Full wwPDB NMR Structure Validation Report (i)

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PDB ID	:	2V9H
BMRB ID	:	15247
Title	:	Solution Structure of an Escherichia coli YaeT tandem POTRA domain
Authors	:	Knowles, T.J.; Jeeves, M.; Bobat, S.; Dancea, F.; Mcclelland, D.M.; Palmer, T.; Overduin, M.; Henderson, I.R.
Deposited on	:	2007-08-23

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:

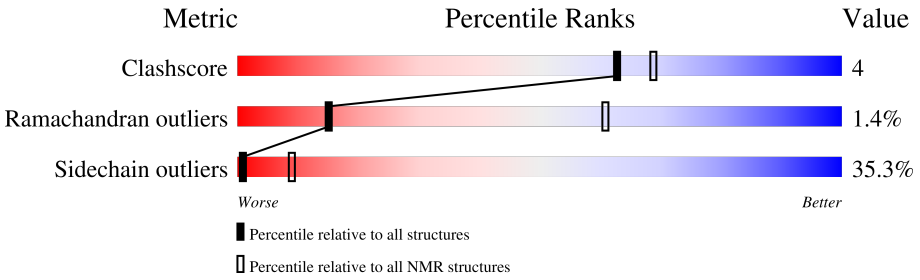
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
wwPDB-RCI	:	v_1n_11_5_13_A (Berjanski et al., 2005)
PANAV	:	Wang et al. (2010)
wwPDB-ShiftChecker	:	v1.2
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

1 Overall quality at a glance (i)

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

The overall completeness of chemical shifts assignment is 92%.

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	164	54% 32% • 7% 6%

2 Ensemble composition and analysis (i)

This entry contains 20 models. Model 9 is the overall representative, medoid model (most similar to other models). The authors have identified model 3 as representative.

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:23-A:33, A:38-A:89 (63)	0.49	2
2	A:92-A:170 (79)	0.69	9

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 3 single-model clusters were found.

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

3 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 2383 atoms, of which 1200 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET.

Mol	Chain	Residues	Atoms						Trace
			Total	C	H	N	O	S	
1	A	154	2383	742	1200	205	234	2	0

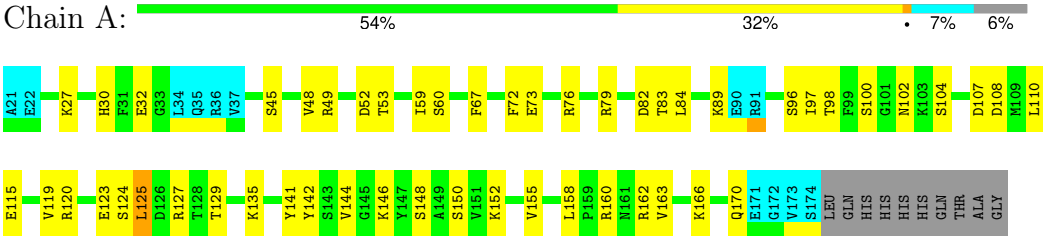
4 Residue-property plots

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: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

Chain A:



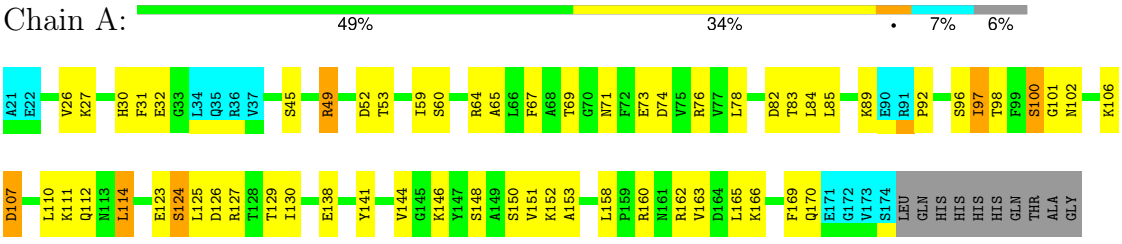
4.2 Scores per residue for each member of the ensemble

Colouring as in section 4.1 above.

4.2.1 Score per residue for model 1

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

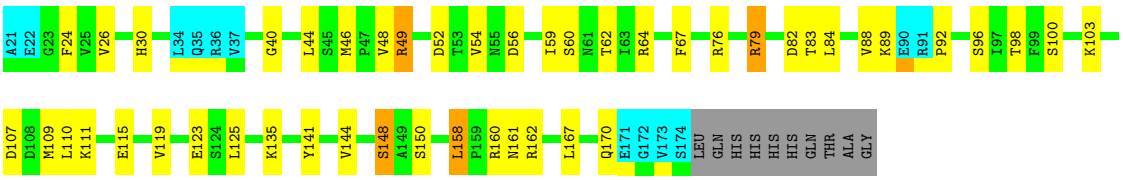
Chain A:



4.2.2 Score per residue for model 2

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

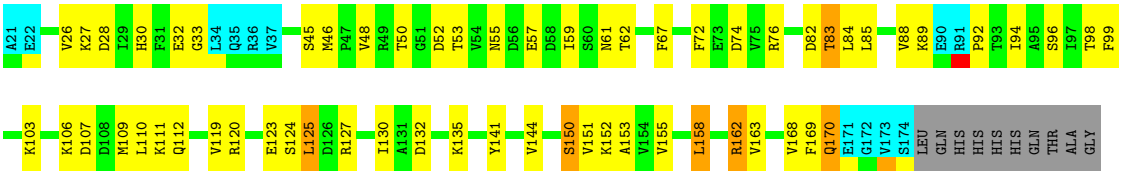
Chain A:



4.2.3 Score per residue for model 3

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

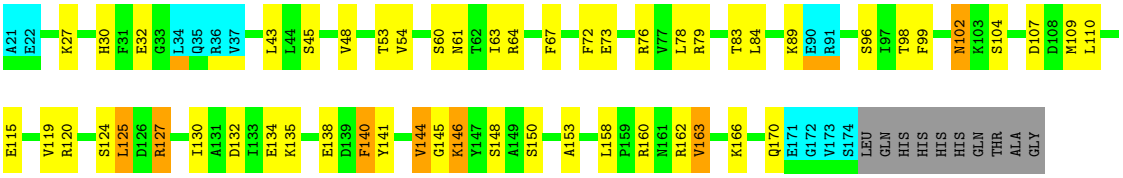
Chain A:



4.2.4 Score per residue for model 4

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

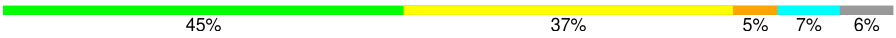
Chain A:

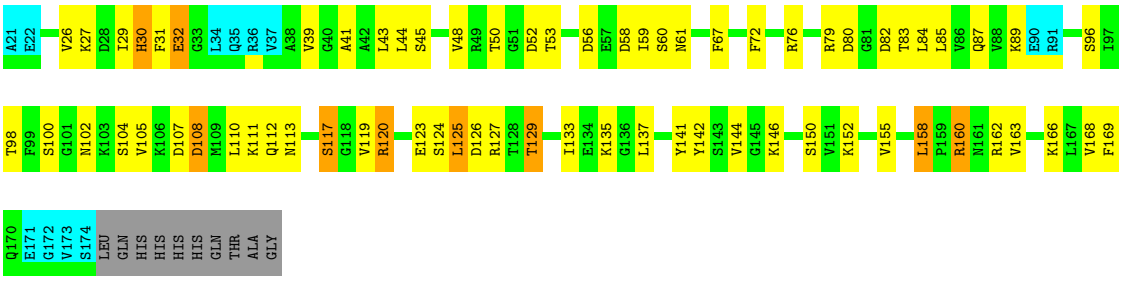


4.2.5 Score per residue for model 5

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

Chain A:

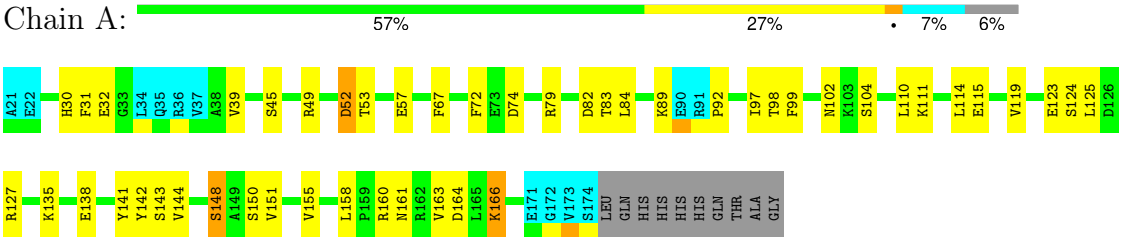




4.2.6 Score per residue for model 6

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

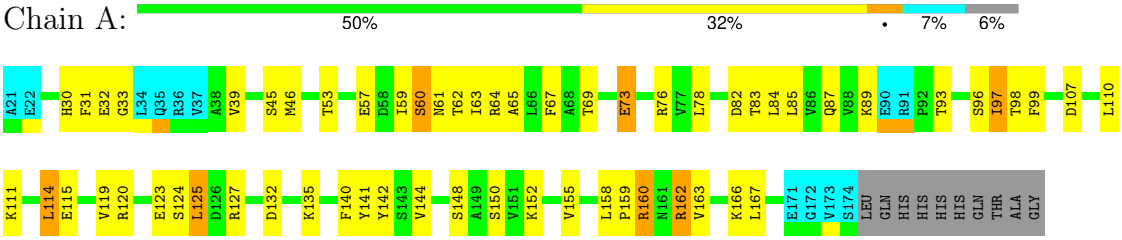
Chain A:



4.2.7 Score per residue for model 7

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

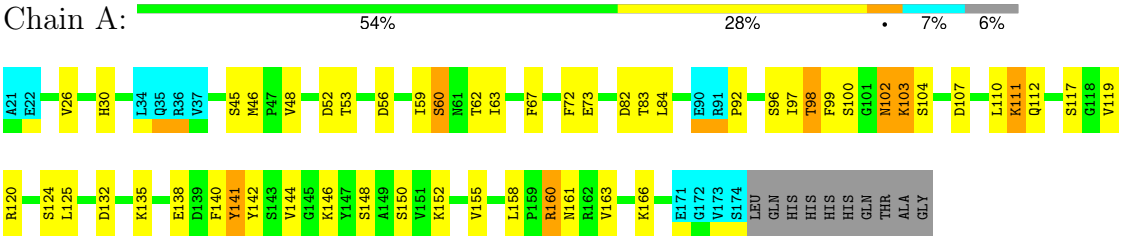
Chain A:



4.2.8 Score per residue for model 8

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

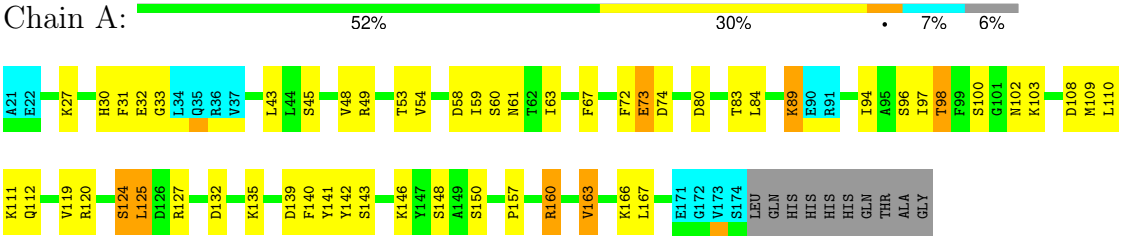
Chain A:



4.2.9 Score per residue for model 9 (medoid)

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

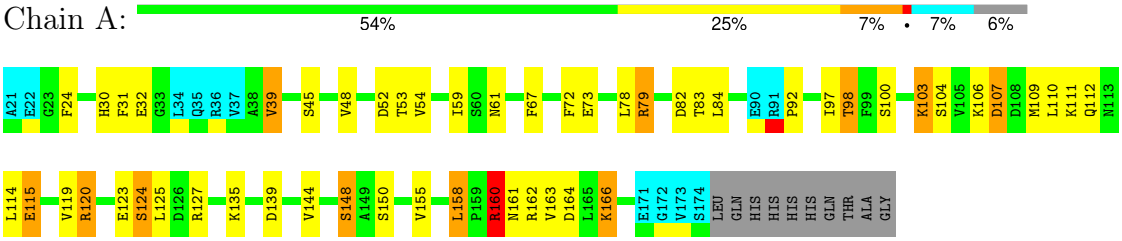
Chain A:



4.2.10 Score per residue for model 10

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

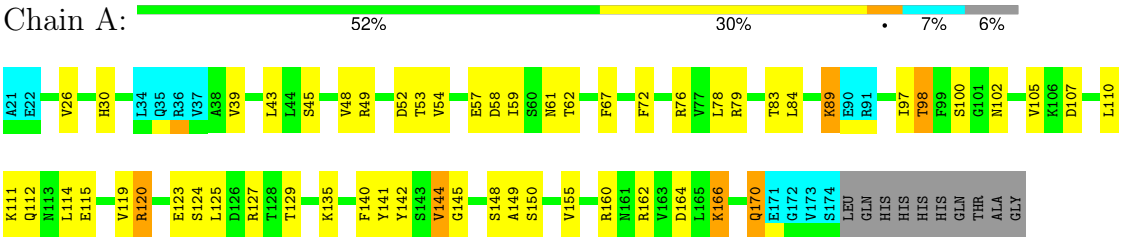
Chain A:



4.2.11 Score per residue for model 11

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

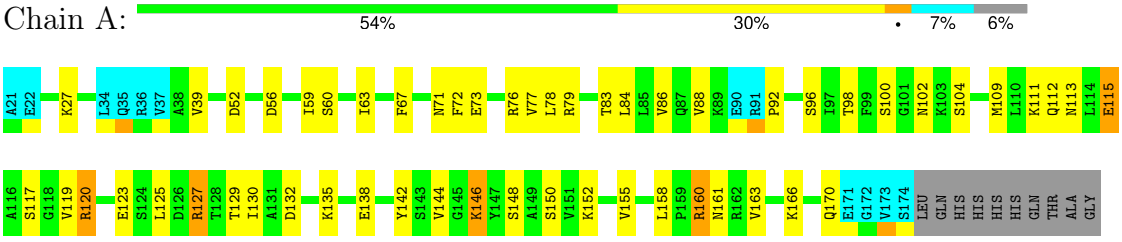
Chain A:



4.2.12 Score per residue for model 12

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

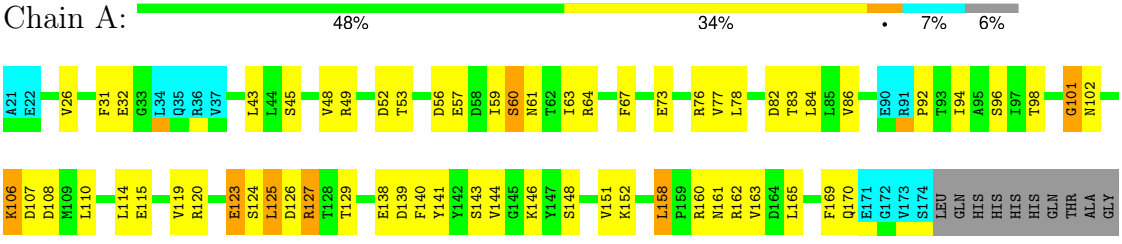
Chain A:



4.2.13 Score per residue for model 13

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

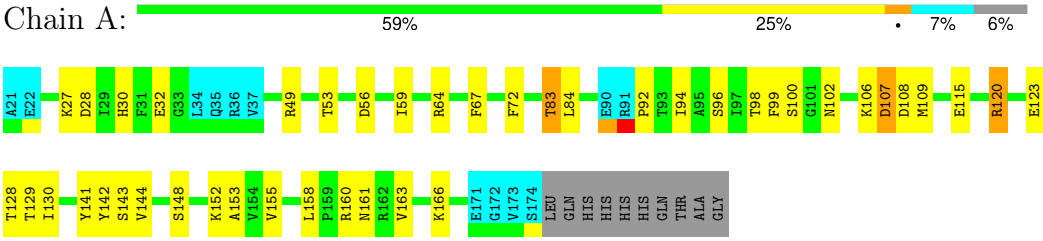
Chain A:



4.2.14 Score per residue for model 14

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

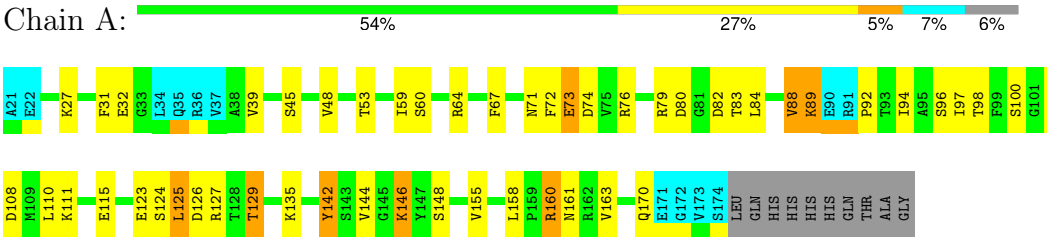
Chain A:



4.2.15 Score per residue for model 15

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

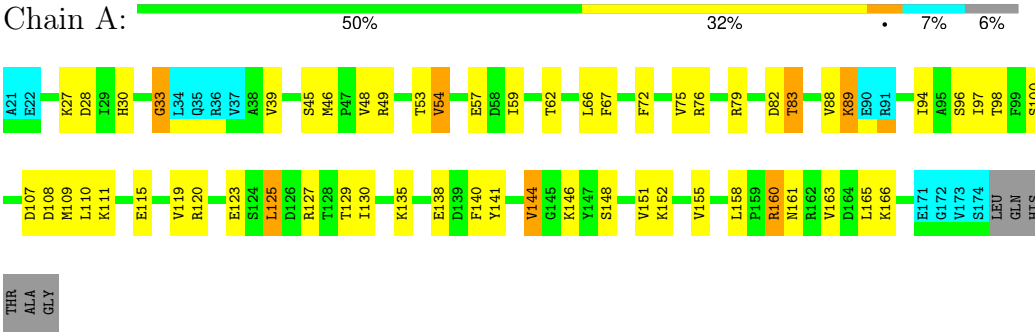
Chain A:



4.2.16 Score per residue for model 16

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

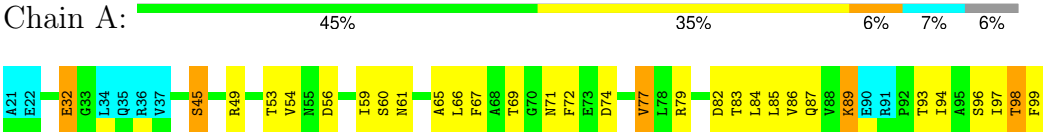
Chain A:

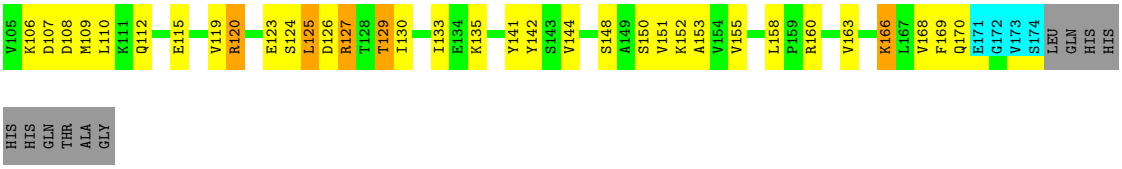


4.2.17 Score per residue for model 17

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

Chain A:

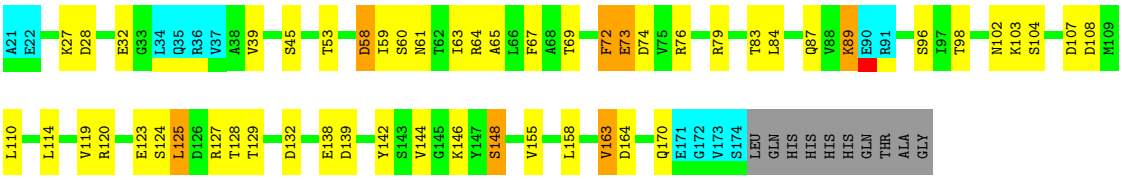




4.2.18 Score per residue for model 18

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

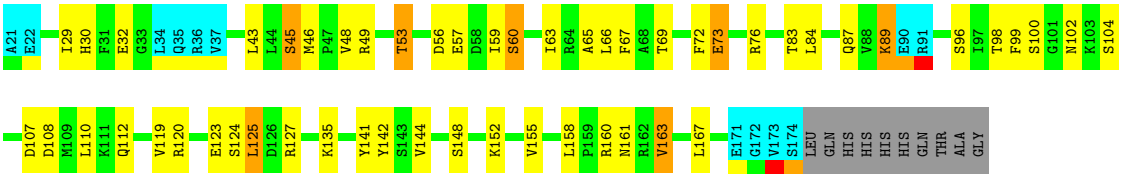
Chain A:



4.2.19 Score per residue for model 19

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

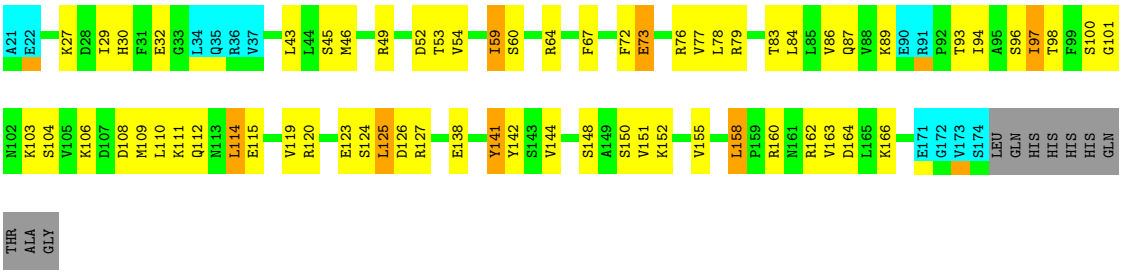
Chain A:



4.2.20 Score per residue for model 20

• Molecule 1: OUTER MEMBRANE PROTEIN ASSEMBLY FACTOR YAET

Chain A:



5 Refinement protocol and experimental data overview

The models were refined using the following method: *distance geometry*.

Of the 450 calculated structures, 20 were deposited, based on the following criterion: *LEAST RESTRAINT VIOLATIONS*.

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

Software name	Classification	Version
ARIA	refinement	
NMRPipe	structure solution	
Sparky	structure solution	
VNMR	structure solution	
CYANA	structure solution	
CNS	structure solution	

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	1906
Number of shifts mapped to atoms	1888
Number of unparsed shifts	0
Number of shifts with mapping errors	18
Number of shifts with mapping warnings	0
Assignment completeness (well-defined parts)	92%

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	1088	1104	1103	10±4
All	All	21760	22080	22060	194

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 4.

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

Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:59:ILE:HD11	1:A:79:ARG:HD3	0.70	1.61	20	1
1:A:108:ASP:HA	1:A:111:LYS:HE2	0.69	1.62	5	1
1:A:138:GLU:HG3	1:A:151:VAL:HG23	0.68	1.66	20	4
1:A:93:THR:HB	1:A:162:ARG:HG3	0.68	1.64	7	1
1:A:74:ASP:HB3	1:A:89:LYS:HB2	0.66	1.68	18	6
1:A:115:GLU:HG2	1:A:120:ARG:HG3	0.63	1.69	20	1
1:A:107:ASP:HA	1:A:110:LEU:HD12	0.63	1.68	10	2
1:A:98:THR:HB	1:A:166:LYS:HG3	0.62	1.70	8	2
1:A:125:LEU:HD22	1:A:163:VAL:HG11	0.61	1.71	19	2
1:A:73:GLU:HB3	1:A:124:SER:HB3	0.59	1.74	1	1
1:A:73:GLU:HB3	1:A:124:SER:HB2	0.58	1.75	9	1
1:A:45:SER:HB3	1:A:69:THR:HG21	0.58	1.76	7	3
1:A:115:GLU:HA	1:A:120:ARG:HB3	0.58	1.75	17	1
1:A:58:ASP:HA	1:A:61:ASN:HB2	0.58	1.74	18	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:93:THR:HB	1:A:162:ARG:HD2	0.58	1.75	20	1
1:A:46:MET:HG2	1:A:62:THR:HG23	0.57	1.76	3	5
1:A:125:LEU:HD22	1:A:163:VAL:HG21	0.57	1.76	5	3
1:A:60:SER:HA	1:A:63:ILE:HD12	0.56	1.76	18	8
1:A:97:ILE:HG21	1:A:114:LEU:HD22	0.56	1.76	1	4
1:A:142:TYR:HA	1:A:146:LYS:HA	0.56	1.76	12	3
1:A:43:LEU:HD22	1:A:49:ARG:HG2	0.56	1.77	19	1
1:A:24:PHE:CE1	1:A:79:ARG:HD2	0.55	2.36	2	2
1:A:32:GLU:HB2	1:A:87:GLN:HG2	0.55	1.76	20	2
1:A:138:GLU:HG3	1:A:151:VAL:HG12	0.55	1.78	13	1
1:A:92:PRO:HA	1:A:161:ASN:O	0.55	2.02	8	6
1:A:31:PHE:HD2	1:A:39:VAL:HG12	0.55	1.62	10	2
1:A:93:THR:HA	1:A:124:SER:HA	0.55	1.78	17	1
1:A:99:PHE:HE1	1:A:111:LYS:HG3	0.54	1.62	6	4
1:A:66:LEU:HB3	1:A:75:VAL:HG21	0.54	1.78	16	1
1:A:108:ASP:HA	1:A:111:LYS:CE	0.54	2.32	5	1
1:A:33:GLY:HA3	1:A:88:VAL:H	0.54	1.59	3	1
1:A:65:ALA:O	1:A:69:THR:HG23	0.54	2.03	7	5
1:A:101:GLY:HA3	1:A:169:PHE:HB2	0.54	1.78	1	3
1:A:103:LYS:H	1:A:103:LYS:HD2	0.53	1.63	8	1
1:A:32:GLU:HB3	1:A:87:GLN:HG2	0.53	1.78	17	2
1:A:28:ASP:HB3	1:A:83:THR:HG23	0.53	1.79	3	3
1:A:66:LEU:HD22	1:A:72:PHE:HE2	0.53	1.63	17	1
1:A:33:GLY:HA3	1:A:88:VAL:HG22	0.53	1.79	16	1
1:A:48:VAL:HG12	1:A:54:VAL:HG11	0.52	1.79	4	1
1:A:73:GLU:HG2	1:A:124:SER:HB2	0.52	1.80	10	2
1:A:125:LEU:HD11	1:A:130:ILE:HD11	0.52	1.81	16	1
1:A:158:LEU:HD11	1:A:162:ARG:HB2	0.51	1.82	20	3
1:A:94:ILE:HG13	1:A:125:LEU:HB2	0.51	1.81	13	1
1:A:115:GLU:HG2	1:A:120:ARG:HB3	0.51	1.82	12	3
1:A:98:THR:HB	1:A:166:LYS:HG2	0.51	1.83	6	2
1:A:130:ILE:HG23	1:A:153:ALA:HB3	0.51	1.83	14	5
1:A:49:ARG:HD2	1:A:52:ASP:HB2	0.51	1.83	2	1
1:A:29:ILE:HD13	1:A:43:LEU:HD21	0.51	1.82	19	1
1:A:41:ALA:HA	1:A:44:LEU:HD12	0.51	1.81	5	1
1:A:48:VAL:HG11	1:A:54:VAL:HG13	0.50	1.83	16	1
1:A:45:SER:HB2	1:A:66:LEU:HD23	0.50	1.82	17	2
1:A:94:ILE:HD11	1:A:125:LEU:HB2	0.49	1.85	15	6
1:A:150:SER:H	1:A:170:GLN:HB2	0.48	1.68	3	1
1:A:77:VAL:HB	1:A:86:VAL:HG22	0.48	1.84	17	1
1:A:126:ASP:HB3	1:A:129:THR:OG1	0.47	2.09	15	4

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:127:ARG:HD2	1:A:127:ARG:H	0.47	1.68	17	1
1:A:29:ILE:HG21	1:A:46:MET:HE1	0.47	1.84	20	1
1:A:99:PHE:HB3	1:A:102:ASN:HD21	0.47	1.70	4	1
1:A:130:ILE:HA	1:A:133:ILE:HD12	0.47	1.86	17	1
1:A:48:VAL:HB	1:A:54:VAL:HG11	0.47	1.87	9	1
1:A:77:VAL:HG22	1:A:86:VAL:HG13	0.46	1.86	12	3
1:A:151:VAL:HA	1:A:168:VAL:O	0.46	2.10	17	2
1:A:145:GLY:O	1:A:146:LYS:HG2	0.46	2.10	4	1
1:A:30:HIS:O	1:A:85:LEU:HA	0.46	2.11	5	1
1:A:43:LEU:HD22	1:A:49:ARG:HD2	0.46	1.87	13	2
1:A:72:PHE:CD1	1:A:88:VAL:HG21	0.45	2.47	15	1
1:A:32:GLU:HG3	1:A:85:LEU:HD11	0.45	1.87	3	1
1:A:73:GLU:HG2	1:A:89:LYS:HD2	0.45	1.88	15	1
1:A:115:GLU:HG2	1:A:120:ARG:HB2	0.45	1.89	14	1
1:A:100:SER:OG	1:A:166:LYS:HE3	0.44	2.12	1	1
1:A:40:GLY:O	1:A:44:LEU:HG	0.44	2.12	2	1
1:A:117:SER:HB2	1:A:133:ILE:HG12	0.44	1.89	5	1
1:A:77:VAL:O	1:A:78:LEU:HD13	0.43	2.13	20	1
1:A:99:PHE:HD1	1:A:107:ASP:HB2	0.43	1.73	17	2
1:A:127:ARG:HA	1:A:130:ILE:HG12	0.43	1.90	12	2
1:A:106:LYS:O	1:A:110:LEU:HG	0.43	2.13	13	1
1:A:102:ASN:HA	1:A:141:TYR:OH	0.43	2.14	8	1
1:A:98:THR:HB	1:A:166:LYS:HE3	0.43	1.91	11	1
1:A:158:LEU:HD12	1:A:160:ARG:HB2	0.43	1.91	13	1
1:A:119:VAL:HG21	1:A:133:ILE:HD11	0.42	1.91	17	1
1:A:134:GLU:O	1:A:138:GLU:HG2	0.42	2.13	4	1
1:A:102:ASN:HB2	1:A:105:VAL:O	0.42	2.14	11	2
1:A:157:PRO:HA	1:A:163:VAL:HG12	0.42	1.91	9	1
1:A:48:VAL:HG23	1:A:52:ASP:HB3	0.42	1.91	10	1
1:A:73:GLU:O	1:A:126:ASP:HB2	0.42	2.13	20	1
1:A:49:ARG:O	1:A:52:ASP:HB2	0.42	2.15	6	2
1:A:158:LEU:HG	1:A:162:ARG:O	0.42	2.14	5	3
1:A:32:GLU:O	1:A:87:GLN:HA	0.42	2.15	5	1
1:A:160:ARG:HA	1:A:160:ARG:HD2	0.42	1.63	10	1
1:A:127:ARG:HD3	1:A:128:THR:HG23	0.42	1.91	14	1
1:A:140:PHE:O	1:A:144:VAL:HG23	0.42	2.14	4	2
1:A:123:GLU:HG3	1:A:124:SER:N	0.42	2.30	13	1
1:A:137:LEU:HD22	1:A:169:PHE:HZ	0.42	1.75	5	1
1:A:126:ASP:HA	1:A:127:ARG:NH1	0.42	2.30	13	1
1:A:103:LYS:HA	1:A:103:LYS:HD2	0.42	1.67	10	1
1:A:103:LYS:H	1:A:103:LYS:CD	0.41	2.27	8	1

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Atom-1	Atom-2	Clash(Å)	Distance(Å)	Models	
				Worst	Total
1:A:27:LYS:HB2	1:A:82:ASP:HB3	0.41	1.93	5	1
1:A:144:VAL:HG13	1:A:145:GLY:H	0.41	1.74	11	1
1:A:74:ASP:HB3	1:A:89:LYS:HB3	0.41	1.92	3	1
1:A:73:GLU:H	1:A:73:GLU:HG3	0.41	1.55	19	1
1:A:97:ILE:HG21	1:A:114:LEU:CD1	0.41	2.46	10	1
1:A:98:THR:HB	1:A:166:LYS:HD3	0.41	1.93	10	1
1:A:73:GLU:OE1	1:A:89:LYS:HE2	0.41	2.16	19	1
1:A:120:ARG:HG3	1:A:123:GLU:HB2	0.41	1.92	5	1
1:A:99:PHE:HE2	1:A:167:LEU:HD13	0.41	1.76	19	1
1:A:29:ILE:HD12	1:A:43:LEU:HD21	0.40	1.92	5	1
1:A:94:ILE:CD1	1:A:125:LEU:HB2	0.40	2.47	14	1
1:A:149:ALA:HA	1:A:170:GLN:O	0.40	2.16	11	1
1:A:104:SER:HB2	1:A:141:TYR:CE1	0.40	2.52	20	1
1:A:94:ILE:CD1	1:A:119:VAL:HG12	0.40	2.46	17	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	142/164 (87%)	136±2 (96±1%)	4±2 (3±1%)	2±1 (1±1%)	15	61
All	All	2840/3280 (87%)	2728 (96%)	73 (3%)	39 (1%)	15	61

All 7 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	144	VAL	19
1	A	160	ARG	9
1	A	161	ASN	4
1	A	33	GLY	3
1	A	148	SER	2
1	A	159	PRO	1
1	A	101	GLY	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	121/139 (87%)	78±3 (65±3%)	43±3 (35±3%)	1 9
All	All	2420/2780 (87%)	1566 (65%)	854 (35%)	1 9

All 91 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	67	PHE	20
1	A	83	THR	20
1	A	125	LEU	20
1	A	84	LEU	19
1	A	98	THR	19
1	A	53	THR	18
1	A	59	ILE	18
1	A	127	ARG	18
1	A	148	SER	18
1	A	158	LEU	18
1	A	96	SER	17
1	A	45	SER	16
1	A	123	GLU	16
1	A	141	TYR	16
1	A	160	ARG	16
1	A	163	VAL	16
1	A	119	VAL	16
1	A	30	HIS	15
1	A	107	ASP	15
1	A	110	LEU	15
1	A	135	LYS	15
1	A	120	ARG	15
1	A	155	VAL	15
1	A	76	ARG	14
1	A	100	SER	14
1	A	124	SER	14
1	A	150	SER	14
1	A	72	PHE	14
1	A	102	ASN	12

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Mol	Chain	Res	Type	Models (Total)
1	A	152	LYS	12
1	A	89	LYS	12
1	A	32	GLU	11
1	A	82	ASP	11
1	A	112	GLN	11
1	A	79	ARG	11
1	A	166	LYS	11
1	A	142	TYR	11
1	A	27	LYS	10
1	A	60	SER	10
1	A	111	LYS	10
1	A	170	GLN	10
1	A	109	MET	10
1	A	104	SER	10
1	A	108	ASP	10
1	A	64	ARG	9
1	A	97	ILE	9
1	A	146	LYS	9
1	A	115	GLU	9
1	A	73	GLU	9
1	A	129	THR	9
1	A	48	VAL	8
1	A	56	ASP	8
1	A	52	ASP	8
1	A	39	VAL	8
1	A	26	VAL	7
1	A	49	ARG	7
1	A	78	LEU	7
1	A	106	LYS	7
1	A	103	LYS	7
1	A	57	GLU	7
1	A	132	ASP	7
1	A	114	LEU	6
1	A	162	ARG	6
1	A	54	VAL	6
1	A	61	ASN	6
1	A	140	PHE	6
1	A	164	ASP	5
1	A	71	ASN	4
1	A	143	SER	4
1	A	139	ASP	4
1	A	85	LEU	3

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Mol	Chain	Res	Type	Models (Total)
1	A	165	LEU	3
1	A	167	LEU	3
1	A	43	LEU	3
1	A	80	ASP	3
1	A	117	SER	3
1	A	138	GLU	3
1	A	88	VAL	2
1	A	50	THR	2
1	A	31	PHE	2
1	A	113	ASN	2
1	A	55	ASN	1
1	A	169	PHE	1
1	A	168	VAL	1
1	A	62	THR	1
1	A	77	VAL	1
1	A	28	ASP	1
1	A	58	ASP	1
1	A	128	THR	1
1	A	46	MET	1
1	A	87	GLN	1

6.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

6.5 Carbohydrates (i)

There are no monosaccharides in this entry.

6.6 Ligand geometry (i)

There are no ligands in this entry.

6.7 Other polymers (i)

There are no such molecules in this entry.

6.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

7 Chemical shift validation

The completeness of assignment taking into account all chemical shift lists is 92% for the well-defined parts and 91% for the entire structure.

7.1 Chemical shift list 1

File name: working_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	1906
Number of shifts mapped to atoms	1888
Number of unparsed shifts	0
Number of shifts with mapping errors	18
Number of shifts with mapping warnings	0
Number of shift outliers (ShiftChecker)	4

The following assigned chemical shifts were not mapped to the molecules present in the coordinate file.

- No matching atom found in the structure. All 18 occurrences are reported below.

List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	175	LEU	H	8.337	0.006	1
1	A	175	LEU	HA	4.35	0.005	1
1	A	175	LEU	HB2	1.546	0.012	2
1	A	175	LEU	HB3	1.543	0.012	2
1	A	175	LEU	HD11	0.843	0.011	2
1	A	175	LEU	HD12	0.843	0.011	2
1	A	175	LEU	HD13	0.843	0.011	2
1	A	175	LEU	HD21	0.839	0.010	2
1	A	175	LEU	HD22	0.839	0.010	2
1	A	175	LEU	HD23	0.839	0.010	2
1	A	175	LEU	HG	1.558	0.007	1
1	A	175	LEU	C	176.39	0.000	1
1	A	175	LEU	CA	55.201	0.035	1
1	A	175	LEU	CB	42.348	0.036	1

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List ID	Chain	Res	Type	Atom	Shift Data		
					Value	Uncertainty	Ambiguity
1	A	175	LEU	CD1	25.118	0.006	2
1	A	175	LEU	CD2	23.351	0.030	2
1	A	175	LEU	CG	27.057	0.014	1
1	A	175	LEU	N	125.032	0.014	1

7.1.2 Chemical shift referencing (i)

The following table shows the suggested chemical shift referencing corrections.

Nucleus	# values	Correction ± precision, *ppm*	Suggested action
$^{13}C_{\alpha}$	154	-0.31 ± 0.10	None needed (< 0.5 ppm)
$^{13}C_{\beta}$	141	-0.11 ± 0.11	None needed (< 0.5 ppm)
$^{13}C'$	150	-0.23 ± 0.12	None needed (< 0.5 ppm)
^{15}N	149	-0.37 ± 0.35	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 92%, i.e. 1764 atoms were assigned a chemical shift out of a possible 1911. 0 out of 31 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	710/713 (100%)	291/291 (100%)	281/284 (99%)	138/138 (100%)
Sidechain	970/1093 (89%)	664/712 (93%)	297/339 (88%)	9/42 (21%)
Aromatic	84/105 (80%)	42/51 (82%)	42/52 (81%)	0/2 (0%)
Overall	1764/1911 (92%)	997/1054 (95%)	620/675 (92%)	147/182 (81%)

The following table shows the completeness of the chemical shift assignments for the full structure. The overall completeness is 91%, i.e. 1888 atoms were assigned a chemical shift out of a possible 2079. 0 out of 34 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

	Total	^{1}H	^{13}C	^{15}N
Backbone	762/774 (98%)	312/316 (99%)	302/308 (98%)	148/150 (99%)
Sidechain	1042/1200 (87%)	713/780 (91%)	319/371 (86%)	10/49 (20%)
Aromatic	84/105 (80%)	42/51 (82%)	42/52 (81%)	0/2 (0%)
Overall	1888/2079 (91%)	1067/1147 (93%)	663/731 (91%)	158/201 (79%)

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	71	ASN	HB3	0.84	1.12 – 4.38	-5.9
1	A	36	ARG	H	11.50	5.25 – 11.22	5.5
1	A	90	GLU	HB2	3.12	1.00 – 3.05	5.3
1	A	90	GLU	HB3	3.10	0.95 – 3.05	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: