



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 02:24 PM UTC

PDB ID : 3GV0 / pdb_00003gv0
Title : Crystal structure of LacI family transcription regulator from *Agrobacterium tumefaciens*
Authors : Bagaria, A.; Burley, S.K.; Swaminathan, S.; New York SGX Research Center for Structural Genomics (NYSGXRC)
Deposited on : 2009-03-30
Resolution : 2.35 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

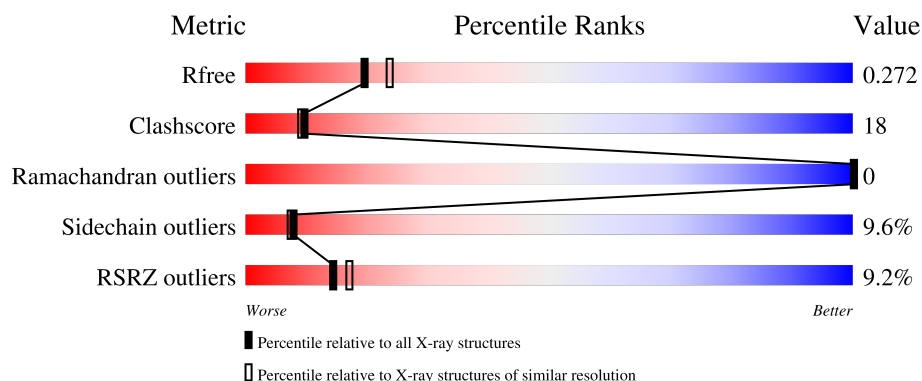
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.35 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}	180053	1596 (2.36-2.36)
Clashscore	190562	1663 (2.36-2.36)
Ramachandran outliers	187476	1646 (2.36-2.36)
Sidechain outliers	187428	1646 (2.36-2.36)
RSRZ outliers	180081	1598 (2.36-2.36)

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	288	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2185 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 Transcriptional regulator, LacI family.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	269	2097	1326	367	396	1	7	0	0	0

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	59	MSE	-	expression tag	UNP Q7CZ24
A	60	SER	-	expression tag	UNP Q7CZ24
A	61	LEU	-	expression tag	UNP Q7CZ24
A	339	GLU	-	expression tag	UNP Q7CZ24
A	340	GLY	-	expression tag	UNP Q7CZ24
A	341	HIS	-	expression tag	UNP Q7CZ24
A	342	HIS	-	expression tag	UNP Q7CZ24
A	343	HIS	-	expression tag	UNP Q7CZ24
A	344	HIS	-	expression tag	UNP Q7CZ24
A	345	HIS	-	expression tag	UNP Q7CZ24
A	346	HIS	-	expression tag	UNP Q7CZ24

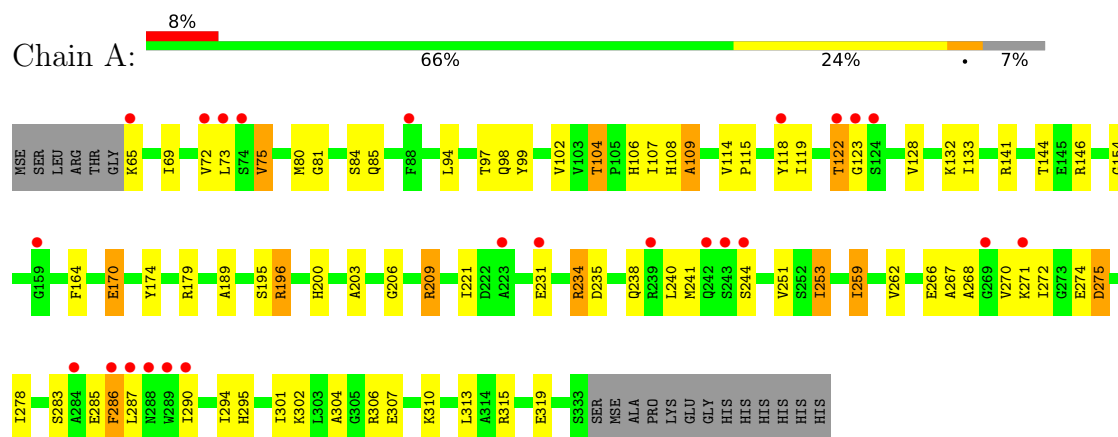
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	88	Total	O	0	0
			88	88		

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: Transcriptional regulator, LacI family



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	86.71Å 86.71Å 111.22Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	43.36 – 2.35 43.36 – 2.35	Depositor EDS
% Data completeness (in resolution range)	99.7 (43.36-2.35) 99.7 (43.36-2.35)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.38 (at 2.34Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.198 , 0.255 (Not available) , 0.272	Depositor DCC
R_{free} test set	1056 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å ²)	44.9	Xtriage
Anisotropy	0.169	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 40.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.025 for -h,-k,l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	2185	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.65% 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

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	1.89	18/2132 (0.8%)	0.96	2/2875 (0.1%)

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	203	ALA	C-O	-6.40	1.16	1.24
1	A	278	ILE	C-O	-6.23	1.17	1.24
1	A	114	VAL	C-O	-6.17	1.19	1.24
1	A	128	VAL	C-O	-6.12	1.18	1.24
1	A	133	ILE	C-O	-5.98	1.17	1.24
1	A	304	ALA	C-O	-5.81	1.17	1.24
1	A	102	VAL	C-O	-5.70	1.18	1.24
1	A	69	ILE	C-O	-5.56	1.18	1.24
1	A	209	ARG	C-O	-5.56	1.17	1.24
1	A	109	ALA	CA-CB	-5.50	1.44	1.53
1	A	251	VAL	C-O	-5.49	1.18	1.24
1	A	104	THR	C-O	-5.48	1.19	1.24
1	A	174	TYR	C-O	-5.23	1.18	1.24
1	A	154	GLY	C-O	-5.16	1.18	1.23
1	A	307	GLU	C-O	-5.05	1.18	1.24
1	A	170	GLU	C-O	-5.03	1.18	1.24
1	A	84	SER	C-O	-5.02	1.18	1.24
1	A	206	GLY	C-O	-5.01	1.17	1.23

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	244	SER	N-CA-C	-5.37	105.86	112.90
1	A	99	TYR	N-CA-C	5.21	117.77	109.96

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	2097	0	2085	74	0
2	A	88	0	0	8	0
All	All	2185	0	2085	74	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 18.

All (74) 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:259:ILE:HD11	1:A:286:PHE:CZ	1.14	1.66
1:A:259:ILE:CD1	1:A:286:PHE:HZ	1.04	1.63
1:A:80:MSE:HE2	1:A:286:PHE:CE2	1.09	1.57
1:A:80:MSE:CE	1:A:286:PHE:HE2	1.28	1.46
1:A:286:PHE:CE1	1:A:290:ILE:HD11	1.70	1.26
1:A:80:MSE:CE	1:A:286:PHE:CE2	2.05	1.26
1:A:286:PHE:CE1	1:A:290:ILE:CD1	2.37	1.08
1:A:286:PHE:CD1	1:A:290:ILE:HD11	1.91	1.06
1:A:259:ILE:CD1	1:A:286:PHE:CZ	1.96	1.01
1:A:286:PHE:HE1	1:A:290:ILE:HD11	1.27	0.96
1:A:259:ILE:HD13	1:A:286:PHE:HZ	1.30	0.96
1:A:238:GLN:NE2	1:A:267:ALA:O	2.00	0.94
1:A:286:PHE:O	1:A:290:ILE:HG13	1.71	0.91
1:A:253:ILE:O	1:A:253:ILE:HG22	1.76	0.85
1:A:94:LEU:O	1:A:97:THR:OG1	1.95	0.83
1:A:238:GLN:HE21	1:A:267:ALA:C	1.87	0.83
1:A:73:LEU:HD12	1:A:73:LEU:O	1.79	0.82
1:A:189:ALA:HB1	1:A:221:ILE:HD12	1.60	0.82
1:A:286:PHE:HE1	1:A:290:ILE:CD1	1.82	0.81
1:A:72:VAL:HG22	1:A:104:THR:OG1	1.80	0.81
1:A:253:ILE:O	1:A:253:ILE:CG2	2.30	0.79
1:A:80:MSE:HE2	1:A:286:PHE:CD2	2.10	0.78
1:A:259:ILE:HD11	1:A:286:PHE:CE2	2.13	0.77
1:A:106:HIS:HD2	1:A:108:HIS:O	1.69	0.76
1:A:72:VAL:O	2:A:471:HOH:O	2.07	0.73

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:MSE:HE2	1:A:286:PHE:CZ	2.10	0.73
1:A:259:ILE:HD13	1:A:286:PHE:CZ	2.12	0.70
1:A:234:ARG:HD3	2:A:415:HOH:O	1.93	0.68
1:A:286:PHE:CE1	1:A:290:ILE:HD12	2.31	0.66
1:A:81:GLY:HA2	2:A:426:HOH:O	1.94	0.66
1:A:179:ARG:HH11	1:A:295:HIS:HD2	1.44	0.65
1:A:238:GLN:NE2	1:A:267:ALA:CB	2.60	0.65
1:A:234:ARG:NH1	1:A:235:ASP:OD1	2.30	0.64
1:A:238:GLN:NE2	1:A:267:ALA:HB1	2.14	0.63
1:A:179:ARG:HH11	1:A:295:HIS:CD2	2.18	0.62
1:A:319:GLU:OE1	2:A:414:HOH:O	2.16	0.61
1:A:75:VAL:O	1:A:75:VAL:HG12	2.00	0.61
1:A:238:GLN:HG3	1:A:268:ALA:HB2	1.84	0.59
1:A:75:VAL:HB	1:A:107:ILE:HD13	1.85	0.58
1:A:286:PHE:CD1	1:A:290:ILE:CD1	2.72	0.58
1:A:266:GLU:C	1:A:268:ALA:H	2.13	0.56
1:A:241:MSE:HG3	1:A:270:VAL:HG21	1.90	0.52
1:A:315:ARG:NH1	1:A:319:GLU:O	2.43	0.52
1:A:275:ASP:N	1:A:275:ASP:OD1	2.41	0.52
1:A:141:ARG:HG3	1:A:141:ARG:HH11	1.75	0.51
1:A:179:ARG:HD2	1:A:295:HIS:CD2	2.46	0.50
1:A:240:LEU:HG	1:A:241:MSE:CE	2.42	0.49
1:A:238:GLN:HE22	1:A:267:ALA:HB1	1.77	0.49
1:A:164:PHE:C	1:A:164:PHE:CD1	2.90	0.49
1:A:306:ARG:O	1:A:310:LYS:HG3	2.12	0.49
1:A:196:ARG:HD2	2:A:409:HOH:O	2.12	0.49
1:A:189:ALA:HB1	1:A:221:ILE:CD1	2.36	0.48
1:A:241:MSE:HA	1:A:241:MSE:HE2	1.97	0.47
1:A:106:HIS:CD2	1:A:108:HIS:O	2.59	0.47
1:A:85:GLN:NE2	2:A:403:HOH:O	2.34	0.47
1:A:234:ARG:NH1	2:A:415:HOH:O	2.41	0.47
1:A:262:VAL:HG21	1:A:294:ILE:HD11	1.98	0.45
1:A:119:ILE:O	1:A:123:GLY:N	2.49	0.44
1:A:287:LEU:HA	1:A:287:LEU:HD23	1.86	0.44
1:A:221:ILE:O	1:A:221:ILE:HG22	2.19	0.43
1:A:118:TYR:O	1:A:122:THR:HB	2.19	0.43
1:A:122:THR:O	1:A:123:GLY:C	2.62	0.43
1:A:170:GLU:OE2	1:A:209:ARG:NH1	2.50	0.43
1:A:141:ARG:HG3	1:A:141:ARG:NH1	2.33	0.42
1:A:80:MSE:SE	1:A:286:PHE:HE2	2.44	0.42
1:A:196:ARG:CD	2:A:409:HOH:O	2.67	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:122:THR:O	1:A:122:THR:HG23	2.20	0.42
1:A:195:SER:HA	1:A:200:HIS:CG	2.54	0.42
1:A:240:LEU:O	1:A:241:MSE:HE2	2.20	0.42
1:A:286:PHE:HD1	1:A:290:ILE:HD11	1.69	0.41
1:A:266:GLU:C	1:A:268:ALA:N	2.76	0.41
1:A:72:VAL:HG11	1:A:115:PRO:HB2	2.03	0.40
1:A:72:VAL:HG22	1:A:104:THR:HG1	1.79	0.40
1:A:109:ALA:HB1	1:A:196:ARG:HH12	1.84	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	267/288 (93%)	261 (98%)	6 (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	228/235 (97%)	206 (90%)	22 (10%)	8	7

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	65	LYS
1	A	75	VAL
1	A	98	GLN
1	A	122	THR
1	A	132	LYS
1	A	144	THR
1	A	146	ARG
1	A	196	ARG
1	A	231	GLU
1	A	234	ARG
1	A	253	ILE
1	A	259	ILE
1	A	271	LYS
1	A	272	ILE
1	A	274	GLU
1	A	275	ASP
1	A	283	SER
1	A	285	GLU
1	A	286	PHE
1	A	301	ILE
1	A	302	LYS
1	A	313	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	85	GLN
1	A	106	HIS
1	A	238	GLN
1	A	295	HIS
1	A	317	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	262/288 (90%)	0.58	24 (9%) 14 17	28, 42, 70, 80	0

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	286	PHE	8.3
1	A	290	ILE	5.5
1	A	124	SER	4.8
1	A	72	VAL	4.4
1	A	73	LEU	4.3
1	A	65	LYS	3.6
1	A	122	THR	3.6
1	A	289	TRP	3.5
1	A	244	SER	3.0
1	A	159	GLY	2.8
1	A	243	SER	2.7
1	A	223	ALA	2.7
1	A	239	ARG	2.6
1	A	287	LEU	2.6
1	A	123	GLY	2.6
1	A	231	GLU	2.5
1	A	269	GLY	2.5
1	A	118	TYR	2.3
1	A	271	LYS	2.3
1	A	284	ALA	2.3
1	A	88	PHE	2.2
1	A	288	ASN	2.2
1	A	74	SER	2.1
1	A	242	GLN	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.