



wwPDB EM Validation Summary Report ⓘ

Sep 16, 2024 – 05:27 pm BST

PDB ID : 8RVP
EMDB ID : EMD-19528
Title : Proteasomal late precursor complex from pre1-1, state 2
Authors : Mark, E.; Ramos, P.C.; Kayser, F.; Hoekendorff, J.; Dohmen, R.J.; Wendler, P.
Deposited on : 2024-02-01
Resolution : 2.28 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 ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

EMDB validation analysis : 0.0.1.dev112
MolProbity : 4.02b-467
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.38.2

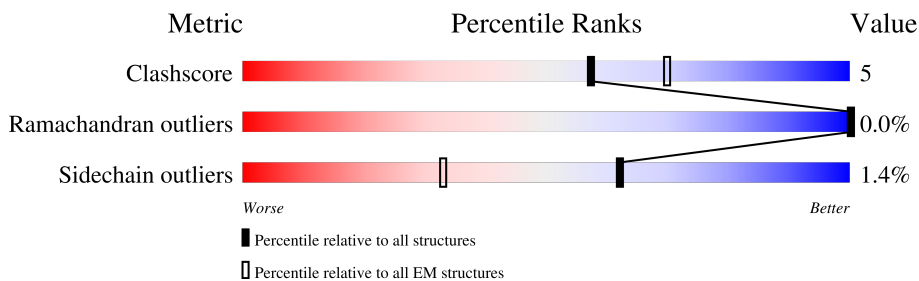
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 2.28 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	1	241	
1	M	241	
2	2	266	
2	N	266	
3	3	148	
3	6	148	
4	4	276	
4	7	276	


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Mol	Chain	Length	Quality of chain
5	5	267	79% 12% 9%
5	8	267	72% 20% 7%
6	A	252	86% 9%
6	O	252	81% 15%
7	B	250	85% 14%
7	P	250	86% 12%
8	C	258	81% 11% 9%
8	Q	258	5% 77% 17% 6%
9	D	254	85% 11%
9	R	254	85% 9% 5%
10	E	260	88% 8%
10	S	260	85% 10%
11	F	234	91% 9%
11	T	234	89% 10%
12	G	288	78% 7% 15%
12	U	288	5% 77% 7% 15%
13	H	215	87% 8% 5%
13	V	215	85% 10% 5%
14	I	261	72% 7% 20%
14	W	261	72% 10% 18%
15	J	205	80% 11% 9%
15	X	205	82% 10% 8%
16	K	212	9% 78% 12% 10%
16	Y	212	6% 81% 8% 10%
17	L	287	5% 74% 14% 11%

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Mol	Chain	Length	Quality of chain
17	Z	287	 75% 13% 12%

2 Entry composition [i](#)

There are 18 unique types of molecules in this entry. The entry contains 61572 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 Proteasome subunit beta type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	1	210	Total	C	N	O	S	0	0
			1663	1058	286	315	4		
1	M	210	Total	C	N	O	S	0	0
			1663	1058	286	315	4		

- Molecule 2 is a protein called Proteasome subunit beta type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	2	224	Total	C	N	O	S	0	0
			1753	1108	300	338	7		
2	N	223	Total	C	N	O	S	0	0
			1745	1104	299	335	7		

- Molecule 3 is a protein called Proteasome maturation factor UMP1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	3	142	Total	C	N	O	S	0	0
			1133	698	200	228	7		
3	6	143	Total	C	N	O	S	0	0
			1139	701	201	230	7		

- Molecule 4 is a protein called Proteasome chaperone 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	4	239	Total	C	N	O	S	0	0
			1861	1211	288	349	13		
4	7	241	Total	C	N	O	S	0	0
			1879	1222	292	352	13		

- Molecule 5 is a protein called Proteasome assembly chaperone 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	5	244	Total	C	N	O	S	0	0
			1980	1285	320	367	8		
5	8	249	Total	C	N	O	S	0	0
			2025	1315	323	380	7		

- Molecule 6 is a protein called Proteasome subunit alpha type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	A	241	Total	C	N	O	S	0	0
			1900	1210	319	363	8		
6	O	241	Total	C	N	O	S	0	0
			1900	1210	319	363	8		

- Molecule 7 is a protein called Proteasome subunit alpha type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	B	249	Total	C	N	O	S	0	0
			1906	1213	314	375	4		
7	P	250	Total	C	N	O	S	0	0
			1914	1219	315	376	4		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
8	C	236	Total	C	N	O	S	0	0
			1856	1176	312	365	3		
8	Q	243	Total	C	N	O	S	0	0
			1900	1199	320	378	3		

- Molecule 9 is a protein called Proteasome subunit alpha type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	D	245	Total	C	N	O	S	0	0
			1923	1199	337	383	4		
9	R	242	Total	C	N	O	S	0	0
			1899	1186	333	376	4		

- Molecule 10 is a protein called Proteasome subunit alpha type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	E	250	Total	C	N	O	S	0	0
			1933	1209	325	391	8		

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	S	249	Total	C	N	O	S	0	0
			1924	1204	324	388	8		

- Molecule 11 is a protein called Proteasome subunit alpha type-6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	F	234	Total	C	N	O	S	0	0
			1802	1134	313	350	5		
11	T	234	Total	C	N	O	S	0	0
			1802	1134	313	350	5		

- Molecule 12 is a protein called Probable proteasome subunit alpha type-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	G	245	Total	C	N	O	S	0	0
			1900	1208	329	359	4		
12	U	244	Total	C	N	O	S	0	0
			1892	1205	328	355	4		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	207	LYS	ASN	conflict	UNP P21242
U	208	LYS	ASN	conflict	UNP P21242

- Molecule 13 is a protein called Proteasome subunit beta type-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	H	205	Total	C	N	O	S	0	0
			1575	996	261	311	7		
13	V	205	Total	C	N	O	S	0	0
			1575	996	261	311	7		

- Molecule 14 is a protein called Proteasome subunit beta type-2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	I	208	Total	C	N	O	S	0	0
			1576	992	274	304	6		
14	W	215	Total	C	N	O	S	0	0
			1629	1024	285	314	6		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	191	THR	LEU	conflict	UNP P25043
I	192	PRO	THR	conflict	UNP P25043
I	193	THR	-	insertion	UNP P25043
W	191	THR	LEU	conflict	UNP P25043
W	192	PRO	THR	conflict	UNP P25043
W	193	THR	-	insertion	UNP P25043

- Molecule 15 is a protein called Proteasome subunit beta type-3.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	J	186	Total	C	N	O	S	0	0
			1452	937	234	273	8		
15	X	189	Total	C	N	O	S	0	0
			1469	948	237	276	8		

- Molecule 16 is a protein called Proteasome subunit beta type-4.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	K	191	Total	C	N	O	S	0	0
			1532	973	260	294	5		
16	Y	190	Total	C	N	O	S	0	0
			1529	975	259	290	5		

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	142	PHE	SER	engineered mutation	UNP P22141
K	199	ASP	-	expression tag	UNP P22141
K	200	TYR	-	expression tag	UNP P22141
K	201	LYS	-	expression tag	UNP P22141
K	202	ASP	-	expression tag	UNP P22141
K	203	ASP	-	expression tag	UNP P22141
K	204	ASP	-	expression tag	UNP P22141
K	205	ASP	-	expression tag	UNP P22141
K	206	LYS	-	expression tag	UNP P22141
K	207	HIS	-	expression tag	UNP P22141
K	208	HIS	-	expression tag	UNP P22141
K	209	HIS	-	expression tag	UNP P22141
K	210	HIS	-	expression tag	UNP P22141
K	211	HIS	-	expression tag	UNP P22141
K	212	HIS	-	expression tag	UNP P22141
Y	142	PHE	SER	engineered mutation	UNP P22141
Y	199	ASP	-	expression tag	UNP P22141

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Chain	Residue	Modelled	Actual	Comment	Reference
Y	200	TYR	-	expression tag	UNP P22141
Y	201	LYS	-	expression tag	UNP P22141
Y	202	ASP	-	expression tag	UNP P22141
Y	203	ASP	-	expression tag	UNP P22141
Y	204	ASP	-	expression tag	UNP P22141
Y	205	ASP	-	expression tag	UNP P22141
Y	206	LYS	-	expression tag	UNP P22141
Y	207	HIS	-	expression tag	UNP P22141
Y	208	HIS	-	expression tag	UNP P22141
Y	209	HIS	-	expression tag	UNP P22141
Y	210	HIS	-	expression tag	UNP P22141
Y	211	HIS	-	expression tag	UNP P22141
Y	212	HIS	-	expression tag	UNP P22141

- Molecule 17 is a protein called Proteasome subunit beta type-5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	L	254	Total 1969	C 1248	N 338	O 374	S 9	0	0
17	Z	252	Total 1958	C 1241	N 337	O 371	S 9	0	0

- Molecule 18 is water.

Mol	Chain	Residues	Atoms		AltConf
18	1	60	Total 60	O 60	0
18	2	66	Total 66	O 66	0
18	3	35	Total 35	O 35	0
18	4	50	Total 50	O 50	0
18	5	49	Total 49	O 49	0
18	6	50	Total 50	O 50	0
18	7	41	Total 41	O 41	0
18	8	76	Total 76	O 76	0
18	A	64	Total 64	O 64	0

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Mol	Chain	Residues	Atoms		AltConf
18	B	67	Total 67	O 67	0
18	C	56	Total 56	O 56	0
18	D	63	Total 63	O 63	0
18	E	72	Total 72	O 72	0
18	F	63	Total 63	O 63	0
18	G	66	Total 66	O 66	0
18	H	62	Total 62	O 62	0
18	I	53	Total 53	O 53	0
18	J	57	Total 57	O 57	0
18	K	56	Total 56	O 56	0
18	L	53	Total 53	O 53	0
18	M	73	Total 73	O 73	0
18	N	60	Total 60	O 60	0
18	O	62	Total 62	O 62	0
18	P	75	Total 75	O 75	0
18	Q	59	Total 59	O 59	0
18	R	56	Total 56	O 56	0
18	S	76	Total 76	O 76	0
18	T	53	Total 53	O 53	0
18	U	54	Total 54	O 54	0
18	V	69	Total 69	O 69	0

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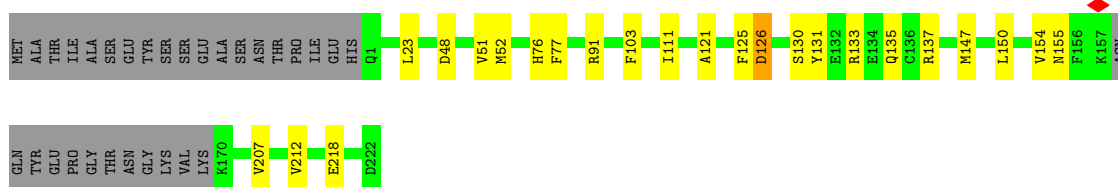
Mol	Chain	Residues	Atoms		AltConf
18	W	61	Total 61	O 61	0
18	X	64	Total 64	O 64	0
18	Y	44	Total 44	O 44	0
18	Z	51	Total 51	O 51	0

3 Residue-property plots [i](#)


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.

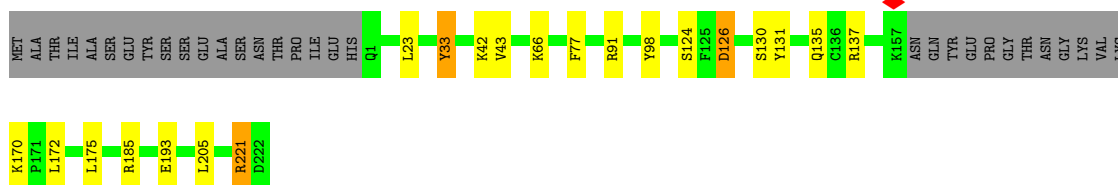
- Molecule 1: Proteasome subunit beta type-6

Chain 1: 



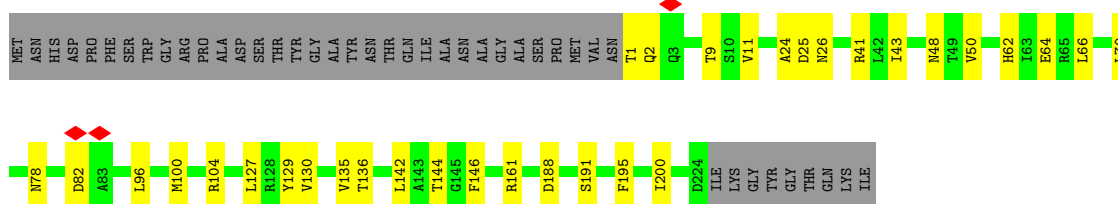
- Molecule 1: Proteasome subunit beta type-6

Chain M: 



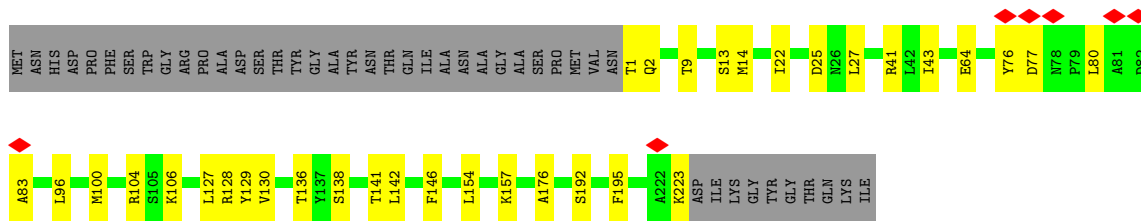
- Molecule 2: Proteasome subunit beta type-7

Chain 2: 

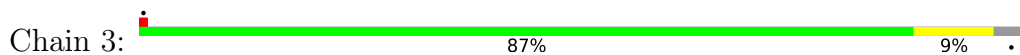


- Molecule 2: Proteasome subunit beta type-7

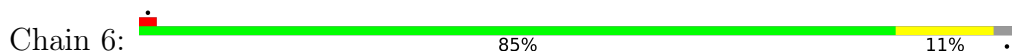
Chain N: 



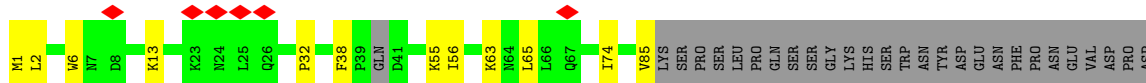
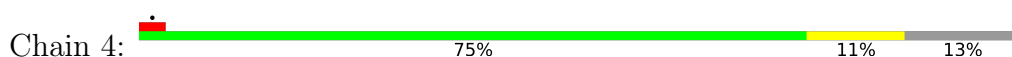
• Molecule 3: Proteasome maturation factor UMP1



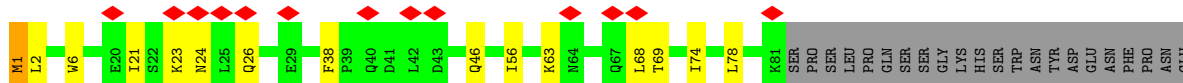
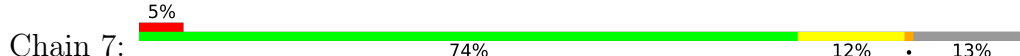
• Molecule 3: Proteasome maturation factor UMP1



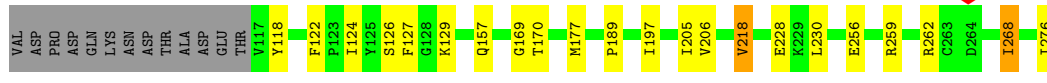
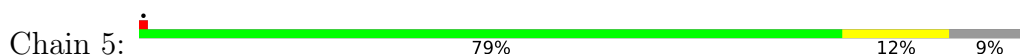
• Molecule 4: Proteasome chaperone 1

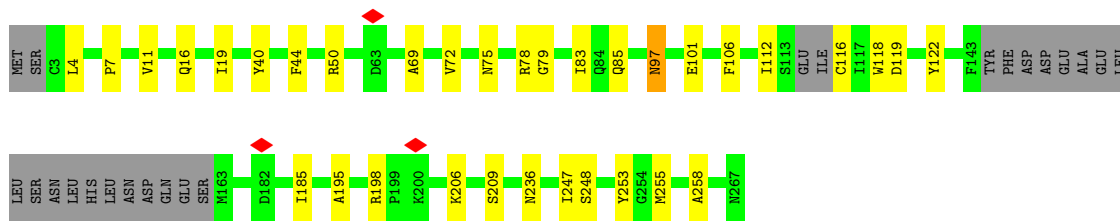


• Molecule 4: Proteasome chaperone 1

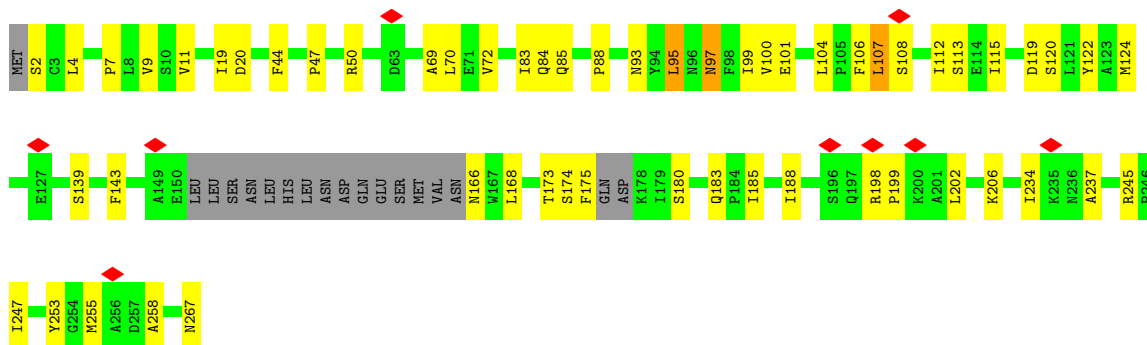


• Molecule 5: Proteasome assembly chaperone 2

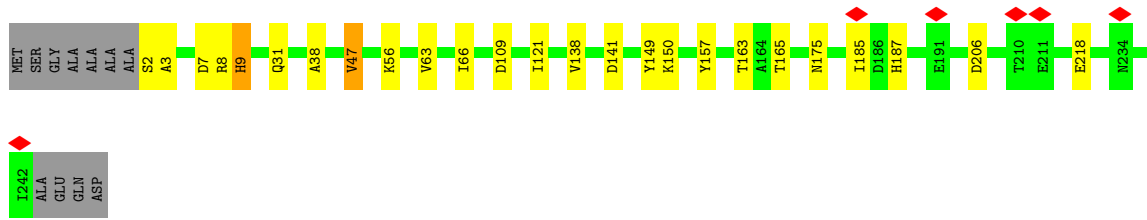
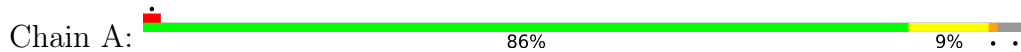




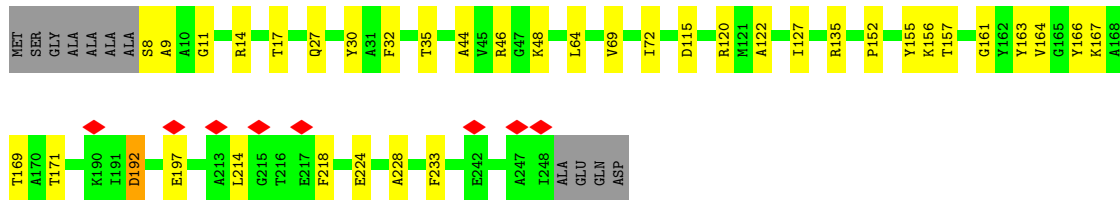
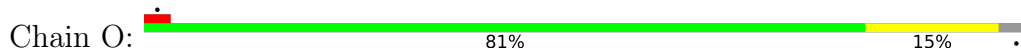
• Molecule 5: Proteasome assembly chaperone 2



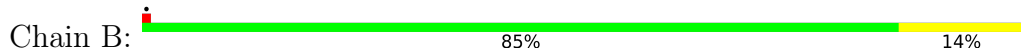
• Molecule 6: Proteasome subunit alpha type-1

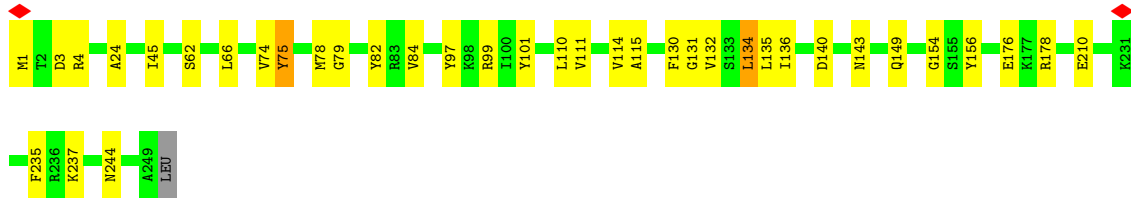


• Molecule 6: Proteasome subunit alpha type-1

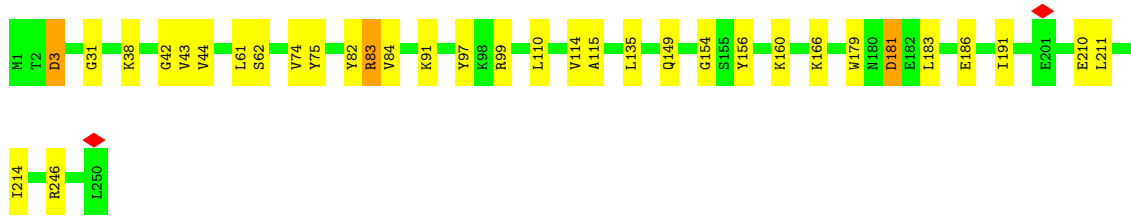
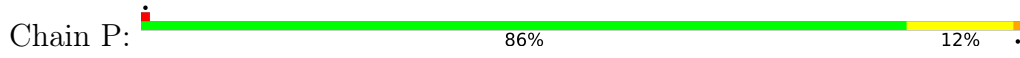


• Molecule 7: Proteasome subunit alpha type-2

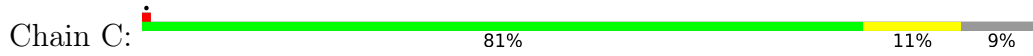




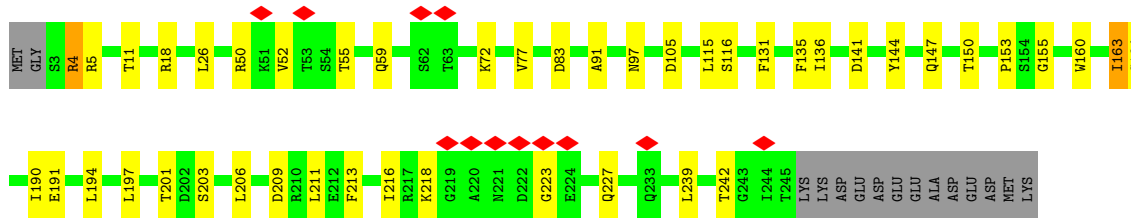
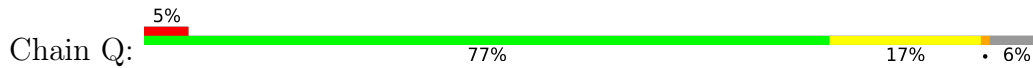
• Molecule 7: Proteasome subunit alpha type-2



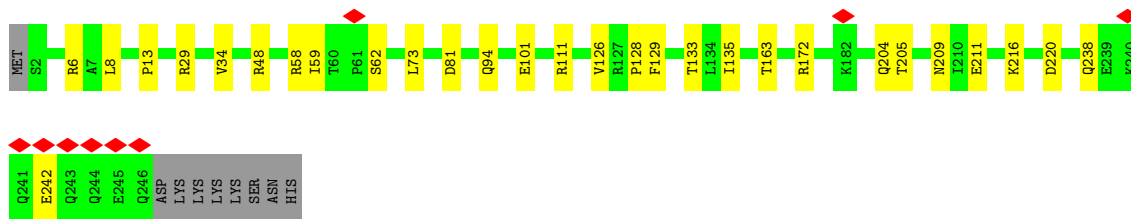
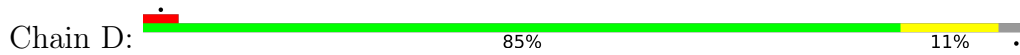
• Molecule 8: Proteasome subunit alpha type-3



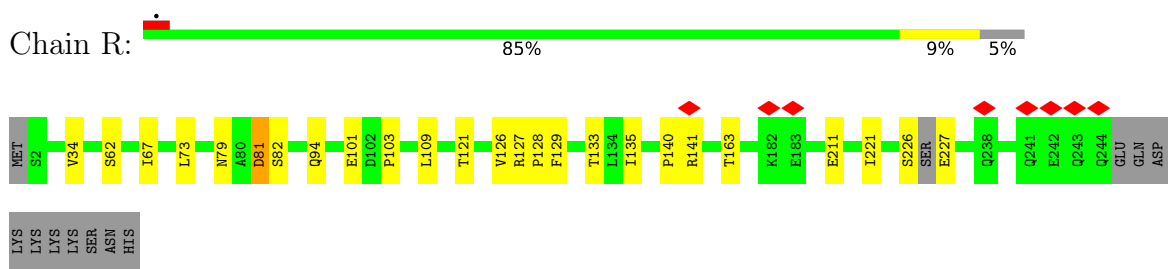
• Molecule 8: Proteasome subunit alpha type-3



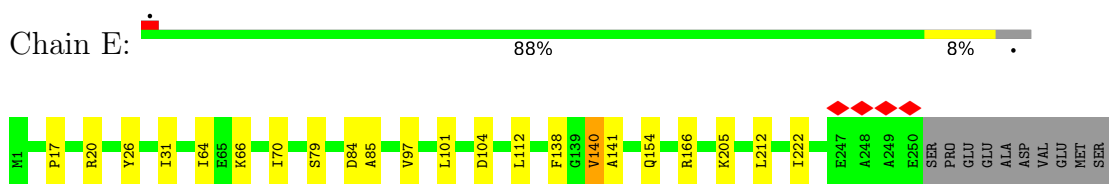
• Molecule 9: Proteasome subunit alpha type-4



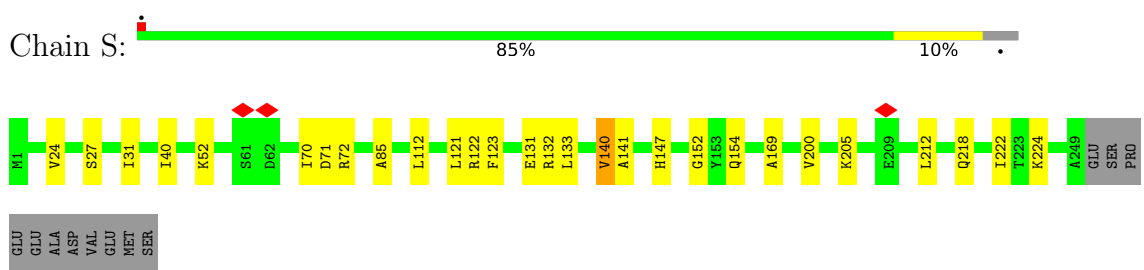
• Molecule 9: Proteasome subunit alpha type-4



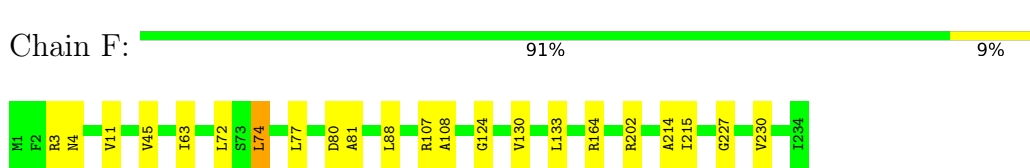
• Molecule 10: Proteasome subunit alpha type-5



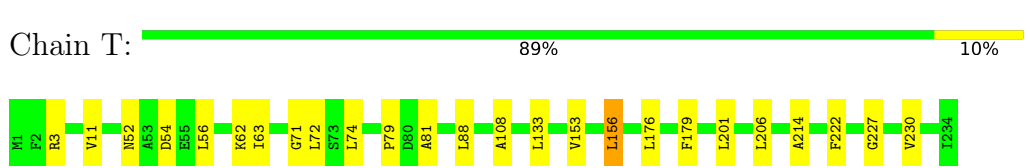
• Molecule 10: Proteasome subunit alpha type-5



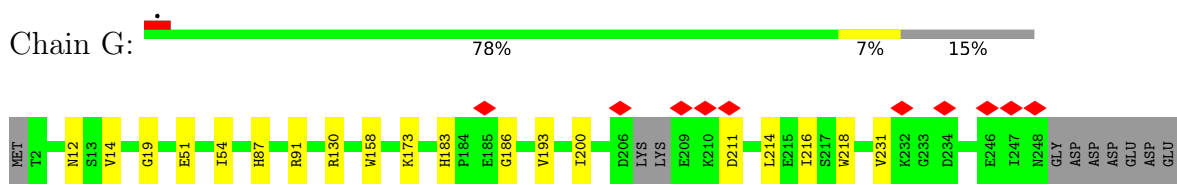
• Molecule 11: Proteasome subunit alpha type-6



• Molecule 11: Proteasome subunit alpha type-6

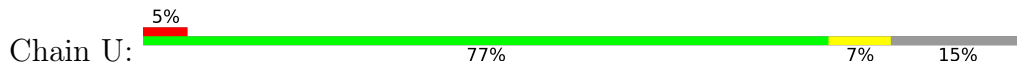


• Molecule 12: Probable proteasome subunit alpha type-7



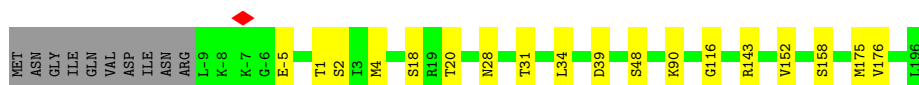
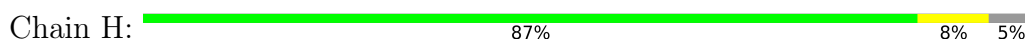
ASP ASP
SER SER
ASP ASP
ASN VAL
VAL MET
SER SER
SER SER
ASP ASP
ASP ASP
GLU ASP
ASN ASN
ALA PRO
VAL VAL
ALA ALA
THR THR
THR THR
GLN GLN
GLU GLU
ASP ASP
ILE ILE
HIS HIS
LEU LEU
GLU GLU

● Molecule 12: Probable proteasome subunit alpha type-7

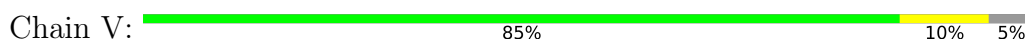


GLY ASP
ASP ASP
ASP ASP
GLN GLN
ASP ASP
GLU ASP
ASP ASP
ASN ASP
VAL VAL
MET MET
SER SER
SER SER
ASP ASP
ASP ASP
GLU GLU
ASN ASN
ALA ALA
PRO PRO
VAL VAL
ALA ALA
THR THR
THR THR
ASP ASP
GLN GLN
GLY GLY
ASP ASP
ILE ILE
HIS HIS
LEU LEU
GLU GLU

● Molecule 13: Proteasome subunit beta type-1



● Molecule 13: Proteasome subunit beta type-1



● Molecule 14: Proteasome subunit beta type-2



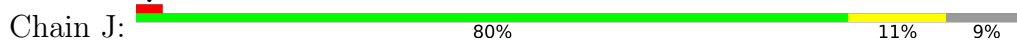
GLU LYS
GLN LYS
SER TVR
LYS LYS
PHE PRO
ARG ARG
GLY THR
THR THR
ALA ALA
VAL VAL
LEU LEU
GLY GLU
SER SER
ILE ILE
VAL VAL
ASN ASN
ILE ILE
CYS CYS
ASP ASP
ILE ILE
GLN GLN
GLU GLU
VAL VAL
ASP ASP
THR THR

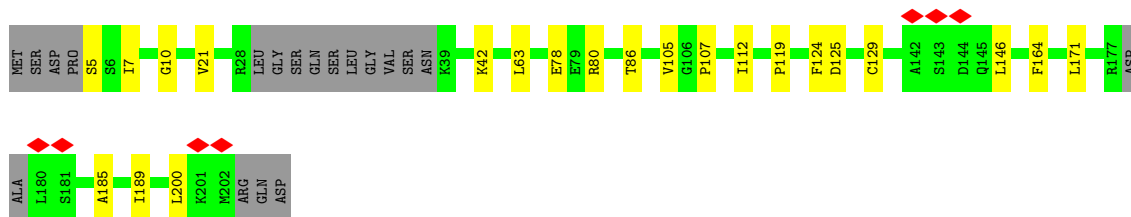
● Molecule 14: Proteasome subunit beta type-2



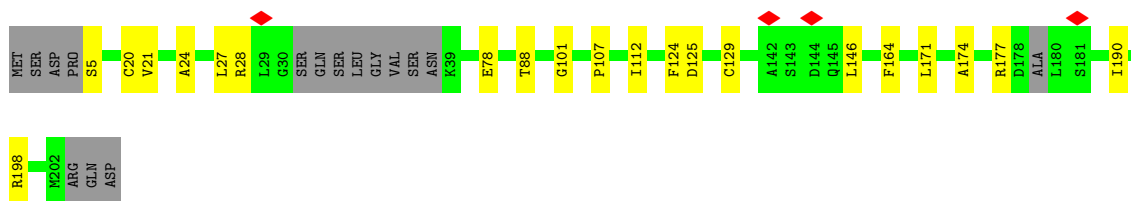
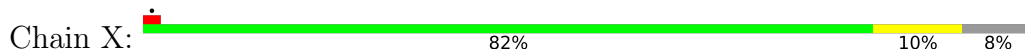
G170
V177
F192
THR
PRO
ASN
VAL
ARG
GLU
GLU
GLN
LYS
SER
TYR
LYS
PHE
PRO
ARG
GLY
THR
THR
VAL
VAL
SER
SER
ILE
ILE
ASN
ASP
CYS
ILE
GLN
GLU
GLN
VAL
VAL
ASP
ASP
ILE
THR

● Molecule 15: Proteasome subunit beta type-3

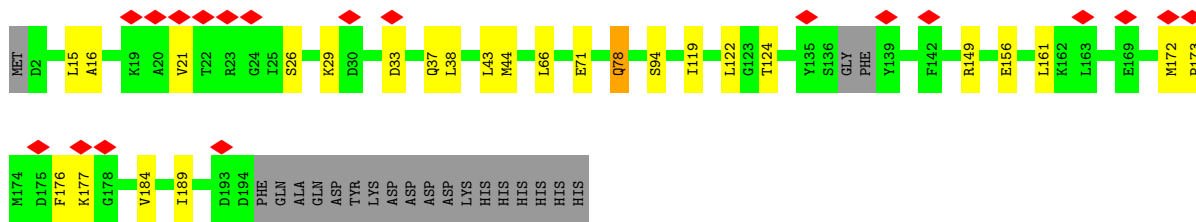
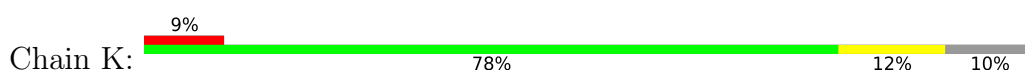




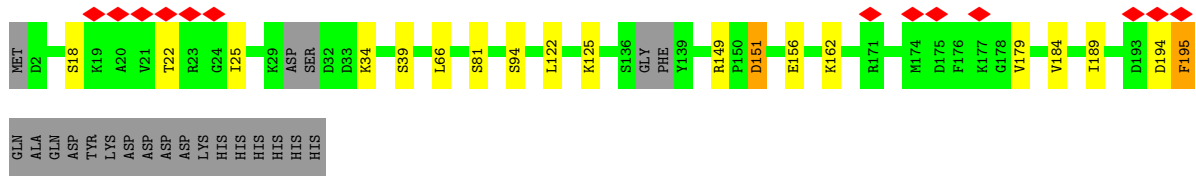
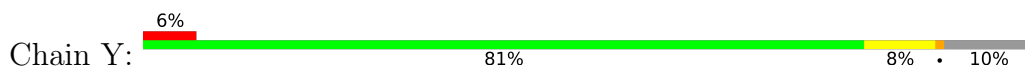
• Molecule 15: Proteasome subunit beta type-3



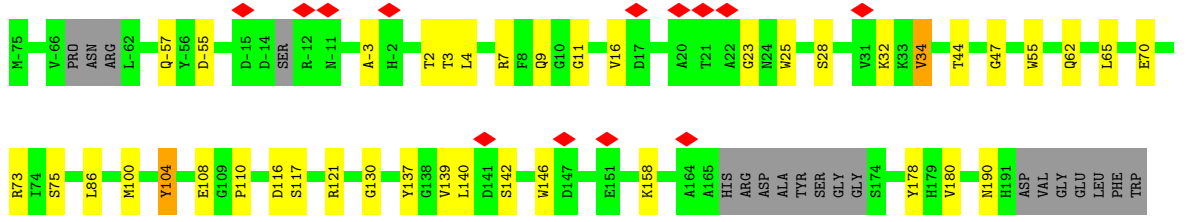
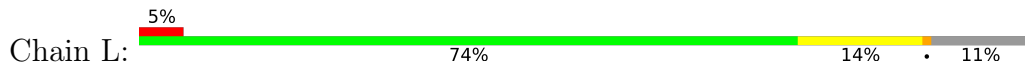
• Molecule 16: Proteasome subunit beta type-4



• Molecule 16: Proteasome subunit beta type-4




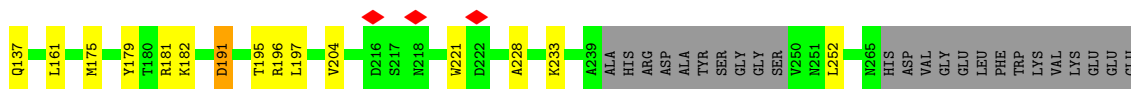
• Molecule 17: Proteasome subunit beta type-5



LYS
VAL
LYS
GLU
GLU
GLY
SER
PHE
ASN
ASN
VAL
ILE
GLY

• Molecule 17: Proteasome subunit beta type-5

Chain Z:  75% 13% 12%



GLY
SER
PHE
ASN
ASN
VAL
ILE
GLY

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	169652	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	44	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	105000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	1.702	Depositor
Minimum map value	-0.922	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.042	Depositor
Recommended contour level	0.205	Depositor
Map size (\AA)	500.4, 500.4, 500.4	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.834, 0.834, 0.834	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	1	0.26	0/1698	0.48	0/2289
1	M	0.26	0/1698	0.49	0/2289
2	2	0.26	0/1783	0.51	0/2420
2	N	0.26	0/1775	0.51	0/2409
3	3	0.24	0/1151	0.47	0/1556
3	6	0.24	0/1157	0.48	0/1564
4	4	0.25	0/1904	0.44	0/2582
4	7	0.25	0/1923	0.44	0/2608
5	5	0.25	0/2028	0.43	0/2754
5	8	0.25	0/2075	0.43	0/2818
6	A	0.27	0/1938	0.48	0/2625
6	O	0.26	0/1938	0.48	0/2625
7	B	0.28	0/1943	0.48	0/2631
7	P	0.27	0/1951	0.47	0/2642
8	C	0.26	0/1884	0.49	0/2548
8	Q	0.26	0/1930	0.48	0/2613
9	D	0.25	0/1952	0.48	0/2642
9	R	0.25	0/1927	0.49	0/2607
10	E	0.25	0/1960	0.47	0/2640
10	S	0.25	0/1951	0.48	0/2628
11	F	0.25	0/1830	0.49	0/2473
11	T	0.26	0/1830	0.49	0/2473
12	G	0.27	0/1939	0.46	0/2618
12	U	0.26	0/1931	0.45	0/2606
13	H	0.26	0/1604	0.48	0/2171
13	V	0.26	0/1604	0.48	0/2171
14	I	0.26	0/1606	0.47	0/2179
14	W	0.26	0/1661	0.47	0/2254
15	J	0.26	0/1479	0.47	0/1993
15	X	0.26	0/1496	0.47	0/2016
16	K	0.25	0/1558	0.47	0/2100
16	Y	0.25	0/1555	0.47	0/2094
17	L	0.25	0/2009	0.46	0/2720
17	Z	0.25	0/1997	0.46	0/2702

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
All	All	0.26	0/60665	0.47	0/82060

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	1	1663	0	1620	13	0
1	M	1663	0	1620	19	0
2	2	1753	0	1754	18	0
2	N	1745	0	1750	18	0
3	3	1133	0	1113	9	0
3	6	1139	0	1118	15	0
4	4	1861	0	1888	19	0
4	7	1879	0	1910	22	0
5	5	1980	0	1957	20	0
5	8	2025	0	1986	35	0
6	A	1900	0	1897	16	0
6	O	1900	0	1897	29	0
7	B	1906	0	1918	30	0
7	P	1914	0	1929	22	0
8	C	1856	0	1864	20	0
8	Q	1900	0	1898	29	0
9	D	1923	0	1927	21	0
9	R	1899	0	1907	15	0
10	E	1933	0	1908	14	0
10	S	1924	0	1902	15	0
11	F	1802	0	1809	17	0
11	T	1802	0	1809	14	0
12	G	1900	0	1889	17	0
12	U	1892	0	1890	12	0
13	H	1575	0	1555	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
13	V	1575	0	1555	13	0
14	I	1576	0	1554	13	0
14	W	1629	0	1606	20	0
15	J	1452	0	1453	13	0
15	X	1469	0	1469	13	0
16	K	1532	0	1539	17	0
16	Y	1529	0	1538	12	0
17	L	1969	0	1932	30	0
17	Z	1958	0	1920	27	0
18	1	60	0	0	1	0
18	2	66	0	0	2	0
18	3	35	0	0	1	0
18	4	50	0	0	0	0
18	5	49	0	0	0	0
18	6	50	0	0	0	0
18	7	41	0	0	1	0
18	8	76	0	0	2	0
18	A	64	0	0	1	0
18	B	67	0	0	2	0
18	C	56	0	0	2	0
18	D	63	0	0	2	0
18	E	72	0	0	0	0
18	F	63	0	0	0	0
18	G	66	0	0	2	0
18	H	62	0	0	1	0
18	I	53	0	0	2	0
18	J	57	0	0	0	0
18	K	56	0	0	1	0
18	L	53	0	0	2	0
18	M	73	0	0	4	0
18	N	60	0	0	1	0
18	O	62	0	0	2	0
18	P	75	0	0	0	0
18	Q	59	0	0	1	0
18	R	56	0	0	0	0
18	S	76	0	0	1	0
18	T	53	0	0	0	0
18	U	54	0	0	0	0
18	V	69	0	0	1	0
18	W	61	0	0	1	0
18	X	64	0	0	2	0
18	Y	44	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
18	Z	51	0	0	2	0
All	All	61572	0	59281	542	0

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

The worst 5 of 542 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)
7:B:75:TYR:HE1	7:B:134:LEU:HG	1.37	0.89
8:Q:150:THR:HG21	8:Q:163:ILE:HD12	1.62	0.79
4:4:1:MET:HG3	11:F:124:GLY:HA3	1.65	0.79
5:8:11:VAL:HG21	5:8:122:TYR:HB2	1.66	0.77
13:H:34:LEU:HD13	13:H:176:VAL:HG23	1.69	0.75

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	1	206/241 (86%)	201 (98%)	5 (2%)	0	100	100
1	M	206/241 (86%)	201 (98%)	5 (2%)	0	100	100
2	2	222/266 (84%)	215 (97%)	7 (3%)	0	100	100
2	N	221/266 (83%)	215 (97%)	6 (3%)	0	100	100
3	3	138/148 (93%)	137 (99%)	1 (1%)	0	100	100
3	6	139/148 (94%)	137 (99%)	2 (1%)	0	100	100
4	4	233/276 (84%)	228 (98%)	5 (2%)	0	100	100
4	7	237/276 (86%)	231 (98%)	6 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	5	238/267 (89%)	237 (100%)	1 (0%)	0	100	100
5	8	243/267 (91%)	231 (95%)	12 (5%)	0	100	100
6	A	239/252 (95%)	232 (97%)	7 (3%)	0	100	100
6	O	239/252 (95%)	235 (98%)	4 (2%)	0	100	100
7	B	247/250 (99%)	243 (98%)	4 (2%)	0	100	100
7	P	248/250 (99%)	247 (100%)	1 (0%)	0	100	100
8	C	230/258 (89%)	227 (99%)	3 (1%)	0	100	100
8	Q	241/258 (93%)	233 (97%)	8 (3%)	0	100	100
9	D	243/254 (96%)	236 (97%)	7 (3%)	0	100	100
9	R	238/254 (94%)	231 (97%)	6 (2%)	1 (0%)	30	36
10	E	248/260 (95%)	246 (99%)	2 (1%)	0	100	100
10	S	247/260 (95%)	247 (100%)	0	0	100	100
11	F	232/234 (99%)	227 (98%)	5 (2%)	0	100	100
11	T	232/234 (99%)	226 (97%)	6 (3%)	0	100	100
12	G	241/288 (84%)	238 (99%)	3 (1%)	0	100	100
12	U	240/288 (83%)	234 (98%)	6 (2%)	0	100	100
13	H	203/215 (94%)	201 (99%)	2 (1%)	0	100	100
13	V	203/215 (94%)	197 (97%)	6 (3%)	0	100	100
14	I	204/261 (78%)	201 (98%)	3 (2%)	0	100	100
14	W	211/261 (81%)	209 (99%)	2 (1%)	0	100	100
15	J	180/205 (88%)	166 (92%)	14 (8%)	0	100	100
15	X	183/205 (89%)	176 (96%)	7 (4%)	0	100	100
16	K	187/212 (88%)	178 (95%)	8 (4%)	1 (0%)	25	30
16	Y	184/212 (87%)	177 (96%)	7 (4%)	0	100	100
17	L	246/287 (86%)	236 (96%)	10 (4%)	0	100	100
17	Z	244/287 (85%)	239 (98%)	5 (2%)	0	100	100
All	All	7493/8348 (90%)	7315 (98%)	176 (2%)	2 (0%)	100	100

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
9	R	221	ILE
16	K	21	VAL

5.3.2 Protein sidechains [i](#)

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	1	175/201 (87%)	171 (98%)	4 (2%)	45	60
1	M	175/201 (87%)	171 (98%)	4 (2%)	45	60
2	2	192/224 (86%)	187 (97%)	5 (3%)	41	56
2	N	191/224 (85%)	187 (98%)	4 (2%)	48	63
3	3	132/136 (97%)	132 (100%)	0	100	100
3	6	133/136 (98%)	132 (99%)	1 (1%)	79	88
4	4	216/251 (86%)	212 (98%)	4 (2%)	52	67
4	7	218/251 (87%)	213 (98%)	5 (2%)	45	60
5	5	222/244 (91%)	220 (99%)	2 (1%)	75	86
5	8	226/244 (93%)	219 (97%)	7 (3%)	35	49
6	A	205/210 (98%)	200 (98%)	5 (2%)	44	59
6	O	205/210 (98%)	202 (98%)	3 (2%)	60	74
7	B	208/209 (100%)	204 (98%)	4 (2%)	52	67
7	P	209/209 (100%)	205 (98%)	4 (2%)	52	67
8	C	199/216 (92%)	198 (100%)	1 (0%)	86	93
8	Q	203/216 (94%)	200 (98%)	3 (2%)	60	74
9	D	217/226 (96%)	216 (100%)	1 (0%)	86	93
9	R	214/226 (95%)	212 (99%)	2 (1%)	75	86
10	E	206/215 (96%)	203 (98%)	3 (2%)	60	74
10	S	205/215 (95%)	202 (98%)	3 (2%)	60	74
11	F	193/193 (100%)	192 (100%)	1 (0%)	86	93
11	T	193/193 (100%)	190 (98%)	3 (2%)	58	72
12	G	202/239 (84%)	202 (100%)	0	100	100
12	U	201/239 (84%)	197 (98%)	4 (2%)	50	65
13	H	169/178 (95%)	169 (100%)	0	100	100
13	V	169/178 (95%)	168 (99%)	1 (1%)	84	91

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
14	I	167/215 (78%)	166 (99%)	1 (1%)	84	91
14	W	173/215 (80%)	173 (100%)	0	100	100
15	J	157/173 (91%)	156 (99%)	1 (1%)	84	91
15	X	158/173 (91%)	157 (99%)	1 (1%)	84	91
16	K	170/189 (90%)	167 (98%)	3 (2%)	54	68
16	Y	169/189 (89%)	165 (98%)	4 (2%)	44	59
17	L	208/235 (88%)	206 (99%)	2 (1%)	73	83
17	Z	207/235 (88%)	204 (99%)	3 (1%)	62	76
All	All	6487/7108 (91%)	6398 (99%)	89 (1%)	62	76

5 of 89 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	N	223	LYS
10	S	140	VAL
6	O	171	THR
8	Q	4	ARG
11	T	156	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
17	L	53	GLN
8	Q	147	GLN
17	Z	137	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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.

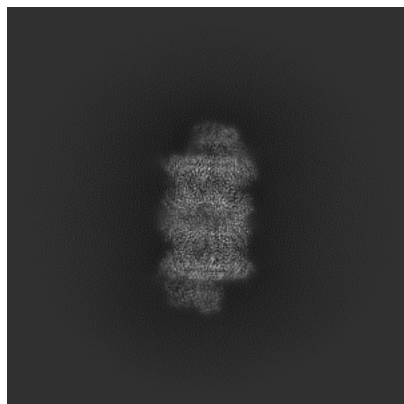
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-19528. These allow visual inspection of the internal detail of the map and identification of artifacts.

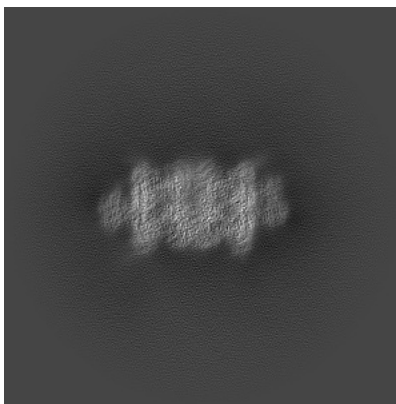
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

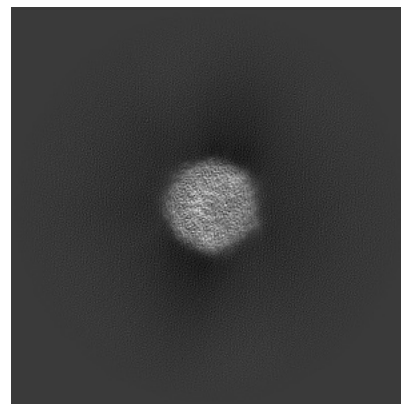
6.1.1 Primary map



X

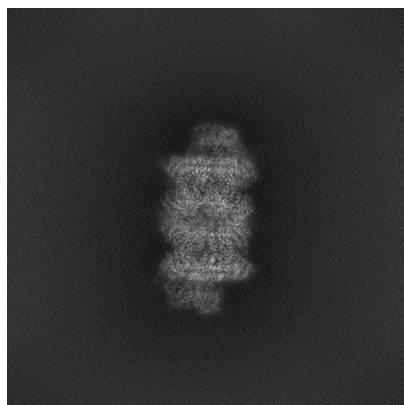


Y

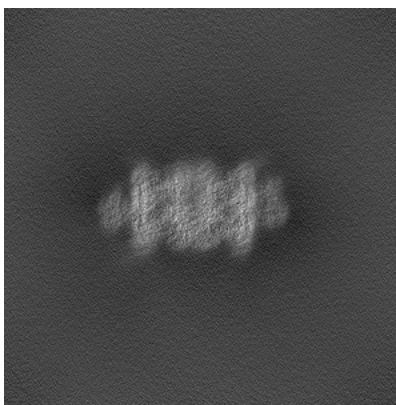


Z

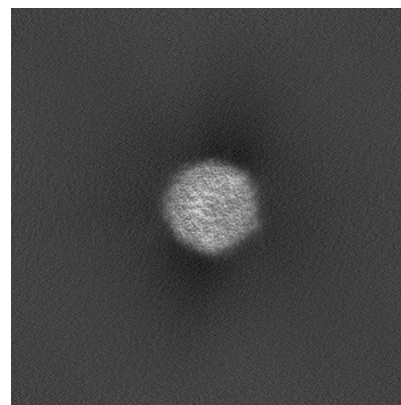
6.1.2 Raw map



X



Y

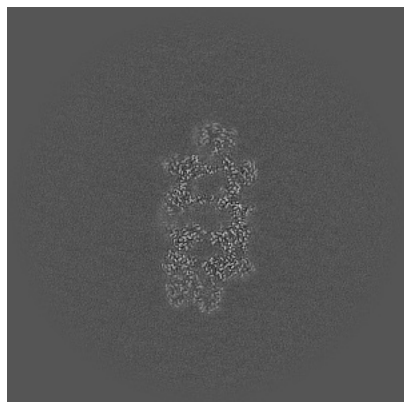


Z

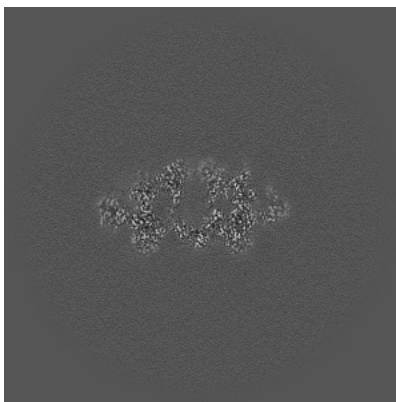
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

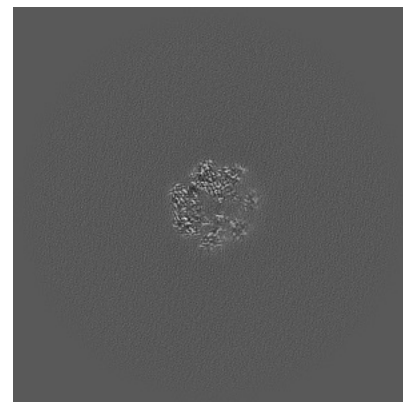
6.2.1 Primary map



X Index: 300

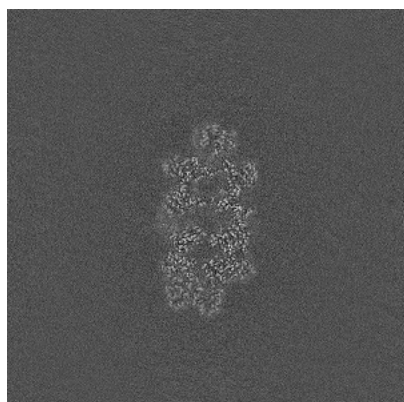


Y Index: 300

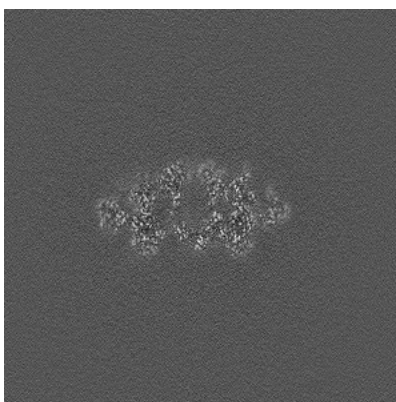


Z Index: 300

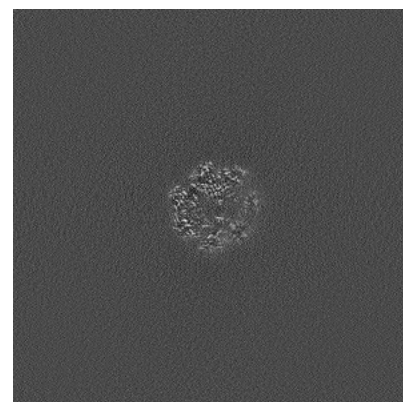
6.2.2 Raw map



X Index: 300



Y Index: 300

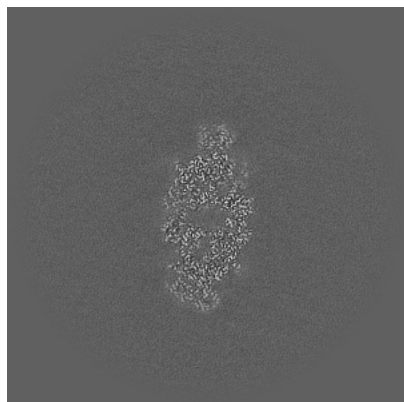


Z Index: 300

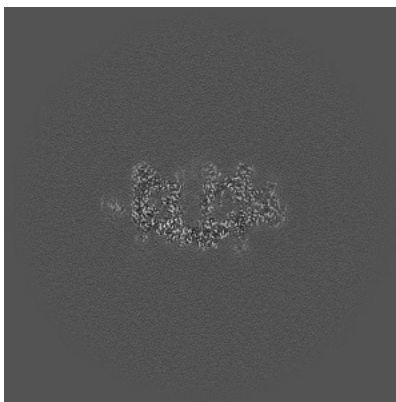
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

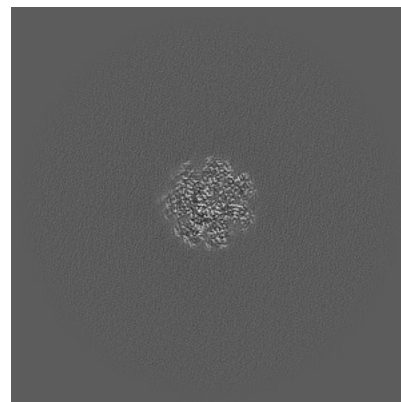
6.3.1 Primary map



X Index: 283

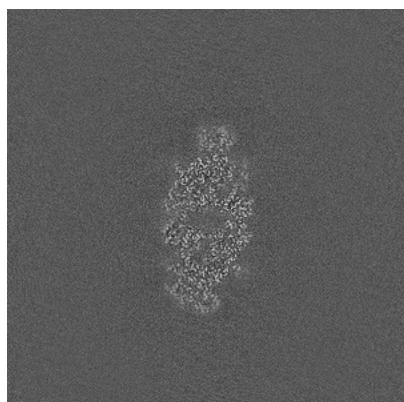


Y Index: 319

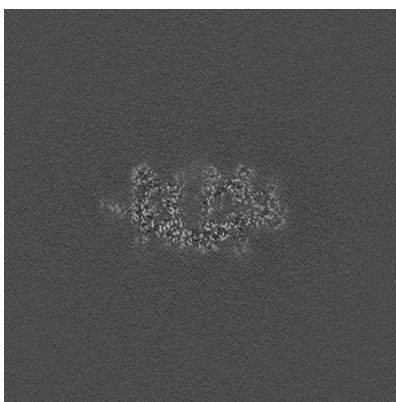


Z Index: 356

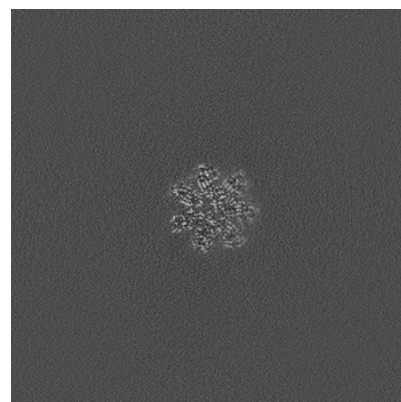
6.3.2 Raw map



X Index: 283



Y Index: 319

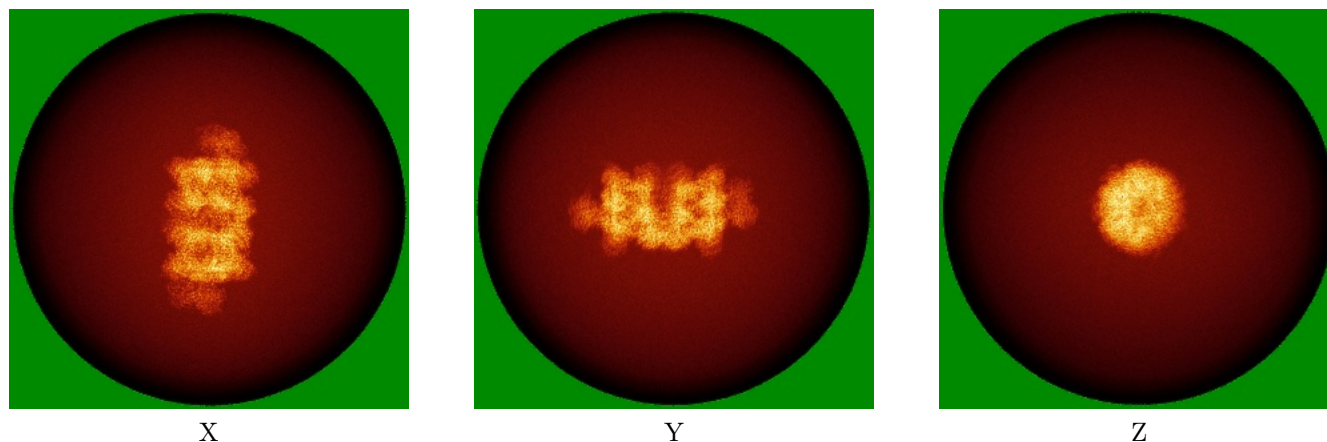


Z Index: 259

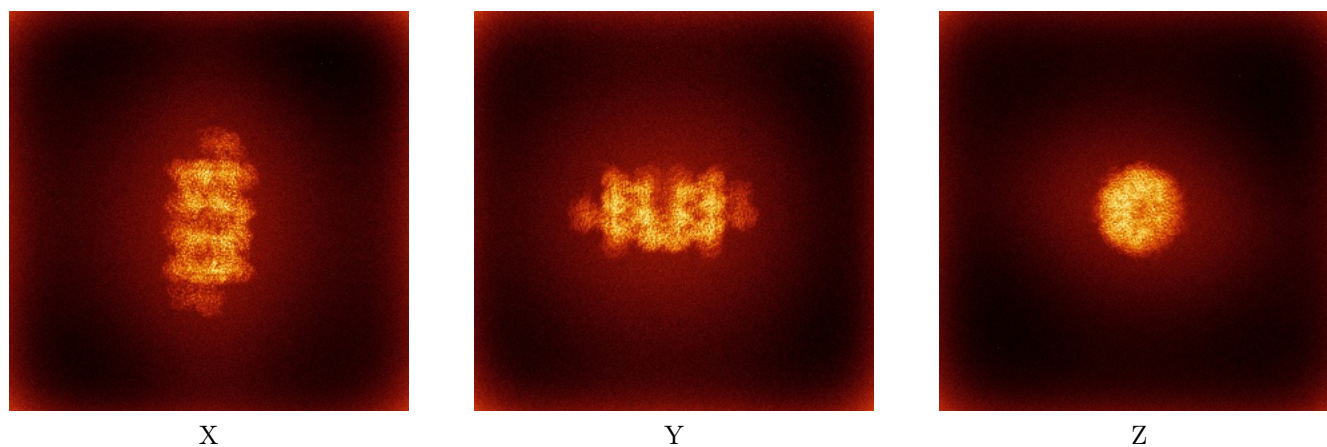
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

6.4.1 Primary map



6.4.2 Raw map



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

6.5 Orthogonal surface views [i](#)

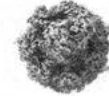
6.5.1 Primary map



X



Y



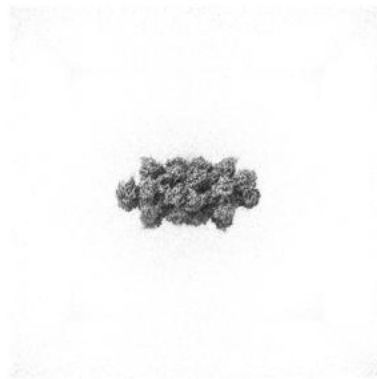
Z

The images above show the 3D surface view of the map at the recommended contour level 0.205. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

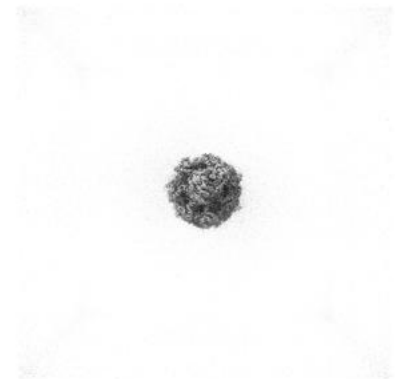
6.5.2 Raw map



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.

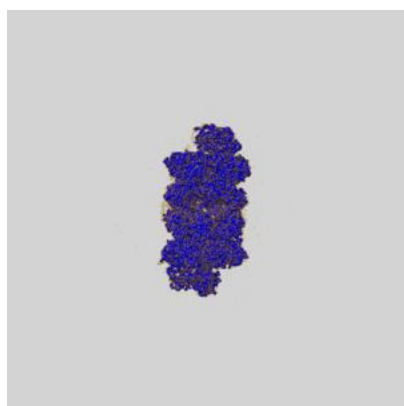
6.6 Mask visualisation [i](#)

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

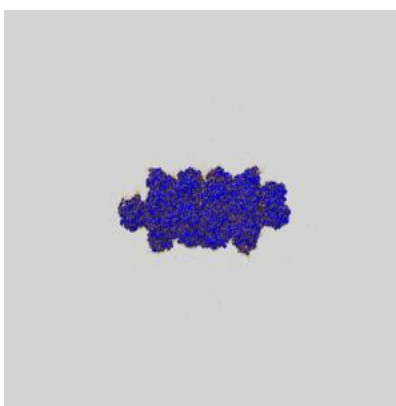
A mask typically either:

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

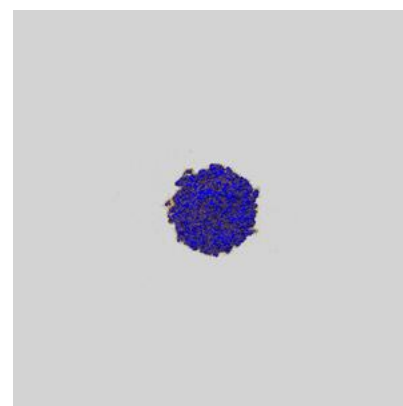
6.6.1 emd_19528_msk_1.map [i](#)



X



Y

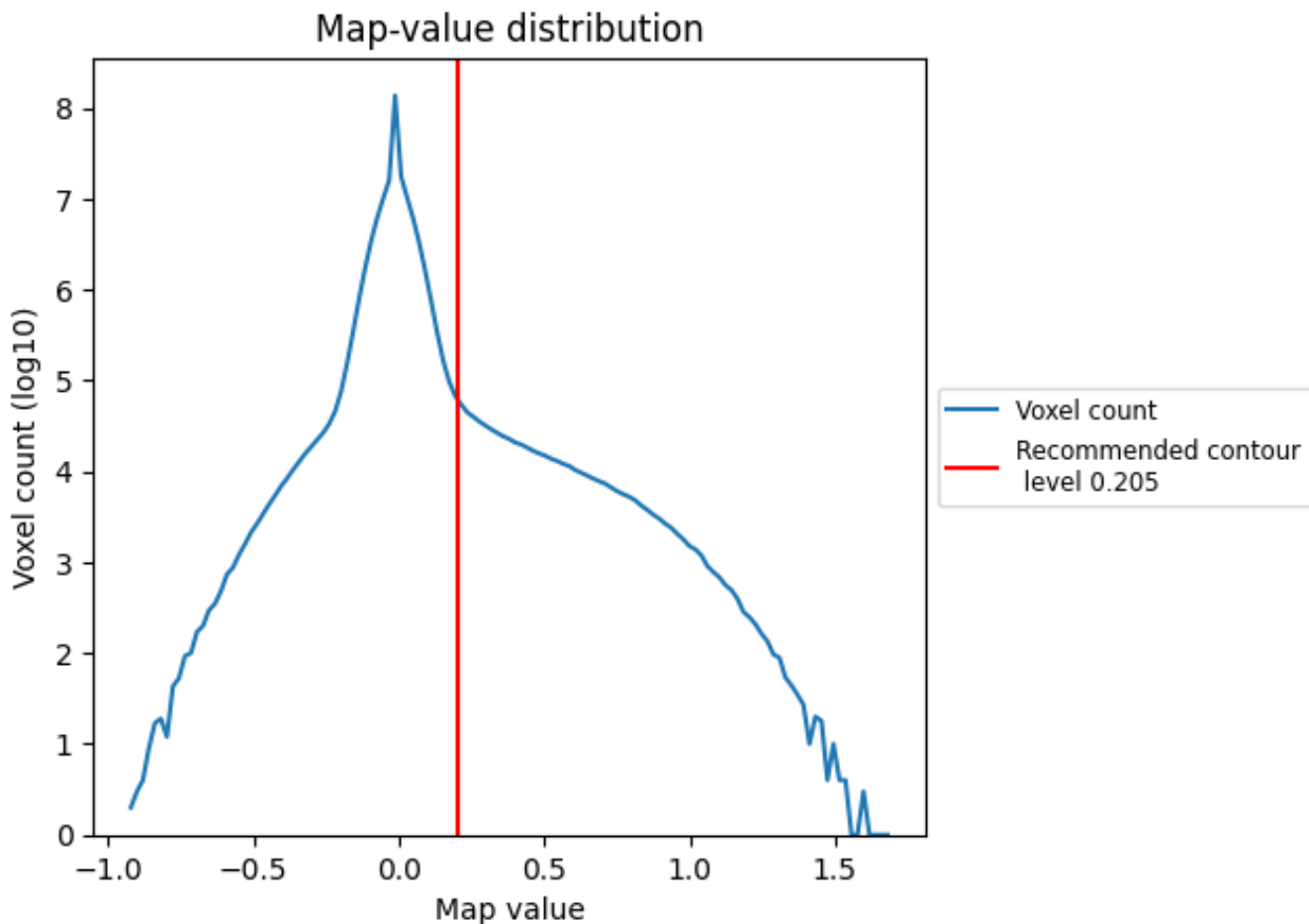


Z

7 Map analysis [i](#)

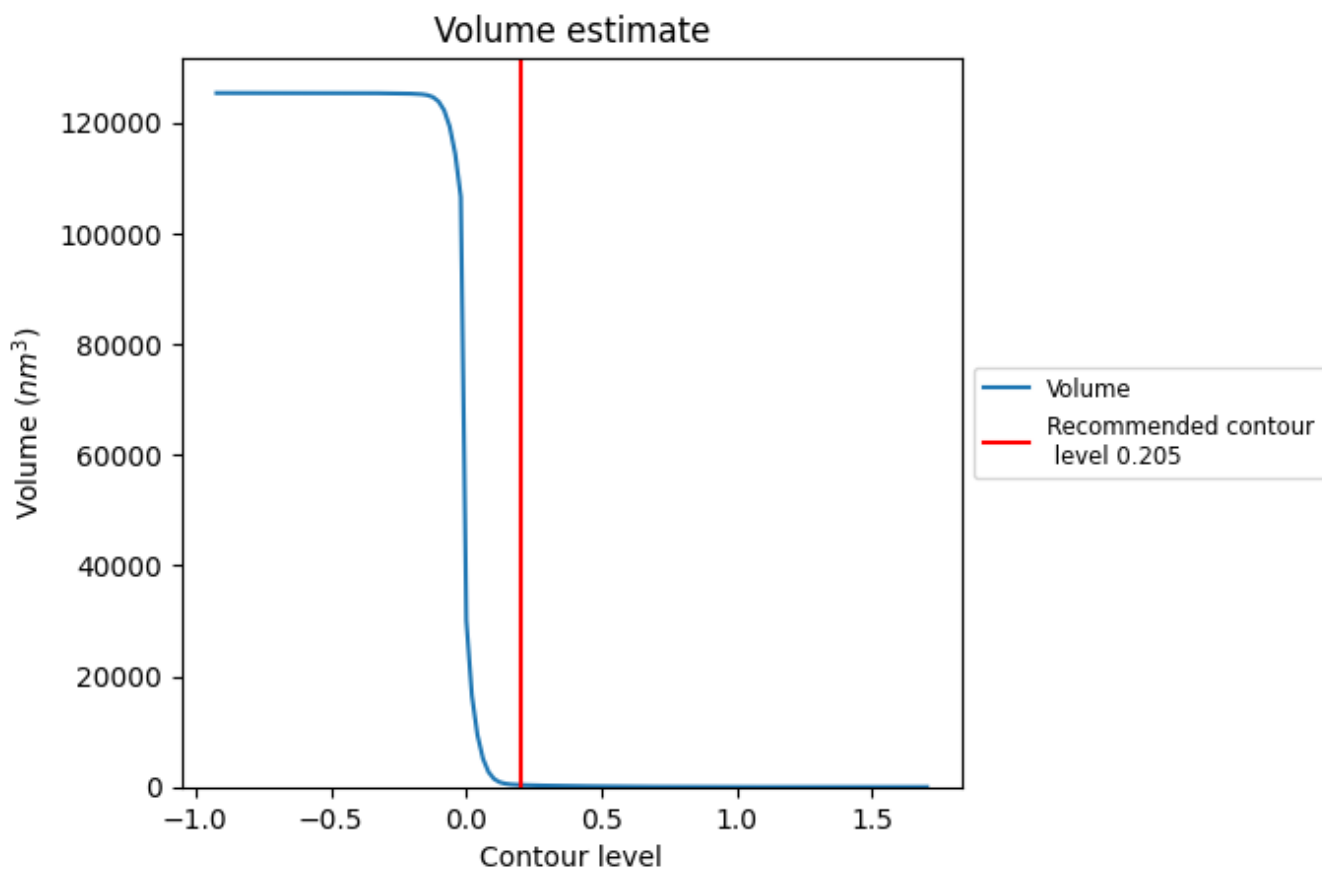
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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.

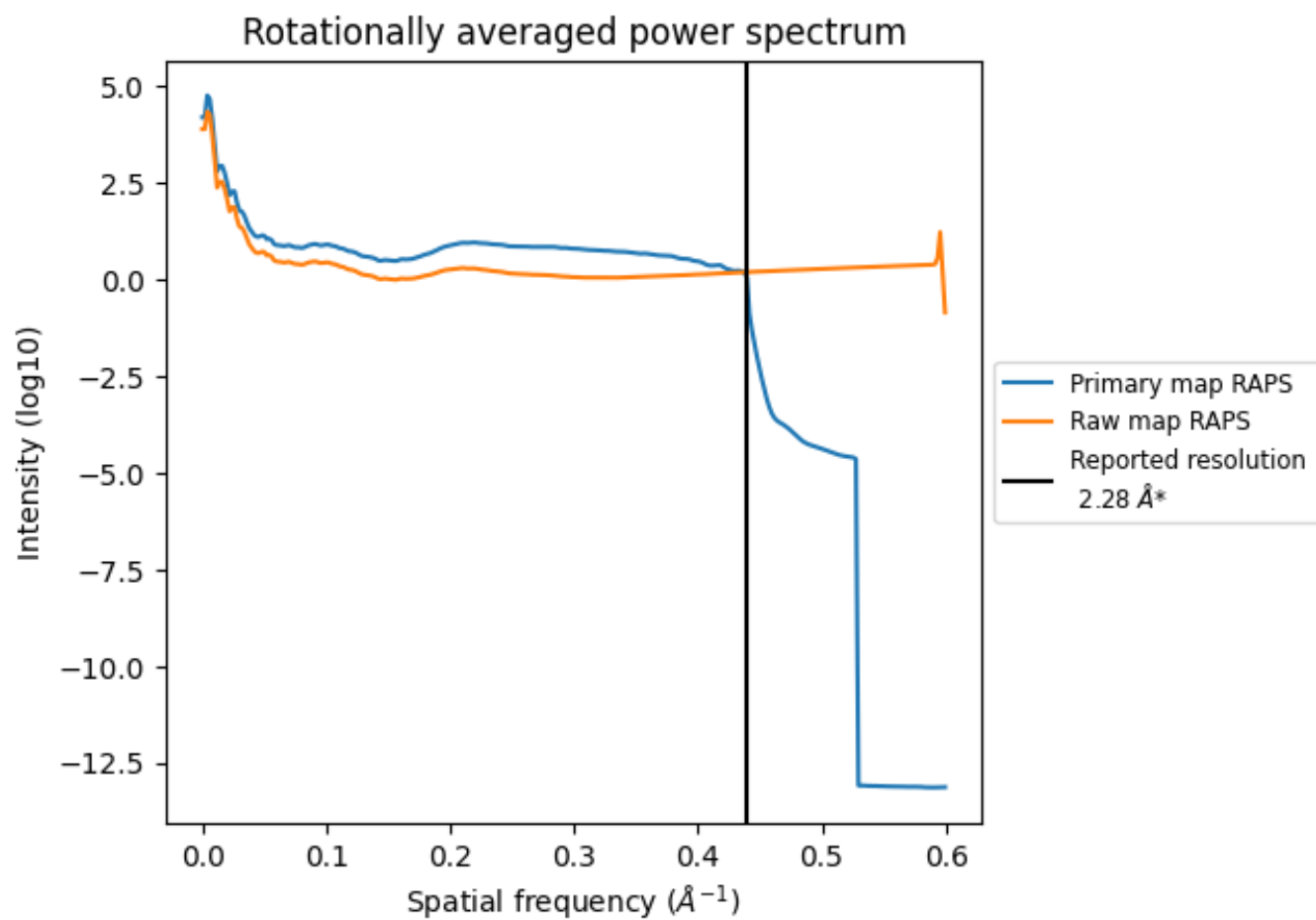
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 352 nm^3 ; this corresponds to an approximate mass of 318 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 i

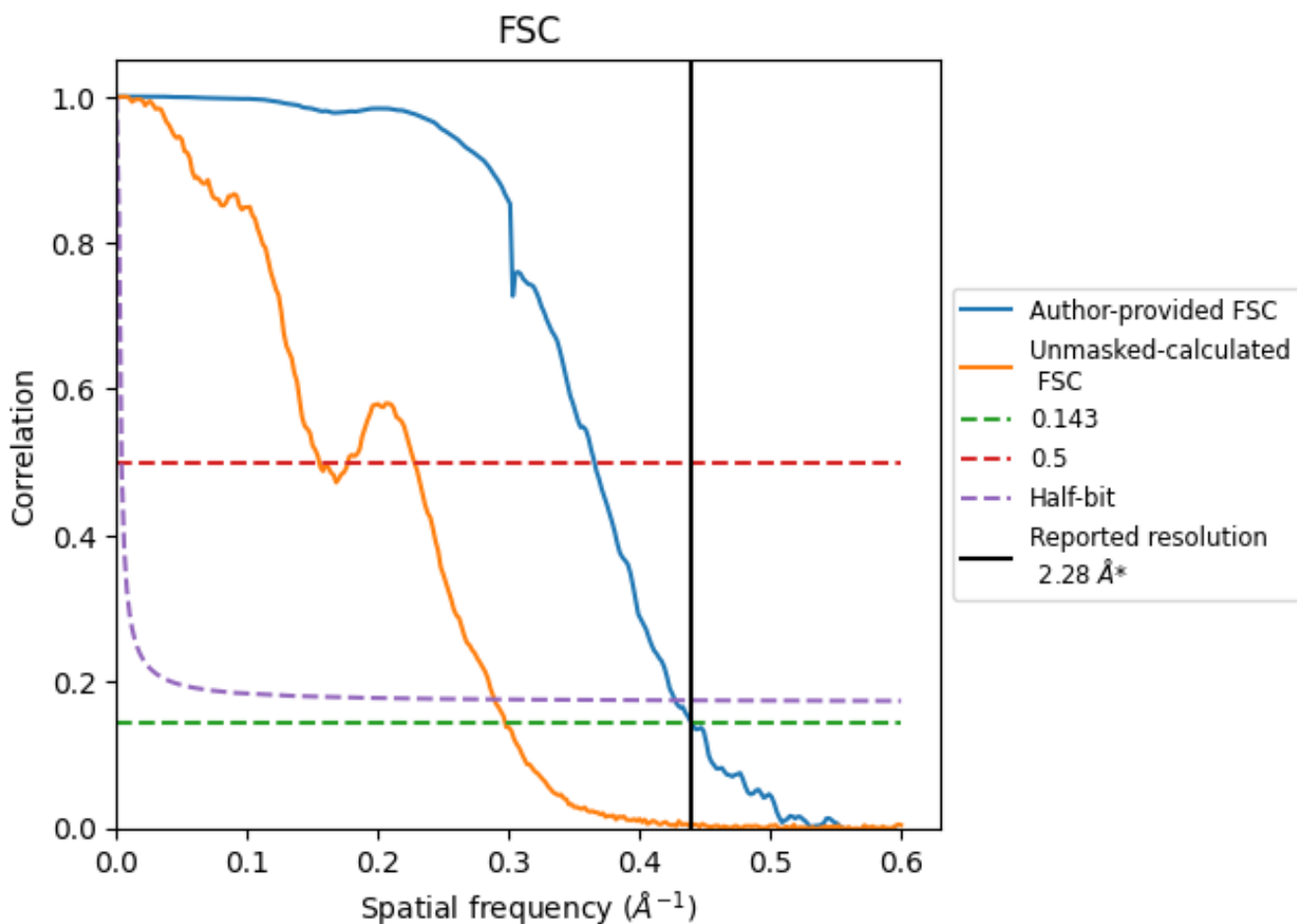


*Reported resolution corresponds to spatial frequency of 0.439 Å⁻¹

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 0.439 Å⁻¹

8.2 Resolution estimates [i](#)

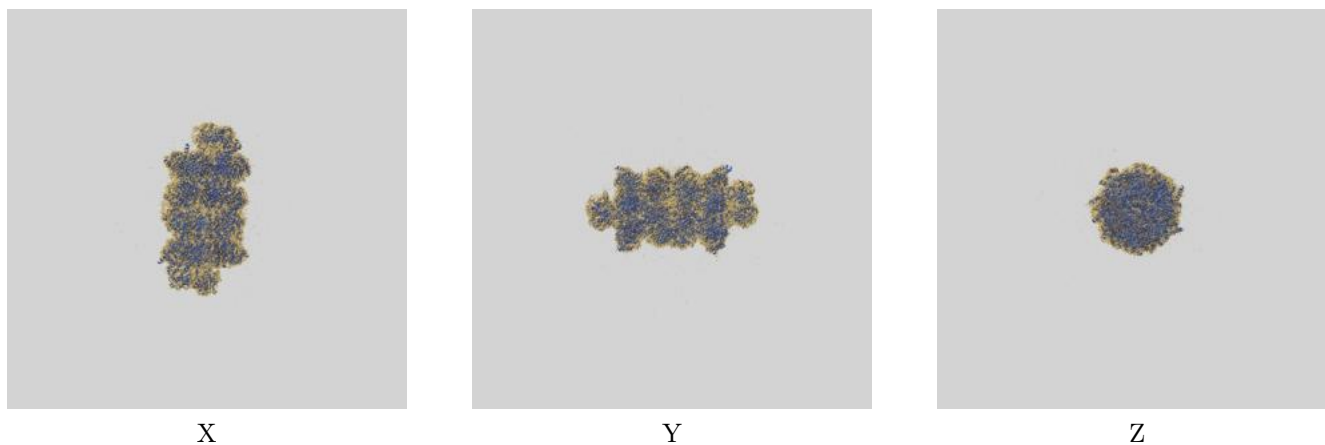
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.28	-	-
Author-provided FSC curve	2.28	2.74	2.34
Unmasked-calculated*	3.37	6.46	3.46

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.37 differs from the reported value 2.28 by more than 10 %

9 Map-model fit [i](#)

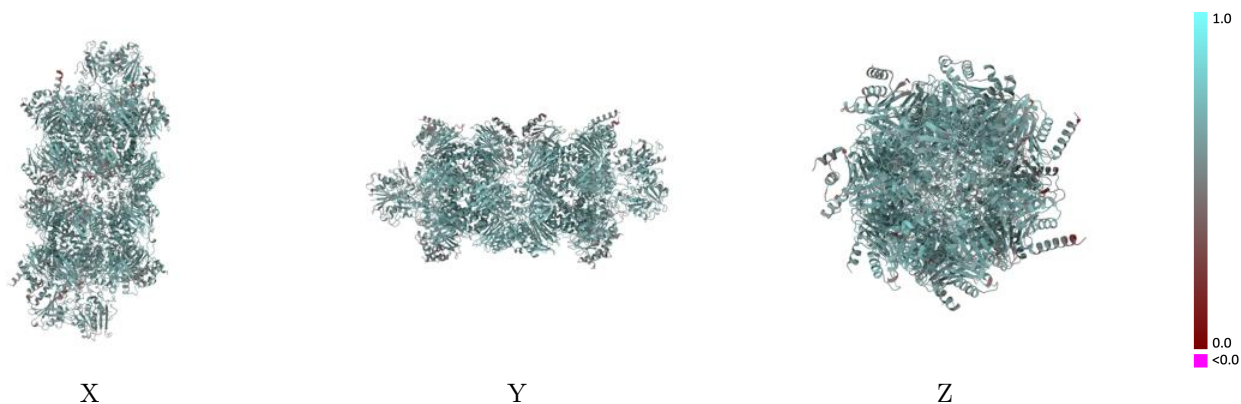
This section contains information regarding the fit between EMDB map EMD-19528 and PDB model 8RVP. Per-residue inclusion information can be found in section 3 on page 12.

9.1 Map-model overlay [i](#)



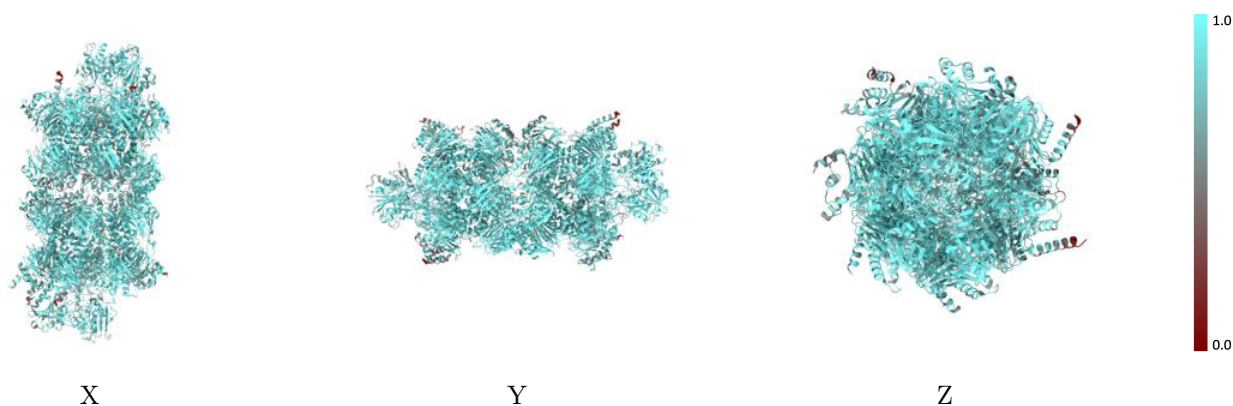
The images above show the 3D surface view of the map at the recommended contour level 0.205 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



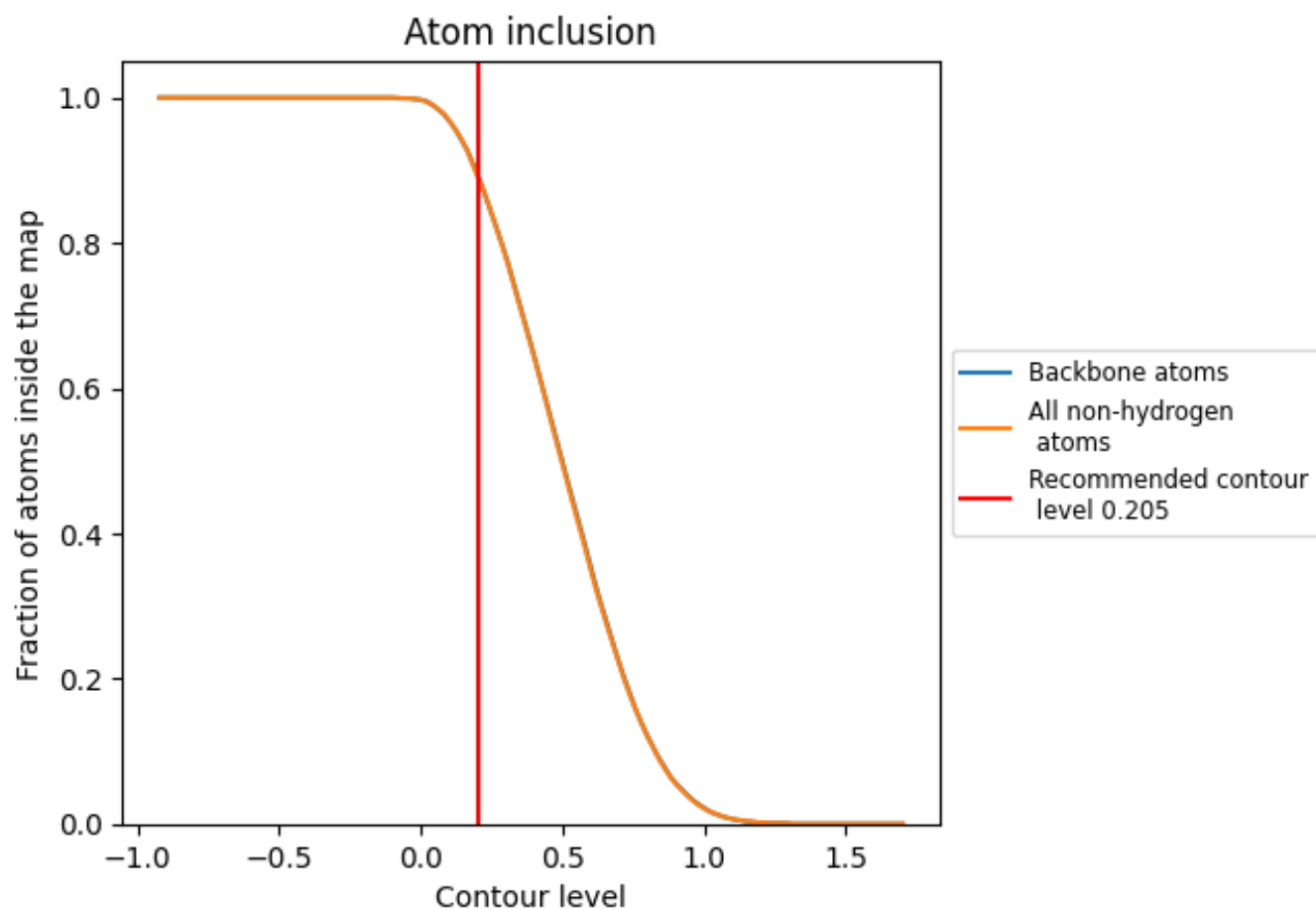
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 [i](#)



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 (0.205).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 89% of all backbone atoms, 89% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.205) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8880	 0.6280
1	 0.9410	 0.6510
2	 0.9340	 0.6520
3	 0.9370	 0.6660
4	 0.8320	 0.5910
5	 0.8770	 0.6030
6	 0.9200	 0.6600
7	 0.7950	 0.5730
8	 0.8400	 0.5780
A	 0.8780	 0.6210
B	 0.9130	 0.6390
C	 0.9000	 0.6320
D	 0.8710	 0.6220
E	 0.9090	 0.6420
F	 0.9340	 0.6510
G	 0.8680	 0.6160
H	 0.9610	 0.6740
I	 0.9680	 0.6720
J	 0.8920	 0.6260
K	 0.8120	 0.5910
L	 0.8310	 0.5940
M	 0.9430	 0.6540
N	 0.9330	 0.6640
O	 0.8780	 0.6250
P	 0.9140	 0.6410
Q	 0.8630	 0.6170
R	 0.8670	 0.6110
S	 0.9010	 0.6310
T	 0.9240	 0.6390
U	 0.8480	 0.6090
V	 0.9630	 0.6740
W	 0.9550	 0.6750
X	 0.8990	 0.6340
Y	 0.8230	 0.5920
Z	 0.8460	 0.5980

