



Full wwPDB EM Validation Report ⓘ

Mar 5, 2026 – 12:41 PM UTC

PDB ID : 7SBA / pdb_00007sba
EMDB ID : EMD-24974
Title : Structure of type I-D Cascade bound to a dsDNA target
Authors : Schwartz, E.A.; Taylor, D.W.
Deposited on : 2021-09-24
Resolution : 2.90 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

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:

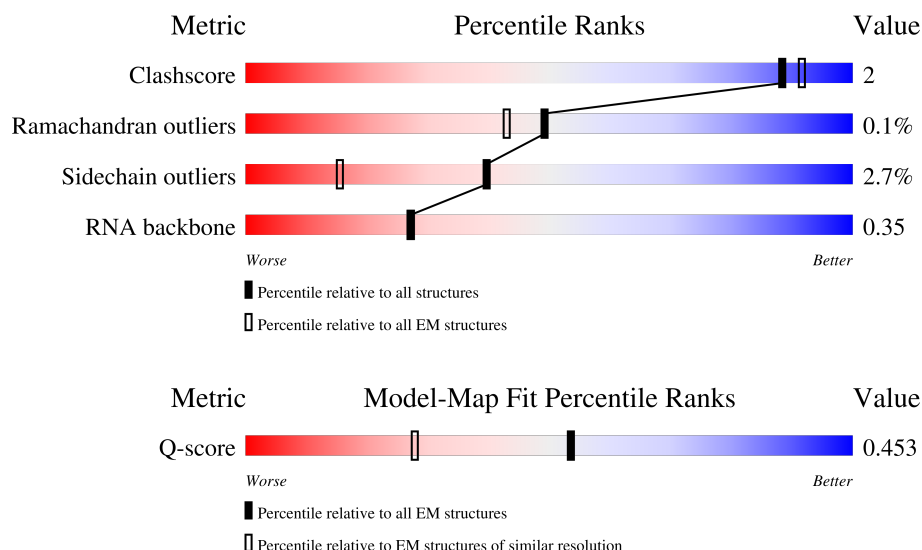
EMDB validation analysis : 0.0.1.dev132
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & 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 2.90 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	-
RNA backbone	8273	3508	-
Q-score	-	25397	13054 (2.40 - 3.40)

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	329	
1	B	329	
1	C	329	

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Mol	Chain	Length	Quality of chain
1	D	329	91% 5% . .
1	E	329	6% 89% 7% . .
1	F	329	7% 89% 7% . .
1	G	329	20% 88% 9% .
2	H	254	83% 10% 6%
3	I	975	5% 85% 6% . 8%
4	J	146	34% 90% 9% .
4	K	146	77% 94% 6%
5	X	16	12% 44% 50% 6%
6	Y	13	46% 69% 23% 8%
7	Z	43	51% 33% 14% .

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 30651 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 Cas7d.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	320	Total	C	N	O	S	0	0
			2503	1572	429	490	12		
1	B	320	Total	C	N	O	S	0	0
			2503	1572	429	490	12		
1	C	320	Total	C	N	O	S	0	0
			2503	1572	429	490	12		
1	D	320	Total	C	N	O	S	0	0
			2503	1572	429	490	12		
1	E	320	Total	C	N	O	S	0	0
			2503	1572	429	490	12		
1	F	320	Total	C	N	O	S	0	0
			2503	1572	429	490	12		
1	G	320	Total	C	N	O	S	0	0
			2503	1572	429	490	12		

- Molecule 2 is a protein called Cas5d.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	H	238	Total	C	N	O	S	0	0
			1929	1249	328	347	5		

- Molecule 3 is a protein called Cas10d.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	I	899	Total	C	N	O	S	0	0
			7323	4709	1240	1356	18		

- Molecule 4 is a protein called Cas11d.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	J	146	Total	C	N	O	S	0	0
			1194	751	209	229	5		

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Mol	Chain	Residues	Atoms					AltConf	Trace
4	K	146	Total	C	N	O	S	0	0
			1194	751	209	229	5		

- Molecule 5 is a DNA chain called DNA target strand.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	X	16	Total	C	N	O	P	0	0
			325	156	66	88	15		

- Molecule 6 is a DNA chain called DNA non-target strand.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	Y	13	Total	C	N	O	P	0	0
			261	128	40	81	12		

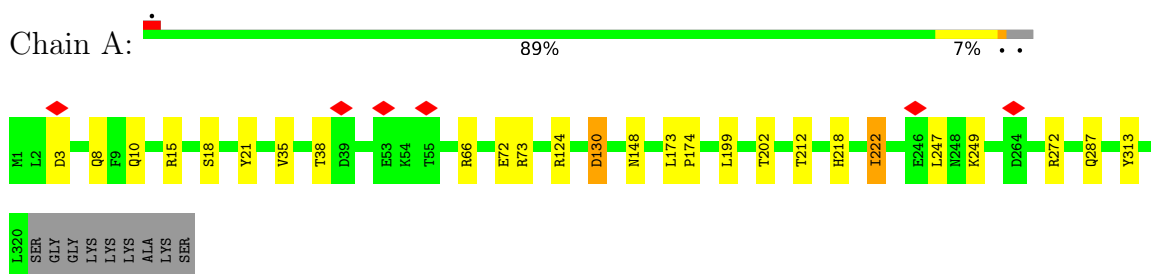
- Molecule 7 is a RNA chain called crRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	Z	43	Total	C	N	O	P	0	0
			904	405	152	305	42		

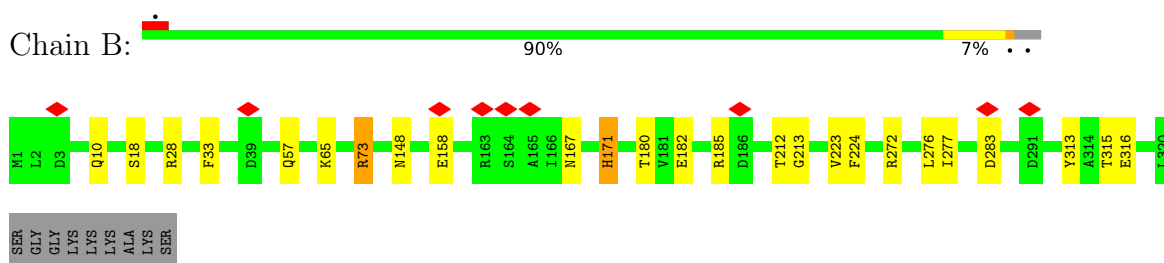
3 Residue-property plots [i](#)

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.

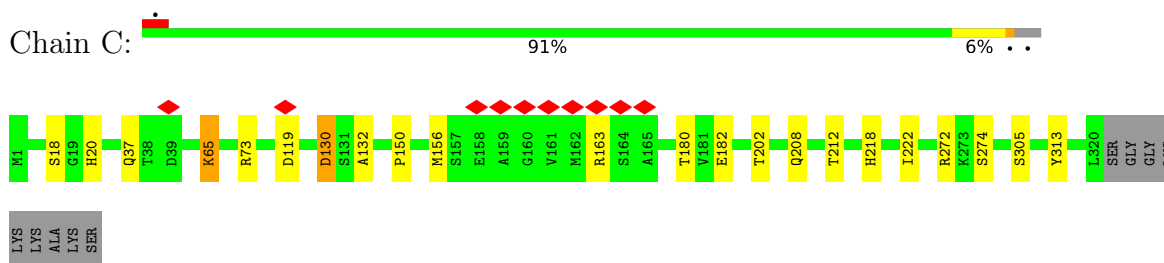
• Molecule 1: Cas7d



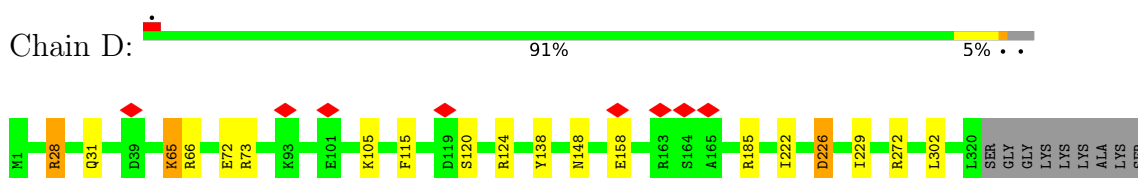
• Molecule 1: Cas7d



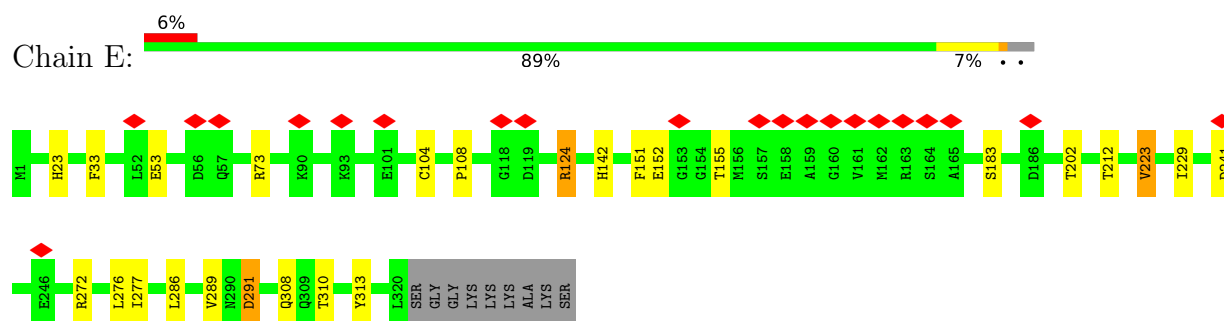
• Molecule 1: Cas7d



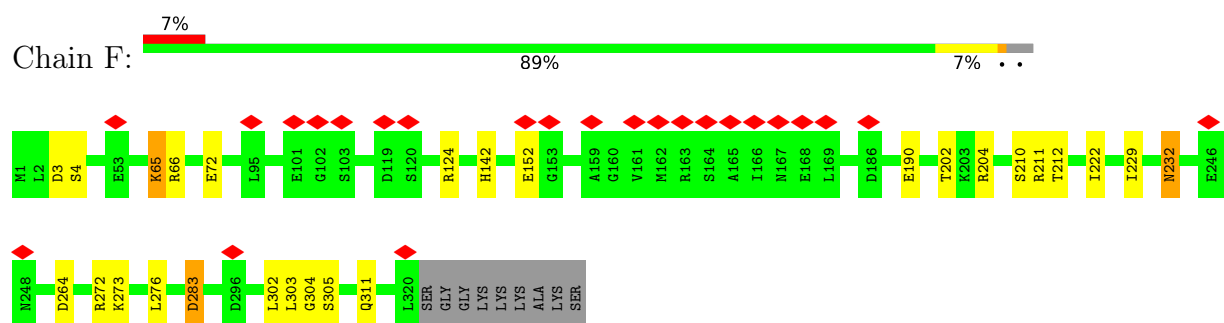
• Molecule 1: Cas7d



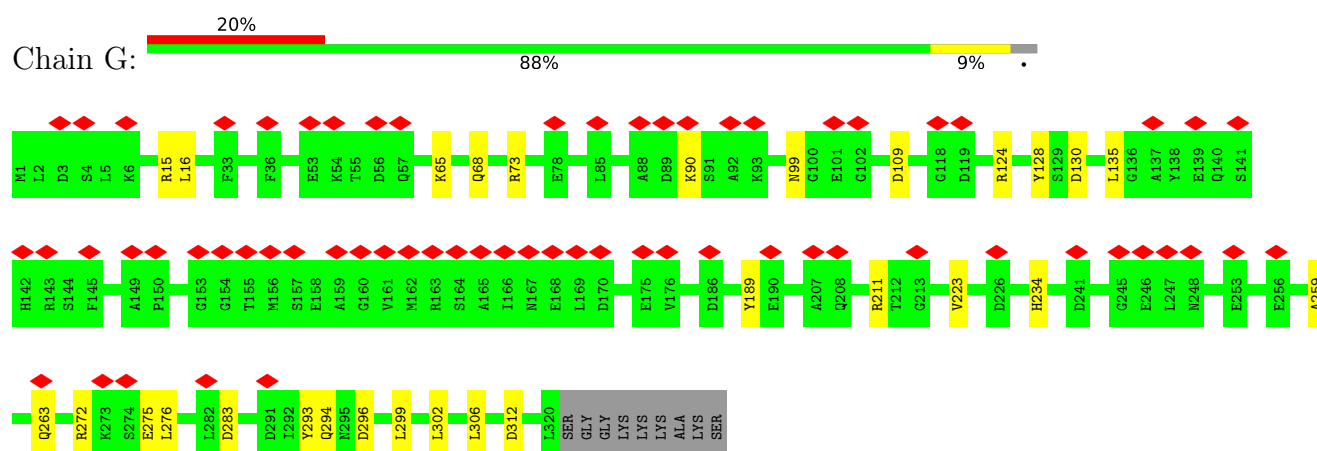
- Molecule 1: Cas7d



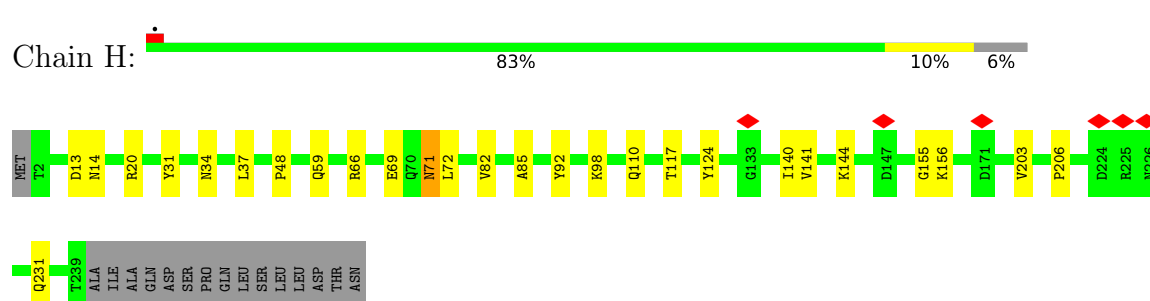
- Molecule 1: Cas7d



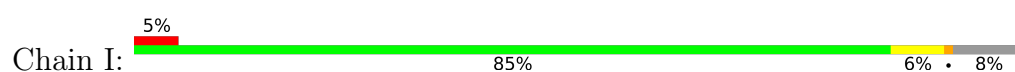
- Molecule 1: Cas7d

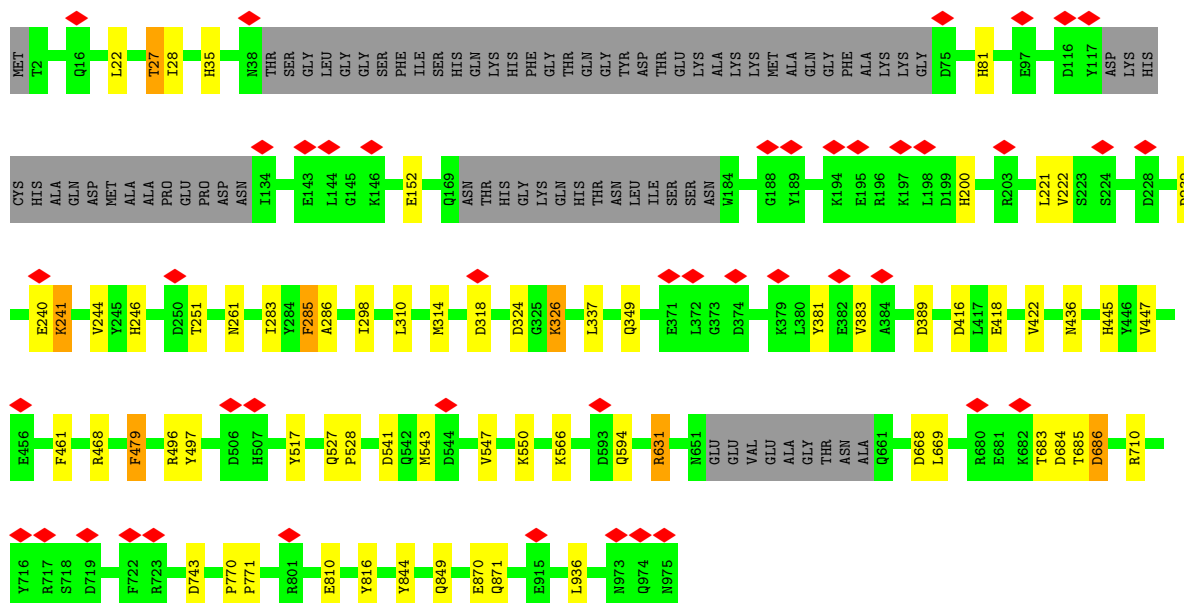


- Molecule 2: Cas5d

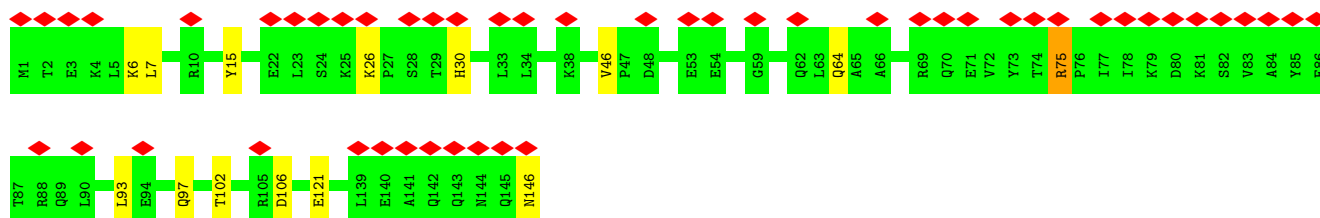
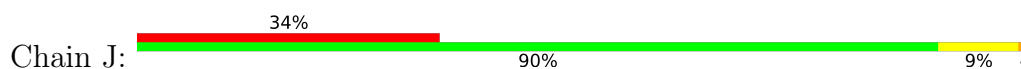


- Molecule 3: Cas10d

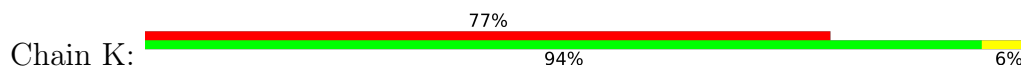




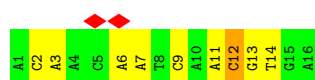
• Molecule 4: Cas11d



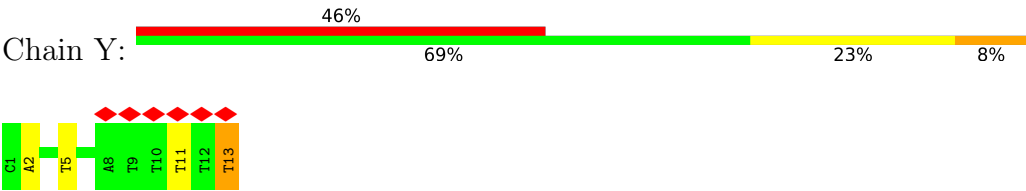
• Molecule 4: Cas11d



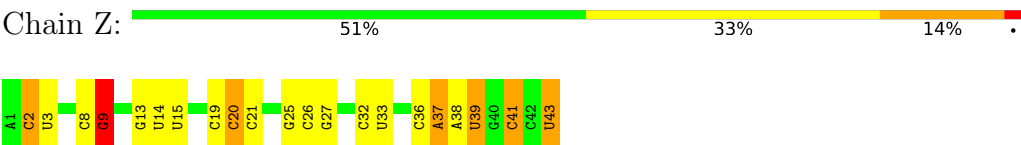
• Molecule 5: DNA target strand



● Molecule 6: DNA non-target strand



● Molecule 7: crRNA



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	336400	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	41.2	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	22500	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.550	Depositor
Minimum map value	-0.002	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.015	Depositor
Recommended contour level	0.106	Depositor
Map size (Å)	459.8, 459.8, 459.8	wwPDB
Map dimensions	440, 440, 440	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.045, 1.045, 1.045	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	A	0.82	1/2549 (0.0%)	1.43	11/3442 (0.3%)
1	B	0.81	1/2549 (0.0%)	1.42	10/3442 (0.3%)
1	C	0.84	1/2549 (0.0%)	1.41	9/3442 (0.3%)
1	D	0.85	1/2549 (0.0%)	1.41	9/3442 (0.3%)
1	E	0.82	2/2549 (0.1%)	1.41	7/3442 (0.2%)
1	F	0.89	1/2549 (0.0%)	1.44	9/3442 (0.3%)
1	G	0.86	2/2549 (0.1%)	1.47	9/3442 (0.3%)
2	H	0.89	2/1988 (0.1%)	1.40	14/2706 (0.5%)
3	I	0.76	2/7487 (0.0%)	1.38	35/10153 (0.3%)
4	J	0.77	0/1209	1.42	11/1624 (0.7%)
4	K	0.81	0/1209	1.42	3/1624 (0.2%)
5	X	0.76	0/366	1.36	0/562
6	Y	0.71	0/290	1.36	2/446 (0.4%)
7	Z	0.92	0/1007	1.40	7/1566 (0.4%)
All	All	0.82	13/31399 (0.0%)	1.41	136/42775 (0.3%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	1
1	C	0	1
1	D	0	1
1	E	0	1
1	F	0	1
1	G	0	2
2	H	0	1
3	I	0	5
4	J	0	1
5	X	0	6

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Mol	Chain	#Chirality outliers	#Planarity outliers
6	Y	0	2
7	Z	0	10
All	All	0	33

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	313	TYR	C-O	-8.68	1.14	1.24
1	A	313	TYR	C-O	-7.88	1.14	1.24
1	C	313	TYR	C-O	-7.69	1.15	1.24
1	B	313	TYR	C-O	-7.29	1.15	1.24
1	D	115	PHE	C-O	-7.02	1.15	1.23
1	E	223	VAL	C-O	-6.57	1.16	1.24
3	I	286	ALA	CA-C	-6.47	1.46	1.52
2	H	37	LEU	C-O	-5.68	1.17	1.24
1	G	223	VAL	C-O	-5.44	1.18	1.24
2	H	34	ASN	C-O	-5.34	1.17	1.24
1	F	311	GLN	C-O	-5.32	1.17	1.24
1	G	306	LEU	C-O	-5.08	1.18	1.24
3	I	28	ILE	C-O	-5.04	1.18	1.24

All (136) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	I	285	PHE	N-CA-C	-11.27	90.87	109.24
6	Y	13	DT	C2'-C3'-O3'	10.08	126.62	111.50
4	J	26	LYS	CB-CA-C	9.24	117.76	111.20
1	A	130	ASP	CA-CB-CG	9.15	121.75	112.60
7	Z	37	A	C5'-C4'-C3'	-8.23	102.86	115.20
1	C	73	ARG	NE-CZ-NH1	-7.87	113.63	121.50
3	I	479	PHE	CA-CB-CG	7.50	121.30	113.80
1	D	73	ARG	NE-CZ-NH1	-7.48	114.02	121.50
1	B	73	ARG	NE-CZ-NH1	-7.45	114.05	121.50
1	G	73	ARG	NE-CZ-NH1	-7.36	114.14	121.50
1	A	173	LEU	CA-C-N	7.27	128.93	119.84
1	A	173	LEU	C-N-CA	7.27	128.93	119.84
1	C	65	LYS	N-CA-C	7.20	119.75	111.11
1	G	312	ASP	N-CA-C	-7.16	103.55	111.36
1	C	73	ARG	NE-CZ-NH2	7.14	125.63	119.20
4	K	26	LYS	CB-CA-C	7.13	116.26	111.20
1	D	73	ARG	NE-CZ-NH2	7.00	125.50	119.20
2	H	85	ALA	N-CA-C	6.98	120.10	108.73

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	Z	8	C	O3'-P-O5'	-6.85	93.73	104.00
1	A	73	ARG	NE-CZ-NH2	6.81	125.33	119.20
6	Y	13	DT	C4'-C3'-O3'	6.77	120.16	110.00
2	H	140	ILE	N-CA-C	-6.69	98.55	108.85
2	H	14	ASN	CA-CB-CG	6.69	119.29	112.60
1	F	283	ASP	CA-CB-CG	6.59	119.19	112.60
2	H	206	PRO	N-CA-CB	6.57	106.64	103.22
1	A	66	ARG	NE-CZ-NH2	6.55	125.10	119.20
1	C	130	ASP	CA-CB-CG	6.54	119.14	112.60
1	D	226	ASP	CA-CB-CG	6.53	119.13	112.60
1	B	73	ARG	NE-CZ-NH2	6.52	125.06	119.20
2	H	13	ASP	CA-CB-CG	6.48	119.08	112.60
2	H	141	VAL	N-CA-C	-6.45	98.83	108.12
1	E	241	ASP	CA-CB-CG	6.43	119.03	112.60
1	G	272	ARG	NE-CZ-NH2	6.41	124.97	119.20
1	E	291	ASP	CA-CB-CG	6.33	118.93	112.60
1	D	222	ILE	N-CA-C	-6.32	99.04	108.46
1	F	65	LYS	N-CA-C	6.22	120.42	112.34
1	C	37	GLN	CA-C-N	6.22	132.85	121.85
1	C	37	GLN	C-N-CA	6.22	132.85	121.85
1	E	272	ARG	NE-CZ-NH2	6.20	124.78	119.20
1	G	294	GLN	OE1-CD-NE2	-6.20	116.40	122.60
7	Z	9	G	O5'-C5'-C4'	-6.10	102.55	111.70
4	J	7	LEU	N-CA-C	6.08	117.99	111.36
1	A	73	ARG	CD-NE-CZ	6.05	132.88	124.40
1	B	283	ASP	CA-CB-CG	6.05	118.65	112.60
3	I	232	ASP	CA-CB-CG	6.05	118.65	112.60
1	G	99	ASN	CA-CB-CG	6.05	118.65	112.60
1	B	272	ARG	NE-CZ-NH2	6.04	124.64	119.20
3	I	326	LYS	N-CA-C	-6.03	105.84	112.72
1	C	222	ILE	N-CA-C	-6.03	98.84	107.77
1	G	65	LYS	N-CA-C	6.02	119.72	112.38
1	D	272	ARG	NE-CZ-NH2	5.98	124.58	119.20
1	F	272	ARG	NE-CZ-NH2	5.97	124.57	119.20
3	I	241	LYS	N-CA-C	-5.97	100.67	109.81
1	B	224	PHE	N-CA-C	-5.90	100.88	110.20
7	Z	39	U	O3'-P-O5'	-5.86	95.21	104.00
2	H	155	GLY	CA-C-N	5.86	130.06	120.63
2	H	155	GLY	C-N-CA	5.86	130.06	120.63
3	I	286	ALA	CA-C-N	-5.84	113.67	119.92
3	I	286	ALA	C-N-CA	-5.84	113.67	119.92
1	A	272	ARG	NE-CZ-NH2	5.79	124.41	119.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	72	LEU	N-CA-C	-5.78	105.89	113.17
4	J	106	ASP	CA-CB-CG	5.74	118.33	112.60
1	A	222	ILE	N-CA-C	-5.73	99.92	108.46
1	G	283	ASP	CA-CB-CG	5.67	118.28	112.60
1	F	304	GLY	N-CA-C	-5.65	105.54	112.77
3	I	81	HIS	CA-CB-CG	5.63	119.44	113.80
4	J	6	LYS	N-CA-C	5.63	119.45	112.24
2	H	48	PRO	CA-C-O	-5.63	115.03	121.56
3	I	251	THR	N-CA-C	5.62	119.72	112.86
2	H	20	ARG	NE-CZ-NH2	5.61	124.25	119.20
3	I	27	THR	N-CA-C	5.60	122.72	110.80
1	E	73	ARG	NE-CZ-NH2	5.58	124.22	119.20
3	I	527	GLN	OE1-CD-NE2	-5.57	117.03	122.60
3	I	318	ASP	CA-CB-CG	5.55	118.15	112.60
3	I	200	HIS	CB-CG-CD2	-5.53	124.02	131.20
1	B	171	HIS	CB-CG-CD2	-5.52	124.03	131.20
1	A	8	GLN	N-CA-C	5.50	117.28	111.28
1	C	272	ARG	NE-CZ-NH2	5.50	124.15	119.20
3	I	436	ASN	CA-CB-CG	5.48	118.08	112.60
3	I	631	ARG	NE-CZ-NH2	5.47	124.13	119.20
3	I	594	GLN	CA-C-N	5.47	128.35	123.10
3	I	594	GLN	C-N-CA	5.47	128.35	123.10
1	C	119	ASP	CA-CB-CG	5.43	118.03	112.60
3	I	35	HIS	CB-CG-CD2	-5.40	124.18	131.20
1	G	234	HIS	CA-CB-CG	5.38	119.18	113.80
3	I	686	ASP	CA-CB-CG	5.38	117.98	112.60
3	I	871	GLN	OE1-CD-NE2	-5.37	117.23	122.60
7	Z	36	C	O3'-P-O5'	-5.37	95.95	104.00
2	H	71	ASN	CB-CA-C	-5.37	100.94	109.80
3	I	810	GLU	CA-C-N	5.36	127.73	120.44
3	I	810	GLU	C-N-CA	5.36	127.73	120.44
3	I	389	ASP	CA-CB-CG	5.36	117.96	112.60
1	A	3	ASP	CA-CB-CG	5.36	117.96	112.60
3	I	246	HIS	CA-CB-CG	5.36	119.16	113.80
1	F	264	ASP	CA-CB-CG	5.34	117.94	112.60
3	I	710	ARG	NE-CZ-NH2	5.32	123.99	119.20
4	J	75	ARG	CA-C-N	5.31	126.48	119.84
4	J	75	ARG	C-N-CA	5.31	126.48	119.84
2	H	82	VAL	N-CA-C	-5.31	100.74	108.97
1	D	148	ASN	CA-CB-CG	5.31	117.91	112.60
4	K	97	GLN	OE1-CD-NE2	-5.31	117.29	122.60
1	B	148	ASN	CA-CB-CG	5.31	117.91	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	185	ARG	NE-CZ-NH2	5.28	123.95	119.20
7	Z	3	U	O4'-C1'-N1	5.25	116.38	108.50
4	K	16	ARG	NE-CZ-NH2	5.23	123.90	119.20
3	I	496	ARG	NE-CZ-NH2	5.22	123.90	119.20
1	D	65	LYS	N-CA-C	5.21	119.92	111.37
1	A	148	ASN	CA-CB-CG	5.20	117.80	112.60
1	F	66	ARG	NE-CZ-NH2	5.20	123.88	119.20
4	J	46	VAL	CA-C-N	5.18	125.18	119.89
4	J	46	VAL	C-N-CA	5.18	125.18	119.89
1	G	90	LYS	N-CA-C	5.17	118.37	111.75
1	E	53	GLU	CA-C-N	5.16	129.04	120.94
1	E	53	GLU	C-N-CA	5.16	129.04	120.94
3	I	594	GLN	OE1-CD-NE2	-5.14	117.46	122.60
1	B	57	GLN	OE1-CD-NE2	-5.14	117.46	122.60
1	D	73	ARG	CD-NE-CZ	5.14	131.59	124.40
1	B	313	TYR	N-CA-C	-5.13	105.58	111.07
3	I	849	GLN	OE1-CD-NE2	-5.11	117.49	122.60
1	F	222	ILE	N-CA-C	-5.10	100.31	107.75
2	H	231	GLN	OE1-CD-NE2	-5.09	117.51	122.60
3	I	743	ASP	CA-CB-CG	5.06	117.66	112.60
1	E	142	HIS	CB-CG-CD2	-5.06	124.62	131.20
1	B	185	ARG	NE-CZ-NH2	5.06	123.75	119.20
1	F	232	ASN	OD1-CG-ND2	-5.06	117.54	122.60
4	J	97	GLN	OE1-CD-NE2	-5.05	117.55	122.60
1	F	3	ASP	CA-CB-CG	5.04	117.64	112.60
4	J	146	ASN	CA-CB-CG	5.04	117.64	112.60
3	I	543	MET	CA-C-N	5.03	128.72	120.63
3	I	543	MET	C-N-CA	5.03	128.72	120.63
3	I	550	LYS	CA-C-N	5.03	124.52	119.19
3	I	550	LYS	C-N-CA	5.03	124.52	119.19
3	I	310	LEU	CA-C-N	5.02	125.52	119.94
3	I	310	LEU	C-N-CA	5.02	125.52	119.94
7	Z	8	C	C3'-C2'-O2'	-5.01	107.09	114.60
4	J	30	HIS	CB-CG-CD2	-5.00	124.69	131.20

There are no chirality outliers.

All (33) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	21	TYR	Sidechain
1	B	73	ARG	Sidechain
1	C	163	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	D	28	ARG	Sidechain
1	E	124	ARG	Sidechain
1	F	204	ARG	Sidechain
1	G	189	TYR	Sidechain
1	G	293	TYR	Sidechain
2	H	92	TYR	Sidechain
3	I	468	ARG	Sidechain
3	I	497	TYR	Sidechain
3	I	517	TYR	Sidechain
3	I	816	TYR	Sidechain
3	I	844	TYR	Sidechain
4	J	15	TYR	Sidechain
5	X	12	DC	Sidechain
5	X	13	DG	Sidechain
5	X	2	DC	Sidechain
5	X	3	DA	Sidechain
5	X	6	DA	Sidechain
5	X	7	DA	Sidechain
6	Y	11	DT	Sidechain
6	Y	5	DT	Sidechain
7	Z	13	G	Sidechain
7	Z	14	U	Sidechain
7	Z	19	C	Sidechain
7	Z	2	C	Sidechain
7	Z	20	C	Sidechain
7	Z	25	G	Sidechain
7	Z	32	C	Sidechain
7	Z	37	A	Sidechain
7	Z	41	C	Sidechain
7	Z	43	U	Sidechain

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	A	2503	0	2454	9	0
1	B	2503	0	2454	13	0
1	C	2503	0	2454	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2503	0	2454	2	0
1	E	2503	0	2454	18	0
1	F	2503	0	2454	9	0
1	G	2503	0	2454	11	0
2	H	1929	0	1877	8	0
3	I	7323	0	7311	43	0
4	J	1194	0	1219	3	0
4	K	1194	0	1219	6	0
5	X	325	0	180	11	0
6	Y	261	0	152	13	0
7	Z	904	0	454	9	0
All	All	30651	0	29590	113	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 2.

All (113) 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)
3:I:221:LEU:HD23	3:I:283:ILE:CD1	1.71	1.18
3:I:771:PRO:HA	6:Y:13:DT:C7	1.82	1.10
3:I:261:ASN:HD22	3:I:668:ASP:HB3	1.06	1.09
3:I:221:LEU:HD23	3:I:283:ILE:HD13	1.29	1.07
3:I:770:PRO:O	6:Y:13:DT:C7	2.04	1.04
5:X:14:DT:O4	6:Y:2:DA:N6	1.96	0.98
3:I:770:PRO:O	6:Y:13:DT:H72	1.65	0.96
5:X:9:DC:H5	7:Z:9:G:H1	0.97	0.95
1:G:15:ARG:O	1:G:16:LEU:HD12	1.67	0.94
1:A:212:THR:CG2	1:B:65:LYS:HD3	1.97	0.94
1:E:212:THR:HG23	1:F:65:LYS:HD2	1.50	0.93
1:E:155:THR:HG22	7:Z:41:C:H1'	1.50	0.91
4:K:135:ARG:O	4:K:139:LEU:HG	1.73	0.88
1:B:212:THR:HG22	1:B:213:GLY:N	1.90	0.86
3:I:261:ASN:ND2	3:I:668:ASP:HB3	1.90	0.84
1:E:155:THR:HG22	7:Z:41:C:C1'	2.07	0.84
3:I:771:PRO:HA	6:Y:13:DT:H71	1.61	0.82
1:E:212:THR:CG2	1:F:65:LYS:HD2	2.11	0.81
1:A:212:THR:HG23	1:B:65:LYS:HD3	1.63	0.79
3:I:770:PRO:O	6:Y:13:DT:H71	1.82	0.79
3:I:221:LEU:CD2	3:I:283:ILE:HG12	2.13	0.79
3:I:221:LEU:HD21	3:I:283:ILE:HG12	1.67	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:15:ARG:C	1:G:16:LEU:HD12	2.09	0.76
1:B:33:PHE:O	1:B:212:THR:CG2	2.36	0.74
5:X:9:DC:H5	7:Z:9:G:N1	1.82	0.73
1:E:155:THR:CG2	7:Z:41:C:H1'	2.18	0.73
1:B:33:PHE:O	1:B:212:THR:HG21	1.88	0.72
1:C:208:GLN:O	1:C:212:THR:HG22	1.89	0.72
1:G:15:ARG:HG2	1:G:16:LEU:HD13	1.72	0.72
1:E:151:PHE:CZ	1:G:16:LEU:HD11	2.25	0.72
3:I:383:VAL:O	3:I:383:VAL:HG12	1.89	0.72
1:D:28:ARG:NH2	1:D:72:GLU:OE2	2.22	0.72
1:B:212:THR:CG2	1:B:213:GLY:N	2.53	0.71
3:I:221:LEU:HD23	3:I:283:ILE:CG1	2.20	0.71
1:B:212:THR:OG1	1:C:65:LYS:HD2	1.92	0.70
1:G:15:ARG:HG2	1:G:16:LEU:CD1	2.23	0.69
1:A:212:THR:HG21	1:B:65:LYS:HD3	1.75	0.69
1:B:10:GLN:NE2	1:B:18:SER:OG	2.25	0.69
3:I:383:VAL:CG1	3:I:447:VAL:HG12	2.23	0.69
3:I:221:LEU:CD2	3:I:283:ILE:CD1	2.63	0.68
1:A:15:ARG:NH2	2:H:69:GLU:OE1	2.28	0.67
4:K:5:LEU:HA	4:K:8:THR:HG22	1.76	0.66
3:I:221:LEU:CD2	3:I:283:ILE:CG1	2.74	0.66
3:I:771:PRO:HA	6:Y:13:DT:H73	1.76	0.64
3:I:261:ASN:HD22	3:I:668:ASP:CB	1.97	0.64
4:J:93:LEU:HD22	4:K:139:LEU:HD21	1.78	0.63
3:I:528:PRO:CD	3:I:541:ASP:OD1	2.48	0.62
1:B:28:ARG:HH11	1:B:180:THR:HG21	1.66	0.61
1:E:212:THR:CG2	1:F:65:LYS:CD	2.78	0.61
2:H:66:ARG:HA	2:H:71:ASN:HD21	1.67	0.59
5:X:14:DT:O4	6:Y:2:DA:C6	2.56	0.59
3:I:221:LEU:HD23	3:I:283:ILE:HD11	1.81	0.58
2:H:110:GLN:HG2	5:X:9:DC:H5''	1.87	0.57
2:H:124:TYR:CE1	5:X:9:DC:C6	2.94	0.56
3:I:261:ASN:HD21	3:I:669:LEU:N	2.04	0.55
3:I:221:LEU:CD2	3:I:283:ILE:HD13	2.20	0.54
1:E:155:THR:HG22	7:Z:41:C:O4'	2.08	0.54
3:I:383:VAL:O	3:I:383:VAL:CG1	2.55	0.54
1:D:138:TYR:CE2	4:K:120:GLN:HG3	2.43	0.53
3:I:771:PRO:CA	6:Y:13:DT:C7	2.73	0.53
3:I:528:PRO:CG	3:I:541:ASP:OD1	2.57	0.53
2:H:110:GLN:CG	5:X:9:DC:H5''	2.39	0.53
1:E:151:PHE:CE1	1:G:16:LEU:HD11	2.44	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:I:314:MET:HE1	3:I:337:LEU:HB2	1.91	0.52
3:I:383:VAL:HG11	3:I:447:VAL:HG12	1.90	0.52
3:I:771:PRO:CA	6:Y:13:DT:H71	2.37	0.52
1:E:23:HIS:HD1	1:E:183:SER:CB	2.19	0.52
4:K:5:LEU:O	4:K:8:THR:HG22	2.10	0.52
3:I:683:THR:CG2	3:I:685:THR:HG22	2.40	0.51
1:A:72:GLU:OE2	1:A:199:LEU:HD23	2.10	0.51
1:G:259:ALA:O	1:G:263:GLN:HG3	2.10	0.51
3:I:383:VAL:HG12	3:I:447:VAL:HG12	1.91	0.51
5:X:14:DT:C4	6:Y:2:DA:N1	2.78	0.51
3:I:261:ASN:ND2	3:I:669:LEU:N	2.59	0.50
1:E:212:THR:HG21	1:F:65:LYS:CD	2.42	0.50
3:I:528:PRO:HG3	3:I:541:ASP:OD1	2.12	0.50
1:E:152:GLU:HG3	1:G:16:LEU:CD2	2.41	0.50
1:B:10:GLN:NE2	1:B:18:SER:HG	2.10	0.49
3:I:683:THR:HG22	3:I:685:THR:HG22	1.95	0.49
1:A:124:ARG:HH21	7:Z:2:C:P	2.37	0.47
1:E:223:VAL:HG13	1:E:276:LEU:CD2	2.45	0.47
3:I:221:LEU:HD12	3:I:222:VAL:HG23	1.98	0.46
4:J:93:LEU:HD22	4:K:139:LEU:CD2	2.45	0.46
1:F:211:ARG:HH21	7:Z:43:U:P	2.39	0.45
1:C:132:ALA:HB2	1:C:180:THR:HG22	1.99	0.44
2:H:31:TYR:CE1	2:H:203:VAL:HG11	2.52	0.44
3:I:566:LYS:HE2	5:X:12:DC:O5'	2.17	0.44
1:E:108:PRO:HA	1:E:310:THR:HG21	1.99	0.44
1:G:296:ASP:HA	1:G:299:LEU:HB3	2.00	0.44
3:I:221:LEU:HD12	3:I:221:LEU:C	2.42	0.44
3:I:683:THR:HG22	3:I:684:ASP:N	2.32	0.43
1:E:212:THR:HG21	1:F:65:LYS:HD3	1.99	0.43
3:I:770:PRO:C	6:Y:13:DT:H71	2.43	0.43
3:I:314:MET:HE1	3:I:337:LEU:CB	2.49	0.43
3:I:422:VAL:HG21	3:I:445:HIS:CD2	2.53	0.43
1:F:210:SER:HA	1:G:128:TYR:CD2	2.53	0.43
1:E:152:GLU:CD	1:G:16:LEU:HD23	2.44	0.43
2:H:124:TYR:HE1	5:X:9:DC:C6	2.37	0.42
1:A:15:ARG:HH21	2:H:69:GLU:CD	2.27	0.41
3:I:261:ASN:ND2	3:I:669:LEU:H	2.17	0.41
4:J:75:ARG:HG2	4:J:75:ARG:HH11	1.85	0.41
1:B:212:THR:CG2	1:B:213:GLY:H	2.30	0.41
1:C:18:SER:OG	1:C:20:HIS:HD2	2.04	0.41
1:A:38:THR:HG22	7:Z:9:G:H5'	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:223:VAL:HG13	1:B:276:LEU:HD23	2.03	0.41
1:A:10:GLN:NE2	1:A:18:SER:OG	2.54	0.41
1:F:273:LYS:HB3	1:F:276:LEU:HD11	2.03	0.41
3:I:566:LYS:HZ3	5:X:11:DA:H2"	1.86	0.41
1:E:286:LEU:HA	1:E:289:VAL:HG12	2.03	0.40
1:E:23:HIS:CE1	1:E:183:SER:HG	2.19	0.40
1:C:150:PRO:HA	1:C:156:MET:SD	2.61	0.40
3:I:771:PRO:HA	6:Y:13:DT:H72	1.89	0.40
1:F:190:GLU:OE1	1:F:305:SER:HB3	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	318/329 (97%)	309 (97%)	8 (2%)	1 (0%)	36	65
1	B	318/329 (97%)	304 (96%)	14 (4%)	0	100	100
1	C	318/329 (97%)	308 (97%)	10 (3%)	0	100	100
1	D	318/329 (97%)	303 (95%)	14 (4%)	1 (0%)	36	65
1	E	318/329 (97%)	308 (97%)	9 (3%)	1 (0%)	36	65
1	F	318/329 (97%)	303 (95%)	14 (4%)	1 (0%)	36	65
1	G	318/329 (97%)	288 (91%)	30 (9%)	0	100	100
2	H	236/254 (93%)	227 (96%)	9 (4%)	0	100	100
3	I	889/975 (91%)	860 (97%)	29 (3%)	0	100	100
4	J	144/146 (99%)	134 (93%)	10 (7%)	0	100	100
4	K	144/146 (99%)	138 (96%)	6 (4%)	0	100	100
All	All	3639/3824 (95%)	3482 (96%)	153 (4%)	4 (0%)	49	77

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	174	PRO
1	E	33	PHE
1	D	229	ILE
1	F	229	ILE

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	
1	A	273/279 (98%)	265 (97%)	8 (3%)	37	71
1	B	273/279 (98%)	266 (97%)	7 (3%)	40	73
1	C	273/279 (98%)	267 (98%)	6 (2%)	45	77
1	D	273/279 (98%)	264 (97%)	9 (3%)	33	67
1	E	273/279 (98%)	266 (97%)	7 (3%)	40	73
1	F	273/279 (98%)	262 (96%)	11 (4%)	28	62
1	G	273/279 (98%)	264 (97%)	9 (3%)	33	67
2	H	205/219 (94%)	200 (98%)	5 (2%)	43	75
3	I	792/855 (93%)	771 (97%)	21 (3%)	39	73
4	J	130/130 (100%)	127 (98%)	3 (2%)	44	76
4	K	130/130 (100%)	129 (99%)	1 (1%)	73	90
All	All	3168/3287 (96%)	3081 (97%)	87 (3%)	40	73

All (87) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	35	VAL
1	A	130	ASP
1	A	202	THR
1	A	218	HIS
1	A	222	ILE
1	A	247	LEU

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Mol	Chain	Res	Type
1	A	249	LYS
1	A	287	GLN
1	B	158	GLU
1	B	167	ASN
1	B	171	HIS
1	B	182	GLU
1	B	277	ILE
1	B	315	THR
1	B	316	GLU
1	C	130	ASP
1	C	182	GLU
1	C	202	THR
1	C	218	HIS
1	C	274	SER
1	C	305	SER
1	D	31	GLN
1	D	65	LYS
1	D	66	ARG
1	D	105	LYS
1	D	120	SER
1	D	124	ARG
1	D	158	GLU
1	D	226	ASP
1	D	302	LEU
1	E	104	CYS
1	E	124	ARG
1	E	202	THR
1	E	229	ILE
1	E	277	ILE
1	E	291	ASP
1	E	308	GLN
1	F	4	SER
1	F	72	GLU
1	F	124	ARG
1	F	142	HIS
1	F	152	GLU
1	F	202	THR
1	F	212	THR
1	F	232	ASN
1	F	283	ASP
1	F	302	LEU
1	F	303	LEU

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Mol	Chain	Res	Type
1	G	68	GLN
1	G	109	ASP
1	G	124	ARG
1	G	130	ASP
1	G	135	LEU
1	G	211	ARG
1	G	275	GLU
1	G	276	LEU
1	G	302	LEU
2	H	59	GLN
2	H	98	LYS
2	H	117	THR
2	H	144	LYS
2	H	156	LYS
3	I	22	LEU
3	I	27	THR
3	I	152	GLU
3	I	240	GLU
3	I	241	LYS
3	I	244	VAL
3	I	285	PHE
3	I	298	ILE
3	I	324	ASP
3	I	326	LYS
3	I	349	GLN
3	I	381	TYR
3	I	416	ASP
3	I	418	GLU
3	I	461	PHE
3	I	479	PHE
3	I	547	VAL
3	I	631	ARG
3	I	686	ASP
3	I	870	GLU
3	I	936	LEU
4	J	64	GLN
4	J	102	THR
4	J	121	GLU
4	K	116	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (56) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	20	HIS
1	A	43	ASN
1	A	218	HIS
1	A	248	ASN
1	A	311	GLN
1	B	10	GLN
1	B	171	HIS
1	B	217	ASN
1	B	287	GLN
1	C	10	GLN
1	C	20	HIS
1	C	57	GLN
1	C	218	HIS
1	C	290	ASN
1	D	10	GLN
1	D	140	GLN
1	D	198	ASN
1	D	218	HIS
1	D	242	GLN
1	E	8	GLN
1	E	140	GLN
1	E	142	HIS
1	F	8	GLN
1	F	281	HIS
1	G	10	GLN
1	G	48	GLN
1	G	68	GLN
1	G	217	ASN
1	G	218	HIS
1	G	237	GLN
1	G	248	ASN
1	G	263	GLN
1	G	281	HIS
2	H	14	ASN
2	H	70	GLN
2	H	71	ASN
2	H	93	GLN
2	H	95	ASN
2	H	194	ASN
2	H	201	ASN
3	I	261	ASN
3	I	280	GLN
3	I	399	GLN

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Mol	Chain	Res	Type
3	I	429	GLN
3	I	519	ASN
3	I	542	GLN
3	I	553	GLN
3	I	754	ASN
3	I	871	GLN
3	I	887	GLN
3	I	893	GLN
4	J	30	HIS
4	J	122	GLN
4	K	122	GLN
4	K	144	ASN
4	K	145	GLN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
7	Z	42/43 (97%)	9 (21%)	0

All (9) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
7	Z	9	G
7	Z	15	U
7	Z	20	C
7	Z	21	C
7	Z	26	C
7	Z	27	G
7	Z	33	U
7	Z	38	A
7	Z	39	U

There are no RNA pucker outliers to report.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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-24974. These allow visual inspection of the internal detail of the map and identification of artifacts.

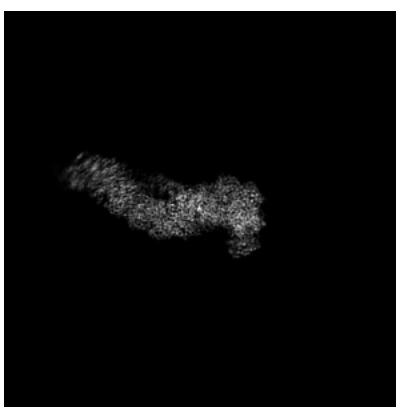
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

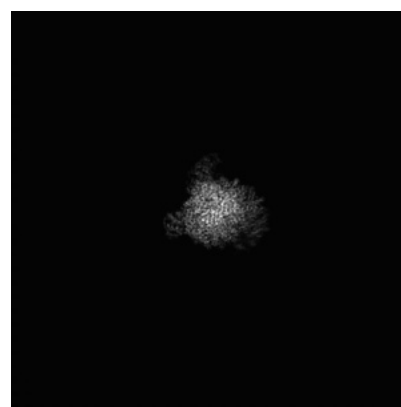
6.1.1 Primary map



X



Y



Z

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

6.2 Central slices [i](#)

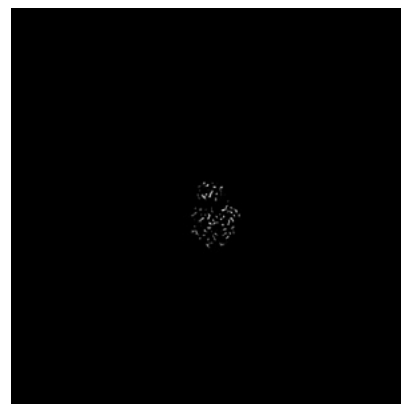
6.2.1 Primary map



X Index: 220



Y Index: 220



Z Index: 220

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

6.3 Largest variance slices [i](#)

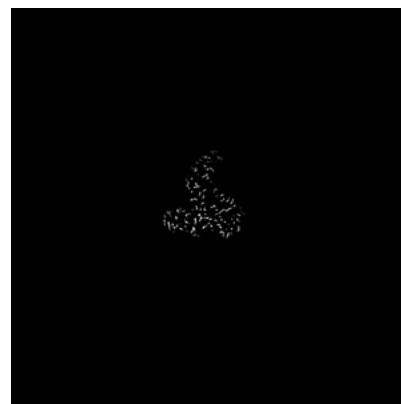
6.3.1 Primary map



X Index: 225



Y Index: 217



Z Index: 257

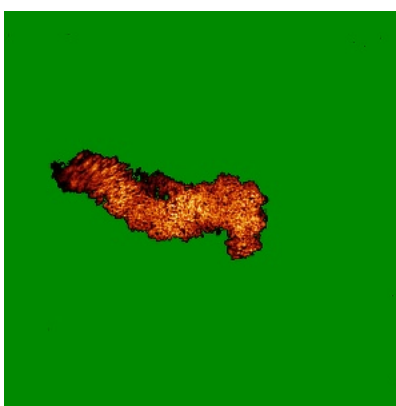
The images above show the largest variance slices of the map in three orthogonal directions.

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

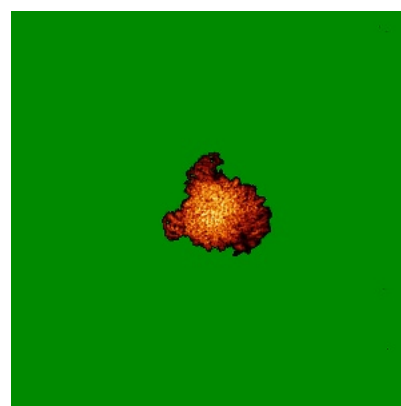
6.4.1 Primary map



X



Y

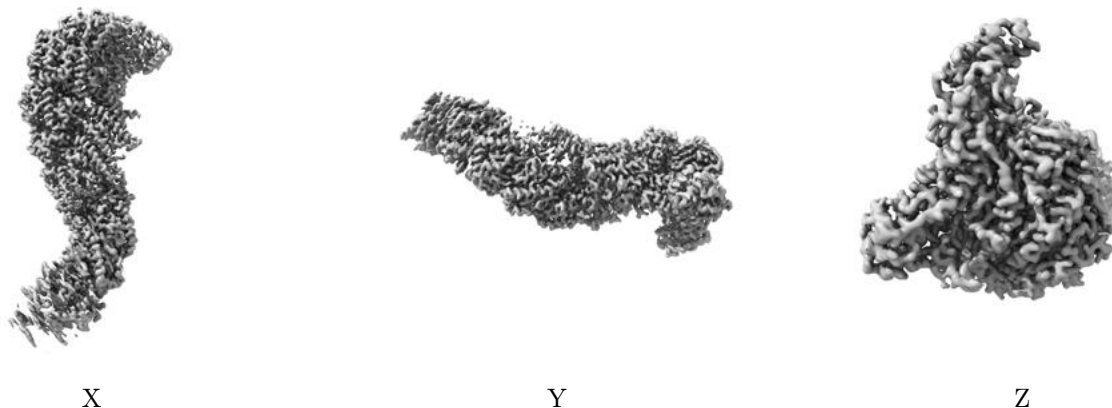


Z

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

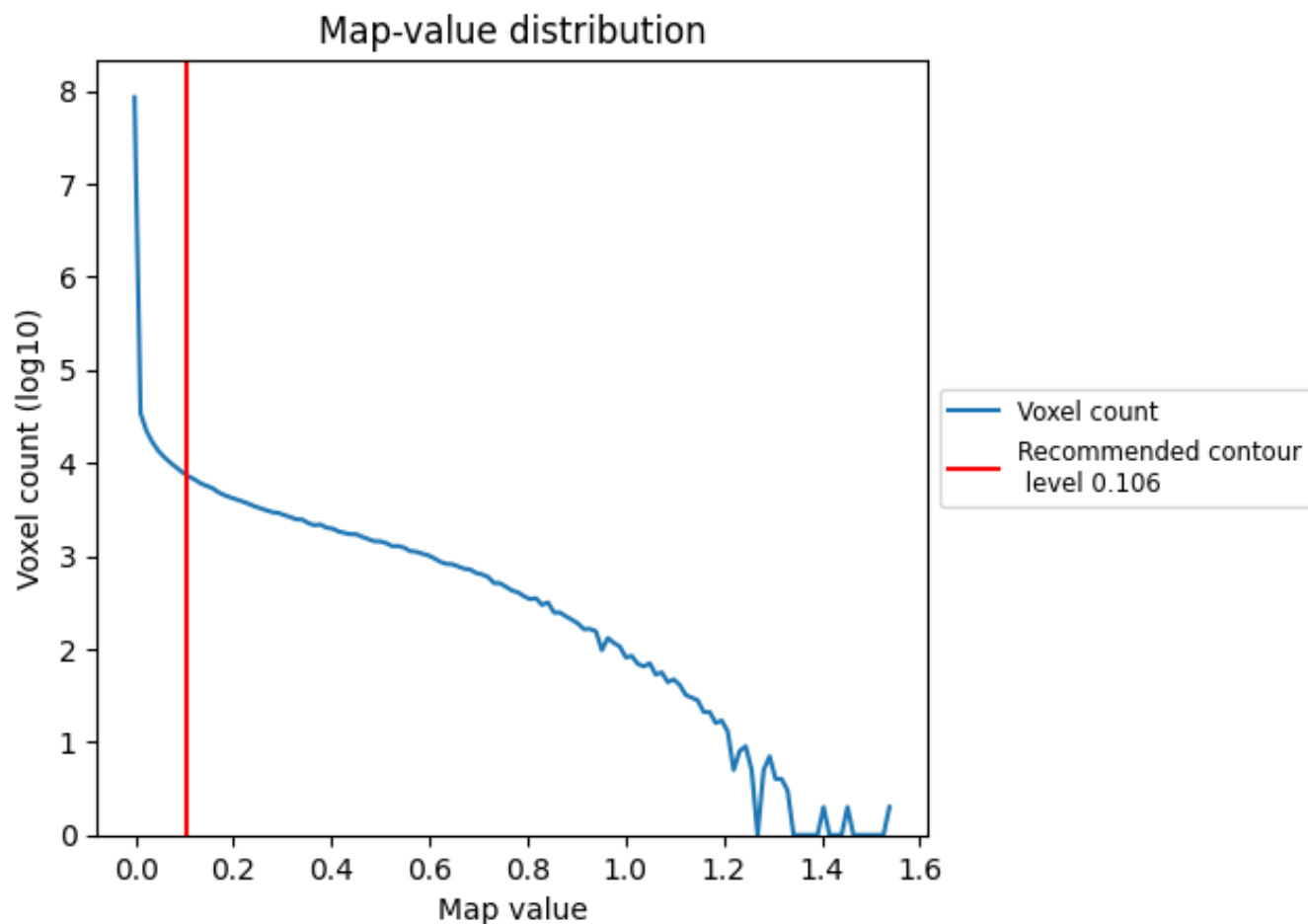
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

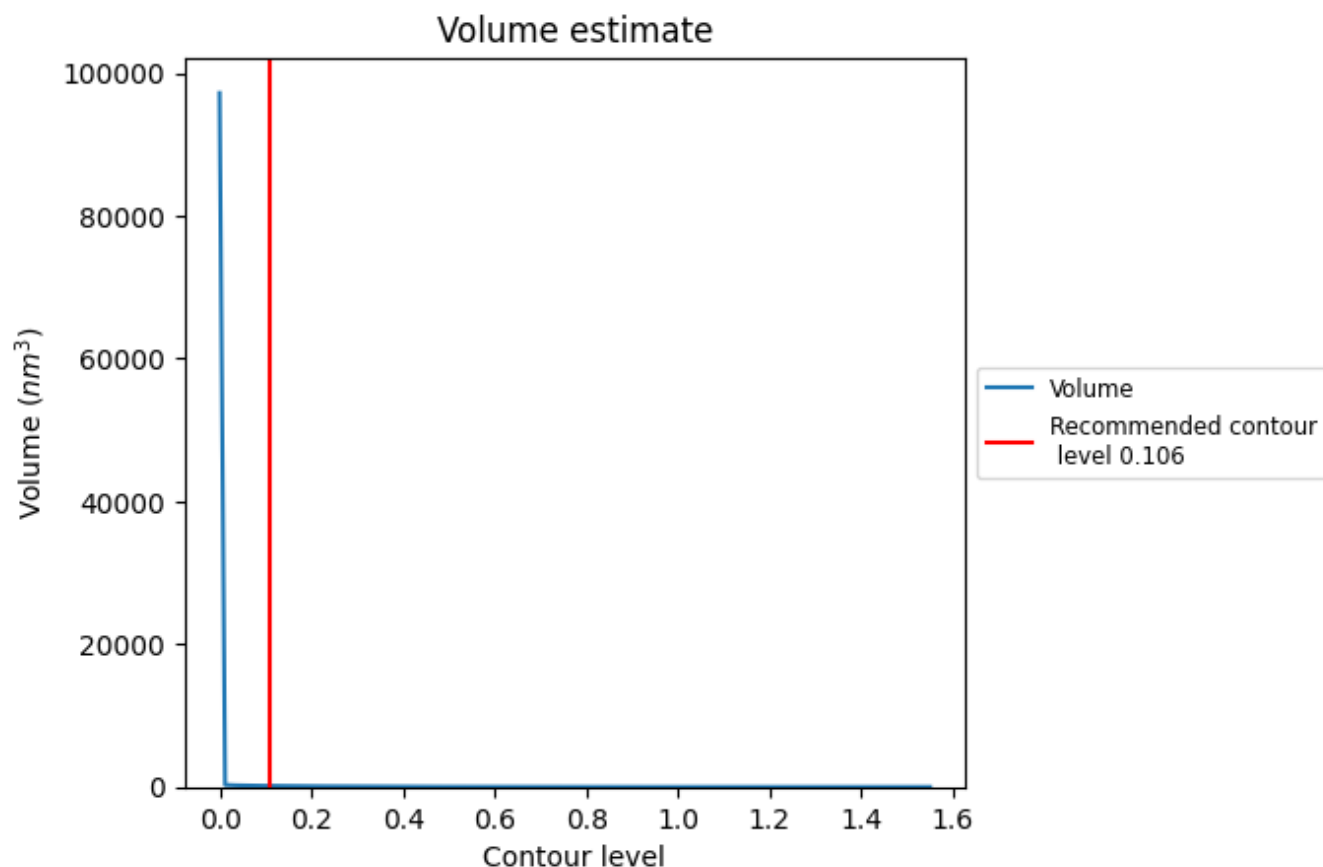
This section contains the results of statistical analysis of the map.

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.

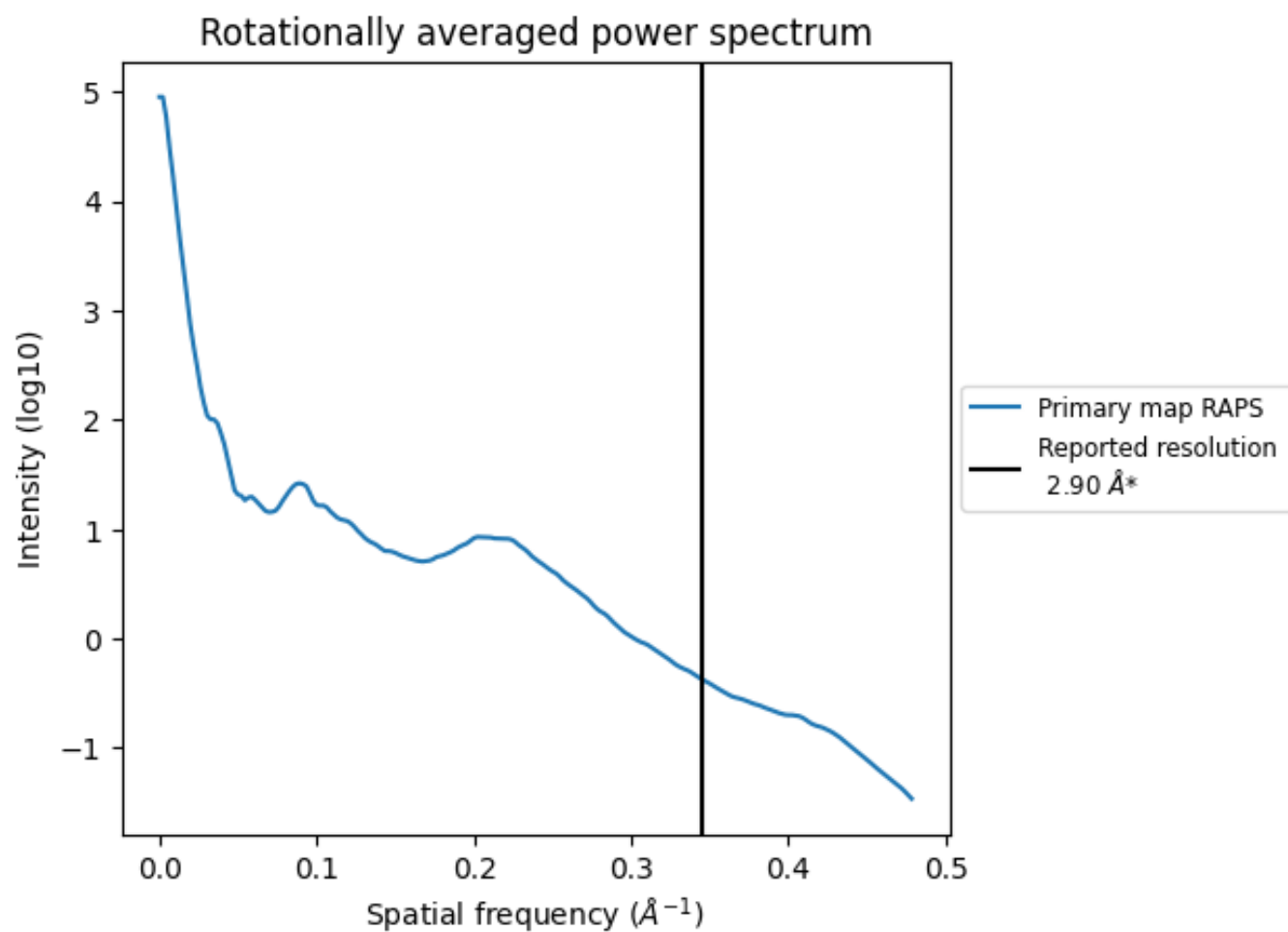
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 149 nm^3 ; this corresponds to an approximate mass of 135 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 ⓘ

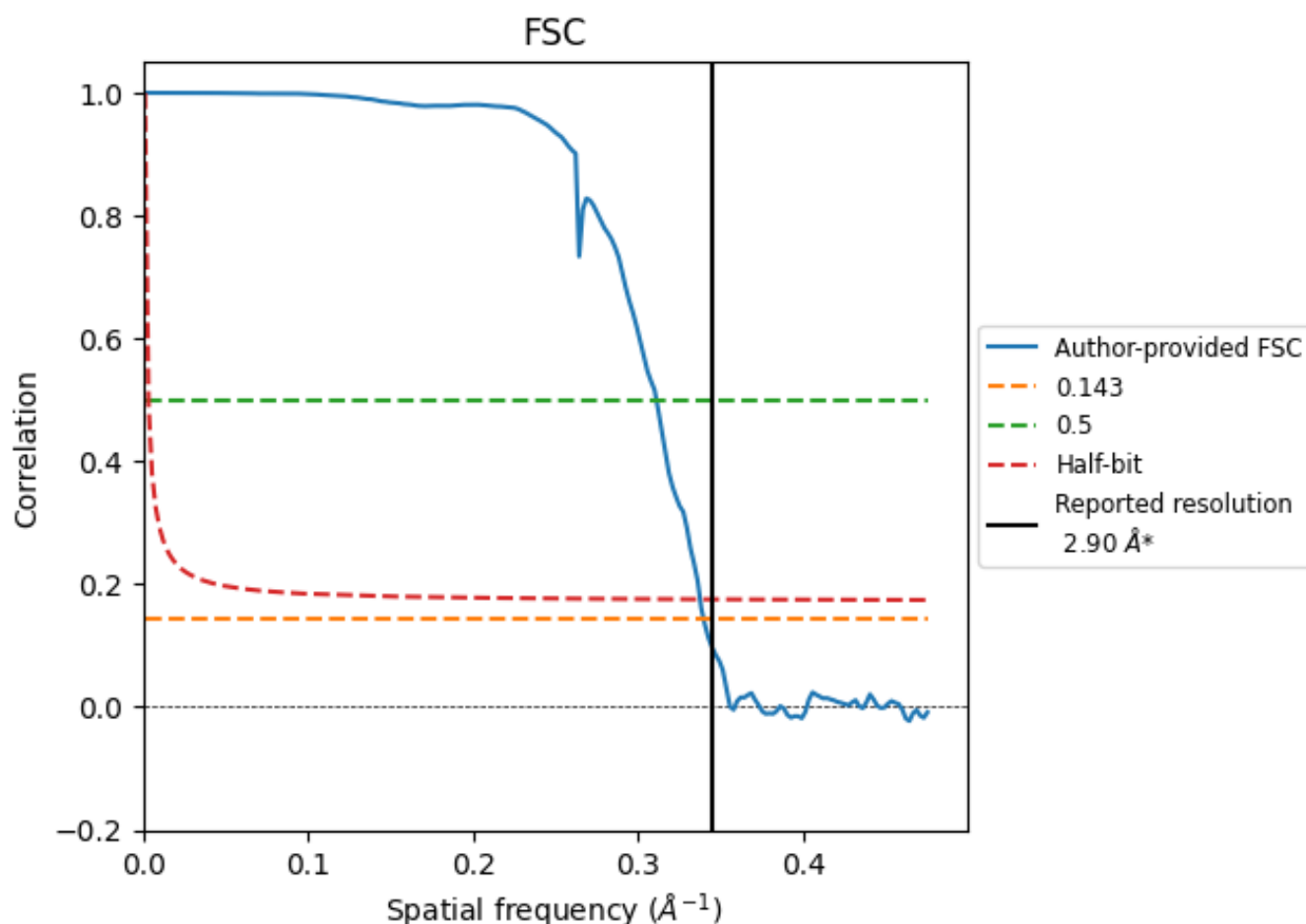


*Reported resolution corresponds to spatial frequency of 0.345 Å⁻¹

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 0.345 Å⁻¹

8.2 Resolution estimates [i](#)

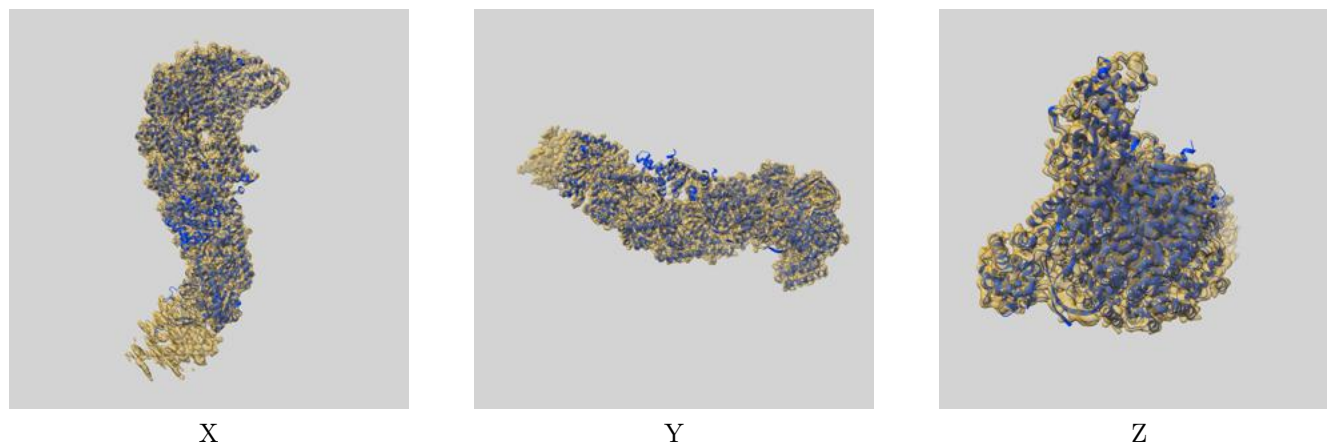
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.90	-	-
Author-provided FSC curve	2.94	3.22	2.96
Unmasked-calculated*	-	-	-

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

9 Map-model fit [i](#)

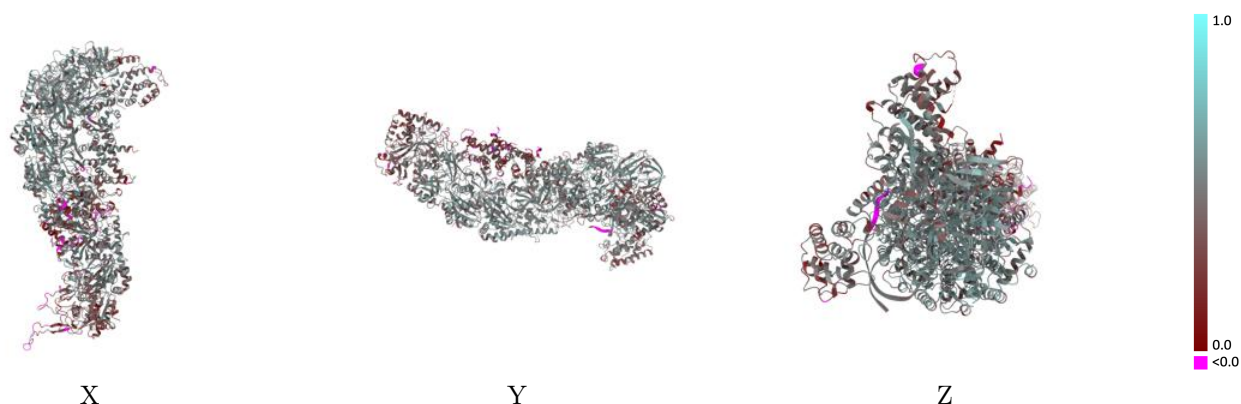
This section contains information regarding the fit between EMDB map EMD-24974 and PDB model 7SBA. Per-residue inclusion information can be found in [section 3](#) on [page 6](#).

9.1 Map-model overlay [i](#)



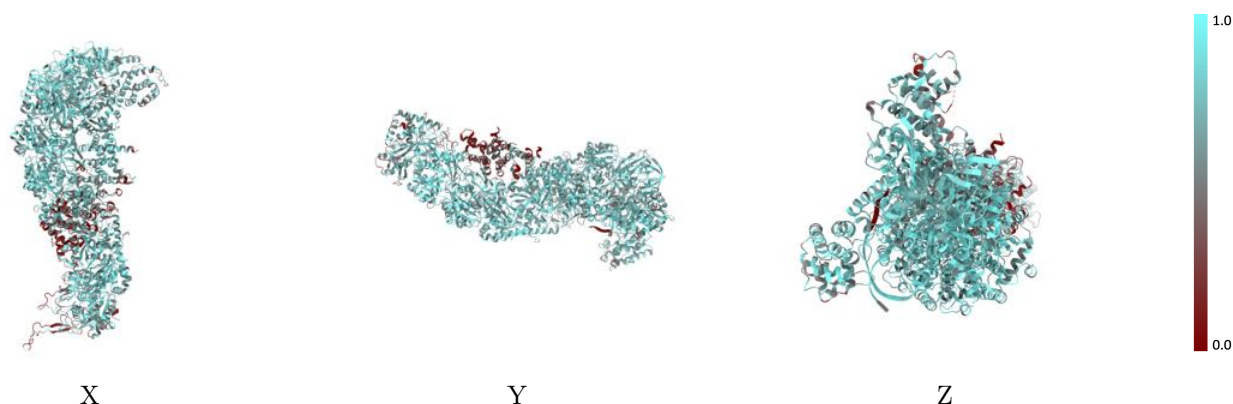
The images above show the 3D surface view of the map at the recommended contour level 0.106 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



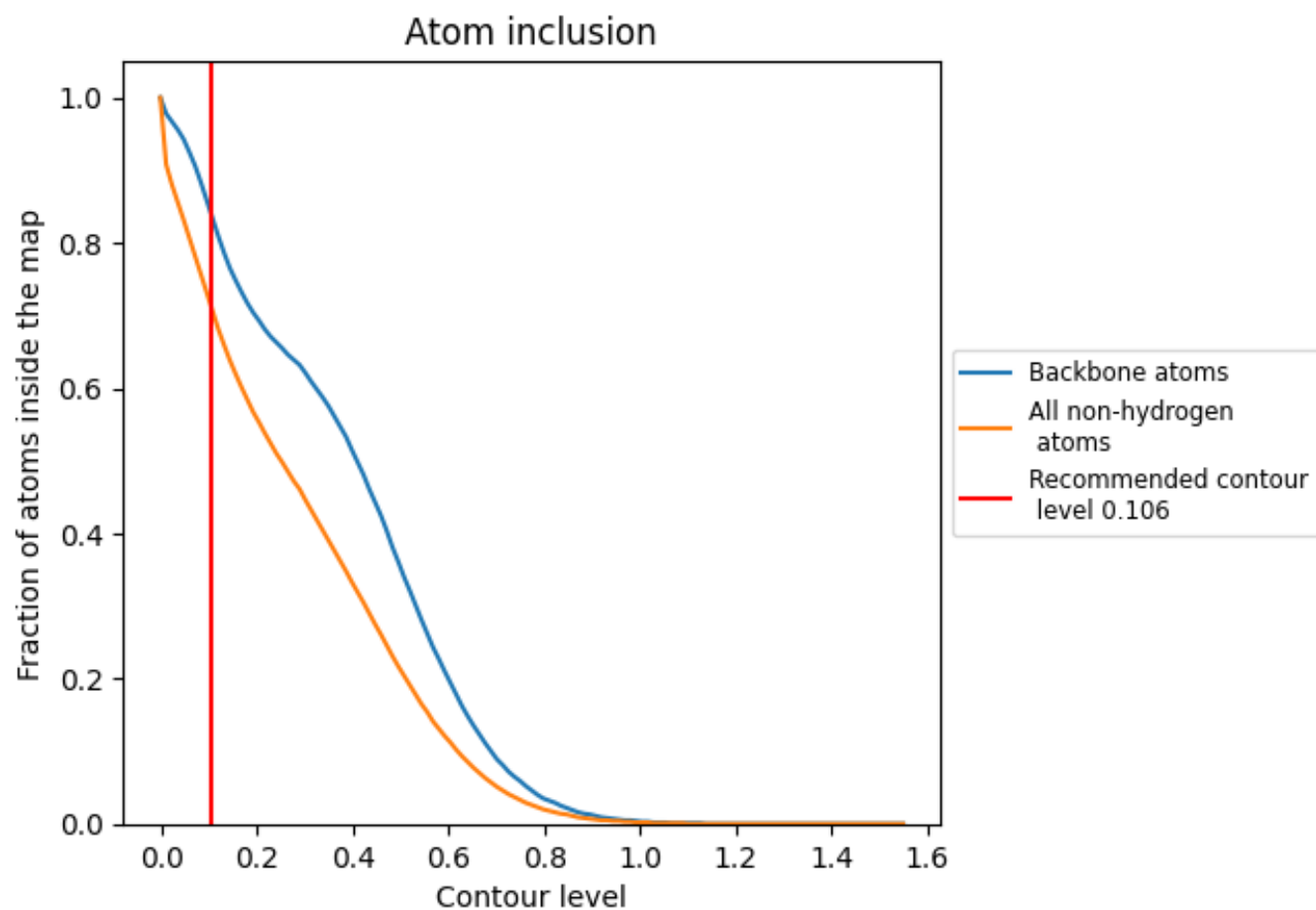
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.106).

9.4 Atom inclusion [i](#)



At the recommended contour level, 84% 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 (0.106) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7090	0.4530
A	0.7540	0.5060
B	0.7720	0.5140
C	0.8020	0.5130
D	0.7810	0.5060
E	0.7200	0.4780
F	0.7340	0.4440
G	0.5890	0.3300
H	0.8010	0.5250
I	0.7190	0.4470
J	0.5020	0.3320
K	0.2260	0.2140
X	0.6710	0.4650
Y	0.5130	0.2700
Z	0.8840	0.5320

