



# Full wwPDB NMR Structure Validation Report ⓘ

Jun 4, 2023 – 10:32 AM EDT

PDB ID : 2L9J  
BMRB ID : 17451  
Title : hRSV M2-1 core domain structure  
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Deposited on : 2011-02-12

This is a Full wwPDB NMR Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

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>.

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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

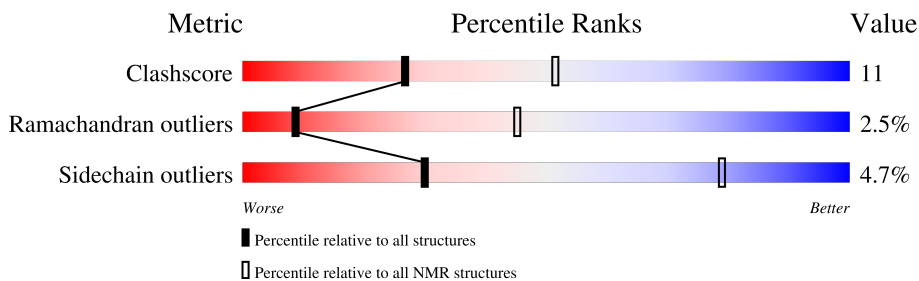
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*SOLUTION NMR*

The overall completeness of chemical shifts assignment is 94%.

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  $\geq 3$ , 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	121	

## 2 Ensemble composition and analysis

This entry contains 20 models. Model 13 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:75-A:171 (97)	0.58	13

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 2 clusters and 3 single-model clusters were found.

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

### 3 Entry composition

There is only 1 type of molecule in this entry. The entry contains 1913 atoms, of which 977 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Matrix protein 2-1.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	119	1913	584	977	165	185	2	0

There are 2 discrepancies between the modelled and reference sequences:

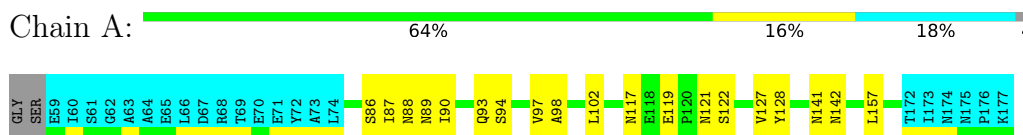
Chain	Residue	Modelled	Actual	Comment	Reference
A	57	GLY	-	expression tag	UNP Q4KRW3
A	120	PRO	LEU	engineered mutation	UNP Q4KRW3

## 4 Residue-property plots [i](#)

### 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: Matrix protein 2-1

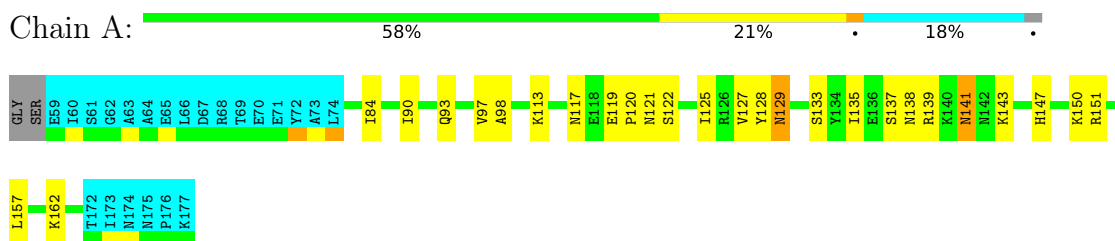


### 4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

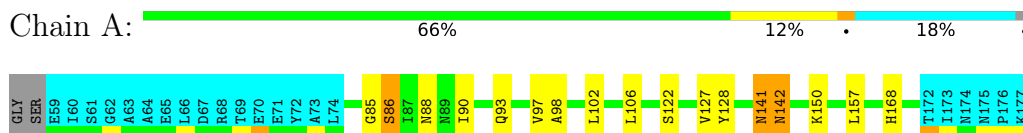
#### 4.2.1 Score per residue for model 1

- Molecule 1: Matrix protein 2-1



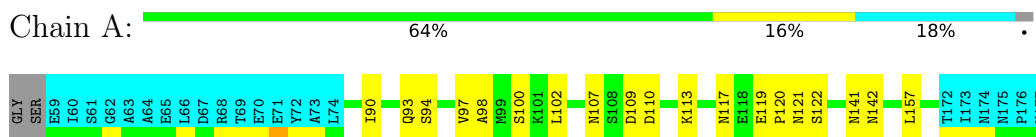
#### 4.2.2 Score per residue for model 2

- Molecule 1: Matrix protein 2-1



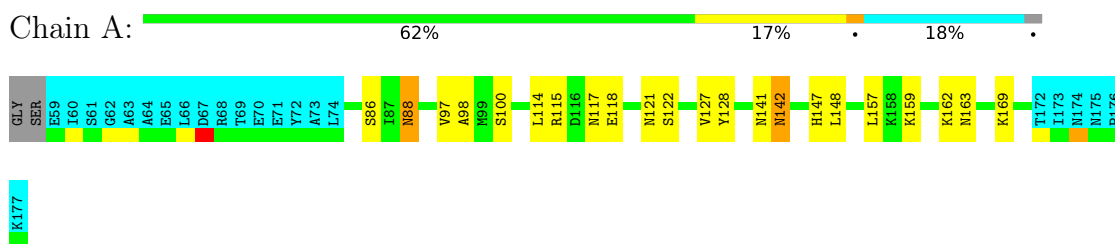
### 4.2.3 Score per residue for model 3

- Molecule 1: Matrix protein 2-1



### 4.2.4 Score per residue for model 4

- Molecule 1: Matrix protein 2-1



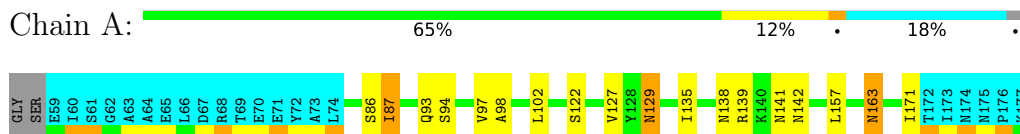
### 4.2.5 Score per residue for model 5

- Molecule 1: Matrix protein 2-1



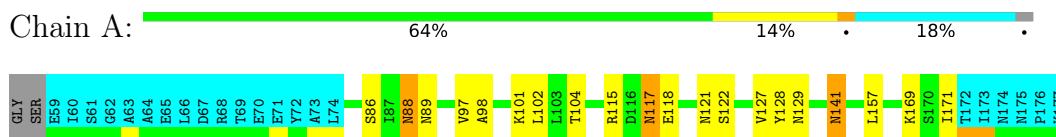
### 4.2.6 Score per residue for model 6

- Molecule 1: Matrix protein 2-1



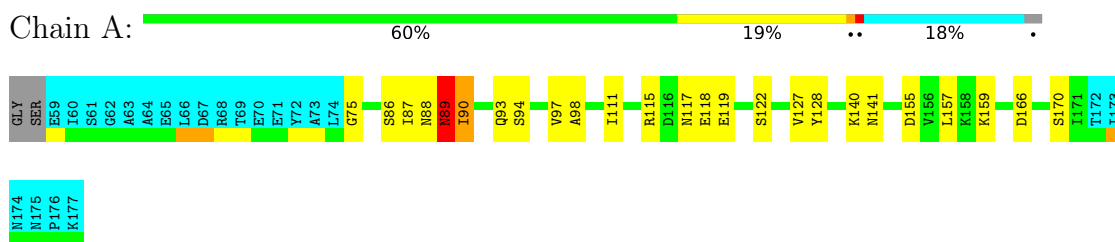
### 4.2.7 Score per residue for model 7

- Molecule 1: Matrix protein 2-1



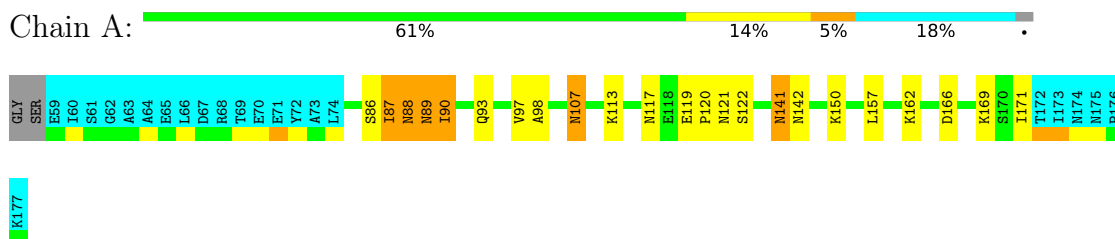
### 4.2.8 Score per residue for model 8

- Molecule 1: Matrix protein 2-1



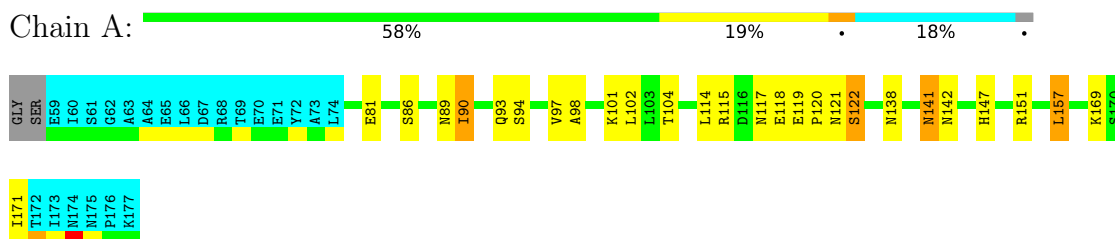
### 4.2.9 Score per residue for model 9

- Molecule 1: Matrix protein 2-1



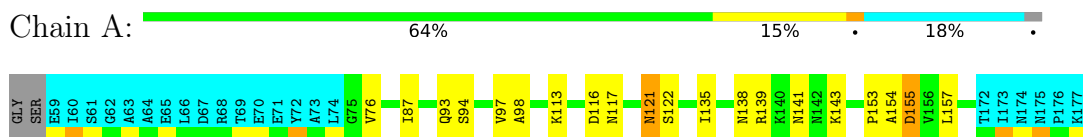
### 4.2.10 Score per residue for model 10

- Molecule 1: Matrix protein 2-1



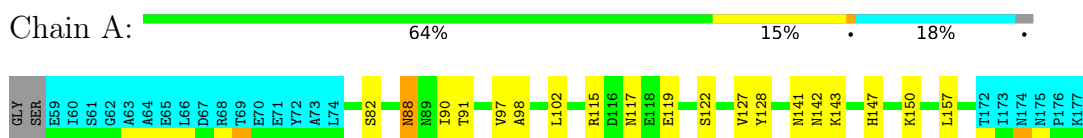
#### 4.2.11 Score per residue for model 11

- Molecule 1: Matrix protein 2-1



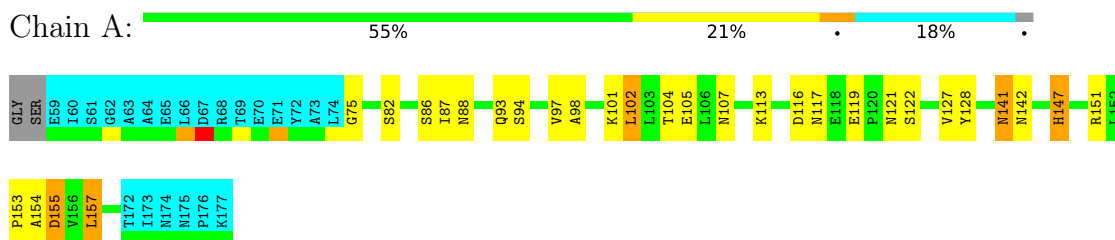
#### 4.2.12 Score per residue for model 12

- Molecule 1: Matrix protein 2-1



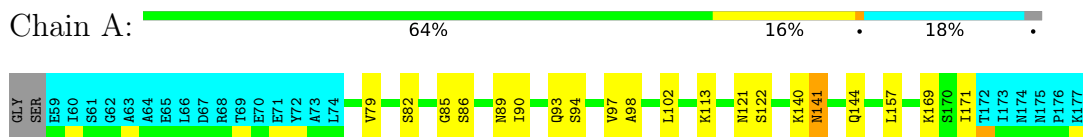
#### 4.2.13 Score per residue for model 13 (medoid)

- Molecule 1: Matrix protein 2-1



#### 4.2.14 Score per residue for model 14

- Molecule 1: Matrix protein 2-1

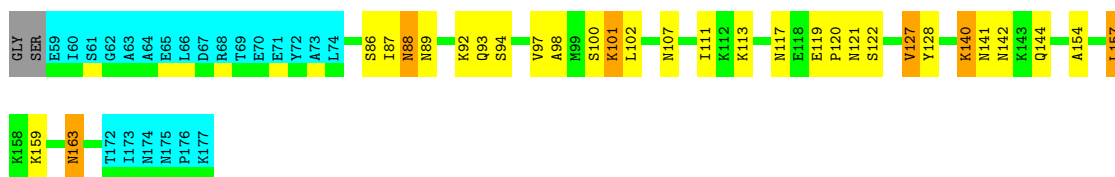


#### 4.2.15 Score per residue for model 15

- Molecule 1: Matrix protein 2-1



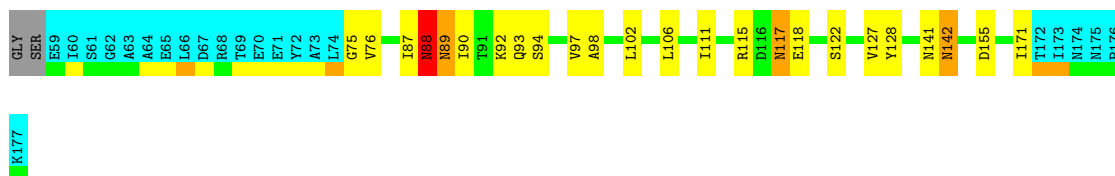




#### 4.2.16 Score per residue for model 16

- Molecule 1: Matrix protein 2-1

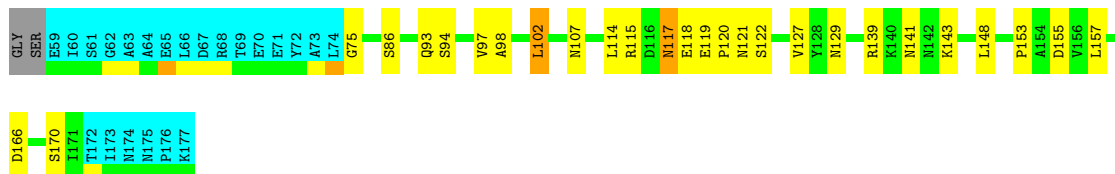
Chain A: 60% 17% 18%



#### 4.2.17 Score per residue for model 17

- Molecule 1: Matrix protein 2-1

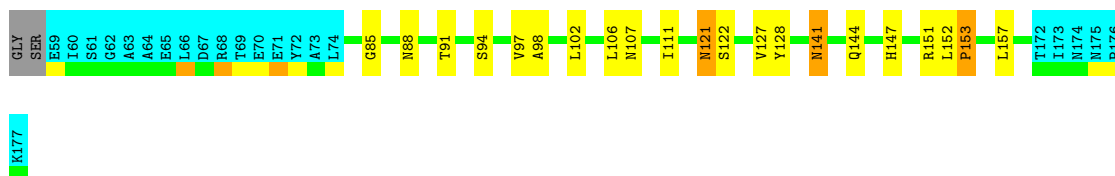
Chain A: 58% 21% 18%



#### 4.2.18 Score per residue for model 18

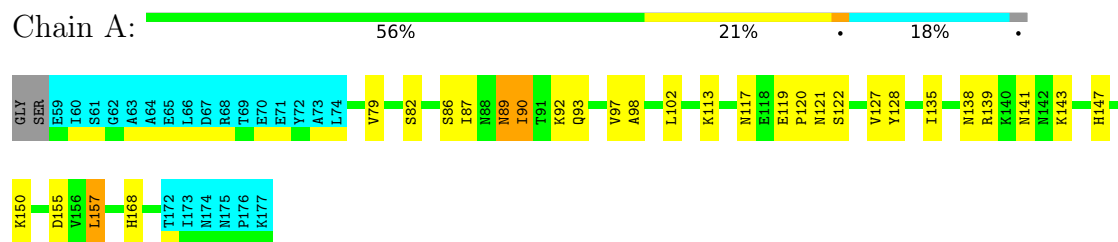
- Molecule 1: Matrix protein 2-1

Chain A: 63% 15% 18%



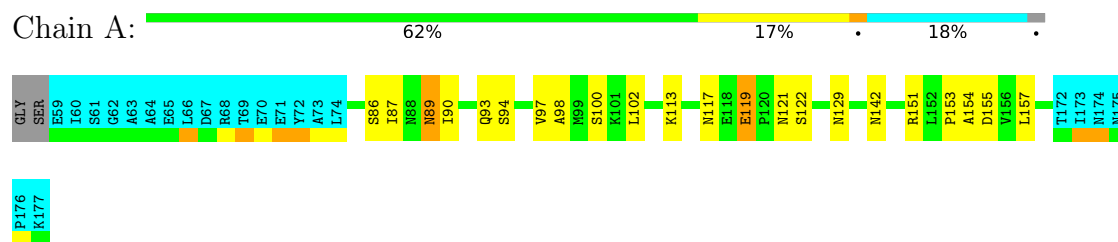
#### 4.2.19 Score per residue for model 19

- Molecule 1: Matrix protein 2-1



#### 4.2.20 Score per residue for model 20

- Molecule 1: Matrix protein 2-1



## 5 Refinement protocol and experimental data overview

The models were refined using the following method: *torsion angle dynamics, simulated annealing*.

Of the 100 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
CYANA	structure solution	2.0
X-PLOR NIH	refinement	
CYANA	refinement	2.0

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	1551
Number of shifts mapped to atoms	1550
Number of unparsed shifts	0
Number of shifts with mapping errors	1
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	94%

## 6 Model quality

### 6.1 Standard geometry

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

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	766	815	815	17±4
All	All	15320	16300	16300	347

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 11.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:157:LEU:HD13	1:A:157:LEU:C	0.66	2.11	9	6
1:A:141:ASN:HD22	1:A:144:GLN:H	0.64	1.34	15	2
1:A:93:GLN:NE2	1:A:150:LYS:NZ	0.62	2.48	1	2
1:A:147:HIS:NE2	1:A:151:ARG:NH2	0.62	2.48	10	1
1:A:88:ASN:HD22	1:A:88:ASN:H	0.61	1.39	12	3
1:A:147:HIS:CE1	1:A:151:ARG:NH2	0.60	2.68	18	3
1:A:117:ASN:HD22	1:A:118:GLU:N	0.59	1.94	7	2
1:A:142:ASN:HD22	1:A:142:ASN:N	0.58	1.96	2	1
1:A:107:ASN:HD21	1:A:139:ARG:NH2	0.57	1.97	17	1
1:A:141:ASN:HD22	1:A:142:ASN:N	0.57	1.97	10	4
1:A:88:ASN:N	1:A:88:ASN:ND2	0.57	2.53	12	6
1:A:147:HIS:ND1	1:A:151:ARG:CZ	0.56	2.68	18	1
1:A:147:HIS:CE1	1:A:151:ARG:CZ	0.56	2.89	18	2
1:A:88:ASN:HD22	1:A:88:ASN:N	0.56	1.97	18	3

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:141:ASN:ND2	1:A:144:GLN:H	0.56	1.97	15	2
1:A:107:ASN:HD22	1:A:107:ASN:N	0.56	1.95	3	3
1:A:168:HIS:CD2	1:A:168:HIS:N	0.56	2.72	2	1
1:A:101:LYS:O	1:A:104:THR:HG22	0.56	2.01	13	2
1:A:117:ASN:ND2	1:A:118:GLU:N	0.55	2.55	7	2
1:A:138:ASN:OD1	1:A:139:ARG:N	0.55	2.39	6	4
1:A:114:LEU:O	1:A:117:ASN:ND2	0.55	2.40	17	2
1:A:111:ILE:CD1	1:A:111:ILE:N	0.55	2.69	15	5
1:A:93:GLN:HE22	1:A:150:LYS:CE	0.55	2.15	1	1
1:A:119:GLU:O	1:A:121:ASN:N	0.55	2.40	17	7
1:A:111:ILE:N	1:A:111:ILE:HD12	0.55	2.17	15	5
1:A:87:ILE:H	1:A:87:ILE:HD13	0.54	1.61	6	1
1:A:90:ILE:N	1:A:90:ILE:CD1	0.54	2.69	19	6
1:A:135:ILE:O	1:A:138:ASN:ND2	0.54	2.41	11	4
1:A:93:GLN:HE22	1:A:150:LYS:NZ	0.53	2.01	1	3
1:A:118:GLU:OE1	1:A:118:GLU:N	0.53	2.42	17	1
1:A:90:ILE:CD1	1:A:90:ILE:N	0.53	2.71	14	2
1:A:141:ASN:O	1:A:141:ASN:ND2	0.53	2.42	1	2
1:A:168:HIS:N	1:A:168:HIS:CD2	0.52	2.75	19	1
1:A:141:ASN:HD22	1:A:144:GLN:N	0.52	2.01	15	1
1:A:113:LYS:O	1:A:117:ASN:ND2	0.52	2.43	20	5
1:A:153:PRO:O	1:A:155:ASP:N	0.52	2.43	11	4
1:A:142:ASN:OD1	1:A:142:ASN:N	0.52	2.43	16	1
1:A:106:LEU:N	1:A:106:LEU:CD2	0.52	2.72	16	1
1:A:92:LYS:NZ	1:A:92:LYS:CB	0.52	2.72	5	2
1:A:141:ASN:ND2	1:A:141:ASN:O	0.52	2.43	7	2
1:A:97:VAL:HG13	1:A:98:ALA:N	0.51	2.20	2	19
1:A:138:ASN:O	1:A:142:ASN:ND2	0.51	2.43	10	1
1:A:90:ILE:N	1:A:90:ILE:HD12	0.51	2.20	3	8
1:A:121:ASN:O	1:A:121:ASN:ND2	0.51	2.43	11	2
1:A:140:LYS:N	1:A:140:LYS:CD	0.51	2.74	14	1
1:A:143:LYS:CB	1:A:143:LYS:NZ	0.50	2.74	1	3
1:A:168:HIS:CD2	1:A:168:HIS:H	0.50	2.24	2	2
1:A:121:ASN:N	1:A:121:ASN:ND2	0.50	2.59	4	1
1:A:166:ASP:O	1:A:170:SER:N	0.50	2.44	17	2
1:A:141:ASN:ND2	1:A:144:GLN:N	0.50	2.60	15	1
1:A:106:LEU:O	1:A:107:ASN:ND2	0.50	2.45	18	1
1:A:107:ASN:N	1:A:107:ASN:ND2	0.50	2.58	3	2
1:A:82:SER:OG	1:A:88:ASN:ND2	0.49	2.45	12	1
1:A:163:ASN:N	1:A:163:ASN:OD1	0.49	2.44	6	2
1:A:155:ASP:N	1:A:155:ASP:OD1	0.49	2.45	19	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:97:VAL:HG23	1:A:98:ALA:N	0.49	2.23	8	1
1:A:84:ILE:HD13	1:A:162:LYS:NZ	0.49	2.21	1	1
1:A:121:ASN:ND2	1:A:121:ASN:N	0.49	2.60	11	1
1:A:90:ILE:HG22	1:A:91:THR:N	0.48	2.21	12	1
1:A:155:ASP:O	1:A:159:LYS:NZ	0.48	2.46	8	1
1:A:143:LYS:N	1:A:143:LYS:CD	0.48	2.76	17	1
1:A:88:ASN:H	1:A:88:ASN:ND2	0.48	2.05	9	1
1:A:82:SER:CB	1:A:88:ASN:HD22	0.48	2.21	13	1
1:A:119:GLU:N	1:A:119:GLU:CD	0.48	2.67	10	4
1:A:121:ASN:ND2	1:A:121:ASN:H	0.48	2.07	18	1
1:A:100:SER:OG	1:A:142:ASN:ND2	0.47	2.47	3	1
1:A:147:HIS:CE1	1:A:151:ARG:HH21	0.47	2.27	1	1
1:A:93:GLN:CG	1:A:94:SER:N	0.47	2.78	11	12
1:A:115:ARG:C	1:A:117:ASN:N	0.47	2.68	8	6
1:A:127:VAL:HG13	1:A:128:TYR:N	0.47	2.24	18	11
1:A:129:ASN:C	1:A:129:ASN:ND2	0.47	2.68	1	1
1:A:90:ILE:CG2	1:A:91:THR:N	0.47	2.78	12	1
1:A:157:LEU:HD23	1:A:157:LEU:O	0.47	2.10	17	5
1:A:101:LYS:O	1:A:104:THR:CG2	0.46	2.63	13	2
1:A:120:PRO:C	1:A:121:ASN:ND2	0.46	2.69	1	1
1:A:105:GLU:O	1:A:107:ASN:ND2	0.46	2.47	13	1
1:A:157:LEU:C	1:A:157:LEU:CD1	0.46	2.84	3	6
1:A:88:ASN:N	1:A:88:ASN:HD22	0.46	2.08	15	3
1:A:141:ASN:ND2	1:A:141:ASN:N	0.46	2.60	7	3
1:A:87:ILE:H	1:A:87:ILE:CD1	0.46	2.21	6	1
1:A:92:LYS:NZ	1:A:154:ALA:HB2	0.46	2.25	15	1
1:A:102:LEU:O	1:A:102:LEU:HD23	0.46	2.11	10	9
1:A:159:LYS:NZ	1:A:163:ASN:HD21	0.46	2.09	4	1
1:A:109:ASP:OD1	1:A:110:ASP:N	0.45	2.49	3	1
1:A:153:PRO:C	1:A:155:ASP:N	0.45	2.68	11	5
1:A:157:LEU:O	1:A:157:LEU:HD23	0.45	2.11	11	8
1:A:118:GLU:N	1:A:118:GLU:CD	0.45	2.70	17	1
1:A:142:ASN:N	1:A:142:ASN:ND2	0.45	2.65	2	1
1:A:113:LYS:CB	1:A:113:LYS:NZ	0.45	2.80	15	1
1:A:97:VAL:CG1	1:A:98:ALA:N	0.45	2.80	2	1
1:A:155:ASP:OD2	1:A:159:LYS:NZ	0.44	2.50	8	1
1:A:101:LYS:O	1:A:104:THR:OG1	0.44	2.34	10	1
1:A:89:ASN:ND2	1:A:89:ASN:H	0.44	2.10	16	1
1:A:89:ASN:O	1:A:90:ILE:O	0.44	2.35	10	4
1:A:81:GLU:OE2	1:A:169:LYS:NZ	0.44	2.45	10	1
1:A:85:GLY:O	1:A:86:SER:OG	0.44	2.36	2	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:115:ARG:O	1:A:117:ASN:N	0.44	2.51	8	4
1:A:141:ASN:HD22	1:A:141:ASN:C	0.44	2.16	9	1
1:A:119:GLU:N	1:A:119:GLU:OE1	0.44	2.51	8	1
1:A:113:LYS:NZ	1:A:113:LYS:CB	0.44	2.81	14	1
1:A:129:ASN:C	1:A:129:ASN:HD22	0.44	2.15	6	2
1:A:143:LYS:O	1:A:147:HIS:CD2	0.44	2.71	19	1
1:A:93:GLN:NE2	1:A:150:LYS:CE	0.43	2.80	1	1
1:A:117:ASN:OD1	1:A:118:GLU:OE2	0.43	2.36	17	2
1:A:79:VAL:O	1:A:82:SER:OG	0.43	2.35	14	2
1:A:140:LYS:CB	1:A:140:LYS:NZ	0.43	2.80	15	1
1:A:115:ARG:O	1:A:118:GLU:OE1	0.43	2.36	17	1
1:A:138:ASN:OD1	1:A:138:ASN:C	0.43	2.56	19	4
1:A:87:ILE:O	1:A:88:ASN:O	0.43	2.35	9	1
1:A:141:ASN:OD1	1:A:141:ASN:O	0.43	2.37	12	3
1:A:121:ASN:N	1:A:121:ASN:HD22	0.43	2.12	4	2
1:A:76:VAL:CG1	1:A:98:ALA:O	0.43	2.67	11	1
1:A:90:ILE:HD12	1:A:90:ILE:H	0.43	1.72	19	1
1:A:106:LEU:N	1:A:106:LEU:HD22	0.43	2.28	16	1
1:A:88:ASN:ND2	1:A:88:ASN:N	0.43	2.67	5	1
1:A:147:HIS:CD2	1:A:151:ARG:HH21	0.43	2.32	13	1
1:A:148:LEU:O	1:A:148:LEU:HD23	0.43	2.13	17	1
1:A:113:LYS:O	1:A:117:ASN:OD1	0.43	2.37	19	4
1:A:119:GLU:C	1:A:121:ASN:N	0.43	2.72	10	5
1:A:117:ASN:ND2	1:A:117:ASN:N	0.43	2.67	11	1
1:A:119:GLU:O	1:A:125:ILE:HD11	0.43	2.14	1	1
1:A:100:SER:OG	1:A:142:ASN:OD1	0.43	2.37	20	3
1:A:91:THR:N	1:A:94:SER:OG	0.43	2.52	18	1
1:A:101:LYS:N	1:A:101:LYS:CD	0.43	2.82	15	1
1:A:117:ASN:HD22	1:A:117:ASN:N	0.43	2.12	16	1
1:A:152:LEU:O	1:A:153:PRO:O	0.43	2.37	18	1
1:A:87:ILE:C	1:A:89:ASN:H	0.43	2.17	20	1
1:A:106:LEU:C	1:A:107:ASN:ND2	0.42	2.72	18	1
1:A:166:ASP:O	1:A:170:SER:CB	0.42	2.67	8	1
1:A:159:LYS:O	1:A:163:ASN:OD1	0.42	2.38	15	1
1:A:102:LEU:HD23	1:A:102:LEU:O	0.42	2.14	17	1
1:A:162:LYS:O	1:A:166:ASP:OD1	0.42	2.37	9	1
1:A:89:ASN:ND2	1:A:89:ASN:N	0.42	2.65	16	1
1:A:121:ASN:O	1:A:121:ASN:OD1	0.42	2.37	14	1
1:A:88:ASN:O	1:A:89:ASN:ND2	0.42	2.52	15	1
1:A:117:ASN:O	1:A:118:GLU:OE1	0.42	2.37	8	1
1:A:115:ARG:O	1:A:117:ASN:ND2	0.42	2.51	16	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:142:ASN:N	1:A:142:ASN:OD1	0.42	2.53	13	1
1:A:133:SER:O	1:A:137:SER:OG	0.42	2.37	1	1
1:A:106:LEU:HD11	1:A:168:HIS:CD2	0.42	2.50	2	1
1:A:87:ILE:HG22	1:A:88:ASN:HD22	0.42	1.75	5	1
1:A:141:ASN:OD1	1:A:144:GLN:NE2	0.41	2.53	14	1
1:A:118:GLU:OE1	1:A:122:SER:OG	0.41	2.37	10	1
1:A:116:ASP:OD1	1:A:116:ASP:O	0.41	2.39	11	1
1:A:89:ASN:OD1	1:A:89:ASN:O	0.41	2.37	14	1
1:A:147:HIS:CD2	1:A:151:ARG:NH2	0.41	2.88	10	1
1:A:127:VAL:CG2	1:A:128:TYR:N	0.41	2.83	15	1
1:A:106:LEU:C	1:A:107:ASN:HD22	0.41	2.19	18	1
1:A:140:LYS:O	1:A:141:ASN:OD1	0.41	2.38	8	1
1:A:141:ASN:C	1:A:141:ASN:ND2	0.41	2.75	10	1
1:A:116:ASP:O	1:A:116:ASP:OD1	0.41	2.39	13	1
1:A:119:GLU:C	1:A:121:ASN:H	0.41	2.18	13	2
1:A:148:LEU:N	1:A:148:LEU:HD12	0.40	2.31	4	1
1:A:87:ILE:HD13	1:A:87:ILE:N	0.40	2.30	6	1
1:A:117:ASN:HD22	1:A:118:GLU:H	0.40	1.57	7	1
1:A:115:ARG:C	1:A:117:ASN:H	0.40	2.19	8	1
1:A:114:LEU:O	1:A:117:ASN:CG	0.40	2.60	10	1

## 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	97/121 (80%)	88±2 (91±2%)	6±1 (6±1%)	2±2 (3±2%)	9	45
All	All	1940/2420 (80%)	1765 (91%)	126 (6%)	49 (3%)	9	45

All 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	86	SER	13
1	A	120	PRO	7

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Mol	Chain	Res	Type	Models (Total)
1	A	87	ILE	7
1	A	89	ASN	5
1	A	75	GLY	4
1	A	90	ILE	4
1	A	88	ASN	3
1	A	154	ALA	3
1	A	85	GLY	2
1	A	153	PRO	1

### 6.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	91/110 (83%)	87±2 (95±2%)	4±2 (5±2%)	30	79
All	All	1820/2200 (83%)	1735 (95%)	85 (5%)	30	79

All 24 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	122	SER	20
1	A	141	ASN	12
1	A	102	LEU	6
1	A	88	ASN	6
1	A	129	ASN	5
1	A	142	ASN	4
1	A	157	LEU	4
1	A	147	HIS	3
1	A	127	VAL	3
1	A	117	ASN	3
1	A	163	ASN	2
1	A	169	LYS	2
1	A	89	ASN	2
1	A	121	ASN	2
1	A	155	ASP	2
1	A	162	LYS	1
1	A	87	ILE	1

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Mol	Chain	Res	Type	Models (Total)
1	A	107	ASN	1
1	A	150	LYS	1
1	A	101	LYS	1
1	A	140	LYS	1
1	A	92	LYS	1
1	A	119	GLU	1
1	A	151	ARG	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 monosaccharides 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 94% for the well-defined parts and 94% for the entire structure.

### 7.1 Chemical shift list 1

File name: working\_cs.cif

Chemical shift list name: *M21\_chemicalshifts.txt*

#### 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	1551
Number of shifts mapped to atoms	1550
Number of unparsed shifts	0
Number of shifts with mapping errors	1
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. All 1 occurrences are reported below.

List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	59	GLU	H	8.73	0.02	1

#### 7.1.2 Chemical shift referencing

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction $\pm$ precision, ppm	Suggested action
$^{13}\text{C}_\alpha$	119	$-0.21 \pm 0.09$	None needed ( $< 0.5$ ppm)
$^{13}\text{C}_\beta$	115	$0.59 \pm 0.08$	Should be checked
$^{13}\text{C}'$	112	$-0.17 \pm 0.07$	None needed ( $< 0.5$ ppm)
$^{15}\text{N}$	115	$0.10 \pm 0.24$	None needed ( $< 0.5$ ppm)

### 7.1.3 Completeness of resonance assignments [i](#)

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 94%, i.e. 1285 atoms were assigned a chemical shift out of a possible 1369. 0 out of 17 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	<b>Total</b>	<b><sup>1</sup>H</b>	<b><sup>13</sup>C</b>	<b><sup>15</sup>N</b>
Backbone	477/482 (99%)	194/194 (100%)	189/194 (97%)	94/94 (100%)
Sidechain	776/846 (92%)	528/548 (96%)	236/262 (90%)	12/36 (33%)
Aromatic	32/41 (78%)	16/20 (80%)	16/19 (84%)	0/2 (0%)
Overall	1285/1369 (94%)	738/762 (97%)	441/475 (93%)	106/132 (80%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 94%, i.e. 1551 atoms were assigned a chemical shift out of a possible 1655. 0 out of 19 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	<b>Total</b>	<b><sup>1</sup>H</b>	<b><sup>13</sup>C</b>	<b><sup>15</sup>N</b>
Backbone	584/591 (99%)	238/238 (100%)	231/238 (97%)	115/115 (100%)
Sidechain	927/1014 (91%)	631/656 (96%)	282/316 (89%)	14/42 (33%)
Aromatic	40/50 (80%)	20/24 (83%)	20/24 (83%)	0/2 (0%)
Overall	1551/1655 (94%)	889/918 (97%)	533/578 (92%)	129/159 (81%)

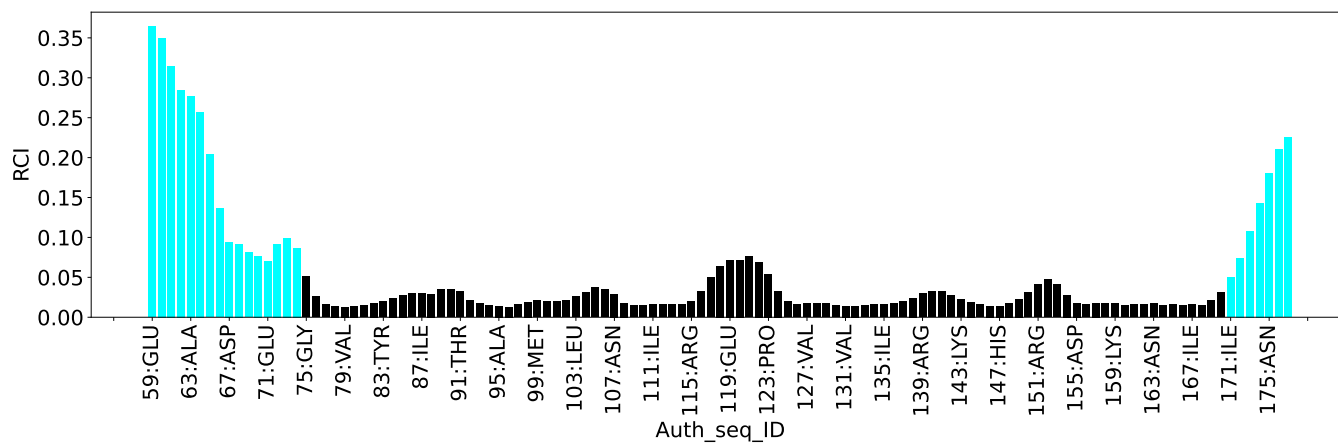
### 7.1.4 Statistically unusual chemical shifts [i](#)

There are no statistically unusual chemical shifts.

### 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:



## 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	1539
Intra-residue ( $ i-j =0$ )	515
Sequential ( $ i-j =1$ )	405
Medium range ( $ i-j >1$ and $ i-j <5$ )	365
Long range ( $ i-j \geq 5$ )	254
Inter-chain	0
Hydrogen bond restraints	0
Disulfide bond restraints	0
Total dihedral-angle restraints	151
Number of unmapped restraints	0
Number of restraints per residue	14.0
Number of long range restraints per residue <sup>1</sup>	2.1

<sup>1</sup>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)	9.7	0.2
0.2-0.5 (Medium)	2.5	0.36
>0.5 (Large)	None	None

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

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)	4.8	4.1
10.0-20.0 (Medium)	None	None
>20.0 (Large)	None	None

## 9 Distance violation analysis [i](#)

### 9.1 Summary of distance violations [i](#)

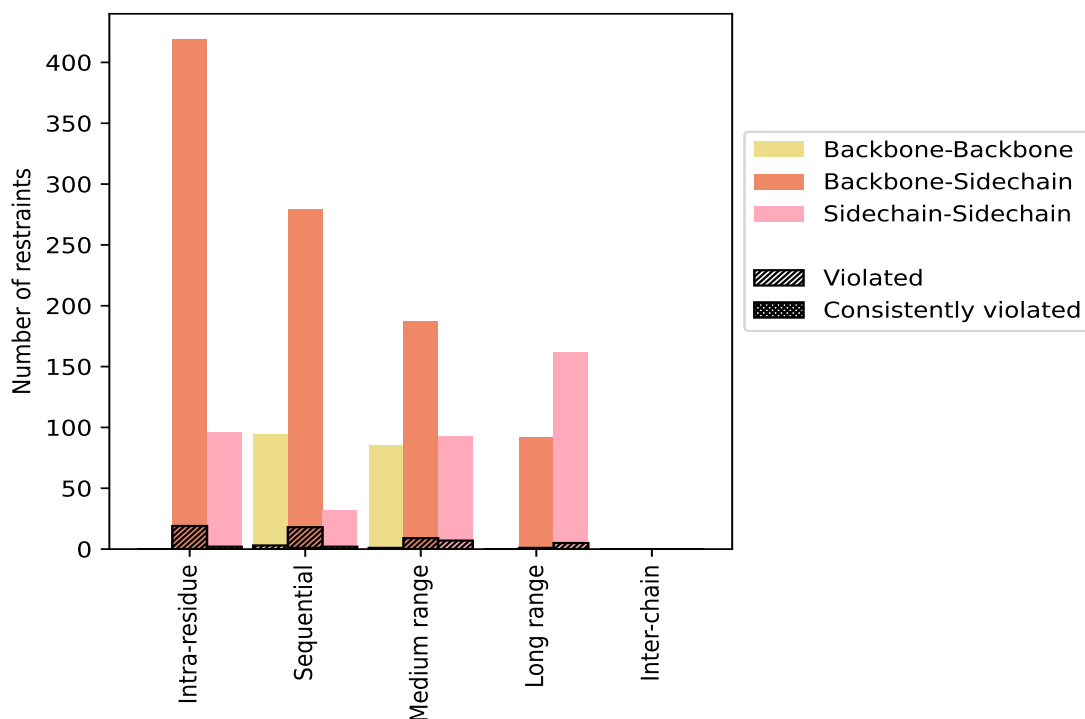
The following table shows the summary of distance violations in different restraint categories based on the sequence separation of the atoms involved. Each category is further sub-divided into three sub-categories based on the atoms involved. Violations less than 0.1 Å are not included in the statistics.

Restrains type	Count	% <sup>1</sup>	Violated <sup>3</sup>			Consistently Violated <sup>4</sup>		
			Count	% <sup>2</sup>	% <sup>1</sup>	Count	% <sup>2</sup>	% <sup>1</sup>
<b>Intra-residue (<math> i-j =0</math>)</b>	<b>515</b>	<b>33.5</b>	<b>21</b>	<b>4.1</b>	<b>1.4</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	419	27.2	19	4.5	1.2	0	0.0	0.0
Sidechain-Sidechain	96	6.2	2	2.1	0.1	0	0.0	0.0
<b>Sequential (<math> i-j =1</math>)</b>	<b>405</b>	<b>26.3</b>	<b>23</b>	<b>5.7</b>	<b>1.5</b>	<b>1</b>	<b>0.2</b>	<b>0.1</b>
Backbone-Backbone	94	6.1	3	3.2	0.2	0	0.0	0.0
Backbone-Sidechain	279	18.1	18	6.5	1.2	1	0.4	0.1
Sidechain-Sidechain	32	2.1	2	6.2	0.1	0	0.0	0.0
<b>Medium range (<math> i-j &gt;1</math> &amp; <math> i-j &lt;5</math>)</b>	<b>365</b>	<b>23.7</b>	<b>17</b>	<b>4.7</b>	<b>1.1</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
Backbone-Backbone	85	5.5	1	1.2	0.1	0	0.0	0.0
Backbone-Sidechain	187	12.2	9	4.8	0.6	0	0.0	0.0
Sidechain-Sidechain	93	6.0	7	7.5	0.5	0	0.0	0.0
<b>Long range (<math> i-j \geq 5</math>)</b>	<b>254</b>	<b>16.5</b>	<b>6</b>	<b>2.4</b>	<b>0.4</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
Backbone-Backbone	0	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	92	6.0	1	1.1	0.1	0	0.0	0.0
Sidechain-Sidechain	162	10.5	5	3.1	0.3	0	0.0	0.0
<b>Inter-chain</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
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
<b>Hydrogen bond</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
<b>Disulfide bond</b>	<b>0</b>	<b>0.0</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
<b>Total</b>	<b>1539</b>	<b>100.0</b>	<b>67</b>	<b>4.4</b>	<b>4.4</b>	<b>1</b>	<b>0.1</b>	<b>0.1</b>
Backbone-Backbone	179	11.6	4	2.2	0.3	0	0.0	0.0
Backbone-Sidechain	977	63.5	47	4.8	3.1	1	0.1	0.1
Sidechain-Sidechain	383	24.9	16	4.2	1.0	0	0.0	0.0

<sup>1</sup> percentage calculated with respect to the total number of distance restraints, <sup>2</sup> percentage calculated with respect to the number of restraints in a particular restraint category, <sup>3</sup> violated in at least one model, <sup>4</sup> 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 disulfid 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 <sup>6</sup> (Å)	Median (Å)
	IR <sup>1</sup>	SQ <sup>2</sup>	MR <sup>3</sup>	LR <sup>4</sup>	IC <sup>5</sup>	Total				
1	1	6	3	1	0	11	0.19	0.32	0.07	0.16
2	2	8	2	0	0	12	0.16	0.29	0.05	0.15
3	3	4	2	0	0	9	0.19	0.36	0.07	0.17
4	3	5	4	0	0	12	0.16	0.3	0.07	0.13
5	2	7	2	1	0	12	0.16	0.31	0.07	0.12
6	6	4	1	2	0	13	0.18	0.29	0.05	0.16
7	0	4	1	0	0	5	0.18	0.29	0.06	0.15
8	4	3	3	2	0	12	0.17	0.32	0.07	0.14
9	5	5	5	0	0	15	0.17	0.36	0.06	0.15
10	5	5	4	0	0	14	0.16	0.3	0.06	0.15
11	1	3	4	0	0	8	0.15	0.28	0.05	0.14

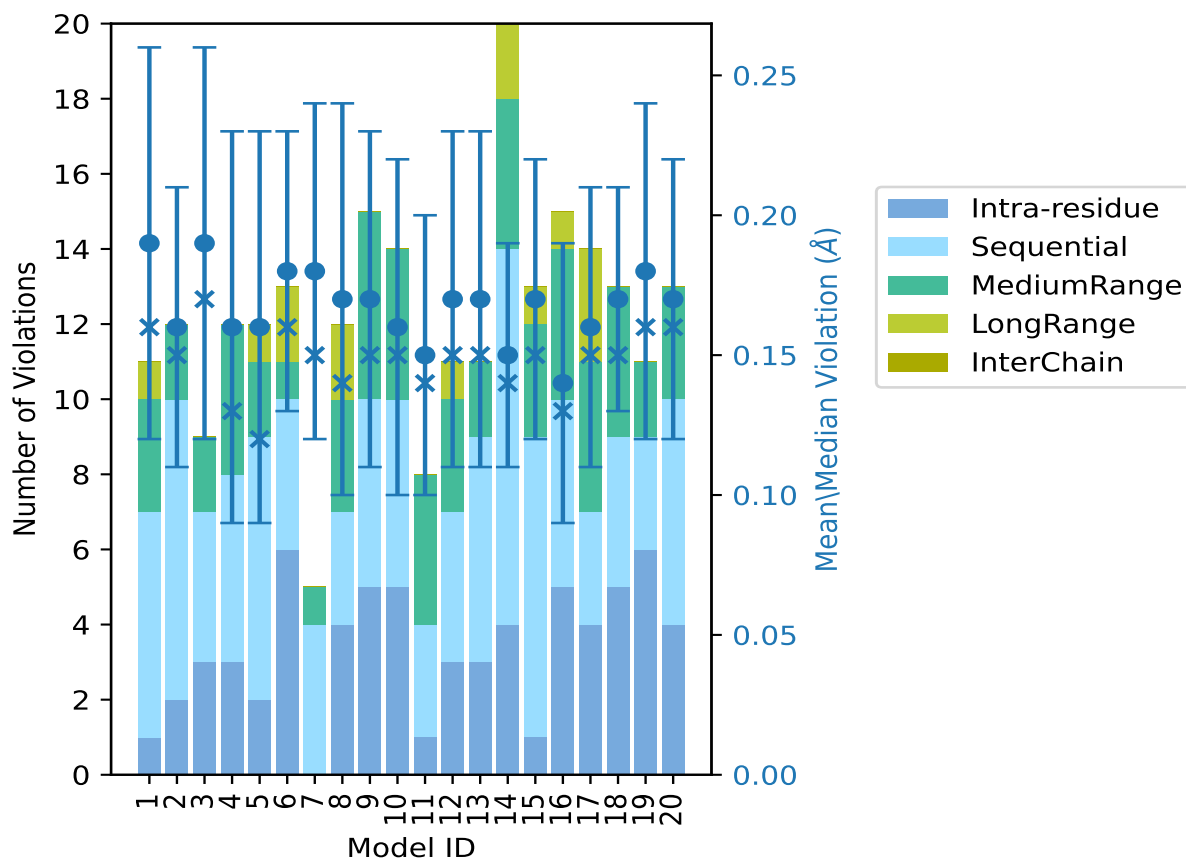
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Model ID	Number of violations					Total	Mean (Å)	Max (Å)	SD <sup>6</sup> (Å)	Median (Å)
	IR <sup>1</sup>	SQ <sup>2</sup>	MR <sup>3</sup>	LR <sup>4</sup>	IC <sup>5</sup>					
12	3	4	3	1	0	11	0.17	0.35	0.06	0.15
13	3	6	2	0	0	11	0.17	0.3	0.06	0.15
14	4	10	4	2	0	20	0.15	0.28	0.04	0.14
15	1	8	3	1	0	13	0.17	0.29	0.05	0.15
16	5	5	4	1	0	15	0.14	0.29	0.05	0.13
17	4	3	4	3	0	14	0.16	0.3	0.05	0.15
18	5	4	4	0	0	13	0.17	0.27	0.04	0.15
19	6	3	2	0	0	11	0.18	0.31	0.06	0.16
20	4	6	3	0	0	13	0.17	0.29	0.05	0.16

<sup>1</sup>Intra-residue restraints, <sup>2</sup>Sequential restraints, <sup>3</sup>Medium range restraints, <sup>4</sup>Long range restraints, <sup>5</sup>Inter-chain restraints, <sup>6</sup>Standard 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

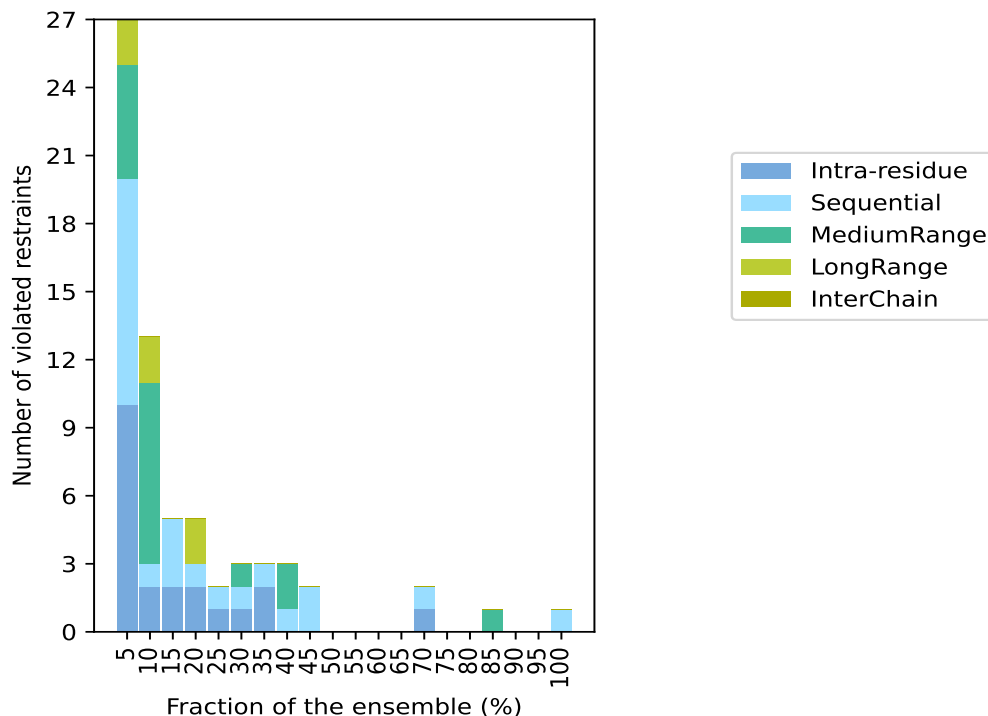
### 9.3 Distance violation statistics for the ensemble

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, 1472(IR:494, SQ:382, MR:348, LR:248, IC:0) restraints are not violated in the ensemble.

Number of violated restraints						Fraction of the ensemble	
IR <sup>1</sup>	SQ <sup>2</sup>	MR <sup>3</sup>	LR <sup>4</sup>	IC <sup>5</sup>	Total	Count <sup>6</sup>	%
10	10	5	2	0	27	1	5.0
2	1	8	2	0	13	2	10.0
2	3	0	0	0	5	3	15.0
2	1	0	2	0	5	4	20.0
1	1	0	0	0	2	5	25.0
1	1	1	0	0	3	6	30.0
2	1	0	0	0	3	7	35.0
0	1	2	0	0	3	8	40.0
0	2	0	0	0	2	9	45.0
0	0	0	0	0	0	10	50.0
0	0	0	0	0	0	11	55.0
0	0	0	0	0	0	12	60.0
0	0	0	0	0	0	13	65.0
1	1	0	0	0	2	14	70.0
0	0	0	0	0	0	15	75.0
0	0	0	0	0	0	16	80.0
0	0	1	0	0	1	17	85.0
0	0	0	0	0	0	18	90.0
0	0	0	0	0	0	19	95.0
0	1	0	0	0	1	20	100.0

<sup>1</sup>Intra-residue restraints, <sup>2</sup>Sequential restraints, <sup>3</sup>Medium range restraints, <sup>4</sup>Long range restraints, <sup>5</sup>Inter-chain restraints, <sup>6</sup> Number of models with violations

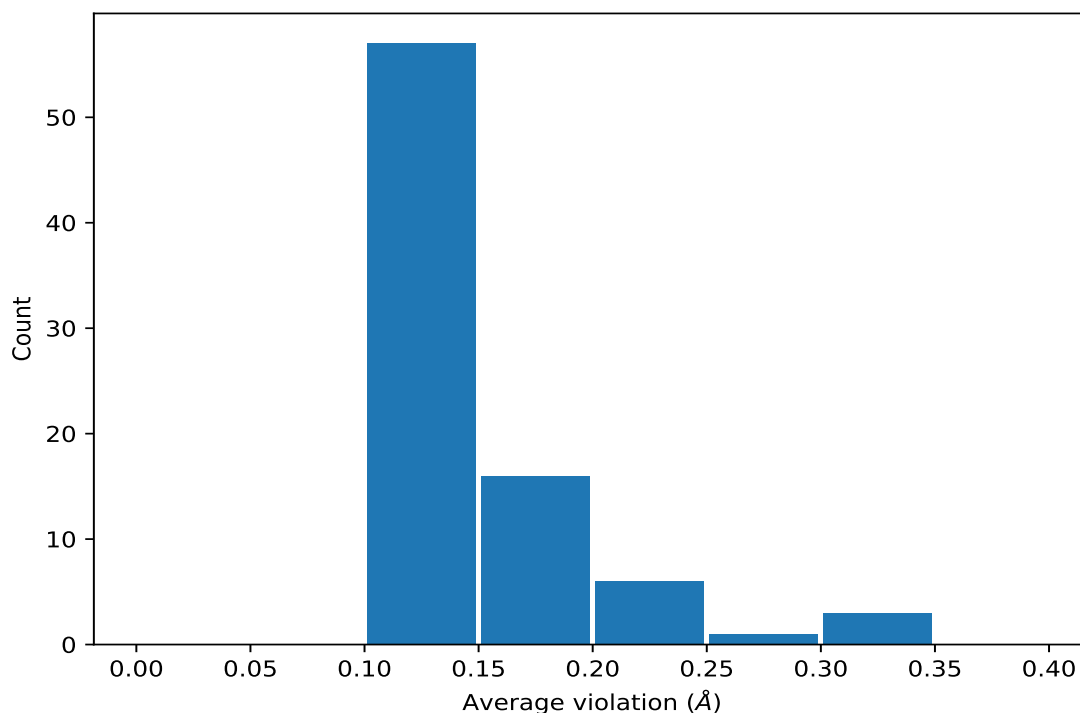
### 9.3.1 Bar graph : Distance violation statistics for the ensemble [i](#)



## 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 <sup>1</sup>	Mean (Å)	SD <sup>1</sup> (Å)	Median (Å)
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	20	0.25	0.08	0.29
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	17	0.2	0.04	0.2
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	17	0.2	0.04	0.2
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	17	0.2	0.04	0.2
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	14	0.17	0.02	0.18
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	14	0.14	0.01	0.14
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	9	0.22	0.02	0.23
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	9	0.14	0.02	0.15
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	9	0.14	0.02	0.15
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	9	0.14	0.02	0.15
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	8	0.15	0.03	0.15
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	8	0.15	0.03	0.15
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	8	0.15	0.03	0.15
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	8	0.14	0.04	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	8	0.12	0.01	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	8	0.12	0.01	0.12

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Key	Atom-1	Atom-2	Models <sup>1</sup>	Mean (Å)	SD <sup>1</sup> (Å)	Median (Å)
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	8	0.12	0.01	0.12
(1,1228)	1:A:150:LYS:HB2	1:A:150:LYS:HE3	7	0.16	0.01	0.15
(1,1228)	1:A:150:LYS:HB3	1:A:150:LYS:HE3	7	0.16	0.01	0.15
(1,341)	1:A:90:ILE:HD11	1:A:91:THR:H	7	0.14	0.02	0.15
(1,341)	1:A:90:ILE:HD12	1:A:91:THR:H	7	0.14	0.02	0.15
(1,341)	1:A:90:ILE:HD13	1:A:91:THR:H	7	0.14	0.02	0.15
(1,1231)	1:A:150:LYS:HB2	1:A:150:LYS:HE2	7	0.11	0.0	0.11
(1,1231)	1:A:150:LYS:HB3	1:A:150:LYS:HE2	7	0.11	0.0	0.11
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD11	6	0.32	0.04	0.34
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD12	6	0.32	0.04	0.34
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD13	6	0.32	0.04	0.34
(1,1339)	1:A:159:LYS:H	1:A:159:LYS:HG2	6	0.21	0.06	0.16
(1,1518)	1:A:171:ILE:HD11	1:A:172:THR:H	6	0.16	0.02	0.15
(1,1518)	1:A:171:ILE:HD12	1:A:172:THR:H	6	0.16	0.02	0.15
(1,1518)	1:A:171:ILE:HD13	1:A:172:THR:H	6	0.16	0.02	0.15
(1,671)	1:A:111:ILE:HG12	1:A:112:LYS:H	5	0.16	0.03	0.17
(1,1177)	1:A:147:HIS:H	1:A:147:HIS:HB3	5	0.15	0.0	0.15
(1,74)	1:A:74:LEU:H	1:A:74:LEU:HB3	4	0.15	0.03	0.14
(1,1341)	1:A:159:LYS:H	1:A:159:LYS:HG3	4	0.14	0.0	0.14
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG21	4	0.12	0.01	0.12
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG22	4	0.12	0.01	0.12
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG23	4	0.12	0.01	0.12
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG21	4	0.12	0.01	0.12
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG22	4	0.12	0.01	0.12
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG23	4	0.12	0.01	0.12
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG21	4	0.12	0.01	0.12
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG22	4	0.12	0.01	0.12
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG23	4	0.12	0.01	0.12
(1,168)	1:A:79:VAL:HG21	1:A:90:ILE:HG12	4	0.12	0.0	0.12
(1,168)	1:A:79:VAL:HG22	1:A:90:ILE:HG12	4	0.12	0.0	0.12
(1,168)	1:A:79:VAL:HG23	1:A:90:ILE:HG12	4	0.12	0.0	0.12
(1,322)	1:A:88:ASN:H	1:A:89:ASN:H	4	0.12	0.0	0.12
(1,1095)	1:A:140:LYS:HA	1:A:140:LYS:HD2	3	0.22	0.0	0.22
(1,49)	1:A:70:GLU:H	1:A:70:GLU:HB3	3	0.18	0.06	0.15
(1,512)	1:A:101:LYS:H	1:A:102:LEU:HB3	3	0.16	0.04	0.15
(1,1497)	1:A:169:LYS:HG3	1:A:170:SER:H	3	0.14	0.02	0.15
(1,1016)	1:A:134:TYR:H	1:A:135:ILE:HG12	3	0.11	0.0	0.11
(1,642)	1:A:109:ASP:HB2	1:A:112:LYS:HB2	2	0.16	0.01	0.16
(1,210)	1:A:80:LEU:HD11	1:A:99:MET:HB3	2	0.16	0.01	0.16
(1,210)	1:A:80:LEU:HD12	1:A:99:MET:HB3	2	0.16	0.01	0.16
(1,210)	1:A:80:LEU:HD13	1:A:99:MET:HB3	2	0.16	0.01	0.16
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD11	2	0.16	0.01	0.16

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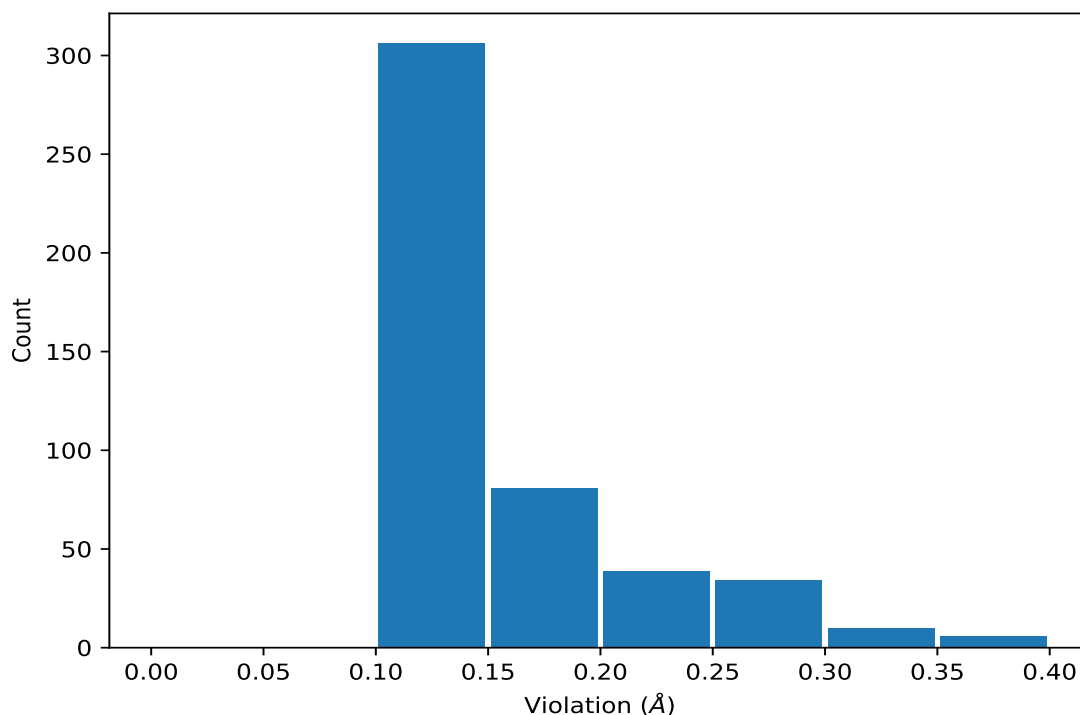
Key	Atom-1	Atom-2	Models <sup>1</sup>	Mean (Å)	SD <sup>1</sup> (Å)	Median (Å)
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD12	2	0.16	0.01	0.16
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD13	2	0.16	0.01	0.16
(1,1267)	1:A:153:PRO:HG2	1:A:155:ASP:H	2	0.15	0.0	0.15
(1,1529)	1:A:173:ILE:HA	1:A:173:ILE:HG13	2	0.15	0.0	0.15
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD21	2	0.14	0.01	0.14
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD22	2	0.14	0.01	0.14
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD23	2	0.14	0.01	0.14
(1,677)	1:A:111:ILE:HG21	1:A:113:LYS:H	2	0.12	0.01	0.12
(1,677)	1:A:111:ILE:HG22	1:A:113:LYS:H	2	0.12	0.01	0.12
(1,677)	1:A:111:ILE:HG23	1:A:113:LYS:H	2	0.12	0.01	0.12
(1,1196)	1:A:148:LEU:HD21	1:A:151:ARG:HD2	2	0.12	0.02	0.12
(1,1196)	1:A:148:LEU:HD21	1:A:151:ARG:HD3	2	0.12	0.02	0.12
(1,1196)	1:A:148:LEU:HD22	1:A:151:ARG:HD2	2	0.12	0.02	0.12
(1,1196)	1:A:148:LEU:HD22	1:A:151:ARG:HD3	2	0.12	0.02	0.12
(1,1196)	1:A:148:LEU:HD23	1:A:151:ARG:HD2	2	0.12	0.02	0.12
(1,1196)	1:A:148:LEU:HD23	1:A:151:ARG:HD3	2	0.12	0.02	0.12
(1,209)	1:A:80:LEU:HD21	1:A:99:MET:HG2	2	0.12	0.0	0.12
(1,209)	1:A:80:LEU:HD22	1:A:99:MET:HG2	2	0.12	0.0	0.12
(1,209)	1:A:80:LEU:HD23	1:A:99:MET:HG2	2	0.12	0.0	0.12
(1,917)	1:A:127:VAL:HG21	1:A:131:VAL:HB	2	0.12	0.01	0.12
(1,917)	1:A:127:VAL:HG22	1:A:131:VAL:HB	2	0.12	0.01	0.12
(1,917)	1:A:127:VAL:HG23	1:A:131:VAL:HB	2	0.12	0.01	0.12
(1,513)	1:A:101:LYS:HA	1:A:103:LEU:H	2	0.12	0.0	0.12
(1,518)	1:A:102:LEU:H	1:A:102:LEU:HG	2	0.12	0.0	0.12
(1,1066)	1:A:137:SER:HB2	1:A:138:ASN:HB3	2	0.11	0.0	0.11

<sup>1</sup>Number of violated models, <sup>2</sup>Standard 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)
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD11	3	0.36
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD12	3	0.36
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD13	3	0.36
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD11	9	0.36
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD12	9	0.36
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD13	9	0.36
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD11	12	0.35
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD12	12	0.35
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD13	12	0.35
(1,62)	1:A:71:GLU:HA	1:A:72:TYR:HB3	1	0.32
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD11	8	0.32
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD12	8	0.32
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD13	8	0.32
(1,396)	1:A:94:SER:HA	1:A:97:VAL:HB	8	0.31
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	5	0.31
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	19	0.31

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1339)	1:A:159:LYS:H	1:A:159:LYS:HG2	4	0.3
(1,1339)	1:A:159:LYS:H	1:A:159:LYS:HG2	5	0.3
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	4	0.3
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	10	0.3
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	13	0.3
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	17	0.3
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	1	0.29
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	2	0.29
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	6	0.29
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	7	0.29
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	15	0.29
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	16	0.29
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	20	0.29
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD11	14	0.28
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD12	14	0.28
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD13	14	0.28
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	11	0.28
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD11	18	0.27
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD12	18	0.27
(1,1322)	1:A:157:LEU:HB2	1:A:161:ILE:HD13	18	0.27
(1,49)	1:A:70:GLU:H	1:A:70:GLU:HB3	10	0.26
(1,1122)	1:A:143:LYS:HA	1:A:143:LYS:HD2	3	0.26
(1,1122)	1:A:143:LYS:HA	1:A:143:LYS:HD3	3	0.26
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	6	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	6	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	6	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	13	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	13	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	13	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	19	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	19	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	19	0.25
(1,419)	1:A:97:VAL:H	1:A:97:VAL:HB	8	0.25
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	9	0.25
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	20	0.24
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	20	0.24
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	20	0.24
(1,61)	1:A:71:GLU:H	1:A:72:TYR:H	13	0.23
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	2	0.23
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	2	0.23
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	2	0.23
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	18	0.23

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	18	0.23
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	18	0.23
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	1	0.23
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	4	0.23
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	14	0.23
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	15	0.23
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	20	0.23
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	6	0.23
(1,1095)	1:A:140:LYS:HA	1:A:140:LYS:HD2	15	0.23
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	1	0.22
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	1	0.22
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	1	0.22
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	12	0.22
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	12	0.22
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	12	0.22
(1,328)	1:A:90:ILE:H	1:A:90:ILE:HG12	19	0.22
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	7	0.22
(1,1095)	1:A:140:LYS:HA	1:A:140:LYS:HD2	17	0.22
(1,1095)	1:A:140:LYS:HA	1:A:140:LYS:HD2	20	0.22
(1,74)	1:A:74:LEU:H	1:A:74:LEU:HB3	6	0.21
(1,512)	1:A:101:LYS:H	1:A:102:LEU:HB3	6	0.21
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	2	0.21
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	3	0.2
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	3	0.2
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	3	0.2
(1,1518)	1:A:171:ILE:HD11	1:A:172:THR:H	9	0.2
(1,1518)	1:A:171:ILE:HD12	1:A:172:THR:H	9	0.2
(1,1518)	1:A:171:ILE:HD13	1:A:172:THR:H	9	0.2
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	1	0.2
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	1	0.2
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	1	0.2
(1,671)	1:A:111:ILE:HG12	1:A:112:LYS:H	15	0.19
(1,671)	1:A:111:ILE:HG12	1:A:112:LYS:H	18	0.19
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	10	0.19
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	10	0.19
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	10	0.19
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	15	0.19
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	15	0.19
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	15	0.19
(1,1513)	1:A:171:ILE:HB	1:A:172:THR:H	19	0.19
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	9	0.19
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	9	0.19

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	9	0.19
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	11	0.19
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	2	0.19
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	13	0.19
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	16	0.19
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	17	0.19
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	18	0.19
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	9	0.18
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	9	0.18
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	9	0.18
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	17	0.18
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	17	0.18
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	17	0.18
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	8	0.18
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	8	0.18
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	8	0.18
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	10	0.18
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	19	0.18
(1,1228)	1:A:150:LYS:HB2	1:A:150:LYS:HE3	6	0.18
(1,1228)	1:A:150:LYS:HB3	1:A:150:LYS:HE3	6	0.18
(1,1228)	1:A:150:LYS:HB2	1:A:150:LYS:HE3	14	0.18
(1,1228)	1:A:150:LYS:HB3	1:A:150:LYS:HE3	14	0.18
(1,671)	1:A:111:ILE:HG12	1:A:112:LYS:H	5	0.17
(1,642)	1:A:109:ASP:HB2	1:A:112:LYS:HB2	10	0.17
(1,37)	1:A:68:ARG:HA	1:A:68:ARG:HD2	12	0.17
(1,37)	1:A:68:ARG:HA	1:A:68:ARG:HD3	12	0.17
(1,210)	1:A:80:LEU:HD11	1:A:99:MET:HB3	17	0.17
(1,210)	1:A:80:LEU:HD12	1:A:99:MET:HB3	17	0.17
(1,210)	1:A:80:LEU:HD13	1:A:99:MET:HB3	17	0.17
(1,1518)	1:A:171:ILE:HD11	1:A:172:THR:H	20	0.17
(1,1518)	1:A:171:ILE:HD12	1:A:172:THR:H	20	0.17
(1,1518)	1:A:171:ILE:HD13	1:A:172:THR:H	20	0.17
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	20	0.17
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	20	0.17
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	20	0.17
(1,1339)	1:A:159:LYS:H	1:A:159:LYS:HG2	18	0.17
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	3	0.17
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	5	0.17
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	8	0.17
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	9	0.17
(1,1116)	1:A:143:LYS:H	1:A:143:LYS:HB2	3	0.17
(1,642)	1:A:109:ASP:HB2	1:A:112:LYS:HB2	18	0.16

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	16	0.16
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	16	0.16
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	16	0.16
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD11	17	0.16
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD12	17	0.16
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD13	17	0.16
(1,341)	1:A:90:ILE:HD11	1:A:91:THR:H	1	0.16
(1,341)	1:A:90:ILE:HD12	1:A:91:THR:H	1	0.16
(1,341)	1:A:90:ILE:HD13	1:A:91:THR:H	1	0.16
(1,341)	1:A:90:ILE:HD11	1:A:91:THR:H	20	0.16
(1,341)	1:A:90:ILE:HD12	1:A:91:THR:H	20	0.16
(1,341)	1:A:90:ILE:HD13	1:A:91:THR:H	20	0.16
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	2	0.16
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	2	0.16
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	2	0.16
(1,1497)	1:A:169:LYS:HG3	1:A:170:SER:H	14	0.16
(1,1339)	1:A:159:LYS:H	1:A:159:LYS:HG2	6	0.16
(1,1339)	1:A:159:LYS:H	1:A:159:LYS:HG2	14	0.16
(1,1339)	1:A:159:LYS:H	1:A:159:LYS:HG2	16	0.16
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	9	0.16
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	9	0.16
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	9	0.16
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	12	0.16
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	12	0.16
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	12	0.16
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	12	0.16
(1,1228)	1:A:150:LYS:HB2	1:A:150:LYS:HE3	19	0.16
(1,1228)	1:A:150:LYS:HB3	1:A:150:LYS:HE3	19	0.16
(1,512)	1:A:101:LYS:H	1:A:102:LEU:HB3	2	0.15
(1,49)	1:A:70:GLU:H	1:A:70:GLU:HB3	6	0.15
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	14	0.15
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	14	0.15
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	14	0.15
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD11	14	0.15
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD12	14	0.15
(1,459)	1:A:99:MET:H	1:A:102:LEU:HD13	14	0.15
(1,39)	1:A:68:ARG:HG2	1:A:69:THR:H	10	0.15
(1,341)	1:A:90:ILE:HD11	1:A:91:THR:H	2	0.15
(1,341)	1:A:90:ILE:HD12	1:A:91:THR:H	2	0.15
(1,341)	1:A:90:ILE:HD13	1:A:91:THR:H	2	0.15
(1,341)	1:A:90:ILE:HD11	1:A:91:THR:H	5	0.15
(1,341)	1:A:90:ILE:HD12	1:A:91:THR:H	5	0.15

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,341)	1:A:90:ILE:HD13	1:A:91:THR:H	5	0.15
(1,210)	1:A:80:LEU:HD11	1:A:99:MET:HB3	14	0.15
(1,210)	1:A:80:LEU:HD12	1:A:99:MET:HB3	14	0.15
(1,210)	1:A:80:LEU:HD13	1:A:99:MET:HB3	14	0.15
(1,1529)	1:A:173:ILE:HA	1:A:173:ILE:HG13	16	0.15
(1,1518)	1:A:171:ILE:HD11	1:A:172:THR:H	14	0.15
(1,1518)	1:A:171:ILE:HD12	1:A:172:THR:H	14	0.15
(1,1518)	1:A:171:ILE:HD13	1:A:172:THR:H	14	0.15
(1,1518)	1:A:171:ILE:HD11	1:A:172:THR:H	15	0.15
(1,1518)	1:A:171:ILE:HD12	1:A:172:THR:H	15	0.15
(1,1518)	1:A:171:ILE:HD13	1:A:172:THR:H	15	0.15
(1,1497)	1:A:169:LYS:HG3	1:A:170:SER:H	7	0.15
(1,138)	1:A:77:VAL:HG11	1:A:102:LEU:HD21	6	0.15
(1,138)	1:A:77:VAL:HG11	1:A:102:LEU:HD22	6	0.15
(1,138)	1:A:77:VAL:HG11	1:A:102:LEU:HD23	6	0.15
(1,138)	1:A:77:VAL:HG12	1:A:102:LEU:HD21	6	0.15
(1,138)	1:A:77:VAL:HG12	1:A:102:LEU:HD22	6	0.15
(1,138)	1:A:77:VAL:HG12	1:A:102:LEU:HD23	6	0.15
(1,138)	1:A:77:VAL:HG13	1:A:102:LEU:HD21	6	0.15
(1,138)	1:A:77:VAL:HG13	1:A:102:LEU:HD22	6	0.15
(1,138)	1:A:77:VAL:HG13	1:A:102:LEU:HD23	6	0.15
(1,135)	1:A:77:VAL:HG21	1:A:81:GLU:HG2	13	0.15
(1,135)	1:A:77:VAL:HG22	1:A:81:GLU:HG2	13	0.15
(1,135)	1:A:77:VAL:HG23	1:A:81:GLU:HG2	13	0.15
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	3	0.15
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	3	0.15
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	3	0.15
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	18	0.15
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	18	0.15
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	18	0.15
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	6	0.15
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	15	0.15
(1,1267)	1:A:153:PRO:HG2	1:A:155:ASP:H	17	0.15
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	20	0.15
(1,1228)	1:A:150:LYS:HB2	1:A:150:LYS:HE3	9	0.15
(1,1228)	1:A:150:LYS:HB3	1:A:150:LYS:HE3	9	0.15
(1,1228)	1:A:150:LYS:HB2	1:A:150:LYS:HE3	10	0.15
(1,1228)	1:A:150:LYS:HB3	1:A:150:LYS:HE3	10	0.15
(1,1228)	1:A:150:LYS:HB2	1:A:150:LYS:HE3	13	0.15
(1,1228)	1:A:150:LYS:HB3	1:A:150:LYS:HE3	13	0.15
(1,1228)	1:A:150:LYS:HB2	1:A:150:LYS:HE3	18	0.15
(1,1228)	1:A:150:LYS:HB3	1:A:150:LYS:HE3	18	0.15

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1177)	1:A:147:HIS:H	1:A:147:HIS:HB3	2	0.15
(1,1177)	1:A:147:HIS:H	1:A:147:HIS:HB3	12	0.15
(1,1177)	1:A:147:HIS:H	1:A:147:HIS:HB3	16	0.15
(1,1177)	1:A:147:HIS:H	1:A:147:HIS:HB3	19	0.15
(1,74)	1:A:74:LEU:H	1:A:74:LEU:HB3	1	0.14
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG21	15	0.14
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG22	15	0.14
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG23	15	0.14
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG21	15	0.14
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG22	15	0.14
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG23	15	0.14
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG21	15	0.14
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG22	15	0.14
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG23	15	0.14
(1,671)	1:A:111:ILE:HG12	1:A:112:LYS:H	8	0.14
(1,547)	1:A:103:LEU:HD21	1:A:104:THR:H	13	0.14
(1,547)	1:A:103:LEU:HD22	1:A:104:THR:H	13	0.14
(1,547)	1:A:103:LEU:HD23	1:A:104:THR:H	13	0.14
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD21	9	0.14
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD22	9	0.14
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD23	9	0.14
(1,341)	1:A:90:ILE:HD11	1:A:91:THR:H	14	0.14
(1,341)	1:A:90:ILE:HD12	1:A:91:THR:H	14	0.14
(1,341)	1:A:90:ILE:HD13	1:A:91:THR:H	14	0.14
(1,1529)	1:A:173:ILE:HA	1:A:173:ILE:HG13	8	0.14
(1,1518)	1:A:171:ILE:HD11	1:A:172:THR:H	1	0.14
(1,1518)	1:A:171:ILE:HD12	1:A:172:THR:H	1	0.14
(1,1518)	1:A:171:ILE:HD13	1:A:172:THR:H	1	0.14
(1,1518)	1:A:171:ILE:HD11	1:A:172:THR:H	4	0.14
(1,1518)	1:A:171:ILE:HD12	1:A:172:THR:H	4	0.14
(1,1518)	1:A:171:ILE:HD13	1:A:172:THR:H	4	0.14
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	4	0.14
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	4	0.14
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	4	0.14
(1,1348)	1:A:159:LYS:HG2	1:A:160:THR:H	12	0.14
(1,1341)	1:A:159:LYS:H	1:A:159:LYS:HG3	14	0.14
(1,1341)	1:A:159:LYS:H	1:A:159:LYS:HG3	16	0.14
(1,1341)	1:A:159:LYS:H	1:A:159:LYS:HG3	18	0.14
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	3	0.14
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	18	0.14
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	7	0.14
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	10	0.14

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	11	0.14
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	13	0.14
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	17	0.14
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	20	0.14
(1,1267)	1:A:153:PRO:HG2	1:A:155:ASP:H	18	0.14
(1,1241)	1:A:151:ARG:H	1:A:151:ARG:HB3	11	0.14
(1,1196)	1:A:148:LEU:HD21	1:A:151:ARG:HD2	11	0.14
(1,1196)	1:A:148:LEU:HD21	1:A:151:ARG:HD3	11	0.14
(1,1196)	1:A:148:LEU:HD22	1:A:151:ARG:HD2	11	0.14
(1,1196)	1:A:148:LEU:HD22	1:A:151:ARG:HD3	11	0.14
(1,1196)	1:A:148:LEU:HD23	1:A:151:ARG:HD2	11	0.14
(1,1196)	1:A:148:LEU:HD23	1:A:151:ARG:HD3	11	0.14
(1,1177)	1:A:147:HIS:H	1:A:147:HIS:HB3	20	0.14
(1,917)	1:A:127:VAL:HG21	1:A:131:VAL:HB	15	0.13
(1,917)	1:A:127:VAL:HG22	1:A:131:VAL:HB	15	0.13
(1,917)	1:A:127:VAL:HG23	1:A:131:VAL:HB	15	0.13
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	12	0.13
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	12	0.13
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	12	0.13
(1,74)	1:A:74:LEU:H	1:A:74:LEU:HB3	10	0.13
(1,74)	1:A:74:LEU:H	1:A:74:LEU:HB3	17	0.13
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG21	8	0.13
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG22	8	0.13
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG23	8	0.13
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG21	8	0.13
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG22	8	0.13
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG23	8	0.13
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG21	8	0.13
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG22	8	0.13
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG23	8	0.13
(1,677)	1:A:111:ILE:HG21	1:A:113:LYS:H	10	0.13
(1,677)	1:A:111:ILE:HG22	1:A:113:LYS:H	10	0.13
(1,677)	1:A:111:ILE:HG23	1:A:113:LYS:H	10	0.13
(1,551)	1:A:103:LEU:HA	1:A:106:LEU:HD11	16	0.13
(1,551)	1:A:103:LEU:HA	1:A:106:LEU:HD12	16	0.13
(1,551)	1:A:103:LEU:HA	1:A:106:LEU:HD13	16	0.13
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD21	4	0.13
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD22	4	0.13
(1,463)	1:A:99:MET:HG3	1:A:102:LEU:HD23	4	0.13
(1,332)	1:A:90:ILE:H	1:A:90:ILE:HD11	19	0.13
(1,332)	1:A:90:ILE:H	1:A:90:ILE:HD12	19	0.13
(1,332)	1:A:90:ILE:H	1:A:90:ILE:HD13	19	0.13

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	19	0.13
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	19	0.13
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	19	0.13
(1,137)	1:A:77:VAL:HA	1:A:102:LEU:HD21	1	0.13
(1,137)	1:A:77:VAL:HA	1:A:102:LEU:HD22	1	0.13
(1,137)	1:A:77:VAL:HA	1:A:102:LEU:HD23	1	0.13
(1,1341)	1:A:159:LYS:H	1:A:159:LYS:HG3	6	0.13
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	9	0.13
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	12	0.13
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	14	0.13
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	1	0.13
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	4	0.13
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	5	0.13
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	19	0.13
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	1	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	1	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	1	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	5	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	5	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	5	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	10	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	10	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	10	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	16	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	16	0.12
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	16	0.12
(1,780)	1:A:118:GLU:H	1:A:118:GLU:HG2	17	0.12
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG21	5	0.12
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG22	5	0.12
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG23	5	0.12
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG21	5	0.12
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG22	5	0.12
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG23	5	0.12
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG21	5	0.12
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG22	5	0.12
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG23	5	0.12
(1,677)	1:A:111:ILE:HG21	1:A:113:LYS:H	4	0.12
(1,677)	1:A:111:ILE:HG22	1:A:113:LYS:H	4	0.12
(1,677)	1:A:111:ILE:HG23	1:A:113:LYS:H	4	0.12
(1,518)	1:A:102:LEU:H	1:A:102:LEU:HG	9	0.12
(1,513)	1:A:101:LYS:HA	1:A:103:LEU:H	5	0.12
(1,49)	1:A:70:GLU:H	1:A:70:GLU:HB3	20	0.12

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,341)	1:A:90:ILE:HD11	1:A:91:THR:H	3	0.12
(1,341)	1:A:90:ILE:HD12	1:A:91:THR:H	3	0.12
(1,341)	1:A:90:ILE:HD13	1:A:91:THR:H	3	0.12
(1,322)	1:A:88:ASN:H	1:A:89:ASN:H	14	0.12
(1,322)	1:A:88:ASN:H	1:A:89:ASN:H	15	0.12
(1,322)	1:A:88:ASN:H	1:A:89:ASN:H	18	0.12
(1,321)	1:A:87:ILE:HG12	1:A:88:ASN:HD22	5	0.12
(1,304)	1:A:86:SER:HB2	1:A:87:ILE:H	20	0.12
(1,27)	1:A:67:ASP:H	1:A:67:ASP:HB3	4	0.12
(1,209)	1:A:80:LEU:HD21	1:A:99:MET:HG2	14	0.12
(1,209)	1:A:80:LEU:HD22	1:A:99:MET:HG2	14	0.12
(1,209)	1:A:80:LEU:HD23	1:A:99:MET:HG2	14	0.12
(1,209)	1:A:80:LEU:HD21	1:A:99:MET:HG2	17	0.12
(1,209)	1:A:80:LEU:HD22	1:A:99:MET:HG2	17	0.12
(1,209)	1:A:80:LEU:HD23	1:A:99:MET:HG2	17	0.12
(1,168)	1:A:79:VAL:HG21	1:A:90:ILE:HG12	6	0.12
(1,168)	1:A:79:VAL:HG22	1:A:90:ILE:HG12	6	0.12
(1,168)	1:A:79:VAL:HG23	1:A:90:ILE:HG12	6	0.12
(1,168)	1:A:79:VAL:HG21	1:A:90:ILE:HG12	12	0.12
(1,168)	1:A:79:VAL:HG22	1:A:90:ILE:HG12	12	0.12
(1,168)	1:A:79:VAL:HG23	1:A:90:ILE:HG12	12	0.12
(1,168)	1:A:79:VAL:HG21	1:A:90:ILE:HG12	17	0.12
(1,168)	1:A:79:VAL:HG22	1:A:90:ILE:HG12	17	0.12
(1,168)	1:A:79:VAL:HG23	1:A:90:ILE:HG12	17	0.12
(1,1531)	1:A:173:ILE:H	1:A:174:ASN:H	15	0.12
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	15	0.12
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	15	0.12
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	15	0.12
(1,1497)	1:A:169:LYS:HG3	1:A:170:SER:H	4	0.12
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	14	0.12
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	14	0.12
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	14	0.12
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	15	0.12
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	15	0.12
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	15	0.12
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	2	0.12
(1,1297)	1:A:156:VAL:H	1:A:157:LEU:HB3	16	0.12
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	9	0.12
(1,1231)	1:A:150:LYS:HB2	1:A:150:LYS:HE2	14	0.12
(1,1231)	1:A:150:LYS:HB3	1:A:150:LYS:HE2	14	0.12
(1,917)	1:A:127:VAL:HG21	1:A:131:VAL:HB	8	0.11
(1,917)	1:A:127:VAL:HG22	1:A:131:VAL:HB	8	0.11

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,917)	1:A:127:VAL:HG23	1:A:131:VAL:HB	8	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	9	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	9	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	9	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	11	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	11	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	11	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG21	20	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG22	20	0.11
(1,857)	1:A:124:LYS:HA	1:A:127:VAL:HG23	20	0.11
(1,73)	1:A:74:LEU:H	1:A:74:LEU:HG	9	0.11
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG21	16	0.11
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG22	16	0.11
(1,690)	1:A:111:ILE:HG21	1:A:131:VAL:HG23	16	0.11
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG21	16	0.11
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG22	16	0.11
(1,690)	1:A:111:ILE:HG22	1:A:131:VAL:HG23	16	0.11
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG21	16	0.11
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG22	16	0.11
(1,690)	1:A:111:ILE:HG23	1:A:131:VAL:HG23	16	0.11
(1,671)	1:A:111:ILE:HG12	1:A:112:LYS:H	16	0.11
(1,59)	1:A:71:GLU:HB2	1:A:72:TYR:H	13	0.11
(1,59)	1:A:71:GLU:HB3	1:A:72:TYR:H	13	0.11
(1,518)	1:A:102:LEU:H	1:A:102:LEU:HG	4	0.11
(1,513)	1:A:101:LYS:HA	1:A:103:LEU:H	16	0.11
(1,512)	1:A:101:LYS:H	1:A:102:LEU:HB3	14	0.11
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	7	0.11
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	7	0.11
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	7	0.11
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD11	11	0.11
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD12	11	0.11
(1,462)	1:A:99:MET:HB3	1:A:102:LEU:HD13	11	0.11
(1,456)	1:A:99:MET:HB2	1:A:100:SER:HA	14	0.11
(1,341)	1:A:90:ILE:HD11	1:A:91:THR:H	16	0.11
(1,341)	1:A:90:ILE:HD12	1:A:91:THR:H	16	0.11
(1,341)	1:A:90:ILE:HD13	1:A:91:THR:H	16	0.11
(1,330)	1:A:90:ILE:H	1:A:90:ILE:HG13	8	0.11
(1,322)	1:A:88:ASN:H	1:A:89:ASN:H	2	0.11
(1,168)	1:A:79:VAL:HG21	1:A:90:ILE:HG12	8	0.11
(1,168)	1:A:79:VAL:HG22	1:A:90:ILE:HG12	8	0.11
(1,168)	1:A:79:VAL:HG23	1:A:90:ILE:HG12	8	0.11
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG21	14	0.11

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG22	14	0.11
(1,1498)	1:A:169:LYS:H	1:A:171:ILE:HG23	14	0.11
(1,1319)	1:A:157:LEU:HB2	1:A:160:THR:H	17	0.11
(1,1300)	1:A:156:VAL:HA	1:A:157:LEU:HB3	8	0.11
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	5	0.11
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	5	0.11
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	5	0.11
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD11	17	0.11
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD12	17	0.11
(1,1299)	1:A:156:VAL:H	1:A:157:LEU:HD13	17	0.11
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	2	0.11
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	5	0.11
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	10	0.11
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	12	0.11
(1,127)	1:A:77:VAL:HB	1:A:78:GLY:H	13	0.11
(1,1231)	1:A:150:LYS:HB2	1:A:150:LYS:HE2	6	0.11
(1,1231)	1:A:150:LYS:HB3	1:A:150:LYS:HE2	6	0.11
(1,1231)	1:A:150:LYS:HB2	1:A:150:LYS:HE2	9	0.11
(1,1231)	1:A:150:LYS:HB3	1:A:150:LYS:HE2	9	0.11
(1,1231)	1:A:150:LYS:HB2	1:A:150:LYS:HE2	10	0.11
(1,1231)	1:A:150:LYS:HB3	1:A:150:LYS:HE2	10	0.11
(1,1231)	1:A:150:LYS:HB2	1:A:150:LYS:HE2	13	0.11
(1,1231)	1:A:150:LYS:HB3	1:A:150:LYS:HE2	13	0.11
(1,1231)	1:A:150:LYS:HB2	1:A:150:LYS:HE2	18	0.11
(1,1231)	1:A:150:LYS:HB3	1:A:150:LYS:HE2	18	0.11
(1,1231)	1:A:150:LYS:HB2	1:A:150:LYS:HE2	19	0.11
(1,1231)	1:A:150:LYS:HB3	1:A:150:LYS:HE2	19	0.11
(1,1196)	1:A:148:LEU:HD21	1:A:151:ARG:HD2	4	0.11
(1,1196)	1:A:148:LEU:HD21	1:A:151:ARG:HD3	4	0.11
(1,1196)	1:A:148:LEU:HD22	1:A:151:ARG:HD2	4	0.11
(1,1196)	1:A:148:LEU:HD22	1:A:151:ARG:HD3	4	0.11
(1,1196)	1:A:148:LEU:HD23	1:A:151:ARG:HD2	4	0.11
(1,1196)	1:A:148:LEU:HD23	1:A:151:ARG:HD3	4	0.11
(1,1182)	1:A:147:HIS:HA	1:A:150:LYS:HB2	11	0.11
(1,1182)	1:A:147:HIS:HA	1:A:150:LYS:HB3	11	0.11
(1,1066)	1:A:137:SER:HB2	1:A:138:ASN:HB3	3	0.11
(1,1066)	1:A:137:SER:HB2	1:A:138:ASN:HB3	14	0.11
(1,1016)	1:A:134:TYR:H	1:A:135:ILE:HG12	2	0.11
(1,1016)	1:A:134:TYR:H	1:A:135:ILE:HG12	10	0.11
(1,1016)	1:A:134:TYR:H	1:A:135:ILE:HG12	16	0.11

## 10 Dihedral-angle violation analysis [i](#)

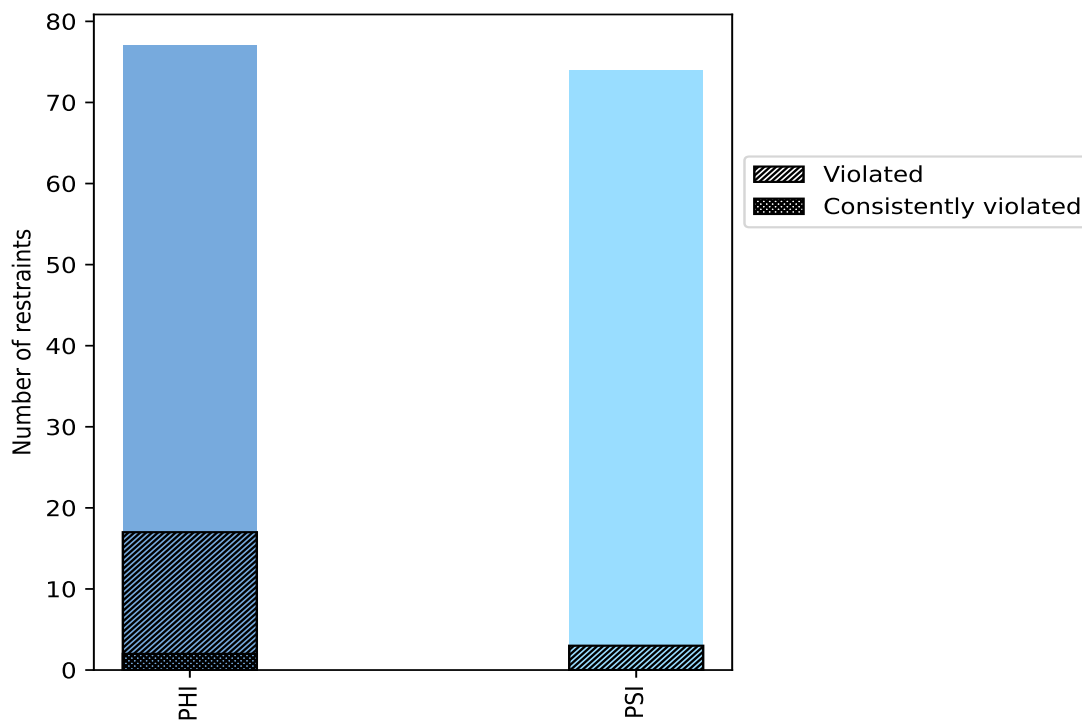
### 10.1 Summary of dihedral-angle violations [i](#)

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	% <sup>1</sup>	Violated <sup>3</sup>			Consistently Violated <sup>4</sup>		
			Count	% <sup>2</sup>	% <sup>1</sup>	Count	% <sup>2</sup>	% <sup>1</sup>
PHI	77	51.0	17	22.1	11.3	2	2.6	1.3
PSI	74	49.0	3	4.1	2.0	0	0.0	0.0
Total	151	100.0	20	13.2	13.2	2	1.3	1.3

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

#### 10.1.1 Bar chart : Distribution of dihedral-angles and violations [i](#)



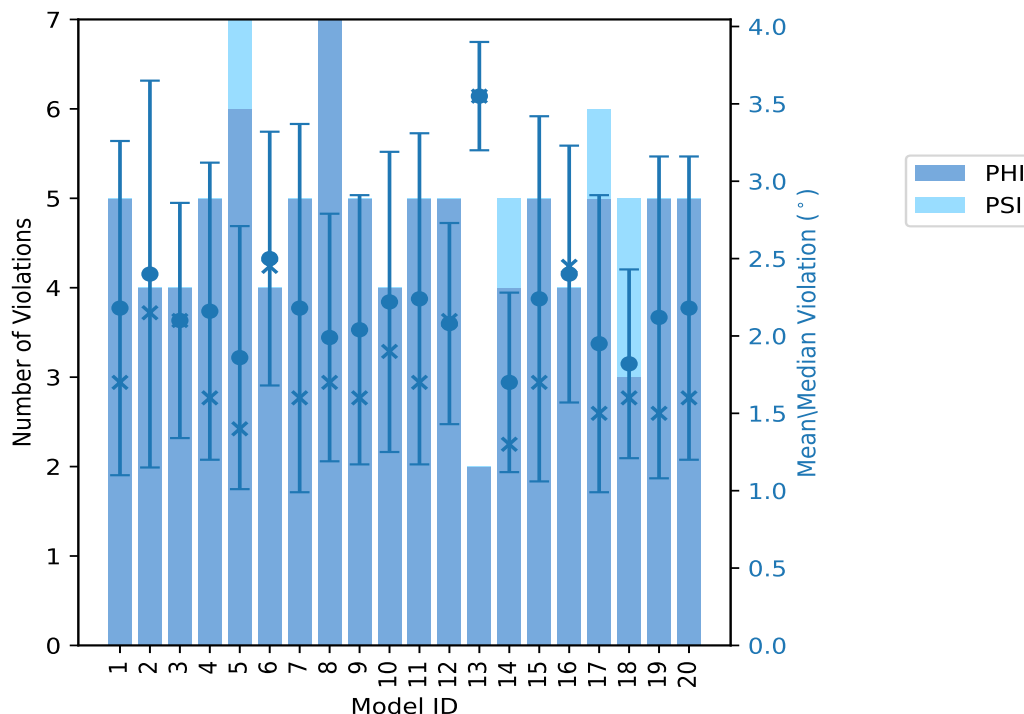
Violated and consistently violated restraints are shown using different hatch patterns in their respective categories

## 10.2 Dihedral-angle violation statistics for each model [i](#)

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 (°)
	PHI	PSI	Total				
1	5	0	5	2.18	3.8	1.08	1.7
2	4	0	4	2.4	4.1	1.25	2.15
3	4	0	4	2.1	3.1	0.76	2.1
4	5	0	5	2.16	3.8	0.96	1.6
5	6	1	7	1.86	3.6	0.85	1.4
6	4	0	4	2.5	3.7	0.82	2.45
7	5	0	5	2.18	4.1	1.19	1.6
8	7	0	7	1.99	3.3	0.8	1.7
9	5	0	5	2.04	3.4	0.87	1.6
10	4	0	4	2.22	3.8	0.97	1.9
11	5	0	5	2.24	3.9	1.07	1.7
12	5	0	5	2.08	2.9	0.65	2.1
13	2	0	2	3.55	3.9	0.35	3.55
14	4	1	5	1.7	2.5	0.58	1.3
15	5	0	5	2.24	3.9	1.18	1.7
16	4	0	4	2.4	3.5	0.83	2.45
17	5	1	6	1.95	3.5	0.96	1.5
18	3	2	5	1.82	2.6	0.61	1.6
19	5	0	5	2.12	3.9	1.04	1.5
20	5	0	5	2.18	3.8	0.98	1.6

### 10.2.1 Bar graph : Dihedral 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

### 10.3 Dihedral-angle violation statistics for the ensemble [i](#)

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	
PHI	PSI	Total	Count <sup>1</sup>	%
6	1	7	1	5.0
4	2	6	2	10.0
0	0	0	3	15.0
1	0	1	4	20.0
0	0	0	5	25.0
1	0	1	6	30.0
1	0	1	7	35.0
0	0	0	8	40.0
1	0	1	9	45.0
0	0	0	10	50.0
0	0	0	11	55.0

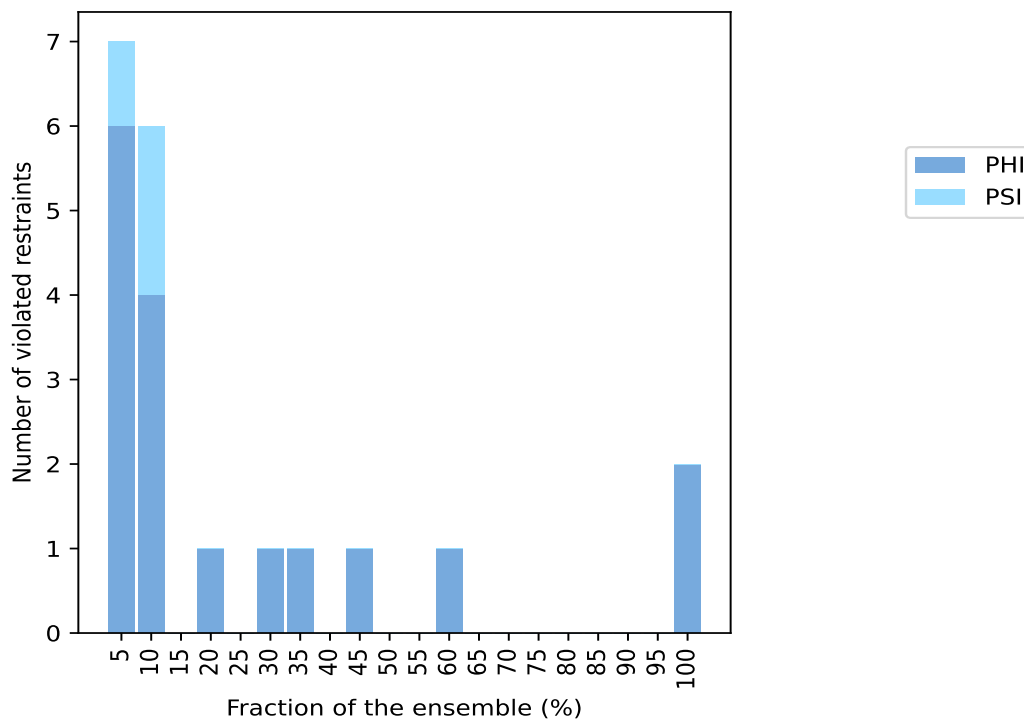
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Number of violated restraints			Fraction of the ensemble	
PHI	PSI	Total	Count <sup>1</sup>	%
1	0	1	12	60.0
0	0	0	13	65.0
0	0	0	14	70.0
0	0	0	15	75.0
0	0	0	16	80.0
0	0	0	17	85.0
0	0	0	18	90.0
0	0	0	19	95.0
2	0	2	20	100.0

<sup>1</sup> Number of models with violations

### 10.3.1 Bar graph : Dihedral-angle Violation statistics for the ensemble [i](#)

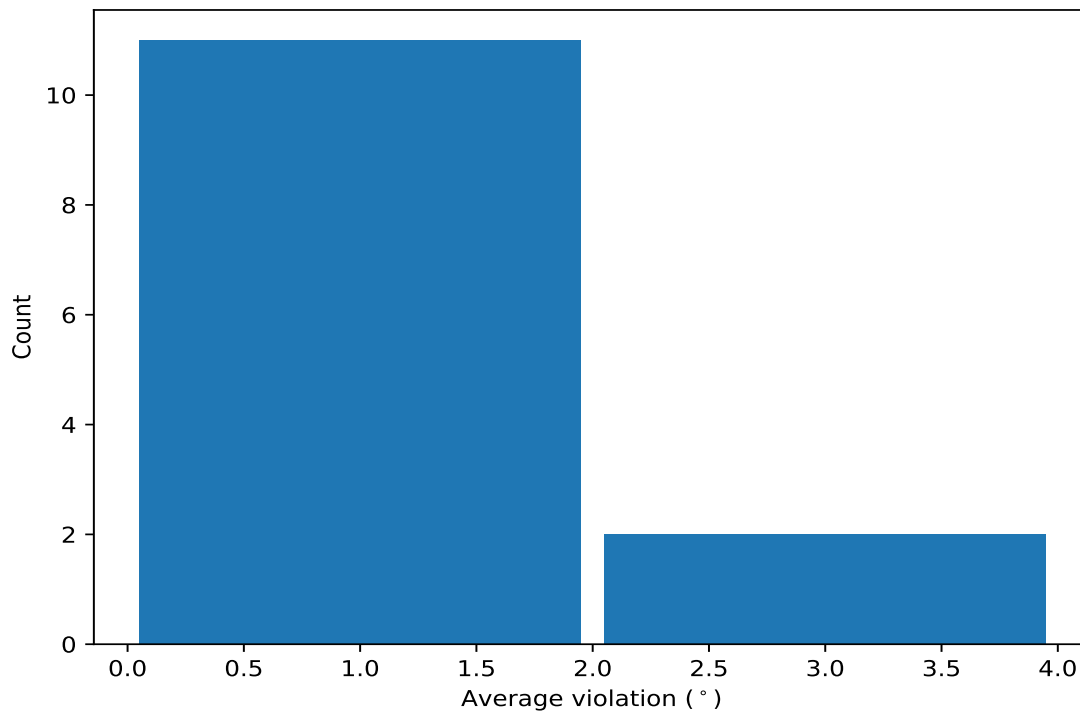


## 10.4 Most violated dihedral-angle restraints in the ensemble [i](#)

### 10.4.1 Histogram : Distribution of mean dihedral-angle 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



#### 10.4.2 Table: Most violated dihedral-angle 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.

Key	Atom-1	Atom-2	Atom-3	Atom-4	Models <sup>1</sup>	Mean	SD <sup>2</sup>	Median
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	20	3.52	0.51	3.75
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	20	2.78	0.37	2.75
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	12	1.32	0.16	1.3
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	9	1.64	0.53	1.5
(1,124)	1:A:156:VAL:C	1:A:157:LEU:N	1:A:157:LEU:CA	1:A:157:LEU:C	7	1.54	0.32	1.6
(1,61)	1:A:115:ARG:C	1:A:116:ASP:N	1:A:116:ASP:CA	1:A:116:ASP:C	6	1.47	0.27	1.5
(1,102)	1:A:144:GLN:C	1:A:145:THR:N	1:A:145:THR:CA	1:A:145:THR:C	4	1.27	0.18	1.25
(1,11)	1:A:80:LEU:C	1:A:81:GLU:N	1:A:81:GLU:CA	1:A:81:GLU:C	2	1.8	0.6	1.8
(1,119)	1:A:154:ALA:N	1:A:154:ALA:CA	1:A:154:ALA:C	1:A:155:ASP:N	2	1.5	0.3	1.5
(1,48)	1:A:109:ASP:N	1:A:109:ASP:CA	1:A:109:ASP:C	1:A:110:ASP:N	2	1.45	0.15	1.45
(1,142)	1:A:165:LEU:C	1:A:166:ASP:N	1:A:166:ASP:CA	1:A:166:ASP:C	2	1.4	0.3	1.4
(1,18)	1:A:91:THR:C	1:A:92:LYS:N	1:A:92:LYS:CA	1:A:92:LYS:C	2	1.15	0.05	1.15
(1,150)	1:A:169:LYS:C	1:A:170:SER:N	1:A:170:SER:CA	1:A:170:SER:C	2	1.1	0.0	1.1

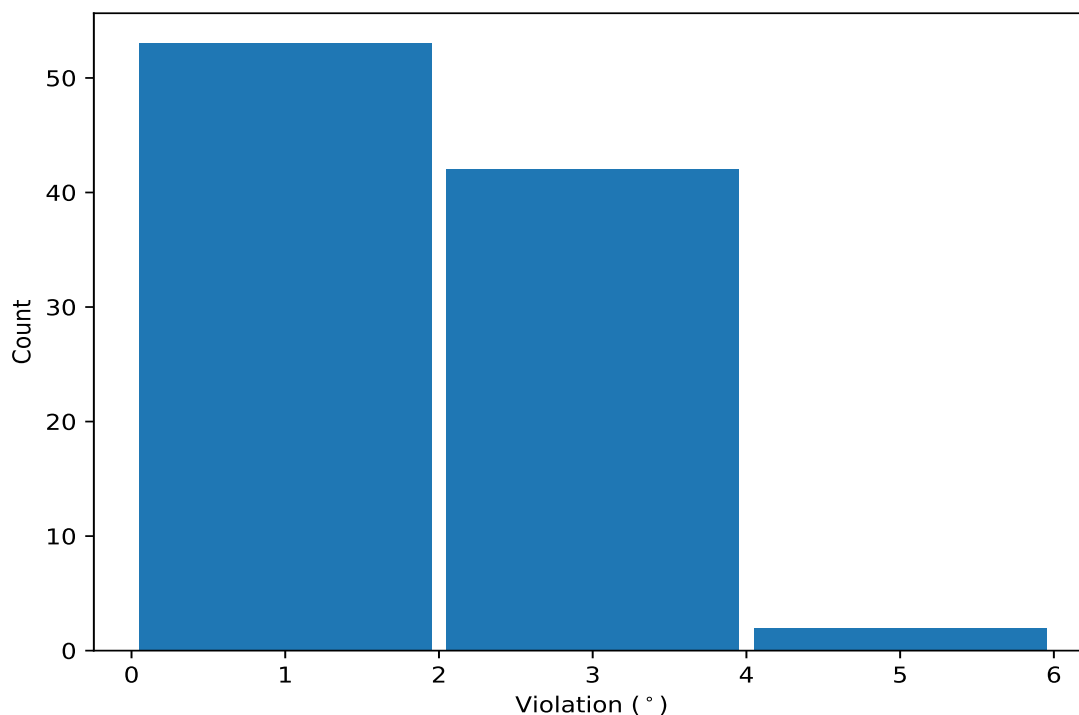
<sup>1</sup> Number of violated models, <sup>2</sup>Standard deviation, All angle values are in degree (°)



## 10.5 All violated dihedral-angle restraints [i](#)

### 10.5.1 Histogram : Distribution of violations [i](#)

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 [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.

Key	Atom-1	Atom-2	Atom-3	Atom-4	Model ID	Violation (°)
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	2	4.1
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	7	4.1
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	11	3.9
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	13	3.9
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	15	3.9
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	19	3.9
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	1	3.8
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	4	3.8
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	10	3.8
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	20	3.8
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	6	3.7
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	5	3.6
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	16	3.5
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	17	3.5

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Key	Atom-1	Atom-2	Atom-3	Atom-4	Model ID	Violation (°)
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	15	3.4
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	9	3.4
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	8	3.3
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	13	3.2
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	1	3.1
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	2	3.1
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	11	3.1
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	3	3.1
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	8	3.1
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	7	3.0
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	17	3.0
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	12	2.9
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	20	2.8
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	16	2.7
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	4	2.7
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	9	2.7
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	19	2.7
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	12	2.7
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	18	2.6
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	3	2.5
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	6	2.5
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	14	2.5
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	18	2.5
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	5	2.4
(1,11)	1:A:80:LEU:C	1:A:81:GLU:N	1:A:81:GLU:CA	1:A:81:GLU:C	6	2.4
(1,122)	1:A:155:ASP:C	1:A:156:VAL:N	1:A:156:VAL:CA	1:A:156:VAL:C	14	2.3
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	10	2.2
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	16	2.2
(1,126)	1:A:157:LEU:C	1:A:158:LYS:N	1:A:158:LYS:CA	1:A:158:LYS:C	5	2.1
(1,124)	1:A:156:VAL:C	1:A:157:LEU:N	1:A:157:LEU:CA	1:A:157:LEU:C	12	2.1
(1,61)	1:A:115:ARG:C	1:A:116:ASP:N	1:A:116:ASP:CA	1:A:116:ASP:C	8	1.9
(1,119)	1:A:154:ALA:N	1:A:154:ALA:CA	1:A:154:ALA:C	1:A:155:ASP:N	17	1.8
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	1	1.7
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	11	1.7
(1,142)	1:A:165:LEU:C	1:A:166:ASP:N	1:A:166:ASP:CA	1:A:166:ASP:C	15	1.7
(1,124)	1:A:156:VAL:C	1:A:157:LEU:N	1:A:157:LEU:CA	1:A:157:LEU:C	3	1.7
(1,124)	1:A:156:VAL:C	1:A:157:LEU:N	1:A:157:LEU:CA	1:A:157:LEU:C	8	1.7
(1,61)	1:A:115:ARG:C	1:A:116:ASP:N	1:A:116:ASP:CA	1:A:116:ASP:C	4	1.6
(1,61)	1:A:115:ARG:C	1:A:116:ASP:N	1:A:116:ASP:CA	1:A:116:ASP:C	10	1.6
(1,48)	1:A:109:ASP:N	1:A:109:ASP:CA	1:A:109:ASP:C	1:A:110:ASP:N	18	1.6
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	7	1.6
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	20	1.6
(1,124)	1:A:156:VAL:C	1:A:157:LEU:N	1:A:157:LEU:CA	1:A:157:LEU:C	9	1.6
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	4	1.5
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	19	1.5
(1,102)	1:A:144:GLN:C	1:A:145:THR:N	1:A:145:THR:CA	1:A:145:THR:C	20	1.5
(1,61)	1:A:115:ARG:C	1:A:116:ASP:N	1:A:116:ASP:CA	1:A:116:ASP:C	12	1.4
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	6	1.4
(1,24)	1:A:94:SER:C	1:A:95:ALA:N	1:A:95:ALA:CA	1:A:95:ALA:C	8	1.4
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	9	1.4
(1,124)	1:A:156:VAL:C	1:A:157:LEU:N	1:A:157:LEU:CA	1:A:157:LEU:C	19	1.4

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Key	Atom-1	Atom-2	Atom-3	Atom-4	Model ID	Violation (°)
(1,102)	1:A:144:GLN:C	1:A:145:THR:N	1:A:145:THR:CA	1:A:145:THR:C	5	1.4
(1,48)	1:A:109:ASP:N	1:A:109:ASP:CA	1:A:109:ASP:C	1:A:110:ASP:N	5	1.3
(1,33)	1:A:99:MET:N	1:A:99:MET:CA	1:A:99:MET:C	1:A:100:SER:N	14	1.3
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	8	1.3
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	10	1.3
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	12	1.3
(1,108)	1:A:147:HIS:C	1:A:148:LEU:N	1:A:148:LEU:CA	1:A:148:LEU:C	11	1.3
(1,61)	1:A:115:ARG:C	1:A:116:ASP:N	1:A:116:ASP:CA	1:A:116:ASP:C	16	1.2
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	8	1.2
(1,32)	1:A:98:ALA:C	1:A:99:MET:N	1:A:99:MET:CA	1:A:99:MET:C	14	1.2
(1,18)	1:A:91:THR:C	1:A:92:LYS:N	1:A:92:LYS:CA	1:A:92:LYS:C	20	1.2
(1,17)	1:A:83:TYR:C	1:A:84:ILE:N	1:A:84:ILE:CA	1:A:84:ILE:C	2	1.2
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	1	1.2
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	2	1.2
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	4	1.2
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	11	1.2
(1,128)	1:A:158:LYS:C	1:A:159:LYS:N	1:A:159:LYS:CA	1:A:159:LYS:C	14	1.2
(1,124)	1:A:156:VAL:C	1:A:157:LEU:N	1:A:157:LEU:CA	1:A:157:LEU:C	17	1.2
(1,119)	1:A:154:ALA:N	1:A:154:ALA:CA	1:A:154:ALA:C	1:A:155:ASP:N	18	1.2
(1,11)	1:A:80:LEU:C	1:A:81:GLU:N	1:A:81:GLU:CA	1:A:81:GLU:C	18	1.2
(1,70)	1:A:126:ARG:C	1:A:127:VAL:N	1:A:127:VAL:CA	1:A:127:VAL:C	17	1.1
(1,61)	1:A:115:ARG:C	1:A:116:ASP:N	1:A:116:ASP:CA	1:A:116:ASP:C	1	1.1
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	3	1.1
(1,36)	1:A:100:SER:C	1:A:101:LYS:N	1:A:101:LYS:CA	1:A:101:LYS:C	7	1.1
(1,18)	1:A:91:THR:C	1:A:92:LYS:N	1:A:92:LYS:CA	1:A:92:LYS:C	15	1.1
(1,150)	1:A:169:LYS:C	1:A:170:SER:N	1:A:170:SER:CA	1:A:170:SER:C	7	1.1
(1,150)	1:A:169:LYS:C	1:A:170:SER:N	1:A:170:SER:CA	1:A:170:SER:C	19	1.1
(1,142)	1:A:165:LEU:C	1:A:166:ASP:N	1:A:166:ASP:CA	1:A:166:ASP:C	5	1.1
(1,136)	1:A:162:LYS:C	1:A:163:ASN:N	1:A:163:ASN:CA	1:A:163:ASN:C	15	1.1
(1,124)	1:A:156:VAL:C	1:A:157:LEU:N	1:A:157:LEU:CA	1:A:157:LEU:C	5	1.1
(1,102)	1:A:144:GLN:C	1:A:145:THR:N	1:A:145:THR:CA	1:A:145:THR:C	9	1.1
(1,102)	1:A:144:GLN:C	1:A:145:THR:N	1:A:145:THR:CA	1:A:145:THR:C	17	1.1