WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB EM Validation Report ⓘ

Apr 15, 2025 – 07:27 PM EDT

PDB ID	:	9N81 / pdb_00009n81
EMDB ID	:	EMD-49108
Title	:	A gap-filling complex with Pol mu engaged in the NHEJ Pathway
Authors	:	Li, J.; Liu, L.; Gellert, M.; Yang, W.
Deposited on	:	2025-02-07
Resolution	:	2.80 Å(reported)
Based on initial model	:	9CQ3

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

EMDB validation analysis	:	0.0.1.dev117
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.42

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.80 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	Percentile Ranks	Value
Ramachandran outliers		0
Sidechain outliers		3.3%

Worse   *Better*

■ Percentile relative to all structures

▯ Percentile relative to all EM structures
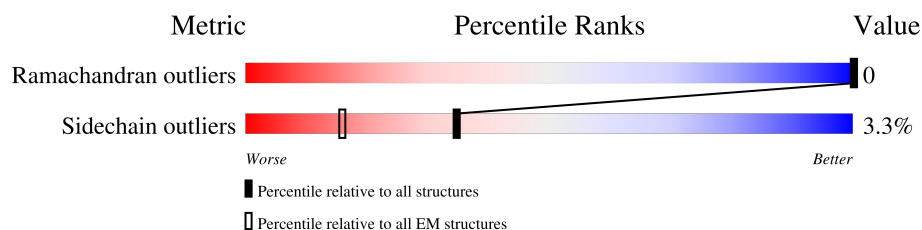
Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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 <=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	612	83% · 16%
1	a	612	81% · 17%
2	B	732	69% · 30%
2	b	732	68% · 30%
3	C	302	75% · 21%
3	c	302	76% · 22%
4	D	336	58% · 40%
4	E	336	55% 5% 40%
4	d	336	58% · 40%

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Mol	Chain	Length	Quality of chain
4	e	336	58% · 40%
5	F	914	72% · 26%
5	f	914	26% · 72%
6	G	218	10% 89%
6	H	218	11% 89%
7	I	68	56% 44%
8	J	68	62% 38%
9	K	51	67% 33%
10	L	50	72% · 26%
11	M	512	81% · 16%
11	m	512	18% · 81%

2   Entry composition ⓘ

There are 13 unique types of molecules in this entry. The entry contains 41888 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 X-ray repair cross-complementing protein 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	516	Total 4169	C 2665	N 704	O 781	S 19	0	0
1	a	507	Total 4094	C 2617	N 693	O 766	S 18	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP P12956
A	-1	PRO	-	expression tag	UNP P12956
A	0	VAL	-	expression tag	UNP P12956
a	-2	GLY	-	expression tag	UNP P12956
a	-1	PRO	-	expression tag	UNP P12956
a	0	VAL	-	expression tag	UNP P12956

- Molecule 2 is a protein called X-ray repair cross-complementing protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	512	Total 4115	C 2631	N 691	O 770	S 23	1	0
2	b	511	Total 4100	C 2623	N 686	O 768	S 23	0	0

- Molecule 3 is a protein called Non-homologous end-joining factor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	238	Total 1887	C 1207	N 317	O 348	S 15	0	0
3	c	235	Total 1869	C 1195	N 314	O 345	S 15	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-2	GLY	-	expression tag	UNP Q9H9Q4
C	-1	PRO	-	expression tag	UNP Q9H9Q4
C	0	VAL	-	expression tag	UNP Q9H9Q4
c	-2	GLY	-	expression tag	UNP Q9H9Q4
c	-1	PRO	-	expression tag	UNP Q9H9Q4
c	0	VAL	-	expression tag	UNP Q9H9Q4

- Molecule 4 is a protein called DNA repair protein XRCC4.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	202	Total	C	N	O	S	0	0
			1633	1034	279	313	7		
4	E	201	Total	C	N	O	S	0	0
			1628	1031	278	312	7		
4	d	200	Total	C	N	O	S	0	0
			1623	1028	277	311	7		
4	e	200	Total	C	N	O	S	0	0
			1623	1028	277	311	7		

- Molecule 5 is a protein called DNA ligase 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	F	679	Total	C	N	O	S	0	0
			5503	3504	945	1021	33		
5	f	255	Total	C	N	O	S	0	0
			2069	1315	349	392	13		

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	-2	GLY	-	expression tag	UNP P49917
F	-1	PRO	-	expression tag	UNP P49917
F	0	VAL	-	expression tag	UNP P49917
f	-2	GLY	-	expression tag	UNP P49917
f	-1	PRO	-	expression tag	UNP P49917
f	0	VAL	-	expression tag	UNP P49917

- Molecule 6 is a protein called Protein PAXX.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	23	Total	C	N	O	S	0	0
			165	105	27	32	1		

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Mol	Chain	Residues	Atoms					AltConf	Trace
6	H	23	Total	C	N	O	S	0	0
			165	105	27	32	1		

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	-13	MET	-	expression tag	UNP Q9BUH6
G	-12	GLY	-	expression tag	UNP Q9BUH6
G	-11	SER	-	expression tag	UNP Q9BUH6
G	-10	SER	-	expression tag	UNP Q9BUH6
G	-9	HIS	-	expression tag	UNP Q9BUH6
G	-8	HIS	-	expression tag	UNP Q9BUH6
G	-7	HIS	-	expression tag	UNP Q9BUH6
G	-6	HIS	-	expression tag	UNP Q9BUH6
G	-5	HIS	-	expression tag	UNP Q9BUH6
G	-4	HIS	-	expression tag	UNP Q9BUH6
G	-3	SER	-	expression tag	UNP Q9BUH6
G	-2	GLN	-	expression tag	UNP Q9BUH6
G	-1	ASP	-	expression tag	UNP Q9BUH6
G	0	PRO	-	expression tag	UNP Q9BUH6
H	-13	MET	-	expression tag	UNP Q9BUH6
H	-12	GLY	-	expression tag	UNP Q9BUH6
H	-11	SER	-	expression tag	UNP Q9BUH6
H	-10	SER	-	expression tag	UNP Q9BUH6
H	-9	HIS	-	expression tag	UNP Q9BUH6
H	-8	HIS	-	expression tag	UNP Q9BUH6
H	-7	HIS	-	expression tag	UNP Q9BUH6
H	-6	HIS	-	expression tag	UNP Q9BUH6
H	-5	HIS	-	expression tag	UNP Q9BUH6
H	-4	HIS	-	expression tag	UNP Q9BUH6
H	-3	SER	-	expression tag	UNP Q9BUH6
H	-2	GLN	-	expression tag	UNP Q9BUH6
H	-1	ASP	-	expression tag	UNP Q9BUH6
H	0	PRO	-	expression tag	UNP Q9BUH6

- Molecule 7 is a DNA chain called DNA (38-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
7	I	38	Total	C	N	O	P	0	0
			771	370	131	232	38		

- Molecule 8 is a DNA chain called DNA (42-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
8	J	42	Total 857	C 410	N 154	O 251	P 42	0	0

- Molecule 9 is a DNA chain called DNA (34-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
9	K	34	Total 702	C 335	N 136	O 198	P 33	0	0

- Molecule 10 is a DNA chain called DNA (37-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
10	L	37	Total 763	C 364	N 137	O 225	P 37	0	0

- Molecule 11 is a protein called DNA-directed DNA/RNA polymerase mu.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	M	428	Total 3389	C 2139	N 622	O 614	S 14	0	0
11	m	96	Total 732	C 457	N 135	O 134	S 6	0	0

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
M	-17	HIS	-	expression tag	UNP Q9NP87
M	-16	HIS	-	expression tag	UNP Q9NP87
M	-15	HIS	-	expression tag	UNP Q9NP87
M	-14	HIS	-	expression tag	UNP Q9NP87
M	-13	HIS	-	expression tag	UNP Q9NP87
M	-12	HIS	-	expression tag	UNP Q9NP87
M	-11	SER	-	expression tag	UNP Q9NP87
M	-10	SER	-	expression tag	UNP Q9NP87
M	-9	GLY	-	expression tag	UNP Q9NP87
M	-8	LEU	-	expression tag	UNP Q9NP87
M	-7	GLU	-	expression tag	UNP Q9NP87
M	-6	VAL	-	expression tag	UNP Q9NP87
M	-5	LEU	-	expression tag	UNP Q9NP87
M	-4	PHE	-	expression tag	UNP Q9NP87
M	-3	GLN	-	expression tag	UNP Q9NP87
M	-2	GLY	-	expression tag	UNP Q9NP87
M	-1	PRO	-	expression tag	UNP Q9NP87

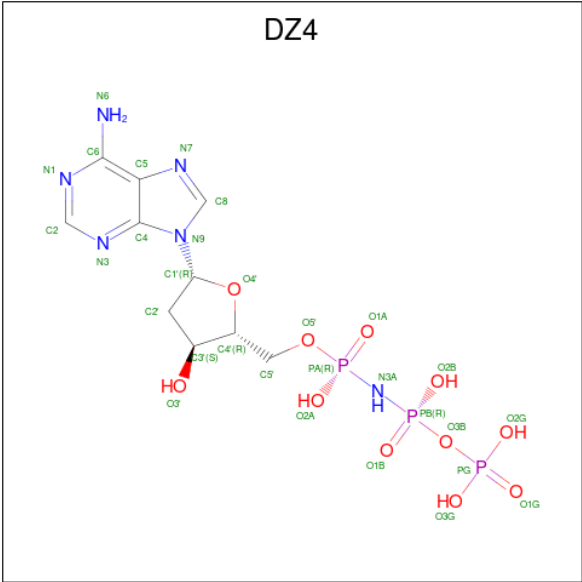*Continued on next page...*

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Chain	Residue	Modelled	Actual	Comment	Reference
M	0	HIS	-	expression tag	UNP Q9NP87
m	-17	HIS	-	expression tag	UNP Q9NP87
m	-16	HIS	-	expression tag	UNP Q9NP87
m	-15	HIS	-	expression tag	UNP Q9NP87
m	-14	HIS	-	expression tag	UNP Q9NP87
m	-13	HIS	-	expression tag	UNP Q9NP87
m	-12	HIS	-	expression tag	UNP Q9NP87
m	-11	SER	-	expression tag	UNP Q9NP87
m	-10	SER	-	expression tag	UNP Q9NP87
m	-9	GLY	-	expression tag	UNP Q9NP87
m	-8	LEU	-	expression tag	UNP Q9NP87
m	-7	GLU	-	expression tag	UNP Q9NP87
m	-6	VAL	-	expression tag	UNP Q9NP87
m	-5	LEU	-	expression tag	UNP Q9NP87
m	-4	PHE	-	expression tag	UNP Q9NP87
m	-3	GLN	-	expression tag	UNP Q9NP87
m	-2	GLY	-	expression tag	UNP Q9NP87
m	-1	PRO	-	expression tag	UNP Q9NP87
m	0	HIS	-	expression tag	UNP Q9NP87

- Molecule 12 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
12	M	1	1	1	0

- Molecule 13 is 2'-deoxy-5'-O-[(R)-hydroxy{[(R)-hydroxy(phosphonooxy)phosphoryl]amino} phosphoryl]adenosine (CCD ID: DZ4) (formula: $C_{10}H_{17}N_6O_{11}P_3$).

DZ4

Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
13	M	1	30	10	6	11	3	0

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: X-ray repair cross-complementing protein 6

Chain A:

- Molecule 1: X-ray repair cross-complementing protein 6

Chain a:

- Molecule 2: X-ray repair cross-complementing protein 5

Chain B:

- Molecule 2: X-ray repair cross-complementing protein 5

Chain b:

68%　　　　　30%

MET VAL ARG SER GLY **N6** VAL THR ALA GLN GLU ILE PHE GLN ASP ASN HIS GLU ASP GLY LYS GLU ASP GLY SER GLY SER ASP ARG ASP GLY PHE ARG LEU GLY LEU GLY HIS GLY PRO PHE PRO LEU LYS **G196** THR SER VAL GLY SER VAL ASN PRO ALA GLU ASN PHE ARG VAL LEU

(with highlighted residues: N6, M20, N66, L83, D87, K97, L169, G196, H246, K286, C296, F323, C339, K465, K525)

A542 LYS LYS ASP GLN VAL THR ALA SER PHE GLU GLU ALA SER ASN GLN LEU ILE ASN HIS ILE GLU GLN PHE LEU ASP THR ASN GLU THR PRO TYR PHE MET LYS SER ILE ASP CYS ILE ARG ALA ARG GLU GLU ALA ILE LYS SER GLU GLU GLU ALA LYS PHE LEU ALA PRO LYS ASP LYS SER PRO GLY ASP ASP THR ALA ALA PHE LEU LYS ALA

VAL LYS GLN LYS ALA SER PHE GLU GLU ALA SER ASN GLN LEU ILE ASN HIS ILE GLU GLN PHE LEU ASP THR ASN GLU THR PRO TYR PHE MET LYS SER ILE ASP CYS ILE ARG ALA ARG GLU ALA GLU GLU ALA ILE LYS SER GLU GLU GLU ALA LYS PHE LEU ALA

LEU GLN GLU GLU GLY LYS VAL GLU ILE LYS GLN LEU ASN HIS PHE TRP GLU ILE VAL VAL GLN ASP GLY ILE LEU THR LEU ILE LYS GLU GLU GLN ALA SER GLY SER SER VAL THR ALA GLU GLU ALA LYS PHE LEU ALA PRO LYS ASP LYS SER PRO GLY ASP ASP ALA ALA PHE GLU GLU

GLY GLY ASP VAL ASP ASP LEU LEU ASP MET ILE

● Molecule 3: Non-homologous end-joining factor 1

Chain C:

75%　　　　　21%

GLY **P-1** LYS **K26** **E47** **Q48** **V49** **H89** **R107** **S110** **S129** **S132** **Y167** **R176** **E182** **S188** **G229** GLN LYS HIS GLN GLY ALA GLY ASP PRO HIS THR SER ASN SER ALA SER LEU GLN GLY ILE LEU ASP SER ARG GLN CYS VAL ASN GLN PRO GLU GLN GLU LEU VAL

SER SER ALA PRO THR LEU SER ALA PRO GLU LYS GLU THR GLY SER GLY THR SER GLY PRO LEU GLN ARG PRO GLN LEU SER LYS VAL LYS ARG LYS **K293** **S299**

● Molecule 3: Non-homologous end-joining factor 1

Chain c:

76%　　　　　22%

GLY PRO **V0** **M1** **L37** **Q42** **C74** **S188** **C202** **Q227** VAL GLY GLN LYS HIS GLN GLY ALA GLY ASP PRO HIS THR SER ASN SER ALA SER LEU GLN GLY ILE LEU ASP SER GLN GLN CYS VAL ASN GLN PRO GLU GLN GLU LEU VAL SER SER ALA SER ALA PRO THR LEU SER ALA PRO GLU

LYS GLU SER THR GLY THR SER GLY PRO LEU GLN ARG PRO GLN LEU SER LYS VAL LYS ARG LYS **K293** **S299**

● Molecule 4: DNA repair protein XRCC4

Chain D:

58%　　　　　40%

M1 LYS **Y66** **Y84** **N87** **K140** **N141** **E142** CYS **C165** **V166** **L184** **A202** GLN GLU ARG GLU LYS ASP ILE LYS GLN GLU GLY THR ALA ILE CYS SER GLU MET THR ALA ASP ARG ASP PRO VAL TYR ASP GLU SER THR ASP GLU GLU SER GLU ASN GLN THR ASP LEU SER

GLY LEU ALA SER ALA ALA VAL SER LYS ASP ASP SER ILE ILE SER LEU ASP VAL THR ASP ILE ALA PRO SER ARG LYS ARG ARG GLN MET GLN ASN ALA GLU GLY LEU GLU LYS GLU SER ARG ASP PRO SER SER

LEU PRO GLU GLU THR SER LYS LYS GLU HIS ILE SER ALA GLU ASN MET SER LEU GLU THR LEU ARG ASN SER SER PRO GLU ASP PHE LEU PHE ASP GLU ILE

● Molecule 4: DNA repair protein XRCC4

Chain E: 55% 5% 40%

M1 T17 H18 Q21 S53 K63 C93 F96 S105 N118 R153 D157 F162 C165 K190 S193 N200 A201 ALA GLN GLU ARG GLU LYS ASP ILE LYS GLN GLU GLY GLU THR ALA ILE CYS SER GLU MET THR ALA ASP ARG ASP PRO VAL

TYR ASP GLU SER ASP GLU GLU SER GLU ASN GLN THR ASP LEU SER GLY LEU ALA SER ALA ALA VAL SER LYS ASP ASP SER ILE ILE SER SER LEU GLU THR LEU ARG ASN SER SER PRO GLU ASP LEU PHE ASP GLU ILE

GLN GLU ASN GLN LEU GLN GLU LYS GLU SER ARG PRO ASP SER SER LEU PRO GLU THR SER LYS LYS GLU HIS ILE SER ALA GLU ASN MET LEU GLY THR LEU ARG ASN SER SER PRO GLU ASP LEU PHE ASP GLU ILE

• Molecule 4: DNA repair protein XRCC4

Chain d: 58% • 40%

M1 S23 K63 K164 S167 D175 N200 ALA ALA GLN GLU ARG GLU LYS ASP LYS GLN GLU GLY GLU THR ALA ILE CYS SER GLU MET THR ALA ASP ARG ASP PRO VAL TYR ASP GLU SER THR ASP GLU GLU SER GLU GLN THR ASP LEU SER GLY LEU ALA

SER ALA ALA VAL SER LYS ASP ASP SER ILE ILE SER SER LEU ASP VAL THR ASP ILE ALA PRO SER ARG LYS ARG GLN ARG MET GLN ASN LEU GLY THR GLU PRO LYS MET ALA PRO GLN GLU ASN GLN LEU GLN ARG GLU LYS GLU SER ARG ASP ASP SER LEU PRO GLU

THR SER LYS LYS HIS ILE SER ALA GLU ASN MET SER LEU GLU THR LEU ARG ASN SER SER PRO GLU ASP LEU PHE ASP GLU ILE

• Molecule 4: DNA repair protein XRCC4

Chain e: 58% • 40%

M1 R7 D38 E55 F106 R161 C165 N200 ALA ALA GLN GLU ARG GLU LYS ASP ILE LYS GLN GLU GLY THR ALA ILE CYS SER GLU MET THR ALA ASP ARG ASP PRO VAL TYR ASP GLU SER THR ASP GLU GLU SER GLU GLN THR ASP LEU SER GLY

LEU ALA SER ALA VAL SER LYS ASP ASP SER ILE ILE SER SER LEU ASP VAL THR ASP ILE ALA PRO SER ARG LYS ARG GLN ARG MET GLN ASN LEU GLY THR GLU PRO LYS MET ALA PRO GLN GLU ASN GLN LEU GLN GLU LYS GLU SER ARG PRO ASP SER SER LEU

PRO GLU THR SER LYS LYS HIS ILE LE SER ALA GLU ASN MET SER LEU GLU THR LEU ARG ASN SER SER PRO GLU ASP LEU PHE ASP GLU ILE

• Molecule 5: DNA ligase 4

Chain F: 72% • 26%

GLY PRO VAL MET ALA ALA SER GLN THR SER Q8 S12 S21 D51 T114 PRO THR GLY THR HIS GLY ASP ALA G123 N209 D210 D220 M263 S267 M281 C326 M343 Q344 K345 GLY THR LYS PHE ASP ILE LYS ARG MET VAL GLU ASP SER ASP LEU

GLN T362 C365 E453 TYR VAL SER GLY LEU MET ASP GLU GLU LEU ASP ILE LEU ILE VAL GLY LEU TYR TRP GLY GLY LYS SER MET MET SER HIS PHE LEU CYS ALA VAL ALA GLU GLY LYS PRO PRO GLY GLU LYS PRO SER VAL PHE HIS THR LEU SER ARG VAL GLY

SER GLY CYS THR MET LYS GLU LEU TYR ASP LEU GLY LEU LYS LEU ALA LYS TYR TRP LYS PRO PHE HIS ARG LYS ALA PRO MET PRO SER ILE LEU CYS GLY THR GLU GLU LYS PRO GLU VAL TYR ILE GLU LEU ALA SER LYS HIS VAL ILE LYS GLN ILE ALA ALA GLU GLU ILE VAL PRO SER

ASP MET TYR LYS THR GLY LYS CYS THR THR LEU ARG LEU PHE PRO ARG ILE GLU ILE ARG ASP LYS GLU TRP HIS GLU CYS MET THR LEU ASP GLU LEU GLU LEU ARG GLY LYS ALA SER GLY LEU ALA SER LYS HIS LEU TYR ILE GLY GLY ASP GLU PRO GLN GLU LYS LYS

ARG LYS ALA ALA PRO LYS MET LYS LYS VAL ILE GLY ILE ILE GLU GLU GLU HIS LEU LYS ALA PRO ASN LEU THR ASN VAL ASN **K654** **Q739** **M743** **H848** **H862** **R871** **E905** **E906** **L910** ILE

- Molecule 5: DNA ligase 4

Chain f: 26% · 72%

GLY PRO VAL MET ALA ALA SER GLN THR SER GLN THR VAL ALA SER HIS VAL PRO PHE ALA ASP LEU CYS SER THR LEU GLU ARG ILE GLN LYS SER LYS GLY ALA ALA GLU LYS ILE LYS ARG PHE ARG GLU PHE LEU ASP SER TRP ARG LYS PHE HIS ASP ALA LEU HIS LYS ASN HIS

LYS ASP VAL THR ASP SER PHE TYR PRO ALA MET ARG LEU ILE LEU PRO GLN LEU GLU ARG GLU MET ALA TYR GLY ILE LYS GLU THR MET LEU ALA LYS LEU TYR ILE GLU LEU LEU ASN LEU PRO ARG ASP GLY LYS ASP ALA LEU LYS LEU LEU ASN TYR ARG THR PRO THR GLY

THR HIS GLY ASP ALA GLY ASP PHE ALA MET ILE ALA TYR PHE VAL LEU LYS PRO ARG CYS LEU GLN LYS GLY SER LEU THR ILE GLN GLN VAL ASN ASP LEU LEU ASP SER ILE ALA SER ASN ASN SER ALA LYS ARG LYS ASP LEU ILE LYS SER LEU GLN ILE THR GLN

SER SER ALA GLU GLN TRP LEU ILE ARG MET ILE ILE LYS ASP LEU LYS LEU GLY VAL SER GLN GLN THR ILE PHE SER VAL PHE HIS ASN ASP ALA ALA GLU LEU HIS ASN VAL THR THR ASP LEU GLU LYS VAL CYS ARG GLN LEU HIS ASP SER VAL LEU SER ASP

ILE SER ILE THR LEU PHE SER ALA PHE LYS PRO MET LEU ALA ALA ILE ALA ASP ILE GLU HIS GLU LYS MET LYS HIS LEU GLN SER PHE TYR ILE GLU LEU THR LYS LEU ASP GLY ARG MET GLN HIS ILE ASP SER VAL LYS TYR PHE SER ARG ASN GLY TYR ASN

TYR THR ASP GLN PHE GLY ALA SER PRO GLU THR GLY GLY SER LEU THR PRO PHE ILE HIS ASN ALA PHE LYS ALA ASP ILE LEU GLN LEU LEU CYS ILE LEU LEU ASP GLY MET MET ALA TYR ASN PRO ASN THR GLN THR PHE MET GLN LYS ASP GLY THR LYS PHE ASP ILE ARG MET VAL GLU ASP

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

LEU ASN GLU ALA ILE ASP LYS ARG GLU GLY GLY ILE MET VAL LYS GLN PRO LEU SER ILE TYR LYS PRO ASP ALA ARG GLY GLU GLY TRP LEU LYS ILE LYS PRO GLU TYR VAL SER GLY GLY GLY SER THR ARG GLY

GLY MET MET SER HIS PHE LEU CYS ALA VAL ALA GLU GLY LYS PRO PRO PRO GLY GLU LYS PRO LEU SER VAL PHE HIS THR LEU SER ARG VAL GLY GLY SER GLY THR MET LYS GLU LEU TYR ASP SER MET TYR LYS LYS ALA LYS TRP LYS PRO PHE HIS ARG LYS ALA PRO PRO SER SER

ILE LEU CYS GLY THR GLU LYS PRO GLU GLU VAL VAL TYR ILE GLU GLY PRO CYS ASN SER VAL ILE GLN GLN ILE LYS ALA GLU LEU PRO ASP ALA MET TYR LYS LYS THR GLY ILE CYS THR LEU ARG PHE PRO ARG ILE GLU ILE LEU VAL GLY GLY ILE ILE GLU GLU HIS LEU LYS ALA PRO ASN LEU THR ASN VAL ASN LYS LYS ILE **S656**

V662 **M667** **Q673** **R681** **I682** **A683** **C747** **E757** **Y758** **D759** **S764** **Y765** **D770** **F847** **H848** **C901** **L910** ILE

- Molecule 6: Protein PAXX

Chain G: 10% 89%

MET GLY SER SER HIS HIS HIS HIS HIS HIS SER GLN ASP PRO MET ASP PRO LEU SER PRO LEU CYS THR LEU PRO PRO GLY PRO GLU PRO ARG PHE VAL CYS TYR CYS GLY LEU GLU GLU GLU SER GLY GLU GLY ASP ARG ARG GLY PHE ASN LEU TYR VAL THR ASP ALA ALA GLU

LEU TRP SER THR CYS PHE PRO THR PRO ASP SER PRO SER LEU ALA ALA LEU LYS ALA ARG PHE GLY LEU SER ALA ALA GLU PHE LEU ASP LEU GLN LEU ALA VAL ALA LEU GLU LEU GLN GLN ASP ARG ALA SER GLU LEU THR LEU SER ARG GLY PRO ALA LEU ALA LEU ALA

PHE ASP LEU SER LYS VAL PRO GLY PRO GLU ALA PRO ARG LEU ALA PRO ARG LEU ALA ALA CYS GLU GLN GLN ALA VAL LEU GLU LEU ASP ARG ALA SER GLU LEU ALA THR GLY ILE LEU PRO GLN PHE LEU ASP PRO ASP ASP

PRO GLN ARG GLY GLY PRO GLY PRO GLY VAL ARG ARG **C180** D200 F201 D202 GLU THR

• Molecule 6: Protein PAXX

Chain H: 11% 89%

MET GLY SER SER HIS HIS HIS HIS HIS SER GLN ASP PRO MET ASP PRO LEU SER PRO PRO LEU CYS THR LEU PRO PRO GLY PRO GLU PRO PRO ARG PHE VAL CYS CYS TYR GLU GLU GLU SER GLY GLU ASP ARG GLY GLY PHE ASN LEU TYR VAL THR ASP ALA ALA GLU

LEU TRP SER CYS PHE THR PRO ASP SER LEU ALA LEU LYS ALA ARG PHE GLY LEU SER ALA ALA GLU ASP ILE THR PRO ARG PHE ARG ALA ALA CYS GLU GLN GLN ALA VAL ALA LEU THR LEU GLN GLU ASP ARG ALA SER LEU THR LEU SER GLY PRO SER ALA LEU ALA

PHE ASP LEU SER LYS VAL PRO GLY PRO GLU ALA ALA PRO ARG ARG LEU ALA ALA LEU THR LEU GLY LEU ALA LYS ARG VAL TRP SER LEU GLU GLN ARG ARG LEU ALA ALA GLU GLU THR ALA VAL SER PRO ARG LYS SER PRO ARG ALA PRO ALA GLY PRO GLN LEU PHE LEU PRO ASP ASP PRO ASP

PRO GLN ARG GLY GLY PRO GLY PRO GLY VAL ARG ARG **C180** D202 GLU THR

• Molecule 7: DNA (38-MER)

Chain I: 56% 44%

DC DG DC DG DC DC DC DA DG DC DT DT DT DC DC DA DG DC DT DA DT DA DA DA DC DT DA DA **A31** T68

• Molecule 8: DNA (42-MER)

Chain J: 62% 38%

DC DG DC DG DC DC DC DA DG DC DT DT DT DC DC DA DG DC DT DA DT DA DA **C27** C68

• Molecule 9: DNA (34-MER)

Chain K: 67% 33%

G1 T34 DT DA DG DT DT DA DT DT DG DG DC DG DC DG

• Molecule 10: DNA (37-MER)

Chain L: 72% . 26%

G2 G38 DT DT DA DT DT DG DG DG DC DG DC DG

• Molecule 11: DNA-directed DNA/RNA polymerase mu

Chain M: 81% . 16%

HIS HIS HIS HIS HIS HIS SER SER GLY LEU GLU VAL LEU PHE GLN GLY PRO HIS MET LEU PRO LYS ARG ARG ALA ARG VAL GLY SER PRO SER GLY ASP ALA ALA SER SER THR PRO PRO SER T25 H68 M87 R122 LEU GLU VAL ALA GLY PRO ARG LYS GLY PRO LEU

SER PRO A136 R230 T261 D264 H337 E340 E343 Y362 H365 Q366 HIS SER CYS CYS GLU SER PRO THR ARG LEU ALA GLN SER HIS MET ASP A384 F385 P398 GLY ALA ALA VAL GLY GLY SER THR ARG PRO CYS PRO S411 E476 A494

• Molecule 11: DNA-directed DNA/RNA polymerase mu

Chain m: 18%   •   81%

HIS HIS HIS HIS HIS HIS SER SER GLY LEU GLU VAL LEU PHE GLN GLY PRO HIS MET LEU PRO LYS ARG ARG ALA ARG VAL GLY SER PRO SER GLY ASP ALA ALA SER SER THR PRO PRO SER THR ARG F27 C62 M71 C94 T95 R122 LEU GLU VAL ALA GLY PRO

ARG LYS GLY PRO LEU SER PRO ALA TRP MET PRO ALA TYR ALA CYS GLN ARG PRO THR PRO LEU THR HIS HIS ASN THR GLY LEU SER GLU GLU ALA LEU GLU GLU ILE LEU ALA GLU ALA GLY PHE GLU GLY GLU ARG TYR GLN THR MET LYS LEU PHE THR GLN ILE PHE GLY VAL VAL LEU LYS ALA

LEU PRO SER PRO VAL THR THR LEU SER GLN LEU GLN GLY LEU PRO HIS PHE GLY GLU HIS SER SER ARG VAL VAL GLN GLU LEU LEU GLU HIS GLY VAL CYS GLU GLU VAL GLU ARG ARG ARG SER GLU ARG TYR GLN THR MET LYS LEU PHE THR GLN ILE PHE GLY VAL VAL LEU VAL GLY VAL

LYS THR ALA ASP ARG TRP TYR ARG GLU GLY LEU ARG THR LEU ASP ASP LEU ARG GLU THR GLY GLY PHE ARG GLY LYS LEU GLY ILE GLN HIS HIS LYS ALA GLY LEU GLN HIS HIS ASP SER LEU THR PRO VAL LEU ARG ASP VAL ASP LEU LEU GLN VAL GLU GLU ALA VAL GLY GLN

ALA LEU PRO GLY ALA THR VAL THR LEU THR GLY GLY PHE ARG ARG GLY LYS LEU GLN GLY HIS ASP VAL ASP PHE LEU ILE THR HIS PRO LYS GLU GLY GLU GLU ALA GLY LEU LEU GLN HIS HIS ASP ASP SER LEU THR PRO VAL LEU ARG PRO VAL MET CYS ARG LEU GLN ASP ALA GLY LEU ILE LEU TYR HIS GLN HIS HIS GLN HIS HIS SER

CYS CYS GLU SER PRO THR ARG LEU ALA GLN GLN GLN SER HIS MET ASP ALA PHE GLU GLU ARG SER PHE ARG LYS GLU ILE PHE ARG LEU PRO GLN PRO GLY GLY ALA ALA VAL GLY GLY SER THR ARG PRO CYS PRO SER TRP LYS ALA VAL ARG VAL ASP GLY LEU VAL LEU VAL ALA PRO VAL SER GLN PHE PRO

PHE ALA LEU LEU GLY TRP THR GLY SER LYS LEU PHE GLN ARG GLU LEU ARG ARG PHE SER ARG LYS GLU LYS GLY LEU LEU TRP LEU ASN SER HIS GLY LEU LEU ASP PRO GLU GLN GLY LYS THR PHE PHE GLN GLU ALA ALA SER GLU GLU ASP ILE PHE ARG HIS LEU GLY LEU GLU GLU TYR LEU PRO

PRO GLU GLN ARG ASN ALA

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	671447	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 $(e^-/\text{Å}^2)$	47.42	Depositor
Minimum defocus (nm)	600	Depositor
Maximum defocus (nm)	1200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.586	Depositor
Minimum map value	-0.200	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.012	Depositor
Recommended contour level	0.06	Depositor
Map size (Å)	426.496, 426.496, 426.496	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.833, 0.833, 0.833	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: MG, DZ4

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	0.25	0/4252	0.47	0/5728
1	a	0.25	0/4175	0.47	0/5626
2	B	0.25	0/4196	0.47	0/5661
2	b	0.25	0/4181	0.46	0/5642
3	C	0.24	0/1926	0.46	0/2610
3	c	0.24	0/1907	0.45	0/2584
4	D	0.25	0/1662	0.45	0/2235
4	E	0.26	0/1657	0.47	0/2228
4	d	0.26	0/1652	0.45	0/2221
4	e	0.25	0/1652	0.46	0/2221
5	F	0.24	0/5617	0.45	0/7568
5	f	0.25	0/2118	0.46	0/2862
6	G	0.25	0/169	0.36	0/226
6	H	0.26	0/169	0.37	0/226
7	I	0.50	0/861	0.94	0/1325
8	J	0.51	0/960	0.93	0/1478
9	K	0.55	0/790	0.92	0/1219
10	L	0.65	1/855 (0.1%)	0.97	0/1317
11	M	0.25	0/3468	0.50	0/4695
11	m	0.26	0/749	0.55	0/1017
All	All	0.28	1/43016 (0.0%)	0.53	0/58689

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
10	L	2	DG	OP3-P	-10.57	1.48	1.61

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2　Too-close contacts ⓘ

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

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	512/612 (84%)	500 (98%)	12 (2%)	0	100	100
1	a	505/612 (82%)	496 (98%)	9 (2%)	0	100	100
2	B	509/732 (70%)	500 (98%)	9 (2%)	0	100	100
2	b	507/732 (69%)	503 (99%)	4 (1%)	0	100	100
3	C	234/302 (78%)	224 (96%)	10 (4%)	0	100	100
3	c	231/302 (76%)	223 (96%)	8 (4%)	0	100	100
4	D	200/336 (60%)	193 (96%)	7 (4%)	0	100	100
4	E	199/336 (59%)	195 (98%)	4 (2%)	0	100	100
4	d	198/336 (59%)	196 (99%)	2 (1%)	0	100	100
4	e	198/336 (59%)	192 (97%)	6 (3%)	0	100	100
5	F	671/914 (73%)	657 (98%)	14 (2%)	0	100	100
5	f	253/914 (28%)	244 (96%)	9 (4%)	0	100	100
6	G	21/218 (10%)	21 (100%)	0	0	100	100
6	H	21/218 (10%)	21 (100%)	0	0	100	100
11	M	420/512 (82%)	404 (96%)	16 (4%)	0	100	100
11	m	94/512 (18%)	93 (99%)	1 (1%)	0	100	100
All	All	4773/7924 (60%)	4662 (98%)	111 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	468/550 (85%)	459 (98%)	9 (2%)	52	82
1	a	460/550 (84%)	450 (98%)	10 (2%)	47	79
2	B	464/649 (72%)	457 (98%)	7 (2%)	60	86
2	b	463/649 (71%)	451 (97%)	12 (3%)	41	75
3	C	210/264 (80%)	198 (94%)	12 (6%)	17	46
3	c	208/264 (79%)	202 (97%)	6 (3%)	37	71
4	D	180/303 (59%)	172 (96%)	8 (4%)	24	56
4	E	180/303 (59%)	164 (91%)	16 (9%)	8	25
4	d	180/303 (59%)	175 (97%)	5 (3%)	38	72
4	e	180/303 (59%)	174 (97%)	6 (3%)	33	67
5	F	611/810 (75%)	592 (97%)	19 (3%)	35	69
5	f	231/810 (28%)	218 (94%)	13 (6%)	17	47
6	G	18/173 (10%)	17 (94%)	1 (6%)	17	47
6	H	18/173 (10%)	18 (100%)	0	100	100
11	M	360/428 (84%)	347 (96%)	13 (4%)	30	64
11	m	77/428 (18%)	73 (95%)	4 (5%)	19	50
All	All	4308/6960 (62%)	4167 (97%)	141 (3%)	35	67

All (141) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	53	SER
1	A	92	LYS
1	A	206	LYS
1	A	252	ARG
1	A	258	ARG
1	A	360	HIS
1	A	409	TYR

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Mol	Chain	Res	Type
1	A	450	GLU
2	B	89	ASP
2	B	249	CYS
2	B	306	LEU
2	B	309	ASP
2	B	323	PHE
2	B	400	ARG
2	B	432	GLN
3	C	26	LYS
3	C	47	GLU
3	C	49	VAL
3	C	89	HIS
3	C	107	ARG
3	C	110	SER
3	C	129	SER
3	C	132	SER
3	C	167	TYR
3	C	176	ARG
3	C	182	GLU
3	C	188	SER
4	D	66	TYR
4	D	84	TYR
4	D	87	ASN
4	D	140	LYS
4	D	142	GLU
4	D	165	CYS
4	D	166	VAL
4	D	184	LEU
4	E	17	THR
4	E	18	HIS
4	E	21	GLN
4	E	53	SER
4	E	63	LYS
4	E	93	CYS
4	E	96	PHE
4	E	105	SER
4	E	118	ASN
4	E	153	ARG
4	E	157	ASP
4	E	162	PHE
4	E	165	CYS
4	E	190	LYS

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Mol	Chain	Res	Type
4	E	193	SER
4	E	200	ASN
5	F	12	SER
5	F	21	SER
5	F	51	ASP
5	F	209	ASN
5	F	210	ASP
5	F	220	ASP
5	F	263	MET
5	F	267	SER
5	F	281	MET
5	F	326	CYS
5	F	343	MET
5	F	365	CYS
5	F	739	GLN
5	F	743	MET
5	F	848	HIS
5	F	862	HIS
5	F	871	ARG
5	F	905	GLU
5	F	906	GLU
6	G	200	ASP
11	M	25	THR
11	M	68	HIS
11	M	87	MET
11	M	230	ARG
11	M	261	THR
11	M	264	ASP
11	M	337	HIS
11	M	340	GLU
11	M	343	GLU
11	M	362	TYR
11	M	365	HIS
11	M	385	PHE
11	M	476	GLU
1	a	192	ASP
1	a	200	LEU
1	a	257	SER
1	a	312	LEU
1	a	319	SER
1	a	351	LYS
1	a	357	LYS

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Mol	Chain	Res	Type
1	a	409	TYR
1	a	427	VAL
1	a	516	LYS
2	b	20	MET
2	b	66	ASN
2	b	83	LEU
2	b	87	ASP
2	b	97	LYS
2	b	246	HIS
2	b	286	LYS
2	b	296	CYS
2	b	323	PHE
2	b	339	CYS
2	b	465	LYS
2	b	525	LYS
3	c	1	MET
3	c	37	LEU
3	c	42	GLN
3	c	74	CYS
3	c	188	SER
3	c	202	CYS
4	d	23	SER
4	d	63	LYS
4	d	164	LYS
4	d	167	SER
4	d	175	ASP
4	e	7	ARG
4	e	38	ASP
4	e	55	GLU
4	e	106	PHE
4	e	161	ARG
4	e	165	CYS
5	f	662	VAL
5	f	667	MET
5	f	673	GLN
5	f	681	ARG
5	f	747	CYS
5	f	757	GLU
5	f	759	ASP
5	f	764	SER
5	f	765	TYR
5	f	770	ASP

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Mol	Chain	Res	Type
5	f	847	PHE
5	f	848	HIS
5	f	901	CYS
11	m	62	CYS
11	m	71	MET
11	m	94	CYS
11	m	95	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	264	ASN
2	B	517	ASN
4	E	21	GLN
5	F	200	GLN
5	F	227	GLN
11	M	329	HIS
1	a	65	GLN
2	b	104	GLN
3	c	17	GLN
3	c	133	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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 ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
13	DZ4	M	502	12	28,32,32	1.18	2 (7%)	33,50,50	1.21	2 (6%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
13	DZ4	M	502	12	-	3/15/34/34	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
13	M	502	DZ4	C8-N7	-2.49	1.30	1.34
13	M	502	DZ4	C4-N3	-2.15	1.32	1.35

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
13	M	502	DZ4	N3-C2-N1	-4.56	122.48	128.67
13	M	502	DZ4	C2'-C1'-N9	-2.12	109.70	114.61

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
13	M	502	DZ4	O4'-C4'-C5'-O5'
13	M	502	DZ4	C3'-C4'-C5'-O5'
13	M	502	DZ4	PA-N3A-PB-O1B

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand DZ4 M 502

Bond lengths   Bond angles

Torsions   Rings
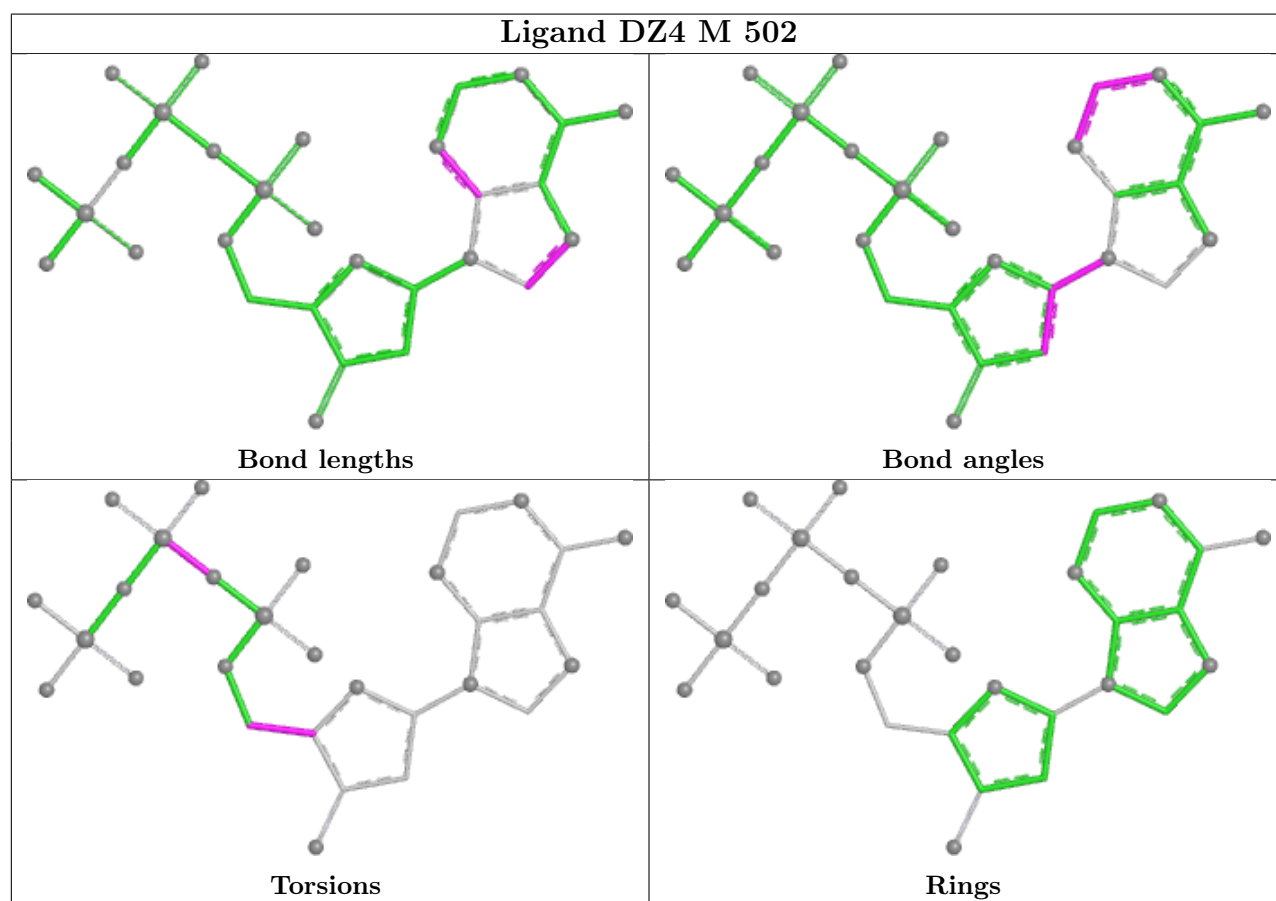
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6　Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-49108. 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 ⓘ
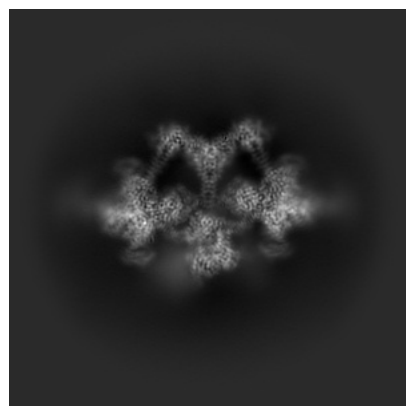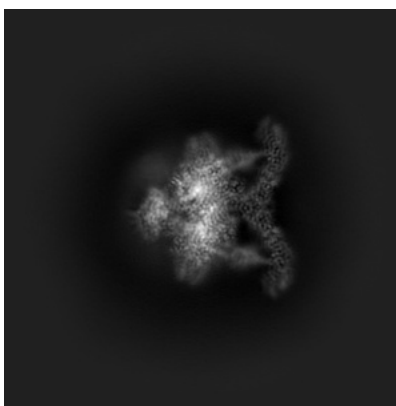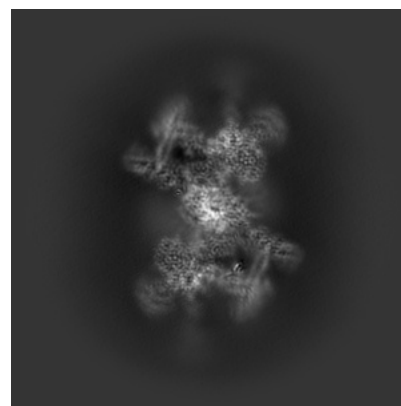
6.1.1　Primary map

X　　　　　　　　　　　Y　　　　　　　　　　　Z

6.1.2　Raw map

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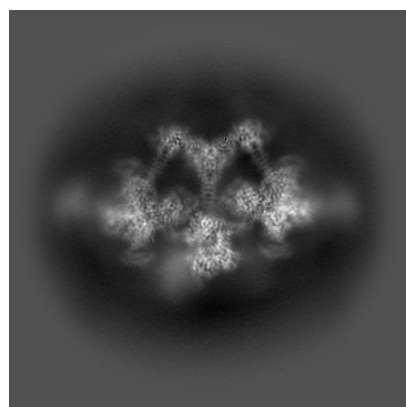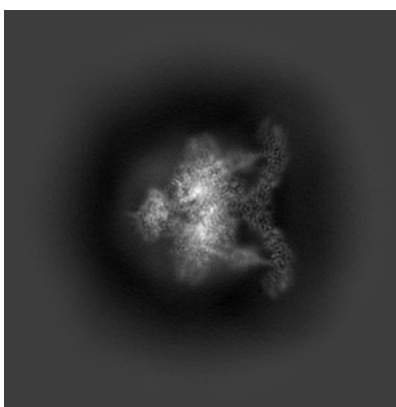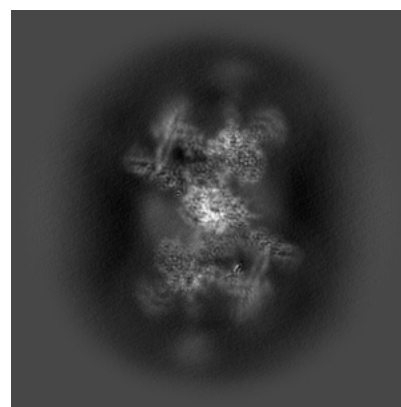
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

6.2.1 Primary map
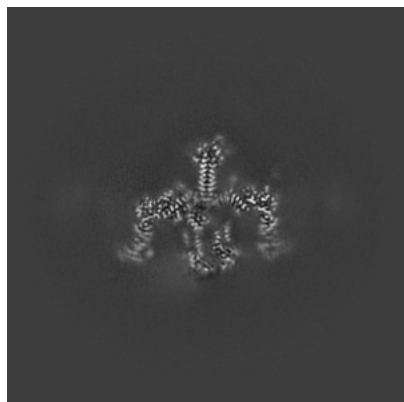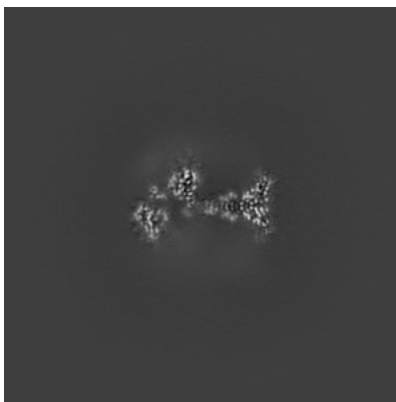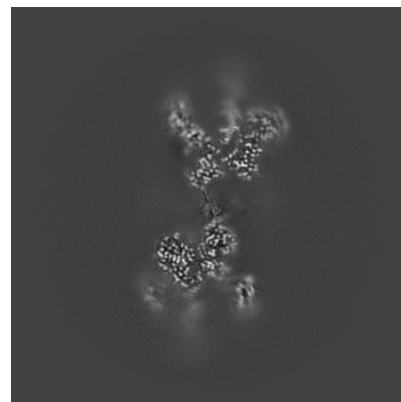
| X Index: 256 | Y Index: 256 | Z Index: 256 |

6.2.2 Raw map
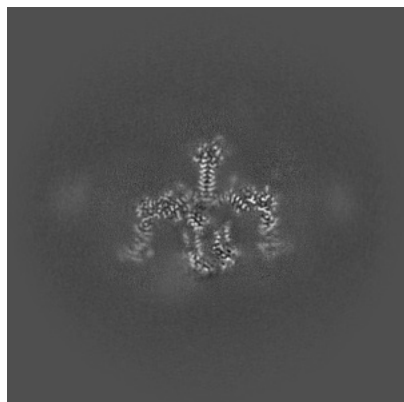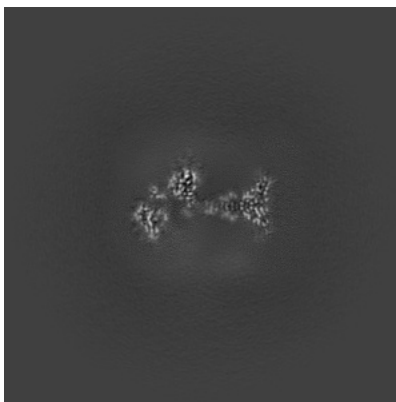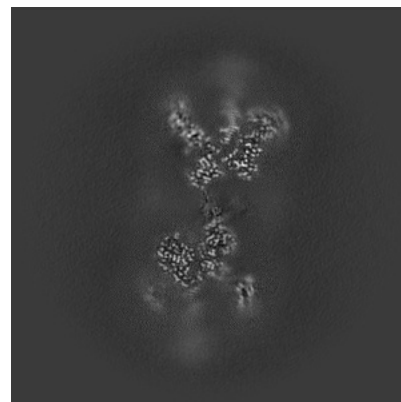
| X Index: 256 | Y Index: 256 | Z Index: 256 |

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

6.3 Largest variance slices (i)

6.3.1 Primary map
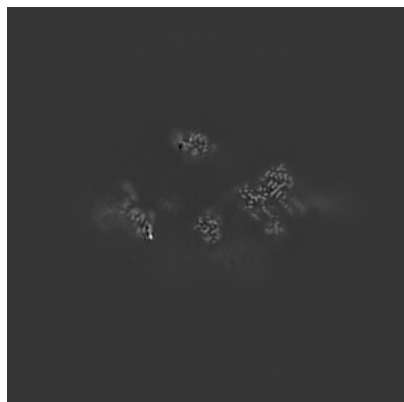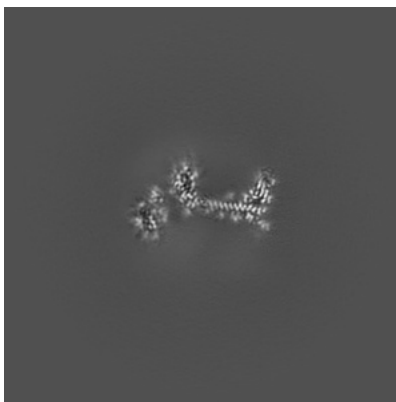
| X Index: 289 | Y Index: 251 | Z Index: 259 |
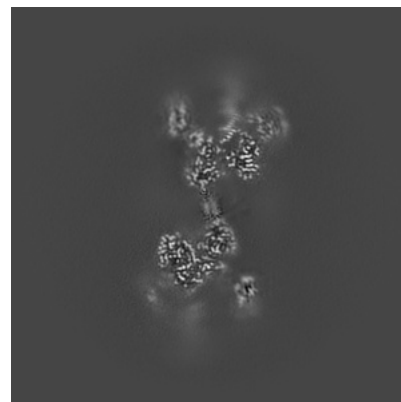
6.3.2 Raw map
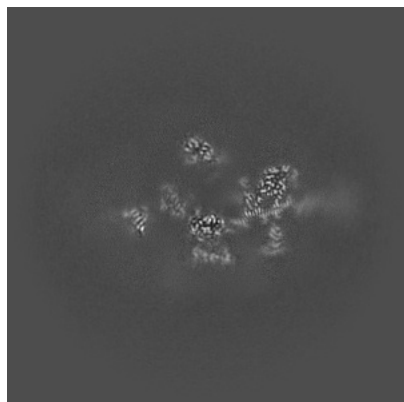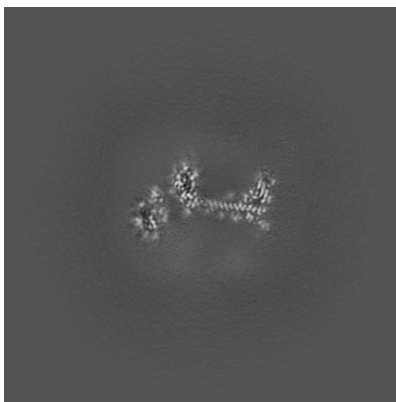
| X Index: 278 | Y Index: 251 | Z Index: 259 |
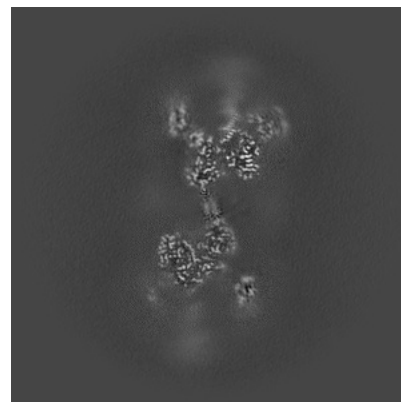
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) ⓘ

6.4.1 Primary map
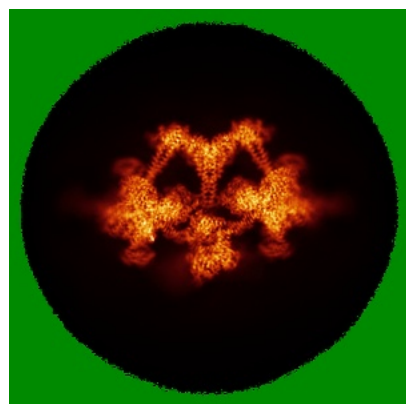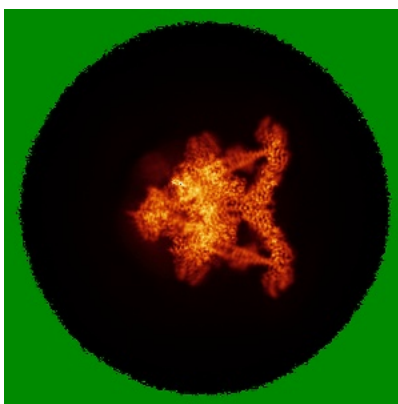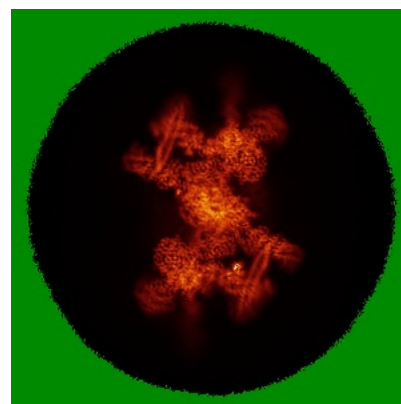
X	Y	Z

6.4.2 Raw map

X	Y	Z
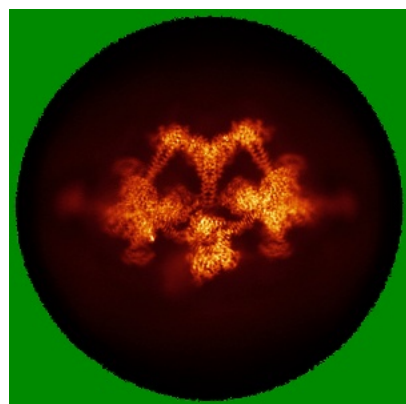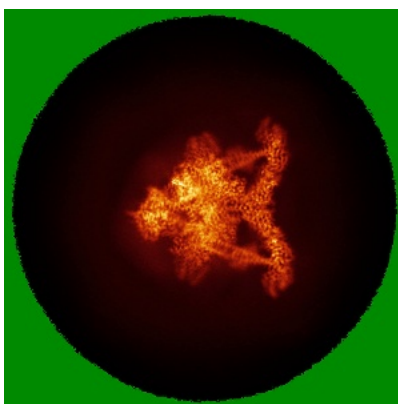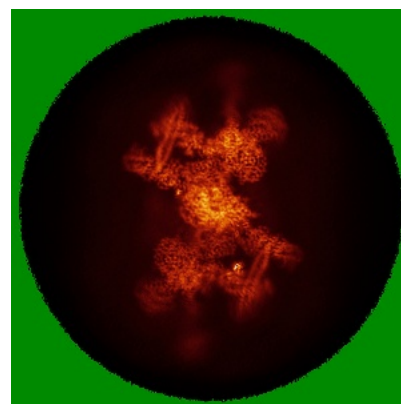
The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5　Orthogonal surface views ⓘ

6.5.1　Primary map

| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.06. 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

| X | Y | Z |

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 ⓘ

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

A mask typically either:

- Encompasses the whole structure

- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

6.6.1　emd_49108_msk_1.map ⓘ

X　　　　　　　　　Y　　　　　　　　　Z
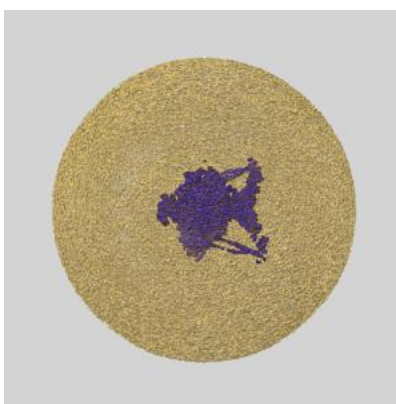
7　Map analysis ⓘ

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

7.1　Map-value distribution ⓘ

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 ⓘ
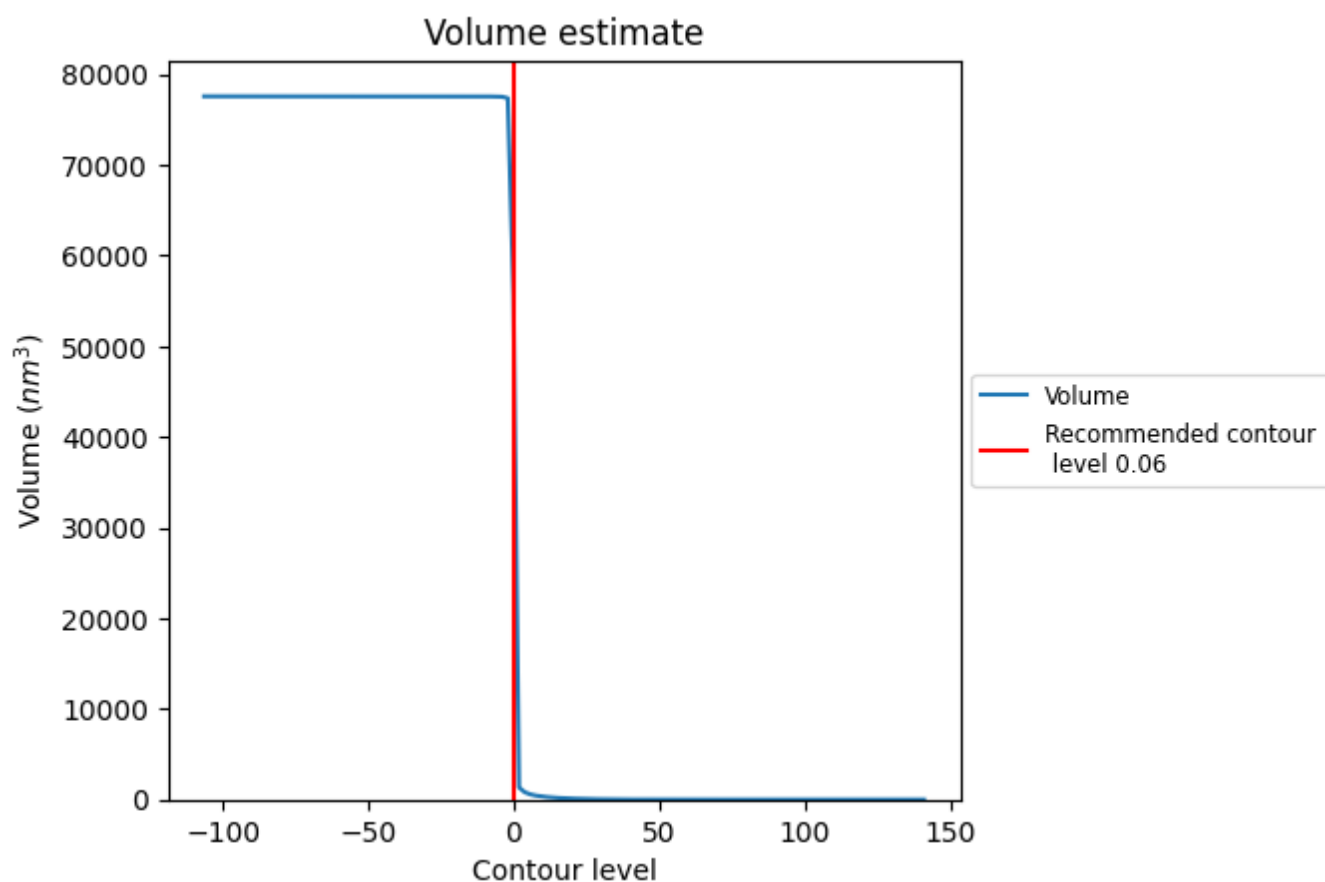
The volume at the recommended contour level is 50910 nm^3; this corresponds to an approximate mass of 45988 kDa.

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 ⓘ
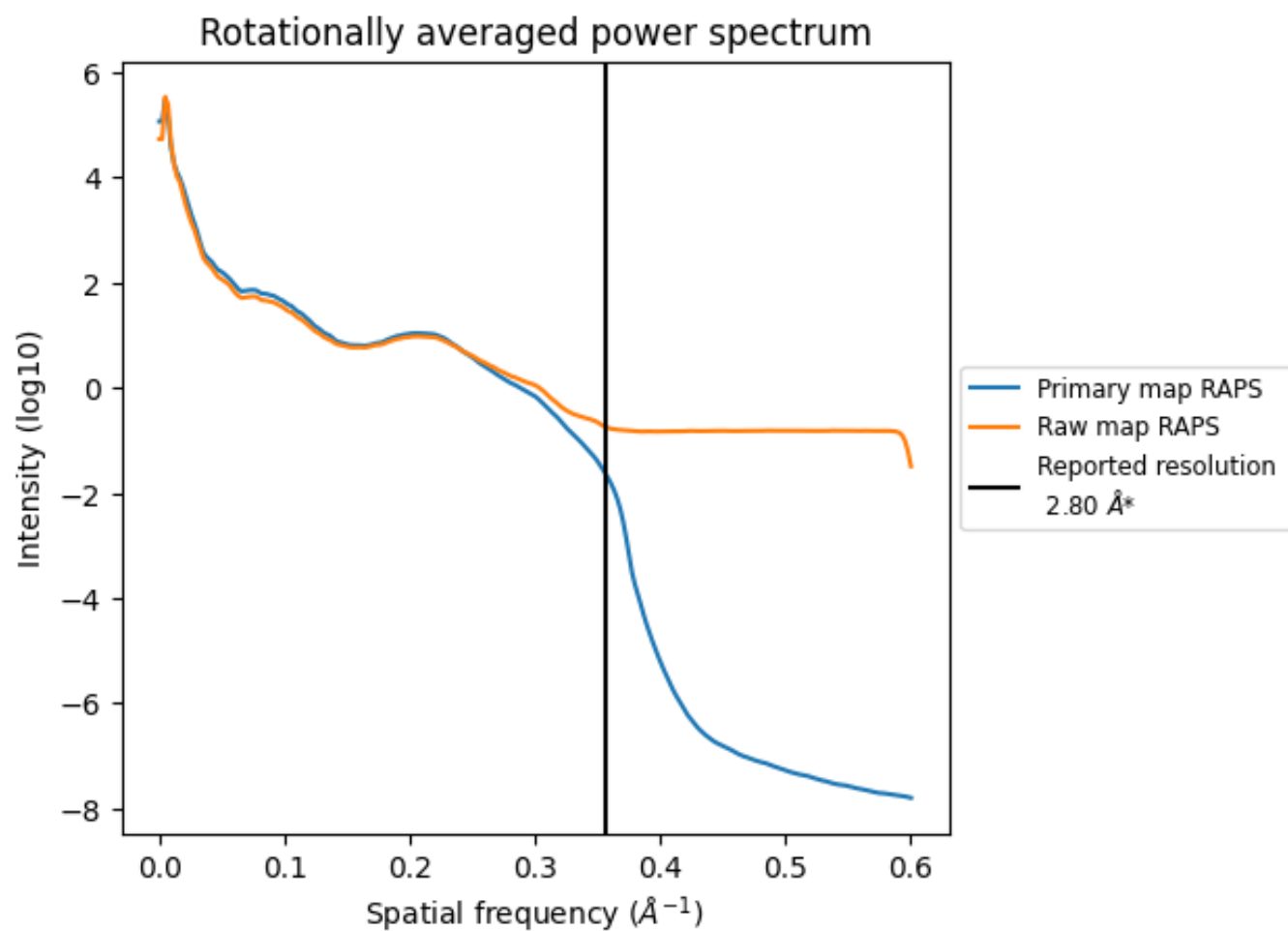
*Reported resolution corresponds to spatial frequency of 0.357 Å^{-1}

8 Fourier-Shell correlation ⓘ

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 ⓘ
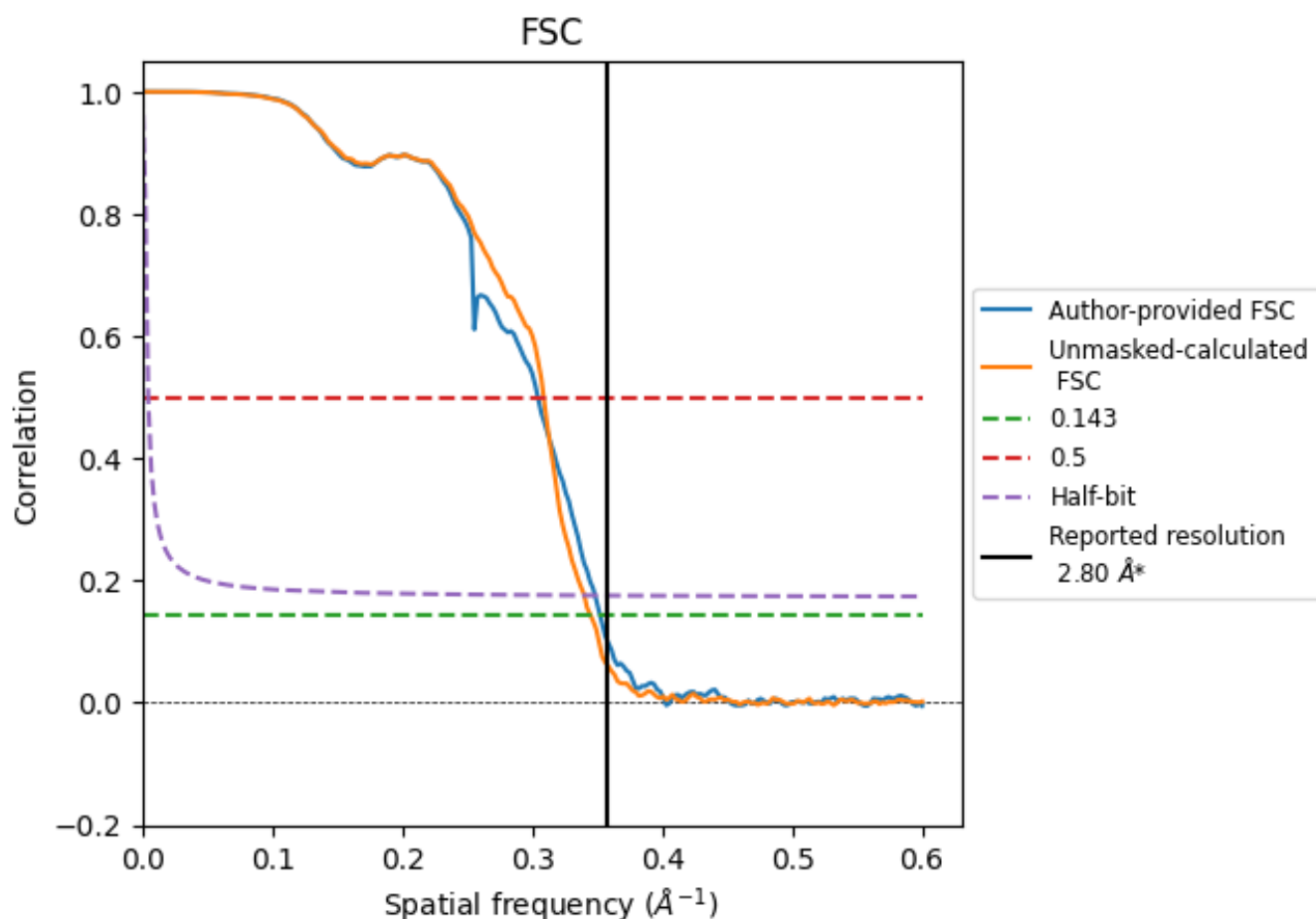
*Reported resolution corresponds to spatial frequency of 0.357 Å^{-1}

8.2 Resolution estimates (i)

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.80	-	-
Author-provided FSC curve	2.84	3.28	2.87
Unmasked-calculated*	2.90	3.24	2.94

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

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-49108 and PDB model 9N81. Per-residue inclusion information can be found in section 3 on page 10.

9.1 Map-model overlay ⓘ

| X | Y | Z |
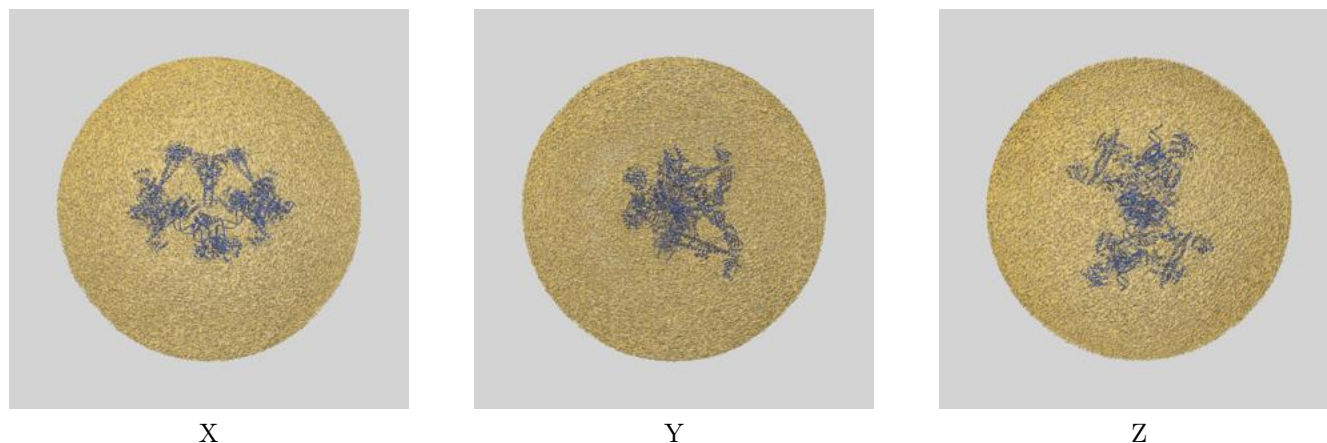
The images above show the 3D surface view of the map at the recommended contour level 0.06 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model ⓘ

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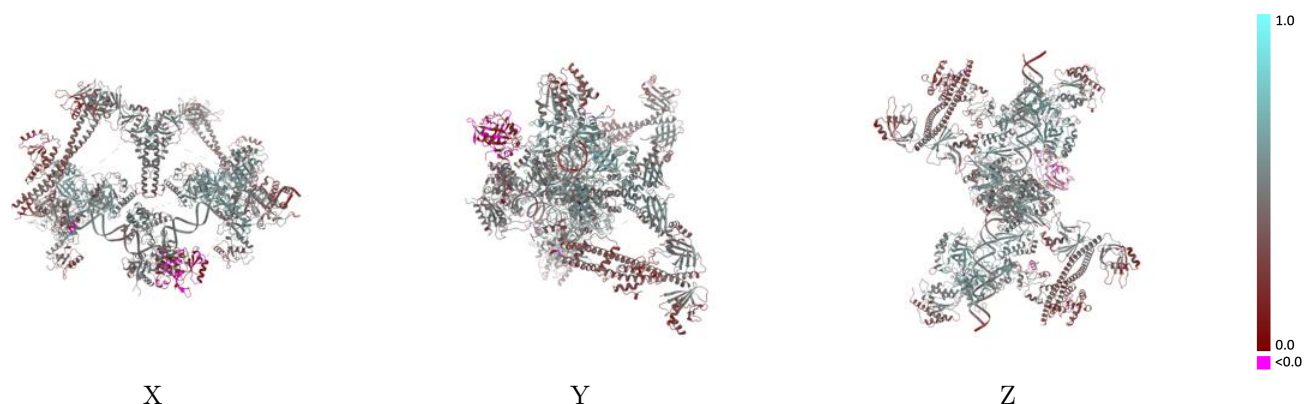
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

X   Y   Z
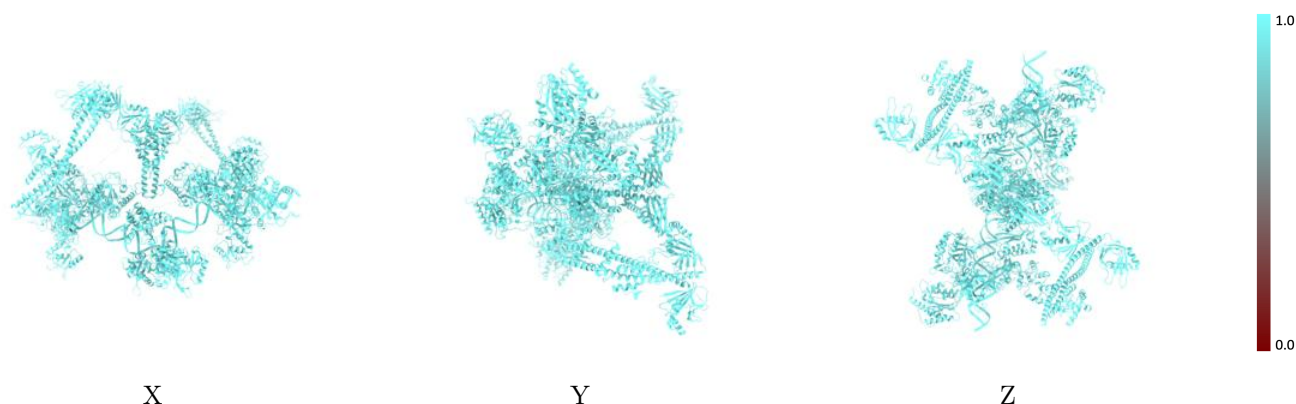
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.06).

9.4 Atom inclusion (i)
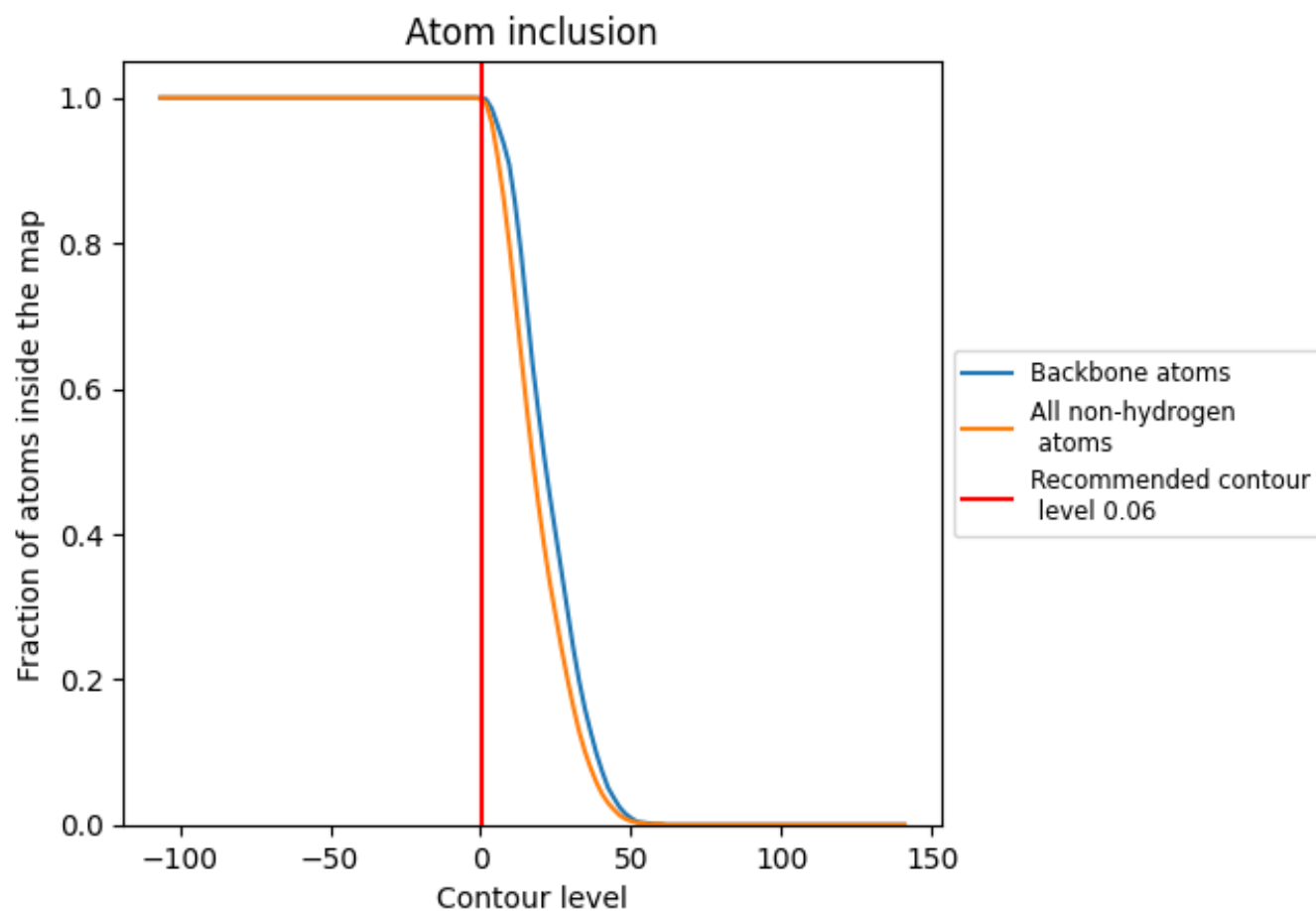
At the recommended contour level, 100% of all backbone atoms, 100% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.06) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9980	0.4410
A	0.9980	0.5350
B	1.0000	0.4960
C	0.9970	0.4780
D	0.9980	0.3510
E	0.9940	0.4050
F	0.9990	0.3040
G	1.0000	0.5440
H	0.9940	0.5160
I	1.0000	0.4240
J	1.0000	0.4510
K	1.0000	0.4590
L	1.0000	0.4690
M	0.9990	0.4470
a	0.9990	0.5400
b	1.0000	0.5020
c	0.9980	0.4690
d	0.9980	0.3650
e	0.9980	0.4190
f	0.9960	0.2980
m	0.9940	0.3680

1.0

0.0
<0.0