



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 3, 2024 – 09:18 pm GMT

PDB ID : 8A6X
Title : Crystal structure of a chimeric LOV-Histidine kinase SB2F1 (asymmetrical variant, trigonal form with long c axis)
Authors : Arinkin, V.; Granzin, J.; Batra-Safferling, R.
Deposited on : 2022-06-20
Resolution : 2.45 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

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>.

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

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

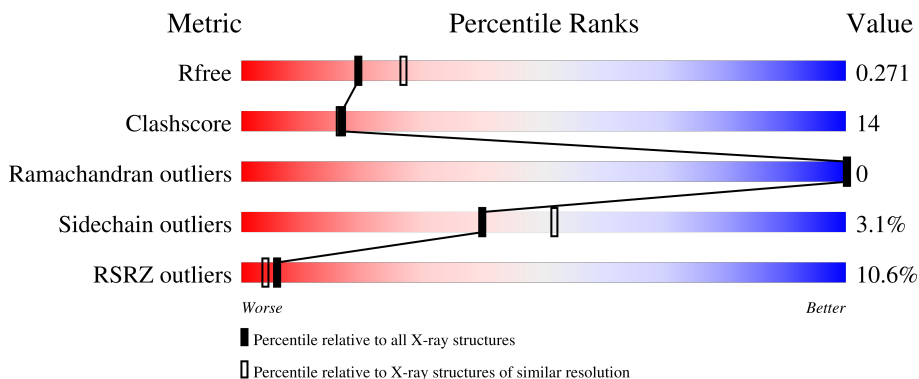
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.45 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	1544 (2.48-2.44)
Clashscore	141614	1613 (2.48-2.44)
Ramachandran outliers	138981	1598 (2.48-2.44)
Sidechain outliers	138945	1598 (2.48-2.44)
RSRZ outliers	127900	1523 (2.48-2.44)

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 ≥ 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	388	 9% 70% 23% • 6%
1	B	388	 10% 67% 27% • 5%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 5811 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 Putative Sensory box protein, Sensor protein FixL.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	364	2837	1756	516	552	4	9	61	1	0
1	B	368	2850	1762	518	557	4	9	50	0	0

There are 40 discrepancies between the modelled and reference sequences:

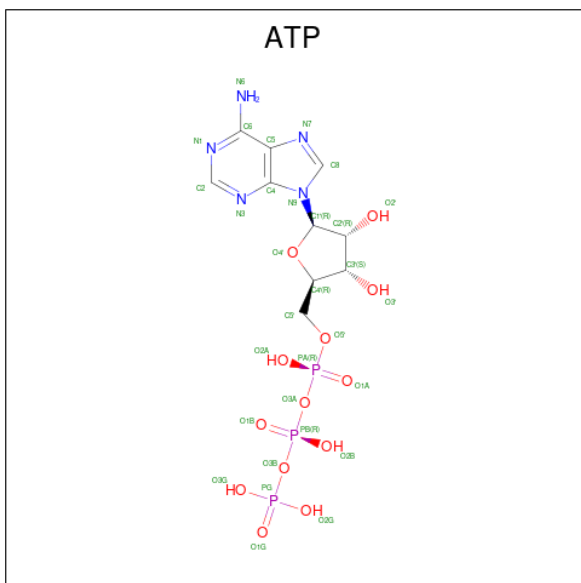
Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MSE	-	initiating methionine	UNP Q88JB0
A	-18	GLY	-	expression tag	UNP Q88JB0
A	-17	SER	-	expression tag	UNP Q88JB0
A	-16	SER	-	expression tag	UNP Q88JB0
A	-15	HIS	-	expression tag	UNP Q88JB0
A	-14	HIS	-	expression tag	UNP Q88JB0
A	-13	HIS	-	expression tag	UNP Q88JB0
A	-12	HIS	-	expression tag	UNP Q88JB0
A	-11	HIS	-	expression tag	UNP Q88JB0
A	-10	HIS	-	expression tag	UNP Q88JB0
A	-9	SER	-	expression tag	UNP Q88JB0
A	-8	SER	-	expression tag	UNP Q88JB0
A	-7	GLY	-	expression tag	UNP Q88JB0
A	-6	LEU	-	expression tag	UNP Q88JB0
A	-5	VAL	-	expression tag	UNP Q88JB0
A	-4	PRO	-	expression tag	UNP Q88JB0
A	-3	ARG	-	expression tag	UNP Q88JB0
A	-2	GLY	-	expression tag	UNP Q88JB0
A	-1	SER	-	expression tag	UNP Q88JB0
A	0	HIS	-	expression tag	UNP Q88JB0
B	-19	MSE	-	initiating methionine	UNP Q88JB0
B	-18	GLY	-	expression tag	UNP Q88JB0
B	-17	SER	-	expression tag	UNP Q88JB0
B	-16	SER	-	expression tag	UNP Q88JB0
B	-15	HIS	-	expression tag	UNP Q88JB0

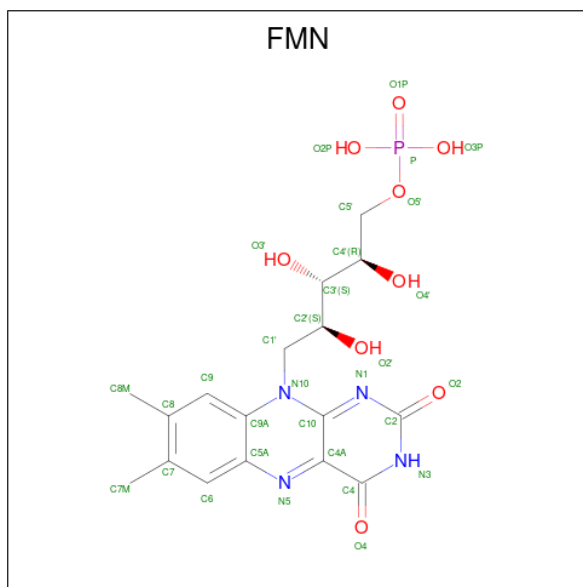
Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	-14	HIS	-	expression tag	UNP Q88JB0
B	-13	HIS	-	expression tag	UNP Q88JB0
B	-12	HIS	-	expression tag	UNP Q88JB0
B	-11	HIS	-	expression tag	UNP Q88JB0
B	-10	HIS	-	expression tag	UNP Q88JB0
B	-9	SER	-	expression tag	UNP Q88JB0
B	-8	SER	-	expression tag	UNP Q88JB0
B	-7	GLY	-	expression tag	UNP Q88JB0
B	-6	LEU	-	expression tag	UNP Q88JB0
B	-5	VAL	-	expression tag	UNP Q88JB0
B	-4	PRO	-	expression tag	UNP Q88JB0
B	-3	ARG	-	expression tag	UNP Q88JB0
B	-2	GLY	-	expression tag	UNP Q88JB0
B	-1	SER	-	expression tag	UNP Q88JB0
B	0	HIS	-	expression tag	UNP Q88JB0

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



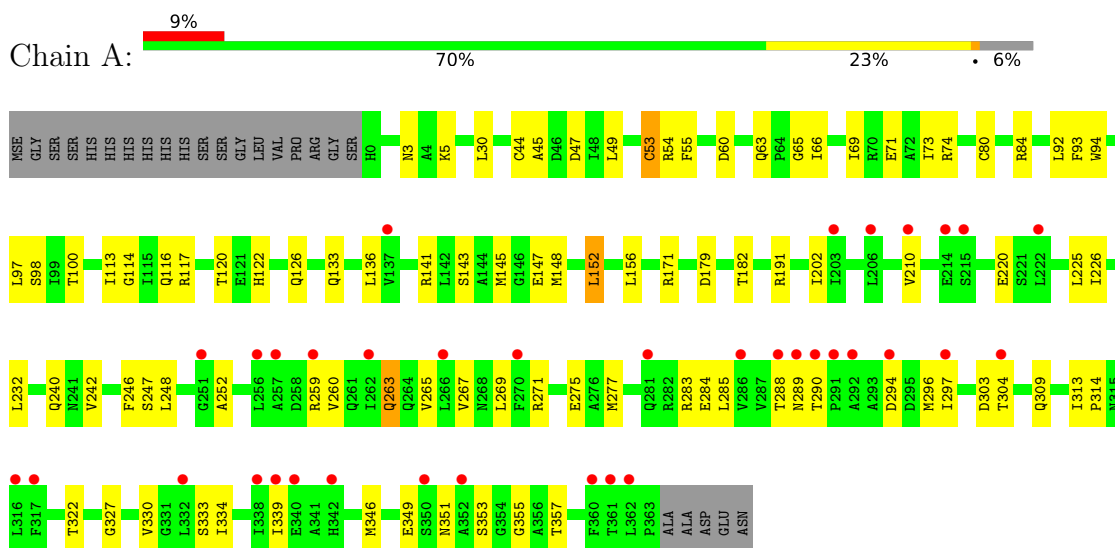


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	31	17	4	9	1	0	0
3	B	1	31	17	4	9	1	0	0

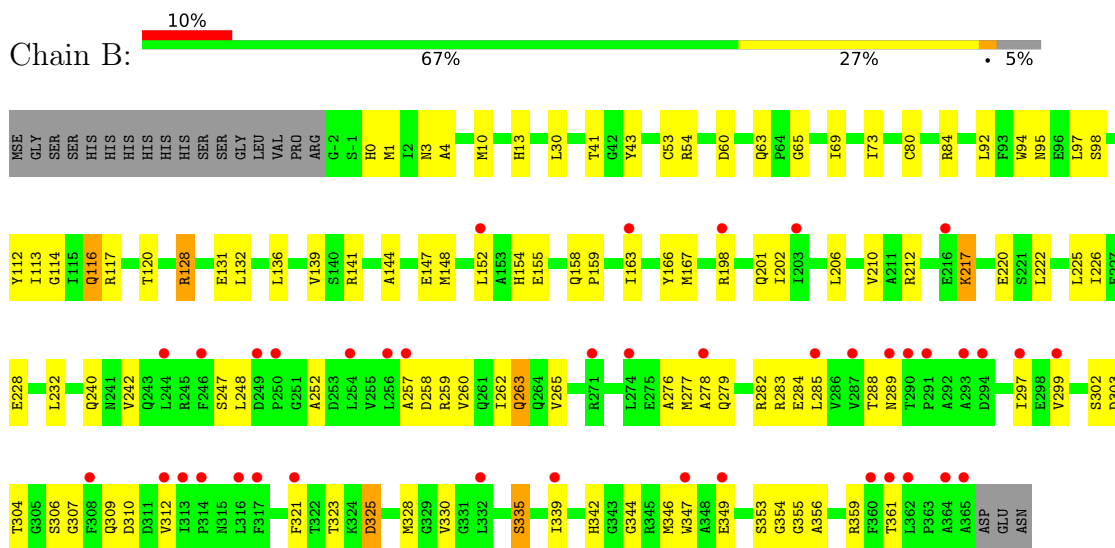
3 Residue-property plots [i](#)

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: Putative Sensory box protein, Sensor protein FixL



- Molecule 1: Putative Sensory box protein, Sensor protein FixL



4 Data and refinement statistics i

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	138.79Å 138.79Å 96.08Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	45.43 – 2.45 45.43 – 2.45	Depositor EDS
% Data completeness (in resolution range)	68.7 (45.43-2.45) 68.7 (45.43-2.45)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.61 (at 2.45Å)	Xtrriage
Refinement program	PHENIX 1.19rc6_4061	Depositor
R, R_{free}	0.226 , 0.267 0.226 , 0.271	Depositor DCC
R_{free} test set	1385 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å ²)	71.0	Xtrriage
Anisotropy	0.038	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 57.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.031 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5811	wwPDB-VP
Average B, all atoms (Å ²)	99.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.99% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

5.1 Standard geometry

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

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	0.36	0/2873	0.61	0/3869
1	B	0.38	0/2882	0.65	0/3881
All	All	0.37	0/5755	0.63	0/7750

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

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	2837	0	2798	87	0
1	B	2850	0	2809	102	0
2	A	31	0	12	2	0
2	B	31	0	12	2	0
3	A	31	0	19	4	0
3	B	31	0	19	3	0
All	All	5811	0	5669	159	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 14.

All (159) 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:A:117:ARG:HH12	1:B:117:ARG:NE	1.63	0.96
1:A:45:ALA:HB1	1:B:1:MSE:HE1	1.49	0.94
1:A:117:ARG:HH12	1:B:117:ARG:HE	0.97	0.90
1:A:117:ARG:NH1	1:B:117:ARG:HE	1.75	0.84
1:A:117:ARG:NH1	1:B:117:ARG:HH21	1.74	0.84
1:B:139:VAL:HG21	1:B:260:VAL:HG11	1.59	0.84
1:B:128:ARG:O	1:B:131:GLU:HG2	1.79	0.82
1:A:49:LEU:HD11	1:B:1:MSE:HE2	1.65	0.78
1:A:313:ILE:HG23	1:A:314:PRO:HD3	1.64	0.78
1:B:217:LYS:HD3	1:B:258:ASP:HB2	1.67	0.75
1:B:30:LEU:HD21	1:B:53:CYS:SG	2.29	0.72
1:A:252:ALA:O	1:A:289:ASN:ND2	2.22	0.71
1:B:325:ASP:OD1	1:B:325:ASP:N	2.19	0.69
1:A:327:GLY:O	1:B:212:ARG:NH2	2.27	0.68
1:A:94:TRP:HE3	1:A:120:THR:HG22	1.60	0.67
1:A:117:ARG:HH12	1:B:117:ARG:CZ	2.08	0.65
1:B:139:VAL:HG21	1:B:260:VAL:CG1	2.26	0.65
1:B:147:GLU:HG2	1:B:330:VAL:HG23	1.80	0.62
1:A:152:LEU:HD12	1:B:152:LEU:HD13	1.81	0.62
1:B:303:ASP:O	1:B:355:GLY:HA3	2.00	0.62
1:B:277:MSE:HE1	1:B:285:LEU:HB2	1.82	0.61
1:B:95:ASN:HD21	1:B:116:GLN:HG2	1.66	0.60
1:B:60:ASP:O	1:B:63:GLN:NE2	2.35	0.60
1:A:117:ARG:NH1	1:B:117:ARG:NH2	2.45	0.60
1:B:323:THR:HG1	2:B:401:ATP:HO2'	1.46	0.60
1:A:145:MSE:SE	1:B:328:MSE:HE2	2.52	0.59
1:A:147:GLU:HG2	1:A:330:VAL:HG23	1.82	0.59
1:B:265:VAL:HG22	1:B:335:SER:HA	1.84	0.59
1:B:132:LEU:HD21	1:B:228:GLU:HB3	1.85	0.58
1:A:65:GLY:O	1:A:69:ILE:HG13	2.03	0.58
1:A:80:CYS:HA	1:A:97:LEU:O	2.04	0.58
1:A:45:ALA:HB1	1:B:1:MSE:CE	2.30	0.58
1:A:322:THR:HG21	1:B:212:ARG:HH22	1.68	0.58
1:B:54:ARG:NH2	3:B:402:FMN:O3P	2.34	0.58
1:A:117:ARG:HH12	1:B:117:ARG:NH2	2.03	0.57
1:B:222:LEU:HD13	1:B:289:ASN:HD21	1.69	0.57
1:A:303:ASP:O	1:A:355:GLY:HA3	2.05	0.57
1:A:191:ARG:HE	1:B:166:TYR:HE1	1.53	0.57
1:B:282:ARG:NE	1:B:284:GLU:OE1	2.37	0.57
1:B:309:GLN:HG2	1:B:310:ASP:H	1.70	0.56
1:B:41:THR:HG23	1:B:43:TYR:H	1.69	0.56

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:222:LEU:HD23	1:B:225:LEU:HD21	1.87	0.56
1:A:136:LEU:HD22	1:A:232:LEU:HD13	1.88	0.56
1:A:145:MSE:HG2	1:B:148:MSE:HB2	1.87	0.56
1:A:54:ARG:NE	3:A:402:FMN:O3P	2.37	0.55
1:A:240:GLN:O	1:A:283:ARG:NH1	2.40	0.55
1:B:198:ARG:HA	1:B:201:GLN:HG2	1.90	0.54
1:A:339:ILE:HD12	1:A:346:MSE:SE	2.57	0.54
1:B:242:VAL:HG22	1:B:283:ARG:HD3	1.89	0.54
1:A:277:MSE:CE	1:A:304:THR:H	2.21	0.54
1:A:30:LEU:HD21	1:A:53:CYS:SG	2.48	0.53
1:A:265:VAL:HG11	1:A:339:ILE:HD11	1.90	0.53
1:B:339:ILE:HD12	1:B:346:MSE:SE	2.59	0.52
1:B:349:GLU:OE2	1:B:359:ARG:NH1	2.41	0.52
1:A:69:ILE:O	1:A:73:ILE:HG13	2.08	0.52
1:A:277:MSE:HE1	1:A:284:GLU:O	2.10	0.52
1:A:277:MSE:HE3	1:A:303:ASP:HB2	1.90	0.52
1:B:73:ILE:HG23	1:B:112:TYR:CE2	2.44	0.52
1:A:152:LEU:HD23	1:B:206:LEU:HD12	1.91	0.52
1:A:179:ASP:HB3	1:A:182:THR:HG23	1.91	0.52
1:A:97:LEU:HD21	3:A:402:FMN:C4A	2.40	0.52
1:B:222:LEU:HD23	1:B:225:LEU:HD11	1.92	0.51
1:B:285:LEU:HD12	1:B:302:SER:O	2.11	0.51
1:A:313:ILE:HD11	1:A:349:GLU:HA	1.93	0.51
1:A:94:TRP:CE3	1:A:120:THR:HG22	2.45	0.51
1:A:97:LEU:HD21	3:A:402:FMN:C10	2.41	0.51
1:B:148:MSE:HE3	1:B:152:LEU:HD12	1.92	0.51
1:A:71:GLU:OE2	1:A:74:ARG:HD3	2.11	0.50
1:A:220:GLU:CD	1:A:259:ARG:HB3	2.32	0.50
1:B:65:GLY:O	1:B:69:ILE:HG13	2.12	0.50
1:B:344:GLY:HA3	1:B:361:THR:O	2.12	0.50
1:B:225:LEU:HD12	1:B:226:ILE:N	2.27	0.50
1:B:94:TRP:H	1:B:120:THR:CG2	2.25	0.50
1:A:141:ARG:NH2	2:B:401:ATP:O3G	2.39	0.49
1:A:242:VAL:HG22	1:A:283:ARG:HB3	1.94	0.49
1:A:122:HIS:NE2	1:A:126:GLN:OE1	2.46	0.49
1:A:269:LEU:HD21	1:A:346:MSE:HE1	1.95	0.49
1:A:152:LEU:CD2	1:B:206:LEU:HD12	2.42	0.49
1:A:294:ASP:O	1:A:296:MSE:HG2	2.13	0.48
1:B:312:VAL:HG13	1:B:321:PHE:CZ	2.47	0.48
1:B:132:LEU:HD21	1:B:228:GLU:CB	2.44	0.48
1:B:136:LEU:HD22	1:B:232:LEU:HD13	1.94	0.48

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:210:VAL:HG12	1:B:328:MSE:HE1	1.96	0.48
1:B:80:CYS:HA	1:B:97:LEU:O	2.14	0.48
1:B:303:ASP:OD1	1:B:356:ALA:N	2.37	0.48
1:A:304:THR:HG22	1:A:353:SER:OG	2.14	0.47
1:B:94:TRP:H	1:B:120:THR:HG23	1.80	0.47
1:A:94:TRP:H	1:A:120:THR:HG23	1.79	0.47
1:B:163:ILE:O	1:B:167:MSE:HG2	2.15	0.47
1:A:143:SER:OG	1:A:334:ILE:HD13	2.15	0.47
1:B:97:LEU:HD21	3:B:402:FMN:N5	2.30	0.47
1:B:282:ARG:NE	1:B:304:THR:HG21	2.29	0.46
1:A:100:THR:HG21	1:B:13:HIS:O	2.15	0.46
1:A:152:LEU:HD23	1:A:152:LEU:HA	1.63	0.46
1:A:148:MSE:HE1	1:B:210:VAL:HG11	1.98	0.46
1:A:63:GLN:OE1	1:A:84:ARG:N	2.41	0.46
1:A:148:MSE:CE	1:B:210:VAL:HG11	2.46	0.46
1:A:226:ILE:HD12	1:A:248:LEU:HD21	1.97	0.46
1:B:139:VAL:HG11	1:B:260:VAL:HG12	1.98	0.45
1:A:247:SER:O	1:A:288:THR:HA	2.17	0.45
1:B:226:ILE:HD12	1:B:248:LEU:HD21	1.99	0.45
1:B:304:THR:HG22	1:B:353:SER:OG	2.16	0.45
1:A:54:ARG:NH2	3:A:402:FMN:O3P	2.49	0.45
1:A:351:ASN:HB2	1:A:357:THR:HG23	1.98	0.45
1:B:252:ALA:HB1	1:B:297:ILE:HG12	1.98	0.45
1:A:117:ARG:CZ	1:B:117:ARG:HH21	2.29	0.45
1:A:277:MSE:HE3	1:A:304:THR:H	1.81	0.45
1:A:285:LEU:HD23	1:A:285:LEU:HA	1.77	0.45
1:A:330:VAL:HG22	1:A:334:ILE:HG13	1.99	0.45
1:B:247:SER:O	1:B:288:THR:HA	2.17	0.45
1:A:60:ASP:O	1:A:63:GLN:NE2	2.51	0.44
1:A:145:MSE:SE	1:B:144:ALA:HB1	2.67	0.44
1:A:156:LEU:HD23	1:B:202:ILE:HD11	1.98	0.44
2:A:401:ATP:PG	1:B:141:ARG:HH12	2.39	0.44
1:A:98:SER:O	1:A:114:GLY:HA2	2.18	0.44
1:B:84:ARG:HB3	1:B:92:LEU:HD11	2.00	0.44
1:B:220:GLU:OE2	1:B:259:ARG:HB3	2.17	0.44
1:A:113:ILE:HB	1:B:10:MSE:HB3	2.00	0.43
1:B:276:ALA:HB1	1:B:306:SER:H	1.83	0.43
1:B:278:ALA:O	1:B:283:ARG:NH2	2.46	0.43
1:B:98:SER:O	1:B:114:GLY:HA2	2.18	0.43
1:B:136:LEU:HD12	1:B:136:LEU:HA	1.84	0.43
1:A:313:ILE:CD1	1:A:349:GLU:HA	2.48	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:44:CYS:HB3	1:A:47:ASP:OD2	2.18	0.43
1:A:53:CYS:HA	1:A:55:PHE:CE1	2.53	0.43
1:A:260:VAL:O	1:A:263:GLN:HG2	2.19	0.43
1:A:3:ASN:OD1	1:A:5:LYS:HB3	2.18	0.43
1:B:299:VAL:O	1:B:359:ARG:HA	2.19	0.43
1:B:307:GLY:HA3	1:B:354:GLY:O	2.19	0.43
1:A:63:GLN:HB2	1:A:66:ILE:HD12	2.00	0.43
1:A:303:ASP:OD2	2:A:401:ATP:N6	2.30	0.43
1:B:312:VAL:HG13	1:B:321:PHE:HZ	1.84	0.42
1:A:93:PHE:HA	1:A:120:THR:CG2	2.50	0.42
1:B:30:LEU:HD11	1:B:53:CYS:SG	2.59	0.42
1:B:158:GLN:HB3	1:B:159:PRO:HD3	2.01	0.42
1:B:206:LEU:HD23	1:B:206:LEU:HA	1.79	0.42
1:B:217:LYS:H	1:B:217:LYS:HG2	1.66	0.42
1:B:116:GLN:HE21	1:B:116:GLN:HB2	1.55	0.42
1:A:147:GLU:OE2	1:A:333:SER:OG	2.24	0.42
1:A:45:ALA:CB	1:B:1:MSE:HE1	2.36	0.42
1:B:225:LEU:HD12	1:B:226:ILE:HG13	2.02	0.42
1:A:271:ARG:O	1:A:275:GLU:HG3	2.19	0.42
1:B:69:ILE:O	1:B:73:ILE:HG13	2.19	0.42
1:B:152:LEU:HD23	1:B:152:LEU:HA	1.84	0.41
1:A:84:ARG:HB3	1:A:92:LEU:HD11	2.02	0.41
1:A:191:ARG:NE	1:B:166:TYR:CE1	2.87	0.41
1:B:240:GLN:HB3	1:B:242:VAL:HG23	2.03	0.41
1:B:3:ASN:OD1	1:B:4:ALA:N	2.54	0.41
1:B:97:LEU:HD11	3:B:402:FMN:C10	2.50	0.41
1:A:152:LEU:CD1	1:B:152:LEU:HD13	2.48	0.41
1:B:198:ARG:O	1:B:202:ILE:HG23	2.20	0.41
1:B:297:ILE:O	1:B:361:THR:HA	2.21	0.41
1:A:202:ILE:HD13	1:B:155:GLU:HB3	2.03	0.41
1:B:257:ALA:HA	1:B:342:HIS:HD2	1.86	0.41
1:B:328:MSE:HB2	1:B:330:VAL:HG12	2.02	0.40
1:A:267:VAL:O	1:A:271:ARG:HG2	2.21	0.40
1:A:246:PHE:CD1	1:A:246:PHE:N	2.90	0.40
1:A:290:THR:O	1:A:297:ILE:HG23	2.21	0.40
1:B:262:ILE:HG13	1:B:263:GLN:N	2.37	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	363/388 (94%)	354 (98%)	9 (2%)	0	100	100
1	B	366/388 (94%)	358 (98%)	8 (2%)	0	100	100
All	All	729/776 (94%)	712 (98%)	17 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	303/311 (97%)	295 (97%)	8 (3%)	46	58
1	B	303/311 (97%)	292 (96%)	11 (4%)	35	46
All	All	606/622 (97%)	587 (97%)	19 (3%)	40	52

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	53	CYS
1	A	116	GLN
1	A	133	GLN
1	A	152	LEU
1	A	171	ARG
1	A	225	LEU
1	A	263	GLN
1	A	309	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	B	0	HIS
1	B	113	ILE
1	B	116	GLN
1	B	128	ARG
1	B	154	HIS
1	B	217	LYS
1	B	263	GLN
1	B	279	GLN
1	B	325	ASP
1	B	335	SER
1	B	347	TRP

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

Mol	Chain	Res	Type
1	A	116	GLN
1	B	116	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](#)

4 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
2	ATP	B	401	-	26,33,33	0.99	1 (3%)	31,52,52	1.46	6 (19%)
2	ATP	A	401	-	26,33,33	0.97	2 (7%)	31,52,52	1.51	5 (16%)
3	FMN	B	402	-	33,33,33	1.05	2 (6%)	48,50,50	1.28	6 (12%)
3	FMN	A	402	-	33,33,33	1.08	2 (6%)	48,50,50	1.32	8 (16%)

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
2	ATP	B	401	-	-	1/18/38/38	0/3/3/3
2	ATP	A	401	-	-	2/18/38/38	0/3/3/3
3	FMN	B	402	-	-	5/18/18/18	0/3/3/3
3	FMN	A	402	-	-	6/18/18/18	0/3/3/3

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	402	FMN	C4A-N5	3.87	1.38	1.30
3	A	402	FMN	C4A-N5	3.57	1.37	1.30
2	B	401	ATP	C5-C4	2.68	1.48	1.40
3	A	402	FMN	C10-N1	2.64	1.38	1.33
2	A	401	ATP	C5-C4	2.55	1.47	1.40
3	B	402	FMN	C10-N1	2.28	1.37	1.33
2	A	401	ATP	O4'-C1'	2.05	1.43	1.41

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	ATP	C3'-C2'-C1'	3.53	106.29	100.98
3	B	402	FMN	C4-N3-C2	-3.30	119.54	125.64
3	A	402	FMN	C4-N3-C2	-3.26	119.62	125.64
2	A	401	ATP	N3-C2-N1	-3.23	123.63	128.68
3	B	402	FMN	O4-C4-C4A	-3.17	118.18	126.60
2	B	401	ATP	C3'-C2'-C1'	3.16	105.74	100.98
2	A	401	ATP	PA-O3A-PB	-3.03	122.42	132.83
2	B	401	ATP	N3-C2-N1	-2.96	124.05	128.68

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	402	FMN	C4A-C4-N3	2.80	120.29	113.19
2	B	401	ATP	C4-C5-N7	-2.75	106.53	109.40
3	A	402	FMN	C4A-C10-N1	-2.75	118.36	124.73
3	A	402	FMN	C4A-C4-N3	2.72	120.09	113.19
2	A	401	ATP	C4-C5-N7	-2.70	106.58	109.40
3	A	402	FMN	O4-C4-C4A	-2.68	119.48	126.60
2	A	401	ATP	PB-O3B-PG	-2.68	123.64	132.83
3	A	402	FMN	C4-C4A-C10	2.46	120.93	116.79
3	B	402	FMN	C4'-C3'-C2'	-2.43	108.31	113.36
2	B	401	ATP	PB-O3B-PG	-2.31	124.88	132.83
3	B	402	FMN	C4A-C10-N10	2.29	119.82	116.48
3	A	402	FMN	C9A-C5A-N5	-2.18	120.06	122.43
3	A	402	FMN	C5A-C9A-N10	2.15	120.18	117.95
3	A	402	FMN	C4A-C10-N10	2.12	119.58	116.48
2	B	401	ATP	PA-O3A-PB	-2.12	125.56	132.83
2	B	401	ATP	O2'-C2'-C3'	-2.07	105.13	111.82
3	B	402	FMN	C9A-C5A-N5	-2.03	120.22	122.43

There are no chirality outliers.

All (14) torsion outliers are listed below:

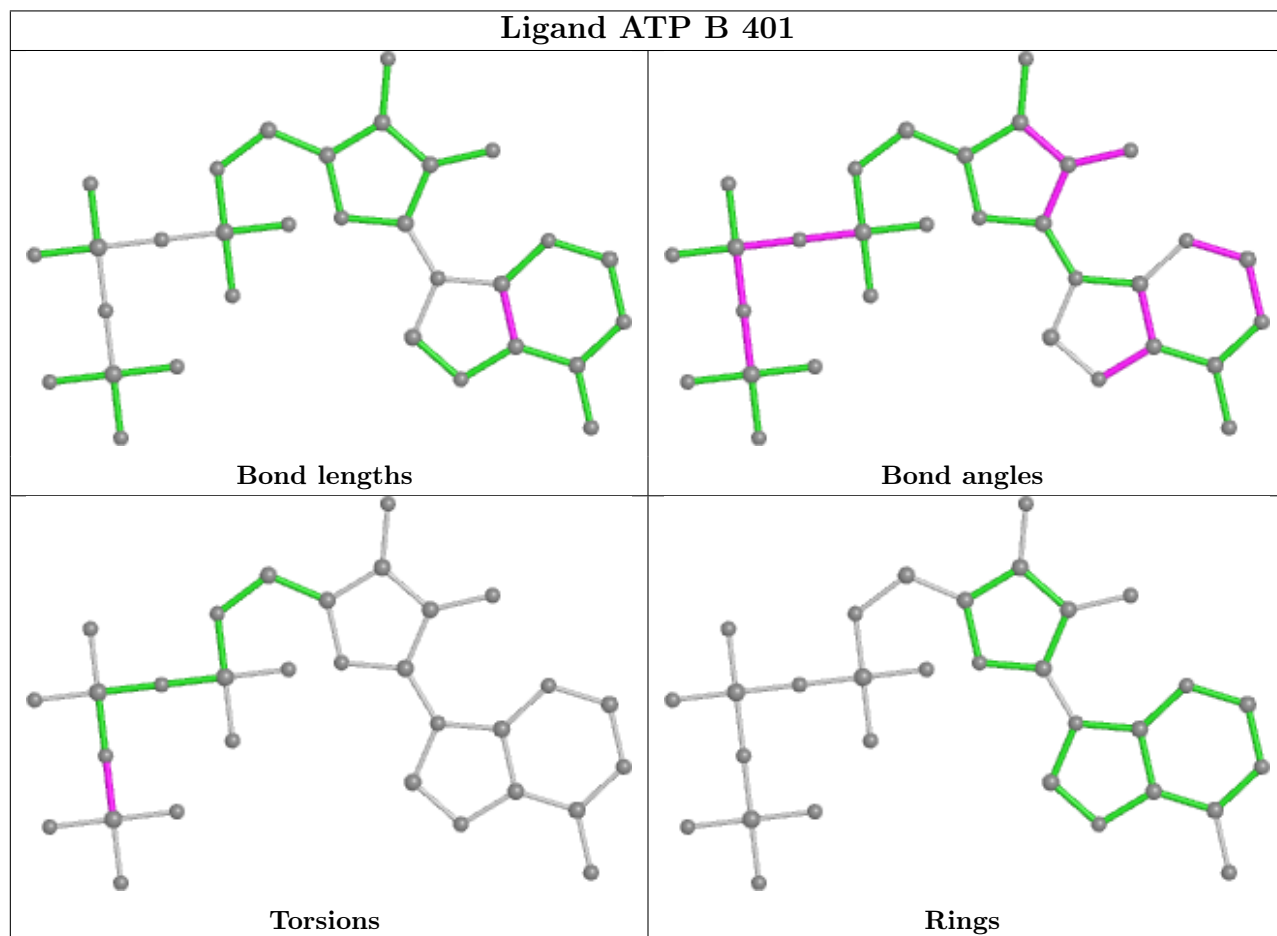
Mol	Chain	Res	Type	Atoms
2	B	401	ATP	PB-O3B-PG-O2G
3	A	402	FMN	C5'-O5'-P-O2P
3	A	402	FMN	C5'-O5'-P-O3P
3	B	402	FMN	C5'-O5'-P-O3P
3	A	402	FMN	C3'-C4'-C5'-O5'
3	B	402	FMN	C3'-C4'-C5'-O5'
3	B	402	FMN	C5'-O5'-P-O2P
3	B	402	FMN	C4'-C5'-O5'-P
3	A	402	FMN	C4'-C5'-O5'-P
2	A	401	ATP	PB-O3B-PG-O1G
3	A	402	FMN	O4'-C4'-C5'-O5'
3	B	402	FMN	O4'-C4'-C5'-O5'
3	A	402	FMN	C5'-O5'-P-O1P
2	A	401	ATP	PB-O3B-PG-O2G

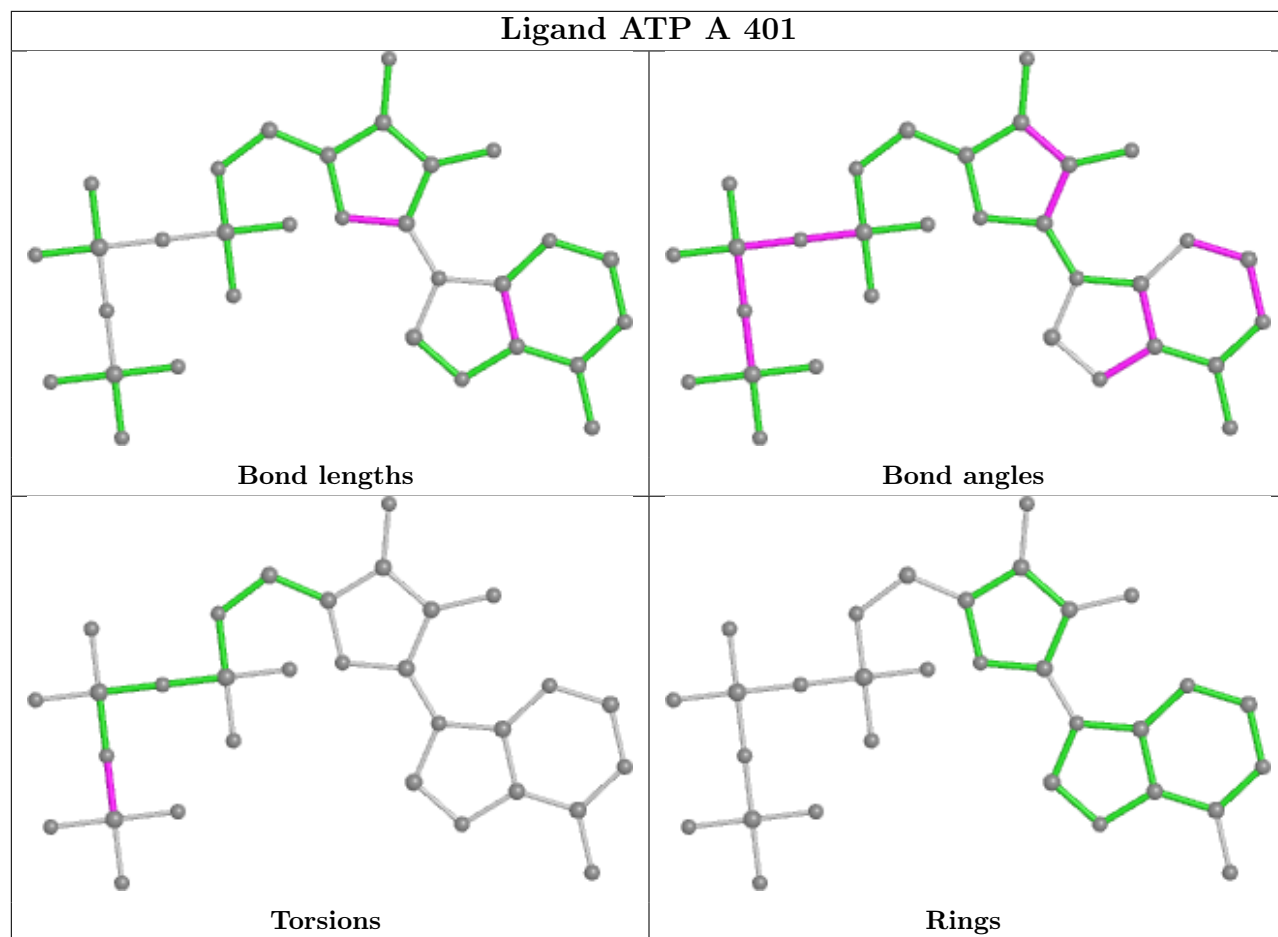
There are no ring outliers.

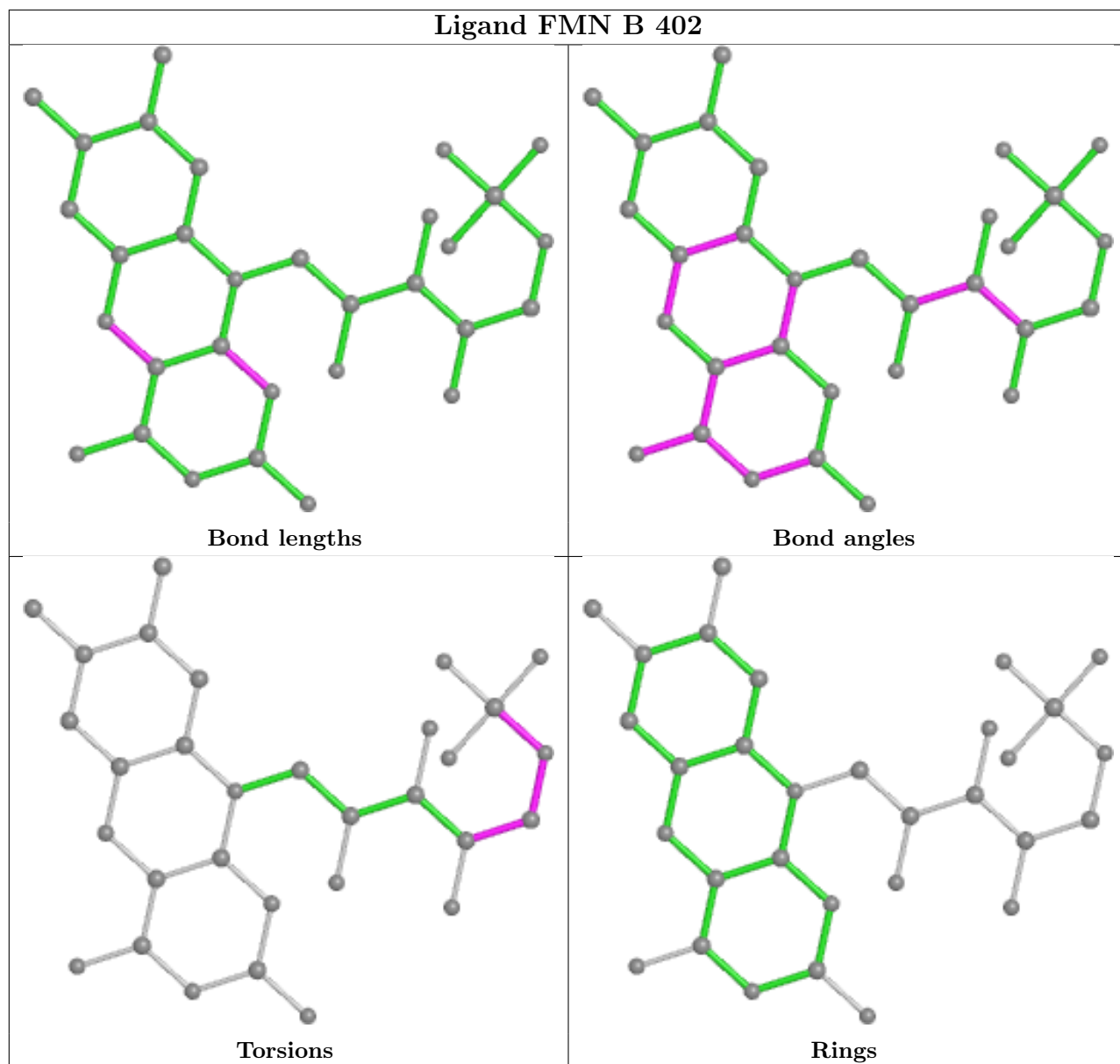
4 monomers are involved in 11 short contacts:

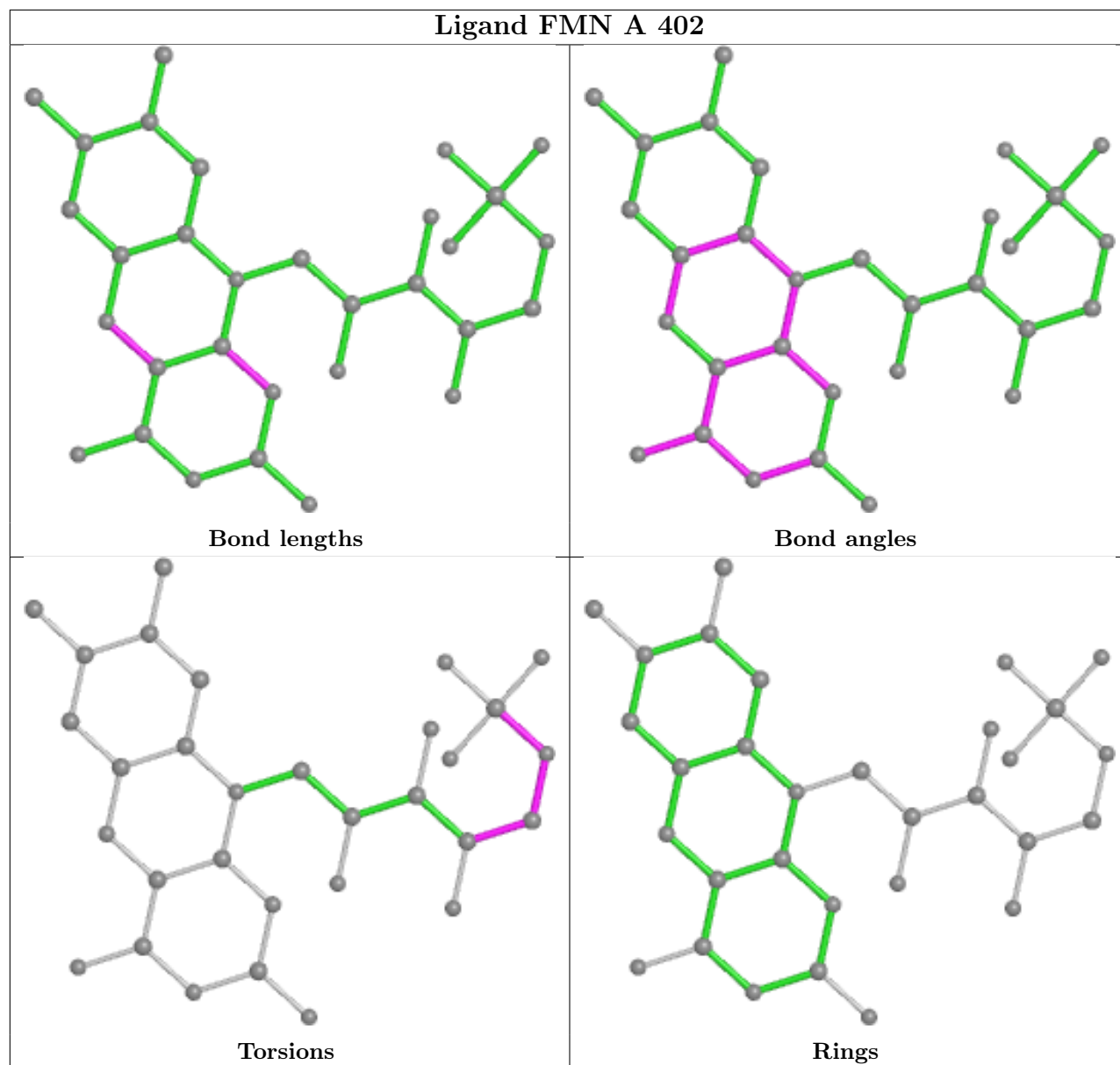
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	ATP	2	0
2	A	401	ATP	2	0
3	B	402	FMN	3	0
3	A	402	FMN	4	0

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 [i](#)

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, 95th 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 ²)	Q<0.9
1	A	355/388 (91%)	0.58	36 (10%) 7 4	34, 95, 174, 199	11 (3%)
1	B	359/388 (92%)	0.63	40 (11%) 5 3	36, 97, 178, 210	10 (2%)
All	All	714/776 (92%)	0.60	76 (10%) 6 4	34, 95, 176, 210	21 (2%)

All (76) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	361	THR	7.9
1	A	291	PRO	7.8
1	B	316	LEU	7.8
1	A	222	LEU	7.4
1	B	313	ILE	7.2
1	B	362	LEU	6.9
1	B	285	LEU	6.5
1	B	365	ALA	6.4
1	B	297	ILE	6.3
1	B	257	ALA	6.1
1	B	360	PHE	5.6
1	A	292	ALA	5.5
1	B	339	ILE	5.2
1	A	297	ILE	5.1
1	A	360	PHE	4.8
1	A	290	THR	4.7
1	A	256	LEU	4.7
1	B	299	VAL	4.4
1	A	270	PHE	4.4
1	B	287	VAL	4.3
1	A	210	VAL	4.2
1	B	290	THR	4.2
1	B	314	PRO	4.1
1	A	342	HIS	4.1

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	250	PRO	4.0
1	A	266	LEU	4.0
1	B	332	LEU	3.9
1	A	288	THR	3.9
1	A	257	ALA	3.8
1	B	256	LEU	3.8
1	A	289	ASN	3.7
1	B	312	VAL	3.7
1	B	254	LEU	3.6
1	A	340	GLU	3.5
1	B	293	ALA	3.5
1	A	259	ARG	3.4
1	A	362	LEU	3.4
1	A	317	PHE	3.3
1	B	361	THR	3.3
1	B	321	PHE	3.2
1	B	364	ALA	3.1
1	B	289	ASN	3.1
1	B	291	PRO	3.0
1	B	308	PHE	2.8
1	A	203	ILE	2.8
1	B	317	PHE	2.7
1	A	286	VAL	2.7
1	B	216	GLU	2.7
1	A	137	VAL	2.6
1	A	339	ILE	2.6
1	B	246	PHE	2.6
1	A	251	GLY	2.5
1	B	347	TRP	2.5
1	A	262	ILE	2.5
1	A	215	SER	2.4
1	A	206	LEU	2.4
1	B	152	LEU	2.4
1	B	294	ASP	2.3
1	A	338	ILE	2.3
1	A	214	GLU	2.3
1	B	198	ARG	2.3
1	A	281	GLN	2.3
1	B	203	ILE	2.3
1	A	332	LEU	2.3
1	B	271	ARG	2.2
1	B	249	ASP	2.2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	B	278	ALA	2.2
1	A	304	THR	2.2
1	B	349	GLU	2.2
1	B	163	ILE	2.1
1	A	316	LEU	2.1
1	A	352	ALA	2.1
1	A	350	SER	2.1
1	B	244	LEU	2.1
1	A	294	ASP	2.1
1	B	274	LEU	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](#)

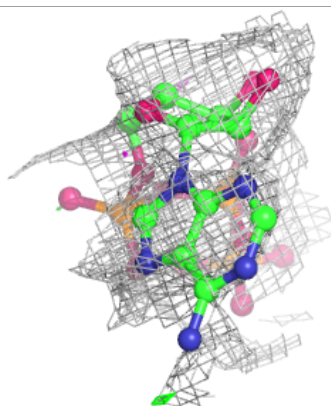
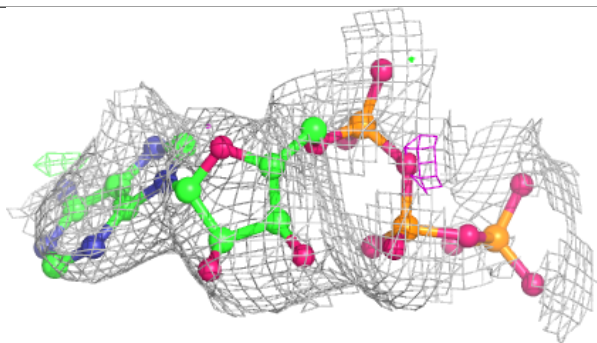
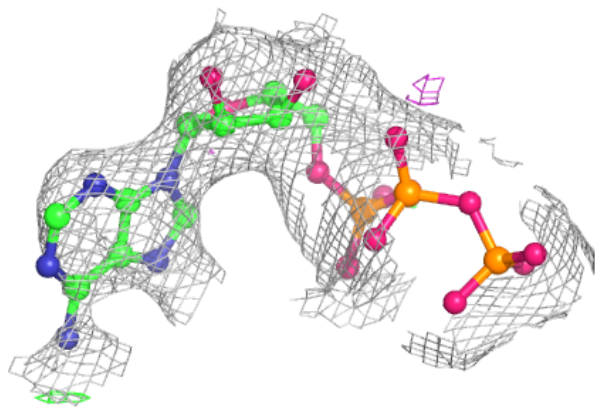
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	ATP	B	401	31/31	0.95	0.19	101,114,133,134	0
3	FMN	B	402	31/31	0.96	0.15	44,59,75,78	0
2	ATP	A	401	31/31	0.97	0.17	95,107,128,136	0
3	FMN	A	402	31/31	0.98	0.15	44,55,73,75	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.

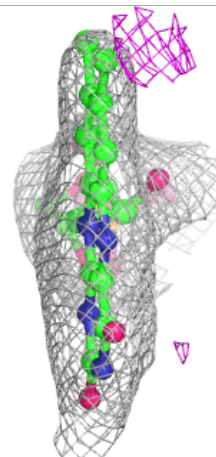
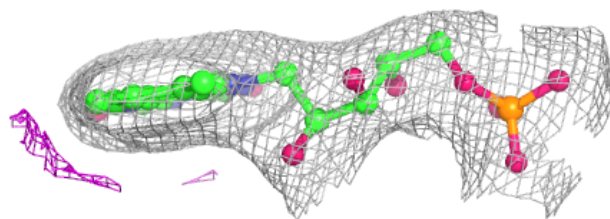
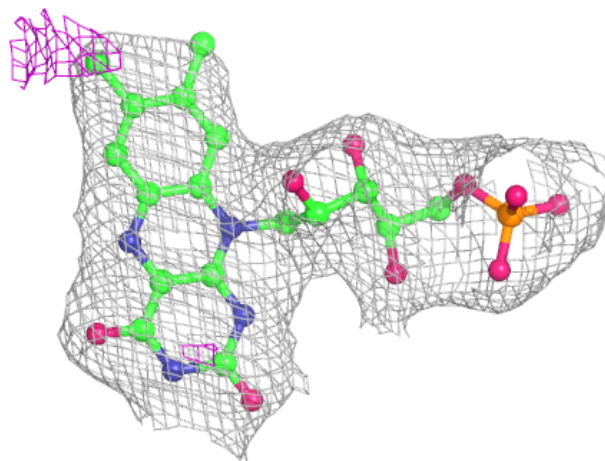
Electron density around ATP B 401:

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



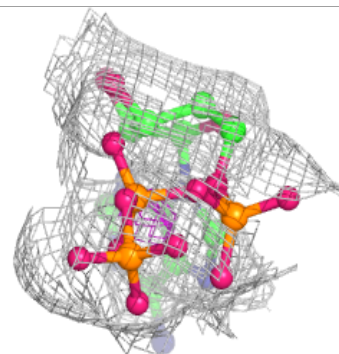
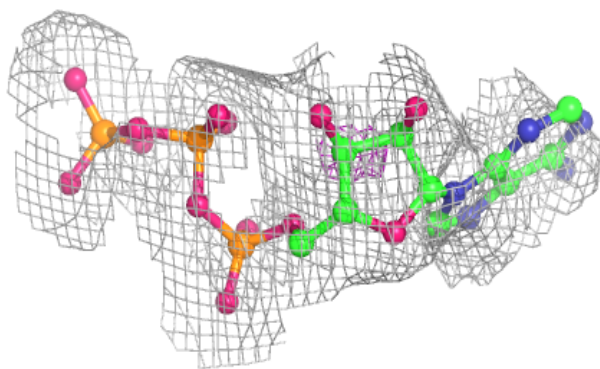
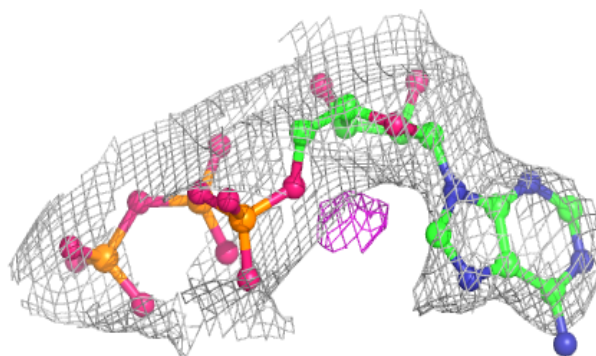
Electron density around FMN B 402:

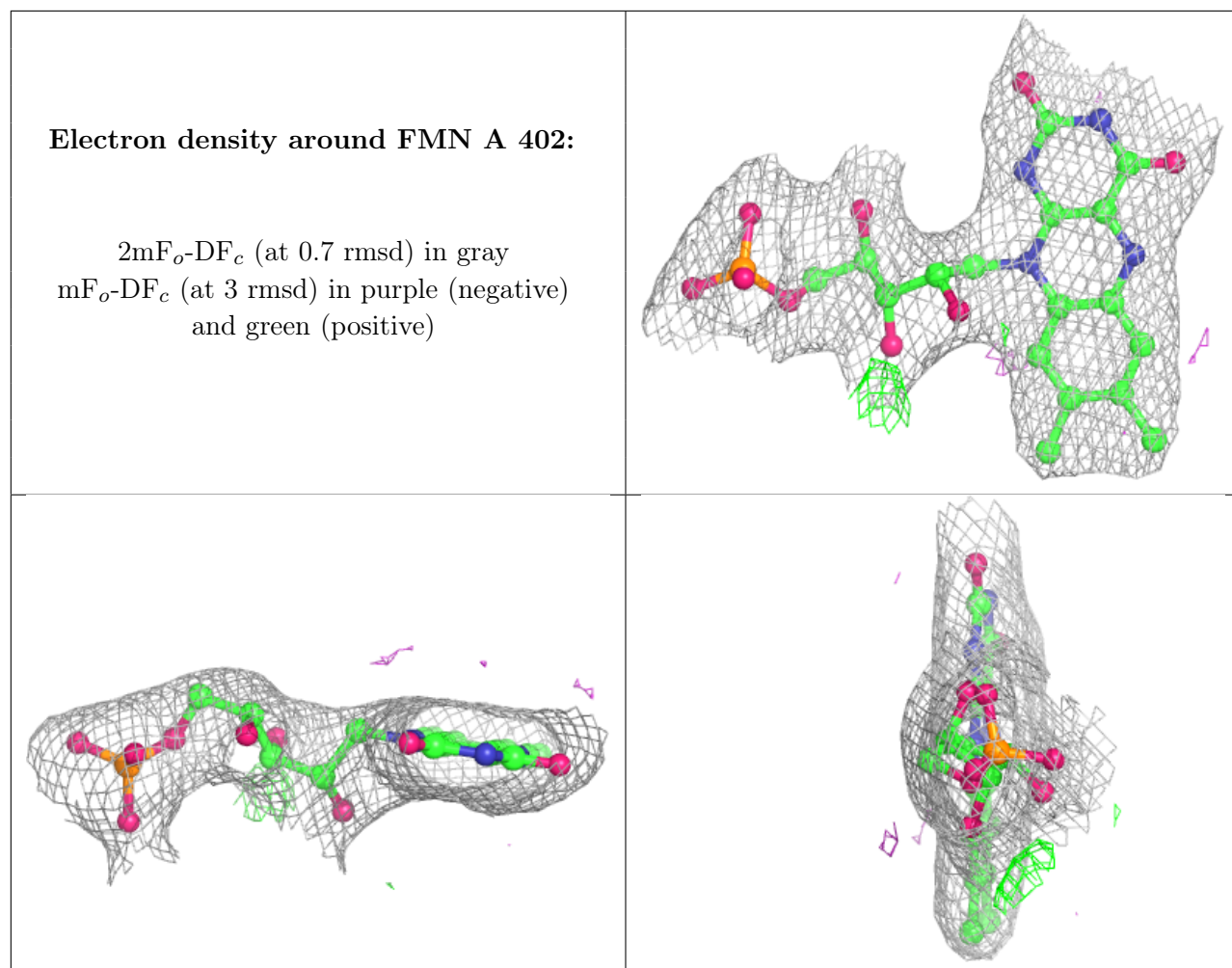
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around ATP A 401:

$2mF_o-DF_c$ (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.