

Integrative Structure Validation Report

July 22, 2024 - 05:07 PM PDT

The following software was used in the production of this report:

Python-IHM Version 1.3

MolProbity Version 4.5.2

Integrative Modeling Validation Version 1.2

PDB ID	9A2V
PDB-Dev ID	PDBDEV_00000180
Structure Title	Model of E. coli AcrA by in-cell photo-crosslinking MS and deep learning
Structure Authors	Stahl, K.; Graziadei, A.; Dau, T.; Brock, O.; Rappsilber, J.

This is a PDB-Dev IM Structure Validation Report for a publicly released PDB-Dev entry.

We welcome your comments at pdb-dev@mail.wwpdb.org

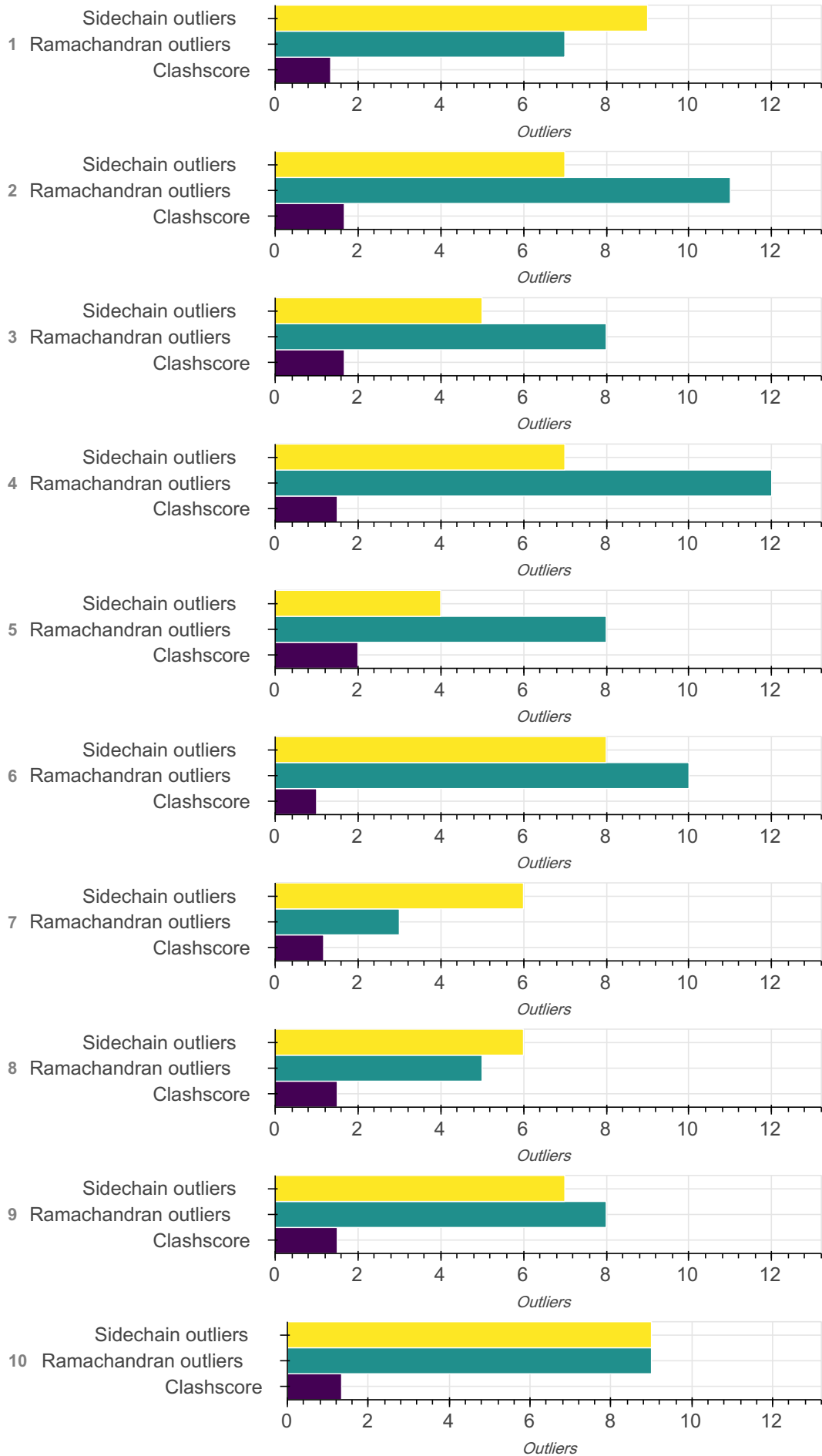
A user guide is available at https://pdb-dev.wwpdb.org/validation_help.html with specific help available everywhere you see the  symbol.

List of references used to build this report is available [here](#).

Overall quality

This validation report contains model quality assessments for all structures, data quality assessment for SAS datasets and fit to model assessments for SAS datasets. Data quality and fit to model assessments for other datasets and model uncertainty are under development. Number of plots is limited to 256.

Model Quality: MolProbity Analysis



Ensemble information

This entry consists of 0 distinct ensemble(s).

Summary

This entry consists of 10 unique models, with 1 subunits in each model. A total of 1 datasets or restraints were used to build this entry. Each model is represented by 0 rigid bodies and 1 flexible or non-rigid units.

Entry composition

There are 10 unique types of models in this entry. These models are titled None, None, None, None, None, None, None, None, None, None respectively.

Model ID	Subunit number	Subunit ID	Subunit name	Chain ID	Chain ID [auth]	Total residues
1	1	1	P0AE06	A	A	397
2	1	1	P0AE06	A	A	397
3	1	1	P0AE06	A	A	397
4	1	1	P0AE06	A	A	397
5	1	1	P0AE06	A	A	397
6	1	1	P0AE06	A	A	397
7	1	1	P0AE06	A	A	397
8	1	1	P0AE06	A	A	397
9	1	1	P0AE06	A	A	397
10	1	1	P0AE06	A	A	397

Datasets used for modeling

There is 1 unique dataset used to build the models in this entry.

ID	Dataset type	Database name	Data access code
1	Crosslinking-MS data	jPOSTrepo	JPST001851

Representation ?

This entry has only one representation and includes 0 rigid bodies and 1 flexible units

Chain ID	Rigid bodies	Non-rigid segments
A	-	1-397

Methodology and software ?

This entry is a result of 1 distinct protocol(s).

Step number	Protocol ID	Method name	Method type	Method description	Number of computed models	Multi state modeling	Multi scale modeling
1	1	AlphaLink with 10 msa subsamples	AlphaLink	None	10	False	False

There is 1 software package reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	AlphaLink	1.0	model building	https://github.com/lhatsk/AlphaLink

Data quality ?

Crosslinking-MS

Validation for this section is under development.

Model quality ?

For models with atomic structures, molprobtity analysis is performed. For models with coarse-grained or multi-scale structures, excluded volume analysis is performed.

Standard geometry: bond outliers?

There are 30200 bond outliers in this entry. A summary is provided below, and a detailed list of outliers can be found [here](#).

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
CG1--HG12	1.09	0.97	560
CB--HB2	1.09	0.97	2760
CG--HG2	1.09	0.97	1150
CA--HA	1.09	0.97	3650
CB--HB3	1.09	0.97	2760
CD--HD2	1.09	0.97	580
CG1--HG13	1.09	0.97	560
CD2--HD21	1.09	0.97	340
CG2--HG22	1.09	0.97	890
CE--HE2	1.09	0.97	270
CG--HG3	1.09	0.97	1150
CD--HD3	1.09	0.97	580
CD1--HD13	1.09	0.97	540
CB--HB1	1.09	0.97	470
CG2--HG21	1.09	0.97	890
CD2--HD22	1.09	0.97	340
CE--HE3	1.09	0.97	270
CG2--HG23	1.09	0.97	890
CB--HB	1.09	0.97	890
CD1--HD12	1.09	0.97	540
NZ--HZ1	1.01	0.89	230
CG--HG	1.09	0.97	340

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
OH--HH	0.96	0.84	90
CA--HA2	1.09	0.97	320
OG--HG	0.96	0.84	220
CD1--HD11	1.09	0.97	540
CA--HA3	1.09	0.97	320
OG1--HG1	0.96	0.84	330
CD2--HD23	1.09	0.97	340
NZ--HZ2	1.01	0.89	230
CG1--HG11	1.09	0.97	360
CE--HE1	1.09	0.97	40
N--H2	1.01	0.89	10
NZ--HZ3	1.01	0.89	230
N--H1	1.01	0.89	10
N--H3	1.01	0.89	10
SG--HG	1.33	1.20	2
SG--HG	1.34	1.20	8
N--H	1.01	0.86	3780
NH2--HH21	1.01	0.86	170
CE1--HE1	1.08	0.93	170
CE2--HE2	1.08	0.93	160
ND2--HD21	1.01	0.86	170
NE2--HE22	1.01	0.86	360
NH1--HH12	1.01	0.86	170

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
NE2--HE21	1.01	0.86	360
CZ--HZ	1.08	0.93	70
ND2--HD22	1.01	0.86	170
CD1--HD1	1.08	0.93	170
NE--HE	1.01	0.86	170
NH2--HH22	1.01	0.86	170
CD2--HD2	1.08	0.93	170
NH1--HH11	1.01	0.86	170
CZ3--HZ3	1.08	0.93	10
CZ2--HZ2	1.08	0.93	10
ND1--HD1	1.01	0.86	10
CE3--HE3	1.08	0.93	10
CH2--HH2	1.08	0.93	10
NE1--HE1	1.01	0.86	10

Standard geometry: angle outliers

There are 290 angle outliers in this entry. A summary is provided below, and a detailed list of outliers can be found [here](#).

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C-N-CA	121.70	137.64	1
C-N-CA	121.70	136.17	1
C-N-CA	121.70	135.34	1
C-N-CA	121.70	135.19	1
C-N-CA	121.70	134.88	1
C-N-CA	121.70	133.51	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C-N-CA	121.70	133.20	1
C-N-CA	121.70	132.99	1
OE1-CD-NE2	122.60	116.36	1
C-N-CA	121.70	132.47	1
C-N-CA	121.70	132.40	1
C-N-CA	121.70	131.98	1
C-N-CA	121.70	131.58	1
C-N-CA	121.70	131.50	1
OE1-CD-NE2	122.60	117.25	1
C-N-CA	121.70	131.21	1
C-N-CA	121.70	131.17	1
C-N-CA	121.70	131.12	1
C-N-CA	121.70	130.99	1
C-N-CA	121.70	130.87	1
CA-C-N	116.20	126.33	1
CA-C-N	116.20	126.26	1
C-N-CA	121.70	130.67	1
C-N-CA	121.70	130.62	1
C-N-CA	121.70	130.60	1
N-CA-CB	111.50	103.12	1
OE1-CD-NE2	122.60	117.67	1
OE1-CD-NE2	122.60	117.70	1
OE1-CD-NE2	122.60	117.72	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OE1-CD-NE2	122.60	117.74	1
C-N-CA	121.70	130.40	1
NH1-CZ-NH2	119.30	113.02	1
OE1-CD-NE2	122.60	117.77	2
OE1-CD-NE2	122.60	117.78	1
OE1-CD-NE2	122.60	117.82	2
C-N-CA	121.70	130.30	1
OE1-CD-NE2	122.60	117.83	1
NH1-CZ-NH2	119.30	113.12	1
OE1-CD-NE2	122.60	117.86	3
OE1-CD-NE2	122.60	117.88	1
NH1-CZ-NH2	119.30	113.17	1
OE1-CD-NE2	122.60	117.90	1
OE1-CD-NE2	122.60	117.91	2
OD1-CG-ND2	122.60	117.92	1
OE1-CD-NE2	122.60	117.93	2
OE1-CD-NE2	122.60	117.94	2
C-N-CA	121.70	130.07	1
OE1-CD-NE2	122.60	117.95	1
C-N-CA	121.70	130.06	1
OE1-CD-NE2	122.60	117.96	2
NH1-CZ-NH2	119.30	113.27	1
OE1-CD-NE2	122.60	117.97	3

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OE1-CD-NE2	122.60	117.98	2
NH1-CZ-NH2	119.30	113.29	1
OE1-CD-NE2	122.60	117.99	1
OE1-CD-NE2	122.60	118.00	3
C-N-CA	121.70	129.97	1
O-C-N	123.00	115.66	1
OE1-CD-NE2	122.60	118.01	1
OE1-CD-NE2	122.60	118.03	3
O-C-N	123.00	115.68	1
OE1-CD-NE2	122.60	118.04	5
OE1-CD-NE2	122.60	118.05	3
OE1-CD-NE2	122.60	118.06	3
NH1-CZ-NH2	119.30	113.40	2
OE1-CD-NE2	122.60	118.07	3
C-N-CA	121.70	129.85	1
OE1-CD-NE2	122.60	118.08	2
C-N-CA	121.70	129.81	1
OE1-CD-NE2	122.60	118.09	1
OE1-CD-NE2	122.60	118.11	3
O-C-N	123.00	115.82	1
OE1-CD-NE2	122.60	118.12	1
OE1-CD-NE2	122.60	118.13	2
OE1-CD-NE2	122.60	118.14	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
NH1-CZ-NH2	119.30	113.51	1
NH1-CZ-NH2	119.30	113.52	1
OE1-CD-NE2	122.60	118.16	5
C-N-CA	121.70	129.69	1
CA-N-CD	112.00	105.79	1
OE1-CD-NE2	122.60	118.17	4
C-N-CA	121.70	129.67	1
OE1-CD-NE2	122.60	118.18	6
C-N-CA	121.70	129.66	1
C-N-CA	121.70	129.65	1
OE1-CD-NE2	122.60	118.19	2
C-N-CA	121.70	129.61	1
OE1-CD-NE2	122.60	118.22	1
OE1-CD-NE2	122.60	118.23	3
OE1-CD-NE2	122.60	118.24	1
C-N-CA	121.70	129.53	1
OE1-CD-NE2	122.60	118.25	2
CA-C-N	116.20	124.88	1
OE1-CD-NE2	122.60	118.27	1
OE1-CD-NE2	122.60	118.28	6
O-C-N	123.00	116.09	1
OE1-CD-NE2	122.60	118.29	3
OD1-CG-ND2	122.60	118.29	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OE1-CD-NE2	122.60	118.30	2
OE1-CD-NE2	122.60	118.31	4
OE1-CD-NE2	122.60	118.32	1
C-N-CA	121.70	129.40	1
C-N-CA	121.70	129.39	1
OE1-CD-NE2	122.60	118.33	1
OE1-CD-NE2	122.60	118.34	3
C-N-CA	121.70	129.36	1
OE1-CD-NE2	122.60	118.35	5
OE1-CD-NE2	122.60	118.36	7
C-N-CA	121.70	129.33	1
C-N-CA	121.70	129.32	1
OE1-CD-NE2	122.60	118.37	3
OE1-CD-NE2	122.60	118.38	2
C-N-CA	121.70	129.30	1
OE1-CD-NE2	122.60	118.39	5
OE1-CD-NE2	122.60	118.40	2
C-N-CA	121.70	129.27	1
OE1-CD-NE2	122.60	118.41	3
C-N-CA	121.70	129.23	1
OE1-CD-NE2	122.60	118.43	6
C-N-CA	121.70	129.20	1
OE1-CD-NE2	122.60	118.44	4

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C-N-CA	121.70	129.18	1
OE1-CD-NE2	122.60	118.45	3
O-C-N	123.00	116.36	1
NE-CZ-NH2	119.20	122.93	1
OE1-CD-NE2	122.60	118.46	2
OE1-CD-NE2	122.60	118.47	2
OE1-CD-NE2	122.60	118.48	6
CA-C-N	116.20	124.44	1
OE1-CD-NE2	122.60	118.49	2
OD1-CG-ND2	122.60	118.50	1
OE1-CD-NE2	122.60	118.50	3
N-CA-C	111.00	122.48	1
OE1-CD-NE2	122.60	118.51	3
OD1-CG-ND2	122.60	118.51	1
OE1-CD-NE2	122.60	118.53	4
OE1-CD-NE2	122.60	118.54	3
OD1-CG-ND2	122.60	118.54	1
NE-CZ-NH2	119.20	122.86	1
O-C-N	123.00	116.51	1
OE1-CD-NE2	122.60	118.55	3
CA-CB-CG1	110.40	117.29	1
OD1-CG-ND2	122.60	118.55	2
OE1-CD-NE2	122.60	118.56	2

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OD1-CG-ND2	122.60	118.56	1
OD1-CG-ND2	122.60	118.57	1
OE1-CD-NE2	122.60	118.57	4
OE1-CD-NE2	122.60	118.58	3
OE1-CD-NE2	122.60	118.59	5
C-N-CA	121.70	128.92	1
CA-CB-CG2	110.40	117.20	1
OE1-CD-NE2	122.60	118.60	1
OD1-CG-ND2	122.60	118.60	1
C-N-H	112.29	124.30	1
C-N-H	112.21	124.30	1
C-N-H	112.20	124.30	1
HZ2-NZ-HZ3	96.73	109.00	1
C-N-H	111.97	124.30	1
C-N-H	111.66	124.30	1
C-N-H	111.48	124.30	1
C-N-H	111.42	124.30	1
C-N-H	111.34	124.30	1
C-N-H	111.23	124.30	1
C-N-H	110.98	124.30	1
C-N-H	110.86	124.30	1
C-N-H	110.35	124.30	1
C-N-H	110.08	124.30	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C-N-H	108.18	124.30	1
C-N-H	108.11	124.30	1
C-N-H	108.04	124.30	1
C-N-H	106.94	124.30	1

Too-close contacts

The following all-atom clashscore is based on a MolProbity analysis. All-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The table below contains clashscores for all the models in this entry.

Model ID	Clash score	Number of clashes
1	1.34	8
2	1.67	10
3	1.67	10
4	1.50	9
5	2.00	12
6	1.00	6
7	1.17	7
8	1.50	9
9	1.50	9
10	1.34	8

All 88 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Model ID	Atom-1	Atom-2	Clash overlap (Å)
1	A:52:ILE:HG23	A:341:GLN:HE22	0.494
1	A:265:VAL:HG22	A:276:LEU:CD2	0.477
1	A:254:PHE:CD2	A:255:PRO:HD2	0.466

Model ID	Atom-1	Atom-2	Clash overlap (Å)
1	A:52:ILE:CG2	A:341:GLN:HE22	0.464
1	A:265:VAL:HG13	A:274:ILE:HG23	0.449
1	A:31:GLN:C	A:33:GLY:H	0.426
1	A:45:VAL:HG13	A:306:ILE:HG23	0.426
1	A:341:GLN:NE2	A:343:ILE:HD11	0.410
2	A:265:VAL:HG12	A:276:LEU:HD23	0.637
2	A:105:TYR:CZ	A:109:LYS:HE3	0.574
2	A:218:GLN:HE22	A:226:LEU:CD1	0.555
2	A:31:GLN:C	A:33:GLY:H	0.454
2	A:245:SER:HB2	A:253:LYS:HE3	0.445
2	A:254:PHE:CD2	A:255:PRO:HD2	0.427
2	A:87:ILE:HG21	A:93:LEU:HD21	0.425
2	A:244:VAL:HG21	A:260:LEU:HB2	0.425
2	A:45:VAL:HG13	A:306:ILE:HG23	0.415
2	A:246:LEU:HG	A:280:PHE:CZ	0.406
3	A:325:VAL:HG21	A:335:ARG:CZ	0.711
3	A:265:VAL:HG12	A:276:LEU:HD23	0.606
3	A:341:GLN:NE2	A:343:ILE:HD11	0.598
3	A:341:GLN:HE21	A:343:ILE:HD11	0.534
3	A:325:VAL:HG21	A:335:ARG:NH2	0.482
3	A:254:PHE:CD2	A:255:PRO:HD2	0.468
3	A:40:VAL:CG1	A:367:VAL:HG21	0.425
3	A:45:VAL:HG13	A:306:ILE:HG23	0.424

Model ID	Atom-1	Atom-2	Clash overlap (Å)
3	A:105:TYR:CZ	A:109:LYS:HE3	0.406
3	A:183:ARG:NH1	A:288:LEU:HD21	0.402
4	A:223:PHE:CZ	A:227:LYS:HE3	0.703
4	A:265:VAL:HG12	A:276:LEU:HD23	0.608
4	A:260:LEU:HD11	A:276:LEU:HB3	0.594
4	A:50:LEU:HD21	A:343:ILE:CD1	0.568
4	A:254:PHE:CD2	A:255:PRO:HD2	0.449
4	A:45:VAL:HG13	A:306:ILE:HG23	0.443
4	A:105:TYR:CZ	A:109:LYS:HE3	0.425
4	A:223:PHE:CE1	A:227:LYS:HE3	0.423
4	A:230:LEU:HD11	A:262:PHE:CD2	0.415
5	A:12:VAL:HG12	A:13:VAL:HG23	0.609
5	A:12:VAL:HG12	A:13:VAL:CG2	0.598
5	A:265:VAL:CG1	A:274:ILE:HG23	0.502
5	A:105:TYR:CZ	A:109:LYS:HE3	0.477
5	A:50:LEU:HD21	A:343:ILE:CD1	0.471
5	A:254:PHE:CD2	A:255:PRO:HD2	0.457
5	A:56:LEU:HD22	A:218:GLN:CD	0.448
5	A:87:ILE:HG21	A:93:LEU:HD21	0.448
5	A:244:VAL:HG21	A:260:LEU:HB2	0.439
5	A:45:VAL:HG13	A:306:ILE:HG23	0.438
5	A:9:PRO:O	A:10:LEU:HD12	0.436
5	A:105:TYR:CE1	A:109:LYS:HE3	0.409

Model ID	Atom-1	Atom-2	Clash overlap (Å)
6	A:265:VAL:HG13	A:274:ILE:HG23	0.634
6	A:244:VAL:HG21	A:260:LEU:HB2	0.525
6	A:87:ILE:HD11	A:206:VAL:HG11	0.486
6	A:254:PHE:CD2	A:255:PRO:HD2	0.455
6	A:87:ILE:O	A:87:ILE:HD12	0.413
6	A:45:VAL:HG13	A:306:ILE:HG23	0.401
7	A:11:ALA:O	A:12:VAL:HG23	0.611
7	A:265:VAL:HG12	A:276:LEU:HD23	0.540
7	A:50:LEU:HD21	A:343:ILE:CD1	0.505
7	A:254:PHE:CD2	A:255:PRO:HD2	0.455
7	A:235:LEU:HD23	A:299:GLU:HA	0.452
7	A:8:THR:HB	A:9:PRO:CD	0.410
7	A:47:THR:HB	A:304:ASN:HA	0.405
8	A:50:LEU:HD21	A:343:ILE:CD1	0.526
8	A:245:SER:HB2	A:253:LYS:HE3	0.482
8	A:105:TYR:CE1	A:109:LYS:HE2	0.470
8	A:254:PHE:CD2	A:255:PRO:HD2	0.469
8	A:244:VAL:HG21	A:260:LEU:HB2	0.466
8	A:87:ILE:HD11	A:206:VAL:HG11	0.454
8	A:87:ILE:O	A:87:ILE:HD12	0.443
8	A:87:ILE:HD11	A:206:VAL:CG1	0.422
8	A:105:TYR:CZ	A:109:LYS:HE2	0.415
9	A:50:LEU:HD21	A:343:ILE:CD1	0.624

Model ID	Atom-1	Atom-2	Clash overlap (Å)
9	A:105:TYR:CZ	A:109:LYS:HE3	0.586
9	A:50:LEU:HD21	A:343:ILE:HD13	0.480
9	A:230:LEU:CB	A:235:LEU:HD12	0.475
9	A:19:SER:HB3	A:20:LEU:HD12	0.462
9	A:45:VAL:HG13	A:306:ILE:HG23	0.444
9	A:230:LEU:HB2	A:235:LEU:HD12	0.443
9	A:254:PHE:CD2	A:255:PRO:HD2	0.432
9	A:235:LEU:HD21	A:262:PHE:CD2	0.414
10	A:56:LEU:CD2	A:218:GLN:HE21	0.627
10	A:235:LEU:HD11	A:297:LEU:HD21	0.518
10	A:56:LEU:HD22	A:218:GLN:HE21	0.493
10	A:230:LEU:HD11	A:237:GLN:CD	0.477
10	A:254:PHE:CD2	A:255:PRO:HD2	0.469
10	A:8:THR:HB	A:9:PRO:HD2	0.432
10	A:87:ILE:HD11	A:206:VAL:HG11	0.431
10	A:40:VAL:HG11	A:367:VAL:HG11	0.416

Torsion angles: Protein backbone

In the following table, Ramachandran outliers are listed. The Analysed column shows the number of residues for which the backbone conformation was analysed.

Model ID	Analysed	Favored	Allowed	Outliers
1	395	374	14	7
2	395	371	13	11
3	395	371	16	8
4	395	373	10	12

Model ID	Analyzed	Favored	Allowed	Outliers
5	395	366	21	8
6	395	370	15	10
7	395	372	20	3
8	395	372	18	5
9	395	373	14	8
10	395	370	16	9

Detailed list of outliers are tabulated below.

Torsion angles: Protein sidechains ?

In the following table, sidechain outliers are listed. The Analysed column shows the number of residues for which the sidechain conformation was analysed.

Model ID	Analyzed	Favored	Allowed	Outliers
1	318	300	9	9
2	318	304	7	7
3	318	307	6	5
4	318	301	10	7
5	318	305	9	4
6	318	301	9	8
7	318	301	11	6
8	318	305	7	6
9	318	302	9	7
10	318	304	5	9

Detailed list of outliers are tabulated below.

Model ID	Chain	Residue ID	Residue type
1	A	7	PHE
1	A	8	THR

Model ID	Chain	Residue ID	Residue type
1	A	10	LEU
1	A	14	LEU
1	A	16	LEU
1	A	17	SER
1	A	22	LEU
1	A	325	VAL
1	A	379	THR
2	A	1	MET
2	A	7	PHE
2	A	8	THR
2	A	10	LEU
2	A	16	LEU
2	A	22	LEU
2	A	388	SER
3	A	8	THR
3	A	14	LEU
3	A	16	LEU
3	A	22	LEU
3	A	54	THR
4	A	8	THR
4	A	10	LEU
4	A	12	VAL
4	A	14	LEU

Model ID	Chain	Residue ID	Residue type
4	A	16	LEU
4	A	20	LEU
4	A	263	SER
5	A	8	THR
5	A	10	LEU
5	A	12	VAL
5	A	14	LEU
6	A	7	PHE
6	A	8	THR
6	A	10	LEU
6	A	14	LEU
6	A	17	SER
6	A	20	LEU
6	A	325	VAL
6	A	379	THR
7	A	1	MET
7	A	8	THR
7	A	14	LEU
7	A	17	SER
7	A	22	LEU
7	A	234	THR
8	A	8	THR
8	A	10	LEU

Model ID	Chain	Residue ID	Residue type
8	A	14	LEU
8	A	16	LEU
8	A	20	LEU
8	A	54	THR
9	A	8	THR
9	A	10	LEU
9	A	14	LEU
9	A	16	LEU
9	A	17	SER
9	A	22	LEU
9	A	378	VAL
10	A	8	THR
10	A	10	LEU
10	A	14	LEU
10	A	16	LEU
10	A	19	SER
10	A	20	LEU
10	A	22	LEU
10	A	244	VAL
10	A	311	GLN

Fit of model to data used for modeling ?

Crosslinking-MS

Validation for this section is under development.

Fit of model to data used for validation

Validation for this section is under development.

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