

# Integrative Structure Validation Report

July 22, 2024 - 04:16 PM PDT

The following software was used in the production of this report:

*Python-IHM Version 1.3*

*MolProbity Version 4.5.2*

*Integrative Modeling Validation Version 1.2*

PDB ID	9A0W
PDB-Dev ID	PDBDEV_00000068
Structure Title	Plasmid replication initiator protein TrfA complexed with double stranded DNA
Structure Authors	Wegrzyn K; Zabrocka E; Bury K; Tomiczek B; Wieczor M; Czub J; Uciechowska U; Moreno-del Alamo M; Walkow U; Grochowina I; Dutkiewicz R; Bujnicki JM; Giraldo R; Konieczny I

*This is a PDB-Dev IM Structure Validation Report for a publicly released PDB-Dev entry.*

*We welcome your comments at [pdb-dev@mail.wwpdb.org](mailto:pdb-dev@mail.wwpdb.org)*

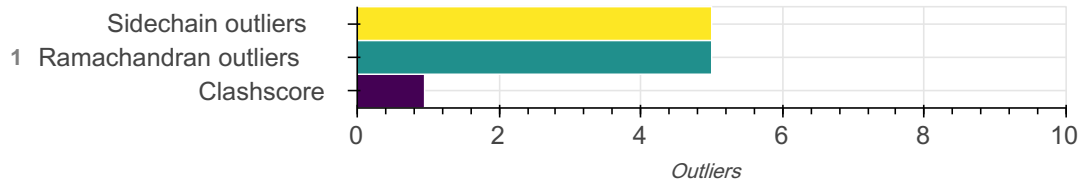
*A user guide is available at [https://pdb-dev.wwpdb.org/validation\\_help.html](https://pdb-dev.wwpdb.org/validation_help.html) with specific help available everywhere you see the  symbol.*

*List of references used to build this report is available [here](#).*

## Overall quality

*This validation report contains model quality assessments for all structures, data quality assessment for SAS datasets and fit to model assessments for SAS datasets. Data quality and fit to model assessments for other datasets and model uncertainty are under development. Number of plots is limited to 256.*

Model Quality: MolProbity Analysis



## Ensemble information ?

This entry consists of 0 distinct ensemble(s).

## Summary ?

This entry consists of 1 unique models, with 3 subunits in each model. A total of 5 datasets or restraints were used to build this entry. Each model is represented by 0 rigid bodies and 5 flexible or non-rigid units.

## Entry composition ?

There is 1 unique type of models in this entry. This model is titled None/Best scoring model.

Model ID	Subunit number	Subunit ID	Subunit name	Chain ID	Chain ID [auth]	Total residues
1	1	1	TrfA33	A	A	285
1	2	2	DNA (26-MER)	B	B	26
1	3	3	DNA (26-MER)	C	C	26

## Datasets used for modeling ?

There are 5 unique datasets used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	Crosslinking-MS data	PRIDE	PXD013286
2	De Novo model	Not available	Not available
3	Comparative model	File	10.1002/pro.68

ID	Dataset type	Database name	Data access code
4	Comparative model	File	10.1002/pro.68
5	Comparative model	File	10.1002/pro.68

### Representation ?

*This entry has only one representation and includes 0 rigid bodies and 5 flexible units*

Chain ID	Rigid bodies	Non-rigid segments
A	-	1-92, 93-99, 100-285
B	-	1-26
C	-	1-26

### Methodology and software ?

*This entry is a result of 1 distinct protocol(s).*

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
1	1	Rosetta ab initio modeling	None	None	None	False	False
2	1	Modeller modeling using crosslinks	None	None	None	False	False

*There are 6 software packages reported in this entry.*

ID	Software name	Software version	Software classification	Software location
1	<a href="https://www.rosettacommons.org/">Rosetta</a>	Not available	model building	<a href="https://www.rosettacommons.org/">https://www.rosettacommons.org/</a>
2	<a href="https://salilab.org/modeller/">Modeller</a>	Not available	homology modeling	<a href="https://salilab.org/modeller/">https://salilab.org/modeller/</a>
3	<a href="http://www.gromacs.org">Gromacs</a>	Not available	model building	<a href="http://www.gromacs.org">http://www.gromacs.org</a>
4	<a href="https://www.prosess.ca">PROSESS</a>	Not available	model evaluation	<a href="https://www.prosess.ca">https://www.prosess.ca</a>

ID	Software name	Software version	Software classification	Software location
5	<a href="#">Molprobity</a>	Not available	model evaluation	<a href="http://molprobity.biochem.duke.edu">http://molprobity.biochem.duke.edu</a>
6	<a href="#">mCSM</a>	Not available	data analysis	<a href="http://biosig.unimelb.edu.au/mcsm/">http://biosig.unimelb.edu.au/mcsm/</a>

## Data quality

### Crosslinking-MS

Validation for this section is under development.

## Model quality

For models with atomic structures, molprobity analysis is performed. For models with coarse-grained or multi-scale structures, excluded volume analysis is performed.

### Standard geometry: bond outliers

There are 2930 bond outliers in this entry. A summary is provided below, and a detailed list of outliers can be found [here](#).

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
CA--HA	1.09	0.97	272
CD--HD3	1.09	0.97	56
OG1--HG1	0.96	0.84	21
C2'--H2'	1.09	0.97	52
C2'--H2''	1.09	0.97	52
CD--HD2	1.09	0.97	56
CG2--HG22	1.09	0.97	50
C5'--H5''	1.09	0.97	52
NZ--HZ3	1.01	0.89	24
CE--HE2	1.09	0.97	31
CG--HG3	1.09	0.97	97

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
CD2--HD21	1.09	0.97	27
CB--HB3	1.09	0.97	222
OG--HG	0.96	0.84	15
CG2--HG23	1.09	0.97	50
CG--HG2	1.09	0.97	97
NZ--HZ2	1.01	0.89	24
C5'--H5'	1.09	0.97	52
CG2--HG21	1.09	0.97	50
CB--HB2	1.09	0.97	222
CG1--HG12	1.09	0.97	29
CD1--HD12	1.09	0.97	38
CD2--HD22	1.09	0.97	27
C7--H73	1.09	0.97	12
CB--HB1	1.09	0.97	19
CB--HB	1.09	0.97	50
C3'--H3'	1.09	0.97	52
CG--HG	1.09	0.97	27
CG1--HG13	1.09	0.97	29
CD1--HD13	1.09	0.97	38
CG1--HG11	1.09	0.97	18
CA--HA2	1.09	0.97	13
CD2--HD23	1.09	0.97	27
NZ--HZ1	1.01	0.89	24

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
C1'--H1'	1.09	0.97	52
C4'--H4'	1.09	0.97	52
C7--H71	1.09	0.97	12
CD1--HD11	1.09	0.97	38
CA--HA3	1.09	0.97	13
CE--HE3	1.09	0.97	31
OH--HH	0.96	0.84	9
CE--HE1	1.09	0.97	7
O5'--HO5'	0.96	0.84	2
C7--H72	1.09	0.97	12
N--H1	1.01	0.89	1
N--H3	1.01	0.89	1
N--H2	1.01	0.89	1
O3'--HO3'	0.96	0.84	2
SG--HG	1.33	1.20	3
SG--HG	1.34	1.20	3
NE--HE	1.01	0.86	23
N--H	1.01	0.86	275
C2--H2	1.08	0.93	12
N4--H41	1.01	0.86	14
CD1--HD1	1.08	0.93	27
CZ--HZ	1.08	0.93	12
N4--H42	1.01	0.86	14

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
N2--H22	1.01	0.86	14
NE2--HE21	1.01	0.86	12
NH1--HH12	1.01	0.86	23
N1--H1	1.01	0.86	14
N6--H62	1.01	0.86	12
NH2--HH21	1.01	0.86	23
CD2--HD2	1.08	0.93	29
C6--H6	1.08	0.93	26
C5--H5	1.08	0.93	14
N6--H61	1.01	0.86	12
CH2--HH2	1.08	0.93	6
NH2--HH22	1.01	0.86	23
NH1--HH11	1.01	0.86	23
CE1--HE1	1.08	0.93	29
CE3--HE3	1.08	0.93	6
CE2--HE2	1.08	0.93	21
C8--H8	1.08	0.93	26
ND2--HD21	1.01	0.86	6
N2--H21	1.01	0.86	14
NE1--HE1	1.01	0.86	6
N3--H3	1.01	0.86	12
NE2--HE22	1.01	0.86	12
CZ2--HZ2	1.08	0.93	6

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
ND2--HD22	1.01	0.86	6
NE2--HE2	1.01	0.86	8
CZ3--HZ3	1.08	0.93	6

### Standard geometry: angle outliers

There are 562 angle outliers in this entry. A summary is provided below, and a detailed list of outliers can be found [here](#).

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CA-CB-CG	112.60	123.00	1
N-CA-CB	103.00	113.46	1
CB-CG-CD2	131.20	119.09	1
CA-CB-CG	112.60	121.91	1
ND1-CG-CD2	106.10	115.09	1
C5'-C4'-C3'	114.90	101.82	1
C5'-C4'-O4'	109.40	122.29	1
O5'-C5'-C4'	110.80	122.82	1
CB-CG-CD2	131.20	121.04	1
NE-CZ-NH2	119.20	112.30	1
C-N-CA	121.70	135.42	1
O4'-C1'-N9	108.40	119.73	1
CA-CB-CG	113.80	106.53	1
O4'-C1'-N9	108.40	119.10	1
C3'-O3'-P	120.20	130.90	1
C-N-CA	121.70	134.40	1
C4'-C3'-O3'	110.00	99.54	1



Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
O2-C2-N3	121.90	111.48	1
NE-CZ-NH1	121.50	128.43	1
C5'-C4'-O4'	109.40	119.75	1
O5'-C5'-C4'	110.80	121.10	1
OD1-CG-ND2	122.60	115.84	1
O4'-C1'-N9	108.40	118.49	1
NH1-CZ-NH2	119.30	110.60	1
O3'-P-O5'	104.00	93.97	1
N6-C6-N1	119.00	109.01	1
C5-C6-N1	117.60	127.54	1
N3-C4-N4	117.90	108.00	1
O6-C6-N1	120.00	110.14	1
O4'-C1'-C2'	106.40	96.57	1
C4'-C3'-O3'	110.00	119.82	1
C3'-C2'-C1'	101.60	111.33	1
OE1-CD-NE2	122.60	116.15	1
C3'-C2'-C1'	101.60	111.26	1
OE1-CD-NE2	122.60	116.16	1
O4'-C1'-N1	108.40	118.04	1
O5'-C5'-C4'	110.80	120.42	1
O4'-C1'-N1	108.40	117.93	1
C4'-O4'-C1'	109.70	100.17	1
N9-C8-N7	113.50	122.96	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C5-C6-N1	117.60	127.06	1
CD-NE-CZ	124.40	133.11	1
NE-CZ-NH1	121.50	127.72	1
CA-CB-CG	113.80	119.99	1
O5'-C5'-C4'	110.80	120.04	1
C4'-C3'-C2'	102.40	93.17	1
CB-CG-CD2	131.20	123.27	1
O4'-C1'-C2'	106.40	97.31	1
N-CD-CG	103.20	112.27	1
C3'-O3'-P	120.20	129.27	1
CA-CB-CG	113.80	107.76	1
N-CA-CB	110.50	120.77	1
CA-CB-OG1	109.60	118.64	1
O4'-C1'-C2'	106.40	97.38	1
O-C-N	123.00	113.39	1
C-CA-CB	110.50	119.49	1
O3'-C3'-C2'	111.50	102.54	1
CA-C-N	116.20	128.11	1
CB-CG-CD2	131.20	123.46	1
C-N-CA	121.70	132.30	1
NE-CZ-NH1	121.50	127.38	1
C4-C5-C6	117.60	108.82	1
C-N-CA	121.70	132.17	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
O4'-C1'-C2'	106.40	97.70	1
N2-C2-N3	119.70	111.01	1
N6-C6-N1	119.00	110.33	1
CB-CG-CD2	131.20	123.70	1
CG-CD2-CE2	121.20	112.66	1
CB-CG-ND1	122.70	131.21	1
C-CA-CB	110.10	120.88	1
CA-CB-CG	112.60	118.24	1
O4'-C1'-N1	108.40	116.80	1
C6-C5-C4	116.90	108.53	1
N-CA-CB	103.00	109.12	1
CD-NE-CZ	124.40	132.18	1
NE-CZ-NH1	121.50	115.95	1
N1-C2-N2	116.30	124.62	1
O3'-P-O5'	104.00	95.68	1
C7-C5-C6	124.00	115.69	1
N1-C2-N2	116.30	124.60	1
C3'-C2'-C1'	101.60	93.31	1
C-CA-CB	110.10	120.58	1
P-O5'-C5'	120.00	128.27	1
NE-CZ-NH1	121.50	116.05	1
CA-CB-CG	112.60	118.05	1
CA-C-N	116.20	127.10	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
NE-CZ-NH1	121.50	126.86	1
C2'-C1'-N9	113.50	121.52	1
O5'-C5'-C4'	110.80	118.81	1
C5'-C4'-C3'	114.90	106.93	1
O3'-P-O5'	104.00	111.93	1
C-N-CA	121.70	131.21	1
NE-CZ-NH2	119.20	114.45	1
CA-CB-CG	112.60	107.33	1
O2-C2-N3	121.90	114.03	1
N-CA-CB	110.50	101.59	1
CD-NE-CZ	124.40	131.72	1
O3'-C3'-C2'	111.50	103.67	1
O5'-C5'-C4'	110.80	118.61	1
CD-NE-CZ	124.40	131.67	1
O3'-P-O5'	104.00	96.22	1
C-N-CA	121.70	131.01	1
C1'-N9-C4	127.05	119.29	1
CA-CB-CG	113.80	118.95	1
CD-NE-CZ	124.40	131.62	1
C-CA-CB	110.10	119.88	1
O5'-C5'-C4'	110.80	118.51	1
N7-C5-C6	132.30	139.98	1
C-CA-CB	111.40	101.69	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
P-O5'-C5'	120.00	112.34	1
O-C-N	123.00	114.83	1
NE-CZ-NH1	121.50	126.60	1
P-O5'-C5'	120.00	127.65	1
O4-C4-C5	122.60	130.25	1
O-C-N	123.00	114.85	1
O3'-P-O5'	104.00	96.40	1
O-C-N	123.00	114.90	1
C4'-C3'-O3'	110.00	102.42	1
C5'-C4'-C3'	114.90	122.46	1
O3'-C3'-C2'	111.50	119.05	1
O-C-N	123.00	114.95	1
C5'-C4'-O4'	109.40	116.91	1
N6-C6-N1	119.00	111.51	1
CE2-CD2-CE3	118.80	113.81	1
NE-CZ-NH2	119.20	114.73	1
CB-CG-CD2	131.20	124.76	1
C2'-C1'-N9	113.50	106.07	1
OD1-CG-ND2	122.60	117.65	1
C8-N7-C5	103.90	96.49	1
C5'-C4'-C3'	114.90	107.52	1
C3'-C2'-C1'	101.60	94.23	1
C2-N3-C4	110.80	118.17	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CD-NE-CZ	124.40	131.25	1
O3'-C3'-C2'	111.50	118.84	1
C5-C6-N1	117.60	124.92	1
CA-C-N	116.20	125.95	1
O3'-C3'-C2'	111.50	118.76	1
C-N-CA	121.70	130.40	1
CD-NE-CZ	124.40	131.16	1
CA-CB-CG1	110.40	118.60	1
NH1-CZ-NH2	119.30	113.03	1
CA-CB-CG1	110.40	118.59	1
CA-CB-OG1	109.60	102.40	1
O3'-C3'-C2'	111.50	104.31	1
CD-NE-CZ	124.40	131.11	1
NE-CZ-NH1	121.50	126.29	1
O-C-N	123.00	115.34	1
C-CA-CB	110.10	119.19	1
O4'-C1'-N9	108.40	115.56	1
N1-C2-O2	119.20	126.36	1
CA-C-N	116.20	125.73	1
OE1-CD-NE2	122.60	117.84	1
C5'-C4'-O4'	109.40	116.54	1
O3'-C3'-C2'	111.50	104.37	1
ND1-CG-CD2	106.10	110.84	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CA-CB-CG	113.80	118.54	1
N-CA-C	111.00	124.23	1
C-N-CA	121.70	130.19	1
NE-CZ-NH1	121.50	116.79	1
C-N-CA	121.70	130.13	1
CG-CD-OE1	118.40	129.17	1
N-CA-CB	110.50	118.46	1
C-N-CA	121.70	130.12	1
O5'-C5'-C4'	110.80	117.80	1
CA-C-N	116.20	125.53	1
O5'-C5'-C4'	110.80	117.79	1
CB-CG-CD2	120.80	113.86	1
C-N-CA	121.70	130.03	2
C4'-C3'-C2'	102.40	109.33	1
N2-C2-N3	119.70	112.77	1
C5'-C4'-O4'	109.40	102.48	1
O4'-C1'-C2'	106.40	99.48	1
CA-C-N	116.20	125.42	1
C-N-CA	121.70	130.00	1
C8-N7-C5	104.20	97.29	1
C4'-C3'-C2'	102.40	95.49	1
O4'-C1'-C2'	106.40	99.51	1
C-N-CA	121.70	129.95	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CA-CB-CG2	110.40	118.17	1
O2-C2-N3	122.00	115.16	1
C1'-N1-C6	119.35	112.52	1
C-CA-CB	110.10	118.74	1
O4'-C1'-N9	108.40	115.21	1
CA-CB-CG	112.60	117.12	1
N3-C4-N4	117.90	111.12	1
N-CA-CB	110.50	102.82	1
C2'-C1'-N9	113.50	120.27	1
C-N-CA	121.70	129.80	1
CA-N-CD	112.00	105.71	1
N-CA-CB	110.50	118.09	1
O3'-P-O5'	104.00	110.70	1
O3'-C3'-C2'	111.50	118.19	1
C1'-N1-C6	119.35	126.04	1
O4-C4-C5	122.60	129.29	1
CA-CB-OG	111.10	120.01	1
C-N-CA	121.70	129.72	1
OG1-CB-CG2	109.30	100.39	1
C4'-O4'-C1'	109.70	103.02	1
CD-NE-CZ	124.40	130.63	1
CA-CB-CG	114.10	105.30	1
C7-C5-C6	124.00	117.40	1



Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CA-C-O	120.80	113.33	1
CA-CB-CG	113.80	118.19	1
CD2-CE2-NE1	107.40	101.71	1
O2-C2-N3	121.90	115.37	2
CD1-CG-CD2	110.80	101.24	1
N6-C6-N1	119.00	112.48	1
OD1-CG-ND2	122.60	118.26	1
OG1-CB-CG2	109.30	100.63	1
CB-CG-CD	112.60	105.25	1
O3'-P-O5'	104.00	97.52	1
P-O5'-C5'	120.00	126.47	1
CA-C-O	120.80	128.13	1
CD1-CG-CD2	110.80	101.34	2
C1'-N9-C8	127.00	133.44	1
OD1-CG-ND2	122.60	118.31	1
O3'-C3'-C2'	111.50	117.94	1
O-C-N	123.00	116.14	1
C3'-O3'-P	120.20	126.60	1
NE-CZ-NH1	121.50	125.76	1
CA-CB-OG1	109.60	103.21	1
CA-C-O	120.80	113.56	1
C5'-C4'-O4'	109.40	115.78	1
N-CA-CB	110.50	117.73	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
O4'-C1'-C2'	106.40	100.03	1
O3'-C3'-C2'	111.50	105.13	1
C7-C5-C6	124.00	117.63	1
C-N-CA	121.70	129.33	1
C4'-O4'-C1'	109.70	103.35	1
O3'-P-O5'	104.00	97.67	1
CA-C-N	116.20	124.64	1
O4'-C1'-N1	108.40	102.08	1
C6-N1-C2	118.80	112.49	1
CE2-CD2-CE3	118.80	114.60	1
CG-CD-OE2	118.40	108.76	1
CA-C-N	116.20	124.58	1
CA-CB-CG	112.60	116.78	1
N7-C5-C6	130.10	136.37	1
C4'-O4'-C1'	109.70	103.44	1
C-CA-CB	110.10	118.03	1
O4'-C1'-N1	108.40	114.65	1
C-N-CA	121.70	129.20	1
CB-CG-CD2	120.70	113.62	1
C-N-CA	121.70	129.19	1
N9-C4-N3	127.40	133.63	1
CB-CG1-CD1	113.80	105.08	1
CA-CB-CG	114.10	122.39	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OE1-CD-NE2	122.60	118.46	1
NE-CZ-NH2	119.20	115.48	1
N1-C6-C5	121.00	114.80	1
N3-C4-O4	122.60	116.40	1
C-CA-CB	110.10	117.94	1
O2-C2-N3	121.90	115.71	1
C-N-CA	121.70	129.12	1
O-C-N	123.00	116.40	1
C5'-C4'-C3'	114.90	108.72	1
C3'-C2'-C1'	101.60	95.43	1
C2'-C1'-N9	113.50	107.33	1
O6-C6-N1	120.00	113.85	1
O4'-C4'-C3'	105.40	111.54	1
C4'-C3'-C2'	102.40	96.26	1
ND1-CG-CD2	106.10	110.19	1
O4'-C4'-C3'	105.40	111.53	1
O5'-C5'-C4'	110.80	116.93	2
P-O5'-C5'	120.00	126.12	1
CA-CB-OG1	109.60	115.72	1
C6-C5-C4	116.90	110.78	1
C1'-N9-C4	127.05	120.94	1
C5'-C4'-C3'	114.90	108.80	1
C-N-CA	121.70	129.01	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
O2-C2-N3	122.00	115.91	1
O4'-C1'-N9	108.40	102.33	1
O3'-P-O5'	104.00	110.07	1
C-N-CA	121.70	128.98	1
C7-C5-C6	124.00	117.94	1
C4'-C3'-O3'	110.00	103.94	1
C6-C5-C4	116.90	110.84	1
N-CD-CG	103.20	109.26	1
NE-CZ-NH1	121.50	117.46	1
C-CA-CB	110.10	117.77	1
CA-CB-CG	113.80	109.76	1
CA-CB-CG	114.10	106.04	2
C4'-C3'-C2'	102.40	96.36	1
N-CA-CB	103.00	107.42	1
C5-C6-O6	128.30	134.33	1
N1-C2-O2	119.20	125.23	1
CD2-CE3-CZ3	118.60	123.82	1
P-O5'-C5'	120.00	126.02	1
C4'-O4'-C1'	109.70	103.68	1
C7-C5-C6	124.00	118.00	1
CG-CB-HB2	120.01	108.00	1
H5'-C5'-H5"	102.98	109.00	1
O3'-C3'-H3'	115.03	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
O3'-C3'-H3'	102.96	109.00	1
C2-N3-H3	110.45	116.50	1
C-N-H	112.20	124.30	1
C4'-C5'-H5''	115.05	109.00	1
HD11-CD1-HD13	97.89	110.00	1
C1'-C2'-H2'	115.06	109.00	1
O5'-C5'-H5'	115.10	109.00	1
H41-N4-H42	126.10	120.00	1
C3'-C2'-H2'	102.89	109.00	1
C5-C6-H6	112.49	118.60	1
C5-C7-H73	115.11	109.00	1
HG22-CG2-HG23	121.23	109.00	1
O5'-C5'-H5'	115.11	109.00	1
C4-C5-H5	127.33	121.20	1
H2'-C2'-H2''	115.13	109.00	1
C2-N2-H22	113.87	120.00	1
O4'-C4'-H4'	115.14	109.00	1
C-N-H	112.00	124.30	1
O4'-C1'-H1'	115.16	109.00	1
C-N-H	111.98	124.30	1
HG21-CG2-HG23	97.67	110.00	1
O4'-C4'-H4'	102.83	109.00	1
C1'-C2'-H2'	115.17	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
O5'-C5'-H5"	102.81	109.00	1
H5'-C5'-H5"	102.80	109.00	1
C4'-C5'-H5"	102.80	109.00	1
C-N-H	111.86	124.30	1
H2'-C2'-H2"	115.22	109.00	1
C-CA-HA	96.55	109.00	1
N-CA-HA	97.54	110.00	1
H2'-C2'-H2"	102.77	109.00	1
H2'-C2'-H2"	102.76	109.00	1
O4'-C1'-H1'	102.75	109.00	1
C3'-C2'-H2'	115.26	109.00	1
H5'-C5'-H5"	115.26	109.00	1
C6-C5-H5	114.93	121.20	1
C4'-C3'-H3'	115.27	109.00	1
C5'-C4'-H4'	102.73	109.00	1
C1'-C2'-H2"	102.72	109.00	1
C-N-H	111.72	124.30	1
C-N-H	111.71	124.30	1
C6-C5-H5	114.90	121.20	1
C2'-C1'-H1'	102.69	109.00	1
C1'-C2'-H2'	115.33	109.00	1
C-N-H	111.62	124.30	1
C3'-C2'-H2'	115.35	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C2'-C3'-H3'	115.35	109.00	1
HD21-CD2-HD22	122.72	110.00	1
C-N-H	111.55	124.30	1
O4'-C1'-H1'	102.62	109.00	1
C5-C6-H6	125.88	119.50	1
C4'-C5'-H5'	102.60	109.00	1
C6-N6-H61	113.60	120.00	1
H71-C7-H73	115.41	109.00	1
H5'-C5'-H5"	102.58	109.00	1
C2-N2-H21	113.58	120.00	1
H72-C7-H73	115.42	109.00	1
C-N-H	111.44	124.30	1
HZ1-NZ-HZ3	121.92	109.00	1
C-N-H	111.36	124.30	1
H2'-C2'-H2"	102.53	109.00	1
C2-N2-H22	113.52	120.00	1
C-N-H	111.31	124.30	1
C3'-C4'-H4'	102.49	109.00	1
HB2-CB-HB3	96.97	110.00	1
C1'-C2'-H2"	115.55	109.00	1
HD2-CD-HD3	96.89	110.00	1
C2'-C3'-H3'	115.56	109.00	1
CB-CA-HA	95.87	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C4-N4-H41	113.43	120.00	1
C4'-C5'-H5'	102.43	109.00	1
CG-CD-HD2	122.16	109.00	1
O5'-C5'-H5'	115.59	109.00	1
HB2-CB-HB3	96.78	110.00	1
C2-N2-H22	113.39	120.00	1
HD2-CD-HD3	96.76	110.00	1
N-CD-HD3	122.26	109.00	1
C6-N6-H61	113.36	120.00	1
N-CA-HA	96.70	110.00	1
C-N-H	110.95	124.30	1
C4'-C5'-H5'	102.33	109.00	1
H5'-C5'-H5"	102.32	109.00	1
C-N-H	110.93	124.30	1
C3'-C2'-H2'	115.70	109.00	1
C1'-C2'-H2'	115.71	109.00	1
N1-C6-H6	125.32	118.60	1
HG22-CG2-HG23	96.53	110.00	1
O4'-C4'-H4'	102.26	109.00	1
O4'-C4'-H4'	102.25	109.00	1
C-N-H	110.80	124.30	1
C-N-H	110.79	124.30	1
H5'-C5'-H5"	102.24	109.00	1



Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
H71-C7-H72	115.78	109.00	1
H5'-C5'-H5"	102.20	109.00	1
H5'-C5'-H5"	102.19	109.00	1
C6-N6-H62	113.18	120.00	1
CD-CE-HE2	122.64	109.00	1
H5'-C5'-H5"	102.18	109.00	1
HG11-CG1-HG13	96.35	110.00	1
C-N-H	110.65	124.30	1
O3'-C3'-H3'	115.83	109.00	1
N1-C1'-H1'	115.83	109.00	1
C3'-C2'-H2"	115.84	109.00	1
H2'-C2'-H2"	102.14	109.00	1
C1'-C2'-H2"	115.87	109.00	1
O4'-C4'-H4'	115.88	109.00	1
O4'-C1'-H1'	102.11	109.00	1
O5'-C5'-H5'	115.90	109.00	1
N3-C2-H2	108.59	115.50	1
C4-N4-H41	113.08	120.00	1
C5-C7-H71	102.07	109.00	1
O5'-C5'-H5"	102.02	109.00	1
H41-N4-H42	126.99	120.00	1
C4'-C5'-H5"	101.98	109.00	1
C2'-C1'-H1'	101.98	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
HD11-CD1-HD12	95.96	110.00	1
O5'-C5'-H5'	101.98	109.00	1
C-N-H	110.24	124.30	1
C2'-C1'-H1'	116.03	109.00	1
C3'-C2'-H2"	116.06	109.00	1
C-N-H	110.17	124.30	1
C-N-H	110.16	124.30	1
HB2-CB-HB3	95.80	110.00	1
C3'-C2'-H2"	116.13	109.00	1
C-N-H	109.97	124.30	1
O4'-C1'-H1'	116.23	109.00	1
O3'-C3'-H3'	116.25	109.00	1
C2'-C3'-H3'	116.26	109.00	1
C1'-C2'-H2"	116.26	109.00	1
C-N-H	109.77	124.30	1
H2'-C2'-H2"	116.29	109.00	1
C4'-C3'-H3'	116.29	109.00	1
C3'-C2'-H2'	116.29	109.00	1
C2'-C3'-H3'	116.31	109.00	1
H2'-C2'-H2"	116.32	109.00	1
C-N-H	109.64	124.30	1
C4-N4-H42	112.67	120.00	1
C1'-C2'-H2'	116.35	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
H61-N6-H62	127.37	120.00	1
C5-C7-H72	116.38	109.00	1
C4'-C5'-H5'	116.40	109.00	1
C-N-H	109.50	124.30	1
O5'-C5'-H5''	116.42	109.00	1
C1'-C2'-H2'	116.47	109.00	1
O4'-C4'-H4'	101.52	109.00	1
C6-C5-H5	113.72	121.20	1
C4-N4-H41	112.50	120.00	1
N7-C8-H8	115.60	123.10	1
C3'-C4'-H4'	101.48	109.00	1
O4'-C1'-H1'	101.47	109.00	1
O5'-C5'-H5'	116.53	109.00	1
C5'-C4'-H4'	101.45	109.00	1
C5'-C4'-H4'	101.44	109.00	1
C2'-C3'-H3'	116.58	109.00	1
N9-C1'-H1'	116.60	109.00	1
C3'-C2'-H2'	116.60	109.00	1
C6-N6-H61	112.35	120.00	1
C4'-C5'-H5'	101.35	109.00	1
CG-CB-HB2	123.31	108.00	1
HG22-CG2-HG23	93.68	109.00	1
O3'-C3'-H3'	116.67	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C-N-H	108.77	124.30	1
O3'-C3'-H3'	116.81	109.00	1
N9-C8-H8	115.48	123.30	1
H71-C7-H73	116.85	109.00	1
H5'-C5'-H5"	101.14	109.00	1
C1'-C2'-H2'	116.86	109.00	1
C5-C7-H72	116.86	109.00	1
O3'-C3'-H3'	116.88	109.00	1
H5'-C5'-H5"	101.11	109.00	1
N9-C1'-H1'	116.89	109.00	1
C1'-C2'-H2'	116.92	109.00	1
C6-C5-H5	113.25	121.20	1
O3'-C3'-H3'	101.03	109.00	1
C2-N1-H1	109.59	117.60	1
C5-C7-H73	117.02	109.00	1
C4'-C5'-H5'	100.97	109.00	1
H41-N4-H42	128.10	120.00	1
C2-N2-H22	111.89	120.00	1
C5-C6-H6	127.63	119.50	1
C3'-C2'-H2"	117.17	109.00	1
C2'-C1'-H1'	117.19	109.00	1
O3'-C3'-H3'	117.19	109.00	1
C1'-C2'-H2"	117.20	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C3'-C4'-H4'	117.20	109.00	1
C6-N6-H62	128.21	120.00	1
C4-C5-H5	129.44	121.20	1
C2'-C3'-H3'	117.24	109.00	1
N9-C1'-H1'	117.25	109.00	1
C1'-C2'-H2'	117.38	109.00	1
O4'-C4'-H4'	100.62	109.00	1
C1'-C2'-H2'	117.40	109.00	1
H5'-C5'-H5"	100.60	109.00	1
C3'-C2'-H2"	117.45	109.00	1
O4'-C1'-H1'	117.45	109.00	1
O4'-C1'-H1'	117.49	109.00	1
C3'-C2'-H2"	117.52	109.00	1
N9-C1'-H1'	100.46	109.00	1
C3'-C2'-H2"	117.54	109.00	1
C3'-C2'-H2'	117.54	109.00	1
N9-C1'-H1'	117.56	109.00	1
O5'-C5'-H5"	117.56	109.00	1
O3'-C3'-H3'	117.64	109.00	1
C-N-H	107.01	124.30	1
O3'-C3'-H3'	117.66	109.00	1
C6-N6-H62	111.31	120.00	1
C1'-C2'-H2'	117.77	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C-N-H	106.65	124.30	1
C5'-C4'-H4'	100.17	109.00	1
H61-N6-H62	111.17	120.00	1
H72-C7-H73	117.84	109.00	1
C6-N6-H62	111.09	120.00	1
C6-N6-H62	111.06	120.00	1
C-N-H	106.34	124.30	1
O3'-C3'-H3'	118.01	109.00	1
H2'-C2'-H2"	99.97	109.00	1
O4'-C1'-H1'	118.03	109.00	1
C5'-C4'-H4'	99.97	109.00	1
O5'-C5'-H5"	118.05	109.00	1
C1'-C2'-H2"	118.06	109.00	1
C3'-C2'-H2'	118.10	109.00	1
C4'-C5'-H5'	99.83	109.00	1
C4'-C3'-H3'	118.17	109.00	1
C4-N4-H42	110.81	120.00	1
C4'-C5'-H5'	99.79	109.00	1
O3'-C3'-H3'	118.29	109.00	1
O5'-C5'-H5'	118.32	109.00	1
H71-C7-H73	118.35	109.00	1
C5-C7-H71	99.60	109.00	1
C1'-C2'-H2"	118.43	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C1'-C2'-H2"	118.46	109.00	1
C3'-C2'-H2"	118.59	109.00	1
HB2-CB-HB3	90.43	110.00	1
O4'-C1'-H1'	118.79	109.00	1
C3'-C2'-H2"	118.79	109.00	1
C3'-C4'-H4'	99.15	109.00	1
C1'-C2'-H2'	118.85	109.00	1
C3'-C2'-H2'	98.95	109.00	1
C3'-O3'-HO3'	99.81	120.00	1
C5-C7-H73	98.85	109.00	1
C4'-C3'-H3'	119.28	109.00	1
C4'-C3'-H3'	119.40	109.00	1
C5'-C4'-H4'	98.57	109.00	1
H2'-C2'-H2"	98.47	109.00	1
C4'-C5'-H5'	98.47	109.00	1
C4'-C3'-H3'	119.75	109.00	1
H21-N2-H22	131.08	120.00	1
C4'-C3'-H3'	120.17	109.00	1
C3'-C2'-H2"	120.36	109.00	1
H5'-C5'-H5"	97.55	109.00	1
O5'-C5'-H5'	120.50	109.00	1
H2'-C2'-H2"	120.51	109.00	1
C2'-C3'-H3'	120.90	109.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C1'-C2'-H2"	120.94	109.00	1
H71-C7-H72	96.89	109.00	1
O3'-C3'-H3'	121.14	109.00	1
O5'-C5'-H5'	96.44	109.00	1
C4'-C3'-H3'	121.74	109.00	1
H41-N4-H42	133.21	120.00	1
H5'-C5'-H5"	95.42	109.00	1
H2'-C2'-H2"	123.10	109.00	1
C1'-C2'-H2"	123.22	109.00	1
O4'-C4'-H4'	93.46	109.00	1
O4'-C1'-H1'	93.16	109.00	1

### Too-close contacts

The following all-atom clashscore is based on a MolProbity analysis. All-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The table below contains clashscores for all the models in this entry.

Model ID	Clash score	Number of clashes
1	0.95	6

All 6 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Model ID	Atom-1	Atom-2	Clash overlap (Å)
1	A:171:LEU:C	A:171:LEU:HD13	0.527
1	A:204:TYR:CE1	A:208:ILE:HG21	0.468
1	B:21:DC:H2"	B:22:DA:C8	0.464
1	B:16:DA:H1'	B:17:DG:C8	0.416
1	A:4:LYS:HE2	A:134:TRP:CD2	0.413
1	A:235:LEU:H	A:235:LEU:HD12	0.410



Torsion angles: Protein backbone ?

In the following table, Ramachandran outliers are listed. The Analysed column shows the number of residues for which the backbone conformation was analysed.

Model ID	Analyzed	Favored	Allowed	Outliers
1	283	253	25	5

Detailed list of outliers are tabulated below.

Torsion angles: Protein sidechains ?

In the following table, sidechain outliers are listed. The Analysed column shows the number of residues for which the sidechain conformation was analysed.

Model ID	Analyzed	Favored	Allowed	Outliers
1	253	230	18	5

Detailed list of outliers are tabulated below.

Model ID	Chain	Residue ID	Residue type
1	A	171	LEU
1	A	208	ILE
1	A	224	ASP
1	A	258	VAL
1	A	278	ASP

Fit of model to data used for modeling ?Crosslinking-MS

Validation for this section is under development.

Fit of model to data used for validation ?

Validation for this section is under development.

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