

Integrative Structure Validation Report

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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	9A34
PDB-Dev ID	PDBDEV_00000189
Structure Title	Model of E. coli OmpT by in-cell photo-crosslinking MS and deep learning
Structure Authors	Stahl, K.; Graziadei, A.; Dau, T.; Brock, O.; Rappilber, 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

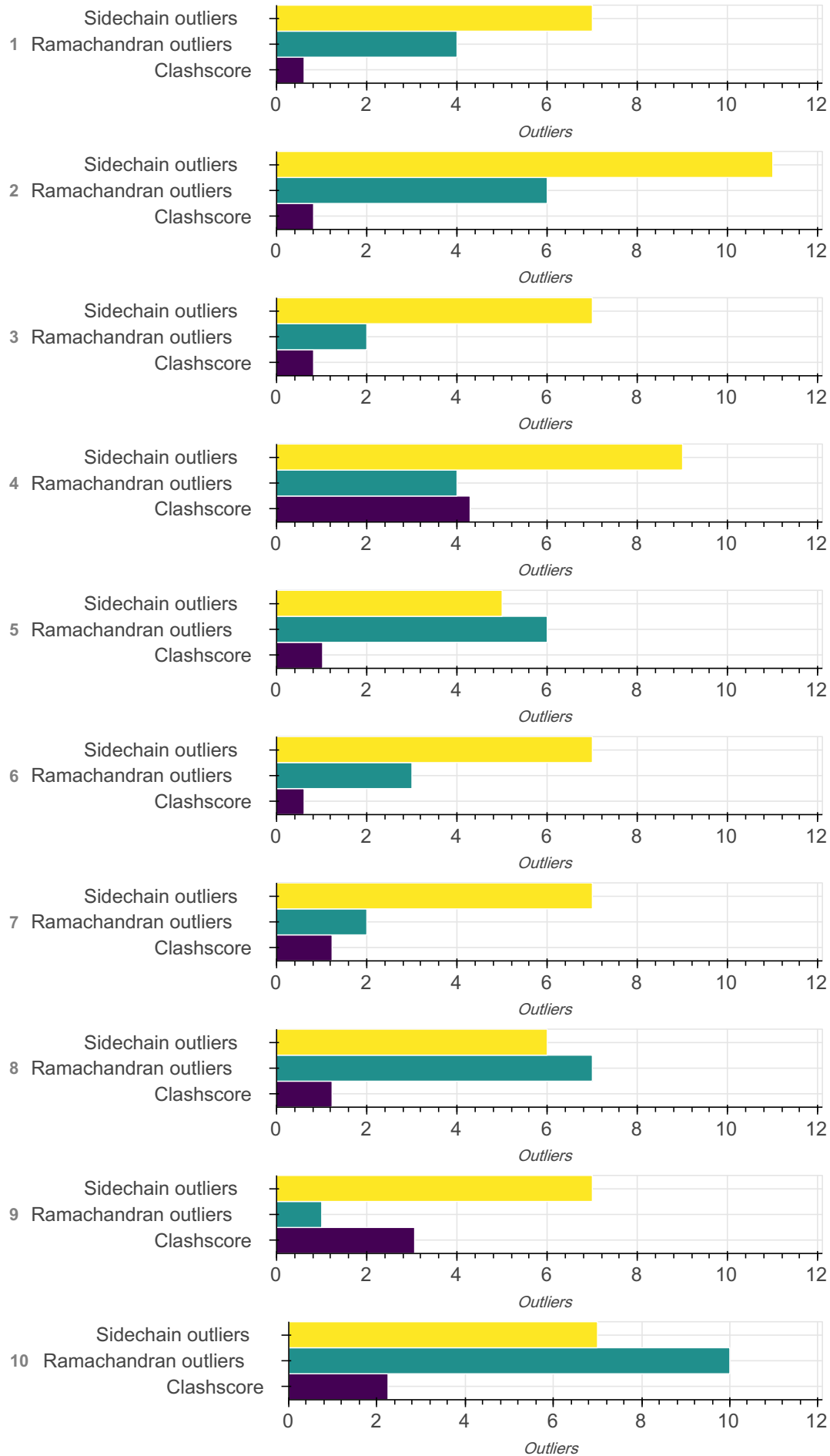
A user guide is available at https://pdb-dev.wwpdb.org/validation_help.html with specific help available everywhere you see the  symbol.

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	P09169	A	A	317
2	1	1	P09169	A	A	317
3	1	1	P09169	A	A	317
4	1	1	P09169	A	A	317
5	1	1	P09169	A	A	317
6	1	1	P09169	A	A	317
7	1	1	P09169	A	A	317
8	1	1	P09169	A	A	317
9	1	1	P09169	A	A	317
10	1	1	P09169	A	A	317

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	-	1-317

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 23820 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
CA--HA2	1.09	0.97	330
CG--HG2	1.09	0.97	730
CA--HA	1.09	0.97	2840
CG--HG3	1.09	0.97	730
CB--HB3	1.09	0.97	2310
CB--HB1	1.09	0.97	200
CG2--HG21	1.09	0.97	530
CB--HB2	1.09	0.97	2310
CD1--HD11	1.09	0.97	380
CD2--HD23	1.09	0.97	200
CE--HE1	1.09	0.97	60
CG2--HG22	1.09	0.97	530
OG--HG	0.96	0.84	270
CB--HB	1.09	0.97	530
OH--HH	0.96	0.84	230
NZ--HZ1	1.01	0.89	180
CG2--HG23	1.09	0.97	530
CA--HA3	1.09	0.97	330
NZ--HZ3	1.01	0.89	180
OG1--HG1	0.96	0.84	230
CD--HD2	1.09	0.97	430
CD1--HD12	1.09	0.97	380

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
CE--HE2	1.09	0.97	240
CD--HD3	1.09	0.97	430
CD1--HD13	1.09	0.97	380
CE--HE3	1.09	0.97	240
CG1--HG12	1.09	0.97	300
CD2--HD21	1.09	0.97	200
CD2--HD22	1.09	0.97	200
N--H3	1.01	0.89	10
NZ--HZ2	1.01	0.89	180
CG1--HG13	1.09	0.97	300
CG--HG	1.09	0.97	200
N--H1	1.01	0.89	10
CG1--HG11	1.09	0.97	120
N--H2	1.01	0.89	10
NH2--HH21	1.01	0.86	150
ND2--HD21	1.01	0.86	260
N--H	1.01	0.86	3060
ND2--HD22	1.01	0.86	260
CD2--HD2	1.08	0.93	380
CD1--HD1	1.08	0.93	430
NH1--HH11	1.01	0.86	150
CE3--HE3	1.08	0.93	80
CE2--HE2	1.08	0.93	350

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
NE1--HE1	1.01	0.86	80
CE1--HE1	1.08	0.93	380
CZ2--HZ2	1.08	0.93	80
NH1--HH12	1.01	0.86	150
NH2--HH22	1.01	0.86	150
CZ--HZ	1.08	0.93	120
NE2--HE2	1.01	0.86	18
NE2--HE21	1.01	0.86	70
NE--HE	1.01	0.86	150
CZ3--HZ3	1.08	0.93	80
NE2--HE22	1.01	0.86	70
CH2--HH2	1.08	0.93	80
ND1--HD1	1.01	0.86	12

Standard geometry: angle outliers

There are 83 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	134.70	1
OE1-CD-NE2	122.60	116.56	1
OD1-CG-ND2	122.60	116.73	1
OD1-CG-ND2	122.60	116.74	1
CA-CB-CG	112.60	118.44	1
C-N-CA	121.70	132.01	1
C-N-CA	121.70	131.40	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C-N-CA	121.70	131.38	1
OE1-CD-NE2	122.60	117.30	1
C-N-CA	121.70	131.16	1
C-N-CA	121.70	130.60	1
OD1-CG-ND2	122.60	117.67	1
O-C-N	123.00	115.12	1
OE1-CD-NE2	122.60	117.77	1
OE1-CD-NE2	122.60	117.78	1
C-N-CA	121.70	130.31	1
OE1-CD-NE2	122.60	117.83	2
OE1-CD-NE2	122.60	117.84	1
C-N-CA	121.70	130.17	1
OD1-CG-ND2	122.60	117.96	1
C-N-CA	121.70	130.02	1
CA-CB-CG	112.60	117.21	1
OE1-CD-NE2	122.60	118.01	2
CG-CD-CE	111.30	100.76	1
C-N-CA	121.70	129.73	1
OE1-CD-NE2	122.60	118.14	2
CA-C-N	116.20	125.06	1
C-N-CA	121.70	129.64	1
OE1-CD-NE2	122.60	118.20	1
C-N-CA	121.70	129.58	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OE1-CD-NE2	122.60	118.23	1
CA-CB-CG	112.60	116.97	1
OE1-CD-NE2	122.60	118.24	1
CA-CB-CG	112.60	116.93	1
OE1-CD-NE2	122.60	118.27	1
OE1-CD-NE2	122.60	118.28	1
OE1-CD-NE2	122.60	118.30	4
OD1-CG-ND2	122.60	118.30	1
OD1-CG-ND2	122.60	118.33	1
CA-CB-CG2	110.50	117.74	1
NE-CZ-NH2	119.20	123.02	1
CA-CB-CG	112.60	116.82	1
OE1-CD-NE2	122.60	118.39	1
OE1-CD-NE2	122.60	118.40	1
OE1-CD-NE2	122.60	118.41	3
C-N-CA	121.70	129.22	1
OE1-CD-NE2	122.60	118.44	1
NH1-CZ-NH2	119.30	113.89	1
N-CA-CB	111.50	104.45	1
OE1-CD-NE2	122.60	118.46	2
CA-CB-CG	112.60	116.73	1
O-C-N	123.00	116.39	1
OE1-CD-NE2	122.60	118.47	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OD1-CG-ND2	122.60	118.48	1
CB-CG-CD2	131.20	125.84	1
OE1-CD-NE2	122.60	118.48	1
C-N-CA	121.70	129.11	1
OD1-CG-ND2	122.60	118.51	1
CA-CB-CG	112.60	116.68	1
OD1-CG-ND2	122.60	118.54	2
OE1-CD-NE2	122.60	118.54	2
CA-CB-CG	112.60	116.66	1
OE1-CD-NE2	122.60	118.58	1
OE1-CD-NE2	122.60	118.59	1
CB-CG-CD2	131.20	125.99	1
OD1-CG-ND2	122.60	118.59	1
C-N-H	111.85	124.30	1
HZ2-NZ-HZ3	96.45	109.00	1
C-N-H	111.68	124.30	1
HE21-NE2-HE22	106.05	120.00	1
C-N-H	108.05	124.30	1
HH21-NH2-HH22	101.06	120.00	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
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Model ID	Clash score	Number of clashes
1	0.61	3
2	0.82	4
3	0.82	4
4	4.29	21
5	1.02	5
6	0.61	3
7	1.23	6
8	1.23	6
9	3.06	15
10	2.25	11

All 78 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:168:TYR:CZ	A:181:GLY:HA3	0.626
1	A:168:TYR:CE2	A:181:GLY:HA3	0.487
1	A:132:PHE:CZ	A:134:LEU:HG	0.473
2	A:44:LYS:HE2	A:46:LYS:HE2	0.563
2	A:132:PHE:CE1	A:156:GLU:HB3	0.457
2	A:283:THR:HB	A:300:ALA:HB2	0.443
2	A:241:TYR:CE1	A:285:LEU:HD12	0.404
3	A:9:VAL:HG12	A:11:THR:HG23	0.676
3	A:44:LYS:HE2	A:46:LYS:HE2	0.559
3	A:9:VAL:CG1	A:11:THR:HG23	0.458
3	A:188:ARG:HH21	A:191:GLY:HA3	0.449

Model ID	Atom-1	Atom-2	Clash overlap (Å)
4	A:25:LEU:HD22	A:27:PHE:CZ	0.635
4	A:64:TRP:CZ2	A:101:MET:SD	0.573
4	A:101:MET:HE2	A:121:HIS:CD2	0.572
4	A:101:MET:CE	A:121:HIS:CD2	0.568
4	A:62:LEU:HD21	A:64:TRP:HE1	0.556
4	A:237:LYS:HA	A:289:ASN:HD21	0.524
4	A:237:LYS:HE2	A:239:ILE:HD11	0.501
4	A:198:MET:HG2	A:224:VAL:HG22	0.494
4	A:226:SER:CB	A:248:GLN:HE22	0.492
4	A:25:LEU:HD22	A:27:PHE:CE2	0.474
4	A:47:GLU:HB3	A:62:LEU:HB3	0.471
4	A:224:VAL:HB	A:248:GLN:HB2	0.469
4	A:278:ASN:HB3	A:302:ILE:H	0.469
4	A:58:LYS:HE3	A:60:SER:HB2	0.442
4	A:27:PHE:CZ	A:147:ARG:HD2	0.435
4	A:237:LYS:CE	A:239:ILE:HD11	0.433
4	A:126:LEU:HD13	A:161:PHE:CE1	0.430
4	A:29:PRO:HA	A:79:ASP:O	0.427
4	A:44:LYS:HE2	A:46:LYS:CE	0.424
4	A:101:MET:HE1	A:190:ILE:HD12	0.422
4	A:29:PRO:HG3	A:82:PRO:HD3	0.401
5	A:44:LYS:HE2	A:46:LYS:HE2	0.478
5	A:247:ASP:HB2	A:279:LYS:HZ3	0.441

Model ID	Atom-1	Atom-2	Clash overlap (Å)
5	A:151:MET:HE3	A:204:THR:HB	0.437
5	A:30:ASP:HA	A:317:PHE:O	0.426
5	A:283:THR:HB	A:300:ALA:HB2	0.410
6	A:195:ARG:NH2	A:197:LYS:HE2	0.471
6	A:188:ARG:HH21	A:191:GLY:HA3	0.424
6	A:107:MET:HE3	A:115:TRP:CH2	0.421
7	A:25:LEU:HD11	A:263:PRO:HA	0.597
7	A:183:PHE:CE1	A:188:ARG:CZ	0.564
7	A:44:LYS:HE2	A:46:LYS:HE2	0.519
7	A:45:THR:HG22	A:64:TRP:HB2	0.489
7	A:25:LEU:HD11	A:263:PRO:CA	0.421
7	A:116:THR:HB	A:171:SER:HB3	0.417
8	A:44:LYS:HE2	A:46:LYS:HE2	0.543
8	A:25:LEU:HD22	A:80:LEU:HD11	0.508
8	A:198:MET:HG2	A:224:VAL:HG22	0.494
8	A:50:TYR:CD1	A:280:LYS:HE2	0.488
8	A:45:THR:HG22	A:64:TRP:HB2	0.473
8	A:58:LYS:HE3	A:115:TRP:CH2	0.422
9	A:101:MET:HE1	A:190:ILE:HD12	0.774
9	A:101:MET:HE2	A:121:HIS:CD2	0.708
9	A:64:TRP:CH2	A:101:MET:SD	0.568
9	A:59:VAL:HG12	A:107:MET:CE	0.567
9	A:44:LYS:HE2	A:46:LYS:HE2	0.549

Model ID	Atom-1	Atom-2	Clash overlap (Å)
9	A:57:ARG:NH2	A:107:MET:SD	0.543
9	A:30:ASP:HA	A:317:PHE:O	0.485
9	A:126:LEU:HD13	A:161:PHE:CE1	0.461
9	A:64:TRP:CZ2	A:101:MET:SD	0.445
9	A:128:TYR:CZ	A:160:SER:HB2	0.439
9	A:101:MET:CE	A:190:ILE:HD12	0.437
9	A:45:THR:HG22	A:64:TRP:HB2	0.435
9	A:101:MET:CE	A:121:HIS:CD2	0.416
9	A:241:TYR:CE1	A:285:LEU:HD12	0.409
9	A:9:VAL:HG12	A:11:THR:HG23	0.408
10	A:101:MET:CE	A:163:ALA:HB2	0.606
10	A:62:LEU:HD11	A:101:MET:SD	0.588
10	A:228:ASP:OD2	A:302:ILE:HD11	0.559
10	A:64:TRP:CH2	A:101:MET:SD	0.537
10	A:30:ASP:HA	A:317:PHE:O	0.517
10	A:101:MET:HE3	A:163:ALA:HB2	0.502
10	A:188:ARG:HH21	A:191:GLY:HA3	0.488
10	A:64:TRP:CZ3	A:101:MET:CE	0.433
10	A:64:TRP:CZ3	A:101:MET:HE2	0.429
10	A:64:TRP:CZ2	A:192:TYR:HB2	0.424
10	A:64:TRP:CH2	A:101:MET:CE	0.422

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	Analyzed	Favored	Allowed	Outliers
1	315	289	22	4
2	315	296	13	6
3	315	299	14	2
4	315	293	18	4
5	315	294	15	6
6	315	297	15	3
7	315	298	15	2
8	315	295	13	7
9	315	293	21	1
10	315	288	17	10

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	264	254	3	7
2	264	248	5	11
3	264	252	5	7
4	264	249	6	9
5	264	251	8	5
6	264	255	2	7
7	264	253	4	7
8	264	252	6	6
9	264	250	7	7
10	264	250	7	7

Detailed list of outliers are tabulated below.

Model ID	Chain	Residue ID	Residue type
1	A	5	LEU
1	A	8	ILE
1	A	10	LEU
1	A	12	THR
1	A	17	SER
1	A	25	LEU
1	A	247	ASP
2	A	5	LEU
2	A	6	LEU
2	A	10	LEU
2	A	12	THR
2	A	22	THR
2	A	24	THR
2	A	25	LEU
2	A	28	THR
2	A	45	THR
2	A	151	MET
2	A	313	LEU
3	A	1	MET
3	A	5	LEU
3	A	12	THR
3	A	24	THR
3	A	33	ASN

Model ID	Chain	Residue ID	Residue type
3	A	45	THR
3	A	247	ASP
4	A	5	LEU
4	A	10	LEU
4	A	12	THR
4	A	16	ILE
4	A	24	THR
4	A	25	LEU
4	A	28	THR
4	A	105	ASP
4	A	124	THR
5	A	6	LEU
5	A	10	LEU
5	A	12	THR
5	A	17	SER
5	A	28	THR
6	A	5	LEU
6	A	6	LEU
6	A	12	THR
6	A	24	THR
6	A	30	ASP
6	A	45	THR
6	A	247	ASP

Model ID	Chain	Residue ID	Residue type
7	A	5	LEU
7	A	6	LEU
7	A	10	LEU
7	A	12	THR
7	A	22	THR
7	A	24	THR
7	A	247	ASP
8	A	5	LEU
8	A	10	LEU
8	A	12	THR
8	A	22	THR
8	A	24	THR
8	A	247	ASP
9	A	5	LEU
9	A	6	LEU
9	A	22	THR
9	A	33	ASN
9	A	57	ARG
9	A	157	SER
9	A	247	ASP
10	A	5	LEU
10	A	6	LEU
10	A	10	LEU

Model ID	Chain	Residue ID	Residue type
10	A	11	THR
10	A	12	THR
10	A	85	SER
10	A	171	SER

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.

Acknowledgements

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