



# Full wwPDB EM Validation Report ⓘ

May 13, 2024 – 09:09 PM JST

PDB ID : 8WXB  
EMDB ID : EMD-37902  
Title : Cryo-EM structure of the alpha-carboxysome shell vertex from *Prochlorococcus* MED4  
Authors : Jiang, Y.L.; Zhou, R.Q.; Zhou, C.Z.; Zeng, Q.L.  
Deposited on : 2023-10-28  
Resolution : 4.20 Å(reported)

This is a Full wwPDB EM Validation 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:

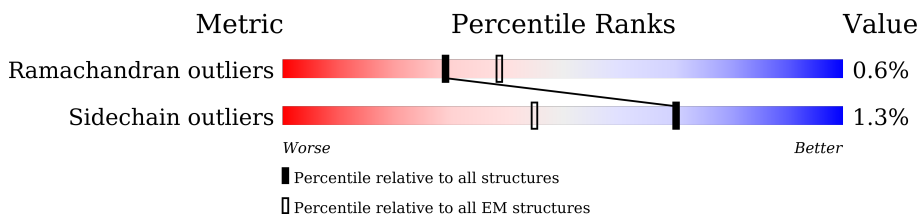
EMDB validation analysis : 0.0.1.dev92  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

# 1 Overall quality at a glance

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

The reported resolution of this entry is 4.20 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)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	2	88	 48% 88% 9%
2	A	98	 18% 91% 8%
2	B	98	 8% 89% 11%
2	C	98	 5% 89% 11%
2	D	98	 88% 11%
2	E	98	 8% 88% 11%
2	F	98	 9% 88% 11%
2	G	98	 11% 92% 8%
2	H	98	 15% 89% 11%

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Mol	Chain	Length	Quality of chain
2	I	98	8% 89% 11%
2	J	98	13% 88% 11%
2	K	98	8% 88% 11%
2	L	98	13% 89% 11%
2	M	98	17% 91% 8%
2	N	98	13% 89% 11%
2	O	98	11% 89% 11%
2	P	98	21% 89% 11%
2	Q	98	23% 89% 11%
2	R	98	16% 89% 11%
2	S	98	15% 92% 8%
2	T	98	9% 89% 11%
2	U	98	10% 88% 11%
2	V	98	14% 88% 11%
2	W	98	23% 89% 11%
2	X	98	14% 89% 11%
2	a	98	20% 91% 8%
2	b	98	18% 89% 11%
2	c	98	23% 87% 11%
2	d	98	19% 89% 11%
2	e	98	22% 88% 11%
2	f	98	17% 88% 11%
2	g	98	32% 92% 8%
2	h	98	26% 89% 11%
2	i	98	23% 89% 11%

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Mol	Chain	Length	Quality of chain
2	j	98	24% 89% 11%
2	k	98	36% 89% 11%
2	l	98	33% 89% 11%
2	m	98	30% 92% 8%
2	n	98	19% 88% 11%
2	o	98	26% 89% 11%
2	p	98	28% 88% 11%
2	q	98	38% 89% 11%
2	r	98	35% 88% 11%
2	s	98	13% 91% 8%
2	t	98	11% 89% 11%
2	u	98	10% 89% 11%
2	v	98	12% 89% 11%
2	w	98	11% 88% 11%
2	x	98	9% 89% 11%
3	Y	765	25% 60% 36%
3	Z	765	23% 42% 55%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 36699 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 Carboxysome shell vertex protein CsoS4A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	2	80	595	378	103	110	4	0	0

- Molecule 2 is a protein called Major carboxysome shell protein CsoS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	A	90	641	397	121	119	4	0	0
2	B	87	621	386	117	115	3	0	0
2	C	87	621	386	117	115	3	0	0
2	D	87	621	386	117	115	3	0	0
2	E	87	621	386	117	115	3	0	0
2	F	87	621	386	117	115	3	0	0
2	G	90	641	397	121	119	4	0	0
2	H	87	621	386	117	115	3	0	0
2	I	87	621	386	117	115	3	0	0
2	J	87	621	386	117	115	3	0	0
2	K	87	621	386	117	115	3	0	0
2	L	87	621	386	117	115	3	0	0
2	M	90	641	397	121	119	4	0	0
2	N	87	621	386	117	115	3	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	O	87	621	386	117	115	3	0	0
2	P	87	621	386	117	115	3	0	0
2	Q	87	621	386	117	115	3	0	0
2	R	87	621	386	117	115	3	0	0
2	S	90	641	397	121	119	4	0	0
2	T	87	621	386	117	115	3	0	0
2	U	87	621	386	117	115	3	0	0
2	V	87	621	386	117	115	3	0	0
2	W	87	621	386	117	115	3	0	0
2	X	87	621	386	117	115	3	0	0
2	a	90	641	397	121	119	4	0	0
2	b	87	621	386	117	115	3	0	0
2	c	87	621	386	117	115	3	0	0
2	d	87	621	386	117	115	3	0	0
2	e	87	621	386	117	115	3	0	0
2	f	87	621	386	117	115	3	0	0
2	g	90	641	397	121	119	4	0	0
2	h	87	621	386	117	115	3	0	0
2	i	87	621	386	117	115	3	0	0
2	j	87	621	386	117	115	3	0	0
2	k	87	621	386	117	115	3	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace
2	l	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	m	90	Total	C	N	O	S	0	0
			641	397	121	119	4		
2	n	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	o	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	p	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	q	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	r	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	s	90	Total	C	N	O	S	0	0
			641	397	121	119	4		
2	t	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	u	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	v	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	w	87	Total	C	N	O	S	0	0
			621	386	117	115	3		
2	x	87	Total	C	N	O	S	0	0
			621	386	117	115	3		

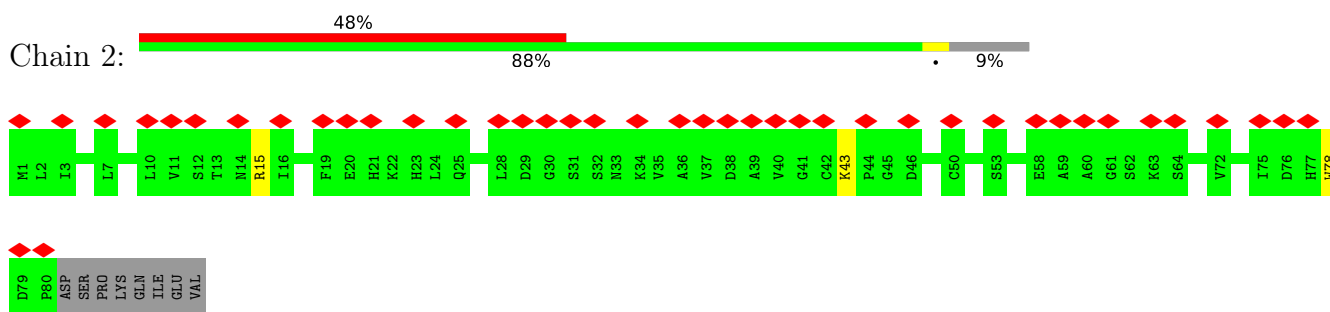
- Molecule 3 is a protein called Carboxysome assembly protein CsoS2.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	Y	488	Total	C	N	O	S	0	0
			3580	2159	635	768	18		
3	Z	348	Total	C	N	O	S	0	0
			2556	1543	446	554	13		

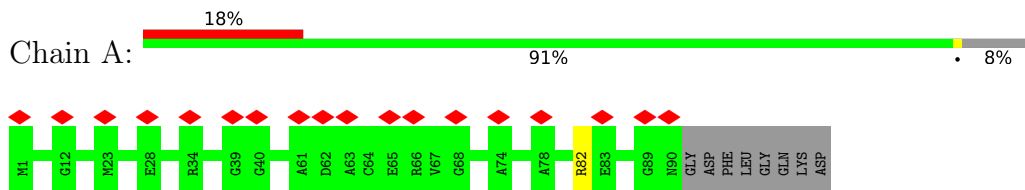
### 3 Residue-property plots [i](#)

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

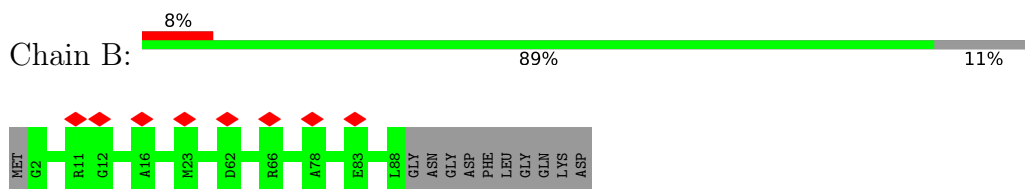
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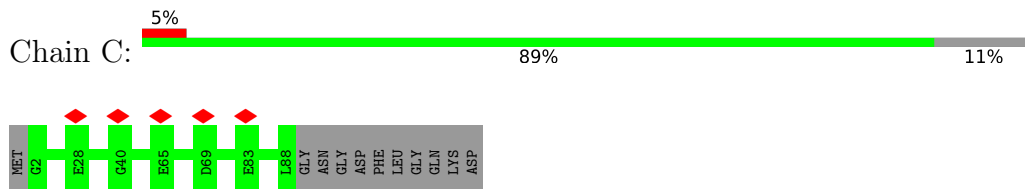
- Molecule 2: Major carboxysome shell protein CsoS1



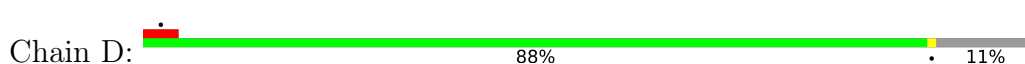
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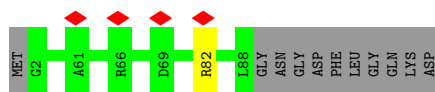
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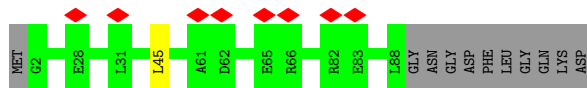
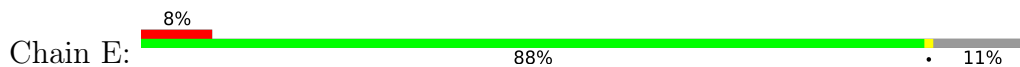
- Molecule 2: Major carboxysome shell protein CsoS1



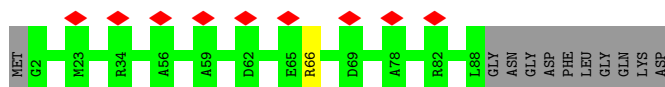
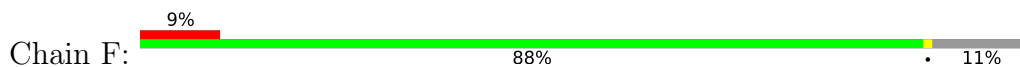




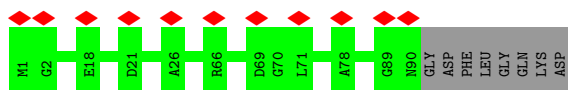
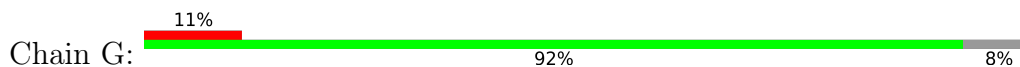
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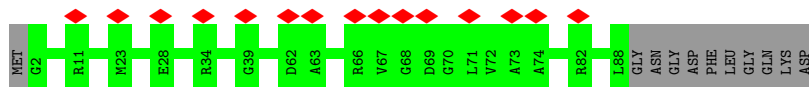
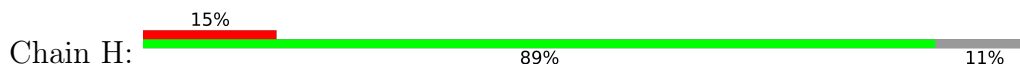
- Molecule 2: Major carboxysome shell protein CsoS1



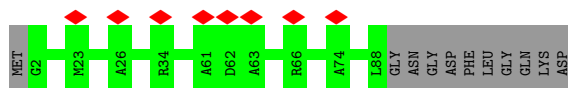
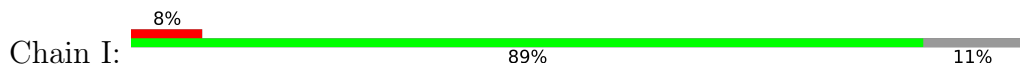
- Molecule 2: Major carboxysome shell protein CsoS1



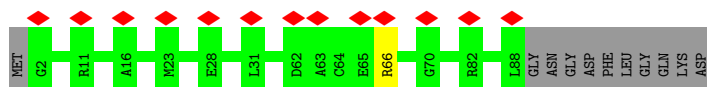
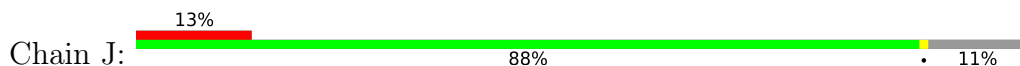
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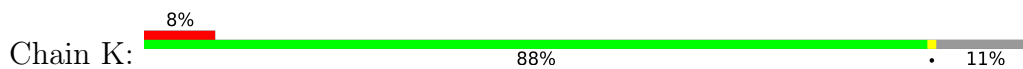
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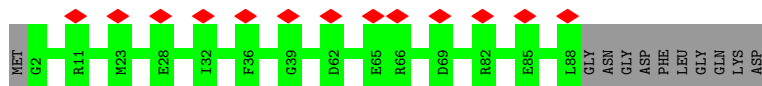
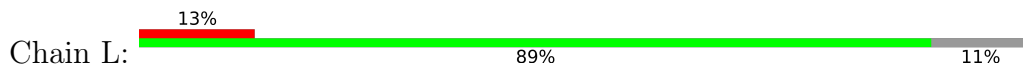
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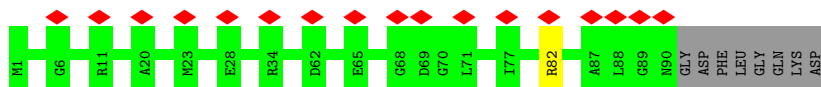
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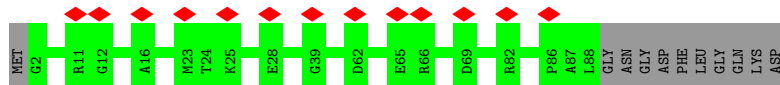
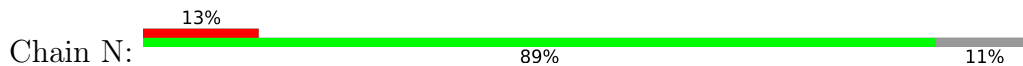
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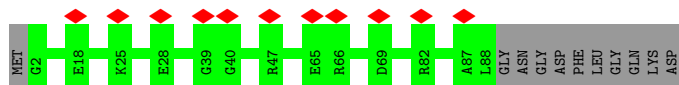
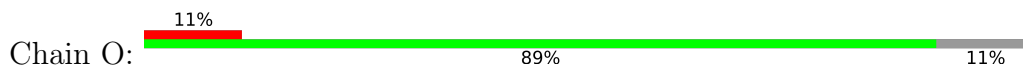
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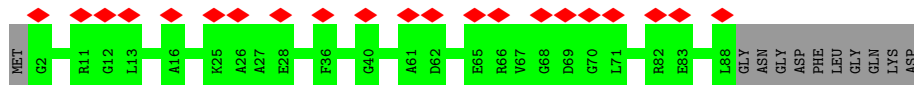
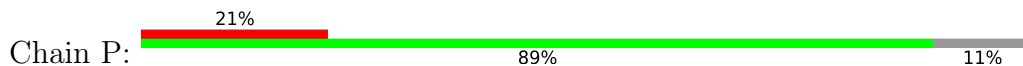
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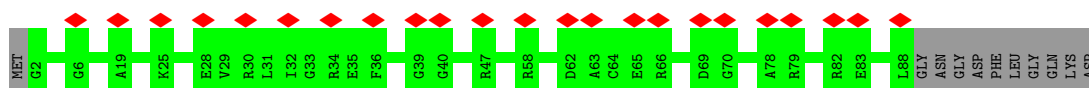
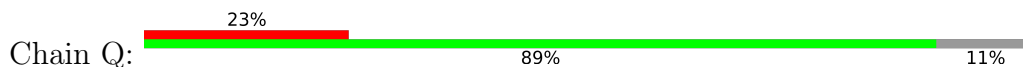
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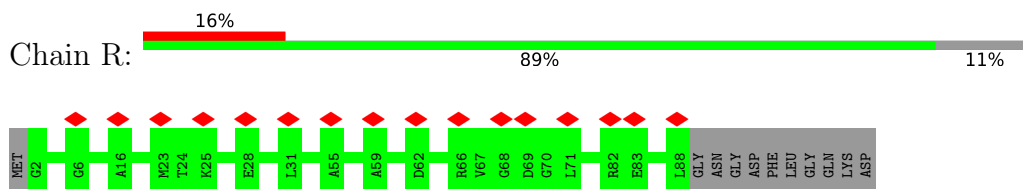
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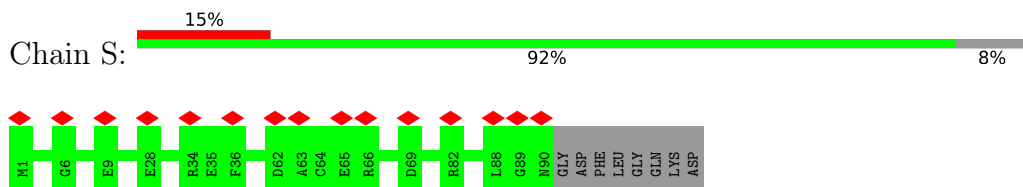
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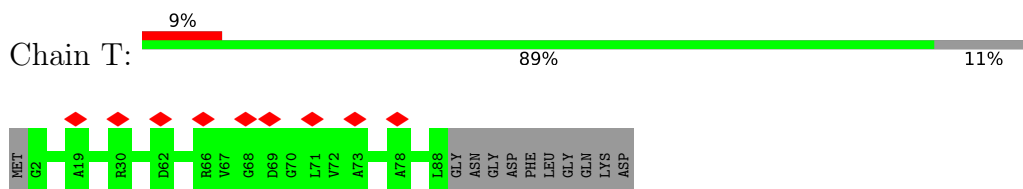
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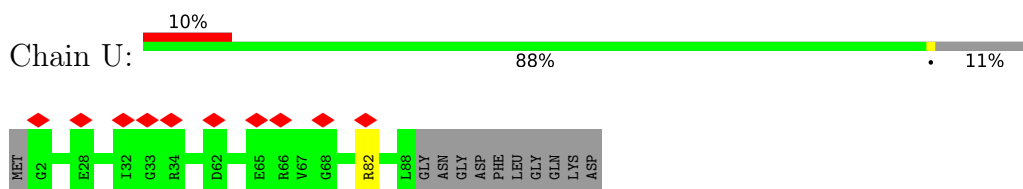
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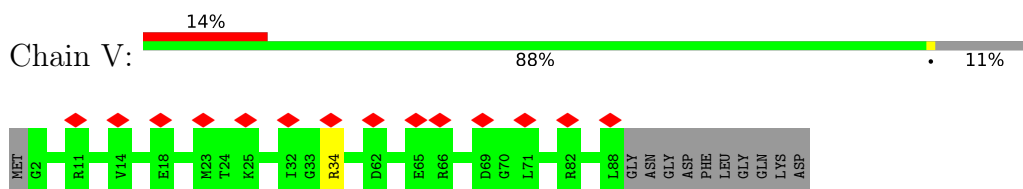
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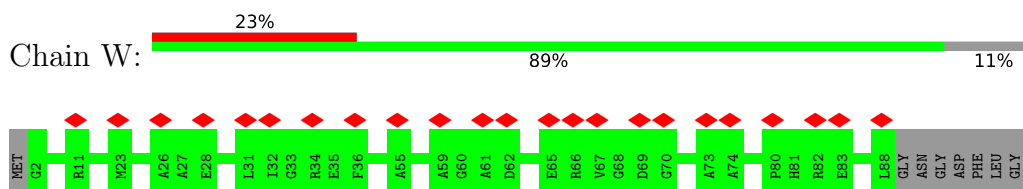
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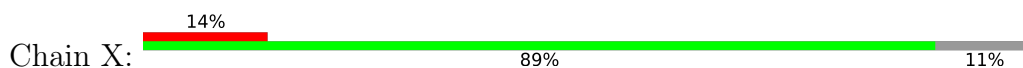
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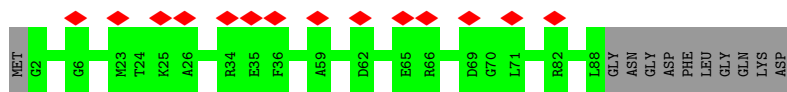


- Molecule 2: Major carboxysome shell protein CsoS1

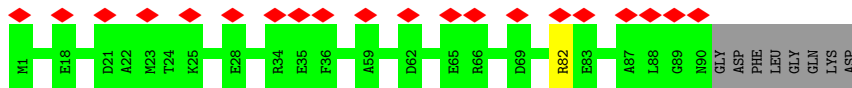
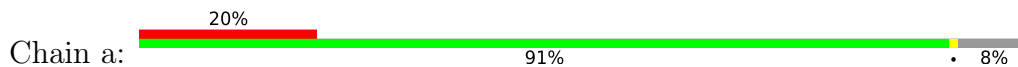


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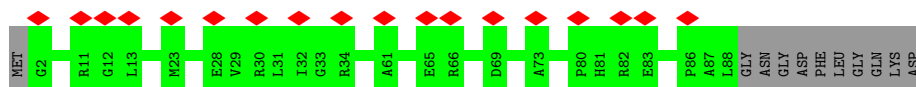




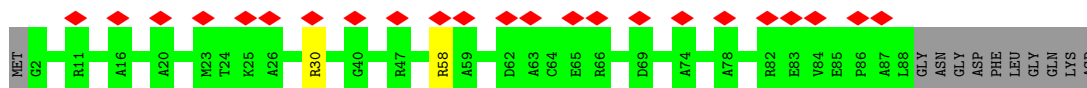
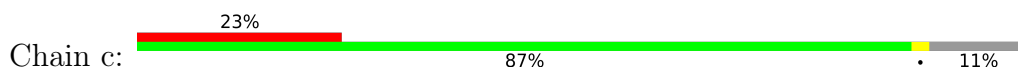
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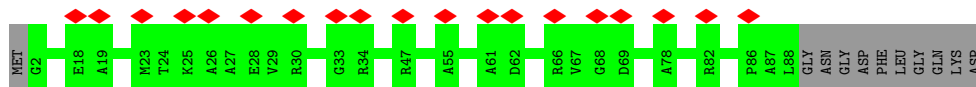
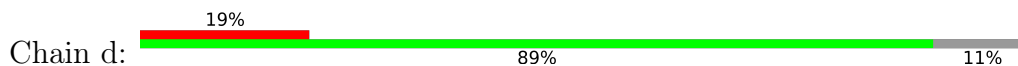
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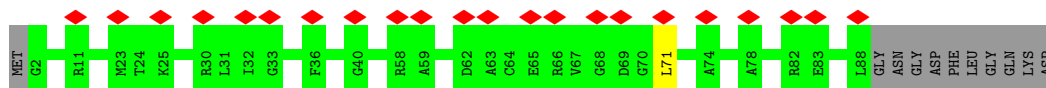
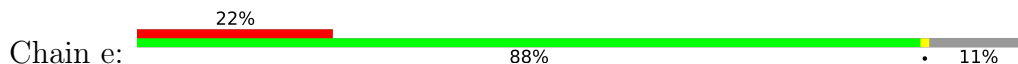
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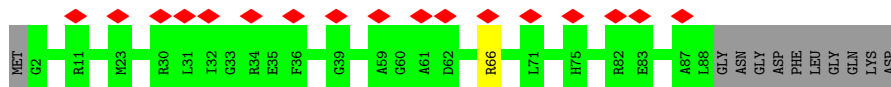
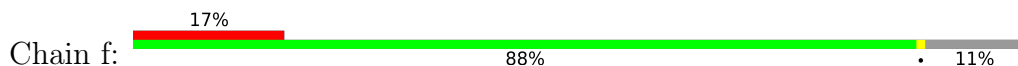
- Molecule 2: Major carboxysome shell protein CsoS1



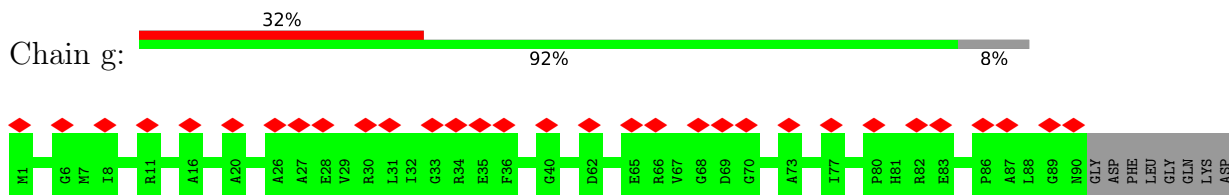
- Molecule 2: Major carboxysome shell protein CsoS1



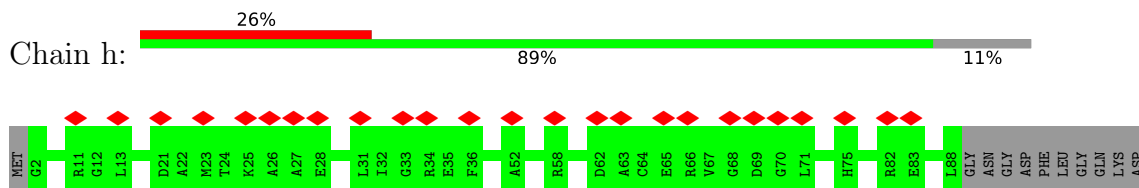
- Molecule 2: Major carboxysome shell protein CsoS1



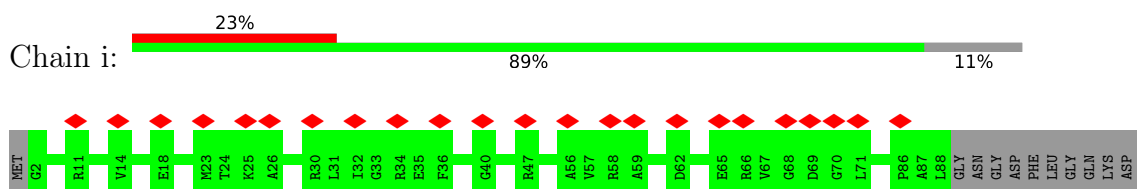
- Molecule 2: Major carboxysome shell protein CsoS1



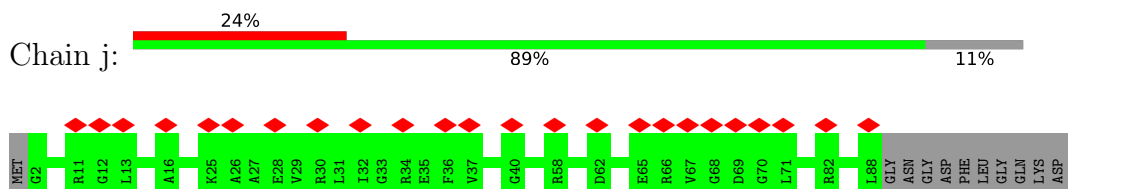
• Molecule 2: Major carboxysome shell protein CsoS1



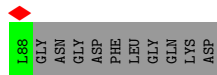
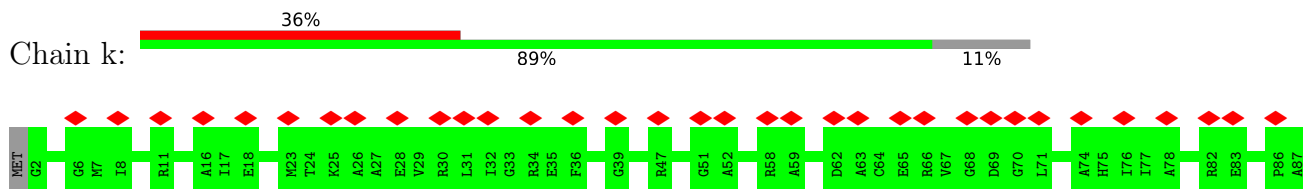
• Molecule 2: Major carboxysome shell protein CsoS1



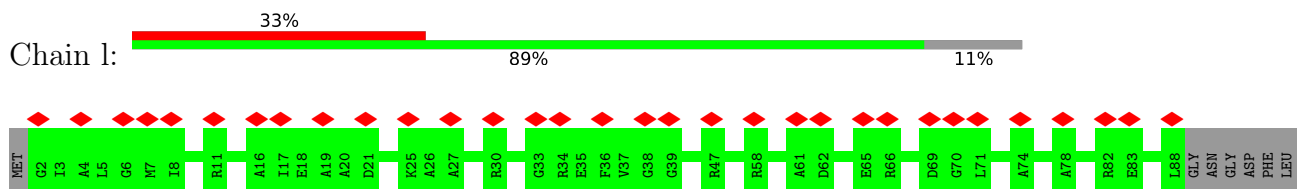
• Molecule 2: Major carboxysome shell protein CsoS1



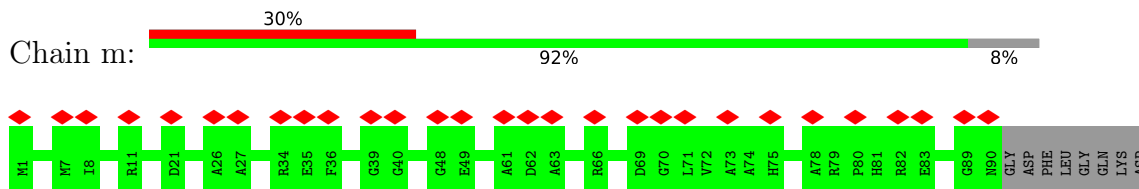
• Molecule 2: Major carboxysome shell protein CsoS1



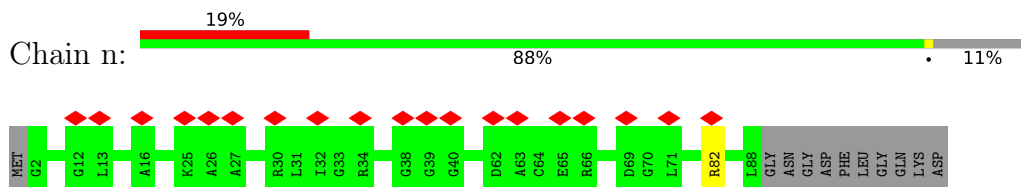
• Molecule 2: Major carboxysome shell protein CsoS1



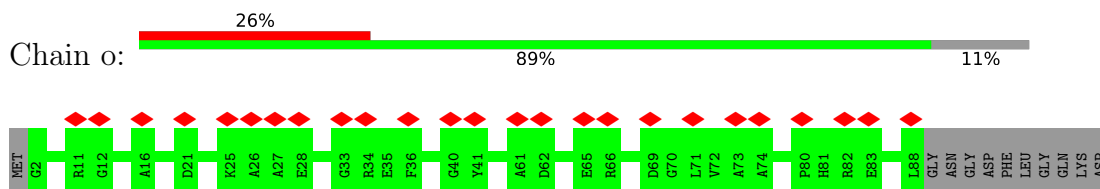
• Molecule 2: Major carboxysome shell protein CsoS1



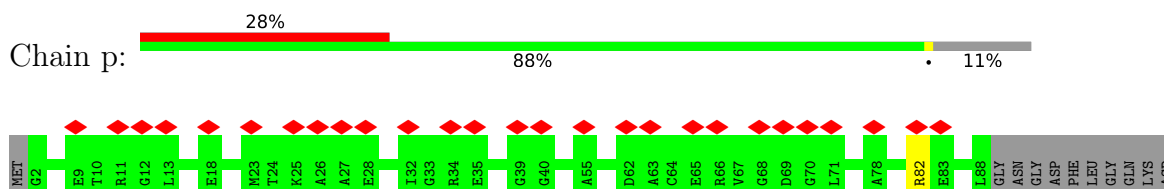
• Molecule 2: Major carboxysome shell protein CsoS1



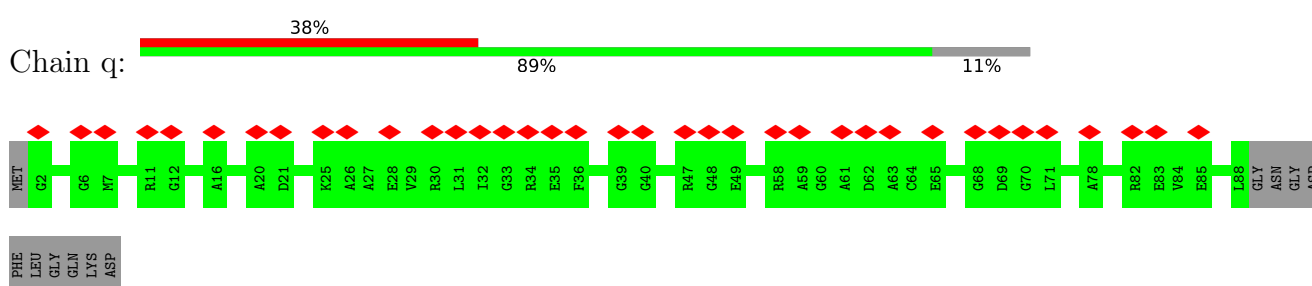
• Molecule 2: Major carboxysome shell protein CsoS1



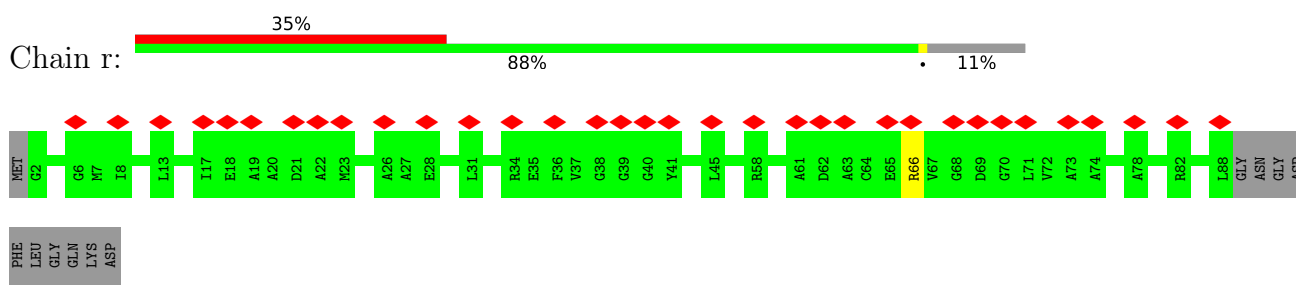
• Molecule 2: Major carboxysome shell protein CsoS1



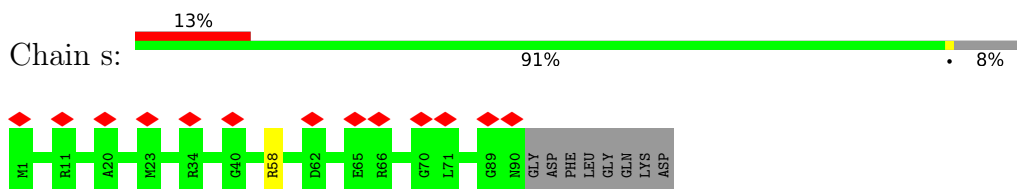
• Molecule 2: Major carboxysome shell protein CsoS1



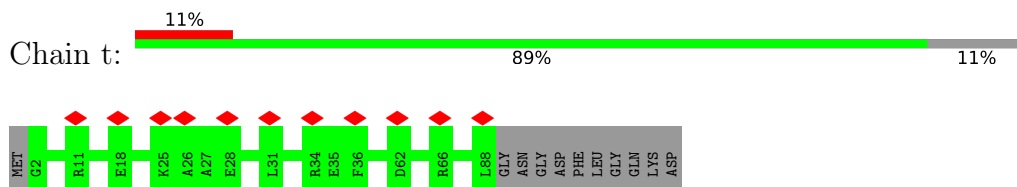
• Molecule 2: Major carboxysome shell protein CsoS1



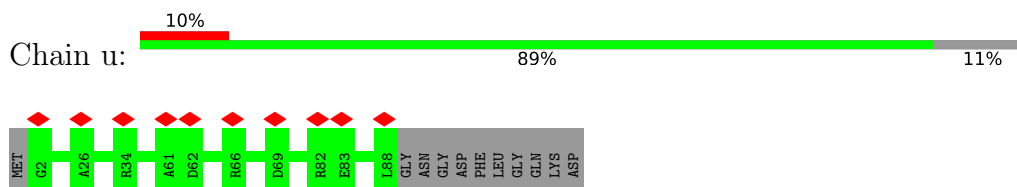
- Molecule 2: Major carboxysome shell protein CsoS1



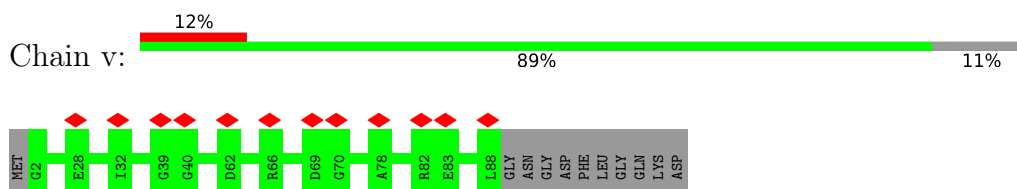
- Molecule 2: Major carboxysome shell protein CsoS1



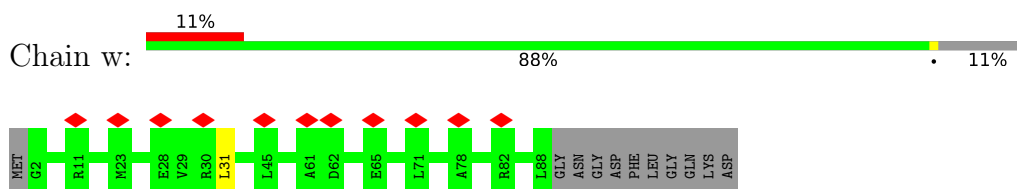
- Molecule 2: Major carboxysome shell protein CsoS1



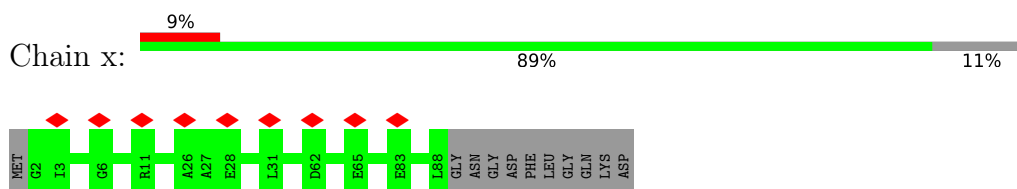
- Molecule 2: Major carboxysome shell protein CsoS1



- Molecule 2: Major carboxysome shell protein CsoS1

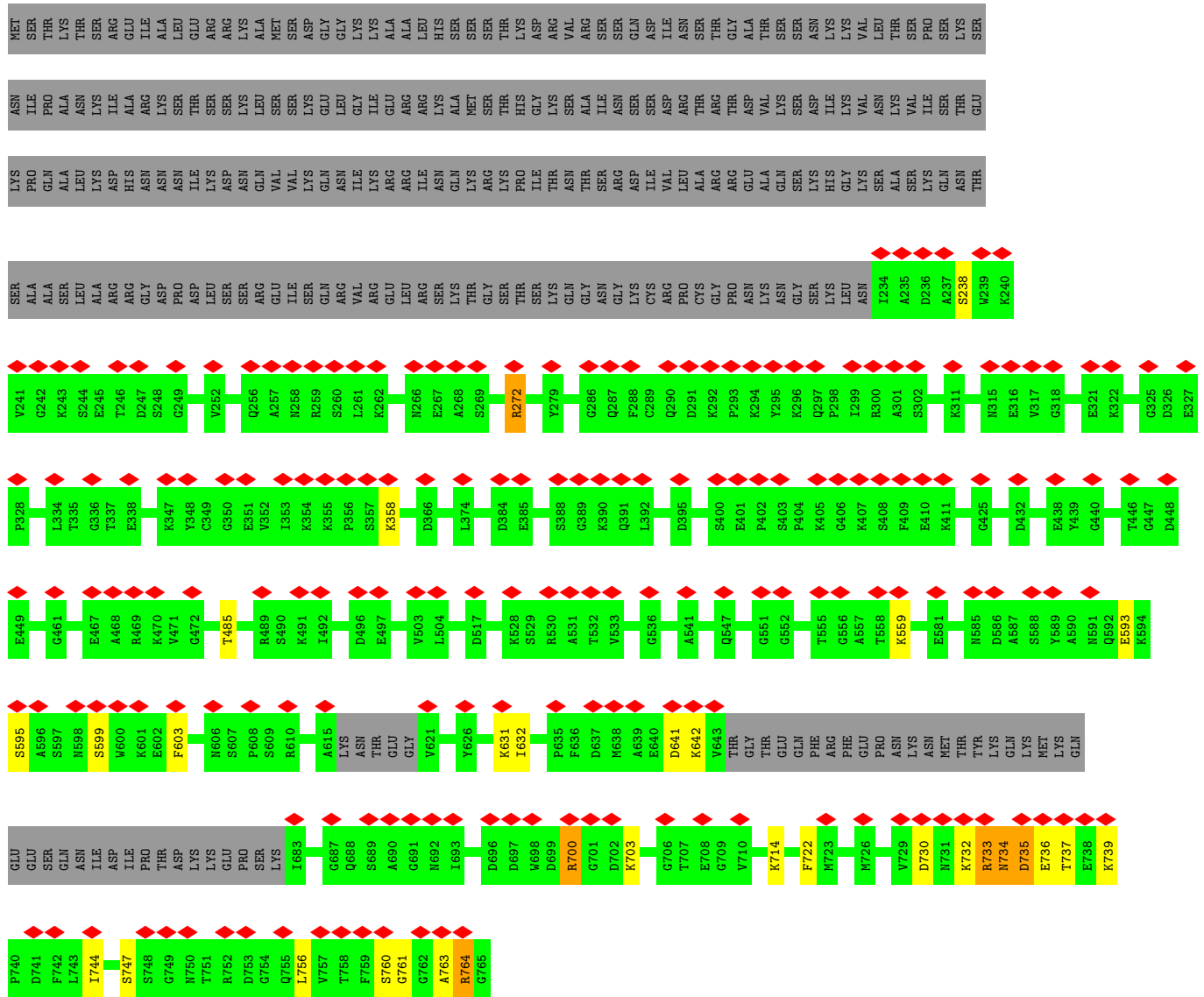


- Molecule 2: Major carboxysome shell protein CsoS1

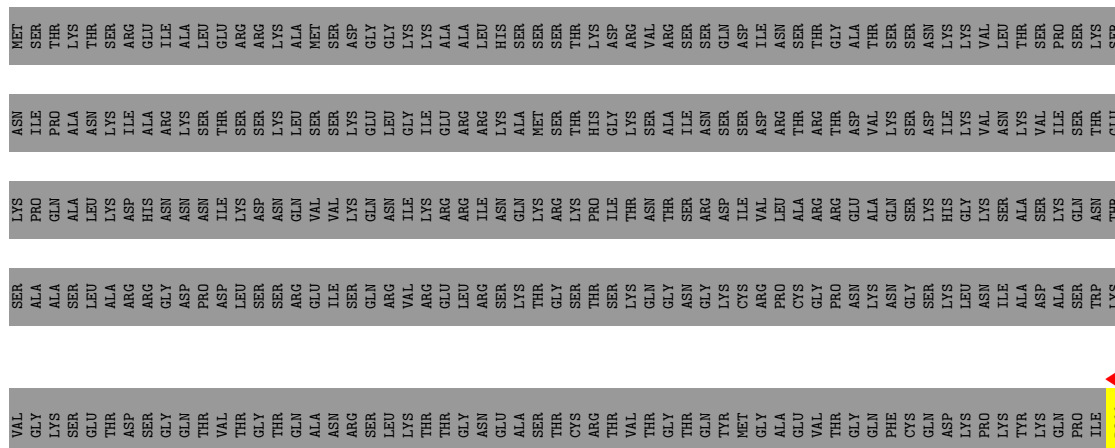


- Molecule 3: Carboxysome assembly protein CsoS2





● Molecule 3: Carboxysome assembly protein Cso2





A301	S302	V303	T304	T305	T306	T307	S308	G309	N310	K311	N315	E316	V317	G318	R319	S320	E321	K322	D326	E327	P328	G329	T330	C331	K332	N333	L334	T335	G336	T337	E338	Y339	I340	S341	A342	N343	K347	Y348	C349	G350	GLU	VAL	ILE	LYS	LYS	PRO	SER	LYS	V359	M360	Q361	T365	D366	G367	L368																		
K369	S373	L374	P375	G376	R377	L380	E385	S386	G389	K390	Q391	L392	Q396	G399	S400	E401	P402	S403	P404	K405	G406	K407	S408	F409	E410	K411	V412	G413	D416	T417	L418	M419	G420	M421	M422	G427	V428	G429	R430	S431	D432	Y433	Y434	Y439	G440	K443	M444	L445																									
E449	Y450	I451	G452	E457	K458	F459	C460	G461	S462	K465	P466	E467	A468	R469	K470	V471	G472	L473	S477	K478	M486	T487	G488	R489	S490	K491	I492	D496	E497	K502	V503	L504	A510	G511	I515	N516	D517	N518	C519	N520	A521	E522	D525	D526	M527	K528	S529	R530	A531	T532																							
V533	N534	S539	N540	A541	R542	I550	G551	G552	A557	T558	K559	G560	L565	N579	C580	E581	T582	P583	P584	N585	D586	A587	S588	Y589	A590	N591	Q592	E593	K594	S595	A596	S597	N598	S599	W600	K601	E602	F603	M606	S607	P608	S609	R610	K616	N617	T618	V621	T622	G623	Y626																							
E627	D628	S629	S630	K631	I632	T633	F636	D637	M638	A639	E640	D641	K642	Q648	F649	N654	K655	ASN	MET	THR	PHE	TYR	LYS	GLN	LYS	MET	GLN	LYS	GLN	GLU	VAL	GLN	GLU	ASP	ASN	LYS	ARG	ASN	ILE	ASP	ILE	PRO	THR	THR	ASP	LYS	LYS	ASP	PHE	GLU	LEU	ILE	THR	LYS	ILE	GLY	THR	SER	THR	GLY	GLN	THR	THR	GLN	GLY	ARG	SER	ASP	ALA	ALA	GLY	ASN	THR
GLN	LEU	VAL	THR	PHE	SER	GLY	ARG	ALA	ARG	GLY	VAL	SER	ALA	ARG	LYS	ARG	ASN	SER	ARG	ALA	GLY	PHE	MET	LYS	GLN	ALA	MET	PRO	VAL	GLN	ASP	ASN	LYS	ARG	ASN	ASN	ILE	ASP	ILE	PRO	THR	THR	ASP	LYS	LYS	ASP	PHE	GLU	LEU	ILE	THR	LYS	ILE	GLY	THR	SER	THR	GLY	GLN	THR	THR	GLN	GLY	ARG	SER	ASP	ALA	ALA	GLY	ASN	THR		

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	28093	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	50	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	0.015	Depositor
Minimum map value	-0.006	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.006	Depositor
Map size ( $\text{\AA}$ )	727.16, 727.16, 727.16	wwPDB
Map dimensions	686, 686, 686	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.06, 1.06, 1.06	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	2	0.34	0/608	0.61	0/827
2	A	0.28	0/647	0.66	0/875
2	B	0.31	0/627	0.67	0/849
2	C	0.32	0/627	0.70	0/849
2	D	0.29	0/627	0.66	0/849
2	E	0.32	0/627	0.68	1/849 (0.1%)
2	F	0.31	0/627	0.66	0/849
2	G	0.27	0/647	0.63	0/875
2	H	0.27	0/627	0.63	0/849
2	I	0.30	0/627	0.69	0/849
2	J	0.31	0/627	0.68	0/849
2	K	0.30	0/627	0.64	0/849
2	L	0.29	0/627	0.68	0/849
2	M	0.31	0/647	0.72	0/875
2	N	0.29	0/627	0.67	0/849
2	O	0.30	0/627	0.67	0/849
2	P	0.31	0/627	0.64	0/849
2	Q	0.32	0/627	0.66	0/849
2	R	0.35	0/627	0.65	0/849
2	S	0.29	0/647	0.69	0/875
2	T	0.28	0/627	0.62	0/849
2	U	0.30	0/627	0.71	0/849
2	V	0.28	0/627	0.66	0/849
2	W	0.28	0/627	0.64	0/849
2	X	0.31	0/627	0.65	0/849
2	a	0.30	0/647	0.70	0/875
2	b	0.29	0/627	0.63	0/849
2	c	0.30	0/627	0.64	0/849
2	d	0.33	0/627	0.70	0/849
2	e	0.29	0/627	0.71	1/849 (0.1%)
2	f	0.31	0/627	0.62	0/849
2	g	0.29	0/647	0.70	0/875
2	h	0.31	0/627	0.66	0/849
2	i	0.30	0/627	0.67	0/849

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
2	j	0.26	0/627	0.62	0/849
2	k	0.26	0/627	0.63	0/849
2	l	0.29	0/627	0.63	0/849
2	m	0.29	0/647	0.65	0/875
2	n	0.27	0/627	0.67	0/849
2	o	0.28	0/627	0.67	0/849
2	p	0.28	0/627	0.66	0/849
2	q	0.26	0/627	0.66	0/849
2	r	0.28	0/627	0.61	0/849
2	s	0.32	0/647	0.65	0/875
2	t	0.31	0/627	0.76	0/849
2	u	0.28	0/627	0.66	0/849
2	v	0.30	0/627	0.70	0/849
2	w	0.33	0/627	0.74	1/849 (0.1%)
2	x	0.33	0/627	0.68	0/849
3	Y	0.31	0/3628	0.55	0/4890
3	Z	0.32	0/2591	0.58	0/3493
All	All	0.30	0/37083	0.65	3/50170 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
3	Y	0	3
3	Z	0	1
All	All	0	4

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	e	71	LEU	CA-CB-CG	5.61	128.20	115.30
2	w	31	LEU	CA-CB-CG	5.40	127.71	115.30
2	E	45	LEU	CA-CB-CG	5.13	127.09	115.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	Y	272	ARG	Sidechain
3	Y	733	ARG	Sidechain
3	Y	764	ARG	Sidechain
3	Z	433	TYR	Peptide

## 5.2 Too-close contacts [i](#)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

## 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	2	78/88 (89%)	59 (76%)	17 (22%)	2 (3%)	5	35
2	A	88/98 (90%)	83 (94%)	5 (6%)	0	100	100
2	B	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	C	85/98 (87%)	83 (98%)	2 (2%)	0	100	100
2	D	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	E	85/98 (87%)	80 (94%)	5 (6%)	0	100	100
2	F	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	G	88/98 (90%)	88 (100%)	0	0	100	100
2	H	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	I	85/98 (87%)	81 (95%)	4 (5%)	0	100	100
2	J	85/98 (87%)	81 (95%)	4 (5%)	0	100	100
2	K	85/98 (87%)	82 (96%)	3 (4%)	0	100	100
2	L	85/98 (87%)	83 (98%)	2 (2%)	0	100	100
2	M	88/98 (90%)	84 (96%)	4 (4%)	0	100	100
2	N	85/98 (87%)	81 (95%)	4 (5%)	0	100	100
2	O	85/98 (87%)	83 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	P	85/98 (87%)	83 (98%)	2 (2%)	0	100	100
2	Q	85/98 (87%)	79 (93%)	6 (7%)	0	100	100
2	R	85/98 (87%)	81 (95%)	4 (5%)	0	100	100
2	S	88/98 (90%)	87 (99%)	1 (1%)	0	100	100
2	T	85/98 (87%)	85 (100%)	0	0	100	100
2	U	85/98 (87%)	83 (98%)	2 (2%)	0	100	100
2	V	85/98 (87%)	82 (96%)	3 (4%)	0	100	100
2	W	85/98 (87%)	82 (96%)	3 (4%)	0	100	100
2	X	85/98 (87%)	85 (100%)	0	0	100	100
2	a	88/98 (90%)	86 (98%)	2 (2%)	0	100	100
2	b	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	c	85/98 (87%)	77 (91%)	8 (9%)	0	100	100
2	d	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	e	85/98 (87%)	85 (100%)	0	0	100	100
2	f	85/98 (87%)	81 (95%)	4 (5%)	0	100	100
2	g	88/98 (90%)	87 (99%)	1 (1%)	0	100	100
2	h	85/98 (87%)	82 (96%)	3 (4%)	0	100	100
2	i	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	j	85/98 (87%)	82 (96%)	3 (4%)	0	100	100
2	k	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	l	85/98 (87%)	80 (94%)	5 (6%)	0	100	100
2	m	88/98 (90%)	87 (99%)	1 (1%)	0	100	100
2	n	85/98 (87%)	83 (98%)	2 (2%)	0	100	100
2	o	85/98 (87%)	85 (100%)	0	0	100	100
2	p	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	q	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	r	85/98 (87%)	84 (99%)	1 (1%)	0	100	100
2	s	88/98 (90%)	86 (98%)	2 (2%)	0	100	100
2	t	85/98 (87%)	78 (92%)	7 (8%)	0	100	100
2	u	85/98 (87%)	85 (100%)	0	0	100	100
2	v	85/98 (87%)	82 (96%)	3 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	w	85/98 (87%)	83 (98%)	2 (2%)	0	100	100
2	x	85/98 (87%)	82 (96%)	3 (4%)	0	100	100
3	Y	482/765 (63%)	374 (78%)	89 (18%)	19 (4%)	3	27
3	Z	344/765 (45%)	265 (77%)	70 (20%)	9 (3%)	5	35
All	All	5008/6322 (79%)	4689 (94%)	289 (6%)	30 (1%)	29	64

All (30) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	Y	238	SER
3	Y	593	GLU
3	Y	599	SER
3	Y	641	ASP
3	Y	700	ARG
3	Y	744	ILE
3	Z	534	ASN
3	Z	593	GLU
3	Z	603	PHE
1	2	43	LYS
3	Y	737	THR
3	Z	621	VAL
3	Z	633	THR
3	Y	631	LYS
3	Y	722	PHE
3	Y	761	GLY
3	Z	636	PHE
3	Z	640	GLU
3	Y	603	PHE
3	Y	632	ILE
3	Y	735	ASP
3	Y	763	ALA
3	Z	302	SER
1	2	78	TRP
3	Y	485	THR
3	Y	734	ASN
3	Y	736	GLU
3	Y	747	SER
3	Y	595	SER
3	Z	434	VAL

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	2	67/75 (89%)	66 (98%)	1 (2%)	65	80
2	A	60/66 (91%)	59 (98%)	1 (2%)	60	78
2	B	58/66 (88%)	58 (100%)	0	100	100
2	C	58/66 (88%)	58 (100%)	0	100	100
2	D	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	E	58/66 (88%)	58 (100%)	0	100	100
2	F	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	G	60/66 (91%)	60 (100%)	0	100	100
2	H	58/66 (88%)	58 (100%)	0	100	100
2	I	58/66 (88%)	58 (100%)	0	100	100
2	J	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	K	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	L	58/66 (88%)	58 (100%)	0	100	100
2	M	60/66 (91%)	59 (98%)	1 (2%)	60	78
2	N	58/66 (88%)	58 (100%)	0	100	100
2	O	58/66 (88%)	58 (100%)	0	100	100
2	P	58/66 (88%)	58 (100%)	0	100	100
2	Q	58/66 (88%)	58 (100%)	0	100	100
2	R	58/66 (88%)	58 (100%)	0	100	100
2	S	60/66 (91%)	60 (100%)	0	100	100
2	T	58/66 (88%)	58 (100%)	0	100	100
2	U	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	V	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	W	58/66 (88%)	58 (100%)	0	100	100
2	X	58/66 (88%)	58 (100%)	0	100	100
2	a	60/66 (91%)	59 (98%)	1 (2%)	60	78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	b	58/66 (88%)	58 (100%)	0	100	100
2	c	58/66 (88%)	56 (97%)	2 (3%)	37	61
2	d	58/66 (88%)	58 (100%)	0	100	100
2	e	58/66 (88%)	58 (100%)	0	100	100
2	f	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	g	60/66 (91%)	60 (100%)	0	100	100
2	h	58/66 (88%)	58 (100%)	0	100	100
2	i	58/66 (88%)	58 (100%)	0	100	100
2	j	58/66 (88%)	58 (100%)	0	100	100
2	k	58/66 (88%)	58 (100%)	0	100	100
2	l	58/66 (88%)	58 (100%)	0	100	100
2	m	60/66 (91%)	60 (100%)	0	100	100
2	n	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	o	58/66 (88%)	58 (100%)	0	100	100
2	p	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	q	58/66 (88%)	58 (100%)	0	100	100
2	r	58/66 (88%)	57 (98%)	1 (2%)	60	78
2	s	60/66 (91%)	59 (98%)	1 (2%)	60	78
2	t	58/66 (88%)	58 (100%)	0	100	100
2	u	58/66 (88%)	58 (100%)	0	100	100
2	v	58/66 (88%)	58 (100%)	0	100	100
2	w	58/66 (88%)	58 (100%)	0	100	100
2	x	58/66 (88%)	58 (100%)	0	100	100
3	Y	397/644 (62%)	381 (96%)	16 (4%)	31	57
3	Z	287/644 (45%)	273 (95%)	14 (5%)	25	52
All	All	3551/4531 (78%)	3504 (99%)	47 (1%)	70	82

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	2	15	ARG
2	A	82	ARG
2	D	82	ARG

Continued on next page...

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	F	66	ARG
2	J	66	ARG
2	K	54	ASN
2	M	82	ARG
2	U	82	ARG
2	V	34	ARG
3	Y	272	ARG
3	Y	358	LYS
3	Y	559	LYS
3	Y	642	LYS
3	Y	700	ARG
3	Y	703	LYS
3	Y	714	LYS
3	Y	730	ASP
3	Y	732	LYS
3	Y	733	ARG
3	Y	734	ASN
3	Y	735	ASP
3	Y	739	LYS
3	Y	756	LEU
3	Y	760	SER
3	Y	764	ARG
3	Z	300	ARG
3	Z	403	SER
3	Z	405	LYS
3	Z	407	LYS
3	Z	408	SER
3	Z	419	ASN
3	Z	478	LYS
3	Z	631	LYS
3	Z	632	ILE
3	Z	637	ASP
3	Z	638	MET
3	Z	640	GLU
3	Z	641	ASP
3	Z	642	LYS
2	a	82	ARG
2	c	30	ARG
2	c	58	ARG
2	f	66	ARG
2	n	82	ARG
2	p	82	ARG

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Mol	Chain	Res	Type
2	r	66	ARG
2	s	58	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	75	HIS
2	E	75	HIS
2	R	54	ASN
3	Y	258	ASN
3	Y	592	GLN
3	Y	734	ASN
3	Z	534	ASN
3	Z	591	ASN
2	a	75	HIS
2	b	75	HIS
2	i	75	HIS

### 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 monosaccharides 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

There are no chain breaks in this entry.

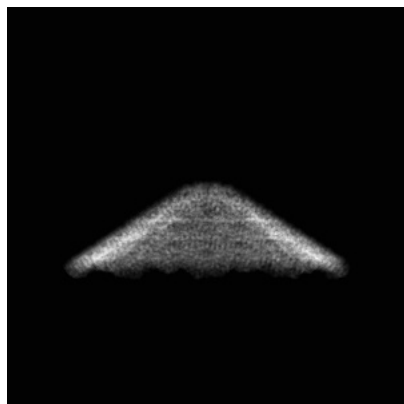
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-37902. These allow visual inspection of the internal detail of the map and identification of artifacts.

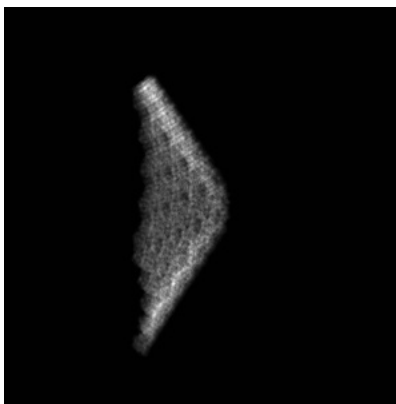
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

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

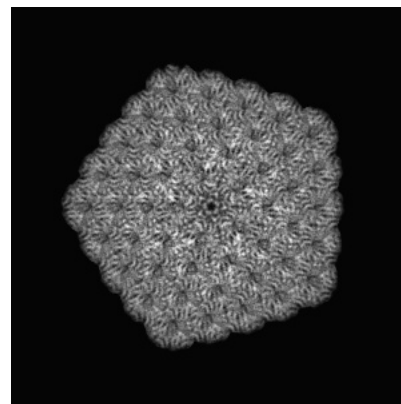
#### 6.1.1 Primary map



X

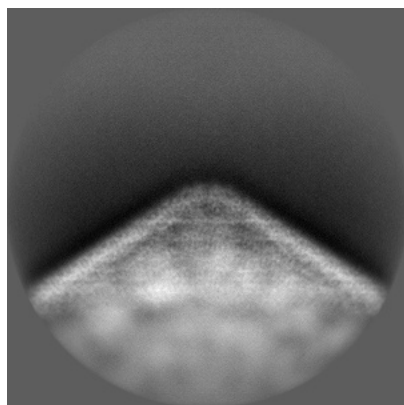


Y

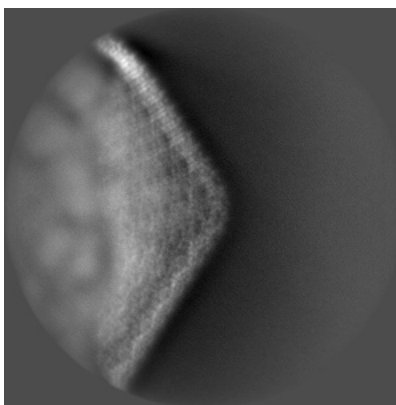


Z

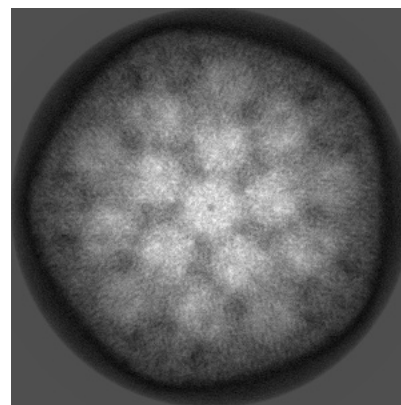
#### 6.1.2 Raw map



X



Y



Z

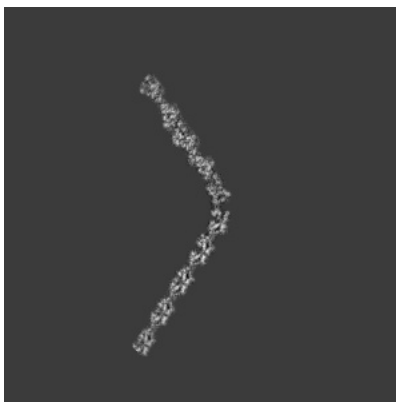
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

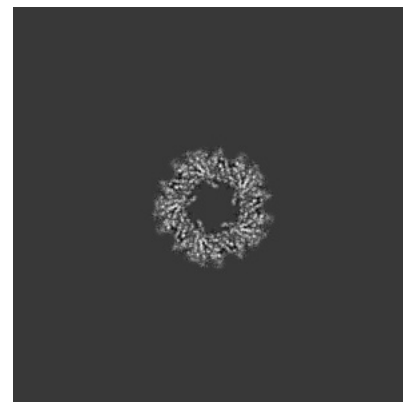
### 6.2.1 Primary map



X Index: 343

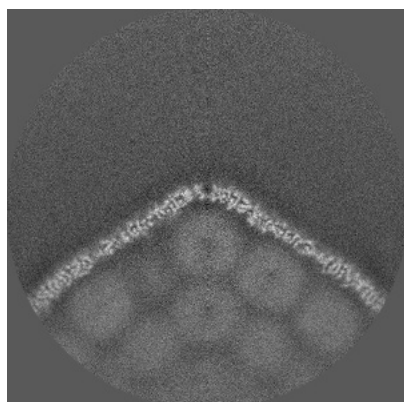


Y Index: 343

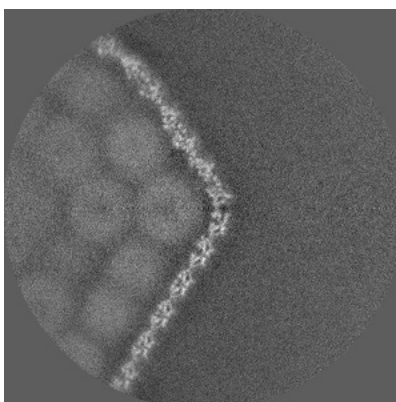


Z Index: 343

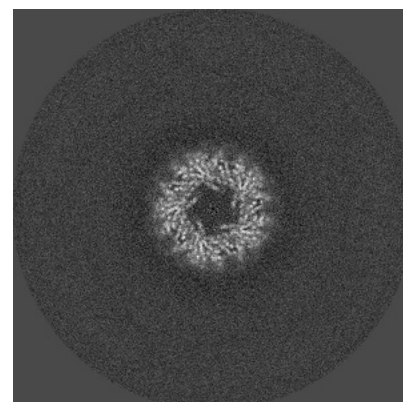
### 6.2.2 Raw map



X Index: 343



Y Index: 343

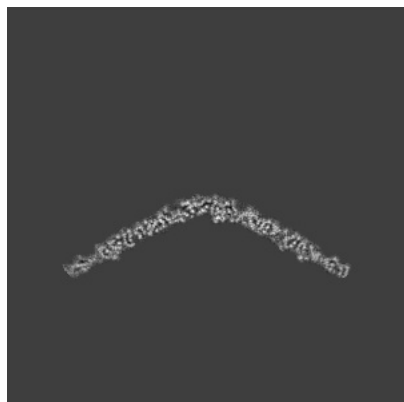


Z Index: 343

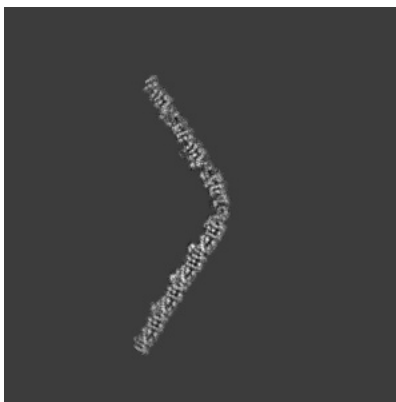
The images above show central slices of the map in three orthogonal directions.

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

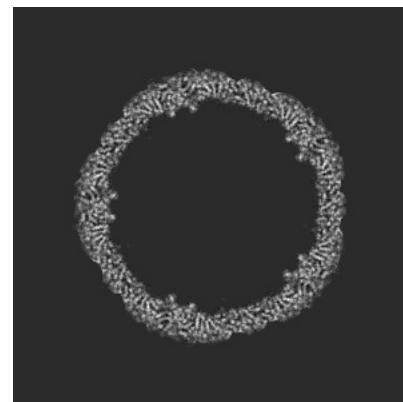
### 6.3.1 Primary map



X Index: 274

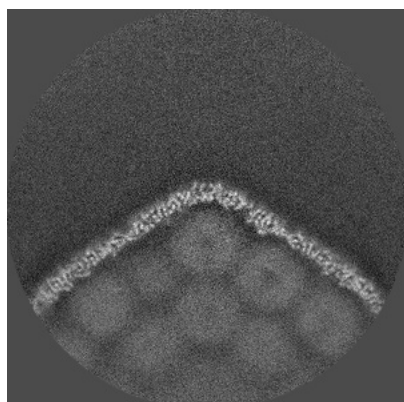


Y Index: 360

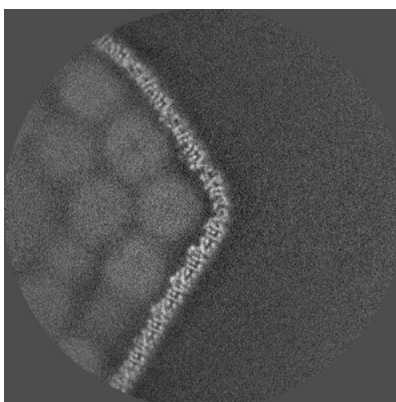


Z Index: 255

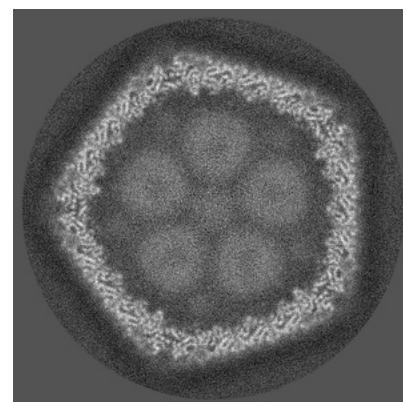
### 6.3.2 Raw map



X Index: 351



Y Index: 360

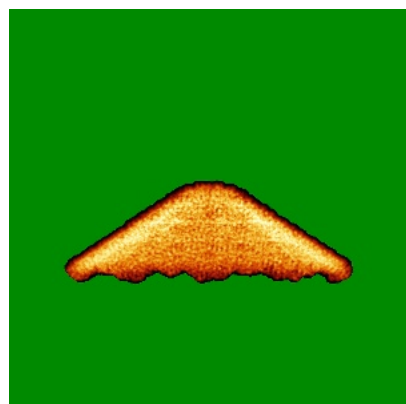


Z Index: 236

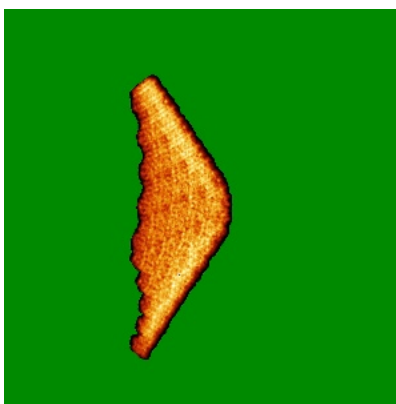
The images above show the largest variance slices of the map in three orthogonal directions.

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

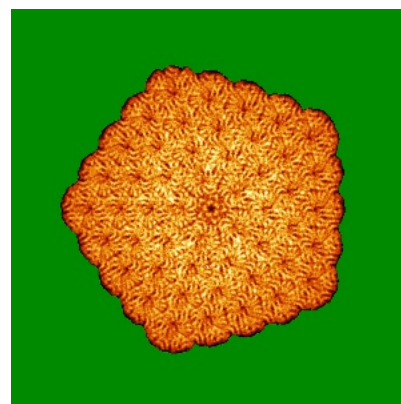
### 6.4.1 Primary map



X

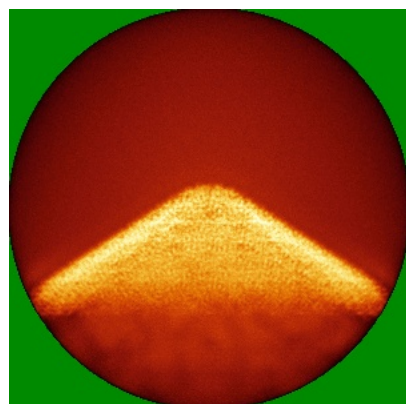


Y

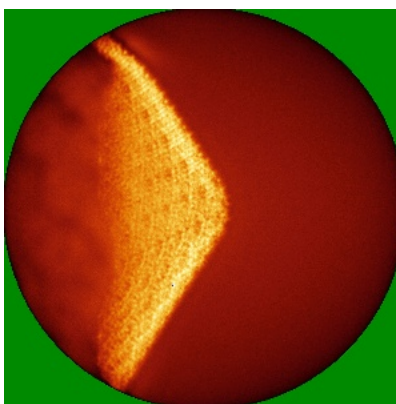


Z

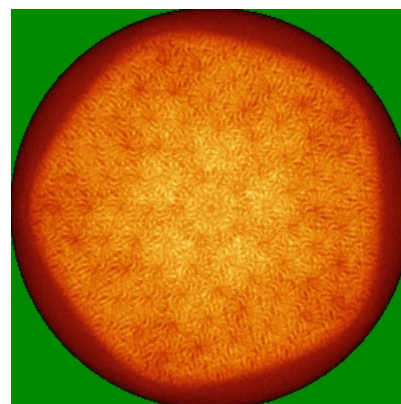
### 6.4.2 Raw map



X



Y



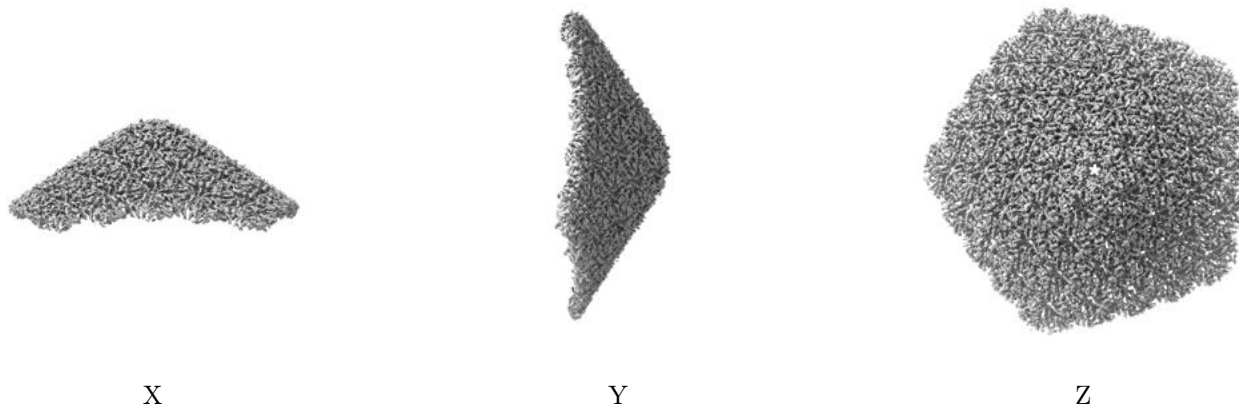
Z

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.



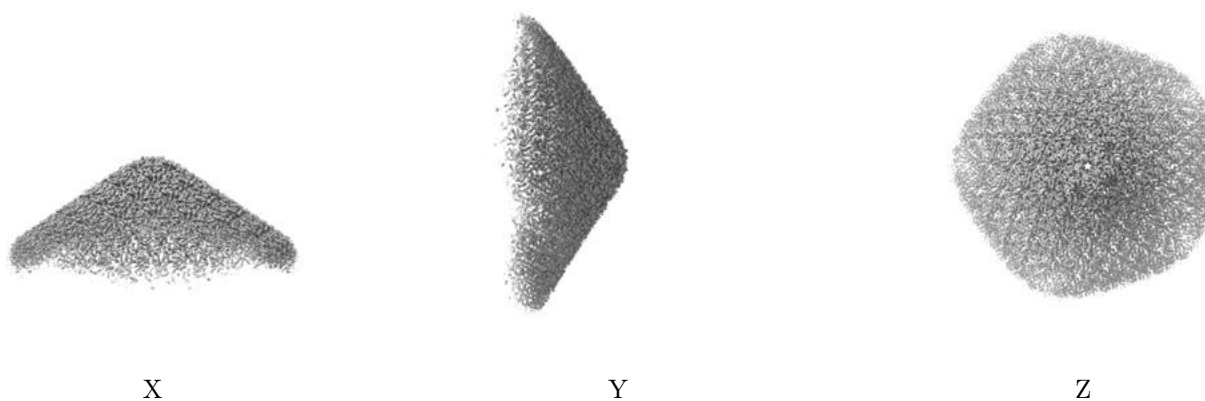
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.006. 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.

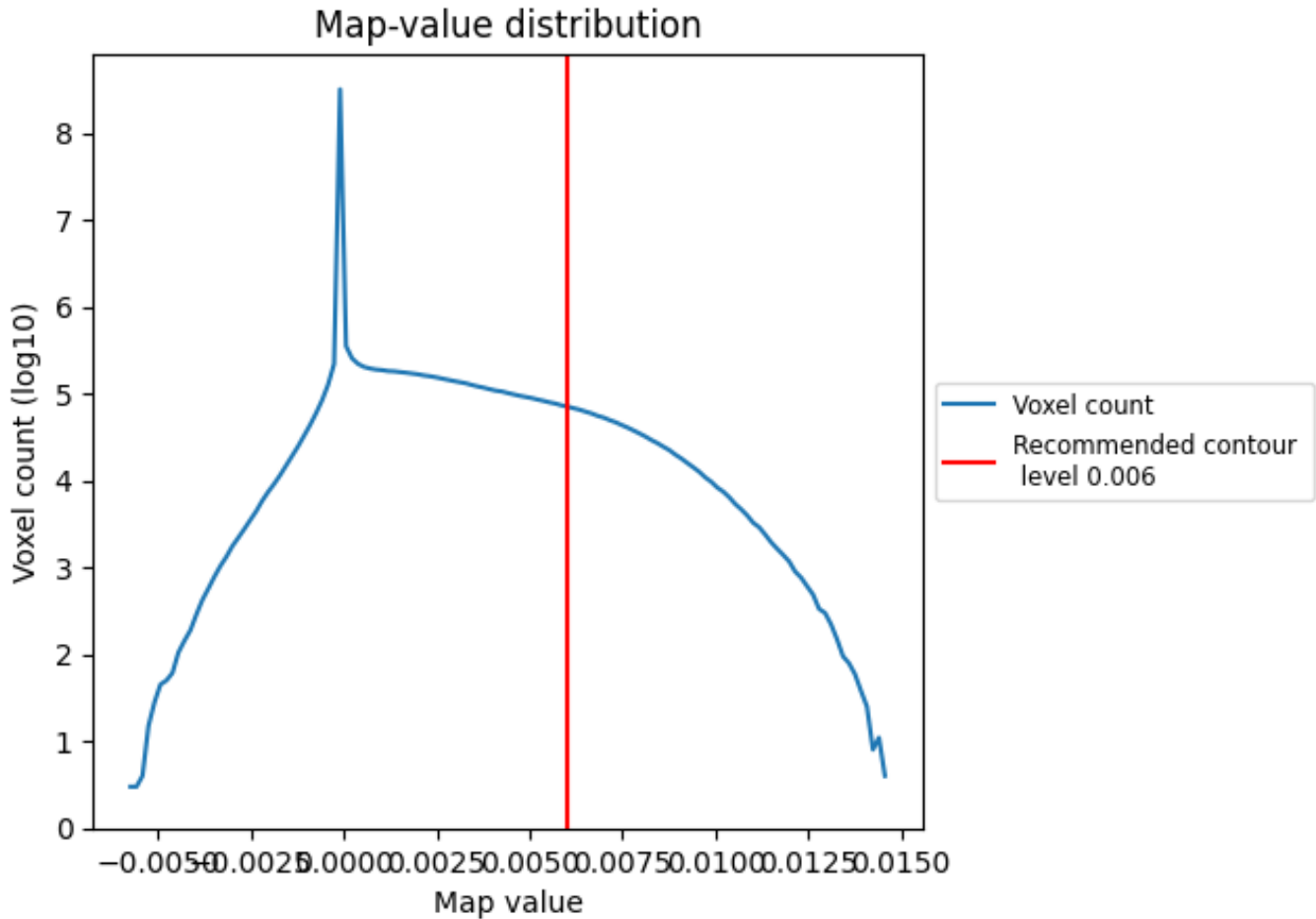
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

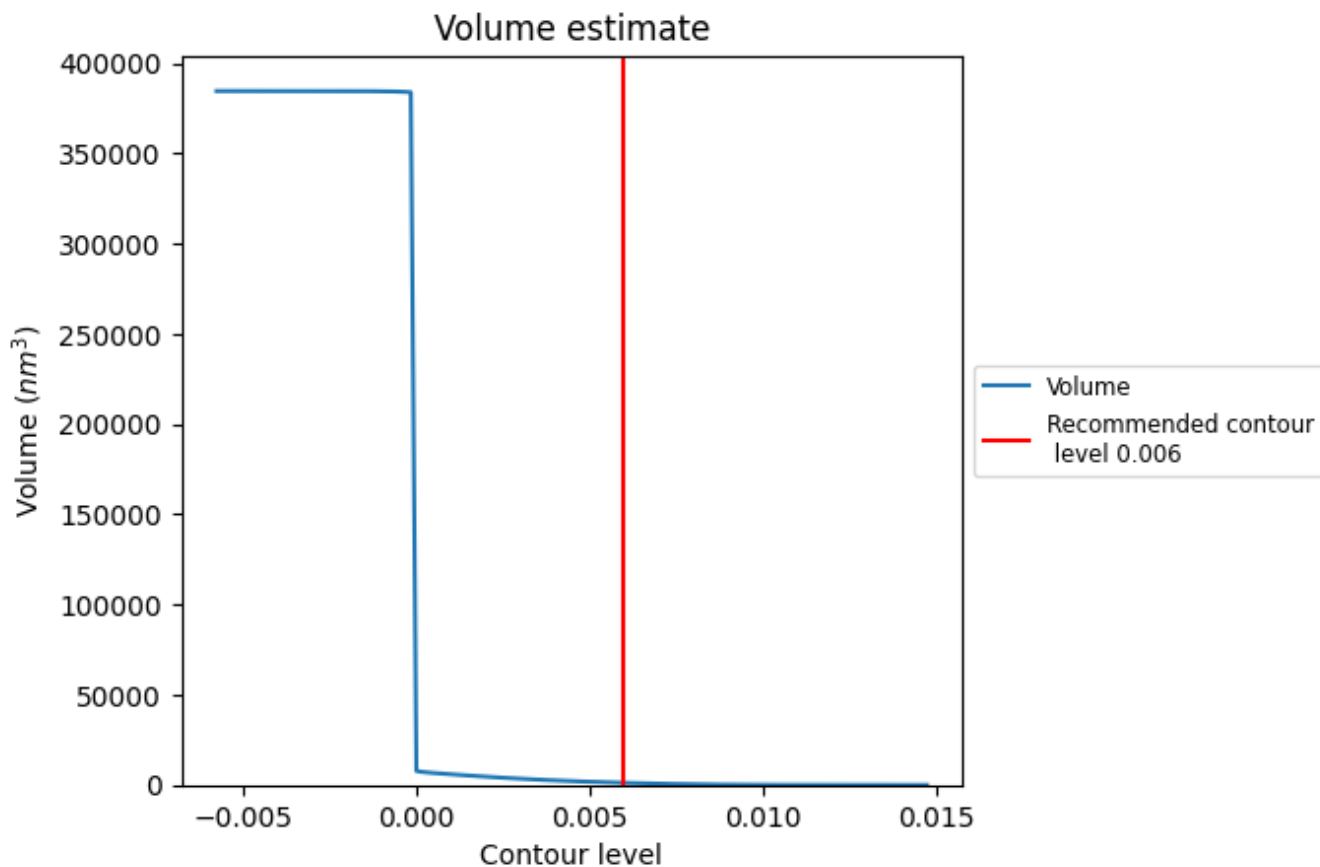
This section contains the results of statistical analysis of the map.

### 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.

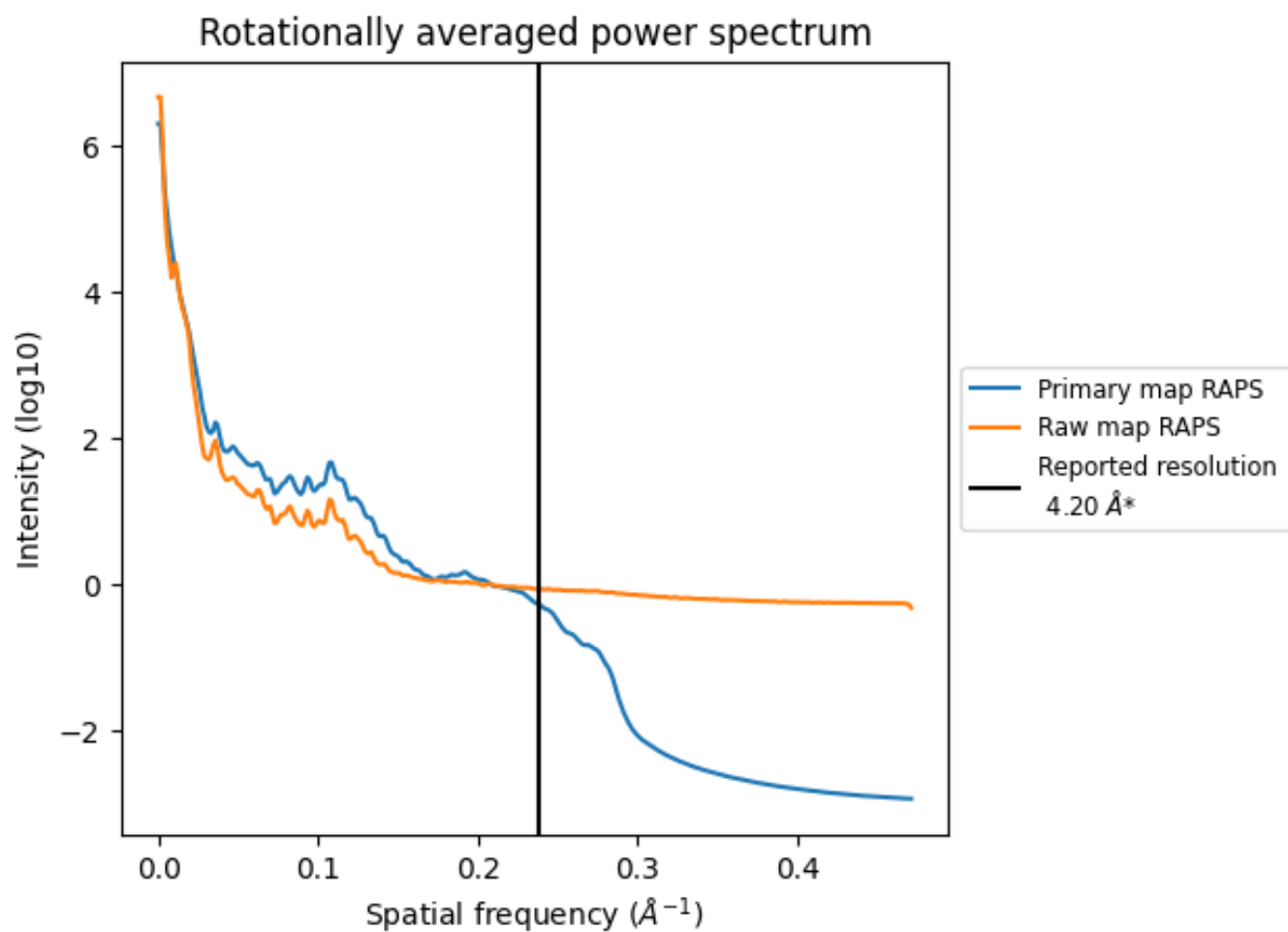
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1176 nm<sup>3</sup>; this corresponds to an approximate mass of 1062 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

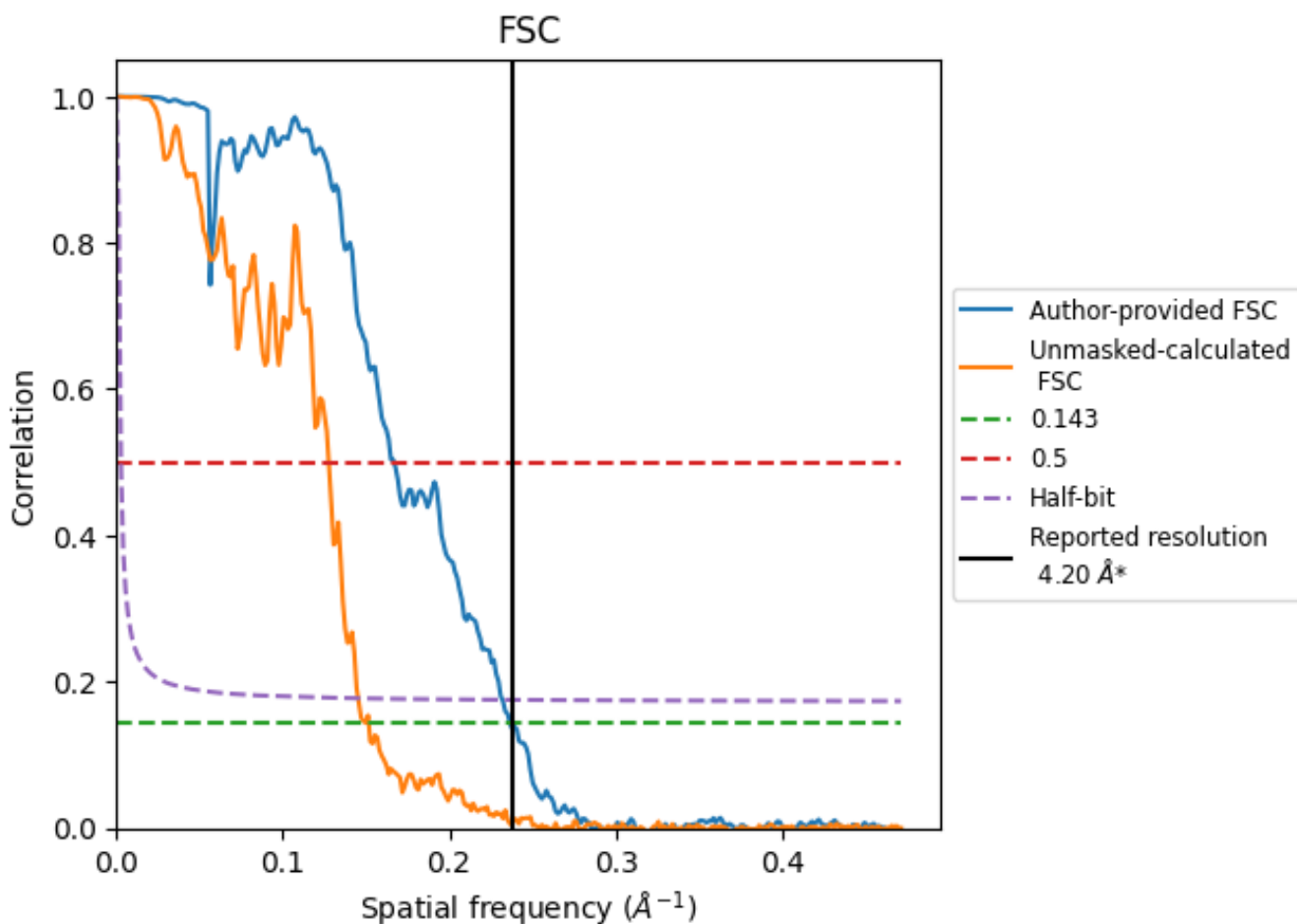


\*Reported resolution corresponds to spatial frequency of 0.238 Å<sup>-1</sup>

## 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 0.238 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.20	-	-
Author-provided FSC curve	4.23	6.00	4.31
Unmasked-calculated*	6.59	7.83	6.88

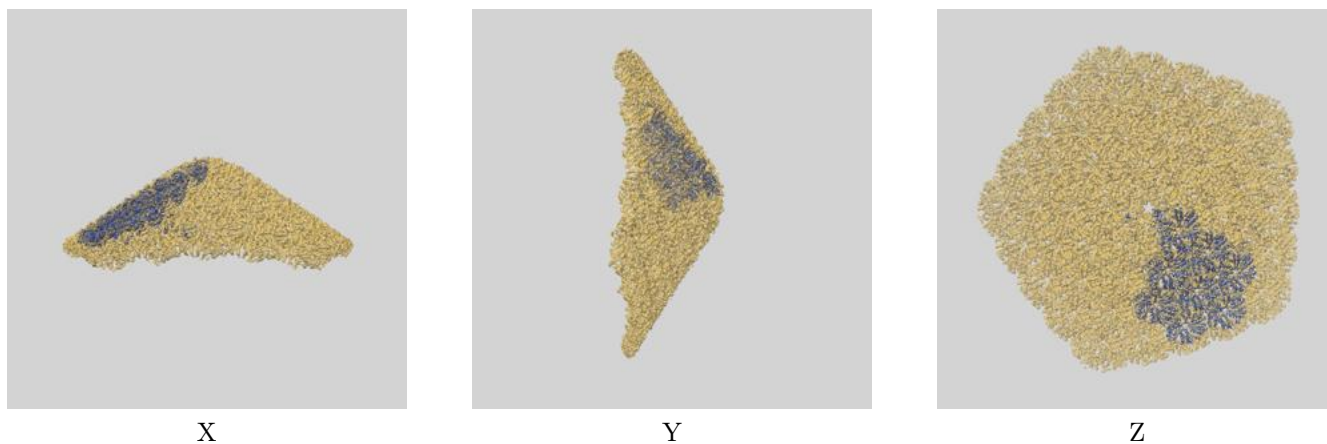
\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 6.59 differs from the reported value 4.2 by more than 10 %

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

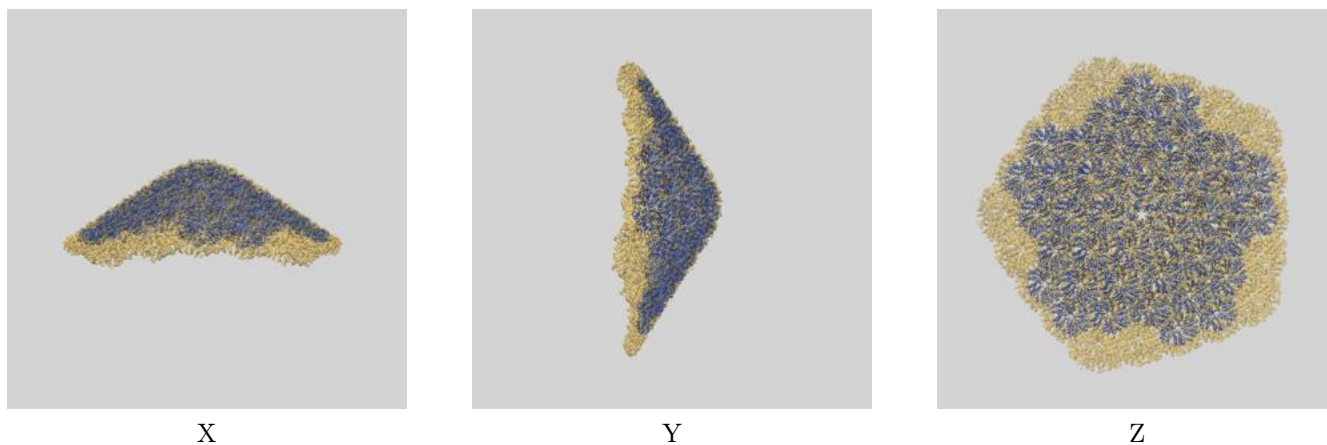
This section contains information regarding the fit between EMDB map EMD-37902 and PDB model 8WXB. Per-residue inclusion information can be found in section 3 on page 8.

### 9.1 Map-model overlays

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

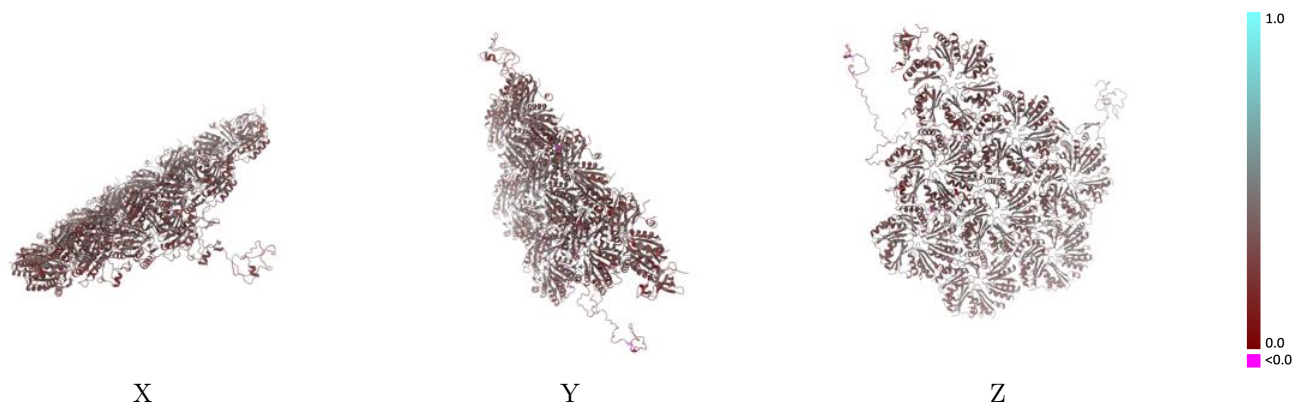


#### 9.1.2 Map-model assembly overlay [i](#)



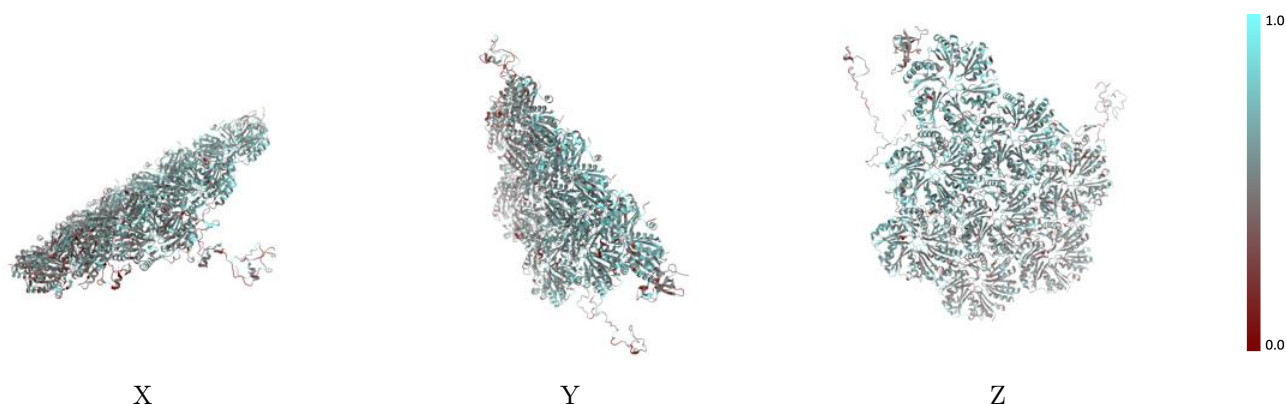
The images above show the 3D surface view of the map at the recommended contour level 0.006 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 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.

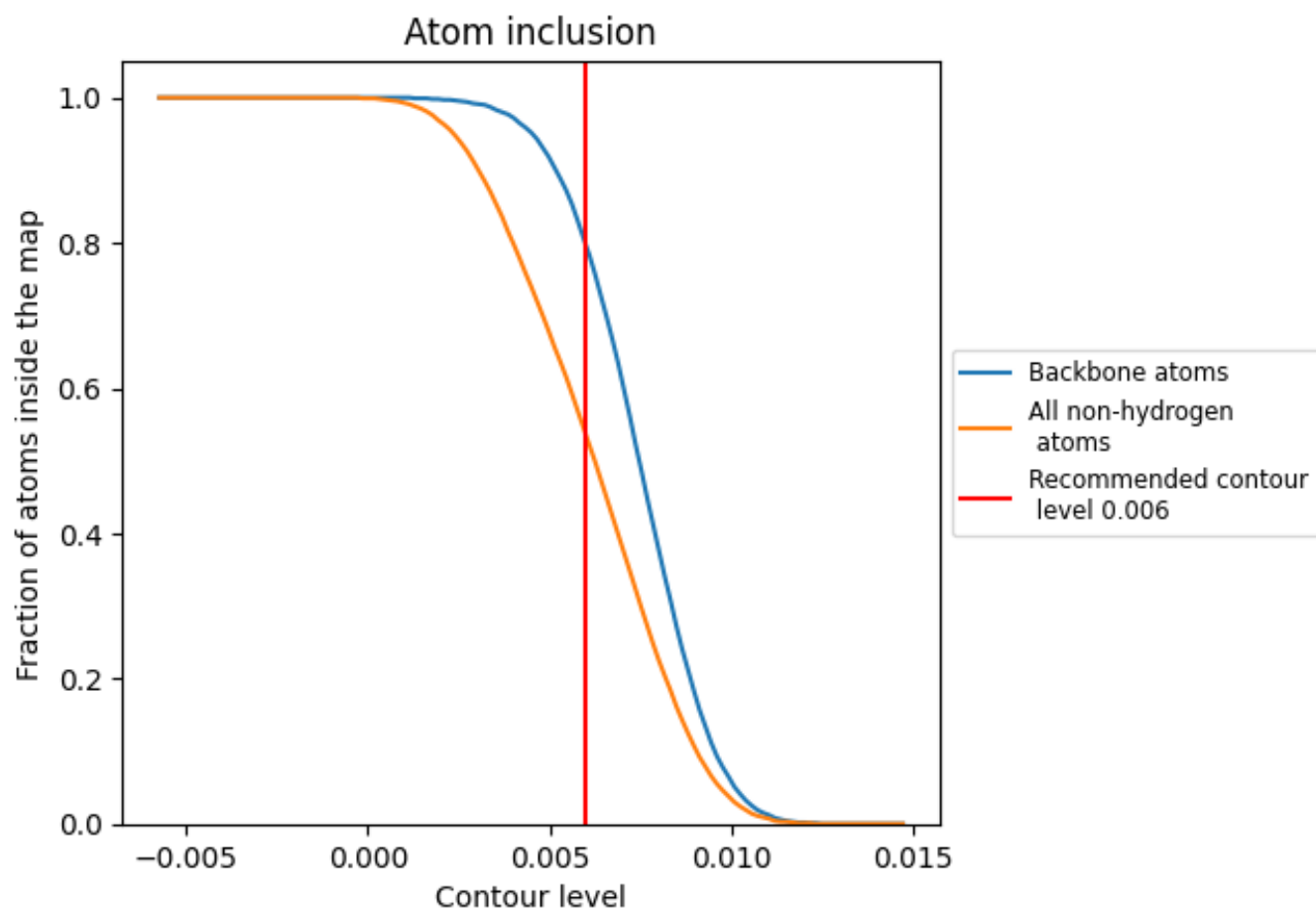
## 9.3 Atom inclusion mapped to coordinate model [i](#)



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 (0.006).









































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 80% of all backbone atoms, 54% 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 (0.006) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.5360	 0.3370
2	 0.4010	 0.2920
A	 0.5750	 0.3470
B	 0.6190	 0.3530
C	 0.6520	 0.3550
D	 0.6260	 0.3600
E	 0.6180	 0.3470
F	 0.6410	 0.3680
G	 0.6190	 0.3450
H	 0.5960	 0.3330
I	 0.6470	 0.3500
J	 0.5930	 0.3520
K	 0.6470	 0.3410
L	 0.5880	 0.3320
M	 0.5880	 0.3660
N	 0.5630	 0.3550
O	 0.6160	 0.3430
P	 0.5350	 0.3430
Q	 0.5280	 0.3530
R	 0.5580	 0.3590
S	 0.5670	 0.3480
T	 0.6270	 0.3630
U	 0.5800	 0.3520
V	 0.5680	 0.3450
W	 0.5210	 0.3400
X	 0.5500	 0.3530
Y	 0.4520	 0.3050
Z	 0.3730	 0.3040
a	 0.5510	 0.3540
b	 0.5600	 0.3280
c	 0.5380	 0.3460
d	 0.5360	 0.3230
e	 0.5230	 0.3480
f	 0.5430	 0.3470
g	 0.4820	 0.3400



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Chain	Atom inclusion	Q-score
h	 0.5100	 0.3330
i	 0.5180	 0.3320
j	 0.4870	 0.3460
k	 0.4590	 0.3180
l	 0.4750	 0.3230
m	 0.4980	 0.3360
n	 0.5480	 0.3310
o	 0.5020	 0.3270
p	 0.4950	 0.3360
q	 0.4540	 0.3130
r	 0.4820	 0.3180
s	 0.5910	 0.3690
t	 0.6040	 0.3440
u	 0.6160	 0.3520
v	 0.6210	 0.3560
w	 0.5980	 0.3590
x	 0.6040	 0.3630