



wwPDB EM Map/Model Validation Report ⓘ

Apr 10, 2016 – 01:40 PM BST

PDB ID : 3IZY
EMDB ID: : EMD-1855
Title : Mammalian mitochondrial translation initiation factor 2
Authors : Yassin, A.S.; Haque, E.; Datta, P.P.; Elmore, K.; Banavali, N.K.; Spremulli, L.L.; Agrawal, R.K.
Deposited on : 2011-01-19
Resolution : 10.80 Å(reported)

This is a wwPDB EM Map/Model Validation Report for a publicly released PDB/EMDB entry.
For rigid body fitted models, validation errors reported here could stem from errors in the original structure(s) used in the fitting.
We welcome your comments at validation@mail.wwpdb.org
A user guide is available at
<http://wwpdb.org/validation/2016/EMValidationReportHelp>

MolProbity : 4.02b-467
Mogul : unknown
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : trunk27241

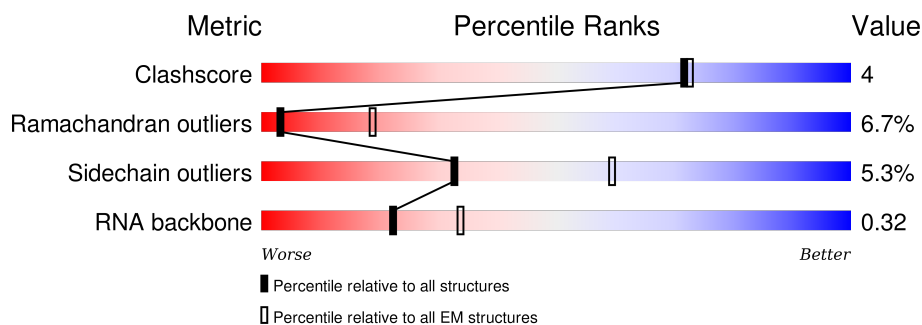
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 10.80 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)	EM structures (#Entries)
Clashscore	114402	924
Ramachandran outliers	111179	726
Sidechain outliers	111093	686
RNA backbone	3027	244

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	N	76	 55% 34% 9%
2	P	537	 80% 17%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5802 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 RNA chain called tRNA-Phe.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	N	76	Total	C	N	O	P	0	0
			1622	725	293	529	75		

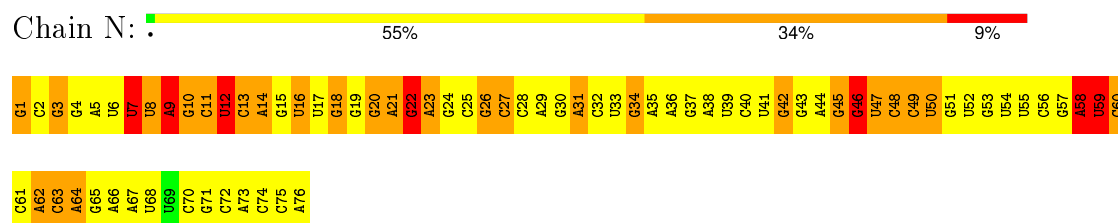
- Molecule 2 is a protein called Translation initiation factor IF-2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	P	537	Total	C	N	O	S	0	0
			4180	2631	732	799	18		

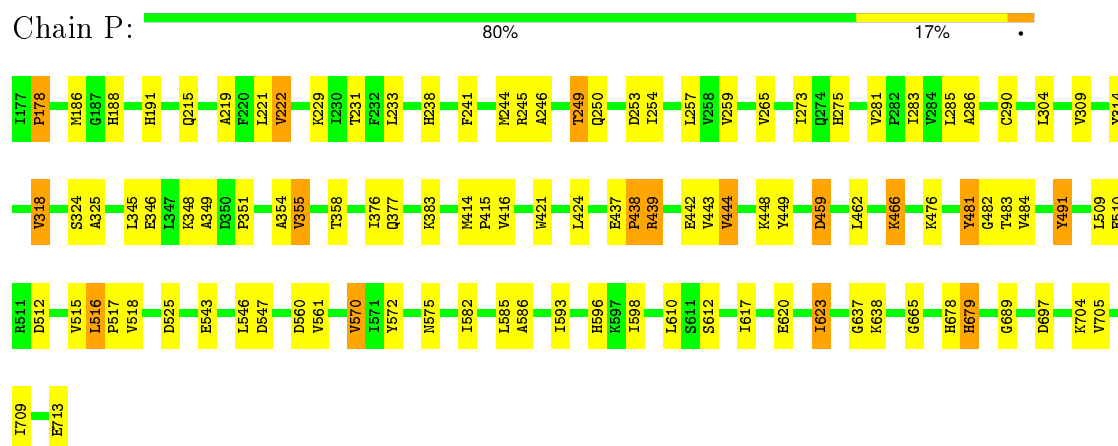
3 Residue-property plots

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. 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. 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: tRNA-Phe



- Molecule 2: Translation initiation factor IF-2, mitochondrial



4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	Depositor
Number of images	121742	Depositor
Resolution determination method	Not provided	Depositor
CTF correction method	Every Micrograph	Depositor
Microscope	Tecnai F20	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	Not provided	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	50000	Depositor
Image detector	Kodak S0163	Depositor

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 > 2$	RMSZ	# $ Z > 2$
1	N	1.61	9/1814 (0.5%)	2.50	198/2827 (7.0%)
2	P	0.96	2/4247 (0.0%)	1.17	12/5726 (0.2%)
All	All	1.20	11/6061 (0.2%)	1.73	210/8553 (2.5%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	N	0	11
2	P	0	5
All	All	0	16

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	P	713	GLU	C-OXT	-12.08	1.00	1.23
2	P	713	GLU	C-O	-12.05	1.00	1.23
1	N	14	A	N7-C5	-6.04	1.35	1.39
1	N	44	A	N7-C5	-5.82	1.35	1.39
1	N	31	A	N7-C5	-5.78	1.35	1.39
1	N	58	A	N7-C5	-5.53	1.35	1.39
1	N	64	A	N7-C5	-5.36	1.36	1.39
1	N	62	A	N7-C5	-5.19	1.36	1.39
1	N	26	G	N7-C5	-5.09	1.36	1.39
1	N	9	A	C2'-C1'	-5.08	1.47	1.53
1	N	36	A	N7-C5	-5.01	1.36	1.39

All (210) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	N	23	A	N1-C6-N6	14.70	127.42	118.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	N	44	A	N1-C6-N6	14.27	127.16	118.60
1	N	31	A	N1-C6-N6	14.10	127.06	118.60
1	N	62	A	N1-C6-N6	13.97	126.98	118.60
1	N	29	A	N1-C6-N6	13.73	126.84	118.60
1	N	64	A	N1-C6-N6	13.53	126.72	118.60
1	N	5	A	N1-C6-N6	12.76	126.25	118.60
1	N	14	A	N1-C6-N6	12.17	125.90	118.60
1	N	58	A	N1-C6-N6	11.92	125.75	118.60
1	N	26	G	N1-C6-O6	11.85	127.01	119.90
1	N	21	A	N1-C6-N6	11.85	125.71	118.60
1	N	67	A	N1-C6-N6	11.83	125.70	118.60
1	N	9	A	N1-C6-N6	11.78	125.67	118.60
1	N	66	A	N1-C6-N6	11.77	125.67	118.60
1	N	35	A	N1-C6-N6	11.68	125.61	118.60
1	N	36	A	N1-C6-N6	11.63	125.58	118.60
1	N	76	A	N1-C6-N6	11.55	125.53	118.60
1	N	73	A	N1-C6-N6	11.27	125.36	118.60
1	N	38	A	N1-C6-N6	11.12	125.27	118.60
1	N	22	G	N1-C6-O6	11.06	126.54	119.90
1	N	51	G	N1-C6-O6	10.97	126.48	119.90
1	N	30	G	N1-C6-O6	10.05	125.93	119.90
1	N	18	G	N1-C6-O6	9.90	125.84	119.90
1	N	22	G	C5-C6-O6	-9.80	122.72	128.60
1	N	55	U	O4'-C1'-N1	9.62	115.90	108.20
1	N	42	G	N1-C6-O6	9.42	125.55	119.90
1	N	26	G	C5-C6-O6	-9.25	123.05	128.60
1	N	4	G	N1-C6-O6	9.14	125.39	119.90
1	N	19	G	N1-C6-O6	9.13	125.38	119.90
1	N	3	G	N1-C6-O6	9.05	125.33	119.90
1	N	37	G	N1-C6-O6	9.01	125.30	119.90
1	N	34	G	N1-C6-O6	8.98	125.29	119.90
1	N	51	G	C5-C6-O6	-8.89	123.27	128.60
1	N	57	G	N1-C6-O6	8.89	125.23	119.90
1	N	45	G	N1-C6-O6	8.85	125.21	119.90
1	N	24	G	N1-C6-O6	8.81	125.19	119.90
1	N	43	G	N1-C6-O6	8.78	125.17	119.90
1	N	10	G	N1-C6-O6	8.72	125.13	119.90
1	N	20	G	N1-C6-O6	8.40	124.94	119.90
1	N	65	G	N1-C6-O6	8.40	124.94	119.90
1	N	47	U	O4'-C1'-N1	8.34	114.88	108.20
1	N	30	G	C5-C6-O6	-8.22	123.67	128.60
2	P	491	TYR	CB-CG-CD2	-8.10	116.14	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	P	244	MET	CG-SD-CE	-8.02	87.36	100.20
1	N	71	G	N1-C6-O6	7.98	124.69	119.90
1	N	59	U	O4'-C1'-N1	7.95	114.56	108.20
1	N	23	A	C5-C6-N6	-7.90	117.38	123.70
1	N	75	C	O4'-C1'-N1	7.76	114.41	108.20
1	N	11	C	O4'-C1'-N1	7.63	114.30	108.20
1	N	42	G	C5-C6-O6	-7.62	124.03	128.60
1	N	10	G	C5-C6-O6	-7.61	124.04	128.60
1	N	18	G	C5-C6-O6	-7.61	124.03	128.60
1	N	25	C	O4'-C1'-N1	7.60	114.28	108.20
1	N	6	U	O4'-C1'-N1	7.58	114.27	108.20
1	N	2	C	O4'-C1'-N1	7.53	114.22	108.20
1	N	1	G	N1-C6-O6	7.51	124.41	119.90
1	N	46	G	N1-C6-O6	7.46	124.37	119.90
1	N	19	G	C5-C6-O6	-7.33	124.20	128.60
2	P	481	TYR	CB-CG-CD2	-7.30	116.62	121.00
1	N	9	A	O4'-C1'-N9	7.29	114.03	108.20
1	N	24	G	C5-C6-O6	-7.23	124.26	128.60
1	N	29	A	C5-C6-N6	-7.20	117.94	123.70
1	N	46	G	P-O3'-C3'	7.09	128.21	119.70
1	N	37	G	C5-C6-O6	-7.07	124.36	128.60
1	N	34	G	C5-C6-O6	-7.06	124.36	128.60
1	N	44	A	C5-C6-N6	-7.04	118.06	123.70
1	N	4	G	C5-C6-O6	-6.99	124.41	128.60
1	N	3	G	C5-C6-O6	-6.96	124.42	128.60
1	N	12	U	O4'-C1'-N1	6.96	113.77	108.20
1	N	57	G	C5-C6-O6	-6.96	124.42	128.60
1	N	60	C	N3-C4-N4	6.95	122.86	118.00
1	N	64	A	C4-C5-C6	6.94	120.47	117.00
1	N	74	C	O4'-C1'-N1	6.90	113.72	108.20
1	N	62	A	C5-C6-N6	-6.86	118.21	123.70
1	N	23	A	O4'-C1'-N9	6.84	113.67	108.20
1	N	43	G	C5-C6-O6	-6.83	124.50	128.60
1	N	14	A	C4-C5-C6	6.83	120.41	117.00
1	N	31	A	C5-C6-N6	-6.82	118.25	123.70
1	N	31	A	C4-C5-C6	6.81	120.41	117.00
1	N	16	U	O4'-C1'-N1	6.78	113.62	108.20
1	N	7	U	O4'-C1'-N1	6.74	113.59	108.20
1	N	29	A	C4-C5-C6	6.72	120.36	117.00
1	N	40	C	O4'-C1'-N1	6.71	113.57	108.20
1	N	64	A	C5-C6-N6	-6.69	118.35	123.70
1	N	20	G	O4'-C1'-N9	6.68	113.55	108.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	N	53	G	N1-C6-O6	6.67	123.91	119.90
1	N	65	G	C5-C6-O6	-6.65	124.61	128.60
2	P	491	TYR	CB-CG-CD1	6.63	124.98	121.00
1	N	61	C	O4'-C1'-N1	6.62	113.49	108.20
1	N	28	C	O4'-C1'-N1	6.60	113.48	108.20
1	N	72	C	O4'-C1'-N1	6.60	113.48	108.20
1	N	52	U	O4'-C1'-N1	6.59	113.47	108.20
1	N	44	A	C4-C5-C6	6.58	120.29	117.00
1	N	13	C	O4'-C1'-N1	6.57	113.45	108.20
1	N	62	A	C4-C5-C6	6.50	120.25	117.00
1	N	61	C	N3-C4-N4	6.46	122.53	118.00
1	N	27	C	O4'-C1'-N1	6.46	113.37	108.20
1	N	13	C	N3-C4-C5	-6.46	119.32	121.90
1	N	20	G	C5-C6-O6	-6.45	124.73	128.60
1	N	3	G	O4'-C1'-N9	6.44	113.35	108.20
1	N	55	U	C2-N1-C1'	6.42	125.41	117.70
1	N	73	A	C4-C5-C6	6.42	120.21	117.00
1	N	41	U	O4'-C1'-N1	6.40	113.32	108.20
1	N	72	C	N3-C4-N4	6.39	122.47	118.00
1	N	45	G	C5-C6-O6	-6.38	124.77	128.60
1	N	5	A	C4-C5-C6	6.33	120.17	117.00
1	N	36	A	C4-C5-C6	6.32	120.16	117.00
1	N	70	C	O4'-C1'-N1	6.32	113.25	108.20
1	N	5	A	O4'-C1'-N9	6.31	113.25	108.20
1	N	32	C	O4'-C1'-N1	6.29	113.23	108.20
1	N	58	A	C4-C5-C6	6.28	120.14	117.00
1	N	31	A	C5-C6-N1	-6.26	114.57	117.70
1	N	35	A	C4-C5-C6	6.24	120.12	117.00
2	P	481	TYR	CB-CG-CD1	6.24	124.74	121.00
1	N	5	A	C5-C6-N6	-6.21	118.73	123.70
1	N	21	A	C4-C5-C6	6.18	120.09	117.00
1	N	74	C	N3-C4-N4	6.18	122.33	118.00
1	N	18	G	O4'-C1'-N9	6.15	113.12	108.20
1	N	43	G	O4'-C1'-N9	6.15	113.12	108.20
1	N	71	G	C5-C6-O6	-6.14	124.91	128.60
1	N	32	C	N3-C4-C5	-6.13	119.45	121.90
1	N	9	A	P-O5'-C5'	-6.12	111.10	120.90
1	N	51	G	O4'-C1'-N9	6.12	113.09	108.20
1	N	56	C	O4'-C1'-N1	6.11	113.08	108.20
1	N	13	C	N3-C4-N4	6.08	122.26	118.00
1	N	50	U	O4'-C1'-N1	6.07	113.05	108.20
1	N	58	A	C5-C6-N1	-6.04	114.68	117.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	N	63	C	N3-C4-N4	6.04	122.23	118.00
1	N	67	A	C4-C5-C6	6.01	120.00	117.00
1	N	9	A	C4-C5-C6	6.00	120.00	117.00
1	N	1	G	C5-C6-O6	-6.00	125.00	128.60
1	N	44	A	C5-C6-N1	-5.96	114.72	117.70
1	N	35	A	O4'-C1'-N9	5.96	112.97	108.20
1	N	22	G	O4'-C1'-N9	5.94	112.95	108.20
1	N	70	C	N3-C4-N4	5.91	122.14	118.00
1	N	27	C	N3-C4-N4	5.90	122.13	118.00
1	N	33	U	O4'-C1'-N1	5.90	112.92	108.20
1	N	66	A	C4-C5-C6	5.89	119.95	117.00
1	N	62	A	C5-C6-N1	-5.86	114.77	117.70
1	N	14	A	C5-C6-N6	-5.84	119.03	123.70
2	P	572	TYR	CB-CG-CD1	-5.78	117.53	121.00
1	N	71	G	O4'-C1'-N9	5.78	112.83	108.20
1	N	76	A	C4-C5-C6	5.76	119.88	117.00
1	N	38	A	C4-C5-C6	5.71	119.85	117.00
1	N	67	A	C5-C6-N6	-5.70	119.14	123.70
1	N	15	G	N1-C6-O6	5.69	123.32	119.90
1	N	49	C	N3-C4-C5	-5.69	119.62	121.90
1	N	21	A	C5-C6-N6	-5.68	119.16	123.70
1	N	60	C	N3-C4-C5	-5.66	119.64	121.90
1	N	15	G	O4'-C1'-N9	5.65	112.72	108.20
1	N	48	C	N3-C4-C5	-5.64	119.64	121.90
1	N	49	C	N3-C4-N4	5.64	121.95	118.00
1	N	49	C	P-O3'-C3'	5.63	126.46	119.70
1	N	46	G	C5-C6-O6	-5.62	125.23	128.60
1	N	22	G	P-O3'-C3'	-5.60	112.98	119.70
1	N	9	A	C5-C6-N6	-5.59	119.22	123.70
1	N	66	A	O4'-C1'-N9	5.59	112.67	108.20
1	N	36	A	C5-C6-N1	-5.58	114.91	117.70
2	P	286	ALA	N-CA-CB	5.56	117.89	110.10
1	N	65	G	O4'-C1'-N9	5.56	112.65	108.20
2	P	709	ILE	N-CA-C	-5.56	95.99	111.00
1	N	23	A	C4-C5-C6	5.55	119.78	117.00
1	N	64	A	C5-C6-N1	-5.54	114.93	117.70
1	N	24	G	O4'-C1'-N9	5.54	112.63	108.20
1	N	54	U	O4'-C1'-N1	5.53	112.63	108.20
1	N	53	G	O4'-C1'-N9	5.50	112.60	108.20
1	N	66	A	C5-C6-N6	-5.49	119.31	123.70
1	N	76	A	O4'-C1'-N9	5.47	112.58	108.20
1	N	75	C	N3-C4-N4	5.46	121.82	118.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	N	76	A	C5-C6-N6	-5.45	119.34	123.70
1	N	73	A	C5-C6-N1	-5.44	114.98	117.70
1	N	61	C	N3-C4-C5	-5.43	119.73	121.90
1	N	35	A	C5-C6-N6	-5.42	119.36	123.70
1	N	5	A	C5-C6-N1	-5.40	115.00	117.70
1	N	16	U	P-O3'-C3'	5.39	126.16	119.70
1	N	38	A	O4'-C1'-N9	5.38	112.50	108.20
1	N	10	G	O4'-C1'-N9	5.38	112.50	108.20
1	N	63	C	N3-C4-C5	-5.38	119.75	121.90
1	N	28	C	N3-C4-C5	-5.37	119.75	121.90
1	N	56	C	N3-C4-C5	-5.36	119.76	121.90
1	N	75	C	N3-C4-C5	-5.34	119.76	121.90
1	N	66	A	C5-C6-N1	-5.34	115.03	117.70
1	N	35	A	C5-C6-N1	-5.34	115.03	117.70
1	N	14	A	C5-C6-N1	-5.32	115.04	117.70
1	N	55	U	C6-N1-C1'	-5.31	113.77	121.20
2	P	572	TYR	CB-CG-CD2	5.31	124.18	121.00
2	P	713	GLU	CA-C-O	-5.28	109.01	120.10
1	N	28	C	N3-C4-N4	5.26	121.68	118.00
1	N	36	A	C5-C6-N6	-5.25	119.50	123.70
1	N	76	A	C5-C6-N1	-5.24	115.08	117.70
1	N	21	A	C5-C6-N1	-5.20	115.10	117.70
1	N	9	A	C5-C6-N1	-5.19	115.10	117.70
1	N	48	C	N3-C4-N4	5.19	121.63	118.00
1	N	2	C	N3-C4-C5	-5.17	119.83	121.90
1	N	30	G	O4'-C1'-N9	5.17	112.34	108.20
1	N	58	A	C5-C6-N6	-5.17	119.56	123.70
1	N	11	C	N3-C4-C5	-5.15	119.84	121.90
1	N	38	A	C5-C6-N6	-5.14	119.59	123.70
1	N	38	A	C5-C6-N1	-5.12	115.14	117.70
1	N	67	A	C5-C6-N1	-5.11	115.14	117.70
2	P	249	THR	N-CA-CB	5.11	120.01	110.30
1	N	42	G	O4'-C1'-N9	5.10	112.28	108.20
1	N	29	A	O4'-C1'-N9	5.09	112.27	108.20
1	N	74	C	N3-C4-C5	-5.08	119.87	121.90
1	N	73	A	C5-C6-N6	-5.07	119.65	123.70
1	N	72	C	N3-C4-C5	-5.06	119.88	121.90
1	N	23	A	C5-C6-N1	-5.03	115.18	117.70
2	P	186	MET	CG-SD-CE	-5.02	92.17	100.20
1	N	70	C	N3-C4-C5	-5.01	119.89	121.90
1	N	34	G	O4'-C1'-N9	5.00	112.20	108.20

There are no chirality outliers.

All (16) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	N	10	G	Sidechain
1	N	12	U	Sidechain
1	N	22	G	Sidechain
1	N	23	A	Sidechain
1	N	31	A	Sidechain
1	N	42	G	Sidechain
1	N	45	G	Sidechain
1	N	58	A	Sidechain
1	N	59	U	Sidechain
1	N	7	U	Sidechain
1	N	8	U	Sidechain
2	P	245	ARG	Sidechain
2	P	414	MET	Peptide
2	P	424	LEU	Peptide
2	P	449	TYR	Sidechain
2	P	481	TYR	Sidechain

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	N	1622	0	821	21	0
2	P	4180	0	4249	40	0
All	All	5802	0	5070	47	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 4.

All (47) 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:N:1:G:C5'	2:P:637:GLY:HA2	1.46	1.46
1:N:1:G:H5'	2:P:637:GLY:CA	1.44	1.45
1:N:1:G:C4'	2:P:637:GLY:HA2	1.45	1.43
1:N:1:G:C4'	2:P:637:GLY:CA	2.41	0.97

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:N:1:G:C5'	2:P:637:GLY:CA	2.19	0.93
1:N:1:G:H5'	2:P:637:GLY:HA3	1.53	0.90
1:N:1:G:H4'	2:P:637:GLY:HA2	1.57	0.86
1:N:1:G:O4'	2:P:637:GLY:HA2	1.75	0.85
1:N:1:G:H5'	2:P:637:GLY:C	1.96	0.84
1:N:68:U:OP1	2:P:638:LYS:HA	1.81	0.81
1:N:13:C:H42	1:N:46:G:H21	1.43	0.67
1:N:1:G:O4'	2:P:637:GLY:CA	2.46	0.64
1:N:1:G:H5'	2:P:637:GLY:O	2.00	0.62
2:P:304:LEU:H	2:P:304:LEU:HD22	1.69	0.57
2:P:575:ASN:HD22	2:P:596:HIS:CD2	2.24	0.55
2:P:246:ALA:HB1	2:P:377:GLN:HE22	1.70	0.55
1:N:1:G:C5'	2:P:637:GLY:O	2.55	0.54
2:P:518:VAL:HG12	2:P:570:VAL:H	1.74	0.53
2:P:257:LEU:HD13	2:P:273:ILE:HG12	1.93	0.51
2:P:241:PHE:HB2	2:P:275:HIS:CD2	2.46	0.50
2:P:354:ALA:HB2	2:P:444:VAL:H	1.78	0.48
1:N:11:C:C4	1:N:12:U:C5	3.03	0.47
2:P:355:VAL:HG22	2:P:376:ILE:HG23	1.97	0.47
1:N:11:C:C5	1:N:12:U:C5	3.04	0.46
2:P:191:HIS:CE1	2:P:259:VAL:HA	2.51	0.46
1:N:8:U:H2'	1:N:14:A:H62	1.80	0.46
2:P:561:VAL:HG11	2:P:586:ALA:HB2	1.98	0.46
2:P:222:VAL:HG13	2:P:231:THR:H	1.81	0.45
2:P:678:HIS:CG	2:P:679:HIS:H	2.35	0.45
2:P:283:ILE:HB	2:P:318:VAL:HA	1.98	0.44
2:P:221:LEU:HD11	2:P:233:LEU:HD23	2.00	0.43
2:P:257:LEU:HD11	2:P:283:ILE:HG21	1.99	0.43
1:N:9:A:OP2	1:N:12:U:C5	2.72	0.43
2:P:285:LEU:HD11	2:P:309:VAL:HB	2.01	0.42
2:P:253:ASP:HA	2:P:345:LEU:HD23	2.02	0.42
2:P:516:LEU:H	2:P:517:PRO:CD	2.33	0.42
2:P:178:PRO:HA	2:P:349:ALA:HB3	2.02	0.41
2:P:250:GLN:HG3	2:P:281:VAL:HG21	2.02	0.41
1:N:1:G:C5'	2:P:637:GLY:C	2.72	0.41
1:N:11:C:C4	1:N:12:U:C4	3.09	0.41
2:P:358:THR:HA	2:P:439:ARG:HA	2.02	0.41
2:P:290:CYS:H	2:P:324:SER:HA	1.84	0.41
2:P:275:HIS:CE1	2:P:459:ASP:O	2.74	0.41
2:P:462:LEU:HA	2:P:462:LEU:HD23	1.97	0.41
1:N:63:C:H2'	1:N:64:A:C8	2.55	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:P:466:LYS:HE3	2:P:547:ASP:H	1.86	0.40
2:P:188:HIS:HA	2:P:238:HIS:CD2	2.57	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 PDB entries followed by that with respect to all EM entries.

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	
2	P	535/537 (100%)	440 (82%)	59 (11%)	36 (7%)	1	24

All (36) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	P	219	ALA
2	P	229	LYS
2	P	249	THR
2	P	265	VAL
2	P	437	GLU
2	P	459	ASP
2	P	483	THR
2	P	484	VAL
2	P	346	GLU
2	P	348	LYS
2	P	476	LYS
2	P	516	LEU
2	P	610	LEU
2	P	612	SER
2	P	617	ILE
2	P	623	ILE
2	P	697	ASP
2	P	705	VAL
2	P	314	TYR

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Mol	Chain	Res	Type
2	P	325	ALA
2	P	351	PRO
2	P	383	LYS
2	P	438	PRO
2	P	448	LYS
2	P	482	GLY
2	P	665	GLY
2	P	689	GLY
2	P	178	PRO
2	P	442	GLU
2	P	512	ASP
2	P	543	GLU
2	P	598	ILE
2	P	679	HIS
2	P	444	VAL
2	P	704	LYS
2	P	515	VAL

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 PDB entries followed by that with respect to all EM entries.

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
2	P	453/453 (100%)	429 (95%)	24 (5%)	28 64

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	P	215	GLN
2	P	222	VAL
2	P	254	ILE
2	P	318	VAL
2	P	355	VAL
2	P	415	PRO
2	P	416	VAL
2	P	421	TRP
2	P	438	PRO

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Mol	Chain	Res	Type
2	P	439	ARG
2	P	443	VAL
2	P	466	LYS
2	P	491	TYR
2	P	509	LEU
2	P	510	GLU
2	P	525	ASP
2	P	546	LEU
2	P	560	ASP
2	P	570	VAL
2	P	582	ILE
2	P	585	LEU
2	P	593	ILE
2	P	620	GLU
2	P	623	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
2	P	216	HIS
2	P	238	HIS
2	P	275	HIS
2	P	377	GLN
2	P	575	ASN
2	P	679	HIS

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	N	75/76 (98%)	19 (25%)	4 (5%)

All (19) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	N	3	G
1	N	7	U
1	N	9	A
1	N	16	U
1	N	17	U
1	N	18	G

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Mol	Chain	Res	Type
1	N	20	G
1	N	21	A
1	N	22	G
1	N	26	G
1	N	27	C
1	N	34	G
1	N	39	U
1	N	47	U
1	N	48	C
1	N	49	C
1	N	50	U
1	N	59	U
1	N	62	A

All (4) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	N	16	U
1	N	46	G
1	N	58	A
1	N	60	C

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 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 ⓘ

There are no chain breaks in this entry.