

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	9A40
PDB-Dev ID	PDBDEV_00000221
Structure Title	model of Cullin4
Structure Authors	Kolja Stahl; Oliver Brock; Juri Rappsilber

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

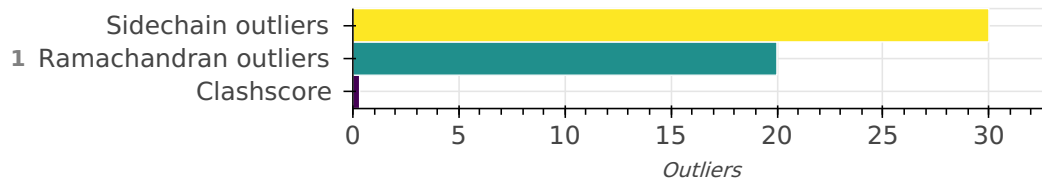
A user guide is available at https://pdb-dev.wwpdb.org/validation_help.html with specific help available everywhere you see the  symbol.

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 1 unique models, with 6 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 6 flexible or non-rigid units.

Entry composition ?

There is 1 unique type of models in this entry. This model is titled None/None.

Model ID	Subunit number	Subunit ID	Subunit name	Chain ID	Chain ID [auth]	Total residues
1	1	1	CUL4A_HUMAN	A	A	739
1	2	2	DCAF1_HUMAN	B	B	373
1	3	3	DDB1_HUMAN	C	C	1142
1	4	4	RBX1_HUMAN	D	D	98
1	5	5	G7N4W9_MACMU	E	E	628
1	6	6	A4UDG5_SIV	F	F	138

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	PRIDE	PXD020453

Representation ?

This entry has only one representation and includes 0 rigid bodies and 6 flexible units.

Chain ID	Rigid bodies	Non-rigid segments
C	-	1-1142
B	-	1-373
F	-	1-138
A	-	1-739
E	-	1-628
D	-	1-98

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	AlphaLink2	AlphaLink2	No starting models were used in the modeling	1	False	False

There is 1 software package reported in this entry.

ID	Software name	Software version	Software classification	Software location
1	AlphaLink2	1.0	model building	https://github.com/Rappsilber-Laboratory/AlphaLink2

Data quality ?

Crosslinking-MS

Validation for this section is under development.

Model quality ?

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

Standard geometry: bond outliers ?

There are 24726 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
CB--HB3	1.09	0.97	2379
CG--HG3	1.09	0.97	942
CE--HE3	1.09	0.97	272
CG1--HG11	1.09	0.97	199
CG2--HG22	1.09	0.97	548
CB--HB2	1.09	0.97	2379
CA--HA	1.09	0.97	2927
N--H3	1.01	0.89	6
CG2--HG21	1.09	0.97	548
NZ--HZ2	1.01	0.89	189
CD--HD2	1.09	0.97	492
CA--HA2	1.09	0.97	191
CB--HB	1.09	0.97	548
OG--HG	0.96	0.84	197
CD1--HD11	1.09	0.97	494
CD1--HD12	1.09	0.97	494
CG--HG2	1.09	0.97	942
CG--HG	1.09	0.97	308

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
CD2--HD23	1.09	0.97	308
CG2--HG23	1.09	0.97	548
CD--HD3	1.09	0.97	492
CD2--HD21	1.09	0.97	308
CD1--HD13	1.09	0.97	494
CB--HB1	1.09	0.97	166
NZ--HZ3	1.01	0.89	189
CE--HE2	1.09	0.97	272
OH--HH	0.96	0.84	97
CD2--HD22	1.09	0.97	308
CA--HA3	1.09	0.97	191
CG1--HG13	1.09	0.97	385
CG1--HG12	1.09	0.97	385
OG1--HG1	0.96	0.84	163
NZ--HZ1	1.01	0.89	189
CE--HE1	1.09	0.97	83
N--H1	1.01	0.89	6
N--H2	1.01	0.89	6
SG--HG	1.33	1.20	6
SG--HG	1.34	1.20	58
N--H	1.01	0.86	2982
CE1--HE1	1.08	0.93	345
NH1--HH11	1.01	0.86	173
NH2--HH21	1.01	0.86	173

Bond type	Observed distance (Å)	Ideal distance (Å)	Number of outliers
NE--HE	1.01	0.86	173
NH1--HH12	1.01	0.86	173
CD1--HD1	1.08	0.93	271
ND1--HD1	1.01	0.86	94
CH2--HH2	1.08	0.93	34
CD2--HD2	1.08	0.93	345
CE2--HE2	1.08	0.93	237
NE2--HE21	1.01	0.86	138
NH2--HH22	1.01	0.86	173
CZ--HZ	1.08	0.93	140
NE2--HE22	1.01	0.86	138
CZ2--HZ2	1.08	0.93	34
CZ3--HZ3	1.08	0.93	34
ND2--HD21	1.01	0.86	139
ND2--HD22	1.01	0.86	139
CE3--HE3	1.08	0.93	34
NE1--HE1	1.01	0.86	34
NE2--HE2	1.01	0.86	14

Standard geometry: angle outliers

There are 171 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	132.84	1
CA-CB-CA-CB-CG	112.60	118.43	1
CA-CB-CG	112.60	118.36	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
O-C-N	123.00	113.92	1
CA-CB-CG	112.60	118.15	1
CA-CB-CG	112.60	118.09	1
OE1-CD-NE2	122.60	117.13	1
OE1-CD-NE2	122.60	117.16	1
OE1-CD-NE2	122.60	117.21	1
OE1-CD-NE2	122.60	117.29	1
CA-C-N	116.90	124.81	1
CA-C-N	116.20	126.73	1
CA-N-CD	112.00	104.63	1
OE1-CD-NE2	122.60	117.36	1
CA-CB-CG	112.60	117.82	1
OE1-CD-CD-NE-CZ	124.40	131.64	1
C-N-CA	121.70	130.94	1
OE1-CD-NE2	122.60	117.47	1
C-N-CA	121.70	130.87	1
C-N-CA	121.70	130.86	1
OE1-CD-NE2	122.60	117.66	1
CA-CB-CG	112.60	117.53	1
OD1-CG-ND2	122.60	117.67	1
CA-CB-CG	112.60	117.52	1
CA-CB-CG	113.80	118.71	1
OD1-CG-ND2	122.60	117.72	1
OE1-CD-NE2	122.60	117.73	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OE1-CD-NE2	122.60	117.78	1
CA-CB-CG	112.60	117.41	1
CB-CG-CD2	131.20	124.96	1
OE1-CD-NE2	122.60	117.80	2
C-N-CA	121.70	130.32	1
OE1-CD-NE2	122.60	117.81	1
OE1-CD-NE2	122.60	117.82	1
CD-NE-CZ	124.40	131.05	1
CA-C-N	116.20	125.70	1
NH1-CZ-NH2	119.30	113.13	1
N-CA-C	111.00	124.29	1
OE1-CD-NE2	122.60	117.86	2
CA-CB-CG	112.60	117.33	2
CB-CG-OE1-CD-NE2	122.60	117.88	1
OE1-CD-NE2	122.60	117.89	1
CA-CB-CG	113.80	118.50	1
OE1-CD-NE2	122.60	117.91	2
OE1-CD-NE2	122.60	117.92	1
CA-CB-CG	112.60	117.27	1
OE1-CD-NE2	122.60	117.94	1
OE1-CD-NE2	122.60	117.95	1
CA-CB-CG	112.60	117.24	1
OE1-CD-NE2	122.60	117.96	1
OE1-CD-NE2	122.60	117.99	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
OE1-CD-NE2	122.60	118.00	2
CA-CB-CG	113.80	118.40	1
OE1-CD-NE2	122.60	118.01	1
OE1-CD-NE2	122.60	118.03	2
CA-CB-CG	112.60	117.13	1
OE1-CD-NE2	122.60	118.07	2
CB-CG-CD2	131.20	125.33	2
OE1-CD-NE2	122.60	118.09	1
CB-CG-CD2	131.20	125.36	1
CB-CG-CD2	131.20	125.37	1
OE1-CD-NE2	122.60	118.12	2
OD1-CG-ND2	122.60	118.12	1
OE1-CD-NE2	122.60	118.13	2
CB-CG-CD2	131.20	125.40	1
OE1-CD-NE2	122.60	118.14	1
OE1-CD-NE2	122.60	118.15	1
N-CA-C	111.00	123.45	1
CB-CG-CD2	131.20	125.42	1
C-N-CA	121.70	129.70	1
OE1-CD-NE2	122.60	118.16	1
OE1-CD-CD-NE-CZ	124.40	130.59	1
C-N-CA	121.70	129.66	1
CB-CG-CD2	131.20	125.45	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CB-CG-CD2	131.20	125.46	1
OE1-CD-NE2	122.60	118.19	1
OE1-CD-OE1-CD-NE2	122.60	118.19	1
CB-CG-CD2	131.20	125.47	1
OE1-CD-NE2	122.60	118.20	3
OD1-CG-ND2	122.60	118.21	1
CA-CB-CG	112.60	116.99	1
CA-CB-CG	112.60	108.21	1
CB-CG-CD2	131.20	125.49	1
OE1-CD-NE2	122.60	118.21	1
OE1-CD-NE2	122.60	118.22	2
CA-C-N	116.90	123.47	1
OE1-CD-NE2	122.60	118.23	2
CA-CB-CG	112.60	116.97	1
OE1-CD-NE2	122.60	118.25	1
CA-CB-CG	112.60	116.94	1
OD1-CG-ND2	122.60	118.27	1
CA-CB-CG	112.60	116.93	1
OE1-CD-NE2	122.60	118.27	1
CB-CG-CD2	131.20	125.57	1
OE1-CD-NE2	122.60	118.28	1
CB-CG-CD2	131.20	125.60	1
CA-CB-CG	113.80	118.10	1
OE1-CD-NE2	122.60	118.30	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
CA-CB-CG	112.60	116.90	1
OE1-CD-CB-CG-CD2	131.20	125.63	1
OE1-CD-NE2	122.60	118.32	1
CA-N-CD	112.00	106.02	1
CB-CG-CD2	131.20	125.66	1
OE1-CD-NE2	122.60	118.35	2
N-CA-C	112.10	122.71	1
CA-CB-CG	112.60	116.84	2
OE1-CD-NE2	122.60	118.37	1
OD1-CG-ND2	122.60	118.37	1
CB-CG-CD2	131.20	125.71	2
OE1-CD-NE2	122.60	118.38	1
CB-CG-CD2	131.20	125.72	1
OD1-CG-ND2	122.60	118.39	1
CA-CB-CG	113.80	118.00	1
CD-NE-CZ	124.40	130.27	1
OE1-CD-NE2	122.60	118.41	2
OE1-CD-NE2	122.60	118.43	1
CA-CB-CG	113.80	117.96	1
CD-NE-CB-CG-CD2	131.20	125.81	1
CA-CB-CB-CG-CD2	131.20	125.83	1
OD1-CG-ND2	122.60	118.47	1
OE1-CD-NE2	122.60	118.47	2
OE1-CD-NE2	122.60	118.48	4

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
NE-CZ-NH1	121.50	125.61	1
N-CA-C	111.00	122.50	1
CB-CG-CD2	131.20	125.88	1
OD1-CG-ND2	122.60	118.51	1
NE-CZ-NH1	121.50	125.59	1
OD1-CG-ND2	122.60	118.52	1
OE1-CD-NE2	122.60	118.52	1
OE1-CD-NE2	122.60	118.54	2
OE1-CD-CB-CG-CD2	131.20	125.93	1
CA-C-N	116.20	124.31	1
CB-CG-CD2	131.20	125.94	1
OE1-CD-NE2	122.60	118.56	2
OD1-CG-ND2	122.60	118.57	1
CB-CG-CD2	131.20	125.96	1
OE1-CD-NE2	122.60	118.57	1
CD-NE-CZ	124.40	130.02	1
OE1-CD-NE2	122.60	118.59	1
CB-CG-CD2	131.20	125.99	1
OE1-CD-NE2	122.60	118.60	1
CB-CG-CD2	131.20	126.00	1
C-N-H	112.27	124.30	1
HZ2-NZ-HZ3	96.88	109.00	1
HZ1-NZ-HZ3	96.38	109.00	1
HH21-NH2-HH22	107.11	120.00	1

Angle type	Observed angle (°)	Ideal angle (°)	Number of outliers
C-N-H	110.52	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	0.32	16

All 16 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:191:ARG:HD3	A:256:THR:HG21	0.546
1	A:531:GLN:HE21	A:549:TRP:CG	0.545
1	A:245:LYS:HE2	A:249:GLU:OE1	0.466
1	B:264:MET:HE1	B:298:TYR:CD1	0.464
1	C:682:MET:HE2	C:694:LEU:HD22	0.437
1	E:52:VAL:CG1	E:80:LEU:HD11	0.424
1	E:373:ARG:HG3	E:507:MET:HE2	0.417
1	C:582:LYS:HE2	C:584:MET:SD	0.414
1	E:14:ARG:HA	E:15:PRO:HD3	0.414
1	F:124:ASP:HA	F:125:PRO:HD3	0.408
1	A:531:GLN:HE21	A:549:TRP:CD1	0.408
1	E:1:GLY:HA3	E:2:PRO:HD3	0.406
1	C:495:GLU:HA	C:496:PRO:HD3	0.401

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
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Model ID	Analyzed	Favored	Allowed	Outliers
1	3106	2964	122	20

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	2761	2669	62	30

Detailed list of outliers are tabulated below.

Model ID	Chain	Residue ID	Residue type
1	A	59	ILE
1	A	73	LEU
1	A	374	PHE
1	A	419	LEU
1	A	700	TYR
1	B	178	ASN
1	B	258	ASN
1	B	373	HIS
1	C	4	MET
1	C	128	ASP
1	C	416	LEU
1	C	536	GLU
1	C	764	LEU
1	C	898	THR
1	C	973	ASN
1	C	1035	THR

Model ID	Chain	Residue ID	Residue type
1	E	23	THR
1	E	27	THR
1	E	80	LEU
1	E	103	LEU
1	E	113	HIS
1	E	209	ASP
1	E	295	ARG
1	E	313	ASP
1	E	346	ASP
1	E	602	TYR
1	E	610	THR
1	F	99	THR
1	F	126	THR
1	F	135	ARG

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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