



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 01:28 PM UTC

PDB ID : 8I3E / pdb_00008i3e
Title : Crystal structure of ELKS1 in complex with Piccolo
Authors : Cai, Q.; Zhang, M.
Deposited on : 2023-01-17
Resolution : 2.70 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

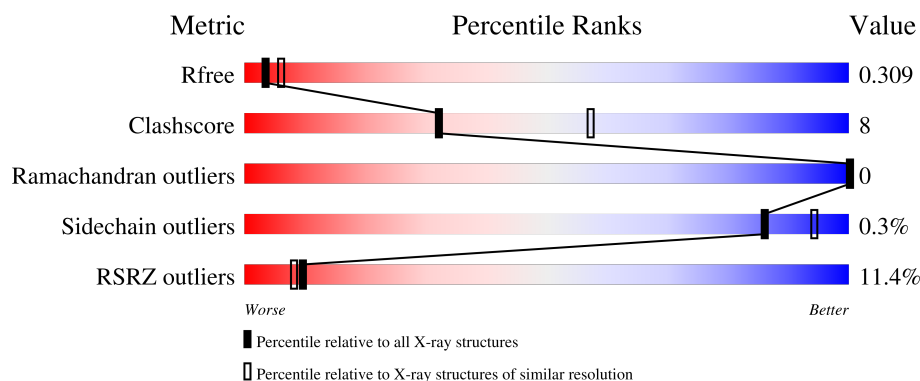
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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	146	12% 68% 23% 8%
1	B	146	10% 68% 24% 8%
2	C	91	5% 56% 5% 38%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2647 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 ELKS/Rab6-interacting/CAST family member 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	134	Total	C	N	O	S	0	0	0
			1082	661	195	222	4			
1	B	135	Total	C	N	O	S	0	0	0
			1090	665	196	225	4			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	465	GLY	-	expression tag	UNP A0A8I6AIL7
A	466	PRO	-	expression tag	UNP A0A8I6AIL7
A	467	GLY	-	expression tag	UNP A0A8I6AIL7
A	468	SER	-	expression tag	UNP A0A8I6AIL7
B	465	GLY	-	expression tag	UNP A0A8I6AIL7
B	466	PRO	-	expression tag	UNP A0A8I6AIL7
B	467	GLY	-	expression tag	UNP A0A8I6AIL7
B	468	SER	-	expression tag	UNP A0A8I6AIL7

- Molecule 2 is a protein called MKIAA0559 protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	56	Total	C	N	O	S	0	0	0
			475	292	87	95	1			

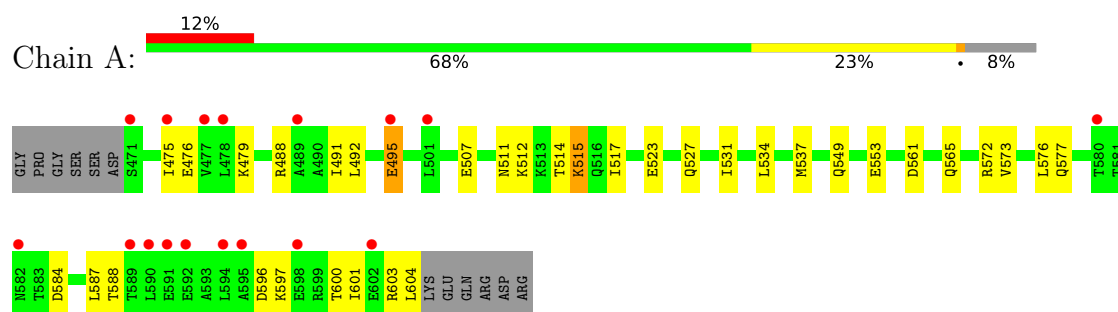
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	3679	GLY	-	expression tag	UNP Q8CHE8
C	3680	PRO	-	expression tag	UNP Q8CHE8
C	3681	GLY	-	expression tag	UNP Q8CHE8
C	3682	SER	-	expression tag	UNP Q8CHE8

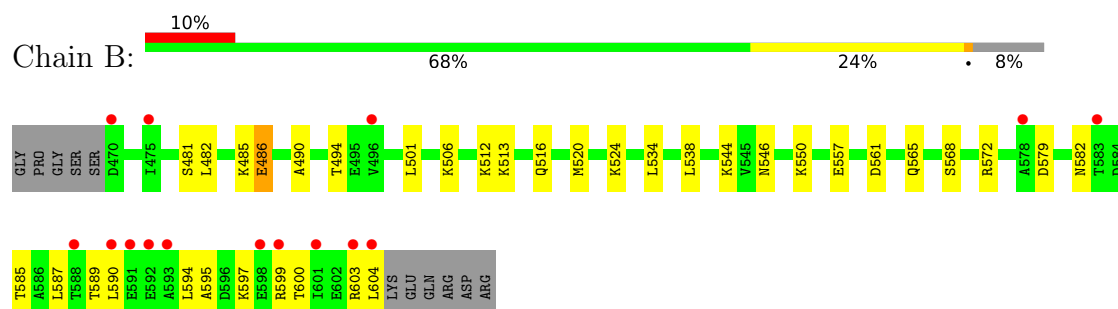
3 Residue-property plots

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.

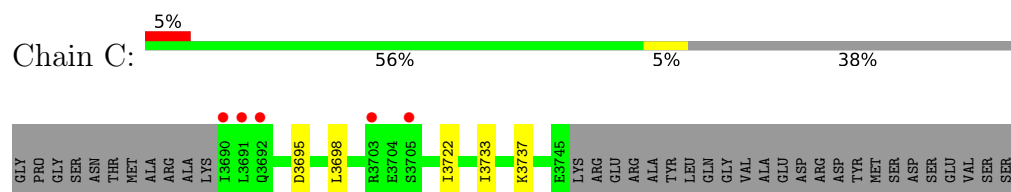
- Molecule 1: ELKS/Rab6-interacting/CAST family member 1



- Molecule 1: ELKS/Rab6-interacting/CAST family member 1



- Molecule 2: MKIAA0559 protein



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	110.38Å 46.11Å 84.36Å 90.00° 110.44° 90.00°	Depositor
Resolution (Å)	31.11 – 2.70 31.11 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.3 (31.11-2.70) 99.7 (31.11-2.70)	Depositor EDS
R_{merge}	0.24	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.50 (at 2.69Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.245 , 0.298 0.254 , 0.309	Depositor DCC
R_{free} test set	560 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	58.8	Xtriage
Anisotropy	0.334	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 54.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	2647	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 16.03% 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	0.59	0/1083	0.93	4/1444 (0.3%)
1	B	0.59	0/1091	0.92	3/1455 (0.2%)
2	C	0.54	0/475	0.72	0/628
All	All	0.58	0/2649	0.89	7/3527 (0.2%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	512	LYS	CA-CB-CG	7.07	128.24	114.10
1	A	476	GLU	CA-CB-CG	-6.51	101.08	114.10
1	A	495	GLU	CA-CB-CG	6.13	126.36	114.10
1	B	486	GLU	CA-CB-CG	-5.77	102.56	114.10
1	A	515	LYS	CB-CG-CD	5.43	123.79	111.30
1	B	501	LEU	CA-CB-CG	5.28	134.78	116.30
1	B	557	GLU	CA-CB-CG	5.23	124.56	114.10

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	1082	0	1132	26	0
1	B	1090	0	1136	25	0
2	C	475	0	493	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	2647	0	2761	43	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 (43) 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:492:LEU:HA	1:A:495:GLU:HG3	1.28	1.11
1:B:572:ARG:NH2	2:C:3695:ASP:OD1	1.96	0.98
1:A:523:GLU:HB3	1:B:524:LYS:HE3	1.61	0.81
1:A:492:LEU:O	1:A:495:GLU:HB2	1.82	0.79
1:A:517:ILE:HG23	1:B:520:MET:HE1	1.66	0.77
1:A:600:THR:O	1:A:604:LEU:HD12	1.96	0.66
1:B:544:LYS:HB2	2:C:3722:ILE:HG21	1.82	0.62
2:C:3733:ILE:O	2:C:3737:LYS:HG3	2.02	0.60
1:A:492:LEU:HA	1:A:495:GLU:CG	2.20	0.56
1:A:523:GLU:CB	1:B:524:LYS:HE3	2.35	0.55
1:B:579:ASP:HA	1:B:582:ASN:OD1	2.07	0.55
1:A:572:ARG:O	1:A:576:LEU:HG	2.07	0.54
1:A:573:VAL:O	1:A:577:GLN:N	2.28	0.54
1:A:561:ASP:O	1:A:565:GLN:HG3	2.08	0.52
1:B:561:ASP:O	1:B:565:GLN:HG3	2.09	0.52
1:B:594:LEU:HA	1:B:597:LYS:HE3	1.92	0.52
1:A:514:THR:OG1	1:B:513:LYS:NZ	2.44	0.51
1:A:534:LEU:HD23	1:A:537:MET:CE	2.40	0.51
1:B:481:SER:O	1:B:485:LYS:HG2	2.11	0.51
1:B:486:GLU:O	1:B:486:GLU:HG2	2.10	0.51
1:B:512:LYS:O	1:B:516:GLN:HG3	2.11	0.51
1:A:475:ILE:HG22	1:A:479:LYS:HE2	1.93	0.51
1:B:585:THR:O	1:B:589:THR:HG23	2.11	0.50
1:A:527:GLN:OE1	1:B:524:LYS:HG3	2.12	0.50
1:A:488:ARG:O	1:A:491:ILE:HG22	2.12	0.49
1:A:511:ASN:O	1:A:515:LYS:HG2	2.13	0.48
1:A:600:THR:O	1:A:603:ARG:HB3	2.13	0.48
1:B:603:ARG:HG2	1:B:604:LEU:HD22	1.96	0.47
1:B:600:THR:O	1:B:603:ARG:HG2	2.15	0.47
1:A:587:LEU:HD13	1:B:587:LEU:HB3	1.97	0.47
1:A:584:ASP:O	1:A:588:THR:HG23	2.16	0.46
1:A:537:MET:HE3	1:B:538:LEU:HD11	1.99	0.45
1:A:534:LEU:HD13	1:B:534:LEU:HB2	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:590:LEU:HD23	1:B:590:LEU:HA	1.80	0.45
1:B:568:SER:HB2	2:C:3698:LEU:HD21	2.00	0.44
1:B:546:ASN:O	1:B:550:LYS:HG2	2.18	0.44
1:A:527:GLN:O	1:A:531:ILE:HG13	2.18	0.43
1:A:596:ASP:O	1:A:600:THR:HG23	2.19	0.42
1:B:595:ALA:O	1:B:599:ARG:HG3	2.20	0.42
1:B:490:ALA:O	1:B:494:THR:HG23	2.20	0.42
1:A:549:GLN:O	1:A:553:GLU:HG3	2.22	0.40
1:A:507:GLU:OE1	1:B:506:LYS:NZ	2.52	0.40
1:A:597:LYS:O	1:A:601:ILE:HG12	2.22	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	132/146 (90%)	130 (98%)	2 (2%)	0	100	100
1	B	133/146 (91%)	133 (100%)	0	0	100	100
2	C	54/91 (59%)	54 (100%)	0	0	100	100
All	All	319/383 (83%)	317 (99%)	2 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	122/132 (92%)	122 (100%)	0	100	100
1	B	123/132 (93%)	122 (99%)	1 (1%)	73	88
2	C	51/79 (65%)	51 (100%)	0	100	100
All	All	296/343 (86%)	295 (100%)	1 (0%)	86	94

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	482	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	474	HIS
1	A	493	GLN
1	A	577	GLN
1	B	554	ASN
1	B	556	GLN
1	B	558	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

There are no such residues in this entry.

5.8 Polymer linkage issues

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	134/146 (91%)	0.90	17 (12%) 8 7	41, 68, 113, 127	0
1	B	135/146 (92%)	0.91	15 (11%) 10 8	41, 71, 116, 154	0
2	C	56/91 (61%)	0.67	5 (8%) 15 13	40, 59, 114, 118	0
All	All	325/383 (84%)	0.86	37 (11%) 10 8	40, 69, 114, 154	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	598	GLU	5.7
1	B	578	ALA	4.4
1	B	601	ILE	4.1
2	C	3690	ILE	4.0
1	A	478	LEU	3.7
1	A	594	LEU	3.3
1	B	591	GLU	3.1
1	B	598	GLU	3.0
1	A	592	GLU	2.9
1	B	475	ILE	2.8
1	A	590	LEU	2.7
1	A	589	THR	2.6
1	A	501	LEU	2.5
1	A	477	VAL	2.5
1	B	592	GLU	2.5
1	A	595	ALA	2.4
2	C	3691	LEU	2.4
1	A	602	GLU	2.4
1	B	599	ARG	2.4
1	A	580	THR	2.4
1	B	593	ALA	2.4
1	B	583	THR	2.3
1	A	495	GLU	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	496	VAL	2.3
1	B	604	LEU	2.3
1	B	603	ARG	2.3
1	A	475	ILE	2.2
1	B	588	THR	2.2
1	A	582	ASN	2.2
1	A	471	SER	2.2
2	C	3705	SER	2.1
2	C	3703	ARG	2.1
2	C	3692	GLN	2.1
1	B	590	LEU	2.1
1	B	470	ASP	2.1
1	A	489	ALA	2.1
1	A	591	GLU	2.1

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 ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.