



Full wwPDB EM Validation Report ⓘ

Jun 20, 2026 – 10:34 am BST

PDB ID : 9RUX / pdb_00009rux
EMDB ID : EMD-54277
Title : Cryo-EM structure of DISC1 core
Authors : Zhou, J.C.
Deposited on : 2025-07-05
Resolution : 3.90 Å(reported)
Based on initial model : .

This is a Full wwPDB EM Validation 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:

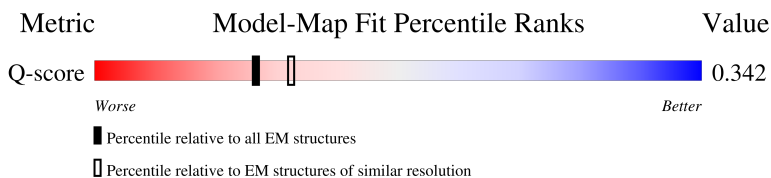
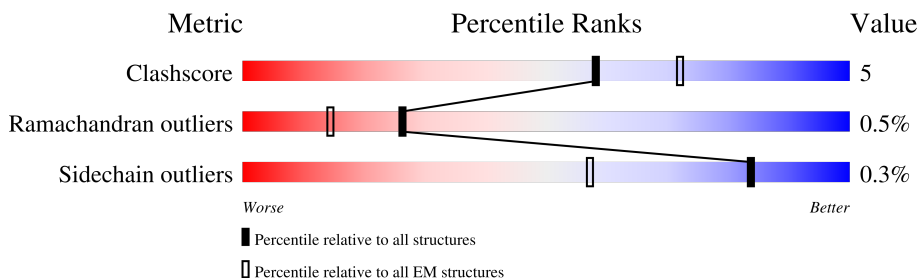
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

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 3.90 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	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	8855 (3.40 - 4.40)

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	A	478	
1	B	478	
1	C	478	
1	D	478	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 19428 atoms, of which 9836 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 Disrupted in schizophrenia 1 homolog.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	304	Total	C	H	N	O	S	0	0
			4857	1490	2459	436	455	17		
1	B	304	Total	C	H	N	O	S	0	0
			4857	1490	2459	436	455	17		
1	C	304	Total	C	H	N	O	S	0	0
			4857	1490	2459	436	455	17		
1	D	304	Total	C	H	N	O	S	0	0
			4857	1490	2459	436	455	17		

There are 308 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	245	MET	-	initiating methionine	UNP Q811T9
A	246	GLN	-	expression tag	UNP Q811T9
A	247	TYR	-	expression tag	UNP Q811T9
A	248	LYS	-	expression tag	UNP Q811T9
A	249	LEU	-	expression tag	UNP Q811T9
A	250	ALA	-	expression tag	UNP Q811T9
A	251	LEU	-	expression tag	UNP Q811T9
A	252	ASN	-	expression tag	UNP Q811T9
A	253	GLY	-	expression tag	UNP Q811T9
A	254	LYS	-	expression tag	UNP Q811T9
A	255	THR	-	expression tag	UNP Q811T9
A	256	LEU	-	expression tag	UNP Q811T9
A	257	LYS	-	expression tag	UNP Q811T9
A	258	GLY	-	expression tag	UNP Q811T9
A	259	GLU	-	expression tag	UNP Q811T9
A	260	THR	-	expression tag	UNP Q811T9
A	261	THR	-	expression tag	UNP Q811T9
A	262	THR	-	expression tag	UNP Q811T9
A	263	GLU	-	expression tag	UNP Q811T9
A	264	ALA	-	expression tag	UNP Q811T9
A	265	VAL	-	expression tag	UNP Q811T9
A	266	ASP	-	expression tag	UNP Q811T9

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Chain	Residue	Modelled	Actual	Comment	Reference
A	267	ALA	-	expression tag	UNP Q811T9
A	268	ALA	-	expression tag	UNP Q811T9
A	269	THR	-	expression tag	UNP Q811T9
A	270	ALA	-	expression tag	UNP Q811T9
A	271	GLU	-	expression tag	UNP Q811T9
A	272	LYS	-	expression tag	UNP Q811T9
A	273	VAL	-	expression tag	UNP Q811T9
A	274	PHE	-	expression tag	UNP Q811T9
A	275	LYS	-	expression tag	UNP Q811T9
A	276	GLN	-	expression tag	UNP Q811T9
A	277	TYR	-	expression tag	UNP Q811T9
A	278	ALA	-	expression tag	UNP Q811T9
A	279	ASN	-	expression tag	UNP Q811T9
A	280	ASP	-	expression tag	UNP Q811T9
A	281	ASN	-	expression tag	UNP Q811T9
A	282	GLY	-	expression tag	UNP Q811T9
A	283	VAL	-	expression tag	UNP Q811T9
A	284	ASP	-	expression tag	UNP Q811T9
A	285	GLY	-	expression tag	UNP Q811T9
A	286	GLU	-	expression tag	UNP Q811T9
A	287	TRP	-	expression tag	UNP Q811T9
A	288	THR	-	expression tag	UNP Q811T9
A	289	TYR	-	expression tag	UNP Q811T9
A	290	ASP	-	expression tag	UNP Q811T9
A	291	ASP	-	expression tag	UNP Q811T9
A	292	ALA	-	expression tag	UNP Q811T9
A	293	THR	-	expression tag	UNP Q811T9
A	294	LYS	-	expression tag	UNP Q811T9
A	295	THR	-	expression tag	UNP Q811T9
A	296	PHE	-	expression tag	UNP Q811T9
A	297	THR	-	expression tag	UNP Q811T9
A	298	VAL	-	expression tag	UNP Q811T9
A	299	THR	-	expression tag	UNP Q811T9
A	300	GLU	-	expression tag	UNP Q811T9
A	301	HIS	-	expression tag	UNP Q811T9
A	302	MET	-	expression tag	UNP Q811T9
A	303	HIS	-	expression tag	UNP Q811T9
A	304	HIS	-	expression tag	UNP Q811T9
A	305	HIS	-	expression tag	UNP Q811T9
A	306	HIS	-	expression tag	UNP Q811T9
A	307	HIS	-	expression tag	UNP Q811T9
A	308	HIS	-	expression tag	UNP Q811T9

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Chain	Residue	Modelled	Actual	Comment	Reference
A	309	SER	-	expression tag	UNP Q811T9
A	310	SER	-	expression tag	UNP Q811T9
A	311	GLY	-	expression tag	UNP Q811T9
A	312	LEU	-	expression tag	UNP Q811T9
A	313	GLU	-	expression tag	UNP Q811T9
A	314	VAL	-	expression tag	UNP Q811T9
A	315	LEU	-	expression tag	UNP Q811T9
A	316	PHE	-	expression tag	UNP Q811T9
A	317	GLN	-	expression tag	UNP Q811T9
A	318	GLY	-	expression tag	UNP Q811T9
A	319	PRO	-	expression tag	UNP Q811T9
A	320	GLY	-	expression tag	UNP Q811T9
A	321	SER	-	expression tag	UNP Q811T9
B	245	MET	-	initiating methionine	UNP Q811T9
B	246	GLN	-	expression tag	UNP Q811T9
B	247	TYR	-	expression tag	UNP Q811T9
B	248	LYS	-	expression tag	UNP Q811T9
B	249	LEU	-	expression tag	UNP Q811T9
B	250	ALA	-	expression tag	UNP Q811T9
B	251	LEU	-	expression tag	UNP Q811T9
B	252	ASN	-	expression tag	UNP Q811T9
B	253	GLY	-	expression tag	UNP Q811T9
B	254	LYS	-	expression tag	UNP Q811T9
B	255	THR	-	expression tag	UNP Q811T9
B	256	LEU	-	expression tag	UNP Q811T9
B	257	LYS	-	expression tag	UNP Q811T9
B	258	GLY	-	expression tag	UNP Q811T9
B	259	GLU	-	expression tag	UNP Q811T9
B	260	THR	-	expression tag	UNP Q811T9
B	261	THR	-	expression tag	UNP Q811T9
B	262	THR	-	expression tag	UNP Q811T9
B	263	GLU	-	expression tag	UNP Q811T9
B	264	ALA	-	expression tag	UNP Q811T9
B	265	VAL	-	expression tag	UNP Q811T9
B	266	ASP	-	expression tag	UNP Q811T9
B	267	ALA	-	expression tag	UNP Q811T9
B	268	ALA	-	expression tag	UNP Q811T9
B	269	THR	-	expression tag	UNP Q811T9
B	270	ALA	-	expression tag	UNP Q811T9
B	271	GLU	-	expression tag	UNP Q811T9
B	272	LYS	-	expression tag	UNP Q811T9
B	273	VAL	-	expression tag	UNP Q811T9

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Chain	Residue	Modelled	Actual	Comment	Reference
B	274	PHE	-	expression tag	UNP Q811T9
B	275	LYS	-	expression tag	UNP Q811T9
B	276	GLN	-	expression tag	UNP Q811T9
B	277	TYR	-	expression tag	UNP Q811T9
B	278	ALA	-	expression tag	UNP Q811T9
B	279	ASN	-	expression tag	UNP Q811T9
B	280	ASP	-	expression tag	UNP Q811T9
B	281	ASN	-	expression tag	UNP Q811T9
B	282	GLY	-	expression tag	UNP Q811T9
B	283	VAL	-	expression tag	UNP Q811T9
B	284	ASP	-	expression tag	UNP Q811T9
B	285	GLY	-	expression tag	UNP Q811T9
B	286	GLU	-	expression tag	UNP Q811T9
B	287	TRP	-	expression tag	UNP Q811T9
B	288	THR	-	expression tag	UNP Q811T9
B	289	TYR	-	expression tag	UNP Q811T9
B	290	ASP	-	expression tag	UNP Q811T9
B	291	ASP	-	expression tag	UNP Q811T9
B	292	ALA	-	expression tag	UNP Q811T9
B	293	THR	-	expression tag	UNP Q811T9
B	294	LYS	-	expression tag	UNP Q811T9
B	295	THR	-	expression tag	UNP Q811T9
B	296	PHE	-	expression tag	UNP Q811T9
B	297	THR	-	expression tag	UNP Q811T9
B	298	VAL	-	expression tag	UNP Q811T9
B	299	THR	-	expression tag	UNP Q811T9
B	300	GLU	-	expression tag	UNP Q811T9
B	301	HIS	-	expression tag	UNP Q811T9
B	302	MET	-	expression tag	UNP Q811T9
B	303	HIS	-	expression tag	UNP Q811T9
B	304	HIS	-	expression tag	UNP Q811T9
B	305	HIS	-	expression tag	UNP Q811T9
B	306	HIS	-	expression tag	UNP Q811T9
B	307	HIS	-	expression tag	UNP Q811T9
B	308	HIS	-	expression tag	UNP Q811T9
B	309	SER	-	expression tag	UNP Q811T9
B	310	SER	-	expression tag	UNP Q811T9
B	311	GLY	-	expression tag	UNP Q811T9
B	312	LEU	-	expression tag	UNP Q811T9
B	313	GLU	-	expression tag	UNP Q811T9
B	314	VAL	-	expression tag	UNP Q811T9
B	315	LEU	-	expression tag	UNP Q811T9

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Chain	Residue	Modelled	Actual	Comment	Reference
B	316	PHE	-	expression tag	UNP Q811T9
B	317	GLN	-	expression tag	UNP Q811T9
B	318	GLY	-	expression tag	UNP Q811T9
B	319	PRO	-	expression tag	UNP Q811T9
B	320	GLY	-	expression tag	UNP Q811T9
B	321	SER	-	expression tag	UNP Q811T9
C	245	MET	-	initiating methionine	UNP Q811T9
C	246	GLN	-	expression tag	UNP Q811T9
C	247	TYR	-	expression tag	UNP Q811T9
C	248	LYS	-	expression tag	UNP Q811T9
C	249	LEU	-	expression tag	UNP Q811T9
C	250	ALA	-	expression tag	UNP Q811T9
C	251	LEU	-	expression tag	UNP Q811T9
C	252	ASN	-	expression tag	UNP Q811T9
C	253	GLY	-	expression tag	UNP Q811T9
C	254	LYS	-	expression tag	UNP Q811T9
C	255	THR	-	expression tag	UNP Q811T9
C	256	LEU	-	expression tag	UNP Q811T9
C	257	LYS	-	expression tag	UNP Q811T9
C	258	GLY	-	expression tag	UNP Q811T9
C	259	GLU	-	expression tag	UNP Q811T9
C	260	THR	-	expression tag	UNP Q811T9
C	261	THR	-	expression tag	UNP Q811T9
C	262	THR	-	expression tag	UNP Q811T9
C	263	GLU	-	expression tag	UNP Q811T9
C	264	ALA	-	expression tag	UNP Q811T9
C	265	VAL	-	expression tag	UNP Q811T9
C	266	ASP	-	expression tag	UNP Q811T9
C	267	ALA	-	expression tag	UNP Q811T9
C	268	ALA	-	expression tag	UNP Q811T9
C	269	THR	-	expression tag	UNP Q811T9
C	270	ALA	-	expression tag	UNP Q811T9
C	271	GLU	-	expression tag	UNP Q811T9
C	272	LYS	-	expression tag	UNP Q811T9
C	273	VAL	-	expression tag	UNP Q811T9
C	274	PHE	-	expression tag	UNP Q811T9
C	275	LYS	-	expression tag	UNP Q811T9
C	276	GLN	-	expression tag	UNP Q811T9
C	277	TYR	-	expression tag	UNP Q811T9
C	278	ALA	-	expression tag	UNP Q811T9
C	279	ASN	-	expression tag	UNP Q811T9
C	280	ASP	-	expression tag	UNP Q811T9

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Chain	Residue	Modelled	Actual	Comment	Reference
C	281	ASN	-	expression tag	UNP Q811T9
C	282	GLY	-	expression tag	UNP Q811T9
C	283	VAL	-	expression tag	UNP Q811T9
C	284	ASP	-	expression tag	UNP Q811T9
C	285	GLY	-	expression tag	UNP Q811T9
C	286	GLU	-	expression tag	UNP Q811T9
C	287	TRP	-	expression tag	UNP Q811T9
C	288	THR	-	expression tag	UNP Q811T9
C	289	TYR	-	expression tag	UNP Q811T9
C	290	ASP	-	expression tag	UNP Q811T9
C	291	ASP	-	expression tag	UNP Q811T9
C	292	ALA	-	expression tag	UNP Q811T9
C	293	THR	-	expression tag	UNP Q811T9
C	294	LYS	-	expression tag	UNP Q811T9
C	295	THR	-	expression tag	UNP Q811T9
C	296	PHE	-	expression tag	UNP Q811T9
C	297	THR	-	expression tag	UNP Q811T9
C	298	VAL	-	expression tag	UNP Q811T9
C	299	THR	-	expression tag	UNP Q811T9
C	300	GLU	-	expression tag	UNP Q811T9
C	301	HIS	-	expression tag	UNP Q811T9
C	302	MET	-	expression tag	UNP Q811T9
C	303	HIS	-	expression tag	UNP Q811T9
C	304	HIS	-	expression tag	UNP Q811T9
C	305	HIS	-	expression tag	UNP Q811T9
C	306	HIS	-	expression tag	UNP Q811T9
C	307	HIS	-	expression tag	UNP Q811T9
C	308	HIS	-	expression tag	UNP Q811T9
C	309	SER	-	expression tag	UNP Q811T9
C	310	SER	-	expression tag	UNP Q811T9
C	311	GLY	-	expression tag	UNP Q811T9
C	312	LEU	-	expression tag	UNP Q811T9
C	313	GLU	-	expression tag	UNP Q811T9
C	314	VAL	-	expression tag	UNP Q811T9
C	315	LEU	-	expression tag	UNP Q811T9
C	316	PHE	-	expression tag	UNP Q811T9
C	317	GLN	-	expression tag	UNP Q811T9
C	318	GLY	-	expression tag	UNP Q811T9
C	319	PRO	-	expression tag	UNP Q811T9
C	320	GLY	-	expression tag	UNP Q811T9
C	321	SER	-	expression tag	UNP Q811T9
D	245	MET	-	initiating methionine	UNP Q811T9

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Chain	Residue	Modelled	Actual	Comment	Reference
D	246	GLN	-	expression tag	UNP Q811T9
D	247	TYR	-	expression tag	UNP Q811T9
D	248	LYS	-	expression tag	UNP Q811T9
D	249	LEU	-	expression tag	UNP Q811T9
D	250	ALA	-	expression tag	UNP Q811T9
D	251	LEU	-	expression tag	UNP Q811T9
D	252	ASN	-	expression tag	UNP Q811T9
D	253	GLY	-	expression tag	UNP Q811T9
D	254	LYS	-	expression tag	UNP Q811T9
D	255	THR	-	expression tag	UNP Q811T9
D	256	LEU	-	expression tag	UNP Q811T9
D	257	LYS	-	expression tag	UNP Q811T9
D	258	GLY	-	expression tag	UNP Q811T9
D	259	GLU	-	expression tag	UNP Q811T9
D	260	THR	-	expression tag	UNP Q811T9
D	261	THR	-	expression tag	UNP Q811T9
D	262	THR	-	expression tag	UNP Q811T9
D	263	GLU	-	expression tag	UNP Q811T9
D	264	ALA	-	expression tag	UNP Q811T9
D	265	VAL	-	expression tag	UNP Q811T9
D	266	ASP	-	expression tag	UNP Q811T9
D	267	ALA	-	expression tag	UNP Q811T9
D	268	ALA	-	expression tag	UNP Q811T9
D	269	THR	-	expression tag	UNP Q811T9
D	270	ALA	-	expression tag	UNP Q811T9
D	271	GLU	-	expression tag	UNP Q811T9
D	272	LYS	-	expression tag	UNP Q811T9
D	273	VAL	-	expression tag	UNP Q811T9
D	274	PHE	-	expression tag	UNP Q811T9
D	275	LYS	-	expression tag	UNP Q811T9
D	276	GLN	-	expression tag	UNP Q811T9
D	277	TYR	-	expression tag	UNP Q811T9
D	278	ALA	-	expression tag	UNP Q811T9
D	279	ASN	-	expression tag	UNP Q811T9
D	280	ASP	-	expression tag	UNP Q811T9
D	281	ASN	-	expression tag	UNP Q811T9
D	282	GLY	-	expression tag	UNP Q811T9
D	283	VAL	-	expression tag	UNP Q811T9
D	284	ASP	-	expression tag	UNP Q811T9
D	285	GLY	-	expression tag	UNP Q811T9
D	286	GLU	-	expression tag	UNP Q811T9
D	287	TRP	-	expression tag	UNP Q811T9

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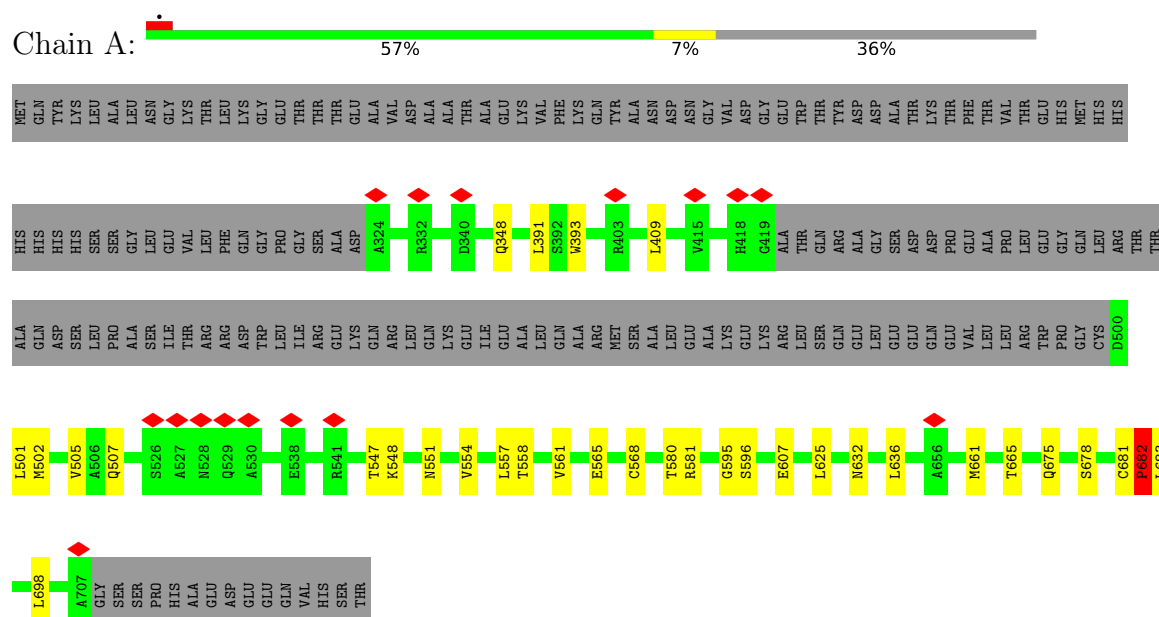
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Chain	Residue	Modelled	Actual	Comment	Reference
D	288	THR	-	expression tag	UNP Q811T9
D	289	TYR	-	expression tag	UNP Q811T9
D	290	ASP	-	expression tag	UNP Q811T9
D	291	ASP	-	expression tag	UNP Q811T9
D	292	ALA	-	expression tag	UNP Q811T9
D	293	THR	-	expression tag	UNP Q811T9
D	294	LYS	-	expression tag	UNP Q811T9
D	295	THR	-	expression tag	UNP Q811T9
D	296	PHE	-	expression tag	UNP Q811T9
D	297	THR	-	expression tag	UNP Q811T9
D	298	VAL	-	expression tag	UNP Q811T9
D	299	THR	-	expression tag	UNP Q811T9
D	300	GLU	-	expression tag	UNP Q811T9
D	301	HIS	-	expression tag	UNP Q811T9
D	302	MET	-	expression tag	UNP Q811T9
D	303	HIS	-	expression tag	UNP Q811T9
D	304	HIS	-	expression tag	UNP Q811T9
D	305	HIS	-	expression tag	UNP Q811T9
D	306	HIS	-	expression tag	UNP Q811T9
D	307	HIS	-	expression tag	UNP Q811T9
D	308	HIS	-	expression tag	UNP Q811T9
D	309	SER	-	expression tag	UNP Q811T9
D	310	SER	-	expression tag	UNP Q811T9
D	311	GLY	-	expression tag	UNP Q811T9
D	312	LEU	-	expression tag	UNP Q811T9
D	313	GLU	-	expression tag	UNP Q811T9
D	314	VAL	-	expression tag	UNP Q811T9
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D	316	PHE	-	expression tag	UNP Q811T9
D	317	GLN	-	expression tag	UNP Q811T9
D	318	GLY	-	expression tag	UNP Q811T9
D	319	PRO	-	expression tag	UNP Q811T9
D	320	GLY	-	expression tag	UNP Q811T9
D	321	SER	-	expression tag	UNP Q811T9

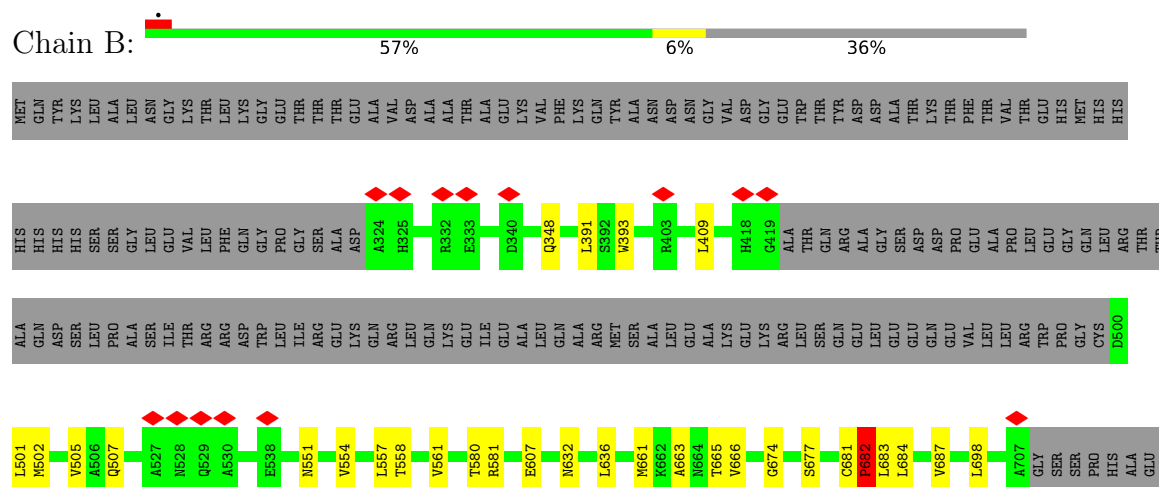
3 Residue-property plots

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: Disrupted in schizophrenia 1 homolog



- Molecule 1: Disrupted in schizophrenia 1 homolog



ASP
GLU
GLU
GLN
VAL
HIS
SER
THR

● Molecule 1: Disrupted in schizophrenia 1 homolog



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

HIS
HIS
HIS
HIS
SER
SER
GLY
LEU
LEU
GLU
VAL
LEU
LEU
PHE
GLN
GLY
PRO
GLY
GLY
SER
THR
ALA
ASP
A324
H325
H328
R332
E335
P336
R378
F382
R390
V393
A394
L396
P396
S397
Q398
R403
S404
F405
L409
A410
A411
Q412
I413
Q414
V415
A416
L417
H418
G419
ALA
THR
GLN

ARG
ALA
GLY
SER
ASP
ASP
PRO
GLU
ALA
PRO
VAL
LEU
LEU
GLY
GLN
GLY
ARG
THR
THR
ALA
GLN
ASP
LEU
LEU
SER
PRO
ALA
SER
ILE
THR
THR
ARG
ASP
TRP
LEU
ILE
GLY
GLN
GLN
ARG
LEU
GLN
LYS
Q398
R403
S404
F405
L409
A410
A411
Q412
I413
Q414
V415
A416
L417
H418
G419
ALA
THR
GLN

LEU
SER
GLN
GLY
LEU
GLY
GLN
GLY
D500
L501
L504
M508
S517
T523
L524
A530
P531
F532
E535
R573
S576
L591
A592
T600
M620
R624
A627
R631
L636
G637
D649
S677
L683

L684
W688
D691
T694
Q703
L704
Q705
E706
A707
GLY
SER
SER
PRO
HIS
ALA
GLU
ASP
GLU
GLN
GLN
HIS
VAL
SER
THR

● Molecule 1: Disrupted in schizophrenia 1 homolog



MET
GLN
TYR
LYS
LEU
ALA
LEU
ASN
GLY
THR
LYS
LEU
THR
LEU
GLY
GLY
THR
THR
THR
GLU
ALA
VAL
ASP
ALA
ALA
THR
ALA
GLU
LYS
VAL
PHE
LYS
GLN
TYR
ALA
ASN
ASP
ASN
GLY
VAL
ASP
GLY
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TRP
THR
TYR
ASP
ASP
ALA
THR
LYS
THR
PHE
THR
THR
VAL
THR
GLU
HIS
MET
HIS

HIS
HIS
HIS
HIS
SER
SER
GLY
LEU
LEU
GLU
VAL
LEU
PHE
GLN
GLY
PRO
GLY
GLY
SER
ALA
ASP
A324
H325
G326
H328
R332
E335
P336
R390
V393
A394
L395
P396
S397
Q398
R403
S404
F405
Y408
L409
L417
H418
G419
ALA
THR
GLN
ARG
GLY
ALA
GLY
SER
ASP
PRO
GLU

ALA
PRO
GLU
GLY
GLY
TRP
PRO
GLY
CYS
D500
L501
E515
V516
S517
E522
T523
L524
T525
S526
A530
P531
F532
Q533
V534
R573
S576
L585
L591
A592
G595
T600
L611
M620
R624
A627
L636
G637
D649
M661
Q675
L683

W688
D691
T694
Q703
L704
Q705
E706
A707
GLY
SER
SER
PRO
HIS
ALA
GLU
ASP
GLU
GLN
VAL
HIS
SER
THR

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	227140	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	1250	Depositor
Maximum defocus (nm)	1750	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	2.023	Depositor
Minimum map value	-0.037	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.010	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	474.87997, 474.87997, 474.87997	wwPDB
Map dimensions	448, 448, 448	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	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	A	0.27	0/2427	0.49	0/3269
1	B	0.27	0/2427	0.50	0/3269
1	C	0.24	0/2427	0.48	0/3269
1	D	0.24	0/2427	0.49	0/3269
All	All	0.26	0/9708	0.49	0/13076

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2398	2459	2455	23	0
1	B	2398	2459	2455	19	0
1	C	2398	2459	2455	27	0
1	D	2398	2459	2455	31	0
All	All	9592	9836	9820	91	0

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

All (91) 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:D:500:ASP:OD1	1:D:501:LEU:N	2.21	0.72
1:C:500:ASP:OD1	1:C:501:LEU:N	2.23	0.70
1:B:507:GLN:N	1:B:507:GLN:OE1	2.25	0.69
1:A:661:MET:O	1:A:665:THR:HG23	1.95	0.67
1:D:530:ALA:HB1	1:D:531:PRO:HD2	1.75	0.67
1:B:348:GLN:NE2	1:B:391:LEU:O	2.29	0.65
1:A:507:GLN:N	1:A:507:GLN:OE1	2.30	0.64
1:B:681:CYS:O	1:B:682:PRO:C	2.41	0.63
1:A:681:CYS:O	1:A:682:PRO:C	2.41	0.62
1:B:661:MET:O	1:B:665:THR:HG23	2.00	0.61
1:C:530:ALA:HB1	1:C:531:PRO:HD2	1.81	0.61
1:D:398:GLN:NE2	1:D:523:THR:O	2.34	0.60
1:D:534:VAL:HG13	1:D:661:MET:HE1	1.83	0.60
1:B:558:THR:HG21	1:C:592:ALA:HB2	1.83	0.60
1:A:558:THR:HG21	1:D:592:ALA:HB2	1.84	0.60
1:C:324:ALA:O	1:C:328:HIS:N	2.35	0.58
1:D:417:LEU:HD11	1:D:517:SER:HB2	1.85	0.58
1:A:348:GLN:NE2	1:A:391:LEU:O	2.37	0.57
1:C:409:LEU:HD22	1:C:683:LEU:HD23	1.85	0.57
1:D:409:LEU:HD22	1:D:683:LEU:HD23	1.88	0.56
1:D:636:LEU:C	1:D:636:LEU:HD23	2.32	0.55
1:D:534:VAL:HG12	1:D:534:VAL:O	2.05	0.54
1:B:561:VAL:HG22	1:B:632:ASN:OD1	2.08	0.54
1:D:534:VAL:HG13	1:D:661:MET:CE	2.39	0.53
1:C:636:LEU:C	1:C:636:LEU:HD23	2.34	0.52
1:C:417:LEU:HD11	1:C:517:SER:HB2	1.90	0.52
1:D:620:MET:SD	1:D:624:ARG:NH2	2.80	0.52
1:A:675:GLN:O	1:A:678:SER:HB2	2.11	0.51
1:A:561:VAL:HG22	1:A:632:ASN:OD1	2.10	0.51
1:C:398:GLN:NE2	1:C:524:LEU:O	2.43	0.51
1:D:522:GLU:O	1:D:526:SER:OG	2.23	0.51
1:D:324:ALA:O	1:D:328:HIS:N	2.41	0.50
1:C:378:ARG:NH2	1:C:382:GLU:OE2	2.46	0.49
1:C:413:ILE:HG21	1:C:517:SER:HA	1.94	0.48
1:A:558:THR:HG22	1:D:600:THR:CG2	2.44	0.47
1:C:504:LEU:O	1:C:508:MET:N	2.48	0.46
1:A:551:ASN:HA	1:A:554:VAL:HG12	1.97	0.46
1:D:691:ASP:O	1:D:694:THR:HG22	2.15	0.46
1:D:409:LEU:HD22	1:D:683:LEU:CD2	2.45	0.46
1:C:691:ASP:O	1:C:694:THR:HG22	2.15	0.46
1:C:620:MET:SD	1:C:624:ARG:NH2	2.81	0.46
1:B:558:THR:HG22	1:C:600:THR:CG2	2.46	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:396:PRO:HD2	1:D:694:THR:HG21	1.98	0.46
1:C:409:LEU:HD22	1:C:683:LEU:CD2	2.46	0.45
1:B:393:TRP:CH2	1:B:698:LEU:HA	2.52	0.45
1:A:551:ASN:ND2	1:D:595:GLY:O	2.44	0.45
1:A:502:MET:O	1:A:505:VAL:HG22	2.17	0.44
1:B:551:ASN:HA	1:B:554:VAL:HG12	2.00	0.44
1:B:557:LEU:CD2	1:B:636:LEU:HD13	2.48	0.44
1:C:396:PRO:HD2	1:C:694:THR:HG21	1.99	0.44
1:A:554:VAL:HG23	1:D:591:LEU:CD2	2.48	0.44
1:B:502:MET:O	1:B:505:VAL:HG22	2.18	0.44
1:C:393:TRP:C	1:C:393:TRP:CD1	2.95	0.44
1:C:411:ALA:O	1:C:415:VAL:HG23	2.18	0.44
1:D:393:TRP:CD1	1:D:393:TRP:C	2.96	0.44
1:A:551:ASN:O	1:A:554:VAL:HG12	2.18	0.44
1:A:557:LEU:CD2	1:A:636:LEU:HD13	2.48	0.43
1:C:396:PRO:CD	1:C:694:THR:HG21	2.48	0.43
1:C:573:ARG:O	1:C:576:SER:OG	2.29	0.43
1:D:636:LEU:HD23	1:D:636:LEU:O	2.18	0.43
1:D:395:LEU:HD12	1:D:532:PHE:CZ	2.54	0.43
1:B:554:VAL:HG23	1:C:591:LEU:CD2	2.48	0.43
1:B:674:GLY:O	1:B:677:SER:OG	2.26	0.43
1:A:568:CYS:SG	1:A:625:LEU:HD23	2.59	0.43
1:D:585:LEU:HD12	1:D:611:LEU:HD12	2.01	0.42
1:C:395:LEU:O	1:C:396:PRO:C	2.60	0.42
1:C:523:THR:HG22	1:C:688:TRP:HE1	1.84	0.42
1:C:530:ALA:CB	1:C:531:PRO:HD2	2.45	0.42
1:D:573:ARG:O	1:D:576:SER:OG	2.29	0.42
1:A:393:TRP:CH2	1:A:698:LEU:HA	2.55	0.42
1:B:551:ASN:O	1:B:554:VAL:HG12	2.19	0.42
1:B:684:LEU:HA	1:B:687:VAL:HG12	2.01	0.42
1:D:335:GLU:N	1:D:336:PRO:HD2	2.35	0.42
1:C:335:GLU:N	1:C:336:PRO:HD2	2.35	0.42
1:C:636:LEU:HD23	1:C:636:LEU:O	2.19	0.42
1:B:580:THR:HG22	1:B:580:THR:O	2.19	0.42
1:A:547:THR:HG23	1:A:548:LYS:N	2.35	0.42
1:A:554:VAL:HG23	1:D:591:LEU:HD23	2.02	0.42
1:A:580:THR:O	1:A:580:THR:HG22	2.19	0.42
1:B:409:LEU:HD13	1:B:501:LEU:HD21	2.02	0.41
1:A:409:LEU:HD13	1:A:501:LEU:HD21	2.02	0.41
1:B:581:ARG:NH1	1:B:607:GLU:OE2	2.53	0.41
1:D:395:LEU:O	1:D:396:PRO:C	2.62	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:530:ALA:C	1:C:532:PHE:N	2.77	0.41
1:A:581:ARG:NH1	1:A:607:GLU:OE2	2.54	0.41
1:A:595:GLY:O	1:A:596:SER:OG	2.31	0.41
1:B:663:ALA:O	1:B:666:VAL:HG12	2.21	0.41
1:D:675:GLN:HG3	1:D:688:TRP:CH2	2.55	0.41
1:D:396:PRO:CD	1:D:694:THR:HG21	2.50	0.41
1:A:565:GLU:CD	1:D:585:LEU:HD11	2.46	0.40
1:D:620:MET:SD	1:D:624:ARG:NH1	2.91	0.40

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	A	300/478 (63%)	293 (98%)	5 (2%)	2 (1%)	18	53
1	B	300/478 (63%)	293 (98%)	5 (2%)	2 (1%)	18	53
1	C	300/478 (63%)	295 (98%)	4 (1%)	1 (0%)	36	69
1	D	300/478 (63%)	293 (98%)	6 (2%)	1 (0%)	36	69
All	All	1200/1912 (63%)	1174 (98%)	20 (2%)	6 (0%)	26	59

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	683	LEU
1	B	683	LEU
1	C	531	PRO
1	D	530	ALA
1	A	682	PRO
1	B	682	PRO

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	A	264/409 (64%)	263 (100%)	1 (0%)	84	83
1	B	264/409 (64%)	263 (100%)	1 (0%)	84	83
1	C	264/409 (64%)	263 (100%)	1 (0%)	84	83
1	D	264/409 (64%)	264 (100%)	0	100	100
All	All	1056/1636 (64%)	1053 (100%)	3 (0%)	84	85

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	682	PRO
1	B	682	PRO
1	C	677	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	345	ASN
1	B	345	ASN
1	C	348	GLN
1	C	653	GLN
1	D	328	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 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.

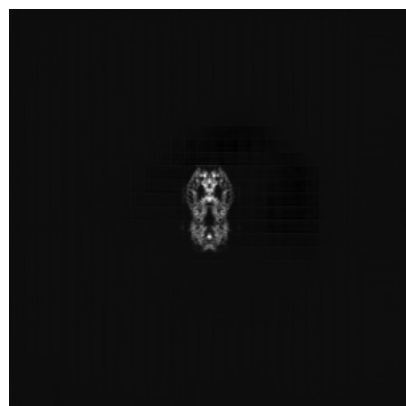
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-54277. These allow visual inspection of the internal detail of the map and identification of artifacts.

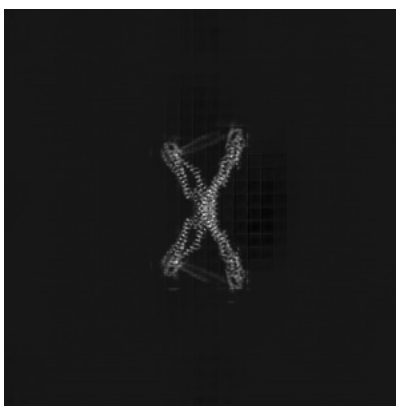
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

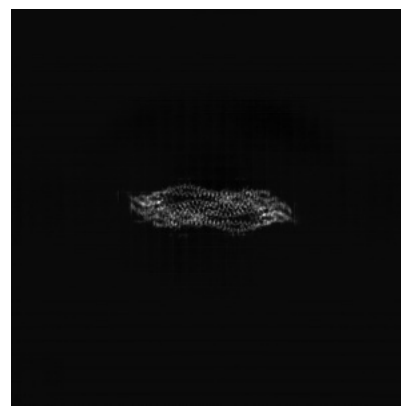
6.1.1 Primary map



X

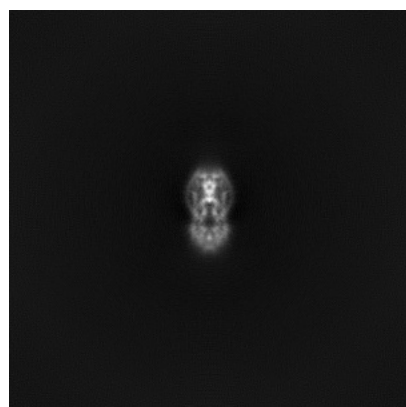


Y

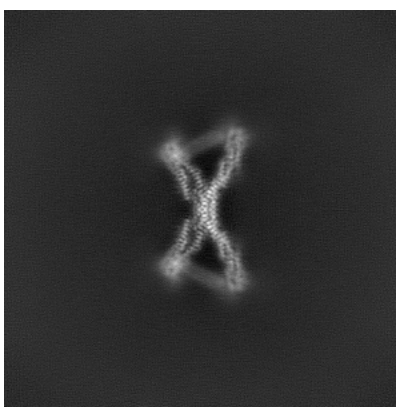


Z

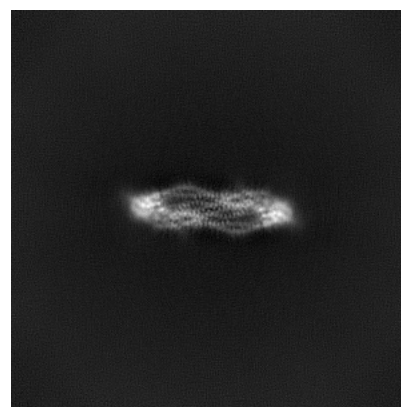
6.1.2 Raw map



X



Y

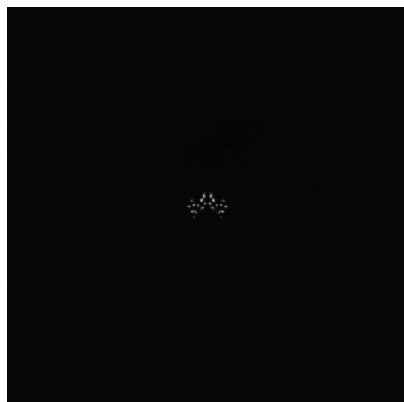


Z

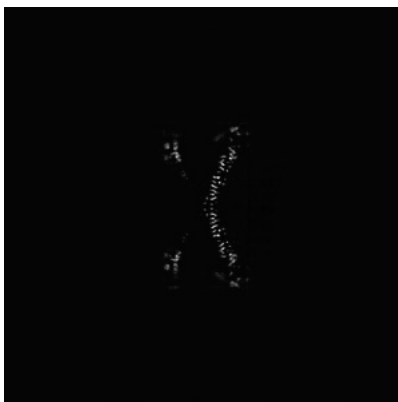
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

6.2.1 Primary map



X Index: 224

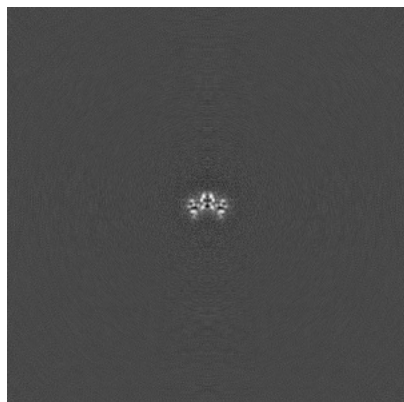


Y Index: 224

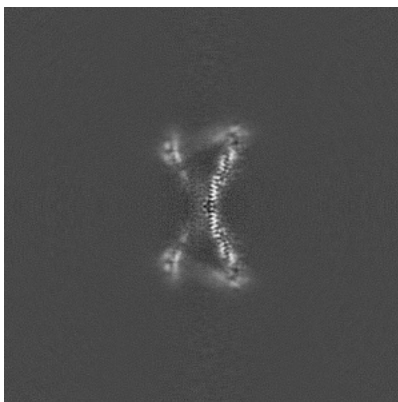


Z Index: 224

6.2.2 Raw map



X Index: 224



Y Index: 224

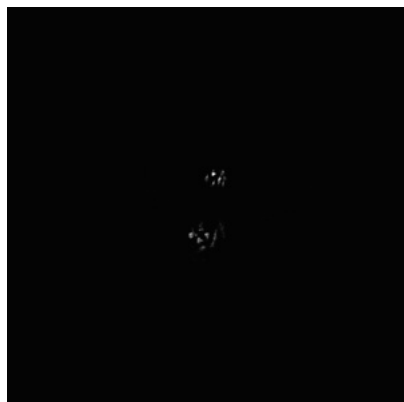


Z Index: 224

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: 164

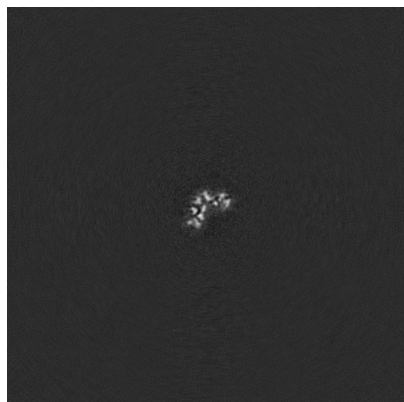


Y Index: 217

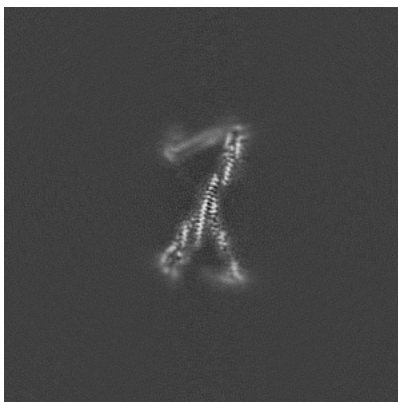


Z Index: 261

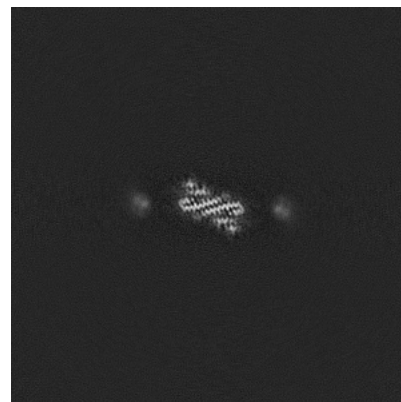
6.3.2 Raw map



X Index: 210



Y Index: 219



Z Index: 235

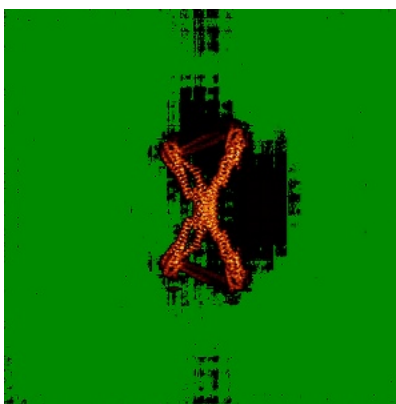
The images above show the largest variance slices of the map in three orthogonal directions.

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

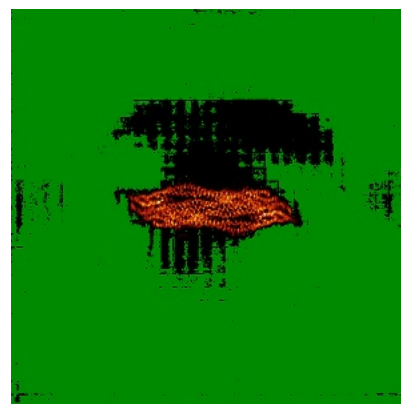
6.4.1 Primary map



X

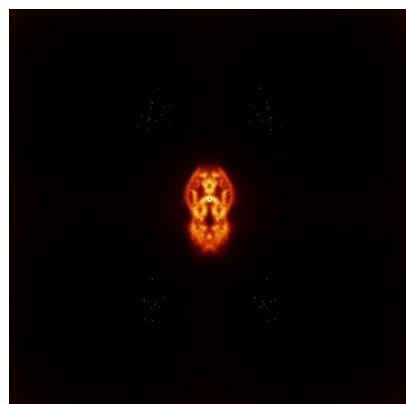


Y

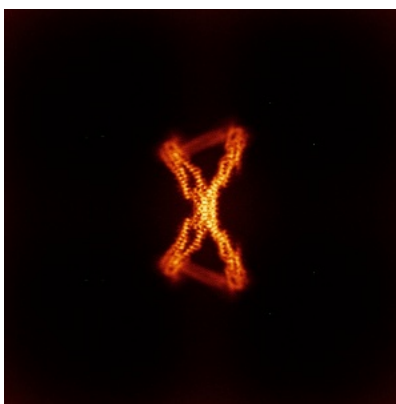


Z

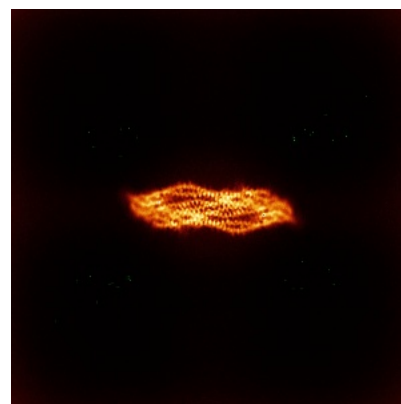
6.4.2 Raw map



X



Y

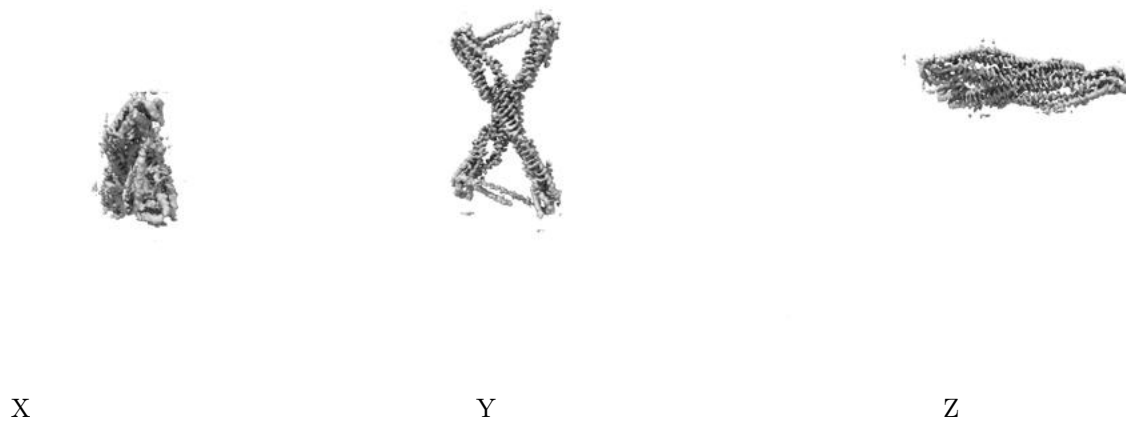


Z

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.

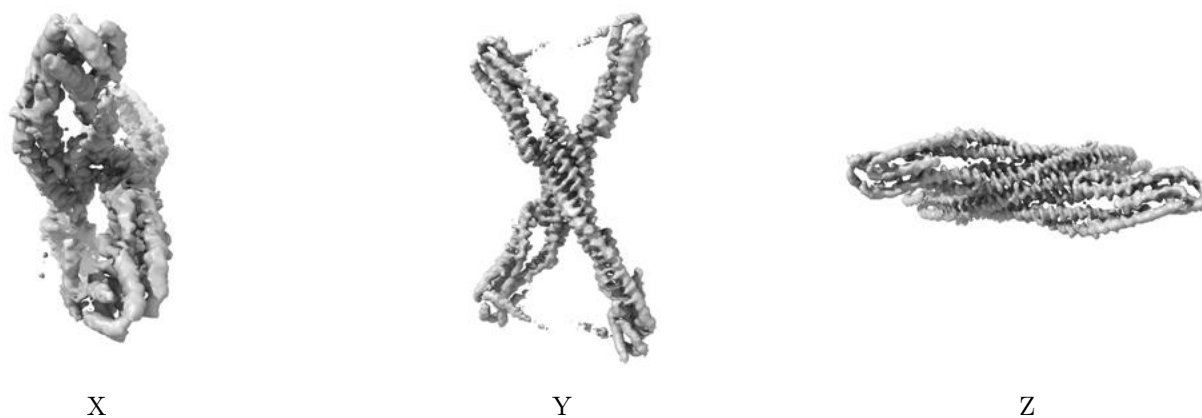
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.1. 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.

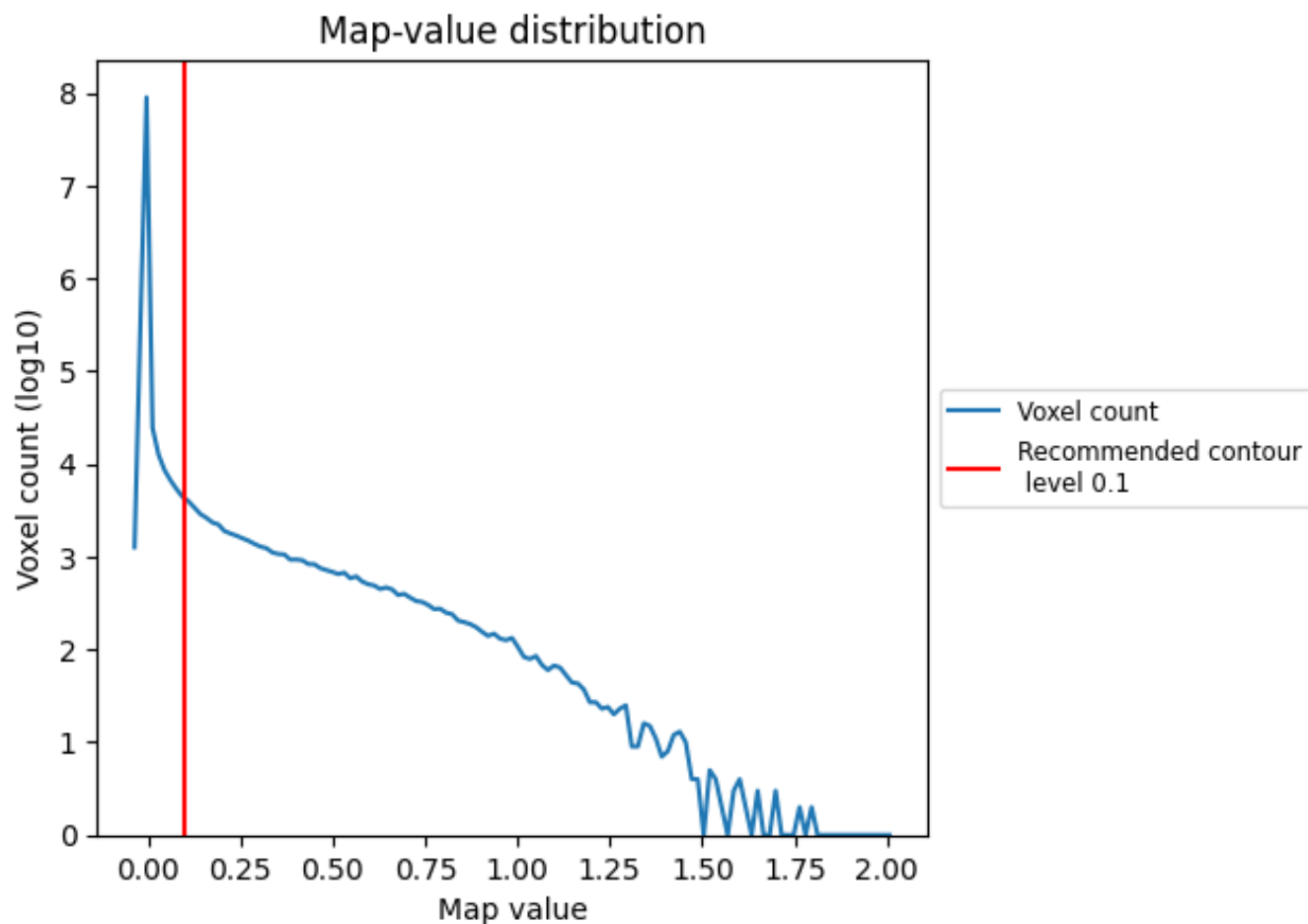
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

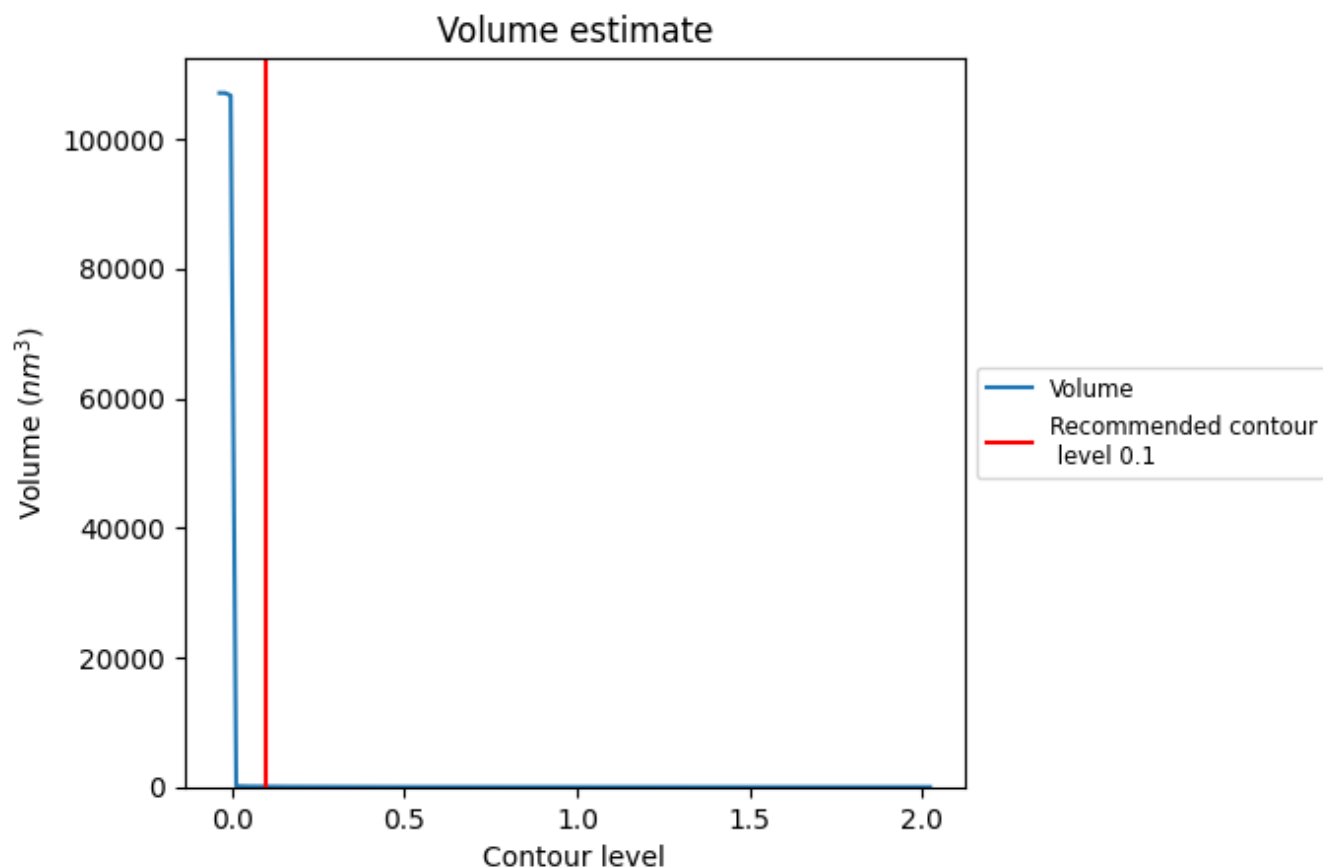
This section contains the results of statistical analysis of the map.

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.

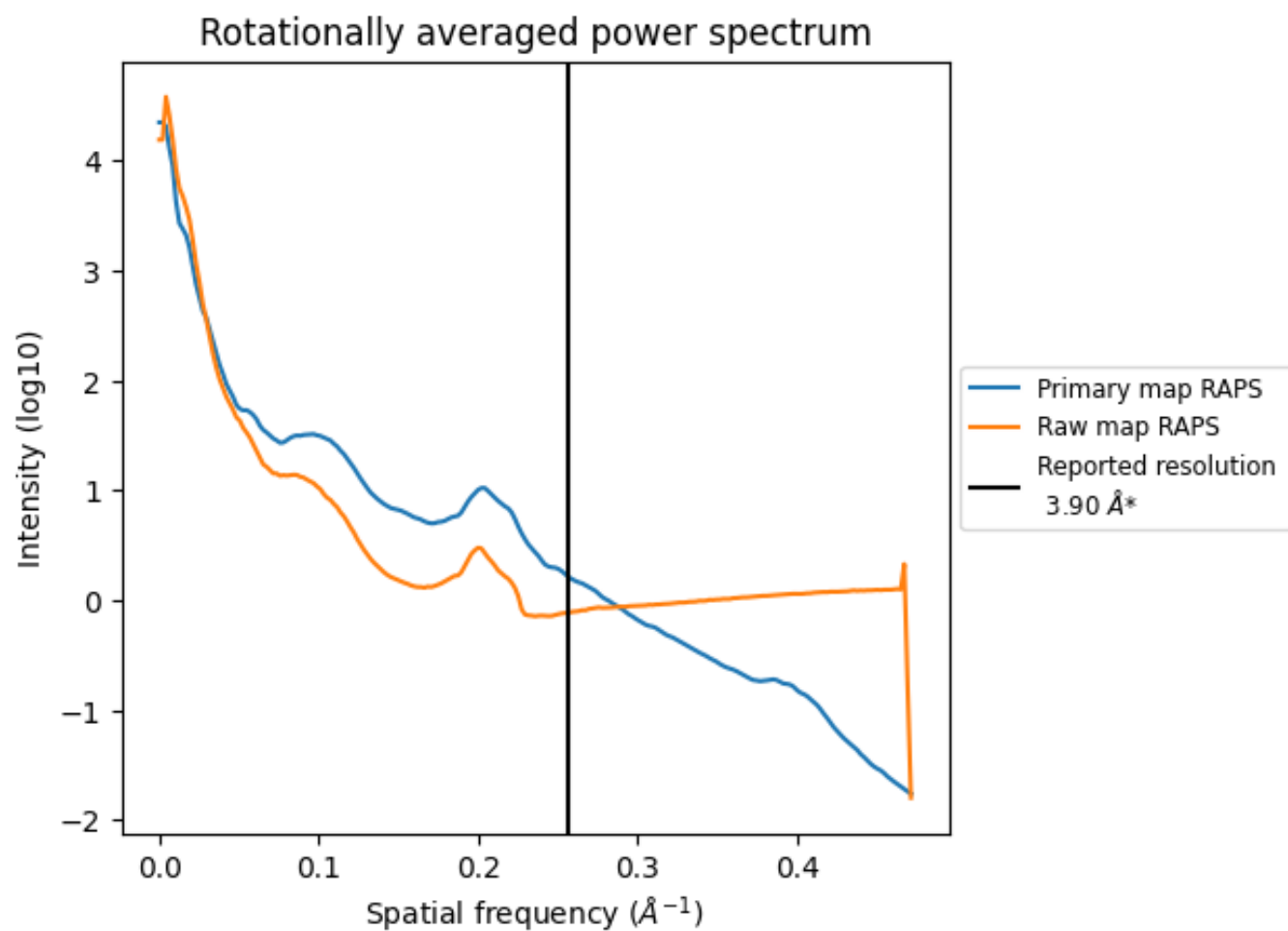
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 64 nm^3 ; this corresponds to an approximate mass of 57 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ

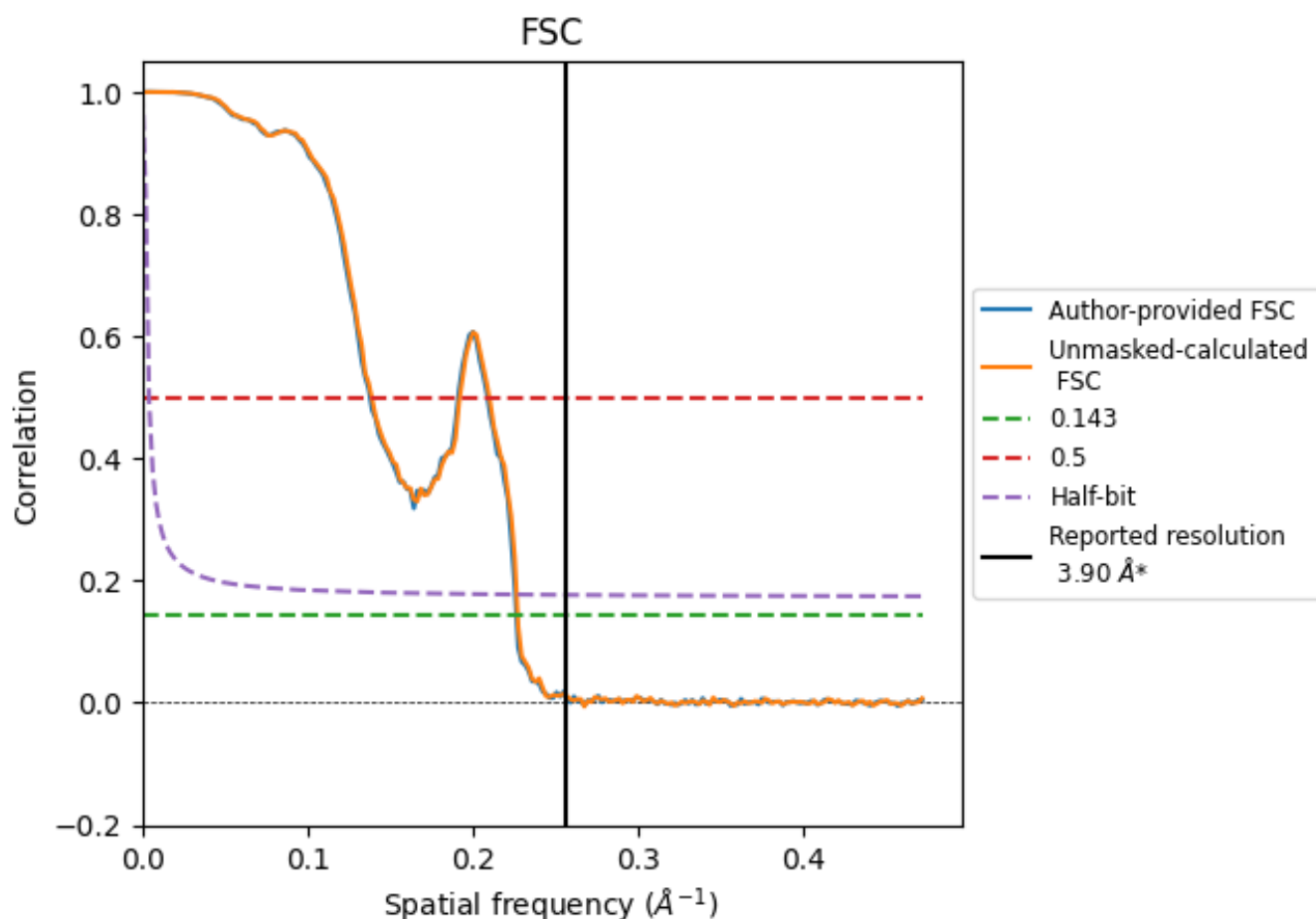


*Reported resolution corresponds to spatial frequency of 0.256 Å⁻¹

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 0.256 $\text{\AA}^{-1}$

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	4.42	7.26	4.43
Unmasked-calculated*	4.40	7.20	4.42

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from author-provided FSC intersecting FSC 0.143 CUT-OFF 4.42 differs from the reported value 3.9 by more than 10 %

The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.40 differs from the reported value 3.9 by more than 10 %

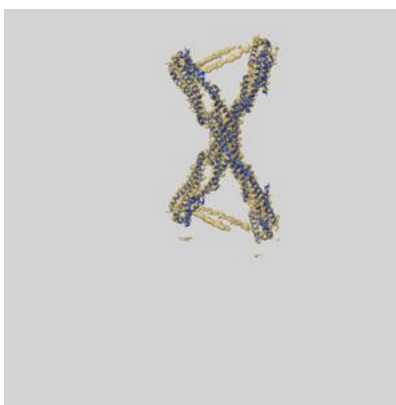
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-54277 and PDB model 9RUX. Per-residue inclusion information can be found in section [3](#) on page [11](#).

9.1 Map-model overlay [i](#)



X



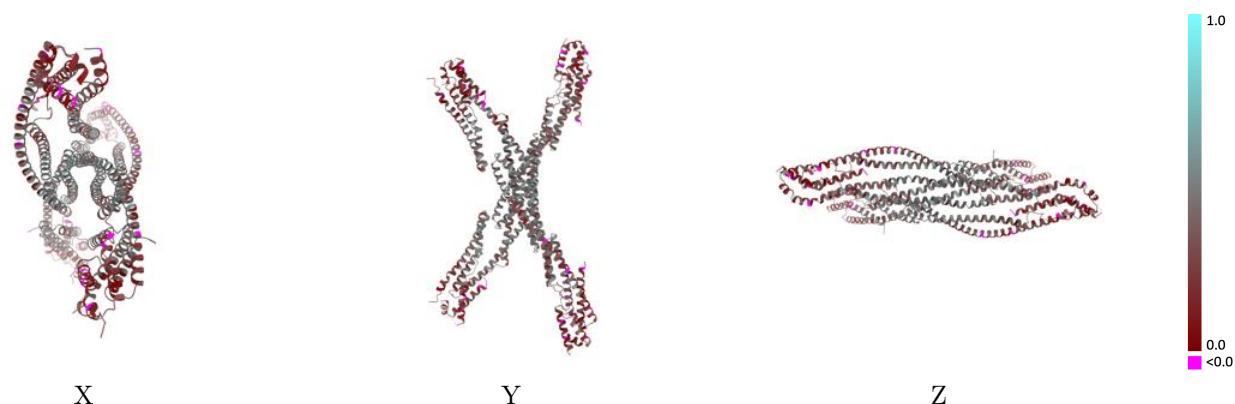
Y



Z

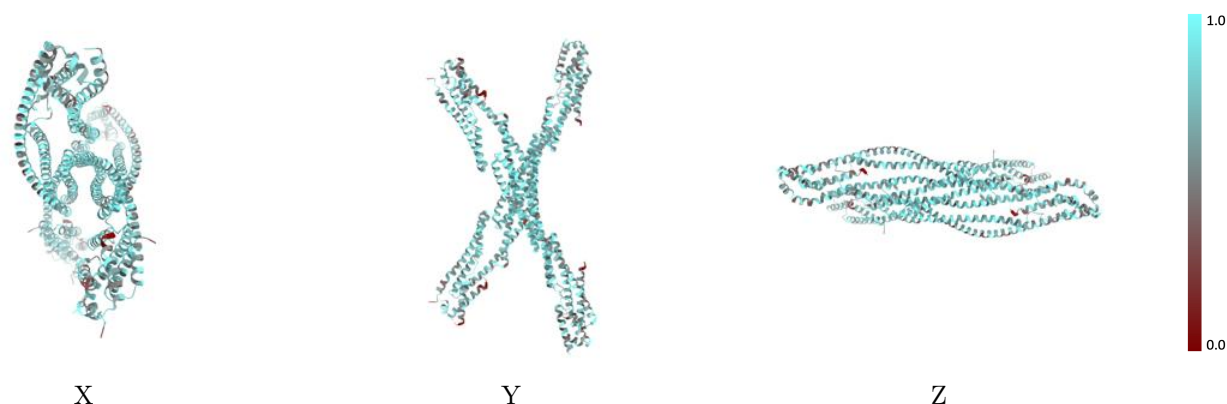
The images above show the 3D surface view of the map at the recommended contour level 0.1 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



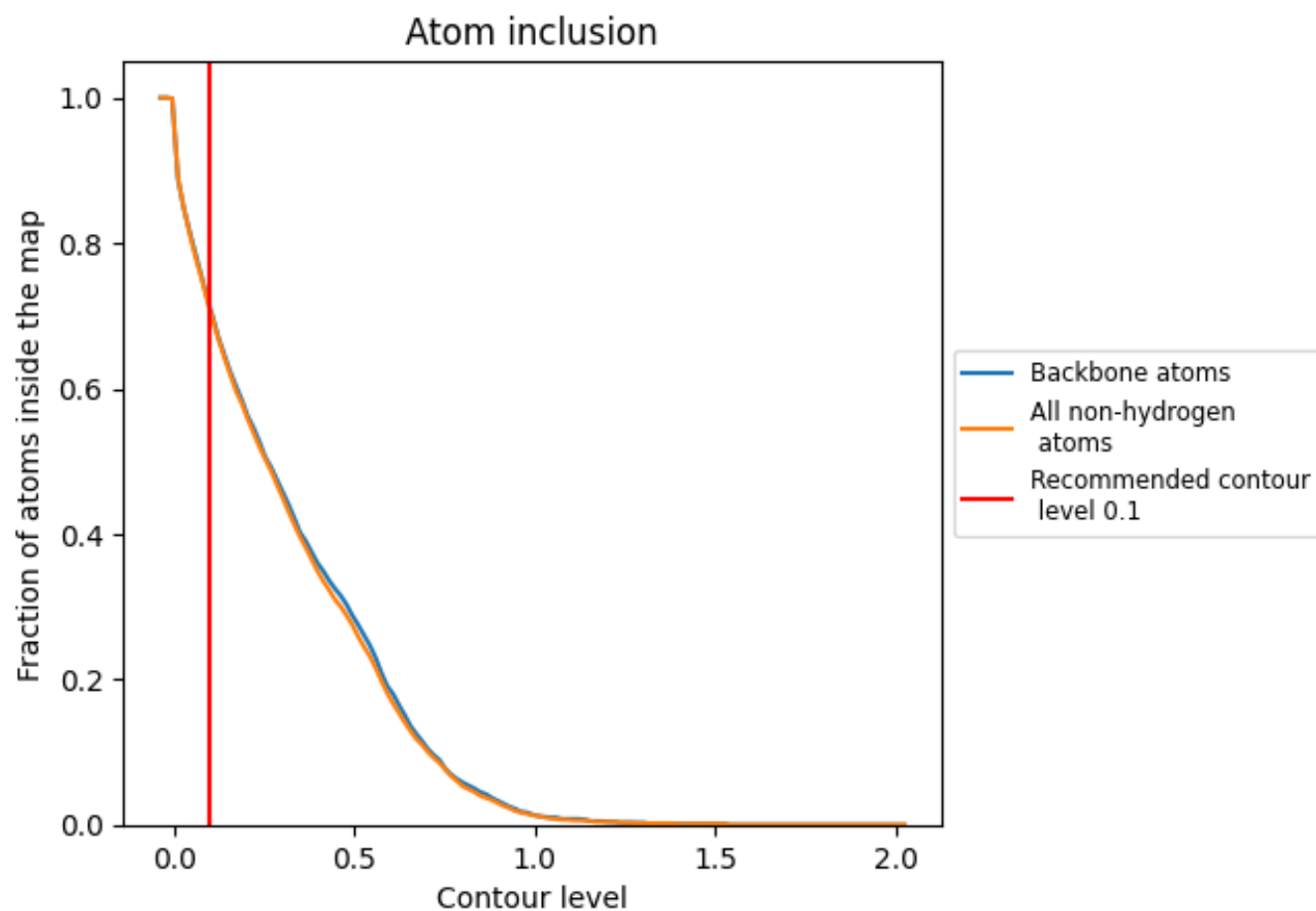
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.1).

9.4 Atom inclusion [i](#)



At the recommended contour level, 71% of all backbone atoms, 71% 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 (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7080	0.3420
A	0.7280	0.3570
B	0.7360	0.3630
C	0.7240	0.3300
D	0.7090	0.3210

