



wwPDB EM Validation Summary Report ⓘ

Mar 9, 2026 – 04:51 PM JST

PDB ID : 9M7B / pdb_00009m7b
EMDB ID : EMD-63680
Title : Structure of flagellar hook at 3.14 angstroms resolution, conformation 2.
Authors : Chen, L.X.; Jiang, W.X.; Cheng, X.Q.; Dong, X.; Xing, Q.
Deposited on : 2025-03-10
Resolution : 3.14 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:

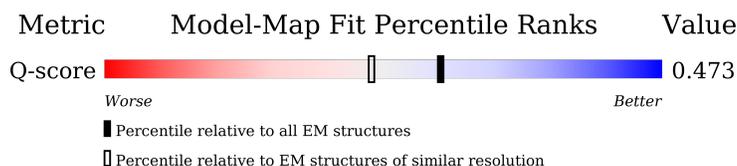
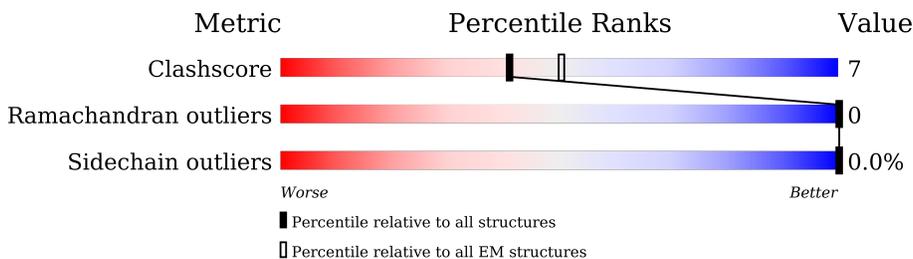
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh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

1 Overall quality at a glance

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

The reported resolution of this entry is 3.14 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	14483 (2.64 - 3.64)

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	DA	402	 9% 80% 20%
1	DB	402	 1% 79% 21%
1	DC	402	 1% 81% 19%
1	DD	402	 1% 81% 19%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain	
1	DE	402	5% 	85% 15%
1	DF	402		83% 17%
1	DG	402		83% 17%
1	DH	402		76% 24%
1	DI	402	8% 	80% 20%
1	DJ	402	6% 	79% 21%
1	DK	402	18% 	83% 17%
1	EA	402		83% 17%
1	EB	402		83% 16%
1	EC	402		83% 17%
1	ED	402		88% 12%
1	EE	402		80% 20%
1	EF	402		87% 13%
1	EG	402		83% 17%
1	EH	402		82% 18%
1	EI	402		81% 19%
1	EJ	402		82% 18%
1	EK	402		82% 18%
1	FA	402		86% 14%
1	FB	402		88% 12%
1	FC	402		92% 8%
1	FD	402		88% 12%
1	FE	402		86% 14%
1	FF	402		86% 14%
1	FG	402		87% 13%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain	
1	FH	402	87%	13%
1	FI	402	83%	17%
1	FJ	402	84%	16%
1	FK	402	85%	15%
1	GA	402	89%	11%
1	GB	402	88%	12%
1	GC	402	87%	13%
1	GD	402	85%	15%
1	GE	402	90%	10%
1	GF	402	88%	12%
1	GG	402	88%	11%
1	GH	402	91%	9%
1	GI	402	88%	12%
1	GJ	402	87%	13%
1	GK	402	87%	13%
1	HA	402	88%	12%
1	HB	402	87%	13%
1	HC	402	85%	15%
1	HD	402	82%	18%
1	HE	402	86%	14%
1	HF	402	82%	18%
1	HG	402	85%	15%
1	HH	402	80%	20%
1	HI	402	84%	16%
1	HJ	402	84%	16%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	HK	402	 89% 10%
1	IA	402	 81% 19%
1	IB	402	 74% 25%
1	IC	402	 81% 18%
1	ID	402	 81% 19%
1	IE	402	 81% 19%
1	IF	402	 76% 24%
1	IG	402	 79% 21%
1	IH	402	 5% 81% 19%
1	II	402	 81% 19%
1	IJ	402	 78% 22%
1	IK	402	 75% 25%

2 Entry composition [i](#)

There is only 1 type of molecule in this entry. The entry contains 195294 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 Flagellar hook protein FlgE.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	DA	402	2959	1820	511	620	8	0	0
1	DB	402	2959	1820	511	620	8	0	0
1	DC	402	2959	1820	511	620	8	0	0
1	DD	402	2959	1820	511	620	8	0	0
1	DE	402	2959	1820	511	620	8	0	0
1	DF	402	2959	1820	511	620	8	0	0
1	DG	402	2959	1820	511	620	8	0	0
1	DH	402	2959	1820	511	620	8	0	0
1	DI	402	2959	1820	511	620	8	0	0
1	DJ	402	2959	1820	511	620	8	0	0
1	DK	402	2959	1820	511	620	8	0	0
1	EA	402	2959	1820	511	620	8	0	0
1	EB	402	2959	1820	511	620	8	0	0
1	EC	402	2959	1820	511	620	8	0	0
1	ED	402	2959	1820	511	620	8	0	0
1	EE	402	2959	1820	511	620	8	0	0
1	EF	402	2959	1820	511	620	8	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					AltConf	Trace
1	EG	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	EH	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	EI	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	EJ	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	EK	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FA	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FB	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FC	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FD	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FE	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FF	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FG	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FH	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FI	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FJ	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	FK	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GA	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GB	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GC	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GD	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GE	402	Total 2959	C 1820	N 511	O 620	S 8	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					AltConf	Trace
1	GF	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GG	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GH	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GI	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GJ	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	GK	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HA	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HB	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HC	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HD	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HE	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HF	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HG	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HH	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HI	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HJ	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	HK	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	IA	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	IB	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	IC	402	Total 2959	C 1820	N 511	O 620	S 8	0	0
1	ID	402	Total 2959	C 1820	N 511	O 620	S 8	0	0

Continued on next page...

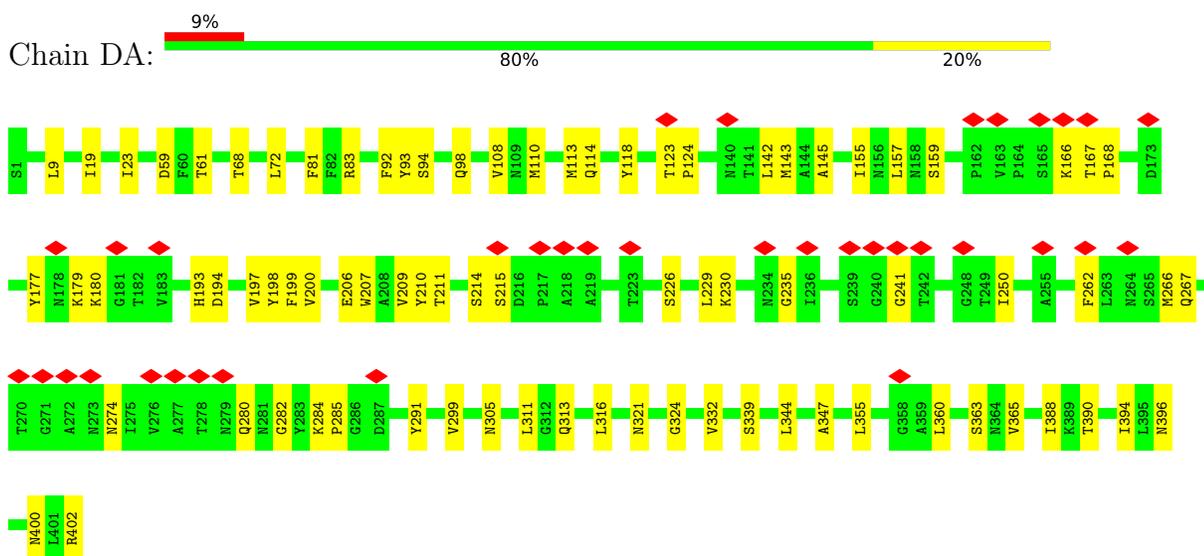
Continued from previous page...

Mol	Chain	Residues	Atoms					AltConf	Trace
1	IE	402	Total	C	N	O	S	0	0
			2959	1820	511	620	8		
1	IF	402	Total	C	N	O	S	0	0
			2959	1820	511	620	8		
1	IG	402	Total	C	N	O	S	0	0
			2959	1820	511	620	8		
1	IH	402	Total	C	N	O	S	0	0
			2959	1820	511	620	8		
1	II	402	Total	C	N	O	S	0	0
			2959	1820	511	620	8		
1	IJ	402	Total	C	N	O	S	0	0
			2959	1820	511	620	8		
1	IK	402	Total	C	N	O	S	0	0
			2959	1820	511	620	8		

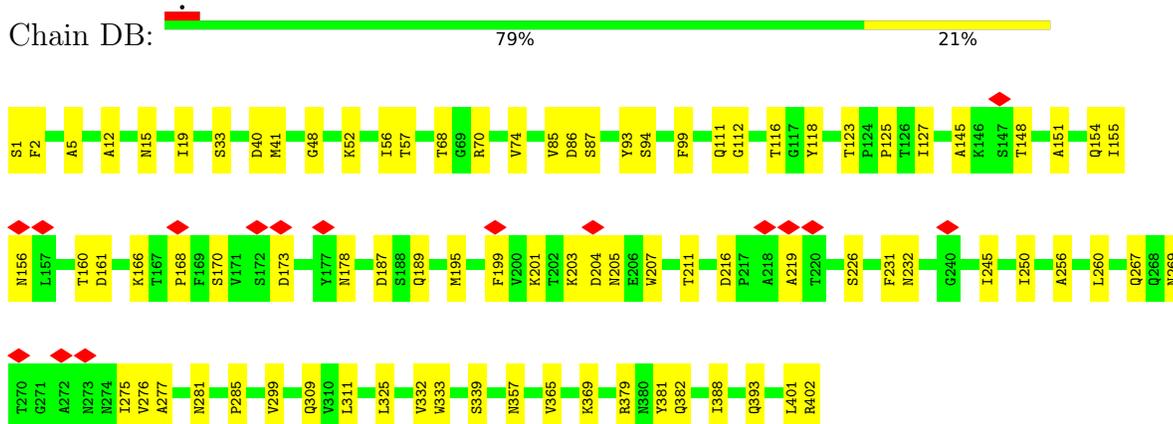
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

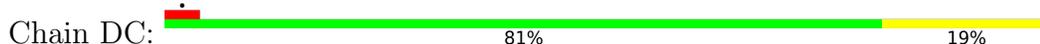
- Molecule 1: Flagellar hook protein FlgE

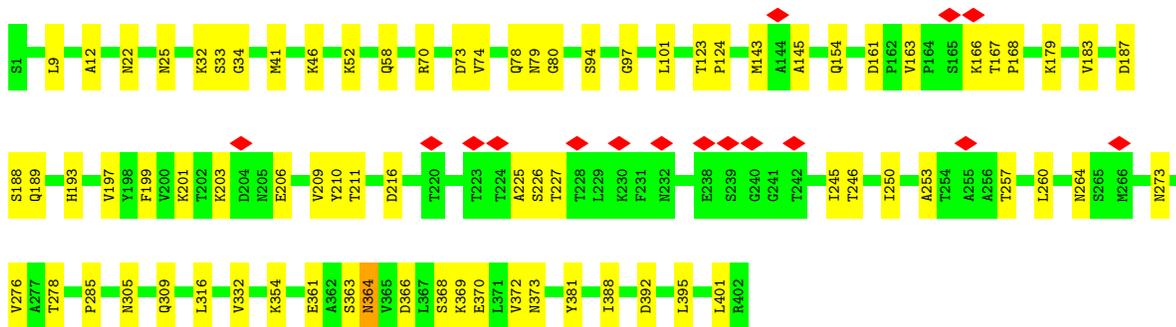


- Molecule 1: Flagellar hook protein FlgE

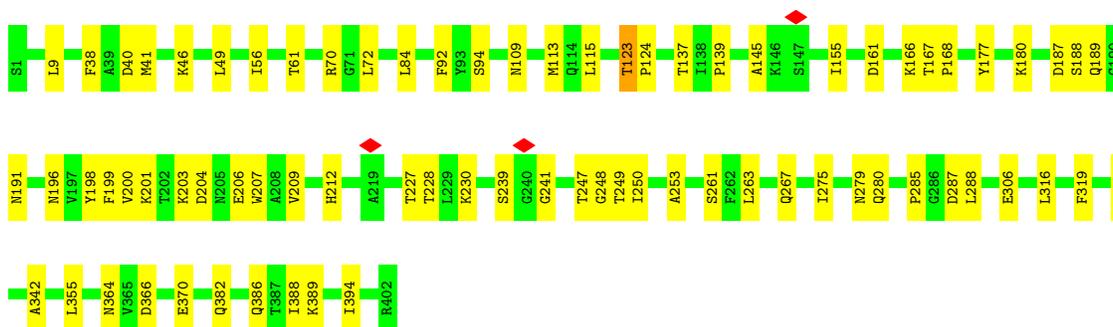
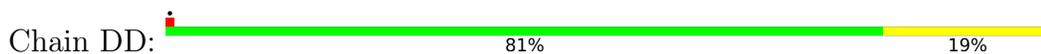


- Molecule 1: Flagellar hook protein FlgE

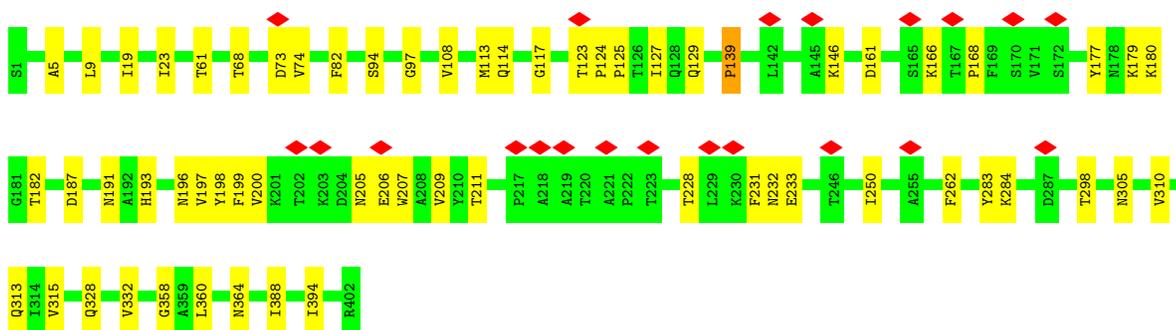
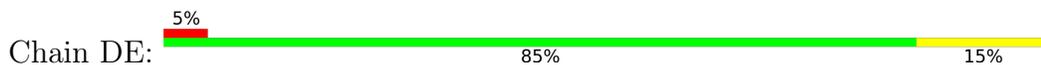




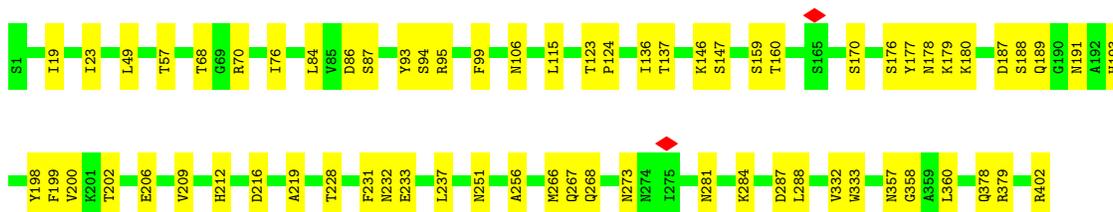
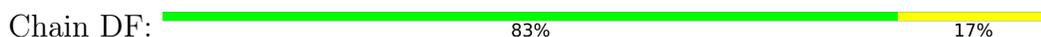
- Molecule 1: Flagellar hook protein FlgE

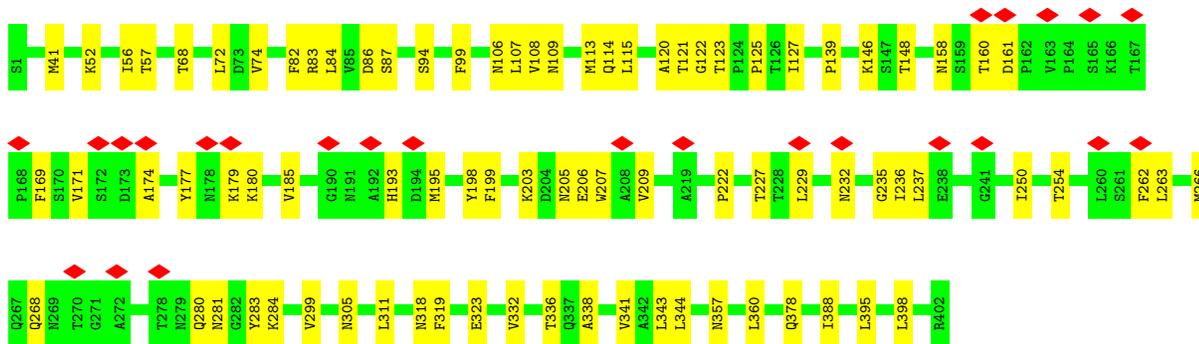


- Molecule 1: Flagellar hook protein FlgE

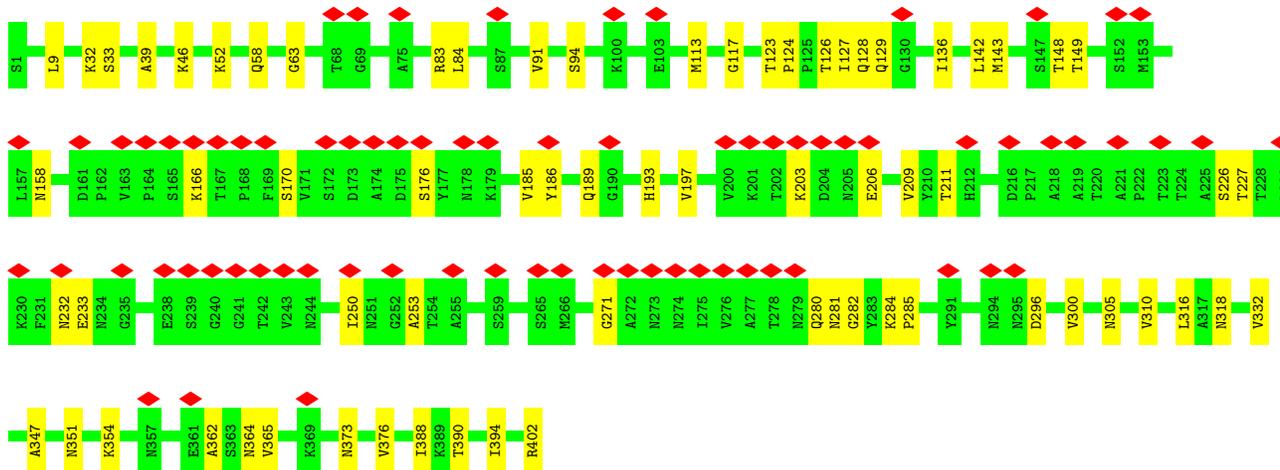
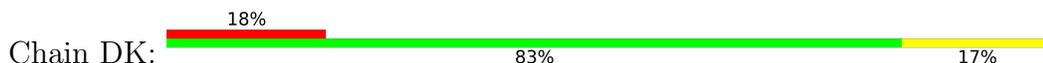


- Molecule 1: Flagellar hook protein FlgE

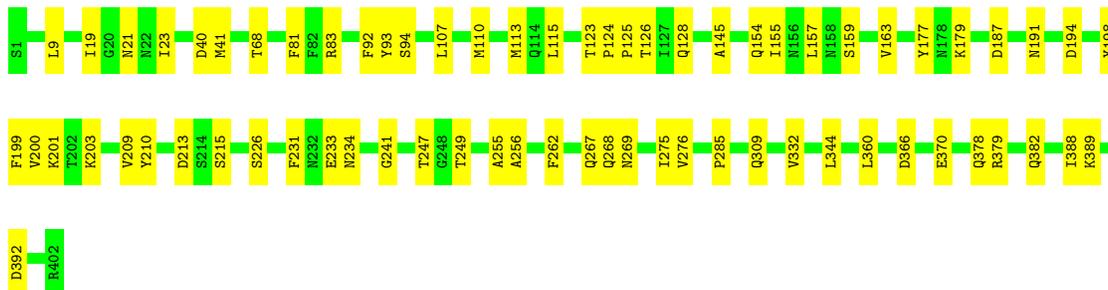
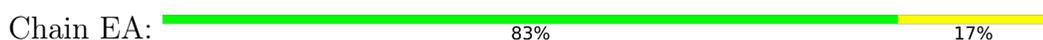




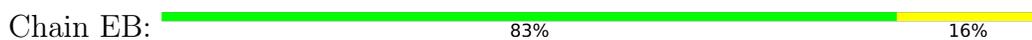
• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE

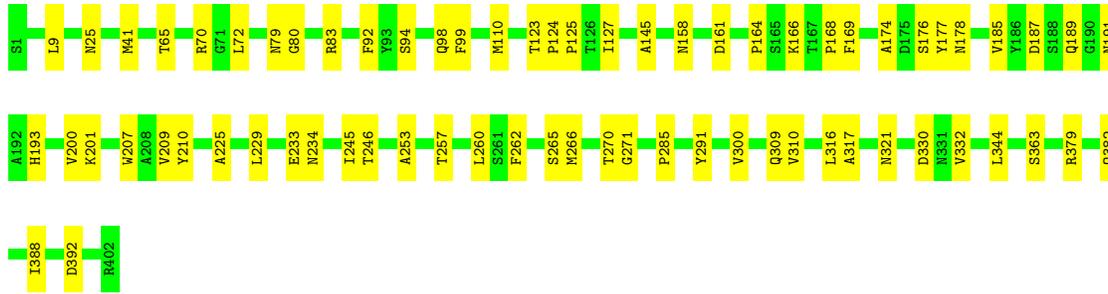
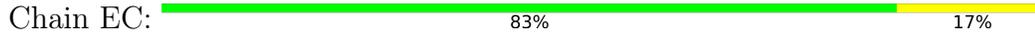


• Molecule 1: Flagellar hook protein FlgE

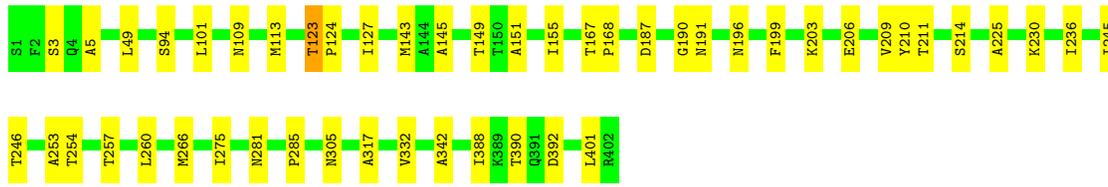




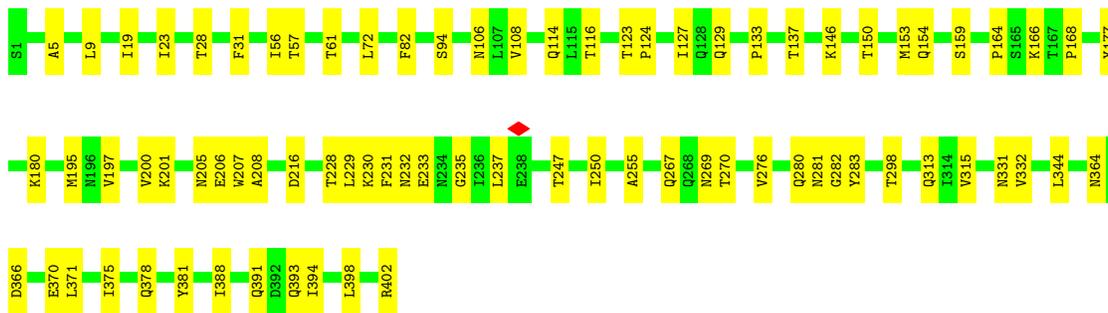
● Molecule 1: Flagellar hook protein FlgE



● Molecule 1: Flagellar hook protein FlgE



● Molecule 1: Flagellar hook protein FlgE

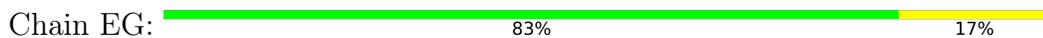


● Molecule 1: Flagellar hook protein FlgE

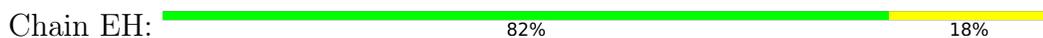




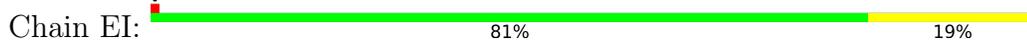
• Molecule 1: Flagellar hook protein FlgE



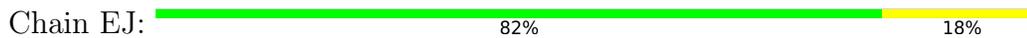
• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE

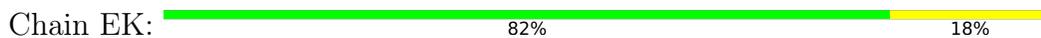


• Molecule 1: Flagellar hook protein FlgE





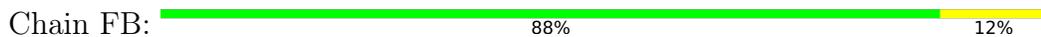
• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE

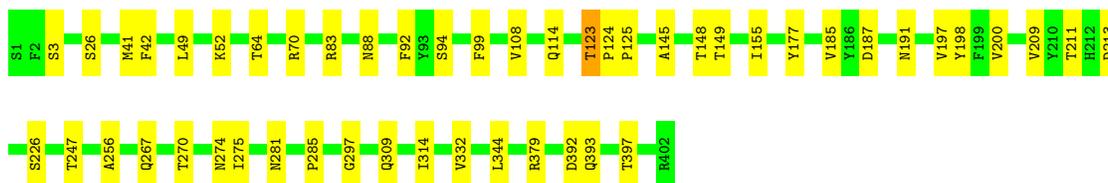


• Molecule 1: Flagellar hook protein FlgE



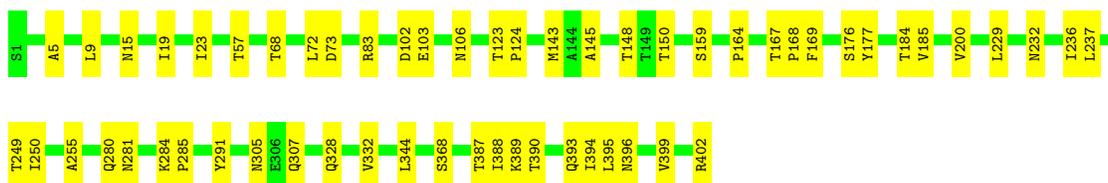
• Molecule 1: Flagellar hook protein FlgE

Chain FD:  88% 12%



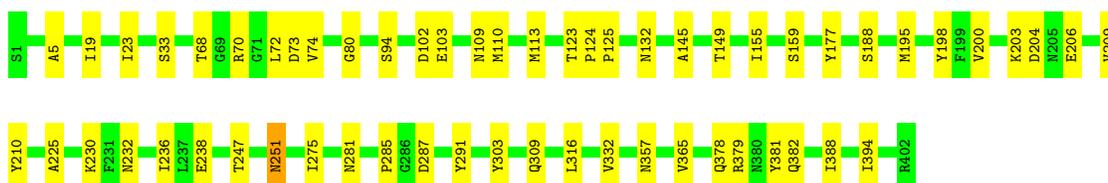
- Molecule 1: Flagellar hook protein FlgE

Chain FE:  86% 14%



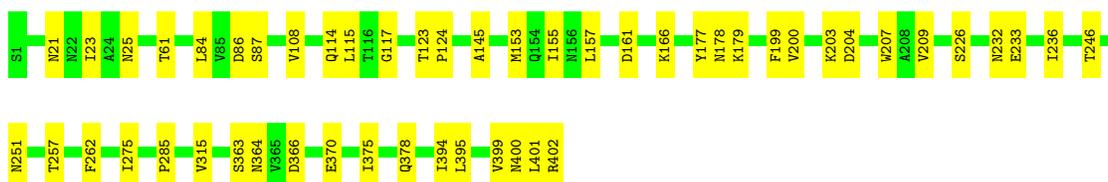
- Molecule 1: Flagellar hook protein FlgE

Chain FF:  86% 14%



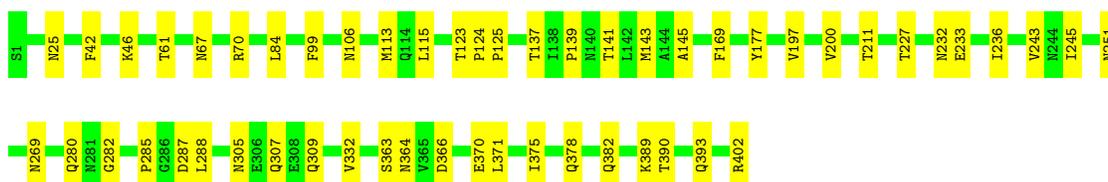
- Molecule 1: Flagellar hook protein FlgE

Chain FG:  87% 13%



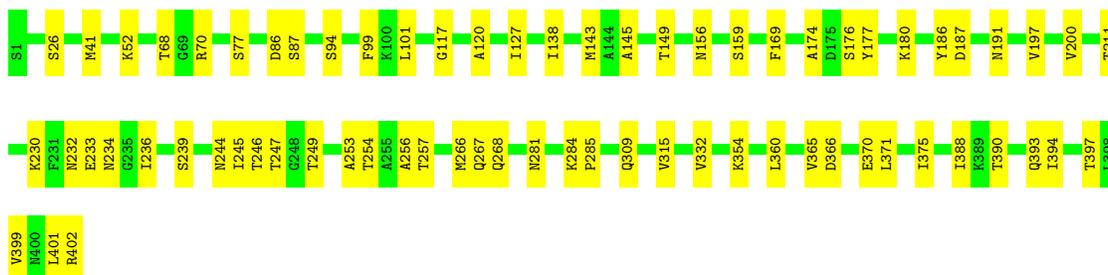
- Molecule 1: Flagellar hook protein FlgE

Chain FH:  87% 13%



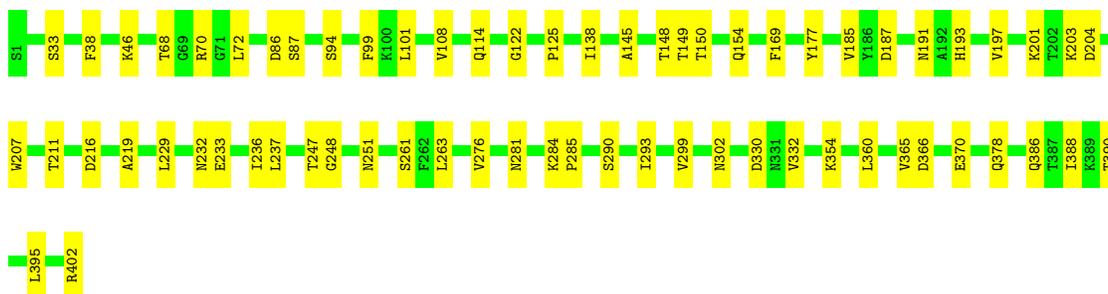
- Molecule 1: Flagellar hook protein FlgE

Chain FI:  83% 17%



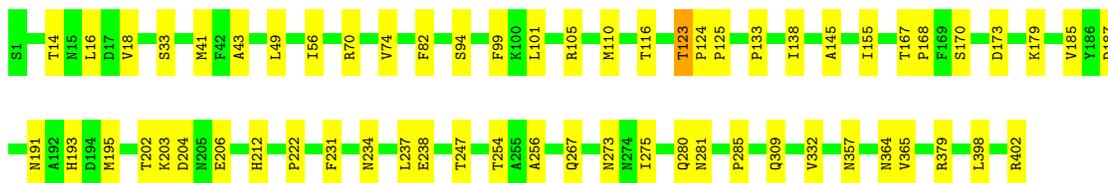
• Molecule 1: Flagellar hook protein FlgE

Chain FJ:  84% 16%



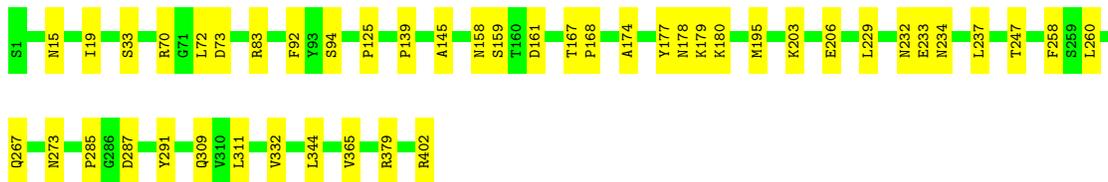
• Molecule 1: Flagellar hook protein FlgE

Chain FK:  85% 15%



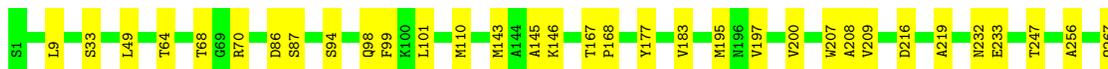
• Molecule 1: Flagellar hook protein FlgE

Chain GA:  89% 11%

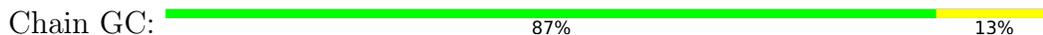


• Molecule 1: Flagellar hook protein FlgE

Chain GB:  88% 12%



• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE





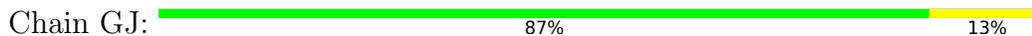
• Molecule 1: Flagellar hook protein FlgE



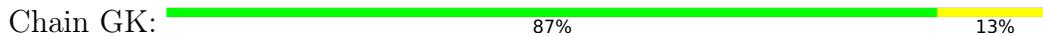
• Molecule 1: Flagellar hook protein FlgE



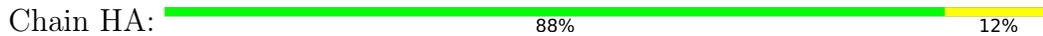
• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE

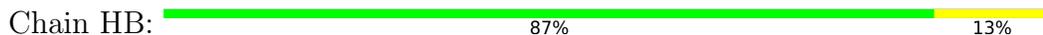


• Molecule 1: Flagellar hook protein FlgE

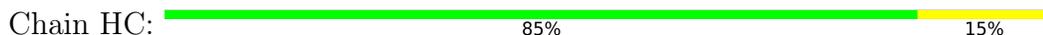




• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE

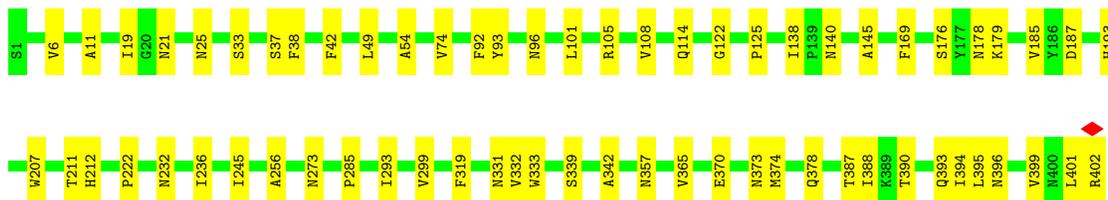
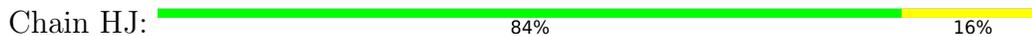


• Molecule 1: Flagellar hook protein FlgE

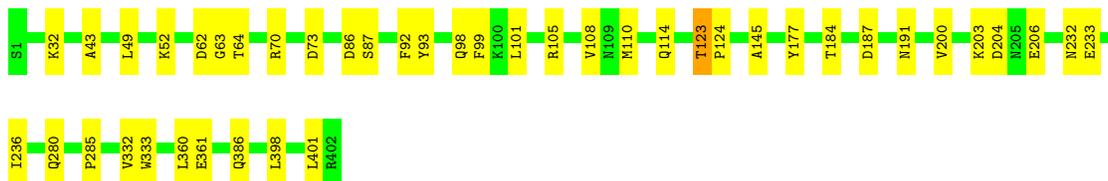




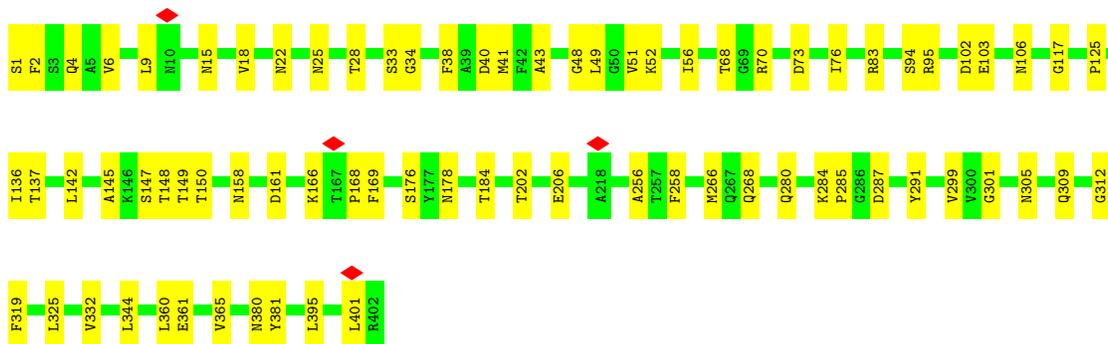
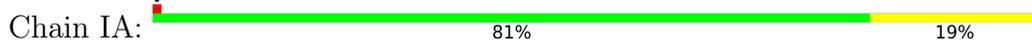
• Molecule 1: Flagellar hook protein FlgE



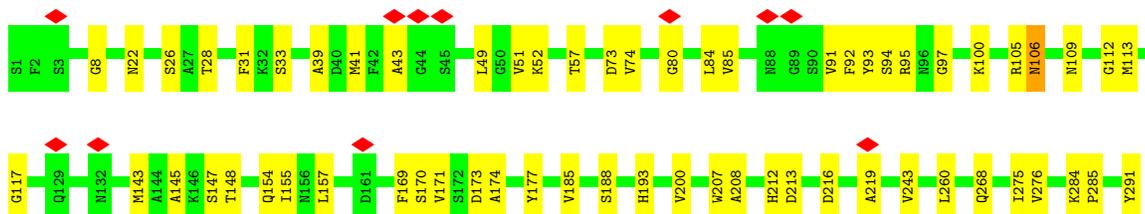
• Molecule 1: Flagellar hook protein FlgE

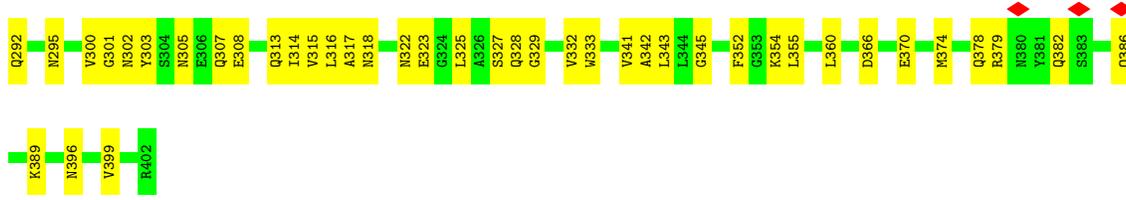


• Molecule 1: Flagellar hook protein FlgE

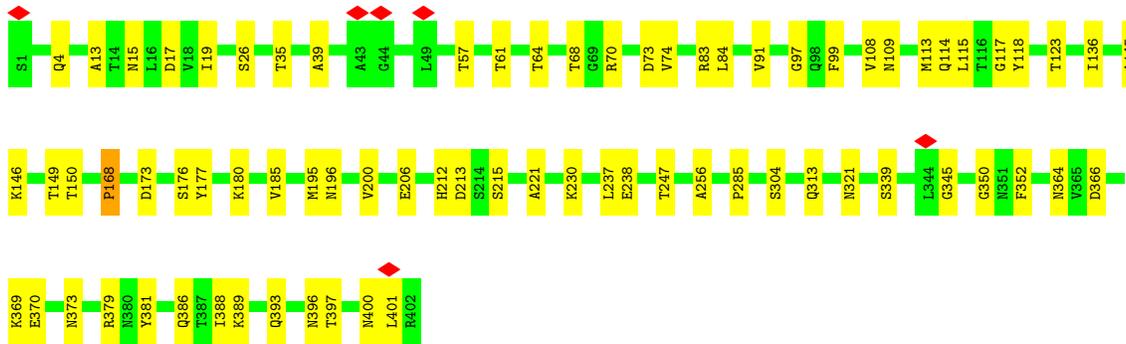
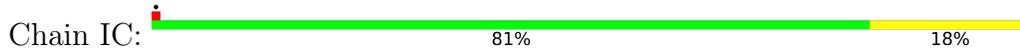


• Molecule 1: Flagellar hook protein FlgE

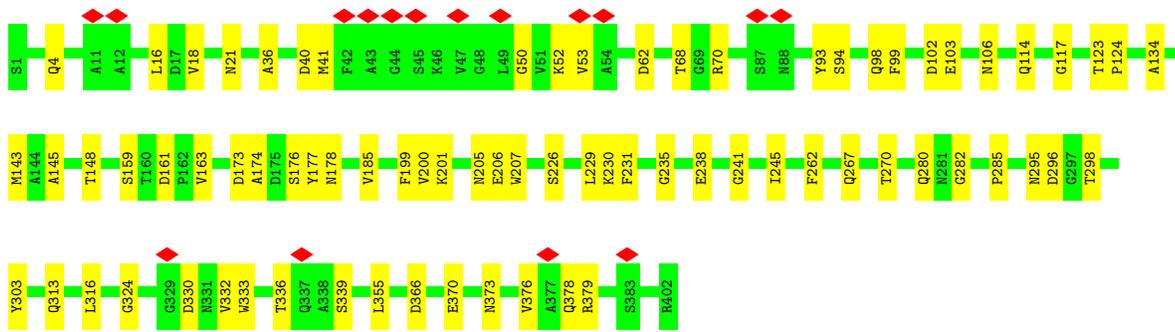
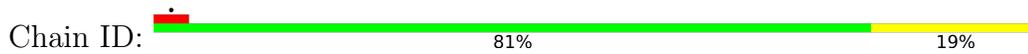




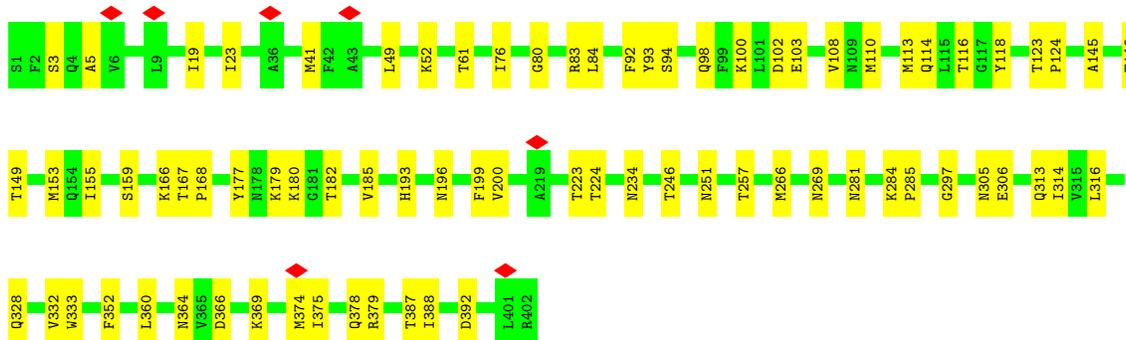
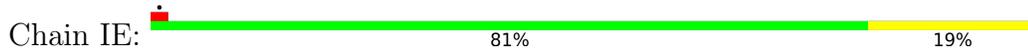
• Molecule 1: Flagellar hook protein FlgE



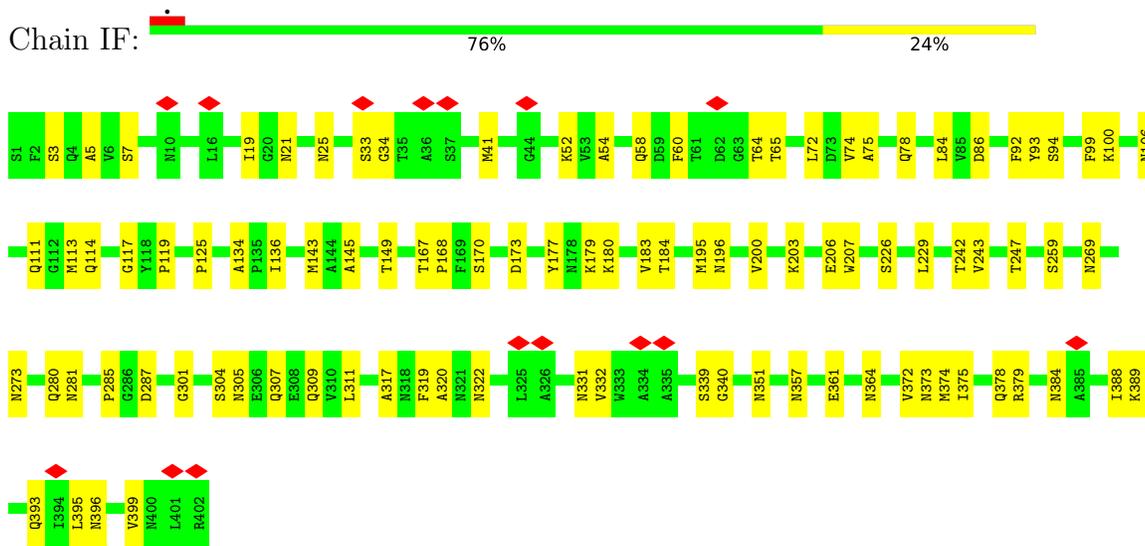
• Molecule 1: Flagellar hook protein FlgE



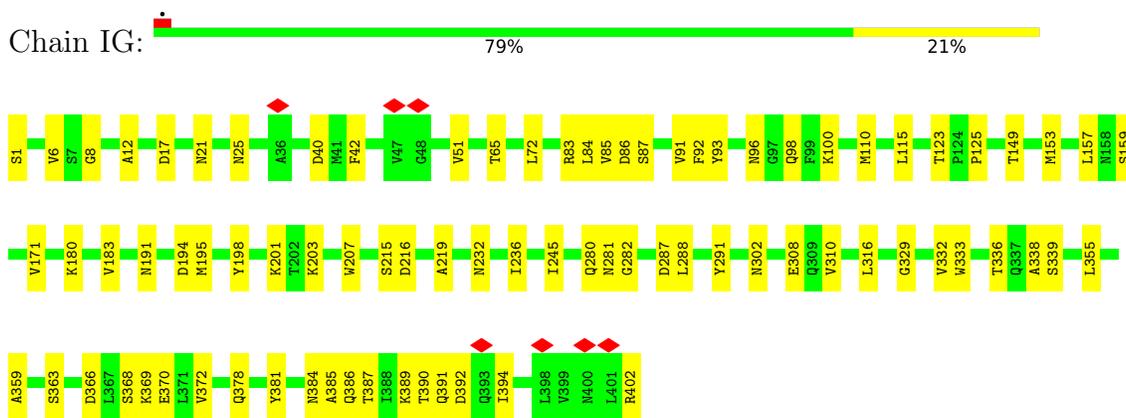
• Molecule 1: Flagellar hook protein FlgE



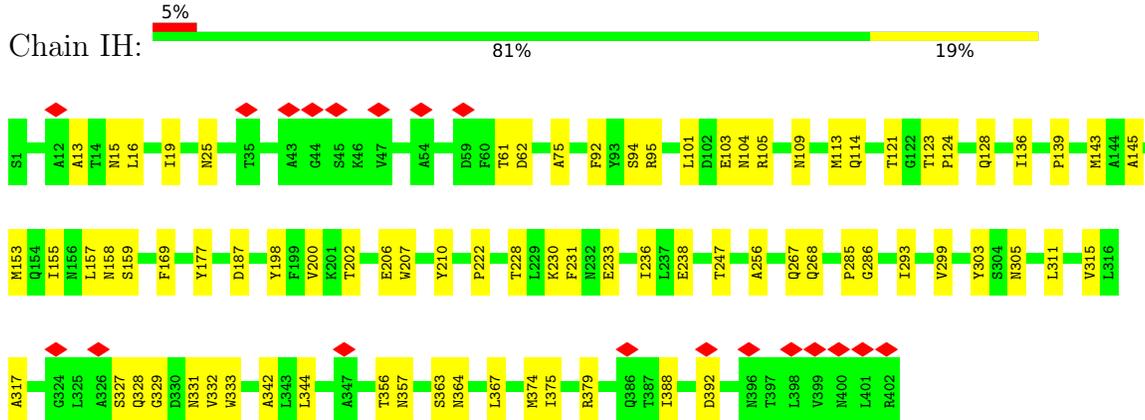
• Molecule 1: Flagellar hook protein FlgE



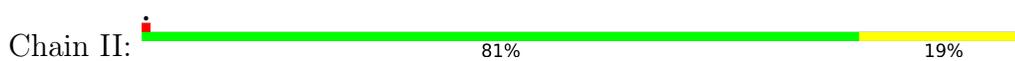
• Molecule 1: Flagellar hook protein FlgE

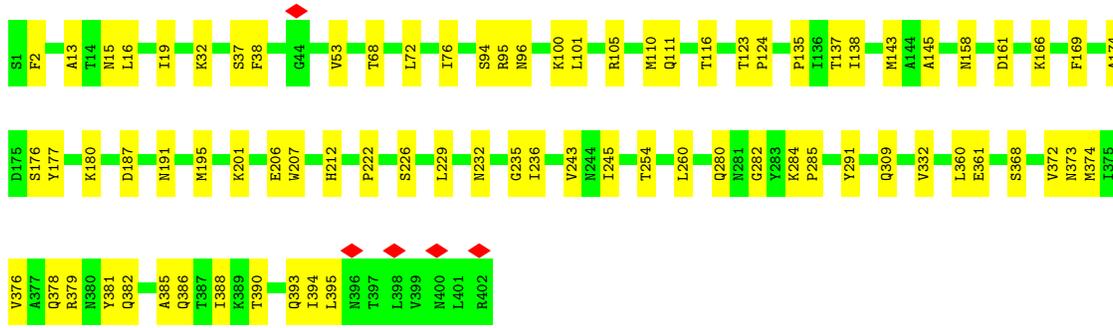


• Molecule 1: Flagellar hook protein FlgE

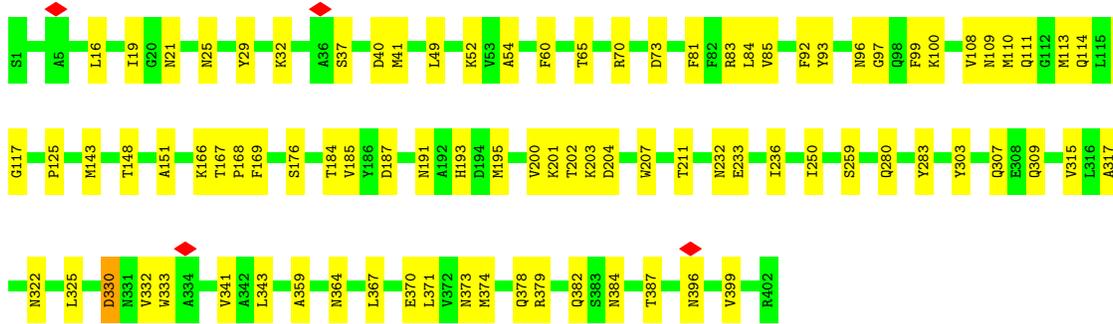
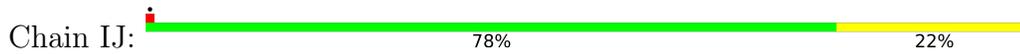


• Molecule 1: Flagellar hook protein FlgE

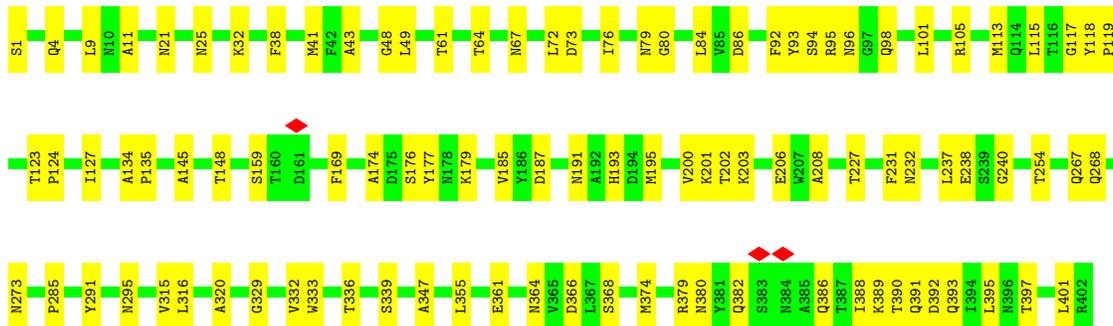
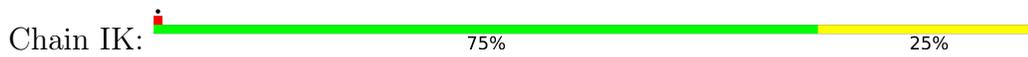




• Molecule 1: Flagellar hook protein FlgE



• Molecule 1: Flagellar hook protein FlgE



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	435796	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	30	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.048	Depositor
Minimum map value	-0.643	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.040	Depositor
Recommended contour level	0.075	Depositor
Map size (Å)	510.0, 510.0, 510.0	wwPDB
Map dimensions	600, 600, 600	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.85, 0.85, 0.85	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	DA	0.12	0/3003	0.35	0/4090
1	DB	0.13	0/3003	0.34	0/4090
1	DC	0.12	0/3003	0.33	0/4090
1	DD	0.13	0/3003	0.34	0/4090
1	DE	0.14	0/3003	0.36	1/4090 (0.0%)
1	DF	0.12	0/3003	0.32	0/4090
1	DG	0.11	0/3003	0.31	0/4090
1	DH	0.12	0/3003	0.32	0/4090
1	DI	0.13	0/3003	0.36	0/4090
1	DJ	0.13	0/3003	0.33	0/4090
1	DK	0.13	0/3003	0.33	0/4090
1	EA	0.12	0/3003	0.33	0/4090
1	EB	0.12	0/3003	0.32	0/4090
1	EC	0.12	0/3003	0.33	0/4090
1	ED	0.13	0/3003	0.32	0/4090
1	EE	0.13	0/3003	0.34	0/4090
1	EF	0.12	0/3003	0.32	0/4090
1	EG	0.12	0/3003	0.33	0/4090
1	EH	0.13	0/3003	0.33	0/4090
1	EI	0.14	0/3003	0.35	0/4090
1	EJ	0.12	0/3003	0.32	0/4090
1	EK	0.13	0/3003	0.34	1/4090 (0.0%)
1	FA	0.13	0/3003	0.35	0/4090
1	FB	0.11	0/3003	0.31	0/4090
1	FC	0.12	0/3003	0.31	0/4090
1	FD	0.12	0/3003	0.30	0/4090
1	FE	0.11	0/3003	0.31	0/4090
1	FF	0.12	0/3003	0.33	0/4090
1	FG	0.12	0/3003	0.33	0/4090
1	FH	0.12	0/3003	0.31	0/4090
1	FI	0.12	0/3003	0.30	0/4090
1	FJ	0.13	0/3003	0.33	1/4090 (0.0%)
1	FK	0.13	0/3003	0.33	0/4090
1	GA	0.13	0/3003	0.33	0/4090

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	GB	0.11	0/3003	0.30	0/4090
1	GC	0.12	0/3003	0.31	0/4090
1	GD	0.13	0/3003	0.32	0/4090
1	GE	0.11	0/3003	0.31	0/4090
1	GF	0.11	0/3003	0.30	0/4090
1	GG	0.11	0/3003	0.30	0/4090
1	GH	0.12	0/3003	0.30	0/4090
1	GI	0.11	0/3003	0.30	0/4090
1	GJ	0.11	0/3003	0.31	0/4090
1	GK	0.11	0/3003	0.30	0/4090
1	HA	0.11	0/3003	0.31	0/4090
1	HB	0.11	0/3003	0.30	0/4090
1	HC	0.12	0/3003	0.33	0/4090
1	HD	0.11	0/3003	0.32	0/4090
1	HE	0.11	0/3003	0.31	0/4090
1	HF	0.12	0/3003	0.31	0/4090
1	HG	0.11	0/3003	0.31	0/4090
1	HH	0.12	0/3003	0.33	0/4090
1	HI	0.11	0/3003	0.29	0/4090
1	HJ	0.12	0/3003	0.33	0/4090
1	HK	0.11	0/3003	0.31	0/4090
1	IA	0.13	0/3003	0.35	0/4090
1	IB	0.11	0/3003	0.32	0/4090
1	IC	0.13	0/3003	0.36	1/4090 (0.0%)
1	ID	0.12	0/3003	0.34	0/4090
1	IE	0.11	0/3003	0.33	0/4090
1	IF	0.11	0/3003	0.31	0/4090
1	IG	0.12	0/3003	0.35	0/4090
1	IH	0.13	0/3003	0.34	0/4090
1	II	0.13	0/3003	0.34	0/4090
1	IJ	0.12	0/3003	0.33	1/4090 (0.0%)
1	IK	0.11	0/3003	0.32	0/4090
All	All	0.12	0/198198	0.32	5/269940 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	DB	0	1
1	DD	0	1

Continued on next page...

Continued from previous page...

Mol	Chain	#Chirality outliers	#Planarity outliers
1	EB	0	1
1	ED	0	1
1	EK	0	1
1	FD	0	1
1	FK	0	1
1	GD	0	1
1	GG	0	1
1	HA	0	1
1	HD	0	1
1	HF	0	1
1	HK	0	1
1	IG	0	1
All	All	0	14

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	DE	139	PRO	CA-N-CD	-8.18	100.54	112.00
1	IC	168	PRO	CA-N-CD	-8.00	100.80	112.00
1	IJ	330	ASP	CB-CA-C	-5.17	110.59	116.54
1	EK	330	ASP	CB-CA-C	-5.07	110.72	116.54
1	FJ	330	ASP	CB-CA-C	-5.04	110.75	116.54

There are no chirality outliers.

5 of 14 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	DB	123	THR	Peptide
1	DD	123	THR	Peptide
1	EB	123	THR	Peptide
1	ED	123	THR	Peptide
1	EK	123	THR	Peptide

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	DA	2959	0	2855	53	0
1	DB	2959	0	2855	56	0
1	DC	2959	0	2855	56	0
1	DD	2959	0	2855	51	0
1	DE	2959	0	2855	37	0
1	DF	2959	0	2855	48	0
1	DG	2959	0	2855	46	0
1	DH	2959	0	2855	63	0
1	DI	2959	0	2855	50	0
1	DJ	2959	0	2855	63	0
1	DK	2959	0	2855	39	0
1	EA	2959	0	2855	45	0
1	EB	2959	0	2855	45	0
1	EC	2959	0	2855	43	0
1	ED	2959	0	2855	36	0
1	EE	2959	0	2855	53	0
1	EF	2959	0	2855	33	0
1	EG	2959	0	2855	47	0
1	EH	2959	0	2855	47	0
1	EI	2959	0	2855	49	0
1	EJ	2959	0	2855	47	0
1	EK	2959	0	2855	43	0
1	FA	2959	0	2855	37	0
1	FB	2959	0	2855	30	0
1	FC	2959	0	2855	27	0
1	FD	2959	0	2855	34	0
1	FE	2959	0	2855	37	0
1	FF	2959	0	2855	39	0
1	FG	2959	0	2855	36	0
1	FH	2959	0	2855	35	0
1	FI	2959	0	2855	45	0
1	FJ	2959	0	2855	42	0
1	FK	2959	0	2855	42	0
1	GA	2959	0	2855	26	0
1	GB	2959	0	2855	31	0
1	GC	2959	0	2855	34	0
1	GD	2959	0	2855	44	0
1	GE	2959	0	2855	27	0
1	GF	2959	0	2855	31	0
1	GG	2959	0	2855	30	0
1	GH	2959	0	2855	23	0
1	GI	2959	0	2855	30	0
1	GJ	2959	0	2855	32	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	GK	2959	0	2855	34	0
1	HA	2959	0	2855	29	0
1	HB	2959	0	2855	31	0
1	HC	2959	0	2855	42	0
1	HD	2959	0	2855	53	0
1	HE	2959	0	2855	43	0
1	HF	2959	0	2855	59	0
1	HG	2959	0	2855	42	0
1	HH	2959	0	2855	54	0
1	HI	2959	0	2855	39	0
1	HJ	2959	0	2855	46	0
1	HK	2959	0	2855	25	0
1	IA	2959	0	2855	47	0
1	IB	2959	0	2855	74	0
1	IC	2959	0	2855	52	0
1	ID	2959	0	2855	51	0
1	IE	2959	0	2855	49	0
1	IF	2959	0	2855	59	0
1	IG	2959	0	2855	54	0
1	IH	2959	0	2855	51	0
1	II	2959	0	2855	59	0
1	IJ	2959	0	2855	56	0
1	IK	2959	0	2855	68	0
All	All	195294	0	188430	2572	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 7.

The worst 5 of 2572 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:EH:203:LYS:HD3	1:EH:204:ASP:H	1.36	0.90
1:GD:123:THR:HG23	1:GD:124:PRO:HD3	1.54	0.89
1:DD:123:THR:HG23	1:DD:124:PRO:HD3	1.56	0.88
1:IH:143:MET:HB2	1:IH:286:GLY:H	1.44	0.83
1:HC:143:MET:SD	1:HC:309:GLN:NE2	2.53	0.81

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	DA	400/402 (100%)	391 (98%)	9 (2%)	0	100	100
1	DB	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	DC	400/402 (100%)	384 (96%)	16 (4%)	0	100	100
1	DD	400/402 (100%)	393 (98%)	7 (2%)	0	100	100
1	DE	400/402 (100%)	388 (97%)	12 (3%)	0	100	100
1	DF	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	DG	400/402 (100%)	387 (97%)	13 (3%)	0	100	100
1	DH	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	DI	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	DJ	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	DK	400/402 (100%)	381 (95%)	19 (5%)	0	100	100
1	EA	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	EB	400/402 (100%)	388 (97%)	12 (3%)	0	100	100
1	EC	400/402 (100%)	382 (96%)	18 (4%)	0	100	100
1	ED	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	EE	400/402 (100%)	382 (96%)	18 (4%)	0	100	100
1	EF	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	EG	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	EH	400/402 (100%)	385 (96%)	15 (4%)	0	100	100
1	EI	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	EJ	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	EK	400/402 (100%)	384 (96%)	16 (4%)	0	100	100
1	FA	400/402 (100%)	394 (98%)	6 (2%)	0	100	100
1	FB	400/402 (100%)	388 (97%)	12 (3%)	0	100	100
1	FC	400/402 (100%)	390 (98%)	10 (2%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	FD	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	FE	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	FF	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	FG	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	FH	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	FI	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	FJ	400/402 (100%)	387 (97%)	13 (3%)	0	100	100
1	FK	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	GA	400/402 (100%)	391 (98%)	9 (2%)	0	100	100
1	GB	400/402 (100%)	393 (98%)	7 (2%)	0	100	100
1	GC	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	GD	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	GE	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	GF	400/402 (100%)	391 (98%)	9 (2%)	0	100	100
1	GG	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	GH	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	GI	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	GJ	400/402 (100%)	393 (98%)	7 (2%)	0	100	100
1	GK	400/402 (100%)	391 (98%)	9 (2%)	0	100	100
1	HA	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	HB	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	HC	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	HD	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	HE	400/402 (100%)	391 (98%)	9 (2%)	0	100	100
1	HF	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	HG	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	HH	400/402 (100%)	388 (97%)	12 (3%)	0	100	100
1	HI	400/402 (100%)	387 (97%)	13 (3%)	0	100	100
1	HJ	400/402 (100%)	392 (98%)	8 (2%)	0	100	100
1	HK	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	IA	400/402 (100%)	390 (98%)	10 (2%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	IB	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	IC	400/402 (100%)	391 (98%)	9 (2%)	0	100	100
1	ID	400/402 (100%)	393 (98%)	7 (2%)	0	100	100
1	IE	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	IF	400/402 (100%)	389 (97%)	11 (3%)	0	100	100
1	IG	400/402 (100%)	390 (98%)	10 (2%)	0	100	100
1	IH	400/402 (100%)	391 (98%)	9 (2%)	0	100	100
1	II	400/402 (100%)	384 (96%)	16 (4%)	0	100	100
1	IJ	400/402 (100%)	395 (99%)	5 (1%)	0	100	100
1	IK	400/402 (100%)	391 (98%)	9 (2%)	0	100	100
All	All	26400/26532 (100%)	25723 (97%)	677 (3%)	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	DA	322/322 (100%)	322 (100%)	0	100	100
1	DB	322/322 (100%)	322 (100%)	0	100	100
1	DC	322/322 (100%)	321 (100%)	1 (0%)	91	95
1	DD	322/322 (100%)	322 (100%)	0	100	100
1	DE	322/322 (100%)	322 (100%)	0	100	100
1	DF	322/322 (100%)	322 (100%)	0	100	100
1	DG	322/322 (100%)	322 (100%)	0	100	100
1	DH	322/322 (100%)	322 (100%)	0	100	100
1	DI	322/322 (100%)	322 (100%)	0	100	100
1	DJ	322/322 (100%)	322 (100%)	0	100	100
1	DK	322/322 (100%)	322 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	EA	322/322 (100%)	322 (100%)	0	100	100
1	EB	322/322 (100%)	322 (100%)	0	100	100
1	EC	322/322 (100%)	322 (100%)	0	100	100
1	ED	322/322 (100%)	322 (100%)	0	100	100
1	EE	322/322 (100%)	322 (100%)	0	100	100
1	EF	322/322 (100%)	322 (100%)	0	100	100
1	EG	322/322 (100%)	322 (100%)	0	100	100
1	EH	322/322 (100%)	322 (100%)	0	100	100
1	EI	322/322 (100%)	322 (100%)	0	100	100
1	EJ	322/322 (100%)	322 (100%)	0	100	100
1	EK	322/322 (100%)	322 (100%)	0	100	100
1	FA	322/322 (100%)	322 (100%)	0	100	100
1	FB	322/322 (100%)	322 (100%)	0	100	100
1	FC	322/322 (100%)	322 (100%)	0	100	100
1	FD	322/322 (100%)	321 (100%)	1 (0%)	91	95
1	FE	322/322 (100%)	322 (100%)	0	100	100
1	FF	322/322 (100%)	321 (100%)	1 (0%)	91	95
1	FG	322/322 (100%)	322 (100%)	0	100	100
1	FH	322/322 (100%)	322 (100%)	0	100	100
1	FI	322/322 (100%)	322 (100%)	0	100	100
1	FJ	322/322 (100%)	322 (100%)	0	100	100
1	FK	322/322 (100%)	322 (100%)	0	100	100
1	GA	322/322 (100%)	322 (100%)	0	100	100
1	GB	322/322 (100%)	322 (100%)	0	100	100
1	GC	322/322 (100%)	322 (100%)	0	100	100
1	GD	322/322 (100%)	322 (100%)	0	100	100
1	GE	322/322 (100%)	322 (100%)	0	100	100
1	GF	322/322 (100%)	322 (100%)	0	100	100
1	GG	322/322 (100%)	322 (100%)	0	100	100
1	GH	322/322 (100%)	322 (100%)	0	100	100
1	GI	322/322 (100%)	322 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	GJ	322/322 (100%)	322 (100%)	0	100	100
1	GK	322/322 (100%)	322 (100%)	0	100	100
1	HA	322/322 (100%)	322 (100%)	0	100	100
1	HB	322/322 (100%)	322 (100%)	0	100	100
1	HC	322/322 (100%)	322 (100%)	0	100	100
1	HD	322/322 (100%)	322 (100%)	0	100	100
1	HE	322/322 (100%)	322 (100%)	0	100	100
1	HF	322/322 (100%)	322 (100%)	0	100	100
1	HG	322/322 (100%)	321 (100%)	1 (0%)	91	95
1	HH	322/322 (100%)	322 (100%)	0	100	100
1	HI	322/322 (100%)	322 (100%)	0	100	100
1	HJ	322/322 (100%)	322 (100%)	0	100	100
1	HK	322/322 (100%)	322 (100%)	0	100	100
1	IA	322/322 (100%)	322 (100%)	0	100	100
1	IB	322/322 (100%)	321 (100%)	1 (0%)	91	95
1	IC	322/322 (100%)	322 (100%)	0	100	100
1	ID	322/322 (100%)	322 (100%)	0	100	100
1	IE	322/322 (100%)	322 (100%)	0	100	100
1	IF	322/322 (100%)	322 (100%)	0	100	100
1	IG	322/322 (100%)	322 (100%)	0	100	100
1	IH	322/322 (100%)	322 (100%)	0	100	100
1	II	322/322 (100%)	322 (100%)	0	100	100
1	IJ	322/322 (100%)	322 (100%)	0	100	100
1	IK	322/322 (100%)	322 (100%)	0	100	100
All	All	21252/21252 (100%)	21247 (100%)	5 (0%)	100	100

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	DC	364	ASN
1	FD	267	GLN
1	FF	251	ASN
1	HG	78	GLN
1	IB	106	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 317 such sidechains are listed below:

Mol	Chain	Res	Type
1	HF	396	ASN
1	IF	269	ASN
1	HH	191	ASN
1	IB	292	GLN
1	IH	318	ASN

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.

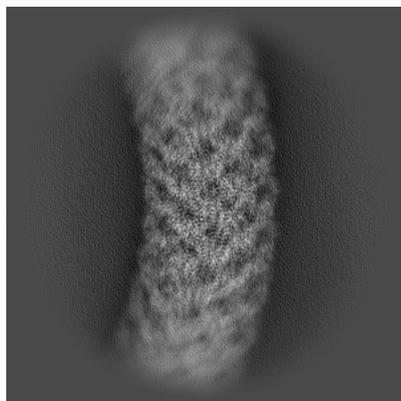
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-63680. These allow visual inspection of the internal detail of the map and identification of artifacts.

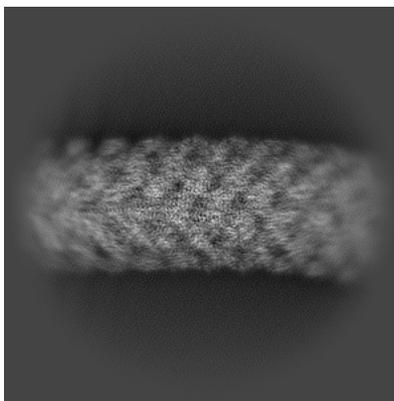
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

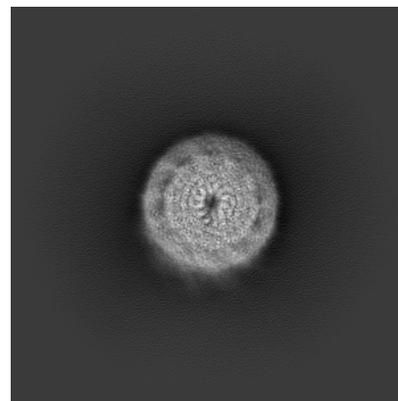
6.1.1 Primary map



X

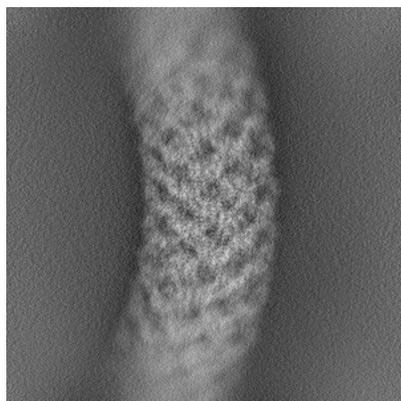


Y

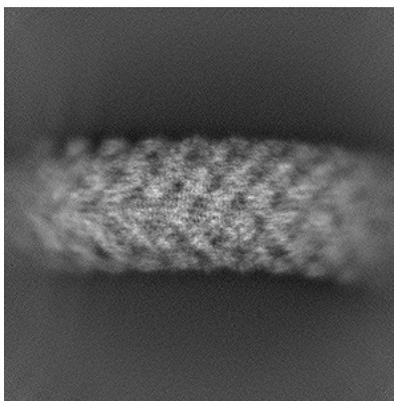


Z

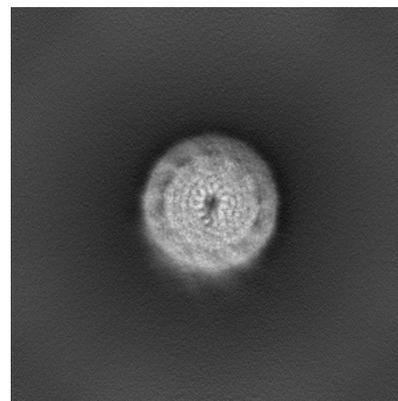
6.1.2 Raw map



X



Y

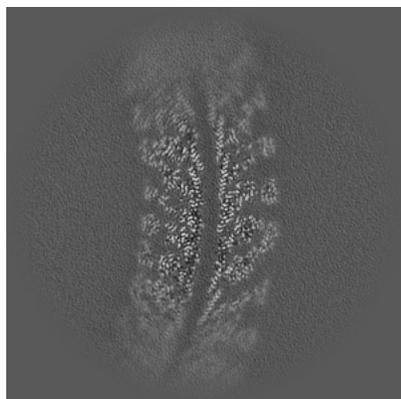


Z

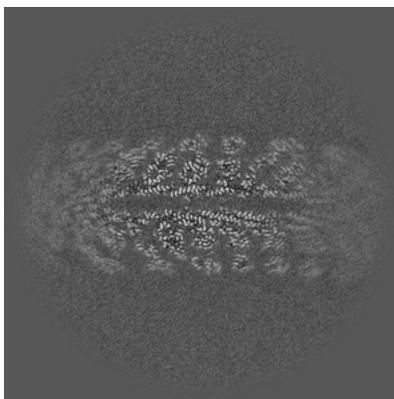
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

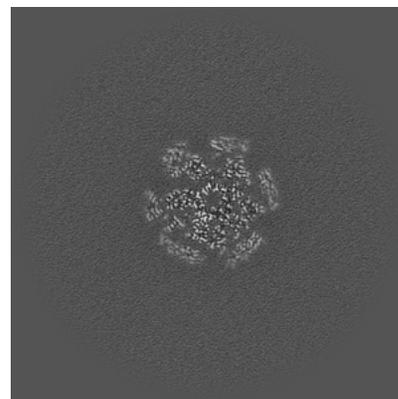
6.2.1 Primary map



X Index: 300

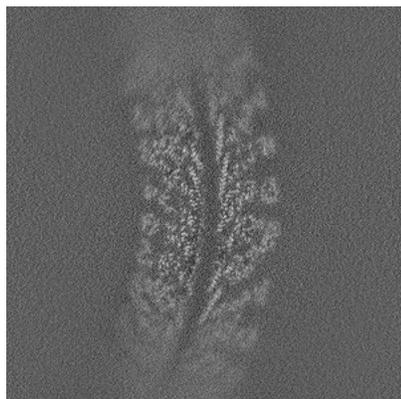


Y Index: 300

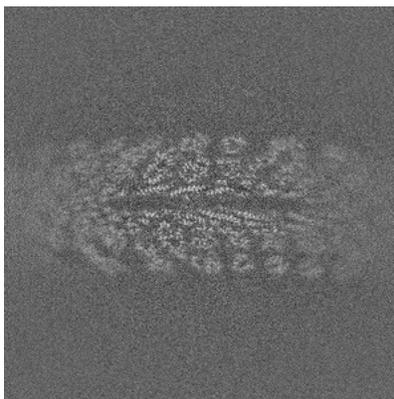


Z Index: 300

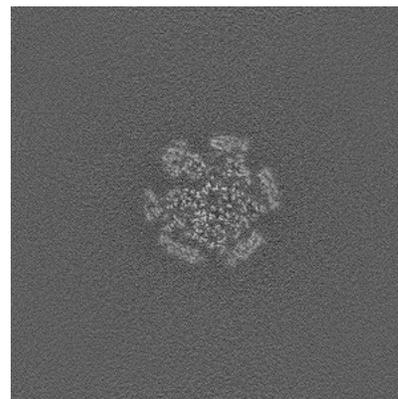
6.2.2 Raw map



X Index: 300



Y Index: 300

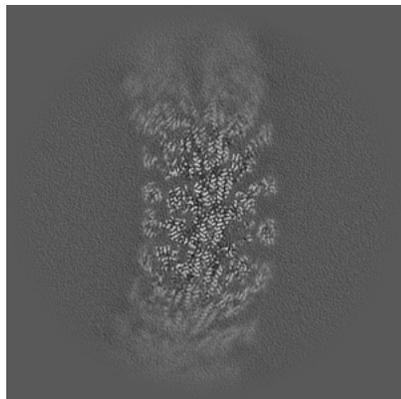


Z Index: 300

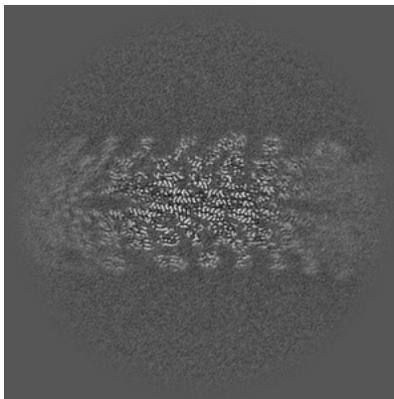
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

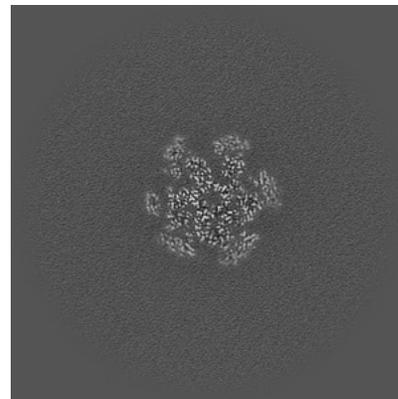
6.3.1 Primary map



X Index: 287

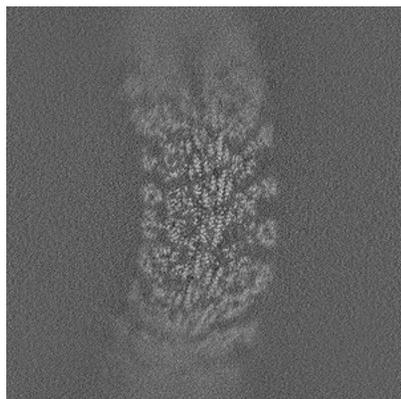


Y Index: 287

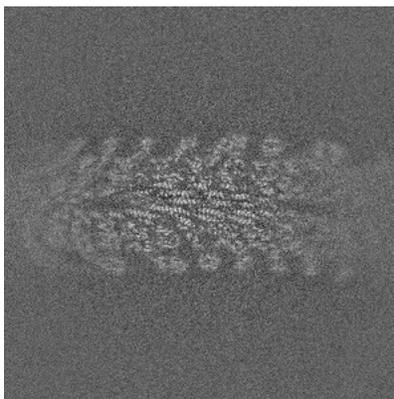


Z Index: 295

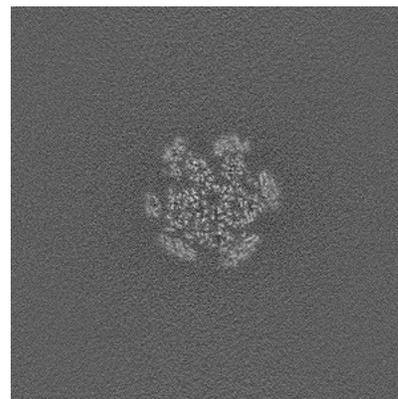
6.3.2 Raw map



X Index: 287



Y Index: 287

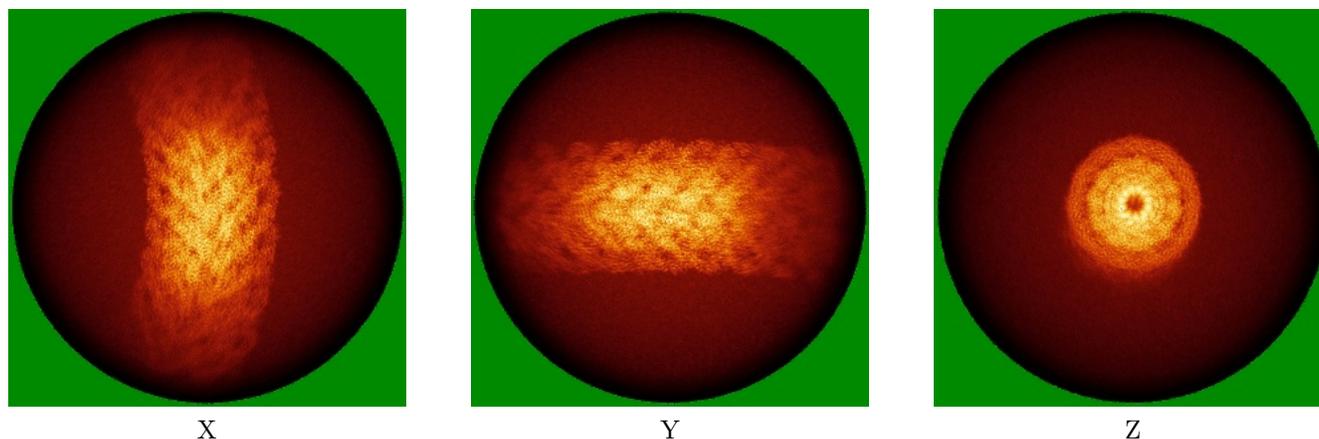


Z Index: 296

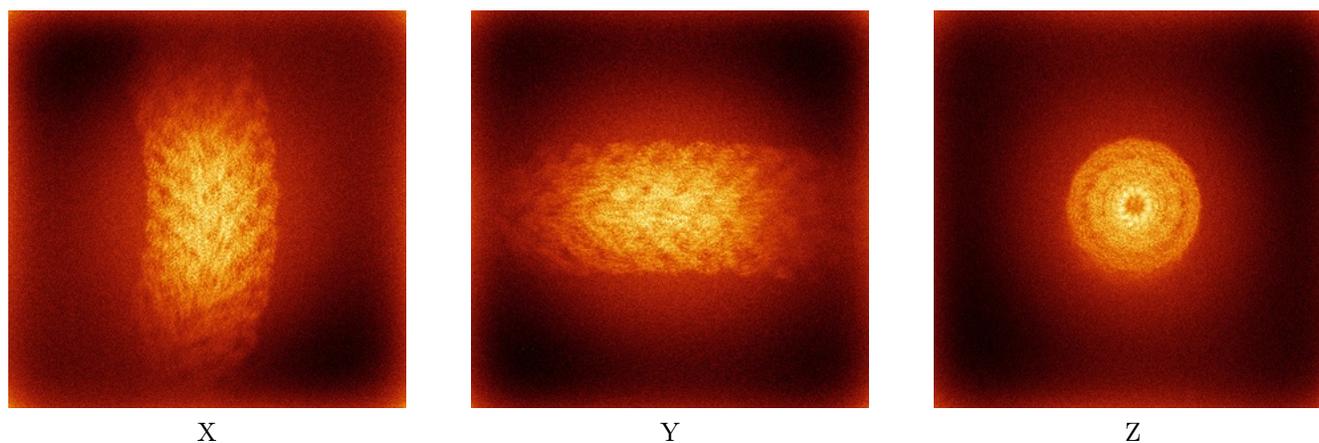
The images above show the largest variance slices of the map in three orthogonal directions.

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

6.4.1 Primary map



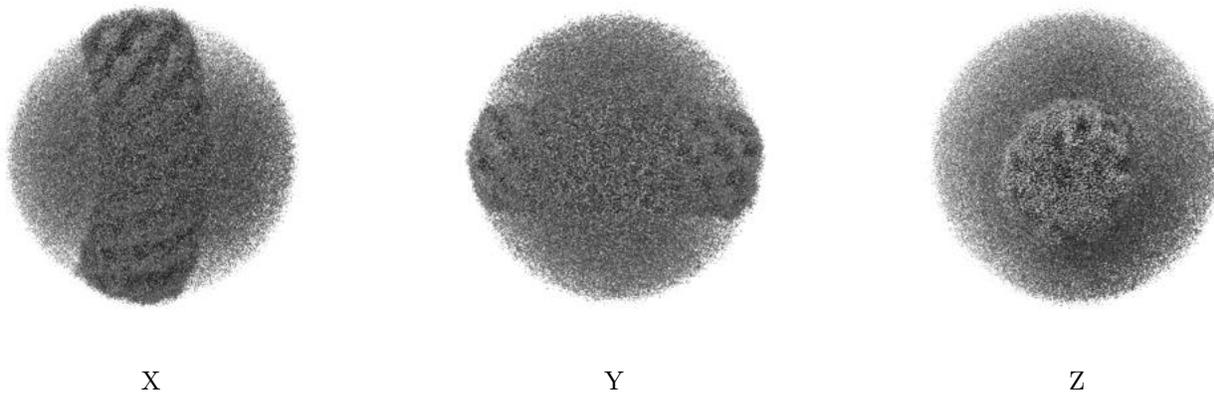
6.4.2 Raw map



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.

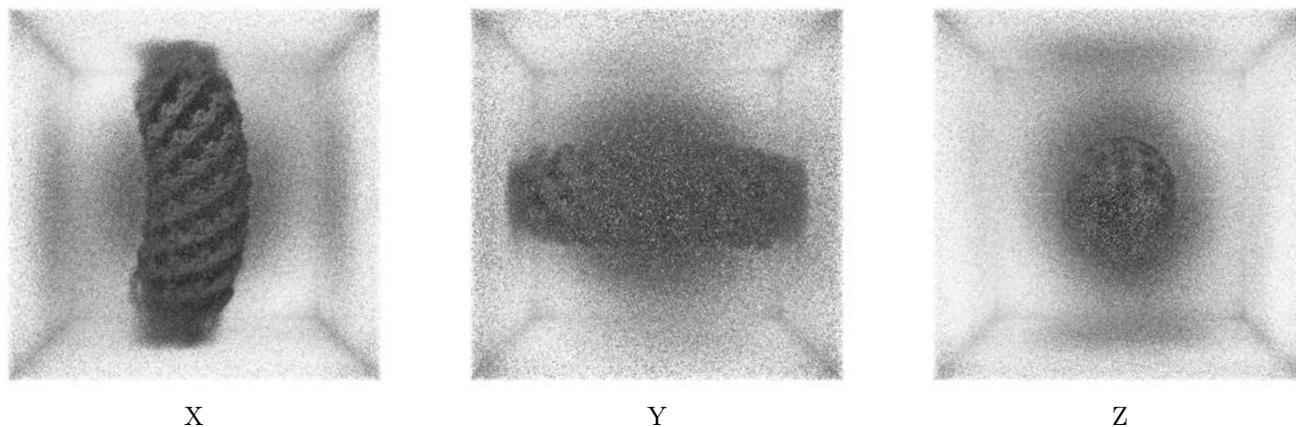
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.075. 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.

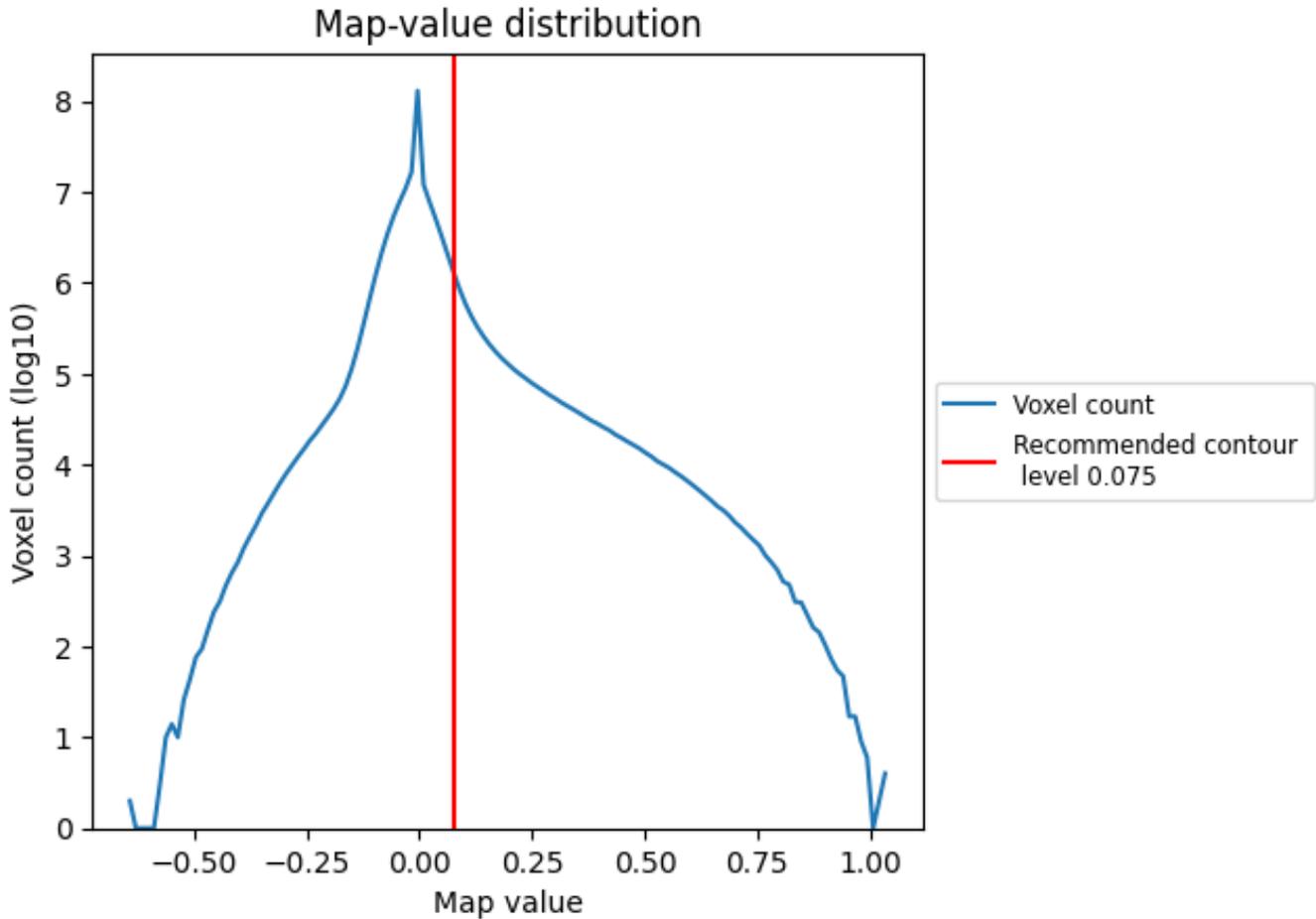
6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

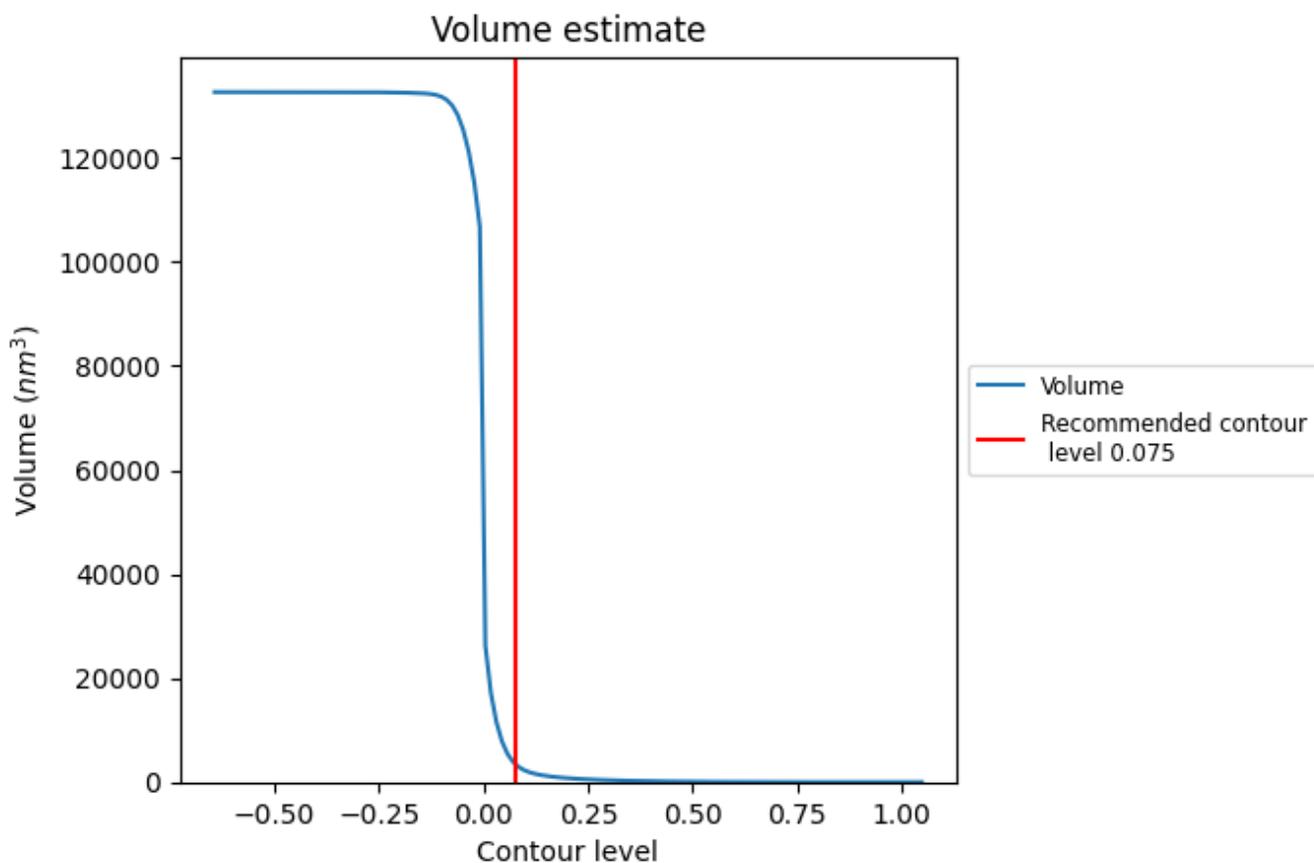
This section contains the results of statistical analysis of the map.

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.

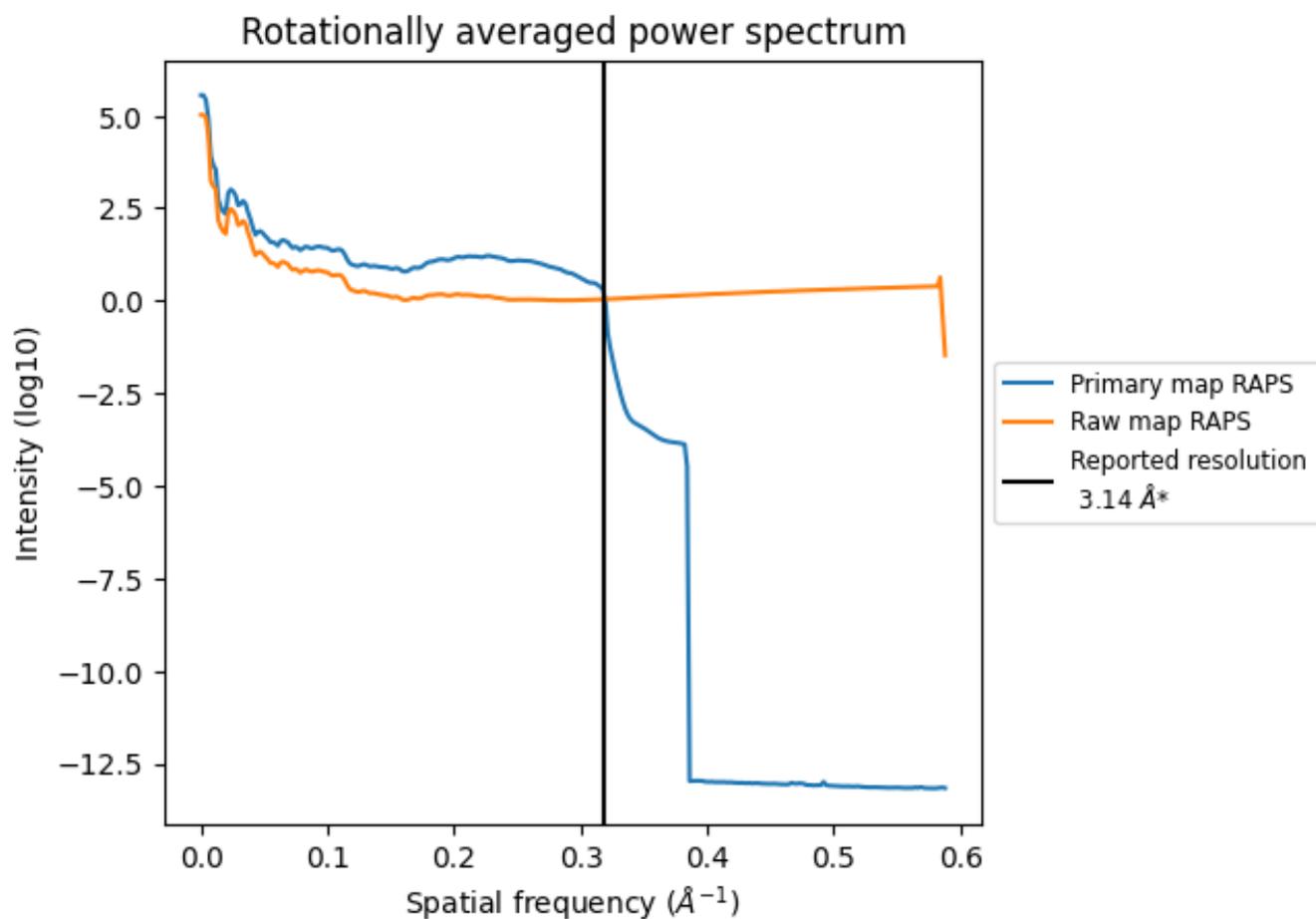
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 3566 nm^3 ; this corresponds to an approximate mass of 3221 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](#)

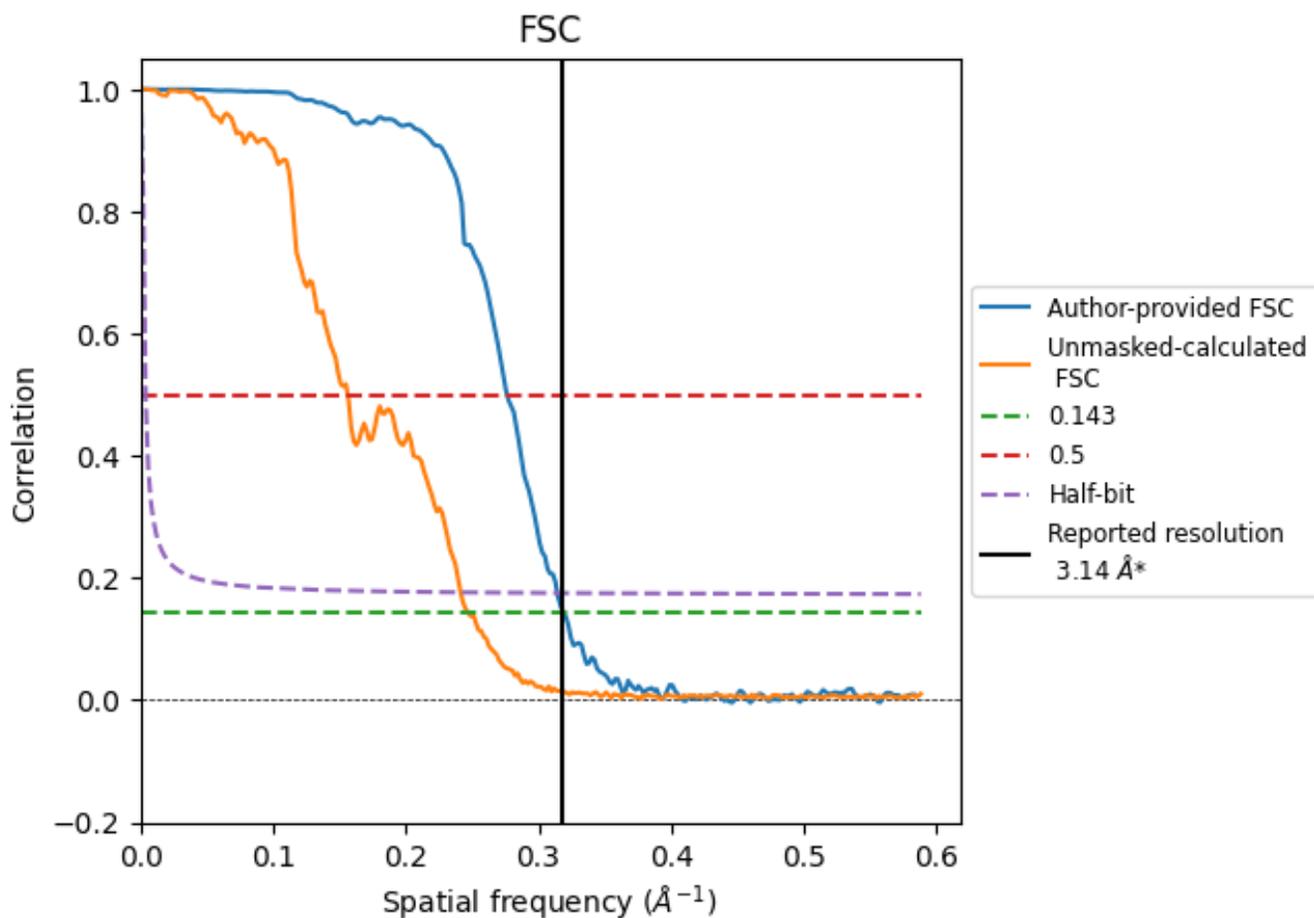


*Reported resolution corresponds to spatial frequency of 0.318 Å⁻¹

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 0.318 Å⁻¹

8.2 Resolution estimates [i](#)

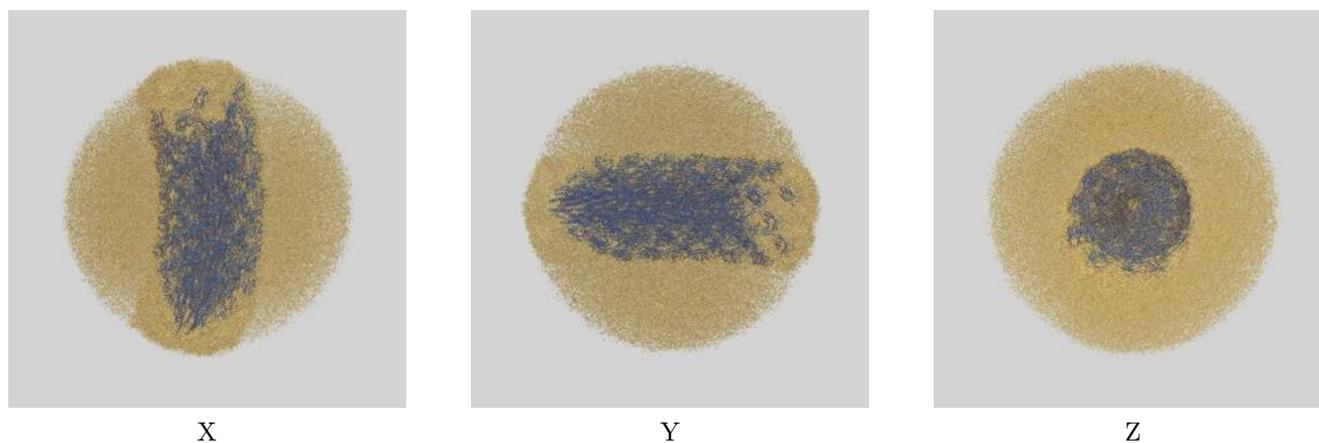
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.14	-	-
Author-provided FSC curve	3.13	3.62	3.18
Unmasked-calculated*	4.05	6.40	4.14

*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 4.05 differs from the reported value 3.14 by more than 10 %

9 Map-model fit [i](#)

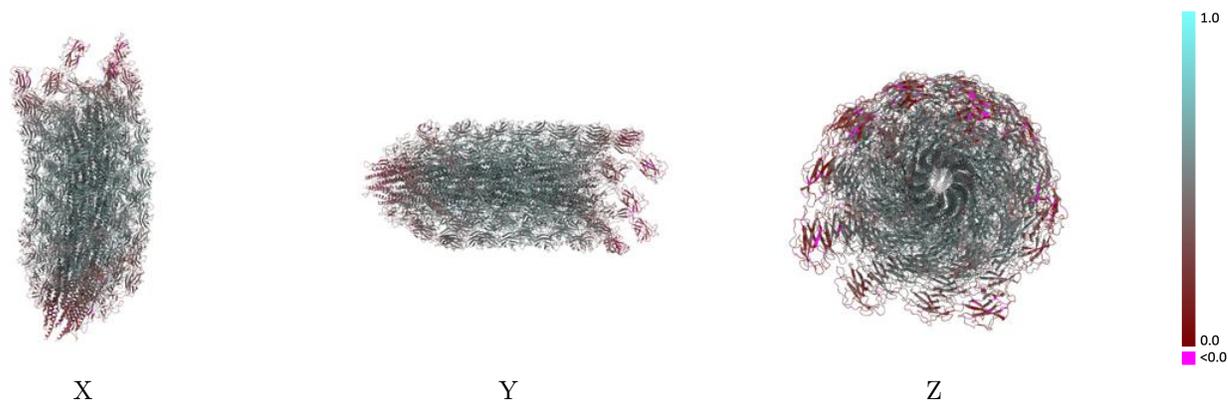
This section contains information regarding the fit between EMDB map EMD-63680 and PDB model 9M7B. Per-residue inclusion information can be found in section 3 on page 10.

9.1 Map-model overlay [i](#)



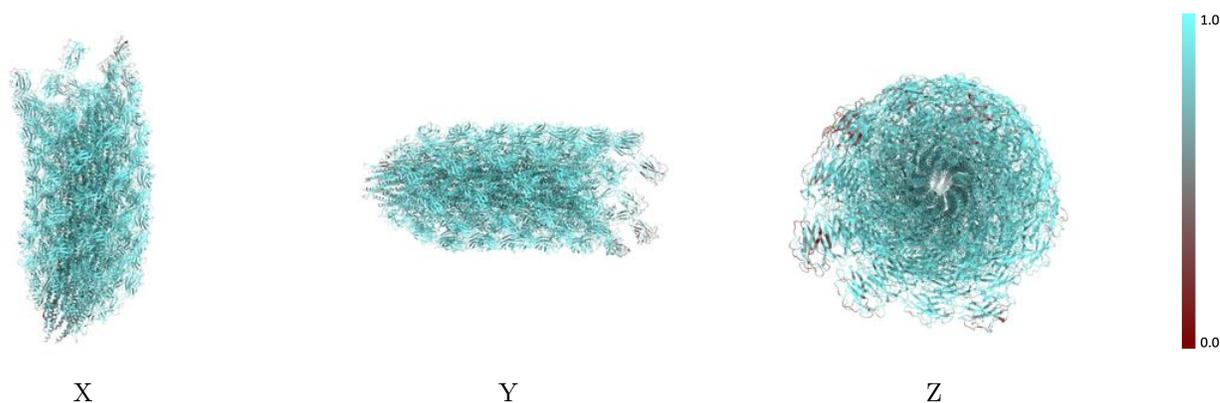
The images above show the 3D surface view of the map at the recommended contour level 0.075 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



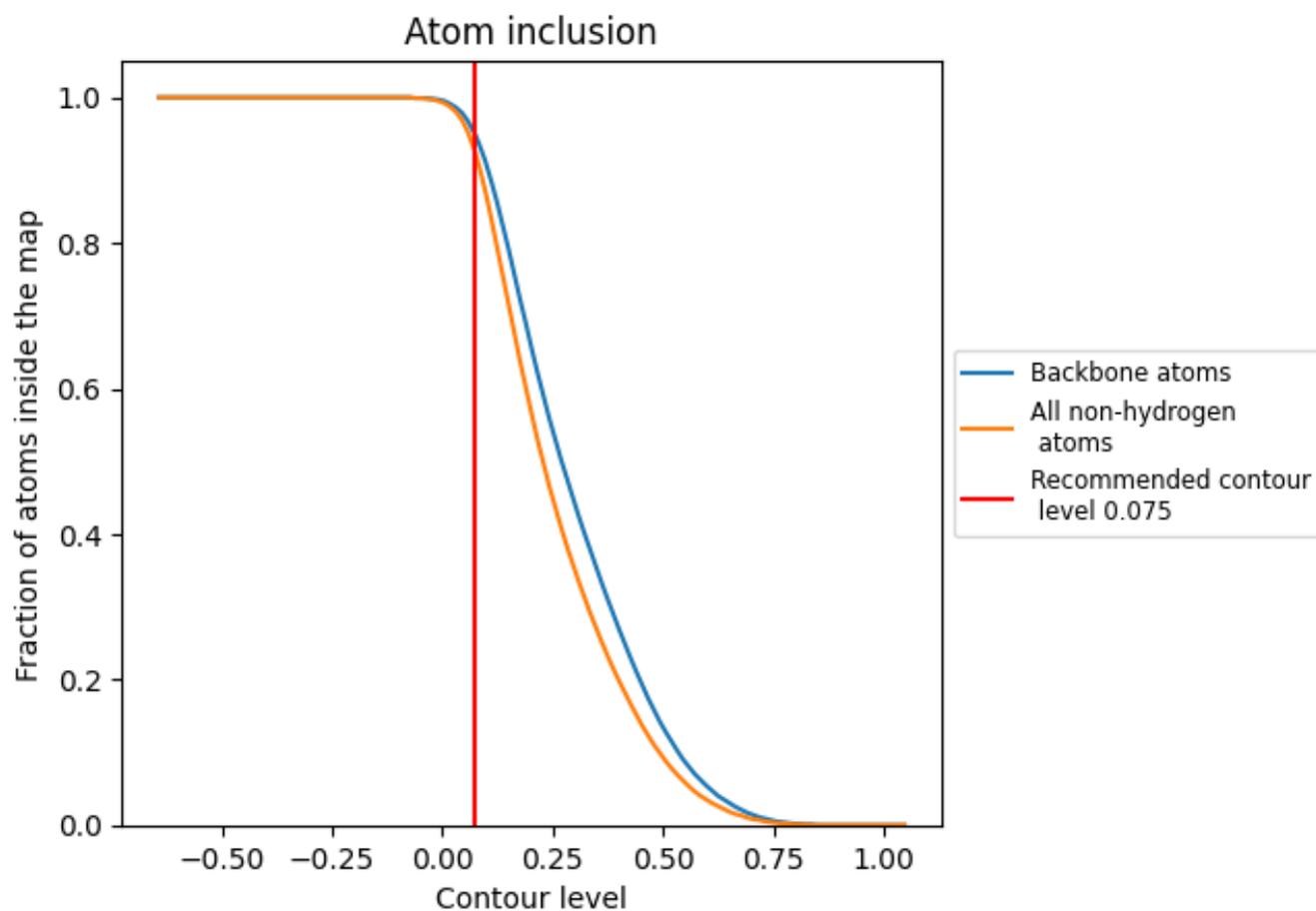
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.075).

9.4 Atom inclusion [i](#)

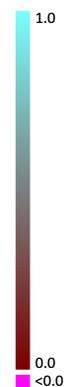


At the recommended contour level, 95% of all backbone atoms, 92% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.075) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9230	 0.4730
DA	 0.7650	 0.3560
DB	 0.8470	 0.4040
DC	 0.8810	 0.4370
DD	 0.9210	 0.4600
DE	 0.8400	 0.3850
DF	 0.9290	 0.4470
DG	 0.8560	 0.3760
DH	 0.8970	 0.4230
DI	 0.7570	 0.3210
DJ	 0.8160	 0.3710
DK	 0.7010	 0.3180
EA	 0.9330	 0.4810
EB	 0.9500	 0.5110
EC	 0.9490	 0.5070
ED	 0.9660	 0.5280
EE	 0.9370	 0.4850
EF	 0.9650	 0.5290
EG	 0.9540	 0.4960
EH	 0.9620	 0.5220
EI	 0.9240	 0.4630
EJ	 0.9500	 0.4940
EK	 0.9150	 0.4630
FA	 0.9620	 0.5220
FB	 0.9700	 0.5380
FC	 0.9680	 0.5380
FD	 0.9710	 0.5510
FE	 0.9700	 0.5410
FF	 0.9680	 0.5440
FG	 0.9690	 0.5400
FH	 0.9690	 0.5420
FI	 0.9720	 0.5350
FJ	 0.9730	 0.5430
FK	 0.9650	 0.5290
GA	 0.9680	 0.5410



Continued on next page...

Continued from previous page...

Chain	Atom inclusion	Q-score
GB	 0.9740	 0.5480
GC	 0.9690	 0.5450
GD	 0.9700	 0.5410
GE	 0.9730	 0.5480
GF	 0.9730	 0.5420
GG	 0.9790	 0.5470
GH	 0.9720	 0.5320
GI	 0.9720	 0.5420
GJ	 0.9730	 0.5310
GK	 0.9710	 0.5470
HA	 0.9650	 0.5380
HB	 0.9370	 0.4870
HC	 0.9490	 0.5130
HD	 0.9370	 0.4890
HE	 0.9510	 0.5170
HF	 0.9280	 0.4610
HG	 0.9530	 0.5070
HH	 0.9280	 0.4540
HI	 0.9590	 0.5070
HJ	 0.9500	 0.4690
HK	 0.9610	 0.5200
IA	 0.8950	 0.4270
IB	 0.8430	 0.3650
IC	 0.8710	 0.3940
ID	 0.8080	 0.3580
IE	 0.8720	 0.4080
IF	 0.7960	 0.3120
IG	 0.8750	 0.3680
IH	 0.8390	 0.2980
II	 0.9100	 0.4010
IJ	 0.8870	 0.3490
IK	 0.9100	 0.4230