



# Full wwPDB NMR Structure Validation Report ⓘ

Sep 7, 2023 – 12:41 PM EDT

PDB ID : 8U27  
BMRB ID : 52100  
Title : Bcl-2-xL complexed with compound 35  
Authors : Rizo, J.; Pan, Y.-Z.  
Deposited on : 2023-09-05

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  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
buster-report : 1.1.7 (2018)  
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) : 2.35

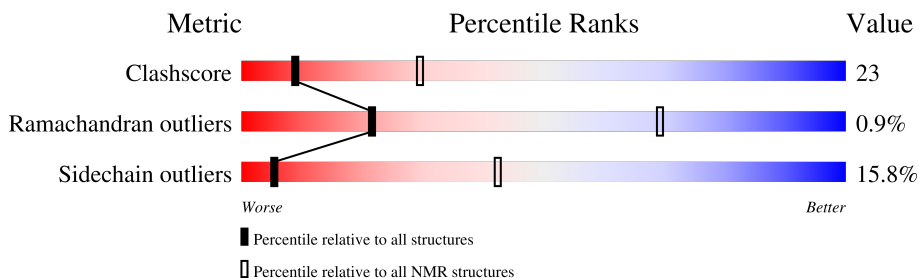
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*SOLUTION NMR*

The overall completeness of chemical shifts assignment is 85%.

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	177	

## 2 Ensemble composition and analysis

This entry contains 20 models. Model 12 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:9-A:32, A:48-A:177 (154)	0.51	12

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

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

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

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

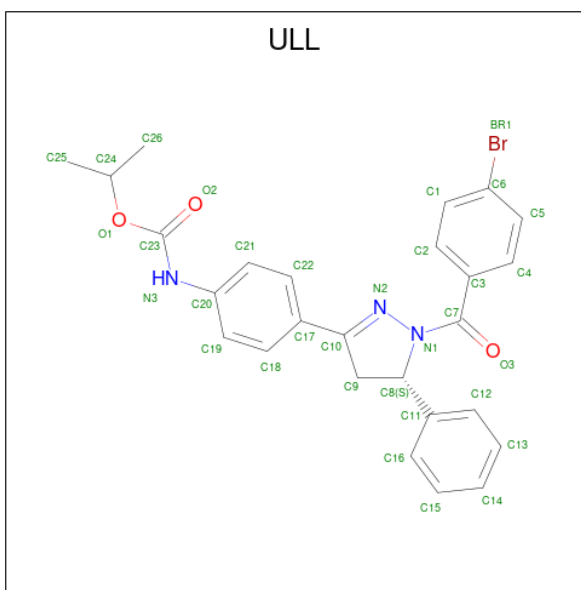
### 3 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 2891 atoms, of which 1400 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	177	2834	923	1376	257	270	8	0

- Molecule 2 is propan-2-yl {4-[(5S)-1-(4-bromobenzoyl)-5-phenyl-4,5-dihydro-1H-pyrazol-3-yl]phenyl}carbamate (three-letter code: ULL) (formula: C<sub>26</sub>H<sub>24</sub>BrN<sub>3</sub>O<sub>3</sub>) (labeled as "Ligand of Interest" by depositor).



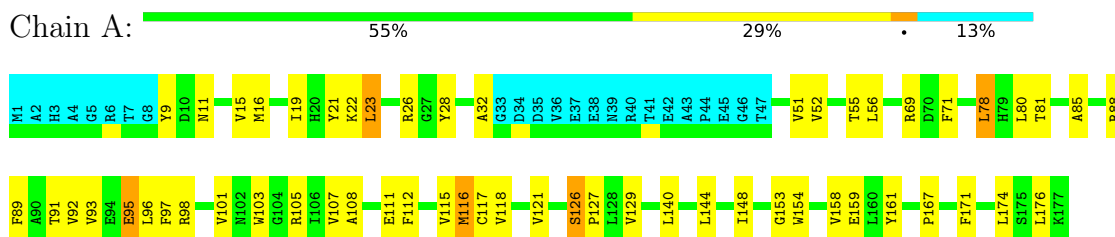
Mol	Chain	Residues	Atoms					
			Total	Br	C	H	N	O
2	A	1	57	1	26	24	3	3

## 4 Residue-property plots

### 4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera

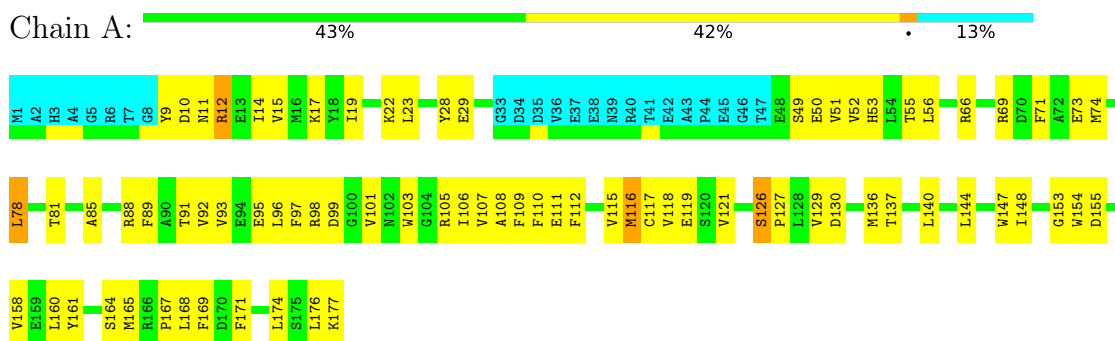


### 4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

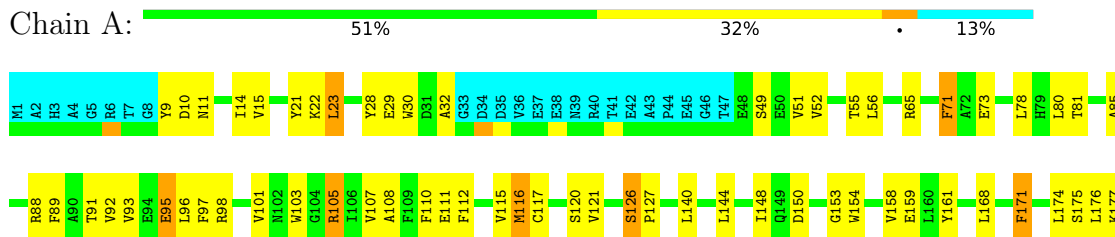
#### 4.2.1 Score per residue for model 1

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



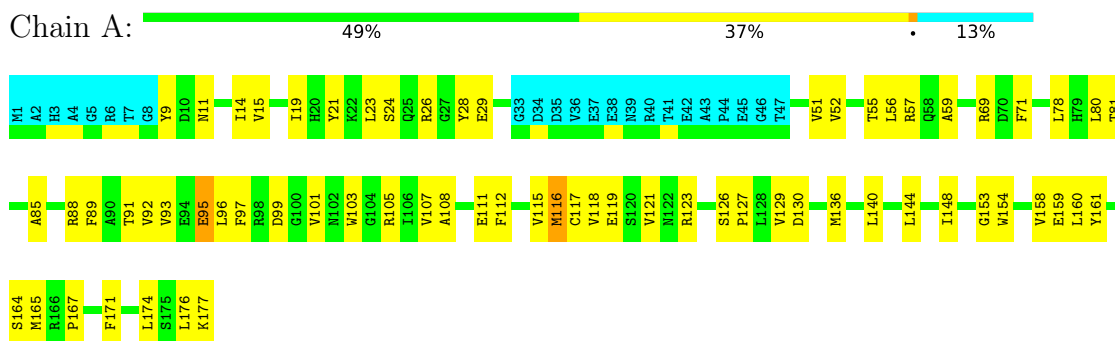
#### 4.2.2 Score per residue for model 2

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



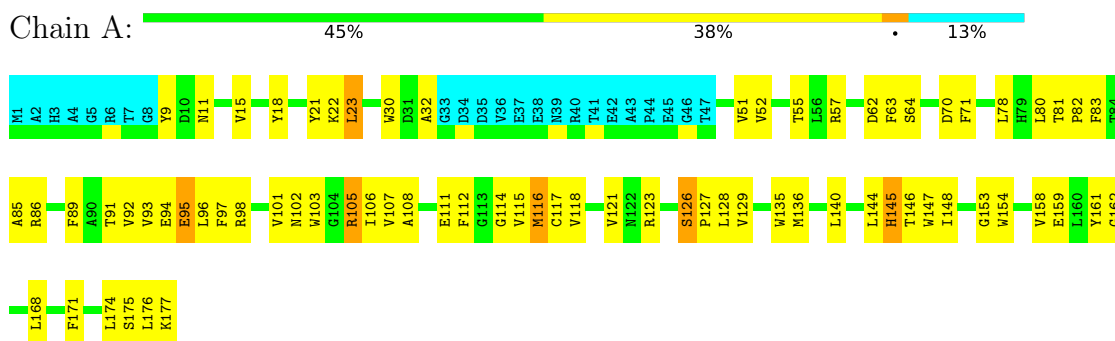
#### 4.2.3 Score per residue for model 3

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



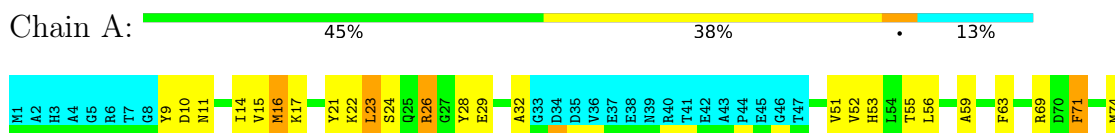
#### 4.2.4 Score per residue for model 4

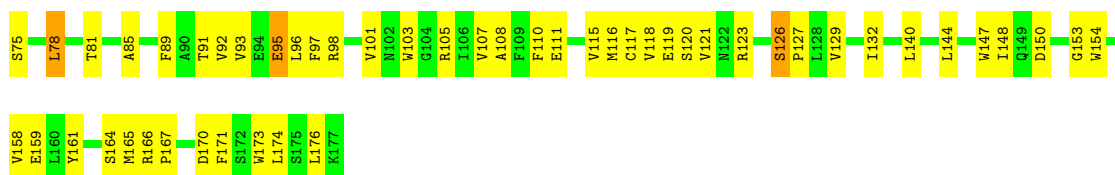
- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



#### 4.2.5 Score per residue for model 5

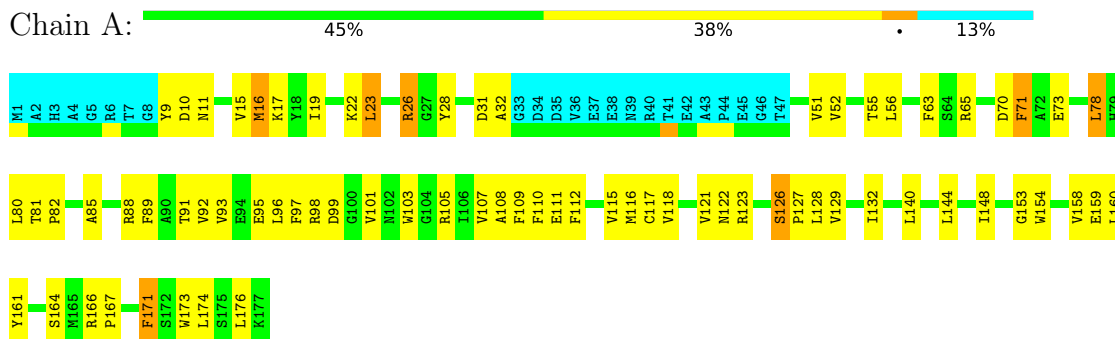
- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera





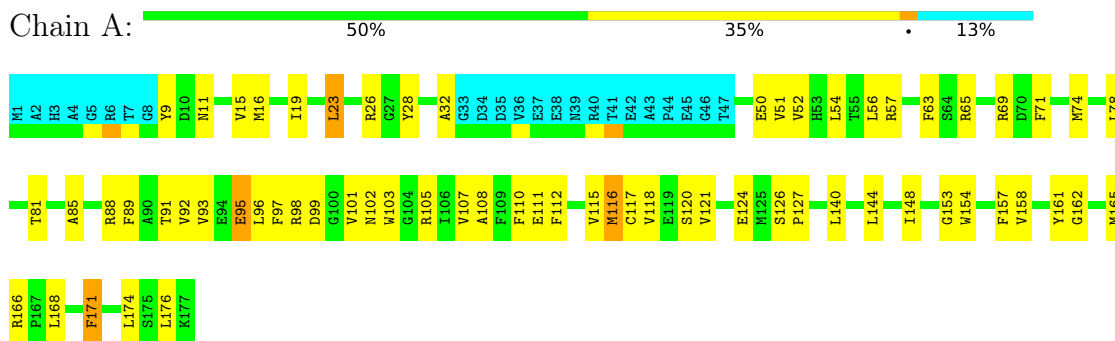
#### 4.2.6 Score per residue for model 6

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



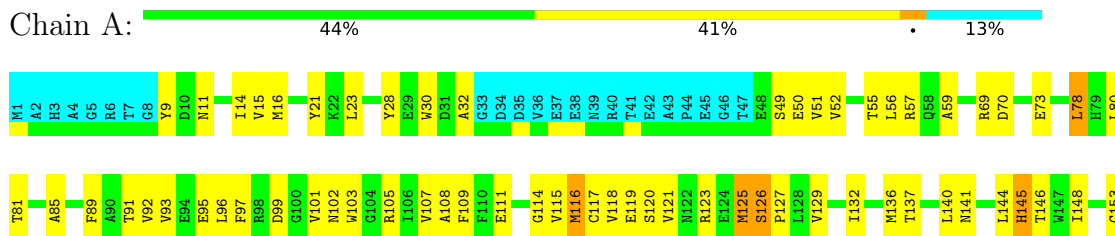
#### 4.2.7 Score per residue for model 7

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



#### 4.2.8 Score per residue for model 8

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera

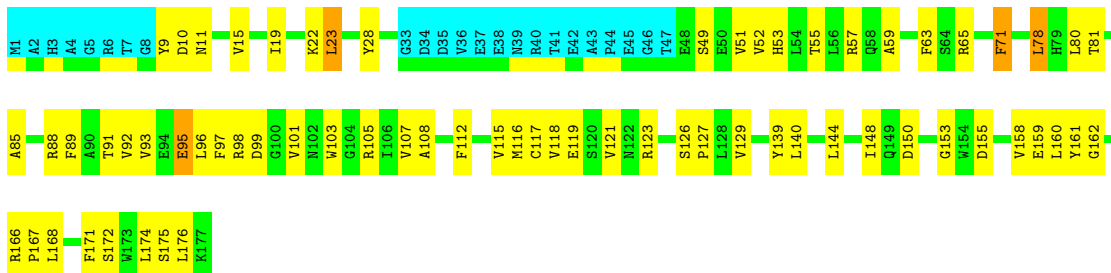




#### 4.2.9 Score per residue for model 9

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera

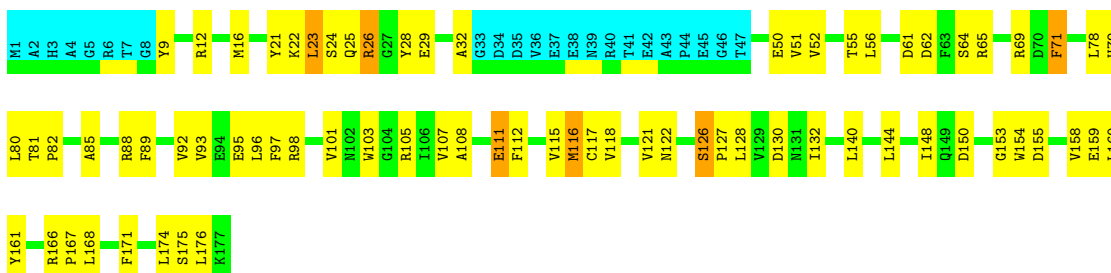
Chain A: 49% 36% 13%



#### 4.2.10 Score per residue for model 10

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera

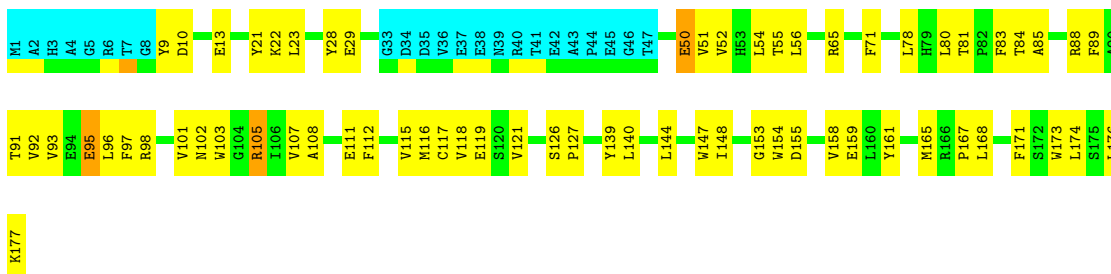
Chain A: 46% 38% 13%



#### 4.2.11 Score per residue for model 11

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera

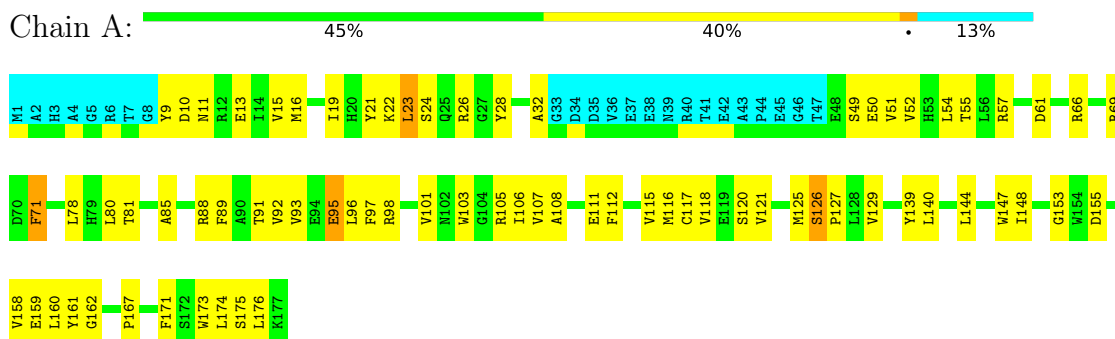
Chain A: 50% 36% 13%





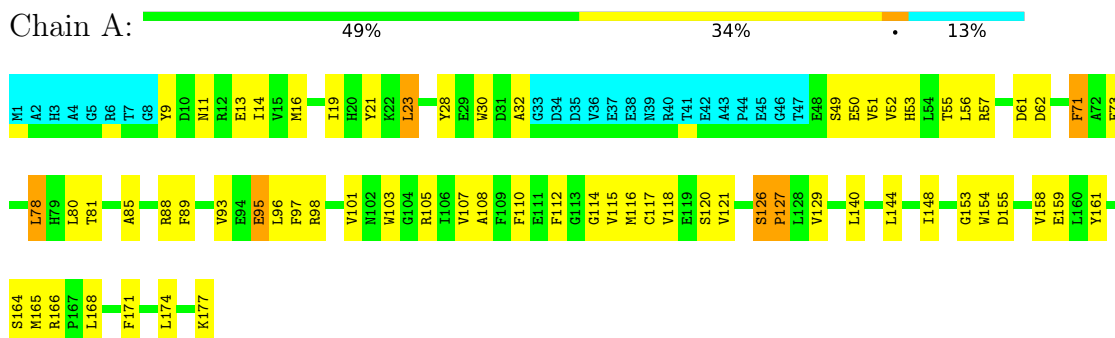
### 4.2.12 Score per residue for model 12 (medoid)

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



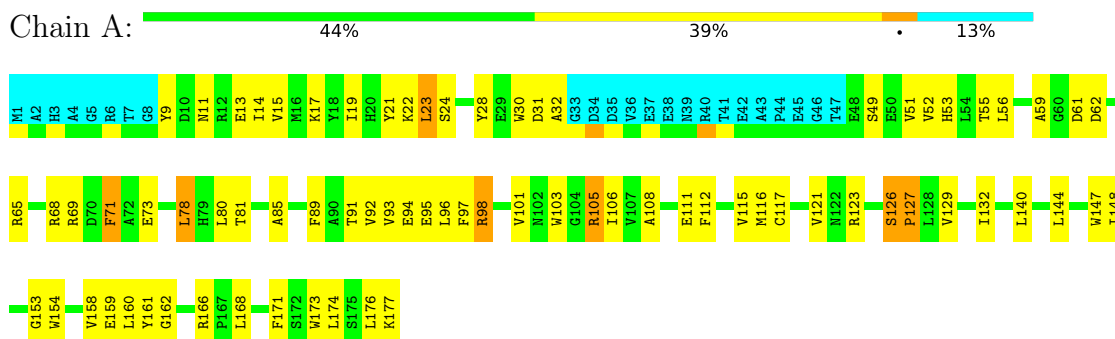
### 4.2.13 Score per residue for model 13

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



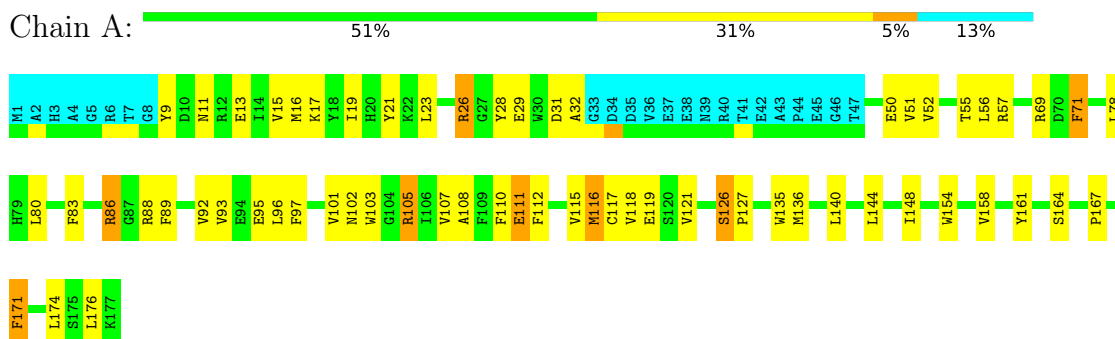
### 4.2.14 Score per residue for model 14

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



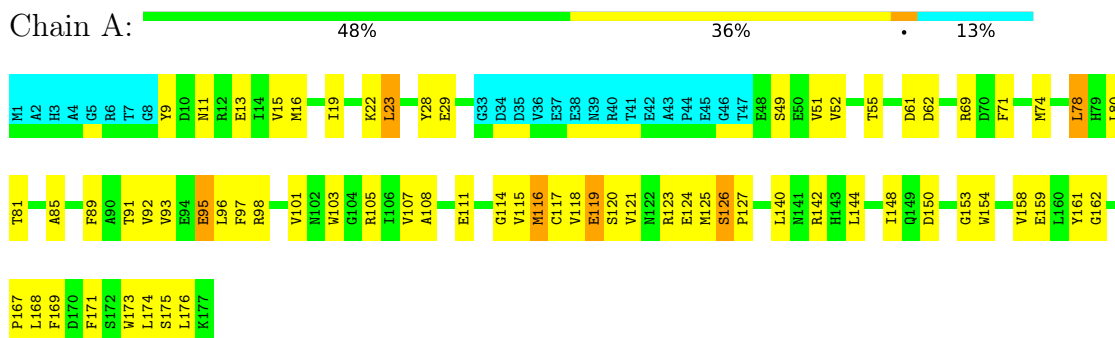
### 4.2.15 Score per residue for model 15

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



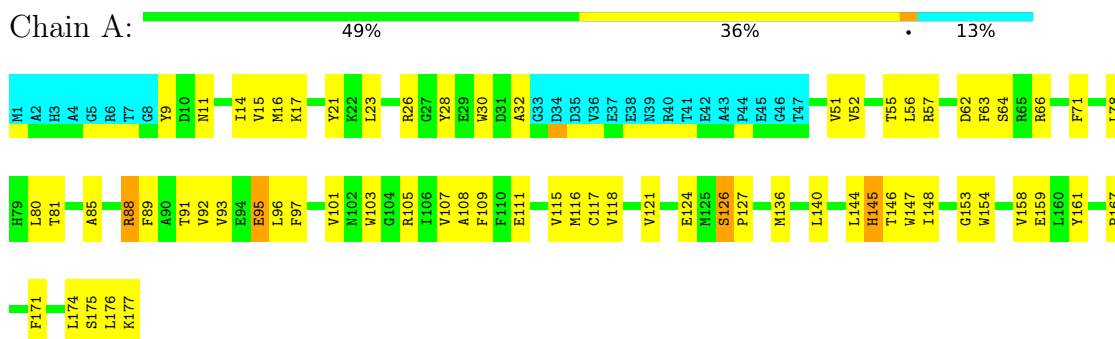
### 4.2.16 Score per residue for model 16

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



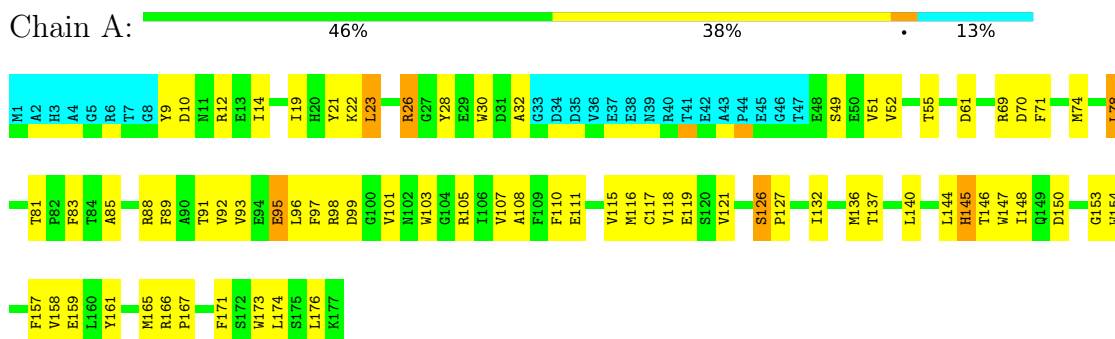
### 4.2.17 Score per residue for model 17

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



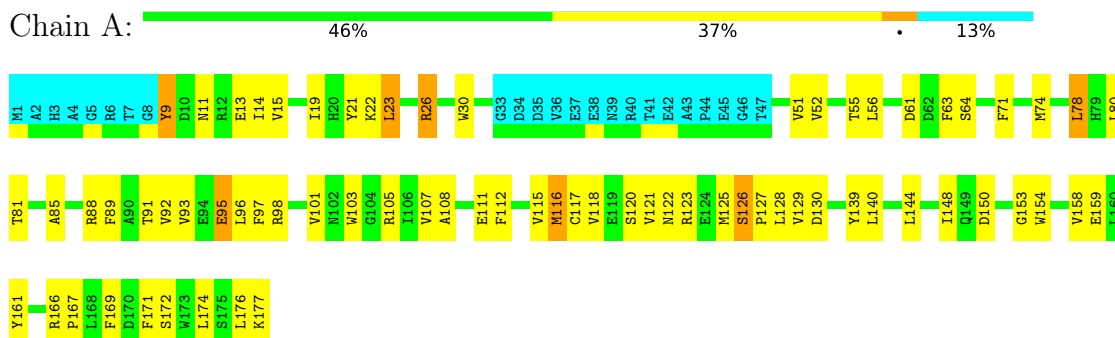
### 4.2.18 Score per residue for model 18

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



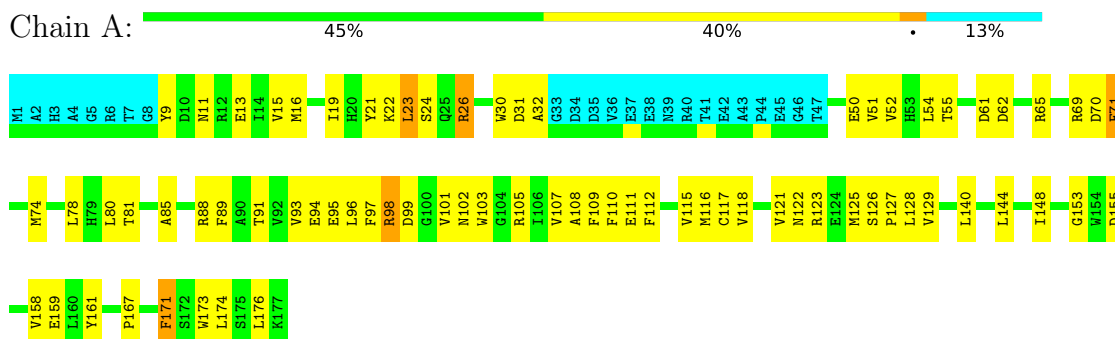
### 4.2.19 Score per residue for model 19

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



### 4.2.20 Score per residue for model 20

- Molecule 1: Apoptosis regulator Bcl-2, Bcl-2-like protein 1 chimera



## 5 Refinement protocol and experimental data overview

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

Of the 4497 calculated structures, 20 were deposited, based on the following criterion: *structures with the lowest energy*.

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

Software name	Classification	Version
CNS	refinement	1.2
CNS	structure calculation	1.2

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	2132
Number of shifts mapped to atoms	2132
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	85%

## 6 Model quality i

### 6.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section:  
ULL

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	1292	1229	1224	57±8
2	A	33	24	0	11±2
All	All	26500	25060	24480	1188

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 23.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:78:LEU:HD21	2:A:201:ULL:N2	1.00	1.71	20	18
1:A:96:LEU:HD13	1:A:174:LEU:HD11	0.94	1.35	15	20
1:A:140:LEU:HD23	1:A:144:LEU:HD12	0.94	1.39	6	19
1:A:108:ALA:HB1	2:A:201:ULL:C26	0.93	1.94	7	20
1:A:108:ALA:HB2	1:A:171:PHE:CE2	0.91	2.01	11	20
1:A:85:ALA:HB1	2:A:201:ULL:BR1	0.87	2.24	5	7
1:A:9:TYR:CE1	1:A:52:VAL:HG21	0.86	2.05	15	13
1:A:97:PHE:CD1	1:A:101:VAL:HG22	0.83	2.07	8	17
1:A:9:TYR:CE2	1:A:52:VAL:HG21	0.83	2.09	19	7
1:A:96:LEU:HD21	1:A:105:ARG:O	0.82	1.73	6	19
1:A:78:LEU:HD13	1:A:116:MET:CE	0.81	2.05	20	6

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:9:TYR:CZ	1:A:52:VAL:HG21	0.80	2.11	3	9
1:A:30:TRP:CZ2	1:A:32:ALA:HB2	0.78	2.12	20	8
1:A:89:PHE:O	1:A:93:VAL:HG23	0.78	1.78	17	14
1:A:111:GLU:O	1:A:115:VAL:HG23	0.77	1.79	20	17
1:A:56:LEU:HD22	1:A:154:TRP:CZ3	0.76	2.15	15	14
1:A:78:LEU:HD21	2:A:201:ULL:N1	0.74	1.97	17	18
1:A:117:CYS:O	1:A:121:VAL:HG23	0.73	1.83	15	19
1:A:91:THR:HG22	1:A:176:LEU:HD22	0.73	1.61	7	17
1:A:103:TRP:O	1:A:107:VAL:HG23	0.73	1.84	15	19
1:A:55:THR:HG23	1:A:161:TYR:O	0.72	1.84	1	19
1:A:140:LEU:CD2	1:A:144:LEU:HD12	0.72	2.14	11	11
1:A:89:PHE:CE1	1:A:93:VAL:HG21	0.72	2.20	7	16
1:A:95:GLU:OE1	1:A:174:LEU:HD22	0.71	1.85	11	6
1:A:107:VAL:HG12	1:A:111:GLU:OE2	0.71	1.86	5	2
1:A:174:LEU:HD12	2:A:201:ULL:C26	0.70	2.17	20	13
1:A:97:PHE:CE2	1:A:144:LEU:HD21	0.70	2.22	11	16
1:A:95:GLU:HG3	1:A:176:LEU:HD21	0.69	1.63	1	4
1:A:92:VAL:HG22	1:A:176:LEU:HD13	0.69	1.65	10	17
1:A:9:TYR:CD1	1:A:52:VAL:HG21	0.69	2.22	16	3
1:A:95:GLU:CG	1:A:176:LEU:HD21	0.69	2.18	20	4
1:A:140:LEU:HD23	1:A:144:LEU:CD1	0.68	2.18	9	12
1:A:81:THR:O	1:A:85:ALA:HB2	0.67	1.89	17	17
1:A:23:LEU:HD21	1:A:117:CYS:HB2	0.67	1.65	20	9
1:A:16:MET:SD	1:A:32:ALA:HB1	0.67	2.29	6	5
1:A:71:PHE:CE1	1:A:115:VAL:HG21	0.66	2.25	13	6
1:A:89:PHE:CZ	1:A:93:VAL:HG21	0.66	2.25	17	4
1:A:16:MET:CE	1:A:32:ALA:HB1	0.66	2.21	15	5
1:A:30:TRP:CH2	1:A:32:ALA:HB2	0.66	2.26	17	8
1:A:126:SER:O	1:A:129:VAL:HG23	0.65	1.91	19	11
1:A:92:VAL:HG21	1:A:112:PHE:CE1	0.64	2.27	4	5
1:A:96:LEU:CD1	1:A:108:ALA:HB3	0.64	2.22	14	12
2:A:201:ULL:N2	2:A:201:ULL:C4	0.64	2.57	17	5
2:A:201:ULL:N2	2:A:201:ULL:C2	0.64	2.59	11	7
1:A:116:MET:CB	1:A:132:ILE:HD13	0.63	2.22	6	1
1:A:14:ILE:HD13	1:A:154:TRP:CE2	0.63	2.29	14	7
1:A:107:VAL:HG12	1:A:111:GLU:CD	0.63	2.14	6	1
1:A:11:ASN:HA	1:A:14:ILE:HD12	0.62	1.72	19	4
1:A:97:PHE:CZ	1:A:144:LEU:HD21	0.62	2.30	16	5
1:A:92:VAL:HG11	1:A:112:PHE:CD1	0.62	2.29	4	4
1:A:78:LEU:HD11	2:A:201:ULL:C18	0.61	2.25	17	3
1:A:80:LEU:HD13	1:A:116:MET:SD	0.61	2.36	20	3

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:78:LEU:HD13	1:A:116:MET:HE1	0.61	1.72	17	3
1:A:116:MET:HB2	1:A:132:ILE:HD13	0.61	1.73	6	4
1:A:89:PHE:CE2	1:A:93:VAL:HG21	0.60	2.32	10	4
1:A:54:LEU:HD23	1:A:57:ARG:NH2	0.60	2.12	7	1
1:A:80:LEU:HD11	2:A:201:ULL:BR1	0.60	2.51	12	4
1:A:96:LEU:HD23	1:A:109:PHE:HB2	0.60	1.74	6	2
1:A:78:LEU:HD13	1:A:116:MET:HE2	0.59	1.73	2	4
1:A:16:MET:HE3	1:A:32:ALA:HB1	0.59	1.75	15	2
1:A:92:VAL:HG11	1:A:112:PHE:CE1	0.59	2.32	1	3
2:A:201:ULL:C2	2:A:201:ULL:N2	0.59	2.64	10	1
1:A:95:GLU:HG2	1:A:176:LEU:HD21	0.59	1.74	11	1
1:A:148:ILE:HG22	1:A:153:GLY:HA2	0.58	1.74	8	19
2:A:201:ULL:C21	2:A:201:ULL:O2	0.58	2.50	5	20
1:A:78:LEU:HD21	2:A:201:ULL:C10	0.58	2.27	13	1
1:A:82:PRO:HB3	1:A:128:LEU:HD21	0.58	1.74	10	3
1:A:126:SER:N	1:A:127:PRO:HD2	0.58	2.13	14	8
1:A:11:ASN:O	1:A:15:VAL:HG23	0.57	1.99	5	16
1:A:19:ILE:HD12	1:A:117:CYS:SG	0.57	2.39	20	10
1:A:95:GLU:OE2	1:A:174:LEU:HD22	0.57	1.99	17	7
1:A:103:TRP:CD1	1:A:160:LEU:HD12	0.57	2.35	6	6
1:A:80:LEU:HD21	1:A:120:SER:OG	0.57	1.99	8	1
1:A:141:ASN:O	1:A:145:HIS:HB3	0.57	2.00	8	1
1:A:28:TYR:CD1	1:A:121:VAL:HG11	0.57	2.34	17	6
1:A:14:ILE:HG22	1:A:110:PHE:CE2	0.56	2.35	1	1
1:A:12:ARG:HG2	1:A:137:THR:HG21	0.56	1.78	1	2
1:A:97:PHE:CD2	1:A:144:LEU:HD21	0.56	2.34	17	1
1:A:23:LEU:HD21	1:A:117:CYS:CB	0.56	2.31	19	14
1:A:110:PHE:CE1	1:A:140:LEU:HD21	0.55	2.36	18	1
1:A:110:PHE:CZ	1:A:140:LEU:HD11	0.55	2.35	6	9
1:A:96:LEU:HD13	1:A:174:LEU:HD21	0.55	1.78	6	2
1:A:116:MET:HG2	2:A:201:ULL:BR1	0.55	2.57	15	9
1:A:92:VAL:HG21	1:A:112:PHE:CZ	0.55	2.37	1	6
1:A:106:ILE:HD11	1:A:147:TRP:CZ3	0.54	2.36	1	3
1:A:51:VAL:HG11	1:A:158:VAL:CG1	0.54	2.33	7	15
1:A:96:LEU:CD1	1:A:174:LEU:HD21	0.54	2.33	6	11
1:A:80:LEU:CD1	2:A:201:ULL:BR1	0.54	3.10	12	1
1:A:78:LEU:HD13	1:A:116:MET:HE3	0.54	1.80	12	3
1:A:116:MET:HB2	1:A:132:ILE:HG21	0.53	1.80	5	3
1:A:19:ILE:O	1:A:23:LEU:HD23	0.53	2.04	6	7
1:A:96:LEU:HD11	1:A:108:ALA:HB3	0.53	1.81	20	4
1:A:30:TRP:CE2	1:A:32:ALA:HB2	0.53	2.38	20	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:28:TYR:CE2	1:A:118:VAL:HG13	0.53	2.39	10	11
1:A:125:MET:HB3	1:A:128:LEU:HD12	0.53	1.80	19	2
1:A:107:VAL:HG12	1:A:111:GLU:OE1	0.53	2.04	17	2
1:A:50:GLU:OE2	1:A:54:LEU:HD11	0.53	2.04	7	1
1:A:9:TYR:CD2	1:A:52:VAL:HG21	0.53	2.38	18	2
1:A:96:LEU:HD13	1:A:174:LEU:CD1	0.52	2.24	15	4
1:A:86:ARG:HG3	1:A:135:TRP:CZ2	0.52	2.39	15	1
1:A:28:TYR:HE2	1:A:118:VAL:HG13	0.52	1.62	11	2
1:A:15:VAL:CG2	1:A:140:LEU:HD12	0.52	2.34	12	4
1:A:16:MET:HE2	1:A:32:ALA:HB1	0.52	1.80	5	1
1:A:154:TRP:O	1:A:158:VAL:HG23	0.52	2.05	14	8
1:A:96:LEU:HD21	1:A:109:PHE:N	0.52	2.20	1	3
1:A:26:ARG:HG3	1:A:118:VAL:HG11	0.51	1.81	10	7
1:A:116:MET:CG	2:A:201:ULL:BR1	0.51	3.14	19	5
1:A:116:MET:HE3	1:A:116:MET:N	0.51	2.21	10	1
1:A:89:PHE:CD2	1:A:112:PHE:CE2	0.51	2.99	7	4
1:A:97:PHE:HB3	1:A:101:VAL:HG22	0.51	1.82	17	2
1:A:85:ALA:O	2:A:201:ULL:BR1	0.50	2.84	8	2
1:A:51:VAL:HG11	1:A:158:VAL:HG11	0.50	1.82	9	17
1:A:71:PHE:CZ	2:A:201:ULL:C25	0.50	2.94	16	9
1:A:97:PHE:CD1	1:A:101:VAL:HG13	0.50	2.41	12	2
1:A:157:PHE:CE2	1:A:161:TYR:CE1	0.50	3.00	7	2
1:A:19:ILE:HD11	1:A:136:MET:SD	0.49	2.47	18	2
1:A:125:MET:CB	1:A:128:LEU:HD12	0.49	2.38	20	1
1:A:116:MET:SD	2:A:201:ULL:BR1	0.49	3.26	18	5
1:A:96:LEU:HD13	1:A:108:ALA:HB3	0.49	1.83	11	1
1:A:28:TYR:CD2	1:A:121:VAL:HG21	0.49	2.42	13	1
2:A:201:ULL:C26	2:A:201:ULL:N3	0.49	2.75	5	6
1:A:145:HIS:CG	1:A:146:THR:N	0.49	2.81	8	4
1:A:78:LEU:CD1	1:A:116:MET:HE3	0.48	2.37	5	1
1:A:80:LEU:HD23	1:A:120:SER:HA	0.48	1.84	19	3
1:A:145:HIS:CD2	1:A:145:HIS:C	0.48	2.85	8	4
1:A:97:PHE:CE1	1:A:101:VAL:HG13	0.48	2.43	12	1
1:A:80:LEU:HD12	2:A:201:ULL:C1	0.48	2.38	15	1
1:A:78:LEU:CD2	2:A:201:ULL:N1	0.48	2.74	14	6
1:A:116:MET:HB3	1:A:132:ILE:HD13	0.48	1.86	8	1
2:A:201:ULL:N3	2:A:201:ULL:C25	0.48	2.76	1	9
1:A:86:ARG:CG	1:A:135:TRP:CZ2	0.47	2.97	15	1
1:A:14:ILE:HD13	1:A:154:TRP:CZ2	0.47	2.44	19	4
1:A:144:LEU:O	1:A:148:ILE:HD12	0.47	2.09	9	16
1:A:92:VAL:CG2	1:A:112:PHE:CZ	0.47	2.98	1	3

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:89:PHE:CE1	1:A:93:VAL:CG2	0.47	2.98	20	5
1:A:174:LEU:CD1	2:A:201:ULL:C26	0.47	2.93	4	6
1:A:51:VAL:CG1	1:A:158:VAL:HG13	0.47	2.40	8	3
1:A:103:TRP:CE3	1:A:106:ILE:HD12	0.47	2.45	1	2
1:A:116:MET:CE	2:A:201:ULL:C5	0.47	2.93	14	2
1:A:74:MET:CE	2:A:201:ULL:C19	0.46	2.94	18	4
1:A:92:VAL:HG13	1:A:176:LEU:CD1	0.46	2.41	1	1
1:A:50:GLU:HG2	1:A:54:LEU:HD11	0.46	1.88	11	2
1:A:9:TYR:CZ	1:A:52:VAL:CG2	0.46	2.96	2	3
1:A:80:LEU:HD22	1:A:116:MET:SD	0.46	2.51	9	1
1:A:14:ILE:HG22	1:A:110:PHE:HE2	0.46	1.67	1	1
1:A:116:MET:CE	2:A:201:ULL:C1	0.46	2.93	12	1
1:A:103:TRP:CD1	1:A:160:LEU:CD1	0.45	3.00	8	2
1:A:80:LEU:HD22	1:A:119:GLU:HB3	0.45	1.87	16	1
1:A:88:ARG:O	1:A:92:VAL:HG23	0.45	2.10	1	1
1:A:9:TYR:CE1	1:A:52:VAL:CG2	0.45	3.00	1	6
1:A:112:PHE:CE1	1:A:116:MET:SD	0.45	3.09	15	3
1:A:116:MET:SD	1:A:116:MET:N	0.45	2.90	12	2
1:A:126:SER:N	1:A:127:PRO:CD	0.45	2.80	12	12
1:A:88:ARG:CB	2:A:201:ULL:C4	0.45	2.95	9	7
1:A:80:LEU:HD12	2:A:201:ULL:C5	0.45	2.42	3	4
1:A:26:ARG:HG2	1:A:118:VAL:HG11	0.45	1.89	5	1
1:A:9:TYR:CE2	1:A:52:VAL:CG2	0.45	2.98	13	3
1:A:30:TRP:CH2	1:A:32:ALA:CB	0.45	2.99	17	2
2:A:201:ULL:O2	2:A:201:ULL:C25	0.45	2.65	20	2
1:A:28:TYR:CE1	1:A:121:VAL:HG11	0.45	2.46	13	1
1:A:88:ARG:CB	2:A:201:ULL:C2	0.45	2.95	13	3
1:A:114:GLY:O	1:A:118:VAL:HG23	0.45	2.11	4	4
1:A:110:PHE:CZ	1:A:140:LEU:CD1	0.45	3.00	5	2
1:A:101:VAL:HG12	1:A:102:ASN:N	0.45	2.27	8	1
1:A:53:HIS:N	1:A:53:HIS:CD2	0.44	2.83	1	2
1:A:71:PHE:HE1	1:A:115:VAL:HG21	0.44	1.70	9	6
1:A:92:VAL:HA	1:A:176:LEU:HD11	0.44	1.89	1	1
1:A:18:TYR:CE1	1:A:22:LYS:CE	0.44	3.00	4	1
1:A:30:TRP:CZ3	1:A:32:ALA:HB2	0.44	2.47	17	2
1:A:96:LEU:HD11	1:A:105:ARG:HA	0.44	1.87	11	5
1:A:51:VAL:CG1	1:A:158:VAL:CG1	0.44	2.96	13	19
1:A:93:VAL:CG1	1:A:139:TYR:CE2	0.44	3.01	19	2
1:A:78:LEU:CD1	1:A:116:MET:CE	0.44	2.96	2	8
1:A:86:ARG:NH1	1:A:135:TRP:CD1	0.44	2.85	4	1
1:A:92:VAL:HB	1:A:112:PHE:CE2	0.44	2.47	15	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:96:LEU:HD11	1:A:105:ARG:CA	0.44	2.42	10	3
1:A:92:VAL:HG11	2:A:201:ULL:C19	0.44	2.42	9	1
1:A:80:LEU:CD1	2:A:201:ULL:C1	0.44	2.96	13	1
1:A:81:THR:OG1	1:A:84:THR:HG22	0.44	2.12	11	1
1:A:30:TRP:CE2	1:A:129:VAL:HG12	0.44	2.48	19	1
1:A:80:LEU:HD23	1:A:125:MET:HE1	0.44	1.89	8	1
1:A:173:TRP:NE1	2:A:201:ULL:O2	0.44	2.50	5	1
1:A:89:PHE:HB2	2:A:201:ULL:BR1	0.43	2.68	15	4
1:A:52:VAL:HG13	1:A:154:TRP:HB3	0.43	1.90	11	12
2:A:201:ULL:O3	2:A:201:ULL:C11	0.43	2.67	20	1
1:A:92:VAL:O	1:A:174:LEU:HD13	0.43	2.13	1	1
1:A:116:MET:HA	1:A:116:MET:HE2	0.43	1.89	13	1
1:A:117:CYS:HB3	1:A:129:VAL:HG13	0.43	1.91	14	2
1:A:94:GLU:O	1:A:98:ARG:N	0.43	2.52	20	2
1:A:59:ALA:HB1	1:A:161:TYR:CD2	0.43	2.49	14	3
1:A:173:TRP:CD1	1:A:174:LEU:N	0.43	2.87	18	4
1:A:9:TYR:CB	1:A:154:TRP:CD1	0.42	3.02	16	1
1:A:78:LEU:CD1	1:A:116:MET:HE1	0.42	2.43	18	3
1:A:71:PHE:CD1	1:A:115:VAL:HG21	0.42	2.49	13	1
1:A:101:VAL:O	1:A:147:TRP:CZ2	0.42	2.73	17	6
1:A:78:LEU:CD2	2:A:201:ULL:C7	0.42	2.97	17	2
1:A:96:LEU:HD11	1:A:105:ARG:O	0.42	2.14	8	3
1:A:78:LEU:CD1	1:A:116:MET:HE2	0.42	2.44	2	1
1:A:103:TRP:CH2	1:A:148:ILE:HG23	0.42	2.50	5	2
1:A:97:PHE:CZ	1:A:144:LEU:CD2	0.42	3.03	9	3
1:A:16:MET:HE1	1:A:32:ALA:HB1	0.42	1.88	7	2
1:A:81:THR:O	1:A:85:ALA:N	0.42	2.53	18	4
1:A:78:LEU:HD22	2:A:201:ULL:C4	0.42	2.45	8	1
1:A:97:PHE:CG	1:A:101:VAL:HG22	0.42	2.47	8	1
1:A:80:LEU:CD1	2:A:201:ULL:C5	0.42	2.97	9	1
1:A:88:ARG:NH1	2:A:201:ULL:C14	0.42	2.83	1	2
1:A:80:LEU:HD11	1:A:116:MET:HG3	0.41	1.91	2	2
1:A:30:TRP:CD1	1:A:129:VAL:CG1	0.41	3.02	13	1
1:A:108:ALA:CB	1:A:171:PHE:CE2	0.41	2.99	7	2
2:A:201:ULL:C25	2:A:201:ULL:N3	0.41	2.80	6	2
1:A:116:MET:HE3	2:A:201:ULL:C5	0.41	2.45	13	1
1:A:79:HIS:CE1	1:A:81:THR:CG2	0.41	3.03	10	1
1:A:12:ARG:CG	1:A:137:THR:CG2	0.41	2.98	18	1
1:A:93:VAL:CG1	1:A:139:TYR:CZ	0.41	3.03	9	2
1:A:50:GLU:CG	1:A:54:LEU:HD11	0.41	2.46	12	1
1:A:59:ALA:O	1:A:63:PHE:CD1	0.41	2.74	5	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:88:ARG:HB3	2:A:201:ULL:C2	0.41	2.44	6	2
1:A:157:PHE:CE2	1:A:161:TYR:CD1	0.41	3.09	18	1
1:A:88:ARG:HB3	2:A:201:ULL:C3	0.41	2.45	15	2
1:A:173:TRP:CG	1:A:174:LEU:N	0.41	2.88	16	1
1:A:49:SER:O	1:A:53:HIS:CD2	0.41	2.74	14	1
1:A:68:ARG:CG	1:A:69:ARG:N	0.41	2.84	14	1
1:A:70:ASP:OD2	1:A:173:TRP:CZ3	0.41	2.74	20	1
1:A:110:PHE:CE1	1:A:140:LEU:HD11	0.41	2.51	1	1
1:A:80:LEU:HD23	1:A:120:SER:OG	0.41	2.15	2	1
1:A:96:LEU:HD12	1:A:174:LEU:HD21	0.41	1.92	4	1
1:A:80:LEU:CD2	1:A:120:SER:CA	0.41	2.99	19	1
1:A:74:MET:SD	2:A:201:ULL:N3	0.41	2.94	20	1
1:A:70:ASP:CB	1:A:173:TRP:CH2	0.41	3.04	6	1
1:A:74:MET:HG3	1:A:75:SER:N	0.40	2.31	5	1
1:A:70:ASP:HB3	1:A:173:TRP:CH2	0.40	2.51	6	1
1:A:51:VAL:HG11	1:A:158:VAL:HG13	0.40	1.91	7	1
1:A:137:THR:O	1:A:141:ASN:ND2	0.40	2.55	8	1
1:A:71:PHE:CE2	1:A:111:GLU:OE1	0.40	2.74	15	1
1:A:96:LEU:CD2	1:A:109:PHE:N	0.40	2.84	1	1
1:A:21:TYR:CE2	1:A:57:ARG:CZ	0.40	3.05	13	1
1:A:15:VAL:CG2	1:A:140:LEU:CD1	0.40	2.99	8	1
1:A:140:LEU:O	1:A:145:HIS:N	0.40	2.54	8	1
1:A:81:THR:O	1:A:85:ALA:CB	0.40	2.67	19	1
1:A:70:ASP:OD2	1:A:173:TRP:CH2	0.40	2.74	8	1
1:A:116:MET:SD	2:A:201:ULL:C5	0.40	3.09	17	1
1:A:92:VAL:HB	1:A:112:PHE:CZ	0.40	2.51	4	1
1:A:108:ALA:O	1:A:112:PHE:CB	0.40	2.70	15	1
1:A:116:MET:HE2	1:A:116:MET:N	0.40	2.30	17	1
1:A:63:PHE:CZ	1:A:169:PHE:O	0.40	2.75	19	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	153/177 (86%)	143±2 (93±1%)	9±2 (6±1%)	1±1 (1±0%)	<span style="border: 1px solid red; padding: 2px;">21</span> <span style="border: 1px solid blue; padding: 2px;">69</span>

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	3060/3540 (86%)	2859 (93%)	174 (6%)	27 (1%)	21 69

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)
1	A	167	PRO	15
1	A	162	GLY	7
1	A	165	MET	4
1	A	9	TYR	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	136/152 (89%)	115±3 (84±2%)	21±3 (16±2%)	5 42
All	All	2720/3040 (89%)	2291 (84%)	429 (16%)	5 42

All 65 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	23	LEU	19
1	A	71	PHE	18
1	A	159	GLU	17
1	A	98	ARG	16
1	A	95	GLU	16
1	A	126	SER	15
1	A	21	TYR	14
1	A	22	LYS	13
1	A	69	ARG	11
1	A	116	MET	11
1	A	78	LEU	10
1	A	168	LEU	10
1	A	26	ARG	10
1	A	123	ARG	10
1	A	166	ARG	10

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Mol	Chain	Res	Type	Models (Total)
1	A	119	GLU	9
1	A	177	LYS	9
1	A	10	ASP	8
1	A	29	GLU	8
1	A	49	SER	8
1	A	99	ASP	8
1	A	155	ASP	8
1	A	65	ARG	8
1	A	61	ASP	8
1	A	13	GLU	8
1	A	150	ASP	7
1	A	175	SER	7
1	A	57	ARG	7
1	A	62	ASP	7
1	A	17	LYS	6
1	A	50	GLU	6
1	A	73	GLU	6
1	A	164	SER	6
1	A	24	SER	6
1	A	136	MET	5
1	A	105	ARG	5
1	A	171	PHE	5
1	A	102	ASN	5
1	A	130	ASP	4
1	A	63	PHE	4
1	A	64	SER	4
1	A	83	PHE	4
1	A	145	HIS	4
1	A	120	SER	4
1	A	31	ASP	4
1	A	122	ASN	4
1	A	66	ARG	3
1	A	16	MET	3
1	A	124	GLU	3
1	A	125	MET	3
1	A	165	MET	3
1	A	12	ARG	2
1	A	169	PHE	2
1	A	70	ASP	2
1	A	53	HIS	2
1	A	172	SER	2
1	A	111	GLU	2

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Mol	Chain	Res	Type	Models (Total)
1	A	127	PRO	2
1	A	88	ARG	2
1	A	94	GLU	1
1	A	170	ASP	1
1	A	25	GLN	1
1	A	86	ARG	1
1	A	74	MET	1
1	A	142	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](#)

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds for which Mogul statistics could be retrieved, the number of bonds that are observed in the model and the number of bonds that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length is the number of standard deviations the observed value is removed from the expected value. A bond length with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the average root-mean-square of all Z scores of the bond lengths.

Mol	Type	Chain	Res	Link	Bond lengths		
					Counts	RMSZ	#Z>2
2	ULL	A	201	-	36,36,36	3.31±0.01	7±0 (19±0%)

In the following table, the Counts columns list the number of angles for which Mogul statistics could be retrieved, the number of angles that are observed in the model and the number of angles that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond angle is the number of standard

deviations the observed value is removed from the expected value. A bond angle with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the average root-mean-square of all Z scores of the bond angles.

Mol	Type	Chain	Res	Link	Bond angles		
					Counts	RMSZ	#Z>2
2	ULL	A	201	-	49,50,50	2.20±0.08	9±1 (18±1%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsions and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ULL	A	201	-	-	2±0,24,36,36	0±0,4,4,4

All unique bond outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)	Models	
								Worst	Total
2	A	201	ULL	N1-N2	11.99	1.13	1.38	18	20
2	A	201	ULL	C11-C8	8.25	1.39	1.51	10	20
2	A	201	ULL	C9-C10	7.66	1.39	1.50	2	20
2	A	201	ULL	C17-C10	7.28	1.33	1.47	15	20
2	A	201	ULL	C3-C7	6.45	1.39	1.50	19	20
2	A	201	ULL	C20-N3	3.97	1.33	1.41	8	20
2	A	201	ULL	C10-N2	3.05	1.33	1.29	2	20

All unique angle outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
2	A	201	ULL	O1-C23-N3	8.92	120.39	109.07	12	20
2	A	201	ULL	C10-N2-N1	8.59	114.10	107.97	17	20
2	A	201	ULL	C8-C9-C10	5.84	97.31	102.73	4	20
2	A	201	ULL	O1-C23-O2	4.12	118.32	124.53	5	20
2	A	201	ULL	C17-C10-N2	3.73	125.06	121.36	20	11
2	A	201	ULL	C8-N1-N2	3.56	109.59	112.98	20	20
2	A	201	ULL	C20-N3-C23	3.56	120.51	126.36	9	20
2	A	201	ULL	C9-C10-N2	3.54	109.40	113.69	7	13
2	A	201	ULL	C7-N1-N2	3.38	128.27	123.77	13	8
2	A	201	ULL	O2-C23-N3	2.47	120.73	126.11	13	20
2	A	201	ULL	C18-C17-C10	2.28	118.06	120.84	4	1

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)	Models	
								Worst	Total
2	A	201	ULL	O3-C7-N1	2.14	122.52	119.83	18	1
2	A	201	ULL	C9-C8-C11	2.14	109.94	113.86	9	5

There are no chirality outliers.

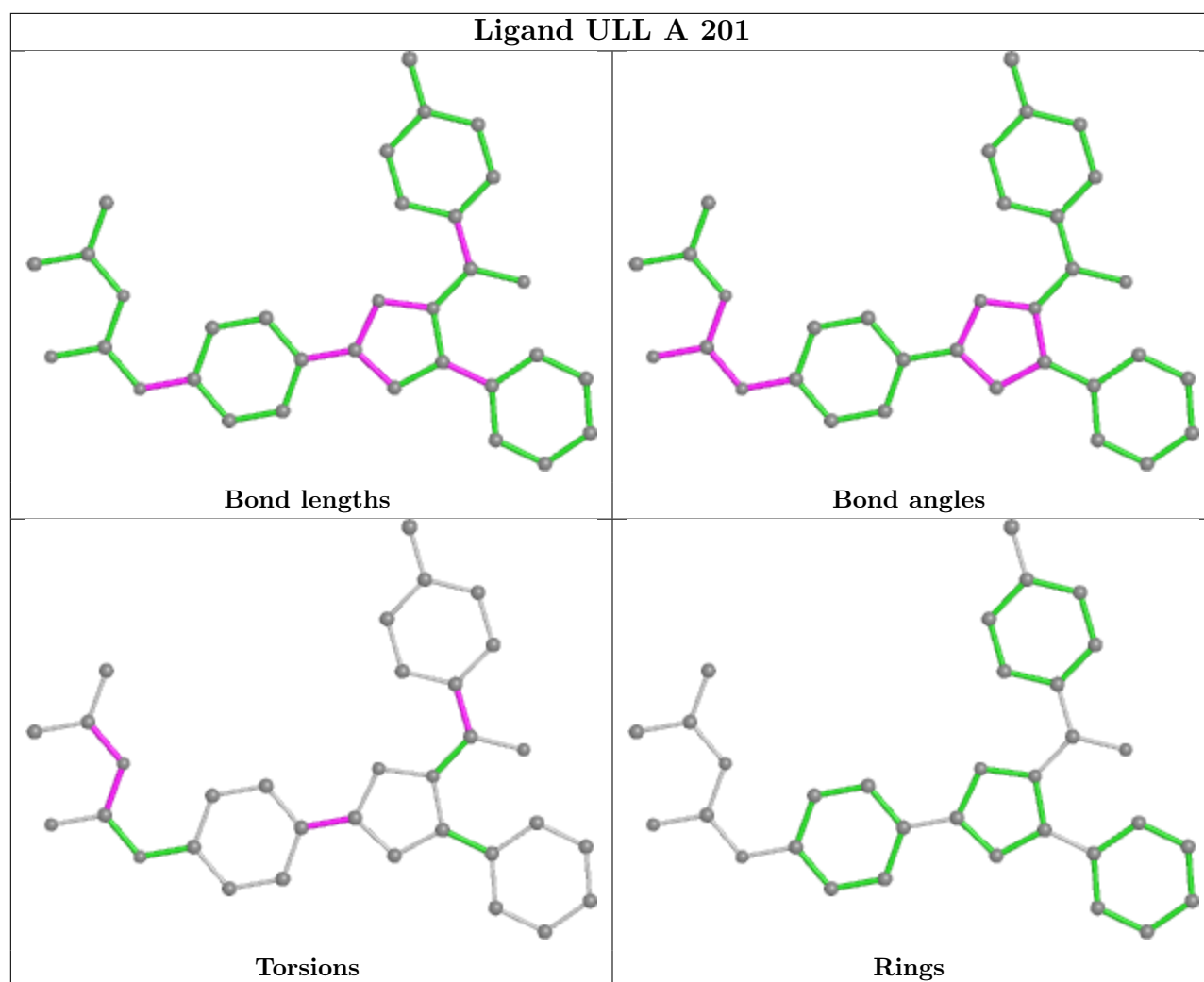
All unique torsion outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Atoms	Models (Total)
2	A	201	ULL	O2-C23-O1-C24	14
2	A	201	ULL	N3-C23-O1-C24	14

There are no ring outliers.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





## 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 [i](#)

The completeness of assignment taking into account all chemical shift lists is 85% for the well-defined parts and 85% for the entire structure.

### 7.1 Chemical shift list 1

File name: working\_cs.cif

Chemical shift list name: *assigned\_chemical\_shifts\_1*

#### 7.1.1 Bookkeeping [i](#)

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	2132
Number of shifts mapped to atoms	2132
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	13

#### 7.1.2 Chemical shift referencing [i](#)

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction $\pm$ precision, ppm	Suggested action
$^{13}\text{C}_\alpha$	174	-0.60 $\pm$ 0.07	Should be checked
$^{13}\text{C}_\beta$	158	0.25 $\pm$ 0.05	None needed (< 0.5 ppm)
$^{13}\text{C}'$	168	-0.29 $\pm$ 0.05	None needed (< 0.5 ppm)
$^{15}\text{N}$	169	-0.05 $\pm$ 0.23	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 85%, i.e. 1879 atoms were assigned a chemical shift out of a possible 2205. 0 out of 26 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	$^1\text{H}$	$^{13}\text{C}$	$^{15}\text{N}$
Backbone	753/772 (98%)	308/314 (98%)	297/308 (96%)	148/150 (99%)
Sidechain	892/1148 (78%)	615/743 (83%)	268/350 (77%)	9/55 (16%)

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	Total	<sup>1</sup> H	<sup>13</sup> C	<sup>15</sup> N
Aromatic	234/285 (82%)	121/139 (87%)	107/130 (82%)	6/16 (38%)
Overall	1879/2205 (85%)	1044/1196 (87%)	672/788 (85%)	163/221 (74%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 85%, i.e. 2106 atoms were assigned a chemical shift out of a possible 2471. 0 out of 27 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	<sup>1</sup> H	<sup>13</sup> C	<sup>15</sup> N
Backbone	867/889 (98%)	356/363 (98%)	342/354 (97%)	169/172 (98%)
Sidechain	1003/1289 (78%)	690/832 (83%)	303/395 (77%)	10/62 (16%)
Aromatic	236/293 (81%)	122/143 (85%)	108/132 (82%)	6/18 (33%)
Overall	2106/2471 (85%)	1168/1338 (87%)	753/881 (85%)	185/252 (73%)

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

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.

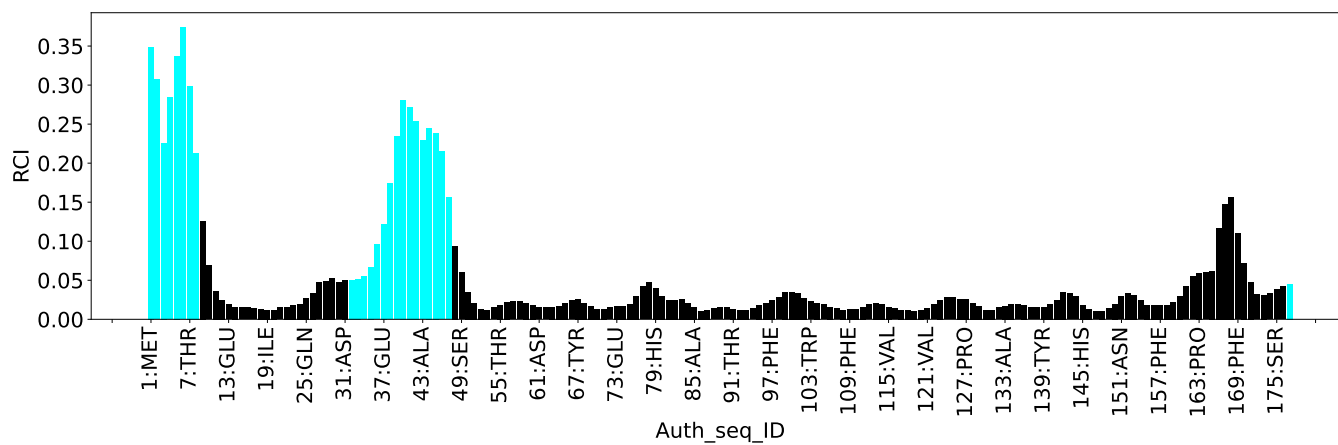
List Id	Chain	Res	Type	Atom	Shift, ppm	Expected range, ppm	Z-score
1	A	55	THR	HG1	5.37	0.08 – 2.19	20.1
1	A	137	THR	HG1	4.72	0.08 – 2.19	17.0
1	A	70	ASP	HB2	-0.07	1.41 – 4.01	-10.7
1	A	70	ASP	HB3	0.92	1.32 – 4.00	-6.5
1	A	151	ASN	HB2	0.85	1.27 – 4.34	-6.4
1	A	101	VAL	HB	0.06	0.43 – 3.54	-6.2
1	A	88	ARG	HB2	0.24	0.52 – 3.08	-6.1
1	A	88	ARG	HD2	1.74	1.97 – 4.26	-6.0
1	A	101	VAL	HG11	-0.69	-0.48 – 2.12	-5.8
1	A	101	VAL	HG12	-0.69	-0.48 – 2.12	-5.8
1	A	101	VAL	HG13	-0.69	-0.48 – 2.12	-5.8
1	A	173	TRP	HH2	5.06	5.24 – 8.73	-5.5
1	A	86	ARG	HG2	0.19	0.26 – 2.87	-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:



## 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	2801
Intra-residue ( $ i-j =0$ )	545
Sequential ( $ i-j =1$ )	655
Medium range ( $ i-j >1$ and $ i-j <5$ )	714
Long range ( $ i-j \geq 5$ )	764
Inter-chain	7
Hydrogen bond restraints	116
Disulfide bond restraints	0
Total dihedral-angle restraints	270
Number of unmapped restraints	0
Number of restraints per residue	17.3
Number of long range restraints per residue <sup>1</sup>	4.3

<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)	1.1	0.19
0.2-0.5 (Medium)	0.6	0.48
>0.5 (Large)	None	None

### 8.2.2 Average number of dihedral-angle violations per model

Dihedral-angle violations less than  $1^\circ$  are not included in the calculation. There are no dihedral-angle violations

## 9 Distance violation analysis

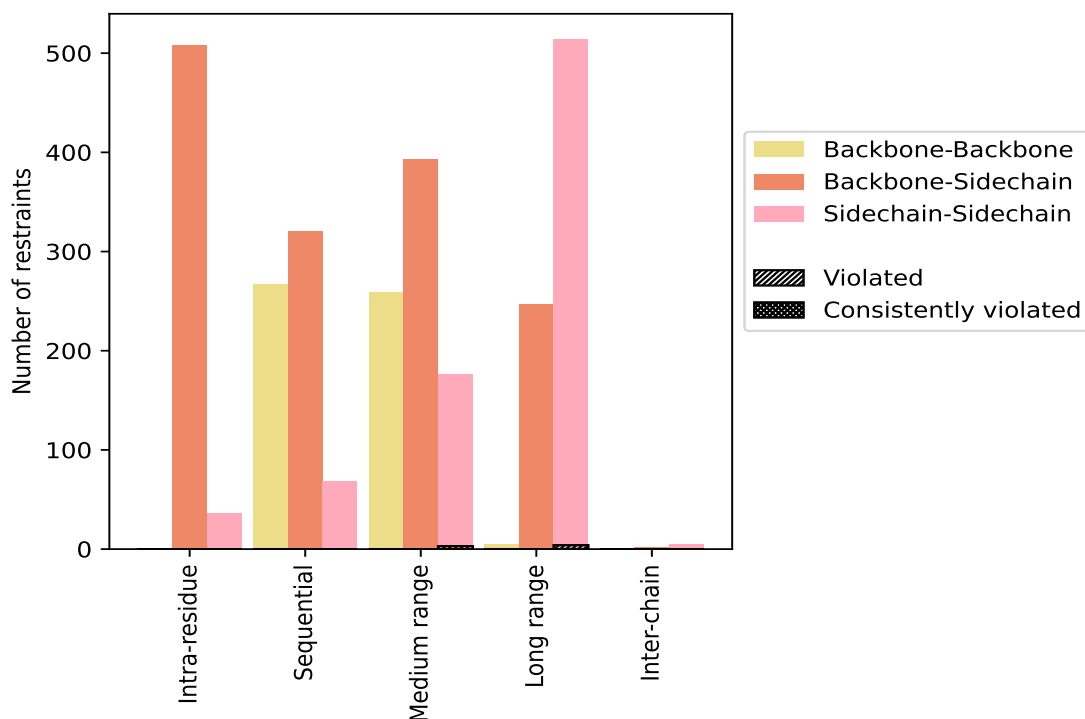
### 9.1 Summary of distance violations

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	% <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>545</b>	<b>19.5</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	1	0.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	508	18.1	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	36	1.3	0	0.0	0.0	0	0.0	0.0
<b>Sequential (<math> i-j =1</math>)</b>	<b>655</b>	<b>23.4</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	267	9.5	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	320	11.4	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	68	2.4	0	0.0	0.0	0	0.0	0.0
<b>Medium range (<math> i-j &gt;1</math> &amp; <math> i-j &lt;5</math>)</b>	<b>714</b>	<b>25.5</b>	<b>3</b>	<b>0.4</b>	<b>0.1</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
Backbone-Backbone	259	9.2	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	279	10.0	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	176	6.3	3	1.7	0.1	0	0.0	0.0
<b>Long range (<math> i-j \geq 5</math>)</b>	<b>764</b>	<b>27.3</b>	<b>4</b>	<b>0.5</b>	<b>0.1</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
Backbone-Backbone	5	0.2	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	245	8.7	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	514	18.4	4	0.8	0.1	0	0.0	0.0
<b>Inter-chain</b>	<b>7</b>	<b>0.2</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	2	0.1	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	5	0.2	0	0.0	0.0	0	0.0	0.0
<b>Hydrogen bond</b>	<b>116</b>	<b>4.1</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>2801</b>	<b>100.0</b>	<b>7</b>	<b>0.2</b>	<b>0.2</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>
Backbone-Backbone	532	19.0	0	0.0	0.0	0	0.0	0.0
Backbone-Sidechain	1470	52.5	0	0.0	0.0	0	0.0	0.0
Sidechain-Sidechain	799	28.5	7	0.9	0.2	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	0	0	1	1	0	2	0.22	0.32	0.1	0.22
2	0	0	1	1	0	2	0.14	0.15	0.02	0.14
3	0	0	1	1	0	2	0.15	0.17	0.03	0.15
4	0	0	1	0	0	1	0.19	0.19	0.0	0.19
5	0	0	1	1	0	2	0.15	0.19	0.04	0.15
6	0	0	0	1	0	1	0.11	0.11	0.0	0.11
7	0	0	0	0	0	0	0.0	0.0	0.0	0.0
8	0	0	1	0	0	1	0.44	0.44	0.0	0.44
9	0	0	1	0	0	1	0.32	0.32	0.0	0.32
10	0	0	0	2	0	2	0.12	0.12	0.0	0.12
11	0	0	1	0	0	1	0.24	0.24	0.0	0.24

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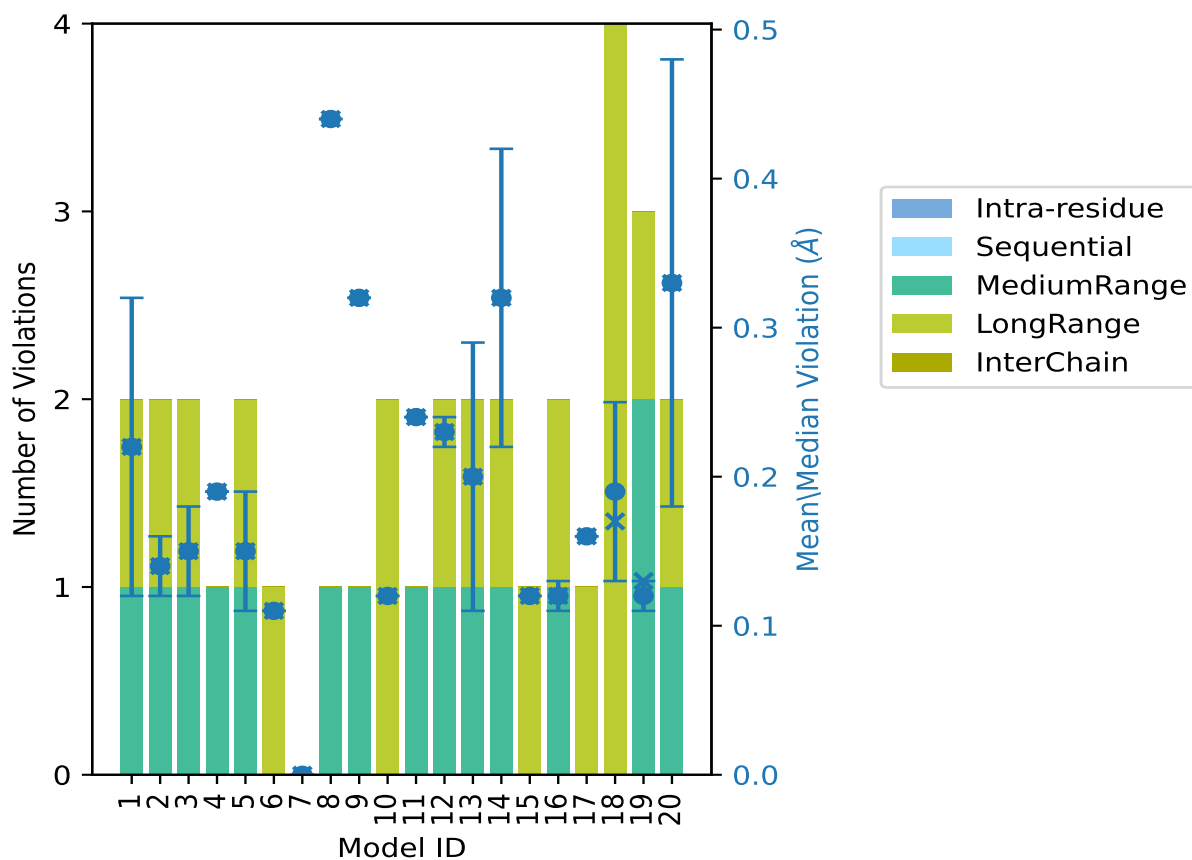


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Model ID	Number of violations						Mean (Å)	Max (Å)	SD <sup>6</sup> (Å)	Median (Å)
	IR <sup>1</sup>	SQ <sup>2</sup>	MR <sup>3</sup>	LR <sup>4</sup>	IC <sup>5</sup>	Total				
12	0	0	1	1	0	2	0.23	0.24	0.01	0.23
13	0	0	1	1	0	2	0.2	0.3	0.09	0.2
14	0	0	1	1	0	2	0.32	0.42	0.1	0.32
15	0	0	0	1	0	1	0.12	0.12	0.0	0.12
16	0	0	1	1	0	2	0.12	0.13	0.01	0.12
17	0	0	0	1	0	1	0.16	0.16	0.0	0.16
18	0	0	0	4	0	4	0.19	0.3	0.06	0.17
19	0	0	2	1	0	3	0.12	0.13	0.01	0.13
20	0	0	1	1	0	2	0.33	0.48	0.15	0.33

<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

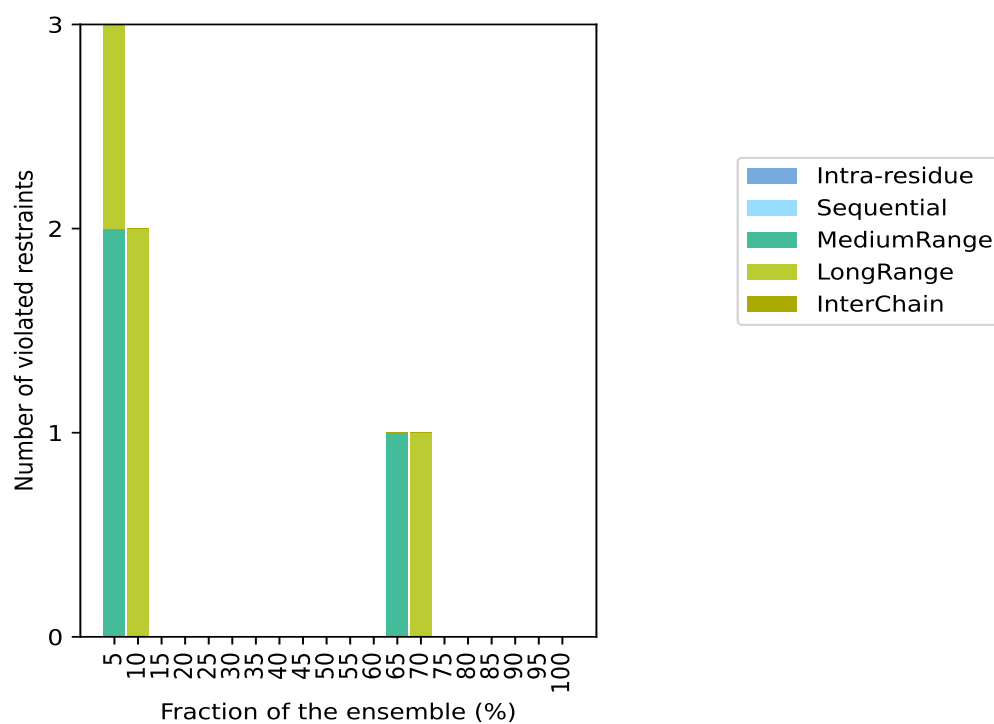
### 9.3 Distance violation statistics for the ensemble

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, 2678(IR:545, SQ:655, MR:711, LR:760, IC:7) 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>	%
0	0	2	1	0	3	1	5.0
0	0	0	2	0	2	2	10.0
0	0	0	0	0	0	3	15.0
0	0	0	0	0	0	4	20.0
0	0	0	0	0	0	5	25.0
0	0	0	0	0	0	6	30.0
0	0	0	0	0	0	7	35.0
0	0	0	0	0	0	8	40.0
0	0	0	0	0	0	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	1	0	0	1	13	65.0
0	0	0	1	0	1	14	70.0
0	0	0	0	0	0	15	75.0
0	0	0	0	0	0	16	80.0
0	0	0	0	0	0	17	85.0
0	0	0	0	0	0	18	90.0
0	0	0	0	0	0	19	95.0
0	0	0	0	0	0	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

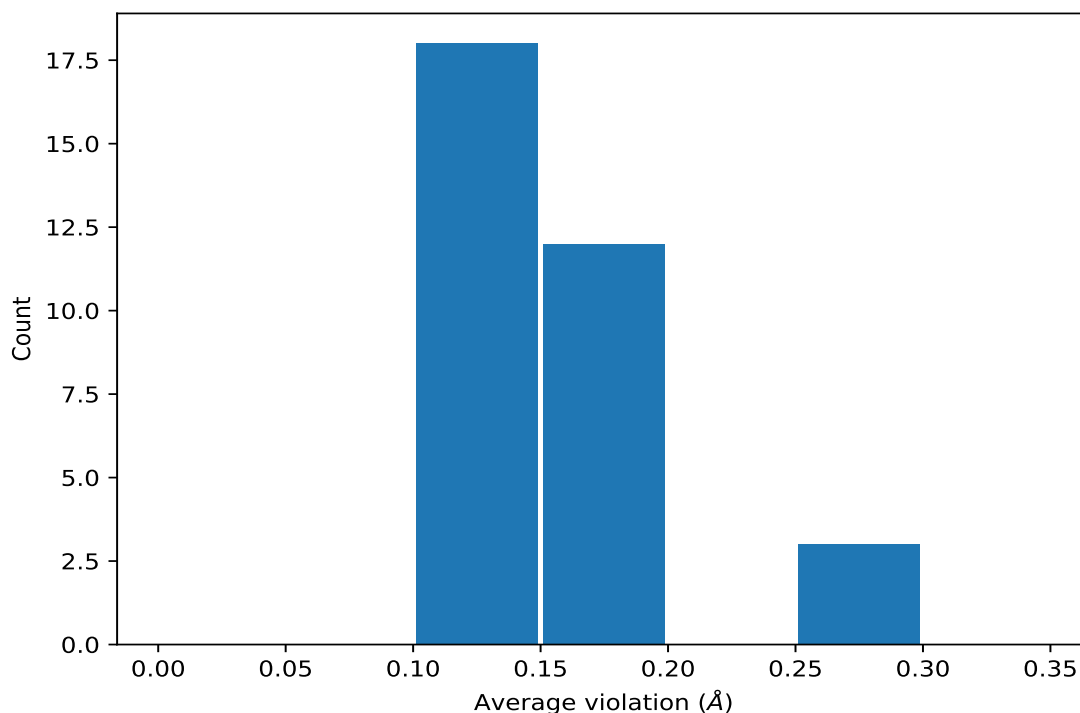
### 9.3.1 Bar graph : Distance violation statistics for the ensemble [i](#)



## 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)
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	14	0.14	0.04	0.12

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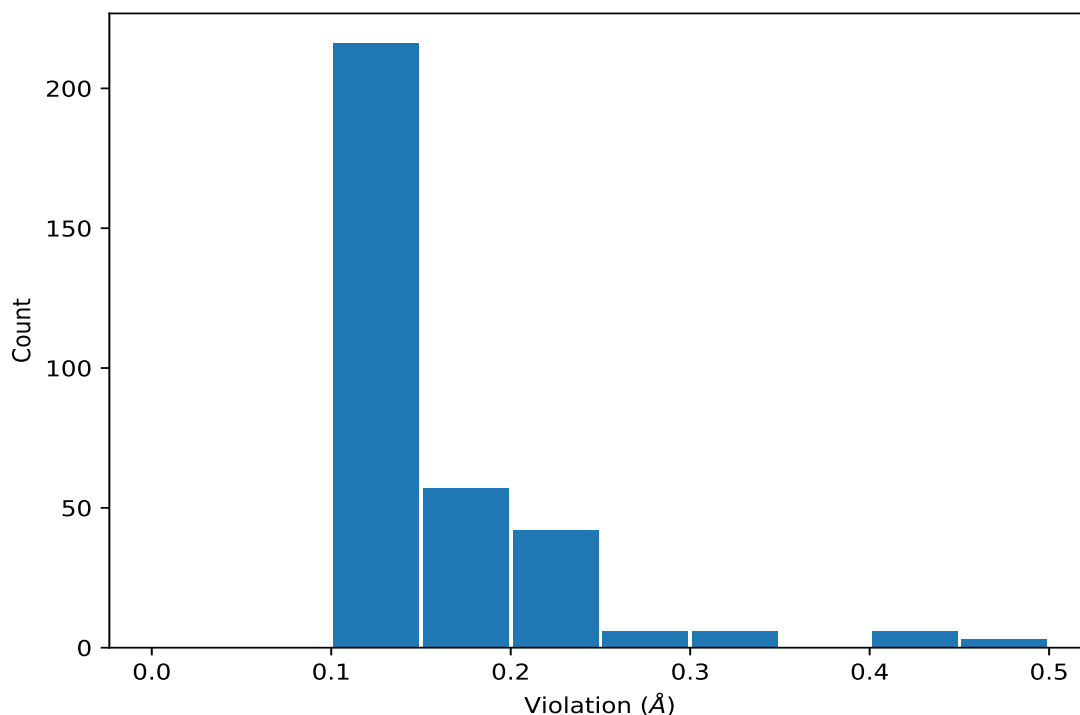
Key	Atom-1	Atom-2	Models <sup>1</sup>	Mean (Å)	SD <sup>1</sup> (Å)	Median (Å)
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	14	0.14	0.04	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	14	0.14	0.04	0.12
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	13	0.28	0.11	0.24
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	13	0.28	0.11	0.24
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	13	0.28	0.11	0.24
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG21	2	0.15	0.03	0.15
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG22	2	0.15	0.03	0.15
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG23	2	0.15	0.03	0.15
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG21	2	0.15	0.03	0.15
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG22	2	0.15	0.03	0.15
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG23	2	0.15	0.03	0.15
(1,418)	1:137:A:THR:HG21	1:12:A:ARG:HG2	2	0.15	0.03	0.15
(1,418)	1:137:A:THR:HG21	1:12:A:ARG:HG3	2	0.15	0.03	0.15
(1,418)	1:137:A:THR:HG22	1:12:A:ARG:HG2	2	0.15	0.03	0.15
(1,418)	1:137:A:THR:HG22	1:12:A:ARG:HG3	2	0.15	0.03	0.15
(1,418)	1:137:A:THR:HG23	1:12:A:ARG:HG2	2	0.15	0.03	0.15
(1,418)	1:137:A:THR:HG23	1:12:A:ARG:HG3	2	0.15	0.03	0.15

<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)
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	20	0.48
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	20	0.48
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	20	0.48
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	8	0.44
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	8	0.44
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	8	0.44
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	14	0.42
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	14	0.42
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	14	0.42
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	1	0.32
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	1	0.32
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	1	0.32
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	9	0.32
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	9	0.32
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	9	0.32
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	13	0.3

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	13	0.3
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	13	0.3
(1,1050)	1:9:A:TYR:HE1	1:52:A:VAL:HG21	18	0.3
(1,1050)	1:9:A:TYR:HE1	1:52:A:VAL:HG22	18	0.3
(1,1050)	1:9:A:TYR:HE1	1:52:A:VAL:HG23	18	0.3
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	11	0.24
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	11	0.24
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	11	0.24
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	12	0.24
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	12	0.24
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	12	0.24
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	12	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	12	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	12	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	12	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	12	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	12	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	12	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	12	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	12	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	12	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	12	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	12	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	12	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	12	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	12	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	12	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	12	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	12	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	14	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	14	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	14	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	14	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	14	0.22
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	14	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	14	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	14	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	14	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	14	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	14	0.22
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	14	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	14	0.22

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	14	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	14	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	14	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	14	0.22
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	14	0.22
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	4	0.19
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	4	0.19
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	4	0.19
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	5	0.19
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	5	0.19
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	5	0.19
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	20	0.18
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	20	0.18
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	20	0.18
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	20	0.18
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	20	0.18
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	20	0.18
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	20	0.18
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	20	0.18
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	20	0.18
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	20	0.18
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	20	0.18
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	20	0.18
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	20	0.18
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	20	0.18
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	20	0.18
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	20	0.18
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	20	0.18
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	20	0.18
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	3	0.17
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	3	0.17
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	3	0.17
(1,418)	1:137:A:THR:HG21	1:12:A:ARG:HG2	18	0.17
(1,418)	1:137:A:THR:HG21	1:12:A:ARG:HG3	18	0.17
(1,418)	1:137:A:THR:HG22	1:12:A:ARG:HG2	18	0.17
(1,418)	1:137:A:THR:HG22	1:12:A:ARG:HG3	18	0.17
(1,418)	1:137:A:THR:HG23	1:12:A:ARG:HG2	18	0.17
(1,418)	1:137:A:THR:HG23	1:12:A:ARG:HG3	18	0.17
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG21	18	0.17
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG22	18	0.17
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG23	18	0.17
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG21	18	0.17

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG22	18	0.17
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG23	18	0.17
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	17	0.16
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	17	0.16
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	17	0.16
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	17	0.16
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	17	0.16
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	17	0.16
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	17	0.16
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	17	0.16
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	17	0.16
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	17	0.16
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	17	0.16
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	17	0.16
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	17	0.16
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	17	0.16
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	17	0.16
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	17	0.16
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	17	0.16
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	17	0.16
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	2	0.15
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	2	0.15
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	2	0.15
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	16	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	16	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	16	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	16	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	16	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	16	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	16	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	16	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	16	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	16	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	16	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	16	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	16	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	16	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	16	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	16	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	16	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	16	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	18	0.13

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	18	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	18	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	18	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	18	0.13
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	18	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	18	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	18	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	18	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	18	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	18	0.13
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	18	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	18	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	18	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	18	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	18	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	18	0.13
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	18	0.13
(1,841)	1:125:A:MET:HE1	1:128:A:LEU:HD11	19	0.13
(1,841)	1:125:A:MET:HE1	1:128:A:LEU:HD12	19	0.13
(1,841)	1:125:A:MET:HE1	1:128:A:LEU:HD13	19	0.13
(1,841)	1:125:A:MET:HE2	1:128:A:LEU:HD11	19	0.13
(1,841)	1:125:A:MET:HE2	1:128:A:LEU:HD12	19	0.13
(1,841)	1:125:A:MET:HE2	1:128:A:LEU:HD13	19	0.13
(1,841)	1:125:A:MET:HE3	1:128:A:LEU:HD11	19	0.13
(1,841)	1:125:A:MET:HE3	1:128:A:LEU:HD12	19	0.13
(1,841)	1:125:A:MET:HE3	1:128:A:LEU:HD13	19	0.13
(1,595)	1:128:A:LEU:HD11	1:125:A:MET:HE1	19	0.13
(1,595)	1:128:A:LEU:HD11	1:125:A:MET:HE2	19	0.13
(1,595)	1:128:A:LEU:HD11	1:125:A:MET:HE3	19	0.13
(1,595)	1:128:A:LEU:HD12	1:125:A:MET:HE1	19	0.13
(1,595)	1:128:A:LEU:HD12	1:125:A:MET:HE2	19	0.13
(1,595)	1:128:A:LEU:HD12	1:125:A:MET:HE3	19	0.13
(1,595)	1:128:A:LEU:HD13	1:125:A:MET:HE1	19	0.13
(1,595)	1:128:A:LEU:HD13	1:125:A:MET:HE2	19	0.13
(1,595)	1:128:A:LEU:HD13	1:125:A:MET:HE3	19	0.13
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG11	16	0.12
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG12	16	0.12
(1,2518)	1:89:A:PHE:HD2	1:93:A:VAL:HG13	16	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	1	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	1	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	1	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	1	0.12

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	1	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	1	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	1	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	1	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	1	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	1	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	1	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	1	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	1	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	1	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	1	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	1	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	1	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	1	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	2	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	2	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	2	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	2	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	2	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	2	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	2	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	2	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	2	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	2	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	2	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	2	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	2	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	2	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	2	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	2	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	2	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	2	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	3	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	3	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	3	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	3	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	3	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	3	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	3	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	3	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	3	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	3	0.12

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	3	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	3	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	3	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	3	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	3	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	3	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	3	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	3	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	15	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	15	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	15	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	15	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	15	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	15	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	15	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	15	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	15	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	15	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	15	0.12
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	15	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	15	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	15	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	15	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	15	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	15	0.12
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	15	0.12
(1,418)	1:137:A:THR:HG21	1:12:A:ARG:HG2	10	0.12
(1,418)	1:137:A:THR:HG21	1:12:A:ARG:HG3	10	0.12
(1,418)	1:137:A:THR:HG22	1:12:A:ARG:HG2	10	0.12
(1,418)	1:137:A:THR:HG22	1:12:A:ARG:HG3	10	0.12
(1,418)	1:137:A:THR:HG23	1:12:A:ARG:HG2	10	0.12
(1,418)	1:137:A:THR:HG23	1:12:A:ARG:HG3	10	0.12
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG21	10	0.12
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG22	10	0.12
(1,11)	1:12:A:ARG:HG2	1:137:A:THR:HG23	10	0.12
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG21	10	0.12
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG22	10	0.12
(1,11)	1:12:A:ARG:HG3	1:137:A:THR:HG23	10	0.12
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	6	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	6	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	6	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	6	0.11

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	6	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	6	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	6	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	6	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	6	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	6	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	6	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	6	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	6	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	6	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	6	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	6	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	6	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	6	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	13	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	13	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	13	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	13	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	13	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	13	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	13	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	13	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	13	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	13	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	13	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	13	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	13	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	13	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	13	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	13	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	13	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	13	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	19	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	19	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	19	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	19	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	19	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	19	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	19	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	19	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	19	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	19	0.11

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Key	Atom-1	Atom-2	Model ID	Violation (Å)
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	19	0.11
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	19	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	19	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	19	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	19	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	19	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	19	0.11
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	19	0.11
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD11	5	0.1
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD12	5	0.1
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD13	5	0.1
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD21	5	0.1
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD22	5	0.1
(1,910)	1:116:A:MET:HE1	1:78:A:LEU:HD23	5	0.1
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD11	5	0.1
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD12	5	0.1
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD13	5	0.1
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD21	5	0.1
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD22	5	0.1
(1,910)	1:116:A:MET:HE2	1:78:A:LEU:HD23	5	0.1
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD11	5	0.1
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD12	5	0.1
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD13	5	0.1
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD21	5	0.1
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD22	5	0.1
(1,910)	1:116:A:MET:HE3	1:78:A:LEU:HD23	5	0.1

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

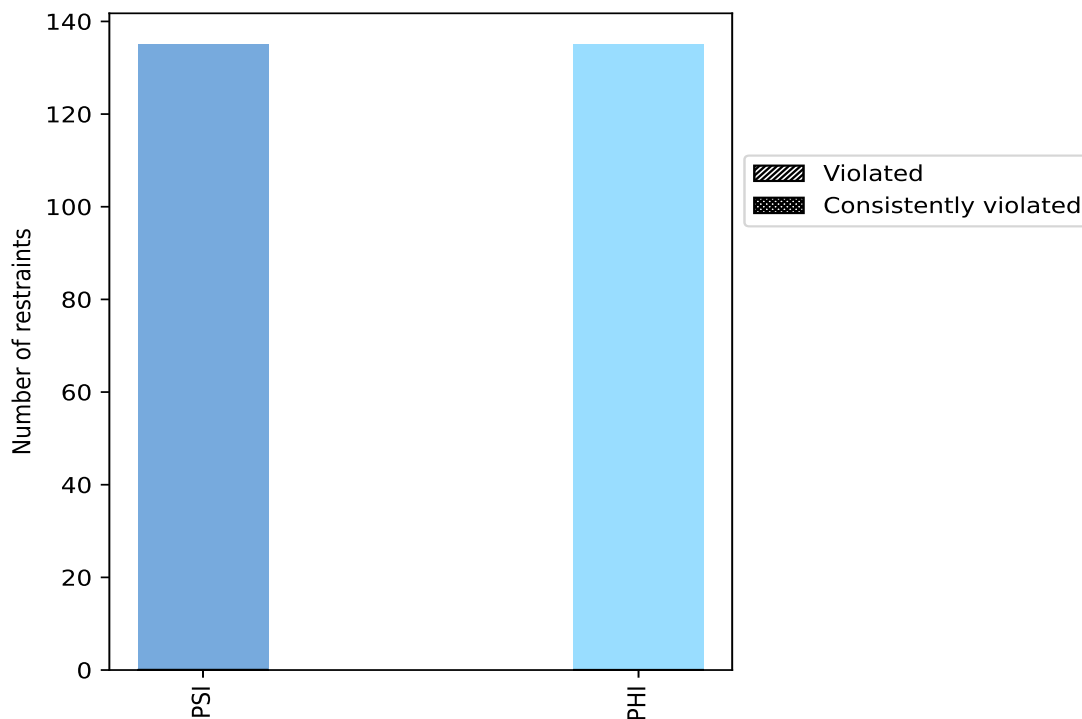
### 10.1 Summary of dihedral-angle violations [i](#)

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>
PSI	135	50.0	0	0.0	0.0	0	0.0	0.0
PHI	135	50.0	0	0.0	0.0	0	0.0	0.0
Total	270	100.0	0	0.0	0.0	0	0.0	0.0

<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](#)

No violations found

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

No violations found

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

No violations found

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

No violations found