



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 01:51 PM UTC

PDB ID : 6A30 / pdb_00006a30
Title : Crystal Structure of Munc13-1 MUN Domain and Synaptobrevin-2 Juxtamembrane Linker Region
Authors : Wang, S.; Li, Y.; Gong, J.H.; Ye, S.; Yang, X.F.; Zhang, R.G.; Ma, C.
Deposited on : 2018-06-14
Resolution : 2.79 Å(reported)

This is a Full wwPDB X-ray 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/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

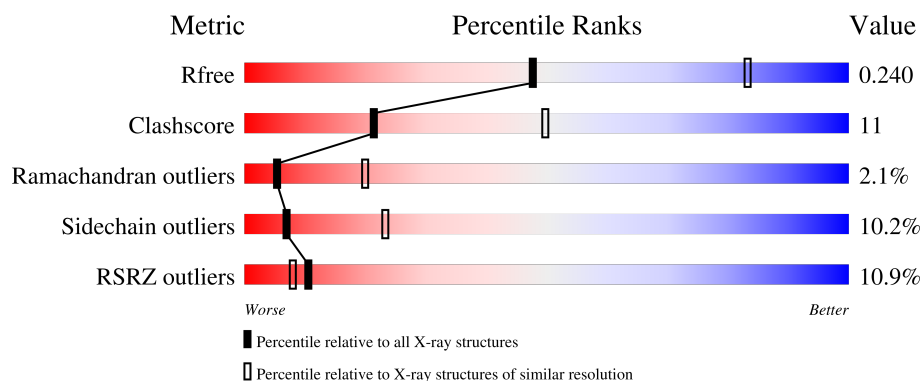
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.79 Å.

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)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	537	10% 71% 23% • •
2	P	6	67% 50% 33% 17%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4347 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Protein unc-13 homolog A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	527	Total	C	N	O	S	0	0	0
			4262	2719	710	805	28			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1408	GLU	-	linker	UNP Q62768
A	1409	PHE	-	linker	UNP Q62768

- Molecule 2 is a protein called Synaptobrevin-2 juxtamembrane linker peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	P	6	Total	C	N	O	0	0	0
			66	47	11	8			

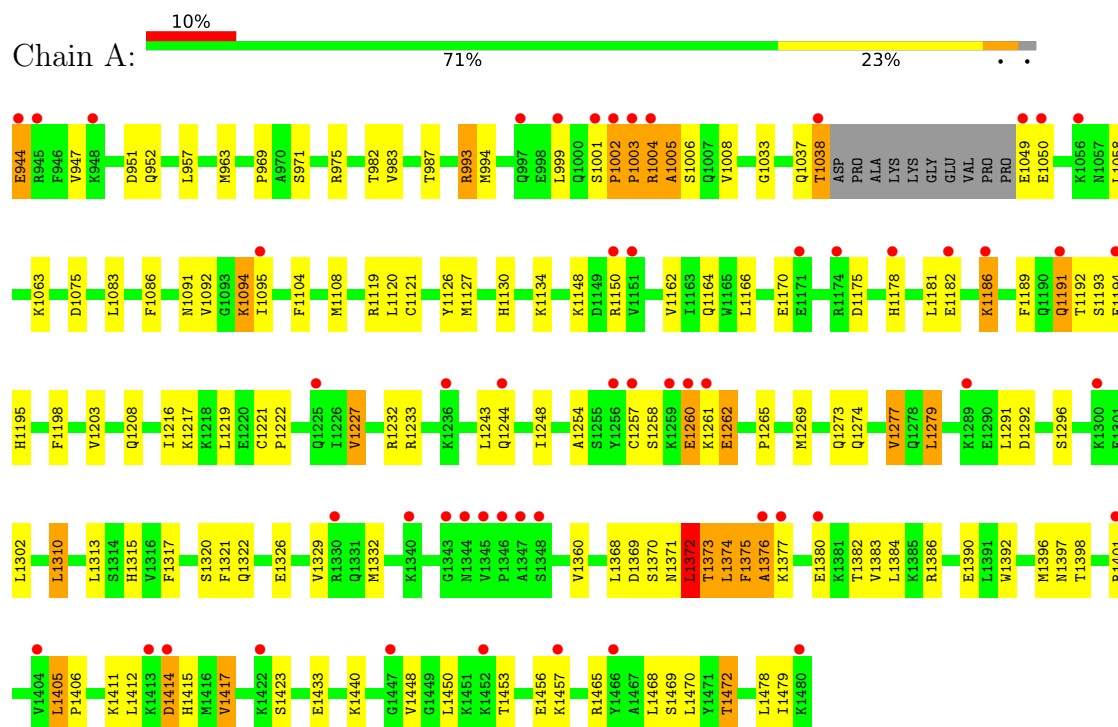
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	19	Total	O	0	0
			19	19		

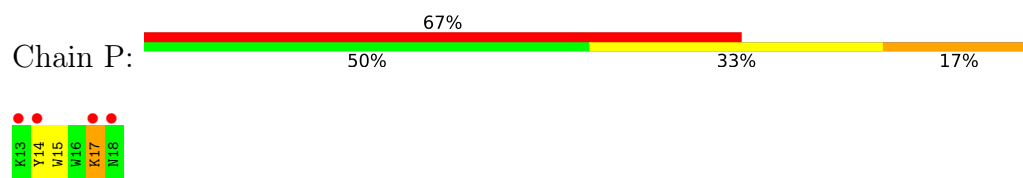
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: Protein unc-13 homolog A



• Molecule 2: Synaptobrevin-2 juxtamembrane linker peptide



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	114.48Å 270.97Å 47.91Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.01 – 2.79 42.01 – 2.79	Depositor EDS
% Data completeness (in resolution range)	99.4 (42.01-2.79) 99.4 (42.01-2.79)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.12 (at 2.81Å)	Xtriage
Refinement program	PHENIX 1.8.2_1309	Depositor
R, R_{free}	0.207 , 0.239 0.211 , 0.240	Depositor DCC
R_{free} test set	1900 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	80.8	Xtriage
Anisotropy	0.482	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 58.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	4347	wwPDB-VP
Average B, all atoms (Å ²)	88.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.84% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.37	0/4348	0.78	6/5873 (0.1%)
2	P	0.20	0/70	0.38	0/94
All	All	0.37	0/4418	0.77	6/5967 (0.1%)

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1002	PRO	CA-C-N	-8.39	109.36	119.84
1	A	1002	PRO	C-N-CA	-8.39	109.36	119.84
1	A	1478	LEU	N-CA-C	-6.61	101.19	110.50
1	A	1150	ARG	CB-CA-C	-5.39	110.34	116.54
1	A	1002	PRO	N-CA-C	5.14	116.97	110.70
1	A	1415	HIS	N-CA-C	5.01	118.47	111.56

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the 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 within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4262	0	4261	92	0
2	P	66	0	60	4	0
3	A	19	0	0	2	0
All	All	4347	0	4321	94	0

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 11.

All (94) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1375:PHE:O	1:A:1377:LYS:N	1.71	1.23
1:A:1374:LEU:HD12	1:A:1374:LEU:O	1.36	1.22
1:A:1374:LEU:HD12	1:A:1374:LEU:C	1.77	0.98
1:A:1258:SER:HA	1:A:1320:SER:HB2	1.60	0.81
1:A:1310:LEU:HD13	1:A:1386:ARG:HH12	1.46	0.81
1:A:1063:LYS:NZ	3:A:1501:HOH:O	2.00	0.78
1:A:1372:LEU:H	1:A:1372:LEU:HD13	1.54	0.73
1:A:1371:ASN:O	1:A:1372:LEU:C	2.30	0.73
1:A:1003:PRO:HB3	1:A:1008:VAL:HG23	1.72	0.71
1:A:1405:LEU:HD23	1:A:1406:PRO:HD2	1.75	0.69
1:A:1127:MET:HE1	1:A:1162:VAL:HG13	1.75	0.68
1:A:1374:LEU:O	1:A:1374:LEU:CD1	2.30	0.68
1:A:969:PRO:HD2	1:A:975:ARG:HG2	1.76	0.66
1:A:1440:LYS:NZ	1:A:1465:ARG:HH22	1.93	0.66
1:A:1130:HIS:NE2	3:A:1503:HOH:O	2.29	0.65
1:A:1371:ASN:O	1:A:1374:LEU:N	2.29	0.65
1:A:951:ASP:OD1	1:A:993:ARG:NH2	2.29	0.65
1:A:1371:ASN:O	1:A:1373:THR:N	2.30	0.65
1:A:1372:LEU:N	1:A:1372:LEU:CD1	2.59	0.65
1:A:1310:LEU:HD13	1:A:1386:ARG:NH1	2.11	0.65
1:A:1269:MET:HE2	1:A:1383:VAL:HG13	1.78	0.63
1:A:1469:SER:HA	1:A:1472:THR:HG22	1.81	0.62
1:A:1375:PHE:CD1	1:A:1375:PHE:N	2.66	0.61
1:A:1033:GLY:HA2	1:A:1037:GLN:HG2	1.82	0.60
1:A:1372:LEU:HD13	1:A:1372:LEU:N	2.14	0.59
1:A:1375:PHE:C	1:A:1377:LYS:N	2.54	0.57
1:A:1371:ASN:C	1:A:1373:THR:N	2.61	0.57
1:A:1332:MET:HB2	1:A:1360:VAL:HG13	1.88	0.56
1:A:1315:HIS:HA	1:A:1390:GLU:HG2	1.87	0.55
1:A:1260:GLU:CD	1:A:1261:LYS:HA	2.33	0.54
1:A:1191:GLN:OE1	1:A:1193:SER:N	2.41	0.54
1:A:1121:CYS:HB2	1:A:1126:TYR:CZ	2.43	0.54
1:A:1004:ARG:O	1:A:1006:SER:N	2.40	0.54
1:A:1257:CYS:SG	1:A:1258:SER:N	2.81	0.53
1:A:1192:THR:HG23	1:A:1198:PHE:O	2.08	0.53
1:A:1232:ARG:NE	1:A:1292:ASP:OD2	2.42	0.52
1:A:1002:PRO:HG2	1:A:1003:PRO:HD3	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1440:LYS:HZ1	1:A:1465:ARG:HH22	1.56	0.52
1:A:1279:LEU:HD11	1:A:1302:LEU:HD23	1.90	0.51
1:A:1274:GLN:HA	1:A:1277:VAL:HG13	1.93	0.50
1:A:1193:SER:O	1:A:1195:HIS:N	2.43	0.49
1:A:1119:ARG:NH1	1:A:1164:GLN:OE1	2.42	0.49
1:A:1003:PRO:HD2	1:A:1004:ARG:HA	1.94	0.49
1:A:1374:LEU:O	1:A:1375:PHE:O	2.30	0.49
1:A:1329:VAL:HA	1:A:1332:MET:HG2	1.94	0.48
1:A:1397:ASN:HB3	1:A:1401:ARG:NH2	2.27	0.48
1:A:1440:LYS:NZ	1:A:1456:GLU:OE2	2.47	0.48
1:A:1134:LYS:HD2	1:A:1219:LEU:O	2.13	0.48
1:A:1091:ASN:HB3	1:A:1094:LYS:HB2	1.95	0.48
1:A:1166:LEU:HD21	1:A:1216:ILE:HD11	1.96	0.47
1:A:957:LEU:HD22	1:A:982:THR:HG23	1.95	0.47
1:A:1004:ARG:O	1:A:1004:ARG:HD2	2.15	0.47
1:A:1369:ASP:O	1:A:1373:THR:HB	2.15	0.47
1:A:1414:ASP:N	1:A:1414:ASP:OD1	2.47	0.47
1:A:987:THR:HG22	1:A:1005:ALA:HB1	1.96	0.46
1:A:1376:ALA:H	1:A:1384:LEU:HD13	1.81	0.46
1:A:1186:LYS:HB2	1:A:1186:LYS:NZ	2.31	0.46
2:P:14:TYR:CD1	2:P:17:LYS:HE3	2.51	0.46
1:A:1273:GLN:HB2	1:A:1310:LEU:HD11	1.98	0.46
1:A:1119:ARG:O	1:A:1126:TYR:OH	2.34	0.45
1:A:1374:LEU:C	1:A:1375:PHE:O	2.59	0.45
1:A:1372:LEU:HB3	2:P:15:TRP:CE3	2.51	0.45
1:A:1392:TRP:O	1:A:1396:MET:HG2	2.16	0.45
1:A:1121:CYS:HB2	1:A:1126:TYR:CE2	2.52	0.45
1:A:1321:PHE:HE1	1:A:1371:ASN:ND2	2.14	0.45
1:A:1440:LYS:HZ1	1:A:1465:ARG:NH2	2.15	0.45
1:A:1075:ASP:HB3	1:A:1092:VAL:HG12	2.00	0.44
1:A:1326:GLU:HA	1:A:1398:THR:HG21	1.99	0.44
1:A:1262:GLU:C	1:A:1265:PRO:HD2	2.42	0.44
1:A:1262:GLU:HG3	1:A:1317:PHE:CE1	2.53	0.43
1:A:1373:THR:HG22	1:A:1374:LEU:N	2.34	0.43
1:A:1372:LEU:HA	1:A:1372:LEU:HD12	1.53	0.43
1:A:1244:GLN:O	1:A:1248:ILE:HG12	2.19	0.43
1:A:1291:LEU:HD23	1:A:1296:SER:HB3	2.01	0.43
1:A:1373:THR:OG1	2:P:15:TRP:O	2.35	0.42
1:A:1412:LEU:HB3	1:A:1417:VAL:HG13	2.00	0.42
2:P:14:TYR:HB2	2:P:17:LYS:HG3	2.00	0.42
1:A:1127:MET:HE3	1:A:1219:LEU:HD11	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:944:GLU:O	1:A:947:VAL:HG12	2.20	0.41
1:A:1170:GLU:OE1	1:A:1233:ARG:NH2	2.51	0.41
1:A:1221:CYS:HB3	1:A:1227:VAL:HG23	2.02	0.41
1:A:1037:GLN:HB3	1:A:1038:THR:H	1.63	0.41
1:A:1104:PHE:CZ	1:A:1108:MET:HE3	2.55	0.41
1:A:1221:CYS:HA	1:A:1222:PRO:HD3	1.77	0.41
1:A:1317:PHE:O	1:A:1320:SER:OG	2.33	0.41
1:A:1003:PRO:CD	1:A:1004:ARG:HA	2.51	0.40
1:A:1119:ARG:HA	1:A:1119:ARG:HD3	1.80	0.40
1:A:1217:LYS:HD2	1:A:1217:LYS:HA	1.93	0.40
1:A:1368:LEU:HB3	1:A:1372:LEU:HD22	2.03	0.40
1:A:983:VAL:O	1:A:987:THR:HG23	2.21	0.40
1:A:1254:ALA:HA	1:A:1257:CYS:SG	2.61	0.40
1:A:1457:LYS:HD3	1:A:1457:LYS:HA	1.90	0.40
1:A:1181:LEU:HD23	1:A:1181:LEU:HA	1.95	0.40
1:A:1243:LEU:HD23	1:A:1243:LEU:HA	1.91	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 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 X-ray entries followed by that with respect to entries of similar resolution.

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	523/537 (97%)	480 (92%)	32 (6%)	11 (2%)	5	20
2	P	4/6 (67%)	4 (100%)	0	0	100	100
All	All	527/543 (97%)	484 (92%)	32 (6%)	11 (2%)	5	20

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1003	PRO
1	A	1005	ALA

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Mol	Chain	Res	Type
1	A	1375	PHE
1	A	1376	ALA
1	A	1178	HIS
1	A	1189	PHE
1	A	1194	GLU
1	A	1372	LEU
1	A	1001	SER
1	A	1414	ASP
1	A	1479	ILE

5.3.2 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 X-ray entries followed by that with respect to entries of similar resolution.

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	483/491 (98%)	434 (90%)	49 (10%)	7	23
2	P	6/6 (100%)	5 (83%)	1 (17%)	2	8
All	All	489/497 (98%)	439 (90%)	50 (10%)	7	23

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	944	GLU
1	A	952	GLN
1	A	963	MET
1	A	971	SER
1	A	993	ARG
1	A	994	MET
1	A	999	LEU
1	A	1004	ARG
1	A	1038	THR
1	A	1049	GLU
1	A	1050	GLU
1	A	1058	LEU
1	A	1083	LEU
1	A	1086	PHE

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Mol	Chain	Res	Type
1	A	1094	LYS
1	A	1095	ILE
1	A	1120	LEU
1	A	1148	LYS
1	A	1175	ASP
1	A	1182	GLU
1	A	1186	LYS
1	A	1191	GLN
1	A	1203	VAL
1	A	1208	GLN
1	A	1227	VAL
1	A	1260	GLU
1	A	1262	GLU
1	A	1277	VAL
1	A	1279	LEU
1	A	1310	LEU
1	A	1313	LEU
1	A	1322	GLN
1	A	1370	SER
1	A	1372	LEU
1	A	1373	THR
1	A	1374	LEU
1	A	1380	GLU
1	A	1382	THR
1	A	1405	LEU
1	A	1411	LYS
1	A	1417	VAL
1	A	1423	SER
1	A	1433	GLU
1	A	1448	VAL
1	A	1450	LEU
1	A	1453	THR
1	A	1468	LEU
1	A	1470	LEU
1	A	1472	THR
2	P	17	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	527/537 (98%)	0.51	54 (10%) 12 9	49, 82, 134, 185	0
2	P	6/6 (100%)	1.99	4 (66%) 0 0	122, 135, 141, 145	0
All	All	533/543 (98%)	0.53	58 (10%) 10 8	49, 83, 137, 185	0

All (58) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1002	PRO	7.8
1	A	999	LEU	7.1
1	A	1344	ASN	5.3
1	A	1151	VAL	5.3
1	A	1049	GLU	5.1
1	A	1345	VAL	5.0
1	A	1447	GLY	5.0
1	A	1150	ARG	4.7
1	A	1289	LYS	4.6
1	A	1038	THR	4.5
1	A	1404	VAL	4.3
1	A	944	GLU	4.0
1	A	1376	ALA	4.0
1	A	1346	PRO	3.9
1	A	1401	ARG	3.9
1	A	1003	PRO	3.8
1	A	1422	LYS	3.7
1	A	1300	LYS	3.7
1	A	1457	LYS	3.5
1	A	1343	GLY	3.5
1	A	1259	LYS	3.4
2	P	13	LYS	3.3
1	A	1452	LYS	3.3
1	A	1050	GLU	3.2

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Mol	Chain	Res	Type	RSRZ
1	A	1261	LYS	3.1
1	A	1260	GLU	3.0
1	A	1004	ARG	3.0
1	A	1480	LYS	2.9
1	A	1340	LYS	2.9
1	A	1257	CYS	2.9
1	A	1256	TYR	2.9
1	A	1236	LYS	2.8
1	A	1191	GLN	2.7
1	A	1182	GLU	2.6
1	A	948	LYS	2.6
1	A	1347	ALA	2.6
1	A	1095	ILE	2.6
1	A	1178	HIS	2.5
2	P	14	TYR	2.4
1	A	1380	GLU	2.4
1	A	1186	LYS	2.3
1	A	1348	SER	2.3
1	A	1414	ASP	2.3
1	A	1377	LYS	2.2
1	A	1194	GLU	2.2
2	P	18	ASN	2.2
1	A	1413	LYS	2.2
2	P	17	LYS	2.2
1	A	997	GLN	2.2
1	A	1225	GLN	2.2
1	A	1171	GLU	2.2
1	A	1174	ARG	2.1
1	A	1001	SER	2.1
1	A	1244	GLN	2.1
1	A	945	ARG	2.1
1	A	1330	ARG	2.0
1	A	1056	LYS	2.0
1	A	1466	TYR	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.