WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB EM Validation Report ⓘ

May 25, 2025 – 11:35 PM EDT

PDB ID	:	8TOE / pdb_00008toe
EMDB ID	:	EMD-41448
Title	:	Escherichia coli RNA polymerase unwinding intermediate (I1c) at the lambda PR promoter
Authors	:	Darst, S.A.; Saecker, R.M.; Mueller, A.U.
Deposited on	:	2023-08-03
Resolution	:	2.90 Å(reported)

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

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

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

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

|		
EMDB validation analysis	:	0.0.1.dev118
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

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 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.
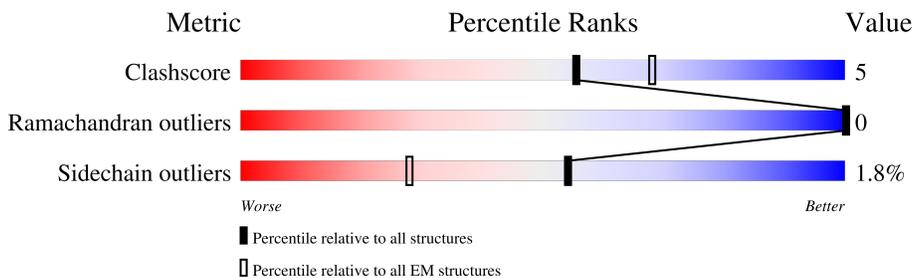
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	G	329	62% 8% · 29%
1	H	329	55% 12% 33%
1	M	329	18% / 19% · 78%
2	I	1342	· 88% 11% ·
3	J	1407	9% / 86% 9% 5%
4	K	91	· 77% 7% 16%
5	L	613	19% / 65% 13% 21%
6	O	105	7% / 28% 10% 62%

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Mol	Chain	Length	Quality of chain
7	P	105	30% 68%

2 Entry composition ⓘ

There are 10 unique types of molecules in this entry. The entry contains 30996 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 DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	G	232	Total 1773	C 1108	N 315	O 344	S 6	0	0
1	H	219	Total 1685	C 1054	N 295	O 330	S 6	0	0
1	M	73	Total 572	C 362	N 100	O 108	S 2	0	0

- Molecule 2 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	I	1336	Total 10518	C 6604	N 1833	O 2038	S 43	0	0

- Molecule 3 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	J	1335	Total 10381	C 6522	N 1851	O 1959	S 49	0	0

- Molecule 4 is a protein called DNA-directed RNA polymerase subunit omega.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	K	76	Total 605	C 368	N 115	O 121	S 1	0	0

- Molecule 5 is a protein called RNA polymerase sigma factor RpoD.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	L	482	Total 3858	C 2416	N 691	O 728	S 23	0	0

- Molecule 6 is a DNA chain called Nontemplate strand of lamdba PR promoter DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	O	40	Total 820	C 391	N 140	O 249	P 40	0	0

- Molecule 7 is a DNA chain called Template strand of lamdba PR promoter DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	P	34	Total 701	C 331	N 140	O 196	P 34	0	0

- Molecule 8 is CHAPSO (CCD ID: 1N7) (formula: $C_{32}H_{59}N_2O_8S$).
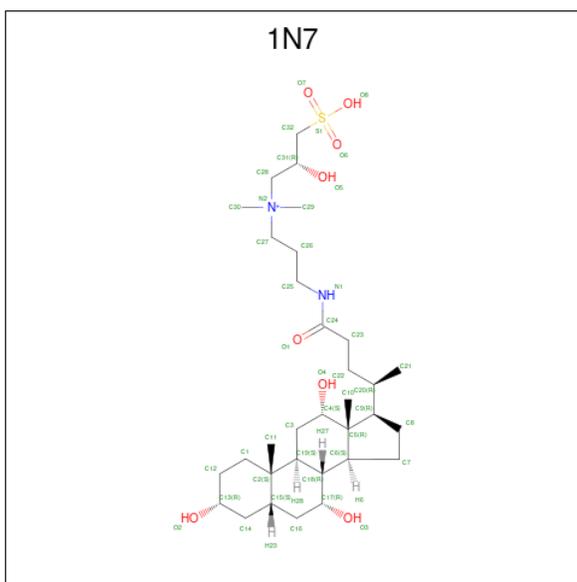
Mol	Chain	Residues	Atoms			AltConf
8	I	1	Total 26	C 23	O 3	0
8	J	1	Total 27	C 24	O 3	0
8	L	1	Total 27	C 24	O 3	0

- Molecule 9 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
9	J	1	Total 1	Mg 1	0

- Molecule 10 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
10	J	2	Total 2	Zn 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: DNA-directed RNA polymerase subunit alpha

Chain G:

- Molecule 1: DNA-directed RNA polymerase subunit alpha

Chain H:

- Molecule 1: DNA-directed RNA polymerase subunit alpha

Chain M:

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

GLU VAL LYS GLU LYS PRO GLU PHE D250 P251 I252 L253 L254 R255 P256 V257 D258 D259 L260 E261 L262 L270 K271 A272 E273 A274 I275 H276 Y277 I278 G279 D280 L281 V282 Q283 R284 T285 E286 V287 E288 L289 L290 K291 T292 P293 N294 L295 G296 K297 K298 S299 L300 T301 E302 I303 K304 D305 V306

L307 A308 S309 R310 G311 L312 S313 L314 G315 M316 R317 L318 E319 N320 W321 P322 PRO ALA SER ILE ALA ASP GLU

• Molecule 2: DNA-directed RNA polymerase subunit beta

Chain I:

88% 11%

MET V2 L28 S29 I30 Q31 N65 S66 T91 P110 E111 G112 T131 D132 I138 Q148 Y179 D185 D189 P190 K191 V196 R197 R201 P205 I208 I209 L221 I232 ARG ASP ASN K236 L246 R247 G248 GLU T250 A251 S252 F253 D254 I255

E256 G259 K260 V261 G266 R267 R272 H273 L277 D280 D281 E290 D303 E304 S305 T306 G307 A312 A313 N314 L317 S318 L319 D320 L321 L322 L336 T350 V353 D354 M370 E374 N406 R407 S408 R411 E412 E413 D427 K431 D444

N450 R451 R452 I453 R454 E458 D483 L484 D485 T486 P489 M492 Q513 D516 L521 T525 L533 R542 D549 V550 L571 I572 N573 V577 N582 E583 L587 Y591 T595 D596 G597 V598 N620 D624 E625 G626 G627 H628 E631

R637 S638 K639 D651 T657 V661 E672 D675 A676 N677 M685 Q686 R687 K697 P698 L699 V714 D728 A729 E738 D739 Y742 P743 G744 I748 D749 Q767 V802 N808 N811 E820 L845 T851 A852 D853 E876 L895 T896

P897 E898 R903 G907 D912 T927 I966 L967 V978 L979 G983 V984 E985 A986 E987 K988 L989 D990 K991 L992 E999 L1000 G1001 L1002 T1003 D1004 E1005 E1006 K1007 Q1010 Q1013 L1014 L1021 F1025 T1037 V1046 Q1061 H1070 G1071 D1084 L1098

V1103 R1106 M1107 N1108 I1109 I1112 L1113 E1114 V1186 V1225 T1226 V1227 L1233 D1240 T1255 Q1256 R1269 F1270 G1271 E1274 L1333 D1341 GLU

• Molecule 3: DNA-directed RNA polymerase subunit beta'

Chain J:

9% 86% 9% 5%

MET LYS ASP LEU LYS LYS PHE LEU LYS ALA GLN THR LYS THR GLU E16 N29 C70 L71 Y75 K76 H80 V83 T111 W115 L120 P121 S122 G125 Y140 E148 G149 G150 M151 E162 L166 E175 L194 E195 I201 E211 T212 K213

K216 L217 L224 L239 D304 A305 R312 L342 Y349 V354 I355 Y382 E386 L387 R388 I394 V401 D413 E414 V415 I416 A426 P427 H430 V470 T473 L474 E475 N489 L510 D516 V526 L527 T528 R535 D558

S568 L569 K570 D571 T572 Y589 N593 I624 A633 M644 V661 Q665 R678 V682 I707 N708 Q712 E713 Q736 R764 R799 L800 V801 L807 V848 L857 V858 L871 V894 C895 A920 E925 T931 MET ARG THR PHE HIS

ILE GLY GLY ALA ALA SER ARG ALA ALA GLU S948 S949 I950 Q951 V952 S957 L960 S961 N962 V963 K964 S965 V966 V967 N968 S969 S970 G971 K972 L973 V974 I975 T976 S977 E987 F988 V997 D1007 G1008 E1009 G1014 P1022 P1026 V1027 I1028 T1029 E1030 V1031 S1032 G1033 F1034

V1035 R1036 F1037 T1038 D1039 M1040 I1041 D1042 G1043 Q1044 T1045 I1046 T1047 R1048 Q1049 T1050 D1051 E1052 L1053 T1054 G1055 L1056 S1057 S1058 L1059 V1060 V1061 L1062 D1063 S1064 A1065 E1066 R1067 T1068 A1069 G1070 G1071 K1072 D1073 L1074 R1075 P1076 A1077 L1078 K1079 I1080 V1081 D1082 A1083 Q1084 G1085 N1086 D1087 V1088 L1089 I1090 P1091 G1092 T1093 D1094

M1095 P1096 A1097 Q1098 Y1099 F1100 L1101 P1102 G1103 K1104 A1105 I1106 V1107 Q1108 L1109 E1110 D1111 G1112 V1113 Q1114 I1115 S1116 S1117 G1118 D1119 T1120 L1121 A1122 R1123 I1124 P1125 Q1126 GLU SER GLY GLY THR LYS ASP ILE T1135 E1146 E1158 S1164 F1165 G1166 K1167 R1173 R1174 L1175 V1176 D1181 G1182 S1183 D1184

E1187 Q1195 F1199 E1200 G1201 E1202 E1205 D1208 V1209 I1210 S1211 I1233 V1237 L1275 N1289 R1290 E1349 I1352 L1356 H1366 Q1367 A1374 ALA GLY GLU ALA PRO ALA ALA PRO GLN VAL THR ALA GLU ASP SER ALA SER LEU ALA GLU LEU LEU ASN

ALA GLY LEU GLY SER ASP ASN GLU

• Molecule 4: DNA-directed RNA polymerase subunit omega

Chain K:

77% 7% 16%

MET A2 R3 N15 R16 R28 E42 E55 A77 ALA GLU LEU GLN ALA VAL THR ALA ILE ALA GLU GLY GLY ARG ARG

• Molecule 5: RNA polymerase sigma factor RpoD

Chain L:

19% 65% 13% 21%

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

ASP ALA ASP ASP LEU MET LEU A9 E15 D41 E44 A45 A46 A47 Q48 VAL LEU SER SER VAL GLU SER GLU ILE GLY ARG T94 T95 R99 E116 I119 R122 I123 E124 E136 V137 P138 E139 A140 Y143 L144 L145 E146 Q147 Y148 D149 R150 V151 E152 A153 E154 E155

A156 R157 L158 S159 D160 L161 I162 T163 G164 F165 V166 D167 PRO ASN ALA GLU GLU GLU ASP LEU ALA ALA PRO THR ALA THR HIS VAL GLY SER GLU GLU LEU SER GLN GLU ASP LEU ASP ASP GLU GLU GLU ASP GLY ASP ASP ASP ASP ASP SER ALA ASP ASP ASP ASN SER ILE ASP PRO E215

L216 A217 R218 E219 A222 R225 A226 Q227 Y228 V229 V230 T231 R232 D233 T234 I235 K236 ALA LYS GLY ARG SER H242 A243 T244 E247 E248 I249 L252 S253 F256 K257 Q258 F259 R260 Y268 N271 S272 M273 R274 V275 M276 R279 V280 R281 T282 R285 L286 I287 M288 K289

L290 C291 V292 E293 Q294 C295 K296 M297 P298 K299 K300 N301 F302 I303 T304 L305 F306 T307 G308 N309 E310 T311 S312 D313 T314 W315 F316 N317 A318 A319 I320 A321 M322 N323 K324 P325 W326 S327 E328 K329 L330 H331 D332 V333 S334 E335 E336 V337 H338 R339 A340 L341 Q342 K343 Q346 I347 E348 E349 E350

L353 V358 N362 R363 R364 E381 L384 I388 Y394 L402 Y421 K426 F427 S428 T429 Y430 T479 E482 L483 A484 M487 L488 M489 P490 E491 D492 K493 I494 I505 T509 P510 I511 G512 D513 D514 E515 D516 S517 D525 T552 E555 A556

K557 V558 M561 R562 I565 D566 M567 N568 T569 E575 V576 G577 D581 E591 P601 S602 E605 D612 ASP

• Molecule 6: Nontemplate strand of lamdba PR promoter DNA

Chain O:

7%

28% 10% 62%

DC DG DG DA DA DT DC DG DA DG DG DG DA DT DC DT DC DT DA DG DA DG DT DG DG DA DT DA DA DA DT DT DC DT DA C40 A41 C42 C43 G44 T45 T59 T60 T61 T65 C66 G69 C70 G74 A75 DT DA

DA T79 G80 G81 T82 DT DG DC DA DT DG DT DA DC DT DA DA DG DA DG DT DC DG

• Molecule 7: Template strand of lamdba PR promoter DNA

Chain P:

30% 68%

DC DG DA DC DA DA DC DC DT DC DC DT DT DA DG DT DA DC DA DT DG DC DA DA DC DC DT DT DT DA DT DC A33 G43 T44 G51 G63 G64 T65 G66 DT DT DA DG DA DA DT DT DT DA DT DC DC DA DA DC

DT DC DT DA DG DA DG DG DA DT DC DC DC DT DC DG DA DT DT DC DC DG

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	137962	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	60	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	3.477	Depositor
Minimum map value	-2.707	Depositor
Average map value	0.003	Depositor
Map value standard deviation	0.068	Depositor
Recommended contour level	0.15	Depositor
Map size (Å)	324.096, 324.096, 324.096	wwPDB
Map dimensions	384, 384, 384	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.84400004, 0.84400004, 0.84400004	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, MG, 1N7

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	G	0.15	0/1795	0.29	0/2436
1	H	0.13	0/1704	0.30	0/2310
1	M	0.08	0/579	0.22	0/784
2	I	0.16	0/10684	0.30	0/14415
3	J	0.13	0/10538	0.29	2/14229 (0.0%)
4	K	0.11	0/607	0.28	0/817
5	L	0.17	0/3906	0.32	0/5252
6	O	0.18	0/915	0.51	2/1409 (0.1%)
7	P	0.17	0/789	0.37	0/1215
All	All	0.15	0/31517	0.31	4/42867 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	O	74	DG	OP2-P-O3'	6.56	127.68	108.00
6	O	74	DG	O3'-P-O5'	-6.25	94.62	104.00
3	J	707	ILE	CA-C-N	5.91	132.33	121.70
3	J	707	ILE	C-N-CA	5.91	132.33	121.70

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	G	1773	0	1793	14	0
1	H	1685	0	1719	23	0
1	M	572	0	602	6	0
2	I	10518	0	10537	94	0
3	J	10381	0	10600	78	0
4	K	605	0	612	5	0
5	L	3858	0	3895	50	0
6	O	820	0	456	8	0
7	P	701	0	379	2	0
8	I	26	0	35	11	0
8	J	27	0	38	13	0
8	L	27	0	37	14	0
9	J	1	0	0	0	0
10	J	2	0	0	0	0
All	All	30996	0	30703	297	0

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

All (297) 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)
8:J:1504:1N7:C3	8:J:1504:1N7:C19	1.83	1.55
8:L:701:1N7:C3	8:L:701:1N7:C19	1.83	1.53
8:I:1401:1N7:C3	8:I:1401:1N7:C19	1.82	1.53
2:I:201:ARG:NH2	2:I:370:MET:SD	2.47	0.88
5:L:602:SER:N	5:L:605:GLU:OE2	2.15	0.79
5:L:552:THR:N	5:L:555:GLU:OE2	2.17	0.77
1:H:15:ASP:OD1	1:H:27:THR:OG1	2.00	0.76
2:I:749:ASP:N	2:I:749:ASP:OD1	2.15	0.76
2:I:624:ASP:OD1	2:I:625:GLU:N	2.19	0.76
3:J:665:GLN:OE1	3:J:678:ARG:NH1	2.21	0.74
8:I:1401:1N7:C3	8:I:1401:1N7:C2	2.65	0.73
1:G:45:ARG:NH2	2:I:1084:ASP:OD1	2.22	0.73
5:L:167:ASP:OD1	5:L:258:GLN:NE2	2.20	0.73
8:L:701:1N7:C3	8:L:701:1N7:C2	2.66	0.72
5:L:381:GLU:OE1	5:L:381:GLU:N	2.22	0.72
2:I:91:THR:OG1	2:I:138:ILE:O	2.04	0.72
2:I:987:GLU:O	2:I:991:LYS:NZ	2.23	0.72
3:J:1057:SER:OG	3:J:1110:GLU:OE2	2.08	0.70
8:J:1504:1N7:C3	8:J:1504:1N7:C2	2.67	0.69
2:I:444:ASP:O	2:I:450:ASN:ND2	2.25	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:L:557:LYS:NZ	5:L:561:MET:SD	2.63	0.68
2:I:197:ARG:NH1	2:I:201:ARG:O	2.27	0.68
2:I:573:ASN:N	2:I:573:ASN:OD1	2.27	0.68
4:K:42:GLU:N	4:K:42:GLU:OE1	2.27	0.68
3:J:1158:GLU:N	3:J:1158:GLU:OE1	2.27	0.67
2:I:148:GLN:OE1	2:I:454:ARG:NH1	2.28	0.67
5:L:513:ASP:OD1	5:L:514:ASP:N	2.29	0.66
1:G:13:LEU:HD12	1:G:13:LEU:O	1.95	0.65
5:L:234:THR:OG1	5:L:248:GLU:OE1	2.12	0.64
5:L:575:GLU:N	5:L:575:GLU:OE1	2.28	0.64
2:I:185:ASP:N	2:I:185:ASP:OD1	2.29	0.64
2:I:406:ASN:ND2	2:I:413:GLU:O	2.30	0.64
3:J:1048:ARG:NH2	3:J:1058:SER:O	2.31	0.64
5:L:505:ILE:CD1	8:L:701:1N7:H25	2.28	0.64
2:I:728:ASP:OD1	2:I:729:ALA:N	2.31	0.63
5:L:116:GLU:N	5:L:116:GLU:OE1	2.31	0.63
3:J:1173:ARG:NH2	3:J:1200:GLU:OE2	2.31	0.62
5:L:247:GLU:OE1	5:L:247:GLU:N	2.31	0.62
3:J:1205:GLU:OE1	3:J:1205:GLU:N	2.32	0.62
2:I:189:ASP:OD1	2:I:191:LYS:N	2.30	0.61
3:J:70:CYS:SG	3:J:71:LEU:N	2.73	0.61
8:J:1504:1N7:H24	8:L:701:1N7:H2	1.83	0.60
3:J:140:TYR:OH	3:J:312:ARG:NH2	2.34	0.60
3:J:388:ARG:NH2	3:J:414:GLU:OE2	2.34	0.60
2:I:714:VAL:O	2:I:767:GLN:NE2	2.35	0.60
2:I:631:GLU:OE1	2:I:631:GLU:N	2.35	0.60
2:I:651:ASP:OD1	2:I:651:ASP:N	2.35	0.59
5:L:505:ILE:HD13	8:L:701:1N7:H25	1.84	0.59
5:L:490:PRO:O	5:L:492:ASP:N	2.36	0.59
2:I:1061:GLN:NE2	2:I:1240:ASP:OD1	2.35	0.59
1:G:233:ASP:N	1:G:233:ASP:OD1	2.35	0.59
5:L:489:MET:HE3	5:L:494:ILE:HG12	1.83	0.59
2:I:318:SER:OG	2:I:320:ASP:OD1	2.18	0.58
5:L:271:ASN:OD1	5:L:274:ARG:NH2	2.35	0.58
2:I:626:GLU:OE2	2:I:628:HIS:ND1	2.36	0.58
5:L:358:VAL:O	5:L:362:ASN:ND2	2.36	0.58
2:I:1271:GLY:N	2:I:1274:GLU:OE1	2.36	0.58
1:H:16:ILE:HG22	1:H:26:VAL:HG22	1.86	0.57
3:J:568:SER:OG	3:J:570:LYS:NZ	2.37	0.57
8:J:1504:1N7:C3	8:J:1504:1N7:C18	2.72	0.57
1:H:77:ASP:OD1	1:H:78:ILE:N	2.37	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:712:GLN:OE1	3:J:712:GLN:N	2.37	0.57
2:I:591:TYR:OH	2:I:637:ARG:NH2	2.37	0.57
8:L:701:1N7:H31	8:L:701:1N7:H5	1.84	0.57
1:G:102:LEU:HD23	1:G:142:MET:CE	2.35	0.57
2:I:374:GLU:OE2	5:L:99:ARG:NH1	2.38	0.57
3:J:1210:ILE:HG22	3:J:1211:SER:H	1.69	0.57
5:L:292:VAL:O	5:L:296:LYS:N	2.37	0.57
5:L:430:TYR:HA	6:O:75:DA:H4'	1.87	0.57
2:I:65:ASN:ND2	2:I:483:ASP:OD2	2.38	0.56
3:J:963:VAL:HG23	3:J:975:ILE:HG23	1.86	0.56
3:J:510:LEU:HD11	3:J:624:ILE:HG23	1.87	0.56
1:G:102:LEU:HD23	1:G:142:MET:HE2	1.88	0.56
2:I:620:ASN:ND2	2:I:620:ASN:O	2.39	0.56
5:L:568:ASN:OD1	5:L:569:THR:N	2.38	0.55
1:H:131:CYS:SG	1:H:132:HIS:N	2.79	0.55
2:I:742:TYR:O	2:I:744:GLY:N	2.39	0.55
3:J:1174:ARG:NH2	3:J:1187:GLU:OE1	2.37	0.55
5:L:280:VAL:HG22	5:L:347:ILE:HD12	1.88	0.55
1:M:290:LEU:O	1:M:290:LEU:HD23	2.07	0.55
3:J:707:ILE:HG22	3:J:713:GLU:HA	1.89	0.54
1:H:207:THR:HG22	1:H:208:ASN:H	1.72	0.54
8:J:1504:1N7:C16	8:L:701:1N7:H2	2.37	0.54
5:L:293:GLU:OE1	5:L:293:GLU:N	2.40	0.54
1:M:270:LEU:O	1:M:274:ALA:N	2.41	0.54
2:I:895:LEU:HD12	2:I:895:LEU:H	1.74	0.53
5:L:552:THR:OG1	5:L:555:GLU:OE1	2.26	0.53
2:I:353:VAL:HG12	2:I:353:VAL:O	2.07	0.53
3:J:1208:ASP:OD1	3:J:1209:VAL:N	2.37	0.53
5:L:601:PRO:O	5:L:602:SER:OG	2.20	0.53
2:I:196:VAL:HG21	2:I:209:ILE:HD12	1.91	0.53
8:J:1504:1N7:C17	8:L:701:1N7:H2	2.39	0.53
2:I:903:ARG:O	2:I:907:GLY:N	2.40	0.53
3:J:386:GLU:OE2	3:J:394:ILE:N	2.42	0.53
5:L:428:SER:OG	6:O:79:DT:O4	2.27	0.53
5:L:577:GLY:O	5:L:581:ASP:N	2.40	0.52
1:H:29:GLU:HB3	1:H:30:PRO:HD3	1.92	0.52
3:J:416:ILE:HG22	3:J:416:ILE:O	2.09	0.52
2:I:65:ASN:OD1	2:I:66:SER:N	2.42	0.52
3:J:475:GLU:OE2	4:K:28:ARG:NH1	2.38	0.52
2:I:1010:GLN:O	2:I:1014:LEU:HD23	2.09	0.52
3:J:964:LYS:N	3:J:977:SER:OG	2.41	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:80:HIS:O	3:J:83:VAL:HG12	2.09	0.52
3:J:195:GLU:OE1	3:J:195:GLU:N	2.39	0.52
1:G:50:SER:O	1:G:51:MET:HE2	2.09	0.51
1:H:172:LEU:HD23	1:H:172:LEU:H	1.74	0.51
3:J:426:ALA:HB3	3:J:427:PRO:HD3	1.92	0.51
3:J:799:ARG:NH1	3:J:1146:GLU:OE2	2.44	0.51
1:H:181:GLU:O	3:J:535:ARG:NH1	2.43	0.51
8:I:1401:1N7:H24	8:I:1401:1N7:O2	2.10	0.51
3:J:572:THR:HG21	3:J:589:TYR:CE2	2.46	0.51
4:K:3:ARG:NH2	4:K:55:GLU:OE1	2.43	0.51
5:L:138:PRO:HD3	5:L:353:LEU:HD12	1.91	0.51
5:L:309:ASN:OD1	5:L:311:THR:OG1	2.28	0.51
1:G:162:GLU:OE2	1:G:165:GLU:N	2.44	0.51
3:J:857:LEU:HD11	3:J:871:LEU:HD21	1.93	0.51
2:I:489:PRO:HA	2:I:492:MET:HE2	1.92	0.50
3:J:572:THR:HG21	3:J:589:TYR:OH	2.11	0.50
2:I:254:ASP:OD1	2:I:255:ILE:N	2.45	0.50
3:J:1164:SER:N	3:J:1176:VAL:O	2.45	0.50
3:J:75:TYR:CD2	3:J:83:VAL:HG11	2.47	0.50
2:I:808:ASN:H	3:J:633:ALA:HB2	1.77	0.50
2:I:989:LEU:HD12	2:I:992:LEU:HD21	1.93	0.50
1:H:192:VAL:O	1:H:194:GLN:N	2.45	0.50
1:H:212:ASP:OD1	1:H:212:ASP:N	2.44	0.50
2:I:748:ILE:HD11	2:I:966:ILE:HD12	1.94	0.50
5:L:94:THR:OG1	5:L:95:THR:N	2.45	0.50
2:I:811:ASN:O	2:I:811:ASN:ND2	2.44	0.49
3:J:29:MET:HE3	3:J:29:MET:HA	1.93	0.49
2:I:314:ASN:O	2:I:314:ASN:ND2	2.46	0.49
5:L:163:THR:O	5:L:260:ARG:NH2	2.45	0.49
8:L:701:1N7:C3	8:L:701:1N7:C18	2.72	0.49
5:L:426:LYS:O	5:L:427:PHE:C	2.55	0.49
3:J:349:TYR:HB3	3:J:470:VAL:HG13	1.95	0.49
3:J:1072:LYS:O	3:J:1075:ARG:NH1	2.45	0.49
2:I:582:ASN:OD1	2:I:583:GLU:N	2.42	0.48
3:J:1051:ASP:O	3:J:1055:GLY:N	2.45	0.48
3:J:707:ILE:HA	3:J:708:ASN:HB2	1.95	0.48
2:I:1333:LEU:HD13	3:J:115:TRP:CH2	2.48	0.48
5:L:305:LEU:HD11	5:L:322:MET:HE1	1.94	0.48
1:G:29:GLU:HB3	1:G:30:PRO:HD3	1.95	0.48
2:I:738:GLU:OE1	2:I:738:GLU:N	2.41	0.48
1:H:33:ARG:NH1	2:I:820:GLU:OE2	2.42	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:4:SER:OG	1:H:5:VAL:N	2.47	0.48
3:J:1356:LEU:O	3:J:1366:HIS:NE2	2.41	0.48
3:J:1210:ILE:O	3:J:1211:SER:C	2.57	0.48
1:H:197:ASP:N	1:H:197:ASP:OD1	2.48	0.47
8:L:701:1N7:H36	8:L:701:1N7:H30	1.64	0.47
2:I:205:PRO:O	2:I:208:ILE:HG22	2.14	0.47
2:I:533:LEU:HD21	2:I:571:LEU:HD13	1.97	0.47
2:I:317:LEU:HD21	2:I:322:LEU:HD21	1.96	0.47
2:I:577:VAL:HG23	2:I:661:VAL:O	2.14	0.47
8:I:1401:1N7:C3	8:I:1401:1N7:C1	2.93	0.47
8:I:1401:1N7:H7	8:I:1401:1N7:O3	2.15	0.47
2:I:320:ASP:OD1	2:I:321:LEU:N	2.47	0.47
4:K:15:ASN:OD1	4:K:16:ARG:N	2.48	0.47
2:I:1070:HIS:NE2	2:I:1114:GLU:OE1	2.43	0.47
3:J:661:VAL:HG23	3:J:682:VAL:HG22	1.96	0.47
1:H:202:VAL:HG12	1:H:202:VAL:O	2.15	0.46
2:I:408:SER:O	2:I:431:LYS:NZ	2.46	0.46
2:I:525:THR:HG21	2:I:687:ARG:CD	2.45	0.46
2:I:1240:ASP:OD1	2:I:1240:ASP:N	2.49	0.46
3:J:342:LEU:HD13	3:J:1352:ILE:HG23	1.98	0.46
7:P:43:DG:H2'	7:P:44:DT:H72	1.97	0.46
2:I:675:ASP:OD2	2:I:677:ASN:ND2	2.44	0.46
2:I:967:LEU:HD13	2:I:1021:LEU:HD11	1.97	0.46
8:I:1401:1N7:H5	8:I:1401:1N7:H31	1.98	0.46
3:J:960:LEU:HD13	3:J:963:VAL:CG1	2.45	0.46
2:I:303:ASP:O	2:I:307:GLY:N	2.48	0.46
2:I:876:GLU:OE1	2:I:927:THR:HG22	2.15	0.46
8:L:701:1N7:H15	8:L:701:1N7:H27	1.72	0.46
3:J:111:THR:O	3:J:239:LEU:N	2.46	0.46
3:J:194:LEU:HD22	3:J:224:LEU:HD13	1.97	0.46
5:L:555:GLU:OE1	5:L:555:GLU:N	2.35	0.46
3:J:871:LEU:C	3:J:871:LEU:HD23	2.41	0.46
2:I:273:HIS:O	2:I:277:LEU:HD13	2.17	0.45
2:I:452:ARG:NH2	2:I:458:GLU:OE2	2.49	0.45
1:M:250:ASP:OD2	1:M:252:ILE:HG22	2.17	0.45
1:G:74:VAL:HG12	1:G:133:LEU:HD23	1.98	0.45
5:L:227:GLN:HG3	5:L:252:LEU:HD13	1.99	0.45
3:J:1098:GLN:OE1	3:J:1098:GLN:N	2.50	0.45
6:O:59:DT:H4'	6:O:60:DT:OP1	2.16	0.45
1:G:28:LEU:HD12	1:G:28:LEU:N	2.32	0.45
2:I:411:ARG:NH2	2:I:427:ASP:OD2	2.49	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:598:VAL:HG22	2:I:628:HIS:CD2	2.51	0.45
2:I:1255:THR:HG23	2:I:1255:THR:O	2.16	0.45
3:J:572:THR:HG22	3:J:593:ASN:OD1	2.16	0.45
2:I:1103:VAL:HG11	2:I:1112:ILE:HD11	1.97	0.45
3:J:736:GLN:N	3:J:736:GLN:OE1	2.50	0.45
3:J:1233:ILE:O	3:J:1237:VAL:HG12	2.17	0.45
1:M:292:THR:OG1	1:M:295:LEU:HD13	2.16	0.45
1:H:83:LEU:HD11	3:J:526:VAL:HG12	1.98	0.45
1:G:155:ALA:O	1:G:159:ILE:HG22	2.18	0.44
2:I:28:LEU:O	2:I:28:LEU:HD12	2.16	0.44
2:I:521:LEU:O	2:I:525:THR:HG22	2.17	0.44
2:I:739:ASP:OD1	2:I:739:ASP:N	2.49	0.44
2:I:453:ILE:HD11	2:I:587:LEU:HD21	1.99	0.44
2:I:897:PRO:O	2:I:898:GLU:HB2	2.18	0.44
3:J:951:GLN:NE2	3:J:1014:GLY:O	2.51	0.44
3:J:1275:LEU:N	3:J:1275:LEU:HD12	2.32	0.44
5:L:565:ILE:HG22	5:L:566:ASP:OD1	2.17	0.44
8:I:1401:1N7:C3	8:I:1401:1N7:C18	2.73	0.44
3:J:848:VAL:HB	3:J:858:VAL:HG22	2.00	0.44
1:G:98:VAL:HG22	1:G:99:ILE:N	2.33	0.44
2:I:851:THR:OG1	2:I:853:ASP:OD2	2.34	0.44
8:J:1504:1N7:C3	8:J:1504:1N7:C1	2.96	0.44
8:J:1504:1N7:C3	8:J:1504:1N7:H1	2.48	0.44
1:H:78:ILE:O	1:H:79:LEU:HB3	2.18	0.43
3:J:151:MET:SD	3:J:151:MET:N	2.80	0.43
3:J:952:VAL:HG13	3:J:1014:GLY:H	1.82	0.43
5:L:290:LEU:HB3	5:L:333:VAL:HG21	1.99	0.43
2:I:802:VAL:HG21	2:I:1098:LEU:HD22	2.00	0.43
5:L:426:LYS:O	5:L:428:SER:N	2.51	0.43
1:G:224:LEU:HD23	1:H:228:LEU:HD11	2.01	0.43
2:I:967:LEU:HD12	2:I:1025:PHE:CE1	2.53	0.43
5:L:514:ASP:OD1	5:L:515:GLU:N	2.51	0.43
3:J:964:LYS:O	3:J:976:THR:N	2.39	0.43
5:L:119:ILE:HD13	5:L:122:ARG:HH21	1.83	0.43
2:I:131:THR:HG22	2:I:132:ASP:N	2.33	0.43
3:J:801:VAL:HG12	3:J:920:ALA:HB3	2.00	0.43
5:L:484:ALA:HB2	5:L:491:GLU:HA	1.99	0.43
3:J:1349:GLU:OE1	3:J:1349:GLU:N	2.52	0.43
2:I:1037:THR:HG22	2:I:1037:THR:O	2.18	0.43
8:J:1504:1N7:H26	8:L:701:1N7:H2	2.00	0.43
1:M:260:LEU:HD23	1:M:262:LEU:HD11	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:20:SER:OG	1:H:21:SER:N	2.50	0.43
3:J:354:VAL:HG12	3:J:355:ILE:N	2.34	0.43
2:I:350:THR:O	2:I:354:ASP:N	2.52	0.43
3:J:948:SER:OG	3:J:949:SER:N	2.51	0.43
3:J:858:VAL:O	3:J:858:VAL:HG23	2.18	0.43
2:I:485:ASP:OD1	2:I:486:THR:N	2.44	0.42
2:I:131:THR:HG22	2:I:132:ASP:OD1	2.19	0.42
8:J:1504:1N7:O3	8:J:1504:1N7:H21	2.18	0.42
6:O:69:DG:H4'	6:O:70:DC:OP1	2.19	0.42
1:G:104:LYS:HG2	1:G:110:VAL:HG22	2.01	0.42
3:J:516:ASP:OD1	3:J:516:ASP:N	2.52	0.42
3:J:1289:ASN:OD1	3:J:1290:ARG:N	2.52	0.42
8:J:1504:1N7:H14	8:J:1504:1N7:H29	1.73	0.42
8:L:701:1N7:C3	8:L:701:1N7:C1	2.96	0.42
2:I:542:ARG:HE	2:I:542:ARG:HB2	1.71	0.42
5:L:479:THR:HG23	5:L:482:GLU:H	1.83	0.42
2:I:1256:GLN:NE2	5:L:525:ASP:OD2	2.53	0.42
8:I:1401:1N7:H14	8:I:1401:1N7:H29	1.83	0.42
4:K:3:ARG:NH1	4:K:55:GLU:OE1	2.50	0.42
2:I:179:TYR:CZ	8:I:1401:1N7:H21	2.55	0.42
2:I:595:THR:O	2:I:596:ASP:C	2.62	0.42
5:L:562:ARG:NH2	7:P:51:DG:OP1	2.53	0.42
1:H:28:LEU:N	1:H:28:LEU:HD12	2.35	0.42
5:L:511:ILE:HG22	5:L:517:SER:O	2.19	0.42
6:O:60:DT:H2'	6:O:61:DT:H71	2.02	0.42
6:O:69:DG:H2"	6:O:70:DC:O5'	2.20	0.42
3:J:644:MET:O	3:J:764:ARG:NE	2.53	0.42
3:J:1183:SER:OG	3:J:1184:ASP:N	2.53	0.42
5:L:487:MET:CE	5:L:489:MET:HE2	2.50	0.42
2:I:748:ILE:HD11	2:I:966:ILE:CD1	2.50	0.41
2:I:1046:VAL:O	2:I:1046:VAL:HG23	2.21	0.41
3:J:122:SER:O	3:J:125:GLY:N	2.53	0.41
1:M:316:MET:SD	1:M:316:MET:N	2.91	0.41
2:I:549:ASP:OD1	2:I:550:VAL:N	2.51	0.41
3:J:894:VAL:HG12	3:J:895:CYS:N	2.35	0.41
5:L:136:GLU:OE1	5:L:364:ARG:NH2	2.53	0.41
2:I:132:ASP:N	2:I:132:ASP:OD1	2.53	0.41
3:J:213:LYS:O	3:J:217:LEU:HG	2.21	0.41
3:J:528:THR:O	3:J:528:THR:HG22	2.21	0.41
5:L:509:THR:O	5:L:509:THR:HG23	2.19	0.41
1:H:61:ILE:O	1:H:64:VAL:HG22	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:I:638:SER:OG	2:I:639:LYS:N	2.53	0.41
3:J:388:ARG:NH1	3:J:414:GLU:OE1	2.53	0.41
3:J:162:GLU:O	3:J:166:LEU:HD23	2.21	0.41
1:H:76:GLU:OE1	1:H:84:ASN:ND2	2.51	0.41
5:L:99:ARG:NH2	6:O:81:DG:O6	2.53	0.41
1:H:118:ASP:HB2	1:H:121:VAL:HG22	2.03	0.41
3:J:975:ILE:HD12	3:J:997:VAL:HG11	2.02	0.41
5:L:558:VAL:HG22	5:L:591:GLU:OE2	2.21	0.41
2:I:672:GLU:OE1	2:I:1186:VAL:O	2.39	0.41
2:I:685:MET:HE2	2:I:1071:GLY:HA2	2.03	0.41
2:I:978:VAL:HG13	2:I:979:LEU:CD1	2.51	0.41
2:I:1106:ARG:O	2:I:1108:ASN:N	2.46	0.41
8:I:1401:1N7:C3	8:I:1401:1N7:H1	2.51	0.41
8:I:1401:1N7:O3	8:I:1401:1N7:C7	2.65	0.41
8:L:701:1N7:H17	8:L:701:1N7:H4	2.01	0.41
1:H:89:ALA:HB3	1:H:124:VAL:CG1	2.51	0.41
2:I:30:ILE:HG23	2:I:31:GLN:N	2.36	0.41
2:I:638:SER:O	2:I:639:LYS:C	2.64	0.41
2:I:179:TYR:OH	2:I:458:GLU:OE2	2.36	0.40
6:O:65:DT:H2"	6:O:66:DC:C6	2.56	0.40
2:I:845:LEU:H	2:I:845:LEU:HD12	1.87	0.40
2:I:967:LEU:HD12	2:I:1025:PHE:CZ	2.56	0.40
3:J:304:ASP:OD1	3:J:305:ALA:N	2.54	0.40
3:J:382:TYR:HE1	3:J:401:VAL:HG21	1.86	0.40
5:L:421:TYR:H	5:L:421:TYR:HD1	1.69	0.40
2:I:221:LEU:HD12	2:I:336:LEU:HD13	2.04	0.40
3:J:975:ILE:CD1	3:J:997:VAL:HG11	2.51	0.40
8:J:1504:1N7:H13	8:J:1504:1N7:H27	1.68	0.40
8:J:1504:1N7:H27	8:J:1504:1N7:H15	1.66	0.40
3:J:416:ILE:O	3:J:416:ILE:CG2	2.68	0.40
3:J:120:LEU:HB3	3:J:121:PRO:HD3	2.03	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	G	230/329 (70%)	219 (95%)	11 (5%)	0	100	100
1	H	215/329 (65%)	198 (92%)	17 (8%)	0	100	100
1	M	71/329 (22%)	70 (99%)	1 (1%)	0	100	100
2	I	1330/1342 (99%)	1255 (94%)	75 (6%)	0	100	100
3	J	1329/1407 (94%)	1264 (95%)	65 (5%)	0	100	100
4	K	74/91 (81%)	71 (96%)	3 (4%)	0	100	100
5	L	472/613 (77%)	454 (96%)	18 (4%)	0	100	100
All	All	3721/4440 (84%)	3531 (95%)	190 (5%)	0	100	100

There are no Ramachandran outliers to report.

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	G	193/286 (68%)	185 (96%)	8 (4%)	26	60
1	H	187/286 (65%)	184 (98%)	3 (2%)	58	84
1	M	65/286 (23%)	65 (100%)	0	100	100
2	I	1147/1157 (99%)	1122 (98%)	25 (2%)	47	78
3	J	1119/1168 (96%)	1107 (99%)	12 (1%)	70	90
4	K	65/75 (87%)	65 (100%)	0	100	100
5	L	411/540 (76%)	401 (98%)	10 (2%)	44	76
All	All	3187/3798 (84%)	3129 (98%)	58 (2%)	54	82

All (58) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	19	VAL
1	G	56	VAL

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Mol	Chain	Res	Type
1	G	74	VAL
1	G	97	GLU
1	G	100	LEU
1	G	173	VAL
1	G	233	ASP
1	G	235	ARG
1	H	13	LEU
1	H	14	VAL
1	H	66	HIS
2	I	185	ASP
2	I	189	ASP
2	I	513	GLN
2	I	516	ASP
2	I	542	ARG
2	I	550	VAL
2	I	573	ASN
2	I	651	ASP
2	I	657	THR
2	I	697	LYS
2	I	699	LEU
2	I	739	ASP
2	I	748	ILE
2	I	749	ASP
2	I	811	ASN
2	I	912	ASP
2	I	1000	LEU
2	I	1003	THR
2	I	1109	ILE
2	I	1225	VAL
2	I	1227	VAL
2	I	1233	LEU
2	I	1240	ASP
2	I	1256	GLN
2	I	1269	ARG
3	J	76	LYS
3	J	304	ASP
3	J	387	LEU
3	J	413	ASP
3	J	430	HIS
3	J	470	VAL
3	J	473	THR
3	J	489	ASN

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Mol	Chain	Res	Type
3	J	800	LEU
3	J	807	LEU
3	J	925	GLU
3	J	1367	GLN
5	L	124	GLU
5	L	145	LEU
5	L	353	LEU
5	L	381	GLU
5	L	384	LEU
5	L	388	ILE
5	L	394	TYR
5	L	402	LEU
5	L	488	LEU
5	L	494	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	G	41	ASN
2	I	46	GLN
2	I	150	HIS
2	I	314	ASN
2	I	725	GLN
2	I	737	ASN
2	I	767	GLN
2	I	894	GLN
2	I	955	GLN
2	I	1256	GLN
3	J	364	HIS
3	J	651	HIS
3	J	720	ASN
3	J	739	GLN
3	J	921	GLN
3	J	1197	ASN
3	J	1326	GLN
4	K	43	ASN
4	K	62	GLN
5	L	129	GLN
5	L	345	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 6 ligands modelled in this entry, 3 are monoatomic - leaving 3 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	$\#|Z| > 2$
8	1N7	I	1401	-	29,29,46	5.30	15 (51%)	47,47,72	2.60	14 (29%)
8	1N7	L	701	-	30,30,46	5.27	15 (50%)	47,48,72	2.46	15 (31%)
8	1N7	J	1504	-	30,30,46	5.32	16 (53%)	47,48,72	2.62	16 (34%)

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	1N7	I	1401	-	-	6/6/71/92	0/4/4/4
8	1N7	L	701	-	-	7/7/72/92	0/4/4/4
8	1N7	J	1504	-	-	5/7/72/92	0/4/4/4

All (46) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	J	1504	1N7	C3-C19	18.26	1.83	1.53
8	L	701	1N7	C3-C19	18.10	1.83	1.53
8	I	1401	1N7	C3-C19	17.95	1.82	1.53
8	J	1504	1N7	C3-C4	12.68	1.73	1.53
8	L	701	1N7	C3-C4	12.32	1.73	1.53
8	I	1401	1N7	C3-C4	12.08	1.73	1.53
8	L	701	1N7	C5-C4	-9.54	1.39	1.54
8	I	1401	1N7	C5-C4	-9.54	1.39	1.54
8	J	1504	1N7	C5-C4	-9.32	1.40	1.54
8	J	1504	1N7	C2-C19	-9.16	1.40	1.56
8	L	701	1N7	C2-C19	-9.13	1.40	1.56
8	I	1401	1N7	C2-C19	-9.11	1.40	1.56
8	L	701	1N7	C8-C7	6.30	1.71	1.54
8	I	1401	1N7	C8-C7	6.27	1.71	1.54
8	J	1504	1N7	C8-C7	6.25	1.71	1.54
8	J	1504	1N7	C5-C6	-5.03	1.47	1.55
8	L	701	1N7	C5-C6	-4.91	1.47	1.55
8	J	1504	1N7	C18-C6	-4.79	1.44	1.53
8	I	1401	1N7	C5-C6	-4.76	1.47	1.55
8	L	701	1N7	C18-C6	-4.55	1.45	1.53
8	I	1401	1N7	O4-C4	-4.13	1.36	1.43
8	L	701	1N7	O4-C4	-4.12	1.36	1.43
8	I	1401	1N7	C18-C6	-4.11	1.46	1.53
8	J	1504	1N7	O4-C4	-4.07	1.36	1.43
8	I	1401	1N7	C7-C6	3.43	1.61	1.54
8	L	701	1N7	C7-C6	3.42	1.61	1.54
8	J	1504	1N7	C7-C6	3.30	1.61	1.54
8	L	701	1N7	C14-C15	-3.29	1.48	1.53
8	J	1504	1N7	C14-C15	-3.06	1.48	1.53
8	J	1504	1N7	C2-C15	3.04	1.60	1.55
8	I	1401	1N7	C20-C9	-2.94	1.49	1.54
8	L	701	1N7	C2-C15	2.90	1.59	1.55
8	J	1504	1N7	C20-C9	-2.88	1.49	1.54
8	I	1401	1N7	C14-C15	-2.88	1.49	1.53
8	L	701	1N7	C20-C9	-2.81	1.49	1.54
8	I	1401	1N7	C14-C13	2.78	1.56	1.52
8	I	1401	1N7	C2-C15	2.77	1.59	1.55
8	J	1504	1N7	C5-C9	2.50	1.59	1.55
8	J	1504	1N7	C14-C13	2.48	1.56	1.52
8	L	701	1N7	C14-C13	2.45	1.56	1.52
8	L	701	1N7	C5-C9	2.42	1.59	1.55
8	I	1401	1N7	C5-C9	2.38	1.59	1.55
8	J	1504	1N7	O2-C13	-2.26	1.36	1.43

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PROTEIN DATA BANK

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	L	701	1N7	O2-C13	-2.26	1.36	1.43
8	I	1401	1N7	O2-C13	-2.25	1.36	1.43
8	J	1504	1N7	C16-C15	2.14	1.57	1.53

All (45) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
8	I	1401	1N7	C9-C5-C4	-8.88	109.68	117.67
8	J	1504	1N7	C9-C5-C4	-8.33	110.17	117.67
8	L	701	1N7	C9-C5-C4	-8.15	110.33	117.67
8	I	1401	1N7	C6-C5-C4	6.96	113.78	107.42
8	J	1504	1N7	C5-C9-C20	-6.90	111.12	119.48
8	I	1401	1N7	C5-C9-C20	-5.89	112.34	119.48
8	L	701	1N7	C5-C9-C20	-5.75	112.52	119.48
8	L	701	1N7	C7-C6-C18	-5.64	110.62	118.36
8	J	1504	1N7	C7-C6-C18	-5.37	110.99	118.36
8	J	1504	1N7	C9-C5-C6	5.35	105.48	100.11
8	I	1401	1N7	C7-C6-C18	-5.17	111.26	118.36
8	I	1401	1N7	C19-C3-C4	-5.14	107.57	114.29
8	L	701	1N7	C6-C5-C4	4.48	111.51	107.42
8	J	1504	1N7	C6-C5-C4	4.09	111.16	107.42
8	L	701	1N7	C19-C3-C4	-4.08	108.95	114.29
8	J	1504	1N7	C7-C6-C5	4.03	107.45	103.54
8	L	701	1N7	C9-C5-C6	4.01	104.13	100.11
8	J	1504	1N7	C5-C6-C18	-3.88	109.80	114.72
8	I	1401	1N7	C3-C19-C2	-3.77	109.88	113.70
8	J	1504	1N7	C8-C9-C5	3.69	107.12	103.54
8	L	701	1N7	C14-C15-C2	-3.46	108.98	112.66
8	I	1401	1N7	C16-C15-C2	-3.36	109.08	112.66
8	I	1401	1N7	C9-C5-C6	3.25	103.38	100.11
8	L	701	1N7	C3-C19-C2	-3.25	110.41	113.70
8	I	1401	1N7	C19-C18-C17	-3.06	108.01	111.86
8	I	1401	1N7	C15-C16-C17	-2.98	110.85	114.40
8	I	1401	1N7	C21-C20-C9	-2.95	108.46	112.88
8	L	701	1N7	C19-C18-C17	-2.92	108.18	111.86
8	J	1504	1N7	C2-C19-C18	-2.92	108.58	111.84
8	J	1504	1N7	C21-C20-C9	-2.80	108.68	112.88
8	L	701	1N7	C7-C6-C5	2.74	106.20	103.54
8	J	1504	1N7	C3-C19-C2	-2.67	111.00	113.70
8	L	701	1N7	C21-C20-C9	-2.63	108.93	112.88
8	J	1504	1N7	C16-C15-C2	-2.61	109.89	112.66
8	J	1504	1N7	C15-C16-C17	-2.56	111.35	114.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
8	L	701	1N7	C8-C9-C5	2.43	105.90	103.54
8	J	1504	1N7	C14-C15-C2	-2.40	110.11	112.66
8	J	1504	1N7	C19-C18-C17	-2.35	108.90	111.86
8	I	1401	1N7	C12-C1-C2	-2.21	109.00	112.74
8	L	701	1N7	C2-C19-C18	-2.21	109.38	111.84
8	I	1401	1N7	C3-C4-C5	-2.20	109.03	111.26
8	L	701	1N7	C6-C18-C17	-2.16	108.98	111.85
8	I	1401	1N7	C8-C9-C5	2.14	105.61	103.54
8	J	1504	1N7	C19-C3-C4	-2.08	111.57	114.29
8	L	701	1N7	C5-C6-C18	-2.02	112.16	114.72

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	L	701	1N7	C21-C20-C22-C23
8	I	1401	1N7	C21-C20-C9-C5
8	J	1504	1N7	C21-C20-C9-C5
8	L	701	1N7	C9-C20-C22-C23
8	I	1401	1N7	C21-C20-C9-C8
8	J	1504	1N7	C21-C20-C9-C8
8	I	1401	1N7	C22-C20-C9-C5
8	I	1401	1N7	C21-C20-C22-C23
8	J	1504	1N7	C22-C20-C9-C5
8	L	701	1N7	C21-C20-C9-C5
8	L	701	1N7	C20-C22-C23-C24
8	L	701	1N7	C21-C20-C9-C8
8	I	1401	1N7	C22-C20-C9-C8
8	J	1504	1N7	C22-C20-C9-C8
8	L	701	1N7	C22-C20-C9-C5
8	J	1504	1N7	C21-C20-C22-C23
8	L	701	1N7	C22-C20-C9-C8
8	I	1401	1N7	C9-C20-C22-C23

There are no ring outliers.

3 monomers are involved in 34 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	I	1401	1N7	11	0
8	L	701	1N7	14	0
8	J	1504	1N7	13	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 1N7 I 1401

Bond lengths   Bond angles

Torsions   Rings

Ligand 1N7 L 701

Bond lengths

Bond angles

Torsions

Rings

Ligand 1N7 J 1504

Bond lengths

Bond angles

Torsions

Rings
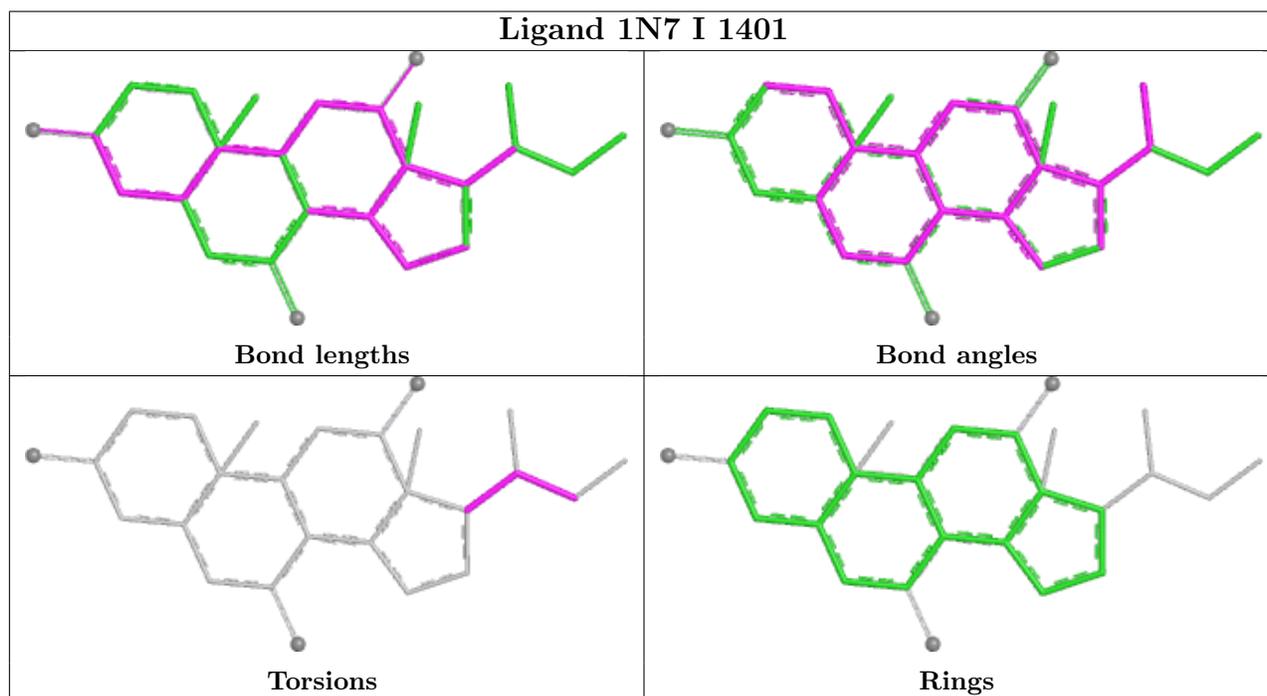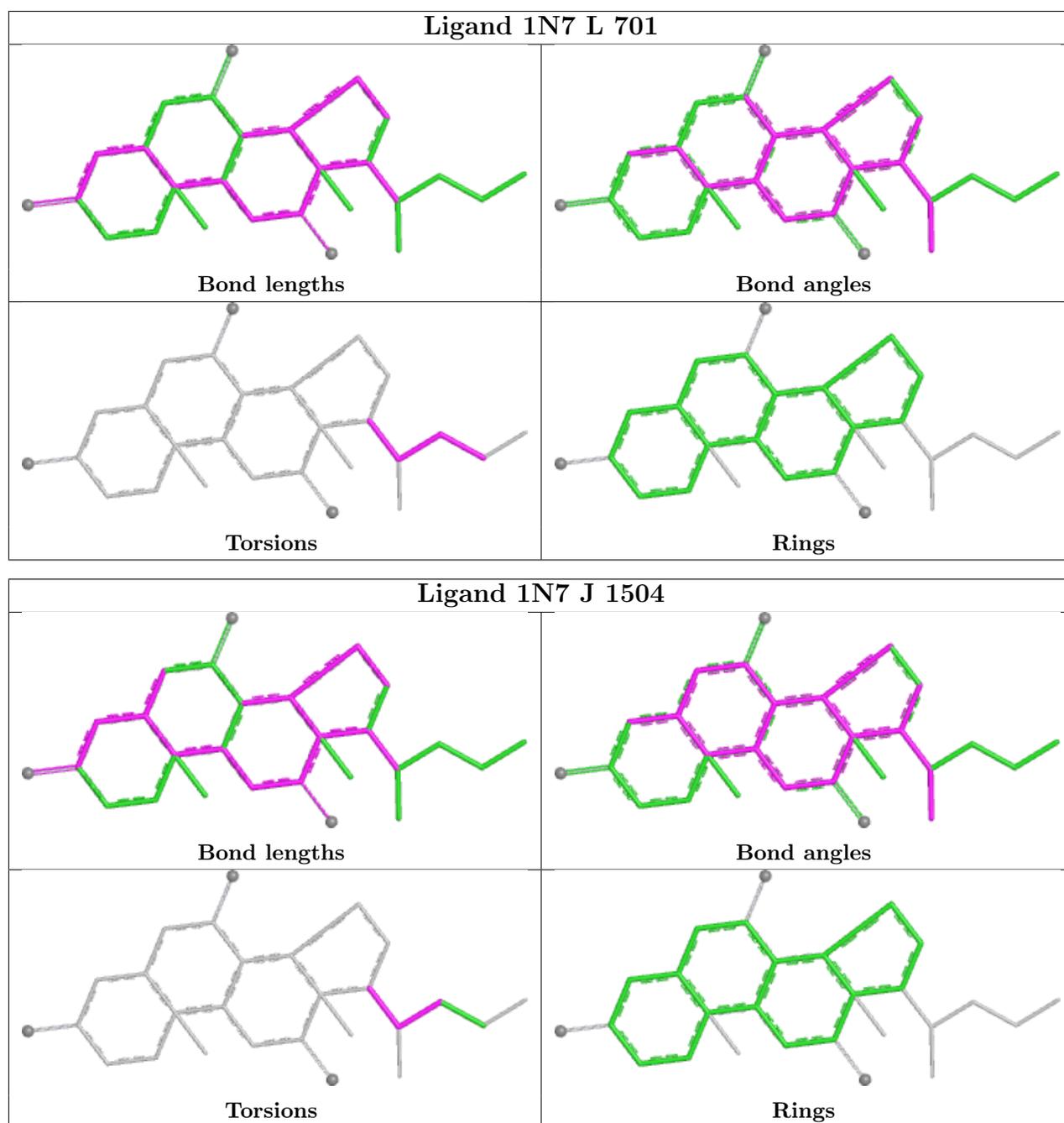
5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
5	L	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	L	15:GLU	C	41:ASP	N	14.17

6　Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-41448. 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
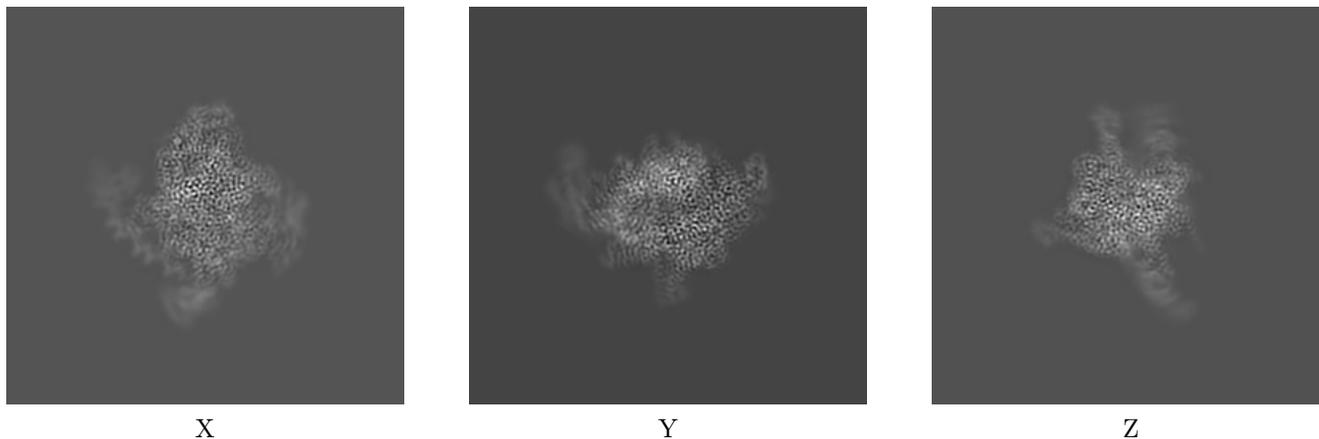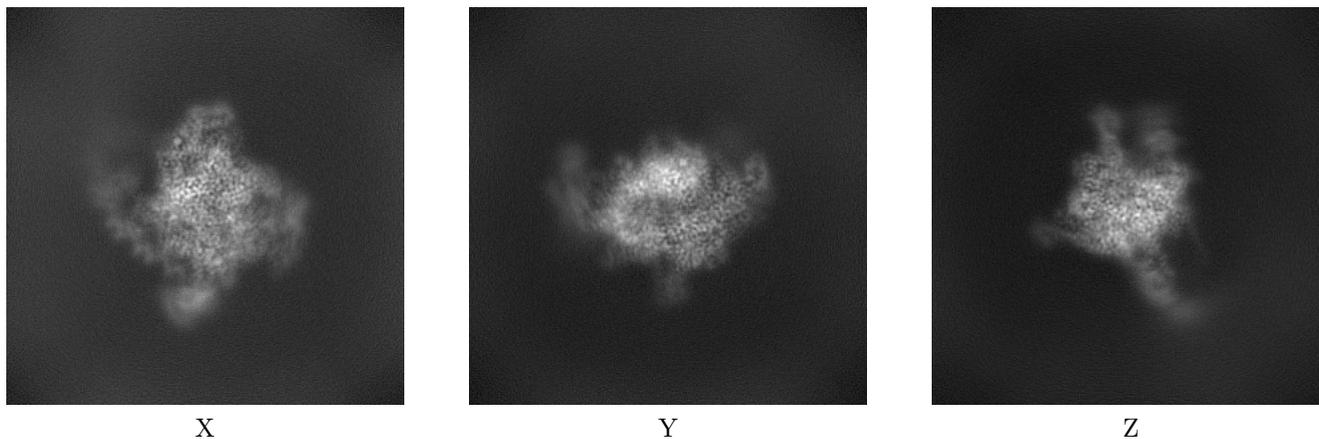
The images above show the map projected in three orthogonal directions.

6.2 Central slices ⓘ
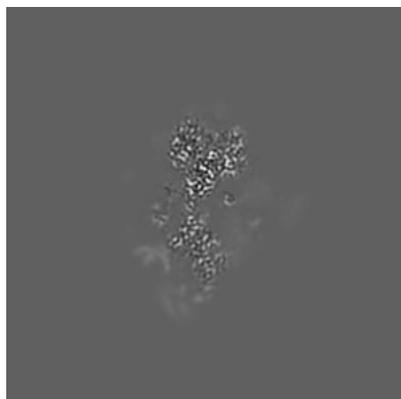
6.2.1 Primary map
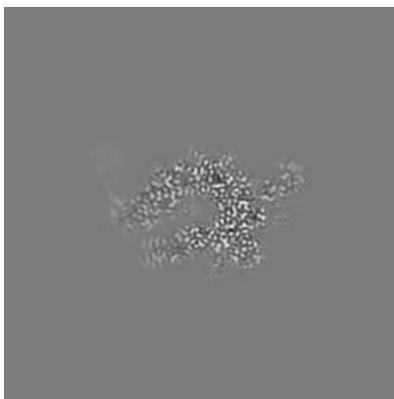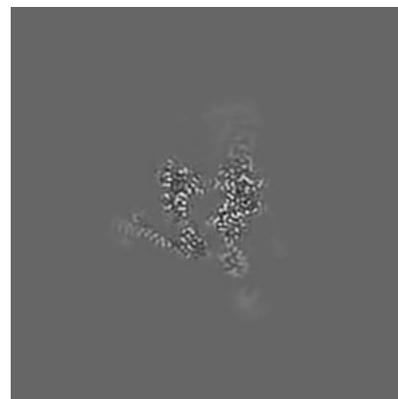
| X Index: 192 | Y Index: 192 | Z Index: 192 |

6.2.2 Raw map
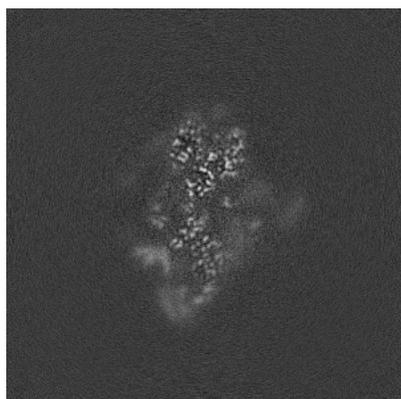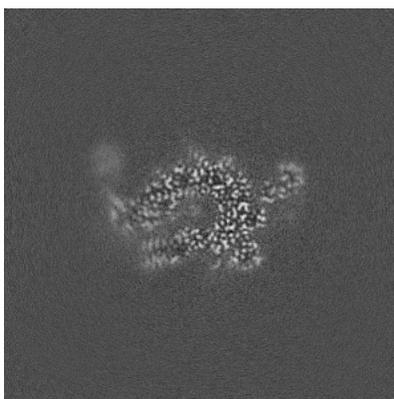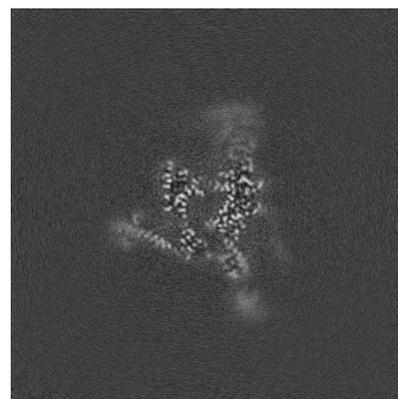
| X Index: 192 | Y Index: 192 | Z Index: 192 |

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

6.3 Largest variance slices ⓘ

6.3.1 Primary map
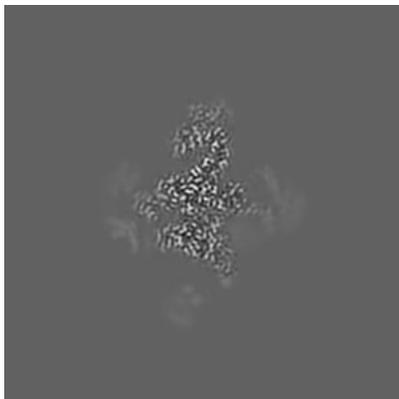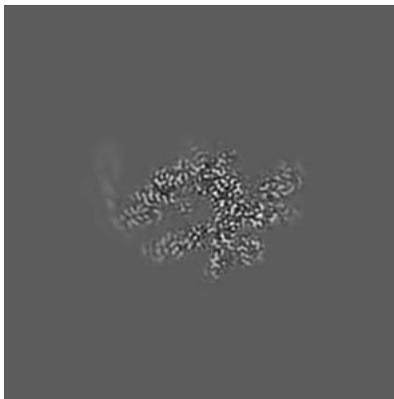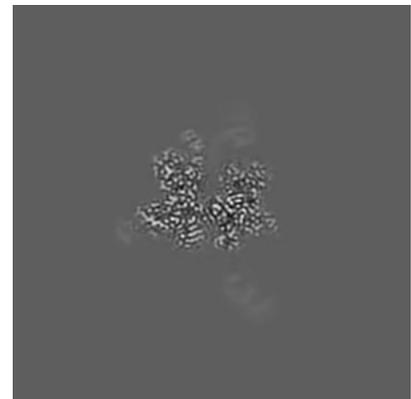
X Index: 210	Y Index: 186	Z Index: 206

6.3.2 Raw map
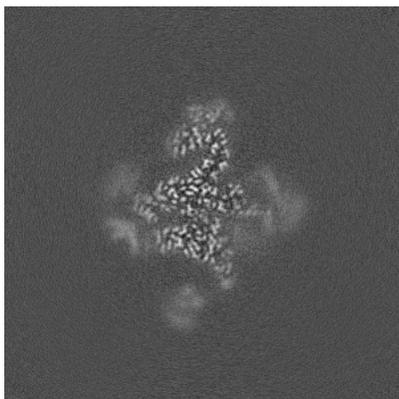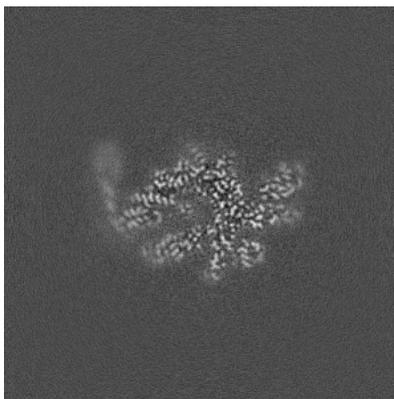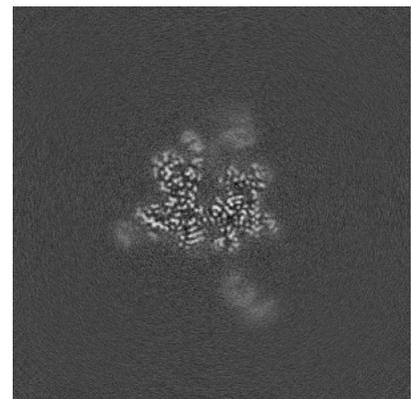
X Index: 210	Y Index: 186	Z Index: 206

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
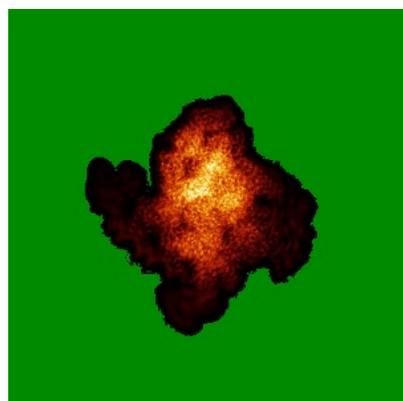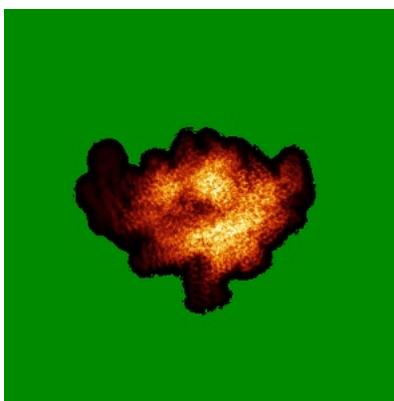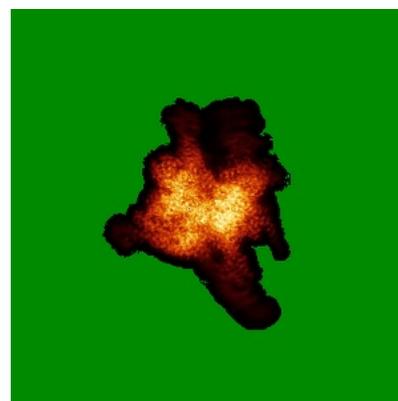
X　　　　　　　　　　Y　　　　　　　　　　Z

6.4.2 Raw map

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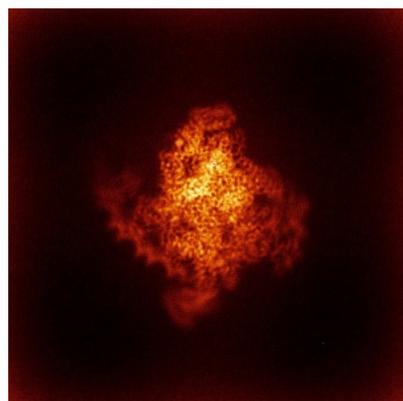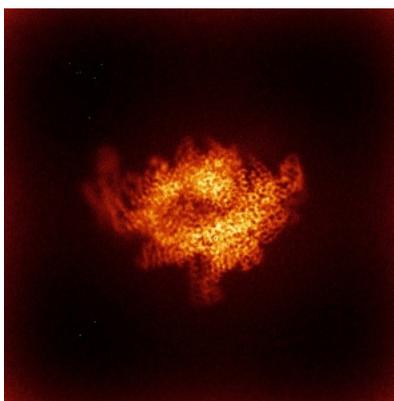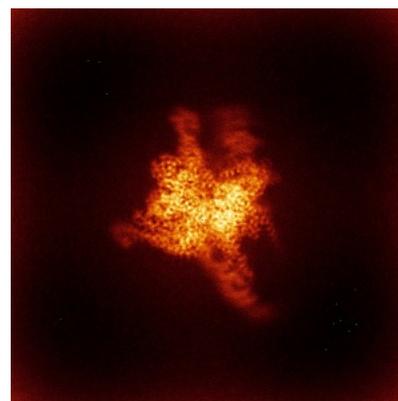
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

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 0.15. 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 |
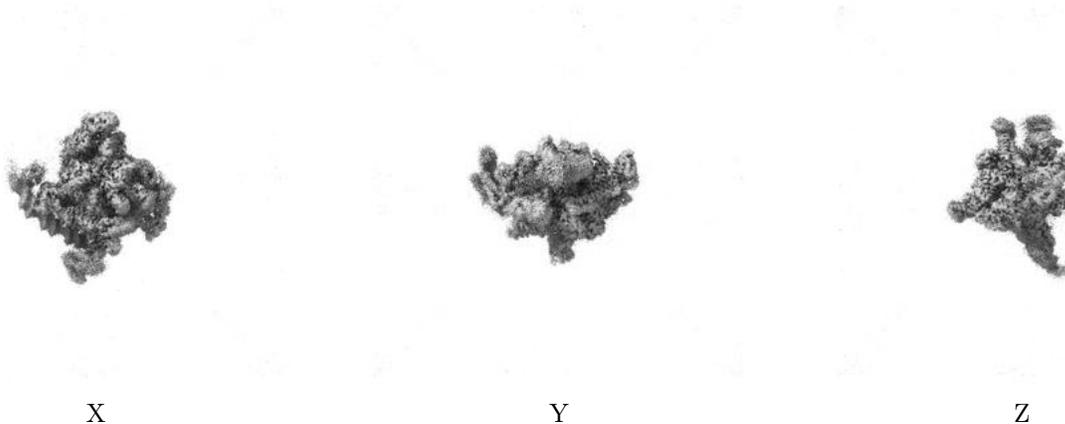
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

6.6 Mask visualisation ⓘ

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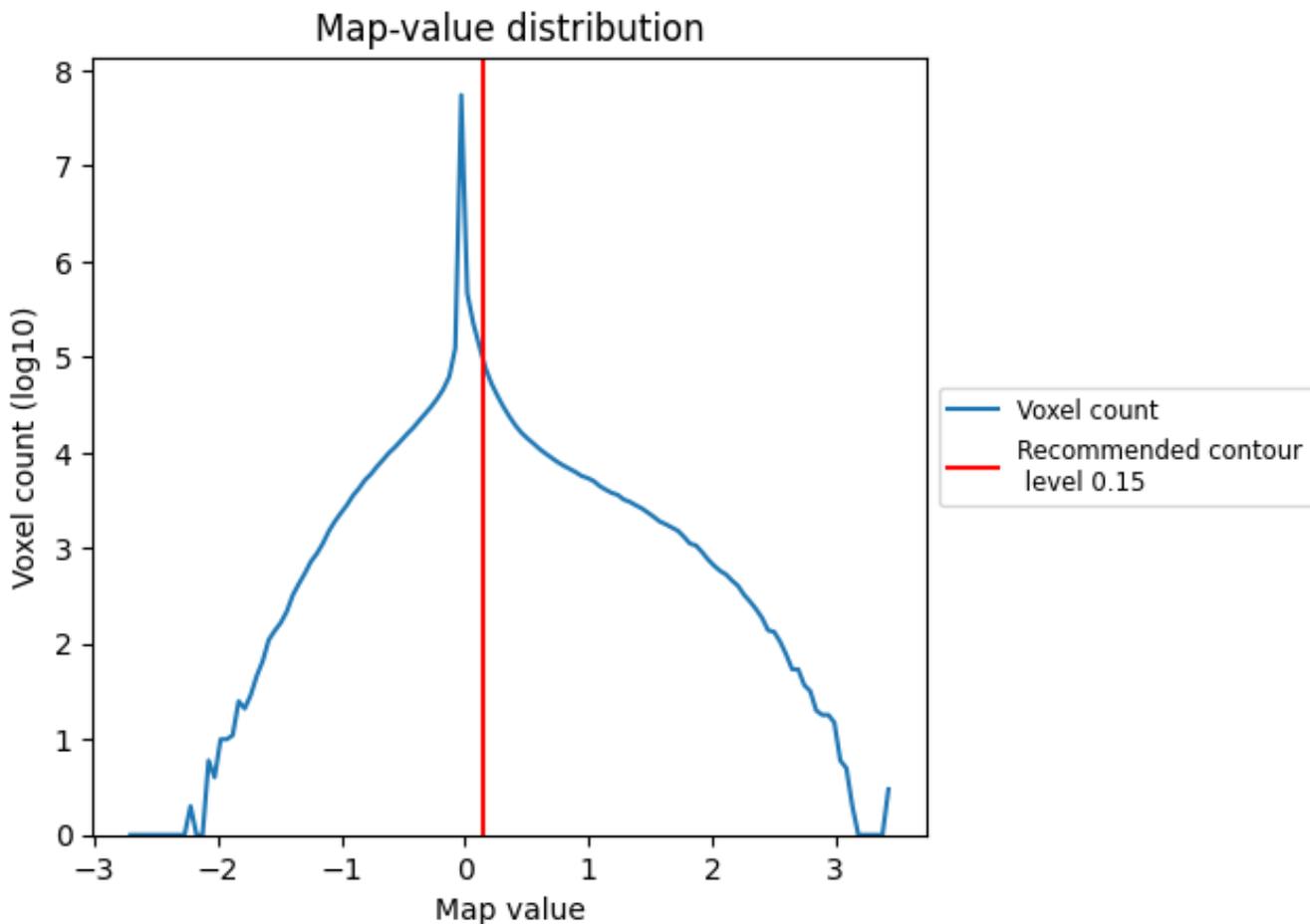
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate ⓘ
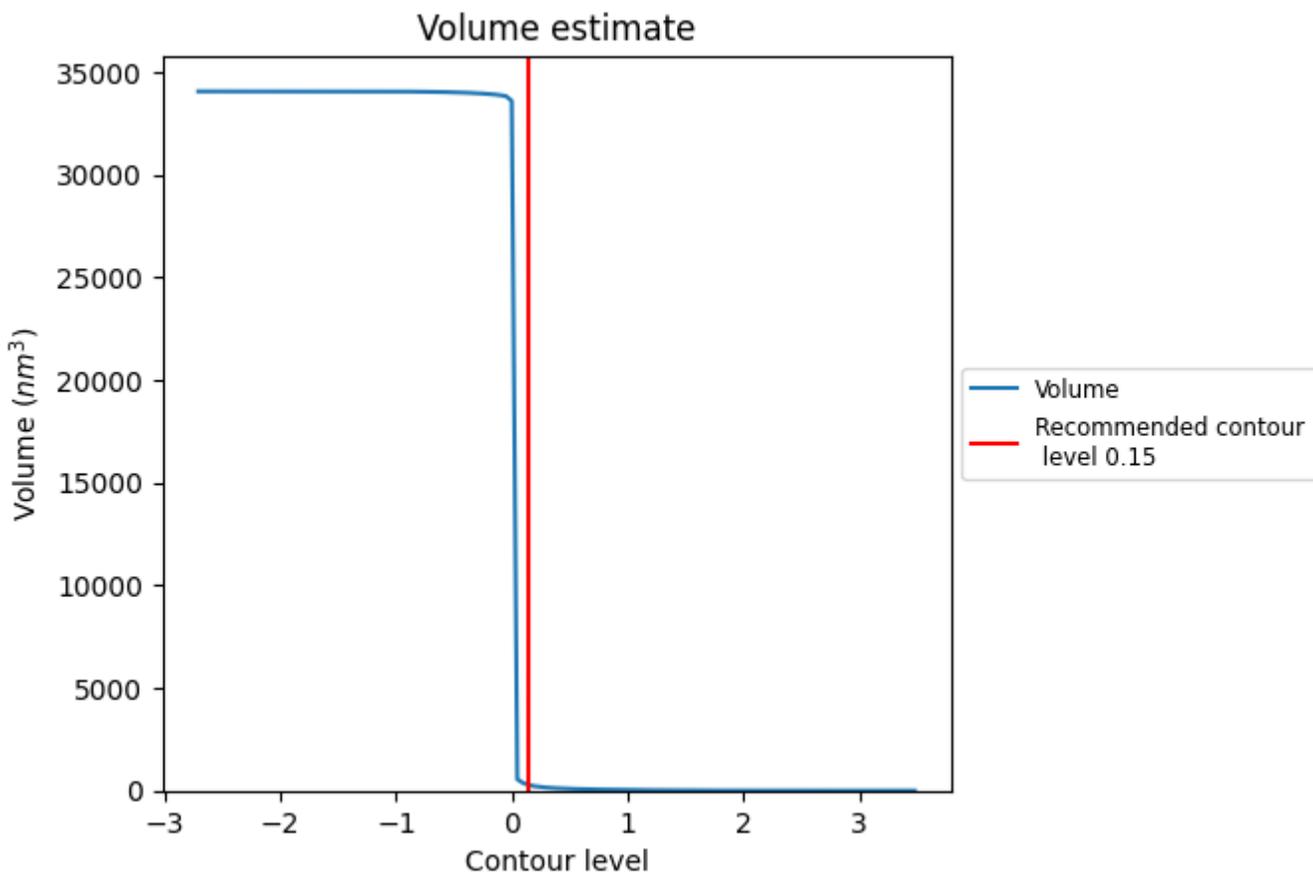
The volume at the recommended contour level is 268 nm^3; this corresponds to an approximate mass of 242 kDa.

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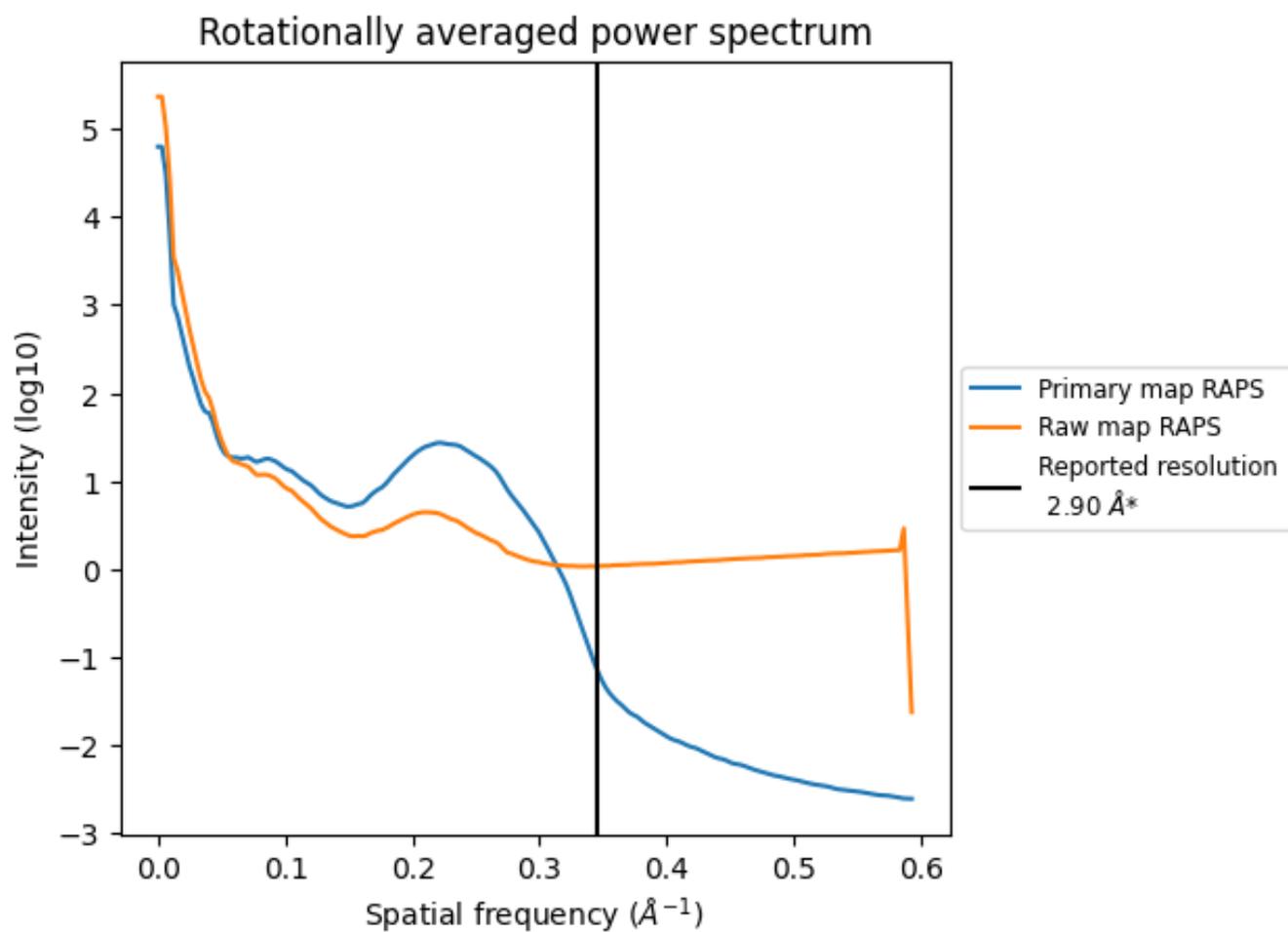
*Reported resolution corresponds to spatial frequency of 0.345 Å^{-1}

8   Fourier-Shell correlation ⓘ

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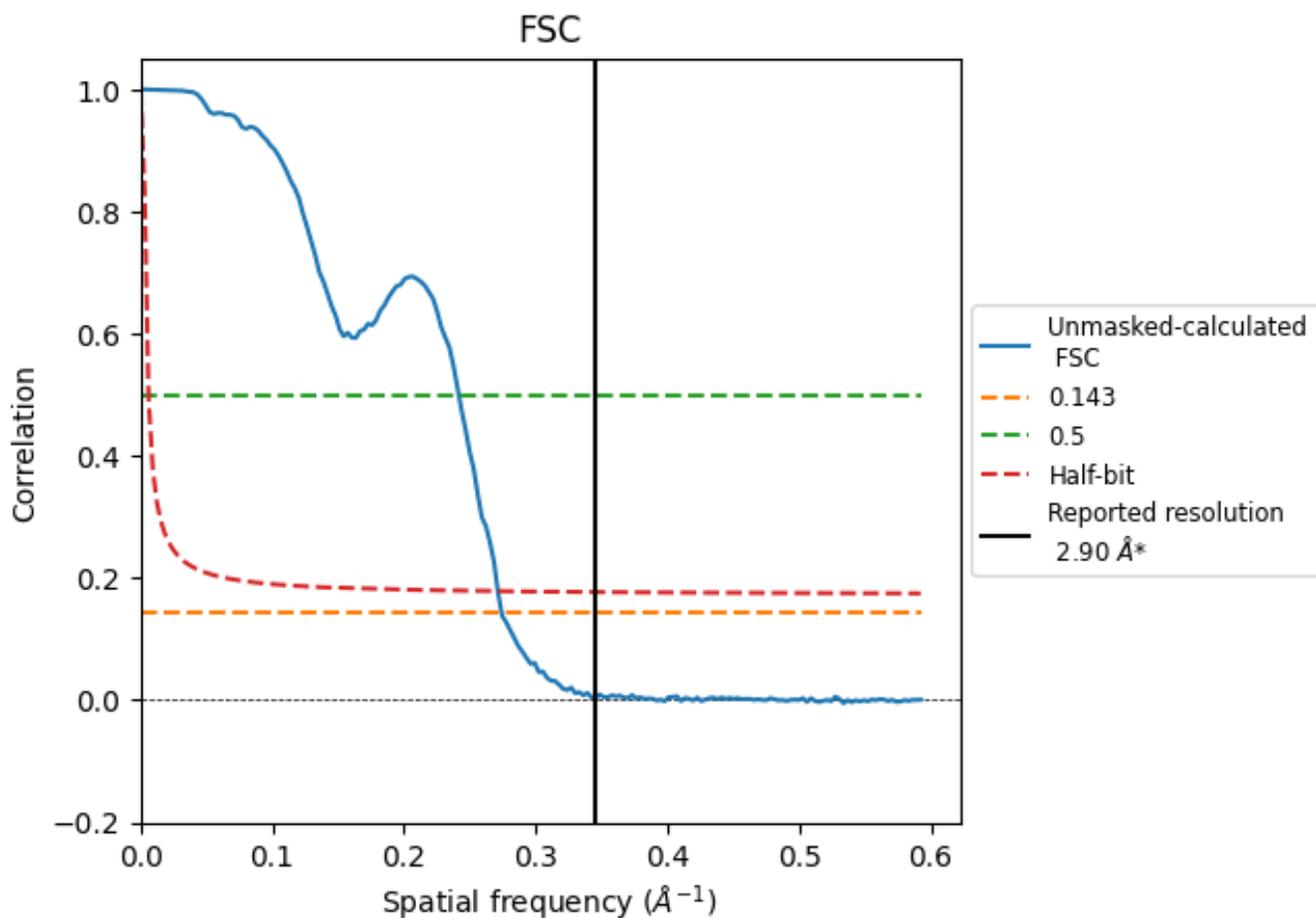
*Reported resolution corresponds to spatial frequency of 0.345 Å^{-1}

8.2 Resolution estimates ⓘ

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.90	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	3.65	4.14	3.68

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.65 differs from the reported value 2.9 by more than 10 %

9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-41448 and PDB model 8TOE. Per-residue inclusion information can be found in section 3 on page 7.

9.1 Map-model overlay (i)
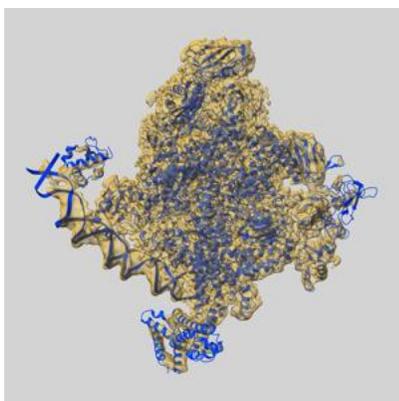
| X | Y | Z |
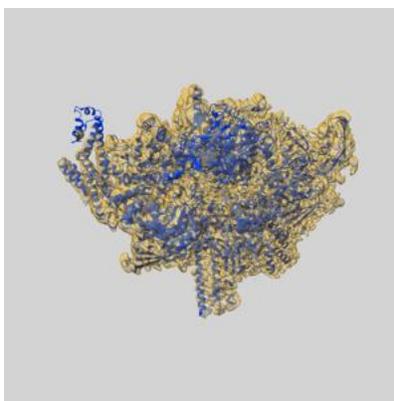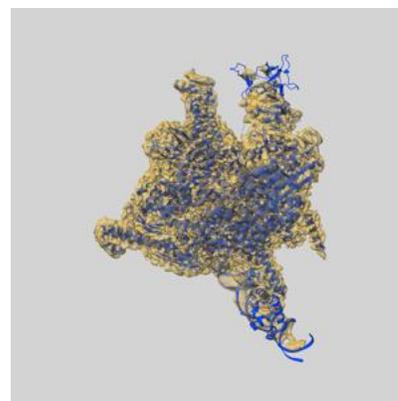
The images above show the 3D surface view of the map at the recommended contour level 0.15 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2　Q-score mapped to coordinate model　ⓘ

X　　　　　　　　　　　　　Y　　　　　　　　　　　　　Z
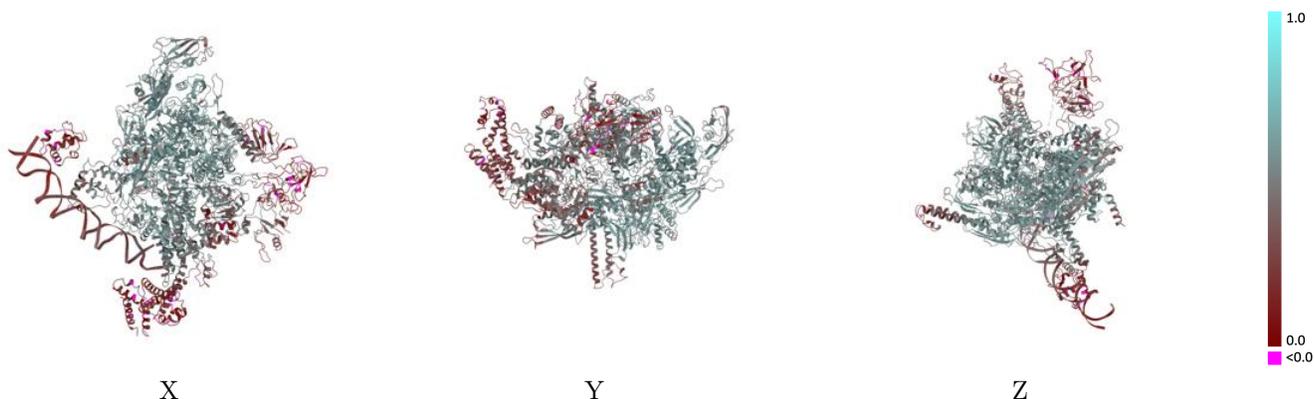
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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
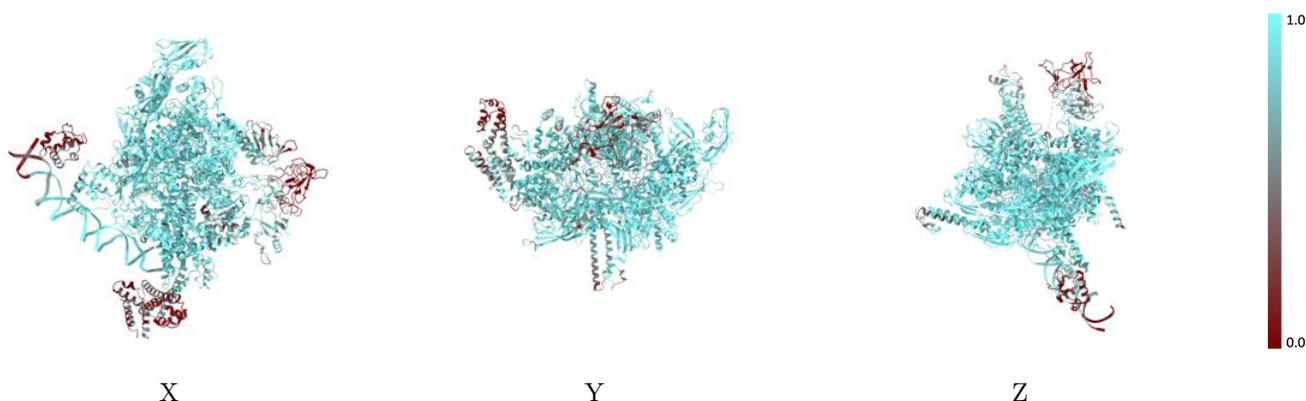
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.15).

9.4 Atom inclusion ⓘ
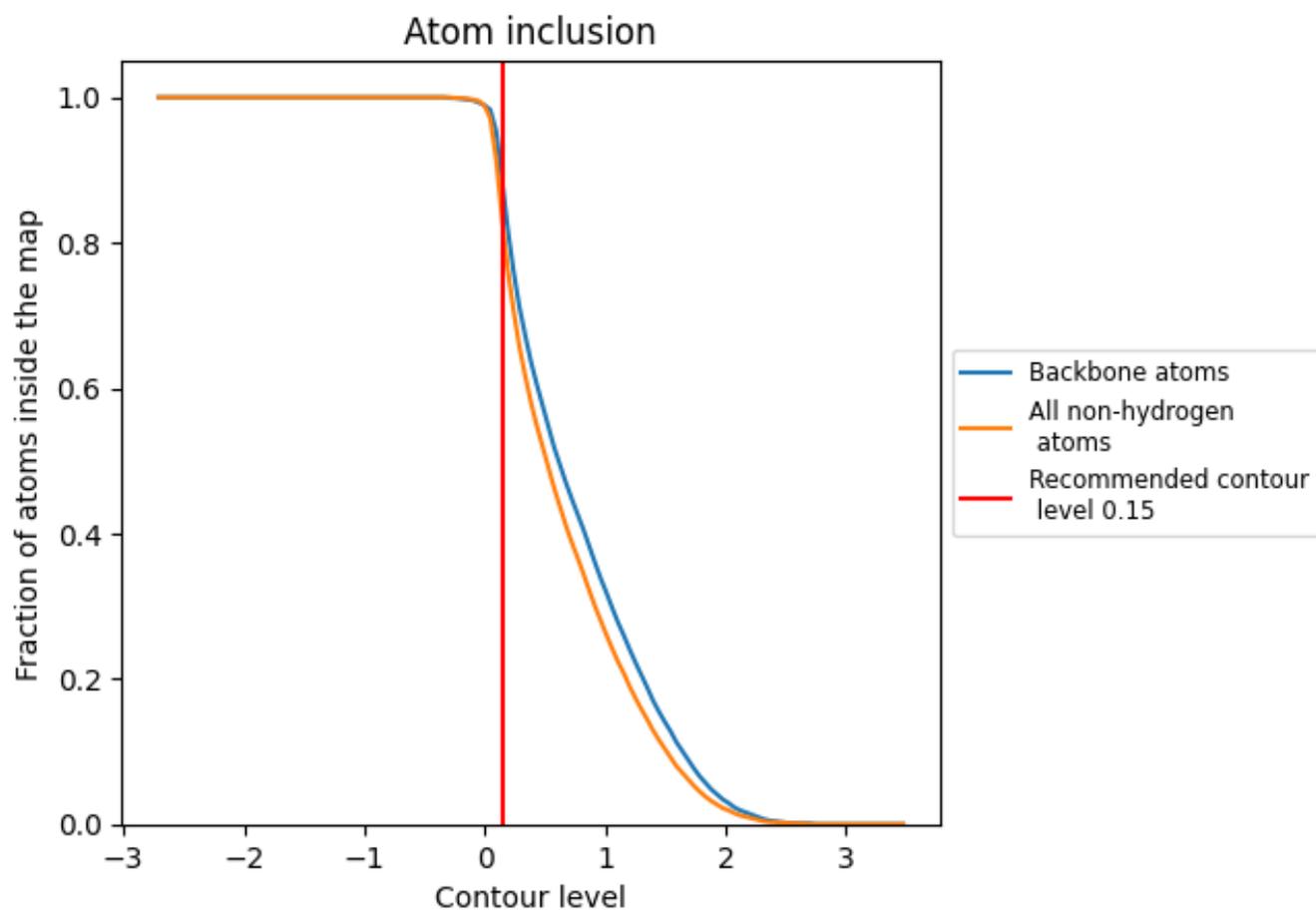
At the recommended contour level, 88% of all backbone atoms, 82% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.15) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8240	0.4620
G	0.9360	0.5550
H	0.9180	0.5200
I	0.8920	0.5110
J	0.8280	0.4770
K	0.8760	0.5190
L	0.6470	0.3330
M	0.1910	0.1610
O	0.7550	0.2830
P	0.7770	0.2600

1.0

0.0
<0.0