



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 22, 2024 – 04:18 PM EDT

PDB ID : 8VWL  
Title : Crystal structure of Vibrio cholerae NFeoB in the apo form  
Authors : Lee, M.; Smith, A.T.  
Deposited on : 2024-02-01  
Resolution : 3.67 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

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>.

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

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.20.1  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.003 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

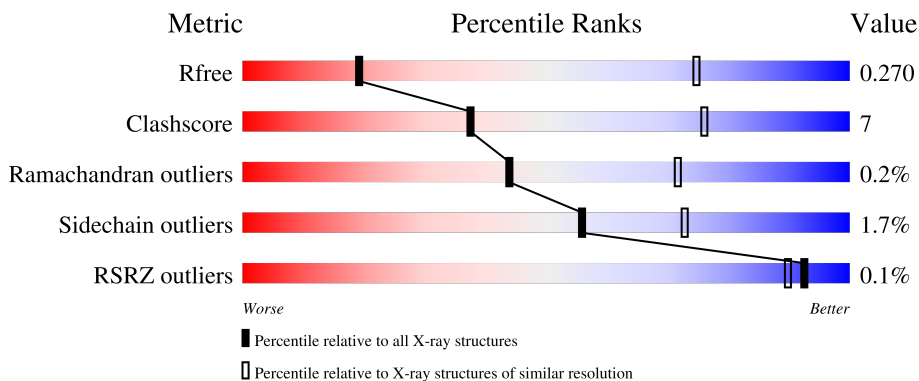
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.67 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)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	1132 (3.80-3.56)
Clashscore	180529	1194 (3.80-3.56)
Ramachandran outliers	177936	1173 (3.80-3.56)
Sidechain outliers	177891	1170 (3.80-3.56)
RSRZ outliers	164620	1132 (3.80-3.56)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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 electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	285	 74% 15% 11%
1	B	285	 74% 13% 12%
1	C	285	 70% 19% 11%
1	D	285	 72% 15% 13%
1	E	285	 66% 20% 13%

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Mol	Chain	Length	Quality of chain
1	F	285	
1	G	285	
1	H	285	

## 2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 15757 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 Ferrous iron transport protein B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	254	2001	1255	360	377	9	0	0	0
1	B	251	1983	1250	356	368	9	0	0	0
1	C	255	2014	1265	363	377	9	0	0	0
1	D	248	1962	1233	354	366	9	0	0	0
1	E	247	1949	1223	351	367	8	0	0	0
1	F	251	1993	1256	360	368	9	0	0	0
1	G	251	1981	1243	357	373	8	0	0	0
1	H	234	1868	1178	333	348	9	0	0	0

There are 104 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	273	LYS	-	expression tag	UNP A0A655NVH2
A	274	LEU	-	expression tag	UNP A0A655NVH2
A	275	ALA	-	expression tag	UNP A0A655NVH2
A	276	ALA	-	expression tag	UNP A0A655NVH2
A	277	ALA	-	expression tag	UNP A0A655NVH2
A	278	LEU	-	expression tag	UNP A0A655NVH2
A	279	GLU	-	expression tag	UNP A0A655NVH2
A	280	HIS	-	expression tag	UNP A0A655NVH2
A	281	HIS	-	expression tag	UNP A0A655NVH2
A	282	HIS	-	expression tag	UNP A0A655NVH2
A	283	HIS	-	expression tag	UNP A0A655NVH2
A	284	HIS	-	expression tag	UNP A0A655NVH2
A	285	HIS	-	expression tag	UNP A0A655NVH2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	273	LYS	-	expression tag	UNP A0A655NVH2
B	274	LEU	-	expression tag	UNP A0A655NVH2
B	275	ALA	-	expression tag	UNP A0A655NVH2
B	276	ALA	-	expression tag	UNP A0A655NVH2
B	277	ALA	-	expression tag	UNP A0A655NVH2
B	278	LEU	-	expression tag	UNP A0A655NVH2
B	279	GLU	-	expression tag	UNP A0A655NVH2
B	280	HIS	-	expression tag	UNP A0A655NVH2
B	281	HIS	-	expression tag	UNP A0A655NVH2
B	282	HIS	-	expression tag	UNP A0A655NVH2
B	283	HIS	-	expression tag	UNP A0A655NVH2
B	284	HIS	-	expression tag	UNP A0A655NVH2
B	285	HIS	-	expression tag	UNP A0A655NVH2
C	273	LYS	-	expression tag	UNP A0A655NVH2
C	274	LEU	-	expression tag	UNP A0A655NVH2
C	275	ALA	-	expression tag	UNP A0A655NVH2
C	276	ALA	-	expression tag	UNP A0A655NVH2
C	277	ALA	-	expression tag	UNP A0A655NVH2
C	278	LEU	-	expression tag	UNP A0A655NVH2
C	279	GLU	-	expression tag	UNP A0A655NVH2
C	280	HIS	-	expression tag	UNP A0A655NVH2
C	281	HIS	-	expression tag	UNP A0A655NVH2
C	282	HIS	-	expression tag	UNP A0A655NVH2
C	283	HIS	-	expression tag	UNP A0A655NVH2
C	284	HIS	-	expression tag	UNP A0A655NVH2
C	285	HIS	-	expression tag	UNP A0A655NVH2
D	273	LYS	-	expression tag	UNP A0A655NVH2
D	274	LEU	-	expression tag	UNP A0A655NVH2
D	275	ALA	-	expression tag	UNP A0A655NVH2
D	276	ALA	-	expression tag	UNP A0A655NVH2
D	277	ALA	-	expression tag	UNP A0A655NVH2
D	278	LEU	-	expression tag	UNP A0A655NVH2
D	279	GLU	-	expression tag	UNP A0A655NVH2
D	280	HIS	-	expression tag	UNP A0A655NVH2
D	281	HIS	-	expression tag	UNP A0A655NVH2
D	282	HIS	-	expression tag	UNP A0A655NVH2
D	283	HIS	-	expression tag	UNP A0A655NVH2
D	284	HIS	-	expression tag	UNP A0A655NVH2
D	285	HIS	-	expression tag	UNP A0A655NVH2
E	273	LYS	-	expression tag	UNP A0A655NVH2
E	274	LEU	-	expression tag	UNP A0A655NVH2
E	275	ALA	-	expression tag	UNP A0A655NVH2

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Chain	Residue	Modelled	Actual	Comment	Reference
E	276	ALA	-	expression tag	UNP A0A655NVH2
E	277	ALA	-	expression tag	UNP A0A655NVH2
E	278	LEU	-	expression tag	UNP A0A655NVH2
E	279	GLU	-	expression tag	UNP A0A655NVH2
E	280	HIS	-	expression tag	UNP A0A655NVH2
E	281	HIS	-	expression tag	UNP A0A655NVH2
E	282	HIS	-	expression tag	UNP A0A655NVH2
E	283	HIS	-	expression tag	UNP A0A655NVH2
E	284	HIS	-	expression tag	UNP A0A655NVH2
E	285	HIS	-	expression tag	UNP A0A655NVH2
F	273	LYS	-	expression tag	UNP A0A655NVH2
F	274	LEU	-	expression tag	UNP A0A655NVH2
F	275	ALA	-	expression tag	UNP A0A655NVH2
F	276	ALA	-	expression tag	UNP A0A655NVH2
F	277	ALA	-	expression tag	UNP A0A655NVH2
F	278	LEU	-	expression tag	UNP A0A655NVH2
F	279	GLU	-	expression tag	UNP A0A655NVH2
F	280	HIS	-	expression tag	UNP A0A655NVH2
F	281	HIS	-	expression tag	UNP A0A655NVH2
F	282	HIS	-	expression tag	UNP A0A655NVH2
F	283	HIS	-	expression tag	UNP A0A655NVH2
F	284	HIS	-	expression tag	UNP A0A655NVH2
F	285	HIS	-	expression tag	UNP A0A655NVH2
G	273	LYS	-	expression tag	UNP A0A655NVH2
G	274	LEU	-	expression tag	UNP A0A655NVH2
G	275	ALA	-	expression tag	UNP A0A655NVH2
G	276	ALA	-	expression tag	UNP A0A655NVH2
G	277	ALA	-	expression tag	UNP A0A655NVH2
G	278	LEU	-	expression tag	UNP A0A655NVH2
G	279	GLU	-	expression tag	UNP A0A655NVH2
G	280	HIS	-	expression tag	UNP A0A655NVH2
G	281	HIS	-	expression tag	UNP A0A655NVH2
G	282	HIS	-	expression tag	UNP A0A655NVH2
G	283	HIS	-	expression tag	UNP A0A655NVH2
G	284	HIS	-	expression tag	UNP A0A655NVH2
G	285	HIS	-	expression tag	UNP A0A655NVH2
H	273	LYS	-	expression tag	UNP A0A655NVH2
H	274	LEU	-	expression tag	UNP A0A655NVH2
H	275	ALA	-	expression tag	UNP A0A655NVH2
H	276	ALA	-	expression tag	UNP A0A655NVH2
H	277	ALA	-	expression tag	UNP A0A655NVH2
H	278	LEU	-	expression tag	UNP A0A655NVH2

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Chain	Residue	Modelled	Actual	Comment	Reference
H	279	GLU	-	expression tag	UNP A0A655NVH2
H	280	HIS	-	expression tag	UNP A0A655NVH2
H	281	HIS	-	expression tag	UNP A0A655NVH2
H	282	HIS	-	expression tag	UNP A0A655NVH2
H	283	HIS	-	expression tag	UNP A0A655NVH2
H	284	HIS	-	expression tag	UNP A0A655NVH2
H	285	HIS	-	expression tag	UNP A0A655NVH2

- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

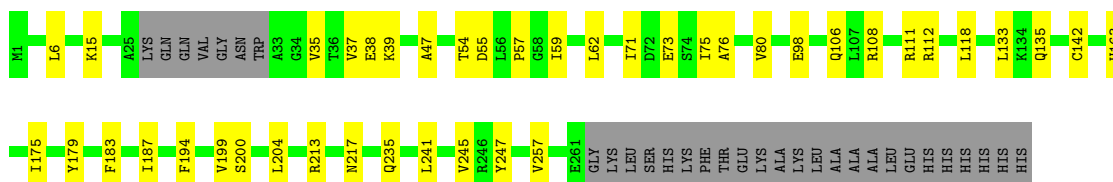
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	2	Total Mg 2 2	0	0
2	B	1	Total Mg 1 1	0	0
2	C	2	Total Mg 2 2	0	0
2	D	1	Total Mg 1 1	0	0

### 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 electron 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 dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). 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.

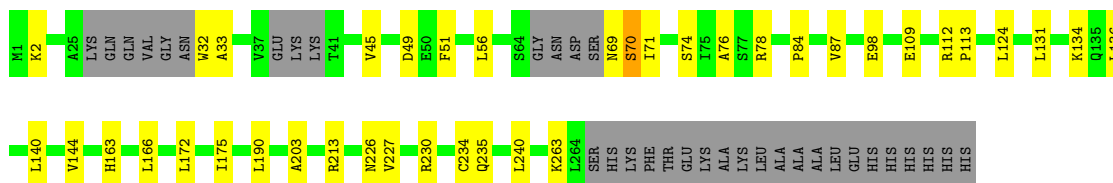
- Molecule 1: Ferrous iron transport protein B

Chain A: 



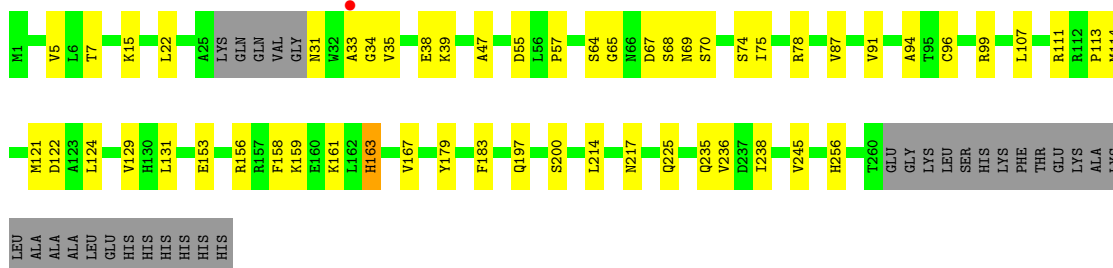
- Molecule 1: Ferrous iron transport protein B

Chain B: 



- Molecule 1: Ferrous iron transport protein B

Chain C: 

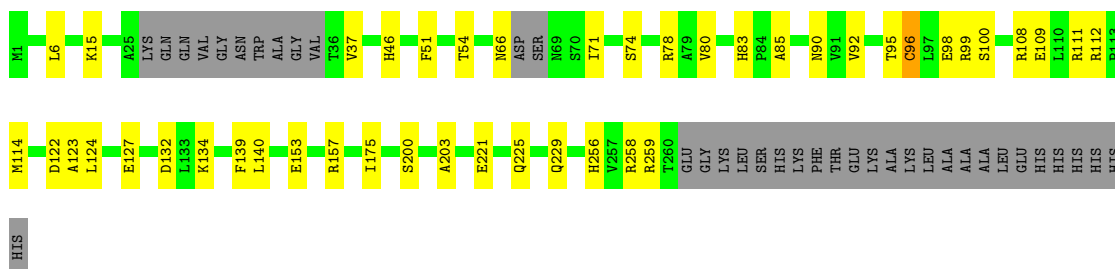


- Molecule 1: Ferrous iron transport protein B

Chain D: 

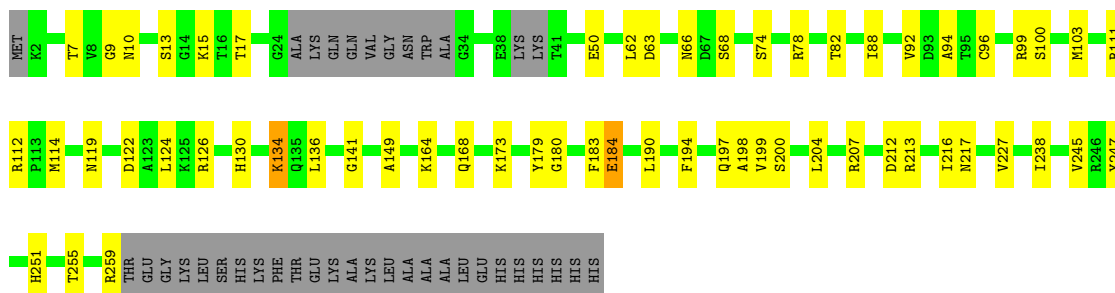






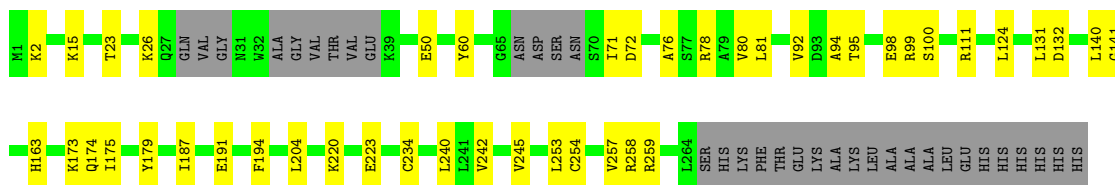
- Molecule 1: Ferrous iron transport protein B

Chain E: 66% 20% 13%



- Molecule 1: Ferrous iron transport protein B

Chain F: 73% 15% 12%



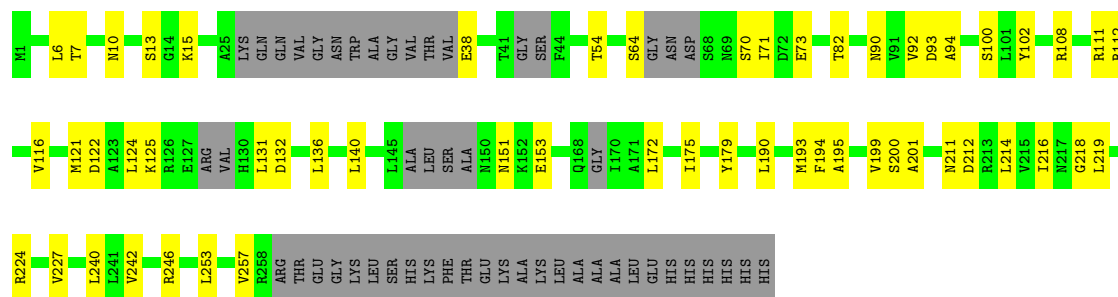
- Molecule 1: Ferrous iron transport protein B

Chain G: 71% 16% 12%



- Molecule 1: Ferrous iron transport protein B

Chain H: 63% 19% 18%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	48.35Å 84.12Å 158.03Å 76.17° 83.91° 74.51°	Depositor
Resolution (Å)	77.57 – 3.67 77.57 – 3.67	Depositor EDS
% Data completeness (in resolution range)	94.9 (77.57-3.67) 95.1 (77.57-3.67)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.21 (at 3.67Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.209 , 0.270 0.209 , 0.270	Depositor DCC
$R_{free}$ test set	1204 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	131.2	Xtrriage
Anisotropy	0.294	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 117.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.41$ , $\langle L^2 \rangle = 0.24$	Xtrriage
Estimated twinning fraction	0.067 for h,h-k,h-l	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	15757	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	147.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.67% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 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

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	0.26	0/2027	0.50	0/2737
1	B	0.27	0/2009	0.51	0/2712
1	C	0.25	0/2042	0.52	0/2759
1	D	0.25	0/1987	0.50	0/2681
1	E	0.26	0/1974	0.51	0/2666
1	F	0.26	0/2019	0.49	0/2720
1	G	0.25	0/2008	0.50	0/2714
1	H	0.25	0/1889	0.50	0/2542
All	All	0.26	0/15955	0.50	0/21531

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2001	0	2039	27	0
1	B	1983	0	2024	25	0
1	C	2014	0	2049	34	0
1	D	1962	0	2006	26	0
1	E	1949	0	1977	38	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	1993	0	2041	26	0
1	G	1981	0	2010	30	0
1	H	1868	0	1903	35	0
2	A	2	0	0	0	0
2	B	1	0	0	0	0
2	C	2	0	0	0	0
2	D	1	0	0	0	0
All	All	15757	0	16049	219	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 7.

All (219) 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:C:65:GLY:HA2	1:C:74:SER:HB2	1.58	0.83
1:A:35:VAL:HG11	1:A:75:ILE:HG13	1.63	0.80
1:E:180:GLY:O	1:E:184:GLU:HB2	1.85	0.75
1:D:153:GLU:HB3	1:D:157:ARG:HH21	1.54	0.72
1:C:238:ILE:H	1:C:238:ILE:HD12	1.55	0.72
1:C:64:SER:HA	1:C:214:LEU:HD22	1.72	0.71
1:E:122:ASP:OD2	1:E:126:ARG:NH2	2.22	0.71
1:H:7:THR:HG22	1:H:15:LYS:HG3	1.74	0.70
1:H:132:ASP:HB2	1:H:257:VAL:HA	1.75	0.68
1:E:130:HIS:H	1:E:259:ARG:HB2	1.59	0.68
1:A:59:ILE:HG22	1:A:73:GLU:HG3	1.77	0.66
1:E:141:GLY:HA2	1:E:173:LYS:HE2	1.79	0.65
1:C:68:SER:HA	1:E:68:SER:HA	1.78	0.65
1:B:190:LEU:HD13	1:B:227:VAL:HG22	1.79	0.65
1:G:197:GLN:HG3	1:G:198:ALA:H	1.62	0.65
1:F:2:LYS:HA	1:F:50:GLU:HB2	1.79	0.64
1:E:112:ARG:HD2	1:E:199:VAL:HG12	1.79	0.64
1:B:78:ARG:HD3	1:G:75:ILE:HD11	1.80	0.64
1:F:240:LEU:HG	1:G:247:TYR:HB2	1.79	0.64
1:G:35:VAL:HG11	1:G:75:ILE:HG13	1.80	0.63
1:A:179:TYR:HA	1:A:245:VAL:HG11	1.79	0.63
1:G:35:VAL:HG23	1:G:39:LYS:HB2	1.81	0.63
1:E:194:PHE:HB3	1:E:204:LEU:HD12	1.81	0.62
1:D:134:LYS:H	1:D:134:LYS:HD2	1.64	0.62
1:B:74:SER:OG	1:B:78:ARG:NH2	2.33	0.62
1:C:38:GLU:HB2	1:C:57:PRO:HA	1.82	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:151:ASN:ND2	1:H:153:GLU:OE1	2.33	0.62
1:H:195:ALA:HA	1:H:201:ALA:HB2	1.85	0.59
1:B:140:LEU:HA	1:B:175:ILE:HD11	1.84	0.58
1:F:132:ASP:OD2	1:F:259:ARG:NH2	2.36	0.58
1:G:94:ALA:HB1	1:G:124:LEU:HD22	1.85	0.58
1:E:7:THR:HG22	1:E:15:LYS:HG3	1.85	0.57
1:D:80:VAL:O	1:D:112:ARG:NH1	2.38	0.57
1:F:92:VAL:HG13	1:F:100:SER:HB2	1.87	0.57
1:C:153:GLU:OE2	1:C:156:ARG:NE	2.36	0.57
1:D:140:LEU:HA	1:D:175:ILE:HD11	1.86	0.57
1:H:136:LEU:HD13	1:H:253:LEU:HD21	1.86	0.56
1:C:197:GLN:NE2	1:H:38:GLU:OE1	2.28	0.56
1:B:45:VAL:HG11	1:C:167:VAL:HG21	1.88	0.56
1:E:94:ALA:HB1	1:E:124:LEU:HD22	1.87	0.56
1:H:94:ALA:HB1	1:H:124:LEU:HD22	1.86	0.56
1:G:164:LYS:HE2	1:G:168:GLN:HG3	1.86	0.56
1:H:193:MET:HE3	1:H:219:LEU:HD22	1.86	0.56
1:A:62:LEU:HD12	1:A:106:GLN:HB3	1.88	0.55
1:F:98:GLU:HB3	1:G:235:GLN:O	2.06	0.55
1:F:179:TYR:HA	1:F:245:VAL:HG11	1.88	0.55
1:C:33:ALA:HB2	1:H:82:THR:HG21	1.88	0.55
1:G:67:ASP:HB2	1:G:70:SER:HB3	1.89	0.55
1:H:121:MET:O	1:H:125:LYS:HG3	2.07	0.55
1:D:6:LEU:HD23	1:D:54:THR:HB	1.88	0.54
1:D:96:CYS:SG	1:D:99:ARG:NH2	2.80	0.54
1:A:108:ARG:HB3	1:A:175:ILE:HD12	1.89	0.54
1:C:124:LEU:HG	1:C:129:VAL:HB	1.90	0.54
1:A:35:VAL:HG23	1:A:39:LYS:HB2	1.89	0.54
1:C:179:TYR:HA	1:C:245:VAL:HG11	1.89	0.53
1:B:32:TRP:HB3	1:G:193:MET:O	2.07	0.53
1:C:7:THR:HG23	1:C:55:ASP:HA	1.90	0.53
1:G:59:ILE:HG13	1:G:103:MET:SD	2.49	0.53
1:D:95:THR:HA	1:D:124:LEU:HD13	1.91	0.53
1:H:211:ASN:HA	1:H:216:ILE:HD11	1.91	0.53
1:C:34:GLY:HA2	1:H:218:GLY:N	2.24	0.53
1:F:254:CYS:O	1:F:258:ARG:HB2	2.09	0.53
1:G:65:GLY:HA2	1:G:74:SER:OG	2.09	0.52
1:D:108:ARG:HD3	1:D:114:MET:HE2	1.91	0.52
1:G:148:SER:HB3	1:G:150:ASN:HD21	1.74	0.52
1:A:47:ALA:HB3	1:A:163:HIS:CE1	2.45	0.52
1:F:94:ALA:HB1	1:F:124:LEU:HD22	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:151:ASN:HB3	1:G:154:GLN:HG3	1.90	0.52
1:D:122:ASP:OD1	1:D:122:ASP:N	2.42	0.52
1:G:148:SER:HB3	1:G:150:ASN:ND2	2.24	0.52
1:A:118:LEU:HD12	1:A:133:LEU:HD22	1.91	0.52
1:A:111:ARG:HB2	1:A:200:SER:HB2	1.93	0.51
1:H:111:ARG:HH12	1:H:172:LEU:HB3	1.74	0.51
1:D:92:VAL:HG13	1:D:100:SER:HB2	1.93	0.51
1:G:213:ARG:HA	1:G:216:ILE:HB	1.93	0.51
1:C:158:PHE:HA	1:C:161:LYS:HD2	1.93	0.51
1:G:84:PRO:HA	1:G:112:ARG:HH22	1.76	0.50
1:A:108:ARG:HD3	1:A:142:CYS:HB3	1.93	0.50
1:E:62:LEU:HB2	1:E:207:ARG:NH2	2.26	0.50
1:E:62:LEU:HD12	1:E:63:ASP:H	1.76	0.50
1:F:140:LEU:HA	1:F:175:ILE:HD11	1.92	0.50
1:E:197:GLN:HG3	1:E:198:ALA:H	1.77	0.49
1:H:116:VAL:HG21	1:H:140:LEU:HD13	1.93	0.49
1:B:136:LEU:HD23	1:B:144:VAL:HG11	1.94	0.49
1:D:78:ARG:HH22	1:E:74:SER:HB3	1.76	0.49
1:C:39:LYS:O	1:C:39:LYS:HG3	2.13	0.49
1:H:70:SER:O	1:H:73:GLU:N	2.43	0.49
1:E:96:CYS:SG	1:E:99:ARG:NH2	2.86	0.48
1:A:194:PHE:HB3	1:A:204:LEU:HD12	1.95	0.48
1:C:15:LYS:HA	1:C:91:VAL:HG21	1.95	0.48
1:E:247:TYR:HB2	1:H:240:LEU:HG	1.94	0.48
1:C:122:ASP:OD1	1:C:122:ASP:N	2.46	0.48
1:G:32:TRP:CG	1:G:39:LYS:HG2	2.48	0.48
1:F:95:THR:HA	1:F:124:LEU:HD13	1.94	0.48
1:D:71:ILE:HD13	1:E:217:ASN:HB3	1.96	0.48
1:B:113:PRO:HA	1:B:172:LEU:HD11	1.96	0.47
1:A:38:GLU:CB	1:A:57:PRO:HA	2.45	0.47
1:H:122:ASP:HA	1:H:125:LYS:HE2	1.96	0.47
1:G:152:LYS:HA	1:G:155:VAL:HB	1.95	0.47
1:C:94:ALA:HB1	1:C:124:LEU:HD13	1.97	0.47
1:D:46:HIS:HB3	1:D:51:PHE:HE2	1.79	0.47
1:B:87:VAL:HG11	1:B:166:LEU:HD11	1.95	0.47
1:A:183:PHE:CD2	1:A:187:ILE:HD11	2.50	0.47
1:A:217:ASN:ND2	1:F:71:ILE:HG12	2.30	0.47
1:C:217:ASN:ND2	1:H:71:ILE:HB	2.29	0.47
1:E:17:THR:HB	1:E:149:ALA:HB1	1.96	0.47
1:E:111:ARG:HB2	1:E:200:SER:HB2	1.97	0.47
1:G:78:ARG:O	1:G:82:THR:HG22	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:85:ALA:H	1:D:112:ARG:HH21	1.62	0.47
1:D:85:ALA:N	1:D:112:ARG:HH21	2.13	0.47
1:D:15:LYS:HB3	1:D:15:LYS:HE3	1.55	0.46
1:F:76:ALA:O	1:F:80:VAL:HG23	2.14	0.46
1:A:112:ARG:HD2	1:A:199:VAL:HG12	1.97	0.46
1:E:62:LEU:HD12	1:E:63:ASP:N	2.30	0.46
1:A:241:LEU:O	1:A:245:VAL:HG23	2.15	0.46
1:F:141:GLY:HA3	1:F:173:LYS:O	2.16	0.46
1:G:122:ASP:OD2	1:G:126:ARG:NH2	2.48	0.46
1:H:92:VAL:HG13	1:H:100:SER:HB3	1.97	0.46
1:B:51:PHE:HZ	1:B:163:HIS:HD1	1.64	0.46
1:F:23:THR:O	1:F:26:LYS:HG2	2.15	0.46
1:A:76:ALA:O	1:A:80:VAL:HG23	2.16	0.46
1:A:71:ILE:HG23	1:F:78:ARG:HH12	1.80	0.46
1:A:57:PRO:HD2	1:A:76:ALA:HB2	1.99	0.45
1:A:98:GLU:HB3	1:B:235:GLN:O	2.16	0.45
1:C:5:VAL:HG13	1:C:87:VAL:HG13	1.98	0.45
1:E:251:HIS:O	1:E:255:THR:HG23	2.16	0.45
1:H:190:LEU:HD13	1:H:227:VAL:HG22	1.98	0.45
1:G:87:VAL:HA	1:G:113:PRO:HB2	1.98	0.45
1:D:109:GLU:O	1:D:203:ALA:HB2	2.17	0.45
1:E:213:ARG:O	1:E:217:ASN:ND2	2.49	0.45
1:A:235:GLN:O	1:B:98:GLU:HB3	2.16	0.45
1:B:263:LYS:HD3	1:B:263:LYS:HA	1.76	0.45
1:E:141:GLY:HA3	1:E:173:LYS:O	2.16	0.45
1:B:109:GLU:O	1:B:203:ALA:HB2	2.17	0.44
1:C:87:VAL:HA	1:C:113:PRO:HB2	1.99	0.44
1:C:96:CYS:SG	1:C:99:ARG:NH1	2.90	0.44
1:E:190:LEU:HD13	1:E:227:VAL:HG22	1.99	0.44
1:A:15:LYS:NZ	1:A:55:ASP:OD2	2.50	0.44
1:D:66:ASN:HB2	1:E:66:ASN:ND2	2.33	0.44
1:H:121:MET:SD	1:H:131:LEU:HD12	2.57	0.44
1:C:131:LEU:HD23	1:C:131:LEU:HA	1.82	0.44
1:A:38:GLU:HB2	1:A:57:PRO:HA	1.99	0.43
1:C:236:VAL:HG12	1:D:98:GLU:HG2	1.99	0.43
1:D:111:ARG:HB2	1:D:200:SER:HB2	2.00	0.43
1:E:78:ARG:O	1:E:82:THR:HG22	2.17	0.43
1:E:92:VAL:HG13	1:E:100:SER:HB2	2.00	0.43
1:H:64:SER:HB2	1:H:214:LEU:HD13	2.01	0.43
1:D:256:HIS:O	1:D:259:ARG:NH2	2.40	0.43
1:G:15:LYS:HA	1:G:91:VAL:HG21	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:131:LEU:HD23	1:H:131:LEU:HA	1.82	0.43
1:B:226:ASN:O	1:B:230:ARG:HG2	2.18	0.43
1:E:179:TYR:HA	1:E:245:VAL:HG21	2.01	0.43
1:G:9:GLY:HA2	1:G:103:MET:HE1	2.01	0.43
1:B:56:LEU:HD13	1:B:76:ALA:HA	2.00	0.43
1:H:124:LEU:HD12	1:H:124:LEU:HA	1.80	0.43
1:B:69:ASN:HB3	1:B:70:SER:H	1.63	0.43
1:C:35:VAL:HG11	1:C:75:ILE:HD12	2.01	0.43
1:C:69:ASN:CG	1:C:70:SER:H	2.22	0.43
1:G:85:ALA:H	1:G:112:ARG:NH2	2.16	0.43
1:H:212:ASP:O	1:H:216:ILE:HG13	2.18	0.43
1:H:219:LEU:HB2	1:H:224:ARG:HG3	2.00	0.43
1:F:60:TYR:HE1	1:F:99:ARG:HH11	1.66	0.42
1:G:65:GLY:HA3	1:G:78:ARG:HH21	1.83	0.42
1:F:15:LYS:HB3	1:F:15:LYS:HE3	1.53	0.42
1:H:102:TYR:HE1	1:H:246:ARG:HD3	1.83	0.42
1:H:112:ARG:HD2	1:H:199:VAL:HG12	2.01	0.42
1:A:35:VAL:O	1:A:37:VAL:N	2.53	0.42
1:D:132:ASP:HB2	1:D:259:ARG:CZ	2.49	0.42
1:A:247:TYR:HB2	1:B:240:LEU:HG	2.01	0.42
1:C:111:ARG:HB2	1:C:200:SER:HB2	2.01	0.42
1:C:121:MET:SD	1:C:124:LEU:HD22	2.60	0.42
1:F:194:PHE:HB3	1:F:204:LEU:HD12	2.01	0.42
1:B:33:ALA:HA	1:G:197:GLN:HE22	1.85	0.42
1:F:131:LEU:HD23	1:F:131:LEU:HA	1.89	0.42
1:C:33:ALA:HB2	1:H:82:THR:CG2	2.48	0.42
1:B:84:PRO:HA	1:B:112:ARG:HH22	1.84	0.42
1:D:74:SER:O	1:D:78:ARG:HD2	2.20	0.42
1:F:220:LYS:HE3	1:F:223:GLU:OE2	2.19	0.42
1:F:187:ILE:O	1:F:191:GLU:HG3	2.20	0.41
1:B:49:ASP:HB2	1:B:163:HIS:HE1	1.85	0.41
1:F:81:LEU:HD23	1:F:81:LEU:HA	1.91	0.41
1:C:47:ALA:HB3	1:C:163:HIS:CD2	2.55	0.41
1:D:221:GLU:O	1:D:225:GLN:HG2	2.20	0.41
1:E:114:MET:HE2	1:E:114:MET:HB3	1.90	0.41
1:F:253:LEU:O	1:F:257:VAL:HG22	2.21	0.41
1:G:154:GLN:HA	1:G:157:ARG:HD2	2.01	0.41
1:H:121:MET:HG3	1:H:125:LYS:HZ3	1.86	0.41
1:E:9:GLY:N	1:E:103:MET:HE1	2.35	0.41
1:B:74:SER:O	1:B:78:ARG:HB2	2.20	0.41
1:F:2:LYS:HE2	1:F:2:LYS:HB3	1.68	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:78:ARG:HG2	1:C:214:LEU:HD11	2.02	0.41
1:C:107:LEU:HB3	1:C:114:MET:SD	2.60	0.41
1:F:179:TYR:HE2	1:F:242:VAL:HG13	1.86	0.41
1:H:111:ARG:HB2	1:H:200:SER:HB2	2.03	0.41
1:C:183:PHE:CE1	1:C:238:ILE:HG23	2.56	0.41
1:E:88:ILE:HD11	1:E:112:ARG:HE	1.86	0.41
1:E:183:PHE:HE1	1:E:238:ILE:HG12	1.85	0.41
1:E:197:GLN:HG3	1:E:199:VAL:H	1.86	0.41
1:E:197:GLN:CG	1:E:198:ALA:H	2.33	0.41
1:F:111:ARG:NE	1:F:174:GLN:HE21	2.18	0.41
1:B:2:LYS:HE3	1:B:2:LYS:HB3	1.92	0.40
1:D:123:ALA:O	1:D:127:GLU:HG2	2.20	0.40
1:E:13:SER:O	1:E:119:ASN:ND2	2.43	0.40
1:A:6:LEU:HD23	1:A:54:THR:HB	2.03	0.40
1:B:124:LEU:HD21	1:B:131:LEU:HG	2.04	0.40
1:E:164:LYS:NZ	1:E:168:GLN:OE1	2.53	0.40
1:B:213:ARG:HA	1:B:213:ARG:HD2	1.75	0.40
1:D:139:PHE:O	1:D:175:ILE:HG12	2.21	0.40
1:E:136:LEU:HD12	1:E:136:LEU:HA	1.93	0.40
1:G:216:ILE:HG23	1:G:224:ARG:HG2	2.03	0.40
1:H:13:SER:HA	1:H:93:ASP:HB2	2.03	0.40
1:A:135:GLN:HB3	1:A:257:VAL:HG12	2.02	0.40
1:C:22:LEU:HD23	1:C:159:LYS:HE2	2.03	0.40
1:E:134:LYS:H	1:E:134:LYS:HG2	1.56	0.40
1:E:212:ASP:O	1:E:216:ILE:HG12	2.21	0.40
1:G:189:GLU:HB3	1:G:230:ARG:HH21	1.87	0.40
1:H:179:TYR:HE2	1:H:242:VAL:HG13	1.87	0.40
1:H:6:LEU:HD23	1:H:54:THR:HB	2.02	0.40
1:H:108:ARG:HD2	1:H:108:ARG:HA	1.99	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 X-ray entries followed by that with respect to entries of similar resolution.

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	250/285 (88%)	239 (96%)	11 (4%)	0	100	100
1	B	243/285 (85%)	234 (96%)	8 (3%)	1 (0%)	30	61
1	C	251/285 (88%)	237 (94%)	14 (6%)	0	100	100
1	D	242/285 (85%)	231 (96%)	10 (4%)	1 (0%)	30	61
1	E	241/285 (85%)	225 (93%)	16 (7%)	0	100	100
1	F	243/285 (85%)	232 (96%)	11 (4%)	0	100	100
1	G	247/285 (87%)	236 (96%)	10 (4%)	1 (0%)	30	61
1	H	220/285 (77%)	210 (96%)	9 (4%)	1 (0%)	25	57
All	All	1937/2280 (85%)	1844 (95%)	89 (5%)	4 (0%)	44	72

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	37	VAL
1	H	175	ILE
1	G	68	SER
1	B	70	SER

### 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 X-ray entries followed by that with respect to entries of similar resolution.

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	219/244 (90%)	218 (100%)	1 (0%)	86	91
1	B	216/244 (88%)	213 (99%)	3 (1%)	62	76
1	C	220/244 (90%)	214 (97%)	6 (3%)	40	60
1	D	215/244 (88%)	210 (98%)	5 (2%)	45	64
1	E	214/244 (88%)	210 (98%)	4 (2%)	52	70
1	F	217/244 (89%)	214 (99%)	3 (1%)	62	76
1	G	217/244 (89%)	212 (98%)	5 (2%)	45	64
1	H	206/244 (84%)	203 (98%)	3 (2%)	60	75
All	All	1724/1952 (88%)	1694 (98%)	30 (2%)	56	73

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	213	ARG
1	B	71	ILE
1	B	134	LYS
1	B	234	CYS
1	C	31	ASN
1	C	67	ASP
1	C	163	HIS
1	C	225	GLN
1	C	235	GLN
1	C	256	HIS
1	D	83	HIS
1	D	90	ASN
1	D	96	CYS
1	D	229	GLN
1	D	258	ARG
1	E	10	ASN
1	E	50	GLU
1	E	134	LYS
1	E	184	GLU
1	F	72	ASP
1	F	163	HIS
1	F	234	CYS
1	G	10	ASN
1	G	32	TRP
1	G	125	LYS
1	G	173	LYS
1	G	234	CYS
1	H	10	ASN
1	H	90	ASN
1	H	194	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	226	ASN
1	B	231	GLN
1	C	46	HIS
1	D	174	GLN
1	E	66	ASN
1	F	10	ASN
1	F	174	GLN

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Mol	Chain	Res	Type
1	G	150	ASN
1	H	10	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 6 ligands modelled in this entry, 6 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	254/285 (89%)	-0.92	0 100 100	87, 130, 179, 270	0
1	B	251/285 (88%)	-0.85	0 100 100	94, 131, 185, 306	0
1	C	255/285 (89%)	-0.88	1 (0%) 89 76	86, 131, 176, 233	0
1	D	248/285 (87%)	-0.89	0 100 100	101, 139, 197, 240	0
1	E	247/285 (86%)	-0.82	0 100 100	109, 159, 206, 270	0
1	F	251/285 (88%)	-0.84	0 100 100	105, 148, 205, 264	0
1	G	251/285 (88%)	-0.84	0 100 100	109, 150, 201, 236	0
1	H	234/285 (82%)	-0.81	0 100 100	110, 161, 211, 265	0
All	All	1991/2280 (87%)	-0.86	1 (0%) 92 90	86, 143, 200, 306	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	33	ALA	2.1

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

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

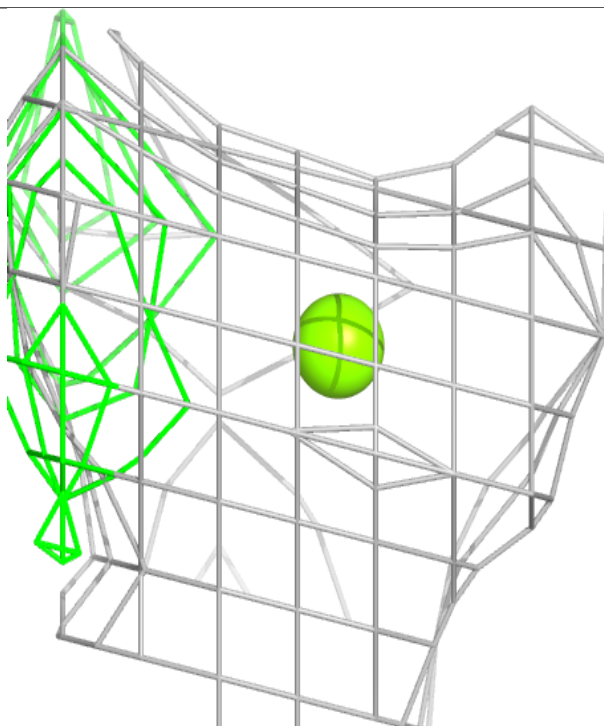
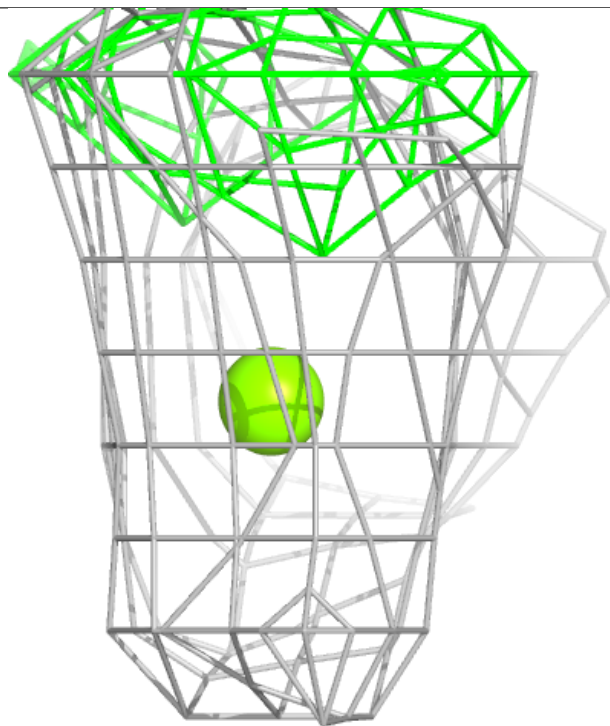
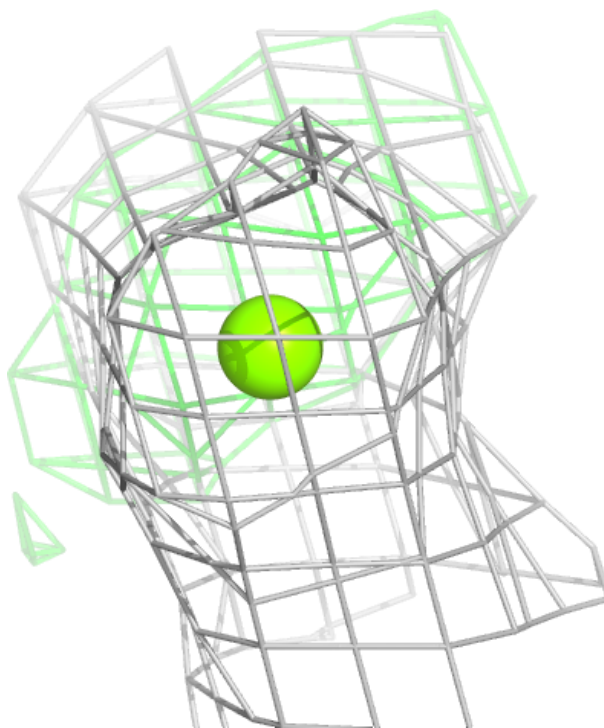
median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	MG	C	301	1/1	0.15	0.15	141,141,141,141	0
2	MG	A	302	1/1	0.68	0.07	118,118,118,118	0
2	MG	A	301	1/1	0.81	0.12	137,137,137,137	0
2	MG	B	301	1/1	0.84	0.08	111,111,111,111	0
2	MG	C	302	1/1	0.87	0.10	110,110,110,110	0
2	MG	D	301	1/1	0.88	0.05	135,135,135,135	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around MG C 301:**

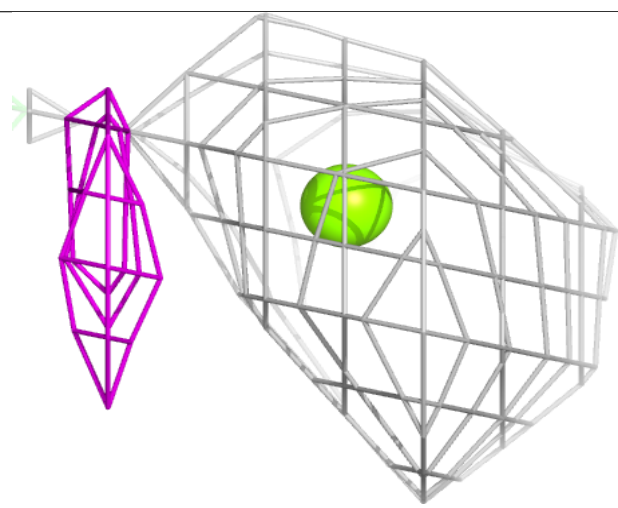
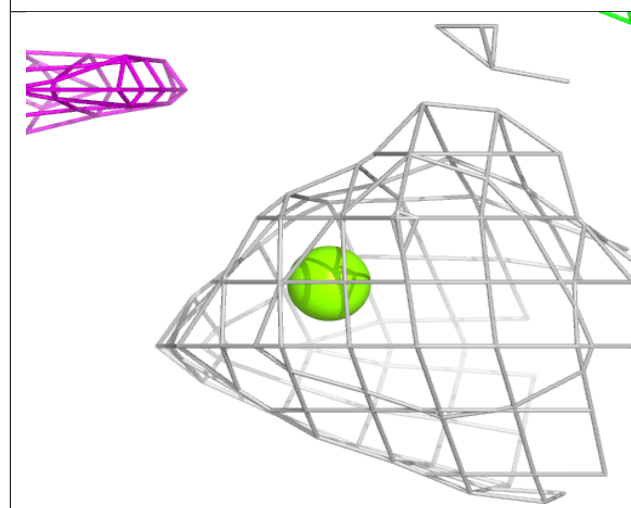
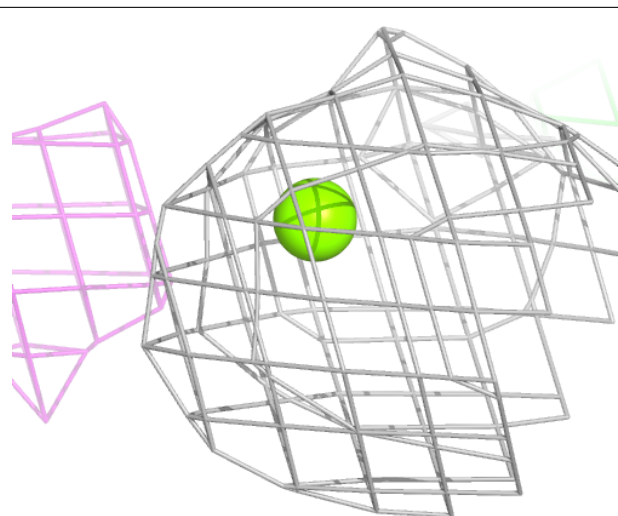
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





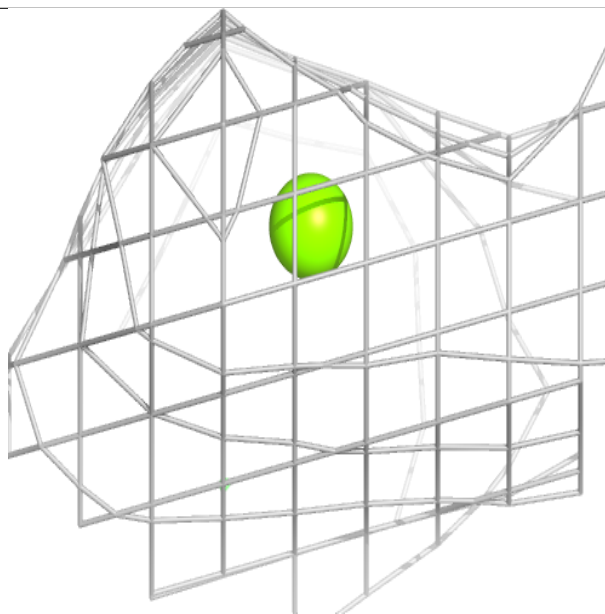
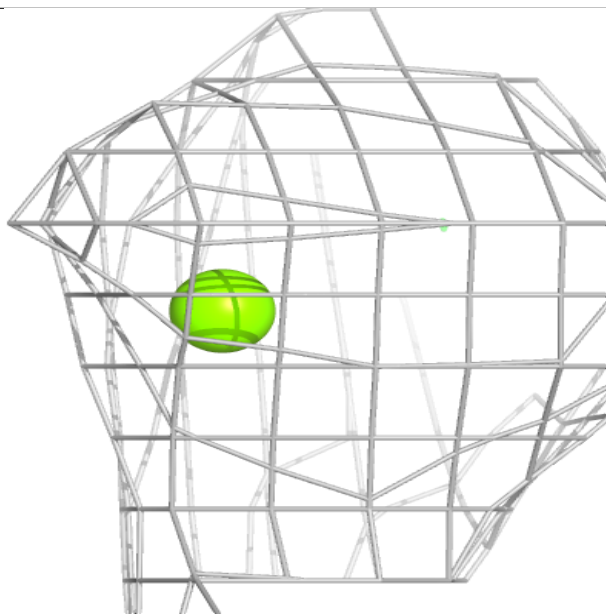
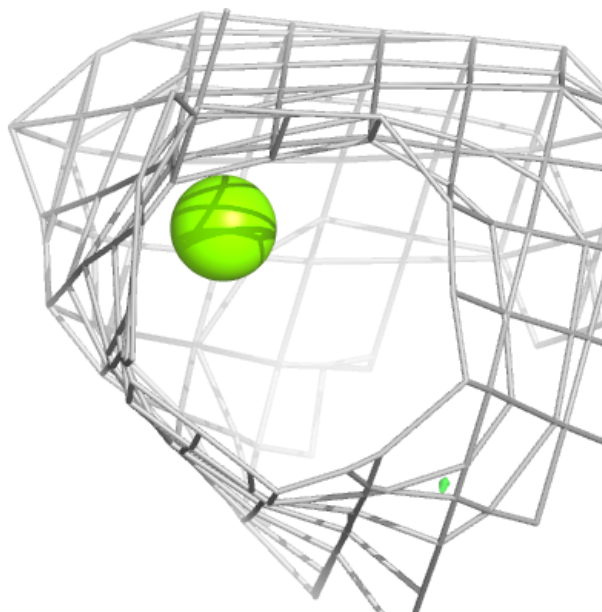
**Electron density around MG A 302:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



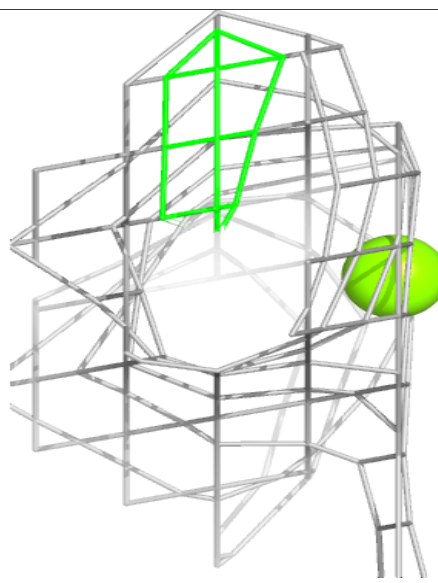
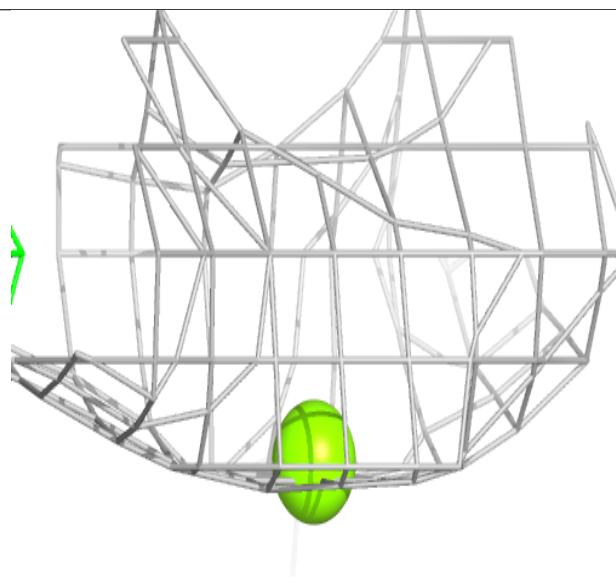
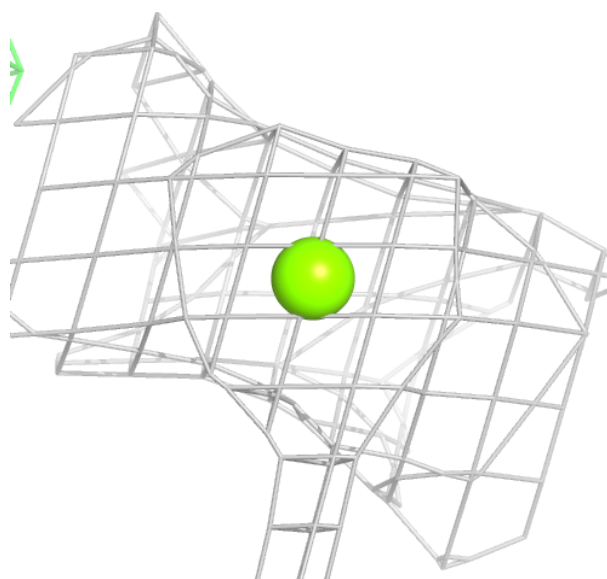
**Electron density around MG A 301:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



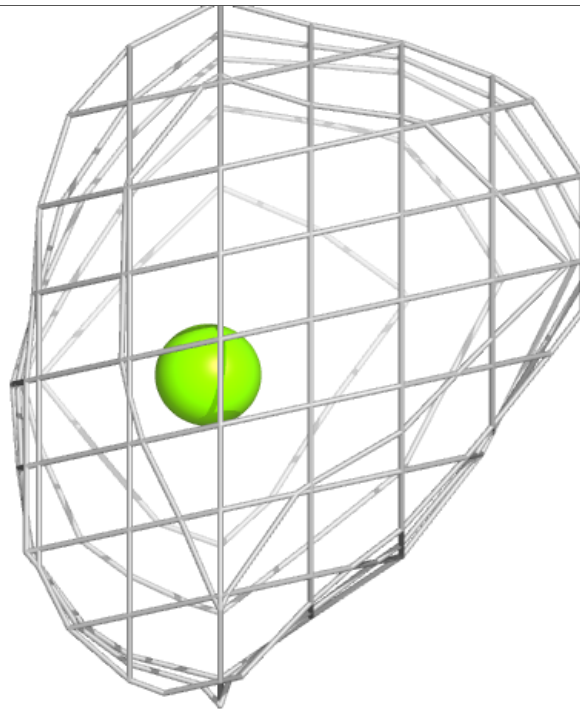
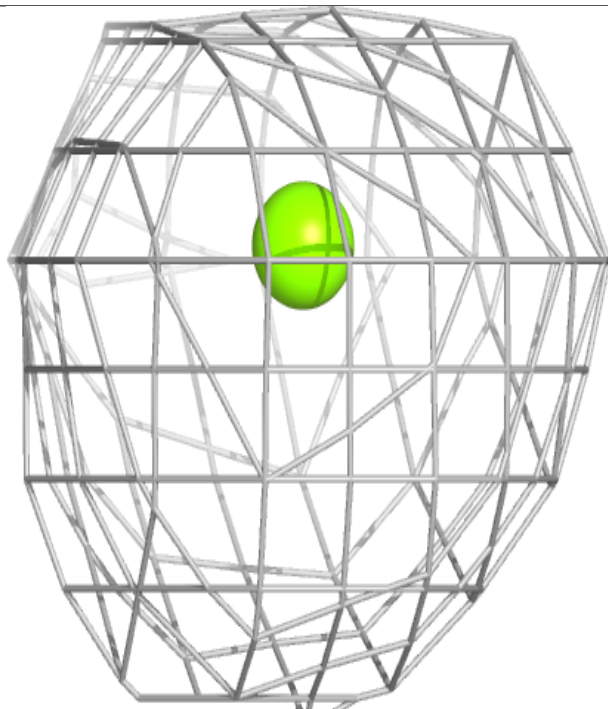
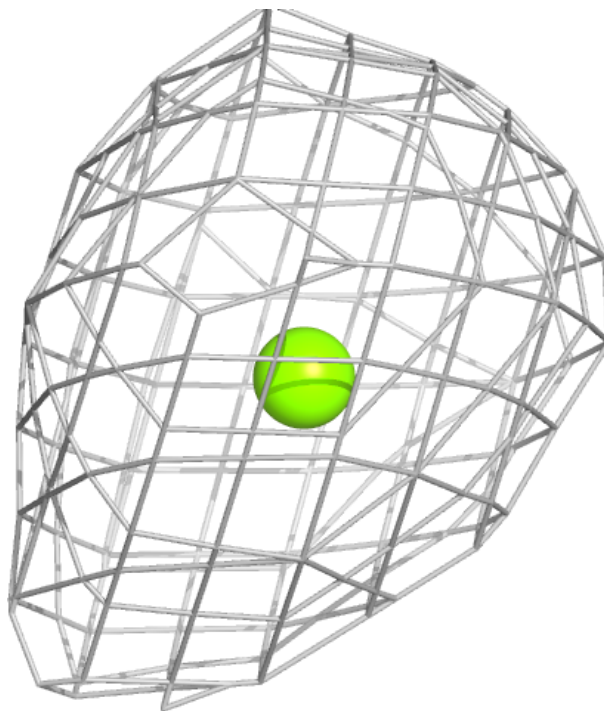
**Electron density around MG B 301:**

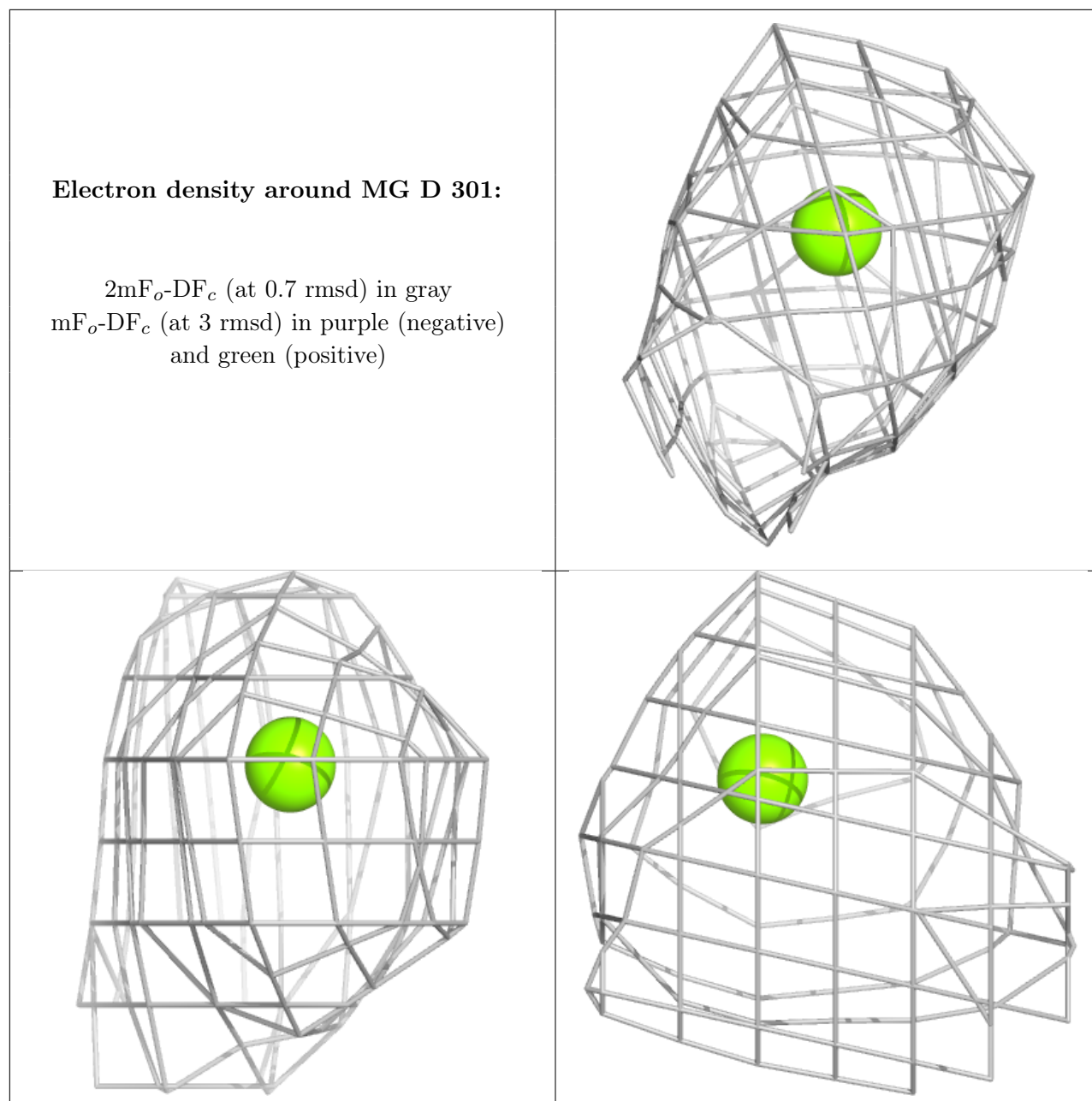
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around MG C 302:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





## 6.5 Other polymers [i](#)

There are no such residues in this entry.