



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 24, 2021 – 02:15 PM JST

PDB ID : 7DQO  
Title : Marsupenaeus japonicus ferritin mutant-D132R  
Authors : Tan, X.; Liu, Y.; Zang, J.; Zhang, T.; Zhao, G.  
Deposited on : 2020-12-24  
Resolution : 1.70 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.

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

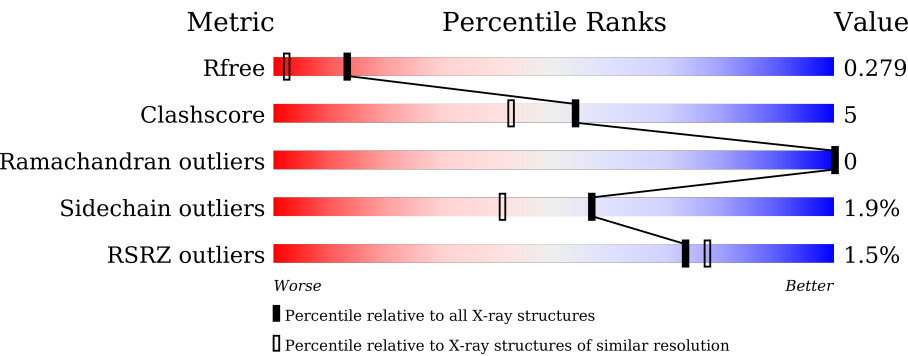
MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.13  
EDS : 2.23.2  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.23.2

# 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 1.70 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))
$R_{free}$	130704	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	169	<div><div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div></div><div>89%11% .</div></div>
1	B	169	<div><div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div></div><div>3%88%11% .</div></div>
1	C	169	<div><div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div></div><div>84%16%</div></div>
1	D	169	<div><div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div></div><div>4%88%12%</div></div>
1	E	169	<div><div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div></div><div>88%12%</div></div>
1	F	169	<div><div></div><div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div></div><div>88%12%</div></div>

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Mol	Chain	Length	Quality of chain
1	G	169	 85% 15%
1	H	169	 2% 79% 21%
1	I	169	 % 87% 13%
1	J	169	 4% 82% 17%
1	K	169	 % 88% 12%
1	L	169	 % 83% 17%

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
2	FE	H	201	-	-	-	X

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 17425 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 Ferritin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	B	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	C	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	D	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	E	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	F	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	G	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	H	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	I	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	J	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	K	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			
1	L	169	Total	C	N	O	S	0	0	0
			1362	854	231	270	7			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	132	ARG	ASP	engineered mutation	UNP T2B7E1
B	132	ARG	ASP	engineered mutation	UNP T2B7E1
C	132	ARG	ASP	engineered mutation	UNP T2B7E1
D	132	ARG	ASP	engineered mutation	UNP T2B7E1
E	132	ARG	ASP	engineered mutation	UNP T2B7E1

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Chain	Residue	Modelled	Actual	Comment	Reference
F	132	ARG	ASP	engineered mutation	UNP T2B7E1
G	132	ARG	ASP	engineered mutation	UNP T2B7E1
H	132	ARG	ASP	engineered mutation	UNP T2B7E1
I	132	ARG	ASP	engineered mutation	UNP T2B7E1
J	132	ARG	ASP	engineered mutation	UNP T2B7E1
K	132	ARG	ASP	engineered mutation	UNP T2B7E1
L	132	ARG	ASP	engineered mutation	UNP T2B7E1

- Molecule 2 is FE (III) ION (three-letter code: FE) (formula: Fe) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Fe 1 1	0	0
2	B	1	Total Fe 1 1	0	0
2	C	1	Total Fe 1 1	0	0
2	D	1	Total Fe 1 1	0	0
2	E	1	Total Fe 1 1	0	0
2	F	1	Total Fe 1 1	0	0
2	G	1	Total Fe 1 1	0	0
2	H	1	Total Fe 1 1	0	0
2	I	1	Total Fe 1 1	0	0
2	J	1	Total Fe 1 1	0	0
2	K	1	Total Fe 1 1	0	0
2	L	1	Total Fe 1 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	128	Total O 128 128	0	0

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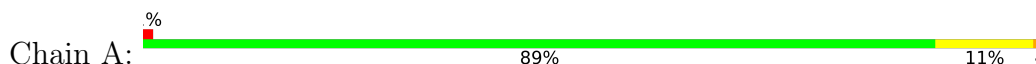
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	41	Total 41	O 41	0	0
3	C	133	Total 133	O 133	0	0
3	D	58	Total 58	O 58	0	0
3	E	80	Total 80	O 80	0	0
3	F	113	Total 113	O 113	0	0
3	G	97	Total 97	O 97	0	0
3	H	76	Total 76	O 76	0	0
3	I	122	Total 122	O 122	0	0
3	J	41	Total 41	O 41	0	0
3	K	128	Total 128	O 128	0	0
3	L	52	Total 52	O 52	0	0

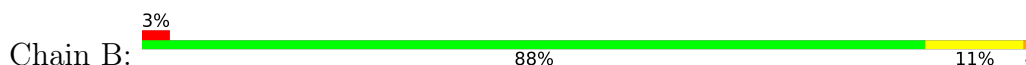
### 3 Residue-property plots [i](#)

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.

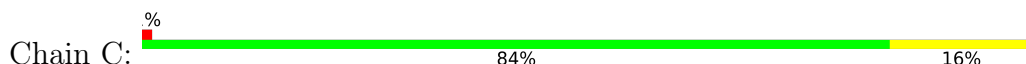
- Molecule 1: Ferritin



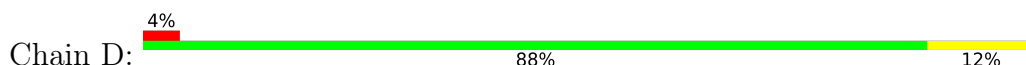
- Molecule 1: Ferritin



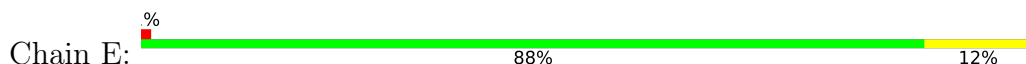
- Molecule 1: Ferritin



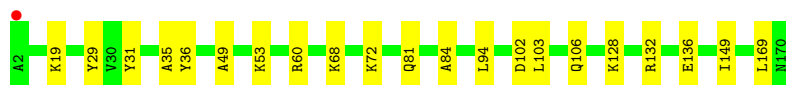
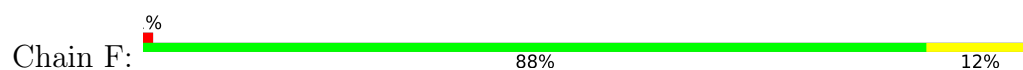
- Molecule 1: Ferritin



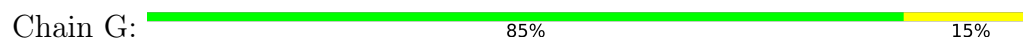
- Molecule 1: Ferritin



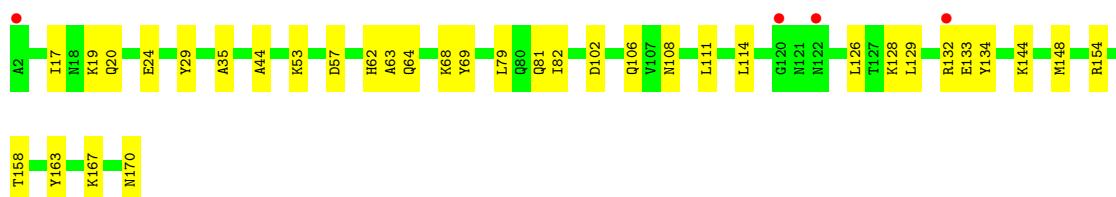
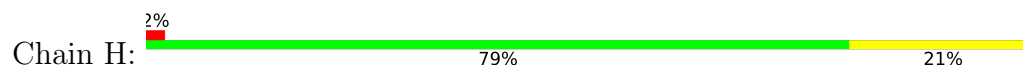
- Molecule 1: Ferritin



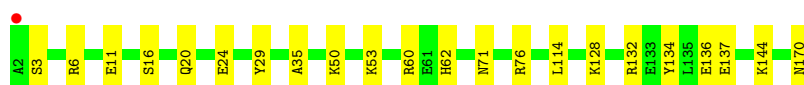
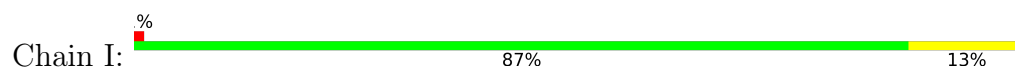
• Molecule 1: Ferritin



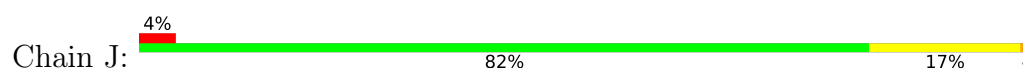
• Molecule 1: Ferritin



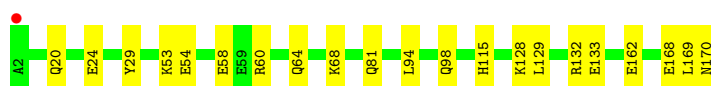
• Molecule 1: Ferritin



• Molecule 1: Ferritin

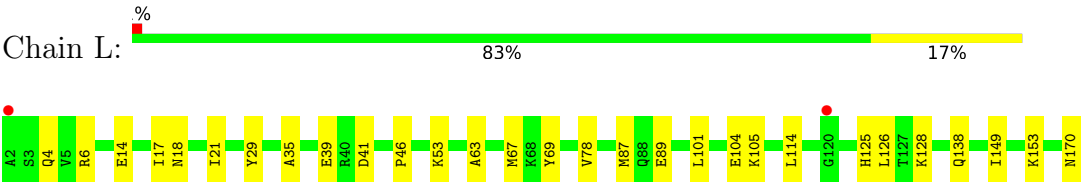


• Molecule 1: Ferritin



• Molecule 1: Ferritin





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 4	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	125.45Å 125.45Å 176.18Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.98 – 1.70 29.98 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.9 (29.98-1.70) 99.8 (29.98-1.70)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.34 (at 1.70Å)	Xtriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, $R_{free}$	0.240 , 0.276 0.241 , 0.279	Depositor DCC
$R_{free}$ test set	2013 reflections (0.68%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	18.3	Xtriage
Anisotropy	0.083	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.41 , 52.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.46$ , $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	0.032 for h,-k,-l	Xtriage
Reported twinning fraction	0.060 for h,-k,-l	Depositor
Outliers	0 of 296828 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	17425	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 84.96 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.4400e-07. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: FE

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	0.40	0/1386	0.56	0/1862
1	B	0.36	0/1386	0.47	0/1862
1	C	0.42	0/1386	0.54	0/1862
1	D	0.37	0/1386	0.46	0/1862
1	E	0.38	0/1386	0.47	0/1862
1	F	0.39	0/1386	0.48	0/1862
1	G	0.39	0/1386	0.51	0/1862
1	H	0.39	0/1386	0.48	0/1862
1	I	0.43	0/1386	0.54	0/1862
1	J	0.36	0/1386	0.46	0/1862
1	K	0.42	0/1386	0.55	0/1862
1	L	0.36	0/1386	0.47	0/1862
All	All	0.39	0/16632	0.50	0/22344

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	1362	0	1320	11	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1362	0	1320	11	1
1	C	1362	0	1320	17	0
1	D	1362	0	1320	11	0
1	E	1362	0	1320	14	0
1	F	1362	0	1320	17	0
1	G	1362	0	1320	17	0
1	H	1362	0	1320	23	1
1	I	1362	0	1320	14	1
1	J	1362	0	1320	15	2
1	K	1362	0	1320	14	1
1	L	1362	0	1320	18	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
2	I	1	0	0	0	0
2	J	1	0	0	0	0
2	K	1	0	0	0	0
2	L	1	0	0	0	0
3	A	128	0	0	2	5
3	B	41	0	0	0	2
3	C	133	0	0	8	9
3	D	58	0	0	2	4
3	E	80	0	0	2	3
3	F	113	0	0	4	3
3	G	97	0	0	3	5
3	H	76	0	0	7	6
3	I	122	0	0	4	3
3	J	41	0	0	1	3
3	K	128	0	0	5	2
3	L	52	0	0	3	5
All	All	17425	0	15840	171	30

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 5.

All (171) 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:I:76:ARG:NH1	3:I:1001:HOH:O	1.86	1.06
1:C:108:ASN:ND2	3:C:301:HOH:O	2.02	0.91
1:H:79:LEU:O	3:H:301:HOH:O	1.90	0.87
1:K:68:LYS:NZ	3:K:302:HOH:O	2.08	0.86
1:F:102:ASP:OD2	1:F:106:GLN:NE2	2.11	0.83
1:I:71:ASN:O	3:I:1002:HOH:O	1.96	0.83
1:A:156:GLY:O	3:A:301:HOH:O	2.00	0.80
1:A:35:ALA:HB1	1:A:53:LYS:HG3	1.66	0.78
1:G:102:ASP:OD2	1:G:106:GLN:NE2	2.19	0.75
1:C:170:ASN:ND2	3:C:303:HOH:O	2.11	0.75
1:F:72:LYS:O	3:F:301:HOH:O	2.03	0.74
1:C:3:SER:OG	1:C:5:VAL:HG22	1.89	0.73
1:L:35:ALA:HB1	1:L:53:LYS:HG3	1.70	0.73
1:A:60:ARG:HD2	3:C:349:HOH:O	1.89	0.73
1:B:69:TYR:CE1	1:B:126:LEU:HD13	2.25	0.72
1:F:36:TYR:HE1	1:H:68:LYS:HG2	1.54	0.71
1:H:44:ALA:O	3:H:302:HOH:O	2.07	0.71
1:K:170:ASN:OD1	3:K:301:HOH:O	2.07	0.71
1:C:140:ASP:OD1	3:C:302:HOH:O	2.11	0.69
1:E:35:ALA:HB1	1:E:53:LYS:HG3	1.75	0.69
1:K:162:GLU:OE1	3:K:303:HOH:O	2.09	0.69
1:L:87:MET:HE2	1:L:89:GLU:H	1.57	0.69
1:C:98:GLN:NE2	3:C:304:HOH:O	2.12	0.67
1:G:128:LYS:HE2	1:G:132:ARG:HD3	1.75	0.67
1:L:170:ASN:ND2	3:L:302:HOH:O	2.28	0.66
1:H:158:THR:O	3:H:304:HOH:O	2.14	0.66
1:G:136:GLU:OE2	3:G:301:HOH:O	2.14	0.66
1:H:108:ASN:OD1	3:H:303:HOH:O	2.13	0.65
1:B:87:MET:HG2	1:B:88:GLN:N	2.12	0.65
1:D:114:LEU:HG	1:D:130:LEU:HD11	1.78	0.65
1:I:128:LYS:HE2	1:I:132:ARG:HH11	1.63	0.63
1:B:69:TYR:CZ	1:B:126:LEU:HD13	2.34	0.62
1:I:60:ARG:NH1	3:I:1005:HOH:O	2.32	0.62
1:J:109:GLN:NE2	1:J:113:GLU:OE2	2.31	0.62
1:L:21:ILE:HD13	1:L:67:MET:HG2	1.82	0.62
1:J:128:LYS:HE3	1:J:132:ARG:HH11	1.65	0.62
1:J:72:LYS:O	3:J:301:HOH:O	2.16	0.61
1:C:35:ALA:HB1	1:C:53:LYS:HG3	1.81	0.61
1:K:54:GLU:O	1:K:58:GLU:HG2	2.01	0.61
1:G:16:SER:HB3	1:G:114:LEU:HD13	1.81	0.61
1:H:35:ALA:HB1	1:H:53:LYS:HG3	1.83	0.60
1:D:16:SER:HB2	1:D:114:LEU:HD13	1.84	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:19:LYS:HE3	3:K:415:HOH:O	2.03	0.58
1:G:132:ARG:HG3	1:G:133:GLU:HG2	1.83	0.58
1:I:62:HIS:NE2	1:I:137:GLU:OE1	2.37	0.57
1:J:37:TYR:O	1:J:40:ARG:HG3	2.04	0.57
1:J:24:GLU:HB2	1:J:63:ALA:HB2	1.87	0.57
1:E:128:LYS:HZ2	1:E:132:ARG:HH21	1.53	0.56
1:H:24:GLU:HB2	1:H:63:ALA:HB2	1.87	0.56
1:A:60:ARG:NH2	3:A:306:HOH:O	2.39	0.56
1:C:129:LEU:HD12	1:C:133:GLU:HG3	1.88	0.56
1:H:129:LEU:HD12	1:H:133:GLU:HG3	1.88	0.55
1:D:20:GLN:HG2	1:D:66:PHE:CE2	2.42	0.55
1:J:20:GLN:O	1:J:24:GLU:HG2	2.06	0.55
1:B:17:ILE:HD13	1:B:114:LEU:HD21	1.88	0.55
1:C:102:ASP:OD2	1:C:106:GLN:NE2	2.38	0.55
1:D:9:TYR:OH	1:D:70:GLN:OE1	2.19	0.55
1:B:87:MET:HG2	1:B:88:GLN:H	1.72	0.55
1:H:102:ASP:O	1:H:106:GLN:HG3	2.06	0.55
1:H:17:ILE:HD13	1:H:114:LEU:HD21	1.88	0.54
1:C:136:GLU:OE1	3:C:305:HOH:O	2.17	0.54
1:L:63:ALA:O	1:L:67:MET:HG3	2.08	0.54
1:F:49:ALA:O	1:F:53:LYS:HG3	2.07	0.53
1:K:81:GLN:CD	1:K:81:GLN:H	2.11	0.53
1:I:128:LYS:HE2	1:I:132:ARG:NH1	2.22	0.53
1:K:81:GLN:NE2	3:K:312:HOH:O	2.42	0.53
1:C:104:GLU:OE1	1:C:141:SER:OG	2.24	0.53
1:H:111:LEU:HD13	1:H:134:TYR:HB3	1.91	0.52
1:L:46:PRO:HG2	3:L:302:HOH:O	2.09	0.52
1:I:35:ALA:HB1	1:I:53:LYS:HG3	1.91	0.52
1:D:105:LYS:NZ	3:D:304:HOH:O	2.29	0.52
1:E:5:VAL:O	3:E:301:HOH:O	2.19	0.51
1:L:149:ILE:HG23	1:L:153:LYS:HE3	1.92	0.51
1:G:124:PRO:HB3	1:K:115:HIS:CE1	2.46	0.50
1:G:35:ALA:HB1	1:G:53:LYS:HG3	1.93	0.50
1:C:3:SER:HB3	1:C:6:ARG:HB2	1.93	0.50
1:A:9:TYR:OH	1:A:17:ILE:HD12	2.11	0.50
1:E:11:GLU:HG2	3:E:364:HOH:O	2.11	0.50
1:F:128:LYS:NZ	1:F:132:ARG:HH21	2.10	0.50
1:D:60:ARG:NH2	3:D:310:HOH:O	2.44	0.50
1:C:68:LYS:HD3	3:C:425:HOH:O	2.13	0.49
1:F:19:LYS:NZ	3:F:302:HOH:O	2.13	0.49
1:E:63:ALA:O	1:E:67:MET:HG3	2.13	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:16:SER:HB3	1:I:114:LEU:HD13	1.94	0.49
1:B:129:LEU:HD12	1:B:133:GLU:HG3	1.95	0.48
1:H:64:GLN:O	1:H:68:LYS:HG3	2.14	0.48
1:H:163:TYR:CZ	1:H:167:LYS:HE2	2.49	0.48
1:G:20:GLN:O	1:G:24:GLU:HG2	2.13	0.48
1:A:23:MET:HE1	1:A:110:SER:HB3	1.94	0.48
1:J:91:GLY:HA3	1:J:95:GLU:OE2	2.14	0.47
1:L:6:ARG:NH1	1:L:14:GLU:OE1	2.42	0.47
1:D:4:GLN:HG3	1:D:5:VAL:HG13	1.96	0.47
1:I:50:LYS:HE2	1:I:170:ASN:OXT	2.14	0.47
1:H:20:GLN:O	1:H:24:GLU:HG2	2.14	0.47
1:J:16:SER:HB3	1:J:114:LEU:HD13	1.97	0.47
1:L:104:GLU:O	1:L:138:GLN:NE2	2.45	0.47
1:A:46:PRO:HB2	1:A:170:ASN:HD21	1.80	0.46
1:G:136:GLU:OE1	3:G:302:HOH:O	2.20	0.46
1:F:128:LYS:HZ2	1:F:132:ARG:HH21	1.62	0.46
1:L:69:TYR:CE2	1:L:126:LEU:HD13	2.50	0.46
1:K:94:LEU:O	1:K:98:GLN:HG3	2.15	0.46
1:J:69:TYR:CD2	1:J:129:LEU:HD22	2.51	0.46
1:K:20:GLN:O	1:K:24:GLU:HG2	2.16	0.46
1:L:69:TYR:HE1	1:L:125:HIS:CE1	2.34	0.46
1:E:79:LEU:HD12	1:G:33:SER:HB2	1.98	0.46
1:F:36:TYR:CE1	1:H:68:LYS:HG2	2.43	0.46
1:I:62:HIS:HD2	1:I:134:TYR:CD1	2.34	0.46
1:D:69:TYR:CE2	1:D:126:LEU:HD13	2.51	0.45
1:G:144:LYS:HE2	1:G:144:LYS:HB3	1.76	0.45
1:I:3:SER:HB3	1:I:6:ARG:HB2	1.96	0.45
1:D:132:ARG:NE	1:D:133:GLU:OE2	2.42	0.45
1:A:20:GLN:O	1:A:24:GLU:HG2	2.17	0.45
1:I:20:GLN:O	1:I:24:GLU:HG2	2.17	0.45
1:J:88:GLN:HE21	1:L:78:VAL:HG13	1.82	0.45
1:L:18:ASN:O	3:L:301:HOH:O	2.21	0.45
1:H:19:LYS:HB2	1:H:19:LYS:HE3	1.83	0.45
1:H:62:HIS:HD2	3:H:339:HOH:O	1.98	0.45
1:C:20:GLN:O	1:C:24:GLU:HG2	2.16	0.45
1:H:69:TYR:CE2	1:H:126:LEU:HD13	2.52	0.45
1:F:60:ARG:NH1	1:H:57:ASP:OD1	2.48	0.45
1:B:16:SER:OG	1:B:114:LEU:HD13	2.17	0.45
1:F:84:ALA:HB1	3:H:301:HOH:O	2.17	0.44
1:K:128:LYS:CE	1:K:132:ARG:HH12	2.31	0.44
1:K:129:LEU:HD12	1:K:133:GLU:HG3	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:98:GLN:NE2	3:G:309:HOH:O	2.50	0.44
1:I:11:GLU:HG3	3:I:1087:HOH:O	2.17	0.44
1:E:128:LYS:HZ3	1:E:132:ARG:HE	1.65	0.44
1:G:128:LYS:O	1:G:132:ARG:HG2	2.18	0.44
1:J:104:GLU:HG3	1:J:145:ILE:HD12	1.99	0.44
1:D:104:GLU:OE1	1:D:138:GLN:NE2	2.52	0.43
1:E:17:ILE:HD13	1:E:114:LEU:HD21	2.00	0.43
1:F:68:LYS:HE3	3:F:399:HOH:O	2.17	0.43
1:L:17:ILE:HD13	1:L:114:LEU:HD21	1.99	0.43
1:H:154:ARG:NH1	3:H:314:HOH:O	2.47	0.43
1:J:51:PHE:O	1:J:55:SER:OG	2.31	0.43
1:F:35:ALA:HB1	1:F:53:LYS:HG2	2.01	0.43
1:H:144:LYS:O	1:H:148:MET:HG3	2.19	0.43
1:B:19:LYS:HB3	1:B:19:LYS:HE3	1.62	0.43
1:F:136:GLU:HB3	3:F:303:HOH:O	2.18	0.43
1:K:53:LYS:HB2	1:K:53:LYS:HE2	1.63	0.43
1:G:94:LEU:HD11	1:G:149:ILE:HG23	1.99	0.42
1:E:76:ARG:HA	1:E:76:ARG:HD3	1.82	0.42
1:K:60:ARG:O	1:K:64:GLN:HG3	2.19	0.42
1:H:128:LYS:HZ2	1:H:132:ARG:HH11	1.66	0.42
1:A:76:ARG:HD3	1:A:76:ARG:HA	1.82	0.42
1:C:50:LYS:HE2	1:C:170:ASN:OXT	2.20	0.42
1:F:31:TYR:CZ	1:F:103:LEU:HD23	2.55	0.42
1:F:128:LYS:NZ	1:F:132:ARG:HD3	2.34	0.41
1:E:24:GLU:HB2	1:E:63:ALA:HB2	2.02	0.41
1:C:46:PRO:HG2	3:C:303:HOH:O	2.19	0.41
1:E:20:GLN:O	1:E:24:GLU:HG2	2.20	0.41
1:L:101:LEU:O	1:L:105:LYS:HG3	2.19	0.41
1:E:33:SER:HB2	1:G:79:LEU:HD12	2.02	0.41
1:E:114:LEU:HG	1:E:130:LEU:HD11	2.03	0.41
1:L:39:GLU:OE2	1:L:53:LYS:NZ	2.35	0.41
1:E:101:LEU:O	1:E:105:LYS:HG3	2.20	0.41
1:F:94:LEU:HD11	1:F:149:ILE:HG23	2.01	0.41
1:C:114:LEU:HG	1:C:130:LEU:HD11	2.02	0.41
1:F:81:GLN:HG3	1:H:82:ILE:O	2.21	0.41
1:J:128:LYS:HE3	1:J:132:ARG:NH1	2.34	0.41
1:A:16:SER:HB3	1:A:114:LEU:HD13	2.03	0.41
1:G:9:TYR:OH	1:G:17:ILE:HD12	2.21	0.41
1:K:128:LYS:HZ1	1:K:132:ARG:HH22	1.69	0.41
1:J:41:ASP:OD1	1:L:4:GLN:HG2	2.21	0.41
1:A:50:LYS:O	1:A:54:GLU:HG3	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:144:LYS:HB3	1:I:144:LYS:HE2	1.77	0.40
1:B:40:ARG:HB2	1:B:43:VAL:HG23	2.02	0.40
1:G:69:TYR:CD1	1:G:129:LEU:HD22	2.56	0.40
1:B:76:ARG:NH1	1:D:40:ARG:HG2	2.37	0.40
1:B:144:LYS:HE2	1:B:144:LYS:HB3	1.86	0.40
1:J:4:GLN:HG2	1:L:41:ASP:OD2	2.22	0.40

All (30) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:348:HOH:O	3:F:301:HOH:O[3_555]	1.72	0.48
3:G:387:HOH:O	3:K:303:HOH:O[4_545]	1.81	0.39
3:C:301:HOH:O	3:F:323:HOH:O[3_555]	1.82	0.38
3:A:422:HOH:O	3:C:414:HOH:O[4_555]	1.83	0.37
3:H:353:HOH:O	3:J:301:HOH:O[4_556]	1.83	0.37
3:C:302:HOH:O	3:F:310:HOH:O[3_555]	1.84	0.36
3:H:375:HOH:O	3:L:306:HOH:O[4_556]	1.84	0.36
3:A:308:HOH:O	3:C:359:HOH:O[4_555]	1.86	0.34
3:C:311:HOH:O	3:H:302:HOH:O[3_555]	1.87	0.33
3:A:315:HOH:O	3:C:392:HOH:O[4_555]	1.90	0.30
3:I:1088:HOH:O	3:I:1116:HOH:O[3_455]	1.91	0.29
3:D:356:HOH:O	3:E:301:HOH:O[3_455]	1.92	0.28
3:G:305:HOH:O	3:I:1095:HOH:O[4_545]	1.94	0.26
3:H:324:HOH:O	3:L:350:HOH:O[1_556]	2.03	0.17
3:B:332:HOH:O	3:D:352:HOH:O[4_545]	2.04	0.16
1:I:136:GLU:OE2	1:K:128:LYS:NZ[3_455]	2.04	0.16
3:E:319:HOH:O	3:G:381:HOH:O[2_545]	2.05	0.15
3:G:387:HOH:O	3:K:351:HOH:O[4_545]	2.05	0.15
3:A:399:HOH:O	3:C:361:HOH:O[4_555]	2.07	0.13
3:A:316:HOH:O	3:C:392:HOH:O[4_555]	2.08	0.12
3:H:314:HOH:O	3:L:304:HOH:O[4_556]	2.08	0.12
3:D:347:HOH:O	3:E:366:HOH:O[3_455]	2.09	0.11
3:B:332:HOH:O	3:D:325:HOH:O[4_545]	2.13	0.07
3:G:384:HOH:O	3:I:1023:HOH:O[4_545]	2.13	0.07
1:H:81:GLN:NE2	3:H:301:HOH:O[2_455]	2.13	0.07
1:B:163:TYR:OH	1:B:168:GLU:OE2[3_455]	2.15	0.05
3:J:314:HOH:O	3:L:325:HOH:O[3_555]	2.15	0.05
3:J:340:HOH:O	3:L:325:HOH:O[3_555]	2.16	0.04
1:J:41:ASP:O	1:J:150:THR:OG1[4_555]	2.19	0.01
1:J:43:VAL:O	1:J:154:ARG:NH2[4_555]	2.19	0.01

## 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 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	167/169 (99%)	164 (98%)	3 (2%)	0	100	100
1	B	167/169 (99%)	163 (98%)	4 (2%)	0	100	100
1	C	167/169 (99%)	165 (99%)	2 (1%)	0	100	100
1	D	167/169 (99%)	163 (98%)	4 (2%)	0	100	100
1	E	167/169 (99%)	165 (99%)	2 (1%)	0	100	100
1	F	167/169 (99%)	164 (98%)	3 (2%)	0	100	100
1	G	167/169 (99%)	162 (97%)	5 (3%)	0	100	100
1	H	167/169 (99%)	164 (98%)	3 (2%)	0	100	100
1	I	167/169 (99%)	164 (98%)	3 (2%)	0	100	100
1	J	167/169 (99%)	161 (96%)	6 (4%)	0	100	100
1	K	167/169 (99%)	164 (98%)	3 (2%)	0	100	100
1	L	167/169 (99%)	163 (98%)	4 (2%)	0	100	100
All	All	2004/2028 (99%)	1962 (98%)	42 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	145/145 (100%)	142 (98%)	3 (2%)	53	36
1	B	145/145 (100%)	140 (97%)	5 (3%)	37	18

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	145/145 (100%)	142 (98%)	3 (2%)	53	36
1	D	145/145 (100%)	143 (99%)	2 (1%)	67	53
1	E	145/145 (100%)	142 (98%)	3 (2%)	53	36
1	F	145/145 (100%)	143 (99%)	2 (1%)	67	53
1	G	145/145 (100%)	143 (99%)	2 (1%)	67	53
1	H	145/145 (100%)	143 (99%)	2 (1%)	67	53
1	I	145/145 (100%)	144 (99%)	1 (1%)	84	77
1	J	145/145 (100%)	140 (97%)	5 (3%)	37	18
1	K	145/145 (100%)	142 (98%)	3 (2%)	53	36
1	L	145/145 (100%)	143 (99%)	2 (1%)	67	53
All	All	1740/1740 (100%)	1707 (98%)	33 (2%)	57	41

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	29	TYR
1	A	87	MET
1	A	170	ASN
1	B	19	LYS
1	B	29	TYR
1	B	81	GLN
1	B	116	SER
1	B	170	ASN
1	C	29	TYR
1	C	168	GLU
1	C	169	LEU
1	D	29	TYR
1	D	170	ASN
1	E	29	TYR
1	E	72	LYS
1	E	80	GLN
1	F	29	TYR
1	F	169	LEU
1	G	3	SER
1	G	29	TYR
1	H	29	TYR
1	H	170	ASN
1	I	29	TYR

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Mol	Chain	Res	Type
1	J	29	TYR
1	J	53	LYS
1	J	68	LYS
1	J	72	LYS
1	J	86	SER
1	K	29	TYR
1	K	168	GLU
1	K	169	LEU
1	L	29	TYR
1	L	128	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	81	GLN
1	H	108	ASN
1	J	108	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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 12 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

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

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	169/169 (100%)	0.02	1 (0%) 89 91	8, 12, 19, 26	0
1	B	169/169 (100%)	0.57	5 (2%) 50 54	22, 31, 38, 41	0
1	C	169/169 (100%)	0.00	1 (0%) 89 91	8, 13, 20, 30	0
1	D	169/169 (100%)	0.42	6 (3%) 42 47	17, 27, 37, 46	0
1	E	169/169 (100%)	0.19	1 (0%) 89 91	13, 21, 31, 40	0
1	F	169/169 (100%)	0.02	1 (0%) 89 91	12, 16, 25, 31	0
1	G	169/169 (100%)	0.02	0 100 100	12, 16, 24, 32	0
1	H	169/169 (100%)	0.18	4 (2%) 59 63	13, 21, 30, 39	0
1	I	169/169 (100%)	-0.01	1 (0%) 89 91	8, 12, 20, 27	0
1	J	169/169 (100%)	0.68	7 (4%) 37 41	23, 31, 38, 46	0
1	K	169/169 (100%)	0.03	1 (0%) 89 91	9, 13, 21, 27	0
1	L	169/169 (100%)	0.49	2 (1%) 79 82	18, 28, 35, 41	0
All	All	2028/2028 (100%)	0.22	30 (1%) 73 77	8, 19, 35, 46	0

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	L	2	ALA	7.5
1	J	2	ALA	6.3
1	C	2	ALA	6.1
1	K	2	ALA	5.7
1	D	2	ALA	5.7
1	F	2	ALA	4.8
1	I	2	ALA	4.3
1	J	156	GLY	4.3
1	E	2	ALA	4.0
1	L	120	GLY	3.7
1	J	87	MET	3.6

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Mol	Chain	Res	Type	RSRZ
1	H	2	ALA	3.5
1	B	2	ALA	3.4
1	B	98	GLN	3.0
1	B	132	ARG	2.9
1	D	120	GLY	2.9
1	J	86	SER	2.8
1	D	3	SER	2.5
1	B	10	HIS	2.5
1	A	2	ALA	2.4
1	H	132	ARG	2.4
1	B	169	LEU	2.3
1	J	3	SER	2.2
1	H	120	GLY	2.2
1	J	170	ASN	2.2
1	D	58	GLU	2.2
1	D	11	GLU	2.1
1	J	155	ALA	2.1
1	H	122	ASN	2.1
1	D	102	ASP	2.0

## 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	FE	B	201	1/1	-0.13	0.32	93,93,93,93	0
2	FE	L	201	1/1	0.14	0.35	73,73,73,73	0
2	FE	G	201	1/1	0.59	0.17	57,57,57,57	0
2	FE	H	201	1/1	0.65	0.43	77,77,77,77	0

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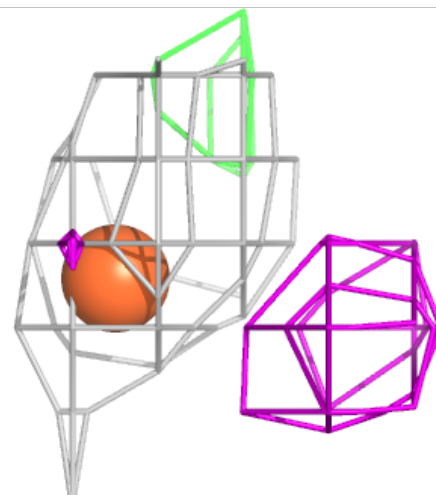
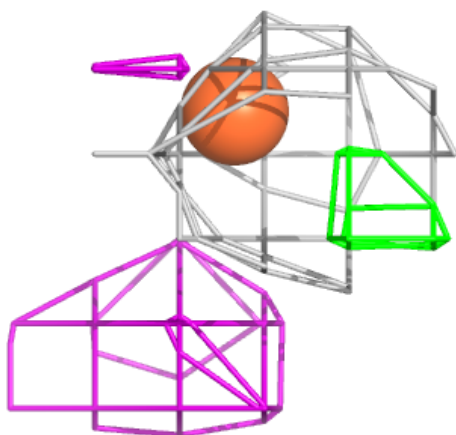
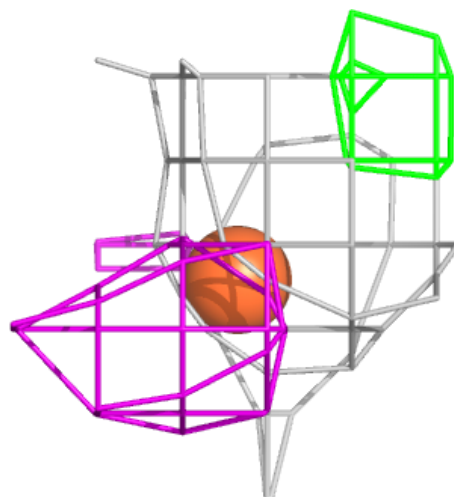
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	FE	C	201	1/1	0.65	0.18	45,45,45,45	0
2	FE	D	201	1/1	0.66	0.23	55,55,55,55	0
2	FE	J	201	1/1	0.75	0.12	65,65,65,65	0
2	FE	I	201	1/1	0.75	0.21	56,56,56,56	0
2	FE	K	201	1/1	0.82	0.19	44,44,44,44	0
2	FE	F	201	1/1	0.82	0.23	54,54,54,54	0
2	FE	A	201	1/1	0.89	0.15	44,44,44,44	0
2	FE	E	201	1/1	0.95	0.14	40,40,40,40	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.



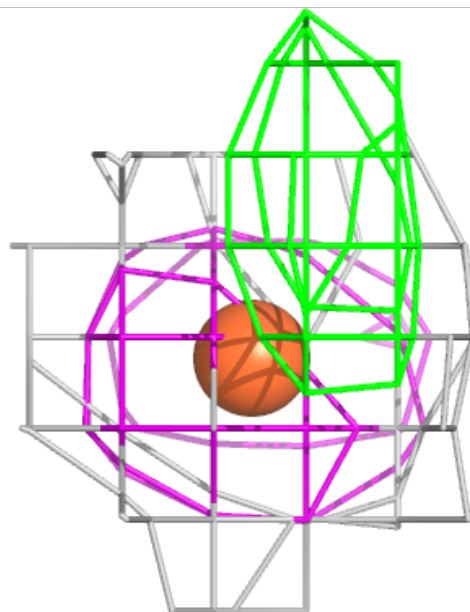
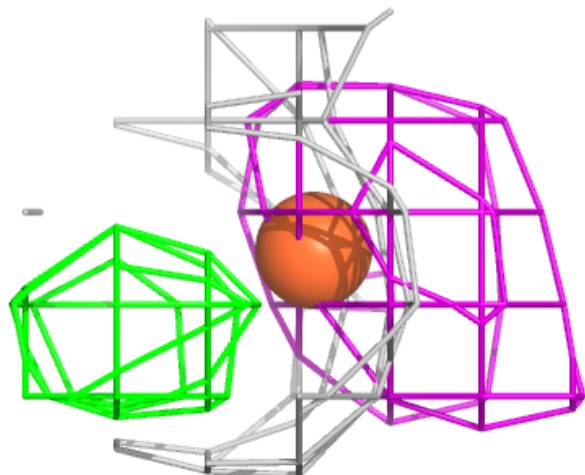
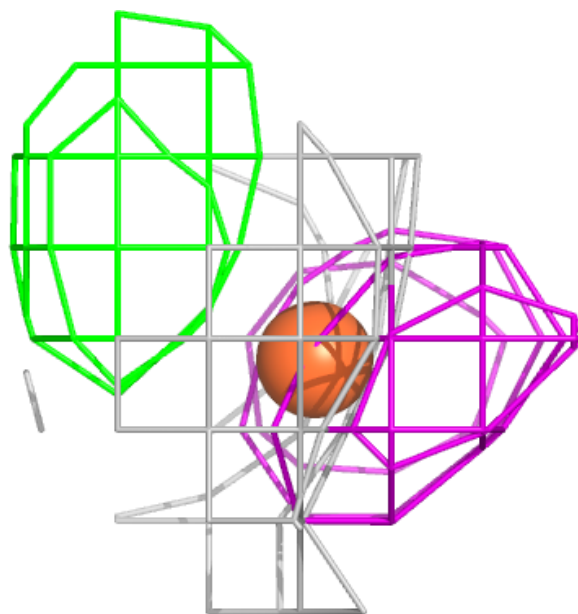
**Electron density around FE B 201:**

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



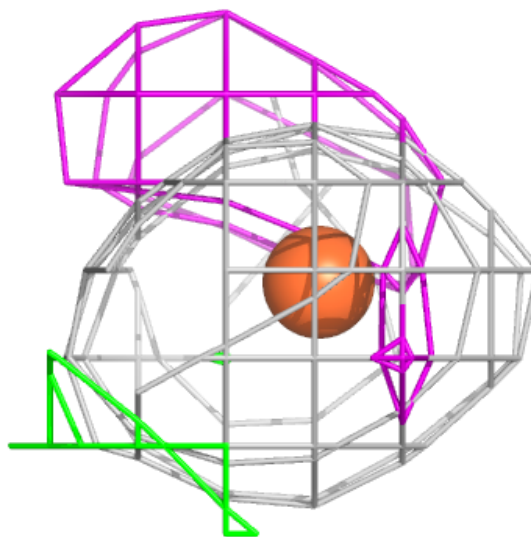
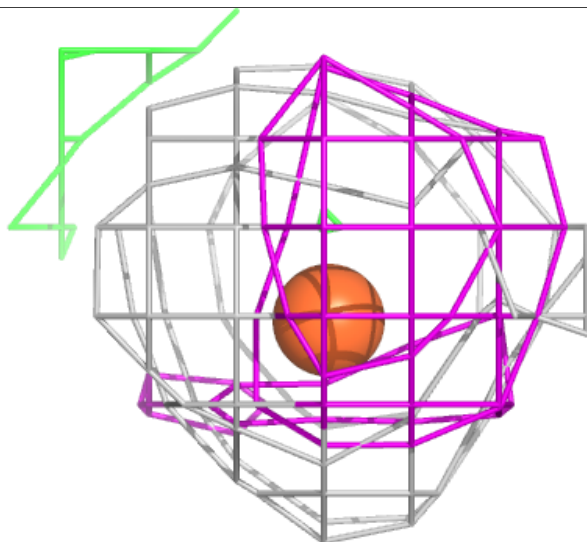
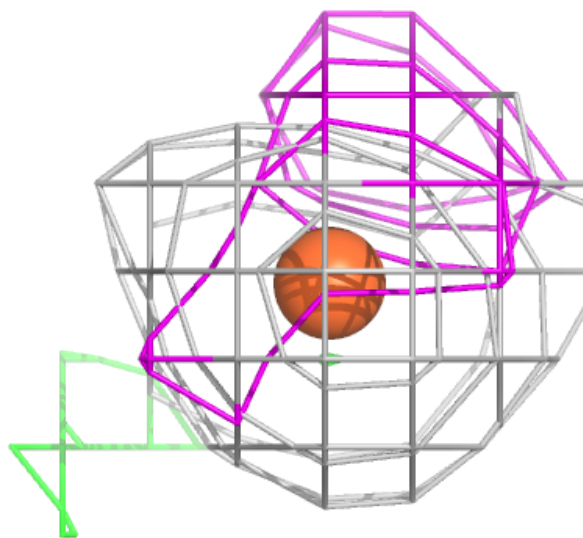
**Electron density around FE L 201:**

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



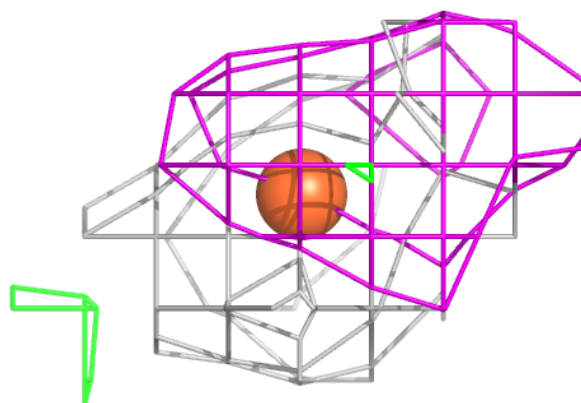
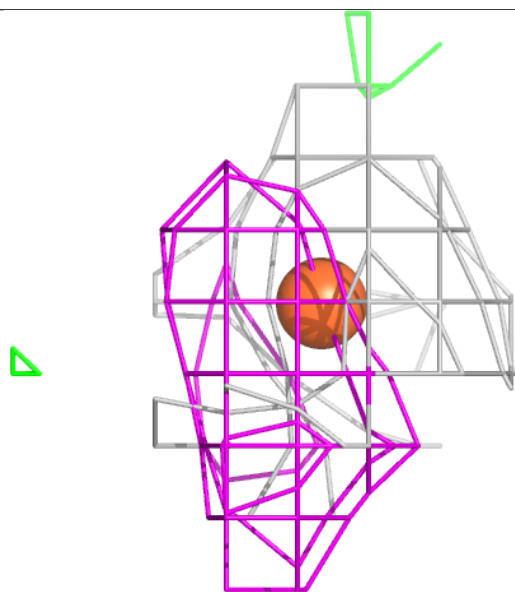
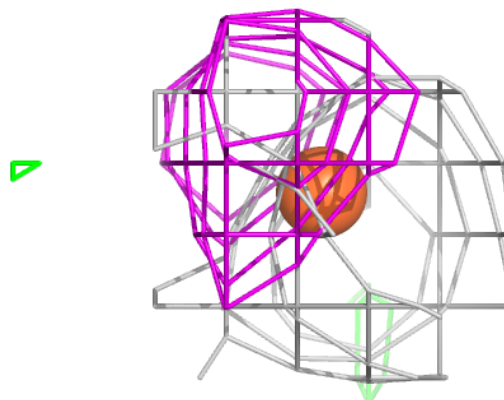
**Electron density around FE G 201:**

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



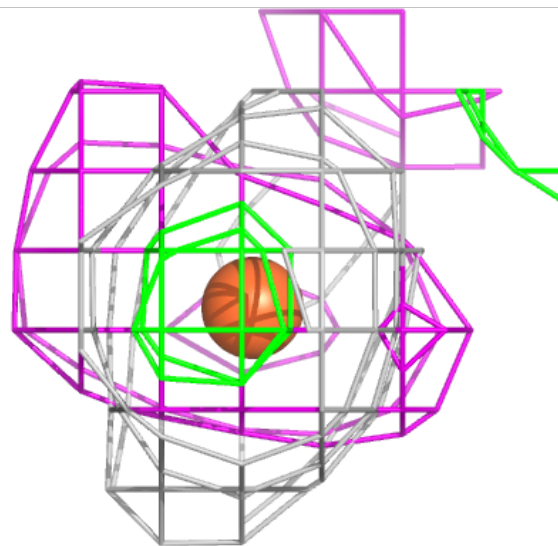
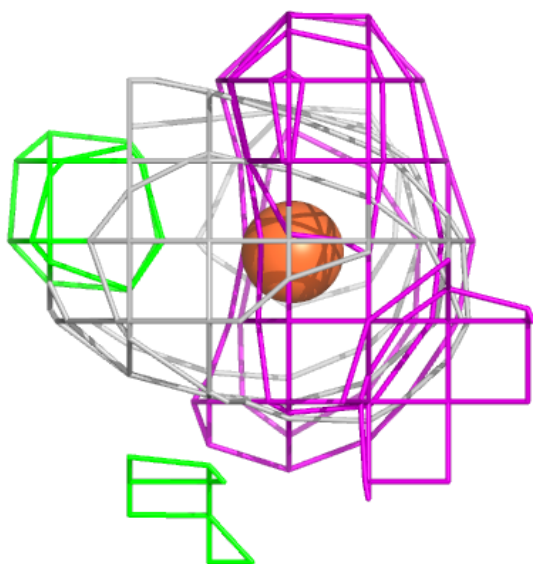
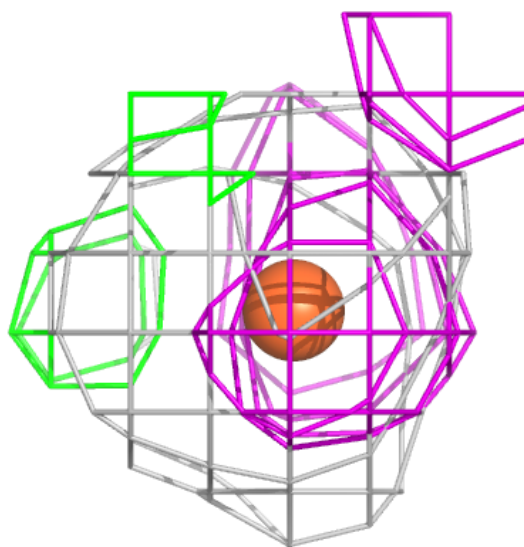
**Electron density around FE H 201:**

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



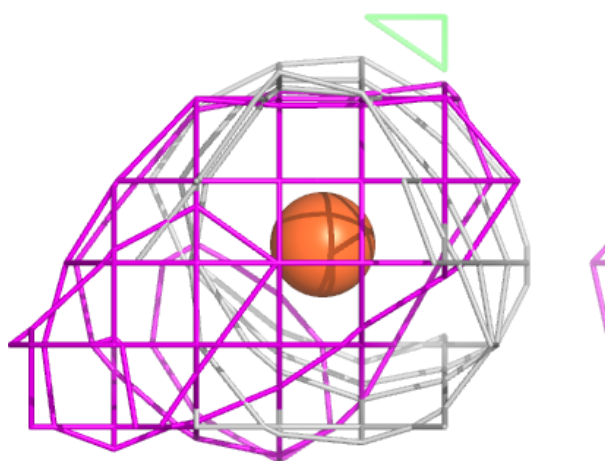
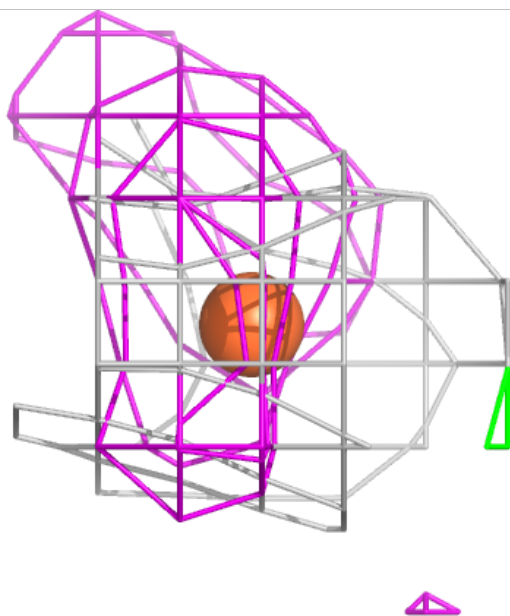
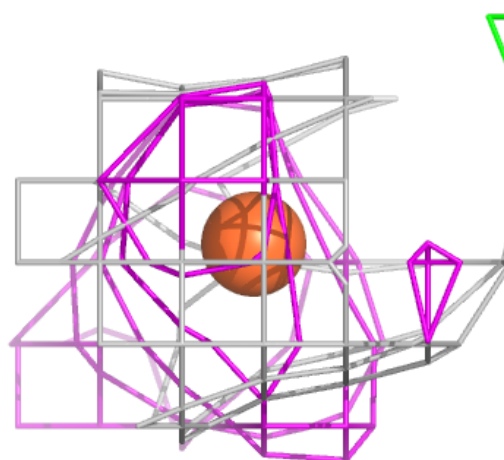
**Electron density around FE C 201:**

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



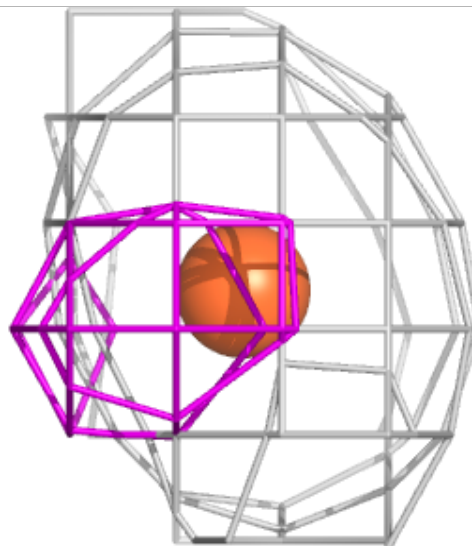
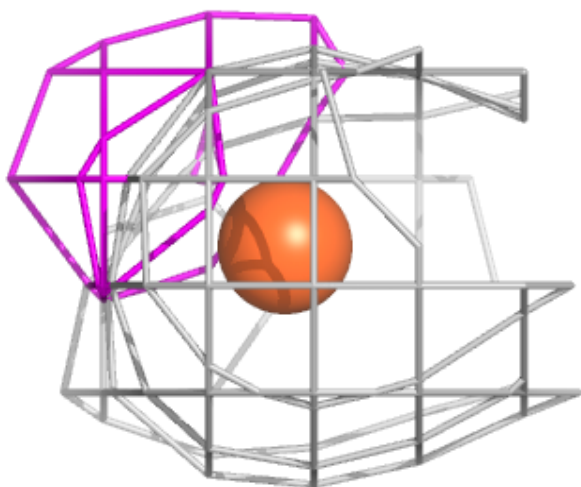
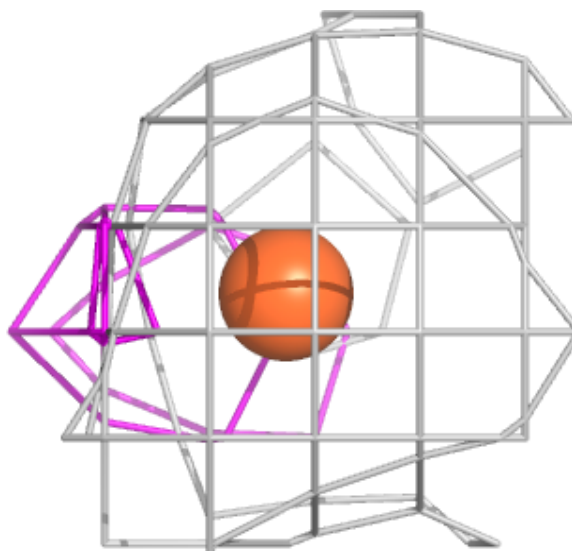
**Electron density around FE D 201:**

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



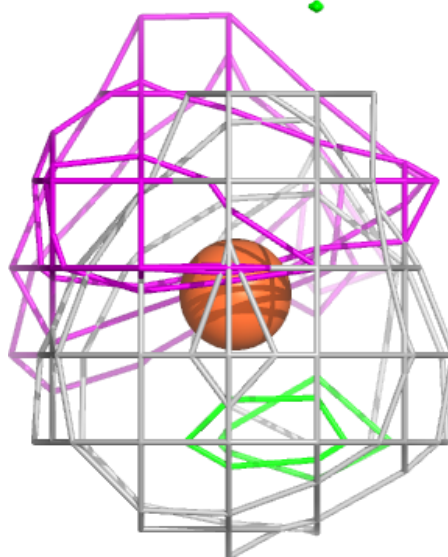
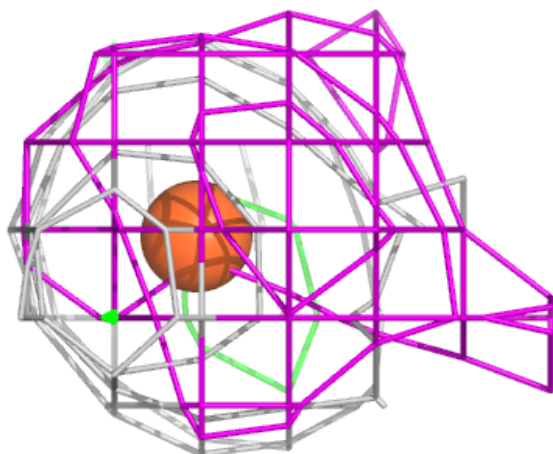
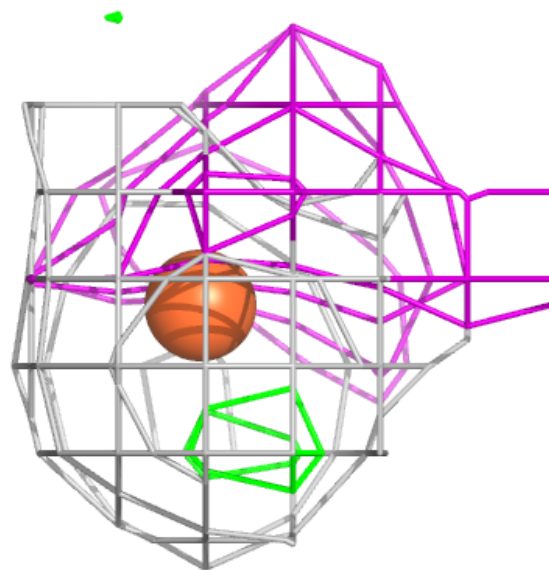
**Electron density around FE J 201:**

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



**Electron density around FE I 201:**

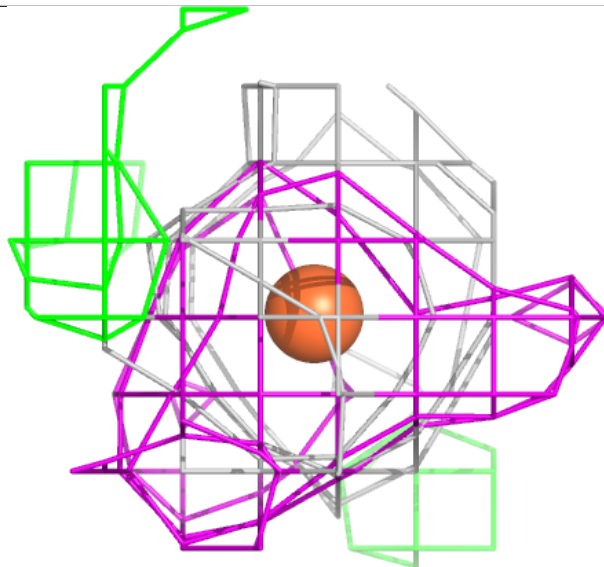
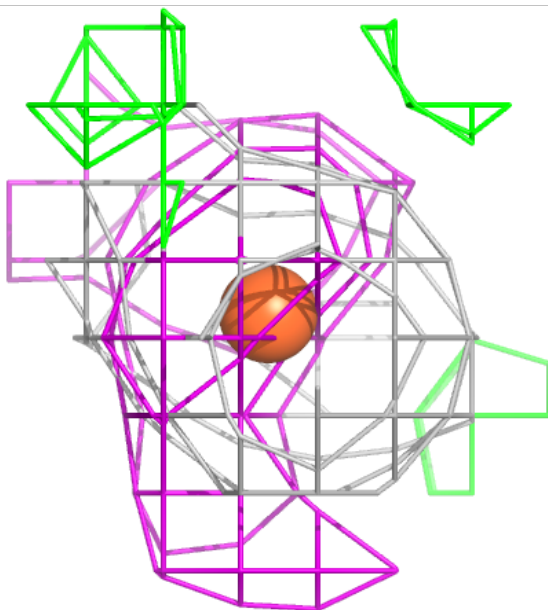
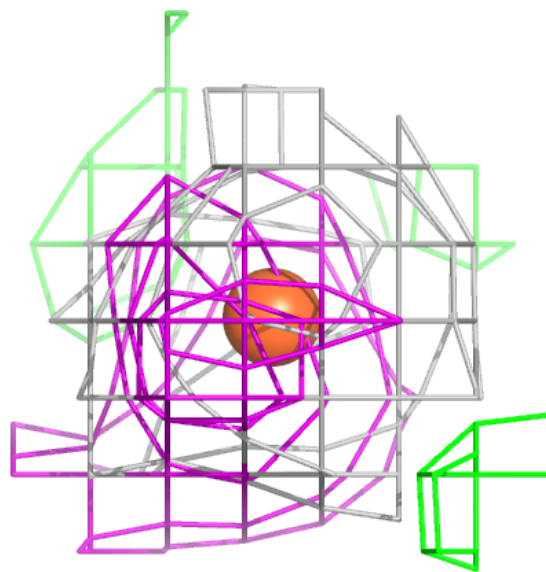
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





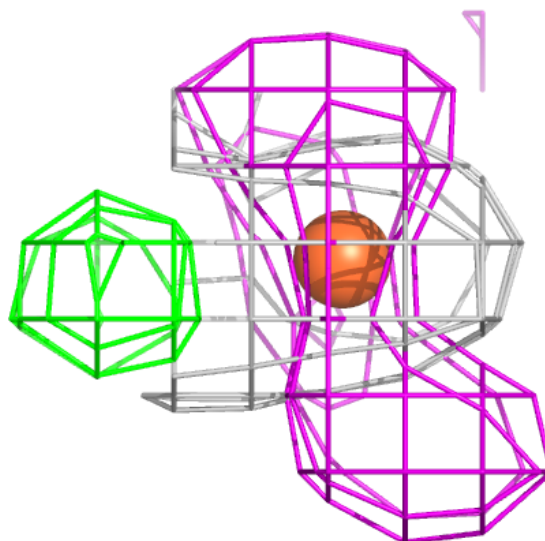
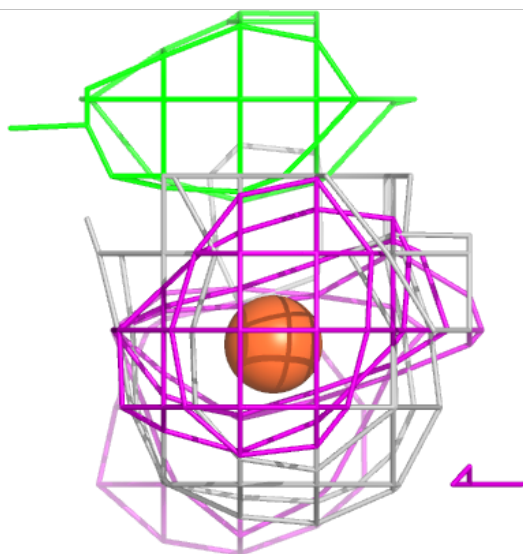
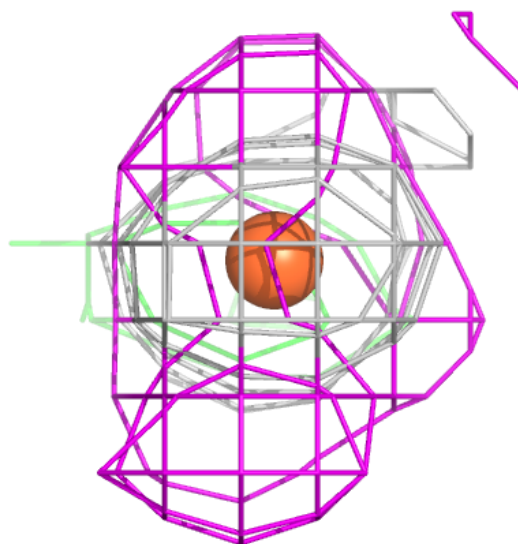
**Electron density around FE K 201:**

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



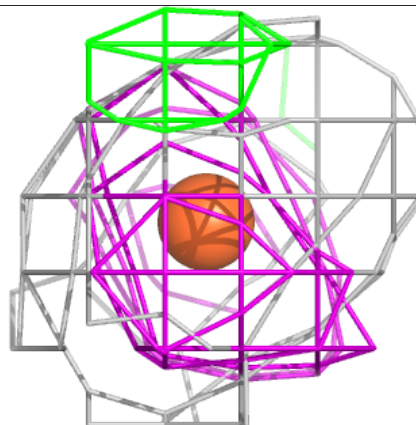
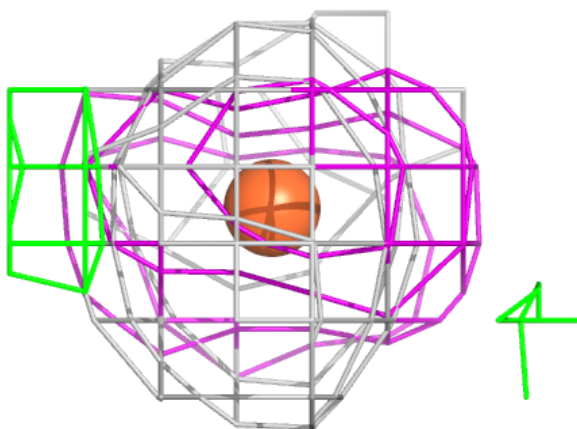
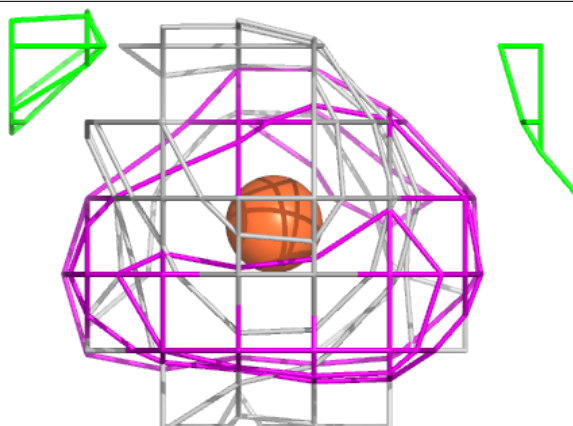
**Electron density around FE F 201:**

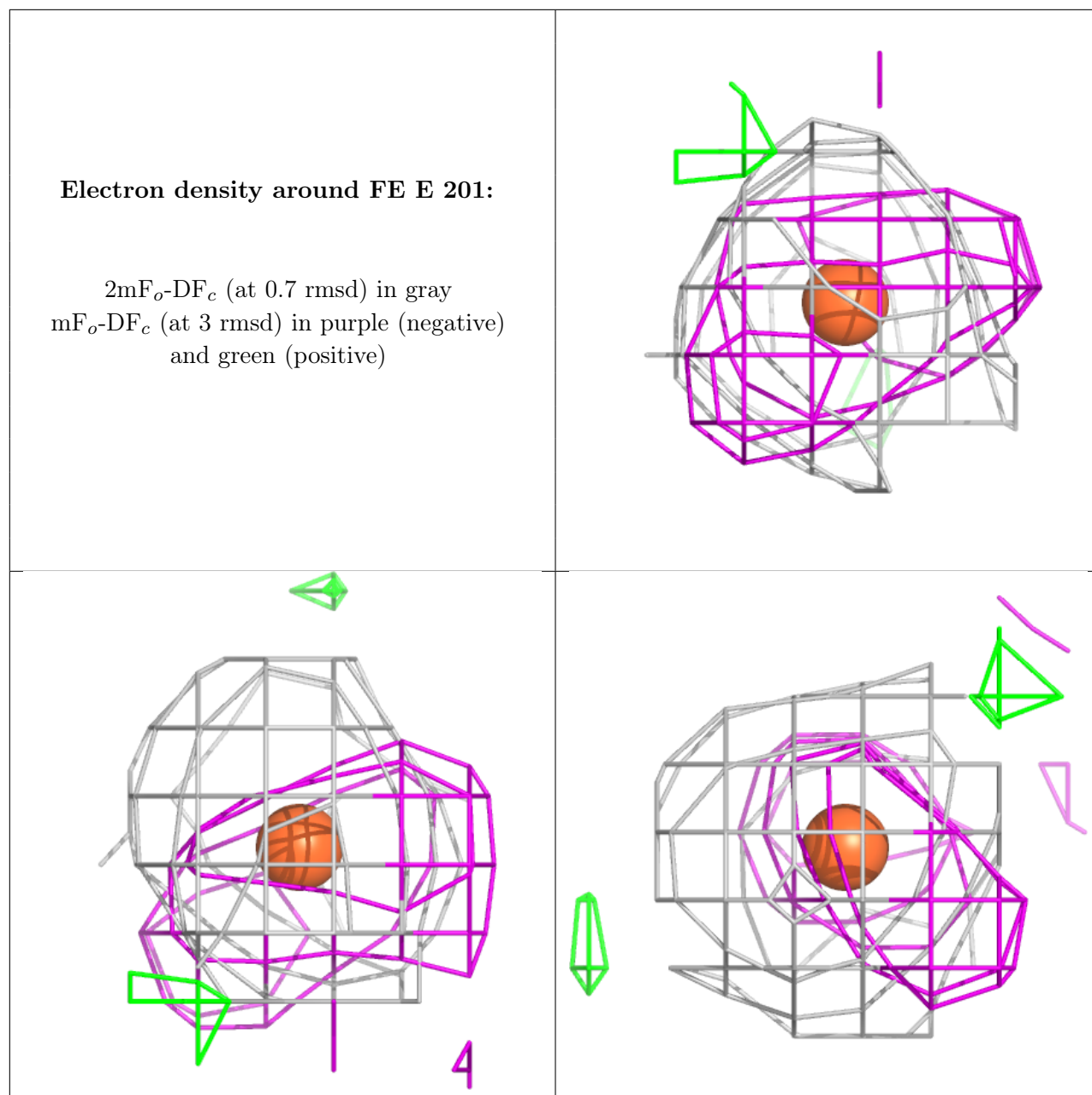
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around FE A 201:**

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





## 6.5 Other polymers ⓘ

There are no such residues in this entry.