



Full wwPDB EM Validation Report ⓘ

Nov 22, 2022 – 04:03 PM JST

PDB ID : 7ENN
EMDB ID : EMD-31217
Title : The structure of ALC1 bound to the nucleosome
Authors : Chen, Z.C.; Chen, K.J.; Wang, L.
Deposited on : 2021-04-18
Resolution : 2.80 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:

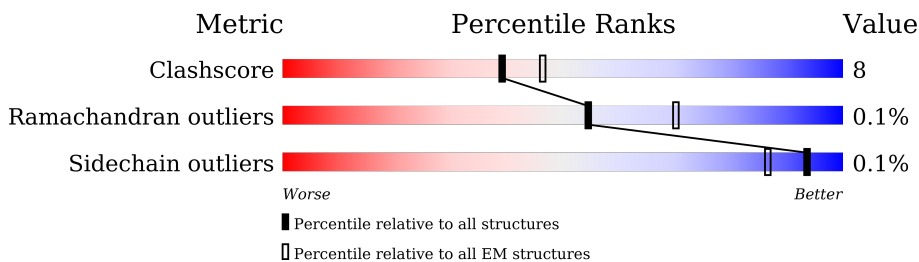
EMDB validation analysis : 0.0.1.dev43
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.3

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 2.80 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	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 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	K	897	
2	A	135	
2	E	135	
3	F	102	
3	L	102	
4	C	129	
4	G	129	
5	D	122	

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Mol	Chain	Length	Quality of chain
5	H	122	
6	I	167	
7	J	167	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	ADP	K	901	-	-	X	-
9	BEF	K	902	-	-	X	-

2 Entry composition i

There are 9 unique types of molecules in this entry. The entry contains 16319 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 Chromodomain-helicase-DNA-binding protein 1-like.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	K	539	4315	2747	739	810	19	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	857	GLN	ARG	engineered mutation	UNP Q86WJ1

- Molecule 2 is a protein called Histone H3.2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	A	98	800	505	153	139	3	0	0
2	E	95	778	491	148	136	3	0	0

- Molecule 3 is a protein called Histone H4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	L	88	707	445	143	118	1	0	0
3	F	80	632	398	122	111	1	0	0

- Molecule 4 is a protein called Histone H2A type 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
4	C	107	811	510	158	143	0	0
4	G	107	815	513	159	143	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	99	ARG	GLY	conflict	UNP P06897
C	123	SER	ALA	conflict	UNP P06897
G	99	ARG	GLY	conflict	UNP P06897
G	123	SER	ALA	conflict	UNP P06897

- Molecule 5 is a protein called Histone H2B 1.1.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	D	93	Total	C	N	O	S	0	0
			718	451	128	137	2		
5	H	93	Total	C	N	O	S	0	0
			726	457	130	137	2		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	29	THR	SER	conflict	UNP P02281
H	29	THR	SER	conflict	UNP P02281

- Molecule 6 is a DNA chain called DNA (167-MER).

Mol	Chain	Residues	Atoms					AltConf	Trace
6	I	146	Total	C	N	O	P	0	0
			2978	1414	542	876	146		

- Molecule 7 is a DNA chain called DNA (167-MER).

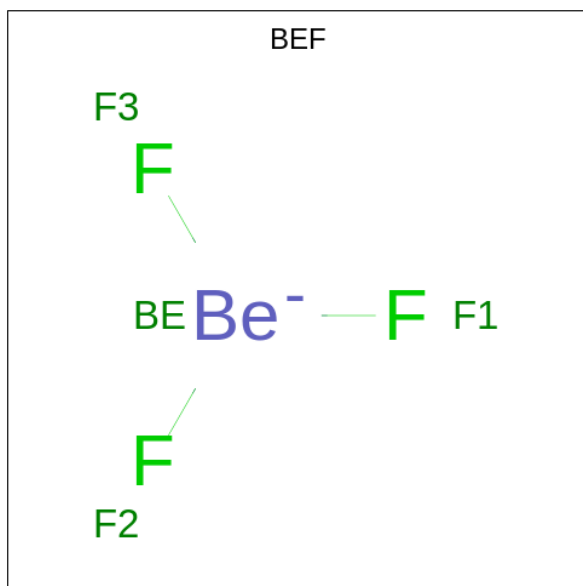
Mol	Chain	Residues	Atoms					AltConf	Trace
7	J	146	Total	C	N	O	P	0	0
			3008	1424	562	876	146		

- Molecule 8 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: C₁₀H₁₅N₅O₁₀P₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
8	K	1	27	10	5	10	2	0

- Molecule 9 is BERYLLIUM TRIFLUORIDE ION (three-letter code: BEF) (formula: BeF₃) (labeled as "Ligand of Interest" by depositor).

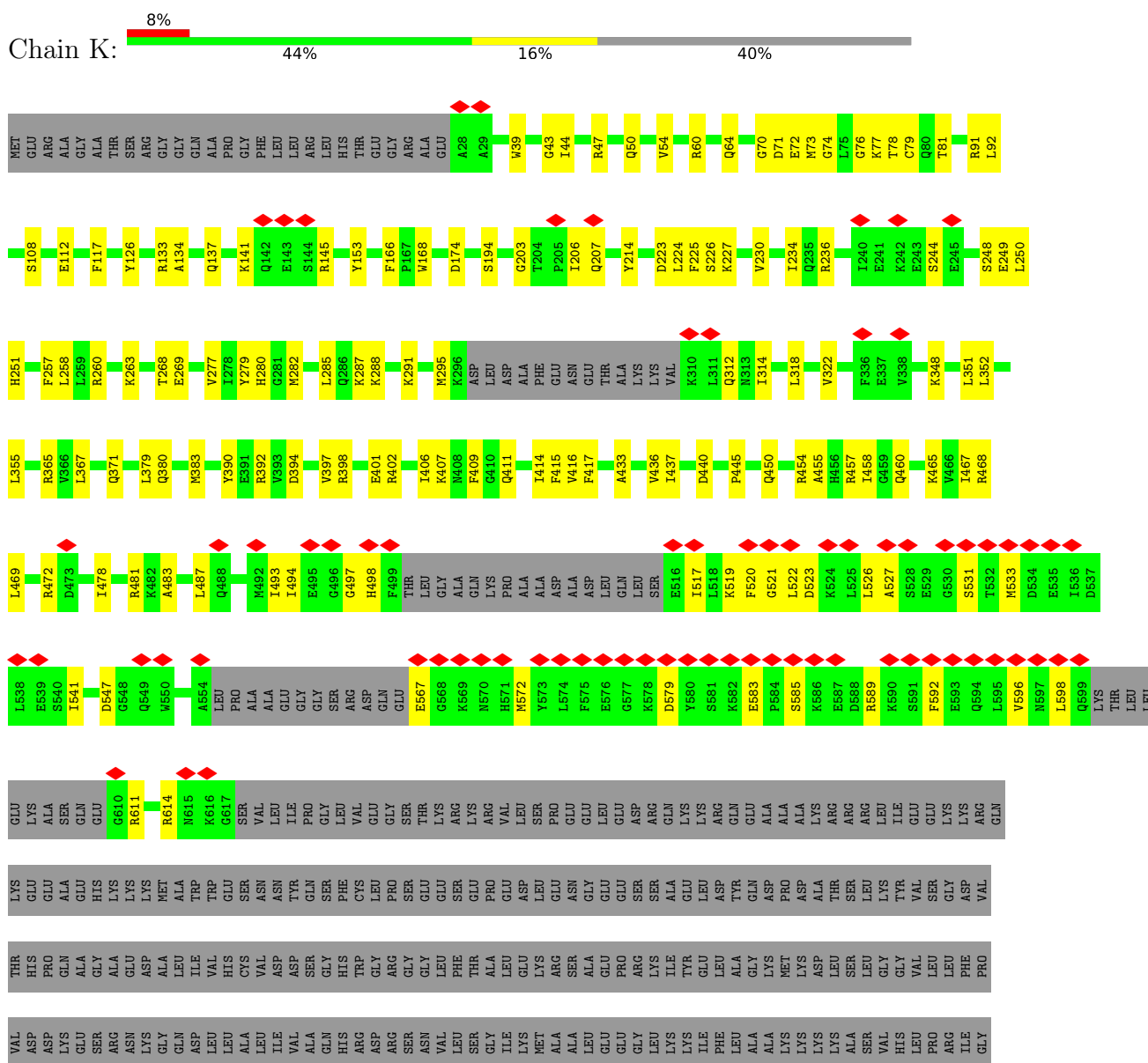


Mol	Chain	Residues	Atoms			AltConf
			Total	Be	F	
9	K	1	4	1	3	0

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: Chromodomain-helicase-DNA-binding protein 1-like



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

● Molecule 2: Histone H3.2



ALA
ARG
THR
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ARG
ARG
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ARG
ALA
ALA
ARG
LYS
SER
ALA
PRO
ALA
ALA
THR
GLY
VAL
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SER
SER
ARG
GLN
LEU
VAL
PRO

● Molecule 2: Histone H3.2



ALA
ARG
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THR
ALA
ARG
LYS
SER
THR
GLY
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ALA
ARG
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ARG
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SER
ALA
PRO
ALA
ALA
THR
GLY
VAL
VAL
LYS
ALA
VAL
PRO
HIS
R40
L61
I62
R63
R72
E73
Q76
D106
L126
R129
I130
R131
R134
ALA

● Molecule 3: Histone H4



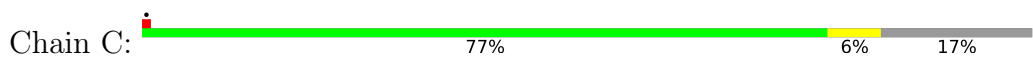
SER
GLY
ARG
GLY
LYS
THR
GLY
LYS
GLY
LEU
GLY
GLY
G14
R17
H18
K19
K20
V21
L22
R23
D24
N25
I26
T30
K31
P32
E52
R55
K59
E63
R92
G101
GLY

● Molecule 3: Histone H4



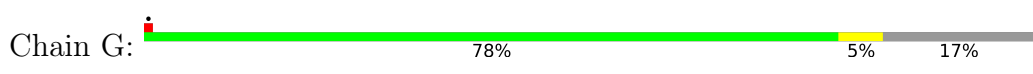
SER
GLY
ARG
LYS
GLY
LYS
GLY
LEU
GLY
GLY
ALA
LYS
HIS
ARG
LYS
VAL
R23
D24
N25
T30
K31
P32
L37
K59
E63
G102

● Molecule 4: Histone H2A type 1



SER
GLY
ARG
LYS
GLN
GLY
LYS
LYS
THR
ARG
A12
T16
Q24
H31
P48
E56
E61
G67
I102
K118
LYS
THR
GLU
SER
SER
LYS
SER
SER
LYS
ALA
SER
SER
LYS

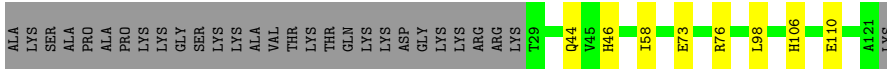
● Molecule 4: Histone H2A type 1



SER
GLY
ARG
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GLN
GLY
LYS
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ARG
A12
R29
R42
L63
G67
I79
H82
I102
K118
LYS
THR
GLU
SER
SER
LYS
SER
SER
LYS
ALA
SER
SER
LYS

● Molecule 5: Histone H2B 1.1

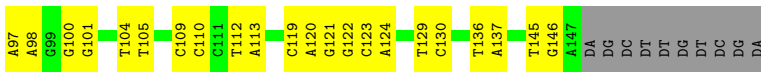




• Molecule 5: Histone H2B 1.1



• Molecule 6: DNA (167-MER)



• Molecule 7: DNA (167-MER)



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	586673	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.027	Depositor
Minimum map value	-0.011	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.003	Depositor
Map size (\AA)	259.8, 259.8, 259.8	wwPDB
Map dimensions	480, 480, 480	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.54125, 0.54125, 0.54125	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: ADP, BEF

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	K	0.27	0/4393	0.47	0/5912
2	A	0.31	0/812	0.41	0/1091
2	E	0.31	0/788	0.41	0/1057
3	F	0.32	0/639	0.43	0/855
3	L	0.31	0/715	0.46	0/955
4	C	0.29	0/821	0.43	0/1112
4	G	0.30	0/825	0.44	0/1116
5	D	0.31	0/729	0.41	0/985
5	H	0.30	0/737	0.43	0/993
6	I	0.67	0/3337	0.96	0/5144
7	J	0.67	0/3377	0.93	0/5214
All	All	0.47	0/17173	0.70	0/24434

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	K	4315	0	4313	133	0
2	A	800	0	829	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	778	0	813	8	0
3	F	632	0	665	4	0
3	L	707	0	760	8	0
4	C	811	0	849	8	0
4	G	815	0	860	8	0
5	D	718	0	725	9	0
5	H	726	0	747	7	0
6	I	2978	0	1639	41	0
7	J	3008	0	1639	34	0
8	K	27	0	12	22	0
9	K	4	0	0	3	0
All	All	16319	0	13851	236	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 8.

All (236) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:K:44:ILE:HD11	8:K:901:ADP:C6	1.10	1.61
1:K:44:ILE:CD1	8:K:901:ADP:C6	2.05	1.39
1:K:44:ILE:HD11	8:K:901:ADP:C5	1.76	1.18
1:K:44:ILE:CD1	8:K:901:ADP:C5	2.33	1.11
1:K:44:ILE:HD11	8:K:901:ADP:N1	1.74	1.01
1:K:44:ILE:HD11	8:K:901:ADP:N6	1.81	0.95
1:K:76:GLY:H	8:K:901:ADP:PB	1.97	0.86
1:K:567:GLU:HG2	1:K:572:MET:HG3	1.58	0.85
1:K:457:ARG:NH2	8:K:901:ADP:O1B	2.12	0.82
6:I:13:DG:N1	7:J:135:DC:N3	2.26	0.82
1:K:141:LYS:HB2	1:K:145:ARG:HH22	1.45	0.81
6:I:13:DG:N2	7:J:135:DC:O2	2.13	0.81
1:K:44:ILE:HD13	8:K:901:ADP:C5	2.20	0.76
2:E:63:ARG:HH21	6:I:60:DA:H5''	1.52	0.74
1:K:285:LEU:HA	1:K:288:LYS:HD2	1.69	0.73
1:K:258:LEU:HD21	1:K:260:ARG:HG3	1.73	0.70
1:K:450:GLN:HG2	1:K:454:ARG:HH22	1.58	0.69
1:K:44:ILE:CD1	8:K:901:ADP:N6	2.46	0.68
1:K:295:MET:HB2	1:K:596:VAL:HG21	1.76	0.68
1:K:371:GLN:HG2	1:K:440:ASP:HB2	1.75	0.68
1:K:251:HIS:ND1	1:K:497:GLY:O	2.28	0.67
4:G:42:ARG:HE	7:J:112:DG:H4'	1.60	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:C:24:GLN:HE21	5:D:44:GLN:NE2	1.94	0.66
1:K:406:ILE:HA	1:K:409:PHE:HD2	1.60	0.65
2:E:73:GLU:OE1	3:F:25:ASN:ND2	2.30	0.65
1:K:397:VAL:O	1:K:398:ARG:HG2	1.98	0.64
1:K:478:ILE:HD11	1:K:520:PHE:HB2	1.79	0.64
1:K:392:ARG:NH2	1:K:394:ASP:OD2	2.30	0.64
1:K:318:LEU:O	1:K:322:VAL:HG23	1.97	0.63
1:K:153:TYR:OH	1:K:174:ASP:O	2.17	0.63
1:K:414:ILE:HG23	1:K:417:PHE:HE1	1.65	0.62
3:F:59:LYS:NZ	3:F:63:GLU:OE2	2.32	0.62
1:K:445:PRO:HB2	1:K:487:LEU:HD13	1.82	0.62
1:K:223:ASP:OD1	1:K:224:LEU:N	2.33	0.61
1:K:494:ILE:O	1:K:498:HIS:HB2	2.00	0.61
1:K:348:LYS:NZ	1:K:469:LEU:O	2.34	0.60
1:K:521:GLY:O	1:K:585:SER:N	2.31	0.60
1:K:455:ALA:O	1:K:460:GLN:NE2	2.33	0.60
1:K:445:PRO:HG2	1:K:487:LEU:HB2	1.84	0.59
1:K:133:ARG:NH2	7:J:58:DT:OP1	2.32	0.59
1:K:454:ARG:HH11	1:K:457:ARG:HH12	1.50	0.59
6:I:47:DC:H2''	6:I:48:DT:H71	1.83	0.58
1:K:141:LYS:HE3	1:K:145:ARG:NH2	2.17	0.58
5:D:73:GLU:OE2	5:D:76:ARG:NH1	2.37	0.58
1:K:74:GLY:HA2	1:K:457:ARG:HH21	1.68	0.58
1:K:355:LEU:HD23	1:K:541:ILE:HD11	1.86	0.57
1:K:78:THR:HG23	8:K:901:ADP:O2A	2.04	0.57
1:K:47:ARG:HH22	1:K:458:ILE:HD13	1.70	0.56
1:K:454:ARG:HE	1:K:457:ARG:NH1	2.04	0.56
2:E:106:ASP:OD1	2:E:131:ARG:NH1	2.34	0.56
6:I:88:DT:H2''	6:I:89:DT:H71	1.86	0.56
6:I:100:DG:H2''	6:I:101:DG:C8	2.41	0.56
1:K:44:ILE:CG1	8:K:901:ADP:N6	2.69	0.56
1:K:133:ARG:O	1:K:137:GLN:HG2	2.06	0.56
5:H:87:THR:OG1	5:H:90:GLU:OE1	2.19	0.56
1:K:230:VAL:O	1:K:234:ILE:HG13	2.06	0.55
1:K:279:TYR:HB3	1:K:472:ARG:HG2	1.89	0.55
1:K:312:GLN:NE2	2:A:82:LEU:O	2.40	0.55
2:A:40:ARG:HH22	6:I:83:DG:H21	1.55	0.55
1:K:236:ARG:NH2	1:K:249:GLU:OE2	2.39	0.55
1:K:592:PHE:O	1:K:596:VAL:HG23	2.06	0.55
1:K:166:PHE:HB2	1:K:168:TRP:CH2	2.41	0.55
7:J:5:DG:H2''	7:J:6:DA:C8	2.42	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:I:104:DT:H2'	6:I:105:DT:H71	1.88	0.54
7:J:16:DC:H2''	7:J:17:DT:C6	2.43	0.54
1:K:401:GLU:OE1	1:K:401:GLU:N	2.39	0.54
4:C:102:ILE:HG23	5:D:58:ILE:HD13	1.90	0.54
1:K:437:ILE:HG12	1:K:467:ILE:HB	1.88	0.54
6:I:123:DC:H2''	6:I:124:DA:C8	2.43	0.54
1:K:614:ARG:NH2	4:C:61:GLU:OE1	2.41	0.53
1:K:244:SER:O	1:K:248:SER:OG	2.20	0.53
6:I:129:DT:H2''	6:I:130:DC:C5	2.44	0.53
4:C:67:GLY:HA3	5:D:46:HIS:CE1	2.44	0.53
6:I:97:DA:H2'	6:I:98:DA:C8	2.44	0.53
6:I:27:DT:H2''	6:I:28:DC:C5	2.45	0.52
1:K:44:ILE:HG12	8:K:901:ADP:N6	2.25	0.51
1:K:70:GLY:O	1:K:260:ARG:HG2	2.10	0.51
1:K:415:PHE:CD2	1:K:416:VAL:HG23	2.44	0.51
6:I:109:DC:H2''	6:I:110:DC:C5	2.46	0.51
1:K:478:ILE:HG12	1:K:481:ARG:HH11	1.76	0.51
1:K:207:GLN:OE1	1:K:493:ILE:HG21	2.09	0.51
1:K:268:THR:O	1:K:269:GLU:HG2	2.10	0.51
1:K:367:LEU:HA	1:K:417:PHE:HB2	1.93	0.51
1:K:611:ARG:HH12	4:C:56:GLU:HG2	1.75	0.51
1:K:523:ASP:HA	1:K:526:LEU:HB2	1.92	0.51
4:G:63:LEU:HD13	5:H:42:LEU:HB2	1.93	0.51
1:K:520:PHE:HD2	1:K:583:GLU:HG3	1.75	0.51
4:C:24:GLN:HE21	5:D:44:GLN:HE22	1.59	0.51
1:K:365:ARG:HB2	1:K:433:ALA:HA	1.92	0.51
1:K:414:ILE:HG23	1:K:417:PHE:CE1	2.46	0.51
6:I:36:DC:H2''	6:I:37:DG:C8	2.46	0.51
7:J:123:DC:H2''	7:J:124:DG:C8	2.45	0.51
1:K:291:LYS:O	1:K:295:MET:HG3	2.11	0.51
1:K:367:LEU:HD23	1:K:417:PHE:HD2	1.76	0.51
1:K:409:PHE:HE1	1:K:417:PHE:HB3	1.75	0.50
1:K:367:LEU:HD12	1:K:436:VAL:HG22	1.93	0.50
1:K:450:GLN:HG2	1:K:454:ARG:NH2	2.25	0.50
1:K:282:MET:HB2	1:K:287:LYS:HE3	1.93	0.50
7:J:89:DT:H2''	7:J:90:DA:C8	2.46	0.50
1:K:531:SER:HB3	1:K:533:MET:HG2	1.92	0.50
6:I:6:DG:H2''	6:I:7:DA:C8	2.47	0.49
7:J:9:DT:H2''	7:J:10:DA:C8	2.47	0.49
1:K:77:LYS:O	1:K:81:THR:HG23	2.11	0.49
1:K:611:ARG:NH2	5:D:44:GLN:OE1	2.46	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:L:18:HIS:O	3:L:18:HIS:ND1	2.45	0.49
4:G:79:ILE:HG12	4:G:82:HIS:CE1	2.47	0.49
7:J:77:DC:H2''	7:J:78:DG:C8	2.47	0.49
3:L:17:ARG:HG3	3:L:18:HIS:CD2	2.47	0.49
2:A:40:ARG:NH2	6:I:83:DG:N3	2.60	0.49
1:K:76:GLY:N	8:K:901:ADP:O2B	2.42	0.49
1:K:207:GLN:OE1	1:K:493:ILE:HD13	2.13	0.49
1:K:74:GLY:CA	8:K:901:ADP:PB	3.01	0.48
7:J:94:DG:H2''	7:J:95:DG:O5'	2.13	0.48
1:K:73:MET:HG2	1:K:450:GLN:HG3	1.95	0.48
6:I:67:DG:H2''	6:I:68:DT:H71	1.96	0.48
8:K:901:ADP:O1B	9:K:902:BEF:F2	2.22	0.48
4:C:16:THR:HA	7:J:31:DA:H5''	1.94	0.48
1:K:291:LYS:NZ	1:K:526:LEU:HB3	2.28	0.48
5:H:73:GLU:OE2	5:H:76:ARG:NH1	2.47	0.47
1:K:214:TYR:OH	1:K:226:SER:O	2.18	0.47
7:J:50:DT:H2'	7:J:51:DT:H71	1.95	0.47
1:K:79:CYS:SG	8:K:901:ADP:C8	3.07	0.47
6:I:15:DT:H2''	6:I:16:DG:C8	2.49	0.47
7:J:111:DC:H2''	7:J:112:DG:C8	2.48	0.47
7:J:127:DC:H2''	7:J:128:DT:H5'	1.97	0.47
6:I:46:DT:H2''	6:I:47:DC:C6	2.49	0.47
1:K:74:GLY:N	8:K:901:ADP:O1B	2.45	0.47
1:K:74:GLY:N	8:K:901:ADP:PB	2.88	0.47
6:I:79:DC:H2''	6:I:80:DC:C5	2.50	0.47
1:K:517:ILE:O	1:K:519:LYS:N	2.48	0.47
7:J:20:DC:H2''	7:J:21:DA:C8	2.49	0.47
1:K:207:GLN:O	1:K:207:GLN:HG2	2.15	0.47
1:K:39:TRP:CH2	1:K:91:ARG:HB2	2.50	0.46
4:G:102:ILE:HG23	5:H:58:ILE:HD13	1.98	0.46
1:K:74:GLY:H	8:K:901:ADP:PB	2.37	0.46
1:K:43:GLY:HA3	1:K:117:PHE:HD1	1.81	0.46
1:K:494:ILE:HA	1:K:498:HIS:ND1	2.31	0.46
3:L:92:ARG:NH2	5:D:98:LEU:HA	2.30	0.46
6:I:48:DT:H2''	6:I:49:DA:C8	2.50	0.46
6:I:66:DC:H2''	6:I:67:DG:C8	2.50	0.46
4:G:42:ARG:NH2	7:J:112:DG:O4'	2.48	0.46
1:K:73:MET:O	1:K:263:LYS:HE2	2.16	0.46
1:K:407:LYS:O	1:K:411:GLN:HG2	2.17	0.45
1:K:166:PHE:O	1:K:194:SER:OG	2.34	0.45
1:K:409:PHE:HE1	1:K:417:PHE:CG	2.35	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:K:60:ARG:HD3	1:K:64:GLN:NE2	2.31	0.45
6:I:78:DC:H2''	6:I:79:DC:C5	2.52	0.45
1:K:523:ASP:O	1:K:527:ALA:N	2.49	0.45
1:K:352:LEU:HD13	1:K:469:LEU:HD11	1.98	0.45
1:K:39:TRP:CH2	1:K:91:ARG:HD3	2.52	0.45
1:K:50:GLN:O	1:K:54:VAL:HG23	2.16	0.45
1:K:60:ARG:HD3	1:K:64:GLN:HE21	1.81	0.45
1:K:206:ILE:H	1:K:206:ILE:HD12	1.82	0.45
1:K:519:LYS:HD3	1:K:589:ARG:HD2	1.99	0.45
1:K:77:LYS:NZ	9:K:902:BEF:F1	2.37	0.45
1:K:579:ASP:N	1:K:579:ASP:OD2	2.50	0.44
3:L:92:ARG:NH2	5:D:98:LEU:HD23	2.32	0.44
3:F:30:THR:HB	3:F:32:PRO:HD2	1.99	0.44
3:L:30:THR:HB	3:L:32:PRO:HD2	1.99	0.44
6:I:82:DC:H2''	6:I:83:DG:C8	2.52	0.44
7:J:4:DG:H2''	7:J:5:DG:C8	2.53	0.44
1:K:250:LEU:HD23	1:K:493:ILE:HD11	1.98	0.44
1:K:390:TYR:C	1:K:414:ILE:HD11	2.37	0.44
3:L:52:GLU:OE1	3:L:55:ARG:NH1	2.50	0.44
6:I:112:DT:H2''	6:I:113:DA:C8	2.52	0.44
7:J:37:DG:H2''	7:J:38:DG:C8	2.53	0.44
6:I:136:DT:H2''	6:I:137:DA:H8	1.82	0.44
7:J:135:DC:H2''	7:J:136:DG:C8	2.53	0.44
1:K:295:MET:CE	1:K:596:VAL:HG22	2.48	0.44
1:K:406:ILE:HA	1:K:409:PHE:CD2	2.49	0.44
6:I:33:DG:H2''	6:I:34:DG:H5''	1.99	0.44
1:K:225:PHE:HE2	1:K:257:PHE:CE2	2.37	0.43
4:G:67:GLY:HA3	5:H:46:HIS:CD2	2.52	0.43
1:K:277:VAL:HG23	1:K:468:ARG:HB2	1.99	0.43
1:K:398:ARG:O	1:K:402:ARG:HG3	2.17	0.43
1:K:72:GLU:OE1	1:K:263:LYS:HG3	2.18	0.43
1:K:108:SER:O	1:K:112:GLU:HG3	2.19	0.43
3:L:24:ASP:O	3:L:26:ILE:N	2.51	0.43
2:E:72:ARG:O	2:E:76:GLN:HG3	2.18	0.43
6:I:119:DC:H2''	6:I:120:DA:N7	2.33	0.43
1:K:126:TYR:OH	1:K:137:GLN:NE2	2.50	0.43
6:I:37:DG:H2''	6:I:38:DT:H72	2.00	0.43
7:J:121:DA:H2''	7:J:122:DG:C8	2.53	0.43
7:J:141:DT:H2''	7:J:142:DC:C6	2.54	0.43
1:K:445:PRO:HG3	1:K:483:ALA:HB1	2.01	0.43
6:I:145:DT:H2''	6:I:146:DG:C8	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:K:547:ASP:OD1	1:K:547:ASP:N	2.52	0.42
6:I:77:DT:H2''	6:I:78:DC:C6	2.53	0.42
7:J:120:DG:H2''	7:J:121:DA:N7	2.34	0.42
7:J:48:DC:H2''	7:J:49:DC:C6	2.54	0.42
1:K:166:PHE:HB2	1:K:168:TRP:CZ2	2.54	0.42
1:K:280:HIS:HB3	1:K:351:LEU:HD13	2.01	0.42
1:K:402:ARG:NH2	7:J:56:DG:OP2	2.25	0.42
4:G:42:ARG:HH21	7:J:112:DG:C4'	2.31	0.42
2:E:61:LEU:HD12	3:F:37:LEU:HD23	2.01	0.42
1:K:71:ASP:O	1:K:203:GLY:HA2	2.20	0.42
6:I:80:DC:H2''	6:I:81:DC:C5	2.54	0.42
5:D:106:HIS:O	5:D:110:GLU:HG2	2.20	0.42
1:K:314:ILE:O	1:K:318:LEU:HD23	2.20	0.42
1:K:134:ALA:O	1:K:137:GLN:HB2	2.20	0.42
1:K:409:PHE:HE1	1:K:417:PHE:CB	2.33	0.41
1:K:92:LEU:HD23	1:K:92:LEU:H	1.84	0.41
1:K:472:ARG:HD2	1:K:472:ARG:HA	1.91	0.41
7:J:99:DT:H2''	7:J:100:DA:N7	2.35	0.41
4:C:31:HIS:ND1	4:C:48:PRO:HG2	2.34	0.41
1:K:454:ARG:HH11	1:K:457:ARG:NH1	2.17	0.41
4:G:29:ARG:NH1	5:H:33:SER:O	2.53	0.41
7:J:94:DG:H2'	7:J:95:DG:C8	2.55	0.41
6:I:121:DG:H2''	6:I:122:DG:C8	2.55	0.41
7:J:95:DG:H2'	7:J:96:DT:H71	2.03	0.41
6:I:67:DG:H2''	6:I:68:DT:C7	2.50	0.41
8:K:901:ADP:O1A	9:K:902:BEF:F2	2.29	0.41
2:E:63:ARG:HH21	6:I:60:DA:C5'	2.29	0.41
2:E:63:ARG:NH2	6:I:60:DA:H5''	2.27	0.41
2:E:126:LEU:O	2:E:130:ILE:HG12	2.21	0.41
6:I:47:DC:H2''	6:I:48:DT:C7	2.51	0.41
7:J:129:DC:H2''	7:J:130:DG:C8	2.56	0.41
7:J:15:DT:H2''	7:J:16:DC:O5'	2.21	0.41
1:K:39:TRP:HH2	1:K:91:ARG:HD3	1.86	0.41
1:K:379:LEU:O	1:K:383:MET:HG2	2.21	0.41
1:K:380:GLN:HG3	1:K:390:TYR:CE2	2.55	0.41
1:K:409:PHE:CE1	1:K:417:PHE:CG	3.09	0.41
1:K:465:LYS:HG3	1:K:467:ILE:HD11	2.03	0.41
1:K:598:LEU:HD23	1:K:598:LEU:HA	1.92	0.41
6:I:136:DT:H2''	6:I:137:DA:C8	2.56	0.41
1:K:227:LYS:HB2	1:K:227:LYS:HE3	1.94	0.41
1:K:522:LEU:HD12	1:K:522:LEU:HA	1.88	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:I:17:DC:H2''	6:I:18:DC:C5	2.55	0.41
6:I:23:DC:H6	6:I:23:DC:H5'	1.85	0.41
7:J:53:DG:H2'	7:J:54:DC:C6	2.56	0.40
7:J:108:DC:H2''	7:J:109:DT:C6	2.56	0.40
1:K:76:GLY:N	8:K:901:ADP:O3A	2.51	0.40
6:I:74:DC:C6	6:I:75:DT:H72	2.56	0.40
7:J:65:DC:H2''	7:J:66:DG:C8	2.56	0.40
3:L:59:LYS:O	3:L:63:GLU:HG3	2.22	0.40
5:H:91:ILE:O	5:H:95:VAL:HG23	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	K	529/897 (59%)	484 (92%)	45 (8%)	0	100	100
2	A	96/135 (71%)	95 (99%)	1 (1%)	0	100	100
2	E	93/135 (69%)	92 (99%)	1 (1%)	0	100	100
3	F	78/102 (76%)	78 (100%)	0	0	100	100
3	L	86/102 (84%)	78 (91%)	7 (8%)	1 (1%)	13	39
4	C	105/129 (81%)	104 (99%)	1 (1%)	0	100	100
4	G	105/129 (81%)	105 (100%)	0	0	100	100
5	D	91/122 (75%)	90 (99%)	1 (1%)	0	100	100
5	H	91/122 (75%)	90 (99%)	1 (1%)	0	100	100
All	All	1274/1873 (68%)	1216 (95%)	57 (4%)	1 (0%)	54	81

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	L	25	ASN

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	K	472/766 (62%)	472 (100%)	0	100	100
2	A	84/110 (76%)	84 (100%)	0	100	100
2	E	82/110 (74%)	81 (99%)	1 (1%)	71	92
3	F	64/78 (82%)	64 (100%)	0	100	100
3	L	72/78 (92%)	72 (100%)	0	100	100
4	C	81/101 (80%)	81 (100%)	0	100	100
4	G	82/101 (81%)	82 (100%)	0	100	100
5	D	77/102 (76%)	77 (100%)	0	100	100
5	H	79/102 (78%)	79 (100%)	0	100	100
All	All	1093/1548 (71%)	1092 (100%)	1 (0%)	93	98

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	E	129	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	K	488	GLN
4	C	24	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

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
8	ADP	K	901	1	24,29,29	0.92	1 (4%)	29,45,45	1.49	5 (17%)
9	BEF	K	902	-	0,3,3	-	-	-	-	-

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
8	ADP	K	901	1	-	5/12/32/32	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	K	901	ADP	C5-C4	2.07	1.46	1.40

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	K	901	ADP	N3-C2-N1	-3.37	123.42	128.68
8	K	901	ADP	PA-O3A-PB	-3.21	121.83	132.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	K	901	ADP	C4-C5-N7	-2.65	106.63	109.40
8	K	901	ADP	O3B-PB-O2B	2.28	116.33	107.64
8	K	901	ADP	C3'-C2'-C1'	2.16	104.23	100.98

There are no chirality outliers.

All (5) torsion outliers are listed below:

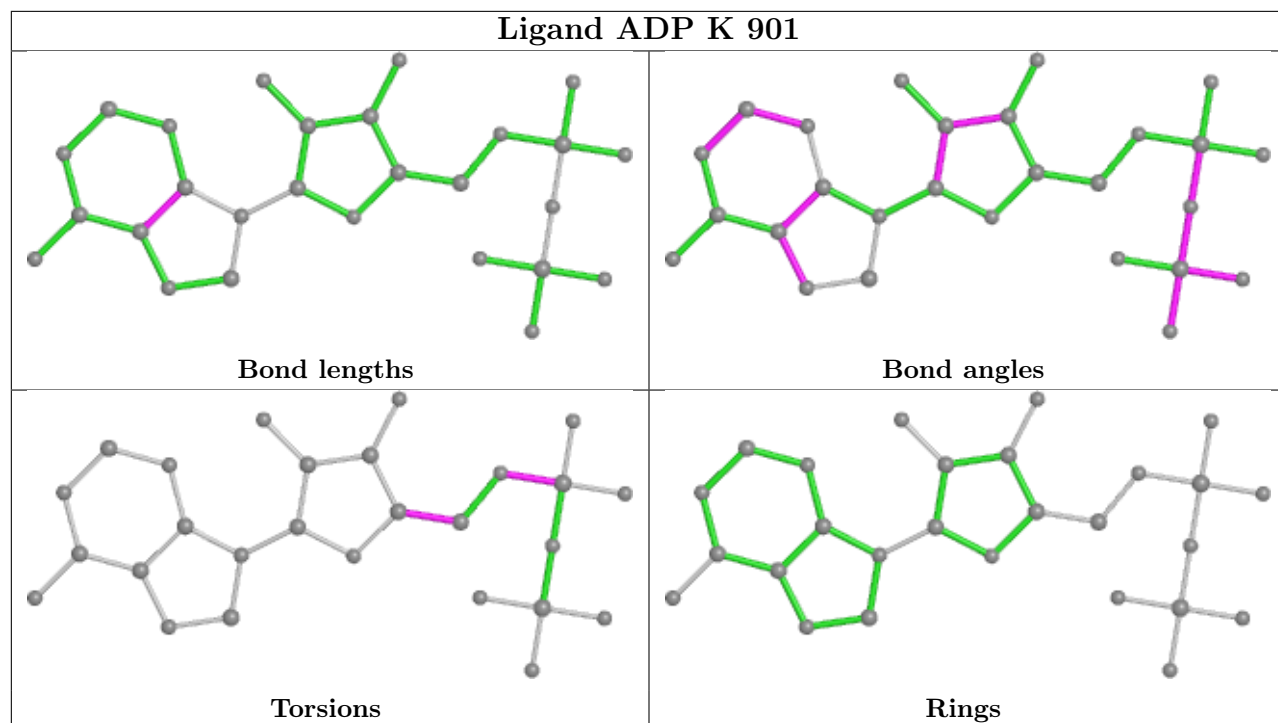
Mol	Chain	Res	Type	Atoms
8	K	901	ADP	C5'-O5'-PA-O1A
8	K	901	ADP	C5'-O5'-PA-O2A
8	K	901	ADP	O4'-C4'-C5'-O5'
8	K	901	ADP	C3'-C4'-C5'-O5'
8	K	901	ADP	C5'-O5'-PA-O3A

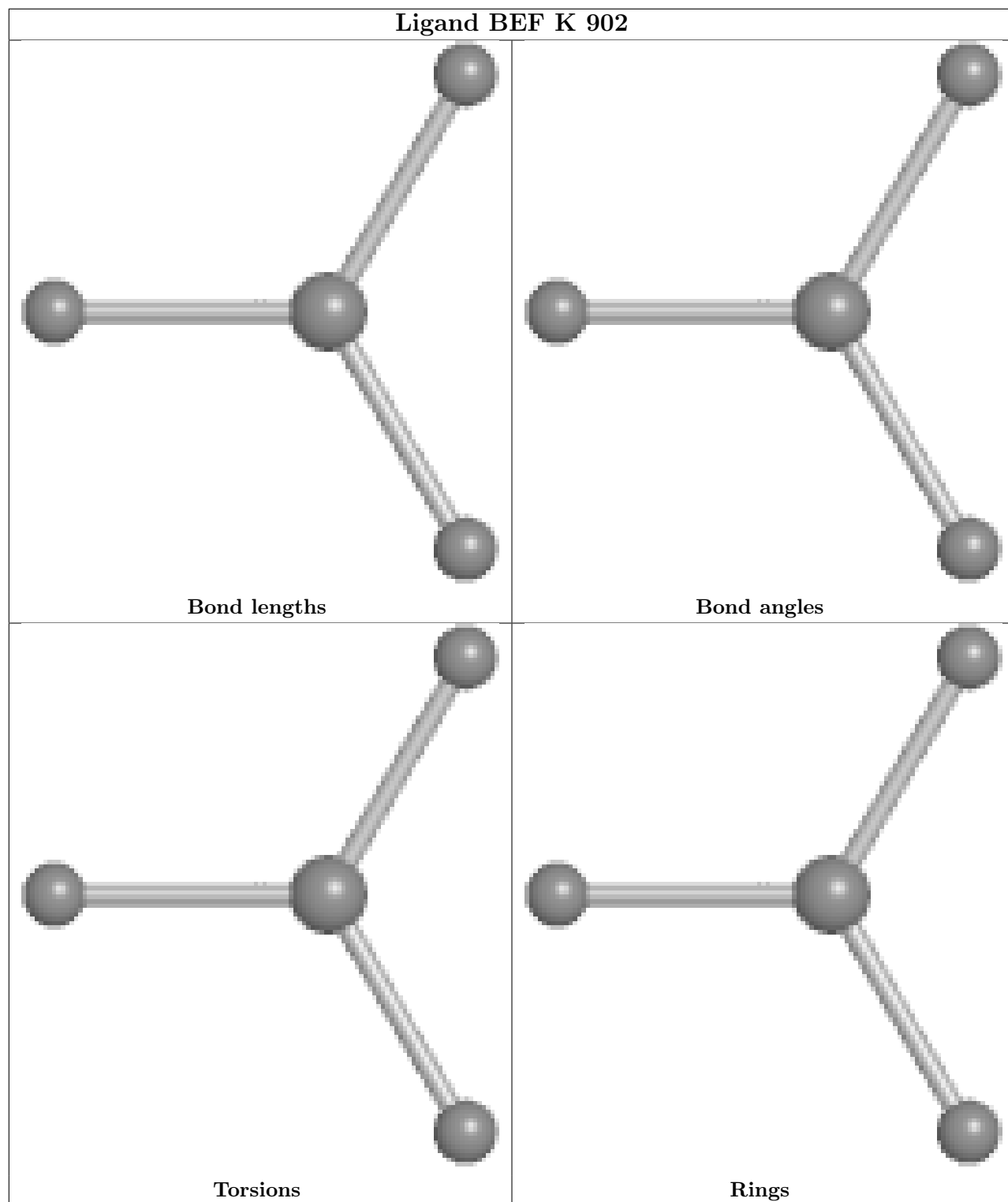
There are no ring outliers.

2 monomers are involved in 23 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	K	901	ADP	22	0
9	K	902	BEF	3	0

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 than 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.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

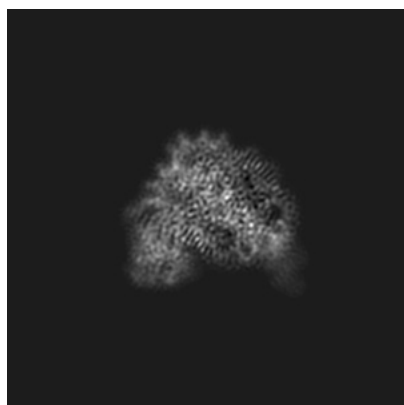
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-31217. These allow visual inspection of the internal detail of the map and identification of artifacts.

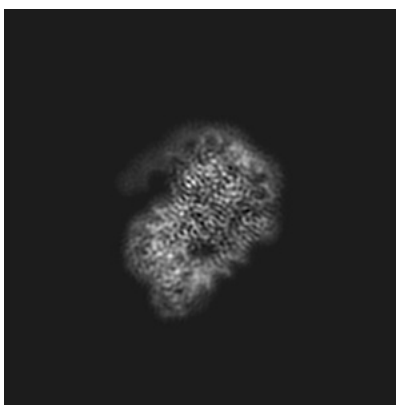
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

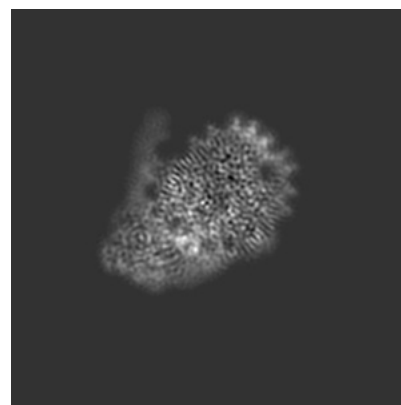
6.1.1 Primary map



X



Y

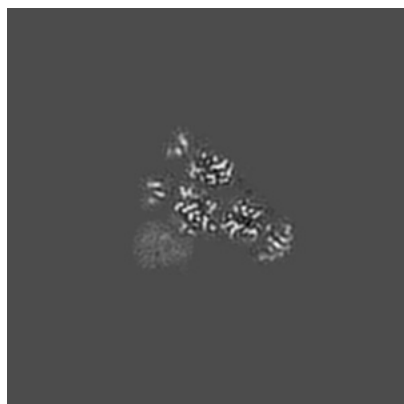


Z

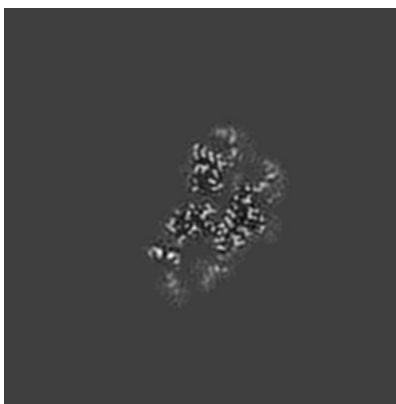
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

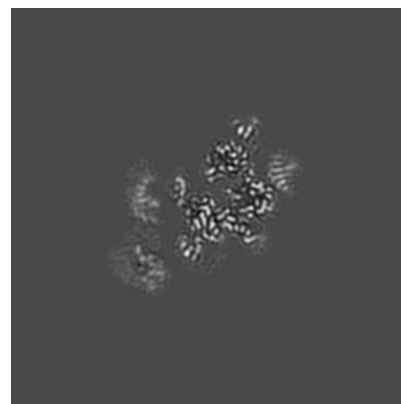
6.2.1 Primary map



X Index: 240



Y Index: 240

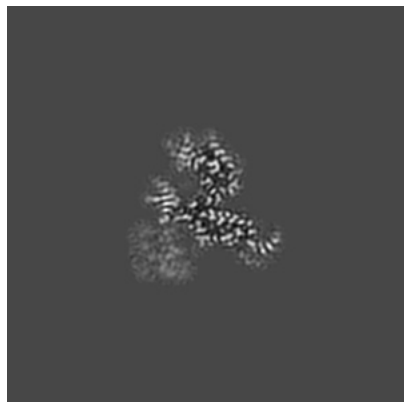


Z Index: 240

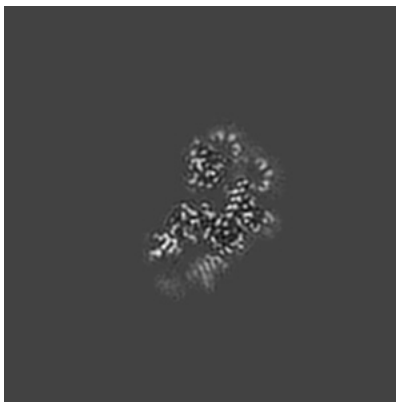
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

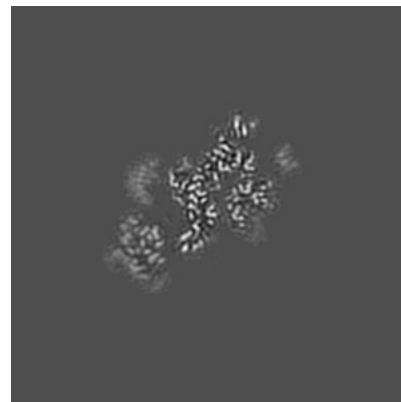
6.3.1 Primary map



X Index: 222



Y Index: 247

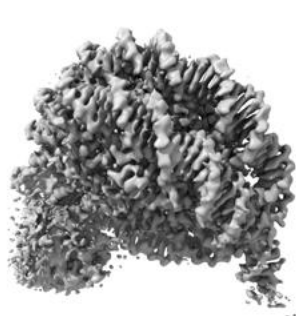


Z Index: 227

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

6.4 Orthogonal surface views [i](#)

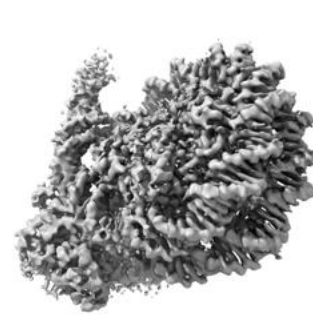
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.003. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

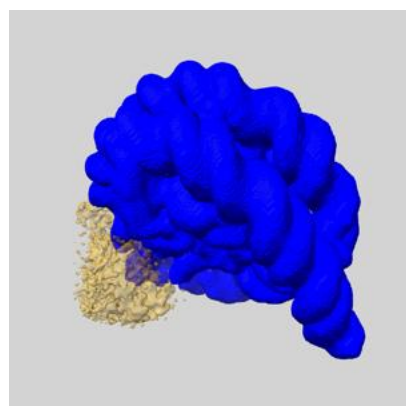
6.5 Mask visualisation [i](#)

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

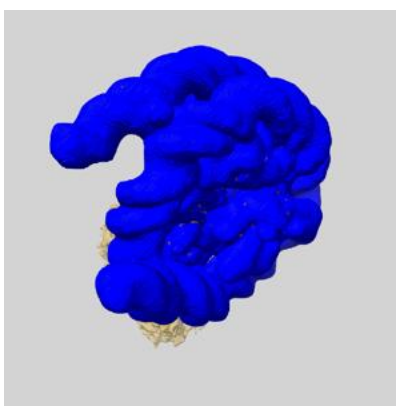
A mask typically either:

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

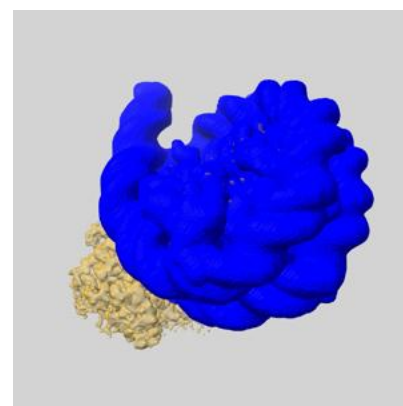
6.5.1 emd_31217_msk_1.map [i](#)



X

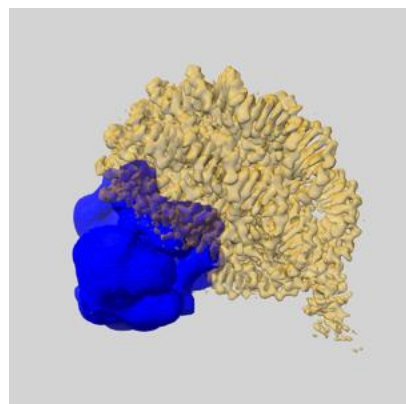


Y

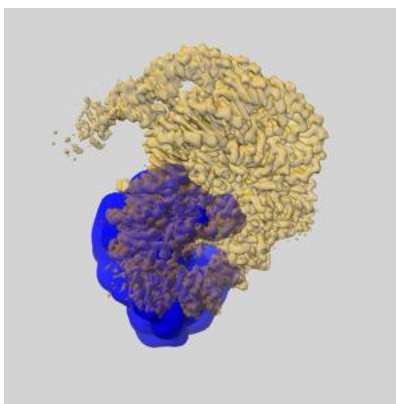


Z

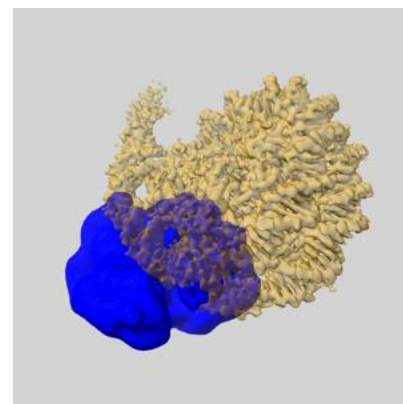
6.5.2 emd_31217_msk_2.map [i](#)



X



Y

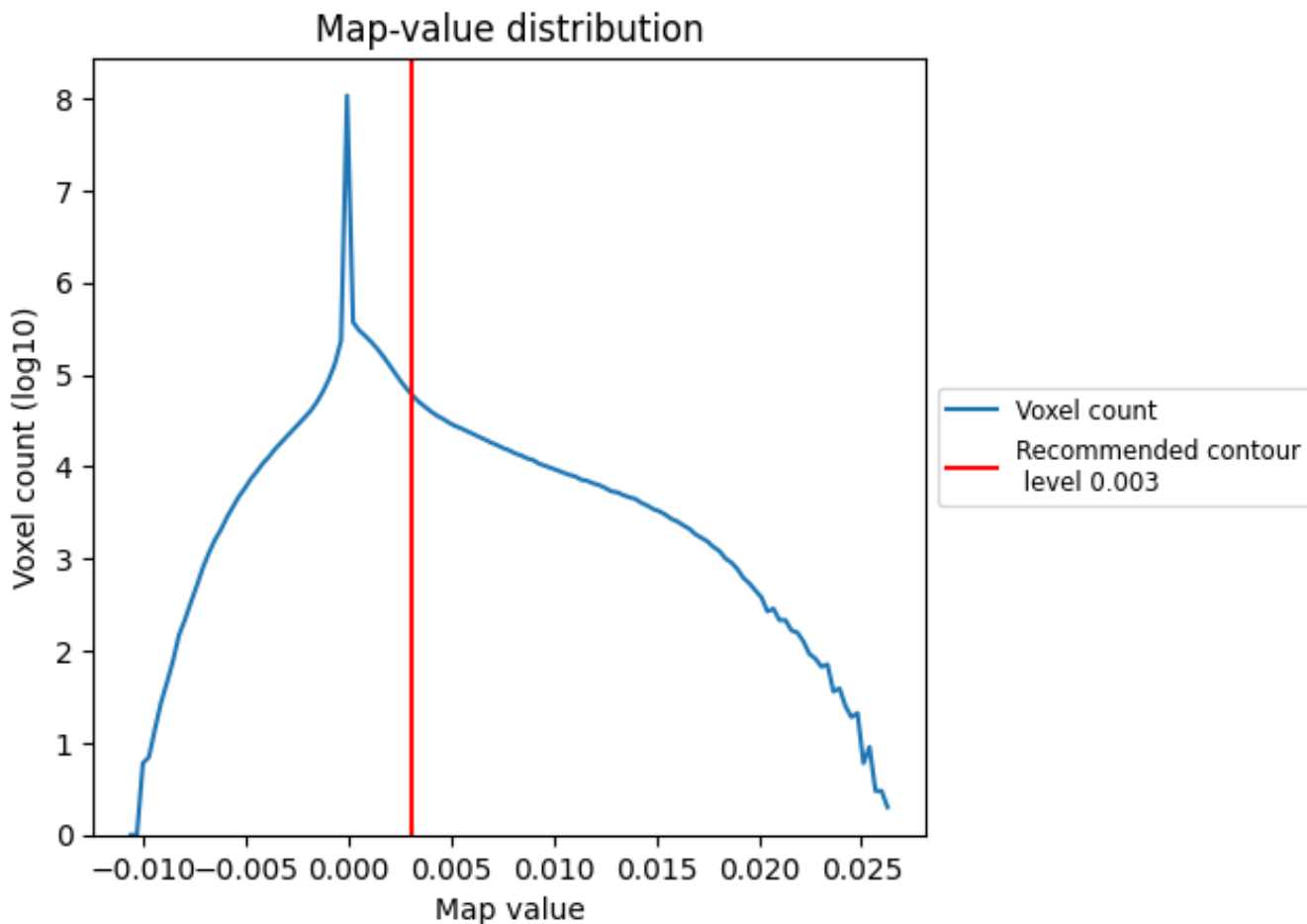


Z

7 Map analysis [i](#)

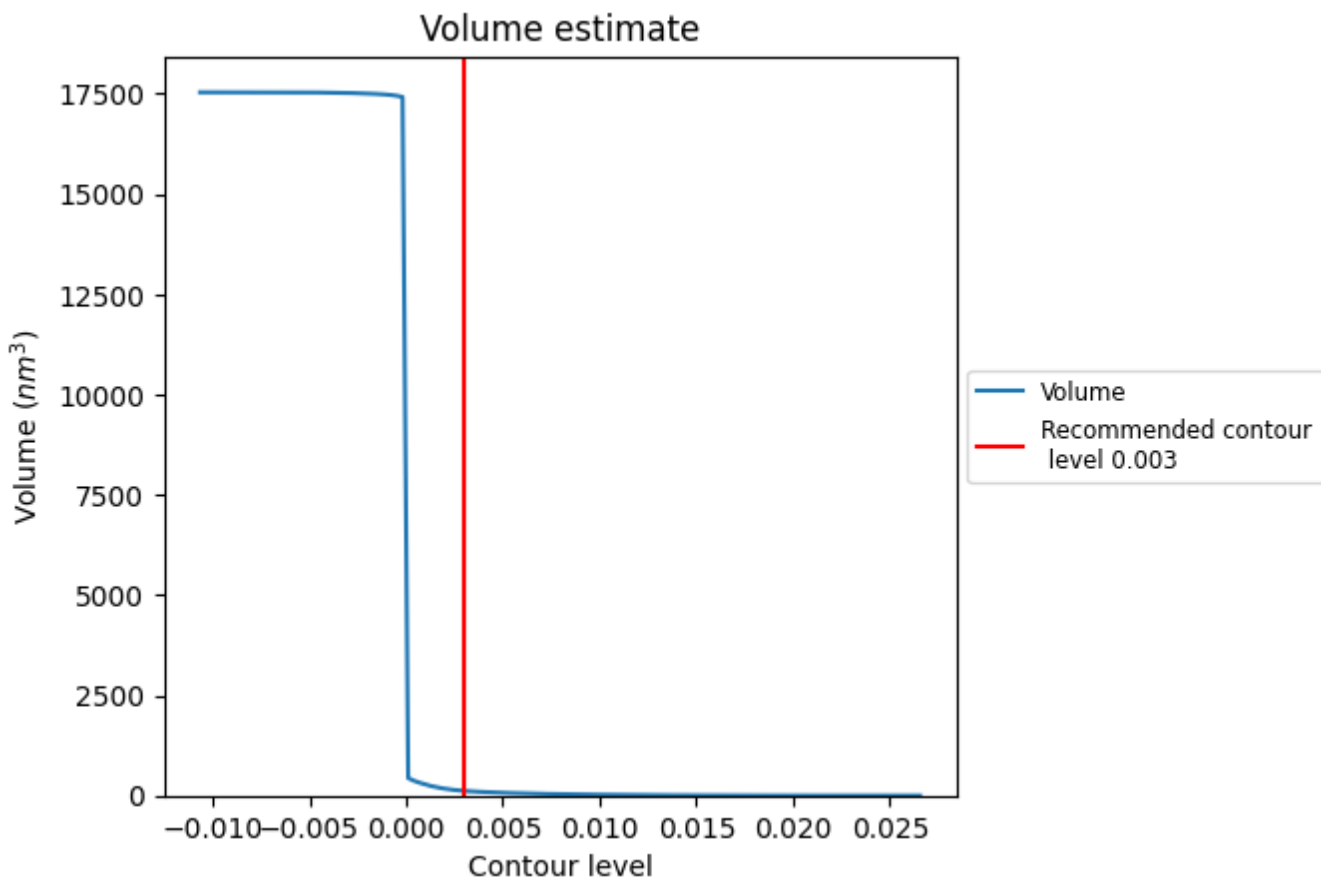
This section contains the results of statistical analysis of the map.

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.

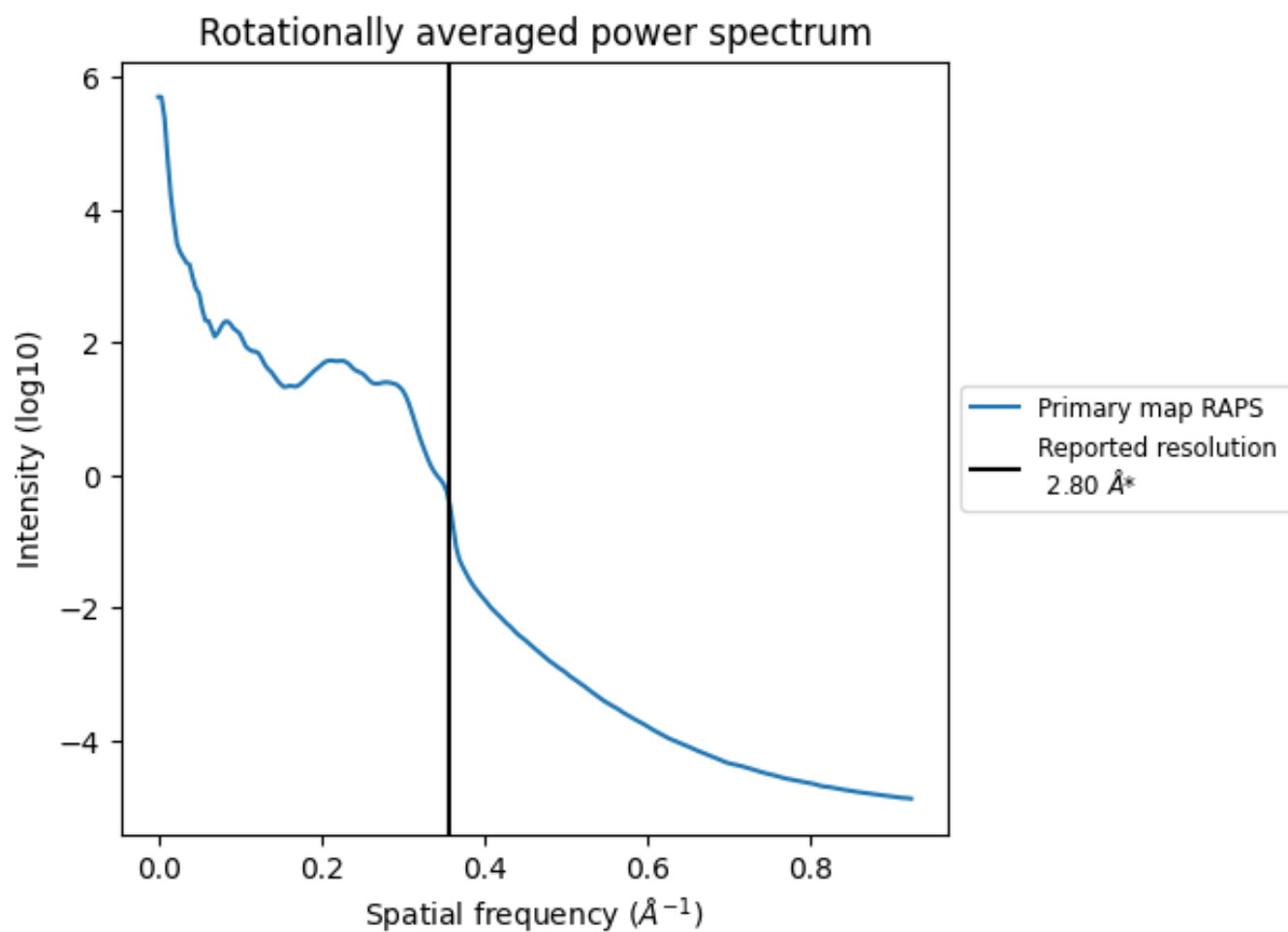
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 117 nm³; this corresponds to an approximate mass of 106 kDa.

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

7.3 Rotationally averaged power spectrum [i](#)



*Reported resolution corresponds to spatial frequency of 0.357\AA^{-1}

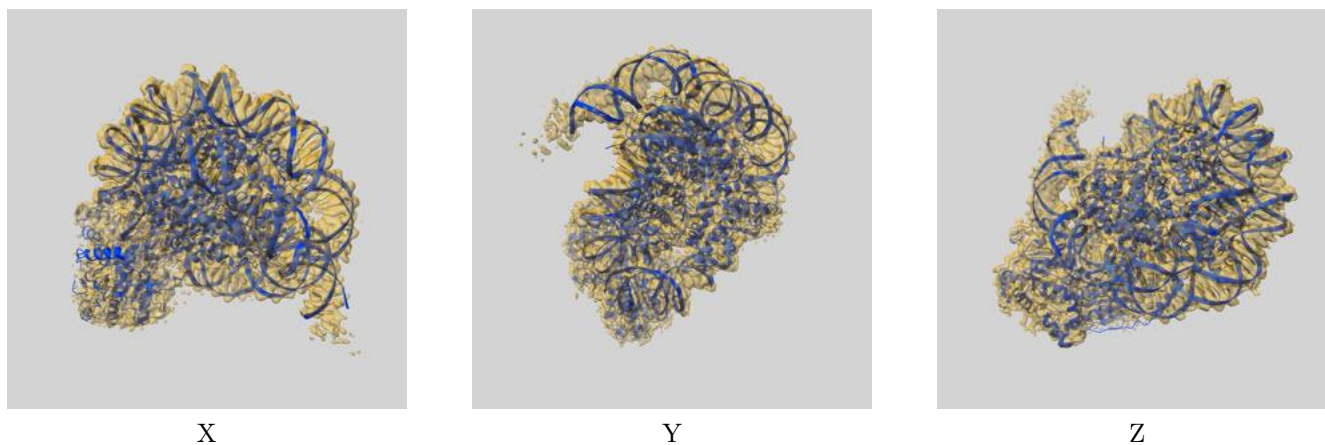
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

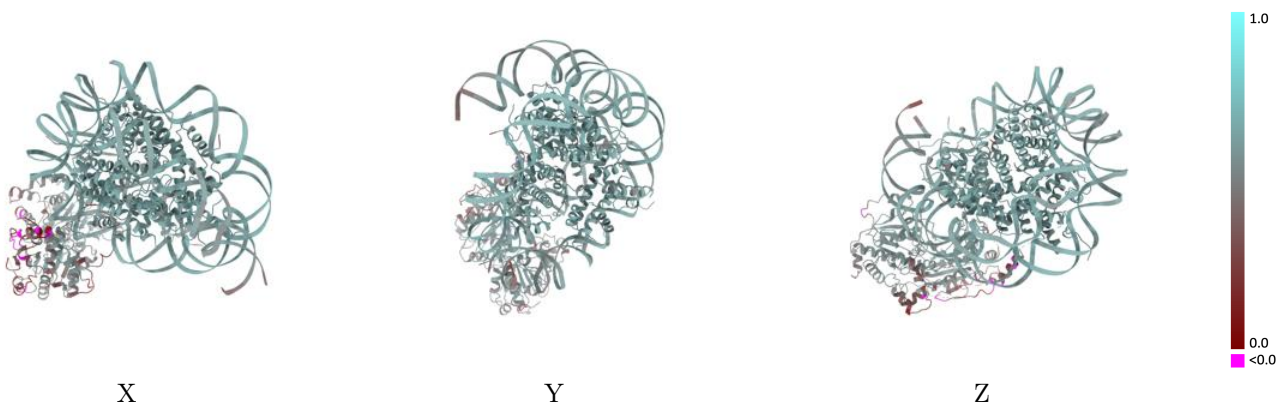
This section contains information regarding the fit between EMDB map EMD-31217 and PDB model 7ENN. Per-residue inclusion information can be found in section 3 on page 7.

9.1 Map-model overlay [i](#)



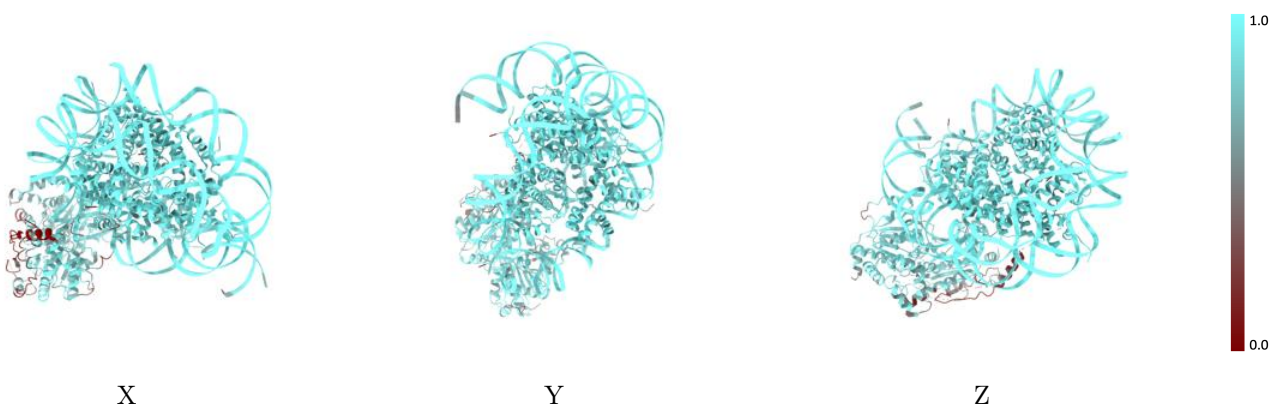
The images above show the 3D surface view of the map at the recommended contour level 0.003 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



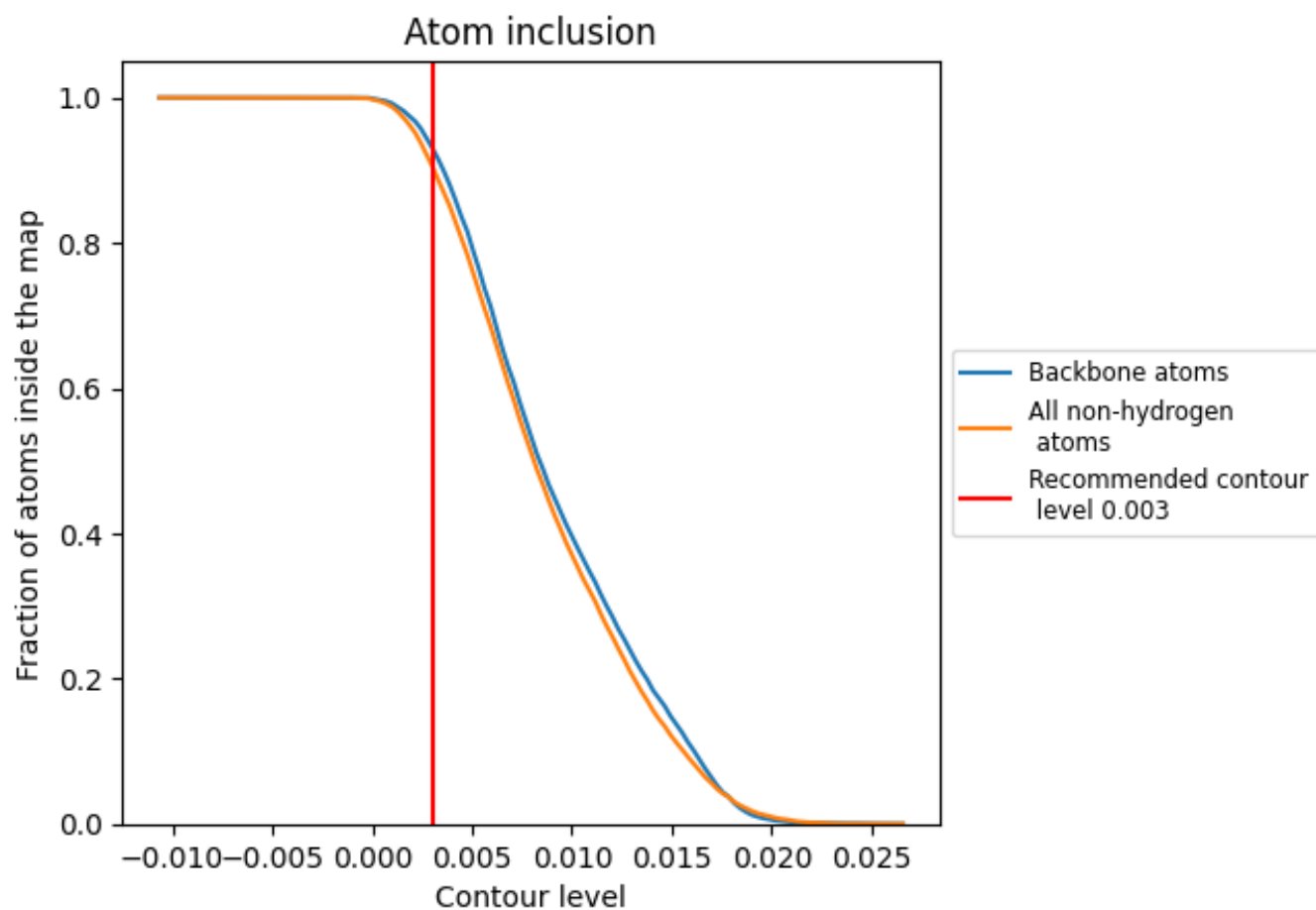
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.003).

























9.4 Atom inclusion [i](#)



At the recommended contour level, 93% of all backbone atoms, 91% 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 (0.003) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.9060	 0.5670
A	 0.9624	 0.6220
C	 0.9415	 0.6200
D	 0.9729	 0.6160
E	 0.9546	 0.6170
F	 0.9622	 0.6290
G	 0.9392	 0.6140
H	 0.9577	 0.6070
I	 0.9725	 0.5990
J	 0.9691	 0.5950
K	 0.7550	 0.4600
L	 0.9129	 0.5920

