



Full wwPDB NMR Structure Validation Report ⓘ

Dec 25, 2024 – 08:20 PM EST

PDB ID : 8VOH
BMRB ID : 31138
Title : HADDOCK models of human alphaM I-domain bound to the the N-terminal domain of the cytokine pleiotrophin
Authors : Wang, X.; Nguyen, H.
Deposited on : 2024-01-15

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A user guide is available at

<https://www.wwpdb.org/validation/2017/NMRValidationReportHelp>

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 : 4.02b-467
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
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) : 2.40

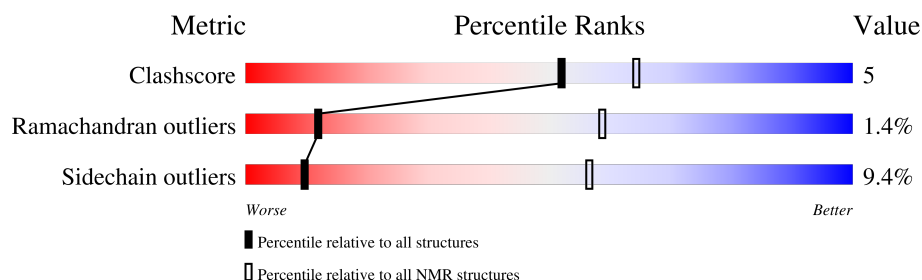
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment is 64%.

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	210492	14027
Ramachandran outliers	207382	12486
Sidechain outliers	206894	12463

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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	194	
2	B	58	

2 Ensemble composition and analysis

This entry contains 10 models. Model 8 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *target function*.

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:131-A:316 (186)	0.16	8
2	B:1-B:58 (58)	0.14	7

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 1 clusters and 1 single-model cluster was found.

Cluster number	Models
1	1, 2, 3, 4, 5, 6, 7, 8, 10
Single-model clusters	9

3 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 4034 atoms, of which 2025 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Integrin alpha-M.

Mol	Chain	Residues	Atoms						Trace
1	A	194	Total	C	H	N	O	S	0
			3149	995	1582	277	292	3	

- Molecule 2 is a protein called Pleiotrophin.

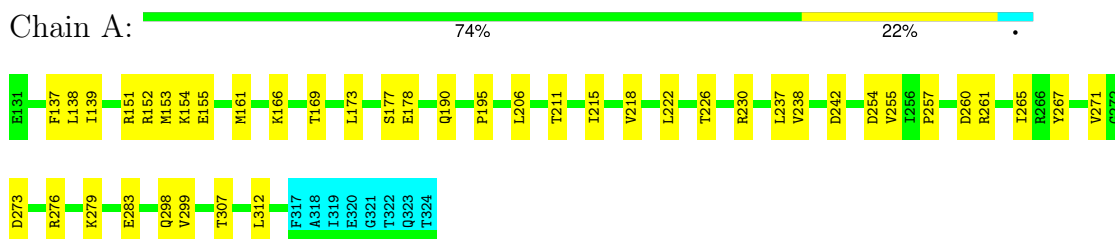
Mol	Chain	Residues	Atoms						Trace
2	B	58	Total	C	H	N	O	S	0
			885	267	443	83	85	7	

4 Residue-property plots

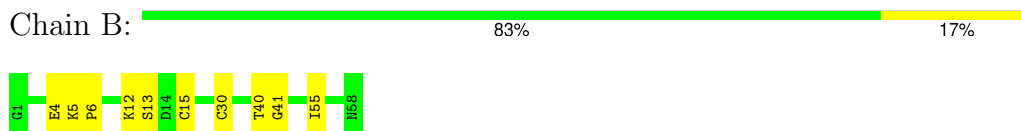
4.1 Average score per residue in the NMR ensemble

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: Integrin alpha-M



- Molecule 2: Pleiotrophin

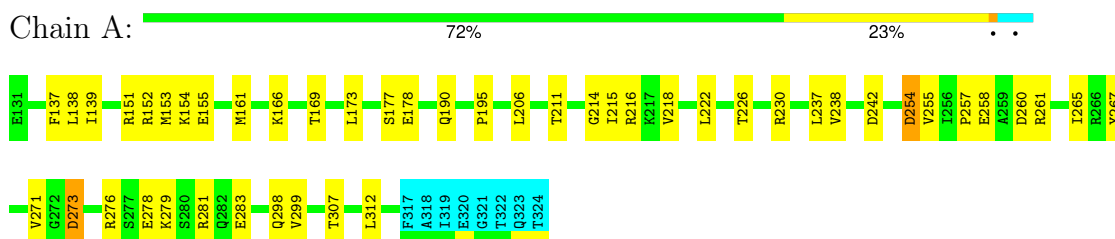


4.2 Scores per residue for each member of the ensemble

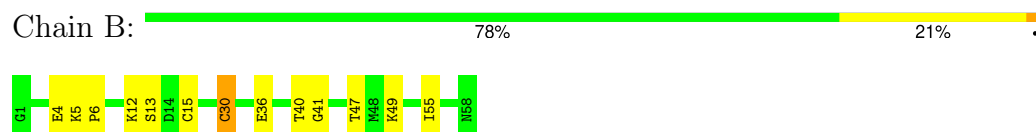
Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

- Molecule 1: Integrin alpha-M

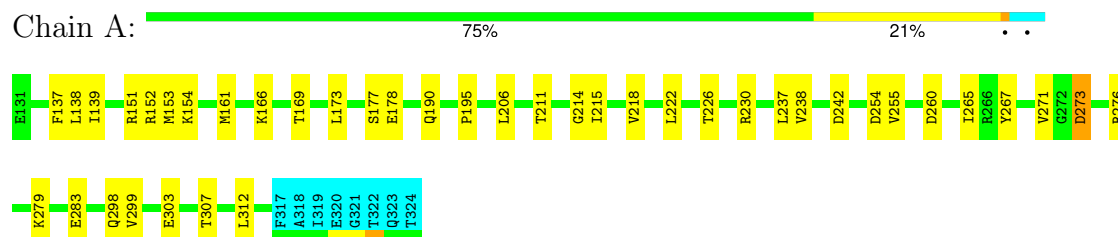


- Molecule 2: Pleiotrophin

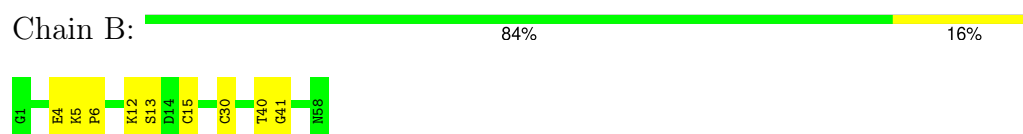


4.2.2 Score per residue for model 2

- Molecule 1: Integrin alpha-M

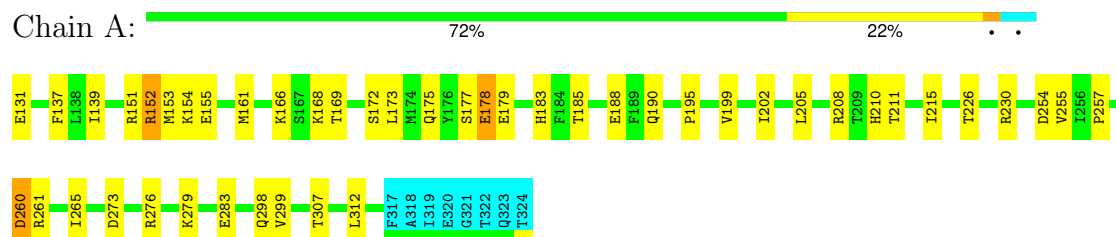


- Molecule 2: Pleiotrophin

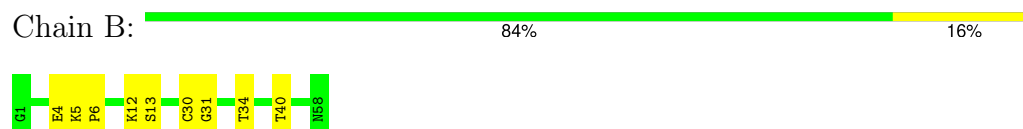


4.2.3 Score per residue for model 3

- Molecule 1: Integrin alpha-M

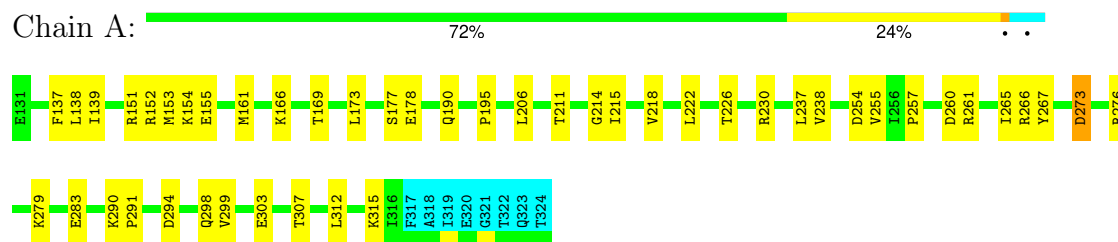


- Molecule 2: Pleiotrophin

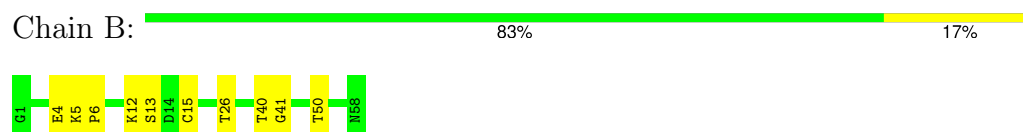


4.2.4 Score per residue for model 4

- Molecule 1: Integrin alpha-M

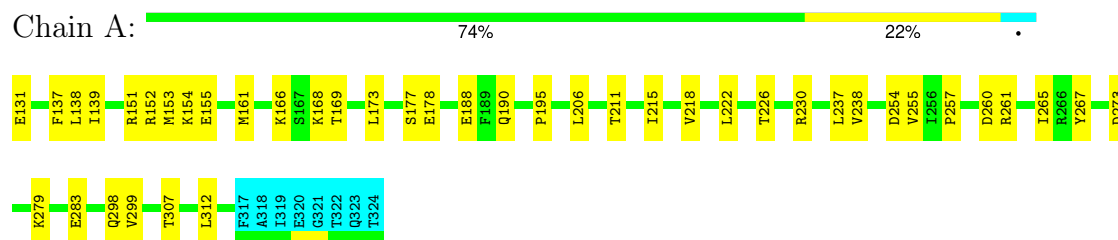


- Molecule 2: Pleiotrophin

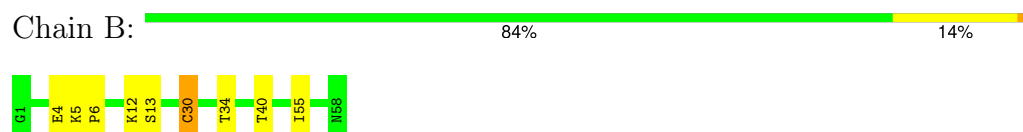


4.2.5 Score per residue for model 5

- Molecule 1: Integrin alpha-M

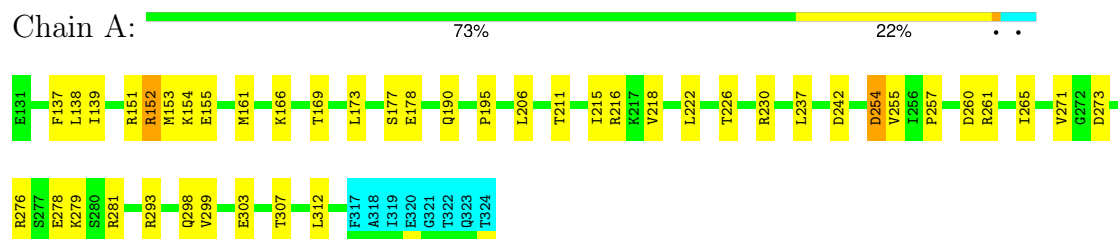


- Molecule 2: Pleiotrophin

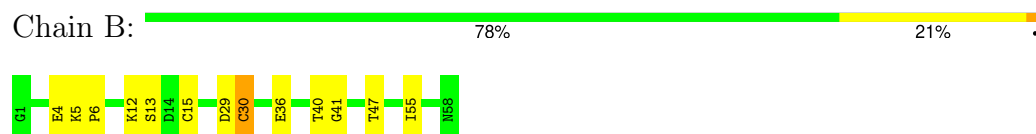


4.2.6 Score per residue for model 6

- Molecule 1: Integrin alpha-M

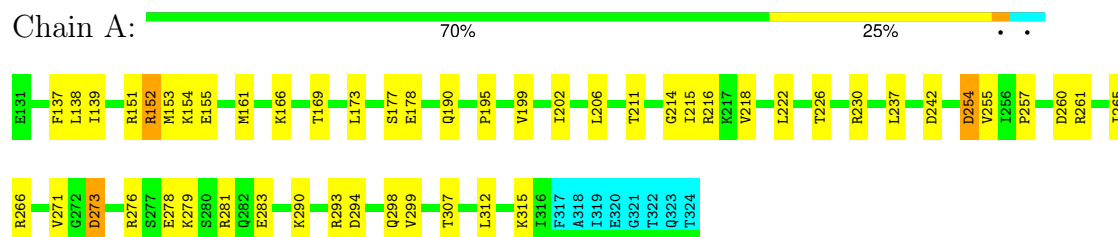


- Molecule 2: Pleiotrophin

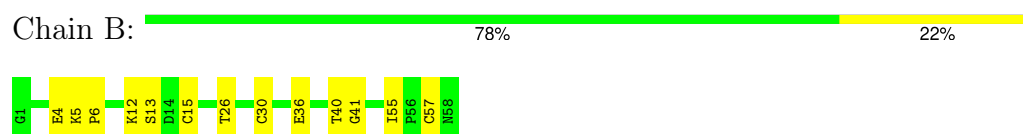


4.2.7 Score per residue for model 7

- Molecule 1: Integrin alpha-M

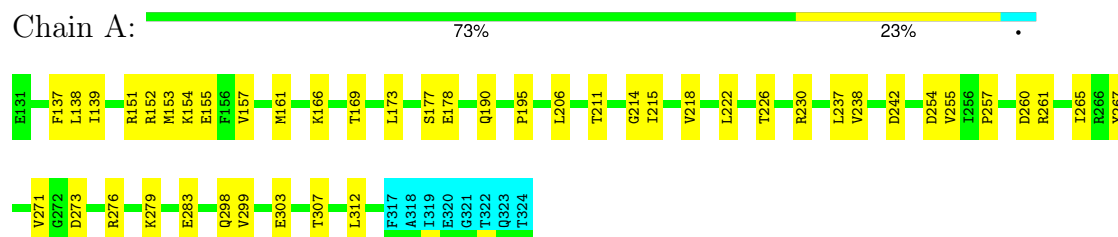


- Molecule 2: Pleiotrophin

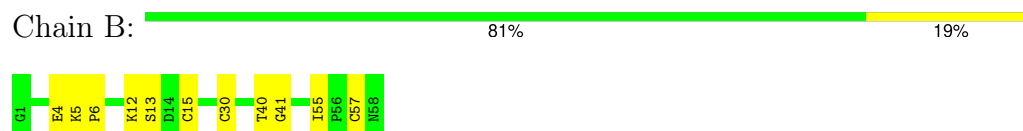


4.2.8 Score per residue for model 8 (medoid)

- Molecule 1: Integrin alpha-M

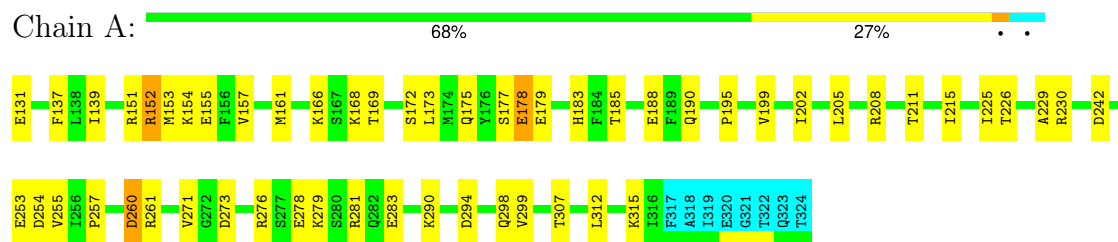


- Molecule 2: Pleiotrophin

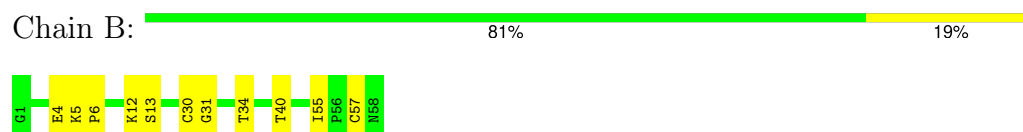


4.2.9 Score per residue for model 9

- Molecule 1: Integrin alpha-M

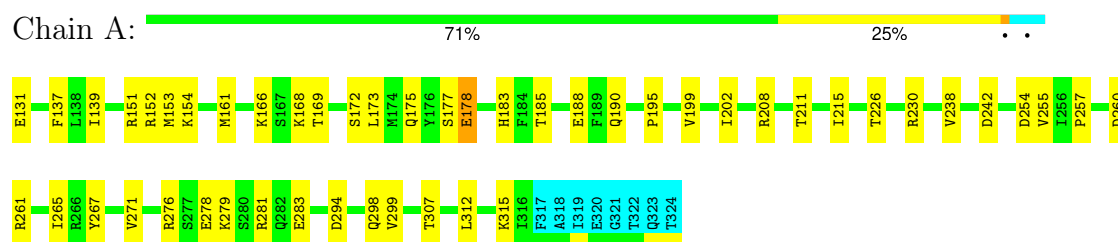


- Molecule 2: Pleiotrophin

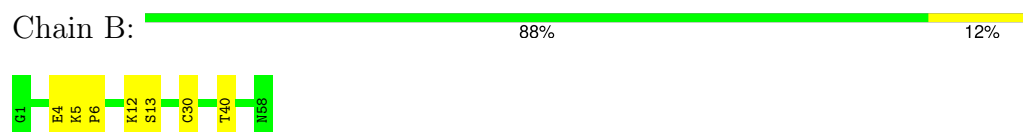


4.2.10 Score per residue for model 10

- Molecule 1: Integrin alpha-M



- Molecule 2: Pleiotrophin



5 Refinement protocol and experimental data overview

The models were refined using the following method: *simulated annealing*.

Of the 200 calculated structures, 10 were deposited, based on the following criterion: *target function*.

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

Software name	Classification	Version
HADDOCK	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	2251
Number of shifts mapped to atoms	2251
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	64%

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	1507	1526	1522	18±3
2	B	442	443	445	3±1
All	All	19490	19690	19670	205

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 5.

All unique clashes are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:215:ILE:HG23	1:A:255:VAL:HG11	0.70	1.64	5	10
1:A:138:LEU:HD23	1:A:237:LEU:HD11	0.63	1.69	2	7
1:A:139:ILE:HB	1:A:153:MET:SD	0.62	2.35	3	10
2:B:30:CYS:HA	2:B:55:ILE:HD13	0.62	1.72	1	5
1:A:151:ARG:O	1:A:154:LYS:HG2	0.62	1.95	5	10
1:A:166:LYS:HB2	1:A:169:THR:OG1	0.61	1.95	9	8
1:A:131:GLU:OE2	1:A:168:LYS:HD2	0.59	1.96	9	4
1:A:257:PRO:O	1:A:261:ARG:HG3	0.56	2.01	1	9
1:A:152:ARG:HA	1:A:155:GLU:CD	0.56	2.21	3	4
1:A:211:THR:O	1:A:215:ILE:HG22	0.55	2.02	5	10
1:A:166:LYS:HE3	1:A:169:THR:OG1	0.54	2.02	2	7
1:A:137:PHE:O	1:A:173:LEU:HD12	0.53	2.04	6	10
1:A:161:MET:SD	1:A:195:PRO:HB3	0.52	2.45	2	10

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:238:VAL:HG12	1:A:267:TYR:HB2	0.50	1.84	2	6
1:A:178:GLU:OE1	1:A:208:ARG:HG2	0.50	2.07	9	3
1:A:218:VAL:HG13	1:A:222:LEU:HD12	0.50	1.84	2	7
1:A:290:LYS:HE2	2:B:26:THR:OG1	0.50	2.07	7	2
1:A:216:ARG:NH2	1:A:254:ASP:OD2	0.49	2.44	6	3
1:A:151:ARG:O	1:A:155:GLU:HG3	0.49	2.07	4	6
1:A:278:GLU:OE2	1:A:281:ARG:HG3	0.49	2.08	10	5
1:A:291:PRO:HG3	2:B:50:THR:HG21	0.48	1.84	4	1
1:A:199:VAL:HA	1:A:202:ILE:CD1	0.48	2.38	9	4
1:A:261:ARG:HG2	2:B:30:CYS:O	0.48	2.08	6	1
1:A:179:GLU:OE1	1:A:205:LEU:HB3	0.47	2.09	9	2
1:A:260:ASP:O	2:B:31:GLY:HA2	0.45	2.12	3	2
1:A:157:VAL:O	1:A:161:MET:HB2	0.45	2.12	9	2
2:B:55:ILE:HG23	2:B:57:CYS:SG	0.44	2.52	8	3
1:A:172:SER:OG	1:A:185:THR:HA	0.43	2.12	10	3
1:A:242:ASP:HA	1:A:271:VAL:O	0.43	2.13	6	7
1:A:273:ASP:O	1:A:276:ARG:HG2	0.43	2.14	2	6
2:B:15:CYS:SG	2:B:41:GLY:HA3	0.43	2.53	2	6
1:A:258:GLU:HG3	1:A:261:ARG:CZ	0.43	2.43	1	1
1:A:175:GLN:OE1	1:A:183:HIS:HE1	0.42	1.98	10	3
1:A:214:GLY:O	1:A:218:VAL:HG23	0.42	2.14	4	5
1:A:294:ASP:HA	1:A:315:LYS:NZ	0.42	2.30	4	4
2:B:4:GLU:H	2:B:4:GLU:CD	0.42	2.18	6	10
1:A:199:VAL:HA	1:A:202:ILE:HD12	0.42	1.91	9	2
1:A:253:GLU:O	1:A:257:PRO:HG2	0.42	2.14	9	1
2:B:36:GLU:HA	2:B:49:LYS:O	0.42	2.15	1	1
1:A:293:ARG:NH2	2:B:36:GLU:OE1	0.41	2.53	7	2
1:A:225:ILE:HA	1:A:229:ALA:O	0.41	2.15	9	1
1:A:261:ARG:HD3	2:B:29:ASP:OD2	0.41	2.16	6	1
1:A:178:GLU:HA	1:A:210:HIS:ND1	0.40	2.32	3	1

6.3 Torsion angles ⓘ

6.3.1 Protein backbone ⓘ

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	185/194 (95%)	173±2 (94±1%)	11±2 (6±1%)	1±0 (0±0%)	32	76
2	B	56/58 (97%)	47±1 (84±2%)	6±1 (11±2%)	3±0 (5±1%)	3	25
All	All	2410/2520 (96%)	2203 (91%)	173 (7%)	34 (1%)	12	59

All 4 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
2	B	6	PRO	10
2	B	12	LYS	10
1	A	206	LEU	7
2	B	30	CYS	7

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	167/173 (97%)	150±1 (90±1%)	17±1 (10±1%)	9	54
2	B	50/50 (100%)	46±0 (93±1%)	4±0 (7±1%)	15	65
All	All	2170/2230 (97%)	1966 (91%)	204 (9%)	10	56

All 26 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	152	ARG	10
1	A	177	SER	10
1	A	178	GLU	10
1	A	190	GLN	10
1	A	226	THR	10
1	A	230	ARG	10
1	A	254	ASP	10
1	A	260	ASP	10
1	A	279	LYS	10
1	A	298	GLN	10
1	A	299	VAL	10
1	A	307	THR	10

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Mol	Chain	Res	Type	Models (Total)
1	A	312	LEU	10
2	B	5	LYS	10
2	B	13	SER	10
2	B	40	THR	10
1	A	265	ILE	9
1	A	283	GLU	9
1	A	273	ASP	7
1	A	303	GLU	4
1	A	188	GLU	4
1	A	276	ARG	3
2	B	34	THR	3
2	B	47	THR	2
1	A	266	ARG	2
1	A	290	LYS	1

6.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.6 Ligand geometry [i](#)

There are no ligands in this entry.

6.7 Other polymers [i](#)

There are no such molecules in this entry.

6.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

7 Chemical shift validation

The completeness of assignment taking into account all chemical shift lists is 64% for the well-defined parts and 64% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *assigned_chem_shift_list_1*

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	2251
Number of shifts mapped to atoms	2251
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	18

7.1.2 Chemical shift referencing

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction \pm precision, ppm	Suggested action
$^{13}\text{C}_\alpha$	243	-0.25 ± 0.11	None needed (< 0.5 ppm)
$^{13}\text{C}_\beta$	211	0.10 ± 0.09	None needed (< 0.5 ppm)
$^{13}\text{C}'$	220	0.19 ± 0.17	None needed (< 0.5 ppm)
^{15}N	219	0.23 ± 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 64%, i.e. 2172 atoms were assigned a chemical shift out of a possible 3400. 0 out of 30 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^1H	^{13}C	^{15}N
Backbone	1087/1216 (89%)	429/495 (87%)	447/488 (92%)	211/233 (91%)
Sidechain	1058/1962 (54%)	644/1259 (51%)	411/606 (68%)	3/97 (3%)

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	Total	¹H	¹³C	¹⁵N
Aromatic	27/222 (12%)	13/110 (12%)	11/103 (11%)	3/9 (33%)
Overall	2172/3400 (64%)	1086/1864 (58%)	869/1197 (73%)	217/339 (64%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 64%, i.e. 2248 atoms were assigned a chemical shift out of a possible 3500. 0 out of 30 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	¹H	¹³C	¹⁵N
Backbone	1128/1257 (90%)	446/512 (87%)	463/504 (92%)	219/241 (91%)
Sidechain	1093/2011 (54%)	668/1291 (52%)	422/622 (68%)	3/98 (3%)
Aromatic	27/232 (12%)	13/115 (11%)	11/108 (10%)	3/9 (33%)
Overall	2248/3500 (64%)	1127/1918 (59%)	896/1234 (73%)	225/348 (65%)

7.1.4 Statistically unusual chemical shifts ⓘ

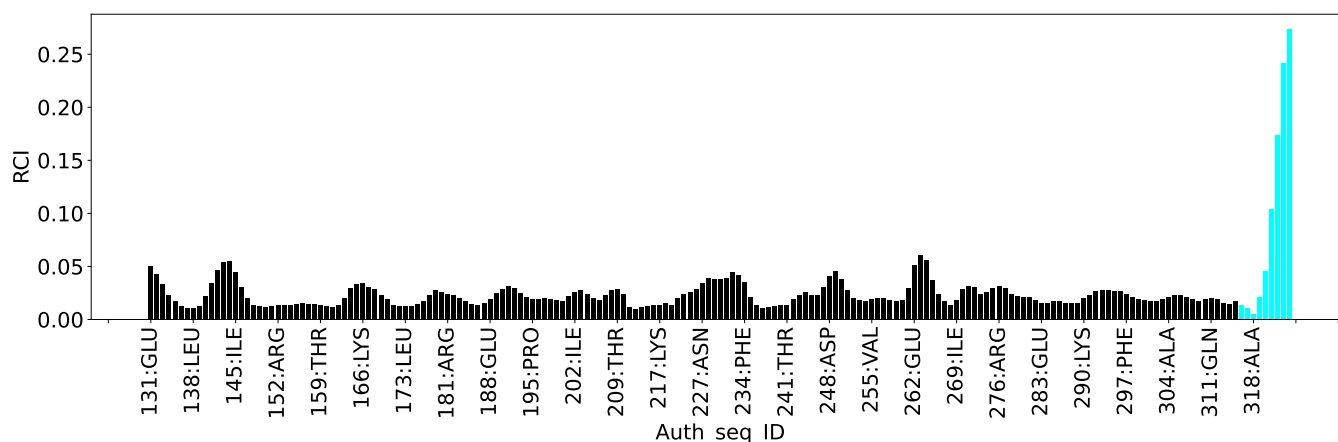
The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

List Id	Chain	Res	Type	Atom	Shift, ppm	Expected range, ppm	Z-score
1	A	278	GLU	HG2	36.30	1.24 – 3.30	165.2
1	A	246	PHE	CE1	27.38	124.17 – 137.29	-78.8
1	A	318	ALA	H	53.48	5.31 – 11.08	78.5
1	A	246	PHE	CG	30.23	123.09 – 153.41	-35.6
1	A	184	PHE	HD1	0.00	5.51 – 8.60	-22.8
1	A	210	HIS	NE2	0.00	100.09 – 268.06	-11.0
1	A	154	LYS	CE	33.70	37.57 – 46.21	-9.5
1	A	194	ASN	HB2	0.00	1.27 – 4.34	-9.1
1	A	195	PRO	CD	58.75	45.11 – 55.58	8.0
1	A	133	SER	HB3	1.75	2.49 – 5.20	-7.7
1	A	207	GLY	HA3	1.15	2.08 – 5.71	-7.5
1	A	230	ARG	CG	36.06	21.24 – 33.19	7.4
1	A	208	ARG	HB2	3.25	0.52 – 3.08	5.7
1	A	311	GLN	CG	39.91	28.36 – 39.21	5.6
1	A	271	VAL	HG11	-0.56	-0.48 – 2.12	-5.3
1	A	271	VAL	HG12	-0.56	-0.48 – 2.12	-5.3
1	A	271	VAL	HG13	-0.56	-0.48 – 2.12	-5.3
1	A	209	THR	CG2	15.78	16.06 – 27.03	-5.3

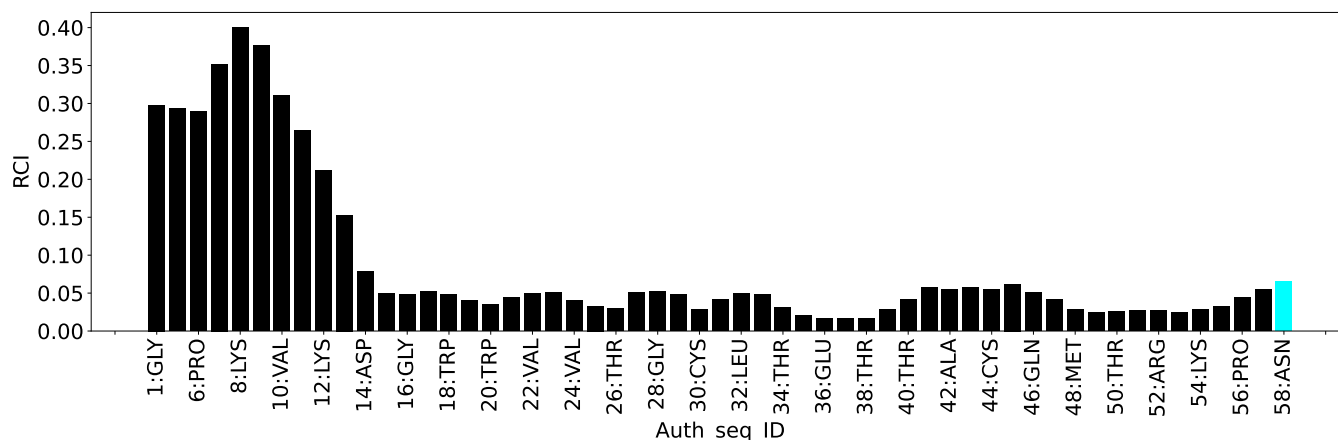
7.1.5 Random Coil Index (RCI) plots [i](#)

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:



Random coil index (RCI) for chain B:



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	10
Intra-residue ($ i-j =0$)	0
Sequential ($ i-j =1$)	0
Medium range ($ i-j >1$ and $ i-j <5$)	0
Long range ($ i-j \geq 5$)	0
Inter-chain	10
Hydrogen bond restraints	0
Disulfide bond restraints	0
Total dihedral-angle restraints	0
Number of unmapped restraints	0
Number of restraints per residue	0.0
Number of long range restraints per residue ¹	0.0

¹Long 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)	1.1	0.16
0.2-0.5 (Medium)	None	None
>0.5 (Large)	0.1	1.29

8.2.2 Average number of dihedral-angle violations per model [i](#)

Dihedral-angle violations less than 1° are not included in the calculation. There are no dihedral-angle violations

9 Distance violation analysis

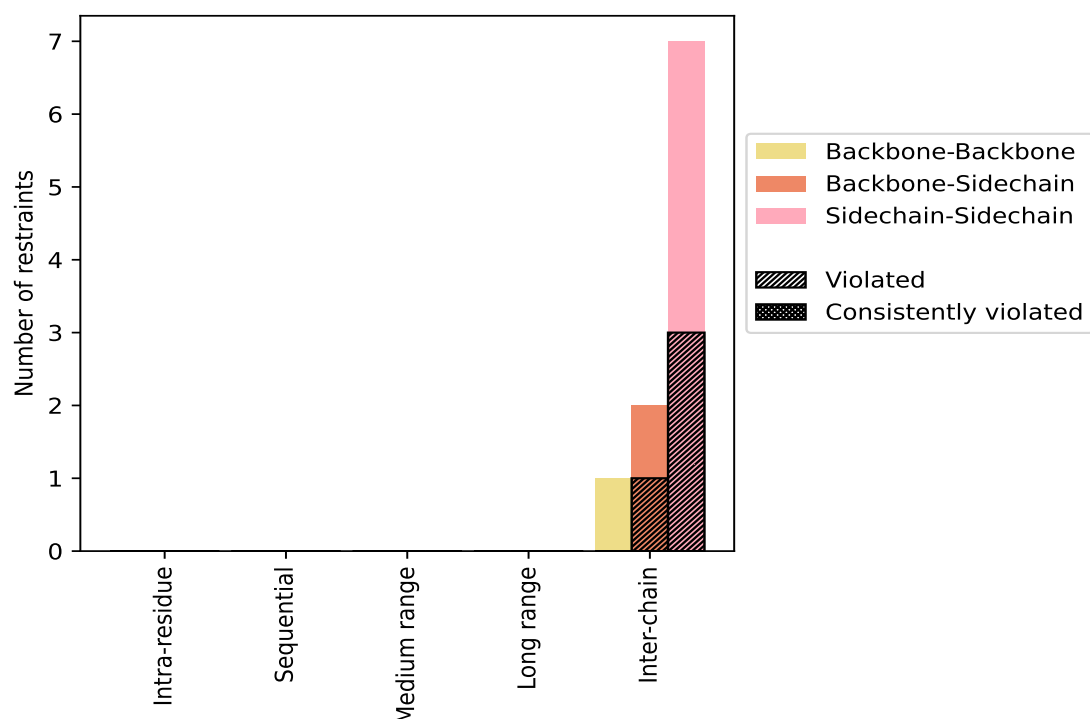
9.1 Summary of distance violations

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.

Restrains type	Count	% ¹	Violated ³			Consistently Violated ⁴		
			Count	% ²	% ¹	Count	% ²	% ¹
Intra-residue (i-j =0)	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Sequential (i-j =1)	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Medium range (i-j >1 & i-j <5)	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Long range (i-j ≥5)	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	0	0.0	0	0.0	0.0	0	0.0	0.0
Inter-chain	10	100.0	4	40.0	40.0	0	0.0	0.0
Backbone-Backbone	1	10.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	2	20.0	1	50.0	10.0	0	0.0	0.0
Sidechain-Sidechain	7	70.0	3	42.9	30.0	0	0.0	0.0
Hydrogen bond	0	0.0	0	0.0	0.0	0	0.0	0.0
Disulfide bond	0	0.0	0	0.0	0.0	0	0.0	0.0
Total	10	100.0	4	40.0	40.0	0	0.0	0.0
Backbone-Backbone	1	10.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	2	20.0	1	50.0	10.0	0	0.0	0.0
Sidechain-Sidechain	7	70.0	3	42.9	30.0	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 [i](#)



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

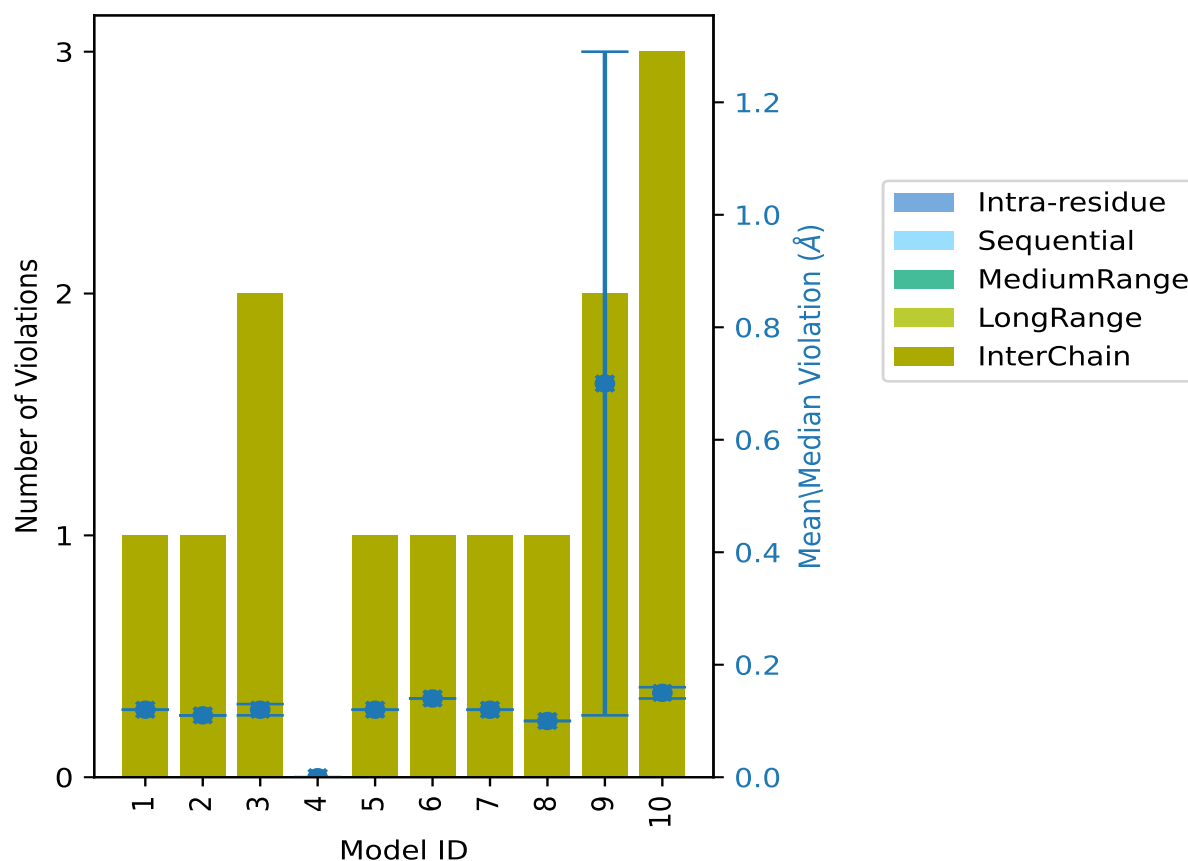
9.2 Distance violation statistics for each model [i](#)

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	0	0	0	0	1	1	0.12	0.12	0.0	0.12
2	0	0	0	0	1	1	0.11	0.11	0.0	0.11
3	0	0	0	0	2	2	0.12	0.13	0.01	0.12
4	0	0	0	0	0	0	0.0	0.0	0.0	0.0
5	0	0	0	0	1	1	0.12	0.12	0.0	0.12
6	0	0	0	0	1	1	0.14	0.14	0.0	0.14
7	0	0	0	0	1	1	0.12	0.12	0.0	0.12
8	0	0	0	0	1	1	0.1	0.1	0.0	0.1
9	0	0	0	0	2	2	0.7	1.29	0.59	0.7
10	0	0	0	0	3	3	0.15	0.16	0.01	0.15

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

9.2.1 Bar graph : Distance Violation statistics for each model [i](#)



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 [i](#)

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, 6(IR:0, SQ:0, MR:0, LR:0, IC:6) 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	%
0	0	0	0	1	1	1	10.0
0	0	0	0	1	1	2	20.0
0	0	0	0	1	1	3	30.0

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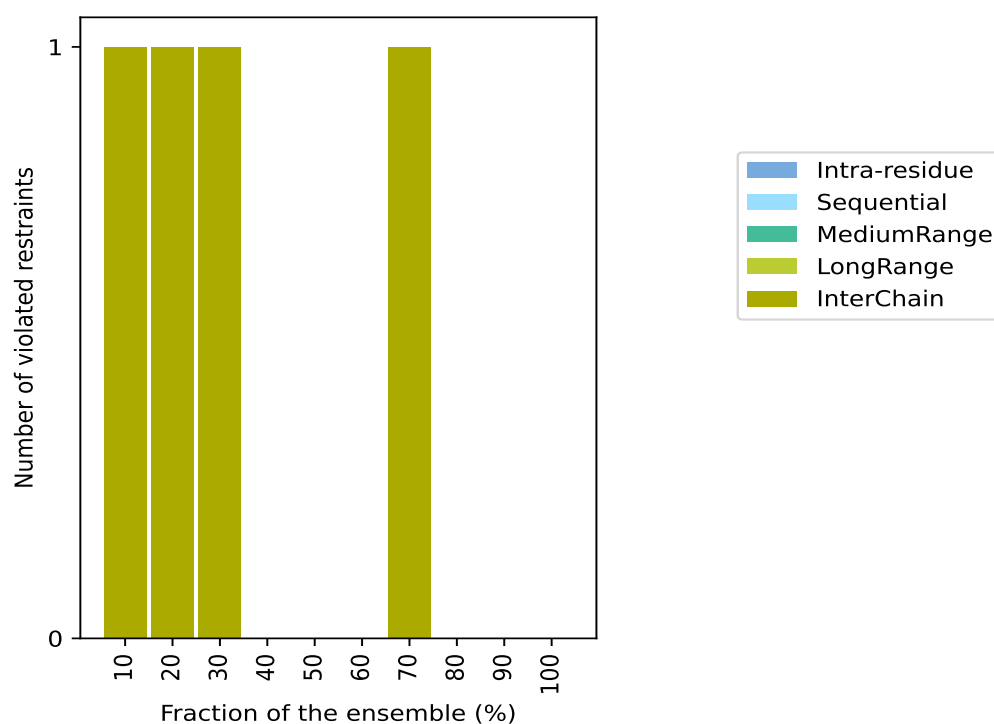
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Number of violated restraints						Fraction of the ensemble	
IR ¹	SQ ²	MR ³	LR ⁴	IC ⁵	Total	Count ⁶	%
0	0	0	0	0	0	4	40.0
0	0	0	0	0	0	5	50.0
0	0	0	0	0	0	6	60.0
0	0	0	0	1	1	7	70.0
0	0	0	0	0	0	8	80.0
0	0	0	0	0	0	9	90.0
0	0	0	0	0	0	10	100.0

¹Intra-residue restraints, ²Sequential restraints, ³Medium range restraints, ⁴Long range restraints,

⁵Inter-chain restraints, ⁶ Number of models with violations

9.3.1 Bar graph : Distance violation statistics for the ensemble [i](#)

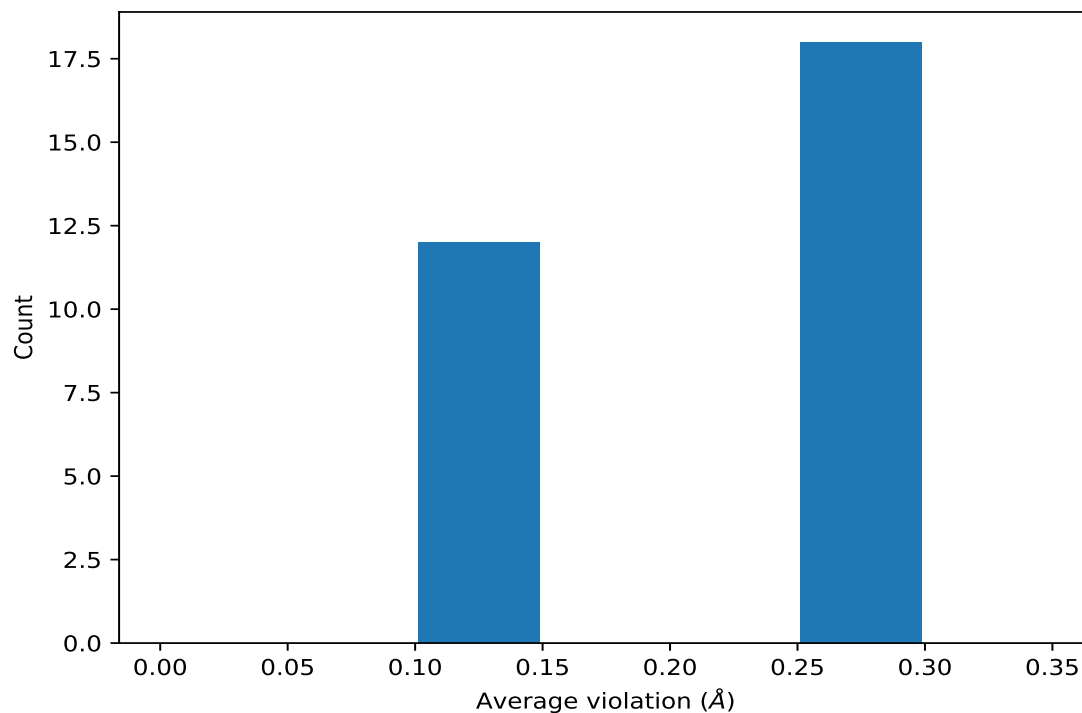


9.4 Most violated distance restraints in the ensemble [i](#)

9.4.1 Histogram : Distribution of mean distance violations [i](#)

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 [i](#)

The following table provides the mean and the standard deviation of the violation for each restraint sorted by number of violated models and the mean 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)
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG21	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG22	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG23	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG21	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG22	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG23	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG21	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG22	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG23	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG21	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG22	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG23	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG21	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG22	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG23	7	0.29	0.41	0.12

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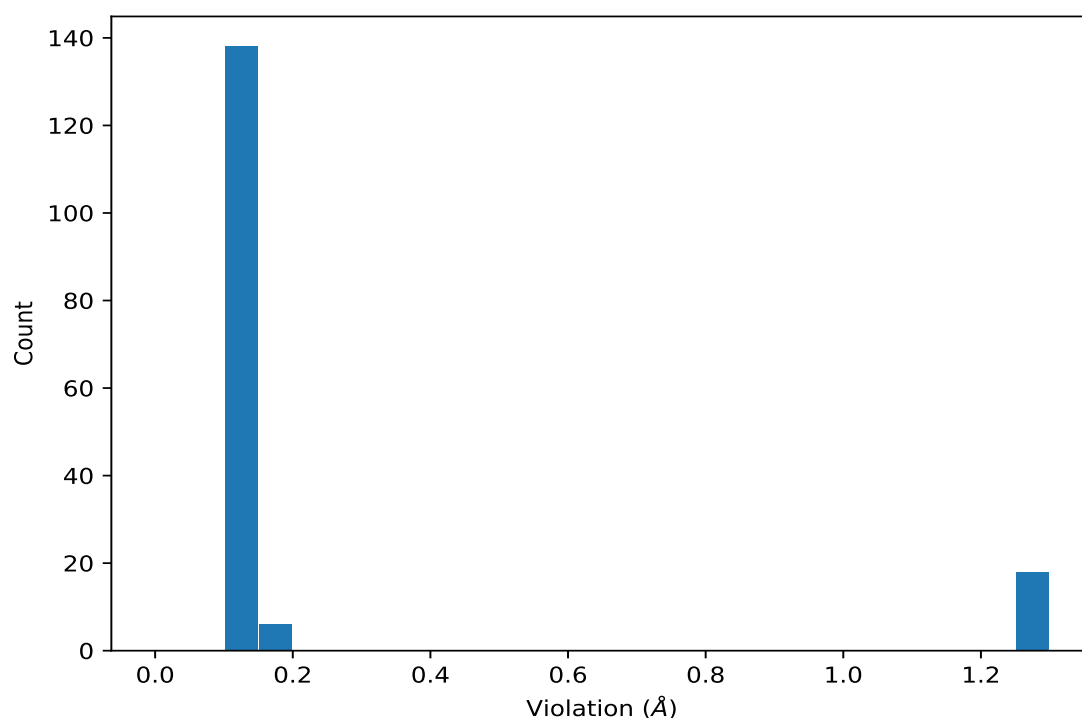
Key	Atom-1	Atom-2	Models ¹	Mean (Å)	SD ¹ (Å)	Median (Å)
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG21	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG22	7	0.29	0.41	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG23	7	0.29	0.41	0.12
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD11	3	0.13	0.02	0.13
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD12	3	0.13	0.02	0.13
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD13	3	0.13	0.02	0.13
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD11	3	0.13	0.02	0.13
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD12	3	0.13	0.02	0.13
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD13	3	0.13	0.02	0.13
(1,5)	2:32:B:LEU:HD11	1:260:A:ASP:HA	2	0.14	0.02	0.14
(1,5)	2:32:B:LEU:HD12	1:260:A:ASP:HA	2	0.14	0.02	0.14
(1,5)	2:32:B:LEU:HD13	1:260:A:ASP:HA	2	0.14	0.02	0.14
(1,5)	2:32:B:LEU:HD21	1:260:A:ASP:HA	2	0.14	0.02	0.14
(1,5)	2:32:B:LEU:HD22	1:260:A:ASP:HA	2	0.14	0.02	0.14
(1,5)	2:32:B:LEU:HD23	1:260:A:ASP:HA	2	0.14	0.02	0.14

¹Number of violated models, ²Standard deviation

9.5 All violated distance restraints [i](#)

9.5.1 Histogram : Distribution of distance violations [i](#)

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 [i](#)

The following table lists the absolute value of the violation for each restraint in the ensemble sorted by its 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)
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG21	9	1.29
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG22	9	1.29
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG23	9	1.29
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG21	9	1.29
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG22	9	1.29
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG23	9	1.29
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG21	9	1.29
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG22	9	1.29
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG23	9	1.29
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG21	9	1.29
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG22	9	1.29
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG23	9	1.29
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG21	9	1.29
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG22	9	1.29
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG23	9	1.29
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG21	9	1.29

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG22	9	1.29
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG23	9	1.29
(1,5)	2:32:B:LEU:HD11	1:260:A:ASP:HA	10	0.16
(1,5)	2:32:B:LEU:HD12	1:260:A:ASP:HA	10	0.16
(1,5)	2:32:B:LEU:HD13	1:260:A:ASP:HA	10	0.16
(1,5)	2:32:B:LEU:HD21	1:260:A:ASP:HA	10	0.16
(1,5)	2:32:B:LEU:HD22	1:260:A:ASP:HA	10	0.16
(1,5)	2:32:B:LEU:HD23	1:260:A:ASP:HA	10	0.16
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD11	10	0.15
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD12	10	0.15
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD13	10	0.15
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD11	10	0.15
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD12	10	0.15
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD13	10	0.15
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG21	6	0.14
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG22	6	0.14
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG23	6	0.14
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG21	6	0.14
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG22	6	0.14
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG23	6	0.14
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG21	6	0.14
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG22	6	0.14
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG23	6	0.14
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG21	6	0.14
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG22	6	0.14
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG23	6	0.14
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG21	6	0.14
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG22	6	0.14
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG23	6	0.14
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG21	6	0.14
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG22	6	0.14
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG23	6	0.14
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD11	3	0.13
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD12	3	0.13
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD13	3	0.13
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD11	3	0.13
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD12	3	0.13
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD13	3	0.13
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG21	10	0.13
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG22	10	0.13
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG23	10	0.13
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG21	10	0.13

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG22	10	0.13
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG23	10	0.13
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG21	10	0.13
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG22	10	0.13
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG23	10	0.13
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG21	10	0.13
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG22	10	0.13
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG23	10	0.13
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG21	10	0.13
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG22	10	0.13
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG23	10	0.13
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG21	10	0.13
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG22	10	0.13
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG23	10	0.13
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG21	1	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG22	1	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG23	1	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG21	1	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG22	1	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG23	1	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG21	1	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG22	1	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG23	1	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG21	1	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG22	1	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG23	1	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG21	1	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG22	1	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG23	1	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG21	1	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG22	1	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG23	1	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG21	5	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG22	5	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG23	5	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG21	5	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG22	5	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG23	5	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG21	5	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG22	5	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG23	5	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG21	5	0.12

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG22	5	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG23	5	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG21	5	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG22	5	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG23	5	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG21	5	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG22	5	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG23	5	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG21	7	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG22	7	0.12
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG23	7	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG21	7	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG22	7	0.12
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG23	7	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG21	7	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG22	7	0.12
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG23	7	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG21	7	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG22	7	0.12
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG23	7	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG21	7	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG22	7	0.12
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG23	7	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG21	7	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG22	7	0.12
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG23	7	0.12
(1,6)	2:34:B:THR:HG21	1:291:A:PRO:HD2	9	0.11
(1,6)	2:34:B:THR:HG21	1:291:A:PRO:HD3	9	0.11
(1,6)	2:34:B:THR:HG22	1:291:A:PRO:HD2	9	0.11
(1,6)	2:34:B:THR:HG22	1:291:A:PRO:HD3	9	0.11
(1,6)	2:34:B:THR:HG23	1:291:A:PRO:HD2	9	0.11
(1,6)	2:34:B:THR:HG23	1:291:A:PRO:HD3	9	0.11
(1,5)	2:32:B:LEU:HD11	1:260:A:ASP:HA	3	0.11
(1,5)	2:32:B:LEU:HD12	1:260:A:ASP:HA	3	0.11
(1,5)	2:32:B:LEU:HD13	1:260:A:ASP:HA	3	0.11
(1,5)	2:32:B:LEU:HD21	1:260:A:ASP:HA	3	0.11
(1,5)	2:32:B:LEU:HD22	1:260:A:ASP:HA	3	0.11
(1,5)	2:32:B:LEU:HD23	1:260:A:ASP:HA	3	0.11
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG21	2	0.11
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG22	2	0.11
(1,3)	2:32:B:LEU:HD11	1:265:A:ILE:HG23	2	0.11
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG21	2	0.11

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG22	2	0.11
(1,3)	2:32:B:LEU:HD12	1:265:A:ILE:HG23	2	0.11
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG21	2	0.11
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG22	2	0.11
(1,3)	2:32:B:LEU:HD13	1:265:A:ILE:HG23	2	0.11
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG21	2	0.11
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG22	2	0.11
(1,3)	2:32:B:LEU:HD21	1:265:A:ILE:HG23	2	0.11
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG21	2	0.11
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG22	2	0.11
(1,3)	2:32:B:LEU:HD22	1:265:A:ILE:HG23	2	0.11
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG21	2	0.11
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG22	2	0.11
(1,3)	2:32:B:LEU:HD23	1:265:A:ILE:HG23	2	0.11
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD11	8	0.1
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD12	8	0.1
(1,10)	2:52:B:ARG:HD2	1:265:A:ILE:HD13	8	0.1
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD11	8	0.1
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD12	8	0.1
(1,10)	2:52:B:ARG:HD3	1:265:A:ILE:HD13	8	0.1

10 Dihedral-angle violation analysis ⓘ

No dihedral-angle restraints found