WORLDWIDE PDB PROTEIN DATA BANK

wwPDB NMR Structure Validation Summary Report ⓘ

Jun 3, 2023 – 09:18 AM EDT

PDB ID	:	6C44
BMRB ID	:	30397
Title	:	Zika virus capsid protein
Authors	:	Morando, M.A.; Barbosa, G.M.; Cruz-Oliveira, C.; Da Poian, A.T.; Almeida, F.C.L.
Deposited on	:	2018-01-11

The following versions of software and data (see references ⓘ) were used in the production of this report:
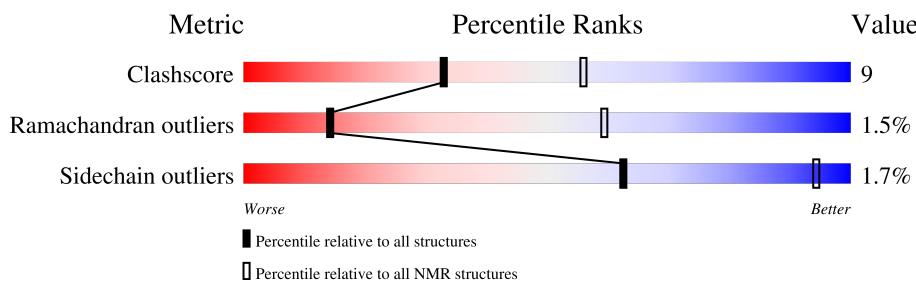
|		
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
BMRB Restraints Analysis	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.33

1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
SOLUTION NMR
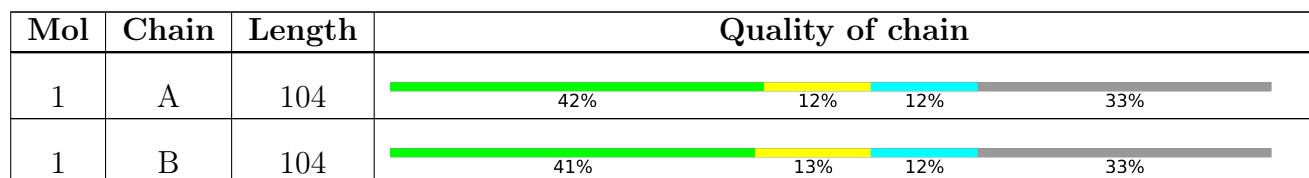
The overall completeness of chemical shifts assignment is 42%.

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)	NMR archive (#Entries)
Clashscore	158937	12864
Ramachandran outliers	154571	11451
Sidechain outliers	154315	11428

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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 <=5%

Mol	Chain	Length	Quality of chain
1	A	104	42% 12% 12% 33%
1	B	104	41% 13% 12% 33%

2 Ensemble composition and analysis ⓘ

This entry contains 20 models. Model 17 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy*.

The following residues are included in the computation of the global validation metrics.

Well-defined (core) protein residues			
Well-defined core	Residue range (total)	Backbone RMSD (Å)	Medoid model
1	A:42-A:98, B:42-B:98 (114)	0.56	17

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

The models can be grouped into 3 clusters and 4 single-model clusters were found.

Cluster number	Models
1	3, 5, 8, 11, 13, 14, 17, 18
2	1, 2, 4, 10, 15, 19
3	6, 20
Single-model clusters	7; 9; 12; 16

3 Entry composition ⓘ

There is only 1 type of molecule in this entry. The entry contains 2374 atoms, of which 1264 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Capsid protein.

Mol	Chain	Residues	Atoms						Trace
1	A	70	Total	C	H	N	O	S	0
			1187	362	632	106	84	3	
1	B	70	Total	C	H	N	O	S	0
			1187	362	632	106	84	3	

4 Residue-property plots ⓘ
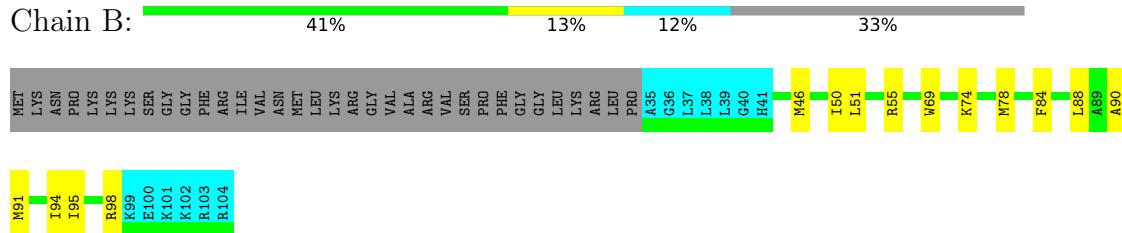
4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

- Molecule 1: Capsid protein

Chain A:

- Molecule 1: Capsid protein

Chain B:
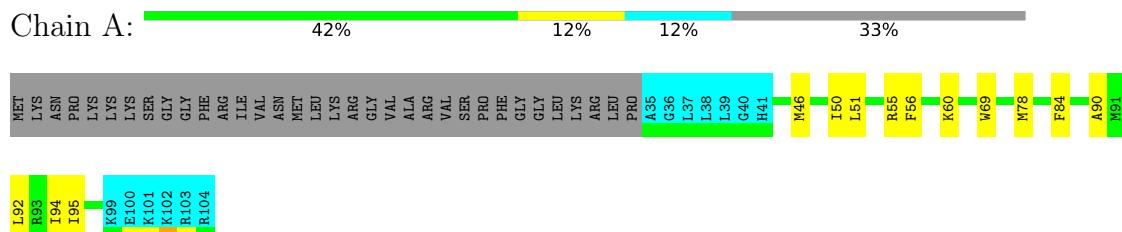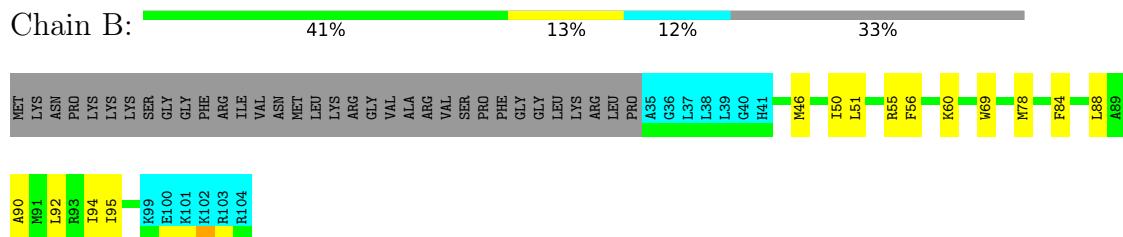
4.2 Residue scores for the representative (medoid) model from the NMR ensemble

The representative model is number 17. Colouring as in section 4.1 above.

- Molecule 1: Capsid protein

Chain A:

• Molecule 1: Capsid protein

Chain B:

41%   13%   12%   33%

MET LYS ASN PRO LYS LYS LYS SER GLY GLY PHE ARG ILE VAL ASN MET LEU LYS ARG GLY VAL ALA ARG VAL SER PRO PHE GLY GLY LEU LYS LYS ARG LEU PRO A35 G36 L37 L38 L39 G40 H41 M46 I50 L51 R55 F56 K60 W69 M78 F84 L88 A89

A90 M91 L92 R93 I94 I95 K99 E100 K101 K102 R103 R104

5 Refinement protocol and experimental data overview ⓘ

The models were refined using the following method: *molecular dynamics.*

Of the 400 calculated structures, 20 were deposited, based on the following criterion: *structures with the lowest energy.*

The following table shows the software used for structure solution, optimisation and refinement.

Software name	Classification	Version
CNS	refinement	1.21
CNS	structure calculation	

The following table shows chemical shift validation statistics as aggregates over all chemical shift files. Detailed validation can be found in section 7 of this report.

Chemical shift file(s)	working_cs.cif
Number of chemical shift lists	1
Total number of shifts	1307
Number of shifts mapped to atoms	883
Number of unparsed shifts	0
Number of shifts with mapping errors	424
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	42%

6 Model quality (i)

6.1 Standard geometry (i)

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

6.2 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 each 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 averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	449	509	509	10±2
1	B	449	509	509	11±2
All	All	17960	20360	20360	351

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 9.

5 of 91 unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models Worst	Total
1:A:42:GLY:HA3	1:A:46:MET:SD	0.63	2.34	1	2
1:B:42:GLY:HA3	1:B:46:MET:SD	0.62	2.34	1	2
1:A:69:TRP:NE1	1:B:95:ILE:HD11	0.61	2.10	14	17
1:A:95:ILE:HD11	1:B:69:TRP:NE1	0.61	2.10	14	17
1:B:90:ALA:O	1:B:94:ILE:HG13	0.56	2.00	18	15

6.3 Torsion angles (i)

6.3.1 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 NMR

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	
1	A	57/104 (55%)	55±1 (96±2%)	1±1 (3±2%)	1±1 (1±1%)	14	59
1	B	57/104 (55%)	55±1 (96±2%)	1±1 (3±2%)	1±1 (1±1%)	14	59
All	All	2280/4160 (55%)	2188 (96%)	58 (3%)	34 (1%)	14	59

5 of 10 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	60	LYS	9
1	B	60	LYS	9
1	A	74	LYS	3
1	B	74	LYS	3
1	A	61	PRO	2

6.3.2 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 NMR 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	
1	A	46/84 (55%)	45±1 (98±2%)	1±1 (2±2%)	62	94
1	B	46/84 (55%)	45±1 (98±2%)	1±1 (2±2%)	62	94
All	All	1840/3360 (55%)	1808 (98%)	32 (2%)	62	94

5 of 14 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
1	A	84	PHE	5
1	B	84	PHE	5
1	A	87	ASP	4
1	B	87	ASP	4
1	A	82	LYS	2

6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.6 Ligand geometry ⓘ

There are no ligands in this entry.

6.7 Other polymers ⓘ

There are no such molecules in this entry.

6.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

7 Chemical shift validation ⓘ

The completeness of assignment taking into account all chemical shift lists is 42% for the well-defined parts and 42% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *data.str*

7.1.1 Bookkeeping ⓘ

The following table shows the results of parsing the chemical shift list and reports the number of nuclei with statistically unusual chemical shifts.

Total number of shifts	1307
Number of shifts mapped to atoms	883
Number of unparsed shifts	0
Number of shifts with mapping errors	424
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	0

The following assigned chemical shifts were not mapped to the molecules present in the coordinate file.

- No matching atom found in the structure. First 5 (of 424) occurrences are reported below.

List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	1	MET	C	175.53	0.000	1
1	A	1	MET	CA	57.87	0.006	1
1	A	1	MET	CB	32.54	0.000	1
1	A	1	MET	CE	16.212	0.019	1
1	A	1	MET	CG	29.485	0.006	1
1	A	1	MET	HA	4.33	0.004	1
1	A	1	MET	HB2	1.822	0.001	1
1	A	1	MET	HB3	1.822	0.001	1
1	A	1	MET	HE1	1.756	0.001	1
1	A	1	MET	HE2	1.756	0.001	1
1	A	1	MET	HE3	1.756	0.001	1
1	A	1	MET	HG2	1.648	0.001	1
1	A	1	MET	HG3	1.648	0.001	1
1	A	2	LYS	C	175.608	0.000	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	2	LYS	CA	56.489	0.001	1
1	A	2	LYS	CB	32.842	0.002	1
1	A	2	LYS	CD	29.329	0.002	1
1	A	2	LYS	CE	42.14	0.002	1
1	A	2	LYS	CG	24.901	0.002	1
1	A	2	LYS	H	8.169	0.001	1
1	A	2	LYS	HA	4.416	0.002	1
1	A	2	LYS	HB2	1.831	0.001	1
1	A	2	LYS	HB3	1.831	0.001	1
1	A	2	LYS	HD2	1.726	0.000	1
1	A	2	LYS	HD3	1.726	0.000	1
1	A	2	LYS	HE2	3.05	0.001	1
1	A	2	LYS	HE3	3.05	0.001	1
1	A	2	LYS	HG2	1.481	0.000	1
1	A	2	LYS	HG3	1.481	0.000	1
1	A	2	LYS	N	122.667	0.002	1
1	A	3	ASN	C	173.334	0.000	1
1	A	3	ASN	CA	51.363	0.063	1
1	A	3	ASN	CB	39.156	0.025	1
1	A	3	ASN	H	8.583	0.003	1
1	A	3	ASN	HA	5.019	0.002	1
1	A	3	ASN	HB2	2.88	0.002	2
1	A	3	ASN	HB3	2.745	0.000	2
1	A	3	ASN	N	121.313	0.005	1
1	A	4	PRO	C	176.843	0.000	1
1	A	4	PRO	CA	63.475	0.002	1
1	A	4	PRO	CB	32.089	0.167	1
1	A	4	PRO	CD	50.83	0.028	1
1	A	4	PRO	CG	27.413	0.134	1
1	A	4	PRO	HA	4.495	0.003	1
1	A	4	PRO	HB2	2.347	0.006	2
1	A	4	PRO	HB3	1.988	0.009	2
1	A	4	PRO	HD2	3.841	0.015	2
1	A	4	PRO	HD3	3.808	0.010	2
1	A	4	PRO	HG2	2.068	0.010	1
1	A	4	PRO	HG3	2.068	0.010	1
1	A	5	LYS	C	176.612	0.000	1
1	A	5	LYS	CA	56.401	0.032	1
1	A	5	LYS	CB	32.527	0.009	1
1	A	5	LYS	CD	29.031	0.001	1
1	A	5	LYS	CE	42.318	0.002	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	5	LYS	CG	24.629	0.001	1
1	A	5	LYS	H	8.257	0.002	1
1	A	5	LYS	HA	4.33	0.000	1
1	A	5	LYS	HB2	1.843	0.000	1
1	A	5	LYS	HB3	1.843	0.000	1
1	A	5	LYS	HD2	1.738	0.001	1
1	A	5	LYS	HD3	1.738	0.001	1
1	A	5	LYS	HE2	3.053	0.000	1
1	A	5	LYS	HE3	3.053	0.000	1
1	A	5	LYS	HG2	1.481	0.000	1
1	A	5	LYS	HG3	1.481	0.000	1
1	A	5	LYS	N	120.812	0.015	1
1	A	6	LYS	C	176.599	0.000	1
1	A	6	LYS	CA	56.38	0.000	1
1	A	6	LYS	CB	32.537	0.004	1
1	A	6	LYS	CD	29.292	0.002	1
1	A	6	LYS	CE	42.318	0.002	1
1	A	6	LYS	CG	24.898	0.002	1
1	A	6	LYS	H	8.151	0.001	1
1	A	6	LYS	HA	4.329	0.001	1
1	A	6	LYS	HB2	1.839	0.000	1
1	A	6	LYS	HB3	1.839	0.000	1
1	A	6	LYS	HD2	1.738	0.000	1
1	A	6	LYS	HD3	1.738	0.000	1
1	A	6	LYS	HE2	3.053	0.000	1
1	A	6	LYS	HE3	3.053	0.000	1
1	A	6	LYS	HG2	1.48	0.000	1
1	A	6	LYS	HG3	1.48	0.000	1
1	A	6	LYS	N	122.491	0.000	1
1	A	7	LYS	C	176.582	0.000	1
1	A	7	LYS	CA	56.497	0.000	1
1	A	7	LYS	CB	32.771	0.001	1
1	A	7	LYS	CD	29.255	0.005	1
1	A	7	LYS	CE	42.44	0.002	1
1	A	7	LYS	CG	24.571	0.001	1
1	A	7	LYS	H	8.152	0.001	1
1	A	7	LYS	HA	4.392	0.001	1
1	A	7	LYS	HB2	1.854	0.003	1
1	A	7	LYS	HB3	1.854	0.003	1
1	A	7	LYS	HD2	1.731	0.000	1
1	A	7	LYS	HD3	1.731	0.000	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	7	LYS	HE2	3.053	0.000	1
1	A	7	LYS	HE3	3.053	0.000	1
1	A	7	LYS	HG2	1.483	0.000	1
1	A	7	LYS	HG3	1.483	0.000	1
1	A	7	LYS	N	122.495	0.002	1
1	A	8	SER	C	174.94	0.000	1
1	A	8	SER	CA	58.394	0.011	1
1	A	8	SER	CB	64.158	0.001	1
1	A	8	SER	H	8.348	0.001	1
1	A	8	SER	HA	4.535	0.005	1
1	A	8	SER	HB2	3.947	0.001	1
1	A	8	SER	HB3	3.947	0.001	1
1	A	8	SER	N	117.231	0.002	1
1	A	9	GLY	C	174.494	0.000	1
1	A	9	GLY	CA	45.348	0.123	1
1	A	9	GLY	H	8.425	0.001	1
1	A	9	GLY	HA2	4.024	0.010	1
1	A	9	GLY	HA3	4.026	0.010	1
1	A	9	GLY	N	110.803	0.002	1
1	A	10	GLY	C	173.838	0.000	1
1	A	10	GLY	CA	45.334	0.112	1
1	A	10	GLY	H	8.23	0.001	1
1	A	10	GLY	HA2	3.955	0.007	1
1	A	10	GLY	HA3	3.955	0.006	1
1	A	10	GLY	N	108.573	0.003	1
1	A	11	PHE	C	175.501	0.000	1
1	A	11	PHE	CA	57.867	0.034	1
1	A	11	PHE	CB	39.902	0.002	1
1	A	11	PHE	H	8.062	0.006	1
1	A	11	PHE	HA	4.665	0.007	1
1	A	11	PHE	HB2	3.124	0.002	1
1	A	11	PHE	HB3	3.124	0.002	1
1	A	11	PHE	N	120.054	0.029	1
1	A	12	ARG	C	175.669	0.000	1
1	A	12	ARG	CA	56.229	0.004	1
1	A	12	ARG	CB	31.067	0.000	1
1	A	12	ARG	CD	43.64	0.000	1
1	A	12	ARG	CG	26.923	0.077	1
1	A	12	ARG	H	8.171	0.002	1
1	A	12	ARG	HA	4.329	0.005	1
1	A	12	ARG	HB2	1.815	0.001	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	12	ARG	HB3	1.815	0.001	1
1	A	12	ARG	HD2	3.217	0.001	1
1	A	12	ARG	HD3	3.217	0.001	1
1	A	12	ARG	HG2	1.738	0.001	1
1	A	12	ARG	HG3	1.738	0.001	1
1	A	12	ARG	N	123.059	0.186	1
1	A	13	ILE	C	176.222	0.000	1
1	A	13	ILE	CA	61.325	0.022	1
1	A	13	ILE	CB	38.578	0.027	1
1	A	13	ILE	CD1	13.385	0.017	1
1	A	13	ILE	CG1	28.021	0.141	1
1	A	13	ILE	CG2	17.761	0.015	1
1	A	13	ILE	H	8.145	0.001	1
1	A	13	ILE	HA	4.176	0.017	1
1	A	13	ILE	HB	1.904	0.007	1
1	A	13	ILE	HD11	0.878	0.015	1
1	A	13	ILE	HD12	0.878	0.015	1
1	A	13	ILE	HD13	0.878	0.015	1
1	A	13	ILE	HG12	1.259	0.025	2
1	A	13	ILE	HG13	1.538	0.004	2
1	A	13	ILE	HG21	0.931	0.008	1
1	A	13	ILE	HG22	0.931	0.008	1
1	A	13	ILE	HG23	0.931	0.008	1
1	A	13	ILE	N	122.502	0.000	1
1	A	14	VAL	C	175.738	0.000	1
1	A	14	VAL	CA	62.568	0.072	1
1	A	14	VAL	CB	32.467	0.014	1
1	A	14	VAL	CG1	20.769	0.001	1
1	A	14	VAL	CG2	20.769	0.001	1
1	A	14	VAL	H	8.13	0.002	1
1	A	14	VAL	HA	4.121	0.006	1
1	A	14	VAL	HB	2.108	0.001	1
1	A	14	VAL	HG11	0.963	0.001	1
1	A	14	VAL	HG12	0.963	0.001	1
1	A	14	VAL	HG13	0.963	0.001	1
1	A	14	VAL	HG21	0.963	0.001	1
1	A	14	VAL	HG22	0.963	0.001	1
1	A	14	VAL	HG23	0.963	0.001	1
1	A	14	VAL	N	123.812	0.001	1
1	A	15	ASN	C	175.269	0.000	1
1	A	15	ASN	CA	53.375	0.086	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	15	ASN	CB	38.874	0.175	1
1	A	15	ASN	H	8.387	0.013	1
1	A	15	ASN	HA	4.743	0.015	1
1	A	15	ASN	HB2	2.875	0.004	2
1	A	15	ASN	HB3	2.817	0.047	2
1	A	15	ASN	N	122.027	0.117	1
1	A	16	MET	C	176.205	0.000	1
1	A	16	MET	CA	56.024	0.105	1
1	A	16	MET	CB	32.838	0.003	1
1	A	16	MET	CE	17.097	0.001	1
1	A	16	MET	CG	31.017	0.117	1
1	A	16	MET	H	8.295	0.010	1
1	A	16	MET	HA	4.161	0.003	1
1	A	16	MET	HB2	2.211	0.006	1
1	A	16	MET	HB3	2.211	0.006	1
1	A	16	MET	HE1	2.18	0.005	1
1	A	16	MET	HE2	2.18	0.005	1
1	A	16	MET	HE3	2.18	0.005	1
1	A	16	MET	HG2	2.647	0.001	1
1	A	16	MET	HG3	2.647	0.001	1
1	A	16	MET	N	121.2	0.098	1
1	A	17	LEU	C	177.353	0.000	1
1	A	17	LEU	CA	55.437	0.002	1
1	A	17	LEU	CB	42.203	0.046	1
1	A	17	LEU	CD1	24.941	0.002	1
1	A	17	LEU	CD2	24.941	0.002	1
1	A	17	LEU	CG	27.091	0.066	1
1	A	17	LEU	H	8.137	0.002	1
1	A	17	LEU	HA	4.34	0.001	1
1	A	17	LEU	HB2	1.732	0.016	1
1	A	17	LEU	HB3	1.732	0.016	1
1	A	17	LEU	HD11	0.964	0.000	2
1	A	17	LEU	HD12	0.964	0.000	2
1	A	17	LEU	HD13	0.964	0.000	2
1	A	17	LEU	HD21	0.909	0.001	2
1	A	17	LEU	HD22	0.909	0.001	2
1	A	17	LEU	HD23	0.909	0.001	2
1	A	17	LEU	HG	1.61	0.003	1
1	A	17	LEU	N	122.49	0.000	1
1	A	18	LYS	C	176.452	0.000	1
1	A	18	LYS	CA	56.4	0.000	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	18	LYS	CB	32.64	0.000	1
1	A	18	LYS	CD	29.11	0.113	1
1	A	18	LYS	CE	42.301	0.001	1
1	A	18	LYS	CG	24.731	0.001	1
1	A	18	LYS	H	8.125	0.001	1
1	A	18	LYS	HA	4.34	0.000	1
1	A	18	LYS	HB2	1.847	0.000	1
1	A	18	LYS	HB3	1.847	0.000	1
1	A	18	LYS	HD2	1.605	0.004	1
1	A	18	LYS	HD3	1.605	0.004	1
1	A	18	LYS	HE2	3.052	0.000	1
1	A	18	LYS	HE3	3.052	0.000	1
1	A	18	LYS	HG2	1.483	0.000	1
1	A	18	LYS	HG3	1.483	0.000	1
1	A	18	LYS	N	121.649	0.002	1
1	A	19	ARG	C	176.766	0.000	1
1	A	19	ARG	CA	56.435	0.002	1
1	A	19	ARG	CB	30.919	0.001	1
1	A	19	ARG	CD	43.545	0.008	1
1	A	19	ARG	CG	28.258	0.009	1
1	A	19	ARG	H	8.239	0.010	1
1	A	19	ARG	HA	4.384	0.002	1
1	A	19	ARG	HB2	1.889	0.001	1
1	A	19	ARG	HB3	1.889	0.001	1
1	A	19	ARG	HD2	3.266	0.003	1
1	A	19	ARG	HD3	3.266	0.003	1
1	A	19	ARG	HG2	1.731	0.003	1
1	A	19	ARG	HG3	1.731	0.003	1
1	A	19	ARG	N	121.877	0.093	1
1	A	20	GLY	C	174.015	0.000	1
1	A	20	GLY	CA	45.404	0.105	1
1	A	20	GLY	H	8.386	0.001	1
1	A	20	GLY	HA2	4.03	0.011	1
1	A	20	GLY	HA3	4.03	0.011	1
1	A	20	GLY	N	110.025	0.009	1
1	A	21	VAL	C	175.765	0.000	1
1	A	21	VAL	CA	62.128	0.129	1
1	A	21	VAL	CB	32.605	0.005	1
1	A	21	VAL	CG1	21.179	0.001	1
1	A	21	VAL	CG2	21.179	0.001	1
1	A	21	VAL	H	7.907	0.002	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	21	VAL	HA	4.184	0.013	1
1	A	21	VAL	HB	2.136	0.001	1
1	A	21	VAL	HG11	0.968	0.001	1
1	A	21	VAL	HG12	0.968	0.001	1
1	A	21	VAL	HG13	0.968	0.001	1
1	A	21	VAL	HG21	0.968	0.001	1
1	A	21	VAL	HG22	0.968	0.001	1
1	A	21	VAL	HG23	0.968	0.001	1
1	A	21	VAL	N	118.963	0.028	1
1	A	22	ALA	C	177.387	0.000	1
1	A	22	ALA	CA	52.516	0.055	1
1	A	22	ALA	CB	19.316	0.066	1
1	A	22	ALA	H	8.318	0.002	1
1	A	22	ALA	HA	4.399	0.006	1
1	A	22	ALA	HB1	1.436	0.002	1
1	A	22	ALA	HB2	1.436	0.002	1
1	A	22	ALA	HB3	1.436	0.002	1
1	A	22	ALA	N	127.437	0.007	1
1	A	23	ARG	C	176.081	0.000	1
1	A	23	ARG	CA	56.082	0.009	1
1	A	23	ARG	CB	30.656	0.007	1
1	A	23	ARG	CD	44.047	0.026	1
1	A	23	ARG	CG	27.109	0.075	1
1	A	23	ARG	H	8.256	0.002	1
1	A	23	ARG	HA	4.389	0.006	1
1	A	23	ARG	HB2	1.826	0.001	1
1	A	23	ARG	HB3	1.826	0.001	1
1	A	23	ARG	HD2	3.263	0.001	1
1	A	23	ARG	HD3	3.263	0.001	1
1	A	23	ARG	HG2	1.619	0.004	1
1	A	23	ARG	HG3	1.618	0.004	1
1	A	23	ARG	N	120.778	0.001	1
1	A	24	VAL	C	175.679	0.000	1
1	A	24	VAL	CA	61.975	0.133	1
1	A	24	VAL	CB	32.853	0.003	1
1	A	24	VAL	CG1	21.142	0.002	1
1	A	24	VAL	CG2	21.142	0.002	1
1	A	24	VAL	H	8.124	0.007	1
1	A	24	VAL	HA	4.216	0.005	1
1	A	24	VAL	HB	2.101	0.001	1
1	A	24	VAL	HG11	0.963	0.000	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	24	VAL	HG12	0.963	0.000	1
1	A	24	VAL	HG13	0.963	0.000	1
1	A	24	VAL	HG21	0.963	0.000	1
1	A	24	VAL	HG22	0.963	0.000	1
1	A	24	VAL	HG23	0.963	0.000	1
1	A	24	VAL	N	121.12	0.063	1
1	A	25	SER	C	173.495	0.000	1
1	A	25	SER	CA	55.967	0.017	1
1	A	25	SER	CB	63.924	0.028	1
1	A	25	SER	H	8.427	0.004	1
1	A	25	SER	HA	4.831	0.002	1
1	A	25	SER	HB2	3.95	0.006	2
1	A	25	SER	HB3	3.885	0.014	2
1	A	25	SER	N	120.452	0.001	1
1	A	26	PRO	CA	63.636	0.070	1
1	A	26	PRO	CB	31.882	0.095	1
1	A	26	PRO	CD	50.789	0.020	1
1	A	26	PRO	CG	27.374	0.079	1
1	A	26	PRO	HA	4.458	0.005	1
1	A	26	PRO	HB2	1.692	0.001	2
1	A	26	PRO	HB3	2.227	0.012	2
1	A	26	PRO	HD2	3.843	0.012	2
1	A	26	PRO	HD3	3.803	0.003	2
1	A	26	PRO	HG2	2.065	0.010	1
1	A	26	PRO	HG3	2.026	0.048	1
1	A	27	PHE	C	176.368	0.000	1
1	A	27	PHE	CA	57.958	0.003	1
1	A	27	PHE	CB	39.625	0.147	1
1	A	27	PHE	H	8.073	0.001	1
1	A	27	PHE	HA	4.648	0.010	1
1	A	27	PHE	HB2	3.266	0.006	2
1	A	27	PHE	HB3	3.06	0.002	2
1	A	27	PHE	N	118.782	0.000	1
1	A	28	GLY	C	174.33	0.000	1
1	A	28	GLY	CA	45.395	0.088	1
1	A	28	GLY	H	8.182	0.001	1
1	A	28	GLY	HA2	3.95	0.006	1
1	A	28	GLY	HA3	3.95	0.006	1
1	A	28	GLY	N	109.753	0.004	1
1	A	29	GLY	C	173.78	0.000	1
1	A	29	GLY	CA	44.975	0.042	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	29	GLY	H	7.928	0.003	1
1	A	29	GLY	HA2	3.845	0.004	1
1	A	29	GLY	HA3	3.845	0.004	1
1	A	29	GLY	N	107.86	0.004	1
1	A	30	LEU	C	176.993	0.000	1
1	A	30	LEU	CA	55.899	0.001	1
1	A	30	LEU	CB	42.943	0.055	1
1	A	30	LEU	CD1	24.691	0.001	1
1	A	30	LEU	CD2	24.691	0.001	1
1	A	30	LEU	CG	27.31	0.003	1
1	A	30	LEU	H	7.968	0.001	1
1	A	30	LEU	HA	4.362	0.001	1
1	A	30	LEU	HB2	1.814	0.007	1
1	A	30	LEU	HB3	1.814	0.007	1
1	A	30	LEU	HD11	0.967	0.000	2
1	A	30	LEU	HD12	0.967	0.000	2
1	A	30	LEU	HD13	0.967	0.000	2
1	A	30	LEU	HD21	0.904	0.000	2
1	A	30	LEU	HD22	0.904	0.000	2
1	A	30	LEU	HD23	0.904	0.000	2
1	A	30	LEU	HG	1.482	0.000	1
1	A	30	LEU	N	121.181	0.027	1
1	A	31	LYS	C	176.201	0.000	1
1	A	31	LYS	CA	57.057	0.068	1
1	A	31	LYS	CB	33.188	0.002	1
1	A	31	LYS	CD	29.124	0.108	1
1	A	31	LYS	CE	41.791	0.001	1
1	A	31	LYS	CG	24.988	0.002	1
1	A	31	LYS	H	8.674	0.010	1
1	A	31	LYS	HA	4.33	0.009	1
1	A	31	LYS	HB2	1.801	0.001	1
1	A	31	LYS	HB3	1.801	0.001	1
1	A	31	LYS	HD2	1.698	0.003	1
1	A	31	LYS	HD3	1.698	0.003	1
1	A	31	LYS	HE2	3.052	0.001	1
1	A	31	LYS	HE3	3.052	0.001	1
1	A	31	LYS	HG2	1.489	0.000	1
1	A	31	LYS	HG3	1.489	0.000	1
1	A	31	LYS	N	122.645	0.009	1
1	A	32	ARG	C	175.146	0.000	1
1	A	32	ARG	CA	54.853	0.029	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	32	ARG	CB	32.196	0.022	1
1	A	32	ARG	CD	42.412	0.002	1
1	A	32	ARG	CG	27.244	0.001	1
1	A	32	ARG	H	7.607	0.003	1
1	A	32	ARG	HA	4.261	0.002	1
1	A	32	ARG	HB2	1.729	0.017	1
1	A	32	ARG	HB3	1.729	0.017	1
1	A	32	ARG	HD2	3.041	0.001	1
1	A	32	ARG	HD3	3.041	0.001	1
1	A	32	ARG	HG2	1.446	0.001	1
1	A	32	ARG	HG3	1.446	0.001	1
1	A	32	ARG	N	116.258	0.001	1
1	A	33	LEU	C	176.501	0.000	1
1	A	33	LEU	CA	53.537	0.159	1
1	A	33	LEU	CB	41.434	0.055	1
1	A	33	LEU	CD1	25.233	0.194	1
1	A	33	LEU	CD2	25.233	0.194	1
1	A	33	LEU	H	8.547	0.004	1
1	A	33	LEU	HA	4.435	0.014	1
1	A	33	LEU	HB2	1.795	0.010	1
1	A	33	LEU	HB3	1.795	0.010	1
1	A	33	LEU	HD11	0.711	0.010	1
1	A	33	LEU	HD12	0.711	0.010	1
1	A	33	LEU	HD13	0.711	0.010	1
1	A	33	LEU	HD21	0.707	0.013	1
1	A	33	LEU	HD22	0.707	0.013	1
1	A	33	LEU	HD23	0.707	0.013	1
1	A	33	LEU	HG	1.333	0.000	1
1	A	33	LEU	N	122.179	0.026	1
1	A	34	PRO	C	176.885	0.000	1
1	A	34	PRO	CA	63.031	0.030	1
1	A	34	PRO	CB	31.675	0.232	1
1	A	34	PRO	CD	50.8	0.071	1
1	A	34	PRO	CG	27.356	0.206	1
1	A	34	PRO	HA	4.46	0.009	1
1	A	34	PRO	HB2	2.342	0.006	1
1	A	34	PRO	HB3	2.342	0.006	1
1	A	34	PRO	HD2	3.832	0.040	2
1	A	34	PRO	HD3	3.802	0.004	2
1	A	34	PRO	HG2	2.046	0.043	1
1	A	34	PRO	HG3	2.061	0.023	1

7.1.2   Chemical shift referencing   ⓘ

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction ± precision, *ppm*	Suggested action
$^{13}C_\alpha$	104	-0.46 ± 0.19	None needed (< 0.5 ppm)
$^{13}C_\beta$	92	0.39 ± 0.18	None needed (< 0.5 ppm)
$^{13}C'$	101	-0.60 ± 0.30	None needed (imprecise)
^{15}N	97	-0.34 ± 0.25	None needed (< 0.5 ppm)

7.1.3   Completeness of resonance assignments   ⓘ

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 42%, i.e. 717 atoms were assigned a chemical shift out of a possible 1710. 0 out of 18 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^1H	^{13}C	^{15}N
Backbone	278/570 (49%)	112/232 (48%)	112/228 (49%)	54/110 (49%)
Sidechain	427/1056 (40%)	292/696 (42%)	135/312 (43%)	0/48 (0%)
Aromatic	12/84 (14%)	6/42 (14%)	5/40 (12%)	1/2 (50%)
Overall	717/1710 (42%)	410/970 (42%)	252/580 (43%)	55/160 (34%)
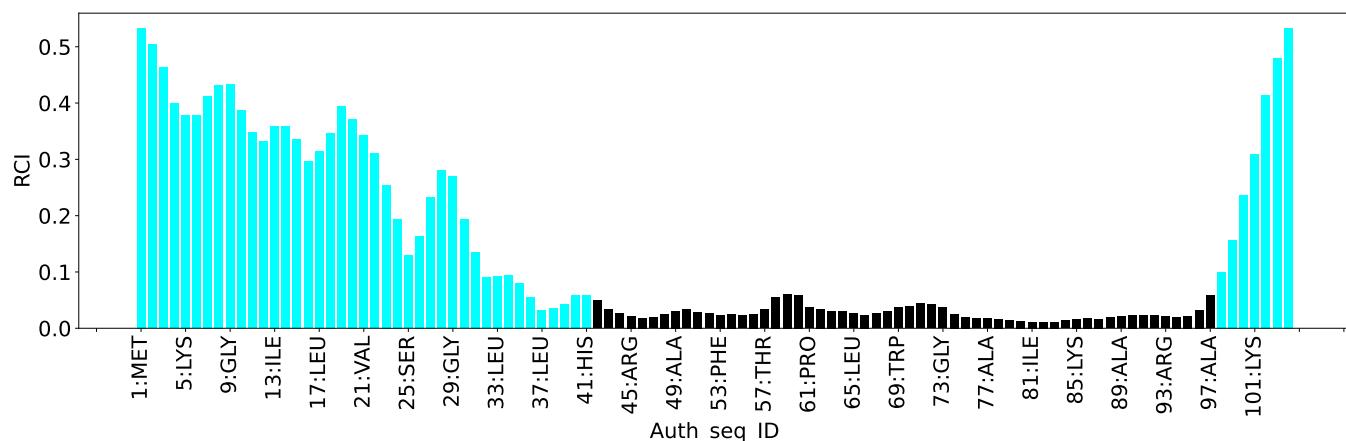
7.1.4   Statistically unusual chemical shifts   ⓘ

There are no statistically unusual chemical shifts.

7.1.5   Random Coil Index (RCI) plots   ⓘ

The image below reports *random coil index* values for the protein chains in the structure. The height of each bar gives a probability of a given residue to be disordered, as predicted from the available chemical shifts and the amino acid sequence. A value above 0.2 is an indication of significant predicted disorder. The colour of the bar shows whether the residue is in the well-defined core (black) or in the ill-defined residue ranges (cyan), as described in section 2 on ensemble composition.If well-defined core and ill-defined regions are not identified then it is shown as gray bars.

Random coil index (RCI) for chain A:

WORLDWIDE
wwPDB
PROTEIN DATA BANK

8 NMR restraints analysis ⓘ

8.1 Conformationally restricting restraints ⓘ

The following table provides the summary of experimentally observed NMR restraints in different categories. Restraints are classified into different categories based on the sequence separation of the atoms involved.

Description	Value
Total distance restraints	2321
Intra-residue ($\|i\text{-}j\|$=0)	724
Sequential ($\|i\text{-}j\|$=1)	598
Medium range ($\|i\text{-}j\|$>1 and $\|i\text{-}j\|$<5)	486
Long range ($\|i\text{-}j\|$≥5)	147
Inter-chain	222
Hydrogen bond restraints	144
Disulfide bond restraints	0
Total dihedral-angle restraints	204
Number of unmapped restraints	0
Number of restraints per residue	12.1
Number of long range restraints per residue[1]	0.7

[1]Long range hydrogen bonds and disulfide bonds are counted as long range restraints while calculating the number of long range restraints per residue

8.2 Residual restraint violations ⓘ

This section provides the overview of the restraint violations analysis. The violations are binned as small, medium and large violations based on its absolute value. Average number of violations per model is calculated by dividing the total number of violations in each bin by the size of the ensemble.

8.2.1 Average number of distance violations per model ⓘ

Distance violations less than 0.1 Å are not included in the calculation.

Bins (Å)	Average number of violations per model	Max (Å)
0.1-0.2 (Small)	23.8	0.2
0.2-0.5 (Medium)	22.6	0.5
>0.5 (Large)	28.0	1.82

8.2.2 Average number of dihedral-angle violations per model ⓘ

Dihedral-angle violations less than 1° are not included in the calculation.

Bins (°)	Average number of violations per model	Max (°)
1.0-10.0 (Small)	35.0	10.0
10.0-20.0 (Medium)	5.7	19.5
>20.0 (Large)	6.5	150.2

9 Distance violation analysis ⓘ
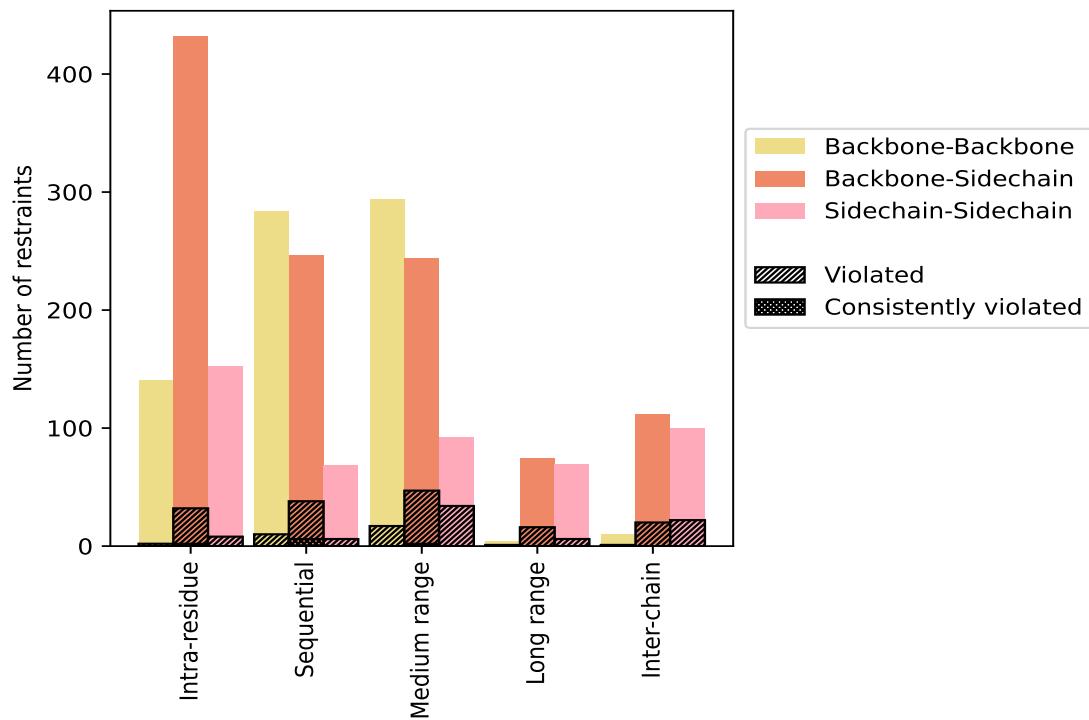
9.1 Summary of distance violations ⓘ

The following table shows the summary of distance violations in different restraint categories based on the sequence separation of the atoms involved. Each category is further sub-divided into three sub-categories based on the atoms involved. Violations less than 0.1 Å are not included in the statistics.

Restraints type	Count	%[1]	Violated[3]			Consistently Violated[4]		
			Count	%[2]	%[1]	Count	%[2]	%[1]
Intra-residue (|i-j|=0)	724	31.2	42	5.8	1.8	2	0.3	0.1
Backbone-Backbone	140	6.0	2	1.4	0.1	0	0.0	0.0
Backbone-Sidechain	432	18.6	32	7.4	1.4	2	0.5	0.1
Sidechain-Sidechain	152	6.5	8	5.3	0.3	0	0.0	0.0
Sequential (|i-j|=1)	598	25.8	54	9.0	2.3	6	1.0	0.3
Backbone-Backbone	284	12.2	10	3.5	0.4	0	0.0	0.0
Backbone-Sidechain	246	10.6	38	15.4	1.6	6	2.4	0.3
Sidechain-Sidechain	68	2.9	6	8.8	0.3	0	0.0	0.0
Medium range (|i-j|>1 & |i-j|<5)	486	20.9	92	18.9	4.0	2	0.4	0.1
Backbone-Backbone	150	6.5	11	7.3	0.5	0	0.0	0.0
Backbone-Sidechain	244	10.5	47	19.3	2.0	2	0.8	0.1
Sidechain-Sidechain	92	4.0	34	37.0	1.5	0	0.0	0.0
Long range (|i-j|≥5)	147	6.3	23	15.6	1.0	0	0.0	0.0
Backbone-Backbone	4	0.2	1	25.0	0.0	0	0.0	0.0
Backbone-Sidechain	74	3.2	16	21.6	0.7	0	0.0	0.0
Sidechain-Sidechain	69	3.0	6	8.7	0.3	0	0.0	0.0
Inter-chain	222	9.6	43	19.4	1.9	0	0.0	0.0
Backbone-Backbone	10	0.4	1	10.0	0.0	0	0.0	0.0
Backbone-Sidechain	112	4.8	20	17.9	0.9	0	0.0	0.0
Sidechain-Sidechain	100	4.3	22	22.0	0.9	0	0.0	0.0
Hydrogen bond	144	6.2	6	4.2	0.3	0	0.0	0.0
Disulfide bond	0	0.0	0	0.0	0.0	0	0.0	0.0
Total	2321	100.0	260	11.2	11.2	10	0.4	0.4
Backbone-Backbone	732	31.5	31	4.2	1.3	0	0.0	0.0
Backbone-Sidechain	1108	47.7	153	13.8	6.6	10	0.9	0.4
Sidechain-Sidechain	481	20.7	76	15.8	3.3	0	0.0	0.0

[1] percentage calculated with respect to the total number of distance restraints, [2] percentage calculated with respect to the number of restraints in a particular restraint category, [3] violated in at least one model, [4] violated in all the models

9.1.1   Bar chart : Distribution of distance restraints and violations ⓘ

Violated and consistently violated restraints are shown using different hatch patterns in their respective categories. The hydrogen bonds and disulfied bonds are counted in their appropriate category on the x-axis

9.2   Distance violation statistics for each model ⓘ

The following table provides the distance violation statistics for each model in the ensemble. Violations less than 0.1 Å are not included in the statistics.

Model ID	Number of violations						Mean (Å)	Max (Å)	SD[6] (Å)	Median (Å)
	IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total				
1	10	14	24	9	16	73	0.52	1.52	0.44	0.36
2	8	14	32	8	14	76	0.59	1.71	0.42	0.46
3	8	14	30	4	6	62	0.57	1.67	0.5	0.34
4	6	10	30	2	8	56	0.48	1.57	0.44	0.34
5	18	16	23	2	22	81	0.58	1.62	0.45	0.44
6	14	10	36	4	11	75	0.58	1.64	0.43	0.43
7	12	20	46	5	10	93	0.52	1.33	0.4	0.37
8	14	20	30	4	12	80	0.54	1.82	0.42	0.44
9	12	24	20	8	9	73	0.48	1.56	0.43	0.26
10	12	14	28	0	14	68	0.54	1.58	0.43	0.41
11	10	16	34	4	15	79	0.49	1.5	0.45	0.25
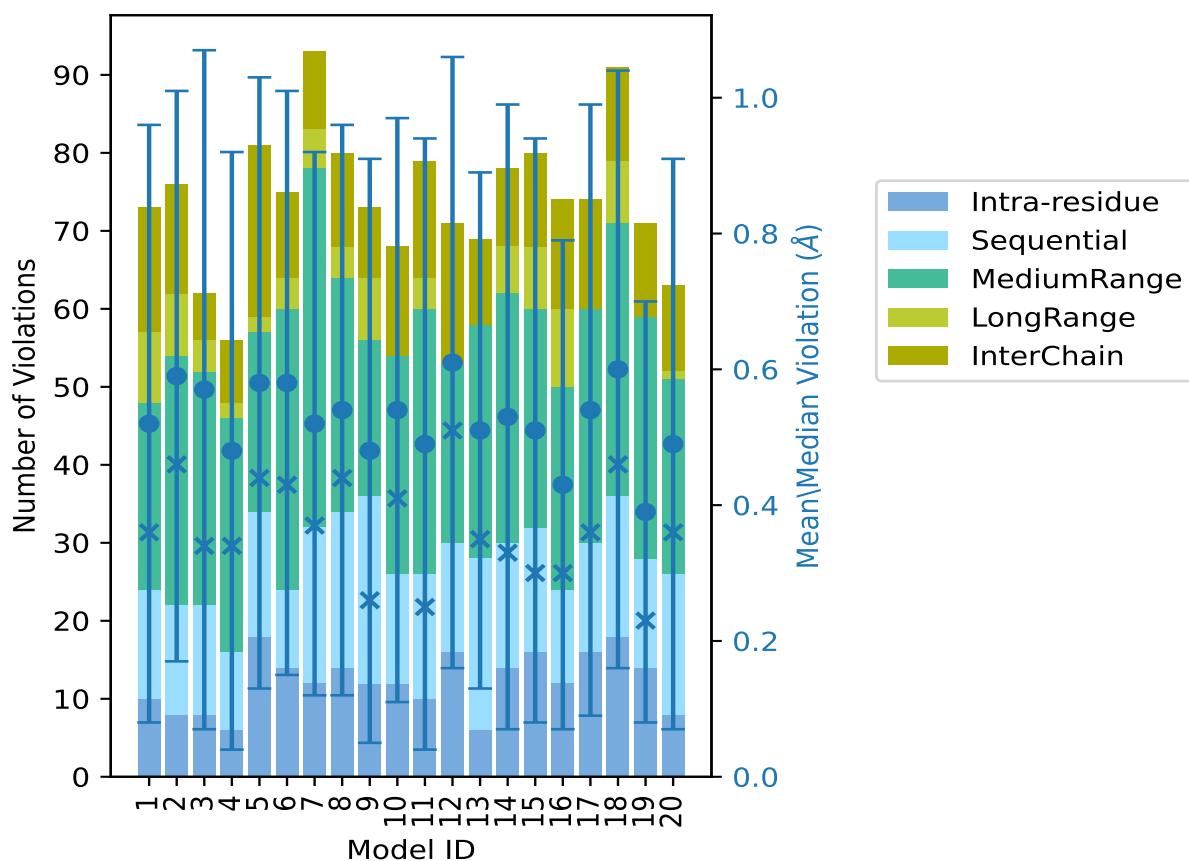
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Model ID	Number of violations						Mean (Å)	Max (Å)	SD[6] (Å)	Median (Å)
	IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total				
12	16	14	23	0	18	71	0.61	1.76	0.45	0.51
13	6	22	30	0	11	69	0.51	1.41	0.38	0.35
14	14	16	32	6	10	78	0.53	1.63	0.46	0.33
15	16	16	28	8	12	80	0.51	1.56	0.43	0.3
16	12	12	26	10	14	74	0.43	1.58	0.36	0.3
17	16	14	30	0	14	74	0.54	1.82	0.45	0.36
18	18	18	35	8	12	91	0.6	1.7	0.44	0.46
19	14	14	31	0	12	71	0.39	1.33	0.31	0.23
20	8	18	25	1	11	63	0.49	1.57	0.42	0.36

[1]Intra-residue restraints, [2]Sequential restraints, [3]Medium range restraints, [4]Long range restraints, [5]Inter-chain restraints, [6]Standard deviation

9.2.1 Bar graph : Distance Violation statistics for each model ⓘ

The mean(dot),median(x) and the standard deviation are shown in blue with respect to the y axis on the right

9.3   Distance violation statistics for the ensemble ⓘ
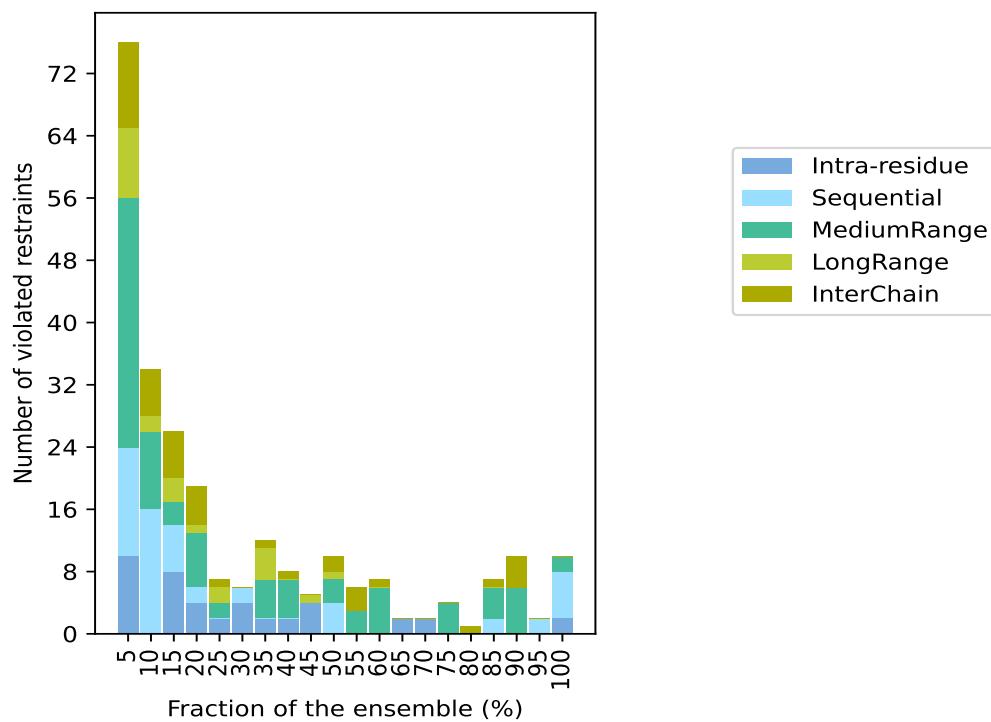
Violation analysis may find that some restraints are violated in few models and some are violated in most of models. The following table provides this information as number of violated restraints for a given fraction of the ensemble. In total, 1923(IR:682, SQ:544, MR:394, LR:124, IC:179) restraints are not violated in the ensemble.

Number of violated restraints						Fraction of the ensemble	
IR[1]	SQ[2]	MR[3]	LR[4]	IC[5]	Total	Count[6]	%
10	14	32	9	11	76	1	5.0
0	16	10	2	6	34	2	10.0
8	6	3	3	6	26	3	15.0
4	2	7	1	5	19	4	20.0
2	0	2	2	1	7	5	25.0
4	2	0	0	0	6	6	30.0
2	0	5	4	1	12	7	35.0
2	0	5	0	1	8	8	40.0
4	0	0	1	0	5	9	45.0
0	4	3	1	2	10	10	50.0
0	0	3	0	3	6	11	55.0
0	0	6	0	1	7	12	60.0
2	0	0	0	0	2	13	65.0
2	0	0	0	0	2	14	70.0
0	0	4	0	0	4	15	75.0
0	0	0	0	1	1	16	80.0
0	2	4	0	1	7	17	85.0
0	0	6	0	4	10	18	90.0
0	2	0	0	0	2	19	95.0
2	6	2	0	0	10	20	100.0

[1]Intra-residue restraints, [2]Sequential restraints, [3]Medium range restraints, [4]Long range restraints, [5]Inter-chain restraints, [6] Number of models with violations
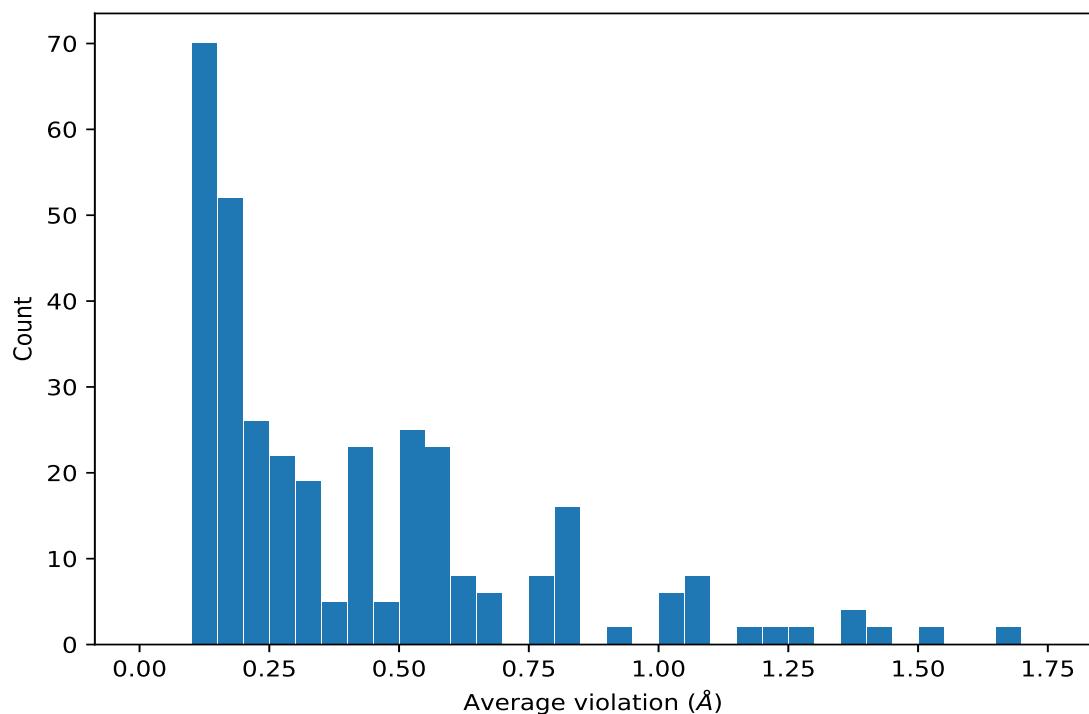
9.3.1 Bar graph : Distance violation statistics for the ensemble ⓘ

9.4 Most violated distance restraints in the ensemble ⓘ

9.4.1 Histogram : Distribution of mean distance violations ⓘ

The following histogram shows the distribution of the average value of the violation. The average is calculated for each restraint that is violated in more than one model over all the violated models in the ensemble

9.4.2　Table: Most violated distance restraints　ⓘ

The following table provides the mean and the standard deviation of the violations for the 10 worst performing restraints, sorted by number of violated models and the mean violation value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint. Rows with same key represent combinatorial or ambiguous restraints and are counted as a single restraint.
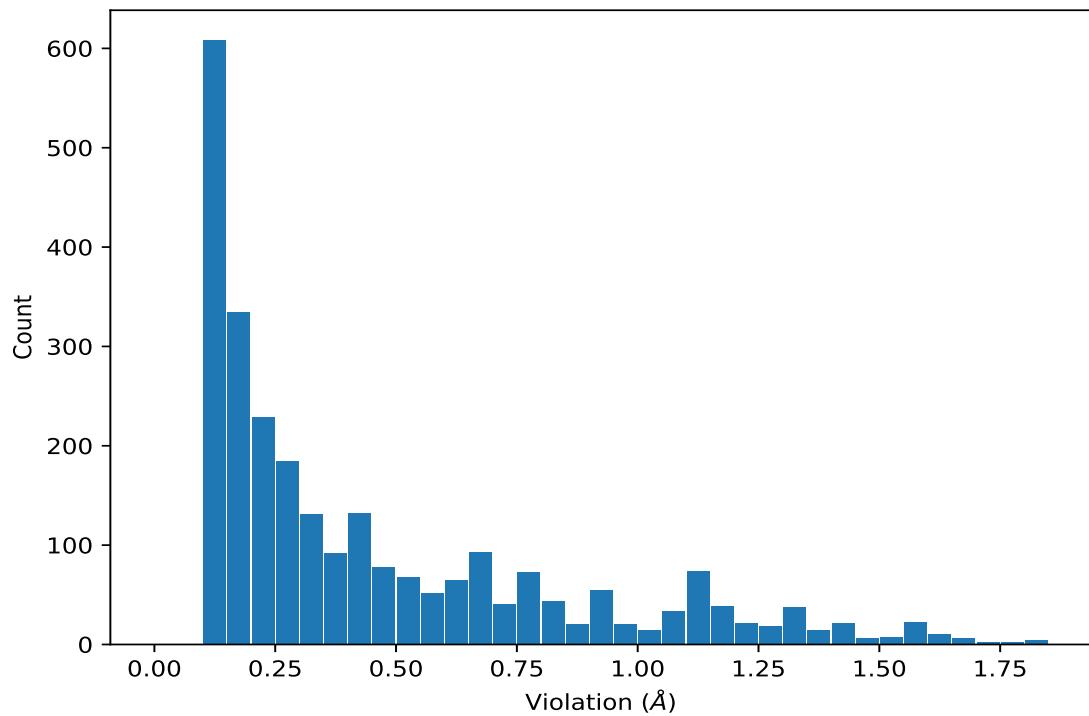
Key	Atom-1	Atom-2	Models[1]	Mean (Å)	SD[1] (Å)	Median (Å)
(3,1404)	1:B:78:MET:HB3	1:B:77:ALA:H	20	1.08	0.05	1.1
(3,1403)	1:A:78:MET:HB3	1:A:77:ALA:H	20	1.08	0.05	1.1
(3,1367)	1:A:77:ALA:HA	1:A:80:ILE:HG12	20	0.54	0.14	0.51
(3,1368)	1:B:77:ALA:HA	1:B:80:ILE:HG12	20	0.54	0.15	0.51
(3,264)	1:B:52:ALA:H	1:B:51:LEU:HB2	20	0.34	0.04	0.34
(3,263)	1:A:52:ALA:H	1:A:51:LEU:HB2	20	0.34	0.05	0.34
(3,131)	1:A:84:PHE:H	1:A:85:LYS:HB3	20	0.26	0.07	0.25
(3,132)	1:B:84:PHE:H	1:B:85:LYS:HB3	20	0.25	0.07	0.24
(3,1467)	1:A:63:LEU:HA	1:A:63:LEU:HB2	20	0.18	0.01	0.18
(3,1468)	1:B:63:LEU:HA	1:B:63:LEU:HB2	20	0.18	0.01	0.18

[1]Number of violated models, [2]Standard deviation

9.5 All violated distance restraints ⓘ

9.5.1 Histogram : Distribution of distance violations ⓘ

The following histogram shows the distribution of the absolute value of the violation for all violated restraints in the ensemble.

9.5.2 Table : All distance violations ⓘ

The following table provides the 10 worst performing restraints, sorted by the violation value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint. Rows with same key represent combinatorial or ambiguous restraints and are counted as a single restraint.

| Key	Atom-1	Atom-2	Model ID	Violation (Å)
(3,8)	1:B:102:LYS:H	1:B:99:LYS:HB2	17	1.82
(3,7)	1:A:102:LYS:H	1:A:99:LYS:HB2	17	1.82
(3,514)	1:B:101:LYS:H	1:B:99:LYS:HB2	8	1.82
(3,513)	1:A:101:LYS:H	1:A:99:LYS:HB2	8	1.81
(3,250)	1:B:58:ALA:H	1:A:46:MET:HG2	12	1.76
(3,249)	1:A:58:ALA:H	1:B:46:MET:HG2	12	1.76
(3,880)	1:B:47:VAL:HA	1:B:68:ARG:HD2	2	1.71
(3,879)	1:A:47:VAL:HA	1:A:68:ARG:HD2	2	1.71
(3,880)	1:B:47:VAL:HA	1:B:68:ARG:HD2	18	1.7
(3,879)	1:A:47:VAL:HA	1:A:68:ARG:HD2	18	1.7

10 Dihedral-angle violation analysis ⓘ
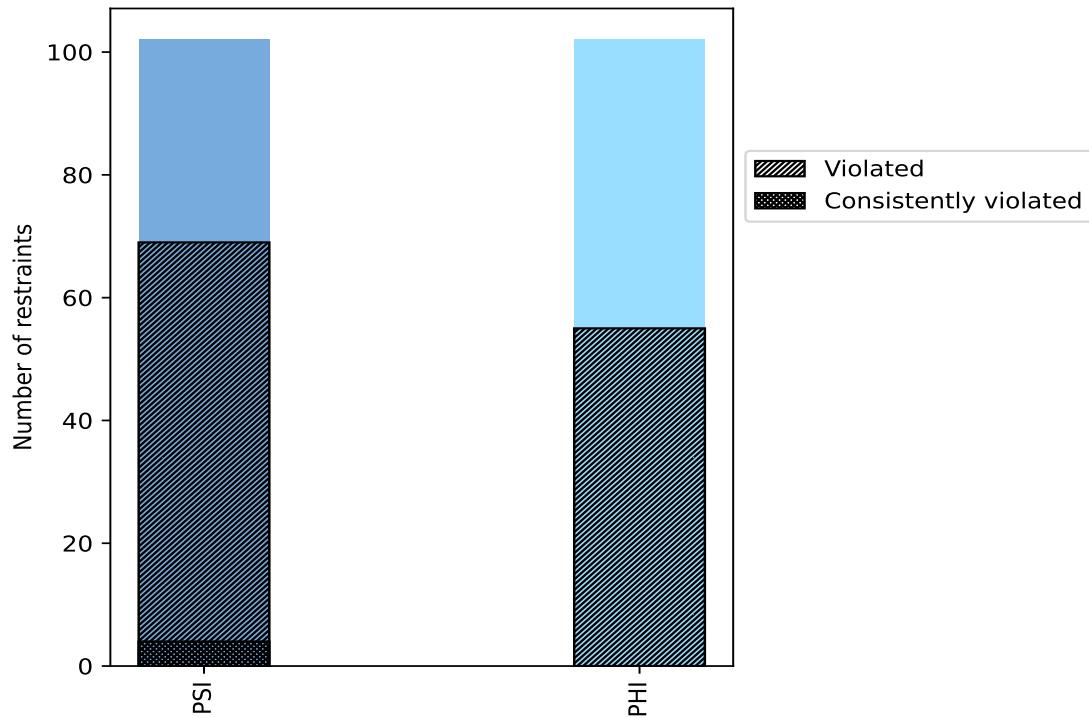
10.1 Summary of dihedral-angle violations ⓘ

The following table provides the summary of dihedral-angle violations in different dihedral-angle types. Violations less than 1° are not included in the calculation.

Angle type	Count	$\%^1$	Violated[3]			Consistently Violated[4]		
			Count	$\%^2$	$\%^1$	Count	$\%^2$	$\%^1$
PSI	102	50.0	69	67.6	33.8	4	3.9	2.0
PHI	102	50.0	55	53.9	27.0	0	0.0	0.0
Total	204	100.0	124	60.8	60.8	4	2.0	2.0

[1] percentage calculated with respect to total number of dihedral-angle restraints, [2] percentage calculated with respect to number of restraints in a particular dihedral-angle type, [3] violated in at least one model, [4] violated in all the models

### 10.1.1 Bar chart : Distribution of dihedral-angles and violations ⓘ
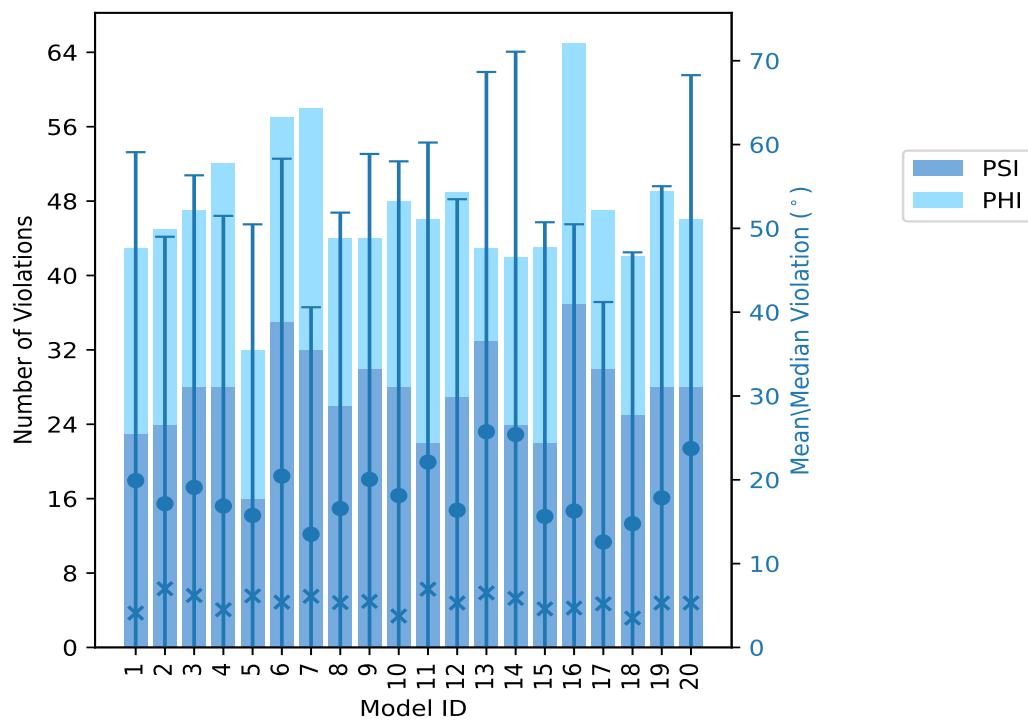
Violated and consistently violated restraints are shown using different hatch patterns in their respective categories

10.2   Dihedral-angle violation statistics for each model ⓘ

The following table provides the dihedral-angle violation statistics for each model in the ensemble. Violations less than 1° are not included in the statistics.

Model ID	Number of violations			Mean (°)	Max (°)	SD (°)	Median (°)
	PSI	PHI	Total				
1	23	20	43	19.91	146.0	39.18	4.1
2	24	21	45	17.15	133.2	31.85	7.0
3	28	19	47	19.1	142.6	37.23	6.2
4	28	24	52	16.87	144.6	34.62	4.5
5	16	16	32	15.75	149.0	34.73	6.15
6	35	22	57	20.44	145.2	37.87	5.4
7	32	26	58	13.5	144.4	27.09	6.1
8	26	18	44	16.57	142.6	35.31	5.35
9	30	14	44	20.05	140.9	38.83	5.5
10	28	20	48	18.12	146.3	39.88	3.75
11	22	24	46	22.11	147.6	38.13	6.95
12	27	22	49	16.37	148.6	37.11	5.3
13	33	10	43	25.74	139.4	42.92	6.5
14	24	18	42	25.4	146.6	45.68	5.85
15	22	21	43	15.63	142.6	35.1	4.6
16	37	28	65	16.28	150.2	34.21	4.7
17	30	17	47	12.58	145.8	28.63	5.2
18	25	17	42	14.76	143.6	32.38	3.5
19	28	21	49	17.85	143.3	37.18	5.3
20	28	18	46	23.73	144.3	44.55	5.3

10.2.1   Bar graph : Dihedral violation statistics for each model ⓘ

The mean(dot),median(x) and the standard deviation are shown in blue with respect to the y axis on the right

10.3   Dihedral-angle violation statistics for the ensemble ⓘ

Violation analysis may find that some restraints are violated in very few models and some are violated in most of models. The following table provides this information as number of violated restraints for a given fraction of ensemble.

Number of violated restraints			Fraction of the ensemble	
PSI	PHI	Total	Count[1]	%
10	1	11	1	5.0
11	11	22	2	10.0
2	8	10	3	15.0
0	7	7	4	20.0
6	0	6	5	25.0
0	0	0	6	30.0
8	4	12	7	35.0
1	0	1	8	40.0
9	5	14	9	45.0
0	1	1	10	50.0
4	5	9	11	55.0
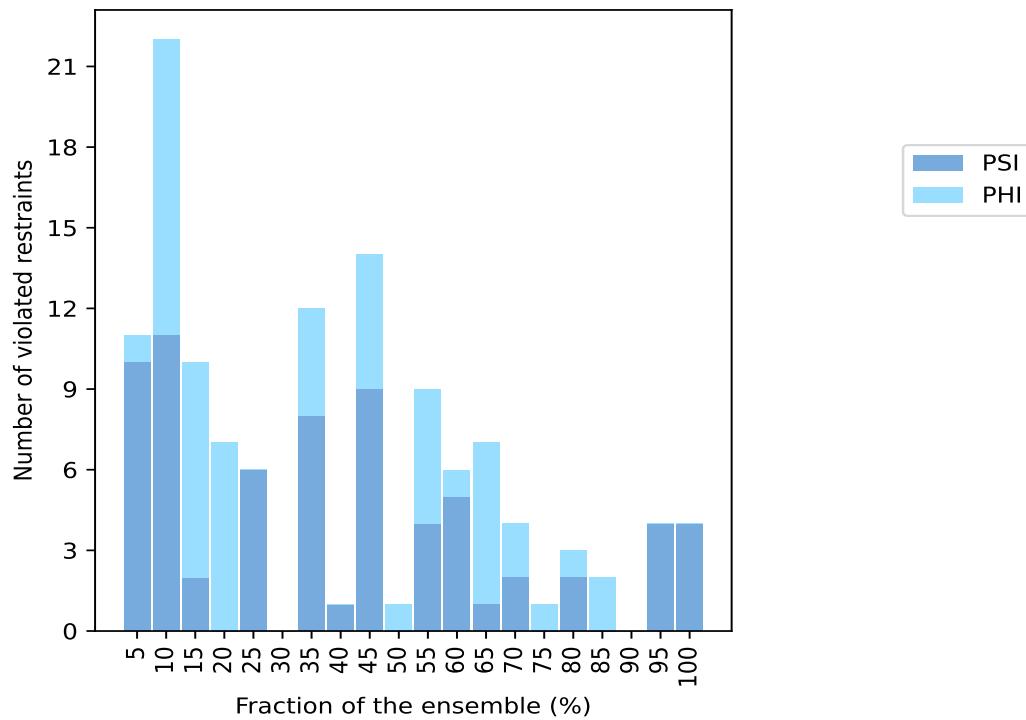
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Number of violated restraints			Fraction of the ensemble	
PSI	PHI	Total	Count[1]	%
5	1	6	12	60.0
1	6	7	13	65.0
2	2	4	14	70.0
0	1	1	15	75.0
2	1	3	16	80.0
0	2	2	17	85.0
0	0	0	18	90.0
4	0	4	19	95.0
4	0	4	20	100.0

[1] Number of models with violations

10.3.1 Bar graph : Dihedral-angle Violation statistics for the ensemble ⓘ
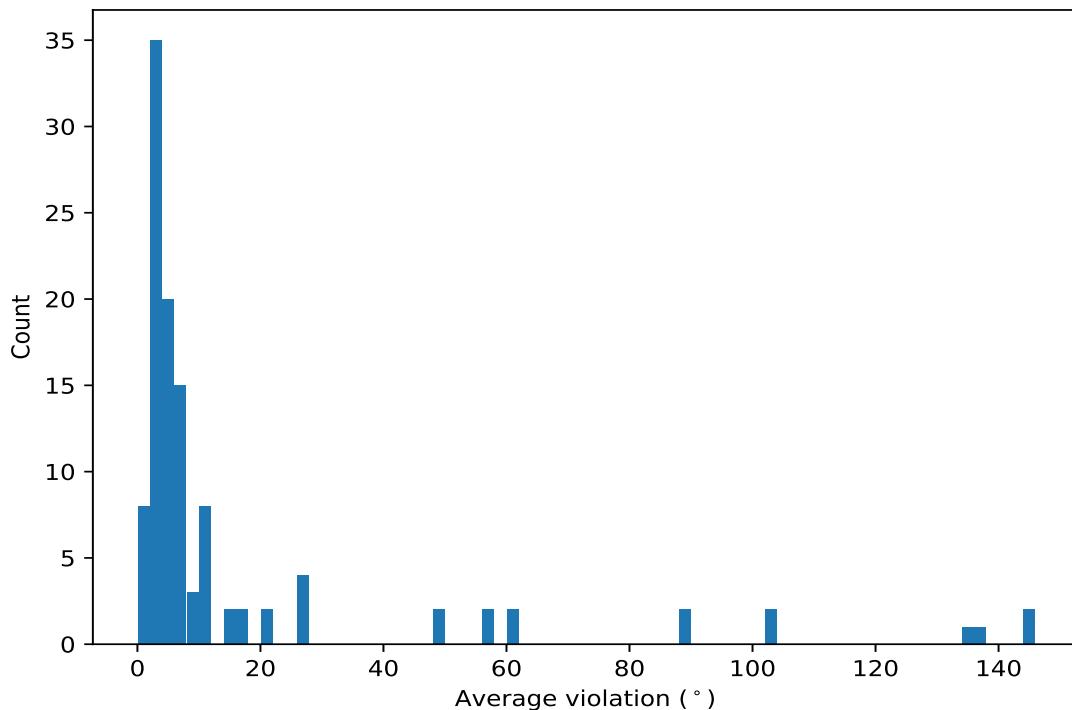
10.4 Most violated dihedral-angle restraints in the ensemble ⓘ

10.4.1 Histogram : Distribution of mean dihedral-angle violations ⓘ

The following histogram shows the distribution of the average value of the violation. The average is calculated for each restraint that is violated in more than one model over all the violated models

in the ensemble

10.4.2 Table: Most violated dihedral-angle restraints ⓘ

The following table provides the mean and the standard deviation of the violations for the 10 worst performing restraints, sorted by number of violated models and the mean violation value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint.
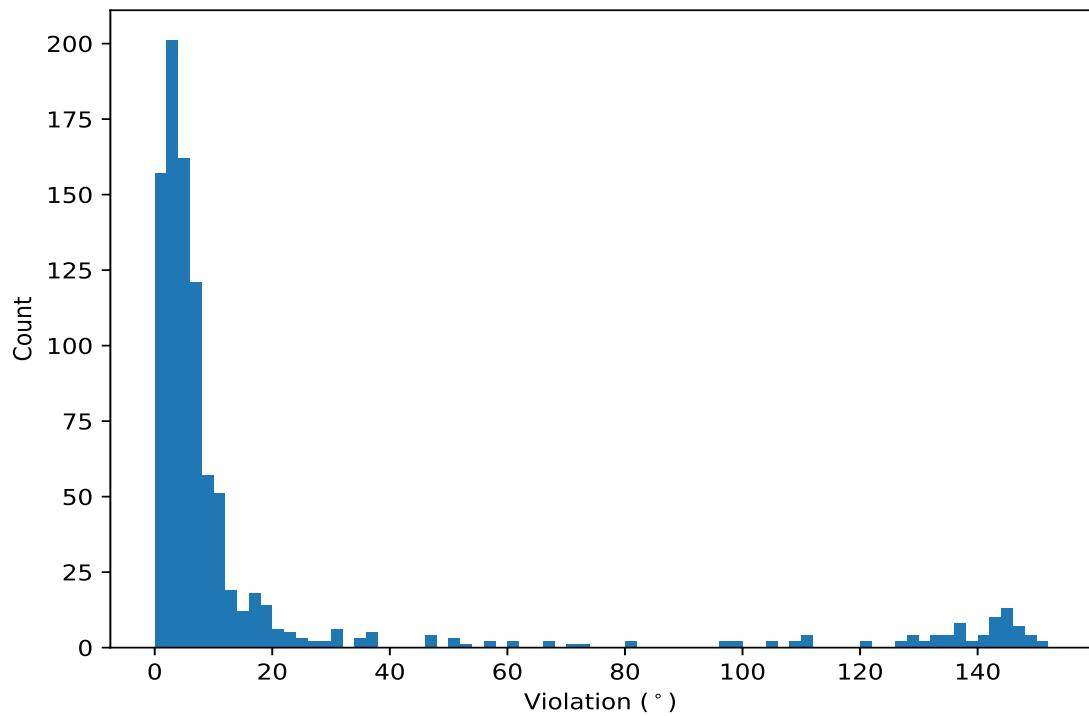
Key	Atom-1	Atom-2	Atom-3	Atom-4	Models[1]	Mean	SD[2]	Median
(1,27)	1:A:44:ILE:N	1:A:44:ILE:CA	1:A:44:ILE:C	1:A:45:ARG:N	20	144.24	3.66	144.35
(1,28)	1:B:44:ILE:N	1:B:44:ILE:CA	1:B:44:ILE:C	1:B:45:ARG:N	20	144.18	3.7	144.45
(1,55)	1:A:53:PHE:N	1:A:53:PHE:CA	1:A:53:PHE:C	1:A:54:LEU:N	20	6.36	2.34	6.1
(1,56)	1:B:53:PHE:N	1:B:53:PHE:CA	1:B:53:PHE:C	1:B:54:LEU:N	20	6.32	2.37	6.1
(1,19)	1:A:41:HIS:N	1:A:41:HIS:CA	1:A:41:HIS:C	1:A:42:GLY:N	19	27.41	16.75	27.3
(1,20)	1:B:41:HIS:N	1:B:41:HIS:CA	1:B:41:HIS:C	1:B:42:GLY:N	19	27.29	16.77	27.0
(1,191)	1:A:94:ILE:N	1:A:94:ILE:CA	1:A:94:ILE:C	1:A:95:ILE:N	19	7.1	3.17	6.8
(1,192)	1:B:94:ILE:N	1:B:94:ILE:CA	1:B:94:ILE:C	1:B:95:ILE:N	19	7.07	3.13	6.9
(1,193)	1:A:94:ILE:C	1:A:95:ILE:N	1:A:95:ILE:CA	1:A:95:ILE:C	17	3.76	1.6	3.5
(1,194)	1:B:94:ILE:C	1:B:95:ILE:N	1:B:95:ILE:CA	1:B:95:ILE:C	17	3.75	1.64	3.4

[1] Number of violated models, [2]Standard deviation, All angle values are in degree (°)

10.5 All violated dihedral-angle restraints ⓘ

10.5.1 Histogram : Distribution of violations ⓘ

The following histogram shows the distribution of the absolute value of the violation for all violated restraints in the ensemble.

10.5.2 Table: All violated dihedral-angle restraints ⓘ

The following table provides the list of violationsfor the 10 worst performing restraints, sorted by the violation value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint.

Key	Atom-1	Atom-2	Atom-3	Atom-4	Model ID	Violation (°)
(1,28)	1:B:44:ILE:N	1:B:44:ILE:CA	1:B:44:ILE:C	1:B:45:ARG:N	16	150.2
(1,27)	1:A:44:ILE:N	1:A:44:ILE:CA	1:A:44:ILE:C	1:A:45:ARG:N	16	150.2
(1,28)	1:B:44:ILE:N	1:B:44:ILE:CA	1:B:44:ILE:C	1:B:45:ARG:N	5	149.0
(1,27)	1:A:44:ILE:N	1:A:44:ILE:CA	1:A:44:ILE:C	1:A:45:ARG:N	5	149.0
(1,28)	1:B:44:ILE:N	1:B:44:ILE:CA	1:B:44:ILE:C	1:B:45:ARG:N	12	148.6
(1,27)	1:A:44:ILE:N	1:A:44:ILE:CA	1:A:44:ILE:C	1:A:45:ARG:N	12	148.6
(1,27)	1:A:44:ILE:N	1:A:44:ILE:CA	1:A:44:ILE:C	1:A:45:ARG:N	11	147.6
(1,28)	1:B:44:ILE:N	1:B:44:ILE:CA	1:B:44:ILE:C	1:B:45:ARG:N	11	147.4
(1,27)	1:A:44:ILE:N	1:A:44:ILE:CA	1:A:44:ILE:C	1:A:45:ARG:N	14	146.6
(1,28)	1:B:44:ILE:N	1:B:44:ILE:CA	1:B:44:ILE:C	1:B:45:ARG:N	14	146.4