



## wwPDB EM Validation Summary Report ⓘ

Nov 4, 2024 – 12:05 PM EST

PDB ID : 9CZ2  
EMDB ID : EMD-46057  
Title : Cryo-EM structure of a nautilus-like HflK/C assembly in complex with FtsH AAA protease  
Authors : Ghanbarpour, A.; Sauer, R.T.; Davis, J.H.  
Deposited on : 2024-08-03  
Resolution : 4.40 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](mailto: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>.

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

EMDB validation analysis : 0.0.1.dev113  
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) : 2.39

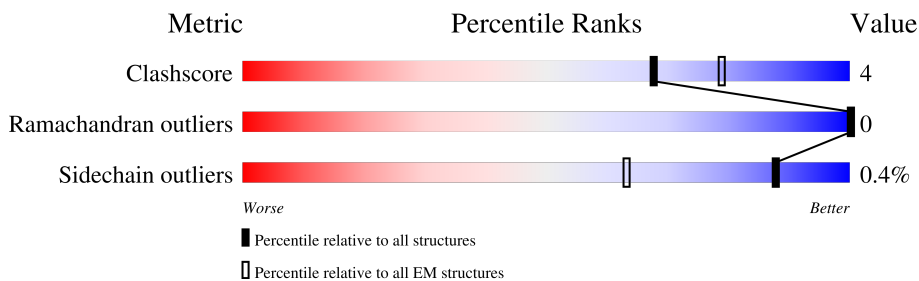
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 4.40 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  $\geq 3$ , 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	XA	419	
1	XC	419	
1	XE	419	
1	XG	419	
1	XI	419	
1	XK	419	
1	XM	419	
1	XO	419	




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Mol	Chain	Length	Quality of chain
1	XQ	419	58% 8% 34%
1	XS	419	61% 5% 34%
1	XU	419	60% 6% 34%
1	XW	419	19% 79%
2	XB	334	81% 9% 10%
2	XD	334	79% 10% 10%
2	XF	334	83% 6% 10%
2	XH	334	80% 10% 10%
2	XJ	334	83% 7% 10%
2	XL	334	79% 10% 10%
2	XN	334	81% 9% 10%
2	XP	334	78% 11% 10%
2	XR	334	77% 12% 10%
2	XT	334	78% 11% 10%
2	XV	334	25% 71%
2	XX	334	29% 69%
3	A	644	9% 90%
3	B	644	10% 90%
3	C	644	9% 90%
3	D	644	10% 90%
3	E	644	9% 90%
3	F	644	9% 90%
3	G	644	10% 90%
3	H	644	9% 90%
3	I	644	9% 90%

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Mol	Chain	Length	Quality of chain
3	J	644	 9% 90%
3	K	644	 10% 90%
3	L	644	 5% 9% 90%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 114310 atoms, of which 57401 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 Modulator of FtsH protease HflK.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
1	XA	277	4404	1379	2212	386	421	6	0	0
1	XC	277	4404	1379	2212	386	421	6	0	0
1	XE	277	4404	1379	2212	386	421	6	0	0
1	XG	277	4396	1379	2204	386	421	6	0	0
1	XI	277	4404	1379	2212	386	421	6	0	0
1	XK	277	4404	1379	2212	386	421	6	0	0
1	XM	277	4404	1379	2212	386	421	6	0	0
1	XO	277	4404	1379	2212	386	421	6	0	0
1	XQ	277	4404	1379	2212	386	421	6	0	0
1	XS	277	4404	1379	2212	386	421	6	0	0
1	XU	277	4404	1379	2212	386	421	6	0	0
1	XW	87	1402	434	712	124	130	2	0	0

- Molecule 2 is a protein called Modulator of FtsH protease HflC.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
2	XB	299	4828	1508	2431	429	450	10	0	0
2	XD	299	4828	1508	2431	429	450	10	0	0
2	XF	299	4828	1508	2431	429	450	10	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace	
2	XH	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XJ	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XL	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XN	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XP	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XR	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XT	299	Total	C	H	N	O	S	0	0
			4828	1508	2431	429	450	10		
2	XX	105	Total	C	H	N	O	S	0	0
			1645	517	802	160	161	5		
2	XV	97	Total	C	H	N	O	S	0	0
			1515	480	737	142	152	4		

- Molecule 3 is a protein called ATP-dependent zinc metalloprotease FtsH.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	A	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	B	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	C	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	D	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	E	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	F	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	G	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	H	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	I	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	J	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		

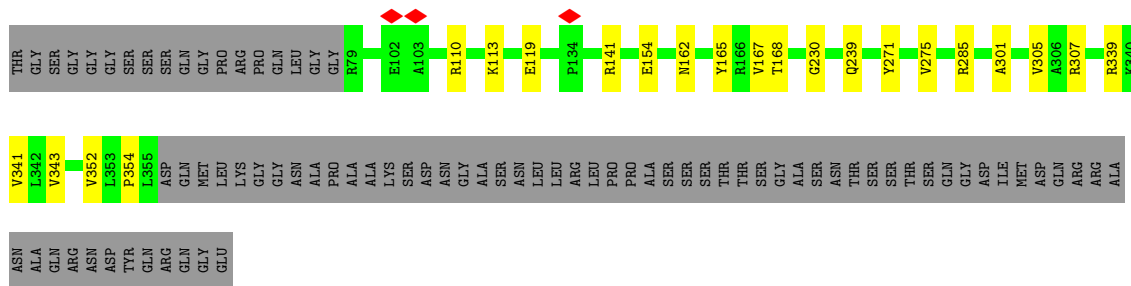
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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
3	K	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		
3	L	67	Total	C	H	N	O	0	0
			1086	338	543	95	110		

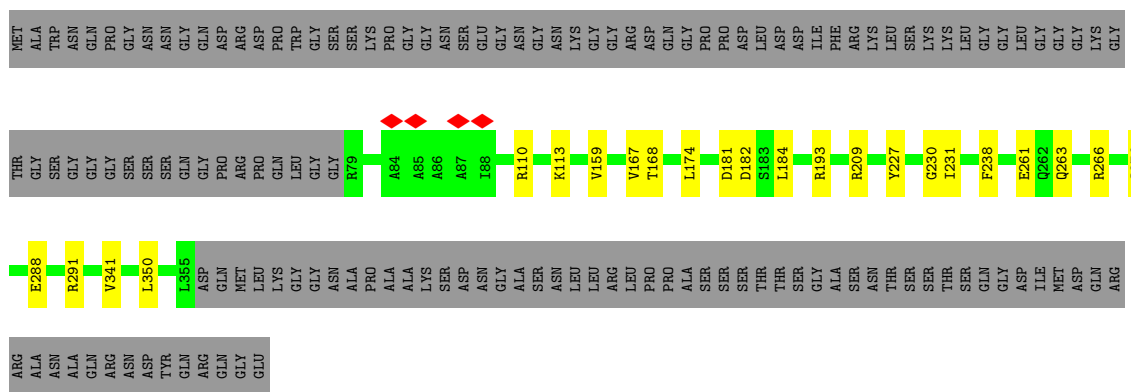






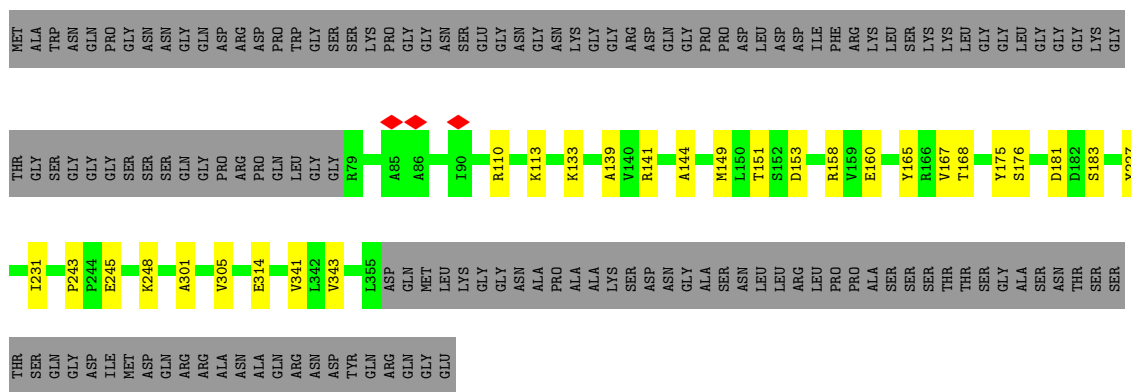
• Molecule 1: Modulator of FtsH protease HfK

Chain XG: 61% 5% 34%



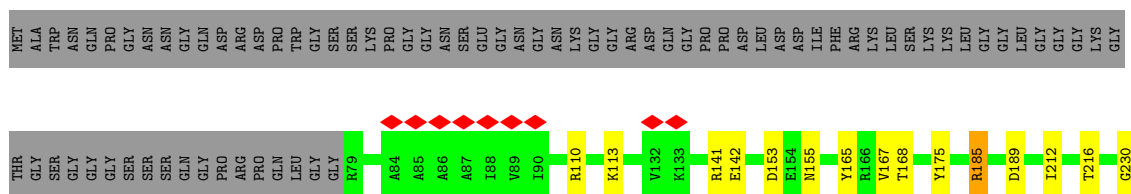
• Molecule 1: Modulator of FtsH protease HfK

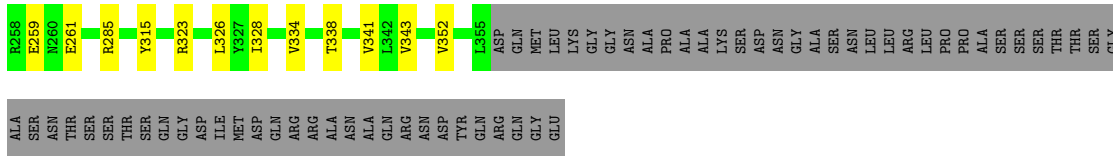
Chain XI: 59% 7% 34%



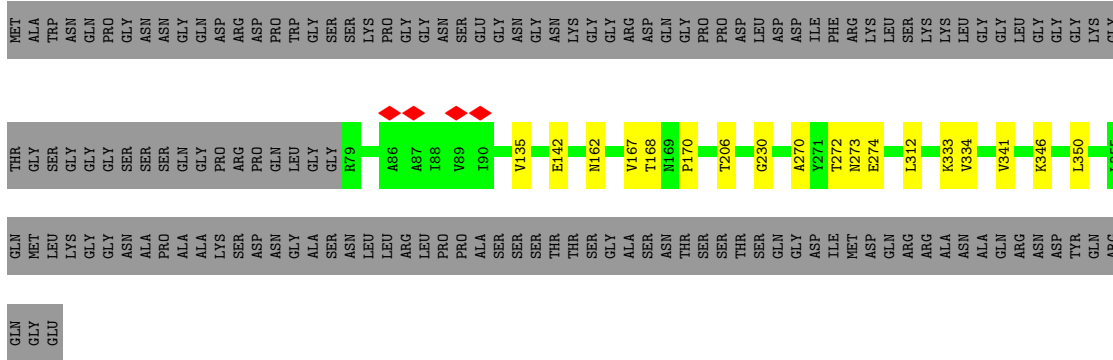
• Molecule 1: Modulator of FtsH protease HfK

Chain XK: 59% 6% 34%

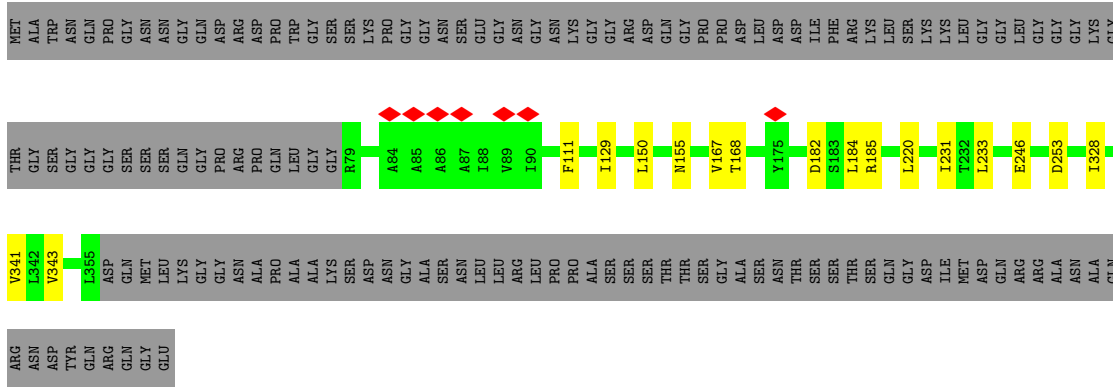




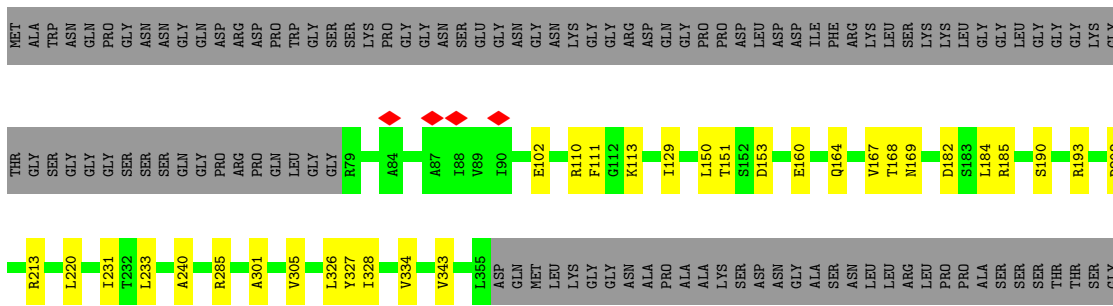
• Molecule 1: Modulator of FtsH protease HflK



• Molecule 1: Modulator of FtsH protease HflK



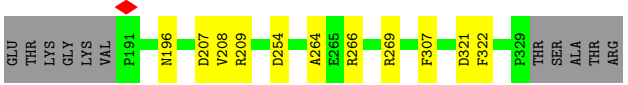
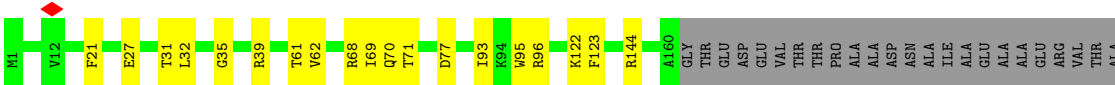
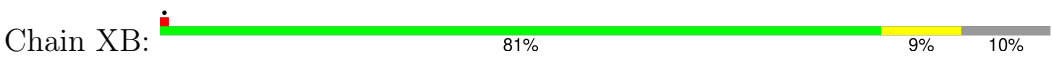
• Molecule 1: Modulator of FtsH protease HflK



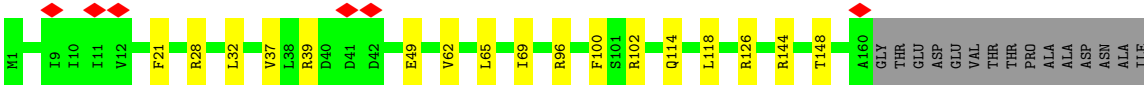
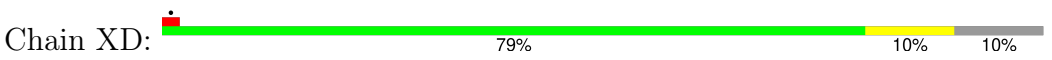


LYS SER ASP ASN GLY ALA SER ASN LEU ARG LEU PRO PRO ALA SER SER THR THR THR GLY ALA SER ASN THR THR THR ILE MET ASP ASP GLN ARG ARG ALA ALA ASN ALA ALA GLN ARG ASN TYP ALA GLN ARG ASP THR ARG ARG GLN GLY GLU

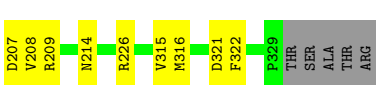
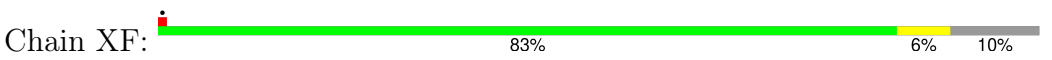
• Molecule 2: Modulator of FtsH protease HflC



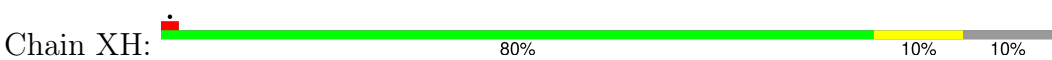
• Molecule 2: Modulator of FtsH protease HflC



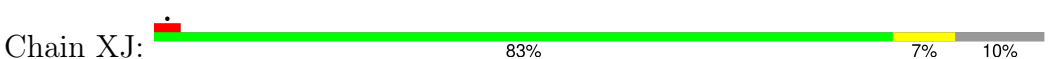
• Molecule 2: Modulator of FtsH protease HflC



• Molecule 2: Modulator of FtsH protease HflC

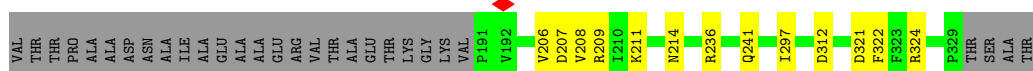
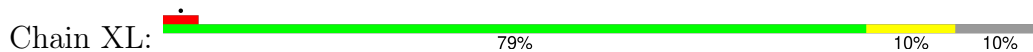


• Molecule 2: Modulator of FtsH protease HflC

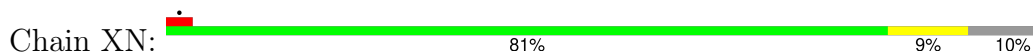




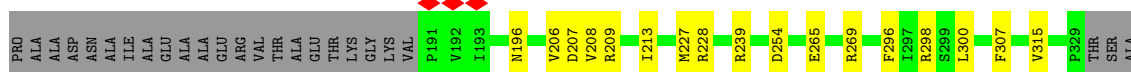
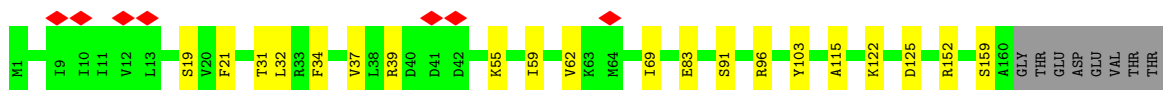
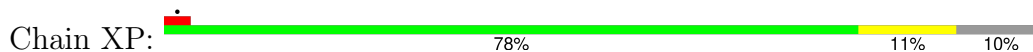
• Molecule 2: Modulator of FtsH protease HflC



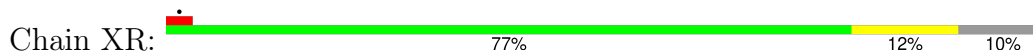
• Molecule 2: Modulator of FtsH protease HflC



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• Molecule 2: Modulator of FtsH protease HflC



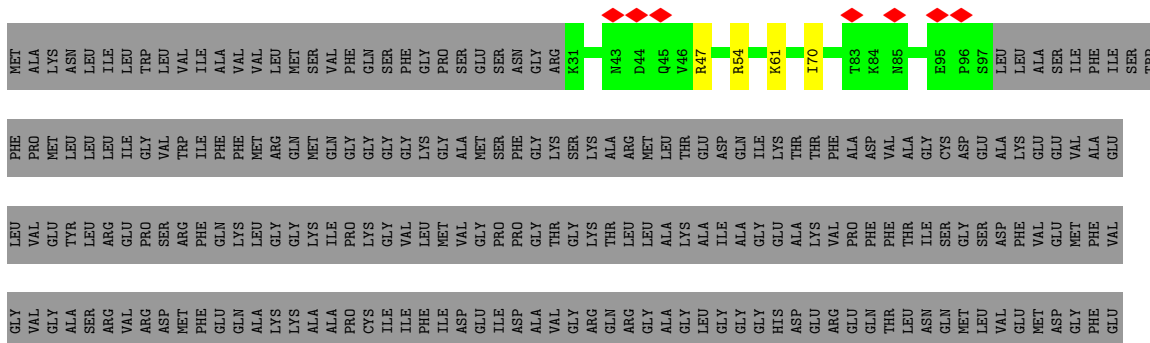




• Molecule 3: ATP-dependent zinc metalloprotease FtsH

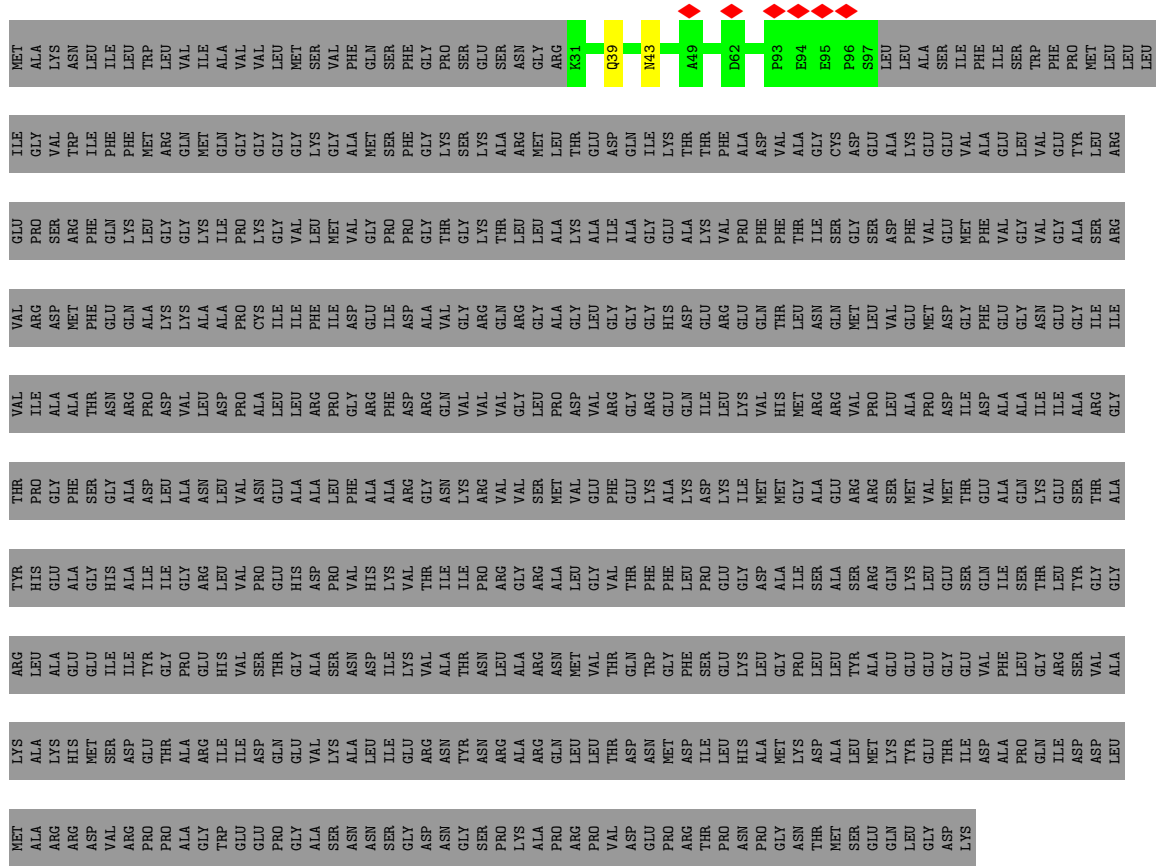


• Molecule 3: ATP-dependent zinc metalloprotease FtsH

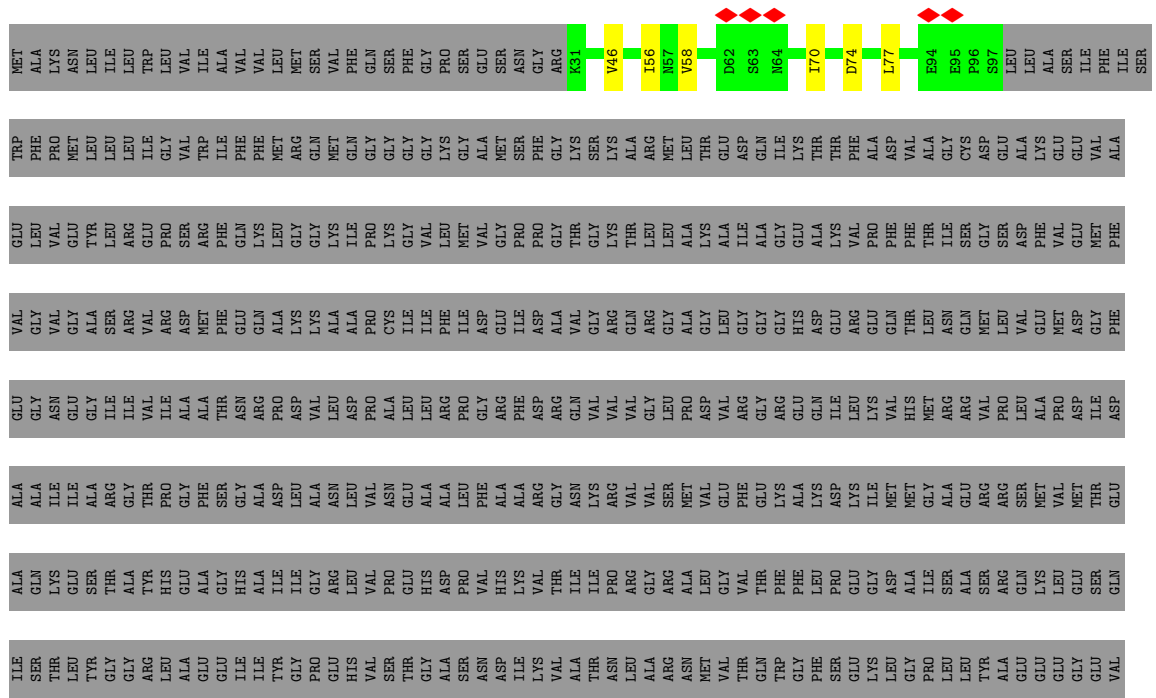








● Molecule 3: ATP-dependent zinc metalloprotease FtsH





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

● Molecule 3: ATP-dependent zinc metalloprotease FtsH



MET	ALA	LYS	ASN	THR	MET	THR	GLY	GLN	LEU	TRP	LEU	LEU	LEU	ILE	VAL	GLY	THR	VAL	GLN	LYS
P93	E94	E95	E96	S97	LEU	LEU	LEU	ALA	ALA	SER	THR	VAL	THR	PHE	GLY	THR	VAL	LEU	LEU	THR
ALA	ASP	VAL	ALA	GLY	ASP	ALA	LYS	VAL	GLY	GLY	ASP	GLY	VAL	VAL	GLY	THR	GLY	VAL	GLY	ASP
PRO	PHE	THR	ILE	ARG	GLY	ASP	PHE	GLY	VAL	VAL	VAL	VAL	ALA	THR	GLY	GLY	VAL	GLY	GLY	ARG
GLU	GLN	THR	LEU	ASN	GLY	LEU	VAL	ASN	GLY	LEU	THR	THR	GLY	VAL	GLY	GLY	GLY	VAL	GLY	LEU
LYS	VAL	HIS	MET	ARG	VAL	PRO	ASP	MET	THR	ILE	PHE	ASP	THR	ASP	GLN	VAL	VAL	VAL	GLY	LEU
ILE	MET	MET	ALA	ARG	GLY	ARG	ARG	ARG	GLY	THR	GLY	GLY	THR	GLY	ASN	VAL	VAL	ARG	ARG	ALA
GLY	ASP	ALA	ILE	SER	ARG	GLN	LEU	ILE	GLY	GLY	THR	THR	GLY	ASP	ALA	VAL	THR	VAL	THR	GLU
LYS	LEU	GLY	PRO	LEU	LEU	ALA	GLY	THR	VAL	ARG	GLY	THR	GLY	THR	ASN	TYR	ASN	ARG	PRO	PRO
HIS	ALA	MET	LYS	ALA	LEU	TYR	LEU	LEU	LEU	GLY	GLY	GLY	THR	GLY	ASN	ALA	ALA	ALA	PRO	PRO
ASN	PRO	GLY	ASN	THR	MET	SER	GLU	GLN	LEU	LEU	ASP	LYS	PRO	THR	GLY	GLY	VAL	VAL	THR	PRO
PRO	GLY	THR	MET	SER	GLY	GLN	LEU	LEU	ASP	GLY	THR	THR	GLY	THR	ASN	VAL	THR	THR	THR	PRO
GLY	ASP	THR	ILE	LEU	VAL	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR

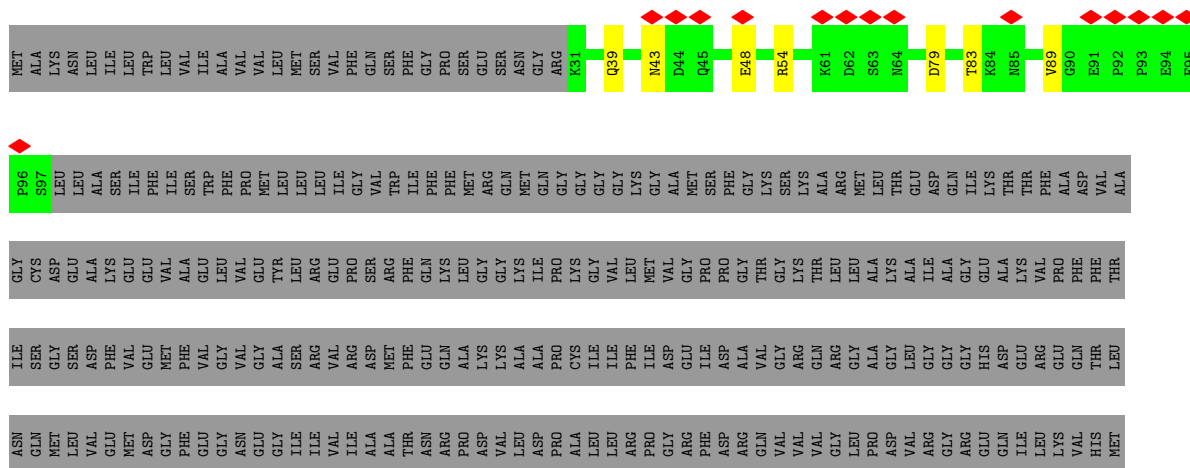
- Molecule 3: ATP-dependent zinc metalloprotease FtsH

Chain I:  90%



- Molecule 3: ATP-dependent zinc metalloprotease FtsH

Chain J:  90%







## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	184019	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE; Patch CTF estimation, cryoSPARC	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	46.1	Depositor
Minimum defocus (nm)	50	Depositor
Maximum defocus (nm)	1700	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.673	Depositor
Minimum map value	-0.212	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.017	Depositor
Recommended contour level	0.053	Depositor
Map size ( $\text{\AA}$ )	588.6, 588.6, 588.6	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.635, 1.635, 1.635	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	XA	0.27	0/2226	0.51	0/3018
1	XC	0.27	0/2226	0.50	0/3018
1	XE	0.27	0/2226	0.51	0/3018
1	XG	0.26	0/2226	0.51	0/3018
1	XI	0.27	0/2226	0.50	0/3018
1	XK	0.27	0/2226	0.50	0/3018
1	XM	0.27	0/2226	0.50	0/3018
1	XO	0.27	0/2226	0.51	0/3018
1	XQ	0.27	0/2226	0.51	0/3018
1	XS	0.27	0/2226	0.52	0/3018
1	XU	0.27	0/2226	0.51	0/3018
1	XW	0.27	0/698	0.49	0/941
2	XB	0.27	0/2432	0.53	0/3268
2	XD	0.27	0/2432	0.53	0/3268
2	XF	0.27	0/2432	0.50	0/3268
2	XH	0.27	0/2432	0.51	0/3268
2	XJ	0.27	0/2432	0.53	0/3268
2	XL	0.27	0/2432	0.54	0/3268
2	XN	0.26	0/2432	0.52	0/3268
2	XP	0.27	0/2432	0.52	0/3268
2	XR	0.26	0/2432	0.53	0/3268
2	XT	0.27	0/2432	0.53	0/3268
2	XV	0.26	0/792	0.46	0/1061
2	XX	0.27	0/857	0.51	0/1146
3	A	0.28	0/551	0.57	0/748
3	B	0.28	0/551	0.53	0/748
3	C	0.29	0/551	0.58	0/748
3	D	0.27	0/551	0.56	0/748
3	E	0.28	0/551	0.55	0/748
3	F	0.27	0/551	0.52	0/748
3	G	0.29	0/551	0.58	0/748
3	H	0.30	0/551	0.57	0/748
3	I	0.28	0/551	0.58	0/748
3	J	0.27	0/551	0.56	0/748



Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
3	K	0.29	0/551	0.56	0/748
3	L	0.28	0/551	0.54	0/748
All	All	0.27	0/57765	0.52	0/78002

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	XA	2192	2212	2212	15	0
1	XC	2192	2212	2212	15	0
1	XE	2192	2212	2212	19	0
1	XG	2192	2204	2212	22	0
1	XI	2192	2212	2212	18	0
1	XK	2192	2212	2212	22	0
1	XM	2192	2212	2212	13	0
1	XO	2192	2212	2212	13	0
1	XQ	2192	2212	2212	24	0
1	XS	2192	2212	2212	13	0
1	XU	2192	2212	2212	19	0
1	XW	690	712	712	9	0
2	XB	2397	2431	2431	19	0
2	XD	2397	2431	2431	21	0
2	XF	2397	2431	2431	13	0
2	XH	2397	2431	2431	26	0
2	XJ	2397	2431	2431	15	0
2	XL	2397	2431	2431	21	0
2	XN	2397	2431	2431	20	0
2	XP	2397	2431	2431	28	0
2	XR	2397	2431	2431	29	0
2	XT	2397	2431	2431	25	0
2	XV	778	737	737	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	XX	843	802	802	8	0
3	A	543	543	543	9	0
3	B	543	543	543	2	0
3	C	543	543	543	5	0
3	D	543	543	543	1	0
3	E	543	543	543	3	0
3	F	543	543	543	5	0
3	G	543	543	543	3	0
3	H	543	543	543	5	0
3	I	543	543	543	6	0
3	J	543	543	543	4	0
3	K	543	543	543	2	0
3	L	543	543	543	5	0
All	All	56909	57401	57409	387	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 4.

The worst 5 of 387 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)
1:XG:261:GLU:HG3	2:XH:242:GLY:HA3	1.36	1.04
1:XQ:150:LEU:HD22	2:XR:215:LEU:HD12	1.57	0.84
1:XG:261:GLU:HG3	2:XH:242:GLY:CA	2.11	0.81
1:XQ:190:SER:OG	2:XR:210:ILE:O	2.03	0.76
3:H:50:ARG:NH1	3:H:90:GLY:O	2.22	0.72

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	XA	275/419 (66%)	275 (100%)	0	0	100	100
1	XC	275/419 (66%)	275 (100%)	0	0	100	100
1	XE	275/419 (66%)	275 (100%)	0	0	100	100
1	XG	275/419 (66%)	275 (100%)	0	0	100	100
1	XI	275/419 (66%)	275 (100%)	0	0	100	100
1	XK	275/419 (66%)	275 (100%)	0	0	100	100
1	XM	275/419 (66%)	274 (100%)	1 (0%)	0	100	100
1	XO	275/419 (66%)	275 (100%)	0	0	100	100
1	XQ	275/419 (66%)	275 (100%)	0	0	100	100
1	XS	275/419 (66%)	275 (100%)	0	0	100	100
1	XU	275/419 (66%)	275 (100%)	0	0	100	100
1	XW	85/419 (20%)	85 (100%)	0	0	100	100
2	XB	295/334 (88%)	295 (100%)	0	0	100	100
2	XD	295/334 (88%)	295 (100%)	0	0	100	100
2	XF	295/334 (88%)	295 (100%)	0	0	100	100
2	XH	295/334 (88%)	295 (100%)	0	0	100	100
2	XJ	295/334 (88%)	295 (100%)	0	0	100	100
2	XL	295/334 (88%)	295 (100%)	0	0	100	100
2	XN	295/334 (88%)	295 (100%)	0	0	100	100
2	XP	295/334 (88%)	294 (100%)	1 (0%)	0	100	100
2	XR	295/334 (88%)	295 (100%)	0	0	100	100
2	XT	295/334 (88%)	295 (100%)	0	0	100	100
2	XV	95/334 (28%)	95 (100%)	0	0	100	100
2	XX	103/334 (31%)	103 (100%)	0	0	100	100
3	A	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	B	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	C	65/644 (10%)	65 (100%)	0	0	100	100
3	D	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	E	65/644 (10%)	65 (100%)	0	0	100	100
3	F	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	G	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
3	H	65/644 (10%)	65 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	I	65/644 (10%)	65 (100%)	0	0	100	100
3	J	65/644 (10%)	65 (100%)	0	0	100	100
3	K	65/644 (10%)	65 (100%)	0	0	100	100
3	L	65/644 (10%)	64 (98%)	1 (2%)	0	100	100
All	All	7038/16764 (42%)	7030 (100%)	8 (0%)	0	100	100

There are no Ramachandran outliers to report.

### 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	XA	232/336 (69%)	232 (100%)	0	100	100
1	XC	232/336 (69%)	232 (100%)	0	100	100
1	XE	232/336 (69%)	232 (100%)	0	100	100
1	XG	232/336 (69%)	231 (100%)	1 (0%)	89	91
1	XI	232/336 (69%)	232 (100%)	0	100	100
1	XK	232/336 (69%)	231 (100%)	1 (0%)	89	91
1	XM	232/336 (69%)	231 (100%)	1 (0%)	89	91
1	XO	232/336 (69%)	232 (100%)	0	100	100
1	XQ	232/336 (69%)	232 (100%)	0	100	100
1	XS	232/336 (69%)	232 (100%)	0	100	100
1	XU	232/336 (69%)	232 (100%)	0	100	100
1	XW	71/336 (21%)	71 (100%)	0	100	100
2	XB	258/283 (91%)	255 (99%)	3 (1%)	67	79
2	XD	258/283 (91%)	254 (98%)	4 (2%)	58	74
2	XF	258/283 (91%)	256 (99%)	2 (1%)	79	85
2	XH	258/283 (91%)	256 (99%)	2 (1%)	79	85
2	XJ	258/283 (91%)	256 (99%)	2 (1%)	79	85

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	XL	258/283 (91%)	256 (99%)	2 (1%)	79	85
2	XN	258/283 (91%)	257 (100%)	1 (0%)	89	91
2	XP	258/283 (91%)	258 (100%)	0	100	100
2	XR	258/283 (91%)	256 (99%)	2 (1%)	79	85
2	XT	258/283 (91%)	257 (100%)	1 (0%)	89	91
2	XV	78/283 (28%)	77 (99%)	1 (1%)	65	77
2	XX	83/283 (29%)	83 (100%)	0	100	100
3	A	64/527 (12%)	64 (100%)	0	100	100
3	B	64/527 (12%)	64 (100%)	0	100	100
3	C	64/527 (12%)	63 (98%)	1 (2%)	58	74
3	D	64/527 (12%)	64 (100%)	0	100	100
3	E	64/527 (12%)	64 (100%)	0	100	100
3	F	64/527 (12%)	64 (100%)	0	100	100
3	G	64/527 (12%)	64 (100%)	0	100	100
3	H	64/527 (12%)	64 (100%)	0	100	100
3	I	64/527 (12%)	63 (98%)	1 (2%)	58	74
3	J	64/527 (12%)	64 (100%)	0	100	100
3	K	64/527 (12%)	64 (100%)	0	100	100
3	L	64/527 (12%)	64 (100%)	0	100	100
All	All	6132/13752 (45%)	6107 (100%)	25 (0%)	88	91

5 of 25 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	XK	185	ARG
1	XM	346	LYS
3	I	50	ARG
2	XL	324	ARG
2	XN	144	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	XC	155	ASN

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Mol	Chain	Res	Type
2	XD	74	ASN
1	XQ	239	GLN
3	C	39	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.

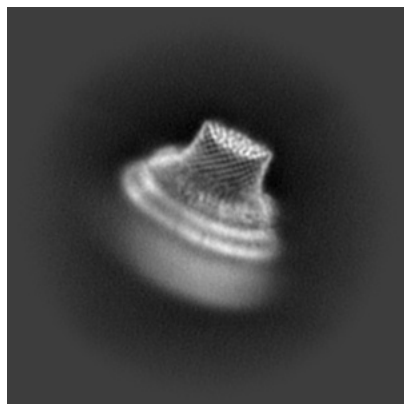
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-46057. These allow visual inspection of the internal detail of the map and identification of artifacts.

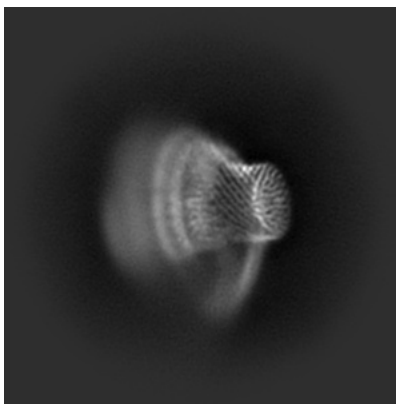
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

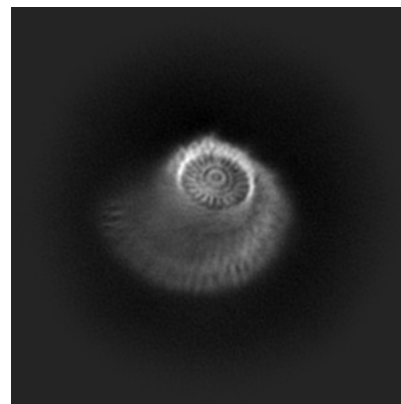
#### 6.1.1 Primary map



X

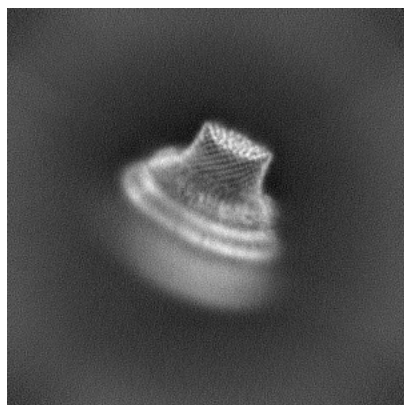


Y

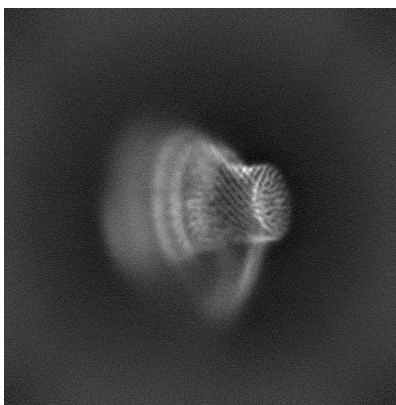


Z

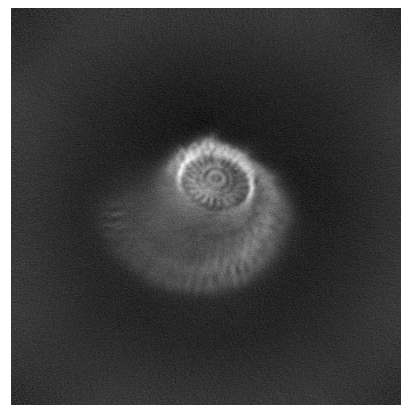
#### 6.1.2 Raw map



X



Y



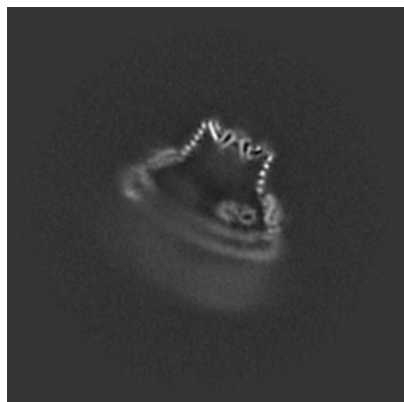
Z

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

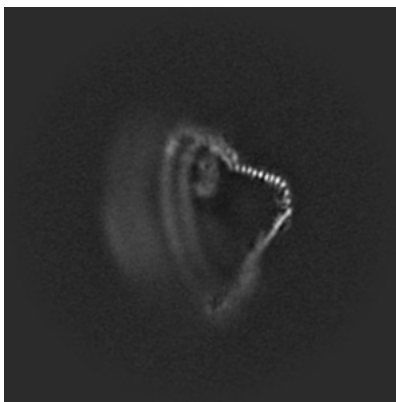


## 6.2 Central slices [i](#)

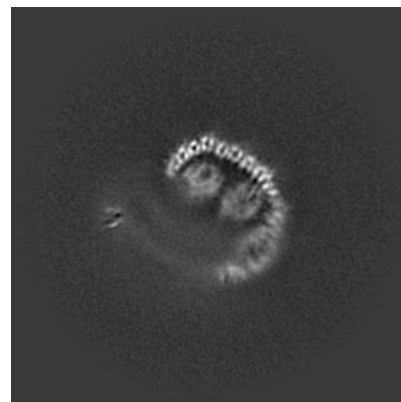
### 6.2.1 Primary map



X Index: 180



Y Index: 180

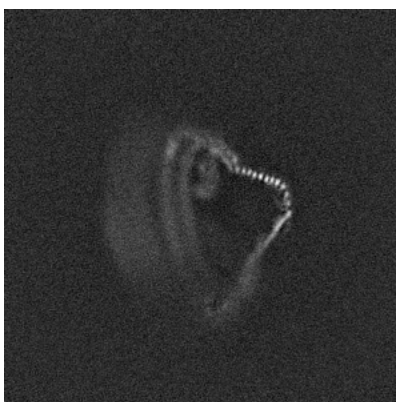


Z Index: 180

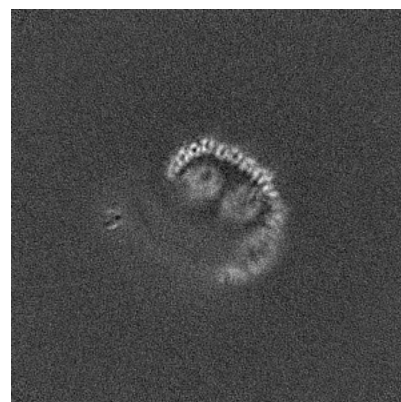
### 6.2.2 Raw map



X Index: 180



Y Index: 180



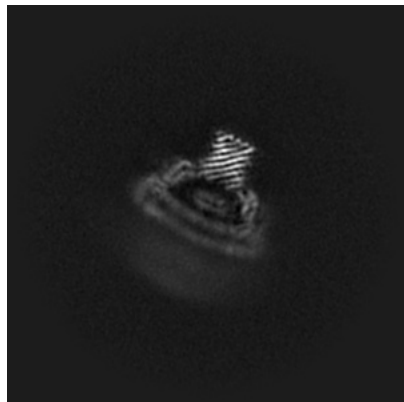
Z Index: 180

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

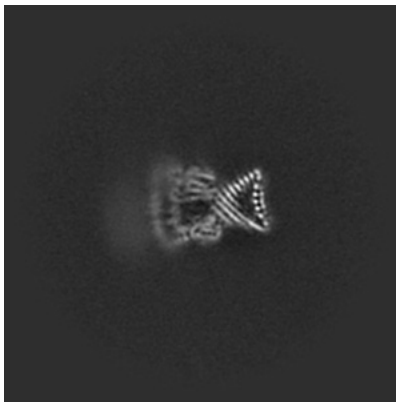


## 6.3 Largest variance slices [i](#)

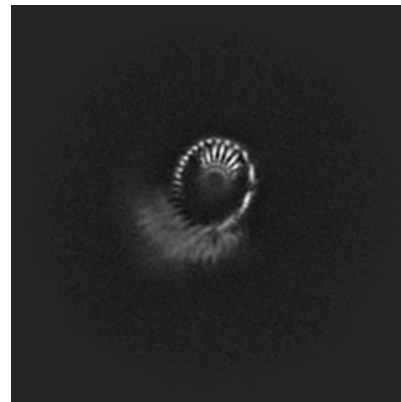
### 6.3.1 Primary map



X Index: 215

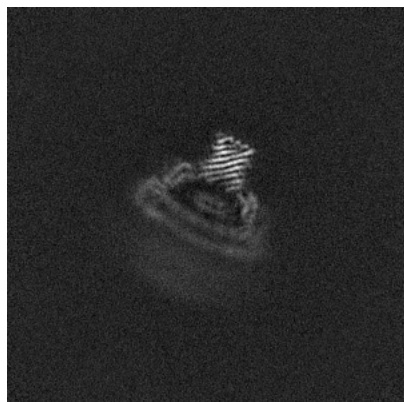


Y Index: 227

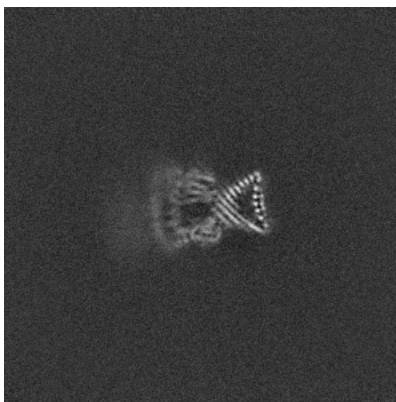


Z Index: 226

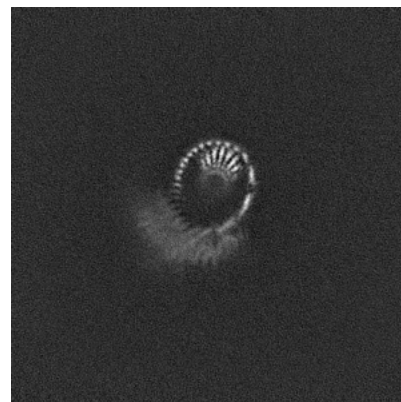
### 6.3.2 Raw map



X Index: 215



Y Index: 227

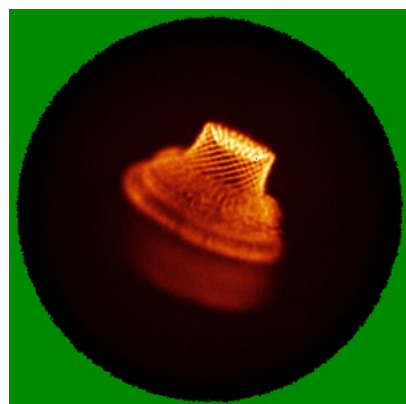


Z Index: 226

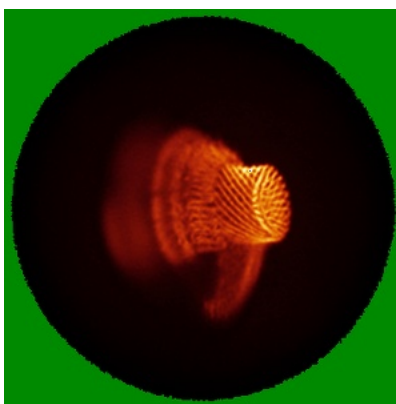
The images above show the largest variance slices of the map in three orthogonal directions.

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

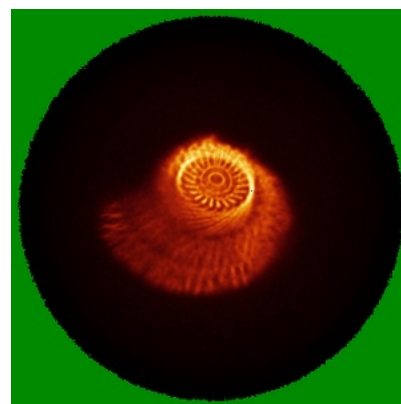
### 6.4.1 Primary map



X

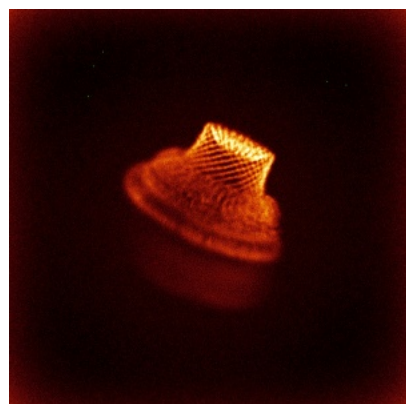


Y

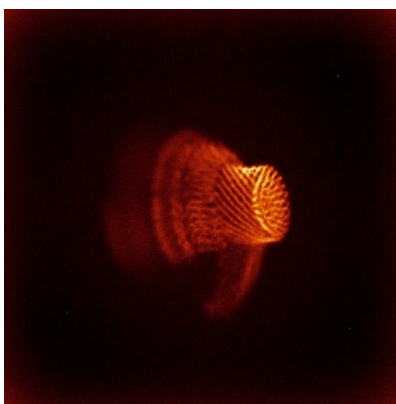


Z

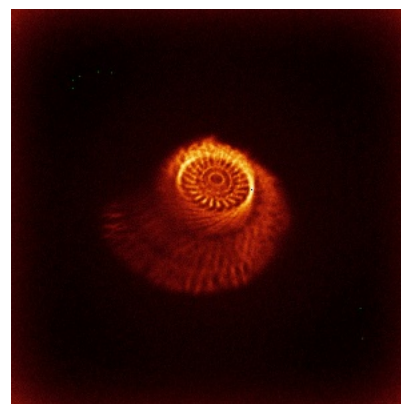
### 6.4.2 Raw map



X



Y

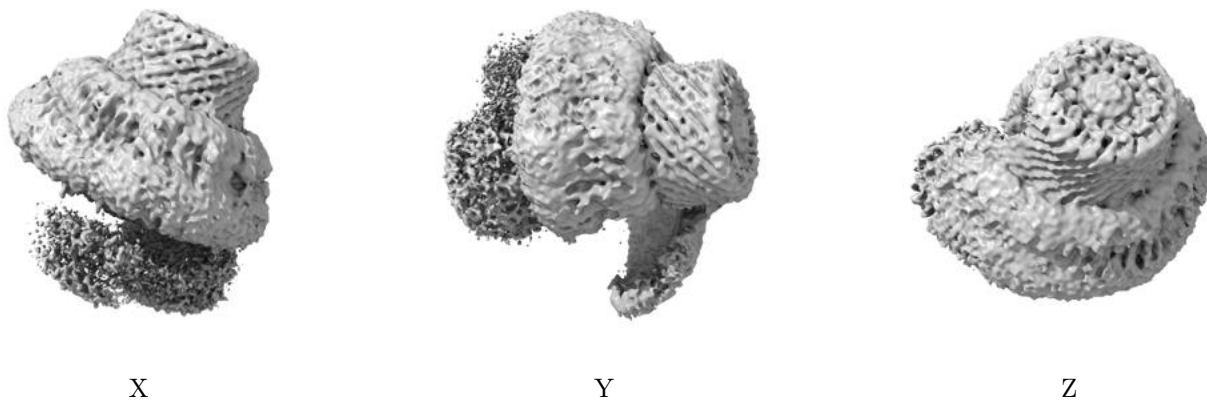


Z

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.

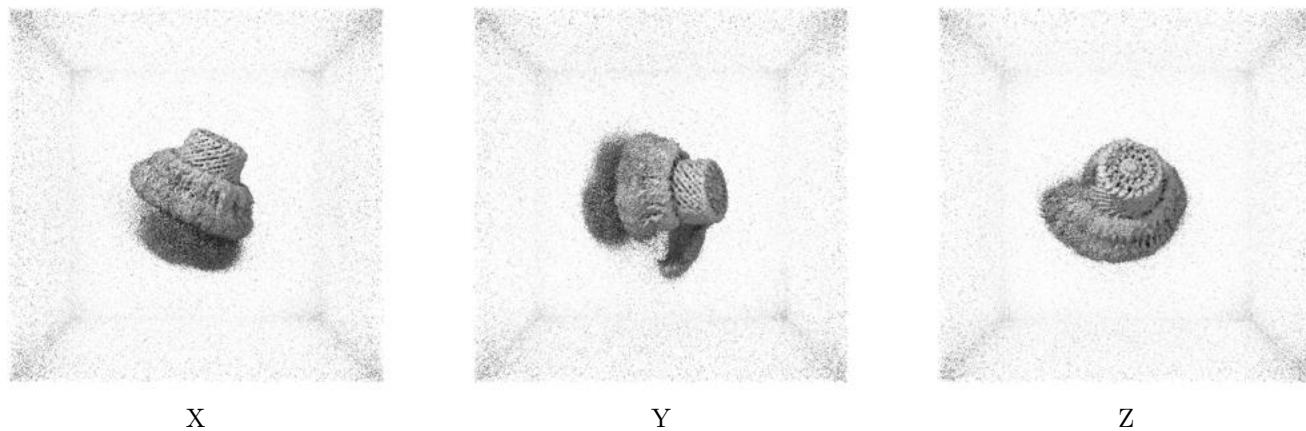
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.053. 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



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.

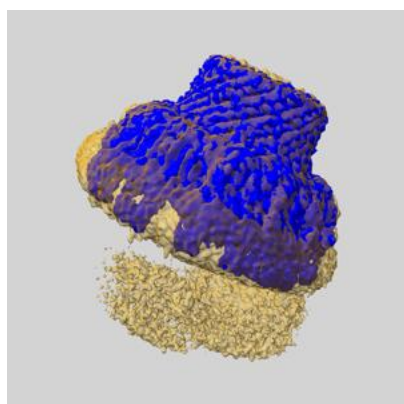
## 6.6 Mask visualisation [i](#)

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

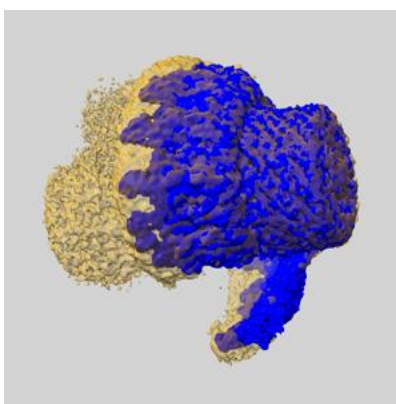
A mask typically either:

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

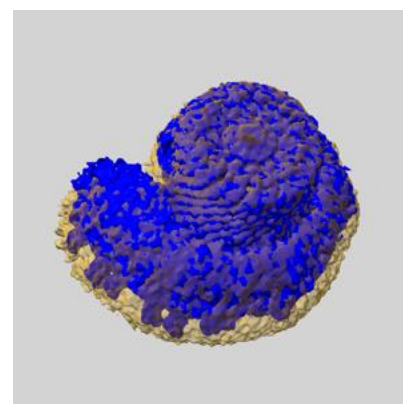
### 6.6.1 emd\_46057\_msk\_1.map [i](#)



X



Y

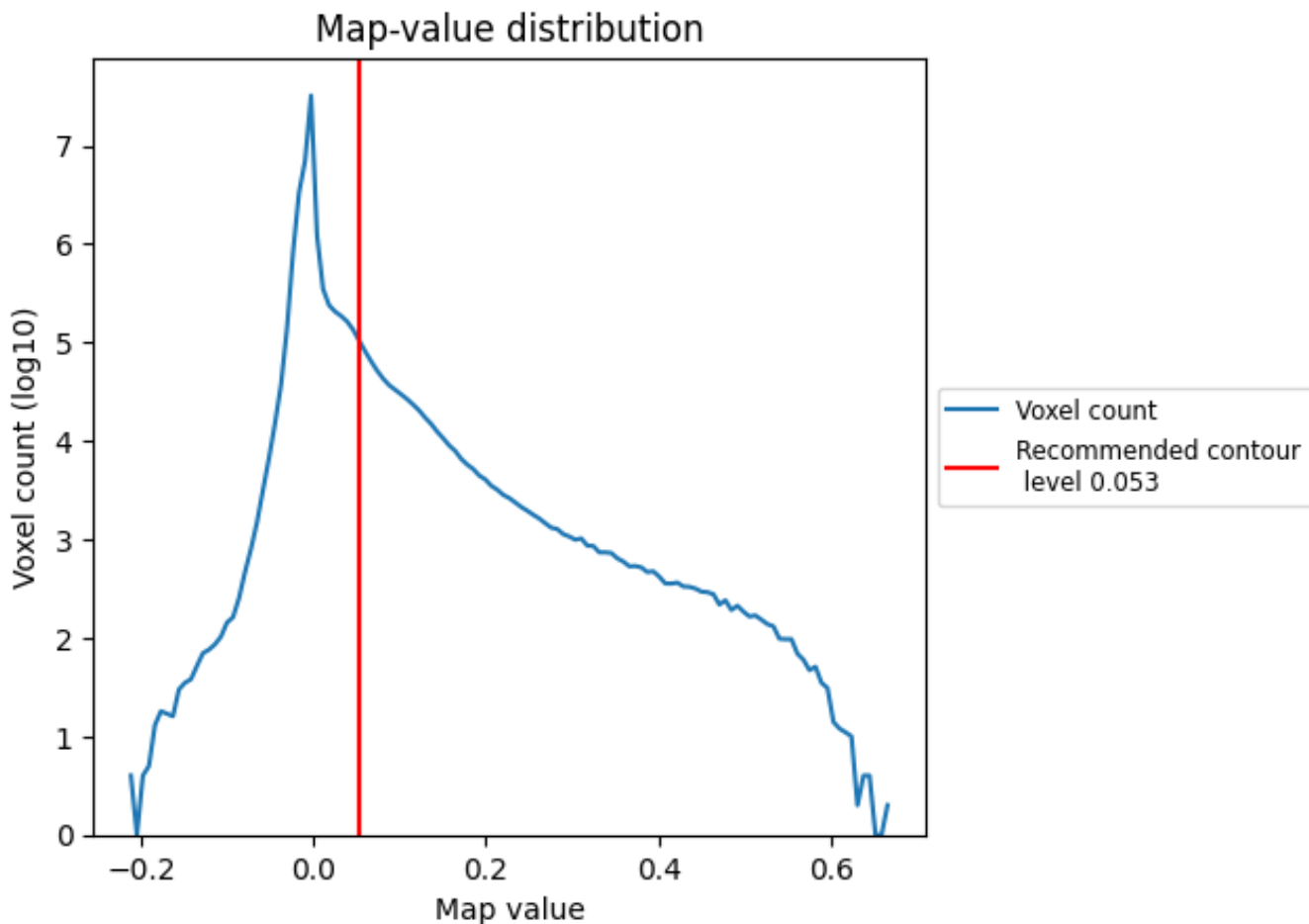


Z

## 7 Map analysis [i](#)

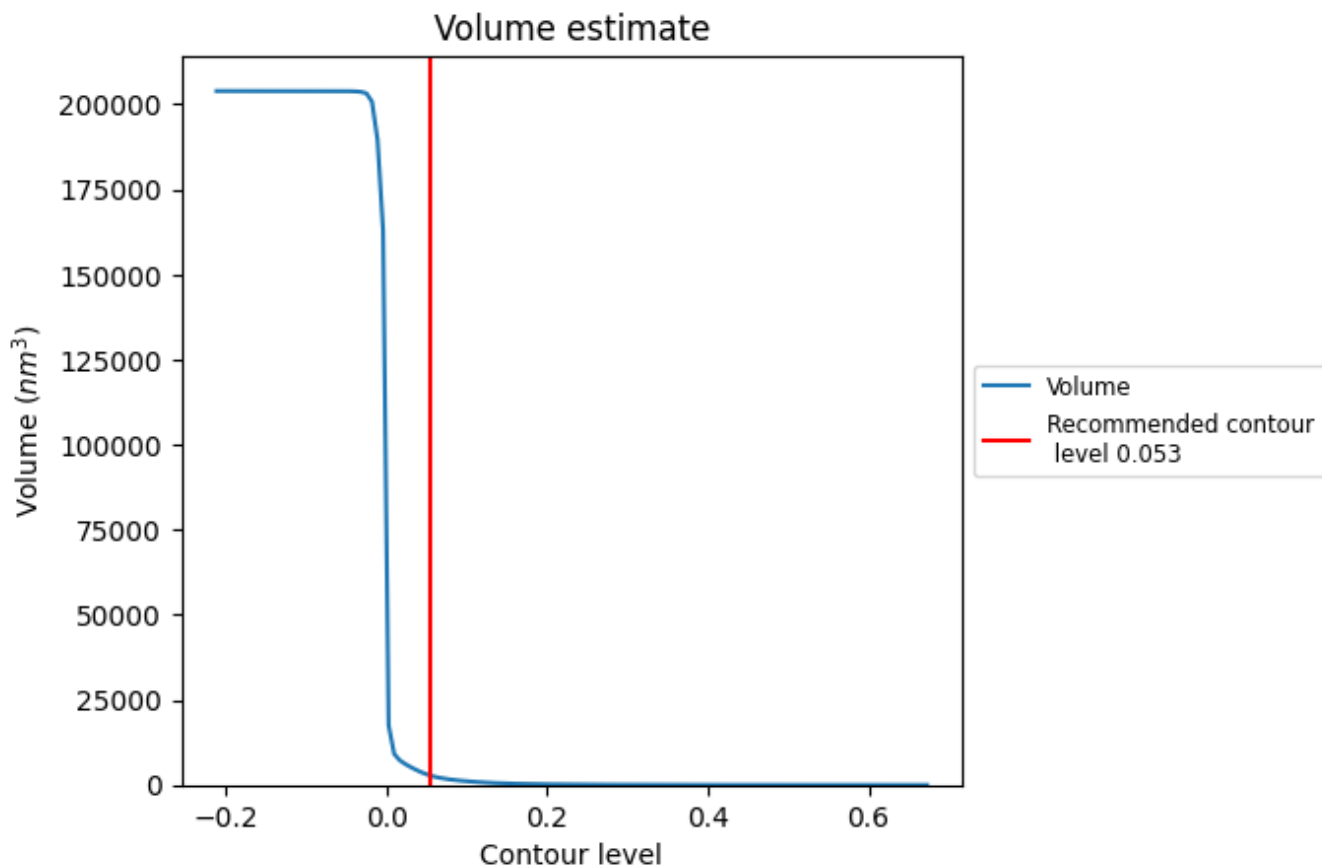
This section contains the results of statistical analysis of the map.

### 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.

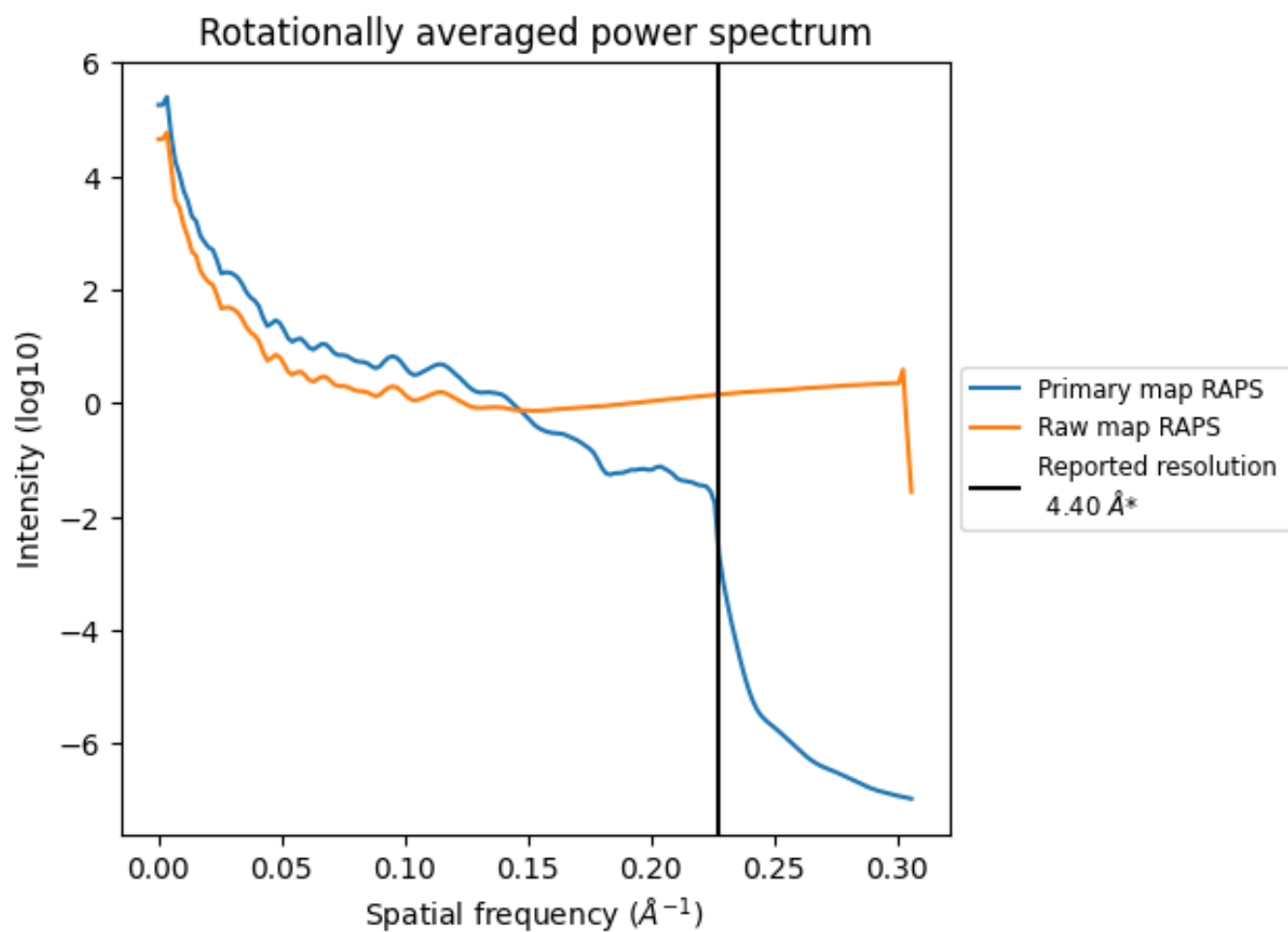
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 2877 nm<sup>3</sup>; this corresponds to an approximate mass of 2599 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

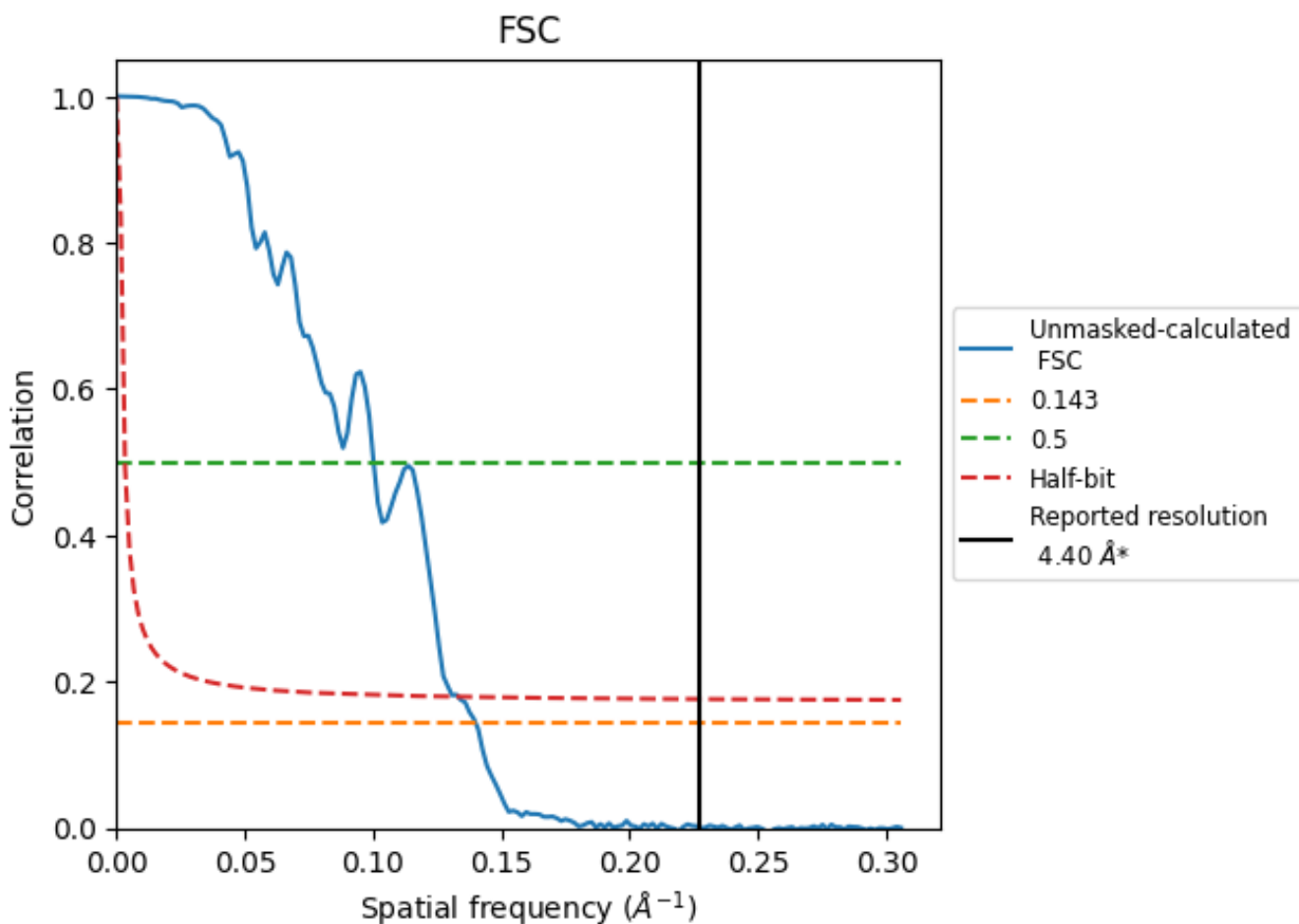


\*Reported resolution corresponds to spatial frequency of  $0.227 \text{ \AA}^{-1}$

## 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 0.227  $\text{\AA}^{-1}$



## 8.2 Resolution estimates [i](#)

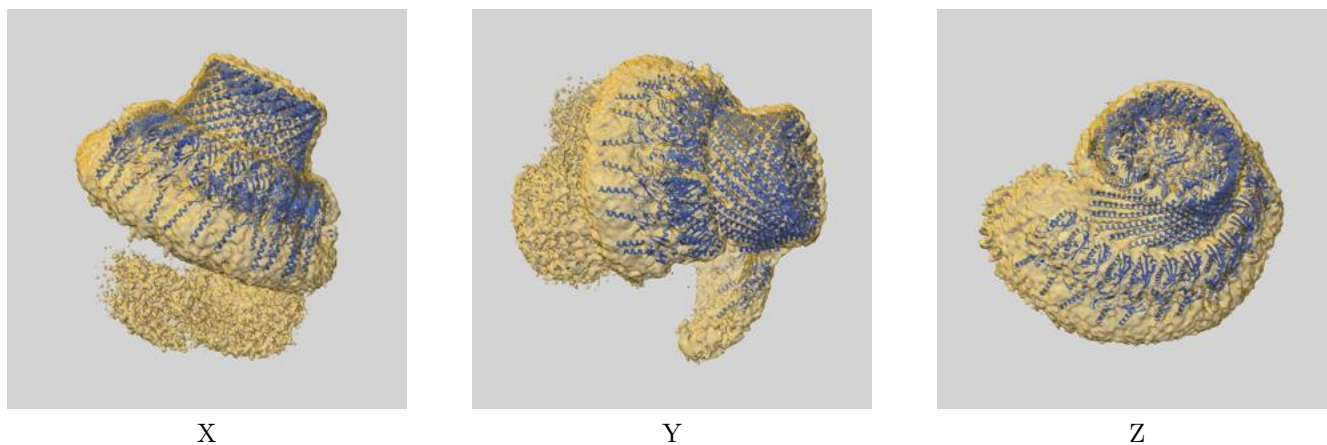
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.40	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.14	9.97	7.51

\*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 7.14 differs from the reported value 4.4 by more than 10 %

## 9 Map-model fit [i](#)

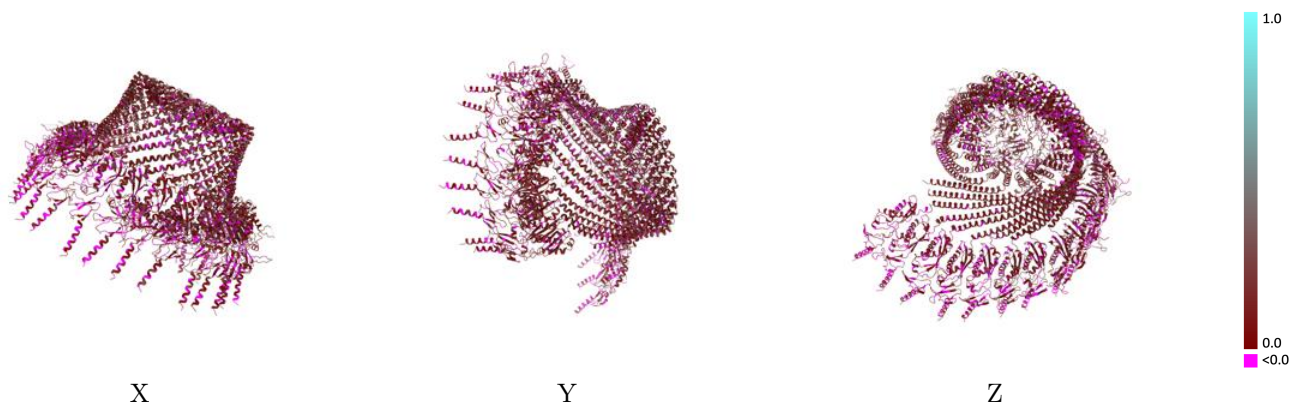
This section contains information regarding the fit between EMDB map EMD-46057 and PDB model 9CZ2. Per-residue inclusion information can be found in section 3 on page 8.

### 9.1 Map-model overlay [i](#)



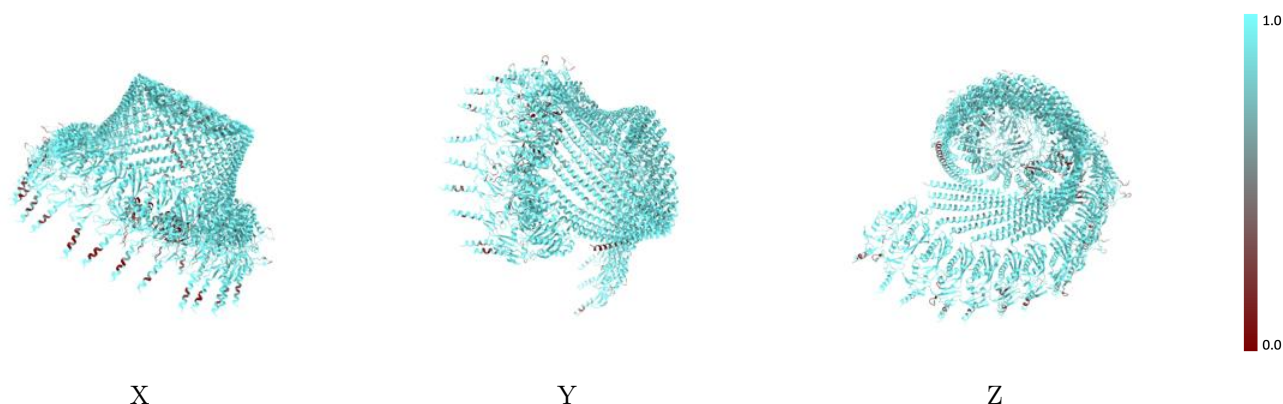
The images above show the 3D surface view of the map at the recommended contour level 0.053 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



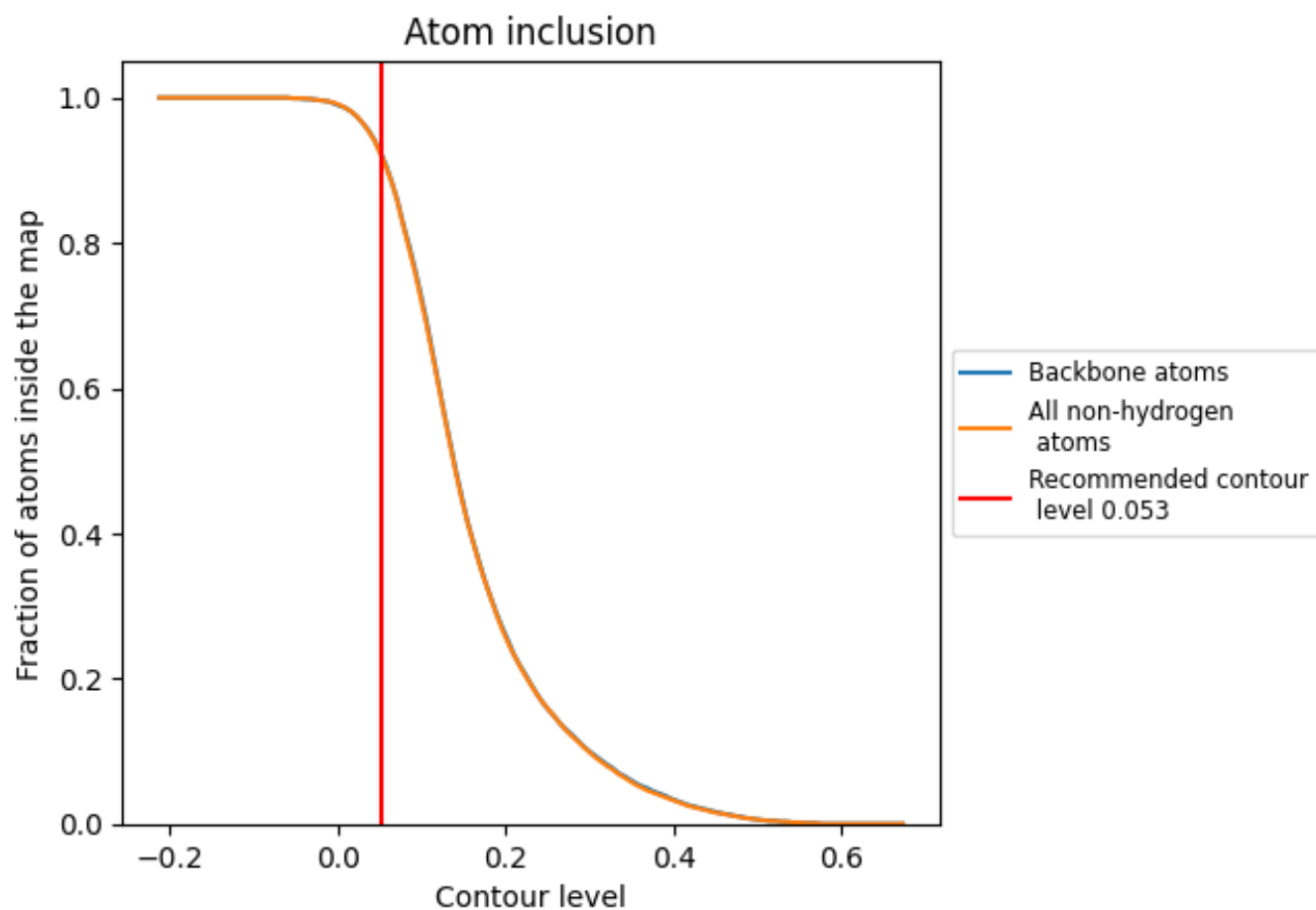
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.053).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 92% 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 (0.053) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9180	 0.1190
A	 0.8820	 0.1300
B	 0.8040	 0.1070
C	 0.8480	 0.1380
D	 0.8740	 0.1250
E	 0.8950	 0.1100
F	 0.9320	 0.1030
G	 0.6770	 0.1020
H	 0.6650	 0.0800
I	 0.8010	 0.1040
J	 0.7460	 0.0810
K	 0.5000	 0.0640
L	 0.5300	 0.1000
XA	 0.9500	 0.1380
XB	 0.9540	 0.1360
XC	 0.9540	 0.1420
XD	 0.9450	 0.1430
XE	 0.9360	 0.1240
XF	 0.9480	 0.1370
XG	 0.9500	 0.1340
XH	 0.9480	 0.1320
XI	 0.9480	 0.1230
XJ	 0.9210	 0.1350
XK	 0.9370	 0.1150
XL	 0.9240	 0.1020
XM	 0.9360	 0.1140
XN	 0.9220	 0.1180
XO	 0.9470	 0.0960
XP	 0.9410	 0.1200
XQ	 0.9530	 0.0970
XR	 0.9430	 0.1050
XS	 0.9680	 0.0890
XT	 0.9420	 0.1070
XU	 0.9520	 0.0900
XV	 0.9520	 0.1860



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Chain	Atom inclusion	Q-score
XW	 0.9380	 0.1600
XX	 0.7950	 0.1430