



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 05:49 PM GMT

PDB ID : 4JLQ
Title : Crystal structure of human Karyopherin-beta2 bound to the PY-NLS of Saccharomyces cerevisiae NAB2
Authors : Sampathkumar, P.; Gizzi, A.; Rout, M.P.; Chook, Y.M.; Almo, S.C.; New York Structural Genomics Research Consortium (NYSGRC); Nucleocytoplasmic Transport: a Target for Cellular Control (NPCXstals)
Deposited on : 2013-03-12
Resolution : 3.05 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

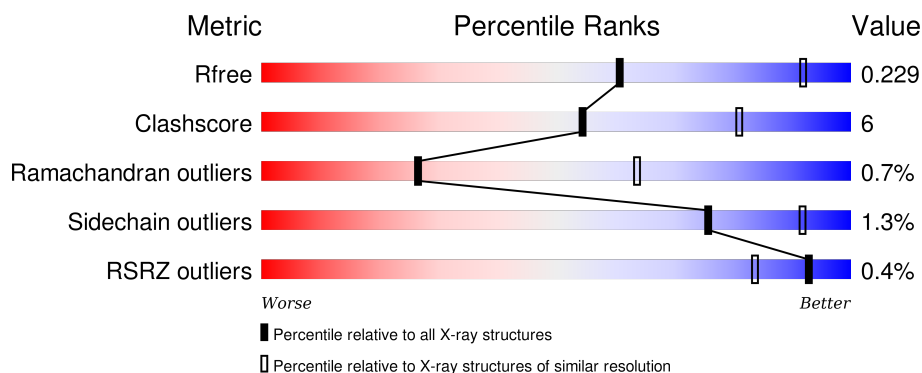
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION



The reported resolution of this entry is 3.05 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}	91344	1191 (3.10-3.02)
Clashscore	102246	1303 (3.10-3.02)
Ramachandran outliers	100387	1254 (3.10-3.02)
Sidechain outliers	100360	1254 (3.10-3.02)
RSRZ outliers	91569	1197 (3.10-3.02)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	854	 82% 16% ..
2	B	38	 16% . 82%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6733 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 Transportin-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	840	Total	C	N	O	S	0	0	0
			6676	4281	1112	1232	51			

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	360	GLY	-	SEE REMARK 999	UNP Q92973
A	361	GLY	-	SEE REMARK 999	UNP Q92973
A	362	SER	-	SEE REMARK 999	UNP Q92973
A	363	GLY	-	SEE REMARK 999	UNP Q92973
A	364	GLY	-	SEE REMARK 999	UNP Q92973
A	365	SER	-	SEE REMARK 999	UNP Q92973
A	366	GLY	-	SEE REMARK 999	UNP Q92973

- Molecule 2 is a protein called Nuclear polyadenylated RNA-binding protein NAB2.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	7	Total	C	N	O	0	0	0
			57	37	11	9			

4 Data and refinement statistics

Property	Value	Source
Space group	P 2 ₁ 2 ₁ 2	Depositor
Cell constants a, b, c, α , β , γ	132.23 Å 172.38 Å 68.44 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.60 – 3.05 47.55 – 3.05	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.60-3.05) 100.0 (47.55-3.05)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.65 (at 3.07 Å)	Xtriage
Refinement program	REFMAC 5.7.0025	Depositor
R, R_{free}	0.184 , 0.237 0.177 , 0.229	Depositor DCC
R_{free} test set	1538 reflections (5.29%)	DCC
Wilson B-factor (Å ²)	90.5	Xtriage
Anisotropy	0.409	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 59.5	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 30598 reflections	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	6733	wwPDB-VP
Average B, all atoms (Å ²)	104.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.48% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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	0.55	0/6819	0.76	0/9264
2	B	0.63	0/58	0.77	0/78
All	All	0.55	0/6877	0.76	0/9342

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	6676	0	6725	86	0
2	B	57	0	57	1	0
All	All	6733	0	6782	86	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 6.

All (86) 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:39:GLN:O	1:A:42:GLN:HG2	1.64	0.96
1:A:736:SER:OG	1:A:778:LEU:HD23	1.91	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:236:CYS:O	1:A:240:VAL:HG23	1.92	0.70
1:A:42:GLN:HG3	1:A:43:TYR:HD1	1.60	0.67
1:A:130:LEU:HB2	1:A:131:PRO:CD	2.27	0.64
1:A:670:THR:O	1:A:673:TYR:HB3	1.98	0.63
1:A:440:ILE:O	1:A:444:ILE:HG13	2.02	0.60
1:A:578:ASP:O	1:A:579:GLU:HB2	2.04	0.56
1:A:710:MET:N	1:A:711:PRO:HD2	2.21	0.56
1:A:433:ILE:HB	1:A:434:PRO:HD3	1.88	0.55
1:A:134:CYS:SG	1:A:175:MET:HG2	2.47	0.54
1:A:516:VAL:HG23	1:A:517:PRO:HD3	1.90	0.53
1:A:541:LEU:O	1:A:545:ILE:HG13	2.09	0.52
1:A:251:LEU:HB3	1:A:252:PRO:HD3	1.92	0.52
1:A:130:LEU:HB2	1:A:131:PRO:HD2	1.91	0.52
1:A:787:ALA:N	1:A:788:PRO:HD2	2.25	0.52
1:A:455:ARG:NH1	1:A:491:ASP:OD1	2.43	0.52
1:A:890:VAL:O	1:A:890:VAL:HG13	2.10	0.51
1:A:130:LEU:CB	1:A:131:PRO:CD	2.87	0.51
1:A:75:ASN:O	1:A:78:ALA:O	2.28	0.51
1:A:395:LEU:N	1:A:396:PRO:CD	2.74	0.51
1:A:519:LEU:HD23	1:A:561:TYR:CE2	2.46	0.51
1:A:602:LEU:HB3	1:A:603:PRO:CD	2.41	0.50
1:A:49:TYR:O	1:A:53:VAL:HG23	2.12	0.50
1:A:488:ARG:NH1	1:A:491:ASP:OD1	2.46	0.49
1:A:744:GLN:N	1:A:745:PRO:HD2	2.28	0.48
1:A:656:GLY:O	1:A:659:ILE:HG22	2.13	0.48
1:A:29:ILE:O	1:A:33:VAL:HG12	2.13	0.48
1:A:442:HIS:O	1:A:445:GLN:HB2	2.13	0.48
1:A:207:GLN:OE1	1:A:207:GLN:HA	2.13	0.48
1:A:76:VAL:HG13	1:A:80:PHE:CD1	2.49	0.47
1:A:516:VAL:HG23	1:A:517:PRO:CD	2.45	0.47
1:A:128:ASP:N	1:A:128:ASP:OD1	2.48	0.47
1:A:191:ARG:NH1	1:A:226:ASP:OD2	2.48	0.47
1:A:692:GLY:HA3	1:A:730:TRP:CZ3	2.50	0.46
1:A:661:GLN:O	1:A:665:ARG:HG3	2.15	0.46
1:A:132:LYS:O	1:A:136:LEU:HD12	2.16	0.46
1:A:629:GLN:HB2	1:A:633:TYR:HD2	1.81	0.46
1:A:297:LEU:HD11	1:A:390:TYR:CD2	2.50	0.46
1:A:505:ALA:HB1	2:B:235:ARG:HH21	1.82	0.45
1:A:802:ARG:NE	1:A:837:ASP:OD2	2.48	0.45
1:A:42:GLN:HG3	1:A:43:TYR:CD1	2.46	0.45
1:A:580:ASP:OD1	1:A:581:LYS:N	2.50	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:223:LEU:O	1:A:224:ALA:C	2.54	0.45
1:A:482:MET:HE3	1:A:482:MET:HB2	1.64	0.45
1:A:440:ILE:HB	1:A:441:PRO:HD3	1.98	0.45
1:A:606:GLU:N	1:A:607:PRO:HD2	2.32	0.44
1:A:710:MET:N	1:A:711:PRO:CD	2.81	0.44
1:A:122:GLU:OE1	1:A:124:GLN:NE2	2.50	0.44
1:A:177:PRO:HG3	1:A:212:HIS:CE1	2.52	0.44
1:A:660:GLU:CG	1:A:701:HIS:CE1	3.01	0.44
1:A:392:ASP:C	1:A:394:LEU:H	2.21	0.44
1:A:479:LYS:HB3	1:A:480:PRO:HD3	2.00	0.44
1:A:802:ARG:HD2	1:A:837:ASP:OD2	2.18	0.44
1:A:755:VAL:HG21	1:A:789:MET:CE	2.48	0.43
1:A:259:GLU:O	1:A:263:GLN:HG2	2.18	0.43
1:A:577:LYS:O	1:A:580:ASP:HB2	2.19	0.43
1:A:301:ILE:HB	1:A:302:PRO:CD	2.48	0.43
1:A:584:PHE:HB3	1:A:585:PRO:HD3	2.00	0.43
1:A:80:PHE:CE2	1:A:121:GLY:HA3	2.54	0.43
1:A:133:LEU:HA	1:A:136:LEU:HD12	2.01	0.43
1:A:62:GLU:N	1:A:63:PRO:HD2	2.34	0.42
1:A:576:LEU:HD22	1:A:580:ASP:OD2	2.19	0.42
1:A:653:GLU:HG2	1:A:654:GLY:N	2.33	0.42
1:A:248:ASP:OD1	1:A:248:ASP:N	2.50	0.42
1:A:490:LEU:HD11	1:A:525:THR:HG23	2.02	0.42
1:A:848:ASP:N	1:A:848:ASP:OD1	2.51	0.42
1:A:629:GLN:HB2	1:A:633:TYR:CD2	2.54	0.42
1:A:447:LEU:O	1:A:455:ARG:HG2	2.20	0.42
1:A:802:ARG:NH1	1:A:803:ASN:OD1	2.53	0.42
1:A:260:TYR:O	1:A:264:ARG:HG2	2.19	0.41
1:A:578:ASP:O	1:A:579:GLU:CB	2.67	0.41
1:A:235:VAL:O	1:A:238:ALA:HB3	2.20	0.41
1:A:391:ARG:HA	1:A:391:ARG:HD2	1.69	0.41
1:A:299:LYS:O	1:A:303:VAL:HG23	2.20	0.41
1:A:109:THR:HA	1:A:112:ILE:HG22	2.01	0.41
1:A:647:LEU:HD12	1:A:647:LEU:O	2.20	0.41
1:A:473:PRO:HA	1:A:474:PRO:HD2	1.96	0.41
1:A:138:ASP:O	1:A:139:SER:C	2.59	0.41
1:A:713:LEU:HD13	1:A:732:ILE:HG22	2.01	0.41
1:A:257:ILE:O	1:A:260:TYR:HB3	2.21	0.41
1:A:162:ILE:O	1:A:165:SER:HB3	2.20	0.41
1:A:124:GLN:O	1:A:127:PRO:HG3	2.21	0.40
1:A:392:ASP:O	1:A:394:LEU:N	2.55	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:61:ASP:HB3	1:A:64:THR:OG1	2.21	0.40
1:A:214:ASP:OD2	1:A:249:ARG:NH1	2.54	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	836/854 (98%)	770 (92%)	60 (7%)	6 (1%)	26	64
2	B	5/38 (13%)	5 (100%)	0	0	100	100
All	All	841/892 (94%)	775 (92%)	60 (7%)	6 (1%)	26	64

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	122	GLU
1	A	393	GLU
1	A	42	GLN
1	A	243	LEU
1	A	603	PRO
1	A	167	VAL

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	751/763 (98%)	741 (99%)	10 (1%)	76	92
2	B	6/25 (24%)	6 (100%)	0	100	100
All	All	757/788 (96%)	747 (99%)	10 (1%)	76	92

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	128	ASP
1	A	149	PHE
1	A	215	SER
1	A	252	PRO
1	A	379	SER
1	A	391	ARG
1	A	488	ARG
1	A	660	GLU
1	A	826	SER
1	A	831	ASP

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

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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

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 [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	840/854 (98%)	-0.38	3 (0%) 93 84	68, 102, 136, 175	0
2	B	7/38 (18%)	0.14	0 100 100	93, 96, 107, 126	0
All	All	847/892 (94%)	-0.38	3 (0%) 93 84	68, 102, 135, 175	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	583	LEU	2.6
1	A	576	LEU	2.2
1	A	320	GLY	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 carbohydrates 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.