WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB EM Validation Summary Report (i)

Dec 13, 2025 – 04:38 PM EST

PDB ID	:	9E8K / pdb_00009e8k
EMDB ID	:	EMD-47723
Title	:	Nub1/Fat10-processing human 26S proteasome with Rpt6 at top of spiral staircase (AAA+ motor locally refined)
Authors	:	Arkinson, C.; Gee, C.L.; Martin, A.
Deposited on	:	2024-11-05
Resolution	:	4.08 Å(reported)

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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 4.08 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		18
Ramachandran outliers		0.6%
Sidechain outliers		0.1%

Worse   *Better*

▮ Percentile relative to all structures

▯ Percentile relative to all EM structures

Metric	Model-Map Fit Percentile Ranks	Value
Q-score		0.265

Worse   *Better*

▮ Percentile relative to all EM structures

▯ Percentile relative to EM structures of similar resolution

Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	6428 (3.58 - 4.58)

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	433	44% / 47% 36% 17%
2	C	406	16% / 54% 35% • 11%
3	H	246	72% / 67% 30% •
4	J	234	66% / 74% 25% •

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Mol	Chain	Length	Quality of chain
5	K	261	82% · 72% · 23% · 5%
6	L	248	81% · 72% · 23%
7	M	263	74% · 63% · 27% · 10%
8	N	255	81% · 70% · 24% · 6%
9	v	8	12% · 100%
10	D	418	11% · 43% · 44% · 13%
11	E	389	14% · 57% · 37% · 5%
12	F	439	15% · 48% · 35% · 16%
13	B	440	38% · 42% · 32% · 26%
14	P	241	77% · 63% · 32% · 5%
15	c	424	11% · 43% · 21% · 36%

2　Entry composition　ⓘ

There are 19 unique types of molecules in this entry. The entry contains 31852 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 26S proteasome regulatory subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	359	Total 2800	C 1762	N 495	O 526	S 17	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	156	ILE	LYS	conflict	UNP P35998
A	157	ALA	ILE	conflict	UNP P35998

- Molecule 2 is a protein called 26S protease regulatory subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	363	Total 2876	C 1813	N 516	O 530	S 17	0	0

- Molecule 3 is a protein called Proteasome subunit alpha type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	H	239	Total 1820	C 1157	N 304	O 346	S 13	0	0

- Molecule 4 is a protein called Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	J	230	Total 1717	C 1091	N 291	O 330	S 5	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
J	163	HIS	MET	conflict	UNP P25787
J	176	HIS	LYS	conflict	UNP P25787
J	177	HIS	ARG	conflict	UNP P25787

- Molecule 5 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	K	248	Total	C	N	O	S	0	0
			1895	1195	324	368	8		

- Molecule 6 is a protein called Proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	L	239	Total	C	N	O	S	0	0
			1704	1056	308	335	5		

- Molecule 7 is a protein called Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	M	238	Total	C	N	O	S	0	0
			1850	1159	334	346	11		

- Molecule 8 is a protein called Proteasome subunit alpha type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	N	240	Total	C	N	O	S	0	0
			1856	1178	314	353	11		

- Molecule 9 is a protein called substrate peptide.

Mol	Chain	Residues	Atoms				AltConf	Trace
9	v	8	Total	C	N	O	0	0
			40	24	8	8		

- Molecule 10 is a protein called 26S proteasome regulatory subunit 6B.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	D	364	Total	C	N	O	S	0	0
			2894	1833	503	547	11		

- Molecule 11 is a protein called 26S protease regulatory subunit 10B.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	E	368	Total	C	N	O	S	0	0
			2932	1846	522	548	16		

- Molecule 12 is a protein called 26S proteasome regulatory subunit 6A.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	F	367	Total 2877	C 1818	N 498	O 544	S 17	0	0

- Molecule 13 is a protein called 26S proteasome regulatory subunit 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	B	326	Total 2544	C 1600	N 435	O 498	S 11	0	0

- Molecule 14 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	P	228	Total 1729	C 1086	N 284	O 349	S 10	0	0

- Molecule 15 is a protein called 26S proteasome non-ATPase regulatory subunit 14.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	c	271	Total 2145	C 1359	N 368	O 401	S 17	0	0

There are 114 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
c	311	LEU	-	expression tag	UNP O00487
c	312	ILE	-	expression tag	UNP O00487
c	313	ASN	-	expression tag	UNP O00487
c	314	HIS	-	expression tag	UNP O00487
c	315	HIS	-	expression tag	UNP O00487
c	316	HIS	-	expression tag	UNP O00487
c	317	HIS	-	expression tag	UNP O00487
c	318	HIS	-	expression tag	UNP O00487
c	319	HIS	-	expression tag	UNP O00487
c	320	ASP	-	expression tag	UNP O00487
c	321	TYR	-	expression tag	UNP O00487
c	322	ASP	-	expression tag	UNP O00487
c	323	ILE	-	expression tag	UNP O00487
c	324	PRO	-	expression tag	UNP O00487
c	325	THR	-	expression tag	UNP O00487
c	326	THR	-	expression tag	UNP O00487
c	327	ALA	-	expression tag	UNP O00487
c	328	SER	-	expression tag	UNP O00487
c	329	GLU	-	expression tag	UNP O00487

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Chain	Residue	Modelled	Actual	Comment	Reference
c	330	ASN	-	expression tag	UNP O00487
c	331	LEU	-	expression tag	UNP O00487
c	332	TYR	-	expression tag	UNP O00487
c	333	PHE	-	expression tag	UNP O00487
c	334	GLN	-	expression tag	UNP O00487
c	335	GLY	-	expression tag	UNP O00487
c	336	GLU	-	expression tag	UNP O00487
c	337	LEU	-	expression tag	UNP O00487
c	338	GLY	-	expression tag	UNP O00487
c	339	MET	-	expression tag	UNP O00487
c	340	ARG	-	expression tag	UNP O00487
c	341	GLY	-	expression tag	UNP O00487
c	342	SER	-	expression tag	UNP O00487
c	343	ALA	-	expression tag	UNP O00487
c	344	GLY	-	expression tag	UNP O00487
c	345	LYS	-	expression tag	UNP O00487
c	346	ALA	-	expression tag	UNP O00487
c	347	GLY	-	expression tag	UNP O00487
c	348	GLU	-	expression tag	UNP O00487
c	349	GLY	-	expression tag	UNP O00487
c	350	GLU	-	expression tag	UNP O00487
c	351	ILE	-	expression tag	UNP O00487
c	352	PRO	-	expression tag	UNP O00487
c	353	ALA	-	expression tag	UNP O00487
c	354	PRO	-	expression tag	UNP O00487
c	355	LEU	-	expression tag	UNP O00487
c	356	ALA	-	expression tag	UNP O00487
c	357	GLY	-	expression tag	UNP O00487
c	358	THR	-	expression tag	UNP O00487
c	359	VAL	-	expression tag	UNP O00487
c	360	SER	-	expression tag	UNP O00487
c	361	LYS	-	expression tag	UNP O00487
c	362	ILE	-	expression tag	UNP O00487
c	363	LEU	-	expression tag	UNP O00487
c	364	VAL	-	expression tag	UNP O00487
c	365	LYS	-	expression tag	UNP O00487
c	366	GLU	-	expression tag	UNP O00487
c	367	GLY	-	expression tag	UNP O00487
c	368	ASP	-	expression tag	UNP O00487
c	369	THR	-	expression tag	UNP O00487
c	370	VAL	-	expression tag	UNP O00487
c	371	LYS	-	expression tag	UNP O00487

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Chain	Residue	Modelled	Actual	Comment	Reference
c	372	ALA	-	expression tag	UNP O00487
c	373	GLY	-	expression tag	UNP O00487
c	374	GLN	-	expression tag	UNP O00487
c	375	THR	-	expression tag	UNP O00487
c	376	VAL	-	expression tag	UNP O00487
c	377	LEU	-	expression tag	UNP O00487
c	378	VAL	-	expression tag	UNP O00487
c	379	LEU	-	expression tag	UNP O00487
c	380	GLU	-	expression tag	UNP O00487
c	381	ALA	-	expression tag	UNP O00487
c	382	MET	-	expression tag	UNP O00487
c	383	LYS	-	expression tag	UNP O00487
c	384	MET	-	expression tag	UNP O00487
c	385	GLU	-	expression tag	UNP O00487
c	386	THR	-	expression tag	UNP O00487
c	387	GLU	-	expression tag	UNP O00487
c	388	ILE	-	expression tag	UNP O00487
c	389	ASN	-	expression tag	UNP O00487
c	390	ALA	-	expression tag	UNP O00487
c	391	PRO	-	expression tag	UNP O00487
c	392	THR	-	expression tag	UNP O00487
c	393	ASP	-	expression tag	UNP O00487
c	394	GLY	-	expression tag	UNP O00487
c	395	LYS	-	expression tag	UNP O00487
c	396	VAL	-	expression tag	UNP O00487
c	397	GLU	-	expression tag	UNP O00487
c	398	LYS	-	expression tag	UNP O00487
c	399	VAL	-	expression tag	UNP O00487
c	400	LEU	-	expression tag	UNP O00487
c	401	VAL	-	expression tag	UNP O00487
c	402	LYS	-	expression tag	UNP O00487
c	403	GLU	-	expression tag	UNP O00487
c	404	ARG	-	expression tag	UNP O00487
c	405	ASP	-	expression tag	UNP O00487
c	406	ALA	-	expression tag	UNP O00487
c	407	VAL	-	expression tag	UNP O00487
c	408	GLN	-	expression tag	UNP O00487
c	409	GLY	-	expression tag	UNP O00487
c	410	GLY	-	expression tag	UNP O00487
c	411	GLN	-	expression tag	UNP O00487
c	412	GLY	-	expression tag	UNP O00487
c	413	LEU	-	expression tag	UNP O00487

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Chain	Residue	Modelled	Actual	Comment	Reference
c	414	ILE	-	expression tag	UNP O00487
c	415	LYS	-	expression tag	UNP O00487
c	416	ILE	-	expression tag	UNP O00487
c	417	GLY	-	expression tag	UNP O00487
c	418	VAL	-	expression tag	UNP O00487
c	419	HIS	-	expression tag	UNP O00487
c	420	HIS	-	expression tag	UNP O00487
c	421	HIS	-	expression tag	UNP O00487
c	422	HIS	-	expression tag	UNP O00487
c	423	HIS	-	expression tag	UNP O00487
c	424	HIS	-	expression tag	UNP O00487

- Molecule 16 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).
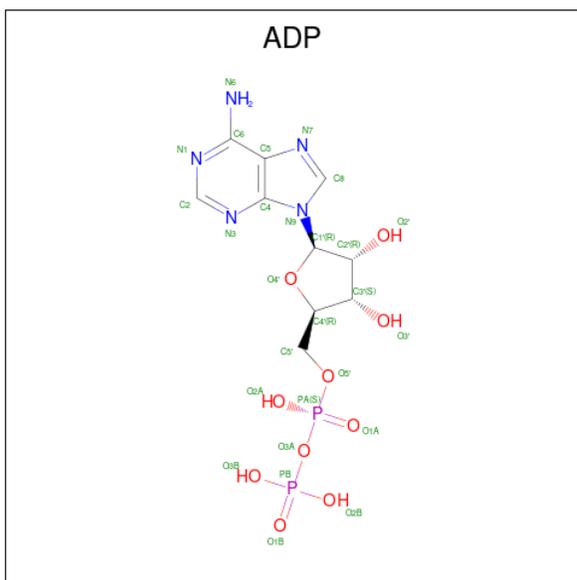
Mol	Chain	Residues	Atoms					AltConf
16	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
16	E	1	Total	C	N	O	P	0
			27	10	5	10	2	
16	F	1	Total	C	N	O	P	0
			27	10	5	10	2	
16	B	1	Total	C	N	O	P	0
			27	10	5	10	2	

- Molecule 17 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).

ATP

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

• Molecule 18 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
18	C	1	Total	Mg	0
			1	1	
18	D	1	Total	Mg	0
			1	1	

• Molecule 19 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
19	c	1	Total	Zn	0
			1	1	

3 Residue-property plots ⓘ

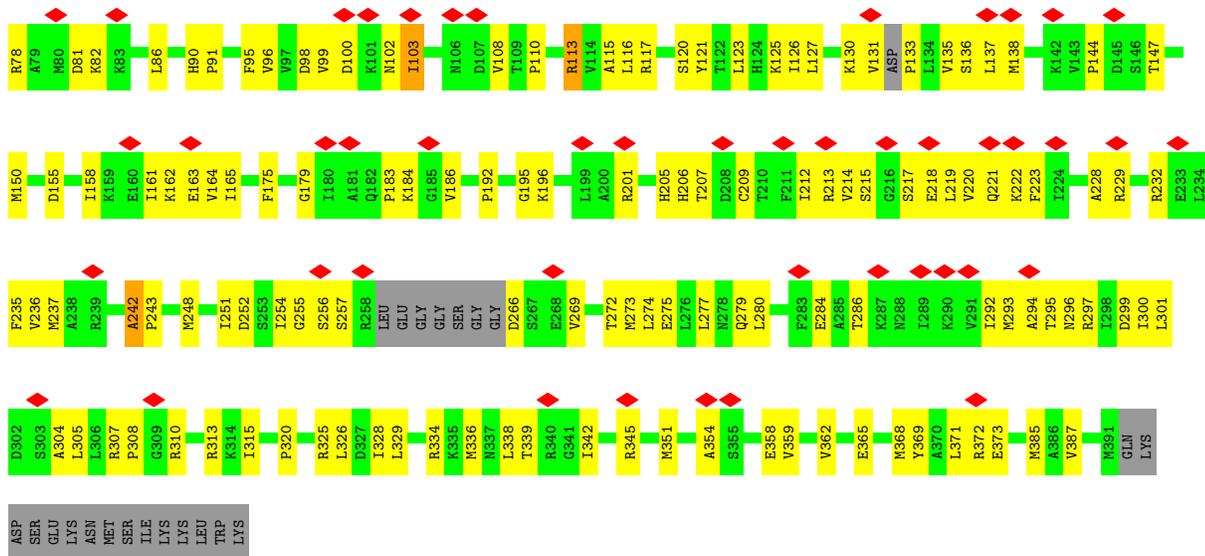These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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.
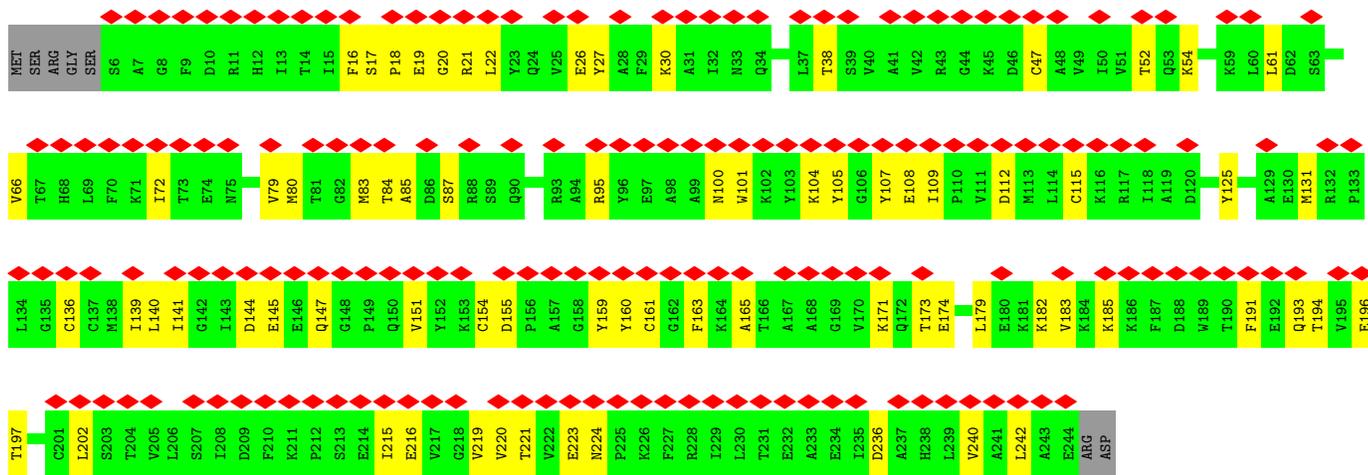
• Molecule 1: 26S proteasome regulatory subunit 7

Chain A:

• Molecule 2: 26S protease regulatory subunit 8

Chain C:

R78 A79 M80 D81 K82 K83 L86 H90 P91 F95 V96 V97 D98 V99 D100 K101 N102 I103 N106 D107 V108 T109 P110 R113 V114 A115 L116 R117 S120 Y121 T122 L123 H124 K125 I126 L127 K130 V131 ASP P133 L134 V135 S136 L137 M138 K142 V143 P144 D145 S146 T147

M150 D155 I158 K159 E160 I161 K162 E163 V164 I165 F175 G179 I180 A181 Q182 P183 K184 G185 V186 P192 G195 K196 L199 A200 R201 H205 H206 T207 D208 C209 T210 F211 I212 R213 V214 S215 Q216 S217 E218 L219 V220 Q221 K222 F223 I224 A228 R229 R232 E233 L234

F235 V236 M237 A238 R239 A242 P243 M248 I251 D252 S253 I254 G255 S256 S257 R258 LEU GLU GLY GLY SER GLY GLY D266 S267 E268 V269 T272 M273 L274 E275 L276 L277 N278 Q279 L280 F283 E284 A285 T286 K287 N288 I289 K290 V291 I292 M293 A294 T295 N296 R297 I298 D299 I300 L301

D302 S303 A304 L305 L306 R307 P308 G309 R310 R313 K314 I315 P320 R325 L326 D327 I328 L329 R334 K335 M336 N337 L338 T339 R340 G341 I342 R345 M351 A354 S355 E358 V359 V362 E365 M368 Y369 A370 L371 R372 E373 M385 A386 V387 M391 GLN LYS
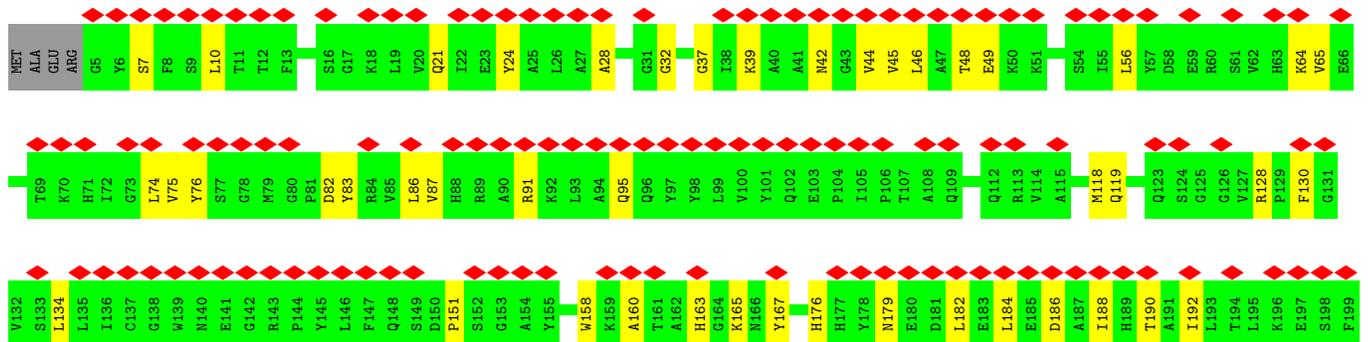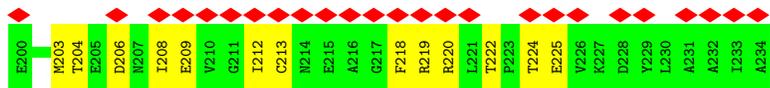
ASP SER GLU GLU LYS ASN MET SER ILE LYS LYS LEU TRP LYS

• Molecule 3: Proteasome subunit alpha type-6

Chain H:
72%
67%   30%   •

MET SER ARG SER S6 A7 G8 F9 D10 R11 H12 I13 T14 I15 F16 S17 P18 E19 G20 R21 L22 Y23 Q24 V25 E26 Y27 A28 F29 K30 A31 I32 N33 Q34 L37 T38 S39 V40 A41 V42 R43 G44 K45 D46 C47 A48 V49 I50 V51 T52 Q53 K54 K59 L60 L61 D62 S63

V66 T67 H68 L69 F70 K71 I72 T73 E74 N75 V79 M80 T81 G82 M83 T84 A85 D86 S87 R88 S89 Q90 R93 A94 R95 Y96 E97 A98 A99 N100 W101 K102 Y103 K104 Y105 G106 Y107 E108 I109 P110 V111 D112 M113 L114 C115 K116 R117 I118 A119 D120 Y125 A129 E130 M131 R132 P133

L134 G135 C136 C137 M138 I139 L140 I141 G142 I143 D144 E145 E146 Q147 G148 P149 Q150 V151 Y152 K153 C154 D155 P156 A157 G158 Y159 Y160 C161 G162 F163 K164 A165 T166 A167 A168 G169 V170 K171 Q172 T173 E174 L179 E180 K181 K182 V183 K184 K185 F186 F187 D188 W189 T190 F191 E192 Q193 T194 V195 E196

T197 C201 L202 S203 T204 V205 L206 S207 I208 D209 F210 K211 P212 S213 E214 I215 E216 V217 G218 V219 V220 T221 V222 E223 N224 P225 K226 F227 R228 I229 L230 T231 E232 A233 E234 I235 D236 A237 H238 L239 V240 A241 L242 A243 E244 ARG ASP
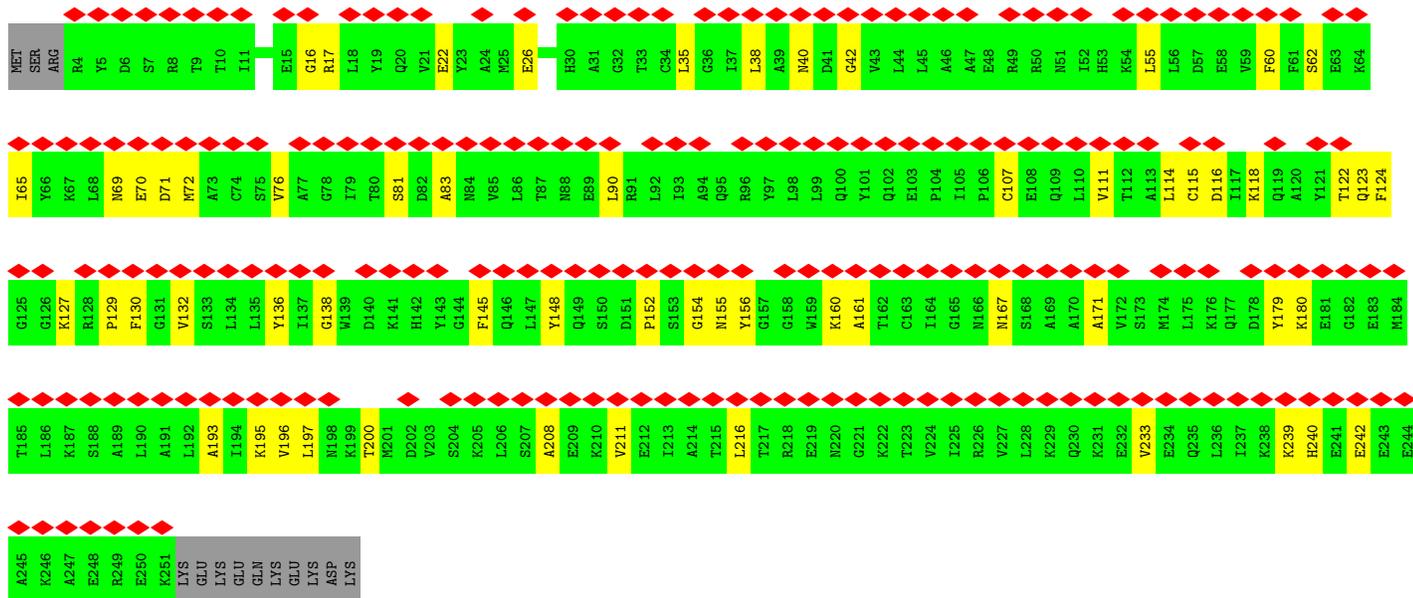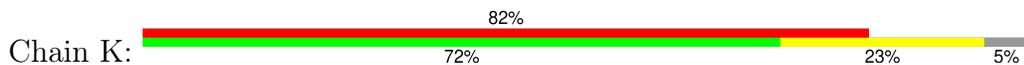
• Molecule 4: Proteasome subunit alpha type-2

Chain J:
66%
74%   25%   •

MET ALA GLU ARG G5 Y6 S7 F8 S9 L10 T11 T12 F13 S16 G17 K18 L19 V20 Q21 I22 E23 Y24 A25 L26 A27 A28 G31 G32 G37 I38 K39 A40 A41 N42 G43 V44 V45 L46 A47 T48 E49 K50 K51 S54 I55 L56 Y57 D58 E59 R60 S61 V62 H63 K64 V65 E66

T69 K70 H71 I72 G73 L74 V75 Y76 S77 G78 M79 G80 P81 D82 Y83 R84 V85 L86 V87 H88 R89 A90 R91 K92 L93 A94 Q95 Q96 Y97 Y98 L99 V100 Y101 Q102 E103 P104 I105 P106 T107 A108 Q109 Q112 R113 V114 A115 M118 Q119 Q123 S124 G125 I126 V127 R128 P129 F130 G131

V132 S133 L134 L135 I136 C137 G138 W139 N140 E141 G142 R143 P144 Y145 L146 F147 Q148 S149 D150 P151 S152 G153 A154 Y155 W158 K159 T161 A162 H163 G164 K165 N166 Y167 H176 H177 Y178 N179 E180 D181 L182 E183 L184 E185 D186 A187 I188 H189 T190 A191 I192 L193 T194 L195 K196 E197 S198 F199

E200 M203 T204 E205 D206 N207 I208 E209 V210 G211 I212 C213 N214 A216 G217 F218 R219 R220 L221 T222 P223 T224 E225 V226 K227 D228 Y229 L230 A231 A232 I233 A234
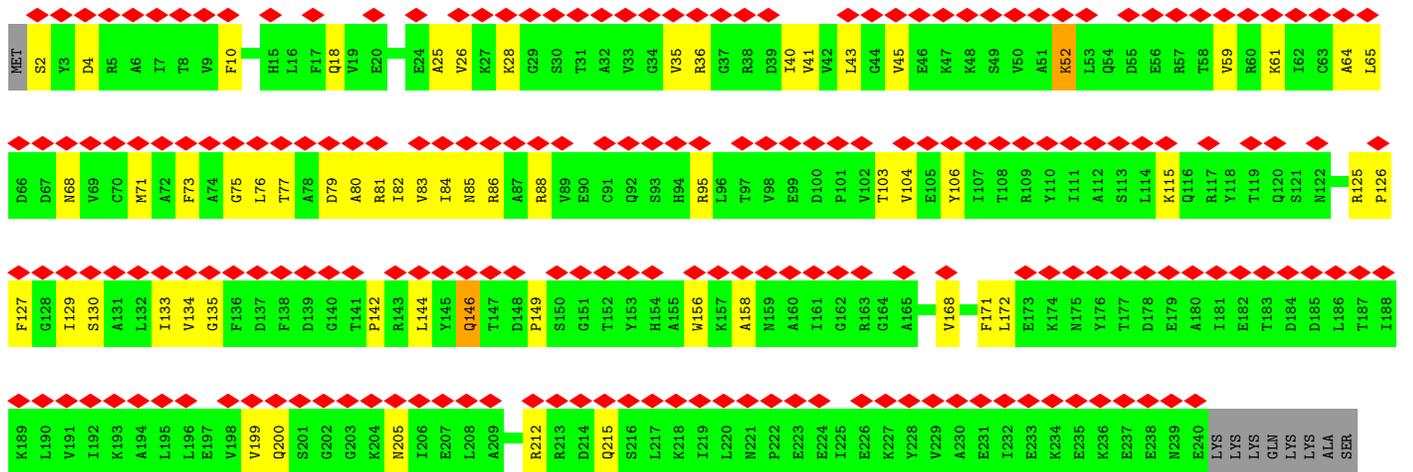
• Molecule 5: Proteasome subunit alpha type-4

Chain K:

82%
72% 23% 5%

MET SER ARG R4 Y5 D6 S7 R8 T9 T10 I11 E15 G16 R17 L18 Y19 Q20 V21 E22 Y23 A24 M25 E26 H30 A31 G32 T33 C34 L35 G36 I37 L38 A39 N40 D41 G42 V43 L44 L45 A46 A47 E48 R49 R50 N51 I52 H53 K54 L55 L56 D57 E58 V59 F60 F61 S62 E63 K64

I65 Y66 K67 L68 N69 E70 D71 M72 A73 C74 S75 V76 A77 G78 I79 T80 S81 D82 A83 N84 V85 L86 T87 N88 E89 L90 R91 L92 I93 A94 Q95 R96 Y97 L98 L99 Q100 Y101 Q102 E103 P104 I105 P106 C107 E108 Q109 L110 V111 T112 A113 L114 C115 D116 I117 K118 Q119 A120 Y121 T122 Q123 F124

G125 G126 K127 R128 P129 F130 G131 V132 S133 L134 L135 Y136 I137 G138 W139 D140 K141 H142 Y143 G144 F145 Q146 L147 Y148 Q149 S150 D151 P152 S153 G154 N155 Y156 G157 G158 W159 K160 A161 T162 C163 I164 G165 N166 N167 S168 A169 A170 A171 V172 S173 M174 L175 K176 Q177 D178 Y179 K180 E181 G182 E183 M184

T185 L186 K187 S188 A189 L190 A191 L192 A193 I194 K195 V196 L197 N198 K199 T200 M201 D202 V203 S204 K205 L206 S207 A208 E209 K210 V211 E212 I213 A214 T215 L216 T217 R218 E219 N220 G221 K222 T223 V224 I225 R226 V227 L228 K229 Q230 K231 E232 V233 E234 Q235 L236 I237 K238 K239 H240 E241 E242 E243 E244

A245 K246 A247 E248 R249 E250 K251 LYS GLU LYS GLU GLN GLN LYS GLU LYS LYS ASP LYS

• Molecule 6: Proteasome subunit alpha type-7

Chain L:

81%
72% 23%

MET S2 Y3 D4 R5 A6 I7 T8 V9 F10 H15 L16 F17 Q18 V19 E20 I24 A25 V26 K27 K28 G29 S30 T31 A32 V33 G34 V35 R36 G37 R38 D39 I40 V41 V42 L43 G44 V45 E46 K47 K48 S49 V50 A51 K52 L53 Q54 D55 E56 R57 T58 V59 R60 K61 I62 C63 A64 L65

D66 D67 N68 V69 C70 M71 A72 F73 A74 G75 L76 T77 A78 D79 A80 R81 I82 V83 I84 N85 R86 A87 R88 V89 E90 C91 Q92 S93 H94 R95 L96 T97 V98 E99 D100 P101 V102 T103 V104 E105 Y106 I107 T108 R109 Y110 I111 A112 S113 L114 K115 Q116 R117 Y118 T119 Q120 S121 N122 R125 P126

F127 G128 I129 S130 A131 L132 I133 V134 G135 F136 D137 F138 D139 G140 T141 P142 R143 L144 Y145 Q146 T147 D148 P149 S150 G151 T152 Y153 H154 A155 W156 K157 A158 N159 A160 I161 G162 R163 G164 A165 V168 F171 L172 E173 K174 N175 Y176 T177 D178 E179 A180 I181 E182 T183 D184 D185 L186 T187 I188

K189 L190 V191 I192 K193 A194 L195 L196 E197 V198 V199 Q200 S201 G202 G203 K204 N205 I206 E207 L208 A209 R212 R213 D214 Q215 S216 L217 K218 I219 L220 N221 P222 E223 I224 I225 E226 K227 Y228 V229 A230 E231 I232 E233 K234 E235 K236 E237 E238 N239 E240 LYS LYS LYS GLN LYS LYS ALA SER

• Molecule 7: Proteasome subunit alpha type-1

Chain M:

74%
63% 27% 10%

MET PHE ARG N4 Q5 Y6 D7 N8 D9 V10 T11 V12 W13 S14 P15 R18 I19 H20 Q21 I22 E23 Y24 E27 A28 V29 K30 Q31 G32 S33 A34 T35 V36 G37 L38 K39 S40 K41 T42 H43 A44 V45 L46 V47 A48 L49 K50 R51 A52 Q53 S54 E55 L56 A57 A58 H59 Q60 K61 K62

I63 L64 H65 V66 D67 N68 H69 I70 G71 I72 S73 I74 A75 G76 L77 T78 A79 D80 A81 R82 L83 L84 C85 N86 F87 M88 H89 Q90 E91 C92 L93 D94 S95 R96 F97 V98 F99 D100 R101 P102 L103 P104 V105 S106 R107 L108 V109 S110 L111 I112 G113 S114 K115 T116 Q117 I118 P119 T120 Q121 R122

Y123 G124 R125 R126 P127 Y128 G129 V130 G131 L132 L133 I134 A135 G136 Y137 D138 D139 M140 G141 P142 H143 I144 F145 Q146 T147 C148 P149 S150 A151 N152 Y153 F154 D155 C156 R157 A158 M159 S160 I161 G162 A163 R164 S165 Q166 S167 L172 E173 R174 H175 M176 S177 E178 F179 M180 E181 C182 N183 L184 N185

E186 L187 V188 K189 H190 G191 L192 R193 A194 L195 R196 E197 T198 L199 P200 A201 E202 Q203 D204 L205 T206 T207 K208 S211 I212 G213 I214 V215 G216 K217 D218 L219 E220 F221 T222 I223 Y224 D225 D226 D227 S230 P231 F232 L233 E234 G235 L236 E237 E238 R239 P240 Q241 ARG LYS ALA GLN PRO ALA

GLN PRO ALA ASP GLU PRO ALA GLU LYS ALA ASP GLU PRO MET GLU HIS

• Molecule 8: Proteasome subunit alpha type-3

Chain N:

81%

70%   24%   6%

MET SER SER ILE GLY T5 G6 L9 S10 A11 S12 T13 F14 S15 P16 D17 G18 R19 V20 F21 Q22 V23 E24 Y25 A26 M27 K28 A29 V30 E31 N32 S33 S34 T35 A36 I37 G38 I39 R40 C41 K42 D43 G44 V45 V46 F47 G48 V49 E50 K51 L52 V53 L54 S55 K56 L57 Y58 E59 E60

G61 S62 N63 K64 R65 L66 F67 N68 V69 D70 R71 H72 V73 G74 M75 A76 V77 A78 G79 L80 L81 A82 D83 A84 R85 S86 L87 A88 D89 I90 A91 R92 E93 E94 A95 S96 N97 F98 R99 S100 N101 F102 G103 Y104 N105 I106 P107 L108 K109 H110 L111 A112 D113 R114 V115 A116 M117 Y118 V119 H120

A121 Y122 T123 L124 Y125 S126 A127 V128 R129 P130 F131 G132 C133 S134 F135 M136 L137 G138 S139 Y140 S141 V142 N143 D145 G146 A146 Q147 L148 Y149 M150 I151 D152 P153 S154 G155 V156 S157 Y158 G159 Y160 W161 C163 A164 I165 G166 K167 A168 R169 Q170 A171 A172 K173 T174 E175 I176 E177 K178 L179 Q180

M181 K182 E183 M184 T185 C186 R187 D188 I189 V190 K191 E192 V193 A194 K195 I196 I197 Y198 I199 V200 H201 D202 E203 V204 K205 D206 K207 A208 F209 E210 L211 E212 L213 S214 W215 V216 G217 E218 L219 T220 N221 G222 R223 H224 E225 I226 V227 P228 K229 D230 I231 R232 E233 E234 A235 E236 K237 Y238 A239 K240

E241 S242 L243 K244 GLU GLU ASP GLU SER ASP ASP ASN MET

• Molecule 9: substrate peptide

Chain v:

12%

100%

X16 X23

• Molecule 10: 26S proteasome regulatory subunit 6B

Chain D:

11%

43%   44%   13%

• Molecule 11: 26S protease regulatory subunit 10B

Chain E:

14%

57%   37%   • 5%

• Molecule 12: 26S proteasome regulatory subunit 6A

Chain F:

15%

48%   35%   • 16%

WORLDWIDE
wwPDB
PROTEIN DATA BANK

• Molecule 13: 26S proteasome regulatory subunit 4

• Molecule 14: Proteasome subunit alpha type-5

MET PHE LEU THR ARG SER GLU Y8 D9 R10 G11 V12 N13 T14 F15 S16 P17 E18 G19 R20 L21 F22 Q23 V24 E25 Y26 A27 I28 E29 A30 I31 K32 L33 G34 S35 T36 A37 I38 G39 I40 Q41 T42 S43 E44 G45 V46 C47 L48 A49 K52 R53 I54 T55 S56 P57 L58 M59 E60 P61

S62 S63 I64 E65 K66 I67 V68 E69 I70 D71 A72 H73 I74 G75 C76 A77 M78 S79 G80 L81 I82 A83 D84 A85 K86 T87 L88 I89 D90 K91 A92 R93 V94 E95 T96 Q97 N98 H99 W100 F101 T102 Y103 N104 E105 T106 M107 T108 V109 E110 S111 V112 T113 Q114 A115 V116 S117 N118 L119 A120 L121

Q122 F123 G124 E125 E126 D127 ALA ASP PRO GLY ALA MET S134 R135 P136 F137 G138 V139 A140 L141 L142 F143 G144 G145 V146 D147 E148 K149 G150 P151 Q152 L153 F154 H155 M156 D157 P158 S159 G160 T161 F162 V163 Q164 C165 D166 A167 R168 A169 I170 E175 L181 Q182 E183 V184 Y185 H186 K187 S188

M189 T190 L191 K192 E193 A194 I195 K196 S197 S198 L199 I200 I201 L202 K203 Q204 V205 M206 E207 E208 K209 L210 N211 A212 T213 N214 I215 E216 L217 A218 T219 V220 Q221 P222 G223 Q224 N225 F226 H227 M228 F229 T230 K231 E232 E233 L234 E235 E236 V237 I238 K239 D240 I241

• Molecule 15: 26S proteasome non-ATPase regulatory subunit 14

11%

Chain c:

43% 21% 36%

MET ASP ARG LEU LEU ARG LEU GLY GLY GLY MET PRO GLY LEU GLY GLN GLY PRO PRO THR ASP ALA PRO A24 V25 A28 E29 Q30 V31 Y32 I33 L36 A37 L38 L39 K40 M41 L42 G48 V49 P50 V53 L56 M57 F61 D64 V67 R68 V69 I70 D71 V72

M75 P76 Q77 S78 G79 T80 E85 D88 F91 K94 M95 L96 K100 G103 R104 V108 V109 G110 W111 Y112 H113 S114 H115 P116 G117 C120 Q130 Q131 S132 F133 E134 A135 L136 R139 A140 V141 A142 V143 V144 V145 D146 Q149 S150 V151 K152 V156

R161 L162 I163 ASN ALA ASN MET MET VAL LEU GLY H172 E173 P174 R175 S179 N180 L181 G182 H183 L184 N185 K186 P187 S188 I189 Q190 A191 L192 I193 N197 R198 H199 Y200 T204 I205 N206 Y207 R208 K209 N210 E211 L212 K215 L220 H221 K222 K223 E227 T230 L231 Q232 D233

Y234 S235 E236 H237 C238 K239 S243 V244 V245 K246 L251 A252 K253 N254 Y255 N256 K257 E260 E261 E262 D263 K264 M265 T266 P267 E268 GLN LEU ALA ILE LYS ASN VAL GLY K277 Q278 D279 P280 R281 R282 E285 V288 L291 M292 I296 V297 Q298 C299 L304 V307 V308

F309 K310 LEU ILE ASN HIS HIS HIS HIS HIS ASP TYR ASP ILE PRO THR THR ALA SER GLU ASN LEU TYR PHE GLN GLY LEU GLU LYS MET GLU THR GLU ILE LEU SER VAL LEU VAL LYS GLU GLU ARG GLY SER ALA GLY LYS ALA VAL GLN GLY GLU GLN GLY LEU ILE PRO ALA PRO LEU ALA GLY THR VAL SER LYS ILE LEU VAL LYS GLY GLY VAL HIS HIS HIS HIS HIS

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

4   Experimental information   ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	10722	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	50	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1700	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.468	Depositor
Minimum map value	-0.275	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.023	Depositor
Recommended contour level	0.13	Depositor
Map size (Å)	356.32, 356.32, 356.32	wwPDB
Map dimensions	340, 340, 340	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.048, 1.048, 1.048	Depositor

5   Model quality ⓘ

5.1   Standard geometry ⓘ

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

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	0.19	0/2847	0.56	1/3845 (0.0%)
2	C	0.19	0/2913	0.54	0/3917
3	H	0.16	0/1853	0.42	0/2515
4	J	0.14	0/1756	0.41	0/2389
5	K	0.15	0/1925	0.44	0/2606
6	L	0.15	0/1728	0.45	1/2358 (0.0%)
7	M	0.15	0/1885	0.41	0/2552
8	N	0.17	0/1891	0.48	0/2552
10	D	0.21	0/2940	0.54	0/3969
11	E	0.21	0/2976	0.55	1/4004 (0.0%)
12	F	0.22	0/2914	0.57	0/3925
13	B	0.19	0/2576	0.54	0/3474
14	P	0.17	0/1755	0.54	0/2375
15	c	0.17	0/2185	0.46	0/2951
All	All	0.18	0/32144	0.51	3/43432 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
11	E	0	1
12	F	0	1
All	All	0	2

There are no bond length outliers.

All (3) bond angle outliers are listed below:

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	258	ARG	CA-CB-CG	6.07	126.24	114.10
6	L	73	PHE	N-CA-C	5.17	116.96	110.91
11	E	263	GLN	N-CA-C	-5.14	105.85	111.82

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
11	E	93	LYS	Mainchain
12	F	146	LYS	Mainchain

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	A	2800	0	2848	137	0
2	C	2876	0	2994	137	0
3	H	1820	0	1789	56	0
4	J	1717	0	1617	47	0
5	K	1895	0	1833	48	0
6	L	1704	0	1517	46	0
7	M	1850	0	1822	50	0
8	N	1856	0	1814	49	0
9	v	40	0	11	0	0
10	D	2894	0	2933	198	0
11	E	2932	0	3012	138	0
12	F	2877	0	2978	147	0
13	B	2544	0	2597	136	0
14	P	1729	0	1680	58	0
15	c	2145	0	2150	63	0
16	A	27	0	12	3	0
16	B	27	0	12	6	0
16	E	27	0	12	3	0
16	F	27	0	12	3	0
17	C	31	0	12	4	0
17	D	31	0	12	7	0
18	C	1	0	0	0	0
18	D	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
19	c	1	0	0	0	0
All	All	31852	0	31667	1175	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 18.

The worst 5 of 1175 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)
3:H:80:MET:HE1	3:H:136:CYS:HB2	1.46	0.97
14:P:202:LEU:HA	14:P:205:VAL:HG22	1.58	0.85
10:D:243:GLY:HA2	10:D:246:MET:HE2	1.58	0.84
10:D:252:ARG:HA	10:D:255:LYS:HD2	1.59	0.84
8:N:50:GLU:HB2	8:N:209:PHE:HE1	1.43	0.82

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	357/433 (82%)	318 (89%)	37 (10%)	2 (1%)	22	59
2	C	357/406 (88%)	317 (89%)	35 (10%)	5 (1%)	9	41
3	H	237/246 (96%)	227 (96%)	10 (4%)	0	100	100
4	J	228/234 (97%)	227 (100%)	1 (0%)	0	100	100
5	K	246/261 (94%)	235 (96%)	11 (4%)	0	100	100
6	L	237/248 (96%)	218 (92%)	18 (8%)	1 (0%)	30	67
7	M	236/263 (90%)	225 (95%)	10 (4%)	1 (0%)	30	67
8	N	238/255 (93%)	221 (93%)	17 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
10	D	360/418 (86%)	320 (89%)	37 (10%)	3 (1%)	16	53
11	E	364/389 (94%)	337 (93%)	24 (7%)	3 (1%)	16	53
12	F	361/439 (82%)	327 (91%)	28 (8%)	6 (2%)	7	37
13	B	318/440 (72%)	285 (90%)	31 (10%)	2 (1%)	22	59
14	P	224/241 (93%)	211 (94%)	13 (6%)	0	100	100
15	c	265/424 (62%)	239 (90%)	25 (9%)	1 (0%)	30	67
All	All	4028/4697 (86%)	3707 (92%)	297 (7%)	24 (1%)	24	59

5 of 24 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	242	ALA
10	D	85	ILE
11	E	116	ASP
12	F	86	LEU
12	F	279	ALA

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	304/371 (82%)	304 (100%)	0	100	100
2	C	319/352 (91%)	319 (100%)	0	100	100
3	H	192/210 (91%)	192 (100%)	0	100	100
4	J	168/191 (88%)	168 (100%)	0	100	100
5	K	191/221 (86%)	191 (100%)	0	100	100
6	L	152/211 (72%)	150 (99%)	2 (1%)	65	77
7	M	198/224 (88%)	198 (100%)	0	100	100
8	N	192/212 (91%)	192 (100%)	0	100	100
10	D	314/366 (86%)	314 (100%)	0	100	100
11	E	324/341 (95%)	324 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
12	F	315/379 (83%)	315 (100%)	0	100	100
13	B	284/385 (74%)	284 (100%)	0	100	100
14	P	187/203 (92%)	187 (100%)	0	100	100
15	c	240/359 (67%)	240 (100%)	0	100	100
All	All	3380/4025 (84%)	3378 (100%)	2 (0%)	92	95

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
6	L	146	GLN
6	L	215	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
8	N	110	HIS
12	F	367	GLN
10	D	175	GLN
14	P	13	ASN
3	H	193	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 9 ligands modelled in this entry, 3 are monoatomic - leaving 6 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
16	ADP	F	501	-	24,29,29	0.89	1 (4%)	29,45,45	1.27	3 (10%)
16	ADP	B	501	-	24,29,29	0.90	0	29,45,45	1.27	3 (10%)
17	ATP	C	501	18	28,33,33	0.67	0	34,52,52	0.77	2 (5%)
16	ADP	A	501	-	24,29,29	0.90	1 (4%)	29,45,45	1.42	5 (17%)
17	ATP	D	501	18	28,33,33	0.69	0	34,52,52	0.63	1 (2%)
16	ADP	E	401	-	24,29,29	0.91	0	29,45,45	1.24	2 (6%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
16	ADP	F	501	-	-	5/12/32/32	0/3/3/3
16	ADP	B	501	-	-	0/12/32/32	0/3/3/3
17	ATP	C	501	18	-	1/18/38/38	0/3/3/3
16	ADP	A	501	-	-	6/12/32/32	0/3/3/3
17	ATP	D	501	18	-	4/18/38/38	0/3/3/3
16	ADP	E	401	-	-	2/12/32/32	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
16	A	501	ADP	O4'-C1'	2.12	1.43	1.40
16	F	501	ADP	C2-N3	2.03	1.35	1.32

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
16	B	501	ADP	N3-C2-N1	-3.93	123.33	128.67
16	E	401	ADP	N3-C2-N1	-3.66	123.71	128.67
16	F	501	ADP	N3-C2-N1	-3.45	123.98	128.67

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
16	A	501	ADP	N3-C2-N1	-3.37	124.10	128.67
16	A	501	ADP	C4'-O4'-C1'	-3.15	107.04	109.92

There are no chirality outliers.

5 of 18 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
16	A	501	ADP	C5'-O5'-PA-O1A
16	A	501	ADP	O4'-C4'-C5'-O5'
16	A	501	ADP	C3'-C4'-C5'-O5'
16	F	501	ADP	C5'-O5'-PA-O2A
16	F	501	ADP	C5'-O5'-PA-O3A

There are no ring outliers.

6 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
16	F	501	ADP	3	0
16	B	501	ADP	6	0
17	C	501	ATP	4	0
16	A	501	ADP	3	0
17	D	501	ATP	7	0
16	E	401	ADP	3	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 ADP F 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP C 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP D 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP E 401

Bond lengths

Bond angles

Torsions

Rings
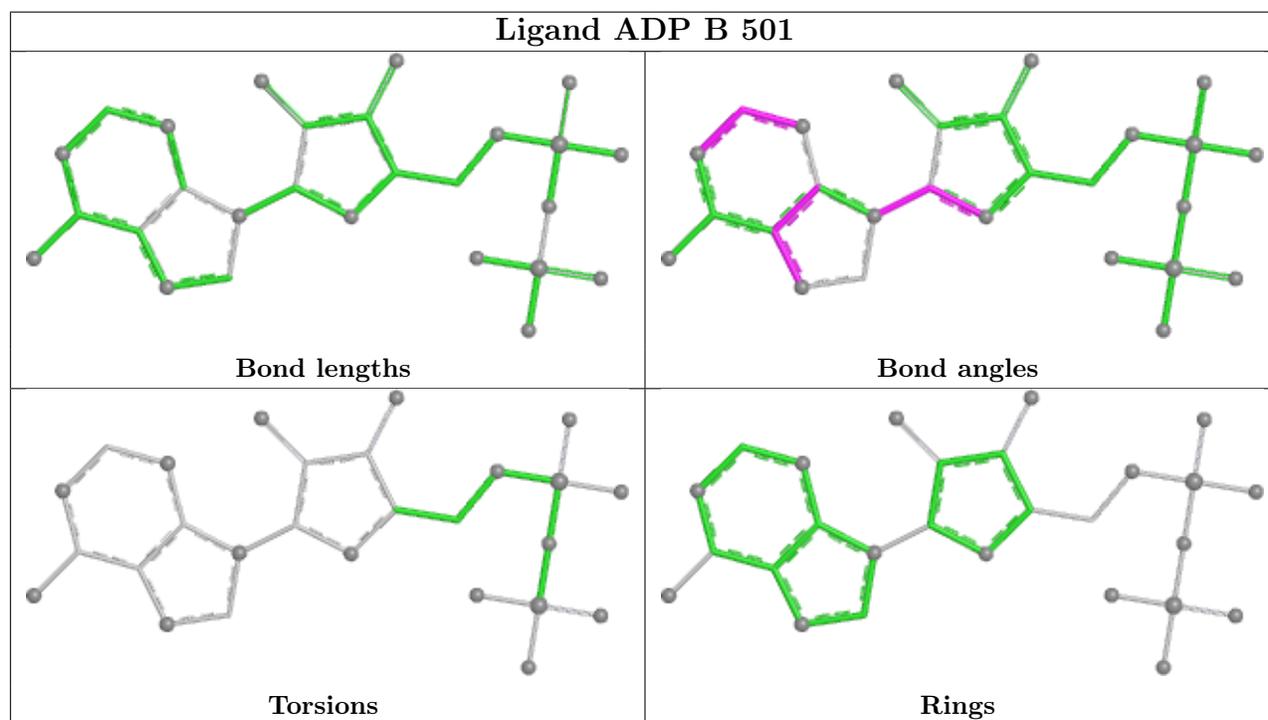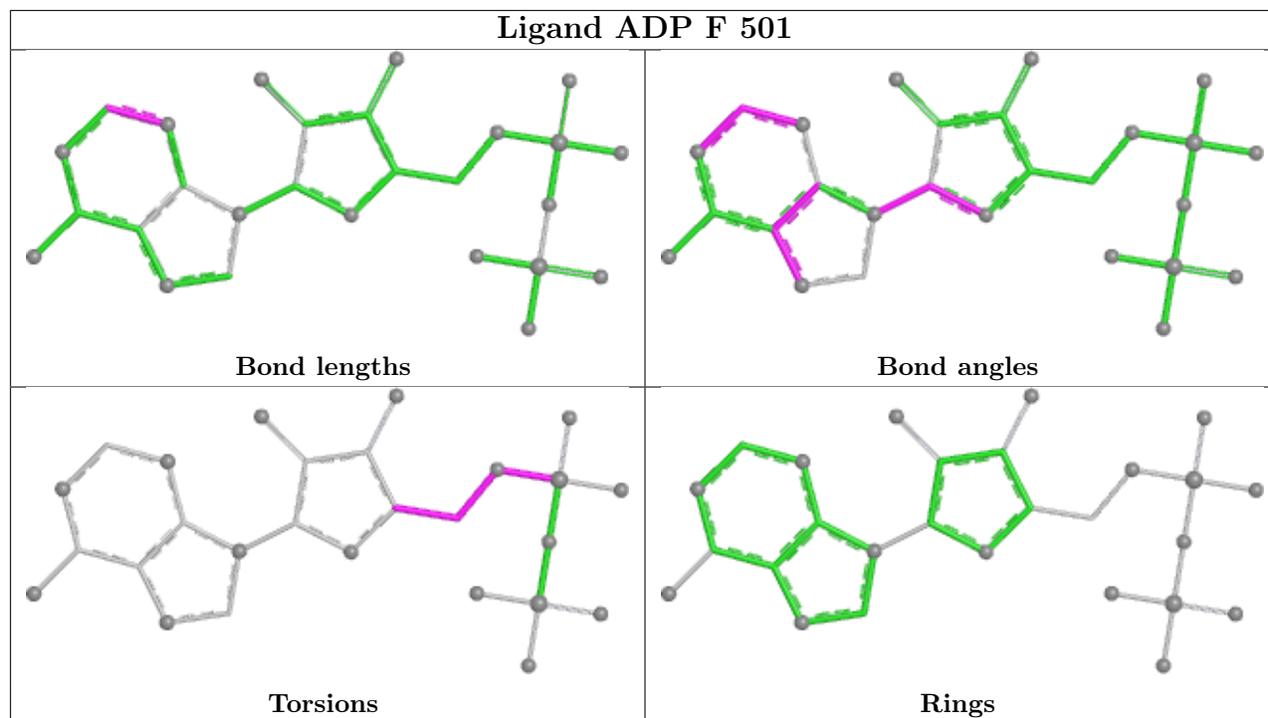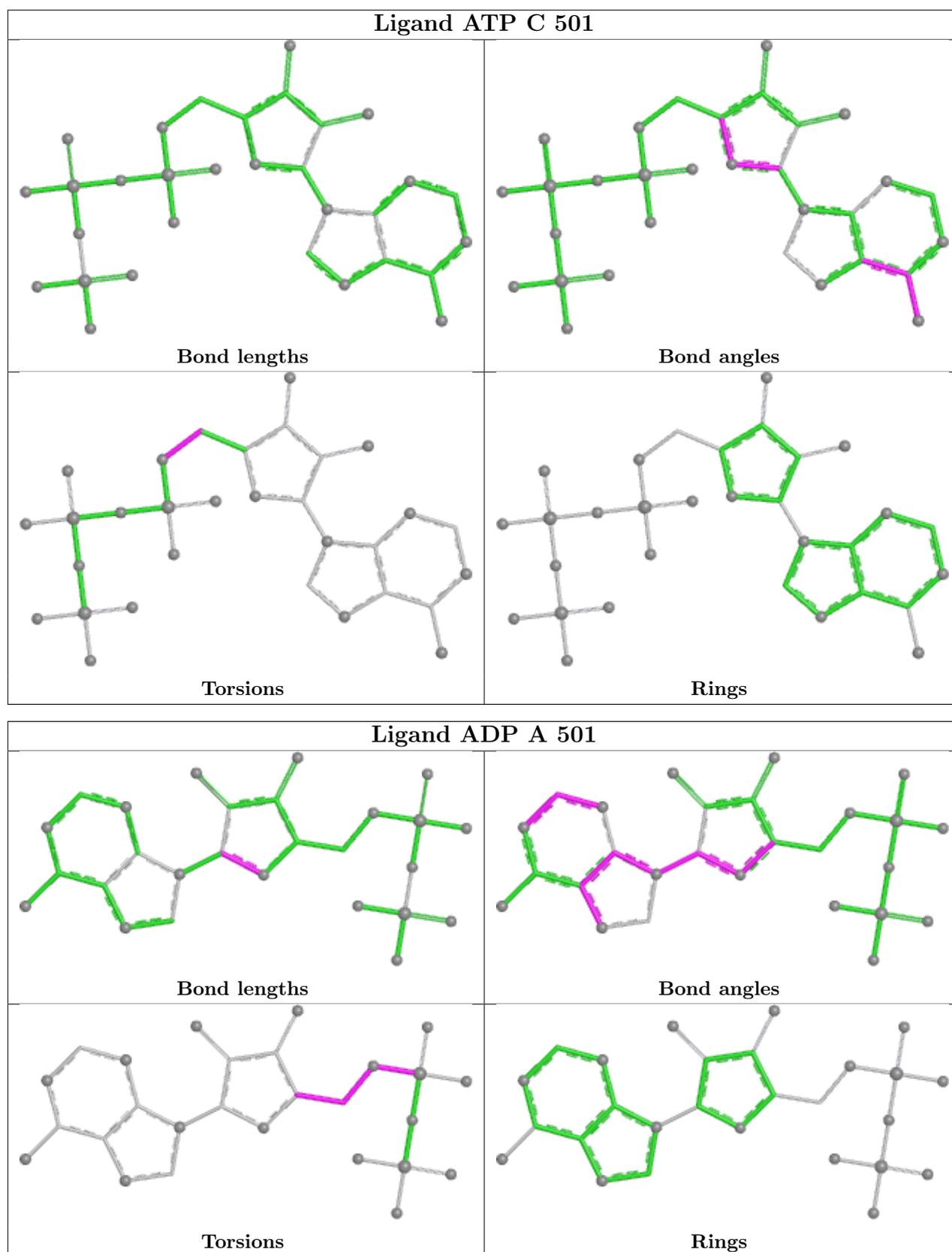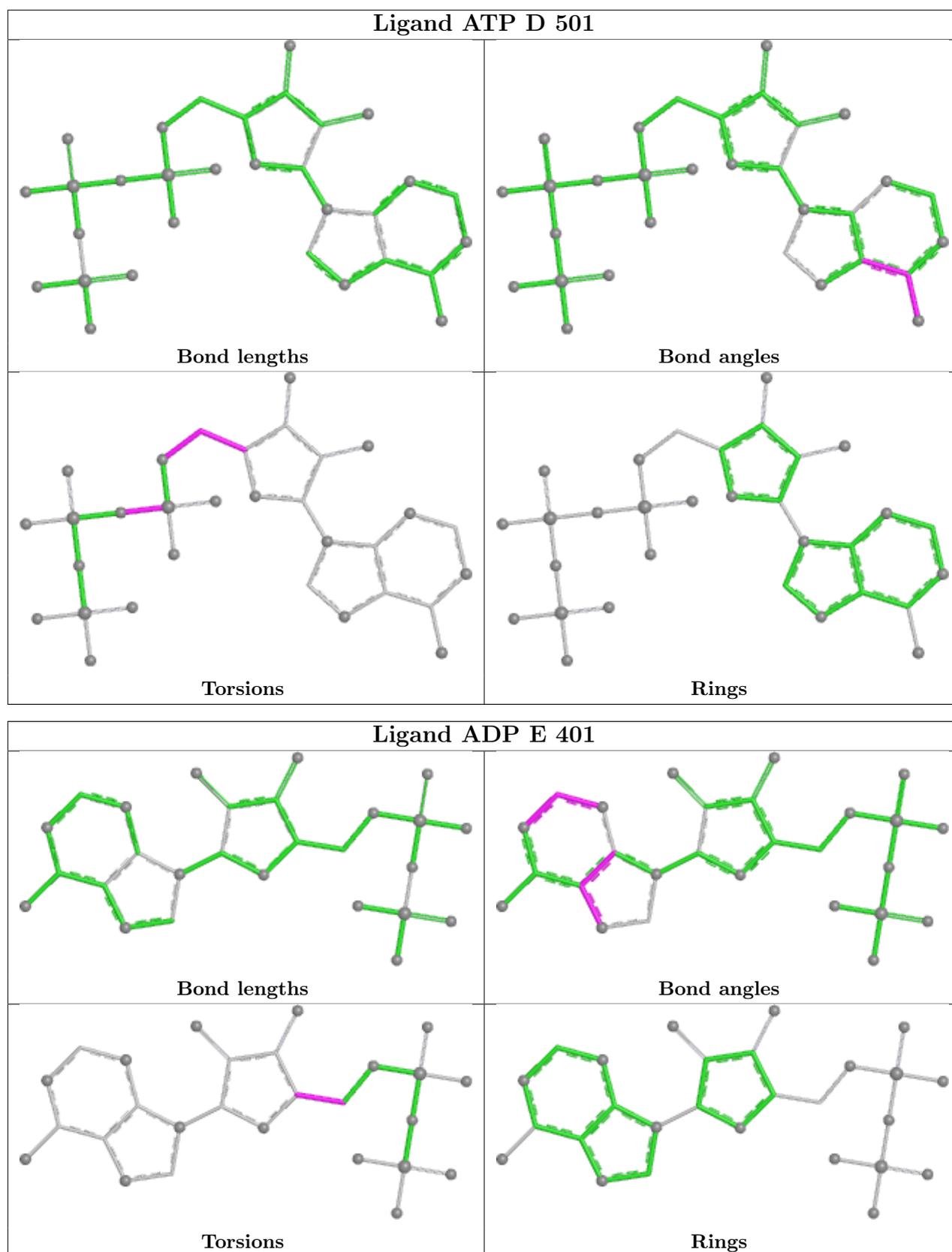
5.7　Other polymers　ⓘ

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-47723. 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 ⓘ
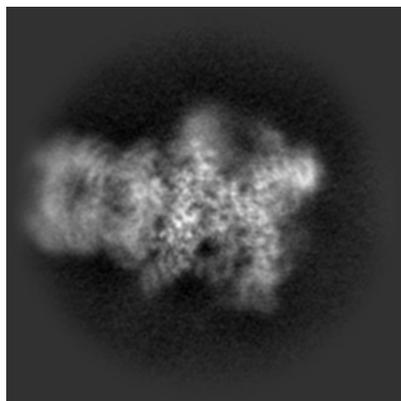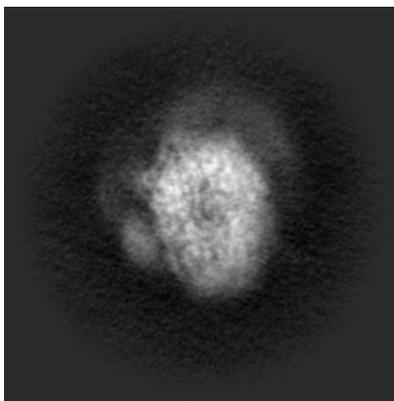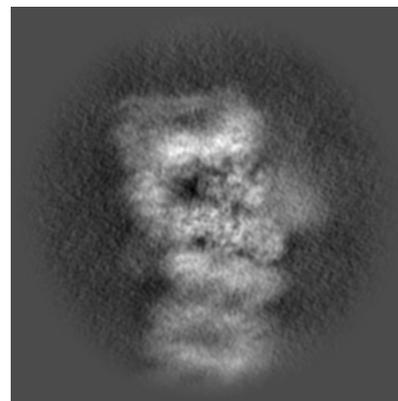
6.1.1   Primary map

X   Y   Z

6.1.2   Raw map

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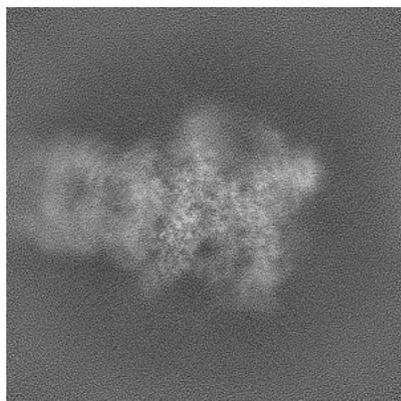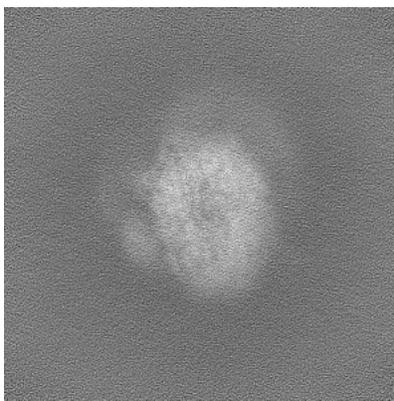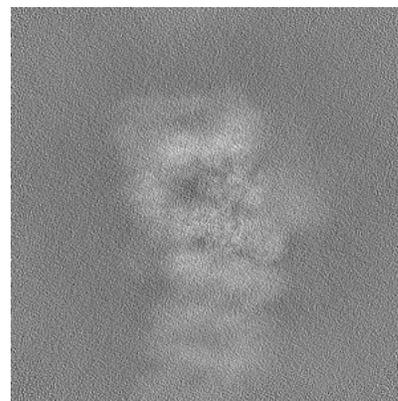
The images above show the map projected in three orthogonal directions.

6.2   Central slices   ⓘ
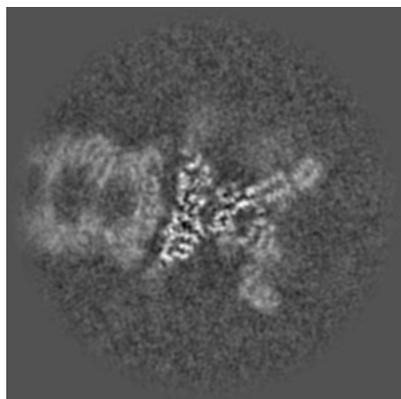
6.2.1   Primary map
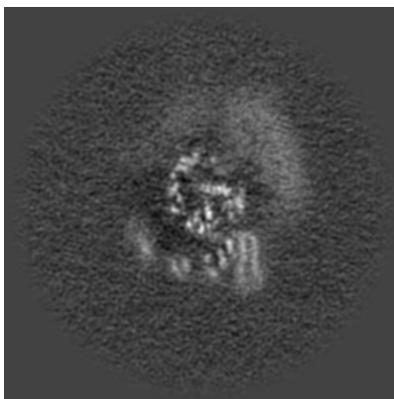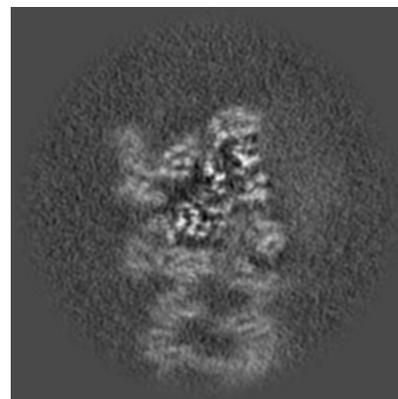
X Index: 170	Y Index: 170	Z Index: 170

6.2.2   Raw map
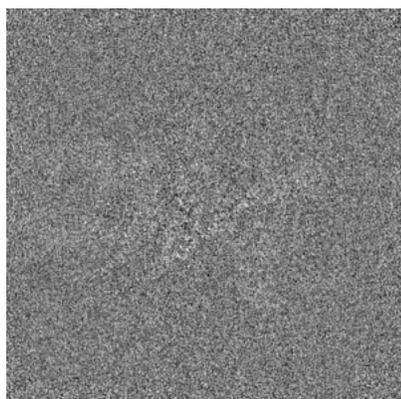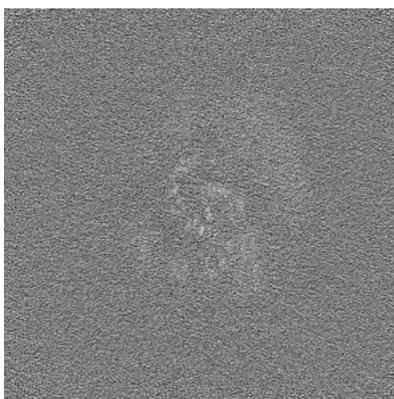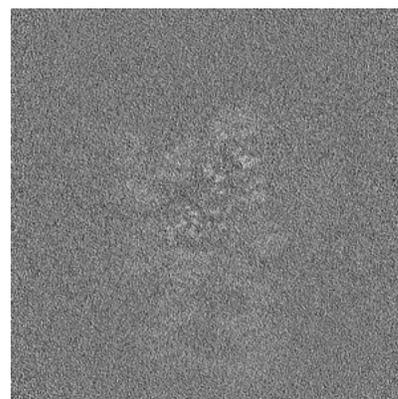
X Index: 170	Y Index: 170	Z Index: 170

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

6.3 Largest variance slices ⓘ
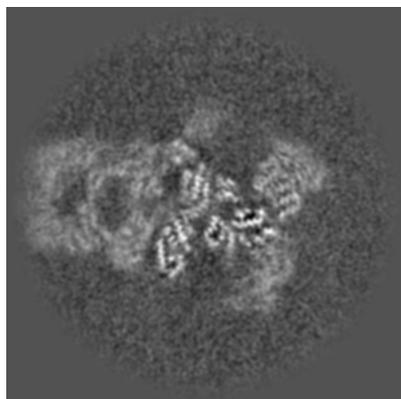
6.3.1 Primary map
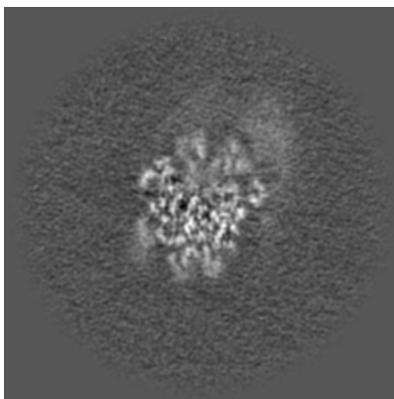
| X Index: 185 | Y Index: 152 | Z Index: 180 |
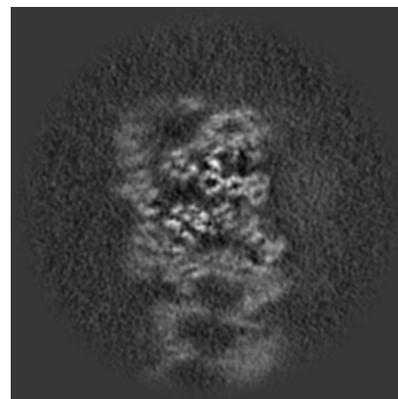
6.3.2 Raw map
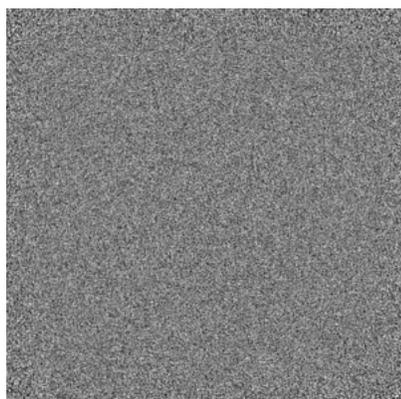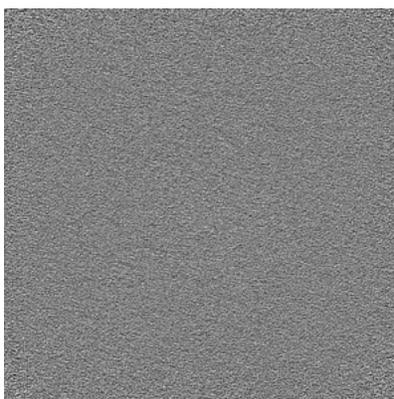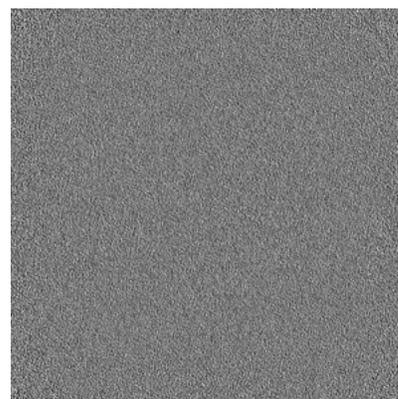
| X Index: 0 | Y Index: 0 | Z Index: 0 |

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
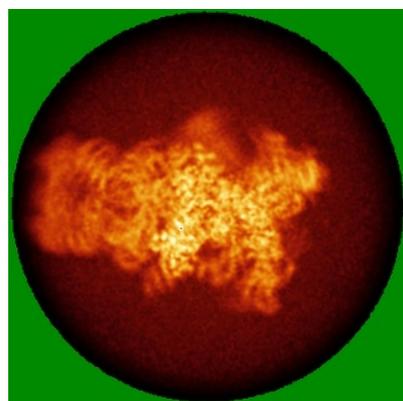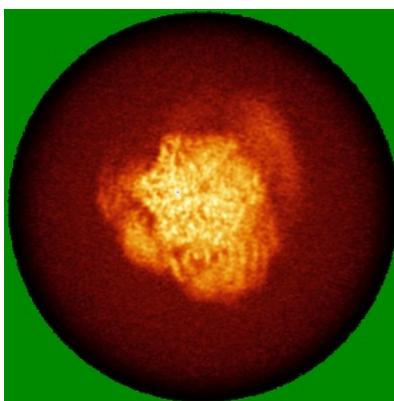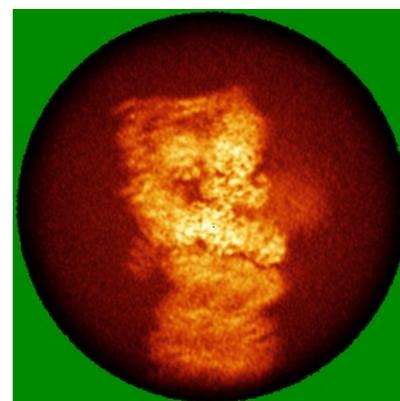
| X | Y | Z |

6.4.2 Raw map

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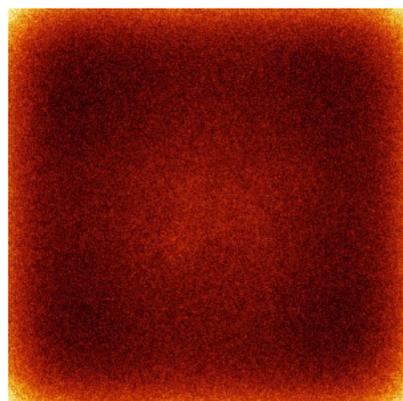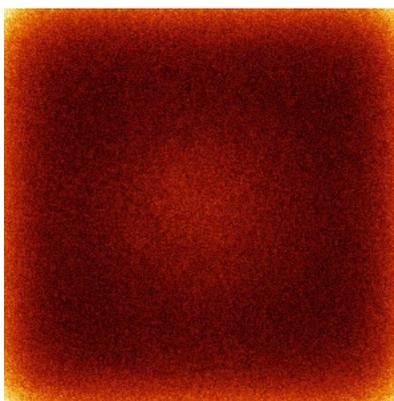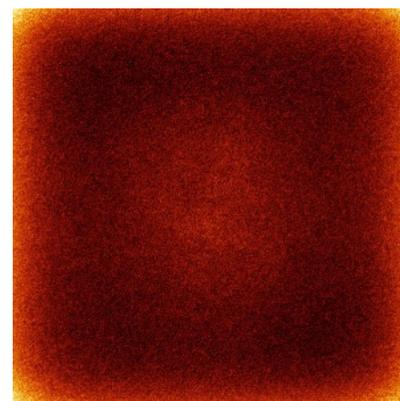
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

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 0.13. 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
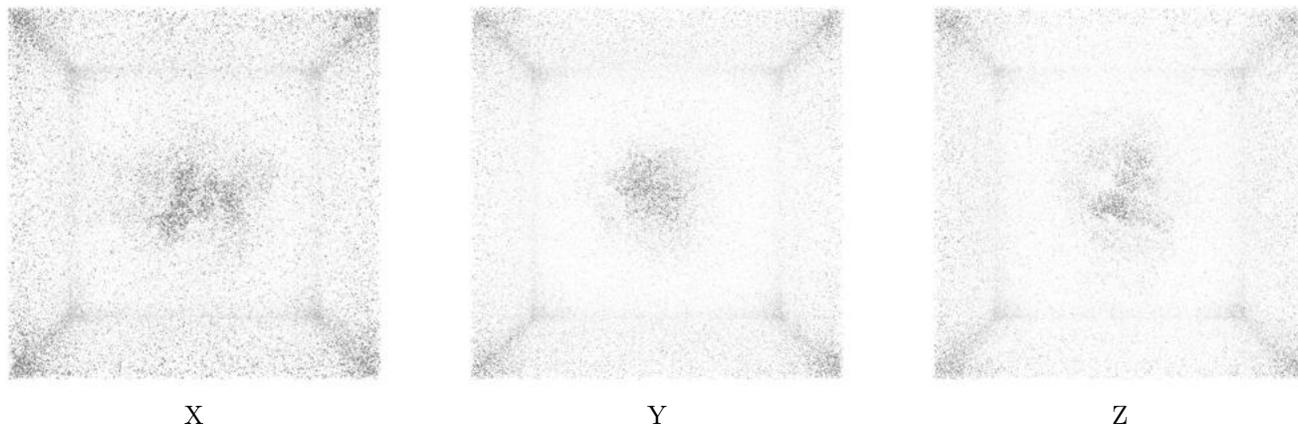
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

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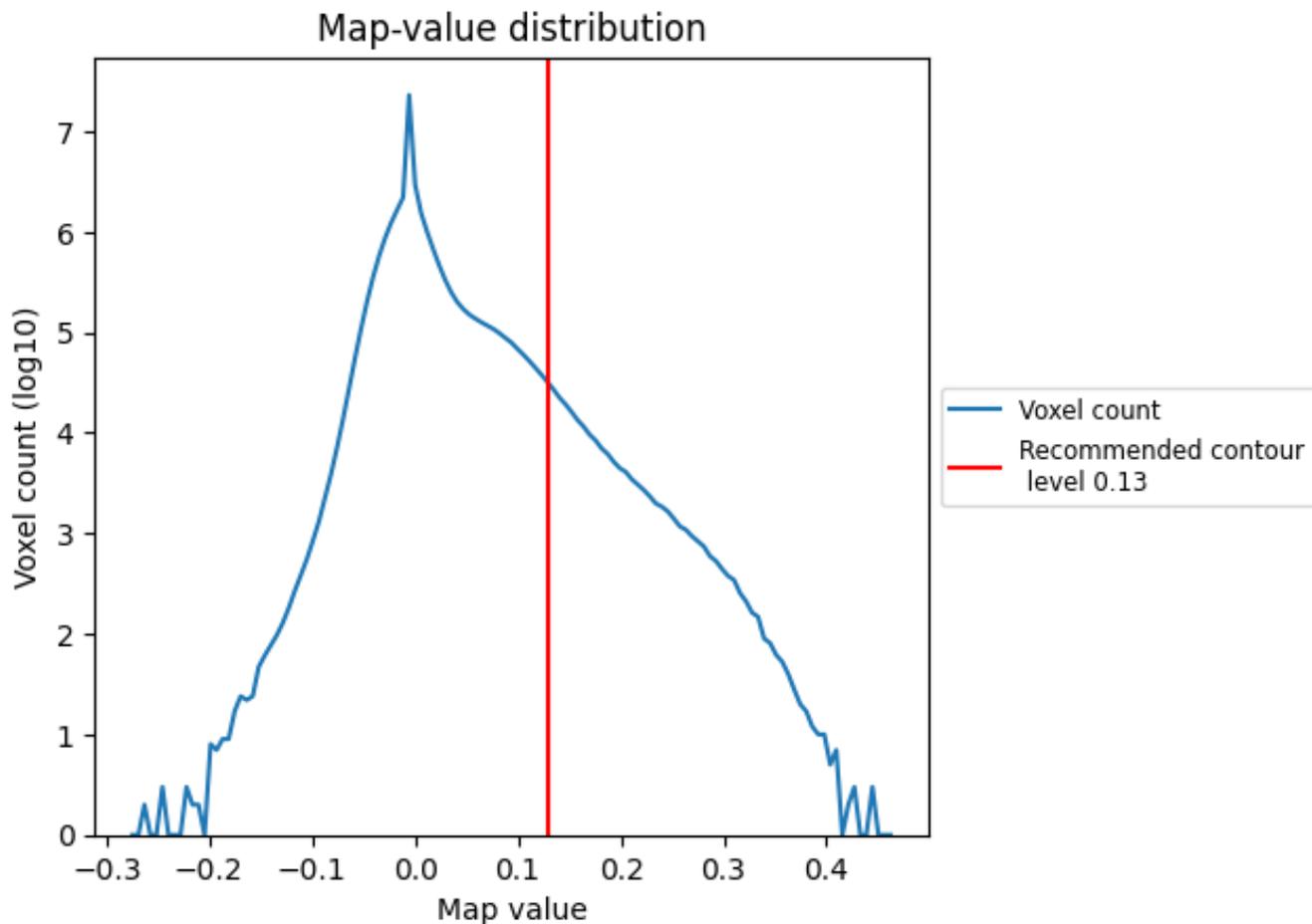
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2   Volume estimate (i)
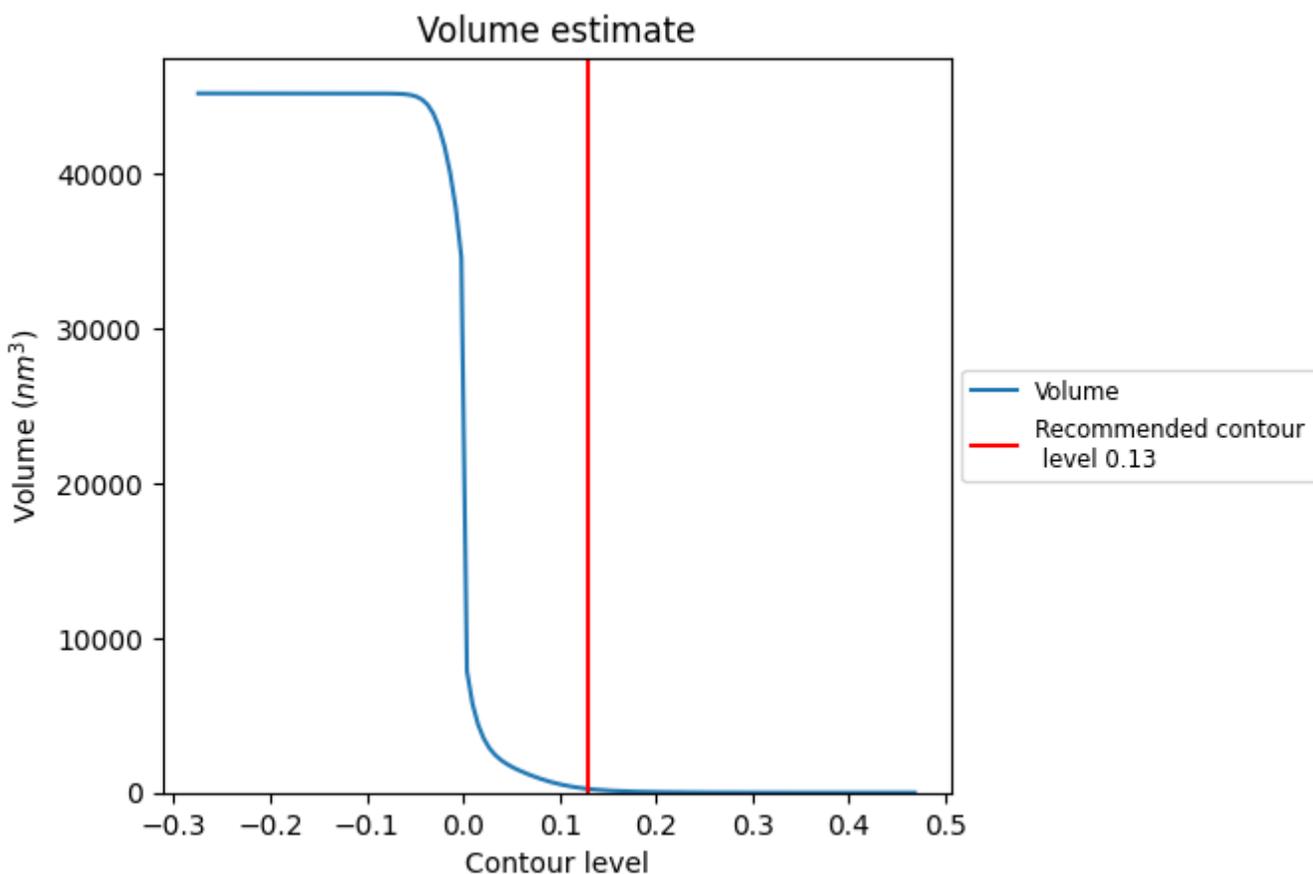
The volume at the recommended contour level is 239 nm^3; this corresponds to an approximate mass of 216 kDa.

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 ⓘ
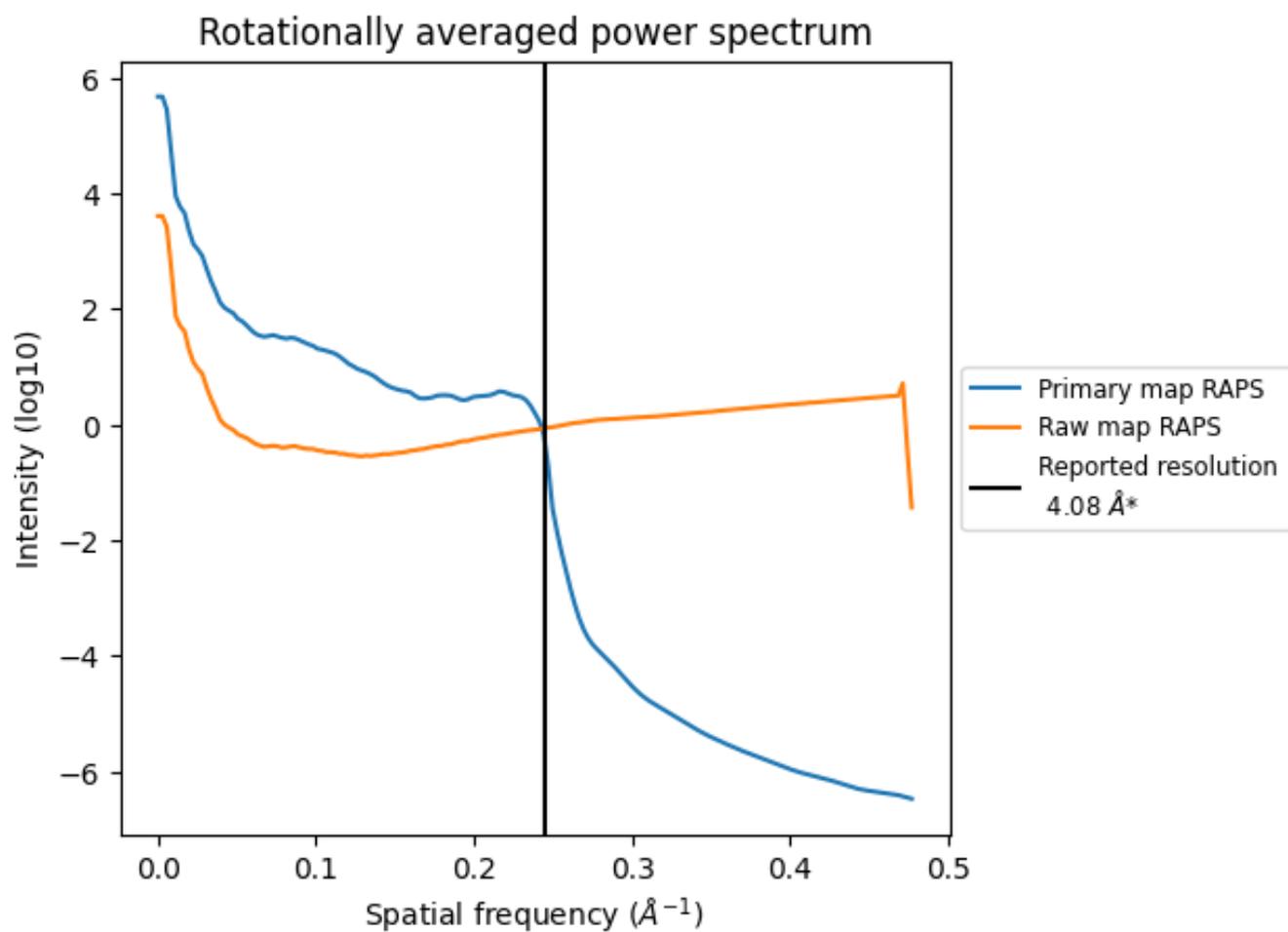
*Reported resolution corresponds to spatial frequency of 0.245 Å^{-1}

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 ⓘ
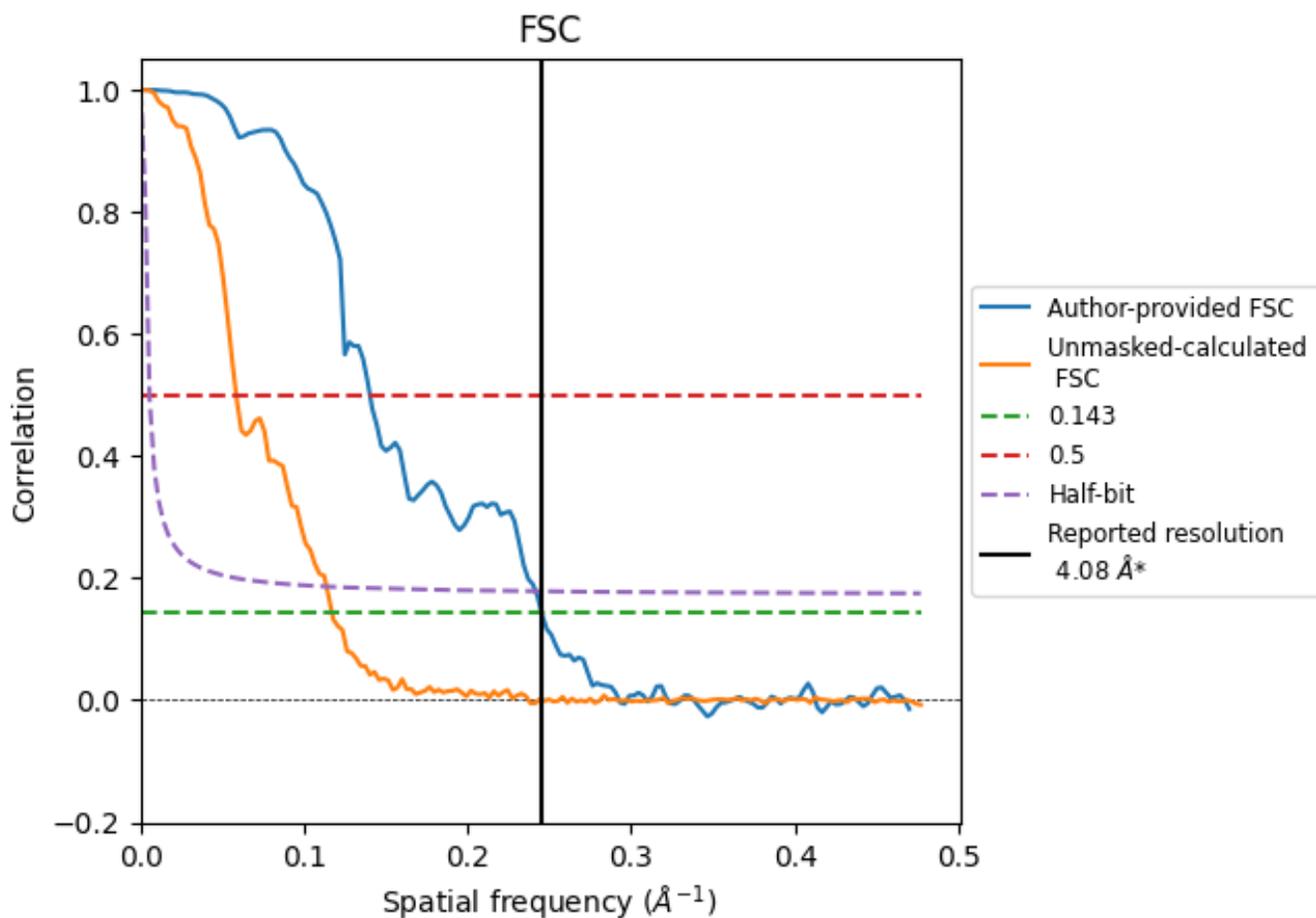
*Reported resolution corresponds to spatial frequency of 0.245 Å^{-1}

8.2   Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.08	-	-
Author-provided FSC curve	4.08	7.13	4.14
Unmasked-calculated*	8.54	17.06	8.80

*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 8.54 differs from the reported value 4.08 by more than 10 %

9   Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-47723 and PDB model 9E8K. Per-residue inclusion information can be found in section 3 on page 11.

## 9.1   Map-model overlay ⓘ

| X | Y | Z |
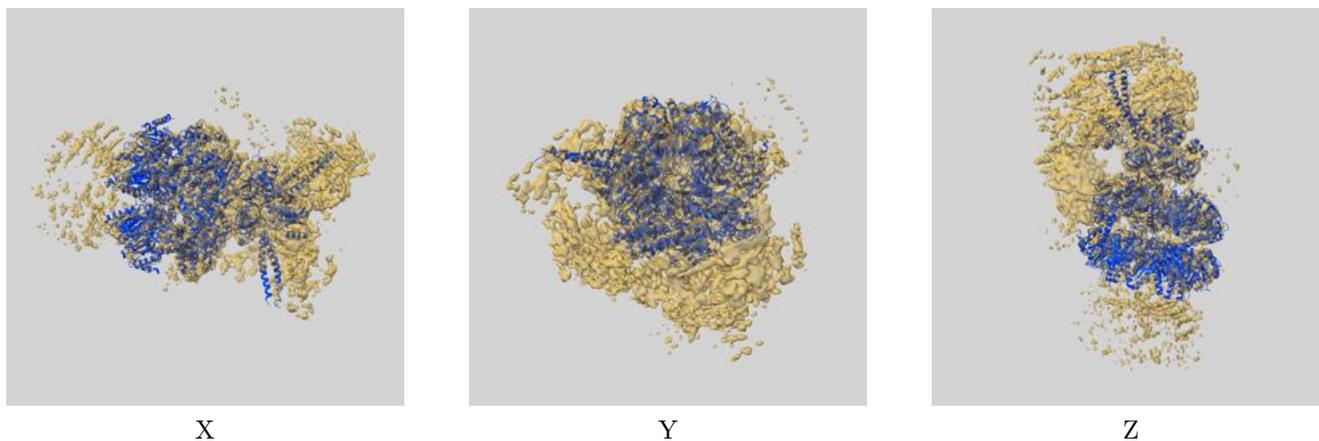
The images above show the 3D surface view of the map at the recommended contour level 0.13 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model ⓘ

X   Y   Z
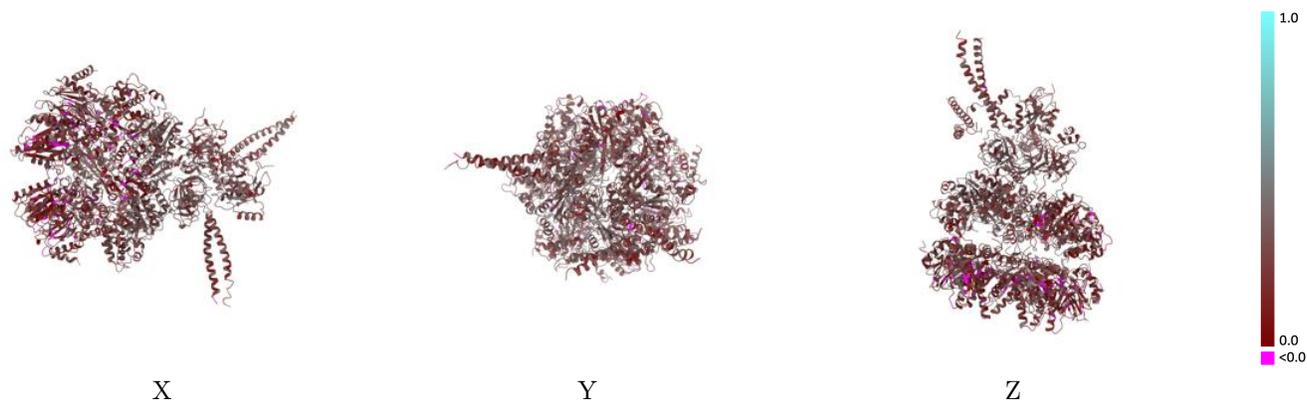
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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
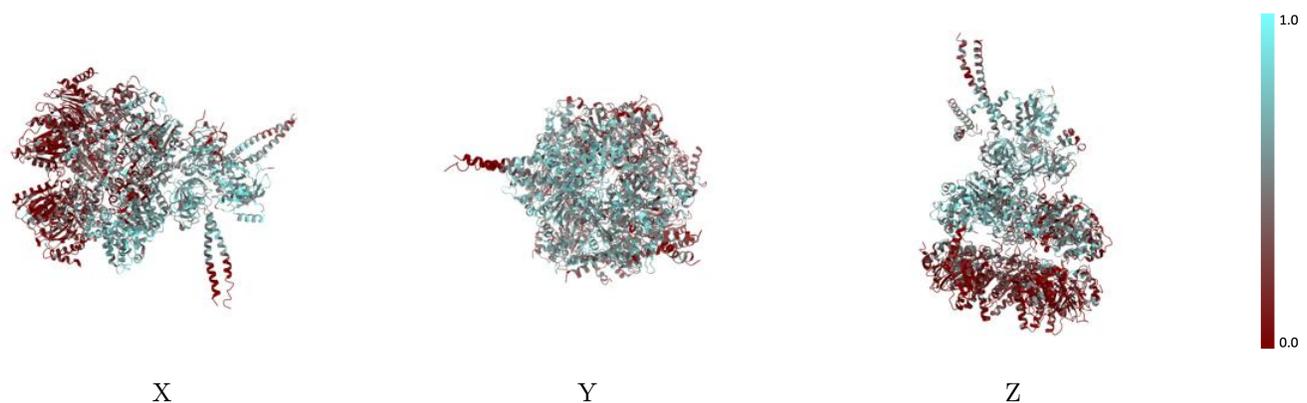
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.13).

9.4   Atom inclusion ⓘ
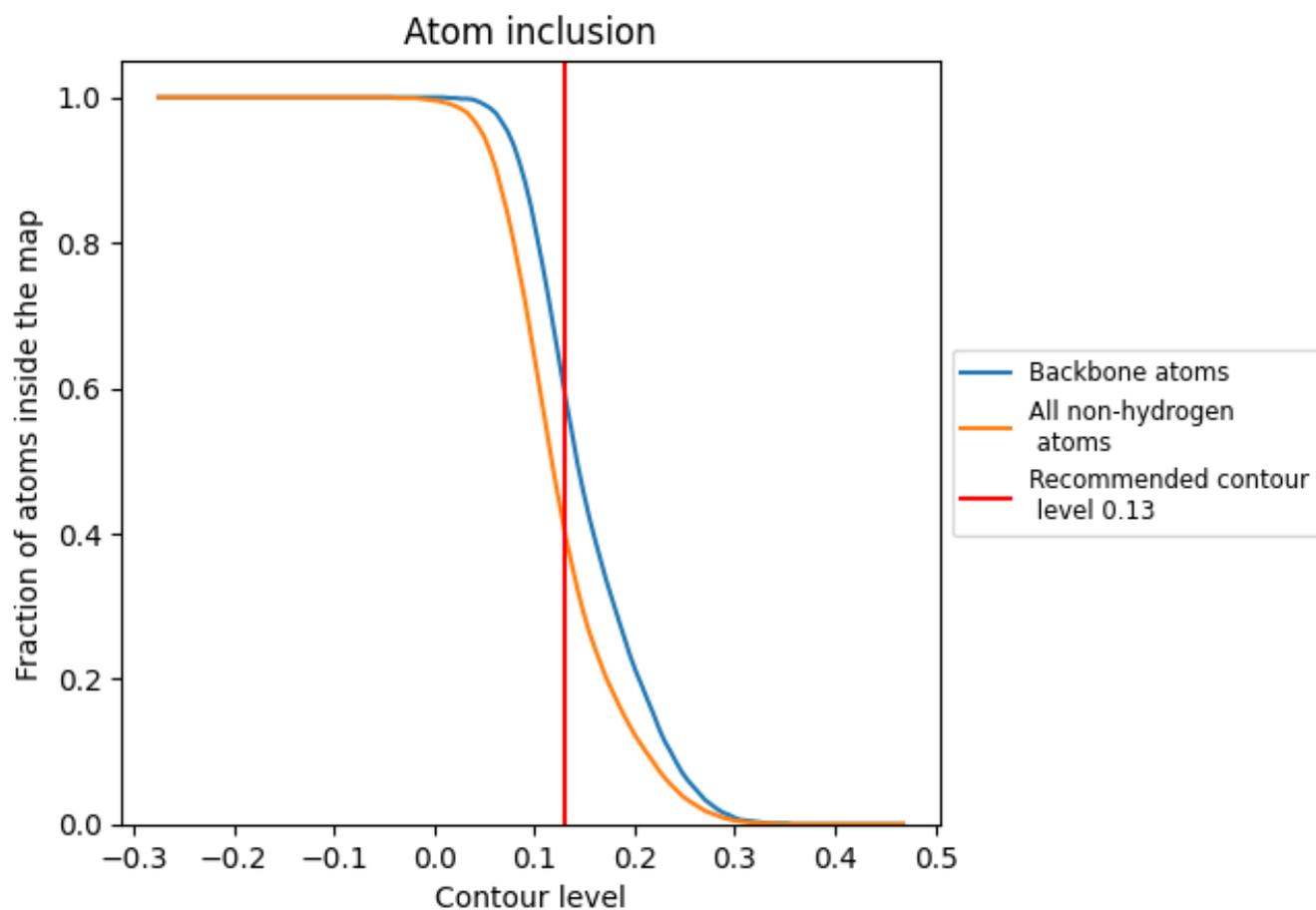
At the recommended contour level, 60% of all backbone atoms, 40% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.13) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.4040	0.2650
A	0.3790	0.2220
B	0.3860	0.2490
C	0.5750	0.2990
D	0.6040	0.3200
E	0.6140	0.3200
F	0.5800	0.2950
H	0.2670	0.2510
J	0.2770	0.2600
K	0.1810	0.2250
L	0.1820	0.2470
M	0.1650	0.1990
N	0.1650	0.2070
P	0.1940	0.2300
c	0.5990	0.3070
v	0.6500	0.4310

1.0

0.0
<0.0