



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 10:18 AM GMT

PDB ID : 3LNU
Title : Crystal structure of ParE subunit
Authors : Jung, H.Y.; Heo, Y.-S.
Deposited on : 2010-02-03
Resolution : 2.20 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

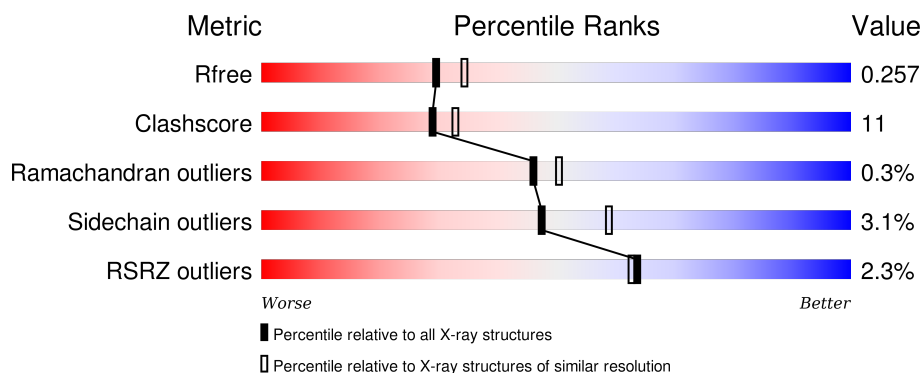
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

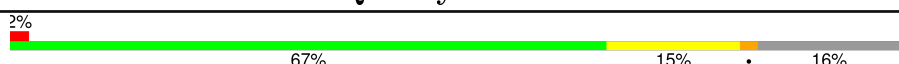
The reported resolution of this entry is 2.20 Å.

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}	91344	3774 (2.20-2.20)
Clashscore	102246	4477 (2.20-2.20)
Ramachandran outliers	100387	4404 (2.20-2.20)
Sidechain outliers	100360	4405 (2.20-2.20)
RSRZ outliers	91569	3781 (2.20-2.20)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	408	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2890 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 Topoisomerase IV subunit B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	344	Total	C	N	O	S	0	0	0
			2696	1695	480	512	9			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	26	MET	-	EXPRESSION TAG	UNP Q5GYJ8
A	27	GLY	-	EXPRESSION TAG	UNP Q5GYJ8
A	28	SER	-	EXPRESSION TAG	UNP Q5GYJ8
A	29	SER	-	EXPRESSION TAG	UNP Q5GYJ8
A	30	HIS	-	EXPRESSION TAG	UNP Q5GYJ8
A	31	HIS	-	EXPRESSION TAG	UNP Q5GYJ8
A	32	HIS	-	EXPRESSION TAG	UNP Q5GYJ8
A	33	HIS	-	EXPRESSION TAG	UNP Q5GYJ8
A	34	HIS	-	EXPRESSION TAG	UNP Q5GYJ8
A	35	HIS	-	EXPRESSION TAG	UNP Q5GYJ8
A	36	SER	-	EXPRESSION TAG	UNP Q5GYJ8
A	37	SER	-	EXPRESSION TAG	UNP Q5GYJ8
A	38	GLY	-	EXPRESSION TAG	UNP Q5GYJ8
A	39	LEU	-	EXPRESSION TAG	UNP Q5GYJ8
A	40	VAL	-	EXPRESSION TAG	UNP Q5GYJ8
A	41	PRO	-	EXPRESSION TAG	UNP Q5GYJ8
A	42	ARG	-	EXPRESSION TAG	UNP Q5GYJ8
A	43	GLY	-	EXPRESSION TAG	UNP Q5GYJ8
A	44	SER	-	EXPRESSION TAG	UNP Q5GYJ8
A	45	HIS	-	EXPRESSION TAG	UNP Q5GYJ8

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	194	Total	O	0	0
			194	194		

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ($\text{RSRZ} > 2$). 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.

Chain A:

Sequence logo for Chain A. The y-axis represents information content in bits (0.00 to 0.20). The x-axis shows positions 1 to 148. A color scale at the top indicates conservation levels: 2% (red), 67% (green), 15% (yellow), and 16% (grey).

Key residues and their approximate information content (bits) are listed below:

Position	Residue(s)	Information Content (bits)
1	A421, R422	0.18
2	LEU	0.15
3	LYS	0.12
4	THR	0.12
5	GLU	0.12
6	LYS	0.12
7	GLN	0.12
8	ILE	0.12
9	VAL	0.12
10	ARG	0.12
11	LYS	0.12
12	LYS	0.12
13	M276	0.12
14	L135	0.12
15	L136	0.12
16	R137	0.12
17	L138	0.12
18	HIS	0.12
19	K288	0.12
20	D289	0.12
21	T290	0.12
22	E291	0.12
23	D294	0.12
24	V300	0.12
25	S309	0.12
26	N312	0.12
27	L313	0.12
28	Q318	0.12
29	H319	0.12
30	LYS	0.12
31	G320	0.12
32	T321	0.12
33	H322	0.12
34	LYS	0.12
35	V323	0.12
36	L330	0.12
37	R335	0.12
38	D339	0.12
39	F340	0.12
40	R341	0.12
41	N342	0.12
42	L343	0.12
43	L350	0.12
44	A351	0.12
45	P352	0.12
46	E353	0.12
47	W356	0.12
48	D357	0.12
49	Q375	0.12
50	T376	0.12
51	K377	0.12
52	L380	0.12
53	S381	0.12
54	S382	0.12
55	V405	0.12
56	E409	0.12
57	A412	0.12
58	I416	0.12
59	D417	0.12
60	R419	0.12
61	I134	0.12
62	L135	0.12
63	T136	0.12
64	R137	0.12
65	L138	0.12
66	HIS	0.12
67	ALA	0.12
68	GLY	0.12
69	GLY	0.12
70	LYS	0.12
71	PHE	0.12
72	ASN	0.12
73	ASN	0.12
74	ARG	0.12
75	ASN	0.12
76	TYR	0.12
77	THR	0.12
78	PHE	0.12
79	SER	0.12
80	GLY	0.12
81	GLY	0.12
82	ASN	0.12
83	THR	0.12
84	ARG	0.12
85	GLY	0.12
86	THR	0.12
87	GLY	0.12
88	ASN	0.12
89	ALA	0.12
90	ALA	0.12
91	ASP	0.12
92	ILE	0.12
93	GLU	0.12
94	VAL	0.12
95	LEU	0.12
96	LEU	0.12
97	SER	0.12
98	G59	0.12
99	R65	0.12
100	T71	0.12
101	H78	0.12
102	Q81	0.12
103	H95	0.12
104	Q98	0.12
105	S108	0.12
106	G115	0.12
107	R116	0.12
108	H123	0.12
109	P124	0.12
110	E125	0.12
111	K127	0.12
112	I128	0.12
113	L132	0.12
114	E273	0.12

4 Data and refinement statistics

Property	Value	Source
Space group	P 42 21 2	Depositor
Cell constants a, b, c, α , β , γ	105.30 Å 105.30 Å 133.76 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	33.30 – 2.20 33.30 – 2.00	Depositor EDS
% Data completeness (in resolution range)	96.3 (33.30-2.20) 94.7 (33.30-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.93 (at 2.00 Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.236 , 0.257 0.236 , 0.257	Depositor DCC
R_{free} test set	1871 reflections (5.00%)	DCC
Wilson B-factor (Å ²)	36.7	Xtriage
Anisotropy	0.153	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 40.6	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	1 of 51358 reflections (0.002%)	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	2890	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.25% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.33	0/2749	0.62	3/3718 (0.1%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	289	ASP	N-CA-C	10.21	138.56	111.00
1	A	290	THR	N-CA-C	-7.76	90.05	111.00
1	A	290	THR	N-CA-CB	-6.29	98.35	110.30

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	2696	0	2667	61	0
2	A	194	0	0	14	0
All	All	2890	0	2667	61	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 11.

All (61) 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:135:LEU:HG	2:A:558:HOH:O	1.61	0.97
1:A:135:LEU:HD22	1:A:164:ASN:HB2	1.57	0.84
1:A:276:MET:HE2	1:A:300:VAL:HG22	1.66	0.76
1:A:98:GLN:HG3	2:A:593:HOH:O	1.90	0.71
1:A:339:ASP:HB3	2:A:533:HOH:O	1.90	0.71
1:A:350:LEU:HD21	1:A:416:ILE:HD13	1.73	0.70
1:A:173:PHE:HB2	1:A:208:ARG:HG3	1.75	0.68
1:A:377:LYS:HG2	1:A:377:LYS:O	1.93	0.68
1:A:412:ALA:O	1:A:416:ILE:HG12	1.98	0.64
1:A:280:ASP:HB3	2:A:541:HOH:O	1.98	0.62
1:A:261:ASN:HB2	1:A:265:ASP:OD2	2.02	0.59
1:A:294:ASP:HB2	2:A:598:HOH:O	2.02	0.59
1:A:357:ASP:HB3	1:A:418:ARG:NH2	2.18	0.58
1:A:202:LYS:HE2	2:A:522:HOH:O	2.04	0.57
1:A:261:ASN:HB2	1:A:265:ASP:CG	2.25	0.56
1:A:98:GLN:HB2	2:A:559:HOH:O	2.05	0.56
1:A:135:LEU:HD22	1:A:164:ASN:CB	2.35	0.55
1:A:126:GLU:HG3	1:A:133:LEU:HD11	1.89	0.55
1:A:375:GLN:CD	1:A:375:GLN:H	2.09	0.54
1:A:71:THR:OG1	1:A:78:HIS:HD2	1.90	0.54
1:A:276:MET:HE2	1:A:300:VAL:CG2	2.36	0.54
1:A:342:ASN:HB3	2:A:534:HOH:O	2.07	0.54
1:A:263:LEU:HD22	1:A:294:ASP:OD2	2.09	0.53
1:A:321:THR:HG22	1:A:380:LEU:HG	1.91	0.52
1:A:128:ILE:HD11	1:A:133:LEU:CD2	2.41	0.50
1:A:172:LEU:O	1:A:172:LEU:HD12	2.12	0.50
1:A:318:GLN:HG2	2:A:595:HOH:O	2.12	0.50
1:A:321:THR:HG21	1:A:382:SER:O	2.12	0.50
1:A:319:HIS:HB3	1:A:323:VAL:HG21	1.94	0.49
1:A:309:SER:OG	1:A:319:HIS:HD2	1.96	0.48
1:A:405:VAL:O	1:A:409:GLU:HG3	2.13	0.48
1:A:271:MET:HB3	1:A:276:MET:CE	2.44	0.48
1:A:377:LYS:HB2	2:A:447:HOH:O	2.12	0.48
1:A:81:GLN:NE2	2:A:528:HOH:O	2.46	0.48
1:A:71:THR:OG1	1:A:78:HIS:CD2	2.67	0.48
1:A:421:ALA:HA	2:A:557:HOH:O	2.13	0.47
1:A:377:LYS:CG	1:A:377:LYS:O	2.62	0.47
1:A:182:ARG:NH2	1:A:184:GLU:OE1	2.47	0.47
1:A:312:ASN:O	1:A:313:LEU:HB2	2.14	0.47
1:A:95:HIS:CG	1:A:116:ARG:HH11	2.32	0.47
1:A:330:LEU:HD12	1:A:356:TRP:HZ3	1.80	0.46
1:A:322:HIS:ND1	1:A:322:HIS:N	2.64	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:271:MET:CB	1:A:276:MET:HE1	2.45	0.45
1:A:197:VAL:HG22	1:A:197:VAL:O	2.16	0.45
1:A:123:HIS:CE1	1:A:125:GLU:HB3	2.50	0.45
1:A:271:MET:HB3	1:A:276:MET:HE1	1.99	0.44
1:A:288:LYS:HE3	1:A:291:GLU:HB2	1.99	0.44
1:A:335:ARG:HD2	2:A:507:HOH:O	2.17	0.44
1:A:126:GLU:HB3	1:A:128:ILE:HG12	1.99	0.44
1:A:95:HIS:O	1:A:115:GLY:HA2	2.18	0.43
1:A:173:PHE:HA	1:A:181:HIS:O	2.19	0.43
1:A:137:ARG:O	1:A:138:LEU:HB2	2.19	0.43
1:A:418:ARG:HD2	2:A:530:HOH:O	2.19	0.42
1:A:126:GLU:O	1:A:127:LYS:HB2	2.19	0.42
1:A:126:GLU:HG3	1:A:133:LEU:HD21	2.01	0.42
1:A:352:PRO:HG2	1:A:353:GLU:OE2	2.20	0.42
1:A:341:ARG:HB2	1:A:343:LEU:HG	2.03	0.41
1:A:123:HIS:HB3	1:A:126:GLU:HB2	2.03	0.41
1:A:108:SER:HB3	1:A:212:TRP:CD1	2.56	0.41
1:A:183:MET:HE2	1:A:194:LEU:HA	2.03	0.40
1:A:209:LEU:C	1:A:209:LEU:HD23	2.41	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	340/408 (83%)	329 (97%)	10 (3%)	1 (0%)	46 50

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	382	SER

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	287/340 (84%)	278 (97%)	9 (3%)	47 59

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	208	ARG
1	A	238	LEU
1	A	261	ASN
1	A	289	ASP
1	A	313	LEU
1	A	318	GLN
1	A	322	HIS
1	A	357	ASP
1	A	418	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	78	HIS
1	A	247	HIS
1	A	254	GLN
1	A	319	HIS

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 carbohydrates 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 [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, 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	344/408 (84%)	-0.14	8 (2%) 64 63	26, 37, 58, 76	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	289	ASP	4.8
1	A	290	THR	3.3
1	A	422	ARG	3.2
1	A	273	GLU	2.9
1	A	375	GLN	2.6
1	A	421	ALA	2.5
1	A	288	LYS	2.4
1	A	65	ARG	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 carbohydrates 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.