



Full wwPDB NMR Structure Validation Report ⓘ

Apr 26, 2016 – 08:56 PM BST

PDB ID : 2HYM
Title : NMR based Docking Model of the Complex between the Human Type I Interferon Receptor and Human Interferon alpha-2
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Deposited on : 2006-08-07

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
Mogul : unknown
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
RCI : v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV : Wang et al. (2010)
ShiftChecker : rb-20027457
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20027457

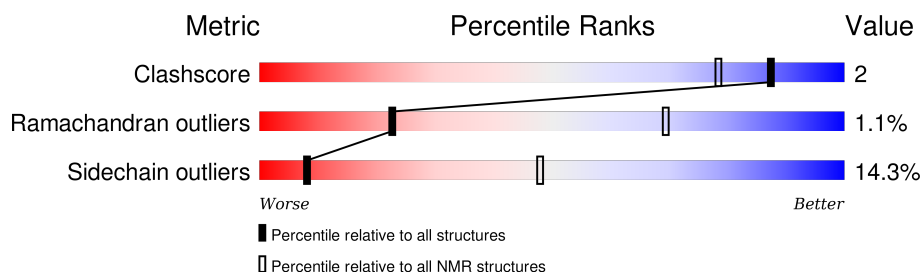
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

SOLUTION NMR

The overall completeness of chemical shifts assignment was not calculated.

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	114402	11133
Ramachandran outliers	111179	9975
Sidechain outliers	111093	9958

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	212	
2	B	165	

2 Ensemble composition and analysis

This entry contains 10 models. Model 6 is the overall representative, medoid model (most similar to other models).

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:1-A:212, B:1-B:165 (377)	0.41	6

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

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

The models can be grouped into 2 clusters and 1 single-model cluster was found.

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

3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6063 atoms, of which 3002 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Soluble IFN alpha/beta receptor.

Mol	Chain	Residues	Atoms						Trace
1	A	212	Total	C	H	N	O	S	0
			3363	1094	1653	270	336	10	

- Molecule 2 is a protein called Interferon alpha-2.

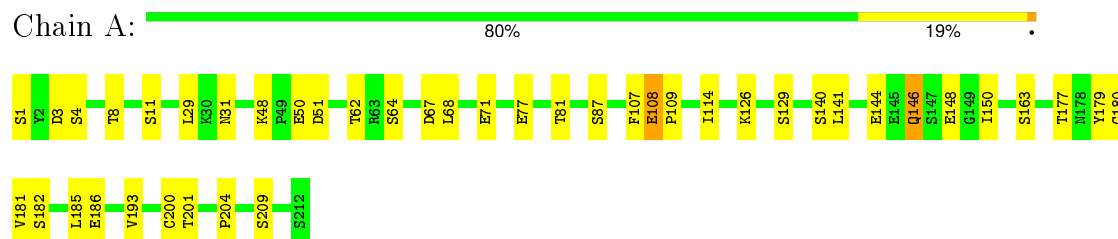
Mol	Chain	Residues	Atoms						Trace
2	B	165	Total	C	H	N	O	S	0
			2700	860	1349	227	255	9	

4 Residue-property plots

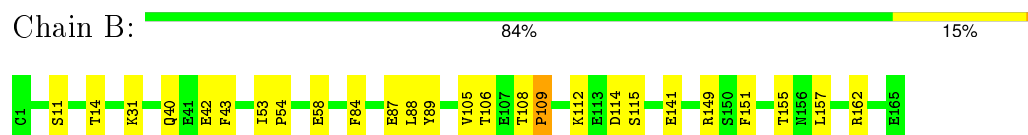
4.1 Average score per residue in the NMR ensemble

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: Soluble IFN alpha/beta receptor



- Molecule 2: Interferon alpha-2

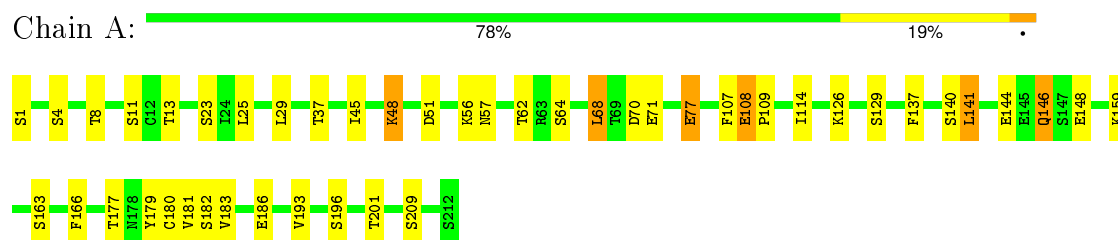


4.2 Scores per residue for each member of the ensemble

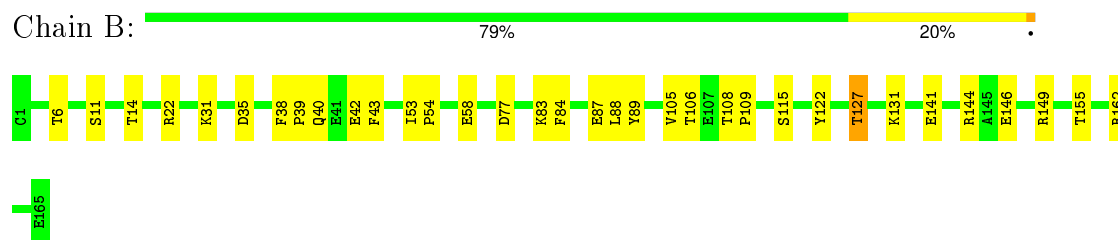
Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

- Molecule 1: Soluble IFN alpha/beta receptor

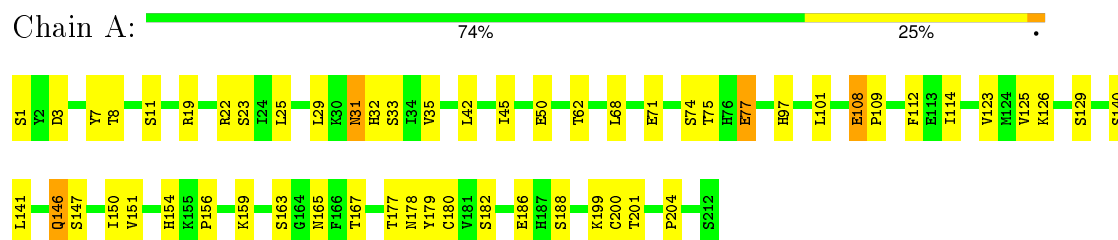


- Molecule 2: Interferon alpha-2

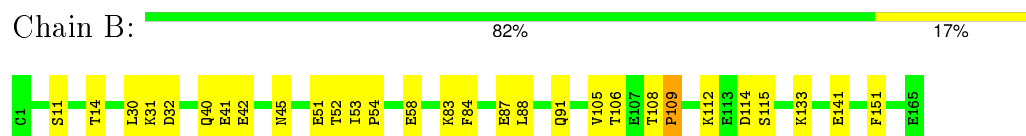


4.2.2 Score per residue for model 2

- Molecule 1: Soluble IFN alpha/beta receptor

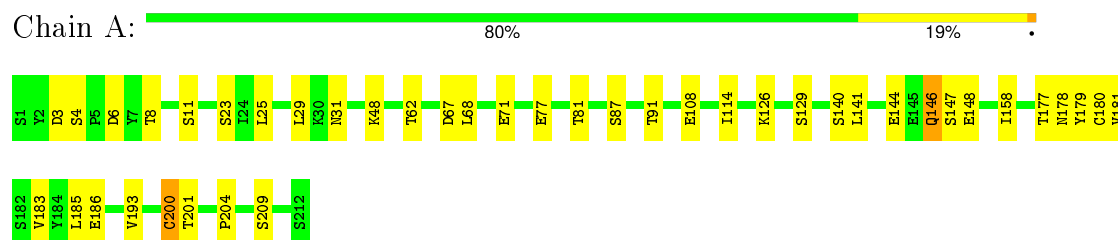


- Molecule 2: Interferon alpha-2

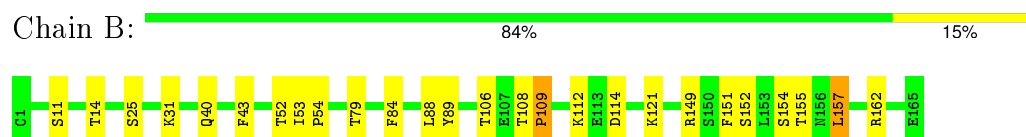


4.2.3 Score per residue for model 3

- Molecule 1: Soluble IFN alpha/beta receptor

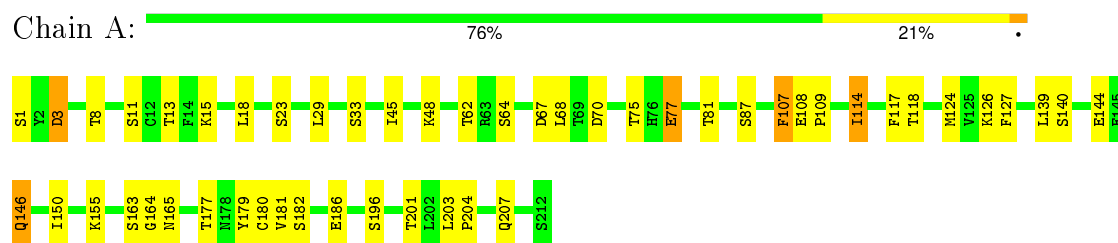


- Molecule 2: Interferon alpha-2

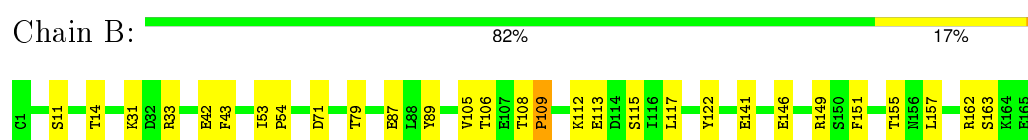


4.2.4 Score per residue for model 4

- Molecule 1: Soluble IFN alpha/beta receptor

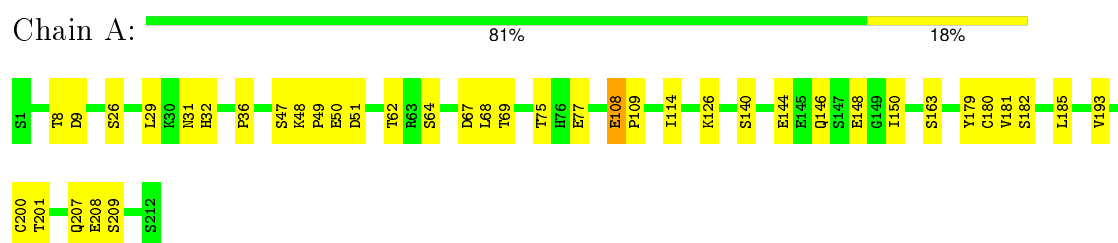


- Molecule 2: Interferon alpha-2

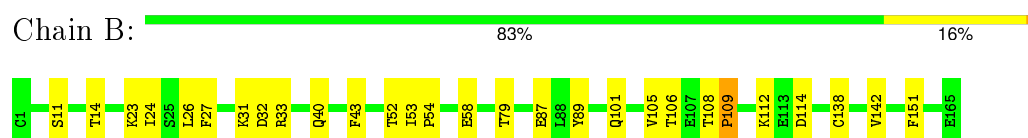


4.2.5 Score per residue for model 5

- Molecule 1: Soluble IFN alpha/beta receptor

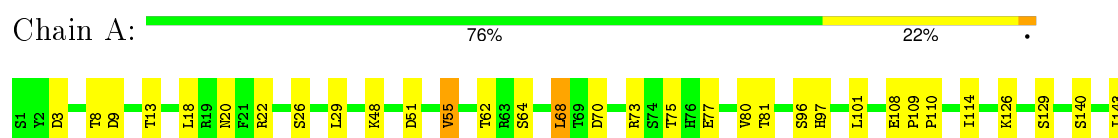


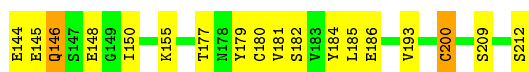
- Molecule 2: Interferon alpha-2



4.2.6 Score per residue for model 6 (medoid)

- Molecule 1: Soluble IFN alpha/beta receptor





• Molecule 2: Interferon alpha-2

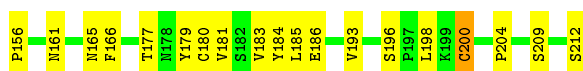
Chain B: 83% 17%



4.2.7 Score per residue for model 7

• Molecule 1: Soluble IFN alpha/beta receptor

Chain A: 76% 21% .



• Molecule 2: Interferon alpha-2

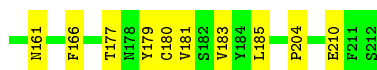
Chain B: 84% 14% .



4.2.8 Score per residue for model 8

• Molecule 1: Soluble IFN alpha/beta receptor

Chain A: 81% 18% .



• Molecule 2: Interferon alpha-2

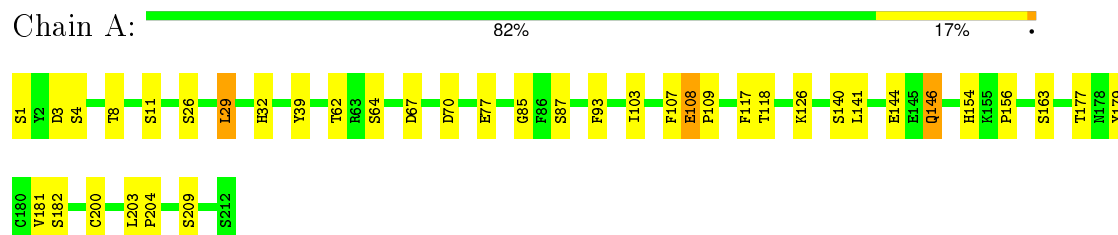
Chain B: 79% 21%



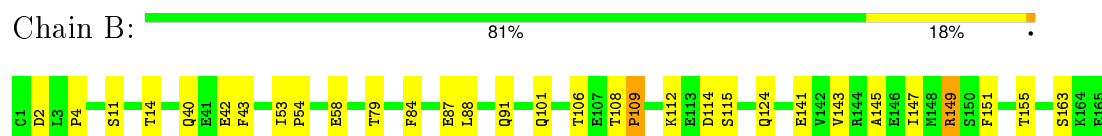


4.2.9 Score per residue for model 9

- Molecule 1: Soluble IFN alpha/beta receptor

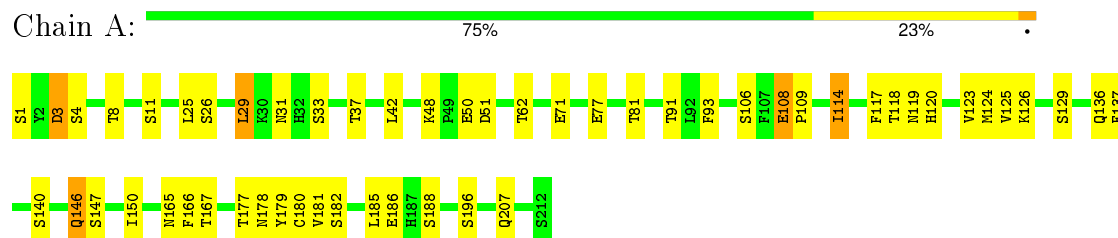


- Molecule 2: Interferon alpha-2

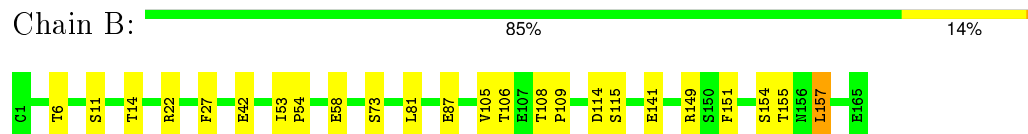


4.2.10 Score per residue for model 10

- Molecule 1: Soluble IFN alpha/beta receptor



- Molecule 2: Interferon alpha-2



5 Refinement protocol and experimental data overview

The models were refined using the following method: *Rigid body docking, semi-flexible simulated annealing, refinement using explicit water.*

Of the 200 calculated structures, 10 were deposited, based on the following criterion: *LOWEST ENERGY STRUCTURES OF LOWEST ENERGY CLUSTER.*

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

Software name	Classification	Version
HADDOCK	refinement	1.3

No chemical shift data was provided. No validations of the models with respect to experimental NMR restraints is performed at this time.

6 Model quality

6.1 Standard geometry

There are no covalent bond-length or bond-angle outliers.

There are no bond-length outliers.

There are no bond-angle outliers.

There are no chirality outliers.

There are no planarity outliers.

6.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in each chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes averaged over the ensemble.

Mol	Chain	Non-H	H(model)	H(added)	Clashes
1	A	1710	1653	1649	10±3
2	B	1351	1349	1347	6±1
All	All	30610	30020	29960	151

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 2.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:141:LEU:HD11	1:A:183:VAL:HG13	0.63	1.70	7	4
1:A:146:GLN:O	1:A:179:TYR:HA	0.62	1.94	9	10
1:A:108:GLU:N	1:A:109:PRO:HD2	0.59	2.12	4	1
2:B:54:PRO:HD3	2:B:105:VAL:HG13	0.55	1.78	10	3
1:A:50:GLU:HB3	2:B:33:ARG:CZ	0.53	2.32	5	2
1:A:29:LEU:HG	1:A:93:PHE:CZ	0.53	2.39	7	3
1:A:108:GLU:H	1:A:109:PRO:CD	0.51	2.19	5	6
1:A:109:PRO:N	1:A:110:PRO:HD2	0.51	2.20	6	1
1:A:144:GLU:O	1:A:181:VAL:HA	0.51	2.06	7	7
1:A:154:HIS:O	1:A:156:PRO:HD3	0.50	2.06	7	3
1:A:124:MET:SD	1:A:165:ASN:HB2	0.50	2.47	4	3
2:B:109:PRO:O	2:B:112:LYS:HG2	0.50	2.07	9	6
1:A:108:GLU:H	1:A:109:PRO:HD2	0.49	1.67	5	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:108:THR:HG22	2:B:109:PRO:HD2	0.49	1.83	7	1
2:B:84:PHE:O	2:B:88:LEU:HG	0.49	2.08	6	7
1:A:49:PRO:HG3	2:B:26:LEU:O	0.49	2.07	5	1
1:A:184:TYR:CE1	1:A:193:VAL:HG12	0.49	2.43	6	2
1:A:18:LEU:HD23	1:A:107:PHE:CE2	0.48	2.43	4	2
1:A:45:ILE:HB	1:A:77:GLU:OE2	0.48	2.09	7	4
2:B:53:ILE:N	2:B:54:PRO:HD2	0.48	2.24	1	9
1:A:146:GLN:HA	1:A:150:ILE:O	0.47	2.09	5	6
2:B:154:SER:O	2:B:157:LEU:HB2	0.47	2.10	10	2
2:B:30:LEU:O	2:B:33:ARG:HD3	0.47	2.08	8	1
2:B:54:PRO:HD3	2:B:105:VAL:CG1	0.47	2.40	8	4
1:A:112:PHE:O	1:A:199:LYS:HE3	0.47	2.10	2	1
1:A:20:ASN:O	1:A:22:ARG:HG3	0.47	2.09	6	2
2:B:38:PHE:CD1	2:B:39:PRO:HD2	0.46	2.45	8	3
2:B:113:GLU:O	2:B:117:LEU:HG	0.46	2.09	4	1
1:A:147:SER:HA	1:A:178:ASN:O	0.46	2.11	2	2
1:A:179:TYR:CE1	1:A:201:THR:HB	0.46	2.45	2	1
1:A:123:VAL:O	1:A:167:THR:HA	0.45	2.11	2	2
2:B:22:ARG:HD3	2:B:24:ILE:O	0.45	2.10	6	1
2:B:73:SER:HA	2:B:81:LEU:CD1	0.45	2.42	6	2
1:A:56:LYS:O	1:A:57:ASN:HB3	0.45	2.11	1	1
2:B:99:VAL:HG22	2:B:105:VAL:HG11	0.45	1.89	6	1
1:A:31:ASN:OD1	1:A:35:VAL:HG13	0.45	2.12	2	1
1:A:138:ASP:OD1	2:B:162:ARG:HD3	0.45	2.11	7	1
1:A:179:TYR:O	1:A:200:CYS:HA	0.44	2.13	3	3
1:A:55:VAL:HG11	1:A:68:LEU:HD23	0.44	1.89	6	1
1:A:161:ASN:HB3	1:A:166:PHE:CE2	0.43	2.48	8	1
1:A:161:ASN:HB3	1:A:166:PHE:CD1	0.43	2.47	7	1
1:A:127:PHE:HB2	1:A:164:GLY:O	0.43	2.14	4	1
1:A:68:LEU:CB	1:A:71:GLU:HB2	0.43	2.44	1	1
2:B:127:THR:O	2:B:131:LYS:HG3	0.43	2.14	1	1
2:B:22:ARG:HD3	2:B:144:ARG:CZ	0.43	2.44	1	1
1:A:112:PHE:HB3	1:A:125:VAL:HG13	0.43	1.91	2	1
1:A:48:LYS:HE3	2:B:35:ASP:OD1	0.43	2.13	1	1
1:A:50:GLU:HB2	2:B:30:LEU:O	0.42	2.14	7	2
1:A:179:TYR:CZ	1:A:201:THR:HB	0.42	2.49	5	3
2:B:122:TYR:OH	2:B:146:GLU:HB3	0.42	2.14	4	2
1:A:114:ILE:HD13	1:A:181:VAL:HB	0.42	1.92	10	2
2:B:41:GLU:O	2:B:45:ASN:HB2	0.42	2.15	2	1
1:A:55:VAL:HG11	1:A:66:CYS:SG	0.42	2.54	8	1
2:B:73:SER:HA	2:B:81:LEU:HD13	0.42	1.91	8	2

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
2:B:145:ALA:O	2:B:149:ARG:HB2	0.42	2.15	9	1
1:A:70:ASP:OD1	1:A:73:ARG:HD3	0.42	2.15	6	1
1:A:117:PHE:O	1:A:203:LEU:HB2	0.42	2.15	9	2
1:A:85:GLY:HA3	1:A:93:PHE:CZ	0.41	2.49	9	1
1:A:8:THR:O	1:A:32:HIS:HB2	0.41	2.14	5	1
1:A:141:LEU:O	1:A:156:PRO:HD2	0.41	2.14	2	1
1:A:48:LYS:HE2	2:B:35:ASP:OD1	0.41	2.16	7	1
1:A:19:ARG:O	1:A:22:ARG:HB2	0.41	2.15	2	1
1:A:125:VAL:HB	1:A:166:PHE:HB3	0.41	1.91	10	1
2:B:143:VAL:O	2:B:147:ILE:HG12	0.41	2.16	9	1
1:A:117:PHE:HB2	1:A:120:HIS:O	0.41	2.16	10	1
1:A:108:GLU:N	1:A:109:PRO:CD	0.40	2.84	1	1
2:B:138:CYS:O	2:B:142:VAL:HG23	0.40	2.17	5	1
1:A:179:TYR:CE2	1:A:201:THR:HB	0.40	2.51	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	210/212 (99%)	180±3 (85±1%)	28±3 (13±1%)	3±1 (1±1%)	20	66
2	B	163/165 (99%)	145±2 (89±1%)	16±2 (10±1%)	1±1 (1±0%)	26	73
All	All	3730/3770 (99%)	3248 (87%)	441 (12%)	41 (1%)	23	69

All 12 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

Mol	Chain	Res	Type	Models (Total)
2	B	109	PRO	9
1	A	108	GLU	9
1	A	3	ASP	7
1	A	204	PRO	6
2	B	31	LYS	3
1	A	103	ILE	1
1	A	106	SER	1

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Mol	Chain	Res	Type	Models (Total)
1	A	159	LYS	1
1	A	104	ASP	1
2	B	162	ARG	1
1	A	158	ILE	1
2	B	24	ILE	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	201/201 (100%)	169±4 (84±2%)	32±4 (16±2%)	7	45
2	B	152/152 (100%)	133±2 (88±1%)	19±2 (12±1%)	10	52
All	All	3530/3530 (100%)	3026 (86%)	504 (14%)	8	48

All 134 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	62	THR	10
1	A	77	GLU	10
2	B	108	THR	10
1	A	126	LYS	10
2	B	11	SER	10
1	A	29	LEU	10
2	B	14	THR	10
1	A	8	THR	9
1	A	140	SER	9
1	A	180	CYS	9
1	A	177	THR	9
2	B	149	ARG	8
2	B	155	THR	8
2	B	141	GLU	8
2	B	106	THR	8
1	A	11	SER	8
2	B	115	SER	8
1	A	114	ILE	8
1	A	146	GLN	8

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Mol	Chain	Res	Type	Models (Total)
1	A	48	LYS	8
2	B	151	PHE	8
2	B	114	ASP	8
1	A	64	SER	7
1	A	186	GLU	7
1	A	182	SER	7
2	B	58	GLU	7
2	B	43	PHE	7
2	B	87	GLU	7
2	B	89	TYR	7
1	A	1	SER	6
1	A	185	LEU	6
1	A	209	SER	6
1	A	200	CYS	6
1	A	68	LEU	6
2	B	42	GLU	6
1	A	148	GLU	6
1	A	81	THR	5
2	B	40	GLN	5
1	A	4	SER	5
1	A	163	SER	5
1	A	87	SER	5
1	A	129	SER	5
2	B	157	LEU	5
1	A	67	ASP	5
1	A	51	ASP	5
1	A	118	THR	4
1	A	75	THR	4
1	A	26	SER	4
2	B	6	THR	4
1	A	23	SER	4
1	A	107	PHE	4
1	A	71	GLU	4
1	A	31	ASN	4
1	A	25	LEU	4
2	B	52	THR	4
2	B	79	THR	4
1	A	196	SER	4
1	A	139	LEU	3
2	B	31	LYS	3
2	B	32	ASP	3
1	A	193	VAL	3

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Mol	Chain	Res	Type	Models (Total)
1	A	33	SER	3
2	B	163	SER	3
1	A	70	ASP	3
1	A	13	THR	3
1	A	207	GLN	3
1	A	141	LEU	3
2	B	2	ASP	3
2	B	162	ARG	3
1	A	91	THR	3
2	B	101	GLN	3
2	B	83	LYS	3
1	A	3	ASP	3
1	A	9	ASP	2
2	B	91	GLN	2
2	B	23	LYS	2
1	A	136	GLN	2
1	A	97	HIS	2
2	B	27	PHE	2
2	B	33	ARG	2
1	A	32	HIS	2
1	A	155	LYS	2
1	A	137	PHE	2
1	A	42	LEU	2
1	A	212	SER	2
1	A	188	SER	2
1	A	55	VAL	2
1	A	101	LEU	2
2	B	35	ASP	2
1	A	37	THR	2
1	A	18	LEU	1
1	A	98	ASN	1
1	A	96	SER	1
1	A	6	ASP	1
1	A	7	TYR	1
1	A	210	GLU	1
2	B	121	LYS	1
1	A	80	VAL	1
2	B	124	GLN	1
1	A	166	PHE	1
2	B	77	ASP	1
2	B	94	ASP	1
1	A	41	LEU	1

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Mol	Chain	Res	Type	Models (Total)
1	A	15	LYS	1
2	B	8	SER	1
2	B	51	GLU	1
2	B	22	ARG	1
1	A	143	ILE	1
1	A	144	GLU	1
1	A	147	SER	1
1	A	74	SER	1
1	A	39	TYR	1
1	A	53	LYS	1
1	A	50	GLU	1
1	A	178	ASN	1
1	A	47	SER	1
1	A	165	ASN	1
1	A	145	GLU	1
2	B	152	SER	1
1	A	119	ASN	1
2	B	71	ASP	1
1	A	36	PRO	1
2	B	4	PRO	1
2	B	72	SER	1
2	B	127	THR	1
1	A	151	VAL	1
1	A	198	LEU	1
1	A	208	GLU	1
2	B	25	SER	1
2	B	133	LYS	1
1	A	159	LYS	1
1	A	99	PHE	1
2	B	69	THR	1
1	A	69	THR	1

6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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](#)

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

No chemical shift data were provided