



wwPDB EM Validation Summary Report ⓘ

Mar 8, 2026 – 02:04 PM UTC

PDB ID : 7Q5B / pdb_00007q5b
EMDB ID : EMD-13831
Title : Cryo-EM structure of Ty3 retrotransposon targeting a TFIIB-bound tRNA gene
Authors : Abascal-Palacios, G.; Jochem, L.; Pla-Prats, C.; Beuron, F.; Vannini, A.
Deposited on : 2021-11-03
Resolution : 3.98 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 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

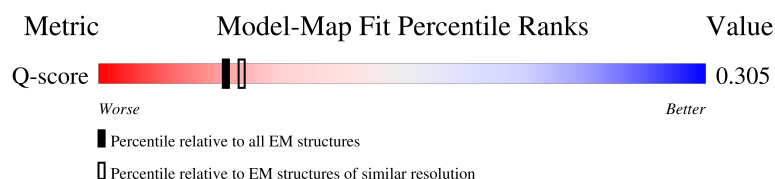
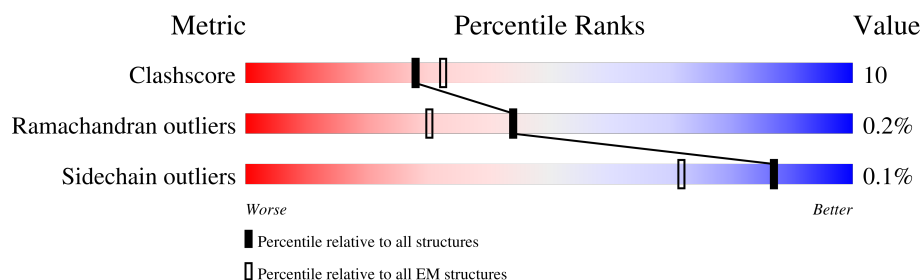
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.98 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.



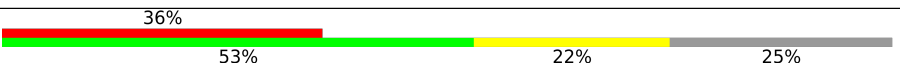
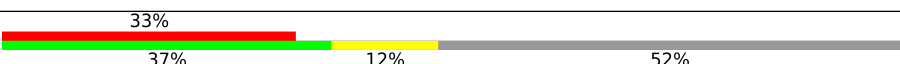
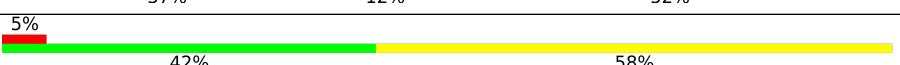
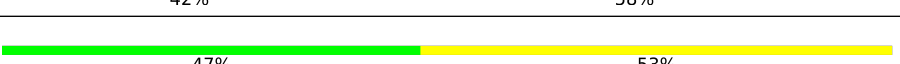
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	7512 (3.48 - 4.48)

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	R	56	7% 52% 48%
2	S	31	13% 71% 29%
3	r	34	24% 71% 29%
4	s	9	44% 44% 56%

Continued on next page...

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Mol	Chain	Length	Quality of chain
5	A	1547	
5	B	1547	
5	C	1547	
5	D	1547	
6	X	594	
7	Y	240	
8	Z	596	
9	t	19	
9	u	19	

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 21746 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 DNA chain called DNA (56-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
1	R	56	Total	C	N	O	P	0	0
			1140	551	187	346	56		

- Molecule 2 is a DNA chain called DNA (31-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
2	S	31	Total	C	N	O	P	0	0
			634	302	127	174	31		

- Molecule 3 is a DNA chain called DNA (34-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
3	r	34	Total	C	N	O	P	0	0
			705	337	143	191	34		

- Molecule 4 is a DNA chain called DNA (9-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
4	s	9	Total	C	N	O	P	0	0
			185	90	27	59	9		

- Molecule 5 is a protein called Transposon Ty3-G Gag-Pol polyprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	A	418	Total	C	N	O	S	0	0
			3438	2199	613	613	13		
5	B	482	Total	C	N	O	S	0	0
			3936	2506	703	711	16		
5	C	482	Total	C	N	O	S	0	0
			3912	2490	700	707	15		
5	D	334	Total	C	N	O	S	0	0
			2681	1705	465	499	12		

- Molecule 6 is a protein called Transcription factor TFIIIB component B”.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	X	70	Total	C	N	O	S	0	0
			591	386	98	103	4		

- Molecule 7 is a protein called TATA-box-binding protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	Y	180	Total	C	N	O	S	0	0
			1416	921	242	247	6		

- Molecule 8 is a protein called Transcription factor IIIB 70 kDa subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	Z	289	Total	C	N	O	S	0	0
			2328	1469	423	427	9		

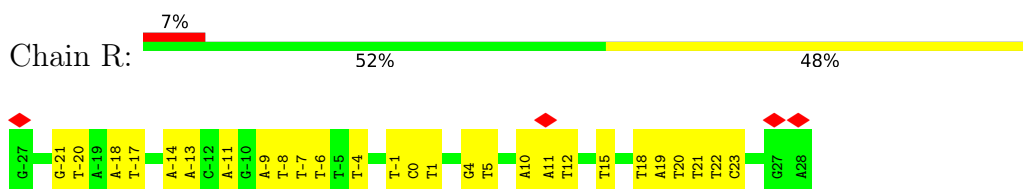
- Molecule 9 is a DNA chain called DNA (19-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
9	t	19	Total	C	N	O	P	0	0
			390	187	68	117	18		
9	u	19	Total	C	N	O	P	0	0
			390	187	68	117	18		

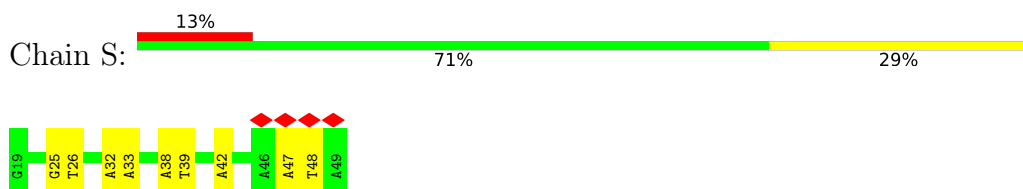
3 Residue-property plots [i](#)

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

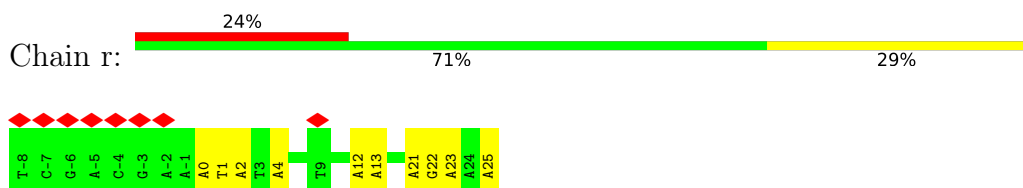
- Molecule 1: DNA (56-MER)



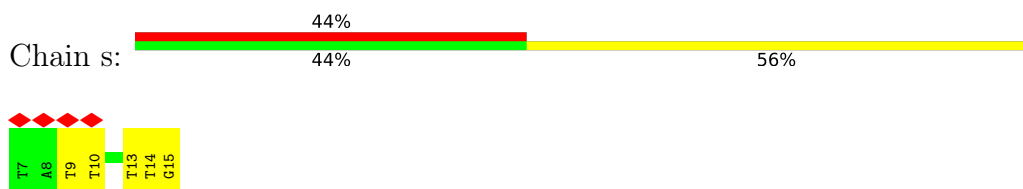
- Molecule 2: DNA (31-MER)



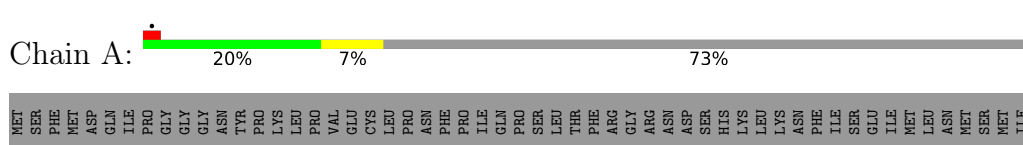
- Molecule 3: DNA (34-MER)



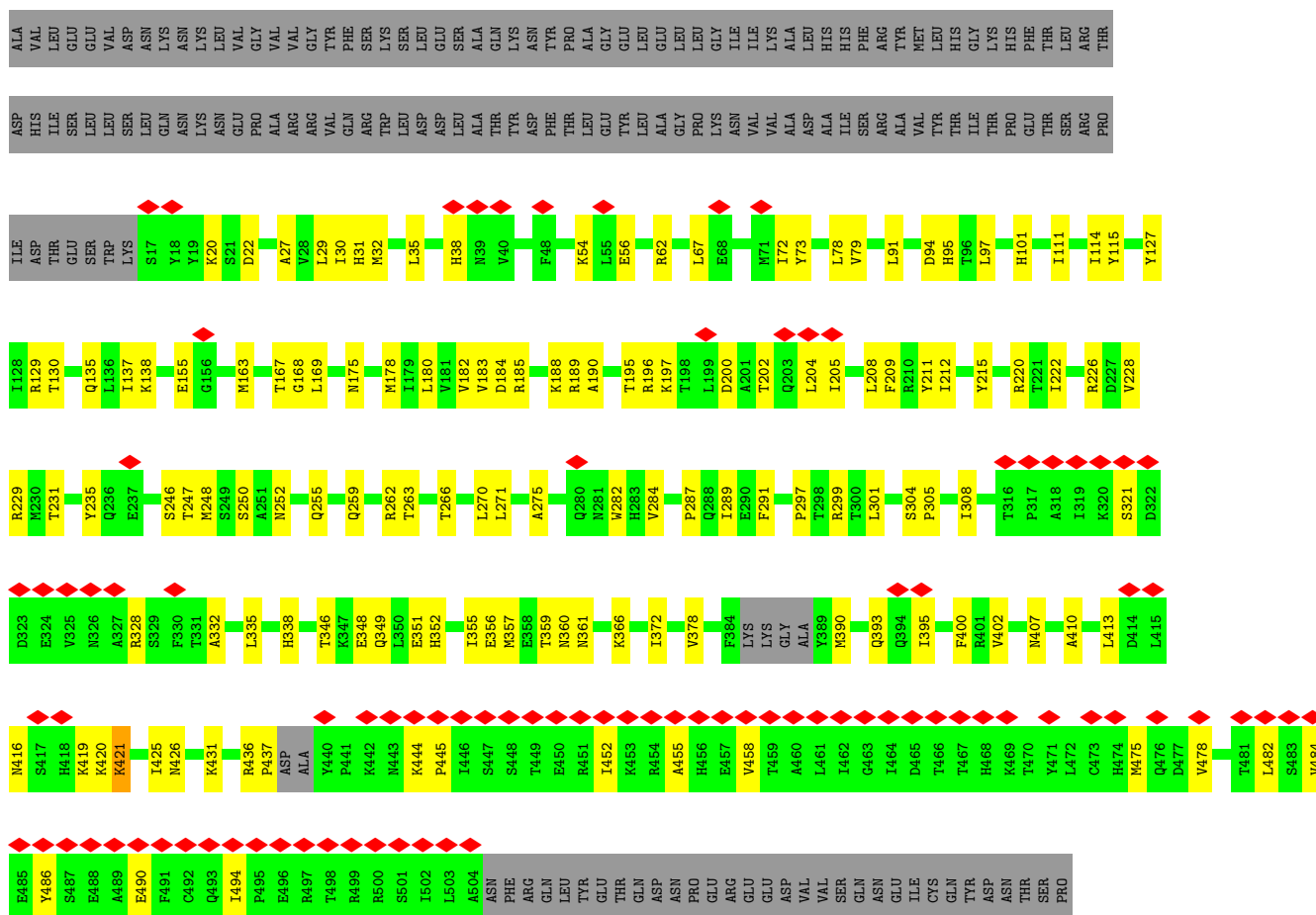
- Molecule 4: DNA (9-MER)



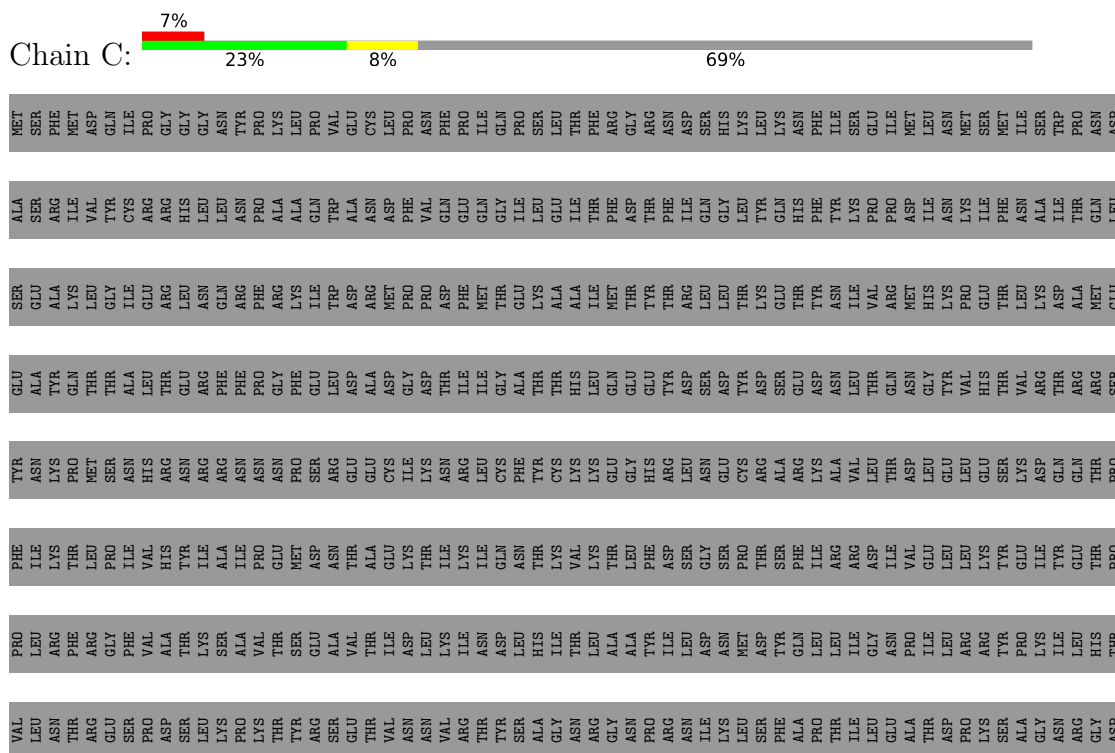
- Molecule 5: Transposon Ty3-G Gag-Pol polyprotein

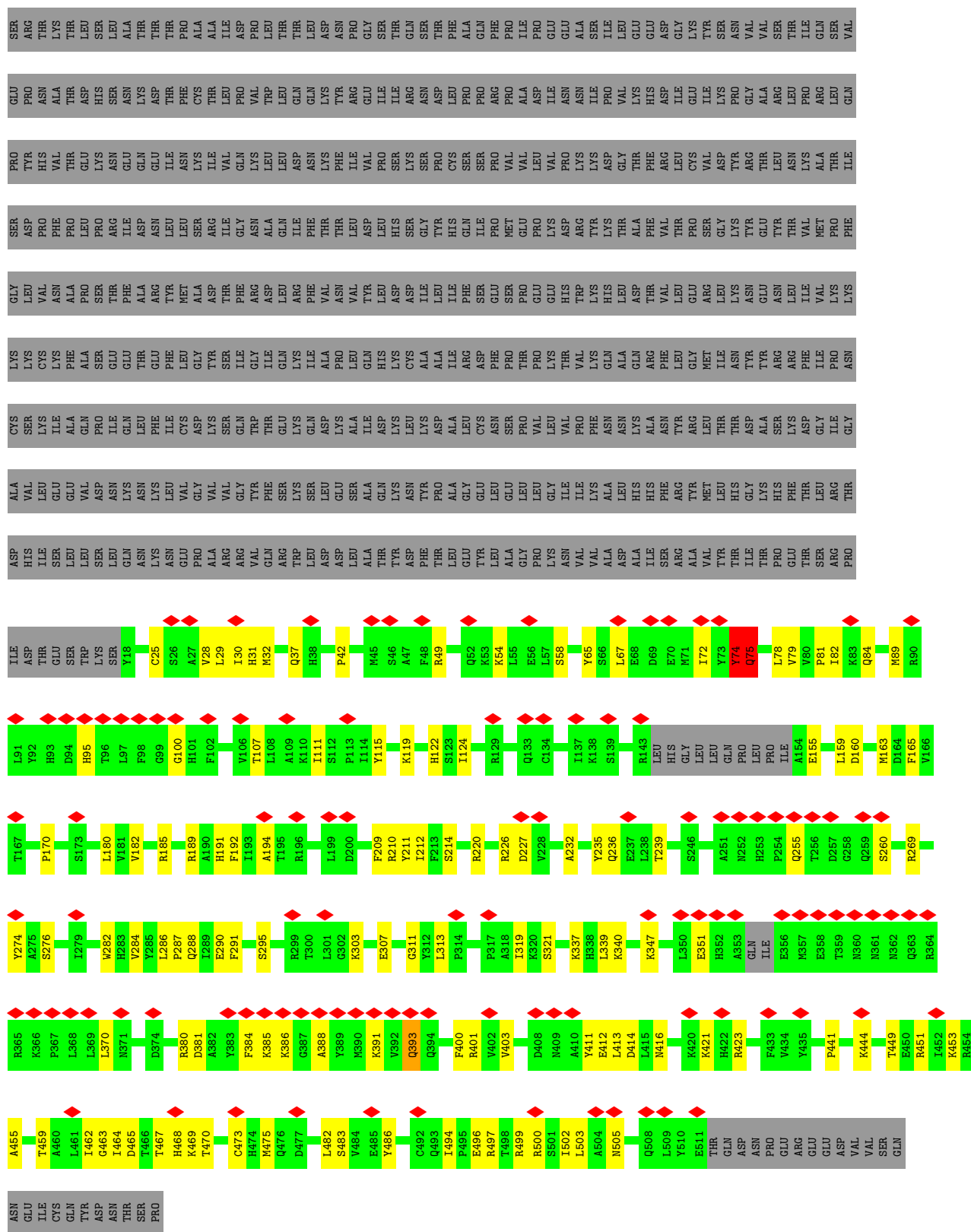






• Molecule 5: Transposon Ty3-G Gag-Pol polyprotein

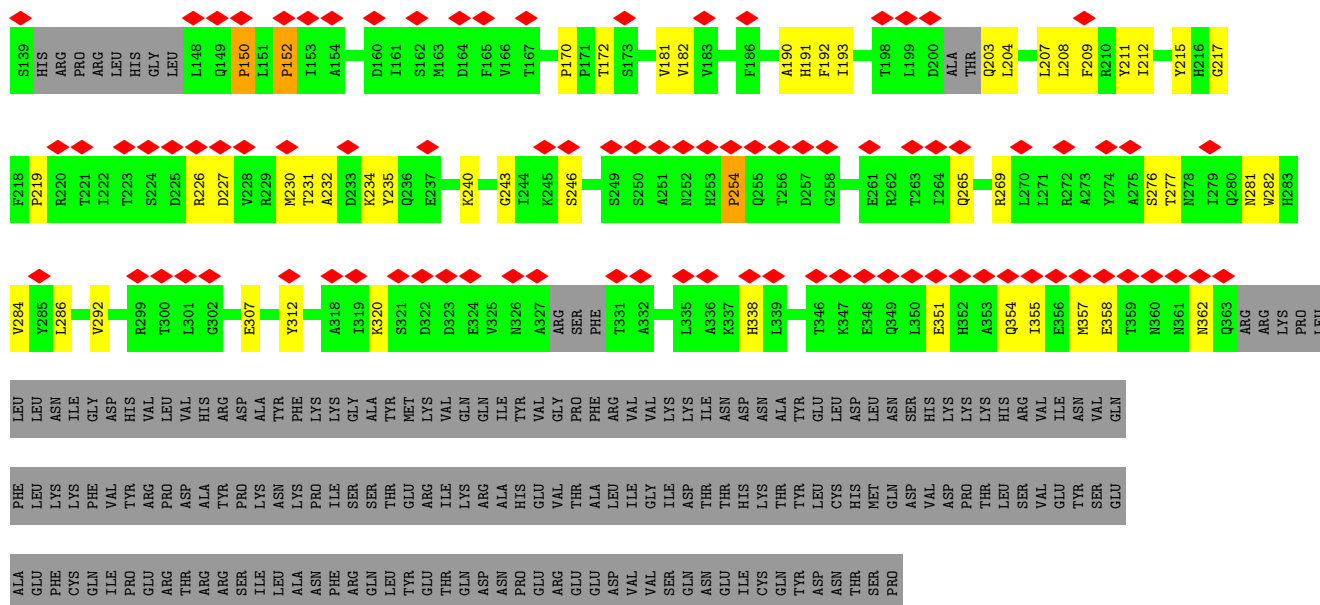




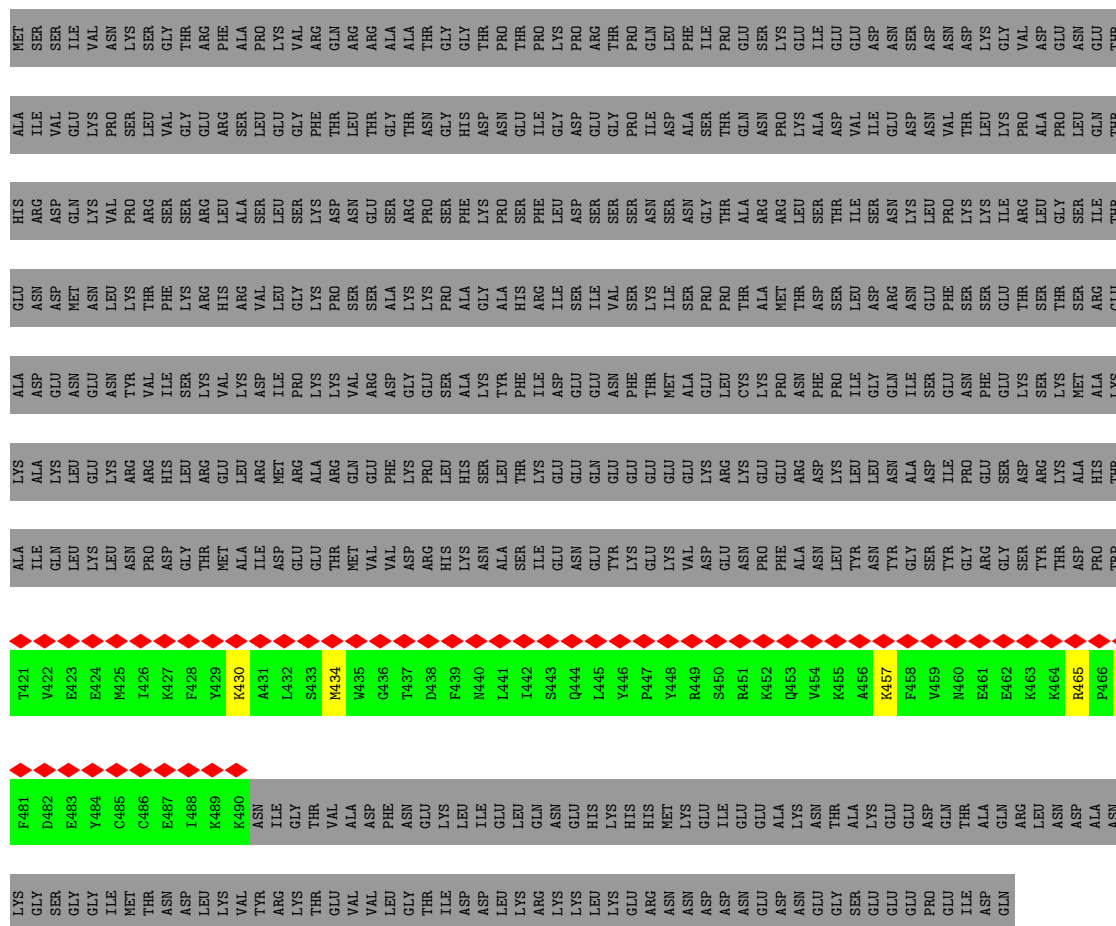
• Molecule 5: Transposon Ty3-G Gag-Pol polyprotein



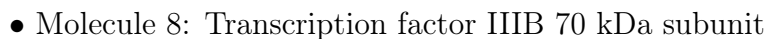




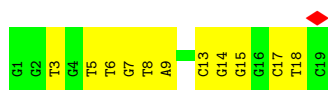
• Molecule 6: Transcription factor TFIIB component B"



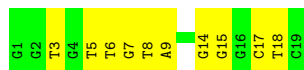
• Molecule 7: TATA-box-binding protein



● Molecule 9: DNA (19-MER)



● Molecule 9: DNA (19-MER)



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	101469	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS, FEI TITAN KRIOS	Depositor
Voltage (kV)	300, 300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50, 70	Depositor
Minimum defocus (nm)	1700, 2400	Depositor
Maximum defocus (nm)	3200, 4000	Depositor
Magnification	130000, 81000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k), GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.102	Depositor
Minimum map value	-0.044	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.02	Depositor
Map size (Å)	322.24, 322.24, 322.24	wwPDB
Map dimensions	304, 304, 304	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor

5 Model quality

5.1 Standard geometry

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	R	0.26	0/1273	0.54	0/1962
2	S	0.29	0/714	0.55	0/1097
3	r	0.24	0/796	0.45	0/1226
4	s	0.26	0/205	0.54	0/315
5	A	0.21	0/3518	0.57	1/4760 (0.0%)
5	B	0.20	0/4024	0.54	2/5448 (0.0%)
5	C	0.25	0/3999	0.65	6/5414 (0.1%)
5	D	0.20	0/2736	0.59	3/3707 (0.1%)
6	X	0.13	0/604	0.36	0/809
7	Y	0.15	0/1443	0.42	0/1942
8	Z	0.16	0/2367	0.46	0/3188
9	t	0.24	0/436	0.43	0/673
9	u	0.24	0/436	0.44	0/673
All	All	0.21	0/22551	0.55	12/31214 (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
5	A	0	1
5	B	0	1
5	D	0	1
All	All	0	3

There are no bond length outliers.

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	75	GLN	CA-C-N	-11.53	104.00	122.79
5	C	75	GLN	C-N-CA	-11.53	104.00	122.79

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	74	TYR	CA-C-N	8.52	137.82	121.54
5	C	74	TYR	C-N-CA	8.52	137.82	121.54
5	D	150	PRO	N-CA-CB	7.94	111.59	103.25

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
5	A	231	THR	Peptide
5	B	421	LYS	Peptide
5	D	292	VAL	Peptide

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	R	1140	0	642	21	0
2	S	634	0	346	6	0
3	r	705	0	382	9	0
4	s	185	0	106	4	0
5	A	3438	0	3471	74	0
5	B	3936	0	3951	92	0
5	C	3912	0	3909	102	0
5	D	2681	0	2631	49	0
6	X	591	0	614	5	0
7	Y	1416	0	1493	39	0
8	Z	2328	0	2375	51	0
9	t	390	0	218	9	0
9	u	390	0	218	9	0
All	All	21746	0	20356	403	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 10.

The worst 5 of 403 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)
5:C:72:ILE:HA	5:C:74:TYR:CZ	1.81	1.14
5:C:72:ILE:HG22	5:C:74:TYR:OH	1.51	1.11
5:D:282:TRP:O	5:D:286:LEU:HB2	1.65	0.95
5:C:72:ILE:HA	5:C:74:TYR:CE2	2.12	0.84
5:C:74:TYR:CE2	5:C:79:VAL:CG2	2.62	0.82

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	A	414/1547 (27%)	349 (84%)	65 (16%)	0	100	100
5	B	476/1547 (31%)	414 (87%)	62 (13%)	0	100	100
5	C	476/1547 (31%)	391 (82%)	83 (17%)	2 (0%)	30	65
5	D	326/1547 (21%)	278 (85%)	45 (14%)	3 (1%)	14	48
6	X	68/594 (11%)	62 (91%)	6 (9%)	0	100	100
7	Y	178/240 (74%)	168 (94%)	10 (6%)	0	100	100
8	Z	285/596 (48%)	262 (92%)	23 (8%)	0	100	100
All	All	2223/7618 (29%)	1924 (86%)	294 (13%)	5 (0%)	44	75

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
5	C	74	TYR
5	C	75	GLN
5	D	150	PRO
5	D	152	PRO
5	D	254	PRO

5.3.2 Protein sidechains

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	
5	A	381/1408 (27%)	381 (100%)	0	100	100
5	B	437/1408 (31%)	437 (100%)	0	100	100
5	C	429/1408 (30%)	427 (100%)	2 (0%)	81	82
5	D	292/1408 (21%)	292 (100%)	0	100	100
6	X	66/534 (12%)	66 (100%)	0	100	100
7	Y	152/205 (74%)	152 (100%)	0	100	100
8	Z	253/513 (49%)	253 (100%)	0	100	100
All	All	2010/6884 (29%)	2008 (100%)	2 (0%)	87	89

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	C	74	TYR
5	C	75	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 23 such sidechains are listed below:

Mol	Chain	Res	Type
5	D	280	GLN
6	X	444	GLN
5	D	361	ASN
6	X	453	GLN
5	B	252	ASN

5.3.3 RNA

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.

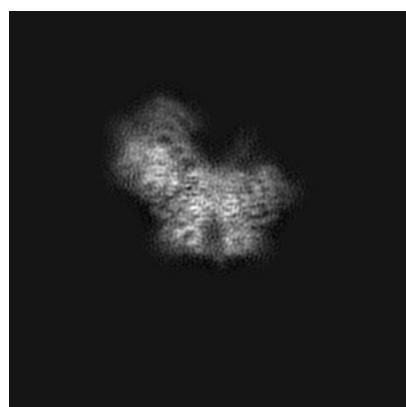
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-13831. These allow visual inspection of the internal detail of the map and identification of artifacts.

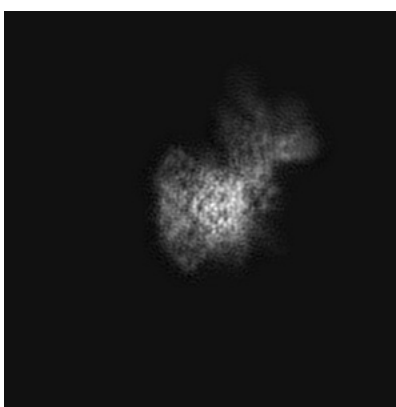
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

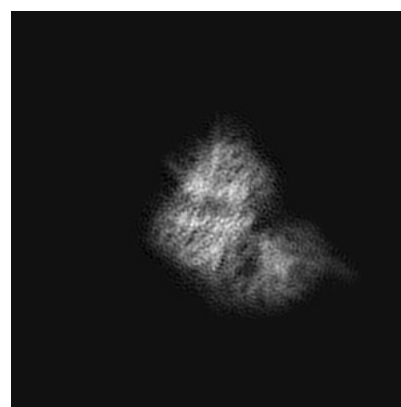
6.1.1 Primary map



X



Y

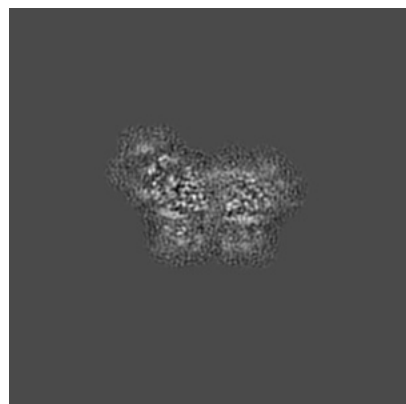


Z

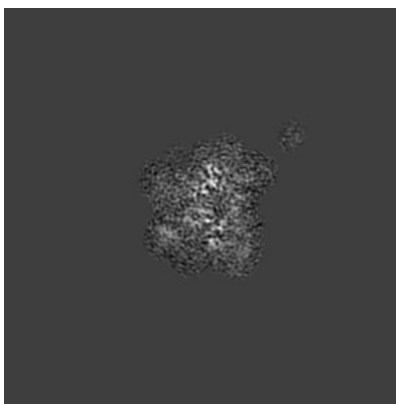
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

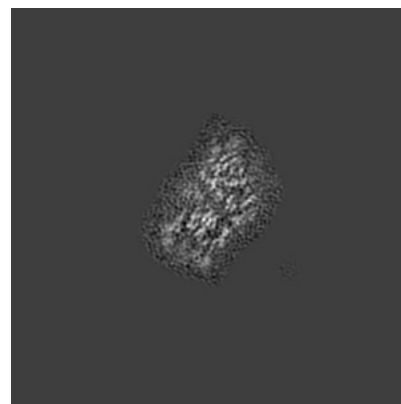
6.2.1 Primary map



X Index: 152



Y Index: 152



Z Index: 152

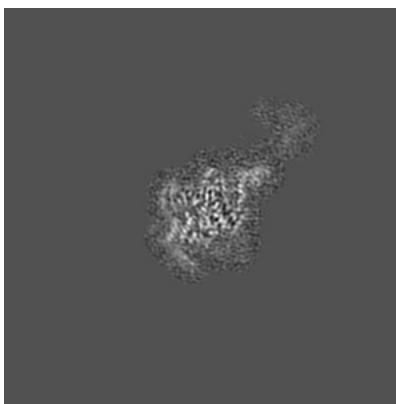
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

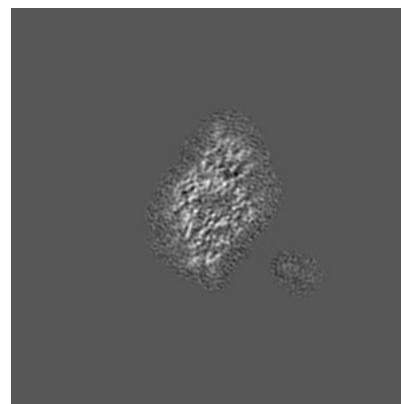
6.3.1 Primary map



X Index: 156



Y Index: 141

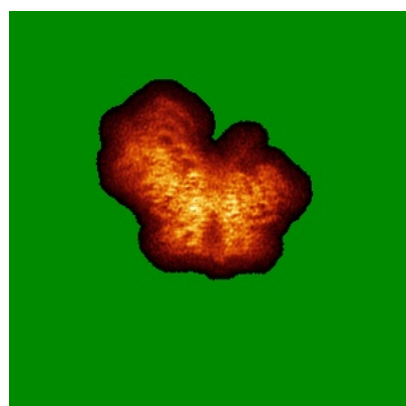


Z Index: 159

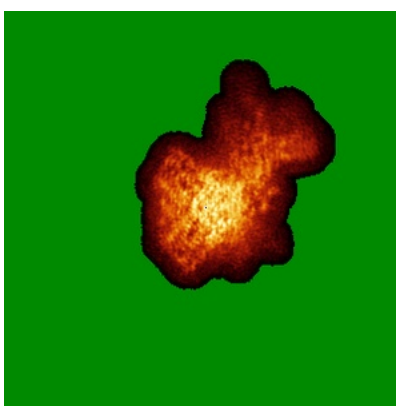
The images above show the largest variance slices of the map in three orthogonal directions.

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

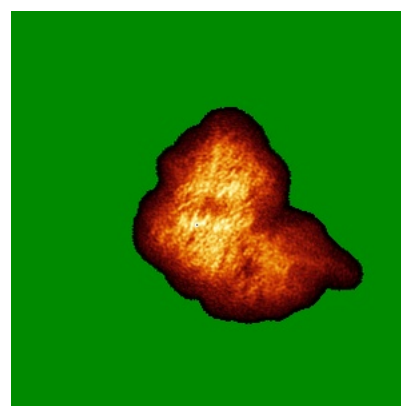
6.4.1 Primary map



X



Y



Z

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 0.02. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

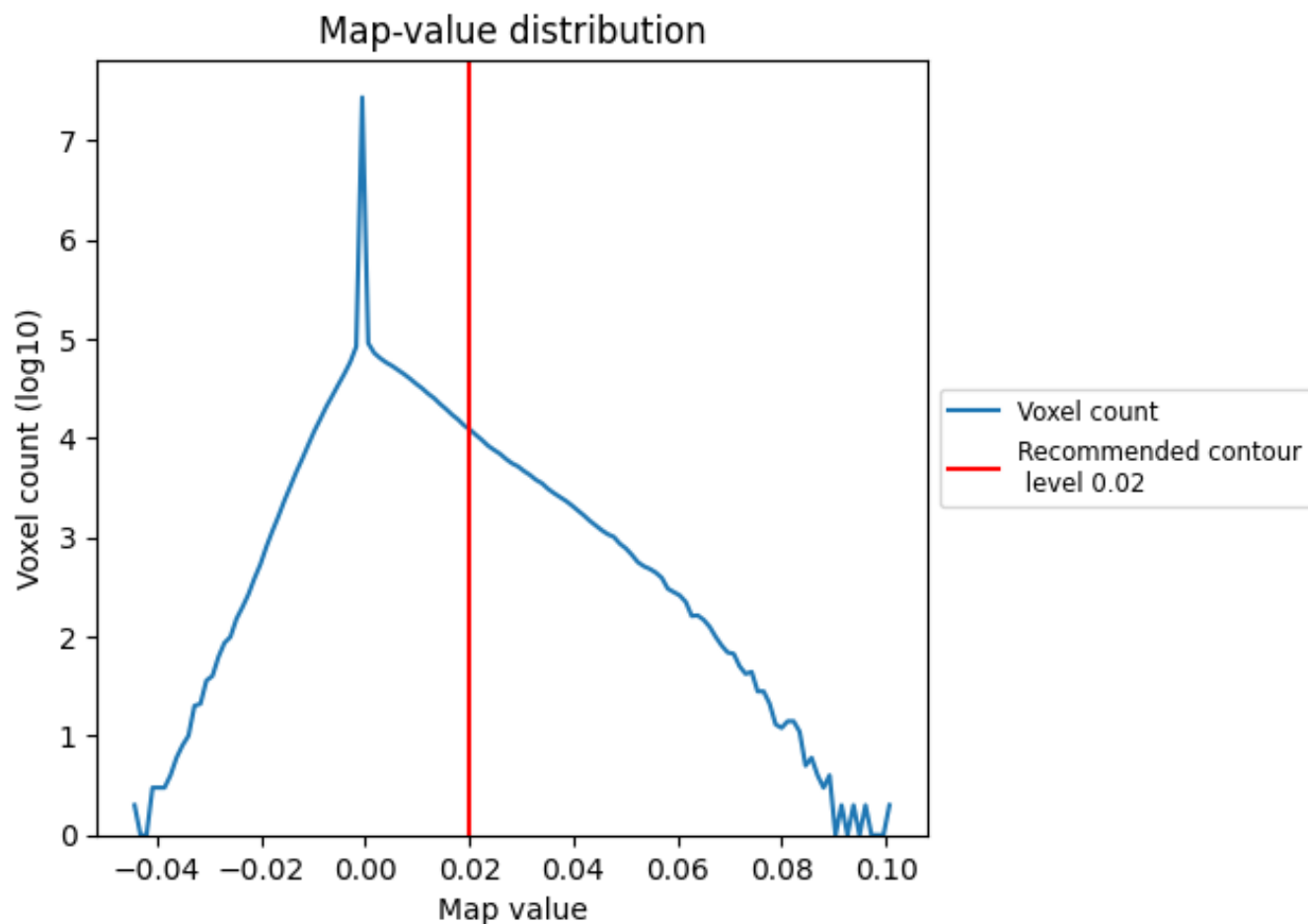
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

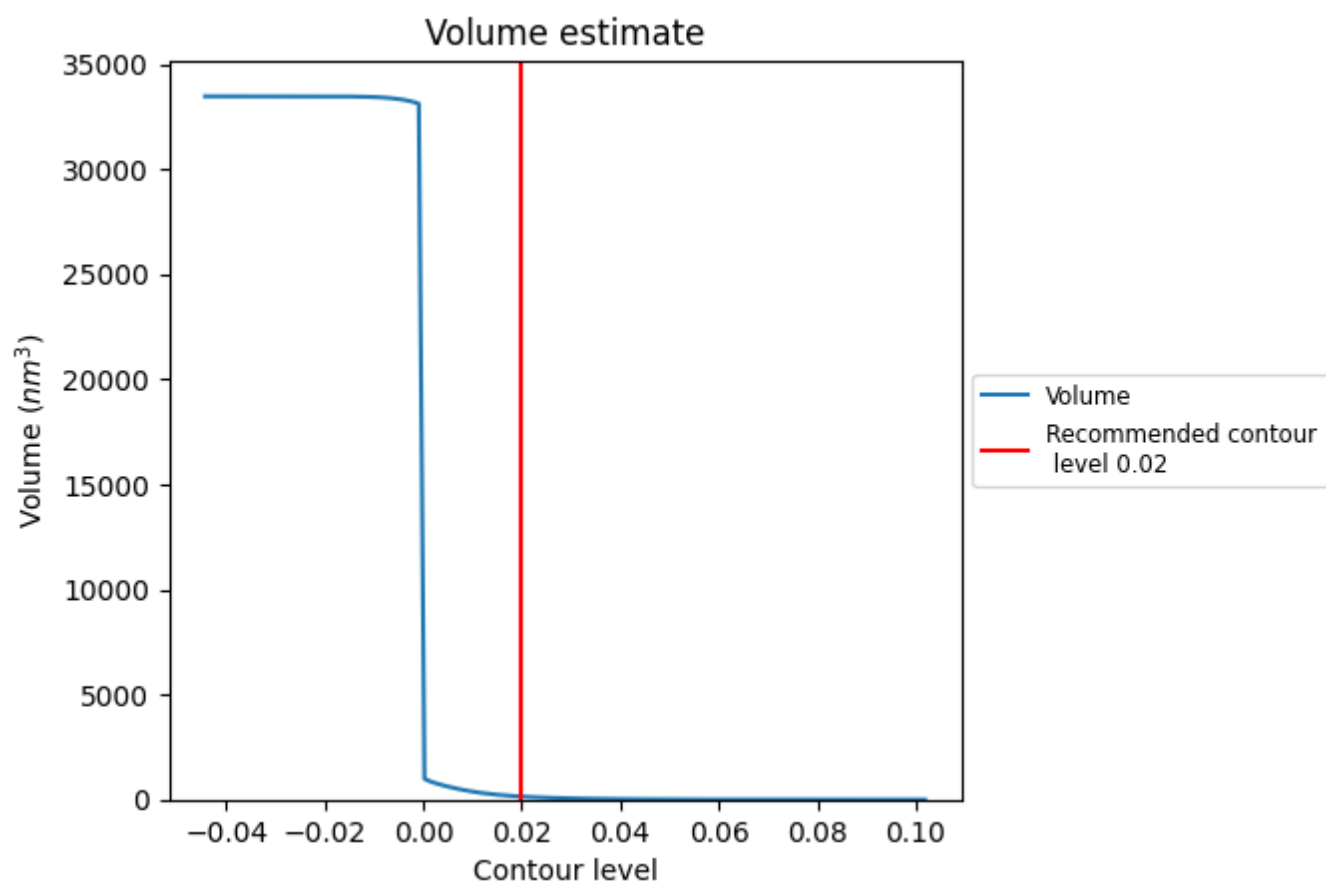
This section contains the results of statistical analysis of the map.

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.

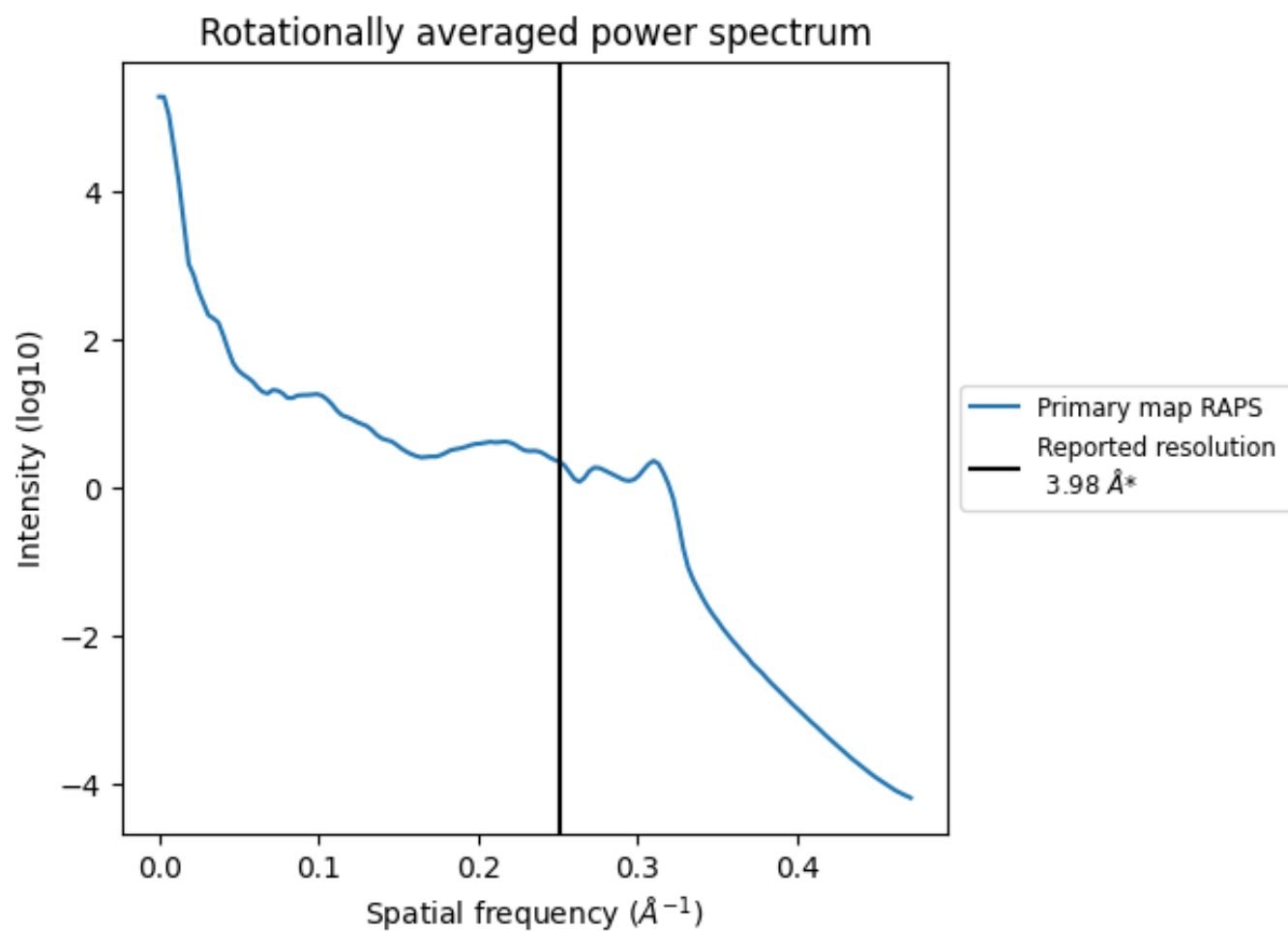
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 142 nm^3 ; this corresponds to an approximate mass of 128 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 ⓘ

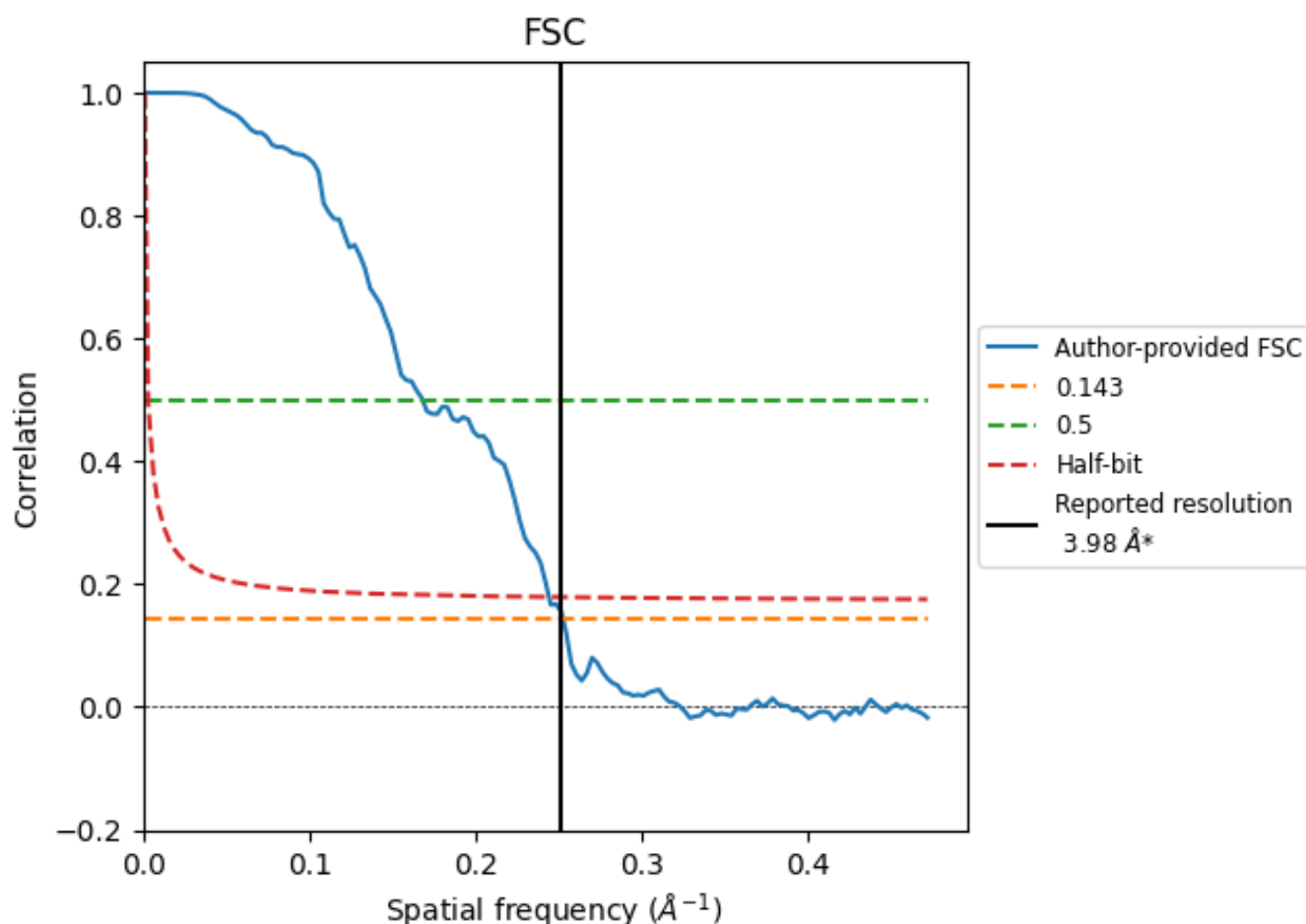


*Reported resolution corresponds to spatial frequency of 0.251 Å⁻¹

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 0.251 Å⁻¹

8.2 Resolution estimates [i](#)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.98	-	-
Author-provided FSC curve	3.96	5.95	4.10
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

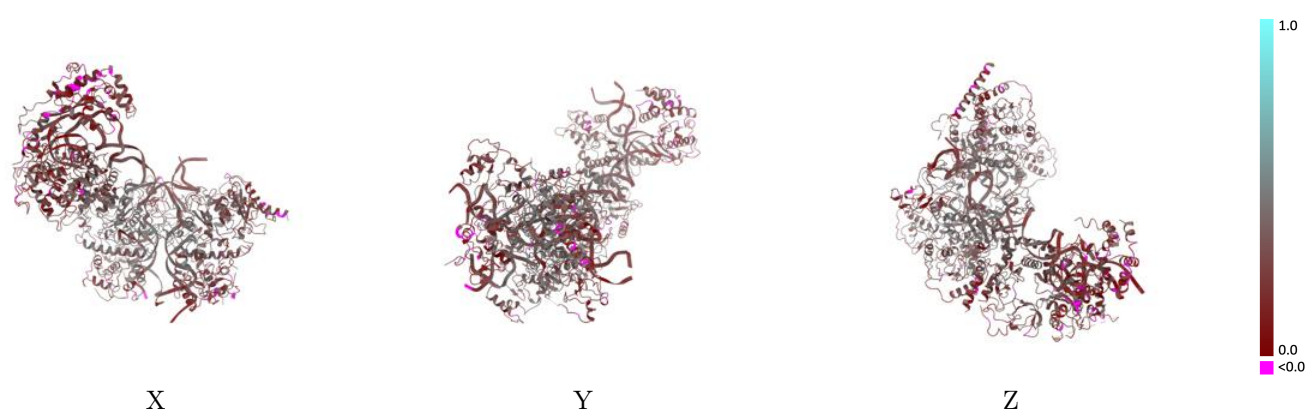
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-13831 and PDB model 7Q5B. Per-residue inclusion information can be found in section 3 on page 6.

9.1 Map-model overlay [i](#)

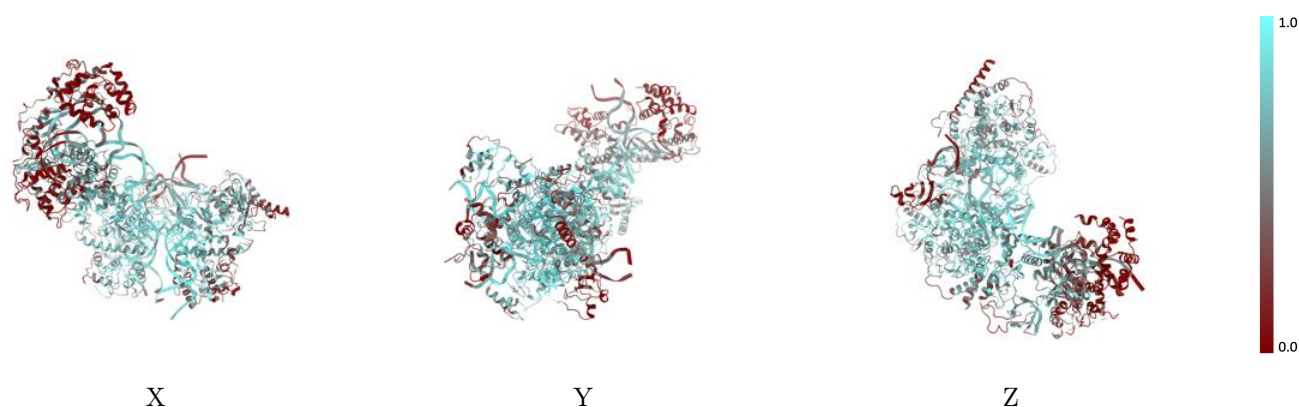
This section was not generated.

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



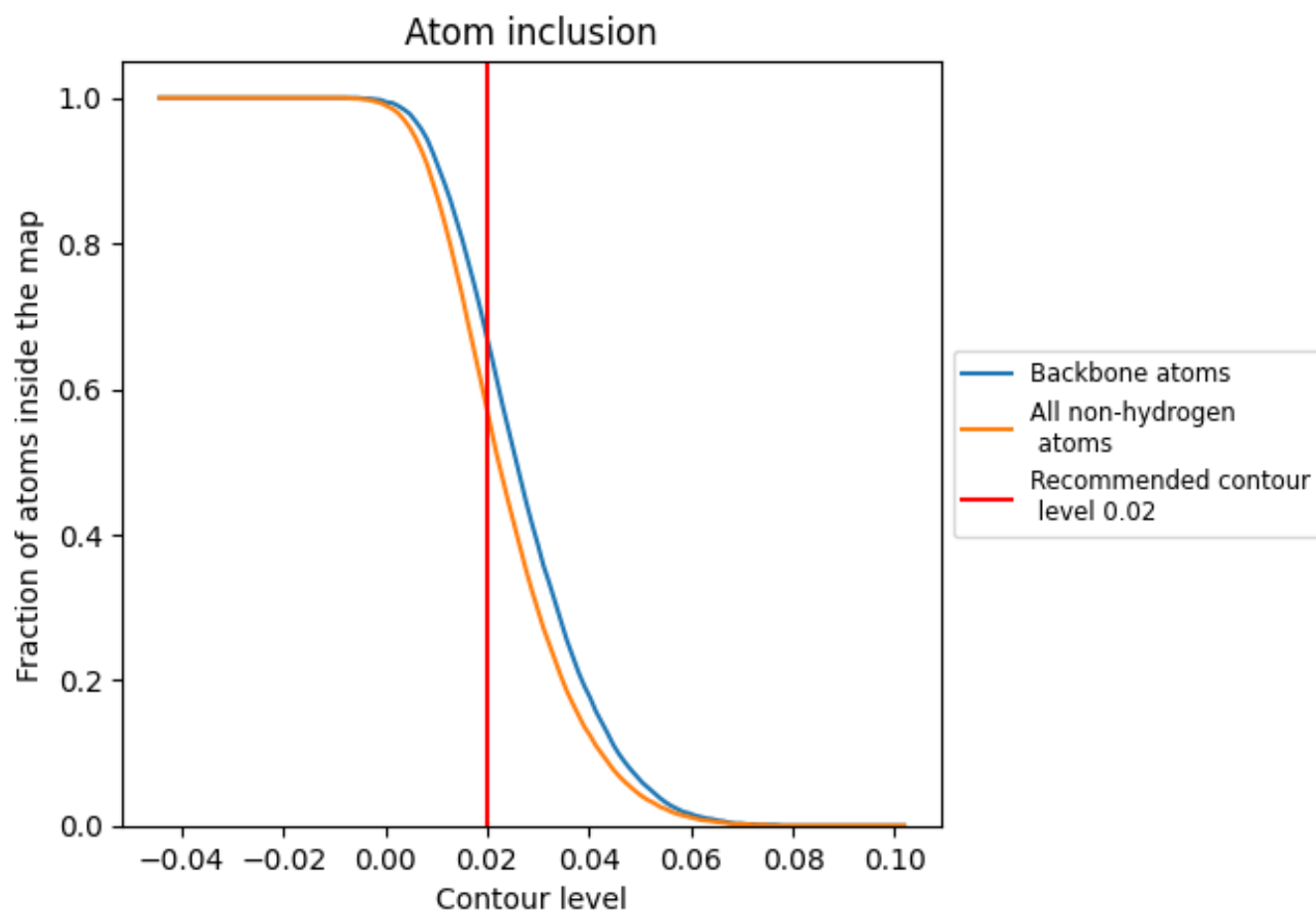
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.02).

9.4 Atom inclusion [i](#)



At the recommended contour level, 67% of all backbone atoms, 57% 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 (0.02) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5710	0.3050
A	0.7570	0.3710
B	0.6620	0.3390
C	0.5980	0.3060
D	0.4290	0.2560
R	0.7250	0.3040
S	0.6890	0.3170
X	0.0240	0.1720
Y	0.4350	0.2480
Z	0.2820	0.2730
r	0.6030	0.2850
s	0.3730	0.2740
t	0.8100	0.3070
u	0.8740	0.3400

1.0

0.0

<0.0