



Full wwPDB EM Validation Report ⓘ

Jul 15, 2025 – 09:48 PM JST

PDB ID : 9JKB / pdb_00009jkb
EMDB ID : EMD-61550
Title : Cryo-EM structure of the CUL1-RBX1-SKP1-FBXO4 SCF ubiquitination ligase complex
Authors : Zhu, W.; Xu, C.
Deposited on : 2024-09-15
Resolution : 3.93 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>
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:

EMDB validation analysis : **FAILED**
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

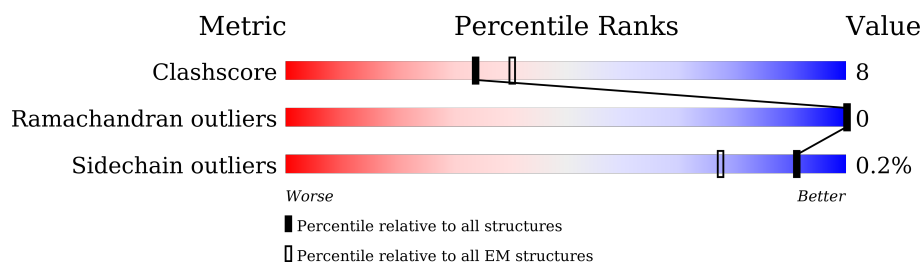
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.93 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	C	315	
1	D	315	
2	A	796	
3	B	166	
4	R	96	

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 9532 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 F-box only protein 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	C	175	Total	C	N	O	S	0	0
			1343	857	224	253	9		
1	D	94	Total	C	N	O	S	0	0
			773	506	122	140	5		

There are 46 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	73	HIS	-	expression tag	UNP Q9UKT5
C	74	MET	-	expression tag	UNP Q9UKT5
C	?	-	THR	deletion	UNP Q9UKT5
C	?	-	ARG	deletion	UNP Q9UKT5
C	?	-	ARG	deletion	UNP Q9UKT5
C	?	-	ALA	deletion	UNP Q9UKT5
C	?	-	SER	deletion	UNP Q9UKT5
C	?	-	LYS	deletion	UNP Q9UKT5
C	?	-	SER	deletion	UNP Q9UKT5
C	?	-	SER	deletion	UNP Q9UKT5
C	?	-	ARG	deletion	UNP Q9UKT5
C	?	-	PRO	deletion	UNP Q9UKT5
C	?	-	MET	deletion	UNP Q9UKT5
C	?	-	TYR	deletion	UNP Q9UKT5
C	?	-	GLY	deletion	UNP Q9UKT5
C	?	-	ALA	deletion	UNP Q9UKT5
C	?	-	VAL	deletion	UNP Q9UKT5
C	?	-	THR	deletion	UNP Q9UKT5
C	?	-	SER	deletion	UNP Q9UKT5
C	?	-	PHE	deletion	UNP Q9UKT5
C	?	-	LEU	deletion	UNP Q9UKT5
C	?	-	HIS	deletion	UNP Q9UKT5
C	?	-	SER	deletion	UNP Q9UKT5
D	52	HIS	-	expression tag	UNP Q9UKT5
D	53	MET	-	expression tag	UNP Q9UKT5
D	?	-	THR	deletion	UNP Q9UKT5

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Chain	Residue	Modelled	Actual	Comment	Reference
D	?	-	ARG	deletion	UNP Q9UKT5
D	?	-	ARG	deletion	UNP Q9UKT5
D	?	-	ALA	deletion	UNP Q9UKT5
D	?	-	SER	deletion	UNP Q9UKT5
D	?	-	LYS	deletion	UNP Q9UKT5
D	?	-	SER	deletion	UNP Q9UKT5
D	?	-	SER	deletion	UNP Q9UKT5
D	?	-	ARG	deletion	UNP Q9UKT5
D	?	-	PRO	deletion	UNP Q9UKT5
D	?	-	MET	deletion	UNP Q9UKT5
D	?	-	TYR	deletion	UNP Q9UKT5
D	?	-	GLY	deletion	UNP Q9UKT5
D	?	-	ALA	deletion	UNP Q9UKT5
D	?	-	VAL	deletion	UNP Q9UKT5
D	?	-	THR	deletion	UNP Q9UKT5
D	?	-	SER	deletion	UNP Q9UKT5
D	?	-	PHE	deletion	UNP Q9UKT5
D	?	-	LEU	deletion	UNP Q9UKT5
D	?	-	HIS	deletion	UNP Q9UKT5
D	?	-	SER	deletion	UNP Q9UKT5

- Molecule 2 is a protein called Cullin-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	736	Total	C	N	O	S	0	0
			6015	3814	1027	1145	29		

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	SER	-	expression tag	UNP Q13616
A	-18	ALA	-	expression tag	UNP Q13616
A	-17	SER	-	expression tag	UNP Q13616
A	-16	TRP	-	expression tag	UNP Q13616
A	-15	SER	-	expression tag	UNP Q13616
A	-14	HIS	-	expression tag	UNP Q13616
A	-13	PRO	-	expression tag	UNP Q13616
A	-12	GLN	-	expression tag	UNP Q13616
A	-11	PHE	-	expression tag	UNP Q13616
A	-10	GLU	-	expression tag	UNP Q13616
A	-9	LYS	-	expression tag	UNP Q13616
A	-8	GLY	-	expression tag	UNP Q13616

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-7	GLY	-	expression tag	UNP Q13616
A	-6	GLY	-	expression tag	UNP Q13616
A	-5	SER	-	expression tag	UNP Q13616
A	-4	GLY	-	expression tag	UNP Q13616
A	-3	GLY	-	expression tag	UNP Q13616
A	-2	GLY	-	expression tag	UNP Q13616
A	-1	SER	-	expression tag	UNP Q13616
A	0	LYS	-	expression tag	UNP Q13616
A	1	LEU	-	expression tag	UNP Q13616

- Molecule 3 is a protein called S-phase kinase-associated protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	B	158	Total	C	N	O	S	0	0
			1257	788	204	260	5		

There are 3 discrepancies between the modelled and reference sequences:

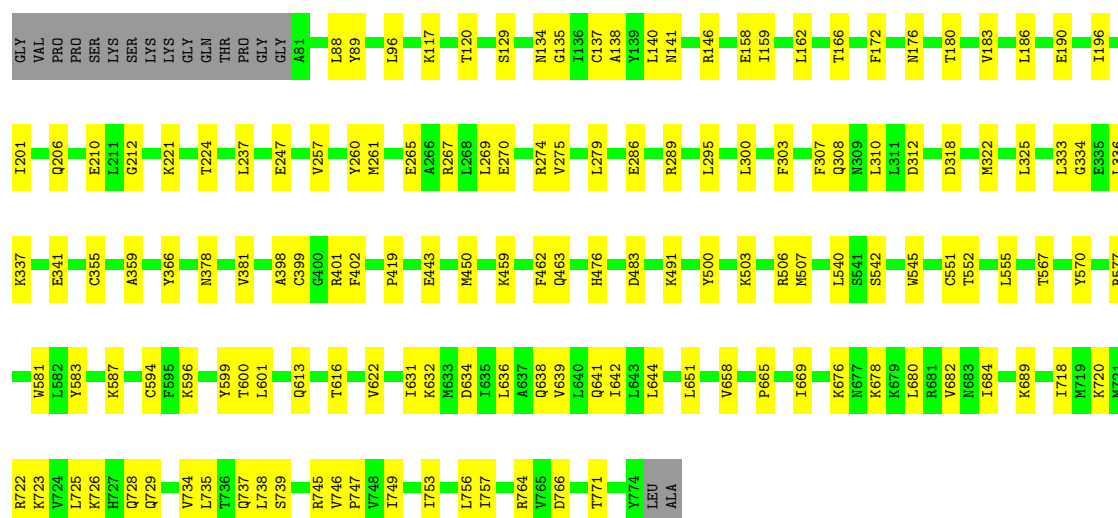
Chain	Residue	Modelled	Actual	Comment	Reference
B	-2	GLY	-	expression tag	UNP P63208
B	-1	GLY	-	expression tag	UNP P63208
B	0	SER	-	expression tag	UNP P63208

- Molecule 4 is a protein called E3 ubiquitin-protein ligase RBX1, N-terminally processed.

Mol	Chain	Residues	Atoms				AltConf	Trace
4	R	16	Total	C	N	O	0	0
			144	98	25	21		

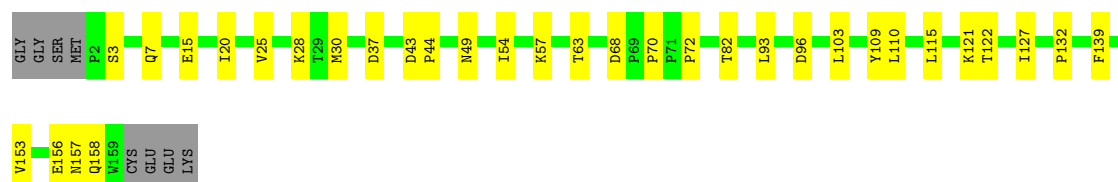
There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R	13	SER	-	expression tag	UNP P62877
R	14	HIS	-	expression tag	UNP P62877
R	15	MET	-	expression tag	UNP P62877



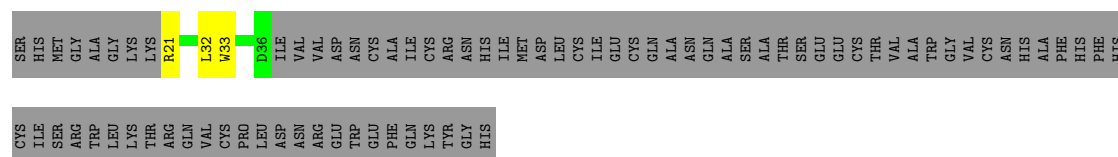
• Molecule 3: S-phase kinase-associated protein 1

Chain B: 75% 20% 5%



• Molecule 4: E3 ubiquitin-protein ligase RBX1, N-terminally processed

Chain R: 14% 83%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	102037	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	55.8	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2900	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

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	C	0.10	0/1374	0.32	0/1867
1	D	0.20	0/799	0.40	0/1096
2	A	0.16	0/6115	0.36	0/8234
3	B	0.15	0/1278	0.42	0/1731
4	R	0.09	0/150	0.27	0/204
All	All	0.16	0/9716	0.37	0/13132

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 [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	C	1343	0	1271	20	0
1	D	773	0	740	16	0
2	A	6015	0	6040	100	0
3	B	1257	0	1232	22	0
4	R	144	0	137	4	0
All	All	9532	0	9420	152	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 8.

All (152) 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)
2:A:303:PHE:HB3	2:A:322:MET:HE1	1.70	0.73
1:C:181:MET:HA	1:C:290:ILE:HB	1.75	0.69
2:A:341:GLU:HG2	2:A:398:ALA:HB2	1.78	0.65
2:A:186:LEU:HD23	2:A:201:ILE:HD11	1.79	0.65
2:A:134:ASN:O	2:A:138:ALA:N	2.32	0.62
1:D:131:VAL:HG22	1:D:133:ASP:H	1.64	0.62
2:A:594:CYS:SG	4:R:21:ARG:N	2.72	0.62
2:A:172:PHE:O	2:A:176:ASN:HB2	1.99	0.61
2:A:186:LEU:HD11	2:A:196:ILE:HG12	1.82	0.61
3:B:25:VAL:HA	3:B:28:LYS:HB3	1.82	0.61
1:D:119:PRO:HB2	1:D:122:GLU:HB3	1.82	0.61
2:A:450:MET:HE3	2:A:491:LYS:HB3	1.81	0.61
1:D:100:ARG:NH1	1:D:129:SER:O	2.35	0.60
2:A:300:LEU:O	2:A:303:PHE:HB2	2.00	0.60
2:A:542:SER:HA	4:R:32:LEU:HD12	1.83	0.60
2:A:341:GLU:OE2	2:A:401:ARG:NH1	2.36	0.59
2:A:137:CYS:HB2	2:A:159:ILE:HG21	1.85	0.58
2:A:601:LEU:HD12	2:A:684:ILE:HD11	1.86	0.58
1:C:220:GLY:HA3	1:C:234:LEU:HA	1.86	0.57
2:A:265:GLU:HB2	2:A:325:LEU:HD11	1.86	0.57
2:A:96:LEU:HB3	2:A:166:THR:HG21	1.87	0.57
2:A:726:LYS:HE3	2:A:729:GLN:HB2	1.85	0.57
2:A:180:THR:HA	2:A:183:VAL:HG12	1.87	0.57
1:D:123:ILE:HA	1:D:127:PRO:HD2	1.87	0.57
3:B:109:TYR:HD2	3:B:110:LEU:HD22	1.70	0.56
3:B:82:THR:HA	3:B:121:LYS:HD2	1.88	0.56
2:A:757:ILE:HG13	2:A:764:ARG:HH21	1.69	0.56
2:A:599:TYR:HD1	2:A:680:LEU:HA	1.71	0.56
2:A:359:ALA:HB1	2:A:366:TYR:HB2	1.89	0.55
2:A:676:LYS:O	2:A:678:LYS:NZ	2.40	0.55
1:D:89:TRP:HA	1:D:92:THR:HG22	1.88	0.55
2:A:270:GLU:OE2	2:A:274:ARG:NH2	2.39	0.55
3:B:68:ASP:OD1	3:B:68:ASP:N	2.40	0.55
1:C:288:GLY:HA2	1:C:323:ARG:HB3	1.88	0.54
3:B:153:VAL:O	3:B:157:ASN:ND2	2.40	0.54
2:A:443:GLU:OE2	2:A:491:LYS:NZ	2.36	0.54
1:C:184:PRO:HD2	1:C:291:TYR:HE1	1.72	0.54
2:A:41:ARG:NH1	2:A:44:GLU:OE1	2.40	0.54
2:A:260:TYR:OH	2:A:295:LEU:O	2.25	0.54
1:C:361:ASP:HB2	1:D:111:SER:HB3	1.89	0.53
2:A:212:GLY:O	2:A:224:THR:OG1	2.27	0.53
3:B:20:ILE:HD12	3:B:63:THR:HA	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:355:CYS:HB3	2:A:359:ALA:HB2	1.91	0.53
2:A:753:ILE:HD13	2:A:756:LEU:HD21	1.91	0.52
1:C:180:ALA:HA	1:C:234:LEU:HB2	1.90	0.52
2:A:135:GLY:O	2:A:138:ALA:HB3	2.10	0.52
2:A:567:THR:HA	2:A:570:TYR:CE2	2.45	0.52
1:C:198:MET:HA	1:C:205:PRO:HB3	1.92	0.51
2:A:141:ASN:O	2:A:146:ARG:NH1	2.43	0.51
2:A:39:LYS:HD3	3:B:30:MET:HE2	1.93	0.51
2:A:24:LEU:HD12	2:A:45:LEU:HD22	1.92	0.50
2:A:27:GLY:HA3	2:A:45:LEU:HD21	1.94	0.50
2:A:463:GLN:HB2	2:A:500:TYR:CZ	2.46	0.50
2:A:735:LEU:O	2:A:739:SER:HB3	2.11	0.50
2:A:722:ARG:HG2	2:A:725:LEU:HD13	1.94	0.50
3:B:7:GLN:HB2	3:B:44:PRO:HB2	1.94	0.49
1:C:357:TRP:H	1:D:115:TRP:HB3	1.76	0.49
2:A:134:ASN:OD1	2:A:141:ASN:ND2	2.45	0.49
2:A:483:ASP:N	2:A:483:ASP:OD1	2.45	0.49
2:A:634:ASP:OD1	2:A:634:ASP:N	2.44	0.49
2:A:275:VAL:HA	2:A:279:LEU:HB2	1.93	0.49
2:A:766:ASP:N	2:A:766:ASP:OD1	2.46	0.49
2:A:286:GLU:OE2	2:A:289:ARG:NH2	2.46	0.49
2:A:600:THR:N	2:A:680:LEU:O	2.46	0.49
2:A:247:GLU:OE2	2:A:267:ARG:NE	2.44	0.48
2:A:419:PRO:HB2	2:A:462:PHE:HB2	1.95	0.48
2:A:190:GLU:OE1	2:A:274:ARG:NE	2.32	0.48
1:D:117:SER:HB3	1:D:145:MET:HG2	1.96	0.48
2:A:334:GLY:O	2:A:337:LYS:HB3	2.14	0.48
2:A:718:ILE:HD11	2:A:737:GLN:HG2	1.96	0.47
3:B:153:VAL:HA	3:B:156:GLU:HB3	1.96	0.47
2:A:307:PHE:CG	2:A:336:LEU:HD11	2.50	0.47
1:D:95:ASP:OD1	1:D:95:ASP:N	2.44	0.47
2:A:261:MET:HE2	2:A:322:MET:HA	1.97	0.47
2:A:631:ILE:HB	2:A:636:LEU:HD12	1.96	0.46
2:A:135:GLY:O	2:A:138:ALA:CB	2.64	0.46
2:A:601:LEU:HA	2:A:682:VAL:H	1.80	0.46
1:C:320:SER:O	1:C:323:ARG:NE	2.47	0.46
1:D:93:VAL:HG13	1:D:140:MET:HE1	1.99	0.45
2:A:399:CYS:HA	2:A:402:PHE:CE1	2.52	0.45
2:A:720:LYS:HA	2:A:723:LYS:HD3	1.98	0.45
3:B:57:LYS:HA	3:B:57:LYS:HD2	1.78	0.45
2:A:540:LEU:O	4:R:33:TRP:N	2.40	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:551:CYS:HB2	2:A:632:LYS:HG2	1.98	0.45
2:A:622:VAL:HB	2:A:665:PRO:HA	1.99	0.45
2:A:734:VAL:O	2:A:738:LEU:HG	2.17	0.45
3:B:96:ASP:OD1	3:B:96:ASP:N	2.49	0.45
1:C:331:ILE:HD13	1:C:338:ARG:HB2	1.98	0.45
2:A:644:LEU:HB3	2:A:658:VAL:HG13	1.99	0.45
1:C:181:MET:O	1:C:236:LEU:N	2.46	0.45
2:A:577:ARG:HB3	4:R:33:TRP:CD1	2.51	0.45
2:A:639:VAL:HA	2:A:642:ILE:HG12	2.00	0.44
2:A:726:LYS:HD2	2:A:729:GLN:H	1.82	0.44
2:A:206:GLN:NE2	2:A:210:GLU:OE1	2.42	0.44
3:B:54:ILE:HD11	3:B:103:LEU:HB2	1.98	0.44
1:C:177:PRO:HD3	1:C:381:VAL:HG13	2.00	0.44
2:A:117:LYS:O	2:A:120:THR:OG1	2.32	0.44
3:B:37:ASP:OD1	3:B:37:ASP:N	2.49	0.44
2:A:651:LEU:HD12	2:A:669:ILE:HG13	1.99	0.44
2:A:745:ARG:HB3	2:A:747:PRO:HD2	1.98	0.44
2:A:43:MET:HG2	3:B:30:MET:HE1	1.99	0.44
2:A:269:LEU:HD23	2:A:269:LEU:HA	1.86	0.44
2:A:551:CYS:SG	2:A:552:THR:N	2.91	0.44
2:A:726:LYS:NZ	2:A:728:GLN:HB2	2.33	0.44
1:C:339:MET:HE3	1:C:343:TYR:HB3	1.99	0.43
3:B:70:PRO:O	3:B:72:PRO:HD3	2.17	0.43
3:B:43:ASP:OD1	3:B:43:ASP:N	2.51	0.43
3:B:93:LEU:HD12	3:B:122:THR:HG21	2.01	0.43
1:D:94:ARG:HA	1:D:140:MET:HE3	2.00	0.43
2:A:507:MET:HG2	2:A:545:TRP:CE2	2.53	0.43
2:A:638:GLN:O	2:A:641:GLN:HG3	2.19	0.43
2:A:746:VAL:HA	2:A:749:ILE:HD12	2.01	0.43
2:A:261:MET:HE3	2:A:325:LEU:HD22	2.00	0.43
3:B:103:LEU:HD11	3:B:115:LEU:HD21	2.01	0.43
1:C:224:GLN:HG2	1:C:227:ASN:HA	2.00	0.42
2:A:308:GLN:O	2:A:312:ASP:N	2.52	0.42
2:A:333:LEU:O	2:A:336:LEU:HB3	2.18	0.42
2:A:581:TRP:HE3	2:A:583:TYR:HE1	1.67	0.42
3:B:3:SER:OG	3:B:15:GLU:OE2	2.36	0.42
2:A:158:GLU:O	2:A:162:LEU:N	2.46	0.42
2:A:596:LYS:HB2	2:A:676:LYS:HZ2	1.85	0.42
2:A:726:LYS:HA	2:A:771:THR:HA	2.01	0.42
2:A:32:TYR:HA	2:A:129:SER:HB2	2.00	0.42
2:A:89:TYR:CZ	2:A:162:LEU:HD22	2.53	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:299:LYS:HD2	1:C:299:LYS:HA	1.90	0.42
2:A:310:LEU:HD21	2:A:318:ASP:HB3	2.02	0.42
2:A:183:VAL:HG23	2:A:201:ILE:HD12	2.02	0.42
1:D:138:ASP:HB2	1:D:141:ALA:HB3	2.02	0.42
2:A:378:ASN:HA	2:A:381:VAL:HG12	2.01	0.42
2:A:221:LYS:HD2	2:A:221:LYS:HA	1.82	0.41
3:B:132:PRO:HG3	1:D:81:GLN:HB3	2.03	0.41
1:C:332:SER:HB2	1:C:336:VAL:HG21	2.03	0.41
2:A:88:LEU:HD23	2:A:140:LEU:HD13	2.02	0.41
2:A:689:LYS:HD2	2:A:689:LYS:HA	1.86	0.41
2:A:450:MET:HE2	2:A:450:MET:HB2	1.91	0.41
2:A:257:VAL:O	2:A:261:MET:HG2	2.19	0.41
3:B:127:ILE:HD11	3:B:139:PHE:HE2	1.85	0.41
1:C:351:ASN:OD1	1:C:351:ASN:N	2.53	0.41
3:B:93:LEU:HD23	3:B:93:LEU:HA	1.79	0.41
2:A:237:LEU:HD23	2:A:237:LEU:HA	1.87	0.41
2:A:613:GLN:O	2:A:616:THR:OG1	2.32	0.41
2:A:261:MET:HE3	2:A:261:MET:HB3	1.94	0.41
2:A:476:HIS:HD1	2:A:587:LYS:HE3	1.86	0.41
1:C:220:GLY:HA2	1:C:235:ILE:HG12	2.01	0.41
2:A:503:LYS:O	2:A:506:ARG:HG2	2.21	0.41
2:A:459:LYS:O	2:A:500:TYR:OH	2.36	0.40
2:A:753:ILE:HD13	2:A:753:ILE:HA	1.93	0.40
1:C:356:PRO:HA	1:D:115:TRP:CG	2.56	0.40
1:D:72:SER:HA	1:D:98:LEU:HD11	2.04	0.40
1:D:86:ASN:HA	1:D:90:ASN:HB2	2.03	0.40
1:C:291:TYR:HD2	1:C:327:VAL:HG22	1.86	0.40
2:A:555:LEU:HD12	2:A:555:LEU:HA	1.96	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 PDB entries followed by that with respect to all EM entries.

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	C	171/315 (54%)	165 (96%)	6 (4%)	0	100	100
1	D	92/315 (29%)	84 (91%)	8 (9%)	0	100	100
2	A	732/796 (92%)	707 (97%)	25 (3%)	0	100	100
3	B	156/166 (94%)	141 (90%)	15 (10%)	0	100	100
4	R	14/96 (15%)	14 (100%)	0	0	100	100
All	All	1165/1688 (69%)	1111 (95%)	54 (5%)	0	100	100

There are no Ramachandran outliers to report.

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 PDB entries followed by that with respect to all EM entries.

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	C	143/283 (50%)	143 (100%)	0	100	100
1	D	87/283 (31%)	87 (100%)	0	100	100
2	A	666/711 (94%)	666 (100%)	0	100	100
3	B	144/151 (95%)	142 (99%)	2 (1%)	62	75
4	R	13/82 (16%)	13 (100%)	0	100	100
All	All	1053/1510 (70%)	1051 (100%)	2 (0%)	91	93

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	B	49	ASN
3	B	158	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	227	ASN
1	C	280	GLN
1	C	333	GLN

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Mol	Chain	Res	Type
2	A	102	ASN
2	A	122	GLN
2	A	254	GLN
2	A	405	ASN
2	A	584	GLN
2	A	593	ASN
2	A	677	ASN
3	B	97	GLN

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.