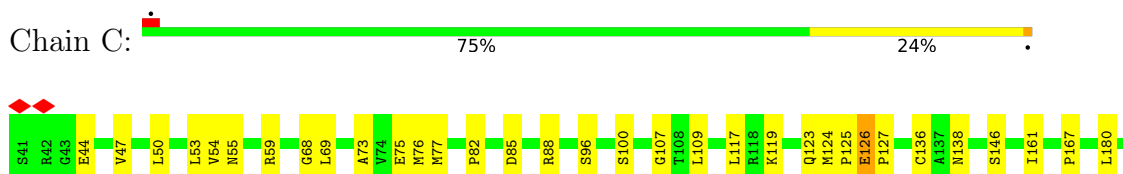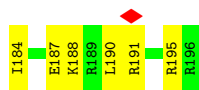
• Molecule 4: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 6

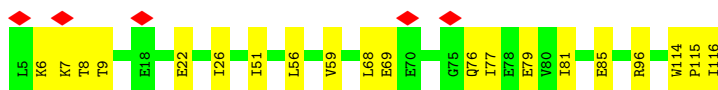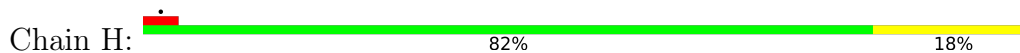Chain E:

9%

83%   17%

G14 T15 S16 V17 K18 P19 I20 F21 S22 E27 R41 V47 F50 Q51 L52 D53 D61 R64 L90 I94 N95 V96 R100 T101 M104 R105 F106 A112 P113 R114 Y123 D127 P128
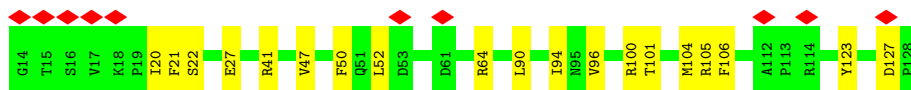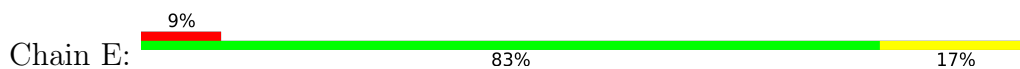
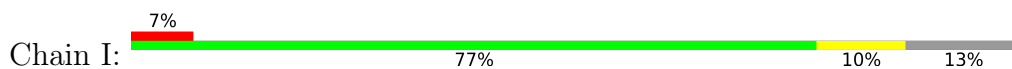• Molecule 5: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 2

Chain F:

13%

85%   15%

L14 I19 Q25 R26 I37 E38 K39 R40 Y41 D50 I53 L54 I55 R56 E57 D60 V61 Q62 R68 N80 S83 A84 D85 R89 S96 G97 K98 A99
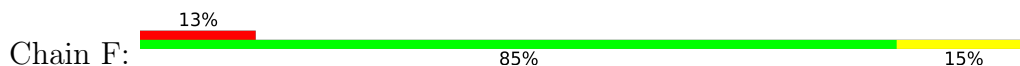
• Molecule 6: Acyl carrier protein

Chain G:

56%

75%   25%

S69 D70 A71 P72 P73 L74 T75 L76 E77 A78 I79 K80 D81 R82 V83 L84 Y85 K88 L89 Y90 D91 K92 I93 D94 P95 E96 K97 N101 S102 H103 K106 D107 D111 S112 L113 E117 I118 I119 M120 A121 M122 E123 D124 E125 F126 G127 F128 E129 I130 P131 D132 I133 D134 A135 E136

K137 L138 Q142 E143 I144 V145 D146 Y147 I148 A149 D150 K151 K152 D153 V154 Y155 E156
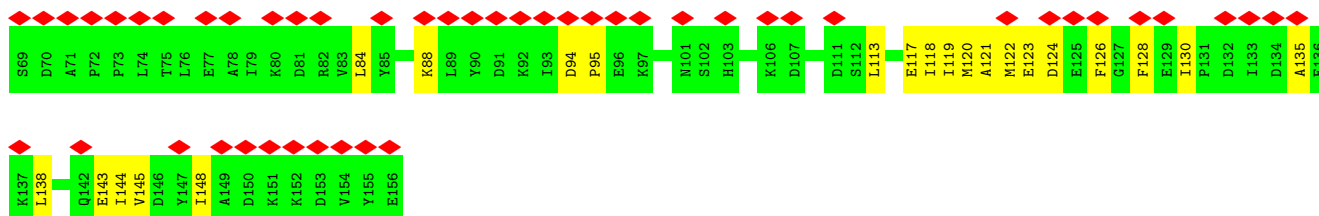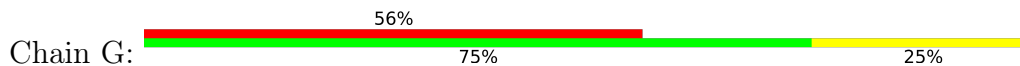
• Molecule 7: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 5

Chain H:

82%   18%

L5 K6 K7 T8 T9 E18 E22 I26 I51 L56 V59 L68 E69 E70 G75 Q76 I77 E78 E79 V80 I81 E85 R96 W114 P115 I116

• Molecule 8: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 7

Chain I:

7%

77%   10%   13%

A2 R6 R18 Q21 K33 Q36 P39 K40 L41 P42 S46 M70 Q73 K74 VAL LEU ALA SER GLY LYS PRO ALA GLU SER SER ALA VAL ALA GLU T90 E91 K102 R103 Q110 L113
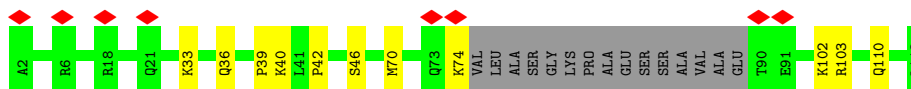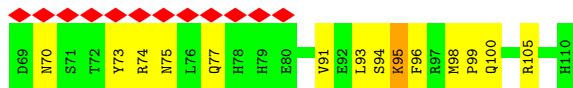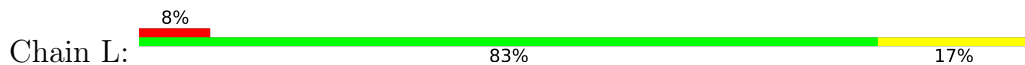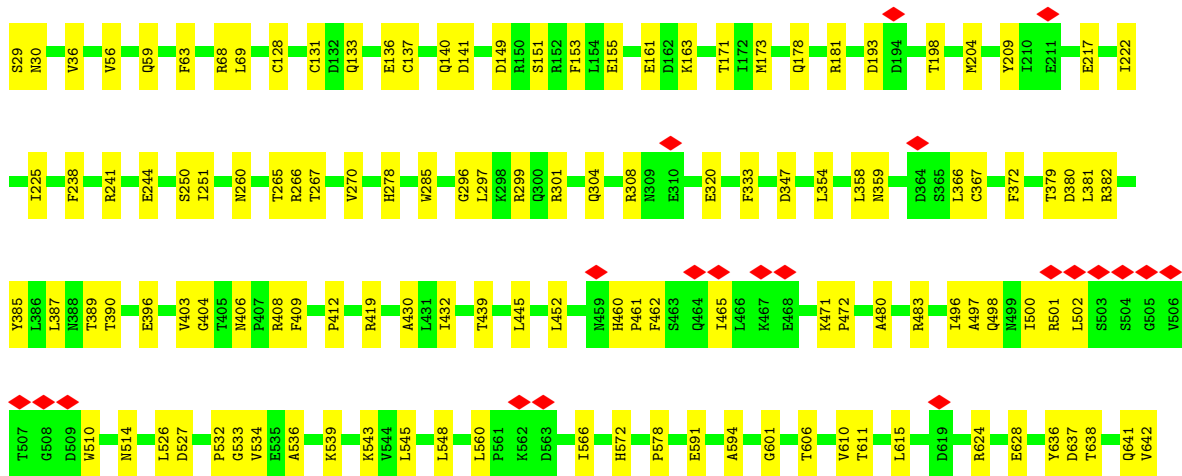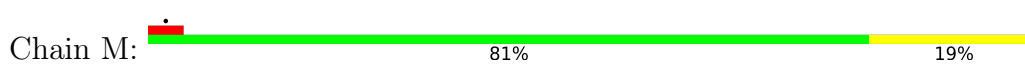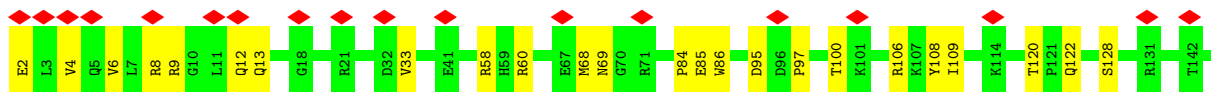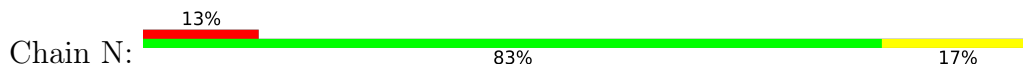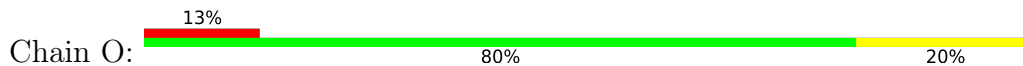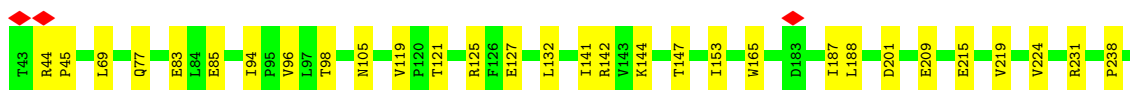
• Molecule 9: NADH dehydrogenase ubiquinone 1 alpha subcomplex subunit 9, mitochondrial

Chain J:

10%

65%   21%   13%

L36 H37 H38 A39 L40 F64 L65 L73 G74 R75 S78 P83 Y89 W108 K111 D112 K113 D114 S115 I116 R117 K118 V119 V120 E121 I127 N128 L129 V130 G131 R132 E133 W134 E135 F139 D143 K147 A153 K163 H166 I167 S168 A172 D173 I174

K175 S176 P177 S178 L181 V191 R192 F195 A198 T199 I200 I201 K202 P203 S204 D205 I206 F207 G208 R209 E210 D211 R212 F213 L214 R221 TRP PHE GLY VAL PRO LEU ILE SER L231 G232 K233 E234 T235 V236 K237 Q238 P239 V240 N251 A252 I253 K254 D255 P256 D257 A258

V266 R270 Y271 L272 D275 Q278 Y285 R286 P287 F288 LEU PRO TYR PRO LEU PRO HIS PHE ALA TYR ARG TRP VAL GLY ARG LEU PHE GLU VAL SER PRO PHE GLU PRO TRP T314 T315 R316 D317 K318 V319 V322 H323 D326 E336 L345 A349 I350 E351 T358

TYR ARG TRP LEU THR SER GLU MET GLU ASP V369 K370 K373 T374 V375 N376

• Molecule 10: NADH dehydrogenase [ubiquinone] flavoprotein 3, mitochondrial

Chain K:

29%

67%   31%   •

D69 N70 S71 T72 Y73 R74 N75 L76 Q77 H78 H79 E80 V91 E92 L93 S94 K95 F96 R97 M98 P99 Q100 R105 H110

• Molecule 11: NADH dehydrogenase [ubiquinone] iron-sulfur protein 4, mitochondrial

Chain L:

8%

83%   17%

Q51 L52 I53 A54 V55 D56 E57 K58 K73 Q88 S89 G90 K96 F101 R104 E105 N109 P110 L111 M112 A118 L124 K131 E139 V147 E148 E149 K158 N163 R169 T170 R171 K175

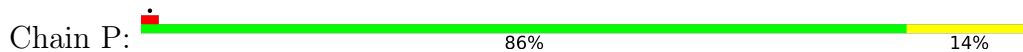• Molecule 12: NADH-ubiquinone oxidoreductase 75 kDa subunit, mitochondrial

Chain M:

•

81%   19%

S29 N30 V36 V56 Q59 F63 R68 L69 C128 C131 D132 Q133 E136 C137 Q140 D141 D149 R150 S151 R152 F153 L154 E155 E161 D162 K163 T171 I172 M173 Q178 R181 D193 D194 T198 M204 Y209 I210 E211 E217 I222

I225 F238 R241 E244 S250 I251 N260 T265 R266 T267 V270 H278 W285 G296 L297 K298 R299 Q300 R301 Q304 R308 N309 E310 E320 F333 D347 L354 L358 N359 D364 S365 L366 C367 F372 T379 D380 L381 R382

Y385 L386 L387 N388 T389 T390 E396 V403 G404 T405 N406 P407 R408 F409 P412 R419 A430 L431 I432 T439 L445 L452 N459 H460 P461 F462 S463 Q464 I465 L466 K467 E468 K471 P472 A480 R483 I496 A497 Q498 N499 I500 R501 L502 S503 S504 G505 V506

T507 G508 D509 W510 N514 L526 D527 P532 G533 V534 E535 A536 K539 K543 V544 L545 L548 L560 P561 K562 D563 I566 H572 P578 E591 A594 G601 T606 V610 T611 L615 D619 R624 E628 Y636 D637 T638 Q641 V642

P651 R655 E660 N663 Y664 F665 Q666 Q667 A668 N669 V675 N676 Q677 A681 D682 P683 L684 Q688 Q705 E716 G717 I718

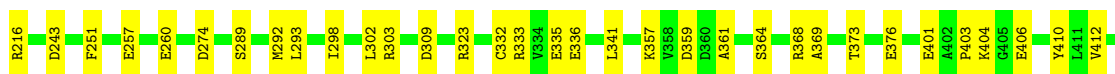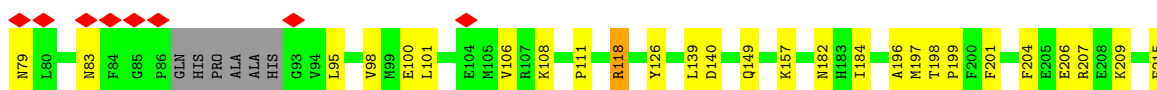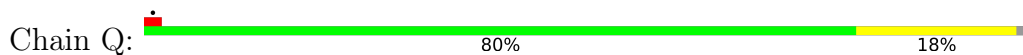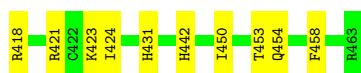• Molecule 13: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 12

Chain N:

13%
83% 17%

E2 L3 V4 Q5 V6 L7 R8 R9 G10 L11 Q12 Q13 G18 R21 D32 V33 E41 R58 H59 R60 E67 M68 N69 G70 R71 P84 E85 W86 D95 D96 P97 T100 K101 R106 K107 Y108 I109 K114 T120 P121 Q122 S128 R131 T142

K145

• Molecule 14: NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial

Chain O:

13%
80% 20%

G33 A34 G35 G36 A37 R42 E46 D50 D54 F55 Y60 P71 K75 R88 I104 L105 Q106 M110 R111 E114 M121 K129 Y130 H131 V134 T137 T138 L149 Q153 K154 K155 L156 K159 E162 T163 T164 P165 D166 K167 I172

C176 C180 V181 N182 V186 N189 D190 E194 D200 I201 E202 I205 D206 E207 L208 K209 K212 I213 P214 K215 P218 R219 S220 G221 R222 A228 G229 G230 L231 K239 G240 F243 A247 G248 L249

• Molecule 15: NADH dehydrogenase [ubiquinone] iron-sulfur protein 3, mitochondrial

Chain P:

86% 14%

T43 R44 P45 L69 Q77 E83 L84 E85 I94 P95 V96 L97 T98 N105 V119 P120 T121 R125 F126 E127 L132 I141 R142 V143 K144 T147 I153 W165 D183 I187 L188 D201 E209 E215 V219 V224 R231 P238

E250

• Molecule 16: NADH dehydrogenase [ubiquinone] iron-sulfur protein 2, mitochondrial

Chain Q:

80% 18%

N79 L80 N83 F84 G85 P86 GLN HIS PRO ALA ALA HIS G93 V94 L95 V98 M99 E100 L101 E104 M105 V106 R107 K108 P111 R118 Y126 L139 D140 Q149 K157 N182 H183 I184 A196 M197 T198 P199 F200 F201 F204 F205 E206 R207 E208 K209 E215

R216 D243 F251 E257 E260 D274 S289 M292 L293 I298 L302 R303 D309 R323 C332 R333 V334 E335 E336 L341 K357 V358 D359 D360 A361 S364 R368 A369 T373 E376 E401 A402 P403 K404 G405 E406 V410 L411 V412

R418 R421 C422 K423 I424 H431 H442 I450 T453 Q454 F458 R463

• Molecule 17: NADH dehydrogenase [ubiquinone] iron-sulfur protein 6, mitochondrial

Chain T:

21%

85%   15%

G28 V29 R30 T31 S32 P33 T34 G35 E36 K37 Q43 A44 D47 G48 D49 Y50 V53 D57 E61 A67 I71 A72 E78 V79 G80 S81 K104 E105 R119 Q120 P121 H122 H123

• Molecule 18: NADH dehydrogenase [ubiquinone] 1 alpha subcomplex subunit 13

Chain W:

17%

83%   17%

A3 S4 K5 V6 K7 L25 R28 G29 L30 S31

4   Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	63623	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/Å^2)$	50	Depositor
Minimum defocus (nm)	1300	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.208	Depositor
Minimum map value	-0.107	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.005	Depositor
Recommended contour level	0.0328	Depositor
Map size (Å)	333.002, 333.002, 333.002	wwPDB
Map dimensions	310, 310, 310	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.0742, 1.0742, 1.0742	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MG, 2MR, PEE, ZN, FMN, FES, SF4, CDL, NDP, PLX, 8Q1

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	A	0.28	0/3393	0.50	0/4584
2	B	0.31	0/1443	0.53	0/1952
3	C	0.31	0/1275	0.54	0/1725
4	E	0.30	0/995	0.57	0/1340
5	F	0.28	0/702	0.57	0/945
6	G	0.26	0/673	0.46	0/911
7	H	0.26	0/929	0.47	0/1258
8	I	0.28	0/798	0.55	0/1079
9	J	0.28	0/2404	0.50	0/3245
10	K	0.26	0/365	0.50	0/493
11	L	0.27	0/1039	0.52	1/1403 (0.1%)
12	M	0.28	0/5381	0.51	0/7291
13	N	0.27	0/1245	0.52	0/1694
14	O	0.28	0/1699	0.48	0/2313
15	P	0.30	0/1789	0.51	0/2436
16	Q	0.30	0/3101	0.52	0/4189
17	T	0.28	0/755	0.52	0/1018
18	W	0.31	0/224	0.51	0/302
All	All	0.29	0/28210	0.51	1/38178 (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})
11	L	118	ALA	C-N-CA	-5.10	108.95	121.70

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3318	0	3280	67	0
2	B	1412	0	1363	29	0
3	C	1244	0	1251	34	0
4	E	971	0	975	17	0
5	F	691	0	704	10	0
6	G	664	0	613	17	0
7	H	910	0	950	17	0
8	I	780	0	808	11	0
9	J	2352	0	2396	67	0
10	K	355	0	329	15	0
11	L	1016	0	1016	17	0
12	M	5293	0	5324	93	0
13	N	1204	0	1162	18	0
14	O	1660	0	1659	31	0
15	P	1738	0	1693	20	0
16	Q	3044	0	3018	46	0
17	T	741	0	702	11	0
18	W	218	0	219	7	0
19	A	8	0	0	2	0
19	B	16	0	0	0	0
19	C	8	0	0	2	0
19	M	16	0	0	0	0
20	A	31	0	19	2	0
21	C	47	0	71	2	0
22	C	52	0	88	4	0
23	G	35	0	0	1	0
24	J	48	0	24	6	0
25	M	4	0	0	0	0
25	O	4	0	0	0	0
26	M	1	0	0	0	0
27	N	51	0	46	1	0
28	T	1	0	0	0	0
All	All	27933	0	27710	457	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.

The worst 5 of 457 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)
24:J:401:NDP:O4D	24:J:401:NDP:C4D	1.68	1.15
3:C:126:GLU:CB	3:C:127:PRO:CD	2.26	1.12
9:J:236:VAL:CG1	9:J:270:ARG:HH21	1.67	1.07
9:J:238:GLN:OE1	9:J:270:ARG:HG2	1.56	1.04
3:C:126:GLU:CB	3:C:127:PRO:HD2	1.96	0.93

There are no symmetry-related clashes.

5.3　Torsion angles (i)

5.3.1　Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	429/431 (100%)	417 (97%)	12 (3%)	0	100	100
2	B	174/176 (99%)	171 (98%)	3 (2%)	0	100	100
3	C	154/156 (99%)	147 (96%)	6 (4%)	1 (1%)	25	58
4	E	113/115 (98%)	108 (96%)	4 (4%)	1 (1%)	17	48
5	F	84/86 (98%)	80 (95%)	4 (5%)	0	100	100
6	G	86/88 (98%)	86 (100%)	0	0	100	100
7	H	110/112 (98%)	103 (94%)	7 (6%)	0	100	100
8	I	93/112 (83%)	78 (84%)	15 (16%)	0	100	100
9	J	289/341 (85%)	277 (96%)	12 (4%)	0	100	100
10	K	40/42 (95%)	39 (98%)	1 (2%)	0	100	100
11	L	123/125 (98%)	121 (98%)	2 (2%)	0	100	100
12	M	688/690 (100%)	667 (97%)	21 (3%)	0	100	100
13	N	142/144 (99%)	138 (97%)	4 (3%)	0	100	100
14	O	215/217 (99%)	209 (97%)	6 (3%)	0	100	100
15	P	206/208 (99%)	196 (95%)	10 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
16	Q	374/385 (97%)	361 (96%)	13 (4%)	0	100	100
17	T	94/96 (98%)	90 (96%)	4 (4%)	0	100	100
18	W	27/29 (93%)	26 (96%)	1 (4%)	0	100	100
All	All	3441/3553 (97%)	3314 (96%)	125 (4%)	2 (0%)	54	82

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	126	GLU
4	E	105	ARG

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	A	345/345 (100%)	344 (100%)	1 (0%)	92	98
2	B	151/151 (100%)	151 (100%)	0	100	100
3	C	131/132 (99%)	131 (100%)	0	100	100
4	E	107/107 (100%)	107 (100%)	0	100	100
5	F	76/76 (100%)	76 (100%)	0	100	100
6	G	66/81 (82%)	66 (100%)	0	100	100
7	H	99/99 (100%)	99 (100%)	0	100	100
8	I	87/97 (90%)	87 (100%)	0	100	100
9	J	253/295 (86%)	252 (100%)	1 (0%)	91	97
10	K	41/41 (100%)	40 (98%)	1 (2%)	49	79
11	L	113/113 (100%)	113 (100%)	0	100	100
12	M	579/580 (100%)	578 (100%)	1 (0%)	93	98
13	N	130/130 (100%)	130 (100%)	0	100	100
14	O	180/183 (98%)	180 (100%)	0	100	100
15	P	190/190 (100%)	189 (100%)	1 (0%)	88	96

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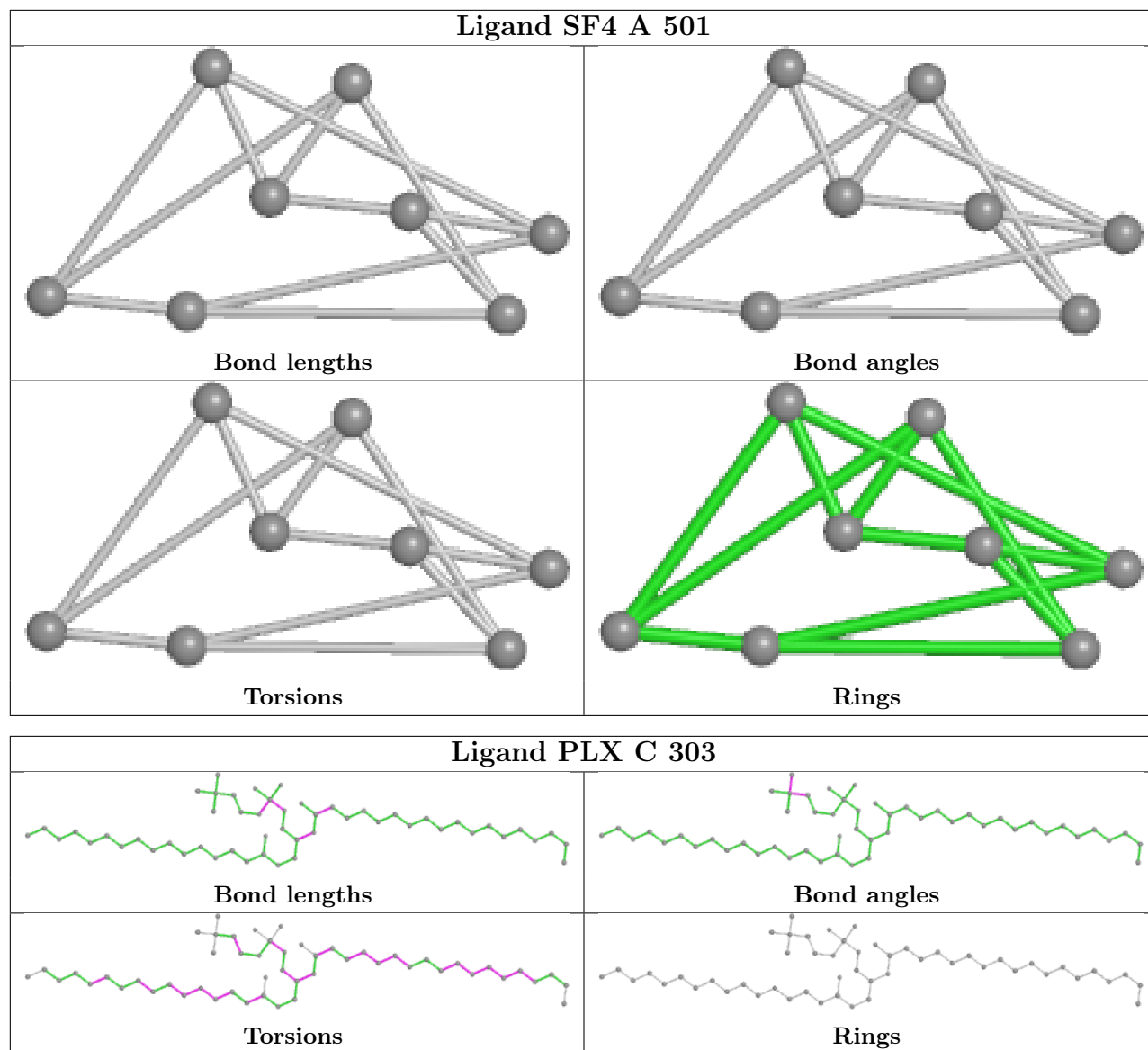| Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
16	Q	327/331 (99%)	327 (100%)	0	100	100
17	T	79/79 (100%)	79 (100%)	0	100	100
18	W	23/24 (96%)	23 (100%)	0	100	100
All	All	2977/3054 (98%)	2972 (100%)	5 (0%)	93	98

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	126	LYS
9	J	118	LYS
10	K	95	LYS
12	M	666	GLN
15	P	231	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

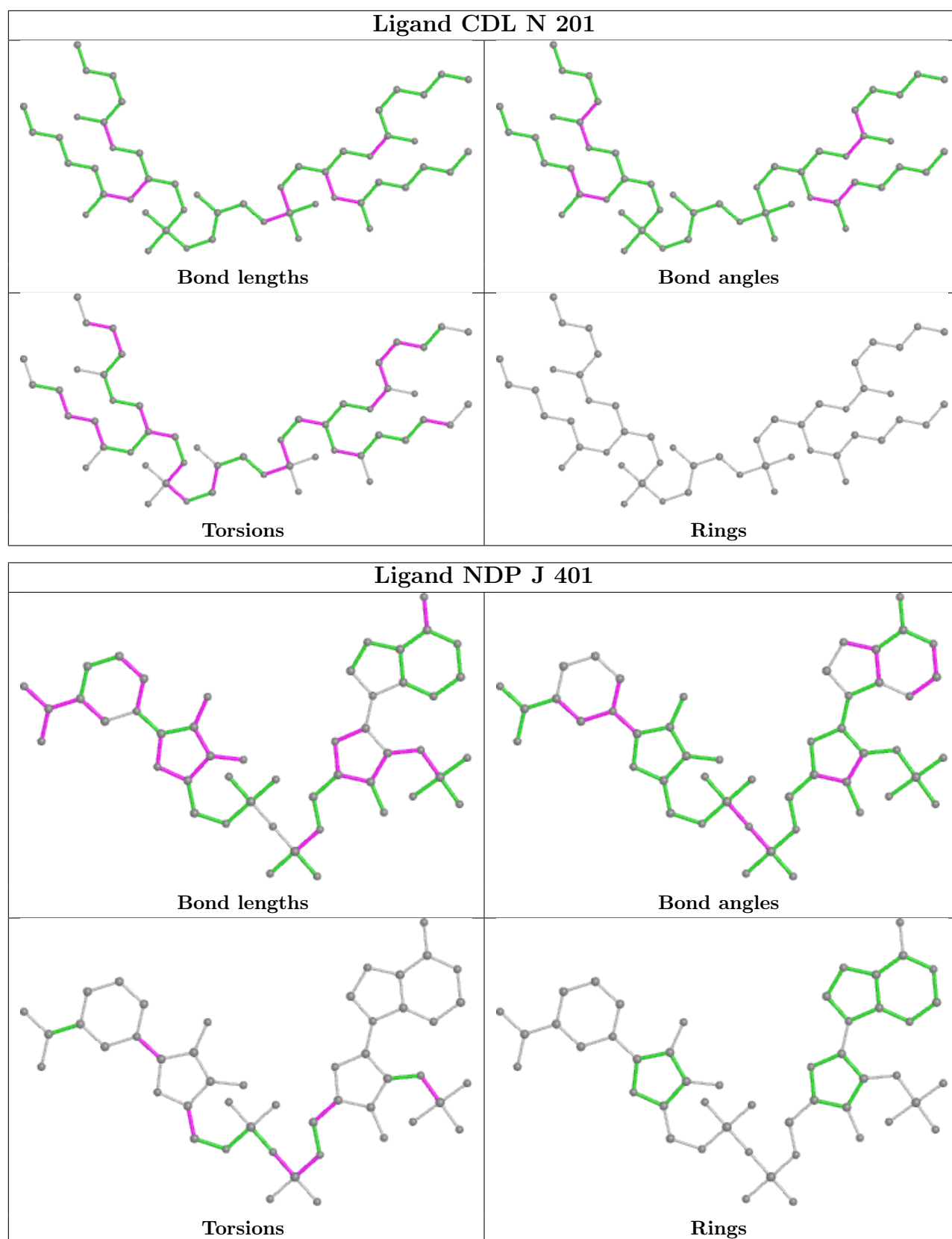| Mol	Chain	Res	Type
17	T	63	ASN
14	O	182	ASN
12	M	669	ASN
12	M	604	GLN
12	M	705	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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
16	2MR	Q	118	16	10,12,13	1.99	1 (10%)	5,13,15	6.43	3 (60%)

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
16	2MR	Q	118	16	-	2/10/13/15	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
16	Q	118	2MR	CZ-NE	5.54	1.46	1.34

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
16	Q	118	2MR	NE-CZ-NH2	13.31	131.68	119.48
16	Q	118	2MR	CD-NE-CZ	4.51	131.85	123.41
16	Q	118	2MR	CQ2-NH2-CZ	2.70	129.83	123.86

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
16	Q	118	2MR	NE-CD-CG-CB
16	Q	118	2MR	CA-CB-CG-CD

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
16	Q	118	2MR	1	0

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 16 ligands modelled in this entry, 2 are monoatomic - leaving 14 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	$\#|Z| > 2$
25	FES	M	803	12	0,4,4	-	-	-		
19	SF4	A	501	1	0,12,12	-	-	-		
22	PLX	C	303	-	51,51,51	1.14	4 (7%)	55,59,59	0.65	1 (1%)
19	SF4	B	302	2	0,12,12	-	-	-		
19	SF4	M	801	12	0,12,12	-	-	-		
27	CDL	N	201	-	50,50,99	1.39	8 (16%)	56,62,111	1.14	4 (7%)
24	NDP	J	401	-	45,52,52	4.56	20 (44%)	53,80,80	1.98	7 (13%)
23	8Q1	G	201	6	31,34,34	1.65	6 (19%)	40,43,43	1.59	7 (17%)
19	SF4	C	301	3	0,12,12	-	-	-		
20	FMN	A	502	-	33,33,33	1.11	2 (6%)	48,50,50	1.27	8 (16%)
19	SF4	B	301	2	0,12,12	-	-	-		
19	SF4	M	802	12	0,12,12	-	-	-		
25	FES	O	301	14	0,4,4	-	-	-		
21	PEE	C	302	-	46,46,50	1.21	6 (13%)	49,51,55	0.97	2 (4%)

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
25	FES	M	803	12	-	-	0/1/1/1
19	SF4	A	501	1	-	-	0/6/5/5
22	PLX	C	303	-	-	27/55/55/55	-
19	SF4	B	302	2	-	-	0/6/5/5
19	SF4	M	801	12	-	-	0/6/5/5
27	CDL	N	201	-	-	33/61/61/110	-
24	NDP	J	401	-	-	13/30/77/77	0/4/5/5
23	8Q1	G	201	6	-	16/41/41/41	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
19	SF4	C	301	3	-	-	0/6/5/5
20	FMN	A	502	-	-	7/18/18/18	0/3/3/3
19	SF4	B	301	2	-	-	0/6/5/5
19	SF4	M	802	12	-	-	0/6/5/5
25	FES	O	301	14	-	-	0/1/1/1
21	PEE	C	302	-	-	21/50/50/54	-

The worst 5 of 46 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
24	J	401	NDP	C3B-C2B	-12.85	1.24	1.52
24	J	401	NDP	C6N-C5N	12.45	1.55	1.33
24	J	401	NDP	O4D-C4D	10.70	1.68	1.45
24	J	401	NDP	C3D-C4D	-9.94	1.27	1.53
24	J	401	NDP	O4B-C1B	8.30	1.52	1.41

The worst 5 of 29 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
24	J	401	NDP	C3N-C2N-N1N	-7.85	111.89	123.10
24	J	401	NDP	C1D-N1N-C2N	-7.32	108.93	121.11
23	G	201	8Q1	C6-C1-S44	5.92	120.35	113.46
24	J	401	NDP	C1D-N1N-C6N	-4.85	110.38	120.83
24	J	401	NDP	N3A-C2A-N1A	-4.19	122.13	128.68

There are no chirality outliers.

5 of 117 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
20	A	502	FMN	N10-C1'-C2'-O2'
20	A	502	FMN	N10-C1'-C2'-C3'
20	A	502	FMN	C3'-C4'-C5'-O5'
20	A	502	FMN	C5'-O5'-P-O1P
20	A	502	FMN	C5'-O5'-P-O2P

There are no ring outliers.

8 monomers are involved in 20 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
19	A	501	SF4	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
22	C	303	PLX	4	0
27	N	201	CDL	1	0
24	J	401	NDP	6	0
23	G	201	8Q1	1	0
19	C	301	SF4	2	0
20	A	502	FMN	2	0
21	C	302	PEE	2	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 FES M 803

Bond lengths   Bond angles

Torsions   Rings

Ligand SF4 A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand PLX C 303

Bond lengths

Bond angles

Torsions

Rings

Ligand SF4 B 302

Bond lengths

Bond angles

Torsions

Rings

Ligand SF4 M 801

Bond lengths

Bond angles

Torsions

Rings

Ligand CDL N 201

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP J 401

Bond lengths

Bond angles

Torsions

Rings

Ligand 8Q1 G 201

Bond lengths	Bond angles
Torsions	Rings

Ligand SF4 C 301

Bond lengths	Bond angles
Torsions	Rings

Ligand FMN A 502

Bond lengths

Bond angles

Torsions

Rings

Ligand SF4 B 301

Bond lengths

Bond angles

Torsions

Rings

Ligand SF4 M 802

Bond lengths

Bond angles

Torsions

Rings

Ligand FES O 301

Bond lengths

Bond angles

Torsions

Rings

Ligand PEE C 302

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-32205. 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 |
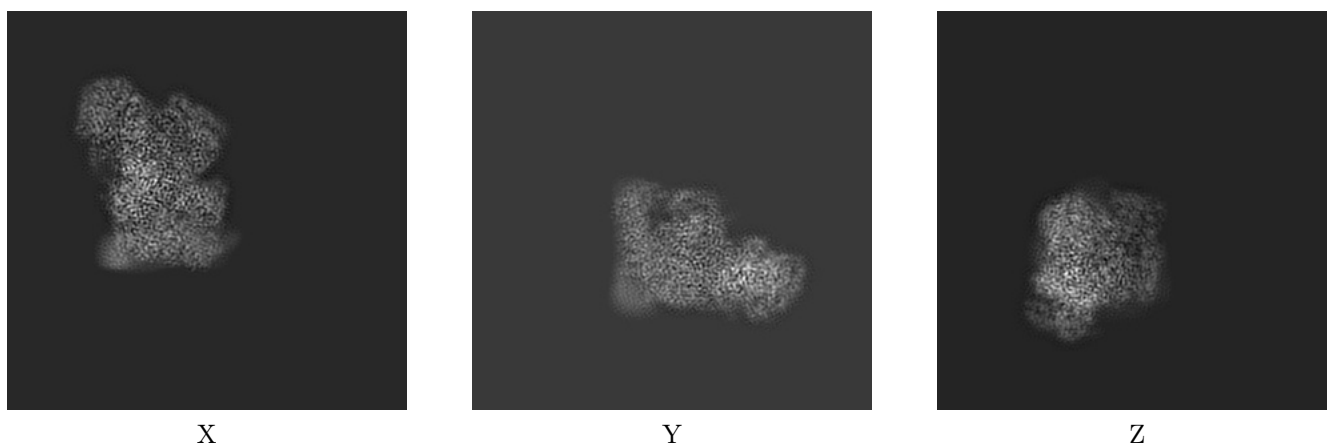
The images above show the map projected in three orthogonal directions.

6.2   Central slices ⓘ

6.2.1   Primary map

| X Index: 155 | Y Index: 155 | Z Index: 155 |
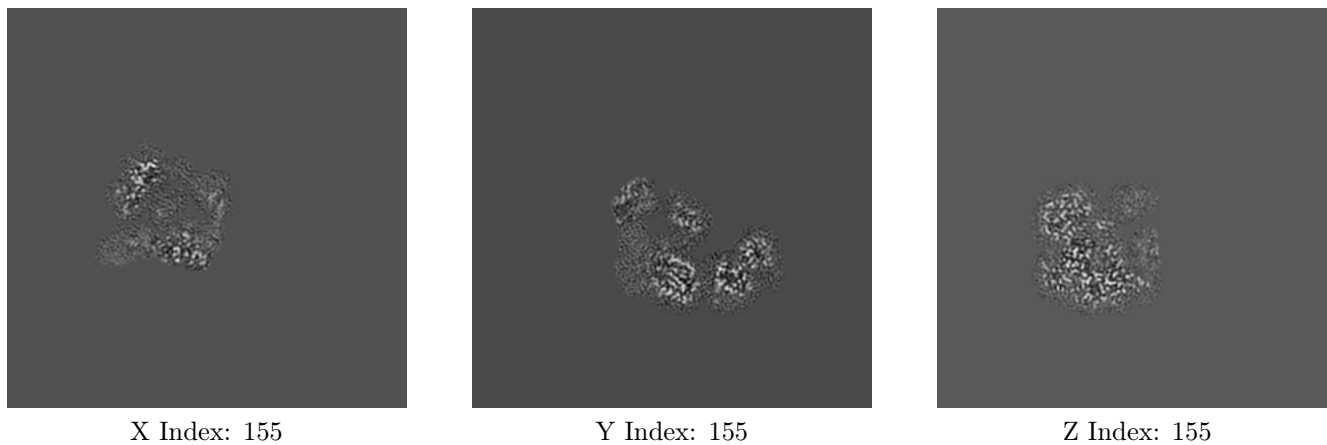
The images above show central slices of the map in three orthogonal directions.

6.3   Largest variance slices   ⓘ
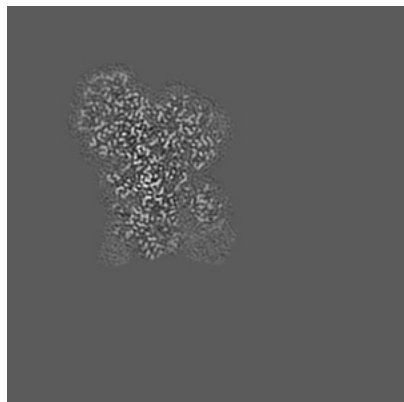
6.3.1   Primary map
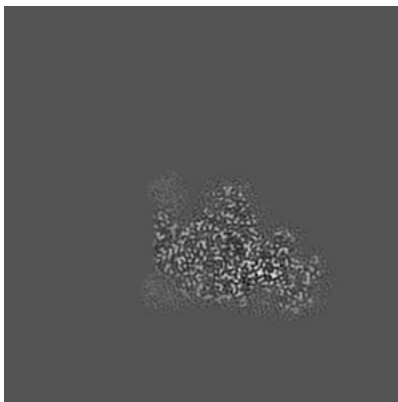
| X Index: 108 | Y Index: 103 | Z Index: 170 |
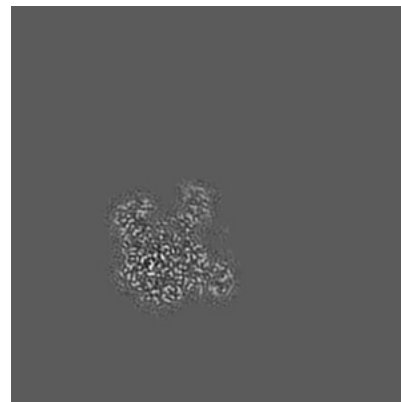
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1   Primary map

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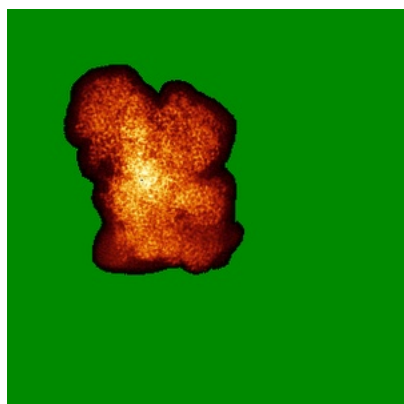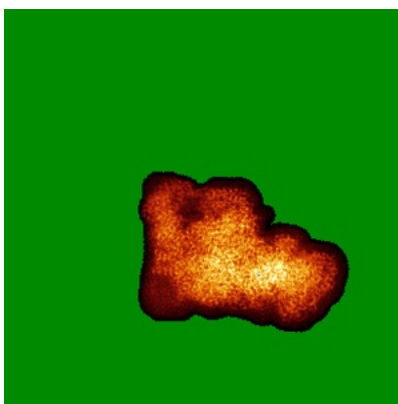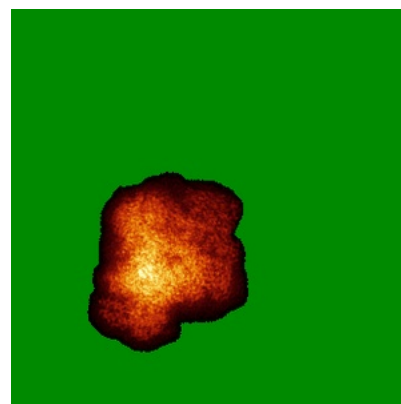
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5   Orthogonal surface views   (i)

6.5.1   Primary map

X   Y   Z
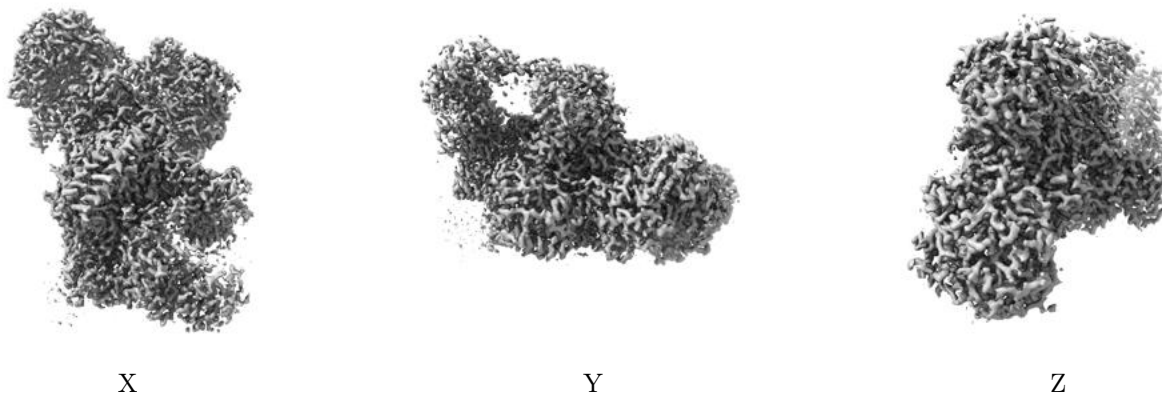
The images above show the 3D surface view of the map at the recommended contour level 0.0328. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.6   Mask visualisation   (i)

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

7   Map analysis ⓘ

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

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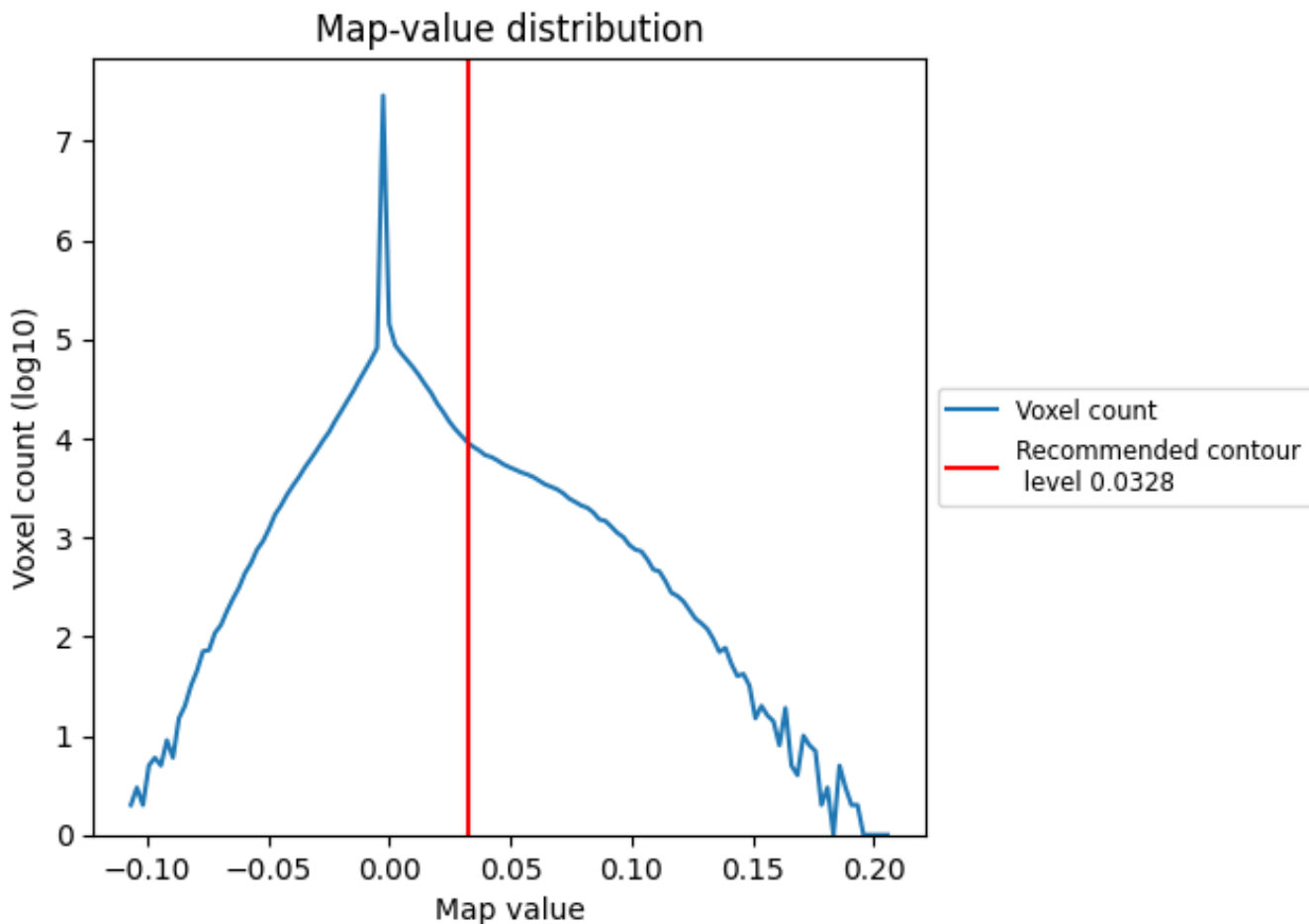
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2　Volume estimate ⓘ
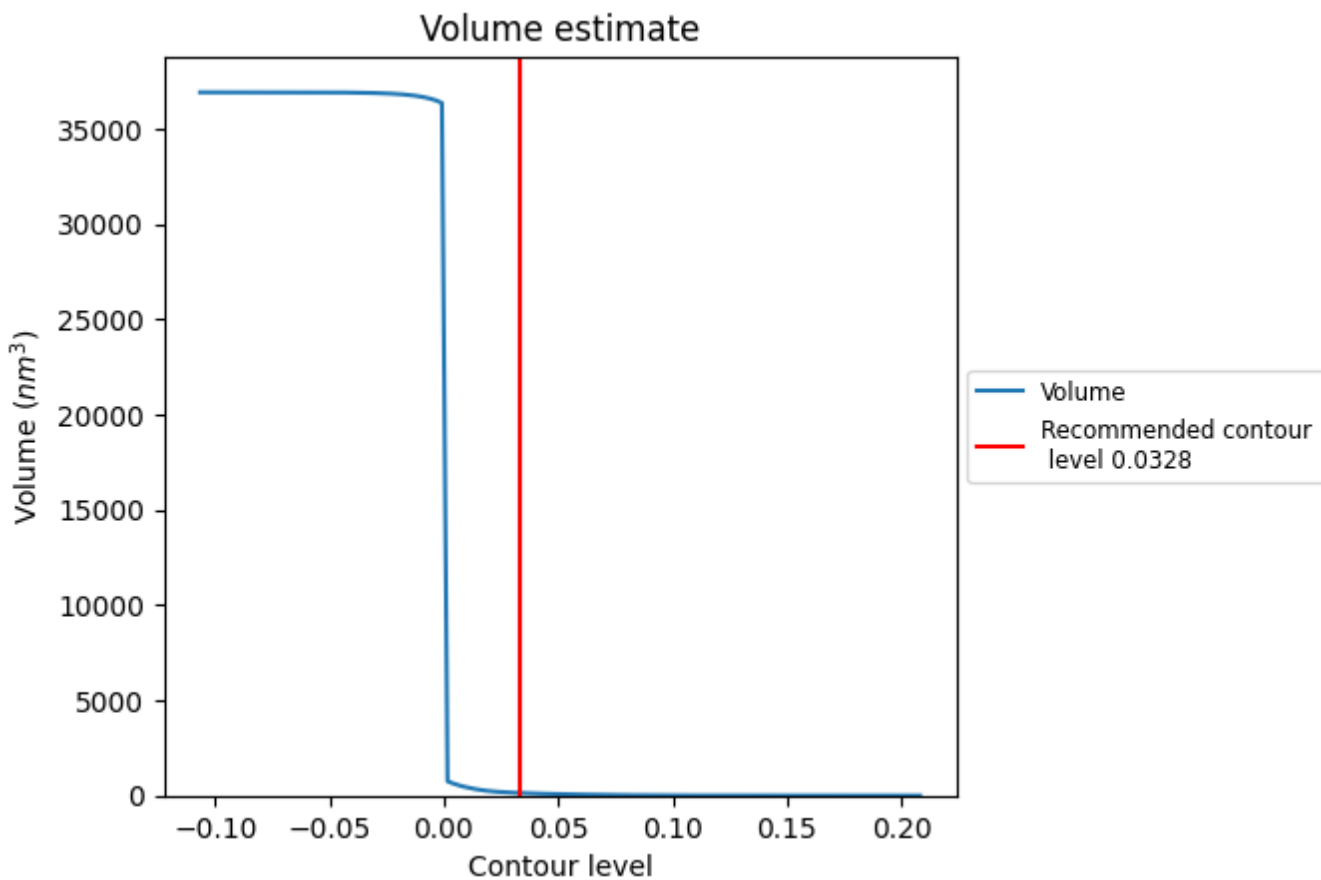
The volume at the recommended contour level is 136 nm^3; this corresponds to an approximate mass of 123 kDa.

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 ⓘ
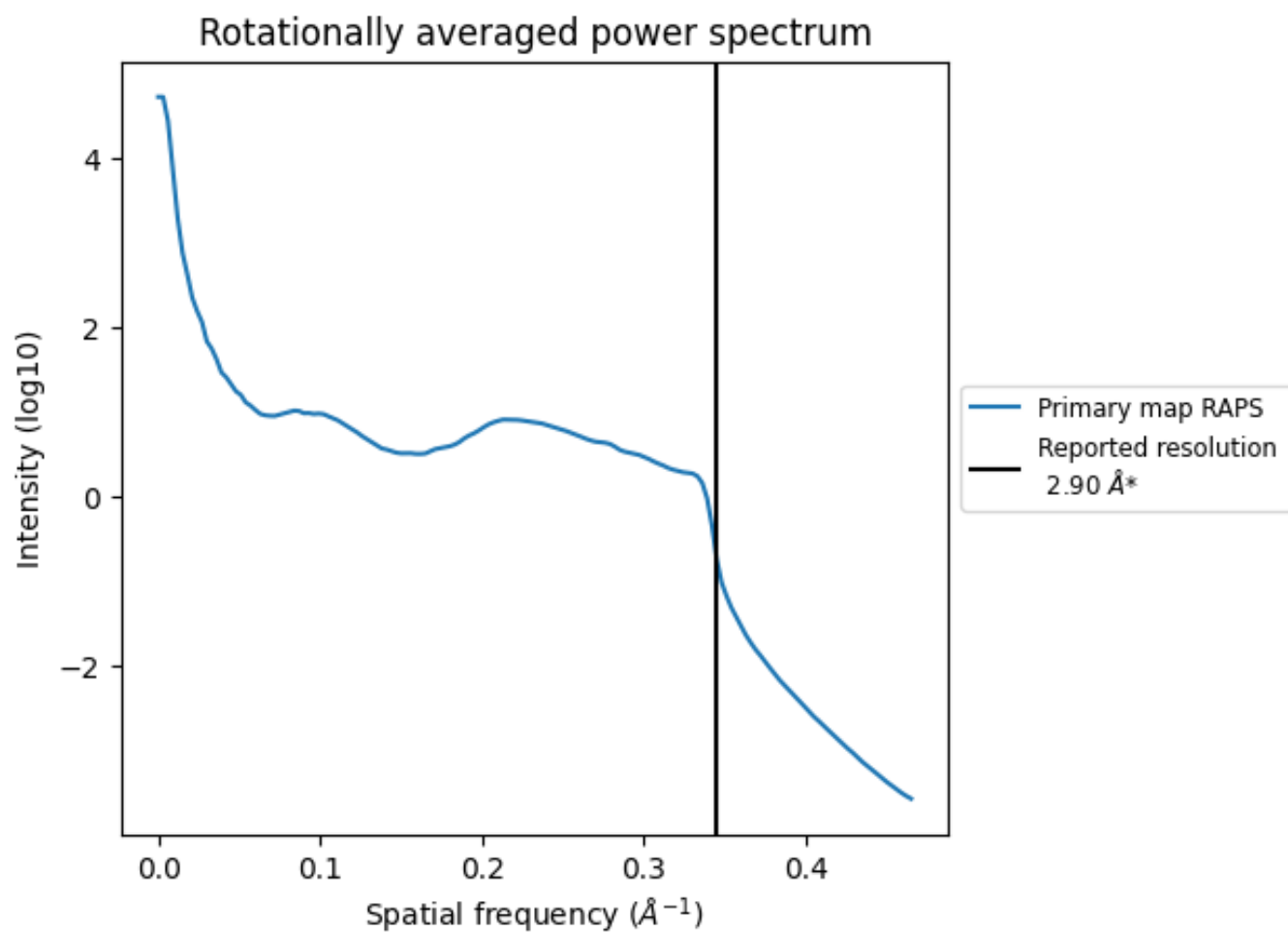
*Reported resolution corresponds to spatial frequency of 0.345 $Å^{-1}$

8 Fourier-Shell correlation ⓘ

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

9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-32205 and PDB model 7VYH. Per-residue inclusion information can be found in section 3 on page 13.

9.1 Map-model overlay (i)
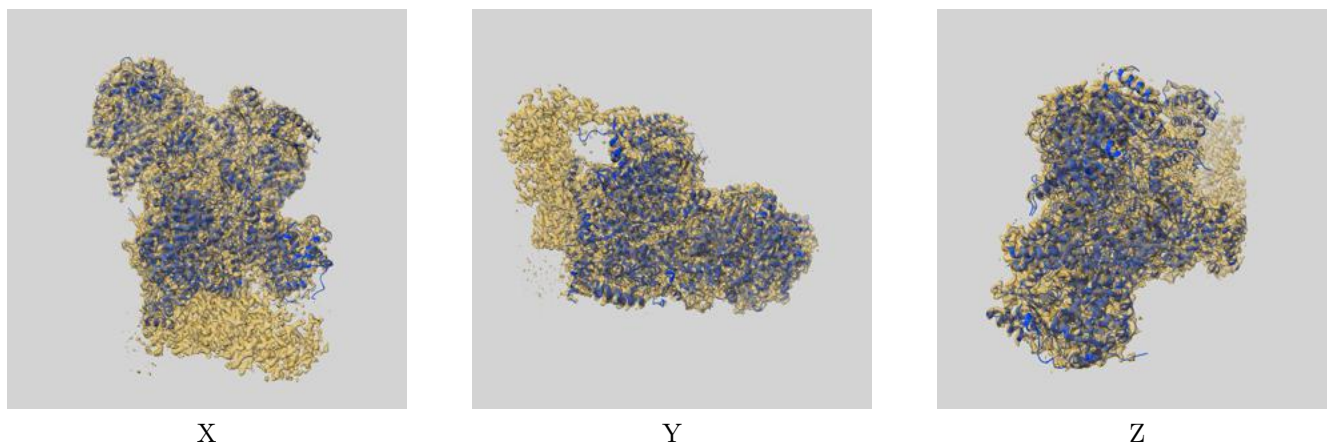
| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.0328 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
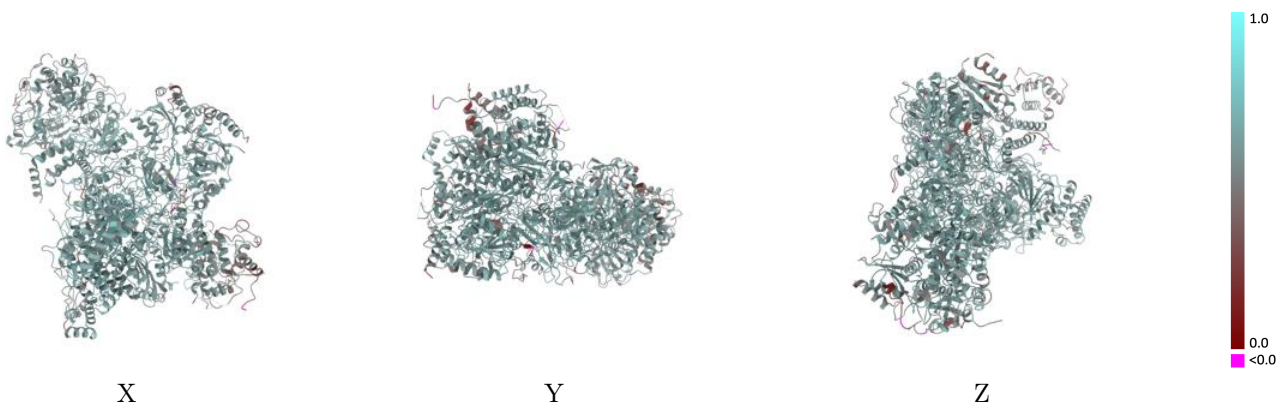
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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
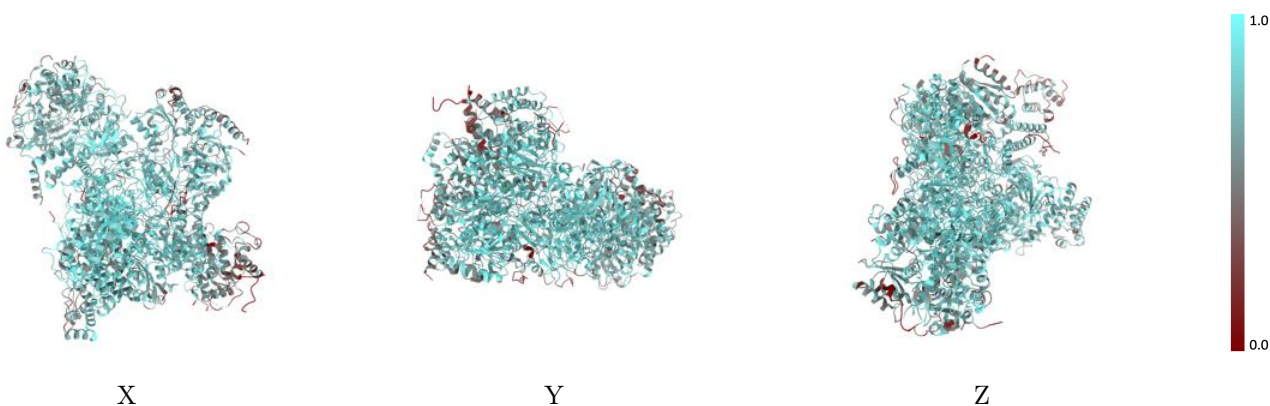
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.0328).

9.4 Atom inclusion ⓘ
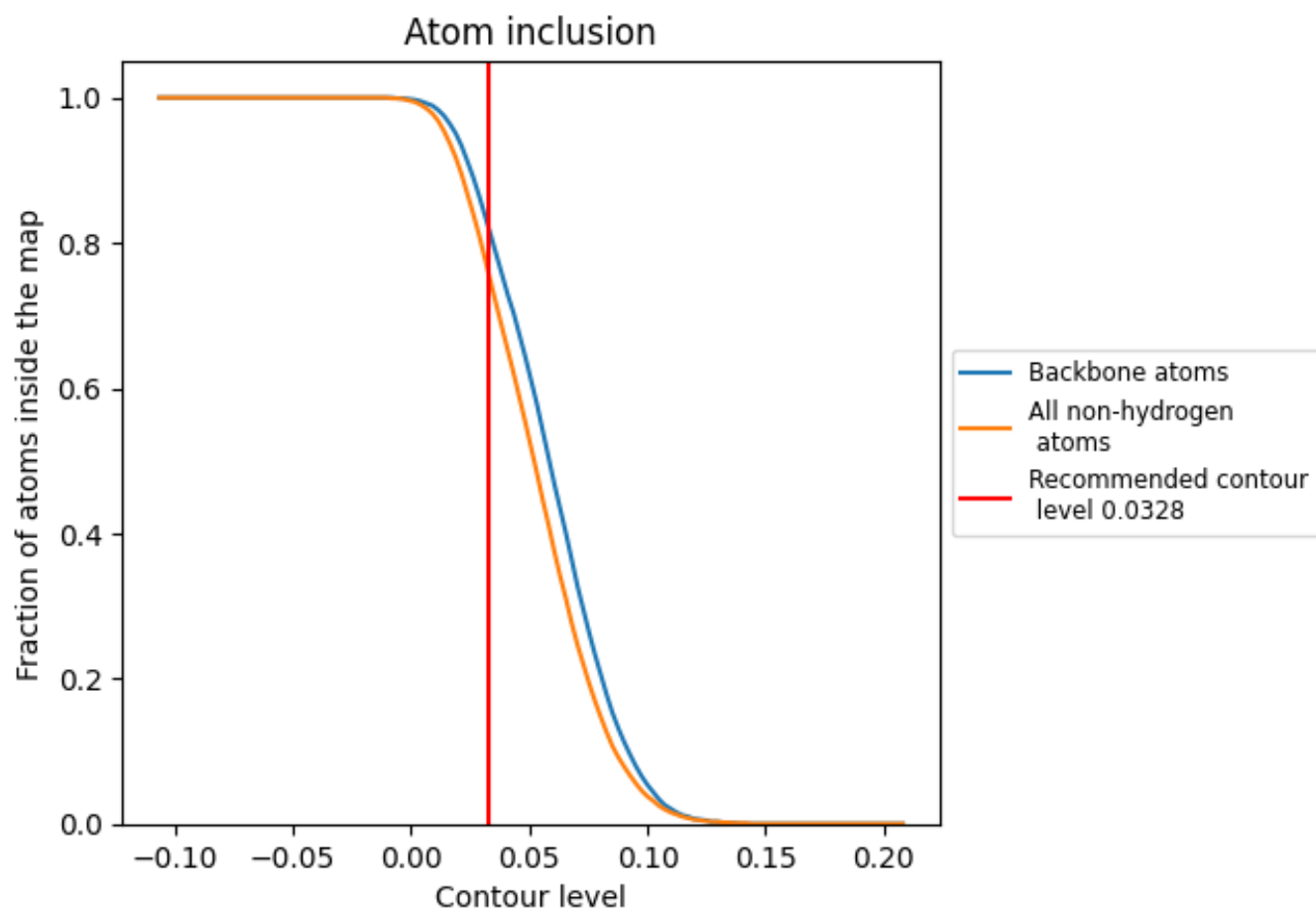
At the recommended contour level, 82% of all backbone atoms, 76% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.0328) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7580	0.5840
A	0.7430	0.5780
B	0.8750	0.6210
C	0.8070	0.5970
E	0.7240	0.5710
F	0.6370	0.5260
G	0.4160	0.4490
H	0.7160	0.5700
I	0.7240	0.5700
J	0.7080	0.5650
K	0.5200	0.4720
L	0.7860	0.5970
M	0.8040	0.5990
N	0.6880	0.5860
O	0.6770	0.5550
P	0.8820	0.6270
Q	0.8520	0.6200
T	0.6560	0.5570
W	0.6650	0.5600

1.0

0.0
<0.0