



Full wwPDB NMR Structure Validation Report ⓘ

Apr 26, 2017 – 11:33 AM EDT

PDB ID : 5B7X
Title : NMR Solution structure of an EF-hand Calcium binding protein (EhCaBP6)
from Entamoeba Histolytica
Authors : Verma, D.; Chary, K.V.
Deposited on : 2016-06-10

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<http://wwpdb.org/validation/2016/NMRValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

Cyrange : Kirchner and Güntert (2011)
NmrClust : Kelley et al. (1996)
MolProbity : 4.02b-467
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
RCI : v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV : Wang et al. (2010)
ShiftChecker : rb-20029077
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20029077

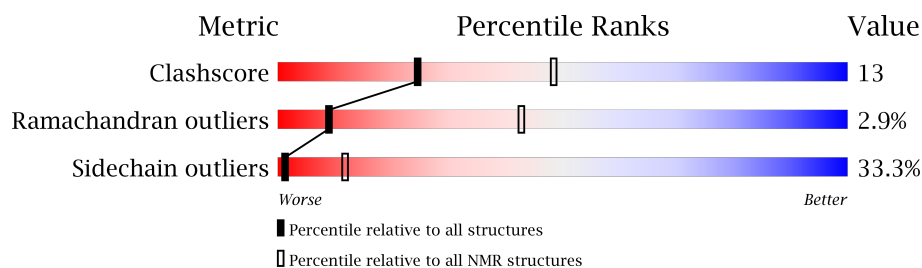
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment is 52%.

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	125131	11601
Ramachandran outliers	121729	10391
Sidechain outliers	121581	10367

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and a grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	156	

2 Ensemble composition and analysis ⓘ

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

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

Well-defined (core) protein residues			
Well-defined core	Residue range (total)	Backbone RMSD (Å)	Medoid model
1	A:10-A:79 (70)	0.60	17
2	A:86-A:150 (65)	0.50	3

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 4 clusters and 1 single-model cluster was found.

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

3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2503 atoms, of which 1238 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Calmodulin, putative.

Mol	Chain	Residues	Atoms						Trace
1	A	156	Total	C	H	N	O	S	0
			2501	794	1238	213	249	7	

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	151	HIS	-	expression tag	UNP M7WXJ8
A	152	HIS	-	expression tag	UNP M7WXJ8
A	153	HIS	-	expression tag	UNP M7WXJ8
A	154	HIS	-	expression tag	UNP M7WXJ8
A	155	HIS	-	expression tag	UNP M7WXJ8
A	156	HIS	-	expression tag	UNP M7WXJ8

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

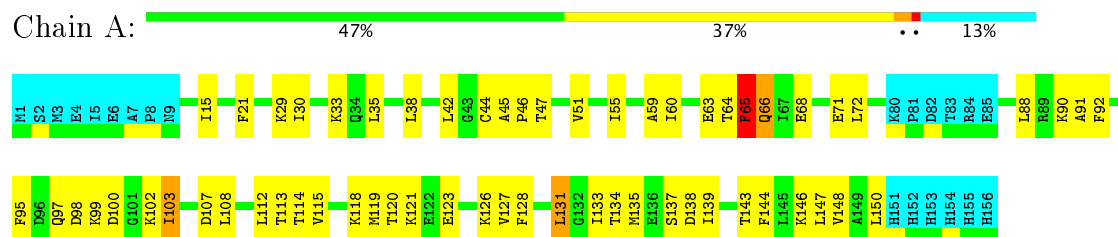
Mol	Chain	Residues	Atoms	
2	A	2	Total	Ca
			2	2

4 Residue-property plots

4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA and DNA 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: Calmodulin, putative

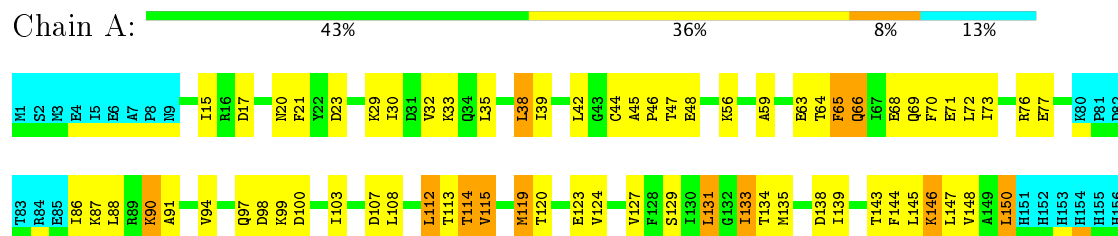


4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

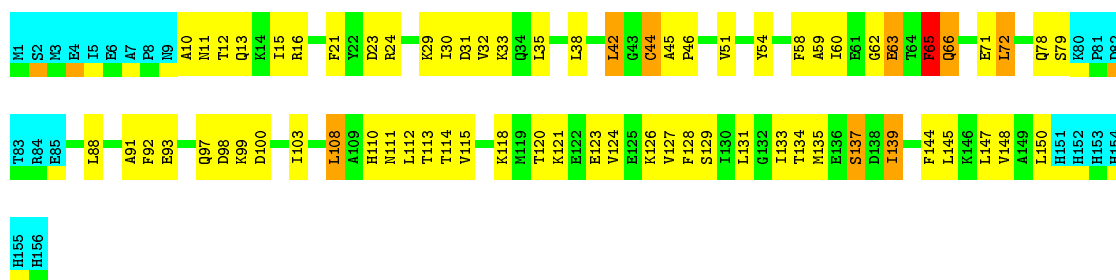
- Molecule 1: Calmodulin, putative



4.2.2 Score per residue for model 2

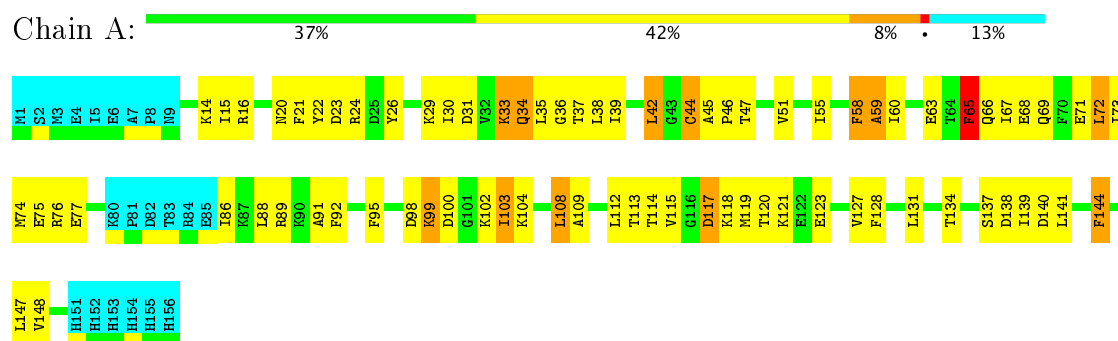
- Molecule 1: Calmodulin, putative





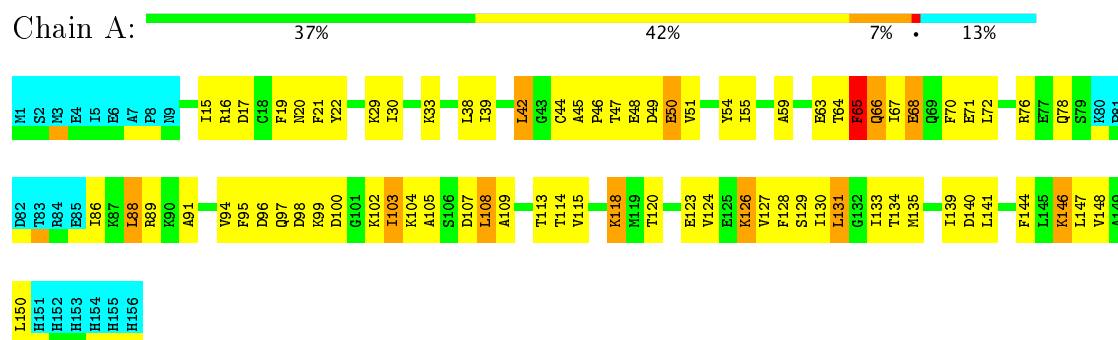
4.2.3 Score per residue for model 3

- Molecule 1: Calmodulin, putative



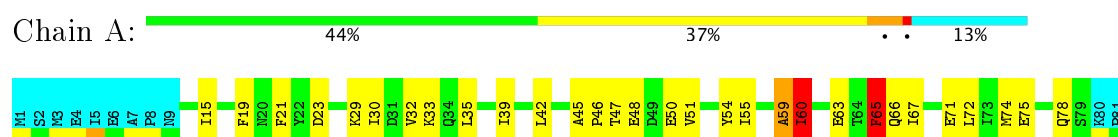
4.2.4 Score per residue for model 4

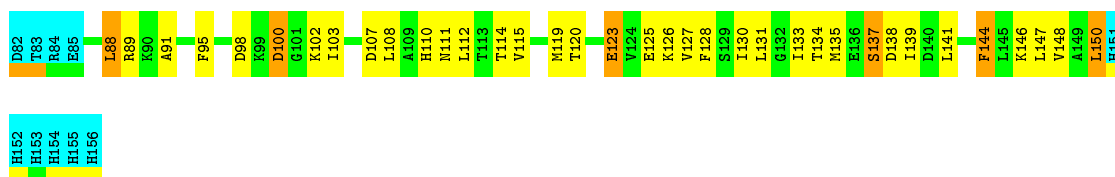
- Molecule 1: Calmodulin, putative



4.2.5 Score per residue for model 5

- Molecule 1: Calmodulin, putative

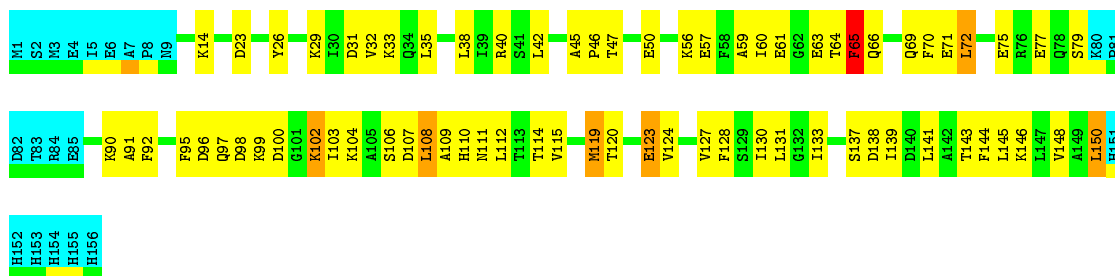




4.2.6 Score per residue for model 6

- Molecule 1: Calmodulin, putative

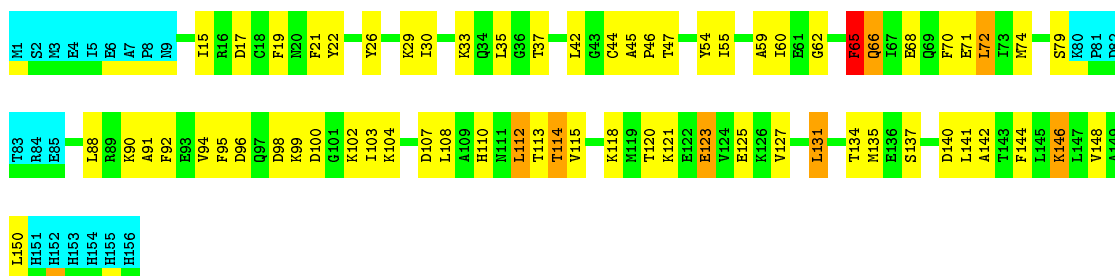
Chain A: 41% 41% 13%



4.2.7 Score per residue for model 7

- Molecule 1: Calmodulin, putative

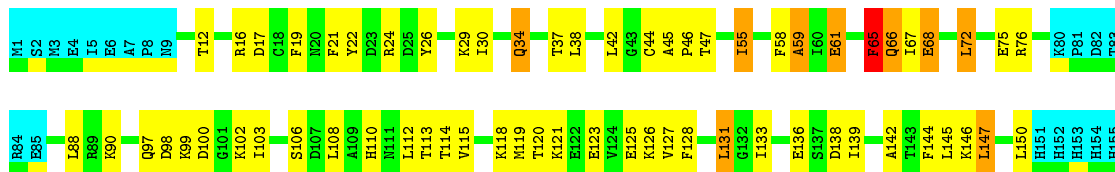
Chain A: 44% 37% 13%



4.2.8 Score per residue for model 8

- Molecule 1: Calmodulin, putative

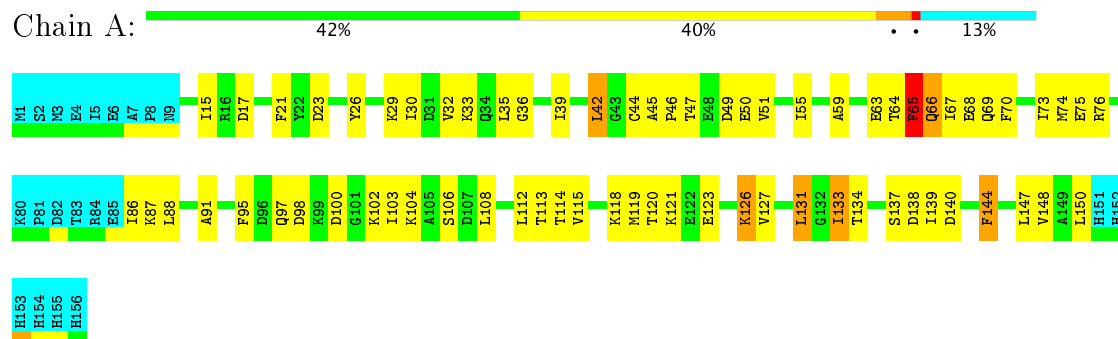
Chain A: 46% 35% 6% 13%



H156

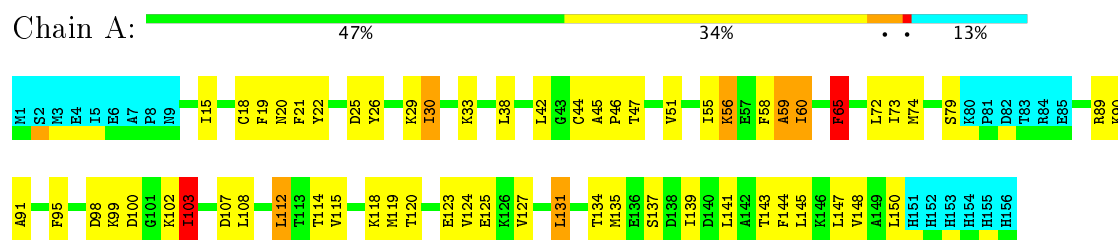
4.2.9 Score per residue for model 9

- Molecule 1: Calmodulin, putative



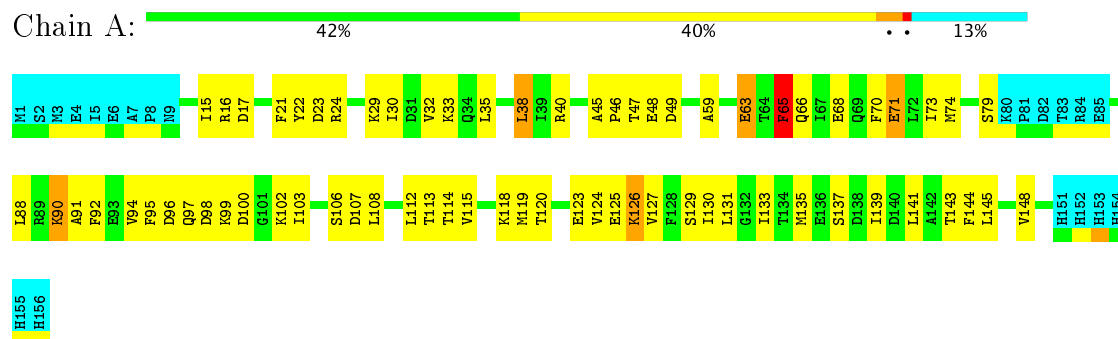
4.2.10 Score per residue for model 10

- Molecule 1: Calmodulin, putative



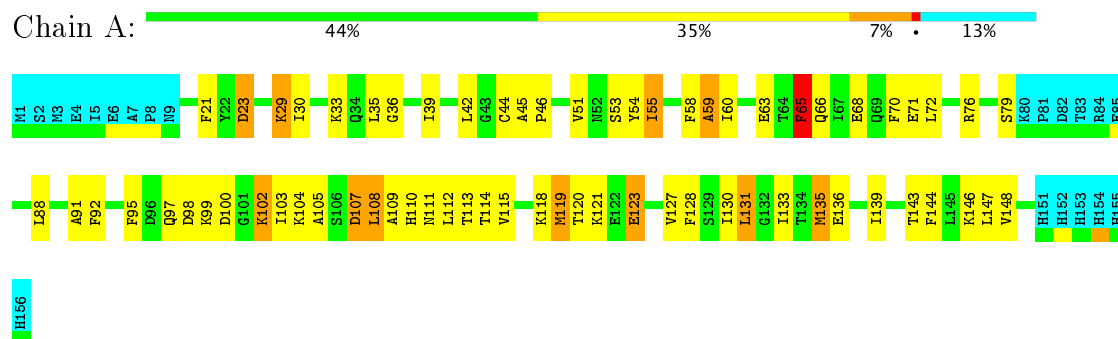
4.2.11 Score per residue for model 11

- Molecule 1: Calmodulin, putative



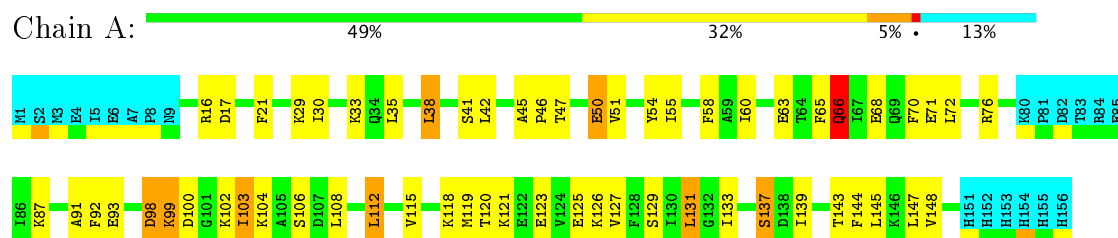
4.2.12 Score per residue for model 12

- Molecule 1: Calmodulin, putative



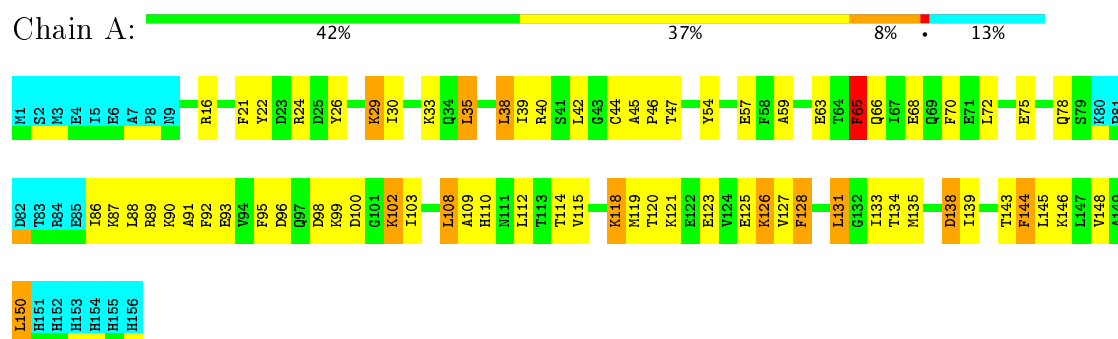
4.2.13 Score per residue for model 13

- Molecule 1: Calmodulin, putative



4.2.14 Score per residue for model 14

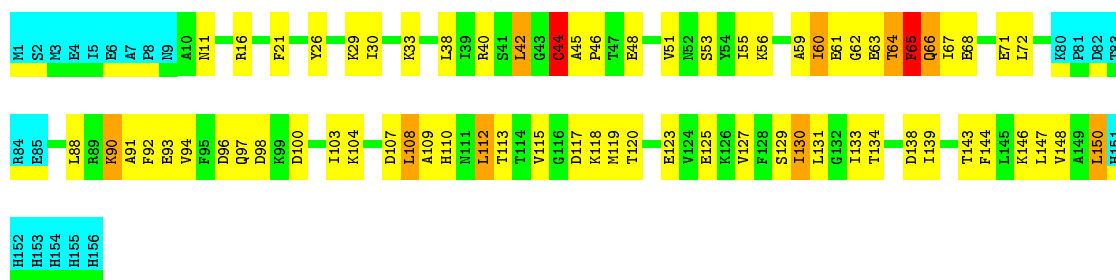
- Molecule 1: Calmodulin, putative



4.2.15 Score per residue for model 15

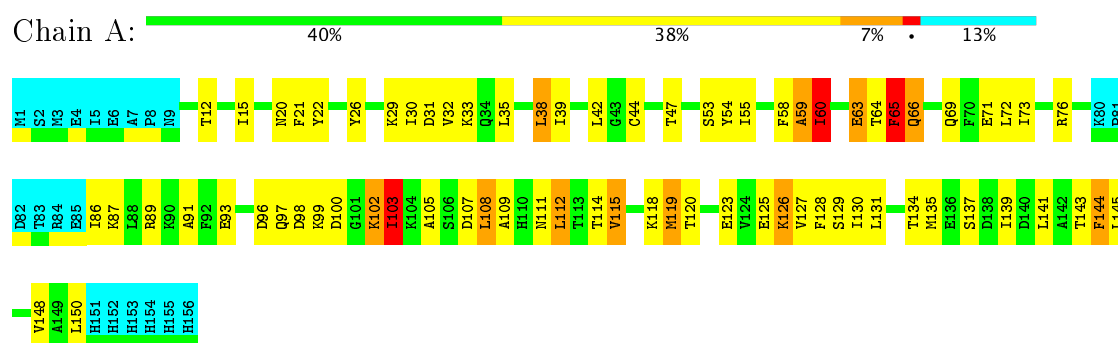
- Molecule 1: Calmodulin, putative





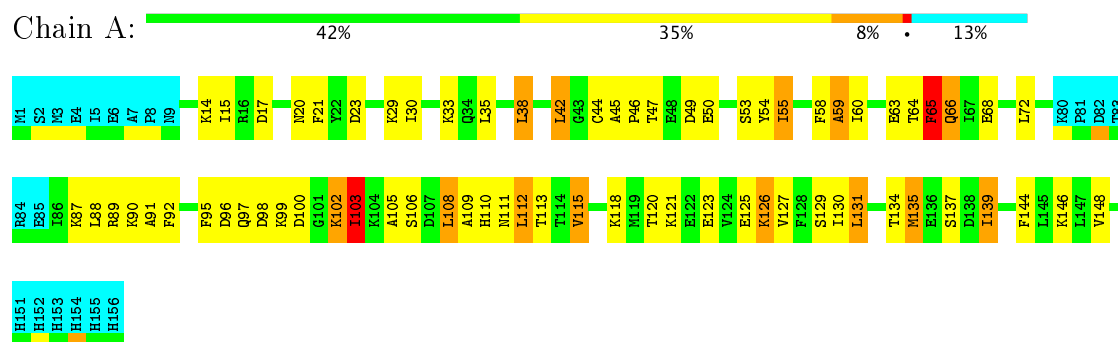
4.2.16 Score per residue for model 16

- Molecule 1: Calmodulin, putative



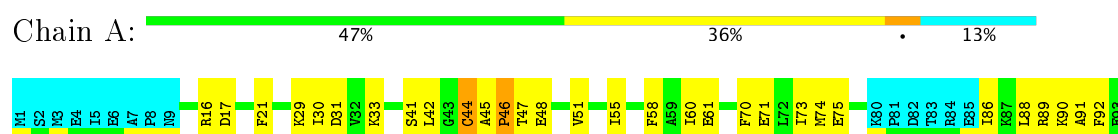
4.2.17 Score per residue for model 17 (medoid)

- Molecule 1: Calmodulin, putative



4.2.18 Score per residue for model 18

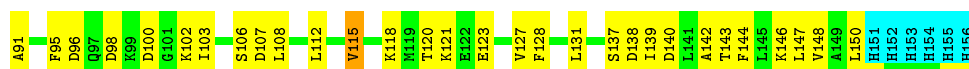
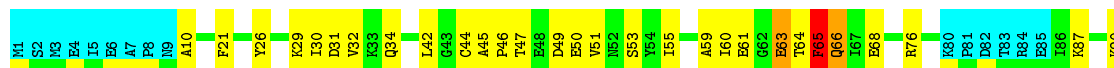
- Molecule 1: Calmodulin, putative





4.2.19 Score per residue for model 19

- Molecule 1: Calmodulin, putative



4.2.20 Score per residue for model 20

- Molecule 1: Calmodulin, putative



5 Refinement protocol and experimental data overview

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

Of the 500 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	refinement	

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)	5b7x_cs.cif
Number of chemical shift lists	1
Total number of shifts	1063
Number of shifts mapped to atoms	1063
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	52%

No validations of the models with respect to experimental NMR restraints is performed at this time.

6 Model quality ⓘ

6.1 Standard geometry ⓘ

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

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	1084	1082	1082	29±6
All	All	21720	21640	21640	579

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 13.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:130:ILE:HD11	1:A:150:LEU:HD23	1.01	1.32	6	1
1:A:108:LEU:HD13	1:A:139:ILE:HG21	0.99	1.32	2	8
1:A:131:LEU:HD21	1:A:142:ALA:HB1	0.94	1.37	8	1
1:A:38:LEU:HD22	1:A:72:LEU:HD21	0.90	1.41	15	6
1:A:108:LEU:HD22	1:A:139:ILE:HG21	0.89	1.43	9	4
1:A:127:VAL:HG21	1:A:147:LEU:HD22	0.88	1.44	8	1
1:A:127:VAL:HG13	1:A:131:LEU:HD12	0.87	1.43	15	1
1:A:88:LEU:HD11	1:A:147:LEU:HD22	0.85	1.45	3	2
1:A:91:ALA:HB3	1:A:115:VAL:HG12	0.84	1.48	2	1
1:A:139:ILE:HG22	1:A:143:THR:HG21	0.83	1.47	11	6
1:A:108:LEU:HD13	1:A:139:ILE:HD13	0.83	1.49	11	1
1:A:88:LEU:HD11	1:A:147:LEU:HD23	0.81	1.52	15	2

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:91:ALA:HB3	1:A:115:VAL:HG22	0.79	1.50	6	10
1:A:131:LEU:HD11	1:A:142:ALA:HB1	0.79	1.53	19	1
1:A:22:TYR:CD1	1:A:38:LEU:HD21	0.72	2.19	11	1
1:A:91:ALA:HB2	1:A:115:VAL:HG23	0.72	1.59	17	2
1:A:15:ILE:HG21	1:A:73:ILE:HD13	0.72	1.58	1	2
1:A:108:LEU:HD12	1:A:139:ILE:HD13	0.71	1.61	17	1
1:A:112:LEU:HD11	1:A:147:LEU:HD21	0.70	1.63	2	1
1:A:88:LEU:HD22	1:A:92:PHE:CZ	0.69	2.21	3	1
1:A:88:LEU:HD22	1:A:92:PHE:CE2	0.69	2.23	12	3
1:A:45:ALA:HB3	1:A:46:PRO:HD3	0.68	1.66	18	1
1:A:88:LEU:HD12	1:A:92:PHE:CZ	0.67	2.24	7	3
1:A:51:VAL:HG12	1:A:55:ILE:HD11	0.67	1.66	19	1
1:A:127:VAL:HG22	1:A:147:LEU:HD13	0.67	1.67	9	2
1:A:123:GLU:O	1:A:127:VAL:HG23	0.66	1.91	1	19
1:A:22:TYR:CE2	1:A:30:ILE:HD13	0.65	2.27	11	1
1:A:15:ILE:HG21	1:A:73:ILE:CD1	0.65	2.22	16	2
1:A:131:LEU:HD13	1:A:131:LEU:O	0.64	1.91	5	5
1:A:88:LEU:HD21	1:A:147:LEU:HD23	0.64	1.70	5	1
1:A:131:LEU:HD21	1:A:142:ALA:C	0.64	2.13	7	1
1:A:22:TYR:OH	1:A:72:LEU:HD21	0.64	1.93	8	2
1:A:131:LEU:O	1:A:131:LEU:HD13	0.64	1.93	9	3
1:A:139:ILE:CG2	1:A:143:THR:HG21	0.64	2.23	16	8
1:A:88:LEU:HD23	1:A:144:PHE:CD2	0.63	2.29	8	2
1:A:131:LEU:HD22	1:A:143:THR:HA	0.63	1.70	14	2
1:A:128:PHE:CD2	1:A:133:ILE:HG23	0.63	2.29	5	1
1:A:123:GLU:O	1:A:127:VAL:HG13	0.63	1.92	6	1
1:A:130:ILE:CG2	1:A:150:LEU:HD23	0.63	2.24	15	1
1:A:22:TYR:OH	1:A:72:LEU:HD11	0.62	1.93	4	6
1:A:112:LEU:HD11	1:A:147:LEU:CD2	0.62	2.24	2	1
1:A:45:ALA:HB3	1:A:46:PRO:CD	0.62	2.25	18	1
1:A:59:ALA:C	1:A:60:ILE:HD12	0.62	2.15	5	2
1:A:30:ILE:HG21	1:A:68:GLU:CB	0.62	2.25	15	1
1:A:29:LYS:O	1:A:30:ILE:HD13	0.62	1.94	12	2
1:A:127:VAL:CG2	1:A:147:LEU:HD13	0.62	2.24	9	4
1:A:88:LEU:HD11	1:A:147:LEU:CD2	0.62	2.23	15	2
1:A:91:ALA:HB3	1:A:115:VAL:HG23	0.62	1.70	13	1
1:A:88:LEU:HD13	1:A:144:PHE:CD2	0.62	2.30	17	2
1:A:131:LEU:HD11	1:A:143:THR:HG23	0.62	1.70	6	1
1:A:35:LEU:HD22	1:A:71:GLU:OE2	0.61	1.94	7	3
1:A:131:LEU:HB3	1:A:143:THR:HG23	0.61	1.72	15	1
1:A:90:LYS:O	1:A:94:VAL:HG23	0.61	1.96	1	4

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:38:LEU:CD2	1:A:72:LEU:HD21	0.61	2.25	17	4
1:A:108:LEU:HD22	1:A:139:ILE:CG2	0.61	2.25	8	3
1:A:15:ILE:HD13	1:A:73:ILE:HD13	0.61	1.72	11	2
1:A:130:ILE:HD11	1:A:150:LEU:HD13	0.61	1.72	4	1
1:A:32:VAL:HG13	1:A:63:GLU:O	0.61	1.95	6	4
1:A:55:ILE:HD11	1:A:71:GLU:CG	0.61	2.25	4	2
1:A:94:VAL:HB	1:A:114:THR:HG21	0.61	1.73	4	4
1:A:108:LEU:CD1	1:A:139:ILE:HG21	0.60	2.22	14	5
1:A:15:ILE:HD13	1:A:73:ILE:CD1	0.60	2.26	3	2
1:A:88:LEU:HD12	1:A:92:PHE:CE1	0.60	2.32	14	1
1:A:51:VAL:O	1:A:55:ILE:HG22	0.60	1.96	5	6
1:A:42:LEU:HD12	1:A:44:CYS:HB2	0.60	1.73	17	6
1:A:112:LEU:O	1:A:115:VAL:HG12	0.60	1.97	8	1
1:A:30:ILE:HG21	1:A:68:GLU:CD	0.59	2.17	8	1
1:A:144:PHE:O	1:A:148:VAL:HG12	0.59	1.97	19	19
1:A:30:ILE:HG22	1:A:66:GLN:N	0.59	2.12	15	1
1:A:126:LYS:O	1:A:130:ILE:HD12	0.59	1.96	17	3
1:A:30:ILE:HG21	1:A:68:GLU:HB3	0.59	1.73	15	4
1:A:131:LEU:HD11	1:A:142:ALA:HB3	0.59	1.75	7	1
1:A:88:LEU:HD23	1:A:144:PHE:CG	0.59	2.33	8	1
1:A:144:PHE:HA	1:A:147:LEU:HD12	0.58	1.75	1	2
1:A:131:LEU:HD12	1:A:133:ILE:CG2	0.58	2.28	2	2
1:A:131:LEU:HD13	1:A:143:THR:CG2	0.58	2.27	15	1
1:A:30:ILE:HD12	1:A:66:GLN:O	0.58	1.98	13	5
1:A:130:ILE:CD1	1:A:150:LEU:HD13	0.58	2.28	4	1
1:A:51:VAL:HG12	1:A:55:ILE:CD1	0.58	2.28	19	1
1:A:91:ALA:CB	1:A:115:VAL:HG22	0.58	2.28	6	8
1:A:131:LEU:HD12	1:A:133:ILE:HG23	0.57	1.76	9	2
1:A:139:ILE:HD13	1:A:144:PHE:CE2	0.57	2.34	20	1
1:A:110:HIS:O	1:A:113:THR:HG22	0.57	1.99	8	2
1:A:88:LEU:HD23	1:A:115:VAL:HG21	0.57	1.74	3	1
1:A:55:ILE:HD11	1:A:71:GLU:HG3	0.57	1.76	4	1
1:A:12:THR:HA	1:A:15:ILE:HD12	0.57	1.75	16	1
1:A:131:LEU:HD23	1:A:146:LYS:CG	0.57	2.29	8	1
1:A:30:ILE:HD11	1:A:65:PHE:CE2	0.57	2.35	9	1
1:A:15:ILE:HG23	1:A:72:LEU:HB2	0.57	1.75	16	3
1:A:65:PHE:CD2	1:A:65:PHE:N	0.57	2.73	7	2
1:A:36:GLY:HA2	1:A:39:ILE:HD12	0.57	1.76	12	3
1:A:131:LEU:HD21	1:A:142:ALA:O	0.56	2.00	7	1
1:A:65:PHE:CD1	1:A:65:PHE:N	0.56	2.72	11	6
1:A:112:LEU:HD23	1:A:119:MET:CB	0.56	2.31	3	3

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:19:PHE:HB2	1:A:72:LEU:HD13	0.56	1.78	7	4
1:A:91:ALA:CB	1:A:115:VAL:HG23	0.56	2.31	1	7
1:A:35:LEU:HD13	1:A:71:GLU:OE1	0.56	2.00	13	1
1:A:131:LEU:CD2	1:A:143:THR:HG23	0.56	2.31	14	1
1:A:15:ILE:HD11	1:A:76:ARG:CD	0.56	2.31	1	1
1:A:39:ILE:HD13	1:A:51:VAL:HG21	0.56	1.78	12	1
1:A:105:ALA:HB2	1:A:135:MET:O	0.55	2.00	12	4
1:A:131:LEU:CD1	1:A:143:THR:HG23	0.55	2.32	6	1
1:A:33:LYS:O	1:A:37:THR:HG23	0.55	2.01	3	1
1:A:65:PHE:N	1:A:65:PHE:CD1	0.55	2.73	12	5
1:A:130:ILE:HG22	1:A:146:LYS:CG	0.55	2.30	12	2
1:A:55:ILE:O	1:A:59:ALA:HB3	0.55	2.01	17	4
1:A:50:GLU:OE1	1:A:51:VAL:HG13	0.55	2.01	13	2
1:A:143:THR:HG22	1:A:147:LEU:HD11	0.55	1.78	18	2
1:A:108:LEU:HD13	1:A:139:ILE:CG1	0.55	2.32	9	1
1:A:92:PHE:CE2	1:A:115:VAL:HG21	0.55	2.36	18	3
1:A:30:ILE:HG22	1:A:66:GLN:HA	0.54	1.79	16	5
1:A:31:ASP:OD2	1:A:64:THR:HG22	0.54	2.01	19	1
1:A:69:GLN:O	1:A:72:LEU:HD12	0.54	2.02	6	2
1:A:130:ILE:HG23	1:A:150:LEU:HD23	0.54	1.78	15	1
1:A:11:ASN:O	1:A:15:ILE:HG23	0.54	2.01	2	1
1:A:127:VAL:CG1	1:A:131:LEU:HD21	0.54	2.33	12	1
1:A:22:TYR:HB3	1:A:37:THR:HG21	0.54	1.80	7	2
1:A:88:LEU:HD11	1:A:112:LEU:HD11	0.54	1.80	20	1
1:A:112:LEU:HD13	1:A:119:MET:HB3	0.54	1.79	1	1
1:A:108:LEU:O	1:A:112:LEU:HD12	0.54	2.03	1	1
1:A:91:ALA:CB	1:A:115:VAL:HG12	0.53	2.29	2	1
1:A:131:LEU:HD11	1:A:142:ALA:CB	0.53	2.33	7	1
1:A:102:LYS:O	1:A:103:ILE:HG23	0.53	2.03	17	13
1:A:15:ILE:HG23	1:A:72:LEU:CB	0.53	2.33	5	2
1:A:108:LEU:HD13	1:A:139:ILE:HG12	0.53	1.79	8	2
1:A:130:ILE:HG22	1:A:146:LYS:HG3	0.53	1.79	4	1
1:A:91:ALA:HB3	1:A:115:VAL:CG2	0.53	2.34	14	3
1:A:38:LEU:HD21	1:A:71:GLU:OE2	0.53	2.04	15	1
1:A:38:LEU:HD12	1:A:39:ILE:HG23	0.52	1.80	14	4
1:A:108:LEU:HD21	1:A:119:MET:CE	0.52	2.34	15	2
1:A:15:ILE:HG21	1:A:76:ARG:HD3	0.52	1.80	3	1
1:A:127:VAL:CG2	1:A:147:LEU:HD22	0.52	2.27	8	1
1:A:108:LEU:O	1:A:112:LEU:HD23	0.52	2.05	18	1
1:A:127:VAL:HG22	1:A:146:LYS:HE2	0.52	1.81	20	1
1:A:51:VAL:HG12	1:A:75:GLU:CD	0.52	2.24	18	1

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:124:VAL:HG22	1:A:128:PHE:CE2	0.52	2.40	2	1
1:A:131:LEU:HD23	1:A:146:LYS:HG2	0.52	1.81	20	3
1:A:103:ILE:HD12	1:A:107:ASP:HB3	0.52	1.82	5	4
1:A:32:VAL:HA	1:A:35:LEU:HD23	0.51	1.81	1	4
1:A:38:LEU:HD22	1:A:72:LEU:HD23	0.51	1.81	6	1
1:A:42:LEU:HD12	1:A:44:CYS:CB	0.51	2.35	4	2
1:A:15:ILE:HG21	1:A:73:ILE:HA	0.51	1.83	9	1
1:A:130:ILE:HG13	1:A:150:LEU:HD11	0.51	1.81	16	1
1:A:146:LYS:O	1:A:150:LEU:HD23	0.51	2.05	1	1
1:A:45:ALA:HB1	1:A:50:GLU:HG3	0.51	1.82	17	3
1:A:18:CYS:HB3	1:A:38:LEU:HD22	0.51	1.82	10	1
1:A:86:ILE:HG23	1:A:144:PHE:CD1	0.51	2.40	1	1
1:A:131:LEU:HD12	1:A:133:ILE:HB	0.51	1.83	4	5
1:A:108:LEU:HD21	1:A:119:MET:SD	0.51	2.46	16	1
1:A:108:LEU:HD23	1:A:109:ALA:N	0.51	2.21	4	8
1:A:32:VAL:HG23	1:A:63:GLU:O	0.50	2.05	5	2
1:A:115:VAL:HG21	1:A:144:PHE:CE2	0.50	2.41	17	1
1:A:131:LEU:HD21	1:A:143:THR:HA	0.50	1.83	6	1
1:A:65:PHE:CZ	1:A:67:ILE:HD12	0.50	2.41	8	1
1:A:15:ILE:HB	1:A:72:LEU:HD12	0.50	1.83	2	1
1:A:112:LEU:HD22	1:A:119:MET:HG3	0.50	1.82	8	1
1:A:128:PHE:HA	1:A:133:ILE:HG22	0.50	1.84	14	1
1:A:108:LEU:O	1:A:112:LEU:HD13	0.50	2.07	20	1
1:A:108:LEU:HD13	1:A:139:ILE:CG2	0.49	2.36	1	1
1:A:124:VAL:HG21	1:A:135:MET:SD	0.49	2.46	4	1
1:A:127:VAL:HG21	1:A:147:LEU:CD2	0.49	2.29	8	1
1:A:131:LEU:HD11	1:A:133:ILE:HB	0.49	1.84	14	1
1:A:86:ILE:HD13	1:A:89:ARG:HD2	0.49	1.84	14	1
1:A:45:ALA:HB1	1:A:46:PRO:HD2	0.49	1.84	20	18
1:A:30:ILE:HG23	1:A:34:GLN:HB3	0.49	1.85	3	2
1:A:112:LEU:C	1:A:112:LEU:HD13	0.49	2.27	11	1
1:A:108:LEU:HG	1:A:139:ILE:HG21	0.49	1.85	5	1
1:A:15:ILE:HD13	1:A:73:ILE:HG22	0.49	1.84	10	1
1:A:30:ILE:HG23	1:A:34:GLN:CB	0.49	2.38	8	2
1:A:30:ILE:HG22	1:A:66:GLN:CA	0.49	2.37	15	2
1:A:108:LEU:CD1	1:A:139:ILE:HD13	0.49	2.37	17	1
1:A:112:LEU:HD13	1:A:119:MET:SD	0.49	2.48	15	3
1:A:131:LEU:HD13	1:A:146:LYS:HG2	0.49	1.84	19	1
1:A:124:VAL:HG21	1:A:135:MET:CB	0.48	2.37	1	3
1:A:30:ILE:HD11	1:A:65:PHE:CZ	0.48	2.43	9	1
1:A:92:PHE:O	1:A:96:ASP:N	0.48	2.46	17	1

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:103:ILE:HD11	1:A:111:ASN:ND2	0.48	2.23	5	1
1:A:131:LEU:HD22	1:A:143:THR:O	0.48	2.08	15	1
1:A:71:GLU:OE1	1:A:72:LEU:HD23	0.48	2.08	20	1
1:A:112:LEU:HD13	1:A:119:MET:CB	0.48	2.38	1	2
1:A:112:LEU:HD22	1:A:119:MET:HB2	0.48	1.86	15	2
1:A:131:LEU:HD11	1:A:143:THR:HA	0.48	1.85	6	1
1:A:127:VAL:CG1	1:A:133:ILE:HD11	0.48	2.38	11	1
1:A:130:ILE:CG1	1:A:150:LEU:HD11	0.48	2.37	16	1
1:A:70:PHE:HA	1:A:73:ILE:HD12	0.48	1.85	18	1
1:A:99:LYS:NZ	1:A:103:ILE:HG21	0.48	2.23	3	1
1:A:103:ILE:HD12	1:A:107:ASP:CB	0.48	2.37	5	1
1:A:30:ILE:HG23	1:A:66:GLN:HA	0.48	1.84	9	1
1:A:127:VAL:HG13	1:A:131:LEU:CD1	0.48	2.27	15	1
1:A:131:LEU:HD12	1:A:133:ILE:HG12	0.47	1.86	9	2
1:A:39:ILE:HG21	1:A:48:GLU:HG2	0.47	1.85	5	1
1:A:108:LEU:HD21	1:A:119:MET:HE1	0.47	1.84	15	2
1:A:88:LEU:HD11	1:A:112:LEU:CD1	0.47	2.39	20	1
1:A:51:VAL:HG12	1:A:75:GLU:OE1	0.47	2.09	18	1
1:A:150:LEU:O	1:A:150:LEU:HD23	0.47	2.10	9	1
1:A:64:THR:C	1:A:65:PHE:CD1	0.47	2.89	15	2
1:A:133:ILE:HD11	1:A:138:ASP:O	0.47	2.10	14	1
1:A:45:ALA:CB	1:A:46:PRO:CD	0.47	2.92	18	1
1:A:88:LEU:CD1	1:A:147:LEU:HD22	0.46	2.31	3	1
1:A:150:LEU:HD13	1:A:150:LEU:O	0.46	2.11	5	2
1:A:126:LYS:HB2	1:A:150:LEU:HD13	0.46	1.88	16	1
1:A:35:LEU:HD23	1:A:68:GLU:CG	0.46	2.41	3	1
1:A:38:LEU:H	1:A:38:LEU:HD22	0.46	1.70	11	1
1:A:131:LEU:HD21	1:A:133:ILE:HB	0.46	1.87	14	1
1:A:86:ILE:HD13	1:A:89:ARG:CD	0.46	2.41	14	1
1:A:133:ILE:HD11	1:A:137:SER:CB	0.46	2.41	2	3
1:A:60:ILE:HD12	1:A:61:GLU:N	0.46	2.26	19	3
1:A:35:LEU:HD13	1:A:71:GLU:HG3	0.46	1.86	1	1
1:A:103:ILE:HD11	1:A:111:ASN:HD21	0.46	1.70	5	1
1:A:29:LYS:C	1:A:30:ILE:HD13	0.46	2.31	10	2
1:A:35:LEU:HD13	1:A:71:GLU:HG2	0.46	1.88	12	2
1:A:131:LEU:HD12	1:A:133:ILE:CG1	0.46	2.41	12	1
1:A:131:LEU:HD12	1:A:133:ILE:HG13	0.46	1.87	12	1
1:A:38:LEU:CD2	1:A:72:LEU:HD23	0.46	2.40	3	1
1:A:42:LEU:N	1:A:42:LEU:HD22	0.46	2.25	20	1
1:A:131:LEU:HD21	1:A:142:ALA:CB	0.45	2.28	8	1
1:A:64:THR:C	1:A:65:PHE:CD2	0.45	2.90	16	3

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:15:ILE:HG21	1:A:76:ARG:CD	0.45	2.41	3	1
1:A:139:ILE:HD13	1:A:144:PHE:CD1	0.45	2.46	4	1
1:A:35:LEU:HD13	1:A:71:GLU:CD	0.45	2.32	11	1
1:A:108:LEU:HD12	1:A:139:ILE:HG21	0.45	1.88	15	1
1:A:88:LEU:HD12	1:A:92:PHE:CE2	0.45	2.45	15	1
1:A:139:ILE:HA	1:A:143:THR:HG21	0.45	1.88	19	1
1:A:88:LEU:HD22	1:A:92:PHE:HE2	0.45	1.72	2	1
1:A:108:LEU:CD2	1:A:112:LEU:HD13	0.45	2.41	5	1
1:A:45:ALA:HB1	1:A:50:GLU:CG	0.45	2.41	17	3
1:A:124:VAL:HA	1:A:127:VAL:HG22	0.45	1.88	6	1
1:A:133:ILE:HD11	1:A:137:SER:OG	0.45	2.11	18	1
1:A:127:VAL:HG12	1:A:131:LEU:HD21	0.45	1.88	12	1
1:A:44:CYS:SG	1:A:51:VAL:HG13	0.45	2.52	18	1
1:A:113:THR:HG23	1:A:117:ASP:O	0.45	2.12	3	1
1:A:58:PHE:O	1:A:59:ALA:HB2	0.45	2.12	3	1
1:A:55:ILE:HD11	1:A:67:ILE:CD1	0.45	2.42	5	1
1:A:39:ILE:HD13	1:A:48:GLU:CB	0.44	2.42	4	1
1:A:150:LEU:O	1:A:150:LEU:HD13	0.44	2.12	15	1
1:A:65:PHE:CD2	1:A:67:ILE:HG22	0.44	2.47	9	1
1:A:23:ASP:OD1	1:A:30:ILE:HD12	0.44	2.12	12	1
1:A:111:ASN:O	1:A:114:THR:HG22	0.44	2.12	6	1
1:A:38:LEU:CD2	1:A:72:LEU:HD22	0.44	2.42	2	1
1:A:131:LEU:HD12	1:A:133:ILE:CB	0.44	2.43	12	2
1:A:133:ILE:HD12	1:A:137:SER:HB3	0.43	1.90	6	1
1:A:86:ILE:HG23	1:A:144:PHE:CE1	0.43	2.48	1	2
1:A:108:LEU:CD2	1:A:139:ILE:HG21	0.43	2.29	9	2
1:A:41:SER:C	1:A:42:LEU:HD13	0.43	2.33	20	1
1:A:108:LEU:CD1	1:A:112:LEU:HD22	0.43	2.43	5	1
1:A:38:LEU:HD22	1:A:72:LEU:CD2	0.43	2.43	6	1
1:A:127:VAL:O	1:A:131:LEU:HD12	0.43	2.14	6	1
1:A:51:VAL:HG21	1:A:71:GLU:HG3	0.43	1.89	2	1
1:A:88:LEU:HD13	1:A:144:PHE:CE2	0.43	2.48	17	1
1:A:108:LEU:HD13	1:A:139:ILE:CD1	0.43	2.43	9	1
1:A:61:GLU:HG3	1:A:67:ILE:HD11	0.43	1.89	15	1
1:A:55:ILE:HD11	1:A:71:GLU:CB	0.42	2.44	16	1
1:A:92:PHE:CE2	1:A:115:VAL:HG11	0.42	2.49	2	1
1:A:112:LEU:HD22	1:A:119:MET:HG2	0.42	1.90	14	1
1:A:35:LEU:O	1:A:35:LEU:HD12	0.42	2.15	14	1
1:A:108:LEU:HD21	1:A:119:MET:HE3	0.42	1.91	12	1
1:A:126:LYS:HD3	1:A:150:LEU:HD22	0.42	1.91	9	1
1:A:130:ILE:HD12	1:A:147:LEU:HA	0.42	1.92	15	1

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:39:ILE:HD13	1:A:48:GLU:HB3	0.42	1.92	4	1
1:A:22:TYR:CE1	1:A:38:LEU:HD21	0.42	2.48	11	1
1:A:51:VAL:HG22	1:A:55:ILE:HD13	0.42	1.91	15	1
1:A:91:ALA:HB1	1:A:115:VAL:HA	0.42	1.91	1	1
1:A:30:ILE:HD12	1:A:30:ILE:C	0.42	2.35	9	1
1:A:112:LEU:HD13	1:A:119:MET:HB2	0.42	1.91	10	1
1:A:126:LYS:HD3	1:A:150:LEU:HD12	0.42	1.91	14	1
1:A:88:LEU:HD13	1:A:144:PHE:CG	0.42	2.50	4	1
1:A:108:LEU:C	1:A:108:LEU:HD13	0.41	2.35	5	1
1:A:130:ILE:HG22	1:A:146:LYS:CD	0.41	2.45	5	1
1:A:108:LEU:HG	1:A:112:LEU:HD13	0.41	1.91	17	3
1:A:88:LEU:CD2	1:A:147:LEU:HD23	0.41	2.44	5	1
1:A:111:ASN:O	1:A:115:VAL:HG23	0.41	2.15	6	1
1:A:112:LEU:HD12	1:A:118:LYS:CA	0.41	2.45	7	1
1:A:139:ILE:HD13	1:A:144:PHE:CE1	0.41	2.50	4	1
1:A:131:LEU:HD22	1:A:143:THR:HG23	0.41	1.93	14	1
1:A:98:ASP:O	1:A:99:LYS:C	0.41	2.59	13	3
1:A:15:ILE:HD12	1:A:16:ARG:N	0.41	2.30	4	1
1:A:131:LEU:HD23	1:A:146:LYS:HB2	0.41	1.93	15	1
1:A:35:LEU:C	1:A:35:LEU:HD12	0.41	2.36	11	1
1:A:39:ILE:HG12	1:A:51:VAL:HG11	0.41	1.93	12	1
1:A:99:LYS:HZ2	1:A:103:ILE:HG21	0.41	1.76	3	1
1:A:92:PHE:CZ	1:A:103:ILE:HD12	0.41	2.51	13	1
1:A:112:LEU:HD22	1:A:119:MET:CE	0.41	2.46	14	1
1:A:147:LEU:HD23	1:A:148:VAL:N	0.41	2.31	19	1
1:A:45:ALA:HB1	1:A:50:GLU:HG2	0.41	1.91	20	1
1:A:35:LEU:HD12	1:A:35:LEU:C	0.41	2.36	5	1
1:A:112:LEU:HD22	1:A:115:VAL:HB	0.41	1.93	11	1
1:A:59:ALA:O	1:A:60:ILE:HD12	0.40	2.16	5	1
1:A:112:LEU:HD22	1:A:112:LEU:O	0.40	2.16	11	1
1:A:55:ILE:HG23	1:A:56:LYS:N	0.40	2.31	10	1
1:A:112:LEU:HD13	1:A:119:MET:CG	0.40	2.46	16	1
1:A:126:LYS:HD3	1:A:150:LEU:HD21	0.40	1.93	4	1

6.3 Torsion angles ⓘ

6.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. The Analysed column shows the number of residues for which the backbone conformation

was analysed and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	135/156 (87%)	116±2 (86±2%)	16±3 (12±2%)	4±1 (3±1%)	9	43
All	All	2700/3120 (87%)	2311 (86%)	311 (12%)	78 (3%)	9	43

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	59	ALA	18
1	A	66	GLN	17
1	A	65	PHE	16
1	A	60	ILE	7
1	A	44	CYS	6
1	A	103	ILE	5
1	A	118	LYS	4
1	A	62	GLY	3
1	A	61	GLU	1
1	A	46	PRO	1

6.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all NMR entries. The Analysed column shows the number of residues for which the sidechain conformation was analysed and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	120/140 (86%)	80±5 (67±4%)	40±5 (33±4%)	1	12
All	All	2400/2800 (86%)	1600 (67%)	800 (33%)	1	12

All 103 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	100	ASP	20
1	A	120	THR	20
1	A	98	ASP	19
1	A	21	PHE	19
1	A	65	PHE	19
1	A	42	LEU	19
1	A	33	LYS	18

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Models (Total)
1	A	29	LYS	18
1	A	47	THR	17
1	A	131	LEU	15
1	A	134	THR	14
1	A	99	LYS	14
1	A	63	GLU	13
1	A	137	SER	13
1	A	103	ILE	12
1	A	95	PHE	12
1	A	114	THR	12
1	A	150	LEU	12
1	A	118	LYS	12
1	A	97	GLN	12
1	A	90	LYS	11
1	A	112	LEU	11
1	A	121	LYS	11
1	A	54	TYR	10
1	A	108	LEU	10
1	A	68	GLU	10
1	A	26	TYR	10
1	A	145	LEU	10
1	A	126	LYS	10
1	A	102	LYS	10
1	A	129	SER	10
1	A	125	GLU	10
1	A	17	ASP	10
1	A	107	ASP	10
1	A	23	ASP	9
1	A	70	PHE	9
1	A	44	CYS	9
1	A	138	ASP	9
1	A	141	LEU	9
1	A	113	THR	9
1	A	58	PHE	9
1	A	16	ARG	9
1	A	87	LYS	8
1	A	128	PHE	8
1	A	104	LYS	8
1	A	110	HIS	8
1	A	146	LYS	8
1	A	38	LEU	8
1	A	96	ASP	8

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Models (Total)
1	A	106	SER	8
1	A	74	MET	8
1	A	76	ARG	7
1	A	119	MET	7
1	A	89	ARG	7
1	A	75	GLU	7
1	A	60	ILE	7
1	A	123	GLU	6
1	A	79	SER	6
1	A	20	ASN	6
1	A	49	ASP	6
1	A	31	ASP	6
1	A	135	MET	6
1	A	72	LEU	6
1	A	93	GLU	6
1	A	53	SER	5
1	A	78	GLN	5
1	A	140	ASP	5
1	A	88	LEU	5
1	A	56	LYS	5
1	A	55	ILE	5
1	A	64	THR	5
1	A	144	PHE	5
1	A	24	ARG	5
1	A	14	LYS	4
1	A	35	LEU	4
1	A	111	ASN	4
1	A	48	GLU	4
1	A	115	VAL	4
1	A	40	ARG	4
1	A	77	GLU	3
1	A	50	GLU	3
1	A	147	LEU	3
1	A	133	ILE	3
1	A	30	ILE	3
1	A	66	GLN	3
1	A	117	ASP	3
1	A	34	GLN	3
1	A	71	GLU	3
1	A	69	GLN	3
1	A	15	ILE	2
1	A	57	GLU	2

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Models (Total)
1	A	136	GLU	2
1	A	11	ASN	2
1	A	139	ILE	2
1	A	41	SER	2
1	A	67	ILE	2
1	A	130	ILE	1
1	A	25	ASP	1
1	A	61	GLU	1
1	A	19	PHE	1
1	A	92	PHE	1
1	A	13	GLN	1
1	A	12	THR	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 carbohydrates in this entry.

6.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

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 52% for the well-defined parts and 50% for the entire structure.

7.1 Chemical shift list 1

File name: 5b7x_cs.cif

Chemical shift list name: *assigned_chem_shift_list_1*

7.1.1 Bookkeeping

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

Total number of shifts	1063
Number of shifts mapped to atoms	1063
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	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
$^{13}\text{C}_\alpha$	143	-0.22 ± 0.08	None needed (< 0.5 ppm)
$^{13}\text{C}_\beta$	133	0.38 ± 0.17	None needed (< 0.5 ppm)
$^{13}\text{C}'$	0	—	None (insufficient data)
^{15}N	144	0.70 ± 0.18	Should be applied

7.1.3 Completeness of resonance assignments

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 52%, i.e. 884 atoms were assigned a chemical shift out of a possible 1688. 1 out of 19 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^1H	^{13}C	^{15}N
Backbone	511/673 (76%)	248/269 (92%)	131/270 (49%)	132/134 (99%)
Sidechain	365/903 (40%)	223/523 (43%)	142/342 (42%)	0/38 (0%)

Continued on next page...

Continued from previous page...

	Total	¹ H	¹³ C	¹⁵ N
Aromatic	8/112 (7%)	8/61 (13%)	0/50 (0%)	0/1 (0%)
Overall	884/1688 (52%)	479/853 (56%)	273/662 (41%)	132/173 (76%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 50%, i.e. 974 atoms were assigned a chemical shift out of a possible 1964. 1 out of 19 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	¹ H	¹³ C	¹⁵ N
Backbone	559/774 (72%)	272/309 (88%)	143/312 (46%)	144/153 (94%)
Sidechain	407/1036 (39%)	252/604 (42%)	155/389 (40%)	0/43 (0%)
Aromatic	8/154 (5%)	8/85 (9%)	0/62 (0%)	0/7 (0%)
Overall	974/1964 (50%)	532/998 (53%)	298/763 (39%)	144/203 (71%)

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.

Mol	Chain	Res	Type	Atom	Shift, ppm	Expected range, ppm	Z-score
1	A	135	MET	CG	38.65	38.33 – 25.73	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.

Random coil index (RCI) for chain A:

