Full wwPDB NMR Structure Validation Report (i)

Jun 22, 2024 – 01:39 PM EDT

PDB ID	:	6O22
BMRB ID	:	30576
Title	:	Structure of Asf1-H3:H4-Rtt109-Vps75 histone chaperone-lysine acetyltransferase complex with the histone substrate.
Authors	:	Danilenko, N.; Carlomagno, T.; Kirkpatrick, J.P.
Deposited on	:	2019-02-22

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
https://www.wwpdb.org/validation/2017/NMRValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

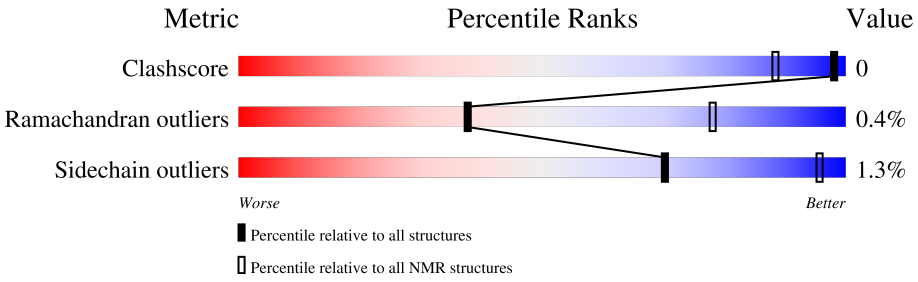
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
SOLUTION NMR, SOLUTION SCATTERING

The overall completeness of chemical shifts assignment is 2%.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



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

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

Mol	Chain	Length	Quality of chain
1	A	264	68% 17% • 13%
1	B	264	62% 17% • 18%
2	C	442	74% 20% • •
3	D	279	46% 11% • 41%
4	E	136	44% 9% • 45%
5	F	103	58% 17% • • 20%

2 Ensemble composition and analysis (i)

This entry contains 1 models. Identification of well-defined residues and clustering analysis are not possible.

3 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 19411 atoms, of which 9680 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Vacuolar protein sorting-associated protein 75.

Mol	Chain	Residues	Atoms						Trace
1	A	230	Total	C	H	N	O	S	0
			3733	1221	1825	309	372	6	
1	B	217	Total	C	H	N	O	S	0
			3562	1168	1752	294	343	5	

- Molecule 2 is a protein called Histone acetyltransferase RTT109.

Mol	Chain	Residues	Atoms						Trace
2	C	424	Total	C	H	N	O	S	0
			6917	2205	3480	585	637	10	

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-5	GLY	-	expression tag	UNP Q07794
C	-4	MET	-	expression tag	UNP Q07794
C	-3	ASP	-	expression tag	UNP Q07794
C	-2	PRO	-	expression tag	UNP Q07794
C	-1	ASN	-	expression tag	UNP Q07794
C	0	SER	-	expression tag	UNP Q07794

- Molecule 3 is a protein called Histone chaperone ASF1.

Mol	Chain	Residues	Atoms						Trace
3	D	164	Total	C	H	N	O	S	0
			2592	840	1280	212	258	2	

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	1	SER	-	expression tag	UNP P32447

- Molecule 4 is a protein called Histone H3.2.

Mol	Chain	Residues	Atoms						Trace
4	E	75	Total	C	H	N	O	S	0
			1243	384	636	114	106	3	

- Molecule 5 is a protein called Histone H4.

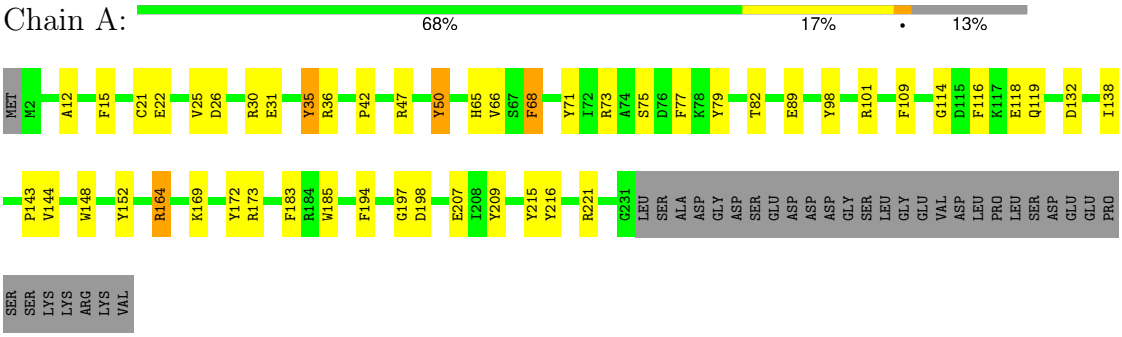
Mol	Chain	Residues	Atoms						Trace
5	F	82	Total	C	H	N	O	S	0
			1364	416	707	128	112	1	

4 Residue-property plots (i)

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.

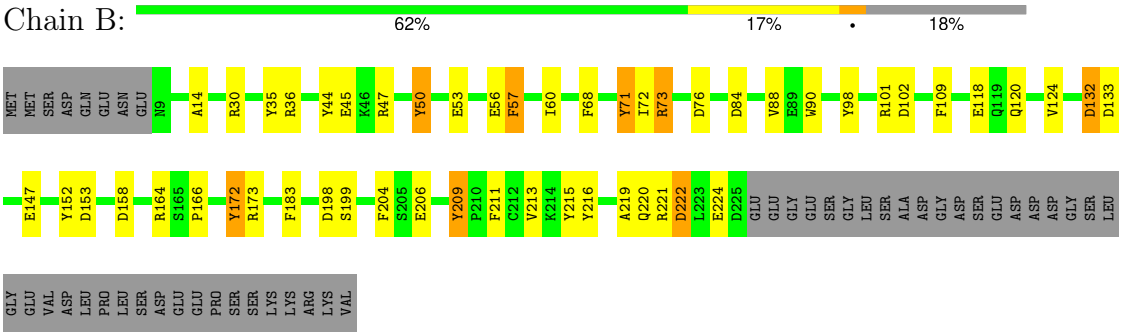
• Molecule 1: Vacuolar protein sorting-associated protein 75

Chain A:



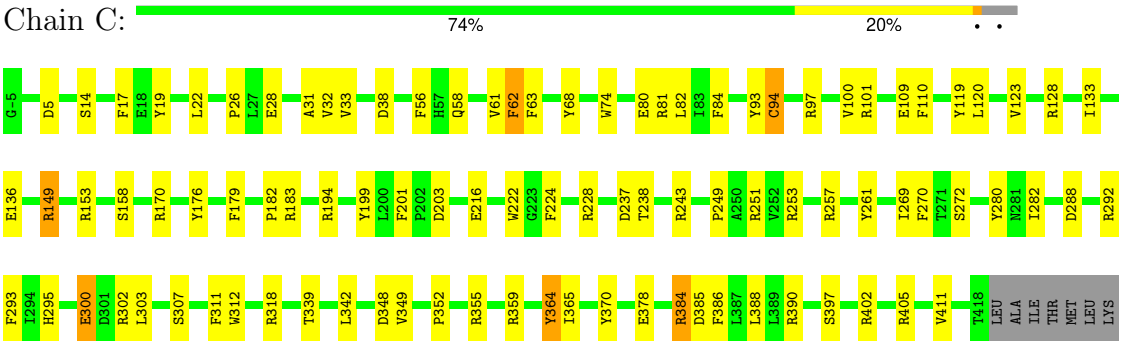
• Molecule 1: Vacuolar protein sorting-associated protein 75

Chain B:



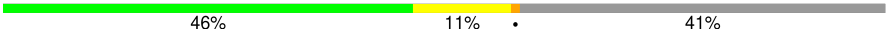
• Molecule 2: Histone acetyltransferase RTT109

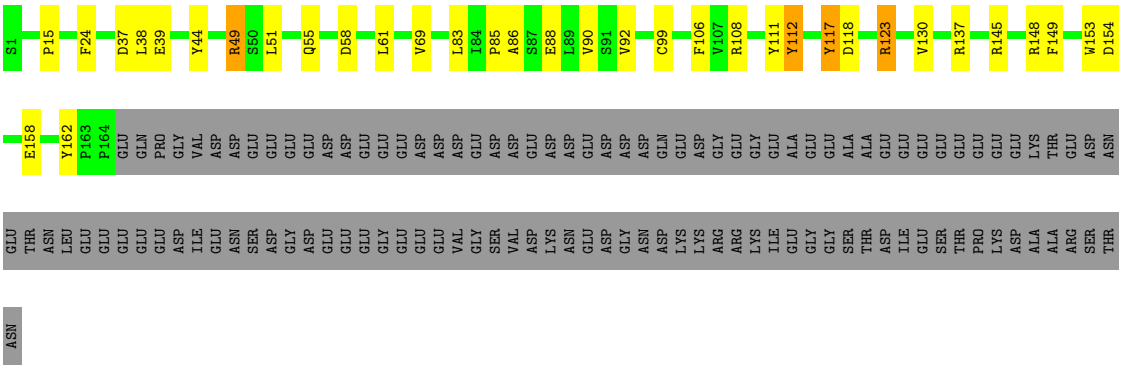
Chain C:



• Molecule 3: Histone chaperone ASF1

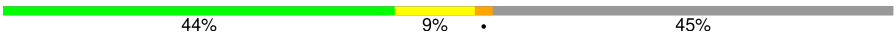
Chain D:

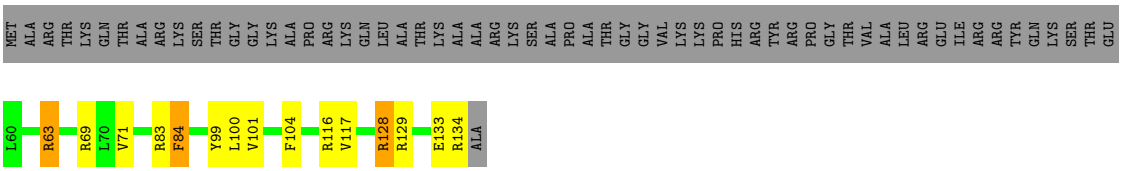




• Molecule 4: Histone H3.2

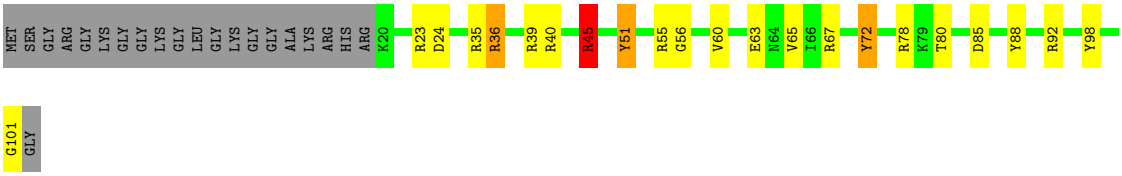
Chain E:





• Molecule 5: Histone H4

Chain F:



5 Refinement protocol and experimental data overview

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

Of the 150 calculated structures, 1 were deposited, based on the following criterion: *structures with the least restraint violations*.

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

Software name	Classification	Version
HADDOCK	structure calculation	
Amber	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)	working_cs.cif
Number of chemical shift lists	1
Total number of shifts	368
Number of shifts mapped to atoms	368
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	2%

6 Model quality (i)

6.1 Standard geometry (i)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the (average) root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#Z>5	RMSZ	#Z>5
1	A	1.59	12/1956 (0.6%)	2.04	59/2633 (2.2%)
1	B	1.57	10/1858 (0.5%)	2.00	58/2503 (2.3%)
2	C	1.53	13/3515 (0.4%)	2.05	107/4758 (2.2%)
3	D	1.60	8/1344 (0.6%)	1.92	35/1835 (1.9%)
4	E	1.55	2/614 (0.3%)	2.14	19/823 (2.3%)
5	F	1.58	3/664 (0.5%)	2.21	29/889 (3.3%)
All	All	1.56	48/9951 (0.5%)	2.04	307/13441 (2.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	Chirality	Planarity
1	A	0	4
1	B	0	8
2	C	0	9
3	D	0	4
4	E	0	3
5	F	0	4
All	All	0	32

All bond outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	71	TYR	CE1-CZ	8.79	1.50	1.38
1	A	42	PRO	N-CD	-7.59	1.37	1.47
2	C	68	TYR	CG-CD1	7.31	1.48	1.39
2	C	253	ARG	CZ-NH1	-7.06	1.23	1.33
3	D	15	PRO	N-CD	-6.96	1.38	1.47
1	B	215	TYR	CE1-CZ	6.69	1.47	1.38
3	D	158	GLU	CG-CD	6.67	1.61	1.51
1	B	101	ARG	CZ-NH2	-6.53	1.24	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	261	TYR	CE2-CZ	6.43	1.47	1.38
4	E	129	ARG	CZ-NH2	-6.27	1.24	1.33
1	B	98	TYR	CE1-CZ	6.26	1.46	1.38
3	D	117	TYR	CE2-CZ	6.21	1.46	1.38
5	F	101	GLY	N-CA	6.12	1.55	1.46
1	A	68	PHE	CG-CD2	6.10	1.47	1.38
2	C	390	ARG	CZ-NH1	-6.04	1.25	1.33
1	B	199	SER	CB-OG	-6.03	1.34	1.42
5	F	88	TYR	CE1-CZ	5.93	1.46	1.38
3	D	130	VAL	N-CA	5.92	1.58	1.46
3	D	158	GLU	CD-OE1	-5.89	1.19	1.25
2	C	183	ARG	CZ-NH2	-5.73	1.25	1.33
4	E	129	ARG	CZ-NH1	-5.70	1.25	1.33
2	C	397	SER	CB-OG	5.70	1.49	1.42
2	C	80	GLU	CG-CD	5.67	1.60	1.51
1	B	215	TYR	CG-CD2	5.67	1.46	1.39
3	D	123	ARG	CZ-NH2	-5.65	1.25	1.33
2	C	272	SER	CA-CB	5.64	1.61	1.52
1	A	118	GLU	N-CA	5.64	1.57	1.46
2	C	128	ARG	NE-CZ	-5.63	1.25	1.33
2	C	109	GLU	CG-CD	5.62	1.60	1.51
3	D	88	GLU	CG-CD	5.61	1.60	1.51
1	B	118	GLU	CG-CD	5.60	1.60	1.51
1	A	207	GLU	CG-CD	5.58	1.60	1.51
1	A	183	PHE	CG-CD2	5.54	1.47	1.38
2	C	224	PHE	CG-CD2	5.40	1.46	1.38
3	D	137	ARG	CD-NE	5.30	1.55	1.46
1	A	22	GLU	CD-OE1	5.26	1.31	1.25
1	B	224	GLU	CG-CD	5.25	1.59	1.51
1	A	79	TYR	CE2-CZ	5.20	1.45	1.38
2	C	62	PHE	CG-CD2	5.20	1.46	1.38
1	A	36	ARG	CZ-NH2	-5.20	1.26	1.33
1	A	21	CYS	CB-SG	-5.20	1.73	1.81
5	F	56	GLY	CA-C	5.19	1.60	1.51
1	B	90	TRP	CD2-CE2	5.18	1.47	1.41
1	B	209	TYR	CD2-CE2	5.17	1.47	1.39
2	C	84	PHE	CG-CD2	5.14	1.46	1.38
1	A	31	GLU	CD-OE1	-5.13	1.20	1.25
1	A	143	PRO	N-CD	-5.11	1.40	1.47
1	B	71	TYR	CG-CD1	5.07	1.45	1.39

All angle outliers are listed below. They are sorted according to the Z-score.

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	E	63	ARG	NE-CZ-NH1	17.31	128.95	120.30
1	A	164	ARG	NE-CZ-NH2	16.23	128.42	120.30
1	B	209	TYR	CB-CG-CD1	-15.18	111.89	121.00
2	C	355	ARG	NE-CZ-NH2	-14.90	112.85	120.30
2	C	97	ARG	NE-CZ-NH2	14.89	127.75	120.30
1	A	221	ARG	NE-CZ-NH1	14.77	127.68	120.30
2	C	128	ARG	NE-CZ-NH1	14.69	127.65	120.30
2	C	359	ARG	NE-CZ-NH2	-14.68	112.96	120.30
5	F	45	ARG	NE-CZ-NH2	-14.00	113.30	120.30
2	C	292	ARG	NE-CZ-NH2	-13.39	113.61	120.30
2	C	253	ARG	NE-CZ-NH1	13.37	126.98	120.30
1	A	77	PHE	CB-CG-CD2	-13.17	111.58	120.80
1	B	73	ARG	NE-CZ-NH1	12.98	126.79	120.30
2	C	292	ARG	NE-CZ-NH1	12.87	126.73	120.30
5	F	39	ARG	NE-CZ-NH2	12.81	126.71	120.30
1	A	101	ARG	NE-CZ-NH1	12.73	126.66	120.30
2	C	110	PHE	CB-CG-CD2	-12.45	112.09	120.80
2	C	302	ARG	NE-CZ-NH1	12.12	126.36	120.30
4	E	99	TYR	CB-CG-CD2	-12.11	113.73	121.00
4	E	134	ARG	NE-CZ-NH2	-12.01	114.29	120.30
1	A	73	ARG	NE-CZ-NH1	11.98	126.29	120.30
5	F	40	ARG	NE-CZ-NH1	11.93	126.27	120.30
2	C	280	TYR	CB-CG-CD1	-11.58	114.05	121.00
4	E	128	ARG	NE-CZ-NH1	11.56	126.08	120.30
2	C	251	ARG	NE-CZ-NH1	11.38	125.99	120.30
2	C	153	ARG	NE-CZ-NH2	-11.24	114.68	120.30
2	C	228	ARG	NE-CZ-NH2	11.07	125.84	120.30
2	C	384	ARG	NE-CZ-NH2	-11.03	114.78	120.30
1	A	77	PHE	CB-CG-CD1	10.98	128.49	120.80
3	D	58	ASP	CB-CG-OD2	10.86	128.07	118.30
2	C	402	ARG	NE-CZ-NH1	10.75	125.67	120.30
2	C	110	PHE	CB-CG-CD1	10.50	128.15	120.80
2	C	38	ASP	CB-CG-OD1	10.14	127.42	118.30
5	F	72	TYR	CB-CG-CD1	-10.02	114.99	121.00
5	F	88	TYR	CB-CG-CD2	-10.01	115.00	121.00
5	F	24	ASP	CB-CG-OD2	9.93	127.24	118.30
1	B	216	TYR	CB-CG-CD1	9.91	126.95	121.00
5	F	88	TYR	CB-CG-CD1	9.55	126.73	121.00
1	B	132	ASP	CB-CG-OD2	-9.52	109.73	118.30
1	B	153	ASP	CB-CG-OD2	9.46	126.81	118.30
2	C	56	PHE	CB-CG-CD1	-9.44	114.19	120.80
3	D	137	ARG	NE-CZ-NH2	-9.44	115.58	120.30
1	A	35	TYR	CB-CG-CD1	-9.41	115.36	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	364	TYR	CB-CG-CD2	-9.39	115.36	121.00
1	A	26	ASP	CB-CG-OD2	9.35	126.72	118.30
2	C	270	PHE	CB-CG-CD1	-9.35	114.26	120.80
5	F	39	ARG	NH1-CZ-NH2	-9.22	109.25	119.40
1	A	89	GLU	OE1-CD-OE2	-9.20	112.26	123.30
1	B	216	TYR	CB-CG-CD2	-9.13	115.52	121.00
4	E	63	ARG	NE-CZ-NH2	-9.00	115.80	120.30
2	C	153	ARG	NE-CZ-NH1	8.95	124.78	120.30
2	C	243	ARG	NE-CZ-NH2	-8.82	115.89	120.30
2	C	390	ARG	NE-CZ-NH1	8.74	124.67	120.30
1	B	132	ASP	CB-CG-OD1	8.68	126.11	118.30
2	C	68	TYR	CB-CG-CD2	-8.64	115.82	121.00
1	A	185	TRP	NE1-CE2-CD2	-8.64	98.66	107.30
5	F	92	ARG	NE-CZ-NH1	8.63	124.62	120.30
1	A	216	TYR	CB-CG-CD2	-8.61	115.83	121.00
4	E	83	ARG	NE-CZ-NH1	8.56	124.58	120.30
1	A	101	ARG	NH1-CZ-NH2	-8.54	110.00	119.40
1	B	209	TYR	CG-CD2-CE2	-8.54	114.47	121.30
1	B	221	ARG	NE-CZ-NH1	8.42	124.51	120.30
1	A	73	ARG	NE-CZ-NH2	-8.42	116.09	120.30
2	C	359	ARG	NE-CZ-NH1	8.38	124.49	120.30
1	A	164	ARG	NE-CZ-NH1	-8.35	116.12	120.30
5	F	23	ARG	NE-CZ-NH1	8.34	124.47	120.30
3	D	24	PHE	CB-CG-CD2	-8.34	114.96	120.80
1	A	215	TYR	CB-CG-CD2	-8.33	116.00	121.00
2	C	17	PHE	CB-CG-CD1	-8.30	114.99	120.80
1	B	222	ASP	CB-CG-OD2	8.29	125.76	118.30
1	A	71	TYR	CB-CG-CD2	-8.24	116.06	121.00
3	D	162	TYR	CB-CG-CD1	8.16	125.89	121.00
5	F	36	ARG	NE-CZ-NH2	-8.15	116.23	120.30
1	A	144	VAL	CG1-CB-CG2	-8.12	97.91	110.90
1	A	185	TRP	CD1-NE1-CE2	8.10	116.29	109.00
1	A	209	TYR	CZ-CE2-CD2	8.03	127.03	119.80
5	F	55	ARG	NE-CZ-NH1	7.96	124.28	120.30
1	A	209	TYR	CG-CD2-CE2	-7.94	114.95	121.30
3	D	49	ARG	NE-CZ-NH1	7.93	124.27	120.30
1	B	57	PHE	CB-CG-CD1	-7.91	115.26	120.80
2	C	56	PHE	CB-CG-CD2	7.75	126.23	120.80
5	F	72	TYR	CG-CD2-CE2	-7.69	115.15	121.30
1	A	47	ARG	NE-CZ-NH2	-7.68	116.46	120.30
1	B	47	ARG	NE-CZ-NH2	-7.62	116.49	120.30
1	A	221	ARG	NE-CZ-NH2	-7.58	116.51	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	124	VAL	CG1-CB-CG2	-7.57	98.78	110.90
1	B	153	ASP	CB-CG-OD1	-7.53	111.52	118.30
1	A	15	PHE	CB-CG-CD1	-7.53	115.53	120.80
1	A	47	ARG	NE-CZ-NH1	7.53	124.06	120.30
1	A	173	ARG	NE-CZ-NH2	7.48	124.04	120.30
2	C	32	VAL	CA-CB-CG1	7.46	122.09	110.90
5	F	39	ARG	NE-CZ-NH1	7.46	124.03	120.30
3	D	145	ARG	CD-NE-CZ	7.45	134.02	123.60
5	F	65	VAL	CG1-CB-CG2	-7.43	99.00	110.90
2	C	384	ARG	NE-CZ-NH1	7.43	124.01	120.30
4	E	117	VAL	CA-CB-CG2	7.42	122.03	110.90
2	C	216	GLU	OE1-CD-OE2	-7.36	114.47	123.30
1	B	209	TYR	CD1-CG-CD2	7.34	125.98	117.90
3	D	162	TYR	CB-CG-CD2	-7.34	116.60	121.00
1	B	183	PHE	CB-CG-CD2	7.32	125.92	120.80
2	C	405	ARG	NE-CZ-NH2	7.31	123.95	120.30
1	B	36	ARG	NE-CZ-NH1	7.28	123.94	120.30
2	C	238	THR	CA-CB-CG2	7.25	122.56	112.40
5	F	60	VAL	CG1-CB-CG2	-7.25	99.30	110.90
2	C	68	TYR	CG-CD2-CE2	-7.20	115.54	121.30
1	B	53	GLU	OE1-CD-OE2	7.19	131.93	123.30
5	F	40	ARG	CD-NE-CZ	7.15	133.61	123.60
1	A	35	TYR	CG-CD2-CE2	-7.14	115.59	121.30
2	C	199	TYR	CB-CG-CD2	-7.11	116.73	121.00
1	B	50	TYR	CB-CG-CD1	-7.08	116.75	121.00
2	C	149	ARG	NE-CZ-NH1	7.08	123.84	120.30
1	A	98	TYR	CB-CG-CD2	-7.06	116.76	121.00
2	C	280	TYR	CG-CD2-CE2	-7.05	115.66	121.30
2	C	355	ARG	NH1-CZ-NH2	7.03	127.13	119.40
1	B	98	TYR	CB-CG-CD2	7.00	125.20	121.00
2	C	58	GLN	CA-CB-CG	6.98	128.76	113.40
3	D	130	VAL	CG1-CB-CG2	-6.98	99.73	110.90
1	B	102	ASP	CB-CG-OD2	6.97	124.58	118.30
3	D	123	ARG	NE-CZ-NH2	-6.97	116.81	120.30
1	A	50	TYR	CB-CG-CD1	-6.96	116.82	121.00
1	B	109	PHE	CB-CG-CD2	-6.90	115.97	120.80
1	A	198	ASP	CB-CG-OD2	6.85	124.46	118.30
1	A	132	ASP	CB-CG-OD2	6.83	124.45	118.30
1	A	71	TYR	CG-CD1-CE1	-6.82	115.84	121.30
1	A	66	VAL	CA-CB-CG2	6.81	121.12	110.90
1	A	173	ARG	NH1-CZ-NH2	-6.81	111.91	119.40
4	E	69	ARG	CD-NE-CZ	6.79	133.10	123.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	98	TYR	CB-CG-CD1	-6.77	116.94	121.00
2	C	411	VAL	CA-CB-CG1	6.72	120.98	110.90
2	C	97	ARG	CD-NE-CZ	6.67	132.93	123.60
2	C	288	ASP	CB-CG-OD2	6.65	124.28	118.30
1	B	221	ARG	CD-NE-CZ	6.63	132.88	123.60
3	D	24	PHE	CG-CD1-CE1	-6.60	113.54	120.80
1	B	44	TYR	CA-CB-CG	6.59	125.93	113.40
1	B	206	GLU	OE1-CD-OE2	-6.59	115.39	123.30
4	E	134	ARG	NE-CZ-NH1	6.55	123.58	120.30
1	B	47	ARG	NE-CZ-NH1	6.55	123.57	120.30
2	C	38	ASP	CB-CG-OD2	-6.53	112.42	118.30
2	C	101	ARG	NE-CZ-NH2	-6.50	117.05	120.30
2	C	352	PRO	N-CA-CB	6.50	111.10	103.30
5	F	35	ARG	NE-CZ-NH2	-6.48	117.06	120.30
1	B	172	TYR	CB-CG-CD1	-6.47	117.12	121.00
5	F	78	ARG	NE-CZ-NH1	6.46	123.53	120.30
4	E	129	ARG	NE-CZ-NH1	-6.37	117.12	120.30
1	A	148	TRP	CE2-CD2-CG	6.36	112.39	107.30
2	C	33	VAL	CG1-CB-CG2	-6.36	100.72	110.90
3	D	148	ARG	NE-CZ-NH2	-6.35	117.12	120.30
1	A	185	TRP	CE2-CD2-CG	6.33	112.36	107.30
1	B	133	ASP	CB-CG-OD2	6.32	123.99	118.30
1	A	35	TYR	CD1-CG-CD2	6.31	124.84	117.90
1	A	148	TRP	NE1-CE2-CD2	-6.29	101.01	107.30
3	D	69	VAL	CA-CB-CG1	6.29	120.33	110.90
4	E	69	ARG	NE-CZ-NH1	6.27	123.44	120.30
3	D	49	ARG	NE-CZ-NH2	-6.26	117.17	120.30
1	B	45	GLU	OE1-CD-OE2	-6.25	115.79	123.30
2	C	378	GLU	OE1-CD-OE2	-6.22	115.83	123.30
1	A	138	ILE	CA-CB-CG1	6.21	122.81	111.00
1	A	42	PRO	N-CD-CG	6.21	112.51	103.20
3	D	92	VAL	CA-CB-CG1	6.21	120.21	110.90
1	B	198	ASP	CB-CG-OD2	6.15	123.84	118.30
1	B	219	ALA	N-CA-CB	-6.14	101.50	110.10
1	B	71	TYR	CB-CG-CD2	6.14	124.68	121.00
2	C	183	ARG	NE-CZ-NH2	-6.10	117.25	120.30
2	C	33	VAL	CA-CB-CG1	6.10	120.05	110.90
2	C	228	ARG	CD-NE-CZ	6.09	132.12	123.60
2	C	300	GLU	OE1-CD-OE2	-6.07	116.02	123.30
2	C	31	ALA	N-CA-CB	-6.06	101.62	110.10
1	B	84	ASP	CB-CG-OD2	-6.04	112.86	118.30
5	F	72	TYR	CD1-CG-CD2	6.04	124.54	117.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	295	HIS	O-C-N	-6.03	113.05	122.70
2	C	386	PHE	CZ-CE2-CD2	6.03	127.34	120.10
2	C	26	PRO	N-CA-CB	6.01	110.52	103.30
1	A	101	ARG	NE-CZ-NH2	6.01	123.31	120.30
1	A	79	TYR	CB-CG-CD2	-6.00	117.40	121.00
4	E	129	ARG	CD-NE-CZ	5.99	131.99	123.60
2	C	179	PHE	CB-CG-CD2	-5.98	116.61	120.80
2	C	339	THR	CA-CB-CG2	5.97	120.76	112.40
1	B	30	ARG	NE-CZ-NH1	5.97	123.28	120.30
1	A	68	PHE	CB-CG-CD1	5.96	124.97	120.80
1	B	60	ILE	O-C-N	-5.95	113.18	122.70
3	D	153	TRP	NE1-CE2-CZ2	5.95	136.94	130.40
2	C	364	TYR	CG-CD2-CE2	-5.94	116.55	121.30
3	D	112	TYR	CB-CG-CD1	-5.94	117.44	121.00
3	D	123	ARG	NE-CZ-NH1	5.92	123.26	120.30
1	A	25	VAL	CG1-CB-CG2	-5.90	101.46	110.90
1	B	211	PHE	CB-CG-CD2	5.89	124.93	120.80
1	A	194	PHE	CB-CG-CD2	-5.88	116.68	120.80
2	C	249	PRO	N-CA-CB	5.88	110.35	103.30
2	C	342	LEU	CB-CG-CD2	5.87	120.98	111.00
5	F	51	TYR	CD1-CE1-CZ	5.87	125.08	119.80
1	A	185	TRP	CE2-CD2-CE3	-5.86	111.67	118.70
2	C	28	GLU	OE1-CD-OE2	-5.86	116.27	123.30
1	A	66	VAL	CA-CB-CG1	-5.86	102.11	110.90
2	C	93	TYR	CB-CG-CD1	-5.86	117.49	121.00
2	C	94	CYS	CA-CB-SG	-5.85	103.47	114.00
2	C	84	PHE	CB-CG-CD2	-5.83	116.72	120.80
1	A	30	ARG	NE-CZ-NH1	5.82	123.21	120.30
3	D	118	ASP	CB-CG-OD1	-5.81	113.07	118.30
2	C	17	PHE	CG-CD1-CE1	-5.81	114.41	120.80
2	C	120	LEU	CB-CG-CD2	5.81	120.87	111.00
4	E	117	VAL	CG1-CB-CG2	-5.80	101.62	110.90
2	C	251	ARG	NH1-CZ-NH2	-5.80	113.02	119.40
3	D	148	ARG	NE-CZ-NH1	5.79	123.20	120.30
3	D	55	GLN	CB-CA-C	5.79	121.97	110.40
3	D	38	LEU	CB-CG-CD2	-5.78	101.17	111.00
1	B	172	TYR	CG-CD1-CE1	-5.78	116.68	121.30
2	C	170	ARG	NE-CZ-NH1	5.76	123.18	120.30
2	C	183	ARG	NE-CZ-NH1	5.75	123.17	120.30
3	D	49	ARG	CA-CB-CG	5.75	126.04	113.40
1	B	164	ARG	CD-NE-CZ	5.73	131.63	123.60
2	C	269	ILE	CA-CB-CG2	5.73	122.36	110.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	216	TYR	CB-CG-CD1	5.72	124.43	121.00
2	C	74	TRP	CE3-CZ3-CH2	-5.72	114.91	121.20
2	C	19	TYR	CD1-CE1-CZ	-5.71	114.66	119.80
1	A	109	PHE	CD1-CE1-CZ	-5.71	113.25	120.10
3	D	108	ARG	CB-CA-C	5.70	121.80	110.40
1	B	76	ASP	CB-CG-OD2	5.70	123.43	118.30
1	B	222	ASP	CB-CG-OD1	-5.69	113.18	118.30
2	C	249	PRO	CA-C-N	5.68	129.69	117.20
2	C	100	VAL	CA-CB-CG2	5.64	119.36	110.90
2	C	348	ASP	CB-CG-OD1	5.63	123.36	118.30
2	C	5	ASP	O-C-N	-5.61	113.73	122.70
3	D	83	LEU	CB-CG-CD2	5.58	120.48	111.00
2	C	253	ARG	NE-CZ-NH2	-5.58	117.51	120.30
4	E	104	PHE	CB-CG-CD1	5.57	124.70	120.80
1	A	114	GLY	CA-C-O	-5.57	110.58	120.60
3	D	137	ARG	NE-CZ-NH1	5.54	123.07	120.30
3	D	86	ALA	N-CA-CB	-5.53	102.35	110.10
5	F	98	TYR	CB-CG-CD1	5.53	124.31	121.00
1	B	152	TYR	CG-CD2-CE2	5.51	125.71	121.30
2	C	249	PRO	CA-N-CD	-5.51	103.79	111.50
2	C	402	ARG	NH1-CZ-NH2	-5.49	113.36	119.40
5	F	80	THR	CA-CB-CG2	5.49	120.08	112.40
3	D	154	ASP	CB-CG-OD2	5.47	123.22	118.30
3	D	85	PRO	N-CA-CB	5.46	109.85	103.30
2	C	128	ARG	NE-CZ-NH2	-5.46	117.57	120.30
1	A	68	PHE	CB-CG-CD2	-5.46	116.98	120.80
1	A	152	TYR	CA-CB-CG	5.43	123.72	113.40
2	C	288	ASP	CB-CG-OD1	-5.43	113.42	118.30
2	C	388	LEU	CB-CG-CD2	-5.42	101.78	111.00
3	D	58	ASP	CB-CG-OD1	-5.42	113.42	118.30
1	B	124	VAL	CA-CB-CG2	5.42	119.03	110.90
2	C	385	ASP	CB-CG-OD2	5.41	123.17	118.30
5	F	51	TYR	CG-CD1-CE1	-5.40	116.98	121.30
1	B	72	ILE	C-N-CA	5.39	135.18	121.70
2	C	303	LEU	CD1-CG-CD2	-5.38	94.35	110.50
1	A	75	SER	N-CA-CB	-5.37	102.45	110.50
2	C	222	TRP	CD2-CE3-CZ3	-5.36	111.83	118.80
2	C	19	TYR	C-N-CA	5.35	135.09	121.70
1	B	158	ASP	CB-CG-OD2	-5.35	113.48	118.30
1	B	14	ALA	N-CA-CB	-5.35	102.61	110.10
3	D	37	ASP	CB-CG-OD1	5.35	123.11	118.30
2	C	318	ARG	NE-CZ-NH1	-5.34	117.63	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	88	VAL	CG1-CB-CG2	-5.34	102.36	110.90
1	A	12	ALA	N-CA-CB	-5.33	102.63	110.10
3	D	99	CYS	CB-CA-C	5.33	121.05	110.40
3	D	106	PHE	CB-CG-CD1	5.32	124.53	120.80
1	B	166	PRO	N-CD-CG	5.32	111.17	103.20
4	E	84	PHE	CA-CB-CG	5.30	126.63	113.90
1	B	221	ARG	NE-CZ-NH2	-5.29	117.66	120.30
2	C	280	TYR	CD1-CG-CD2	5.29	123.72	117.90
5	F	67	ARG	NE-CZ-NH1	5.28	122.94	120.30
2	C	63	PHE	CB-CG-CD1	-5.28	117.11	120.80
2	C	349	VAL	CA-CB-CG1	5.28	118.82	110.90
1	A	71	TYR	CZ-CE2-CD2	-5.28	115.05	119.80
2	C	194	ARG	NE-CZ-NH1	5.26	122.93	120.30
5	F	78	ARG	O-C-N	-5.26	114.28	122.70
1	B	71	TYR	CD1-CG-CD2	-5.24	112.13	117.90
2	C	82	LEU	CB-CG-CD2	-5.24	102.09	111.00
4	E	100	LEU	CB-CG-CD2	5.24	119.91	111.00
1	B	204	PHE	CB-CG-CD2	-5.24	117.13	120.80
2	C	370	TYR	CG-CD1-CE1	-5.24	117.11	121.30
1	A	82	THR	CA-CB-CG2	5.23	119.72	112.40
2	C	386	PHE	CG-CD2-CE2	-5.23	115.04	120.80
2	C	370	TYR	CB-CG-CD2	-5.23	117.86	121.00
5	F	85	ASP	CB-CG-OD1	5.23	123.01	118.30
2	C	312	TRP	NE1-CE2-CD2	-5.22	102.08	107.30
2	C	199	TYR	CG-CD2-CE2	-5.21	117.13	121.30
1	B	152	TYR	CB-CG-CD2	5.21	124.13	121.00
2	C	176	TYR	CB-CG-CD2	5.21	124.13	121.00
3	D	39	GLU	OE1-CD-OE2	-5.20	117.06	123.30
2	C	136	GLU	OE1-CD-OE2	-5.18	117.08	123.30
2	C	228	ARG	NH1-CZ-NH2	-5.17	113.72	119.40
1	B	90	TRP	CE2-CD2-CE3	-5.17	112.50	118.70
1	B	147	GLU	N-CA-CB	-5.16	101.31	110.60
2	C	349	VAL	CG1-CB-CG2	-5.15	102.65	110.90
1	B	213	VAL	CG1-CB-CG2	-5.15	102.66	110.90
2	C	352	PRO	CA-N-CD	-5.15	104.29	111.50
1	A	65	HIS	CA-CB-CG	-5.14	104.85	113.60
4	E	128	ARG	NE-CZ-NH2	-5.12	117.74	120.30
1	B	109	PHE	N-CA-CB	5.11	119.80	110.60
2	C	61	VAL	CA-CB-CG2	5.10	118.56	110.90
1	A	173	ARG	NE-CZ-NH1	5.10	122.85	120.30
1	A	194	PHE	CB-CG-CD1	5.09	124.36	120.80
5	F	40	ARG	NE-CZ-NH2	-5.09	117.76	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	E	83	ARG	NE-CZ-NH2	-5.08	117.76	120.30
2	C	282	ILE	CA-CB-CG1	5.07	120.64	111.00
2	C	158	SER	C-N-CA	5.06	132.93	122.30
3	D	44	TYR	CG-CD2-CE2	-5.06	117.25	121.30
2	C	182	PRO	N-CA-CB	5.06	109.37	103.30
1	B	120	GLN	CA-CB-CG	-5.05	102.28	113.40
1	B	173	ARG	NE-CZ-NH2	-5.05	117.78	120.30
2	C	222	TRP	CE3-CZ3-CH2	5.03	126.74	121.20
3	D	149	PHE	CG-CD2-CE2	-5.03	115.27	120.80
5	F	92	ARG	NH1-CZ-NH2	-5.03	113.87	119.40
2	C	81	ARG	NE-CZ-NH1	5.02	122.81	120.30
4	E	101	VAL	CA-CB-CG2	-5.01	103.39	110.90

There are no chirality outliers.

All planar outliers are listed below.

Mol	Chain	Res	Type	Group
1	A	35	TYR	Sidechain
1	A	50	TYR	Sidechain
1	A	172	TYR	Sidechain
1	A	197	GLY	Mainchain
1	B	35	TYR	Sidechain
1	B	50	TYR	Sidechain
1	B	57	PHE	Sidechain
1	B	68	PHE	Sidechain
1	B	71	TYR	Sidechain
1	B	73	ARG	Sidechain
1	B	172	TYR	Sidechain
1	B	209	TYR	Sidechain
2	C	119	TYR	Sidechain
2	C	123	VAL	Mainchain
2	C	133	ILE	Peptide
2	C	149	ARG	Sidechain
2	C	201	PHE	Sidechain
2	C	257	ARG	Sidechain
2	C	307	SER	Mainchain
2	C	364	TYR	Sidechain
2	C	384	ARG	Sidechain
3	D	111	TYR	Sidechain
3	D	112	TYR	Sidechain
3	D	117	TYR	Sidechain
3	D	123	ARG	Sidechain

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Mol	Chain	Res	Type	Group
4	E	63	ARG	Sidechain
4	E	116	ARG	Sidechain
4	E	128	ARG	Sidechain
5	F	36	ARG	Sidechain
5	F	45	ARG	Sidechain
5	F	51	TYR	Sidechain
5	F	72	TYR	Sidechain

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	1908	1825	1824	2
2	C	3437	3480	3480	2
4	E	607	636	634	1
All	All	9731	9680	9675	5

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 0.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)
2:C:365:ILE:N	2:C:365:ILE:HD12	0.52	2.19
1:A:164:ARG:O	1:A:169:LYS:HE3	0.44	2.12
4:E:71:VAL:HG12	4:E:84:PHE:CZ	0.43	2.49
1:A:116:PHE:CE1	1:A:119:GLN:NE2	0.40	2.88
2:C:293:PHE:CD1	2:C:311:PHE:CE1	0.40	3.10

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	228/264 (86%)	209 (92%)	19 (8%)	0 (0%)	100	100
1	B	215/264 (81%)	203 (94%)	11 (5%)	1 (0%)	32	76
2	C	422/442 (95%)	389 (92%)	31 (7%)	2 (0%)	32	76
3	D	162/279 (58%)	155 (96%)	6 (4%)	1 (1%)	29	74
4	E	73/136 (54%)	67 (92%)	5 (7%)	1 (1%)	15	61
5	F	80/103 (78%)	78 (98%)	2 (2%)	0 (0%)	100	100
All	All	1180/1488 (79%)	1101 (93%)	74 (6%)	5 (0%)	38	78

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

Mol	Chain	Res	Type
1	B	132	ASP
2	C	14	SER
2	C	203	ASP
3	D	90	VAL
4	E	133	GLU

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	205/235 (87%)	204 (100%)	1 (0%)	89	97
1	B	194/235 (83%)	191 (98%)	3 (2%)	66	95
2	C	388/403 (96%)	383 (99%)	5 (1%)	70	96
3	D	151/252 (60%)	148 (98%)	3 (2%)	57	93
4	E	64/111 (58%)	64 (100%)	0 (0%)	100	100
5	F	68/79 (86%)	66 (97%)	2 (3%)	45	89
All	All	1070/1315 (81%)	1056 (99%)	14 (1%)	70	96

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

Mol	Chain	Res	Type
1	A	68	PHE
1	B	56	GLU
1	B	220	GLN
1	B	222	ASP
2	C	22	LEU
2	C	62	PHE
2	C	94	CYS
2	C	237	ASP
2	C	300	GLU
3	D	49	ARG
3	D	51	LEU
3	D	61	LEU
5	F	45	ARG
5	F	63	GLU

6.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates (i)

There are no monosaccharides in this entry.

6.6 Ligand geometry (i)

There are no ligands in this entry.

6.7 Other polymers (i)

There are no such molecules in this entry.

6.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

7 Chemical shift validation

The completeness of assignment taking into account all chemical shift lists is 2% for the well-defined parts and 2% for the entire structure.

7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *assigned_chem_shift_list*

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	368
Number of shifts mapped to atoms	368
Number of unparsed shifts	0
Number of shifts with mapping errors	0
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	6

7.1.2 Chemical shift referencing

No chemical shift referencing corrections were calculated (not enough data).

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 2%, i.e. 368 atoms were assigned a chemical shift out of a possible 16842. 0 out of 181 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	0/5901 (0%)	0/2382 (0%)	0/2384 (0%)	0/1135 (0%)
Sidechain	368/9499 (4%)	276/6138 (4%)	92/2970 (3%)	0/391 (0%)
Aromatic	0/1442 (0%)	0/707 (0%)	0/697 (0%)	0/38 (0%)
Overall	368/16842 (2%)	276/9227 (3%)	92/6051 (2%)	0/1564 (0%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 2%, i.e. 368 atoms were assigned a chemical shift out of a possible 16842. 0 out of 181 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	0/5901 (0%)	0/2382 (0%)	0/2384 (0%)	0/1135 (0%)
Sidechain	368/9499 (4%)	276/6138 (4%)	92/2970 (3%)	0/391 (0%)
Aromatic	0/1442 (0%)	0/707 (0%)	0/697 (0%)	0/38 (0%)
Overall	368/16842 (2%)	276/9227 (3%)	92/6051 (2%)	0/1564 (0%)

7.1.4 Statistically unusual chemical shifts (i)

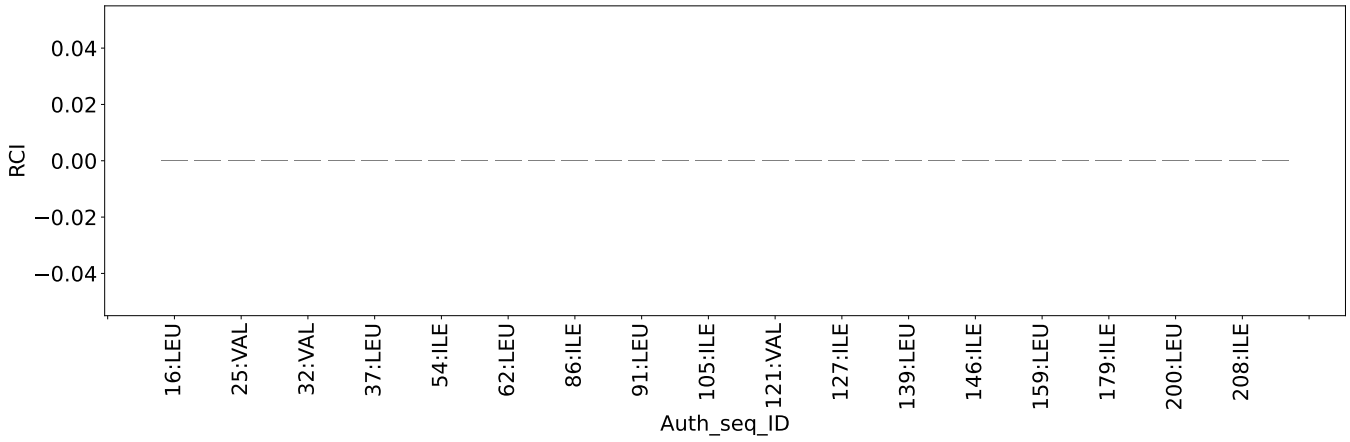
The following table lists the statistically unusual chemical shifts. These are statistical measures, and large deviations from the mean do not necessarily imply incorrect assignments. Molecules containing paramagnetic centres or hemes are expected to give rise to anomalous chemical shifts.

List Id	Chain	Res	Type	Atom	Shift, *ppm*	Expected range, *ppm*	Z-score
1	A	200	LEU	HD23	-0.69	-0.65 – 2.13	-5.1
1	A	200	LEU	HD22	-0.69	-0.65 – 2.13	-5.1
1	A	200	LEU	HD21	-0.69	-0.65 – 2.13	-5.1
1	B	200	LEU	HD23	-0.68	-0.65 – 2.13	-5.1
1	B	200	LEU	HD22	-0.68	-0.65 – 2.13	-5.1
1	B	200	LEU	HD21	-0.68	-0.65 – 2.13	-5.1

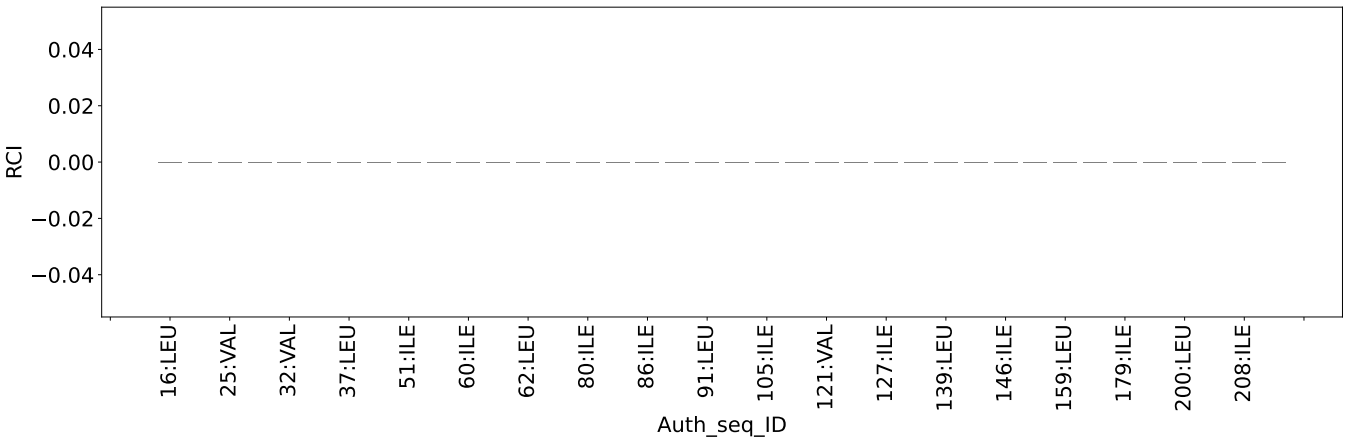
7.1.5 Random Coil Index (RCI) plots (i)

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

Random coil index (RCI) for chain A:



Random coil index (RCI) for chain B:


0.04
0.02
0.00
−0.02
−0.04
RCI
16:LEU
25:VAL
32:VAL
37:LEU
51:ILE
60:ILE
62:LEU
80:ILE
86:ILE
91:LEU
105:ILE
121:VAL
127:ILE
139:LEU
146:ILE
159:LEU
179:ILE
200:LEU
208:ILE
Auth_seq_ID