wwPDB EM Validation Summary Report (i)

Mar 23, 2026 – 08:27 PM JST

PDB ID	:	22MM / pdb_000022mm
EMDB ID	:	EMD-68472
Title	:	Structure of human 26S proteasome complexed with midnolin(1-111+337-468)
Authors	:	Liang, L.; Zhu, C.; Qin, L.
Deposited on	:	2026-01-16
Resolution	:	3.42 Å(reported)

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

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

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

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

EMDB validation analysis	:	0.0.1.dev132
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48.1

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.42 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		14
Ramachandran outliers		0.5%
Sidechain outliers		0.5%

Worse   *Better*

▮ Percentile relative to all structures
⧠ Percentile relative to all EM structures

Metric	Model-Map Fit Percentile Ranks	Value
Q-score		0.445

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	13959 (2.92 - 3.92)

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	U	953	11% / 51% 37% · 11%
2	V	533	11% / 47% 43% · 10%
3	W	456	· / 44% 53% ··
4	X	422	· / 57% 32% 10%

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Mol	Chain	Length	Quality of chain
5	Y	389	54% · 43% ·
6	Z	324	47% · 40% · 12%
7	a	376	18% · 57% · 41% ··
8	c	309	10% · 54% · 38% · 7%
9	d	349	7% · 31% · 40% · 28%
10	e	70	11% · 29% · 27% · 43%
11	A	433	65% · 29% · 5%
12	B	440	66% · 26% · 8%
13	C	398	69% · 30% ··
14	D	418	62% · 28% · 9%
15	E	403	8% · 49% · 37% · 13%
16	F	439	50% · 32% · 18%
17	G	245	82% · 15% ·
17	g	245	79% · 19% ·
18	H	233	81% · 18% ·
18	h	233	82% · 17% ·
19	I	260	85% · 10% · 5%
19	i	260	80% · 15% ··
20	J	248	83% · 16%
21	K	241	85% · 10% · 5%
21	k	241	74% · 20% · 5%
22	L	268	75% · 13% · 11%
22	l	268	69% · 19% · 11%
23	M	254	79% · 15% · 6%
23	m	254	78% · 16% · 6%

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Mol	Chain	Length	Quality of chain
24	N	238	76% 7% 17%
24	n	238	72% 11% 17%
25	O	276	66% 13% 20%
25	o	276	69% 11% 20%
26	P	204	86% 14%
26	p	204	90% 10%
27	Q	201	89% 10%
27	q	201	91% 8%
28	R	262	68% 8% 23%
28	r	262	69% 7% 23%
29	S	240	82% 6% 11%
29	s	240	81% 8% 11%
30	T	263	70% 12% 18%
30	t	263	70% 12% 18%
31	j	247	75% 21%
32	f	445	8% 5% 87%
33	u	908	59% 33% 8%

2 Entry composition ⓘ

There are 38 unique types of molecules in this entry. The entry contains 103249 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 non-ATPase regulatory subunit 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	U	845	Total	C	N	O	S	0	0
			6595	4186	1120	1245	44		

- Molecule 2 is a protein called 26S proteasome non-ATPase regulatory subunit 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	V	480	Total	C	N	O	S	0	0
			3852	2444	684	710	14		

- Molecule 3 is a protein called 26S proteasome non-ATPase regulatory subunit 12.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	W	452	Total	C	N	O	S	0	0
			3667	2314	631	697	25		

- Molecule 4 is a protein called 26S proteasome non-ATPase regulatory subunit 11.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	X	380	Total	C	N	O	S	0	0
			3009	1918	509	570	12		

- Molecule 5 is a protein called 26S proteasome non-ATPase regulatory subunit 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	Y	378	Total	C	N	O	S	0	0
			3115	1987	533	578	17		

- Molecule 6 is a protein called 26S proteasome non-ATPase regulatory subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	Z	286	Total	C	N	O	S	0	0
			2281	1457	392	427	5		

- Molecule 7 is a protein called 26S proteasome non-ATPase regulatory subunit 13.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	a	373	Total	C	N	O	S	0	0
			2995	1911	510	559	15		

- Molecule 8 is a protein called 26S proteasome non-ATPase regulatory subunit 14.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	c	287	Total	C	N	O	S	0	0
			2260	1430	389	422	19		

- Molecule 9 is a protein called 26S proteasome non-ATPase regulatory subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	d	253	Total	C	N	O	S	0	0
			2078	1348	340	381	9		

- Molecule 10 is a protein called 26S proteasome complex subunit SEM1.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	e	40	Total	C	N	O	S	0	0
			334	200	55	77	2		

- Molecule 11 is a protein called 26S proteasome regulatory subunit 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	A	413	Total	C	N	O	S	0	0
			3229	2034	566	611	18		

- Molecule 12 is a protein called 26S proteasome regulatory subunit 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	B	405	Total	C	N	O	S	0	0
			3162	1994	538	615	15		

- Molecule 13 is a protein called 26S proteasome regulatory subunit 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	C	396	Total	C	N	O	S	0	0
			3105	1954	558	576	17		

- Molecule 14 is a protein called 26S proteasome regulatory subunit 6B.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	D	380	Total 3040	C 1923	N 524	O 580	S 13	0	0

- Molecule 15 is a protein called Proteasome 26S subunit, ATPase 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	E	352	Total 2786	C 1750	N 496	O 524	S 16	0	0

- Molecule 16 is a protein called 26S proteasome regulatory subunit 6A.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	F	362	Total 2834	C 1789	N 489	O 540	S 16	0	0

- Molecule 17 is a protein called Proteasome subunit alpha type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	G	237	Total 1809	C 1151	N 302	O 343	S 13	0	0
17	g	240	Total 1830	C 1163	N 306	O 348	S 13	0	0

- Molecule 18 is a protein called Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	H	231	Total 1726	C 1097	N 293	O 331	S 5	0	0
18	h	232	Total 1727	C 1096	N 292	O 334	S 5	0	0

- Molecule 19 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	I	248	Total 1895	C 1195	N 324	O 368	S 8	0	0
19	i	250	Total 1912	C 1204	N 329	O 371	S 8	0	0

- Molecule 20 is a protein called Proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	J	247	Total 1844	C 1148	N 331	O 360	S 5	0	0

- Molecule 21 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	K	230	Total 1746	C 1096	N 286	O 353	S 11	0	0
21	k	228	Total 1722	C 1080	N 284	O 348	S 10	0	0

- Molecule 22 is a protein called Isoform Long of Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	L	238	Total 1850	C 1159	N 334	O 346	S 11	0	0
22	l	238	Total 1850	C 1159	N 334	O 346	S 11	0	0

- Molecule 23 is a protein called Proteasome subunit alpha type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	M	240	Total 1856	C 1178	N 314	O 353	S 11	0	0
23	m	240	Total 1862	C 1181	N 317	O 353	S 11	0	0

- Molecule 24 is a protein called Proteasome subunit beta type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	N	197	Total 1482	C 928	N 253	O 289	S 12	0	0
24	n	197	Total 1482	C 928	N 253	O 289	S 12	0	0

- Molecule 25 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	O	220	Total 1643	C 1033	N 280	O 318	S 12	0	0
25	o	220	Total 1643	C 1033	N 280	O 318	S 12	0	0

- Molecule 26 is a protein called Proteasome subunit beta type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	P	204	Total	C	N	O	S	0	0
			1591	1013	265	294	19		
26	p	204	Total	C	N	O	S	0	0
			1591	1013	265	294	19		

- Molecule 27 is a protein called Proteasome subunit beta type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	Q	199	Total	C	N	O	S	0	0
			1570	1006	265	290	9		
27	q	199	Total	C	N	O	S	0	0
			1574	1009	266	290	9		

- Molecule 28 is a protein called Proteasome subunit beta type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	R	201	Total	C	N	O	S	0	0
			1548	974	273	292	9		
28	r	201	Total	C	N	O	S	0	0
			1548	974	273	292	9		

- Molecule 29 is a protein called Proteasome subunit beta type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	S	213	Total	C	N	O	S	0	0
			1641	1036	282	313	10		
29	s	213	Total	C	N	O	S	0	0
			1641	1036	282	313	10		

- Molecule 30 is a protein called Proteasome subunit beta type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	T	215	Total	C	N	O	S	0	0
			1667	1052	285	318	12		
30	t	215	Total	C	N	O	S	0	0
			1673	1055	288	318	12		

- Molecule 31 is a protein called Proteasome subunit alpha type-7.

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

- Molecule 32 is a protein called Midnolin,MCHERRY,fusion tag.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	f	57	Total 453	C 266	N 108	O 76	S 3	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
f	469	SER	-	linker	UNP Q504T8
f	470	ARG	-	linker	UNP Q504T8
f	471	GLU	-	linker	UNP Q504T8
f	472	ASN	-	linker	UNP Q504T8
f	473	LEU	-	linker	UNP Q504T8
f	474	TYR	-	linker	UNP Q504T8
f	475	PHE	-	linker	UNP Q504T8
f	476	GLN	-	linker	UNP Q504T8
f	477	GLY	-	linker	UNP Q504T8
f	478	ALA	-	linker	UNP Q504T8

- Molecule 33 is a protein called 26S proteasome non-ATPase regulatory subunit 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	u	832	Total 6439	C 4072	N 1090	O 1232	S 45	0	0

- Molecule 34 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 35 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).

ATP
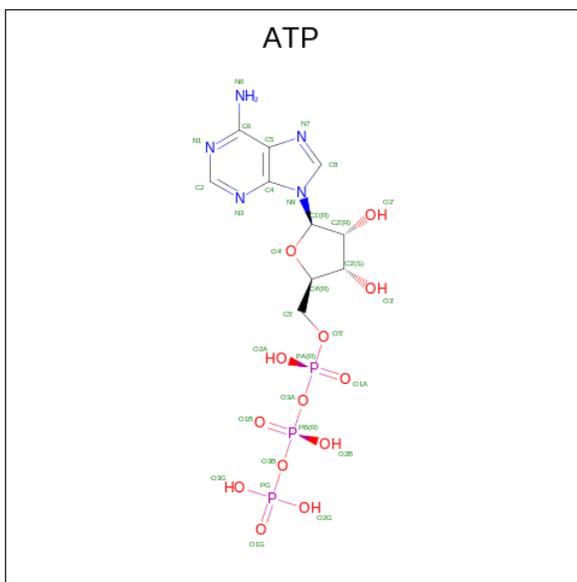
Mol	Chain	Residues	Atoms					AltConf
35	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
35	B	1	Total	C	N	O	P	0
			31	10	5	13	3	
35	C	1	Total	C	N	O	P	0
			31	10	5	13	3	
35	F	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 36 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

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

- Molecule 37 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).

ADP

Mol	Chain	Residues	Atoms						AltConf
37	D	1	Total	C	N	O	P		0
			27	10	5	10	2		
37	E	1	Total	C	N	O	P		0
			27	10	5	10	2		

- Molecule 38 is N-[(benzyloxy)carbonyl]-L-leucyl-N-[(2S)-4-methyl-1-oxopentan-2-yl]-L -leucinamide (CCD ID: LDZ) (formula: $C_{26}H_{41}N_3O_5$) (labeled as "Ligand of Interest" by depositor).

LDZ

Mol	Chain	Residues	Atoms				AltConf
38	N	1	Total	C	N	O	0
			34	26	3	5	

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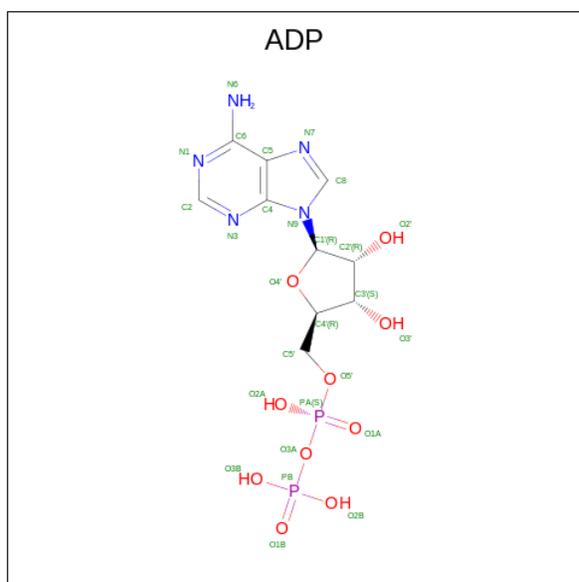
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Mol	Chain	Residues	Atoms				AltConf
38	O	1	Total	C	N	O	0
			34	26	3	5	
38	R	1	Total	C	N	O	0
			34	26	3	5	
38	n	1	Total	C	N	O	0
			34	26	3	5	
38	o	1	Total	C	N	O	0
			34	26	3	5	
38	r	1	Total	C	N	O	0
			34	26	3	5	

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 non-ATPase regulatory subunit 1
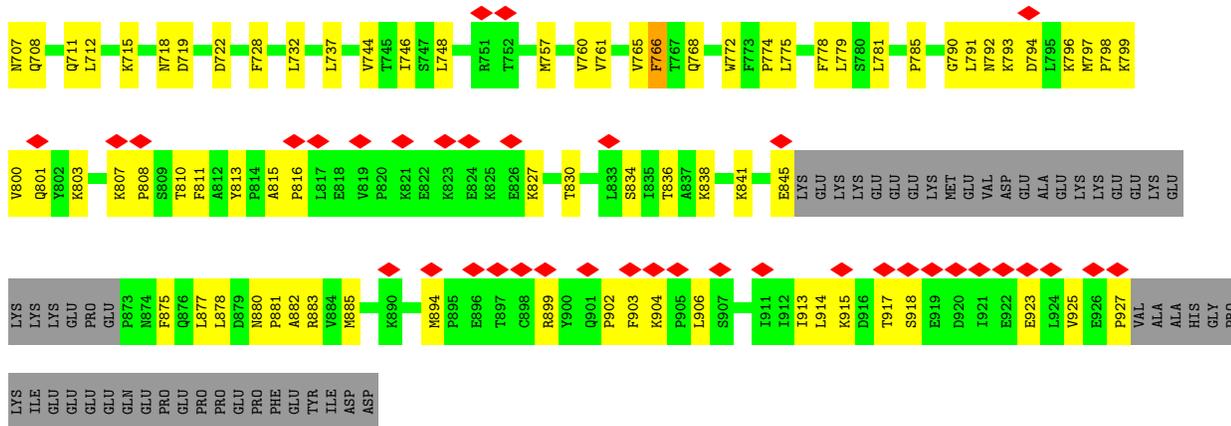
• Molecule 2: 26S proteasome non-ATPase regulatory subunit 3

Chain V:
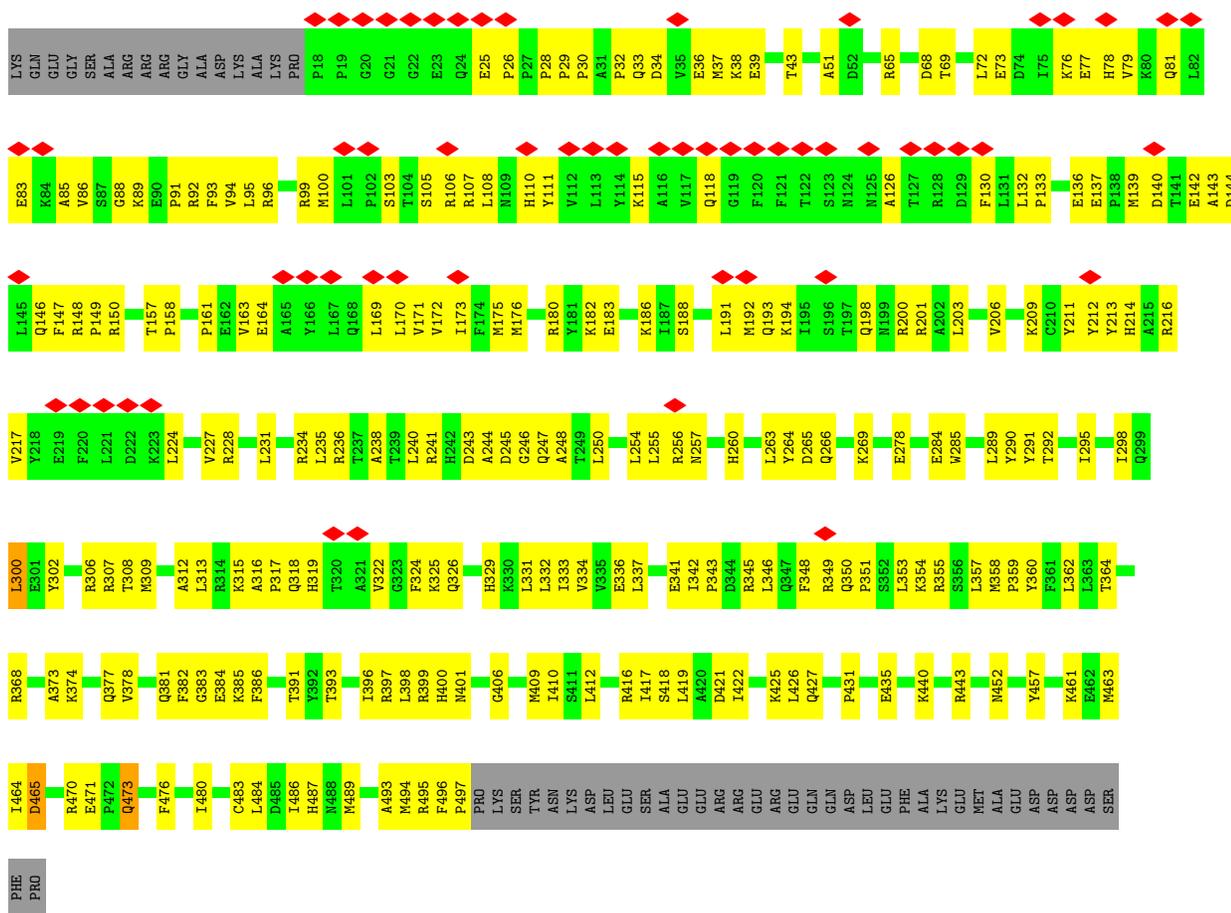
• Molecule 3: 26S proteasome non-ATPase regulatory subunit 12

Chain W:

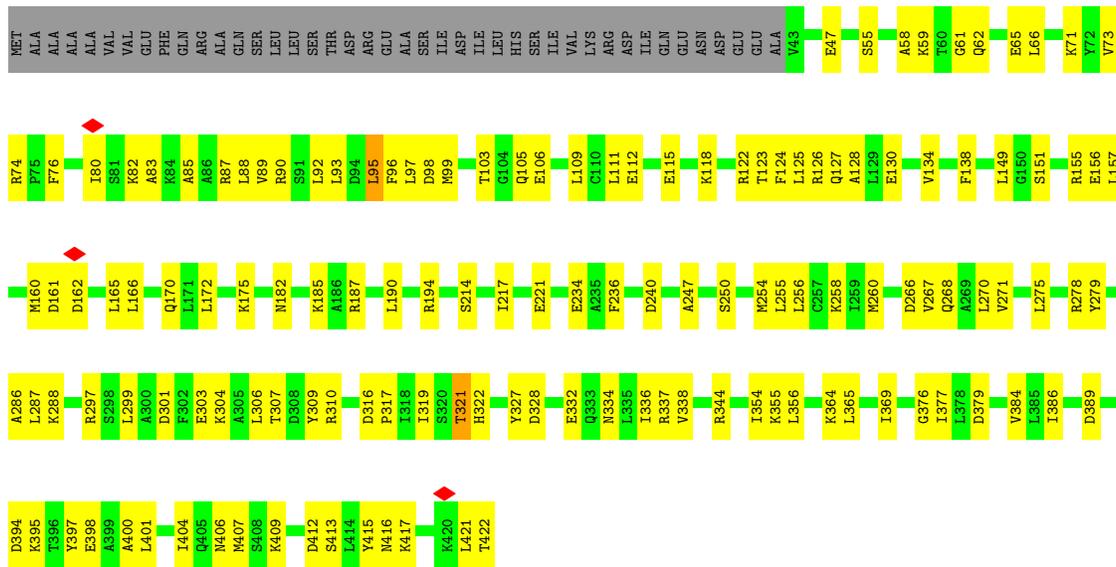- Molecule 4: 26S proteasome non-ATPase regulatory subunit 11

Chain X:

- Molecule 5: 26S proteasome non-ATPase regulatory subunit 6

Chain Y:

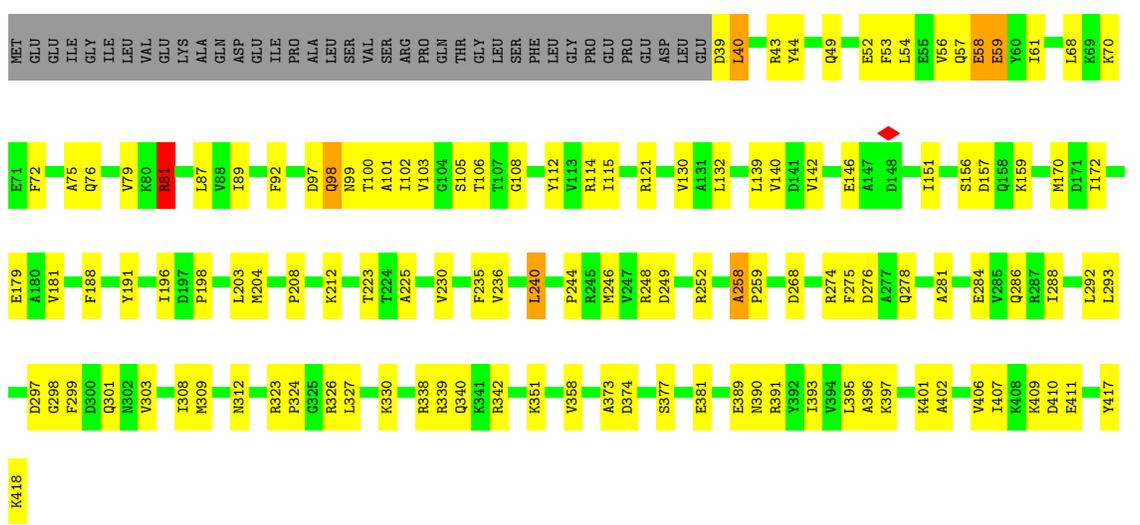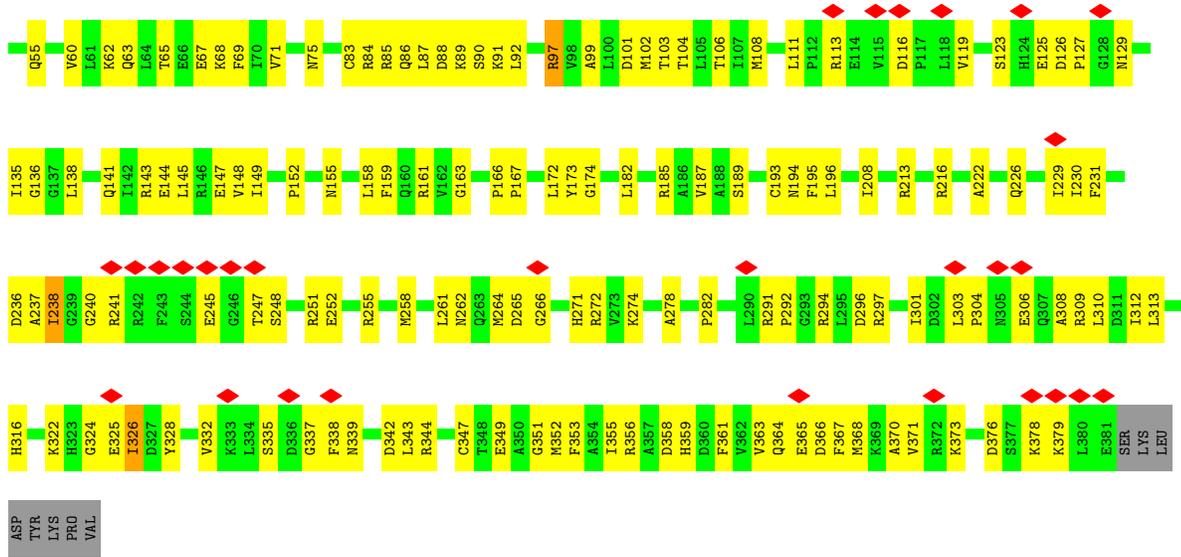• Molecule 6: 26S proteasome non-ATPase regulatory subunit 7

Chain Z: 47%   40%   • 12%

• Molecule 7: 26S proteasome non-ATPase regulatory subunit 13

Chain a: 18%   57%   41%   ••

D137 V138 E139 E140 M141 L142 L145 P146 G147 V151 R154 F155 Y156 D157 K161 Y162 Y163 I166 G167 N168 S171 Y172 R178 G181 I185 K186 D187 L188 P189 V190 S191 E192 Q193 Q194 E195 R196 A197 F198 T199 E208 F211 G214 E215 L216 L217 L222 E223

S224 L225 R226 N227 R230 Q231 W232 L233 T236 L237 V245 E246 R247 F248 Q249 T250 L251 W255 Q258 P259 Q267 L268 L269 I272 L275 C276 L277 M278 E279 M280 T281 R284 P285 A286 N287 H288 R289 Q290 L291 T292 F293 E294 E295 I296 A297 K298 K301 I302 T303 V304

N305 E306 V307 E308 L309 L310 V311 M312 L315 S316 V320 K321 I324 D325 E326 V327 R330 V331 H332 M333 T334 W335 P338 R339 V340 L341 D342 L343 Q344 Q345 I346 K347 G348 M349 K350 E354 S362 M363 E364 M365 L366 H372 D373 I374 L375 T376

• Molecule 8: 26S proteasome non-ATPase regulatory subunit 14

Chain c:

ASP ARG LEU LEU ARG LEU GLY GLY MET PRO GLY LEU GLY GLN PRO PRO THR ASP ALA PRO A24 V25 D26 E29 Q30 V31 Y32 M41 L42 K43 P50 M51 M54 G55 L56 M57 F61 R68 V69 V72 M75 E85 D88 F91 Q92 A93 K94

M95 L96 D97 K100 R104 P105 E106 M107 V108 V109 G110 W111 Y112 F118 G119 C120 W121 L122 S123 G124 V125 D126 I127 N128 T129 A135 E138 R139 A140 V145 D146 V151 K152 G153 K154 V155 V156 I157 R161 L162 I163 N164 A165 N166 M167 M168 V169 H172 E173 P174

T177 H183 L184 N185 K186 P187 Q190 A191 L192 I193 L196 N197 R198 H199 Y200 Y201 S202 I203 T204 R208 K209 N210 E211 L212 E213 Q214 K215 M216 L217 L218 N219 L220 H221 K222 K223 S224 W225 L229 Q232 D233 Y234 S235 E236 H237 C238 E242 S243 V244 V245 K246 E247 M248 L249

E250 L251 N254 K257 A258 V259 E262 D263 K264 M265 T266 P267 E268 Q269 L270 A271 I272 K273 G276 K277 Q278 D279 P280 K281 R282 H283 L284 E285 E286 D289 V290 L291 M292 T293 V297 Q298 C299 L300 M303 F309 K310

• Molecule 9: 26S proteasome non-ATPase regulatory subunit 8

Chain d:

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

ARG LYS MET ALA ALA ALA VAL ASN GLY ALA ALA GLY PHE SER SER GLY PRO ALA ALA THR SER GLY ALA VAL LEU GLN ALA ALA THR GLY M1 Q4 E8 W9 N10 R11 K12 P14 N15 L16 S17 K18 C19 G20 E21 E22 L23 L26 V29 L30 L31 E32

L33 N34 F35 L36 P37 T38 T39 G40 T41 K42 L43 T44 K45 Q46 Q47 L48 R52 D53 I57 G58 A59 Q60 W61 S62 I63 L64 R65 I68 P69 M75 K79 C80 F83 K86 L89 P90 E91 S92 A93 Y94 M95 H96 Q97 L98 F105 L106 L107 S108 Q109 N110 R111

V112 A113 E114 T117 E118 R121 L122 K125 D126 I127 Q128 T129 N130 V131 Y132 I133 K134 H135 L139 Y142 L143 M144 S147 Y148 N149 K150 L153 A154 K155 G156 N157 I158 P159 A160 E161 S162 Y163 T164 F165 D168 L169 L170 L171 D172 T173 I174 R175 I178 A179 G180 C181

I182 E183 K184 A185 Y186 E187 K188 I189 L190 F191 T192 E193 A194 T195 R196 I197 L198 F199 F200 N201 T202 P203 K204 K205 M206 T207 D208 Y209 A210 K211 K212 R213 G214 W215 V216 L217 G218 P219 N220 N221 Y222 Y223 S224 F225 A226 S227 Q228 Q229 GLN LYS PRO GLU D234 T235 T236 I237 P238 S239 T240 E241

L242 A243 K244 Q245 V246 L253 V257

- Molecule 10: 26S proteasome complex subunit SEM1

11%

Chain e: 29%   27% • 43%

M1 S2 E3 K4 K5 Q6 P7 V8 D9 LEU GLY LEU LEU GLU GLU ASP ASP PHE GLU GLU PHE PRO ALA GLU ASP TRP ALA GLY LEU ASP GLU ASP GLU ASP ALA HIS VAL TRP E40 D41 N42 W43 D44 D45 D46 N47 V48 E49 F52 S53 N54 Q55 L56 R57 A58 E59 L60 E61

K62 E68 T69 S70

- Molecule 11: 26S proteasome regulatory subunit 7

Chain A: 65%   29% • 5%

MET PRO ASP TYR LEU GLY ALA ASP GLN ARG LYS THR LYS GLU ASP GLU LYS ASP LYS P21 I22 R23 A24 L25 D26 E27 G28 D29 I30 A31 L32 L33 K34 T35 Y36 Y41 S42 R43 Q44 I45 K46 Q47 V48 E49 D50 L55 L56 K57 K58 I59 G64 I65 K66 E67 S68 D69

T70 G71 P74 L77 L80 K84 Q85 T86 L87 Q88 Q91 P92 V95 T99 K100 I101 S106 E107 D108 P109 K110 I113 N114 V115 K116 Q117 F118 A119 K120 F121 V122 L125 S126 D127 Q128 V129 M138 R139 V142 I149 K156 I157 D158 V161

M164 Q165 V166 E167 E168 Y174 L187 R188 E189 V190 V191 E192 E199 V202 I206 L213 P218 G219 T220 R232 T233 D234 I238 R239 V240 I241 K248 G251 E252 R255 M256 V257 R258 E259 L260 F261 E262 R265 T266 K267 K268 A269 F274 A289 G290

G291 D292 N293 E294 R297 L300 I303 N304 F309 R312 I315 K316 V317 L318 M319 R323 P324 D325 T326 L327 L337 F343 S344 L345 P346 D347 R351 S361 P378 R398 A399 R400 R401 I417 Y420 A421 K422 F423 S424 A425 T426 P427 R428 Y429

M433

- Molecule 12: 26S proteasome regulatory subunit 4

Chain B: 66%   26%   8%

MET GLY GLN SER GLN SER GLY GLY HIS GLY PRO GLY GLY GLY LYS LYS ASP ASP LYS ASP LYS LYS LYS LYS TYR GLU PRO PRO VAL PRO THR ARG VAL GLY LYS K36 K37 K38 K39 T40 K41 A46 S47 K48 L49 V52 L60 R67 I68 K69 D70 Y71 L72 L73 M74

F78 I79 R80 N81 Q82 M85 V99 R103 G104 T105 P106 M107 L112 E113 E114 I115 D118 N119 H120 A121 I122 V123 S124 T125 S126 V127 G128 S129 E130 H131 Y132 I135 L144 E145 L151 V156 V159 I160 G161 V162 L163 M164 D165 D166 L170 V173 E177

K178 A179 G189 Q193 I194 Q195 E196 I197 K198 E202 L203 P204 L205 V222 I223 G231 L234 S244 I256 Q257 K258 F271 E275 I287 D288 A289 R294 Y295 G301 I305 Q306 R307 T308 M309 L316 D317 D320 S321 R322 V325 K326 V327 I328

M329 R343 P344 G345 R346 I347 D348 R349 K350 T360 K361 K362 Q366 S370 R371 L380 D381 D382 L383 I384 D388 D389 A397 E401 M405 A406 L407 R408 E409 R410 K421 S422 K423 E424 N425 V426 L427 Y428 K429 L440

● Molecule 13: 26S proteasome regulatory subunit 8

Chain C:

69%　　　　　30%

MET GLU L11 E12 E13 G14 K15 A16 G17 S18 R21 Y24 L25 S26 K27 I28 E29 E30 L31 Q32 L33 I34 D37 K38 S39 Q40 N41 L42 R43 R44 L45 Q46 A47 N50 E51 L52 N53 A54 K55 V56 R57 L58 L59 R60 L63 Q64 L65 L66 Q67 R78 A79 M80 K83

V89 H90 P91 V96 V97 D98 V99 D100 K101 T109 R113 L116 D119 S120 Y121 T122 L123 N129 K130 V131 D132 V135 M138 M139 V140 E141 P144 K156 E160 I161 K162 E163 L178 G179 P183 V186 Y189 T197 H205 S215 G216

S217 Q221 K222 F223 T224 G225 E226 G227 A228 R229 M230 V231 R232 E233 V236 E240 H241 A242 P243 M248 I251 D252 S253 I254 G255 S256 G262 R271 L280 D281 K290 V291 I292 T295 N296 R297 R307 R310 R313 E316 R340 N343 K346

L350 G367 R372 R375 V376 H377 Q380 E381 D382 F383 E384 K389 K406

● Molecule 14: 26S proteasome regulatory subunit 6B

Chain D:

62%　　　　　28%　　　　　9%

MET GLU GLU ILE GLY ILE LEU VAL GLU LYS ALA GLN ASP GLU ILE PRO ALA LEU SER VAL SER ARG PRO GLN THR GLY LEU SER PHE LEU GLY PRO GLU GLU ASP LEU GLU D39 L40 R43 Y44 Q49 E52 F53 L54 E55 V56 Q57 E58 E59 Y60 I61 L68 K69 K70

E71 F72 A75 Q76 V79 K80 R81 L87 V88 I89 F92 D97 Q98 N99 T100 A101 I102 V103 G104 S105 T106 T107 G108 Y112 V113 R114 I115 R121 V130 A131 L132 L139 V140 D141 V142 E146 A147 D148 I151 S156 D157 G158 K159 M170 D171 I172

E179 A180 V181 F188 Y191 I196 D197 P198 L203 M204 P208 K212 T223 T224 A225 V230 F235 V236 L240 P244 R245 M246 V247 R248 D249 R252 A258 P259 D268 R274 F275 D276 A277 Q278 A281 E284 V285 Q286 R287 I288 L292 L293

D297 C298 F299 D300 Q301 N302 V303 I308 M309 N312 R323 P324 G325 L327 K330 R338 R339 Q340 K341 R342 K351 V358 A373 D374 S377 E381 E389 N390 R391 Y392 I393 V394 L395 A396 K397 K401 A402 V406 I407 K408 K409 D410 E411 Y417

K418

● Molecule 15: Proteasome 26S subunit, ATPase 6

8%

Chain E:

49%　　　　　37%　　　　　13%

MET ALA ILE PRO GLY ILE PRO TYR GLU ARG ARG LEU LEU LEU ILE MET ALA ASP PRO ASP LYS LEU GLN ASP TYR ARG LYS LYS LEU LEU GLU HIS LYS GLU LEU ASP GLY ARG LEU LYS GLU LEU R30 E31 Q32 E35 K38 Q39 Y40 E41 N45 D46 L47 K48 A49 L50

• Molecule 16: 26S proteasome regulatory subunit 6A

• Molecule 17: Proteasome subunit alpha type-6

V151 G158 A165 L179 V220 E244 ARG ASP

• Molecule 17: Proteasome subunit alpha type-6

Chain g:

79%　　　19%

SER ARG GLY S5 S6 R11 H12 I13 E19 G20 R21 L22 Y23 Q24 V25 E26 A48 D58 T67 H68 L69 F70 K71 I72 T73 E74 C78 V79 M80 R88 R95 Y96 E97 R117 T126 M138 I139 L140 I141 V151 G158 C161 G162 K171

E174 K185 F191 E192 T200 T204 V205 L206 S207 I208 K211 P212 S213 V219 V220 T221 N224 P225 K226 E244 ARG ASP

• Molecule 18: Proteasome subunit alpha type-2

Chain H:

81%　　　18%

ALA GLU R4 L10 L19 V20 Q21 V29 I38 K39 E59 V75 Y76 S77 G78 N79 R84 V85 L86 R91 K92 L93 P106 T107 A108 Q109 L110 V111 Q112 R113 M118 Q119 S133 L134 L135 I136 C137 G138 Q148 P151 W158 L174 N179 E180

L184 E185 I188 H189 T190 T204 E205 D206 N214 A231 A232 I233 A234

• Molecule 18: Proteasome subunit alpha type-2

Chain h:

82%　　　17%

ALA E3 R4 G5 Y6 S7 F8 S9 T12 V29 P34 K39 E49 K50 K51 T69 K70 L74 V75 R84 V87 Q95 V111 M118 Q119 T122 G125 R128 S133 L134 L135 I136 Y145 L146 F147 K171 N179 E180 D181 L182 E183

L184 I188 F199 M203 D228 A231 A232 I233 A234

• Molecule 19: Proteasome subunit alpha type-4

Chain I:

85%　　　10%　5%

SER ARG R4 L18 Y19 E22 N40 D41 L44 F61 L68 C74 S81 C107 E108 D116 Q119 D151 P152 S153 C163 I164 G165 N166 M174 E181 G182 L190 K199 E209 E232 K238 K239 K251 LYS GLU LYS GLU GLN

LYS GLU LYS ASP LYS

• Molecule 19: Proteasome subunit alpha type-4

Chain i:

80%　　　15%

• Molecule 20: Proteasome subunit alpha type-7

Chain J:

• Molecule 21: Proteasome subunit alpha type-5

Chain K:

• Molecule 21: Proteasome subunit alpha type-5

Chain k:

• Molecule 22: Isoform Long of Proteasome subunit alpha type-1

Chain L:

• Molecule 22: Isoform Long of Proteasome subunit alpha type-1

Chain l:

• Molecule 23: Proteasome subunit alpha type-3

Chain M:

• Molecule 23: Proteasome subunit alpha type-3

Chain m:

• Molecule 24: Proteasome subunit beta type-6

Chain N:

• Molecule 24: Proteasome subunit beta type-6

Chain n:

I127 Y134 D140 R444 E151 L160 M164 E165 R166 I179 A180 E181 V184 F197 ALA VAL ALA THR LEU PRO PRO ALA

• Molecule 25: Proteasome subunit beta type-7

Chain O:

66% 13% 20%

ALA ALA VAL SER VAL TYR ALA PRO PRO VAL GLY GLY PHE SER PHE ASP ASN CYS ARG ARG ASN ALA VAL LEU GLU ALA ASP PHE ALA LYS ARG GLY TYR LEU PRO LYS VAL ARG LYS THR GLY T1 T2 V7 D10 G11 I12 T18 R19 K33 I34 H35 N40

C43 T56 L68 L73 T78 M82 L98 L110 K121 V125 M135 A136 V155 I159 G162 I163 F164 N165 D166 L167 G168 S169 G170 S171 N172 I173 T190 N193 R198 R201 E220 ILE GLU VAL LEU GLU GLU THR VAL GLN THR MET

ASP THR SER

• Molecule 25: Proteasome subunit beta type-7

Chain o:

69% 11% 20%

ALA ALA VAL SER VAL TYR ALA PRO PRO VAL GLY GLY PHE SER PHE ASP ASN CYS ARG ARG ASN ALA VAL LEU GLU ALA ASP PHE ALA LYS ARG GLY TYR LEU PRO LYS VAL ARG LYS THR GLY T1 D17 T18 R19 H35 F36 I37 T48 A49 A50 T56 E64

Q91 A97 L110 I113 T119 V125 T126 M127 R143 E150 I163 L167 G168 S169 G170 S179 K180 T190 V191 P192 N193 K194 K195 L199 E220 ILE GLU VAL LEU GLU GLU THR VAL GLN THR MET ASP THR SER

• Molecule 26: Proteasome subunit beta type-3

Chain P:

86% 14%

S2 M12 A13 M14 V20 V35 T36 L53 T58 D59 V60 R66 R70 E106 D125 C129 D134 D135 V137 W154 E155 P156 D159 P160 D161 F164 E165 S168 M171 R177 I190 R203 M204 D205

• Molecule 26: Proteasome subunit beta type-3

Chain p:

90% 10%

S2 M12 K15 I22 M34 R48 D59 Q65 Y85 Y104 P107 K115 P119 L124 D135 V138 C142 M146 H188 I189 I190 E191 R203 M204 D205

• Molecule 27: Proteasome subunit beta type-2

Chain Q:

89% 10% •

M1 E2 R19 Q27 D30 D31 K34 E49 A50 N101 M118 L121 L124 H132 L140 E154 R161 K162 E165 R170 F196 P197 K198 Q199 GLY SER

• Molecule 27: Proteasome subunit beta type-2

Chain q:

91%   8%   •

M1 V13 Q27 D31 K41 L45 E49 A50 M69 R86 L103 L104 A105 G106 E154 R170 I182 H189 Q199 GLY SER

• Molecule 28: Proteasome subunit beta type-5

Chain R:

68%   8%   23%

ALA LEU ALA SER VAL LEU GLU ARG PRO LEU PRO VAL ASN GLN ARG GLY PHE PHE GLY LEU GLY GLY ARG ALA ASP LEU LEU ASP LEU GLY PRO GLY SER SER ASP GLY LEU SER LEU ALA ALA PRO GLY TRP GLY VAL PRO GLU GLU PRO GLY ILE GLU MET LEU HIS GLY T1

L4 R19 A22 Q29 I37 N38 L41 A49 C52 R61 R64 E67 K91 M97 M100 Y113 E117 R120 V128 A135 Y143 D182 N191 G201 SER THR PRO

• Molecule 28: Proteasome subunit beta type-5

Chain r:

69%   7%   23%

ALA LEU ALA SER VAL LEU GLU ARG PRO LEU PRO VAL ASN GLN ARG GLY PHE PHE GLY LEU GLY GLY ARG ALA ASP LEU LEU ASP LEU GLY PRO GLY SER SER ASP GLY LEU SER LEU ALA ALA PRO GLY TRP GLY VAL PRO GLU GLU PRO GLY ILE GLU MET LEU HIS GLY T1 T2

T3 R9 A16 R19 Q29 K32 T44 C52 E56 Q62 I65 T99 M100 Y113 R120 R141 D146 R166 N191 G201 SER THR PRO

• Molecule 29: Proteasome subunit beta type-1

Chain S:

82%   6%   11%

LEU SER SER THR ALA MET TYR SER ALA PRO GLY ARG ASP LEU GLY MET GLU PRO HIS ARG ALA ALA GLY PRO LEU GLN LEU R1 A16 A24 R28 T47 D48 V121 E162 R173 K176 I180 E184 G190 D191 A192 L193 R211 K212 D213

• Molecule 29: Proteasome subunit beta type-1

Chain s:

81%   8%   11%

LEU SER SER THR ALA MET TYR SER ALA PRO GLY ARG ASP LEU GLY MET GLU PRO HIS ARG ALA ALA GLY PRO LEU GLN LEU R1 D19 K81 E116 L145 L148 L149 D150 D169 R173 K176 D177 V178 A182 A183 E184 G190 D191 V208 R211 K212

D213

• Molecule 30: Proteasome subunit beta type-4

Chain T:

70%   12%   18%

GLU ALA PHE LEU GLY SER ARG SER GLY LEU LEU TRP ALA GLY GLY PRO ALA PRO GLY GLN PHE TYR ARG ILE PRO SER THR PRO ASP SER PHE MET ASP PRO ALA SER ALA LEU TYR ARG GLY PRO ILE THR ARG T1 T9 D25 M26 L27 A34 N38 R41 T42 M43 R44

V45 N46 T49 M50 Q69 E74 S84 I88 L92 M96 R99 N104 N108 T109 M110 M127 S136 Q147 L150 L154 L176 R186 F187 V192 I211 I215 SER GLY PHE GLU

• Molecule 30: Proteasome subunit beta type-4

Chain t: 70%   12%   18%

GLU ALA PHE LEU GLY SER ARG SER GLY LEU TRP ALA GLY GLY PRO ALA PRO GLY GLN PHE TYR ARG ILE PRO SER THR PRO ASP SER PHE MET ASP PRO ALA SER ALA LEU TYR ARG GLY PRO ILE THR ARG T1 Q2 N3 D25 M26 L27 A34 V45 N46 T49 M50 L51

V71 I72 E75 L76 D79 R99 N104 M110 L122 D126 M127 L137 L149 L150 R151 E155 R179 D180 S183 Y184 N185 R186 F187 T205 I215 SER GLY PHE GLU

• Molecule 31: Proteasome subunit alpha type-7

Chain j: 75%   21%   •

S2 Y3 D4 R5 A6 I7 T8 L16 E20 Y21 E24 A25 V26 R36 G37 R38 V41 A51 K52 E56 D66 D67 N68 A78 D79 A80 E99 V104 E105 R109 S121 N122 G123 P126 I129 S130 A131 L132 F136 P142 R143 A158

N159 L172 T177 D178 E179 A180 I181 D184 I188 L196 V199 Q200 S201 G202 N205 M211 Q215 S216 Y228 E231 E240 LYS LYS LYS GLN LYS LYS ALA SER

• Molecule 32: Midnolin,MCHERRY,fusion tag

Chain f: 8%   5%   87%

M1 R12 A15 P16 G17 G18 MET SER GLN ALA SER SER PRO ALA SER PRO ALA PRO ASP LEU ALA PRO ARG THR THR SER CYS GLU LYS LEU THR ALA ALA PRO SER ALA SER LEU LEU GLN GLY GLN SER ILE ARG MET CYS LYS PRO PRO G377 D378 R379 L380 R381 Q382 T383

E384 N385 R386 A387 T388 K391 R394 L395 Q396 L397 L398 L399 Q400 Q401 L404 R405 R406 R409 R410 D411 A412 R413 G414 P415 TYR HIS TRP SER PRO SER ARG LYS ALA GLY ARG ASP SER SER SER GLY GLY GLY SER PRO SER GLU ALA SER GLY LEU GLY LEU ASP

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

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

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

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

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

PHE GLU LYS GLN PRO GLY GLY ALA ARG SER CYS

• Molecule 33: 26S proteasome non-ATPase regulatory subunit 2

Chain u:

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	17418	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	40	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOCONTINUUM (6k x 4k)	Depositor
Maximum map value	20.957	Depositor
Minimum map value	-0.182	Depositor
Average map value	0.025	Depositor
Map value standard deviation	0.550	Depositor
Recommended contour level	1.6	Depositor
Map size (Å)	510.0, 510.0, 510.0	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.85, 0.85, 0.85	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

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

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	U	0.17	0/6710	0.45	0/9074
2	V	0.21	0/3929	0.55	0/5309
3	W	0.32	0/3713	0.67	0/4988
4	X	0.18	0/3053	0.47	1/4115 (0.0%)
5	Y	0.18	0/3173	0.49	0/4273
6	Z	0.22	0/2324	0.58	1/3150 (0.0%)
7	a	0.19	0/3053	0.55	2/4133 (0.0%)
8	c	0.20	0/2302	0.57	0/3110
9	d	0.21	0/2122	0.60	0/2864
10	e	0.21	0/338	0.64	0/450
11	A	0.18	0/3283	0.47	0/4433
12	B	0.19	0/3208	0.46	0/4327
13	C	0.22	0/3146	0.50	0/4226
14	D	0.25	0/3090	0.55	3/4168 (0.1%)
15	E	0.20	0/2829	0.51	0/3812
16	F	0.21	0/2873	0.54	1/3872 (0.0%)
17	G	0.16	0/1842	0.37	0/2500
17	g	0.14	0/1863	0.34	0/2527
18	H	0.18	0/1762	0.38	0/2394
18	h	0.25	0/1764	0.44	0/2399
19	I	0.16	0/1925	0.37	0/2606
19	i	0.16	0/1942	0.41	0/2628
20	J	0.16	0/1869	0.39	0/2531
21	K	0.14	0/1772	0.31	0/2397
21	k	0.18	0/1747	0.40	1/2364 (0.0%)
22	L	0.15	0/1885	0.34	0/2552
22	l	0.15	0/1885	0.36	0/2552
23	M	0.15	0/1891	0.35	0/2552
23	m	0.25	0/1897	0.42	0/2559
24	N	0.15	0/1508	0.34	0/2040
24	n	0.14	0/1508	0.33	0/2040
25	O	0.16	0/1670	0.37	0/2265

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$|Z|$>5	RMSZ	#$|Z|$>5
25	o	0.15	0/1670	0.41	0/2265
26	P	0.15	0/1620	0.33	0/2184
26	p	0.15	0/1620	0.32	0/2184
27	Q	0.14	0/1603	0.33	0/2174
27	q	0.14	0/1607	0.34	0/2178
28	R	0.14	0/1579	0.32	0/2134
28	r	0.14	0/1579	0.32	0/2134
29	S	0.16	0/1671	0.35	0/2253
29	s	0.15	0/1671	0.34	0/2253
30	T	0.15	0/1700	0.35	0/2305
30	t	0.15	0/1706	0.34	0/2312
31	j	0.15	0/1728	0.38	0/2358
32	f	0.24	0/455	0.72	0/600
33	u	0.18	0/6548	0.45	0/8864
All	All	0.19	0/104633	0.45	9/141408 (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
3	W	0	1
9	d	0	1
14	D	0	1
All	All	0	3

There are no bond length outliers.

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
16	F	205	PRO	CA-N-CD	-9.74	98.36	112.00
7	a	189	PRO	CA-N-CD	-7.01	102.19	112.00
7	a	259	PRO	CA-N-CD	-6.45	102.97	112.00
14	D	58	GLU	CA-C-N	-5.92	111.66	122.38
14	D	58	GLU	C-N-CA	-5.92	111.66	122.38

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
14	D	81	ARG	Sidechain
3	W	27	ARG	Sidechain
9	d	189	ILE	Peptide

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	U	6595	0	6650	305	0
2	V	3852	0	3893	205	0
3	W	3667	0	3786	271	0
4	X	3009	0	3113	124	0
5	Y	3115	0	3120	156	0
6	Z	2281	0	2312	144	0
7	a	2995	0	3012	133	0
8	c	2260	0	2276	108	0
9	d	2078	0	2107	154	0
10	e	334	0	294	19	0
11	A	3229	0	3263	116	0
12	B	3162	0	3225	110	0
13	C	3105	0	3219	126	0
14	D	3040	0	3076	115	0
15	E	2786	0	2843	147	0
16	F	2834	0	2912	127	0
17	G	1809	0	1781	23	0
17	g	1830	0	1807	30	0
18	H	1726	0	1646	31	0
18	h	1727	0	1619	28	0
19	I	1895	0	1833	19	0
19	i	1912	0	1851	36	0
20	J	1844	0	1747	29	0
21	K	1746	0	1695	18	0
21	k	1722	0	1673	37	0
22	L	1850	0	1822	28	0
22	l	1850	0	1822	36	0
23	M	1856	0	1816	25	0
23	m	1862	0	1827	36	0
24	N	1482	0	1450	12	0
24	n	1482	0	1450	15	0

Continued on next page...

WORLDWIDE
PDB
PROTEIN DATA BANK

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
25	O	1643	0	1644	28	0
25	o	1643	0	1644	20	0
26	P	1591	0	1609	20	0
26	p	1591	0	1609	12	0
27	Q	1570	0	1547	17	0
27	q	1574	0	1558	13	0
28	R	1548	0	1499	16	0
28	r	1548	0	1499	16	0
29	S	1641	0	1618	12	0
29	s	1641	0	1618	13	0
30	T	1667	0	1628	21	0
30	t	1673	0	1639	19	0
31	j	1704	0	1517	36	0
32	f	453	0	481	30	0
33	u	6439	0	6456	245	0
34	c	1	0	0	0	0
35	A	31	0	12	0	0
35	B	31	0	12	3	0
35	C	31	0	12	0	0
35	F	31	0	12	0	0
36	A	1	0	0	0	0
36	B	1	0	0	0	0
36	C	1	0	0	0	0
36	D	1	0	0	0	0
36	F	1	0	0	0	0
37	D	27	0	12	0	0
37	E	27	0	12	2	0
38	N	34	0	41	3	0
38	O	34	0	41	4	0
38	R	34	0	41	3	0
38	n	34	0	41	2	0
38	o	34	0	41	1	0
38	r	34	0	41	2	0
All	All	103249	0	102824	2984	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 14.

The worst 5 of 2984 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)
15:E:303:LEU:HD12	15:E:304:PRO:HD2	1.41	1.03
3:W:320:LEU:O	3:W:324:TYR:HB3	1.61	1.01
3:W:35:ALA:HB1	3:W:48:LEU:HD22	1.43	1.00
8:c:55:GLY:HA2	8:c:75:MET:HG2	1.49	0.95
2:V:148:ARG:HD2	2:V:149:PRO:HD3	1.47	0.94

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	U	839/953 (88%)	761 (91%)	75 (9%)	3 (0%)	30	61
2	V	478/533 (90%)	427 (89%)	49 (10%)	2 (0%)	30	61
3	W	448/456 (98%)	400 (89%)	42 (9%)	6 (1%)	10	34
4	X	378/422 (90%)	365 (97%)	12 (3%)	1 (0%)	37	67
5	Y	376/389 (97%)	336 (89%)	38 (10%)	2 (0%)	25	55
6	Z	284/324 (88%)	250 (88%)	32 (11%)	2 (1%)	19	48
7	a	371/376 (99%)	329 (89%)	40 (11%)	2 (0%)	25	55
8	c	285/309 (92%)	247 (87%)	36 (13%)	2 (1%)	19	48
9	d	249/349 (71%)	200 (80%)	46 (18%)	3 (1%)	11	36
10	e	36/70 (51%)	26 (72%)	8 (22%)	2 (6%)	1	10
11	A	411/433 (95%)	371 (90%)	37 (9%)	3 (1%)	19	48
12	B	403/440 (92%)	365 (91%)	36 (9%)	2 (0%)	25	55
13	C	394/398 (99%)	361 (92%)	29 (7%)	4 (1%)	13	40
14	D	378/418 (90%)	339 (90%)	36 (10%)	3 (1%)	16	45
15	E	350/403 (87%)	309 (88%)	36 (10%)	5 (1%)	9	32
16	F	358/439 (82%)	321 (90%)	36 (10%)	1 (0%)	37	67

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
17	G	235/245 (96%)	225 (96%)	9 (4%)	1 (0%)	30	61
17	g	238/245 (97%)	231 (97%)	7 (3%)	0	100	100
18	H	229/233 (98%)	214 (93%)	14 (6%)	1 (0%)	30	61
18	h	230/233 (99%)	222 (96%)	7 (3%)	1 (0%)	30	61
19	I	246/260 (95%)	228 (93%)	17 (7%)	1 (0%)	30	61
19	i	248/260 (95%)	235 (95%)	12 (5%)	1 (0%)	30	61
20	J	245/248 (99%)	231 (94%)	10 (4%)	4 (2%)	8	29
21	K	226/241 (94%)	220 (97%)	6 (3%)	0	100	100
21	k	224/241 (93%)	214 (96%)	10 (4%)	0	100	100
22	L	236/268 (88%)	230 (98%)	6 (2%)	0	100	100
22	l	236/268 (88%)	227 (96%)	9 (4%)	0	100	100
23	M	238/254 (94%)	233 (98%)	4 (2%)	1 (0%)	30	61
23	m	238/254 (94%)	227 (95%)	11 (5%)	0	100	100
24	N	195/238 (82%)	188 (96%)	6 (3%)	1 (0%)	25	55
24	n	195/238 (82%)	189 (97%)	6 (3%)	0	100	100
25	O	218/276 (79%)	209 (96%)	8 (4%)	1 (0%)	25	55
25	o	218/276 (79%)	203 (93%)	15 (7%)	0	100	100
26	P	202/204 (99%)	194 (96%)	8 (4%)	0	100	100
26	p	202/204 (99%)	191 (95%)	11 (5%)	0	100	100
27	Q	197/201 (98%)	186 (94%)	11 (6%)	0	100	100
27	q	197/201 (98%)	187 (95%)	10 (5%)	0	100	100
28	R	199/262 (76%)	195 (98%)	2 (1%)	2 (1%)	13	40
28	r	199/262 (76%)	193 (97%)	6 (3%)	0	100	100
29	S	211/240 (88%)	206 (98%)	4 (2%)	1 (0%)	25	55
29	s	211/240 (88%)	208 (99%)	3 (1%)	0	100	100
30	T	213/263 (81%)	207 (97%)	5 (2%)	1 (0%)	25	55
30	t	213/263 (81%)	203 (95%)	10 (5%)	0	100	100
31	j	237/247 (96%)	219 (92%)	17 (7%)	1 (0%)	30	61
32	f	53/445 (12%)	48 (91%)	4 (8%)	1 (2%)	6	26
33	u	826/908 (91%)	797 (96%)	29 (4%)	0	100	100
All	All	13093/14930 (88%)	12167 (93%)	865 (7%)	61 (0%)	27	55

5 of 61 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	U	41	SER
3	W	45	GLU
3	W	375	MET
4	X	310	ARG
5	Y	361	SER

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	U	722/816 (88%)	717 (99%)	5 (1%)	81	89
2	V	414/459 (90%)	412 (100%)	2 (0%)	86	92
3	W	412/416 (99%)	407 (99%)	5 (1%)	67	79
4	X	327/362 (90%)	326 (100%)	1 (0%)	91	95
5	Y	334/344 (97%)	334 (100%)	0	100	100
6	Z	257/295 (87%)	255 (99%)	2 (1%)	79	87
7	a	333/336 (99%)	329 (99%)	4 (1%)	67	79
8	c	252/267 (94%)	251 (100%)	1 (0%)	89	93
9	d	226/293 (77%)	224 (99%)	2 (1%)	75	86
10	e	38/63 (60%)	38 (100%)	0	100	100
11	A	348/372 (94%)	347 (100%)	1 (0%)	91	95
12	B	352/385 (91%)	352 (100%)	0	100	100
13	C	340/346 (98%)	336 (99%)	4 (1%)	67	79
14	D	333/366 (91%)	328 (98%)	5 (2%)	60	76
15	E	307/353 (87%)	306 (100%)	1 (0%)	91	95
16	F	309/379 (82%)	308 (100%)	1 (0%)	91	95
17	G	191/209 (91%)	191 (100%)	0	100	100
17	g	194/209 (93%)	192 (99%)	2 (1%)	73	83
18	H	169/190 (89%)	169 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
18	h	167/190 (88%)	164 (98%)	3 (2%)	54	73
19	I	191/220 (87%)	191 (100%)	0	100	100
19	i	193/220 (88%)	192 (100%)	1 (0%)	86	92
20	J	179/211 (85%)	179 (100%)	0	100	100
21	K	189/203 (93%)	189 (100%)	0	100	100
21	k	186/203 (92%)	186 (100%)	0	100	100
22	L	198/229 (86%)	198 (100%)	0	100	100
22	l	198/229 (86%)	198 (100%)	0	100	100
23	M	192/211 (91%)	190 (99%)	2 (1%)	73	83
23	m	193/211 (92%)	190 (98%)	3 (2%)	58	75
24	N	154/180 (86%)	154 (100%)	0	100	100
24	n	154/180 (86%)	153 (99%)	1 (1%)	84	90
25	O	177/227 (78%)	177 (100%)	0	100	100
25	o	177/227 (78%)	176 (99%)	1 (1%)	84	90
26	P	173/173 (100%)	173 (100%)	0	100	100
26	p	173/173 (100%)	170 (98%)	3 (2%)	56	74
27	Q	164/171 (96%)	164 (100%)	0	100	100
27	q	165/171 (96%)	165 (100%)	0	100	100
28	R	153/201 (76%)	153 (100%)	0	100	100
28	r	153/201 (76%)	153 (100%)	0	100	100
29	S	174/198 (88%)	174 (100%)	0	100	100
29	s	174/198 (88%)	174 (100%)	0	100	100
30	T	175/214 (82%)	174 (99%)	1 (1%)	84	90
30	t	176/214 (82%)	175 (99%)	1 (1%)	84	90
31	j	152/210 (72%)	152 (100%)	0	100	100
32	f	45/364 (12%)	44 (98%)	1 (2%)	47	68
33	u	702/763 (92%)	700 (100%)	2 (0%)	91	95
All	All	10985/12652 (87%)	10930 (100%)	55 (0%)	85	92

5 of 55 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
14	D	81	ARG

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Mol	Chain	Res	Type
23	M	175	GLU
33	u	744	MET
26	p	115	LYS
14	D	98	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 179 such sidechains are listed below:

Mol	Chain	Res	Type
28	R	29	GLN
23	m	97	ASN
29	S	108	ASN
19	i	109	GLN
26	p	93	ASN

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 18 ligands modelled in this entry, 6 are monoatomic - leaving 12 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
35	ATP	C	501	36	26,33,33	0.61	0	31,52,52	0.75	2 (6%)
38	LDZ	r	301	-	33,34,34	0.43	0	42,44,44	0.80	2 (4%)
38	LDZ	O	301	-	33,34,34	0.38	0	42,44,44	1.53	2 (4%)
37	ADP	E	401	-	24,29,29	0.95	1 (4%)	29,45,45	1.50	4 (13%)
38	LDZ	N	301	-	33,34,34	0.41	0	42,44,44	0.67	0
35	ATP	F	501	36	26,33,33	0.61	0	31,52,52	0.78	2 (6%)
37	ADP	D	501	36	24,29,29	0.95	1 (4%)	29,45,45	1.48	4 (13%)
35	ATP	B	501	36	26,33,33	0.60	0	31,52,52	0.76	2 (6%)
38	LDZ	R	301	-	33,34,34	0.46	0	42,44,44	0.59	0
38	LDZ	n	301	-	33,34,34	0.49	0	42,44,44	1.37	3 (7%)
35	ATP	A	501	36	26,33,33	0.62	0	31,52,52	0.74	2 (6%)
38	LDZ	o	301	-	33,34,34	0.48	0	42,44,44	0.71	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
35	ATP	C	501	36	-	4/18/38/38	0/3/3/3
38	LDZ	r	301	-	-	12/38/39/39	0/1/1/1
38	LDZ	O	301	-	-	15/38/39/39	0/1/1/1
37	ADP	E	401	-	-	5/12/32/32	0/3/3/3
38	LDZ	N	301	-	-	8/38/39/39	0/1/1/1
35	ATP	F	501	36	-	4/18/38/38	0/3/3/3
37	ADP	D	501	36	-	2/12/32/32	0/3/3/3
35	ATP	B	501	36	-	6/18/38/38	0/3/3/3
38	LDZ	R	301	-	-	13/38/39/39	0/1/1/1
38	LDZ	n	301	-	-	21/38/39/39	0/1/1/1
35	ATP	A	501	36	-	4/18/38/38	0/3/3/3
38	LDZ	o	301	-	-	14/38/39/39	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
37	E	401	ADP	C5-C4	2.52	1.47	1.40
37	D	501	ADP	C5-C4	2.47	1.47	1.40

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
38	O	301	LDZ	C17-N16-C15	8.14	138.17	123.15
38	n	301	LDZ	C14-N13-C12	7.08	136.85	121.67
37	E	401	ADP	C3'-C2'-C1'	3.97	106.95	100.98
37	D	501	ADP	C3'-C2'-C1'	3.86	106.78	100.98
37	E	401	ADP	PA-O3A-PB	-3.36	121.29	132.83

There are no chirality outliers.

5 of 108 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
35	A	501	ATP	PB-O3B-PG-O3G
35	A	501	ATP	C5'-O5'-PA-O1A
35	B	501	ATP	C5'-O5'-PA-O1A
35	B	501	ATP	C5'-O5'-PA-O2A
35	B	501	ATP	C5'-O5'-PA-O3A

There are no ring outliers.

8 monomers are involved in 20 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
38	r	301	LDZ	2	0
38	O	301	LDZ	4	0
37	E	401	ADP	2	0
38	N	301	LDZ	3	0
35	B	501	ATP	3	0
38	R	301	LDZ	3	0
38	n	301	LDZ	2	0
38	o	301	LDZ	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand ATP C 501

Bond lengths

Bond angles

Torsions

Rings

Ligand LDZ r 301

Bond lengths

Bond angles

Torsions

Rings

Ligand LDZ O 301

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP E 401

Bond lengths

Bond angles

Torsions

Rings

Ligand LDZ N 301

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP F 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP D 501

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand LDZ R 301

Bond lengths

Bond angles

Torsions

Rings

Ligand LDZ n 301

Bond lengths

Bond angles

Torsions

Rings

Ligand ATP A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand LDZ o 301

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)

There are no chain breaks in this entry.

6　Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-68472. 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 ⓘ
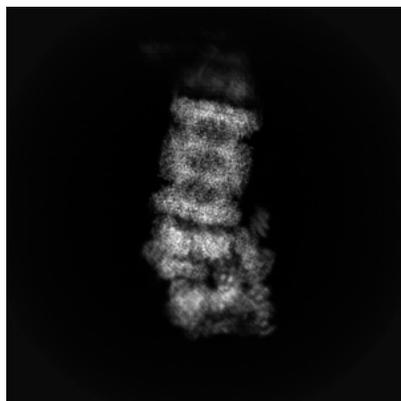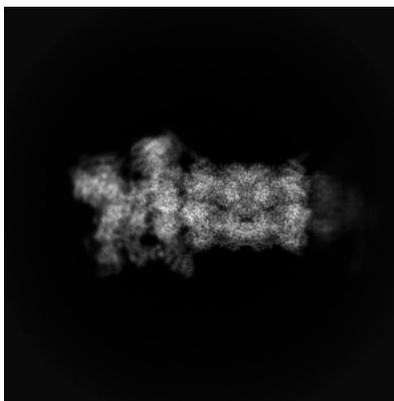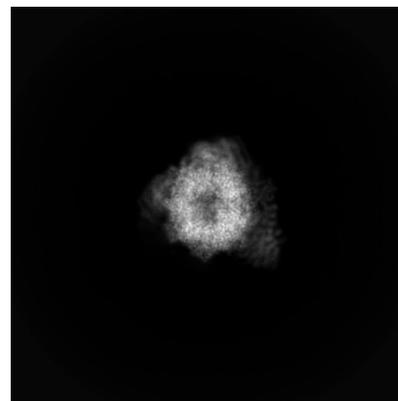
6.1.1　Primary map

X　　　　　　　　　　Y　　　　　　　　　　Z

6.1.2　Raw map

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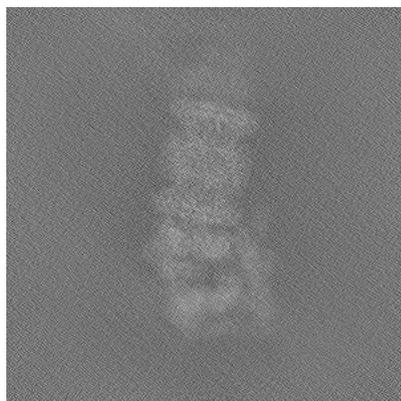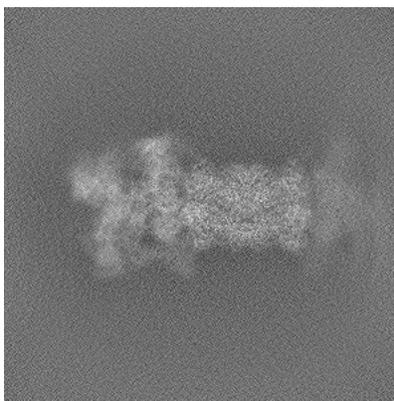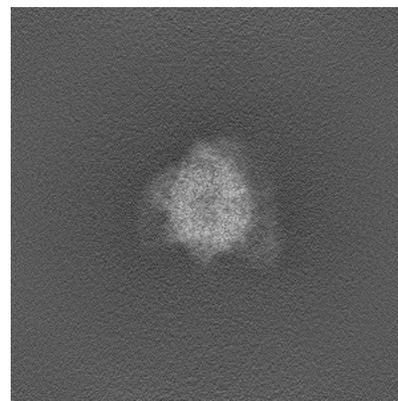
The images above show the map projected in three orthogonal directions.

6.2　Central slices ⓘ
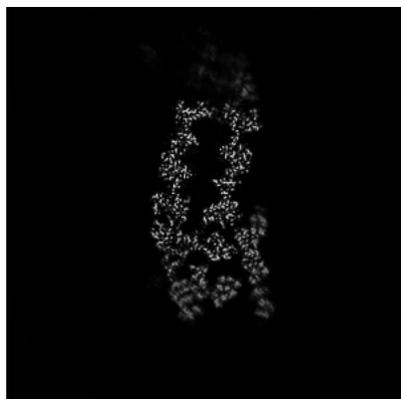
6.2.1　Primary map
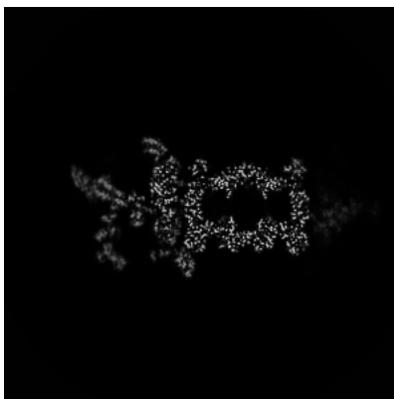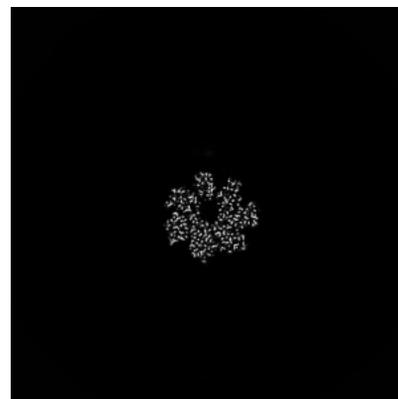
| X Index: 300 | Y Index: 300 | Z Index: 300 |

6.2.2　Raw map
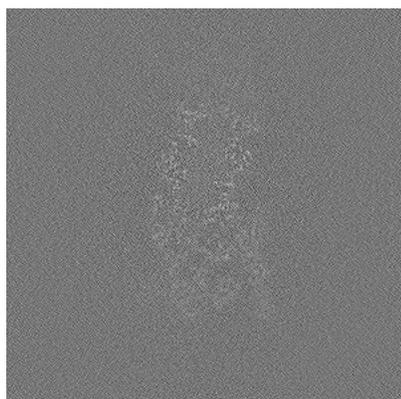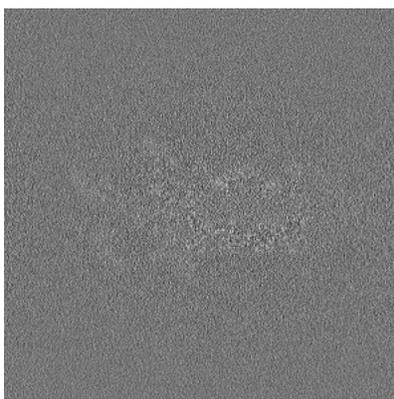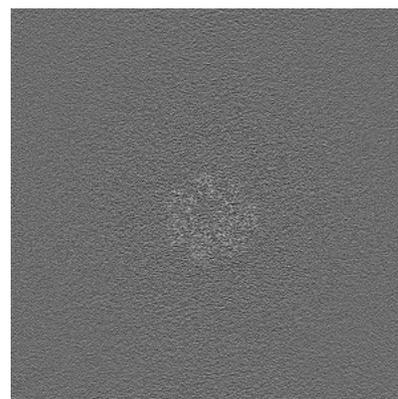
| X Index: 300 | Y Index: 300 | Z Index: 300 |

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

6.3 Largest variance slices (i)

6.3.1 Primary map
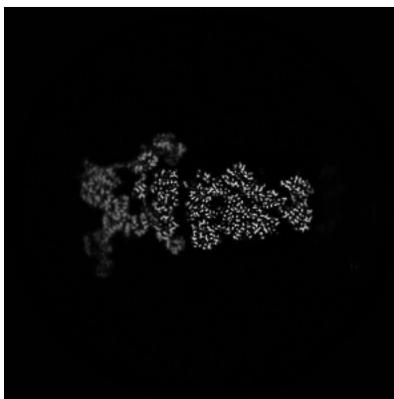
| X Index: 320 | Y Index: 264 | Z Index: 246 |
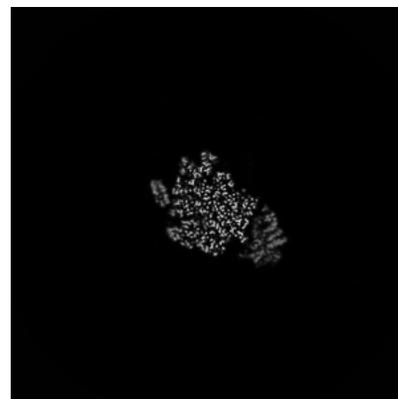
6.3.2 Raw map
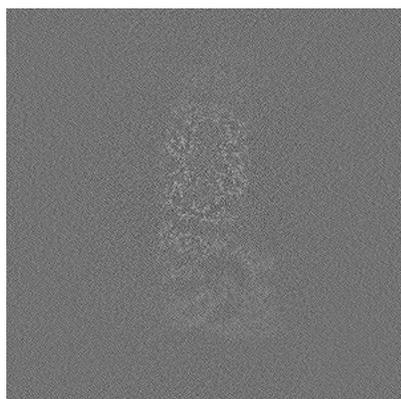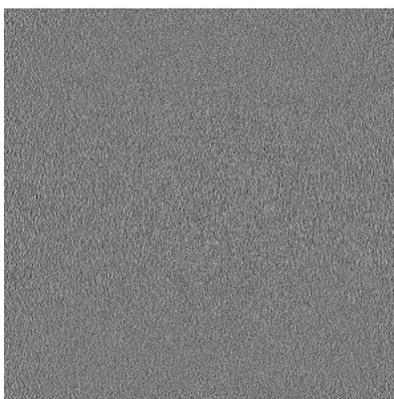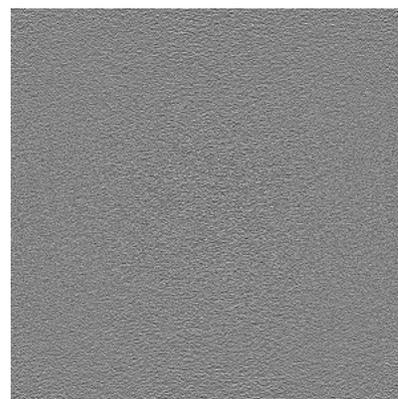
| X Index: 320 | Y Index: 0 | Z Index: 0 |

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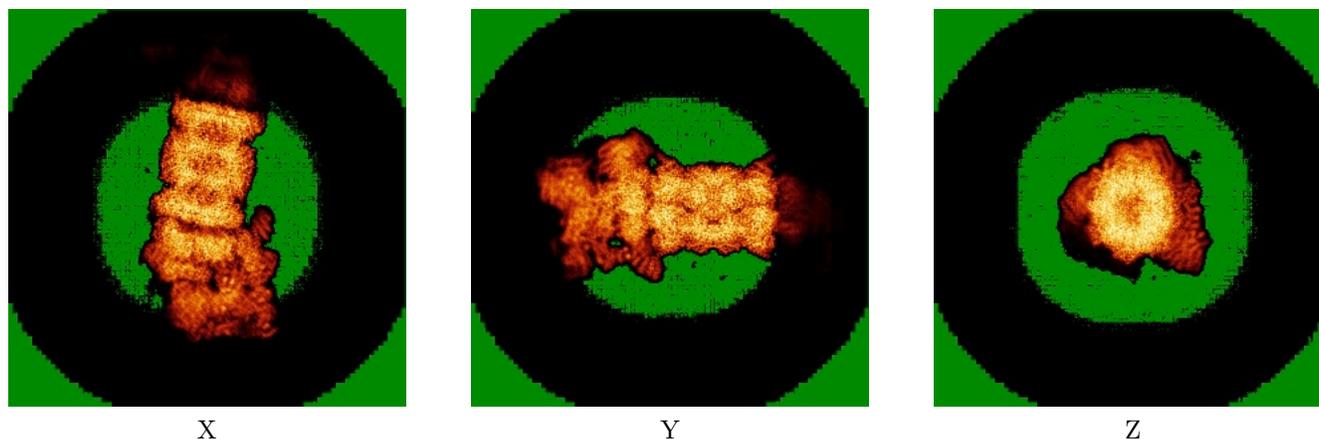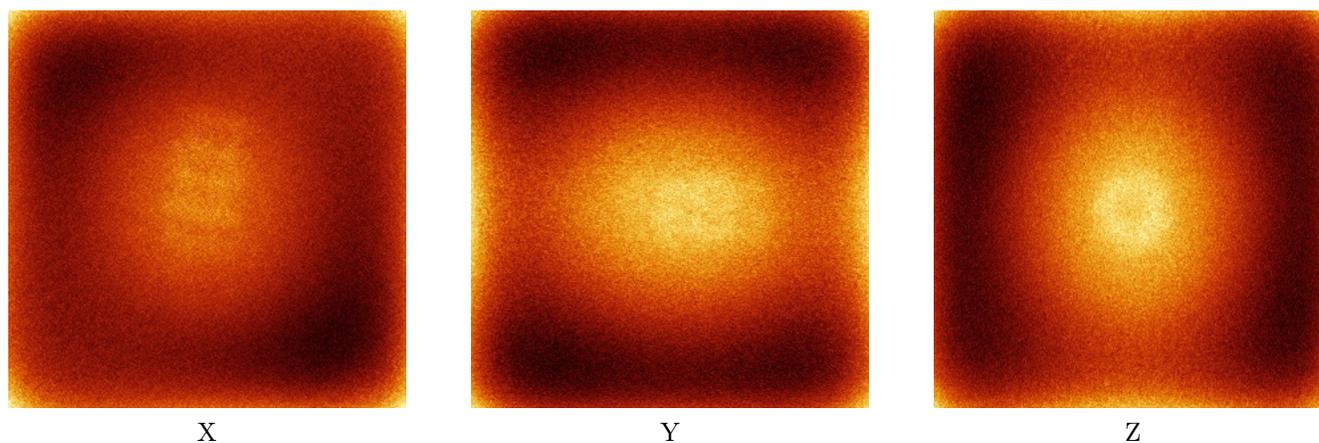
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views ⓘ

6.5.1 Primary map

| X | Y | Z |
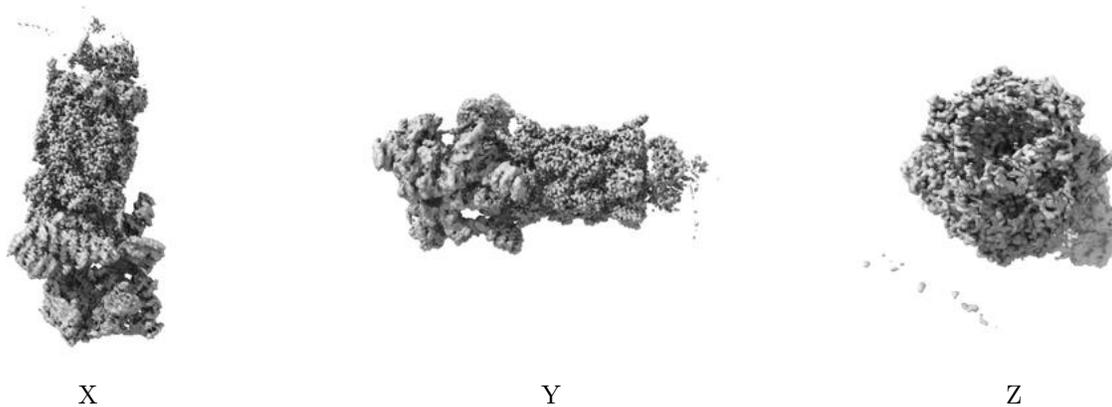
The images above show the 3D surface view of the map at the recommended contour level 1.6. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map

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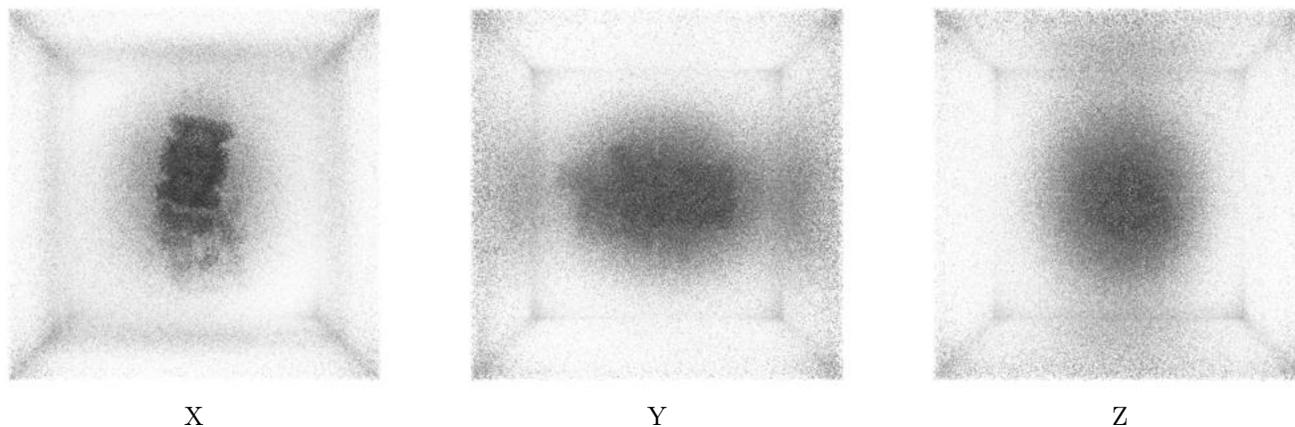
These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

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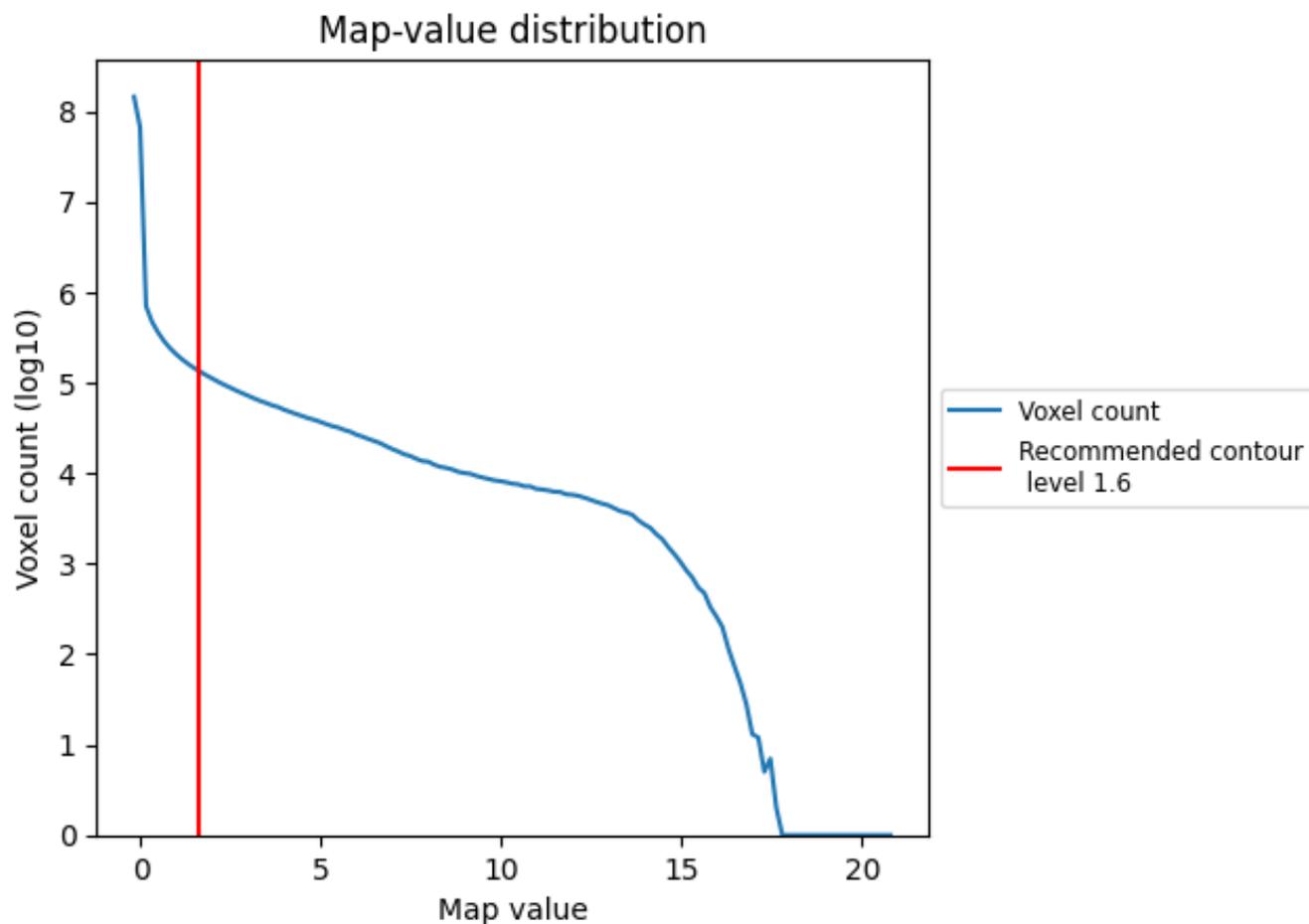
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate (i)
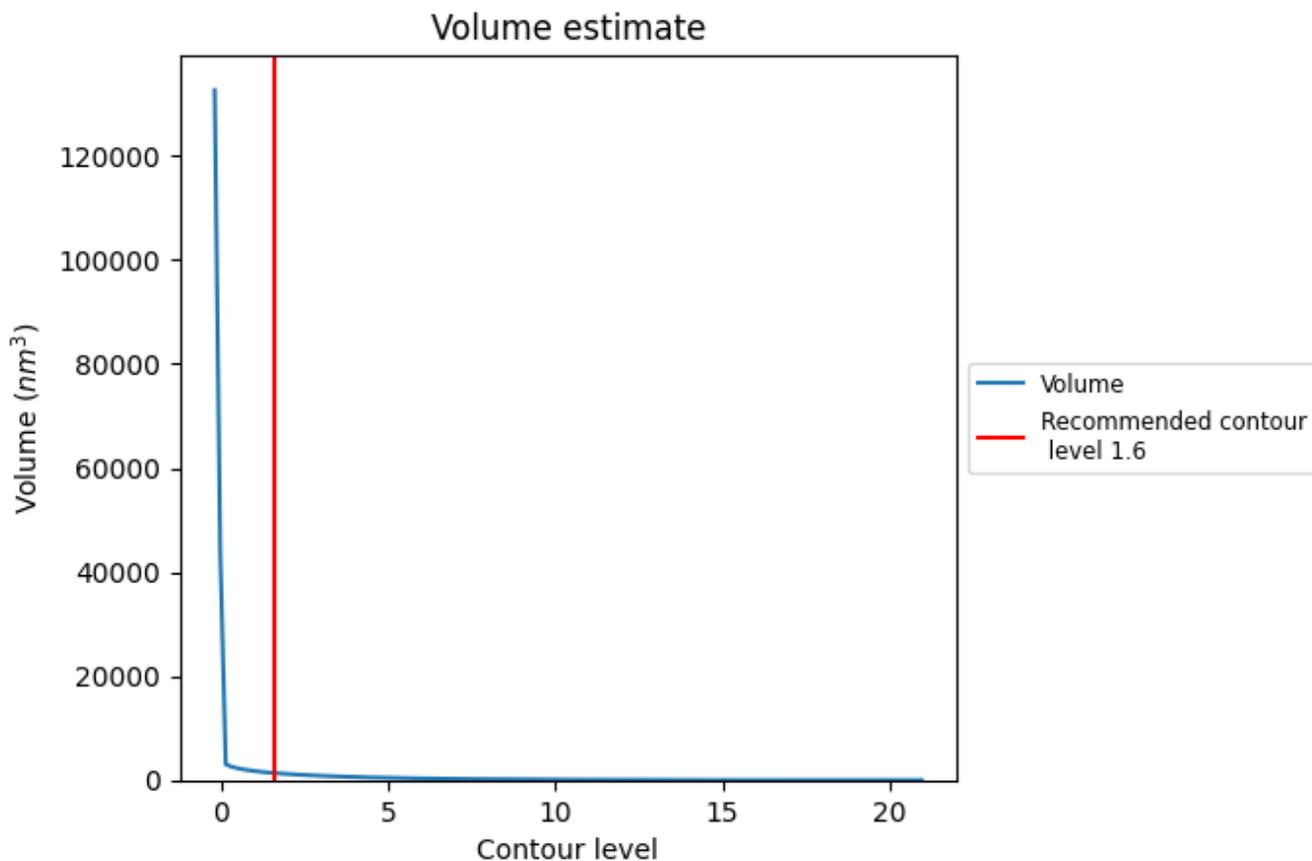
The volume at the recommended contour level is 1351 nm^3; this corresponds to an approximate mass of 1221 kDa.

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   ⓘ
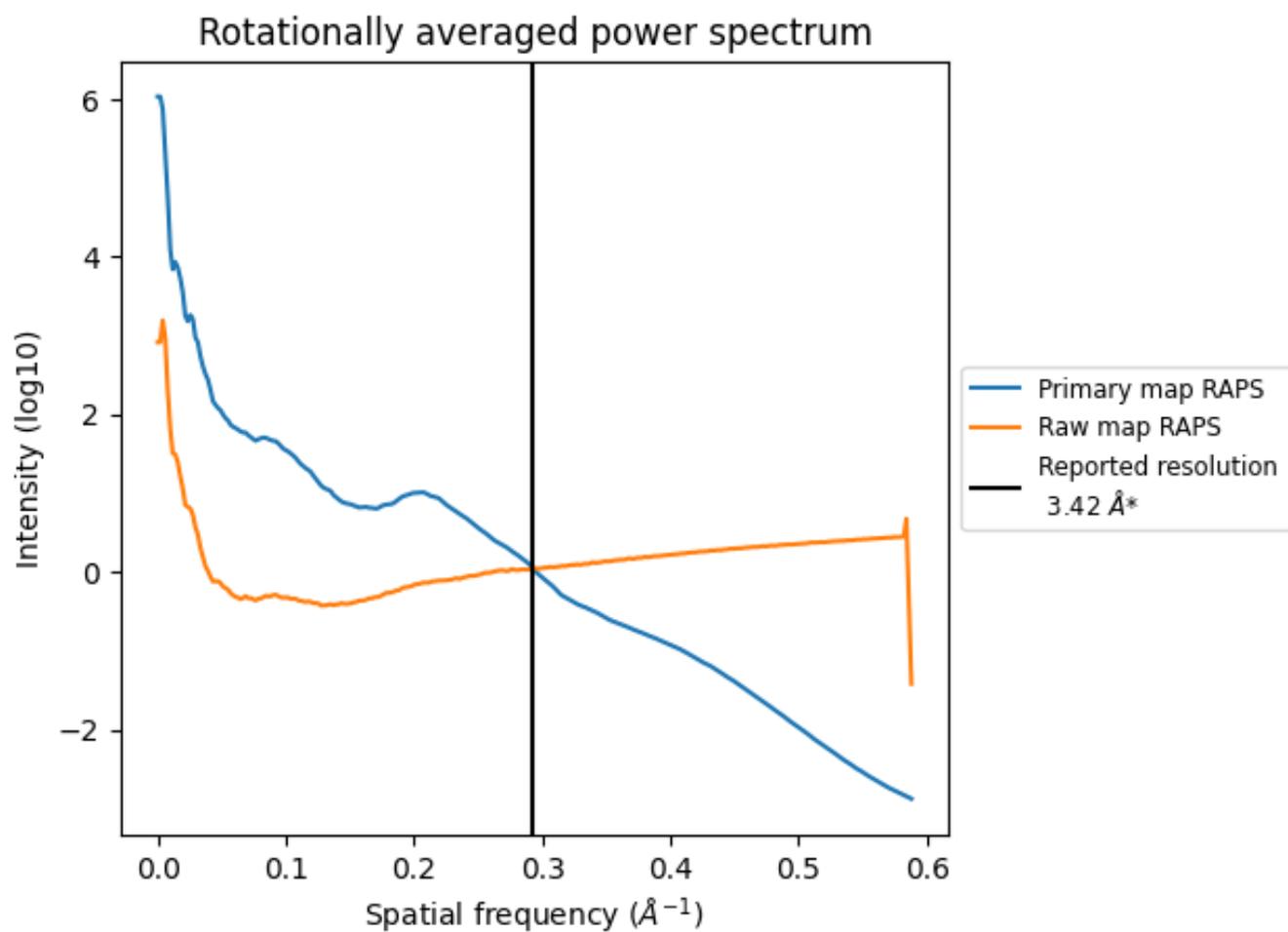
*Reported resolution corresponds to spatial frequency of 0.292 Å^{-1}

8   Fourier-Shell correlation (i)

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 (i)
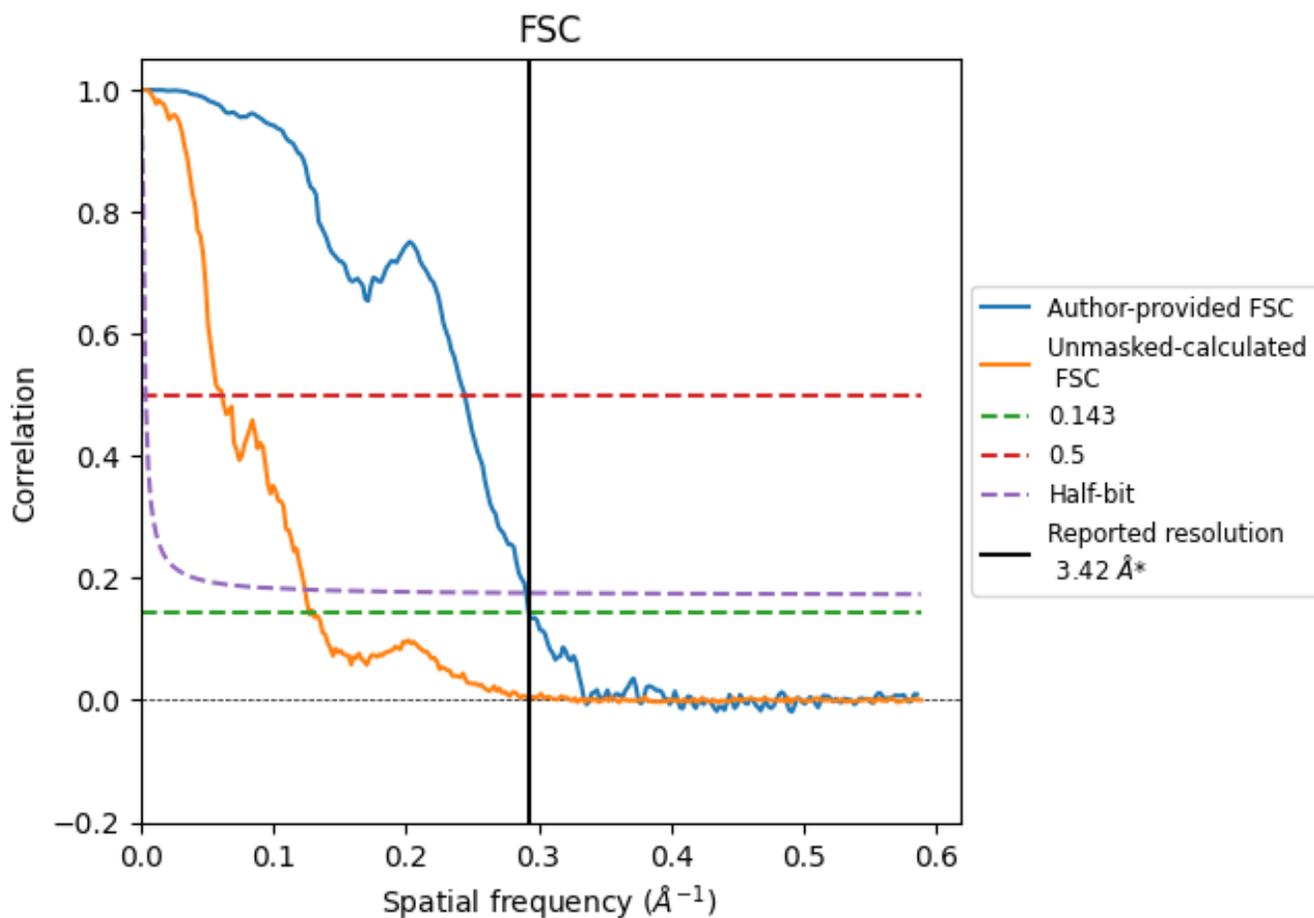
*Reported resolution corresponds to spatial frequency of 0.292 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.42	-	-
Author-provided FSC curve	3.42	4.09	3.44
Unmasked-calculated*	7.86	16.29	8.06

*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 7.86 differs from the reported value 3.42 by more than 10 %

9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-68472 and PDB model 22MM. Per-residue inclusion information can be found in section 3 on page 14.

## 9.1 Map-model overlay (i)

| X | Y | Z |
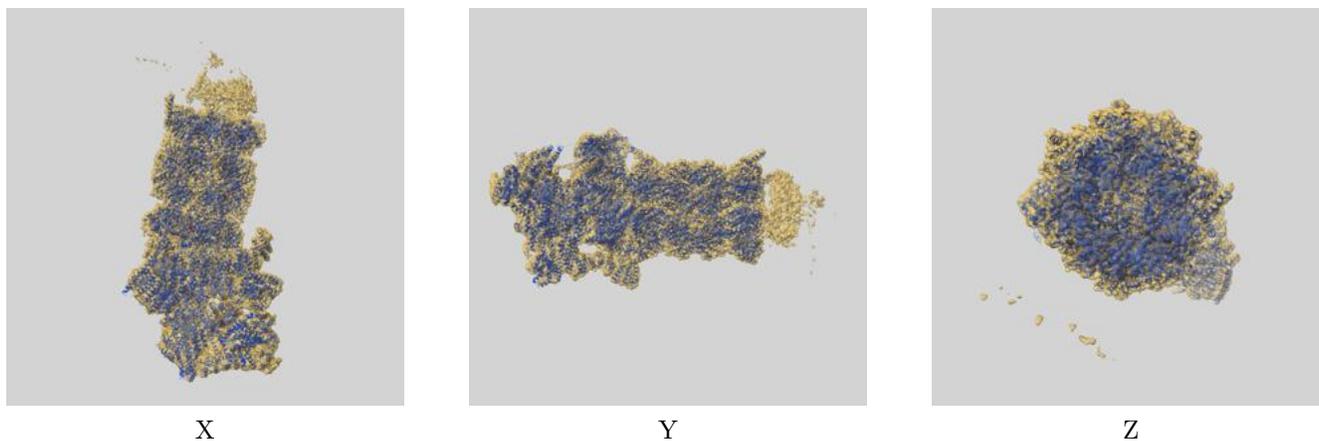
The images above show the 3D surface view of the map at the recommended contour level 1.6 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2   Q-score mapped to coordinate model ⓘ
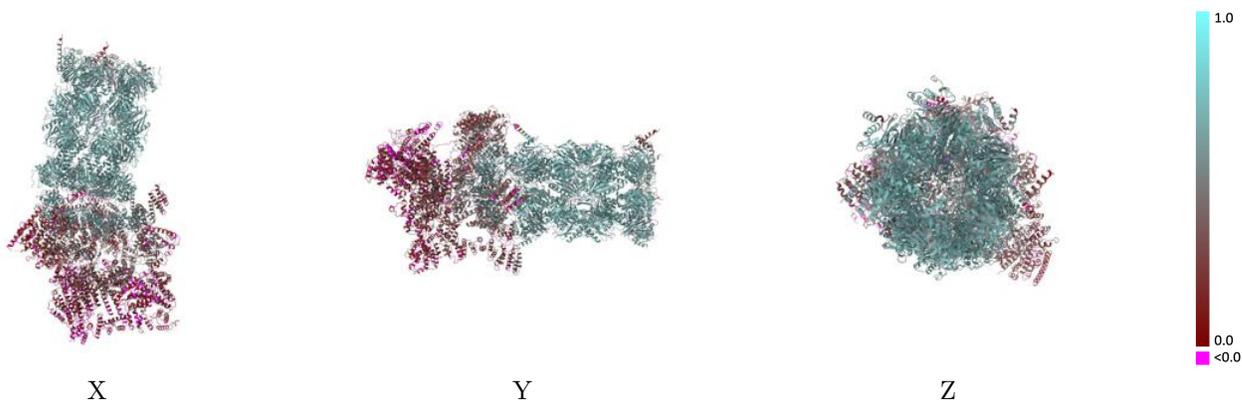

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 ⓘ
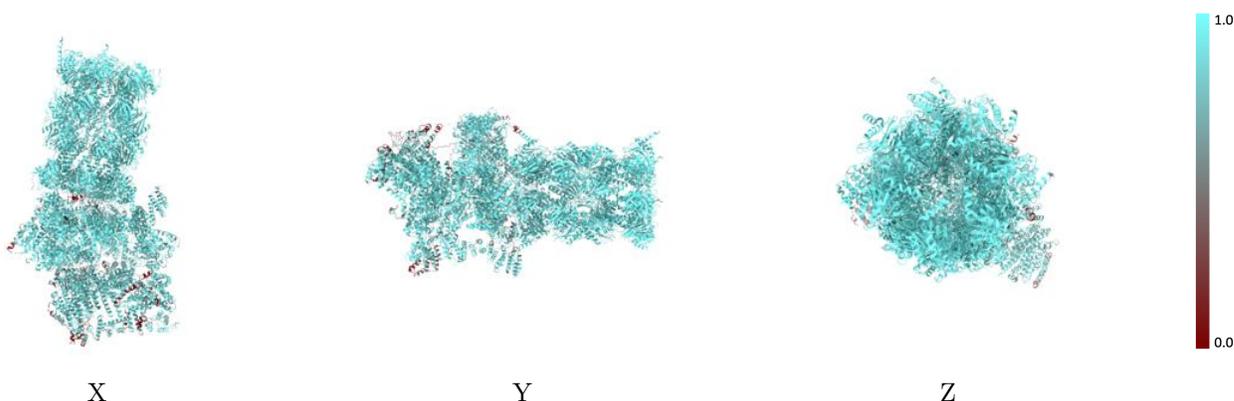
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (1.6).
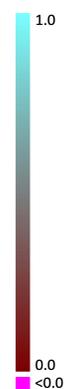
9.4 Atom inclusion (i)
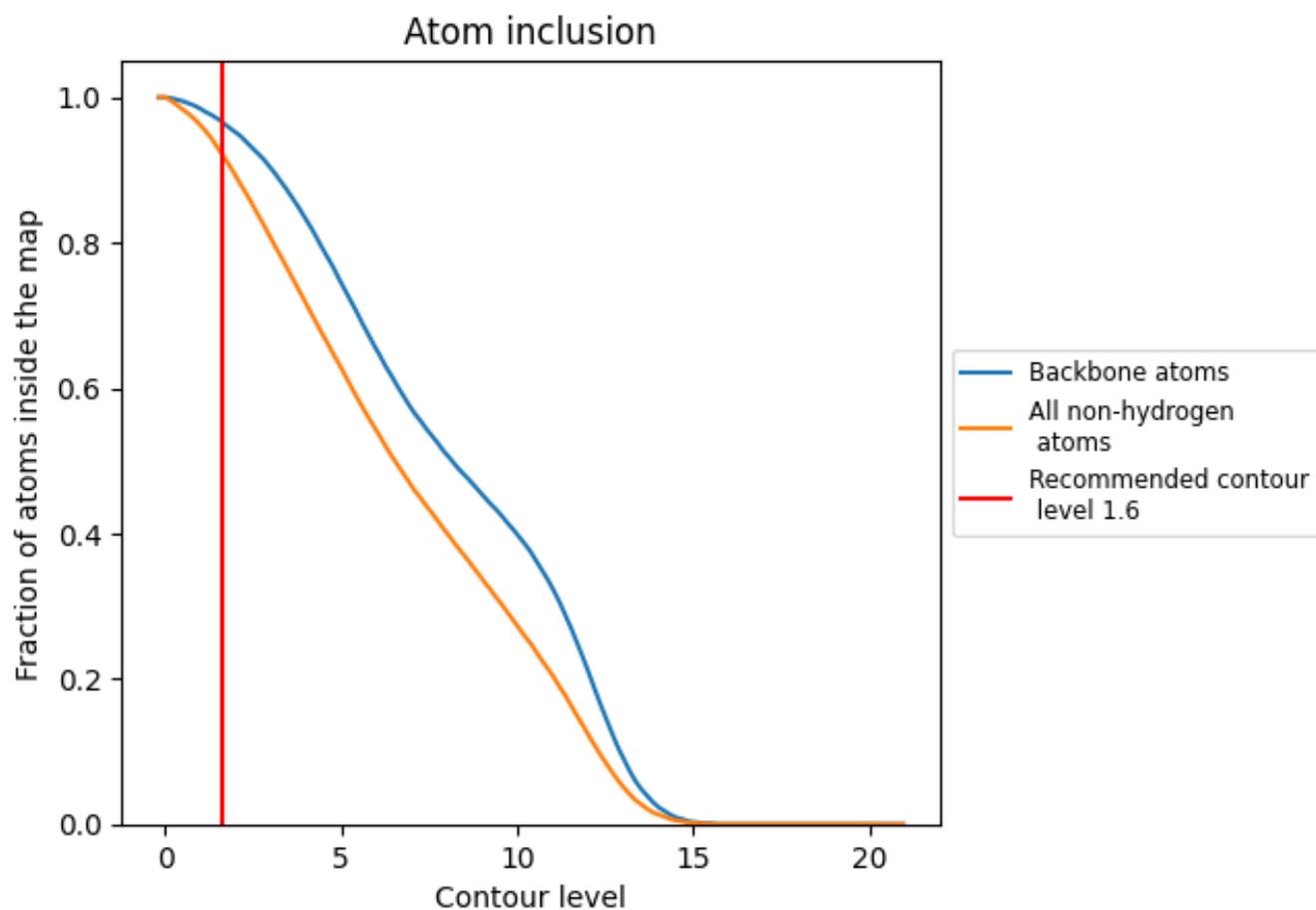
At the recommended contour level, 97% of all backbone atoms, 92% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (1.6) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9230	0.4450
A	0.9360	0.4690
B	0.9490	0.5070
C	0.9520	0.5030
D	0.9450	0.4750
E	0.8290	0.2950
F	0.9030	0.3670
G	0.9900	0.6350
H	0.9910	0.6450
I	0.9750	0.6210
J	0.9420	0.5940
K	0.9890	0.6470
L	0.9910	0.6510
M	0.9840	0.6350
N	0.9890	0.6630
O	0.9860	0.6470
P	0.9970	0.6600
Q	0.9950	0.6610
R	0.9890	0.6630
S	0.9950	0.6680
T	0.9970	0.6630
U	0.8000	0.1400
V	0.8090	0.1520
W	0.8750	0.2220
X	0.9300	0.3610
Y	0.9020	0.2930
Z	0.9230	0.2240
a	0.7090	0.1280
c	0.8230	0.1570
d	0.8210	0.1530
e	0.7510	0.1290
f	0.6350	0.2000
g	0.9820	0.6120
h	0.9730	0.6000
i	0.9670	0.5660

1.0

0.0
<0.0

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Chain	Atom inclusion	Q-score
j	0.9610	0.5210
k	0.9530	0.5720
l	0.9830	0.6150
m	0.9810	0.6000
n	0.9860	0.6600
o	0.9890	0.6370
p	0.9940	0.6560
q	0.9950	0.6590
r	0.9880	0.6560
s	0.9940	0.6620
t	0.9960	0.6650
u	0.9050	0.2610