Full wwPDB X-ray Structure Validation Report ⓘ

Dec 23, 2024 – 04:08 PM JST

PDB ID	:	8Y04
Title	:	Crystal structure of LbCas12a in complex with crRNA and 6nt target DNA
Authors	:	Lin, X.; Chen, J.; Liu, L.
Deposited on	:	2024-01-22
Resolution	:	3.71 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:

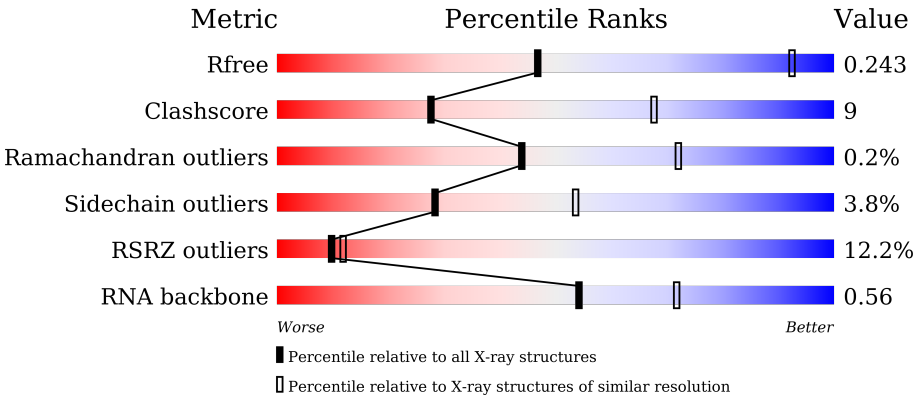
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.71 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}	164625	1058 (3.84-3.60)
Clashscore	180529	1114 (3.84-3.60)
Ramachandran outliers	177936	1095 (3.84-3.60)
Sidechain outliers	177891	1091 (3.84-3.60)
RSRZ outliers	164620	1058 (3.84-3.60)
RNA backbone	3690	1122 (4.40-3.00)

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 <=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	1228	12% 75% 21%
2	B	40	2% 42% 25% 5% 28%
3	C	15	67% 33%
4	D	11	73% 27%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 10967 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 LbCas12a.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	1202	Total	C	N	O	S	0	0	0
			9824	6318	1607	1870	29			

- Molecule 2 is a RNA chain called RNA (29-MER).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	29	Total	C	N	O	P	0	0	0
			610	275	106	201	28			

- Molecule 3 is a DNA chain called DNA (5'-D(P*GP*AP*TP*GP*CP*GP*TP*AP*AP*AP *GP*GP*AP*CP*G)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	15	Total	C	N	O	P	0	0	0
			315	148	65	87	15			

- Molecule 4 is a DNA chain called DNA (5'-D(*CP*GP*TP*CP*CP*TP*TP*TP*AP*TP* T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	11	Total	C	N	O	P	0	0	0
			217	107	31	69	10			

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

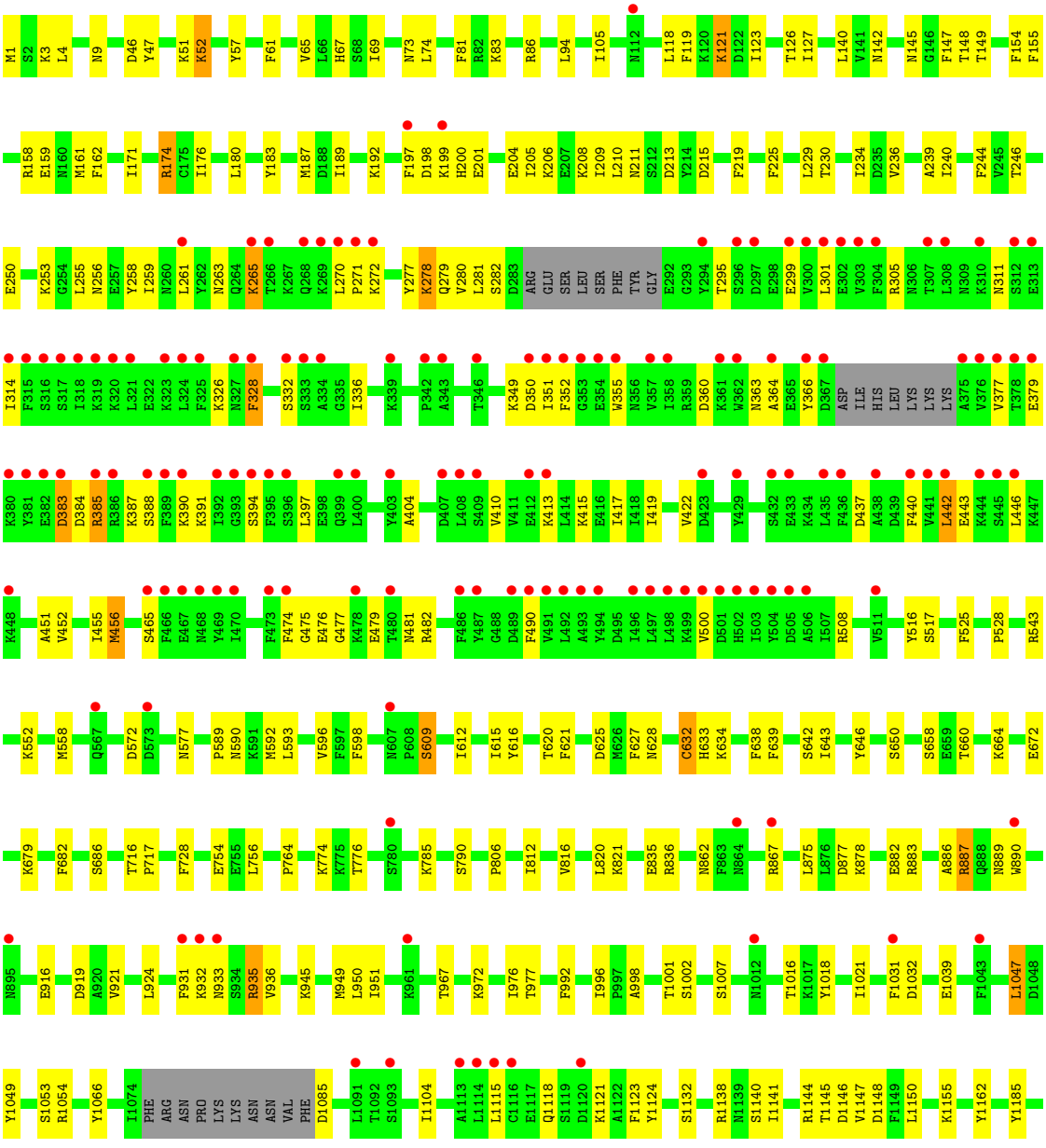
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Mg	0	0
			1	1		

3 Residue-property plots (i)

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.

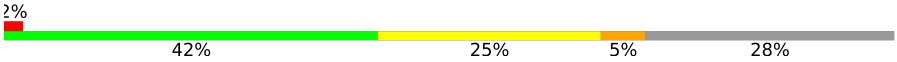
- Molecule 1: LbCas12a

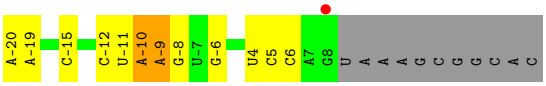
Chain A:



• Molecule 2: RNA (29-MER)

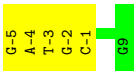
Chain B:





• Molecule 3: DNA (5'-D(P*GP*AP*TP*GP*CP*GP*TP*AP*AP*AP*GP*GP*AP*CP*G)-3')

Chain C:



• Molecule 4: DNA (5'-D(*CP*GP*TP*CP*CP*TP*TP*TP*AP*TP*T)-3')

Chain D:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α, β, γ	154.80Å 154.80Å 210.78Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	49.27 – 3.71 49.27 – 3.71	Depositor EDS
% Data completeness (in resolution range)	95.3 (49.27-3.71) 95.5 (49.27-3.71)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.30 (at 3.67Å)	Xtriage
Refinement program	PHENIX 1.17.1_3660	Depositor
R, R_{free}	0.216 , 0.247 0.216 , 0.243	Depositor DCC
R_{free} test set	1527 reflections (4.82%)	wwPDB-VP
Wilson B-factor (Å^2)	16.1	Xtriage
Anisotropy	0.408	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.29 , 26.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.45$, $< L^2 > = 0.27$	Xtriage
Estimated twinning fraction	0.046 for -h,-k,l	Xtriage
F_o,F_c correlation	0.83	EDS
Total number of atoms	10967	wwPDB-VP
Average B, all atoms (Å^2)	47.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.10% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG

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	0.27	0/10027	0.44	0/13490
2	B	0.24	0/681	0.77	0/1058
3	C	0.53	0/355	0.82	0/547
4	D	0.55	0/240	1.13	0/368
All	All	0.29	0/11303	0.52	0/15463

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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 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	9824	0	9656	177	0
2	B	610	0	312	9	0
3	C	315	0	168	3	0
4	D	217	0	129	3	0
5	A	1	0	0	0	0
All	All	10967	0	10265	186	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 9.

All (186) 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:305:ARG:HH12	1:A:440:PHE:HD2	1.07	0.98
1:A:1016:THR:HG1	1:A:1132:SER:HG	1.12	0.89
1:A:835:GLU:HG2	1:A:935:ARG:HB2	1.54	0.88
1:A:774:LYS:NZ	2:B:-8:G:O6	2.07	0.88
1:A:121:LYS:HA	1:A:148:THR:HG21	1.58	0.86
3:C:-4:DA:H2"	3:C:-3:DT:H5"	1.60	0.84
1:A:996:ILE:HD11	1:A:1191:VAL:HG23	1.61	0.83
1:A:263:ASN:HD21	1:A:270:LEU:HB2	1.45	0.82
1:A:83:LYS:HG2	1:A:86:ARG:HG2	1.62	0.81
1:A:442:LEU:HD11	1:A:446:LEU:HD11	1.63	0.81
1:A:305:ARG:NH2	1:A:437:ASP:O	2.15	0.80
1:A:836:ARG:NH2	1:A:1147:VAL:O	2.18	0.76
1:A:74:LEU:HD21	1:A:225:PHE:HB3	1.68	0.75
1:A:305:ARG:NH1	1:A:440:PHE:HD2	1.84	0.75
1:A:142:ASN:O	1:A:145:ASN:ND2	2.20	0.74
1:A:616:TYR:OH	4:D:0:DT:OP1	2.05	0.72
1:A:349:LYS:HB2	1:A:355:TRP:HD1	1.55	0.72
1:A:210:LEU:HD21	1:A:240:ILE:HD11	1.72	0.71
1:A:821:LYS:NZ	1:A:1201:ALA:O	2.25	0.70
1:A:383:ASP:O	1:A:387:LYS:N	2.21	0.69
1:A:206:LYS:HA	1:A:210:LEU:HB2	1.74	0.69
1:A:835:GLU:OE2	1:A:1138:ARG:NH1	2.26	0.68
1:A:360:ASP:HA	1:A:363:ASN:HB2	1.76	0.68
1:A:452:VAL:O	1:A:456:MET:HG2	1.95	0.67
1:A:349:LYS:HB2	1:A:355:TRP:CD1	2.30	0.67
1:A:442:LEU:HD11	1:A:446:LEU:CD1	2.25	0.66
1:A:477:GLY:HA3	1:A:479:GLU:HB2	1.78	0.65
1:A:887:ARG:NH1	1:A:889:ASN:OD1	2.30	0.65
1:A:350:ASP:HB3	1:A:417:ILE:HD13	1.80	0.64
1:A:525:PHE:O	1:A:543:ARG:NH2	2.30	0.63
1:A:1115:LEU:HD12	1:A:1123:PHE:HZ	1.63	0.63
1:A:508:ARG:HG3	1:A:890:TRP:CD1	2.34	0.62
1:A:1198:PHE:CZ	1:A:1211:ILE:HD11	2.35	0.62
1:A:174:ARG:HH21	1:A:277:TYR:HB3	1.65	0.61
1:A:377:VAL:HG13	1:A:385:ARG:HH12	1.65	0.61
2:B:-20:A:O2'	2:B:-11:U:O4	2.15	0.60
1:A:360:ASP:O	1:A:364:ALA:N	2.33	0.59
1:A:474:PHE:HE1	1:A:490:PHE:HE2	1.49	0.59
1:A:351:ILE:HD12	1:A:352:PHE:H	1.66	0.59
1:A:51:LYS:HE2	1:A:154:PHE:CD1	2.39	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:835:GLU:HG2	1:A:935:ARG:CB	2.29	0.58
1:A:785:LYS:HB2	2:B:-20:A:H5"	1.86	0.57
1:A:543:ARG:HG2	1:A:558:MET:HB2	1.88	0.56
1:A:205:ILE:HG23	1:A:209:ILE:HD12	1.85	0.56
1:A:756:LEU:HD11	1:A:790:SER:HB3	1.88	0.56
1:A:351:ILE:HG22	1:A:413:LYS:CG	2.36	0.56
1:A:377:VAL:HG11	1:A:1054:ARG:HH21	1.70	0.56
1:A:1007:SER:O	1:A:1226:VAL:HG21	2.05	0.55
3:C:-5:DG:H2"	3:C:-4:DA:H5"	1.89	0.55
1:A:951:ILE:HA	1:A:977:THR:HG21	1.89	0.54
1:A:377:VAL:O	1:A:1053:SER:HB2	2.07	0.54
2:B:-10:A:H5'	2:B:-9:A:C2	2.42	0.54
1:A:384:ASP:O	1:A:388:SER:OG	2.19	0.54
1:A:836:ARG:HD2	1:A:1145:THR:HG23	1.90	0.53
1:A:189:ILE:HG23	1:A:271:PRO:HG2	1.89	0.53
1:A:1185:TYR:CZ	1:A:1189:ARG:HD2	2.44	0.53
1:A:46:ASP:HB3	1:A:140:LEU:HD11	1.90	0.53
1:A:351:ILE:HD12	1:A:352:PHE:N	2.22	0.53
1:A:836:ARG:NH2	1:A:1144:ARG:O	2.42	0.53
1:A:1194:ALA:HB1	1:A:1211:ILE:HD12	1.91	0.52
1:A:1141:ILE:HB	1:A:1144:ARG:HB2	1.91	0.52
1:A:572:ASP:O	1:A:577:ASN:ND2	2.28	0.52
1:A:9:ASN:OD1	1:A:806:PRO:HA	2.09	0.52
1:A:1115:LEU:HD12	1:A:1123:PHE:CZ	2.45	0.52
2:B:-20:A:O2'	2:B:-19:A:OP2	2.28	0.52
2:B:4:U:H2'	2:B:5:C:C6	2.44	0.52
4:D:-9:DC:H2'	4:D:-8:DG:C8	2.44	0.52
1:A:474:PHE:CE1	1:A:490:PHE:HE2	2.28	0.52
1:A:945:LYS:O	1:A:949:MET:HG3	2.09	0.52
1:A:155:PHE:O	1:A:159:GLU:HG3	2.09	0.52
1:A:366:TYR:CE2	1:A:385:ARG:HG3	2.45	0.51
1:A:263:ASN:ND2	1:A:270:LEU:HB2	2.20	0.51
1:A:620:THR:O	1:A:627:PHE:HA	2.10	0.51
1:A:326:LYS:HD3	1:A:419:ILE:HD11	1.92	0.51
1:A:967:THR:HA	1:A:972:LYS:HB3	1.92	0.51
1:A:764:PRO:HB2	1:A:776:THR:CG2	2.41	0.51
1:A:592:MET:O	1:A:596:VAL:HG23	2.10	0.50
1:A:415:LYS:HG2	1:A:419:ILE:HD12	1.93	0.50
1:A:1039:GLU:OE2	1:A:1039:GLU:N	2.35	0.50
1:A:1140:SER:OG	1:A:1148:ASP:OD1	2.30	0.50
1:A:625:ASP:OD1	1:A:625:ASP:N	2.39	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:171:ILE:HG12	1:A:280:VAL:HG21	1.94	0.49
1:A:394:SER:HB3	1:A:475:GLY:HA2	1.95	0.49
1:A:314:ILE:HD13	1:A:500:VAL:HG12	1.95	0.49
1:A:836:ARG:NE	1:A:1145:THR:HA	2.27	0.49
1:A:1018:TYR:HE1	1:A:1124:TYR:HB2	1.76	0.49
1:A:682:PHE:HE1	1:A:728:PHE:HB3	1.78	0.49
1:A:255:LEU:O	1:A:259:ILE:HG13	2.13	0.48
1:A:1031:PHE:CE2	1:A:1047:LEU:HD23	2.48	0.48
1:A:351:ILE:HG22	1:A:413:LYS:HG3	1.96	0.48
1:A:820:LEU:HD11	1:A:921:VAL:HG21	1.95	0.48
1:A:836:ARG:HE	1:A:1145:THR:HA	1.79	0.48
1:A:301:LEU:O	1:A:305:ARG:HG3	2.14	0.48
1:A:3:LYS:NZ	1:A:919:ASP:O	2.32	0.48
1:A:198:ASP:OD1	1:A:200:HIS:N	2.42	0.48
1:A:197:PHE:CZ	1:A:255:LEU:HB3	2.49	0.48
1:A:119:PHE:HZ	1:A:162:PHE:HE2	1.60	0.47
1:A:1039:GLU:H	1:A:1039:GLU:CD	2.15	0.47
1:A:812:ILE:O	1:A:816:VAL:HG23	2.14	0.47
1:A:1021:ILE:HD11	1:A:1121:LYS:HB3	1.97	0.47
1:A:998:ALA:O	1:A:1001:THR:OG1	2.31	0.47
1:A:598:PHE:CE1	1:A:638:PHE:HE2	2.33	0.47
1:A:183:TYR:O	1:A:187:MET:HG3	2.15	0.47
1:A:211:ASN:O	1:A:211:ASN:ND2	2.47	0.47
1:A:61:PHE:O	1:A:65:VAL:HG23	2.14	0.47
1:A:621:PHE:HA	1:A:632:CYS:HB2	1.97	0.46
1:A:615:ILE:HD11	1:A:634:LYS:NZ	2.30	0.46
1:A:404:ALA:HB2	1:A:410:VAL:HG23	1.97	0.46
1:A:118:LEU:HA	1:A:123:ILE:HD13	1.98	0.46
1:A:149:THR:HB	1:A:528:PRO:HB2	1.98	0.46
1:A:204:GLU:HG2	1:A:208:LYS:HG3	1.97	0.46
1:A:886:ALA:O	1:A:887:ARG:HG2	2.15	0.46
1:A:508:ARG:HG3	1:A:890:TRP:CG	2.51	0.46
1:A:589:PRO:O	1:A:593:LEU:HB2	2.16	0.46
3:C:-2:DG:H2'	3:C:-1:DC:C6	2.51	0.46
1:A:69:ILE:HG21	1:A:229:LEU:HD12	1.96	0.46
1:A:479:GLU:HB3	1:A:482:ARG:HD2	1.98	0.46
1:A:278:LYS:NZ	1:A:282:SER:O	2.46	0.45
1:A:1104:ILE:HD11	1:A:1118:GLN:HG3	1.99	0.45
1:A:52:LYS:N	1:A:52:LYS:HD2	2.31	0.45
1:A:81:PHE:HD2	1:A:94:LEU:HD21	1.81	0.45
1:A:609:SER:OG	1:A:612:ILE:HG13	2.16	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:127:ILE:HD12	1:A:127:ILE:H	1.81	0.45
1:A:176:ILE:O	1:A:180:LEU:HB3	2.17	0.45
1:A:633:HIS:HD2	1:A:660:THR:HG22	1.81	0.45
1:A:590:ASN:OD1	4:D:0:DT:H2"	2.16	0.45
1:A:219:PHE:HE2	1:A:236:VAL:HG12	1.82	0.45
1:A:201:GLU:HB3	1:A:258:TYR:CE2	2.52	0.44
1:A:366:TYR:HE2	1:A:385:ARG:HG3	1.81	0.44
1:A:379:GLU:HG2	1:A:1054:ARG:HG2	1.99	0.44
1:A:67:HIS:CE1	1:A:230:THR:HG21	2.53	0.44
1:A:754:GLU:H	1:A:754:GLU:CD	2.21	0.44
1:A:976:ILE:HB	1:A:992:PHE:CD2	2.52	0.44
1:A:230:THR:O	1:A:234:ILE:HG13	2.17	0.44
1:A:261:LEU:O	1:A:265:LYS:HG2	2.18	0.44
1:A:263:ASN:OD1	1:A:270:LEU:N	2.29	0.44
1:A:263:ASN:CG	1:A:270:LEU:H	2.14	0.44
1:A:240:ILE:HG22	1:A:255:LEU:HG	2.00	0.44
1:A:281:LEU:HD12	1:A:281:LEU:HA	1.83	0.44
1:A:1146:ASP:OD1	1:A:1146:ASP:N	2.43	0.44
1:A:642:SER:O	1:A:646:TYR:N	2.51	0.43
1:A:4:LEU:HD12	1:A:916:GLU:HA	2.00	0.43
1:A:385:ARG:HH22	1:A:1054:ARG:HH21	1.65	0.43
1:A:377:VAL:HG11	1:A:1054:ARG:NH2	2.32	0.43
1:A:1150:LEU:HD22	1:A:1162:TYR:HE2	1.83	0.43
1:A:390:LYS:O	1:A:390:LYS:NZ	2.32	0.43
1:A:210:LEU:HD11	1:A:219:PHE:CZ	2.54	0.43
1:A:246:THR:OG1	1:A:250:GLU:HG3	2.19	0.43
1:A:451:ALA:O	1:A:455:ILE:HG12	2.18	0.43
1:A:174:ARG:NH2	1:A:277:TYR:HB3	2.33	0.43
1:A:4:LEU:HD23	1:A:4:LEU:HA	1.90	0.42
1:A:377:VAL:CG1	1:A:385:ARG:HH12	2.32	0.42
1:A:225:PHE:CE2	1:A:229:LEU:HD21	2.54	0.42
2:B:-10:A:H4'	2:B:-9:A:H5"	2.01	0.42
1:A:391:LYS:HE3	1:A:391:LYS:HB2	1.87	0.42
1:A:875:LEU:HD23	1:A:875:LEU:HA	1.79	0.42
1:A:328:PHE:CZ	1:A:397:LEU:HD11	2.53	0.42
1:A:639:PHE:O	1:A:643:ILE:HG13	2.19	0.42
1:A:47:TYR:CZ	1:A:51:LYS:HE3	2.55	0.42
1:A:332:SER:O	1:A:336:ILE:HG12	2.19	0.42
1:A:658:SER:OG	1:A:672:GLU:OE1	2.37	0.42
1:A:716:THR:HA	1:A:717:PRO:HD3	1.89	0.42
1:A:862:ASN:ND2	1:A:867:ARG:HG2	2.35	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:878:LYS:O	1:A:882:GLU:HG3	2.20	0.42
1:A:456:MET:HG2	1:A:456:MET:H	1.49	0.42
1:A:516:TYR:OH	2:B:-15:C:OP1	2.30	0.42
1:A:1211:ILE:HA	1:A:1211:ILE:HD13	1.78	0.42
1:A:57:TYR:HE2	1:A:118:LEU:HD22	1.85	0.41
1:A:349:LYS:HD3	1:A:355:TRP:CD1	2.55	0.41
1:A:1066:TYR:CE1	1:A:1155:LYS:HE3	2.56	0.41
1:A:69:ILE:HD11	1:A:105:ILE:HA	2.01	0.41
1:A:615:ILE:HD11	1:A:634:LYS:HZ2	1.85	0.41
1:A:924:LEU:HD11	1:A:950:LEU:HD12	2.03	0.41
1:A:933:ASN:HD21	1:A:936:VAL:HG13	1.85	0.41
1:A:967:THR:HA	1:A:972:LYS:CB	2.50	0.41
1:A:158:ARG:O	1:A:161:MET:HE2	2.21	0.41
1:A:443:GLU:H	1:A:443:GLU:HG2	1.67	0.41
1:A:126:THR:OG1	1:A:127:ILE:HD12	2.21	0.41
1:A:171:ILE:HG23	1:A:279:GLN:HE22	1.86	0.41
1:A:239:ALA:HB1	1:A:244:PHE:HD2	1.86	0.41
1:A:174:ARG:NH1	2:B:6:C:H4'	2.35	0.40
1:A:295:THR:HG22	1:A:299:GLU:OE1	2.21	0.40
1:A:764:PRO:HB2	1:A:776:THR:HG21	2.03	0.40
1:A:419:ILE:O	1:A:422:VAL:HG22	2.22	0.40
1:A:572:ASP:HB2	1:A:686:SER:HB2	2.04	0.40
1:A:256:ASN:HD21	1:A:272:LYS:HE3	1.87	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	1194/1228 (97%)	1154 (97%)	38 (3%)	2 (0%)	44 72

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	481	ASN
1	A	476	GLU

5.3.2 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 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	1065/1115 (96%)	1024 (96%)	41 (4%)	28 53

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	52	LYS
1	A	73	ASN
1	A	121	LYS
1	A	147	PHE
1	A	174	ARG
1	A	192	LYS
1	A	199	LYS
1	A	213	ASP
1	A	215	ASP
1	A	253	LYS
1	A	265	LYS
1	A	278	LYS
1	A	311	ASN
1	A	328	PHE
1	A	383	ASP
1	A	385	ARG
1	A	442	LEU
1	A	456	MET
1	A	465	SER
1	A	517	SER
1	A	552	LYS
1	A	609	SER
1	A	628	ASN
1	A	632	CYS

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Mol	Chain	Res	Type
1	A	650	SER
1	A	664	LYS
1	A	679	LYS
1	A	877	ASP
1	A	883	ARG
1	A	887	ARG
1	A	931	PHE
1	A	932	LYS
1	A	935	ARG
1	A	1002	SER
1	A	1032	ASP
1	A	1047	LEU
1	A	1049	TYR
1	A	1085	ASP
1	A	1207	ASP
1	A	1227	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	862	ASN
1	A	888	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	B	28/40 (70%)	4 (14%)	0

All (4) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	B	-12	C
2	B	-10	A
2	B	-9	A
2	B	-6	G

There are no RNA pucker outliers to report.

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)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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, 95^{th} 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	1202/1228 (97%)	0.61	152 (12%) 9 11	2, 31, 148, 165	0
2	B	29/40 (72%)	0.08	1 (3%) 48 35	5, 13, 29, 95	0
3	C	15/15 (100%)	0.36	0 100 100	5, 18, 35, 42	0
4	D	11/11 (100%)	0.06	0 100 100	12, 14, 31, 35	0
All	All	1257/1294 (97%)	0.59	153 (12%) 10 12	2, 30, 148, 165	0

All (153) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	314	ILE	5.4
1	A	346	THR	5.2
1	A	433	GLU	5.2
1	A	494	TYR	4.9
1	A	377	VAL	4.8
1	A	362	TRP	4.7
1	A	895	ASN	4.7
1	A	307	THR	4.5
1	A	497	LEU	4.5
1	A	392	ILE	4.2
1	A	376	VAL	4.2
1	A	501	ASP	4.2
1	A	474	PHE	4.2
1	A	500	VAL	4.2
1	A	408	LEU	4.1
1	A	357	VAL	4.1
1	A	318	ILE	4.0
1	A	379	GLU	4.0
1	A	294	TYR	3.9
1	A	499	LYS	3.9
1	A	465	SER	3.9

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Mol	Chain	Res	Type	RSRZ
1	A	413	LYS	3.9
1	A	498	LEU	3.9
1	A	383	ASP	3.8
1	A	355	TRP	3.8
1	A	386	ARG	3.7
1	A	313	GLU	3.7
1	A	492	LEU	3.7
1	A	496	ILE	3.7
1	A	400	LEU	3.7
1	A	343	ALA	3.7
1	A	466	PHE	3.7
1	A	378	THR	3.7
1	A	1227	LYS	3.6
1	A	490	PHE	3.6
1	A	342	PRO	3.6
1	A	304	PHE	3.6
1	A	339	LYS	3.6
1	A	502	HIS	3.5
1	A	266	THR	3.5
1	A	272	LYS	3.4
1	A	333	SER	3.3
2	B	8	G	3.3
1	A	324	LEU	3.3
1	A	440	PHE	3.3
1	A	503	ILE	3.2
1	A	470	ILE	3.1
1	A	327	ASN	3.1
1	A	380	LYS	3.1
1	A	269	LYS	3.1
1	A	390	LYS	3.1
1	A	480	THR	3.1
1	A	308	LEU	3.0
1	A	441	VAL	2.9
1	A	931	PHE	2.9
1	A	350	ASP	2.9
1	A	323	LYS	2.9
1	A	394	SER	2.9
1	A	932	LYS	2.9
1	A	438	ALA	2.8
1	A	395	PHE	2.8
1	A	1114	LEU	2.8
1	A	493	ALA	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	303	VAL	2.8
1	A	467	GLU	2.8
1	A	444	LYS	2.8
1	A	1091	LEU	2.8
1	A	864	ASN	2.8
1	A	364	ALA	2.8
1	A	478	LYS	2.8
1	A	270	LEU	2.7
1	A	317	SER	2.7
1	A	321	LEU	2.7
1	A	1115	LEU	2.7
1	A	320	LYS	2.7
1	A	375	ALA	2.7
1	A	268	GLN	2.7
1	A	328	PHE	2.7
1	A	1116	CYS	2.6
1	A	301	LEU	2.6
1	A	436	PHE	2.6
1	A	1012	ASN	2.6
1	A	468	ASN	2.6
1	A	361	LYS	2.6
1	A	382	GLU	2.6
1	A	332	SER	2.6
1	A	412	GLU	2.5
1	A	487	TYR	2.5
1	A	491	VAL	2.5
1	A	367	ASP	2.5
1	A	1093	SER	2.5
1	A	302	GLU	2.5
1	A	261	LEU	2.5
1	A	442	LEU	2.5
1	A	296	SER	2.5
1	A	334	ALA	2.5
1	A	352	PHE	2.5
1	A	407	ASP	2.5
1	A	435	LEU	2.4
1	A	890	TRP	2.4
1	A	393	GLY	2.4
1	A	389	PHE	2.4
1	A	486	PHE	2.4
1	A	300	VAL	2.4
1	A	199	LYS	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	409	SER	2.4
1	A	423	ASP	2.4
1	A	448	LYS	2.4
1	A	197	PHE	2.4
1	A	961	LYS	2.4
1	A	112	ASN	2.3
1	A	353	GLY	2.3
1	A	366	TYR	2.3
1	A	567	GLN	2.3
1	A	316	SER	2.3
1	A	446	LEU	2.3
1	A	351	ILE	2.3
1	A	573	ASP	2.3
1	A	511	VAL	2.3
1	A	325	PHE	2.3
1	A	473	PHE	2.3
1	A	403	TYR	2.3
1	A	607	ASN	2.3
1	A	933	ASN	2.3
1	A	271	PRO	2.2
1	A	388	SER	2.2
1	A	489	ASP	2.2
1	A	505	ASP	2.2
1	A	310	LYS	2.2
1	A	381	TYR	2.2
1	A	867	ARG	2.2
1	A	1043	PHE	2.2
1	A	354	GLU	2.1
1	A	445	SER	2.1
1	A	780	SER	2.1
1	A	297	ASP	2.1
1	A	396	SER	2.1
1	A	429	TYR	2.1
1	A	469	TYR	2.1
1	A	399	GLN	2.1
1	A	265	LYS	2.1
1	A	358	ILE	2.1
1	A	504	TYR	2.1
1	A	1120	ASP	2.1
1	A	385	ARG	2.1
1	A	299	GLU	2.1
1	A	319	LYS	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	506	ALA	2.1
1	A	315	PHE	2.0
1	A	312	SER	2.0
1	A	432	SER	2.0
1	A	1113	ALA	2.0
1	A	1031	PHE	2.0

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

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	MG	A	1301	1/1	0.85	0.34	11,11,11,11	0

6.5 Other polymers (i)

There are no such residues in this entry.