



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 4, 2026 – 09:41 PM UTC

PDB ID : 6HC2 / pdb_00006hc2
Title : Crystal structure of NuMA/LGN hetero-hexamers
Authors : Pasqualato, S.; Culurgioni, S.; Foadi, J.; Alfieri, A.; Mapelli, M.
Deposited on : 2018-08-13
Resolution : 4.31 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

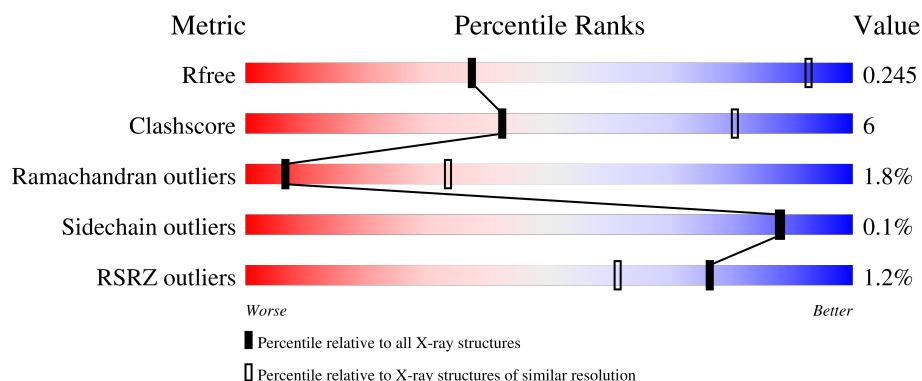
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 4.31 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	1052 (4.70-3.90)
Clashscore	190562	1097 (4.70-3.90)
Ramachandran outliers	187476	1001 (4.70-3.90)
Sidechain outliers	187428	1007 (4.72-3.88)
RSRZ outliers	180081	1049 (4.70-3.90)

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	367	81% 17% .
1	C	367	2% 87% 11% .
1	E	367	89% 10% .
1	G	367	2% 92% 8%
1	I	367	89% 11%

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Mol	Chain	Length	Quality of chain
1	K	367	% 89% 11%
1	M	367	% 90% 10%
1	O	367	% 90% 9% .
1	Q	367	3% 89% 11%
1	S	367	% 90% 8% ..
1	U	367	% 91% 9%
1	W	367	% 87% 12%
2	B	71	42% 21% 37%
2	D	71	32% 18% 49%
2	F	71	32% 17% . 48%
2	H	71	3% 28% 18% . 49%
2	J	71	37% 14% 6% 44%
2	L	71	3% 38% 17% 7% 38%
2	N	71	41% 14% 45%
2	P	71	46% 10% . . 39%
2	R	71	4% 25% 24% 6% . 44%
2	T	71	6% 34% 25% . 37%
2	V	71	% 41% 11% . 45%
2	X	71	32% 20% . 44%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 37558 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 G-protein-signaling modulator 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	365	Total	C	N	O	S	0	0	0
			2834	1778	497	548	11			
1	C	367	Total	C	N	O	S	0	0	0
			2847	1783	500	552	12			
1	E	366	Total	C	N	O	S	0	0	0
			2798	1750	494	545	9			
1	G	367	Total	C	N	O	S	0	0	0
			2815	1759	499	547	10			
1	I	367	Total	C	N	O	S	0	0	0
			2820	1768	497	546	9			
1	K	366	Total	C	N	O	S	0	0	0
			2828	1772	497	547	12			
1	M	366	Total	C	N	O	S	0	0	0
			2820	1767	499	544	10			
1	O	365	Total	C	N	O	S	0	0	0
			2821	1767	496	547	11			
1	Q	367	Total	C	N	O	S	0	0	0
			2831	1773	500	547	11			
1	S	362	Total	C	N	O	S	0	0	0
			2800	1753	496	541	10			
1	U	366	Total	C	N	O	S	0	0	0
			2823	1767	499	547	10			
1	W	366	Total	C	N	O	S	0	0	0
			2817	1763	499	545	10			

There are 72 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	expression tag	UNP P81274
A	2	PRO	-	expression tag	UNP P81274
A	3	LEU	-	expression tag	UNP P81274
A	4	GLY	-	expression tag	UNP P81274
A	5	SER	-	expression tag	UNP P81274

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Chain	Residue	Modelled	Actual	Comment	Reference
A	6	MET	-	expression tag	UNP P81274
C	1	GLY	-	expression tag	UNP P81274
C	2	PRO	-	expression tag	UNP P81274
C	3	LEU	-	expression tag	UNP P81274
C	4	GLY	-	expression tag	UNP P81274
C	5	SER	-	expression tag	UNP P81274
C	6	MET	-	expression tag	UNP P81274
E	1	GLY	-	expression tag	UNP P81274
E	2	PRO	-	expression tag	UNP P81274
E	3	LEU	-	expression tag	UNP P81274
E	4	GLY	-	expression tag	UNP P81274
E	5	SER	-	expression tag	UNP P81274
E	6	MET	-	expression tag	UNP P81274
G	1	GLY	-	expression tag	UNP P81274
G	2	PRO	-	expression tag	UNP P81274
G	3	LEU	-	expression tag	UNP P81274
G	4	GLY	-	expression tag	UNP P81274
G	5	SER	-	expression tag	UNP P81274
G	6	MET	-	expression tag	UNP P81274
I	1	GLY	-	expression tag	UNP P81274
I	2	PRO	-	expression tag	UNP P81274
I	3	LEU	-	expression tag	UNP P81274
I	4	GLY	-	expression tag	UNP P81274
I	5	SER	-	expression tag	UNP P81274
I	6	MET	-	expression tag	UNP P81274
K	1	GLY	-	expression tag	UNP P81274
K	2	PRO	-	expression tag	UNP P81274
K	3	LEU	-	expression tag	UNP P81274
K	4	GLY	-	expression tag	UNP P81274
K	5	SER	-	expression tag	UNP P81274
K	6	MET	-	expression tag	UNP P81274
M	1	GLY	-	expression tag	UNP P81274
M	2	PRO	-	expression tag	UNP P81274
M	3	LEU	-	expression tag	UNP P81274
M	4	GLY	-	expression tag	UNP P81274
M	5	SER	-	expression tag	UNP P81274
M	6	MET	-	expression tag	UNP P81274
O	1	GLY	-	expression tag	UNP P81274
O	2	PRO	-	expression tag	UNP P81274
O	3	LEU	-	expression tag	UNP P81274
O	4	GLY	-	expression tag	UNP P81274
O	5	SER	-	expression tag	UNP P81274

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Chain	Residue	Modelled	Actual	Comment	Reference
O	6	MET	-	expression tag	UNP P81274
Q	1	GLY	-	expression tag	UNP P81274
Q	2	PRO	-	expression tag	UNP P81274
Q	3	LEU	-	expression tag	UNP P81274
Q	4	GLY	-	expression tag	UNP P81274
Q	5	SER	-	expression tag	UNP P81274
Q	6	MET	-	expression tag	UNP P81274
S	1	GLY	-	expression tag	UNP P81274
S	2	PRO	-	expression tag	UNP P81274
S	3	LEU	-	expression tag	UNP P81274
S	4	GLY	-	expression tag	UNP P81274
S	5	SER	-	expression tag	UNP P81274
S	6	MET	-	expression tag	UNP P81274
U	1	GLY	-	expression tag	UNP P81274
U	2	PRO	-	expression tag	UNP P81274
U	3	LEU	-	expression tag	UNP P81274
U	4	GLY	-	expression tag	UNP P81274
U	5	SER	-	expression tag	UNP P81274
U	6	MET	-	expression tag	UNP P81274
W	1	GLY	-	expression tag	UNP P81274
W	2	PRO	-	expression tag	UNP P81274
W	3	LEU	-	expression tag	UNP P81274
W	4	GLY	-	expression tag	UNP P81274
W	5	SER	-	expression tag	UNP P81274
W	6	MET	-	expression tag	UNP P81274

- Molecule 2 is a protein called Nuclear mitotic apparatus protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	45	Total	C	N	O	S	0	0	0
			329	206	53	68	2			
2	D	36	Total	C	N	O	S	0	0	0
			280	177	44	57	2			
2	F	37	Total	C	N	O	S	0	0	0
			288	182	46	58	2			
2	H	36	Total	C	N	O	S	0	0	0
			284	180	44	58	2			
2	J	40	Total	C	N	O	S	0	0	0
			307	192	49	64	2			
2	L	44	Total	C	N	O	S	0	0	0
			341	210	58	71	2			
2	N	39	Total	C	N	O	S	0	0	0
			305	191	49	63	2			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	P	43	Total	C	N	O	S	0	0	0
			320	200	52	66	2			
2	R	40	Total	C	N	O	S	0	0	0
			312	195	50	65	2			
2	T	45	Total	C	N	O	S	0	0	0
			337	209	55	71	2			
2	V	39	Total	C	N	O	S	0	0	0
			301	187	49	63	2			
2	X	40	Total	C	N	O	S	0	0	0
			300	187	49	62	2			

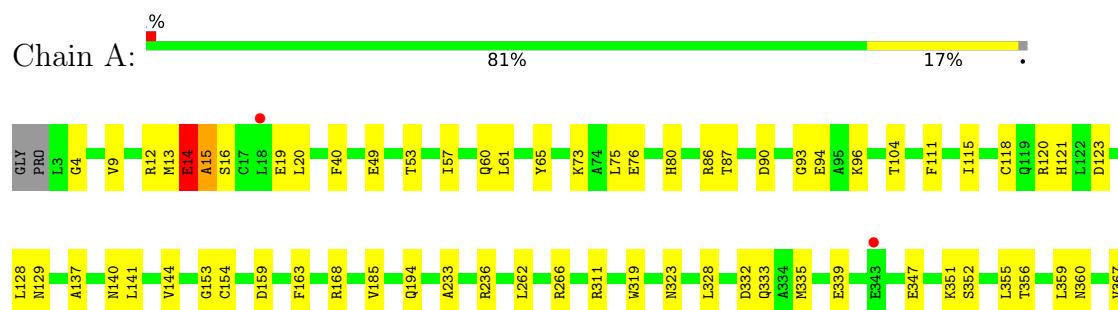
There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1858	GLY	-	expression tag	UNP Q14980
B	1859	PRO	-	expression tag	UNP Q14980
D	1858	GLY	-	expression tag	UNP Q14980
D	1859	PRO	-	expression tag	UNP Q14980
F	1858	GLY	-	expression tag	UNP Q14980
F	1859	PRO	-	expression tag	UNP Q14980
H	1858	GLY	-	expression tag	UNP Q14980
H	1859	PRO	-	expression tag	UNP Q14980
J	1858	GLY	-	expression tag	UNP Q14980
J	1859	PRO	-	expression tag	UNP Q14980
L	1858	GLY	-	expression tag	UNP Q14980
L	1859	PRO	-	expression tag	UNP Q14980
N	1858	GLY	-	expression tag	UNP Q14980
N	1859	PRO	-	expression tag	UNP Q14980
P	1858	GLY	-	expression tag	UNP Q14980
P	1859	PRO	-	expression tag	UNP Q14980
R	1858	GLY	-	expression tag	UNP Q14980
R	1859	PRO	-	expression tag	UNP Q14980
T	1858	GLY	-	expression tag	UNP Q14980
T	1859	PRO	-	expression tag	UNP Q14980
V	1858	GLY	-	expression tag	UNP Q14980
V	1859	PRO	-	expression tag	UNP Q14980
X	1858	GLY	-	expression tag	UNP Q14980
X	1859	PRO	-	expression tag	UNP Q14980

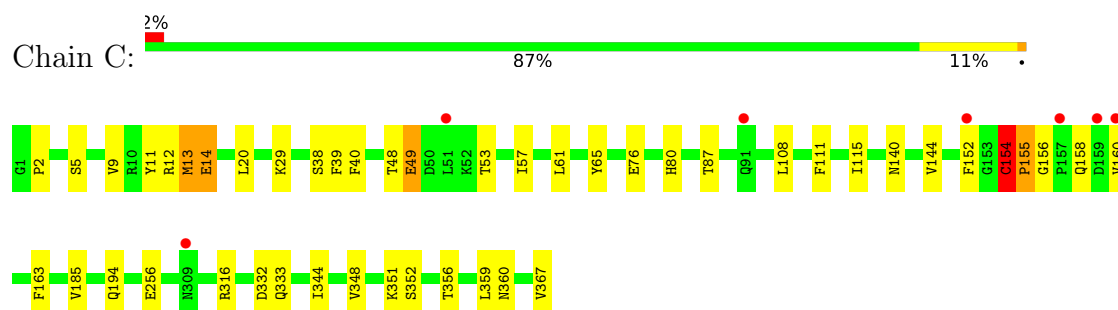
3 Residue-property plots [i](#)

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.

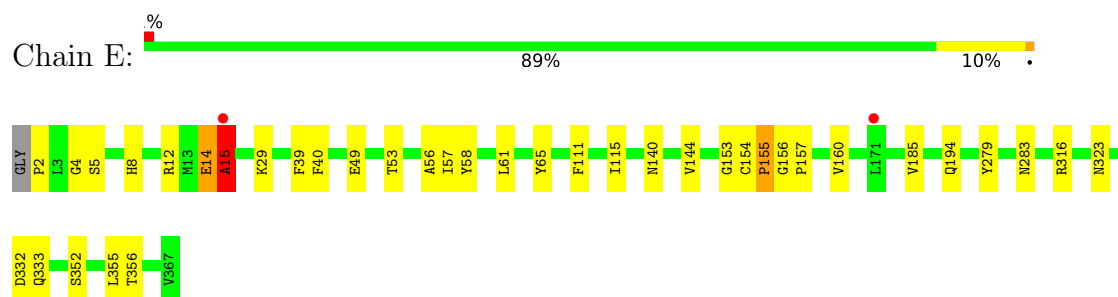
- Molecule 1: G-protein-signaling modulator 2



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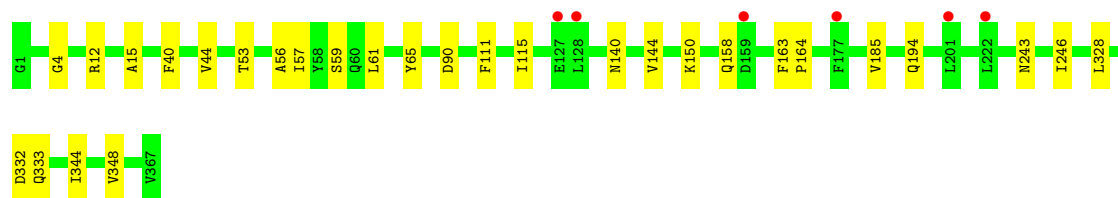


- Molecule 1: G-protein-signaling modulator 2



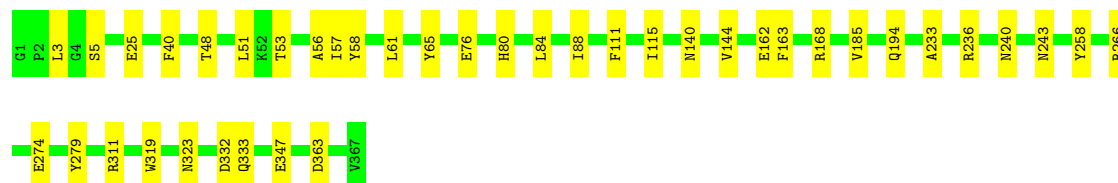
- Molecule 1: G-protein-signaling modulator 2





- Molecule 1: G-protein-signaling modulator 2

Chain I: 89% 11%



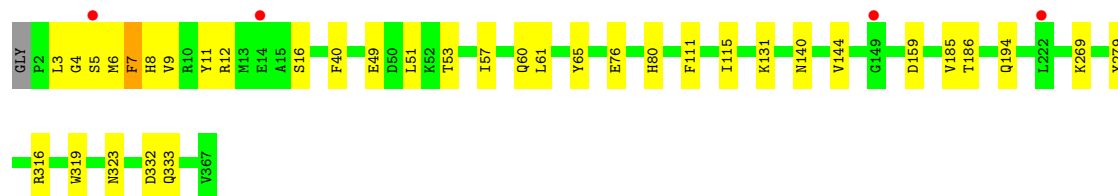
- Molecule 1: G-protein-signaling modulator 2

Chain K: 89% 11%



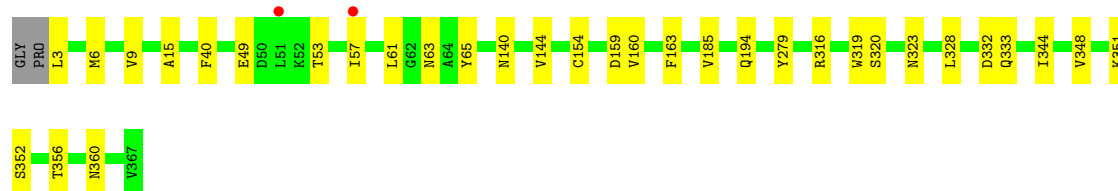
- Molecule 1: G-protein-signaling modulator 2

Chain M: 90% 10%

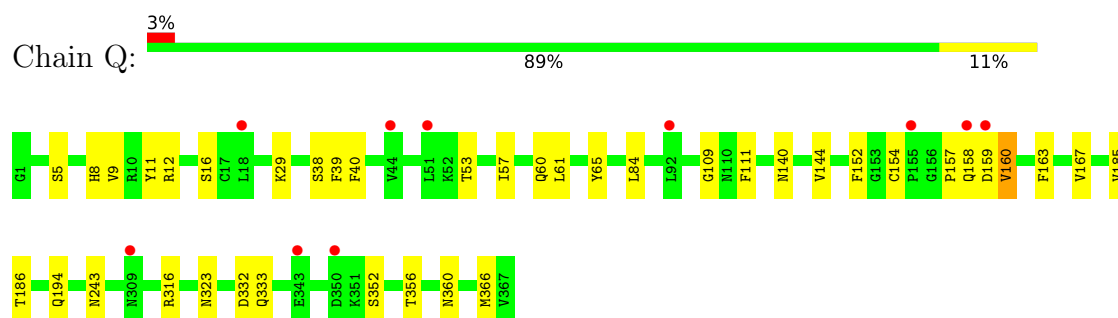


- Molecule 1: G-protein-signaling modulator 2

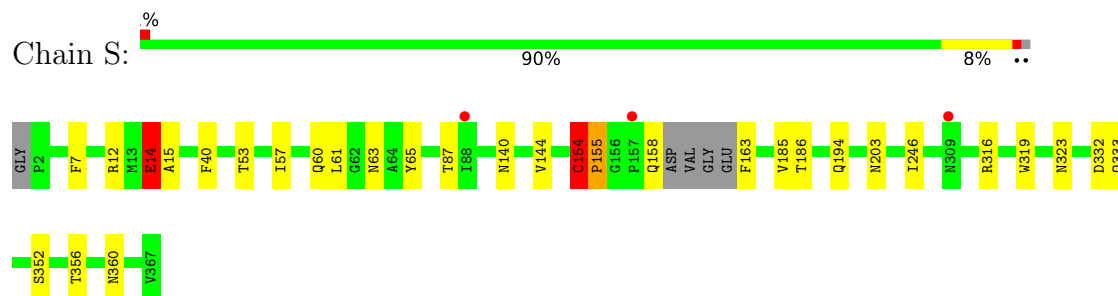
Chain O: 90% 9%



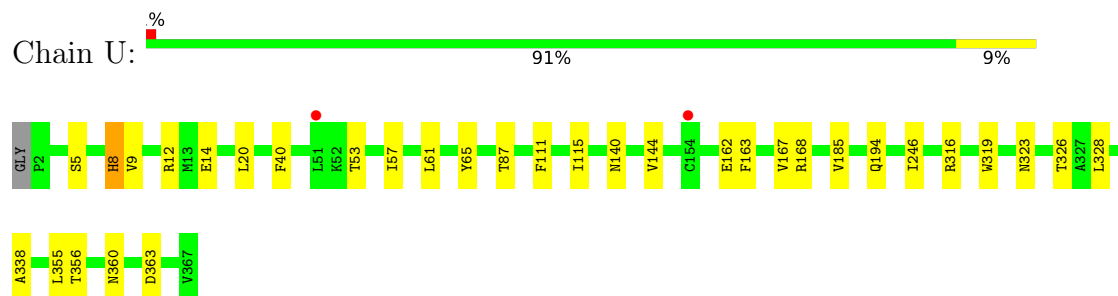
- Molecule 1: G-protein-signaling modulator 2



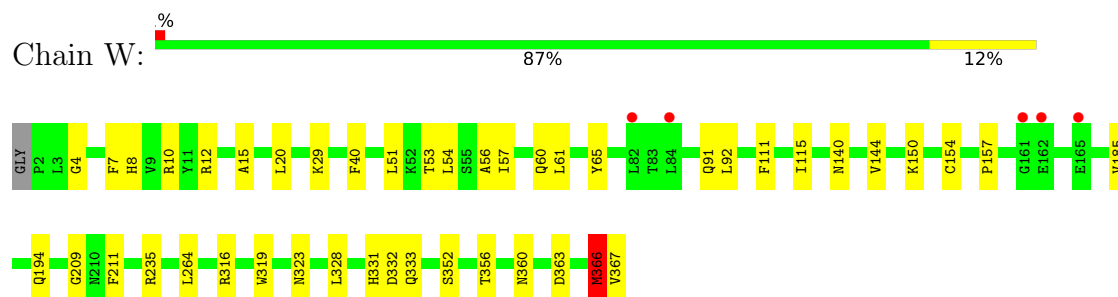
- Molecule 1: G-protein-signaling modulator 2



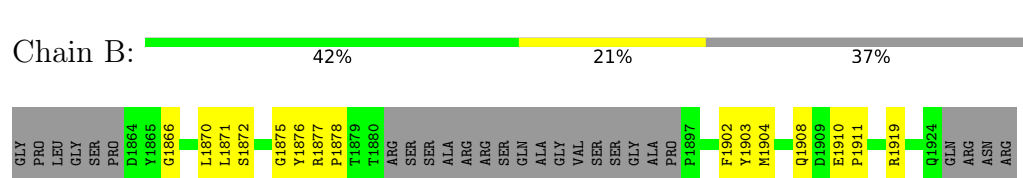
- Molecule 1: G-protein-signaling modulator 2



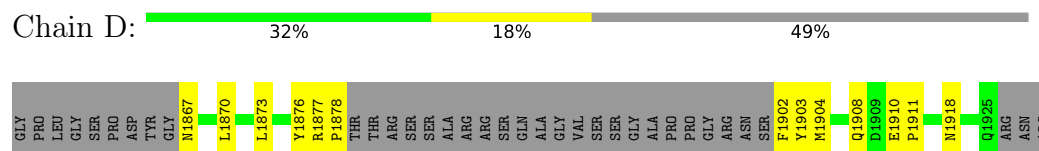
- Molecule 1: G-protein-signaling modulator 2



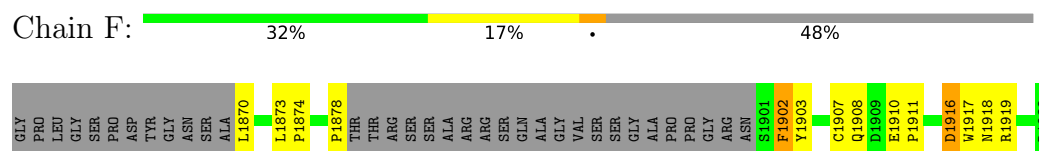
- Molecule 2: Nuclear mitotic apparatus protein 1



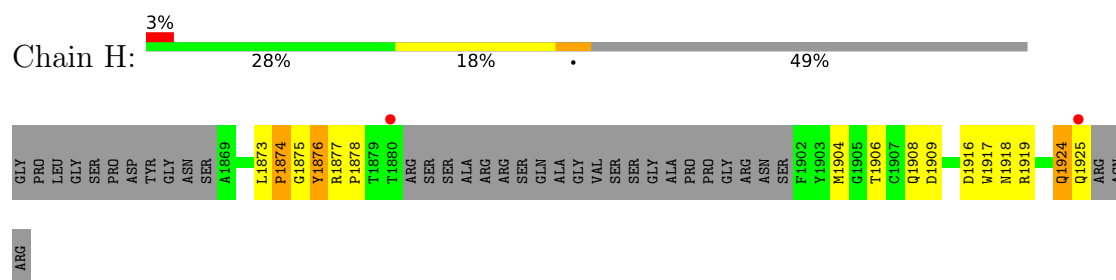
- Molecule 2: Nuclear mitotic apparatus protein 1



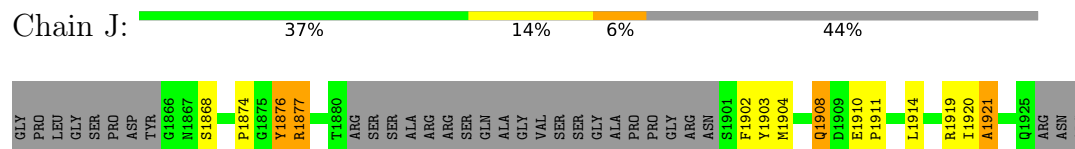
- Molecule 2: Nuclear mitotic apparatus protein 1



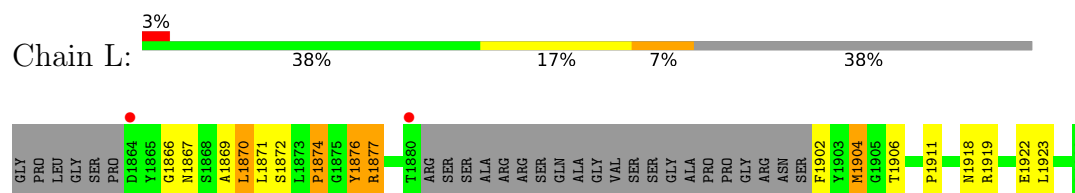
- Molecule 2: Nuclear mitotic apparatus protein 1



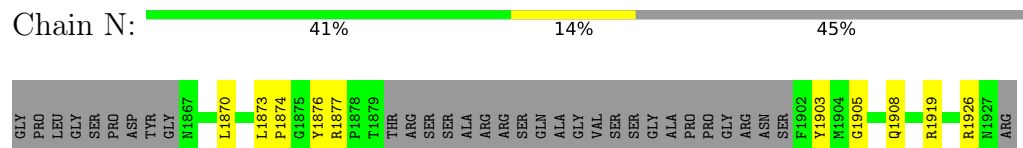
- Molecule 2: Nuclear mitotic apparatus protein 1



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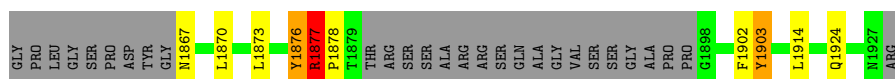


- Molecule 2: Nuclear mitotic apparatus protein 1

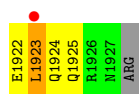
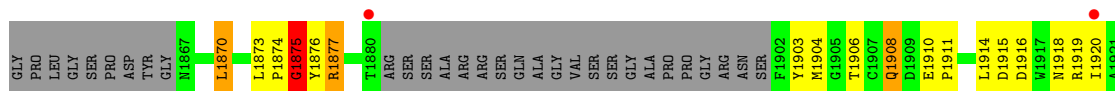
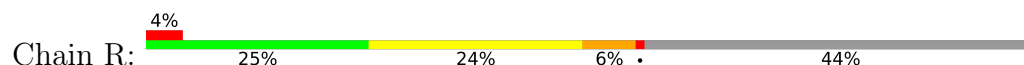


- Molecule 2: Nuclear mitotic apparatus protein 1

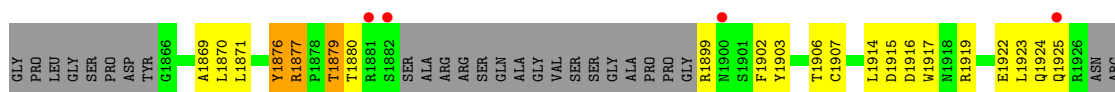
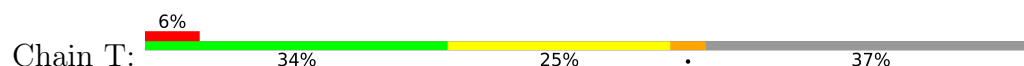




• Molecule 2: Nuclear mitotic apparatus protein 1



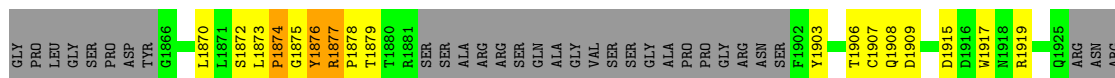
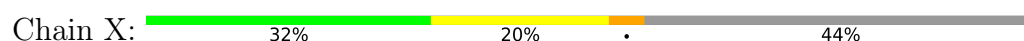
• Molecule 2: Nuclear mitotic apparatus protein 1



• Molecule 2: Nuclear mitotic apparatus protein 1



• Molecule 2: Nuclear mitotic apparatus protein 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	153.94Å 153.94Å 732.95Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	150.65 – 4.31 150.65 – 4.31	Depositor EDS
% Data completeness (in resolution range)	99.8 (150.65-4.31) 95.7 (150.65-4.31)	Depositor EDS
R_{merge}	0.34	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.54 (at 4.30Å)	Xtriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, R_{free}	0.182 , 0.234 0.195 , 0.245	Depositor DCC
R_{free} test set	3061 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	212.5	Xtriage
Anisotropy	0.147	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.23 , 168.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	37558	wwPDB-VP
Average B, all atoms (Å ²)	241.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.82% 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

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	0.24	0/2885	0.58	3/3892 (0.1%)
1	C	0.23	0/2898	0.56	5/3909 (0.1%)
1	E	0.21	0/2847	0.51	3/3845 (0.1%)
1	G	0.21	0/2865	0.46	0/3868
1	I	0.20	0/2872	0.47	0/3881
1	K	0.20	0/2880	0.49	1/3887 (0.0%)
1	M	0.21	0/2872	0.53	0/3877
1	O	0.19	0/2872	0.45	1/3876 (0.0%)
1	Q	0.20	0/2883	0.47	0/3892
1	S	0.21	0/2851	0.57	5/3847 (0.1%)
1	U	0.23	0/2874	0.50	0/3879
1	W	0.23	0/2868	0.48	0/3871
2	B	0.49	0/336	1.02	0/458
2	D	0.37	0/286	0.95	0/389
2	F	0.33	0/294	1.05	0/400
2	H	0.47	0/290	0.97	0/395
2	J	0.48	0/313	1.10	3/426 (0.7%)
2	L	1.12	1/347 (0.3%)	1.06	2/470 (0.4%)
2	N	0.40	0/311	0.86	0/423
2	P	0.41	0/326	1.06	4/444 (0.9%)
2	R	0.47	0/318	1.13	4/433 (0.9%)
2	T	0.40	0/343	1.03	0/467
2	V	0.35	0/306	0.98	0/415
2	X	0.40	0/306	0.91	2/417 (0.5%)
All	All	0.26	1/38243 (0.0%)	0.58	33/51661 (0.1%)

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	2

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Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1
1	E	0	1
1	I	0	1
1	O	0	1
1	Q	0	2
1	S	0	1
1	U	0	1
1	W	0	1
2	D	0	1
2	N	0	1
2	R	0	1
2	T	0	2
2	X	0	1
All	All	0	17

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	L	1904	MET	CA-C	-19.02	1.42	1.52

The worst 5 of 33 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	S	154	CYS	C-N-CD	-11.86	94.50	120.60
1	C	154	CYS	C-N-CD	-9.94	98.73	120.60
1	S	154	CYS	CA-C-N	8.83	148.20	127.00
1	S	154	CYS	C-N-CA	8.83	148.20	127.00
1	A	14	GLU	CA-C-N	6.87	134.66	121.54

There are no chirality outliers.

5 of 17 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	13	MET	Peptide
1	A	153	GLY	Peptide
1	C	154	CYS	Peptide
2	D	1876	TYR	Peptide
1	E	15	ALA	Peptide

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	2834	0	2726	63	0
1	C	2847	0	2741	46	0
1	E	2798	0	2657	31	0
1	G	2815	0	2678	22	0
1	I	2820	0	2686	33	0
1	K	2828	0	2704	29	0
1	M	2820	0	2688	42	0
1	O	2821	0	2696	31	0
1	Q	2831	0	2707	35	0
1	S	2800	0	2671	32	0
1	U	2823	0	2696	44	0
1	W	2817	0	2685	51	0
2	B	329	0	282	13	0
2	D	280	0	246	11	0
2	F	288	0	248	13	0
2	H	284	0	255	11	0
2	J	307	0	271	20	0
2	L	341	0	300	17	0
2	N	305	0	269	6	0
2	P	320	0	272	10	0
2	R	312	0	276	18	0
2	T	337	0	290	14	0
2	V	301	0	260	15	0
2	X	300	0	258	12	0
All	All	37558	0	35562	461	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.

The worst 5 of 461 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:M:4:GLY:H	1:M:6:MET:CE	1.07	1.55
1:M:3:LEU:HD22	1:M:6:MET:CE	1.34	1.54
1:M:3:LEU:CD2	1:M:6:MET:HE2	1.43	1.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:M:4:GLY:N	1:M:6:MET:HE1	1.14	1.42
1:U:5:SER:HA	1:U:8:HIS:ND1	1.62	1.12

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	363/367 (99%)	352 (97%)	6 (2%)	5 (1%)	9	39
1	C	365/367 (100%)	352 (96%)	7 (2%)	6 (2%)	7	37
1	E	364/367 (99%)	349 (96%)	8 (2%)	7 (2%)	6	32
1	G	365/367 (100%)	346 (95%)	17 (5%)	2 (0%)	24	62
1	I	365/367 (100%)	352 (96%)	13 (4%)	0	100	100
1	K	364/367 (99%)	351 (96%)	10 (3%)	3 (1%)	16	52
1	M	364/367 (99%)	351 (96%)	10 (3%)	3 (1%)	16	52
1	O	363/367 (99%)	350 (96%)	12 (3%)	1 (0%)	36	71
1	Q	365/367 (100%)	352 (96%)	10 (3%)	3 (1%)	16	52
1	S	358/367 (98%)	345 (96%)	9 (2%)	4 (1%)	11	45
1	U	364/367 (99%)	351 (96%)	12 (3%)	1 (0%)	36	71
1	W	364/367 (99%)	347 (95%)	14 (4%)	3 (1%)	16	52
2	B	41/71 (58%)	25 (61%)	11 (27%)	5 (12%)	0	4
2	D	32/71 (45%)	24 (75%)	6 (19%)	2 (6%)	1	13
2	F	33/71 (46%)	22 (67%)	8 (24%)	3 (9%)	0	8
2	H	32/71 (45%)	21 (66%)	4 (12%)	7 (22%)	0	1
2	J	36/71 (51%)	25 (69%)	7 (19%)	4 (11%)	0	6
2	L	40/71 (56%)	26 (65%)	10 (25%)	4 (10%)	0	7

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	N	35/71 (49%)	19 (54%)	14 (40%)	2 (6%)	1	14
2	P	39/71 (55%)	24 (62%)	13 (33%)	2 (5%)	1	15
2	R	36/71 (51%)	19 (53%)	12 (33%)	5 (14%)	0	3
2	T	41/71 (58%)	27 (66%)	11 (27%)	3 (7%)	1	11
2	V	35/71 (49%)	22 (63%)	10 (29%)	3 (9%)	0	9
2	X	36/71 (51%)	21 (58%)	9 (25%)	6 (17%)	0	2
All	All	4800/5256 (91%)	4473 (93%)	243 (5%)	84 (2%)	6	33

5 of 84 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	14	GLU
1	A	15	ALA
1	C	14	GLU
1	C	155	PRO
1	E	8	HIS

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	285/291 (98%)	285 (100%)	0	100	100
1	C	287/291 (99%)	286 (100%)	1 (0%)	86	84
1	E	275/291 (94%)	275 (100%)	0	100	100
1	G	278/291 (96%)	278 (100%)	0	100	100
1	I	279/291 (96%)	279 (100%)	0	100	100
1	K	283/291 (97%)	283 (100%)	0	100	100
1	M	279/291 (96%)	279 (100%)	0	100	100
1	O	282/291 (97%)	282 (100%)	0	100	100
1	Q	282/291 (97%)	282 (100%)	0	100	100
1	S	279/291 (96%)	279 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	U	281/291 (97%)	281 (100%)	0	100	100
1	W	279/291 (96%)	279 (100%)	0	100	100
2	B	32/58 (55%)	32 (100%)	0	100	100
2	D	29/58 (50%)	29 (100%)	0	100	100
2	F	29/58 (50%)	29 (100%)	0	100	100
2	H	30/58 (52%)	30 (100%)	0	100	100
2	J	32/58 (55%)	32 (100%)	0	100	100
2	L	35/58 (60%)	35 (100%)	0	100	100
2	N	32/58 (55%)	32 (100%)	0	100	100
2	P	31/58 (53%)	31 (100%)	0	100	100
2	R	33/58 (57%)	32 (97%)	1 (3%)	36	57
2	T	34/58 (59%)	34 (100%)	0	100	100
2	V	31/58 (53%)	31 (100%)	0	100	100
2	X	30/58 (52%)	30 (100%)	0	100	100
All	All	3747/4188 (90%)	3745 (100%)	2 (0%)	88	88

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

Mol	Chain	Res	Type
1	C	49	GLU
2	R	1870	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 63 such sidechains are listed below:

Mol	Chain	Res	Type
1	I	360	ASN
1	U	365	GLN
2	L	1925	GLN
1	U	181	ASN
1	W	103	ASN

5.3.3 RNA ⓘ

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.

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	365/367 (99%)	-0.34	2 (0%) 87 75	184, 257, 338, 428	0
1	C	367/367 (100%)	-0.17	7 (1%) 66 51	162, 231, 315, 405	0
1	E	366/367 (99%)	-0.25	2 (0%) 87 75	184, 238, 313, 419	0
1	G	367/367 (100%)	-0.13	6 (1%) 70 55	160, 221, 302, 404	0
1	I	367/367 (100%)	-0.38	0 100 100	147, 255, 344, 406	0
1	K	366/367 (99%)	-0.24	5 (1%) 73 58	151, 215, 309, 438	0
1	M	366/367 (99%)	-0.06	4 (1%) 78 62	134, 216, 301, 421	0
1	O	365/367 (99%)	-0.40	2 (0%) 87 75	153, 261, 335, 409	0
1	Q	367/367 (100%)	-0.01	10 (2%) 56 43	145, 192, 294, 401	0
1	S	362/367 (98%)	-0.14	3 (0%) 82 68	132, 203, 290, 380	0
1	U	366/367 (99%)	-0.39	2 (0%) 87 75	161, 246, 331, 497	0
1	W	366/367 (99%)	-0.28	5 (1%) 73 58	156, 263, 335, 435	0
2	B	45/71 (63%)	-0.04	0 100 100	227, 277, 333, 361	0
2	D	36/71 (50%)	0.11	0 100 100	191, 277, 340, 368	0
2	F	37/71 (52%)	-0.12	0 100 100	235, 281, 319, 352	0
2	H	36/71 (50%)	-0.07	2 (5%) 30 29	183, 270, 350, 411	0
2	J	40/71 (56%)	-0.15	0 100 100	159, 269, 320, 348	0
2	L	44/71 (61%)	0.10	2 (4%) 38 33	184, 247, 319, 362	0
2	N	39/71 (54%)	0.01	0 100 100	171, 254, 345, 349	0
2	P	43/71 (60%)	0.08	0 100 100	196, 283, 332, 349	0
2	R	40/71 (56%)	0.28	3 (7%) 20 23	165, 251, 329, 367	0
2	T	45/71 (63%)	0.33	4 (8%) 15 18	141, 234, 306, 335	0
2	V	39/71 (54%)	-0.13	1 (2%) 57 44	236, 281, 331, 343	0
2	X	40/71 (56%)	0.03	0 100 100	177, 258, 317, 378	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
All	All	4874/5256 (92%)	-0.21	60 (1%) 76 61	132, 236, 328, 497	0

The worst 5 of 60 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	Q	155	PRO	3.6
1	M	222	LEU	3.4
1	C	159	ASP	3.3
2	T	1881	ARG	3.3
2	R	1880	THR	3.3

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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.