



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:36 AM UTC

PDB ID : 3AEV / pdb_00003aev
Title : Crystal structure of a/eIF2alpha-aDim2p-rRNA complex from *Pyrococcus horikoshii* OT3
Authors : Tanokura, M.; Jia, M.Z.; Nagata, K.
Deposited on : 2010-02-10
Resolution : 2.80 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
Xtrriage (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

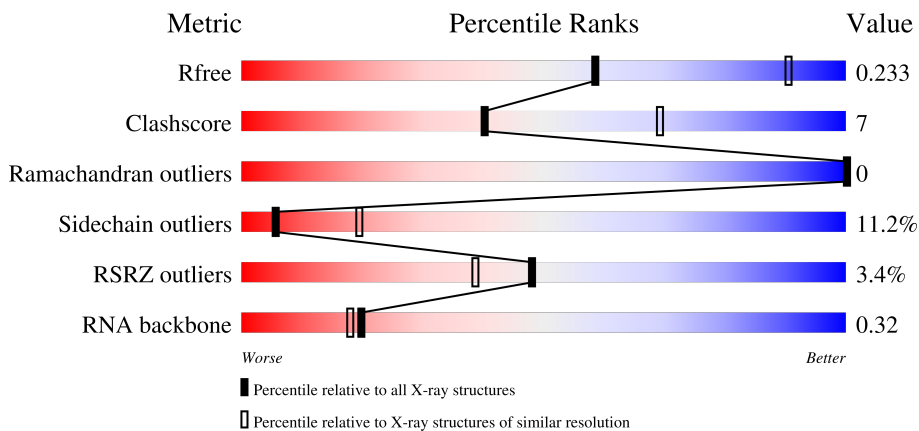
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)
RNA backbone	3983	1114 (3.00-2.60)

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	275	 4% 51% 9% 36%
2	B	219	 4% 61% 17% 18%
3	C	11	 64% 36%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3035 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 Translation initiation factor 2 subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	168	1383	889	239	254	1	0	0	0

- Molecule 2 is a protein called Putative uncharacterized protein PH1566.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	177	1425	906	255	263	1	0	0	0

- Molecule 3 is a RNA chain called RNA (5'-R(*GP*GP*AP*UP*CP*AP*CP*CP*UP*CP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	C	11	227	103	39	75	10	0	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	87.00Å 93.60Å 116.70Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 2.80 50.00 – 2.80	Depositor EDS
% Data completeness (in resolution range)	99.8 (50.00-2.80) 99.8 (50.00-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.99 (at 2.81Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.212 , 0.246 0.201 , 0.233	Depositor DCC
R_{free} test set	1227 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	70.5	Xtrriage
Anisotropy	0.089	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 34.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	3035	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.36% 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 [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	0.91	0/1415	1.02	0/1913
2	B	0.79	0/1445	0.97	2/1939 (0.1%)
3	C	1.00	1/252 (0.4%)	1.44	0/390
All	All	0.87	1/3112 (0.0%)	1.05	2/4242 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	11	C	C3'-O3'	6.37	1.51	1.42

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	122	ILE	CB-CA-C	-6.28	102.30	110.84
2	B	172	ILE	CB-CA-C	-5.63	102.25	110.81

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	1383	0	1374	19	0
2	B	1425	0	1492	21	0
3	C	227	0	121	2	0
All	All	3035	0	2987	40	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (40) 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)
2:B:149:ARG:HH11	2:B:152:GLN:HE22	1.10	0.96
2:B:42:LYS:HZ2	2:B:42:LYS:H	1.11	0.96
1:A:52:ARG:HG2	1:A:52:ARG:HH11	1.30	0.96
1:A:86:THR:H	1:A:89:GLN:HE21	1.22	0.86
2:B:111:ARG:HD3	2:B:117:GLU:OE1	1.80	0.82
1:A:86:THR:H	1:A:89:GLN:NE2	1.84	0.75
2:B:142:ARG:NH2	2:B:192:SER:O	2.21	0.74
1:A:53:ASN:HD22	1:A:54:ILE:N	1.86	0.73
1:A:52:ARG:HG2	1:A:52:ARG:NH1	2.02	0.70
2:B:149:ARG:NH1	2:B:152:GLN:HE22	1.89	0.69
2:B:174:ASN:HD22	2:B:174:ASN:C	2.03	0.66
2:B:136:LEU:HB3	2:B:137:PRO:HD3	1.76	0.65
2:B:149:ARG:HH11	2:B:152:GLN:NE2	1.90	0.64
2:B:42:LYS:H	2:B:42:LYS:NZ	1.93	0.63
1:A:163:LEU:O	1:A:167:VAL:HG13	1.98	0.62
1:A:53:ASN:ND2	1:A:55:ARG:H	2.00	0.59
1:A:86:THR:OG1	1:A:89:GLN:HG3	2.01	0.59
1:A:53:ASN:HD22	1:A:53:ASN:C	2.09	0.59
3:C:5:C:H2'	3:C:6:A:C8	2.41	0.56
2:B:51:LYS:HD3	3:C:9:U:H5''	1.90	0.54
2:B:174:ASN:ND2	2:B:177:GLN:H	2.06	0.53
2:B:127:ILE:O	2:B:128:ILE:C	2.52	0.53
2:B:174:ASN:C	2:B:174:ASN:ND2	2.68	0.51
2:B:56:LYS:HE3	2:B:60:GLU:OE1	2.10	0.51
2:B:146:ARG:HG3	2:B:147:LYS:HG3	1.93	0.50
1:A:114:LEU:HD13	1:A:162:VAL:HG11	1.94	0.49
1:A:102:LYS:HD3	2:B:91:TRP:CZ2	2.48	0.48
2:B:169:VAL:HG11	2:B:185:ILE:HG21	1.97	0.47
1:A:116:LYS:HD2	1:A:159:TRP:CZ2	2.50	0.46
1:A:86:THR:N	1:A:89:GLN:HE21	2.01	0.46
1:A:53:ASN:ND2	1:A:53:ASN:C	2.73	0.46
1:A:34:TYR:O	1:A:37:LYS:HB2	2.17	0.45
1:A:57:TYR:O	1:A:58:LEU:HD23	2.17	0.44
1:A:52:ARG:HH11	1:A:52:ARG:CG	2.13	0.43
2:B:136:LEU:HB3	2:B:137:PRO:CD	2.48	0.43
1:A:13:GLU:OE2	1:A:34:TYR:OH	2.33	0.42
2:B:28:TRP:CH2	2:B:81:THR:HA	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:88:LEU:HD13	2:B:88:LEU:HA	1.90	0.41
1:A:129:LEU:HD23	1:A:129:LEU:HA	1.78	0.41
2:B:106:PRO:O	2:B:107:GLU:C	2.64	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	166/275 (60%)	166 (100%)	0	0	100	100
2	B	173/219 (79%)	172 (99%)	1 (1%)	0	100	100
All	All	339/494 (69%)	338 (100%)	1 (0%)	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	143/235 (61%)	131 (92%)	12 (8%)	10	32
2	B	152/189 (80%)	131 (86%)	21 (14%)	3	12
All	All	295/424 (70%)	262 (89%)	33 (11%)	6	19

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

Mol	Chain	Res	Type
1	A	52	ARG
1	A	60	GLU
1	A	63	LYS
1	A	64	VAL
1	A	74	ARG
1	A	94	LEU
1	A	106	LEU
1	A	145	LYS
1	A	162	VAL
1	A	167	VAL
1	A	171	VAL
1	A	173	VAL
2	B	27	GLU
2	B	42	LYS
2	B	51	LYS
2	B	58	GLU
2	B	61	LYS
2	B	62	ARG
2	B	64	LYS
2	B	72	GLU
2	B	82	LYS
2	B	88	LEU
2	B	111	ARG
2	B	115	GLU
2	B	123	ASN
2	B	125	THR
2	B	146	ARG
2	B	174	ASN
2	B	179	GLU
2	B	201	LEU
2	B	202	GLU
2	B	203	ARG
2	B	208	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	23	HIS
1	A	24	ASN
1	A	53	ASN
1	A	88	GLN
1	A	89	GLN
1	A	95	GLN

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Mol	Chain	Res	Type
2	B	34	GLN
2	B	114	ASN
2	B	152	GLN
2	B	174	ASN
2	B	194	HIS

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
3	C	10/11 (90%)	0	0

There are no RNA backbone outliers to report.

There are no RNA pucker outliers to report.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

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	168/275 (61%)	-0.36	3 (1%) 67 58	13, 23, 36, 44	0
2	B	177/219 (80%)	0.21	9 (5%) 33 25	11, 31, 48, 51	0
3	C	11/11 (100%)	-0.46	0 100 100	13, 29, 57, 62	0
All	All	356/505 (70%)	-0.08	12 (3%) 48 39	11, 26, 47, 62	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	135	ALA	7.0
2	B	208	LEU	6.9
2	B	128	ILE	3.7
1	A	12	GLY	3.4
1	A	113	LYS	3.1
2	B	205	LYS	2.9
1	A	7	GLU	2.6
2	B	204	ARG	2.6
2	B	28	TRP	2.5
2	B	82	LYS	2.5
2	B	62	ARG	2.2
2	B	127	ILE	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

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.