



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 13, 2026 – 10:35 AM EDT

PDB ID : 9PLP / pdb_00009plp
Title : Crystal structure of netrin-1 in complex with anti-netrin-1 Fab (NP137 Fab)
Authors : Rafiei, F.; Bailey-Elkin, B.A.; Stetefeld, J.
Deposited on : 2025-07-15
Resolution : 4.99 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:

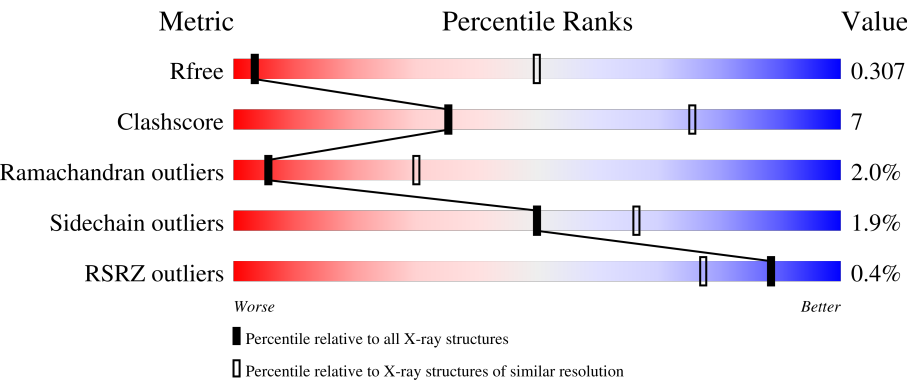
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

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 4.99 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	1009 (6.02-3.98)
Clashscore	190562	1040 (6.00-4.00)
Ramachandran outliers	187476	1015 (6.06-3.92)
Sidechain outliers	187428	1136 (6.10-3.90)
RSRZ outliers	180081	1004 (6.02-3.98)

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	443	
1	B	443	
2	C	222	
2	H	222	
3	D	225	

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Mol	Chain	Length	Quality of chain
3	L	225	% 40% 7% 52%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 10399 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 Netrin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	396	Total	C	N	O	S	0	0	0
			3108	1910	579	582	37			
1	B	397	Total	C	N	O	S	0	0	0
			3111	1914	578	582	37			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	22	ALA	-	insertion	UNP Q90922
A	23	PRO	-	insertion	UNP Q90922
A	24	LEU	-	insertion	UNP Q90922
A	25	ALA	-	insertion	UNP Q90922
A	459	GLY	-	expression tag	UNP Q90922
A	460	SER	-	expression tag	UNP Q90922
A	461	LEU	-	expression tag	UNP Q90922
A	462	VAL	-	expression tag	UNP Q90922
A	463	PRO	-	expression tag	UNP Q90922
A	464	ARG	-	expression tag	UNP Q90922
B	22	ALA	-	insertion	UNP Q90922
B	23	PRO	-	insertion	UNP Q90922
B	24	LEU	-	insertion	UNP Q90922
B	25	ALA	-	insertion	UNP Q90922
B	459	GLY	-	expression tag	UNP Q90922
B	460	SER	-	expression tag	UNP Q90922
B	461	LEU	-	expression tag	UNP Q90922
B	462	VAL	-	expression tag	UNP Q90922
B	463	PRO	-	expression tag	UNP Q90922
B	464	ARG	-	expression tag	UNP Q90922

- Molecule 2 is a protein called NP137 Fab heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	182	Total	C	N	O	S	0	0	0
			1199	746	210	238	5			
2	H	115	Total	C	N	O	S	0	0	0
			860	544	140	171	5			

- Molecule 3 is a protein called NP137 Fab light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	197	Total	C	N	O	S	0	0	0
			1280	800	224	253	3			
3	L	108	Total	C	N	O	S	0	0	0
			839	537	135	164	3			

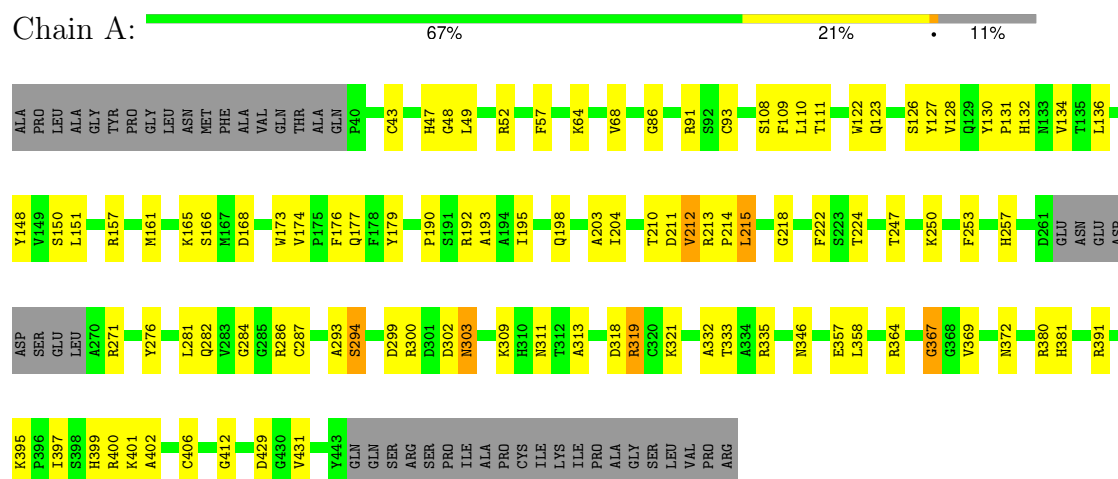
- Molecule 4 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Ca	0	0
			1	1		
4	B	1	Total	Ca	0	0
			1	1		

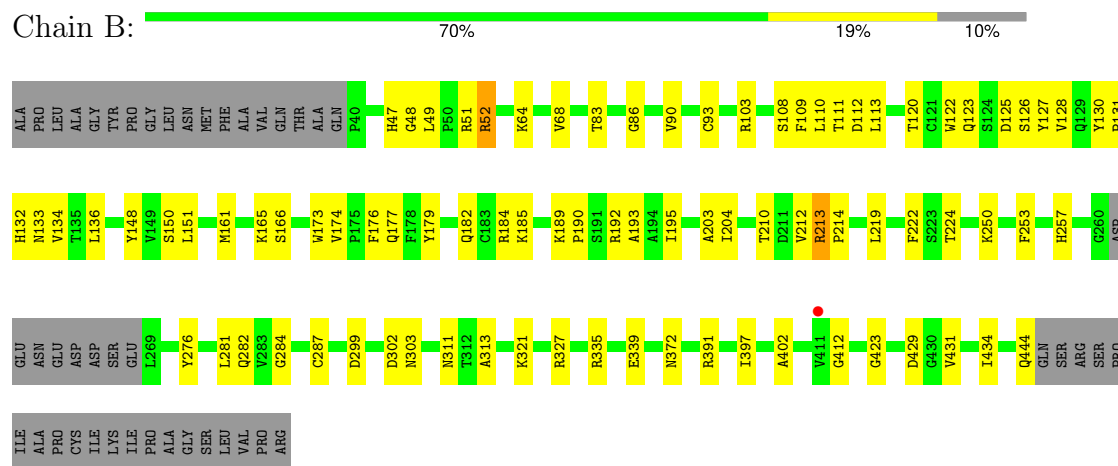
3 Residue-property plots

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.

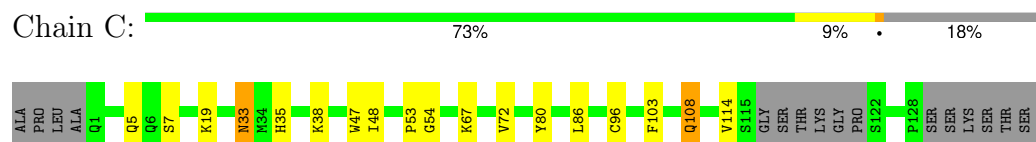
• Molecule 1: Netrin-1

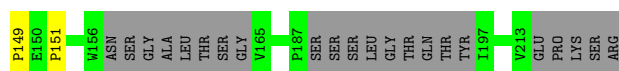


• Molecule 1: Netrin-1

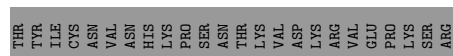
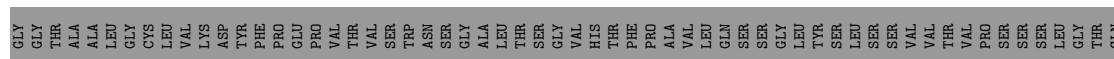


• Molecule 2: NP137 Fab heavy chain

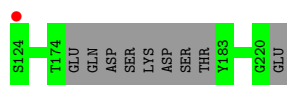
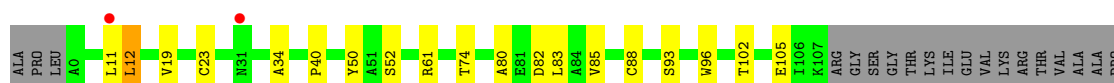
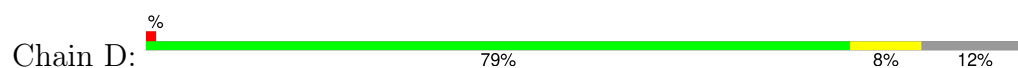




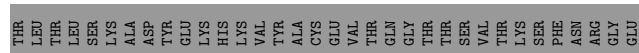
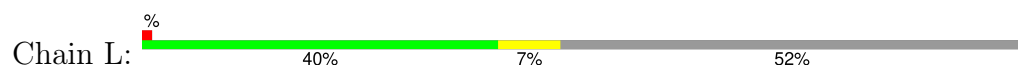
• Molecule 2: NP137 Fab heavy chain



• Molecule 3: NP137 Fab light chain



• Molecule 3: NP137 Fab light chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	67.98Å 263.05Å 68.77Å 90.00° 92.51° 90.00°	Depositor
Resolution (Å)	49.39 – 4.99 49.39 – 4.99	Depositor EDS
% Data completeness (in resolution range)	91.0 (49.39-4.99) 91.1 (49.39-4.99)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.30 (at 5.10Å)	Xtriage
Refinement program	REFMAC 5.8.0430 (refmacat 0.4.105)	Depositor
R, R_{free}	0.286 , 0.321 0.303 , 0.307	Depositor DCC
R_{free} test set	967 reflections (9.19%)	wwPDB-VP
Wilson B-factor (Å ²)	312.2	Xtriage
Anisotropy	0.080	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.22 , 310.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.000 for l,k,-h 0.032 for h,-k,-l 0.166 for l,-k,h	Xtriage
Reported twinning fraction	0.547 for H, K, L 0.453 for -L, -K, -H	Depositor
Outliers	0 of 9577 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	10399	wwPDB-VP
Average B, all atoms (Å ²)	137.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.13% 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

5.1 Standard geometry

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

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	0.56	0/3186	0.86	0/4310
1	B	0.58	0/3189	0.86	0/4315
2	C	0.50	0/1216	0.74	0/1656
2	H	0.61	0/881	0.84	0/1196
3	D	0.53	0/1299	0.74	0/1779
3	L	0.55	0/860	0.75	0/1170
All	All	0.56	0/10631	0.83	0/14426

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	3
1	B	0	3
All	All	0	6

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	286	ARG	Sidechain
1	A	300	ARG	Sidechain
1	A	335	ARG	Sidechain
1	B	103	ARG	Sidechain
1	B	213	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	B	335	ARG	Sidechain

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	3108	0	2931	62	0
1	B	3111	0	2936	52	0
2	C	1199	0	958	11	0
2	H	860	0	810	9	0
3	D	1280	0	1006	9	0
3	L	839	0	814	8	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
All	All	10399	0	9455	147	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 7.

All (147) 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:157:ARG:NH2	1:A:211:ASP:OD1	1.95	1.00
1:B:165:LYS:HB3	1:B:176:PHE:CE2	2.20	0.77
1:A:165:LYS:HB3	1:A:176:PHE:CE2	2.21	0.75
1:A:214:PRO:HG2	1:A:218:GLY:HA2	1.73	0.69
2:H:38:LYS:HB2	2:H:48:ILE:HD11	1.76	0.67
1:A:91:ARG:HH22	1:A:271:ARG:HG3	1.62	0.64
1:B:327:ARG:NH2	1:B:339:GLU:O	2.30	0.64
2:C:38:LYS:HB2	2:C:48:ILE:HD11	1.79	0.64
1:A:148:TYR:O	1:A:284:GLY:N	2.28	0.63
1:B:151:LEU:O	1:B:219:LEU:HD23	2.00	0.61
1:B:47:HIS:O	1:B:49:LEU:N	2.32	0.61
1:B:179:TYR:HB3	1:B:210:THR:HG22	1.84	0.60
1:A:47:HIS:O	1:A:49:LEU:N	2.33	0.60
1:A:212:VAL:HG23	1:A:213:ARG:H	1.67	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:213:ARG:HH11	1:B:214:PRO:HA	1.67	0.59
2:H:53:PRO:HA	2:H:72:VAL:HG11	1.87	0.57
1:B:148:TYR:O	1:B:284:GLY:N	2.29	0.56
1:B:397:ILE:H	1:B:397:ILE:HD12	1.71	0.55
1:A:253:PHE:HB3	1:A:276:TYR:CE1	2.42	0.54
1:B:253:PHE:HB3	1:B:276:TYR:CE1	2.41	0.54
1:A:179:TYR:HB3	1:A:210:THR:HG22	1.90	0.53
3:D:80:ALA:O	3:D:83:LEU:HD22	2.09	0.53
1:A:253:PHE:HB3	1:A:276:TYR:CZ	2.44	0.53
1:A:190:PRO:HG2	1:A:193:ALA:HB2	1.91	0.52
1:B:184:ARG:NH1	1:B:189:LYS:O	2.43	0.52
1:A:43:CYS:SG	1:A:294:SER:OG	2.60	0.52
1:B:64:LYS:O	1:B:111:THR:HG21	2.10	0.52
1:B:253:PHE:HB3	1:B:276:TYR:CZ	2.45	0.52
1:A:52:ARG:HH21	1:A:333:THR:HA	1.76	0.51
1:A:213:ARG:NE	1:A:214:PRO:HA	2.24	0.51
1:B:126:SER:C	1:B:128:VAL:H	2.19	0.51
1:A:192:ARG:HH12	1:A:204:ILE:HD12	1.75	0.50
3:L:80:ALA:O	3:L:83:LEU:HD22	2.11	0.50
1:A:213:ARG:HH21	1:A:214:PRO:HB3	1.77	0.50
1:A:213:ARG:NH2	1:A:214:PRO:HB3	2.27	0.50
1:B:112:ASP:OD2	1:B:120:THR:OG1	2.29	0.50
1:A:126:SER:C	1:A:128:VAL:H	2.19	0.50
1:A:195:ILE:HD11	1:A:204:ILE:HG23	1.93	0.50
2:H:27:TYR:CZ	2:H:98:ARG:HG3	2.47	0.50
1:A:173:TRP:CD1	1:A:250:LYS:HZ3	2.30	0.50
1:A:318:ASP:O	1:A:319:ARG:HB3	2.11	0.50
1:A:128:VAL:HG21	1:A:134:VAL:CG2	2.42	0.49
1:A:313:ALA:HB2	1:A:321:LYS:HA	1.95	0.49
2:H:5:GLN:HA	2:H:108:GLN:HE22	1.78	0.49
1:B:313:ALA:HB2	1:B:321:LYS:HA	1.94	0.49
2:C:53:PRO:HA	2:C:72:VAL:HG11	1.95	0.48
1:B:52:ARG:N	1:B:52:ARG:HD3	2.27	0.48
3:L:19:VAL:O	3:L:74:THR:HA	2.13	0.48
1:B:184:ARG:HG3	1:B:189:LYS:O	2.12	0.48
1:B:68:VAL:HG12	1:B:136:LEU:HD22	1.96	0.48
1:A:299:ASP:HB2	1:A:303:ASN:H	1.79	0.48
1:B:128:VAL:HG21	1:B:134:VAL:CG2	2.44	0.48
3:D:19:VAL:O	3:D:74:THR:HA	2.12	0.48
1:B:151:LEU:HD12	1:B:281:LEU:HD13	1.96	0.48
1:A:68:VAL:HG12	1:A:136:LEU:HD22	1.94	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:52:ARG:HG3	1:A:332:ALA:HB3	1.97	0.47
1:A:284:GLY:HA2	1:B:113:LEU:HD11	1.95	0.47
3:D:61:ARG:HD2	3:D:82:ASP:OD2	2.14	0.47
1:B:190:PRO:HG2	1:B:193:ALA:HB2	1.97	0.47
1:B:299:ASP:HB2	1:B:303:ASN:H	1.80	0.47
2:C:5:GLN:HA	2:C:108:GLN:HE22	1.79	0.47
1:B:192:ARG:NH1	1:B:192:ARG:HG3	2.30	0.47
1:B:150:SER:OG	1:B:282:GLN:O	2.33	0.47
1:A:364:ARG:HG3	3:D:93:SER:HB3	1.97	0.46
3:D:96:TRP:CD1	3:D:96:TRP:N	2.82	0.46
3:L:96:TRP:CD1	3:L:96:TRP:N	2.82	0.46
1:A:346:ASN:ND2	1:A:381:HIS:O	2.46	0.46
1:B:391:ARG:NH1	1:B:402:ALA:HB1	2.30	0.46
1:B:166:SER:HB2	1:B:173:TRP:CZ3	2.51	0.46
1:A:357:GLU:HB2	2:C:33:ASN:OD1	2.16	0.46
1:A:64:LYS:O	1:A:111:THR:HG21	2.14	0.46
1:B:161:MET:HG3	1:B:179:TYR:HB2	1.96	0.46
1:A:166:SER:HB2	1:A:173:TRP:CZ3	2.51	0.45
1:A:293:ALA:HA	1:A:309:LYS:HD3	1.98	0.45
1:B:192:ARG:HG3	1:B:192:ARG:HH11	1.81	0.45
3:D:34:ALA:O	3:D:88:CYS:HA	2.16	0.45
1:A:151:LEU:HD12	1:A:281:LEU:HD13	1.99	0.45
1:B:222:PHE:CE2	1:B:224:THR:HG22	2.52	0.45
3:L:34:ALA:O	3:L:88:CYS:HA	2.17	0.45
1:B:128:VAL:HG21	1:B:134:VAL:HG23	1.98	0.45
1:A:213:ARG:HA	1:A:215:LEU:HD12	1.99	0.45
1:A:222:PHE:CE2	1:A:224:THR:HG22	2.51	0.45
1:B:83:THR:HG23	1:B:90:VAL:HG13	1.99	0.45
1:A:130:TYR:HA	1:A:132:HIS:H	1.83	0.44
1:A:391:ARG:NH1	1:A:402:ALA:HB1	2.32	0.44
1:B:108:SER:C	1:B:110:LEU:H	2.25	0.44
1:B:130:TYR:HA	1:B:132:HIS:H	1.83	0.44
1:A:212:VAL:HG13	1:A:257:HIS:CD2	2.53	0.44
1:B:151:LEU:CD1	1:B:281:LEU:HD13	2.47	0.44
1:A:128:VAL:HG21	1:A:134:VAL:HG23	1.99	0.44
1:A:150:SER:OG	1:A:282:GLN:O	2.35	0.44
1:B:212:VAL:HG22	1:B:257:HIS:CG	2.53	0.44
3:L:85:VAL:HA	3:L:102:THR:O	2.18	0.44
1:B:339:GLU:OE1	1:B:339:GLU:N	2.47	0.43
2:C:67:LYS:HE2	2:C:86:LEU:HD23	1.99	0.43
3:D:85:VAL:HA	3:D:102:THR:O	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:213:ARG:CZ	1:A:214:PRO:HA	2.48	0.43
1:A:397:ILE:HD12	1:A:397:ILE:H	1.84	0.43
1:A:161:MET:HG3	1:A:179:TYR:HB2	2.01	0.43
1:B:195:ILE:HD11	1:B:204:ILE:HG23	1.99	0.43
2:H:27:TYR:OH	2:H:98:ARG:HG3	2.17	0.43
1:A:400:ARG:HD2	1:A:401:LYS:HG3	2.00	0.43
1:B:195:ILE:HD11	1:B:204:ILE:CG2	2.48	0.43
2:C:35:HIS:CD2	2:C:103:PHE:HE1	2.37	0.43
1:B:173:TRP:CD1	1:B:250:LYS:HZ1	2.36	0.43
1:A:108:SER:C	1:A:110:LEU:H	2.26	0.42
1:B:412:GLY:HA3	1:B:431:VAL:HG11	2.01	0.42
1:A:311:ASN:HA	1:A:321:LYS:HE2	2.01	0.42
1:A:177:GLN:HA	1:A:203:ALA:HB1	2.01	0.42
1:A:412:GLY:HA3	1:A:431:VAL:HG11	2.00	0.42
1:B:311:ASN:HA	1:B:321:LYS:HE2	2.02	0.42
1:B:212:VAL:HG22	1:B:257:HIS:ND1	2.34	0.42
2:H:67:LYS:HE2	2:H:86:LEU:HD23	2.01	0.42
1:A:318:ASP:O	1:A:319:ARG:CB	2.68	0.42
1:A:122:TRP:CG	1:A:123:GLN:N	2.88	0.41
1:A:380:ARG:HG2	1:A:381:HIS:CD2	2.56	0.41
1:A:395:LYS:HD3	1:A:399:HIS:ND1	2.35	0.41
1:B:51:ARG:HB2	1:B:52:ARG:HD3	2.02	0.41
2:C:148:PHE:HA	2:C:149:PRO:HA	1.87	0.41
1:A:195:ILE:HD11	1:A:204:ILE:CG2	2.50	0.41
1:B:122:TRP:CG	1:B:123:GLN:N	2.88	0.41
1:A:299:ASP:C	1:A:302:ASP:H	2.28	0.41
1:B:423:GLY:O	1:B:434:ILE:HG23	2.20	0.41
3:D:12:LEU:HD12	3:D:105:GLU:CG	2.50	0.41
1:A:165:LYS:HB3	1:A:176:PHE:CD2	2.56	0.41
1:A:57:PHE:HE1	1:B:113:LEU:HD22	1.86	0.41
1:A:369:VAL:HG12	1:A:380:ARG:HG3	2.02	0.41
2:C:86:LEU:HB3	2:C:114:VAL:HG21	2.01	0.41
3:L:12:LEU:HD12	3:L:105:GLU:CG	2.50	0.41
1:B:182:GLN:HB3	1:B:185:LYS:HD3	2.02	0.41
1:B:299:ASP:C	1:B:302:ASP:H	2.28	0.41
3:D:50:TYR:O	3:D:52:SER:N	2.48	0.41
2:H:35:HIS:HD1	2:H:47:TRP:NE1	2.18	0.41
3:L:2:ILE:HD12	3:L:2:ILE:N	2.36	0.41
3:L:75:ILE:HG21	3:L:78:VAL:HG12	2.03	0.41
1:A:358:LEU:HB3	1:A:367:GLY:HA2	2.03	0.40
2:C:35:HIS:O	2:C:96:CYS:HA	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:20:MET:HE1	2:H:94:TYR:CD2	2.55	0.40
1:A:47:HIS:O	1:A:47:HIS:CG	2.74	0.40
1:A:91:ARG:NH2	1:A:271:ARG:HG3	2.31	0.40
1:B:51:ARG:HB2	1:B:52:ARG:NH1	2.36	0.40
2:C:35:HIS:HD1	2:C:47:TRP:NE1	2.19	0.40
1:A:168:ASP:O	1:A:247:THR:OG1	2.39	0.40
1:B:133:ASN:HA	1:B:253:PHE:O	2.22	0.40
2:C:19:LYS:HE3	2:C:80:TYR:HB3	2.04	0.40
2:H:67:LYS:O	2:H:83:LEU:HA	2.21	0.40
1:B:177:GLN:HA	1:B:203:ALA:HB1	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	392/443 (88%)	341 (87%)	39 (10%)	12 (3%)	3	21
1	B	393/443 (89%)	351 (89%)	33 (8%)	9 (2%)	5	27
2	C	172/222 (78%)	155 (90%)	14 (8%)	3 (2%)	7	34
2	H	113/222 (51%)	101 (89%)	10 (9%)	2 (2%)	6	32
3	D	191/225 (85%)	173 (91%)	17 (9%)	1 (0%)	24	63
3	L	106/225 (47%)	93 (88%)	12 (11%)	1 (1%)	14	50
All	All	1367/1780 (77%)	1214 (89%)	125 (9%)	28 (2%)	6	30

All (28) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	319	ARG
1	A	48	GLY

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Mol	Chain	Res	Type
1	A	86	GLY
1	B	48	GLY
1	B	86	GLY
1	B	429	ASP
2	C	151	PRO
1	A	215	LEU
1	A	372	ASN
1	A	429	ASP
1	B	372	ASN
1	A	109	PHE
1	A	127	TYR
1	A	212	VAL
1	B	52	ARG
1	B	109	PHE
2	C	54	GLY
2	H	54	GLY
1	A	367	GLY
1	B	125	ASP
1	B	127	TYR
2	C	7	SER
1	A	406	CYS
2	H	7	SER
3	L	68	GLY
3	D	40	PRO
1	B	131	PRO
1	A	131	PRO

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	347/385 (90%)	341 (98%)	6 (2%)	53	68
1	B	347/385 (90%)	343 (99%)	4 (1%)	63	74
2	C	90/183 (49%)	88 (98%)	2 (2%)	45	64
2	H	89/183 (49%)	87 (98%)	2 (2%)	45	64

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	D	92/195 (47%)	89 (97%)	3 (3%)	33	55
3	L	92/195 (47%)	89 (97%)	3 (3%)	33	55
All	All	1057/1526 (69%)	1037 (98%)	20 (2%)	50	66

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	93	CYS
1	A	174	VAL
1	A	198	GLN
1	A	287	CYS
1	A	294	SER
1	A	303	ASN
1	B	93	CYS
1	B	174	VAL
1	B	287	CYS
1	B	444	GLN
2	C	33	ASN
2	C	108	GLN
3	D	11	LEU
3	D	12	LEU
3	D	23	CYS
2	H	33	ASN
2	H	108	GLN
3	L	11	LEU
3	L	12	LEU
3	L	89	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (28) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	59	ASN
1	A	115	ASN
1	A	123	GLN
1	A	133	ASN
1	A	198	GLN
1	A	257	HIS
1	A	290	ASN
1	A	303	ASN
1	A	311	ASN

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Mol	Chain	Res	Type
1	A	330	GLN
1	A	372	ASN
1	A	376	ASN
1	A	381	HIS
1	A	383	HIS
1	B	94	HIS
1	B	133	ASN
1	B	188	ASN
1	B	282	GLN
1	B	330	GLN
1	B	376	ASN
1	B	381	HIS
1	B	383	HIS
1	B	416	GLN
3	D	89	GLN
2	H	5	GLN
2	H	6	GLN
2	H	108	GLN
3	L	89	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 2 ligands modelled in this entry, 2 are 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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	396/443 (89%)	-0.97	0 100 100	108, 125, 218, 259	0
1	B	397/443 (89%)	-0.92	1 (0%) 90 80	83, 108, 203, 281	0
2	C	182/222 (81%)	-0.76	0 100 100	170, 185, 204, 216	0
2	H	115/222 (51%)	-0.96	0 100 100	70, 84, 109, 123	0
3	D	197/225 (87%)	-0.81	3 (1%) 72 57	138, 157, 201, 212	0
3	L	108/225 (48%)	-0.82	2 (1%) 66 53	145, 155, 176, 188	0
All	All	1395/1780 (78%)	-0.89	6 (0%) 88 77	70, 135, 203, 281	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	411	VAL	4.2
3	L	91	ASP	2.9
3	D	124	SER	2.9
3	L	92	TYR	2.8
3	D	31	ASN	2.4
3	D	11	LEU	2.1

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 oligosaccharides 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, 95th 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($\text{\AA}^2$)	Q<0.9
4	CA	B	501	1/1	0.99	0.02	50,50,50,50	0
4	CA	A	501	1/1	1.00	0.01	50,50,50,50	0

6.5 Other polymers [i](#)

There are no such residues in this entry.