
Supplementary information

Molecular interactions of FG nucleoporin repeats at high resolution

In the format provided by the authors and unedited

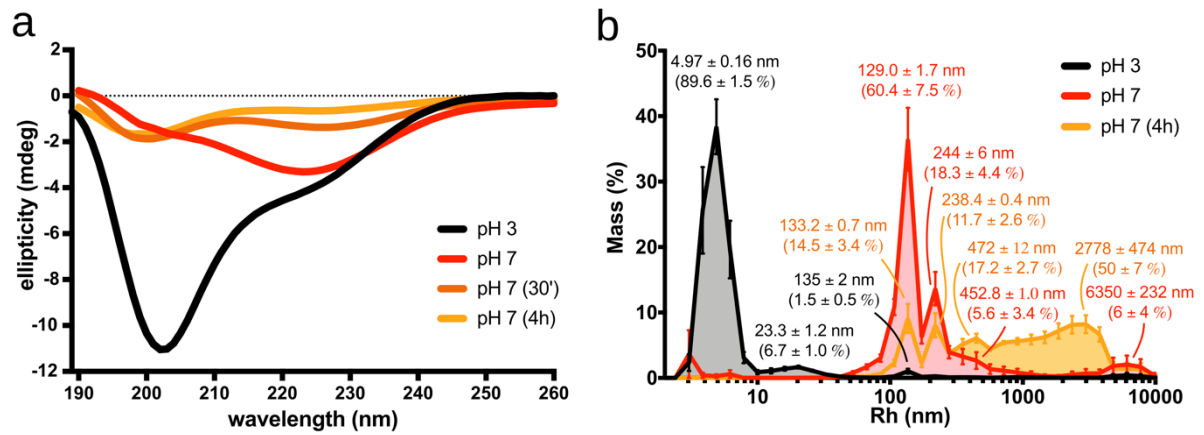


Fig. S1 |

Biophysical properties of the FG-repeat domain of human Nup98. a, Circular dichroism spectra at pH 3 (black) and 7 (red), and the evolution over time (orange, 30' and light orange, 4 h). **b,** Hydrodynamic radii of Nup98^{FG} measured by dynamic light scattering at pH 3 (black) and 7 (red), and the evolution over time (light orange, 4 h). The sizes, together with the population percentages in mass and the respective standard errors from 12 measurements are displayed next to each peak.

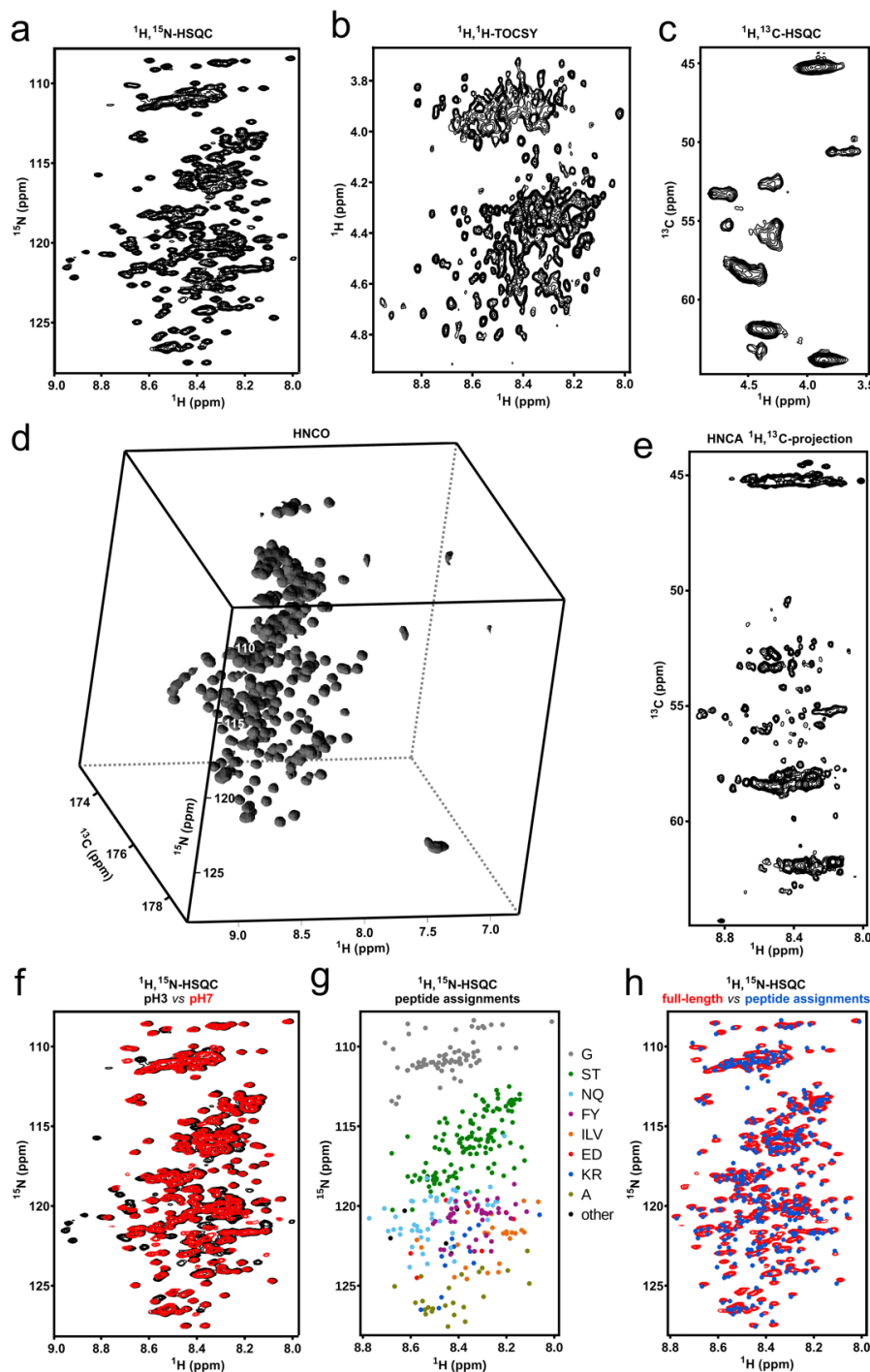


Fig. S2 |

NMR spectroscopy of the FG-repeat domain of human Nup98. **a-c**, $^1\text{H}, ^{15}\text{N}$ -HSQC (a), $^1\text{H}, ^1\text{H}$ -TOCSY (b) and $^1\text{H}, ^{13}\text{C}$ -HSQC (c) spectrum of Nup98^{FG} at pH 3. **d**, 3D HNCO spectrum of Nup98^{FG} at pH 3. **e**, Projection of the $^1\text{H}, ^{13}\text{C}$ planes of the 3D HNCA spectrum of Nup98^{FG} at pH 3. **f**, Comparison of the $^1\text{H}, ^{15}\text{N}$ -HSQC spectra of Nup98^{FG} at pH 3 (black; same as in (a)) and pH 7 (red). **g**, $^1\text{H}, ^{15}\text{N}$ -correlation spectrum that was generated from the chemical shifts, which were obtained through the assignment of the 17 peptides at pH 6.8. Each type of residue is colored as indicated. **h**, Same correlation spectrum as in (g; now in blue) over the $^1\text{H}, ^{15}\text{N}$ -HSQC spectrum of Nup98^{FG} measured at pH 7 before signal decay due to gel/aggregate formation.

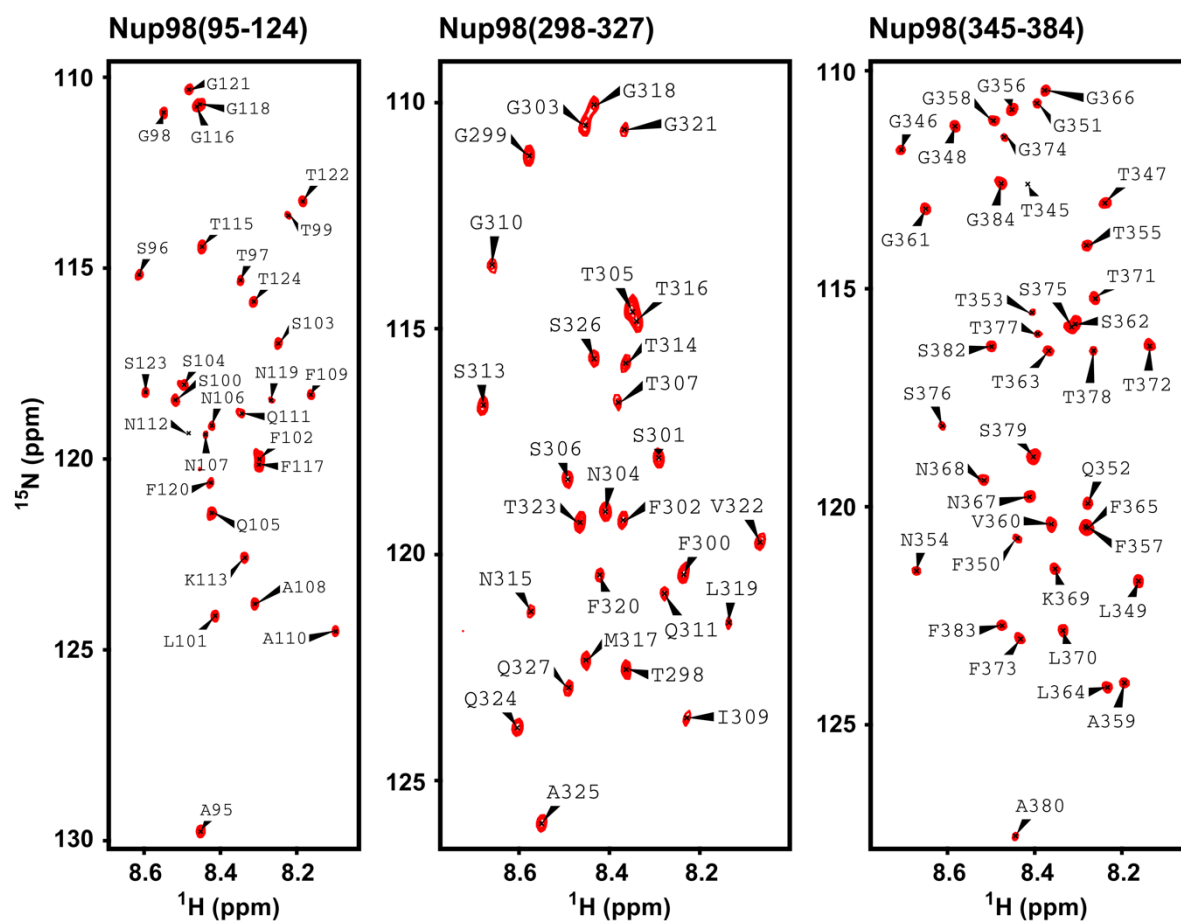


Fig. S3 |

NMR spectroscopy of peptides from the FG-repeat domain of Nup98. Two-dimensional ^1H - ^{15}N HSQC spectra of three of the Nup98 peptides used for the assignment of the 384-residue Nup98^{FG} protein. Samples were prepared at 2 mM peptide concentration in sodium phosphate buffer, pH 6.8 and measured at 278 K.

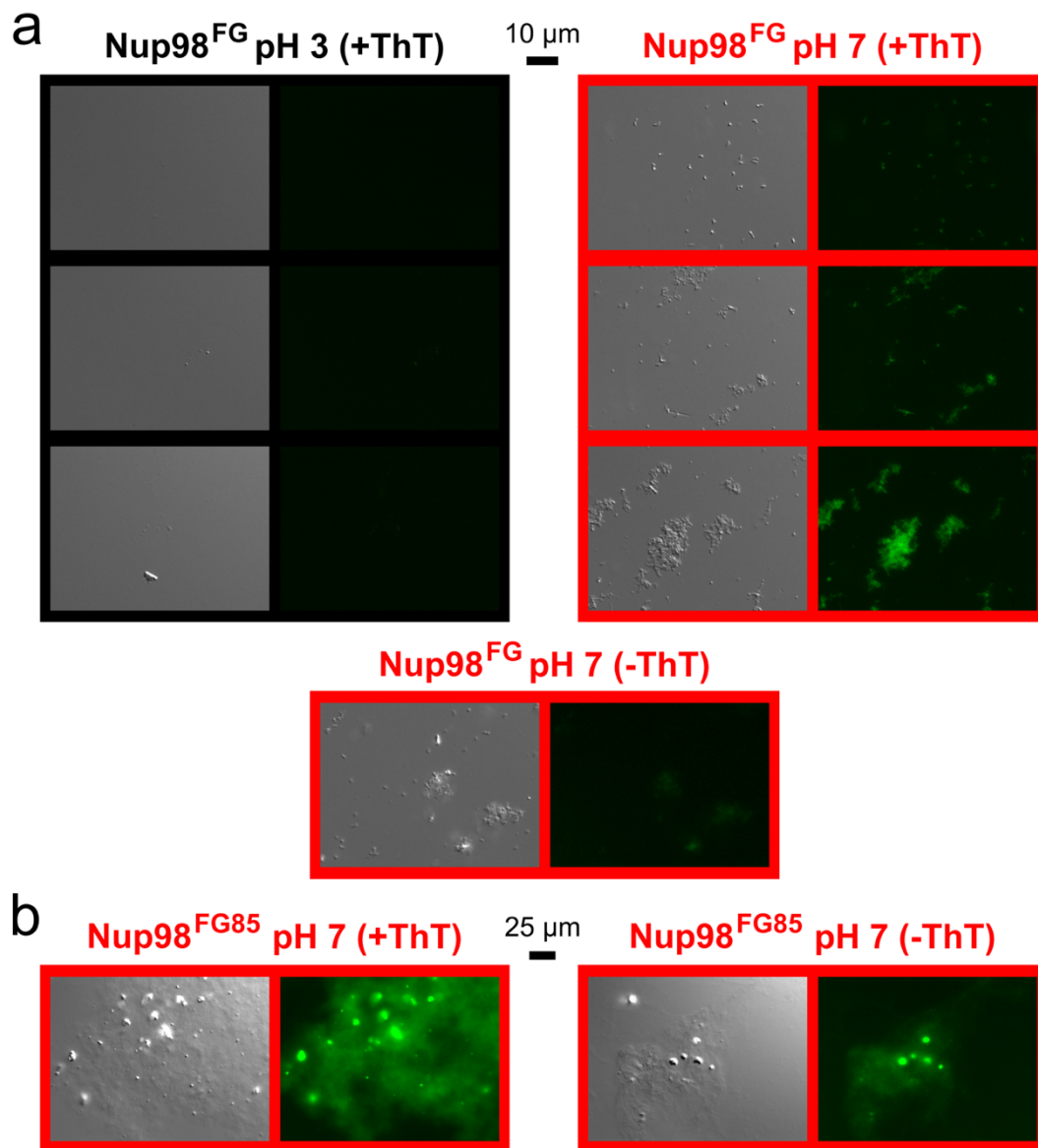


Fig. S4 |

The FG-repeat domain of human Nup98 forms cross- β structure. **a**, Differential interference contrast (left of each panel) and fluorescence (right of each panel) microscopy of Nup98^{FG} at pH 3 (top left, black) and pH 7 (top right, red) in the presence of ThT, and at pH 7 in the absence of ThT (bottom, red) displaying autofluorescence typical of amyloid-like structures¹. Zooms of these micrographs are used in Fig. 1G. **b**, Nup98^{FG85} differential interference contrast (left of each panel) and fluorescence (right of each panel) microscopy at pH 7 in the presence (left) and absence (right) of ThT. For autofluorescence micrographs, 100 times-longer exposure times were used.

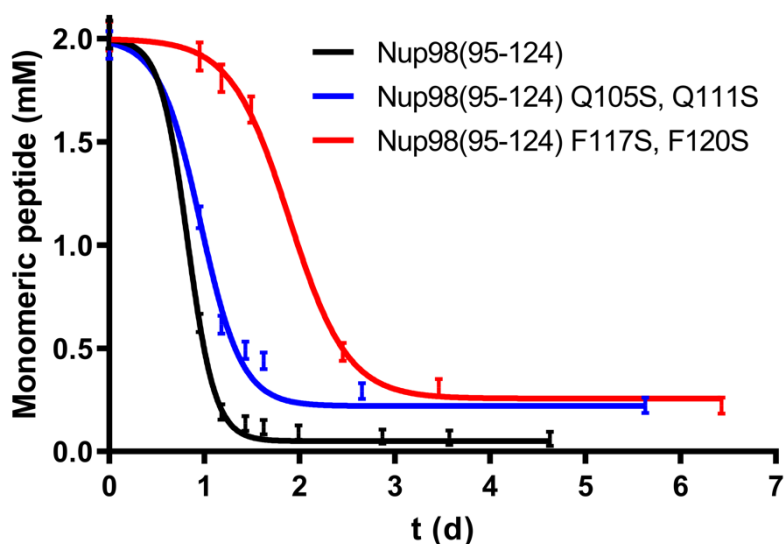


Fig. S5 |

Impact of site-directed mutagenesis on self-association kinetics of Nup98(95-124). Time-dependent decrease in the concentration of NMR-observable Nup98(95-124) (black) and its two variants “Nup98(95-124) Q105S, Q111S” (blue) and “Nup98(95-124) F117S, F120S” (red). The concentrations are calculated from the integral of the 1D ^1H NMR peaks and the error bars represent std based on NMR signal-to-noise ratios. The experiments were acquired at 278 K with 2 mM peptide concentration, in sodium phosphate buffer, pH 6.8.

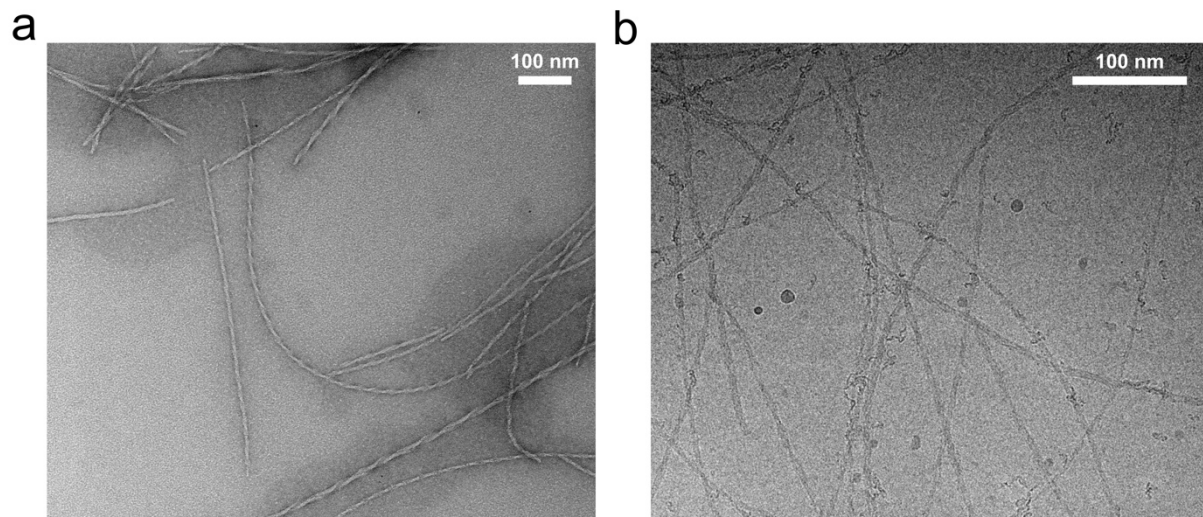


Fig. S6 |

Electron microscopy of Nup98^{FG85} fibrils. **a**, Negative-stain electron micrograph. **b**, Cryo-electron micrograph.

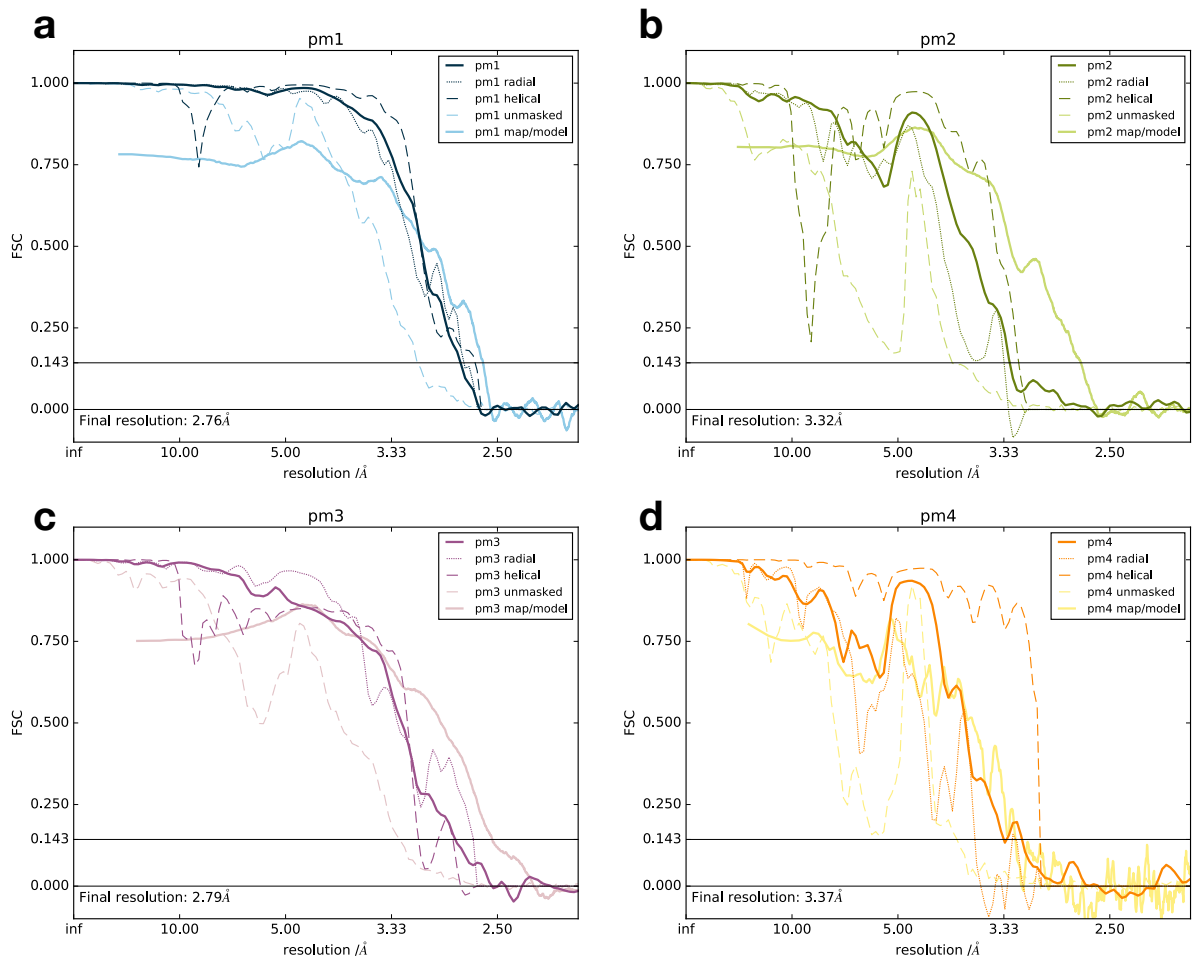


Fig. S7 |

Fourier shell correlation curves. Fourier shell correlation curves (FSC) for pm1 (a), pm2 (b), pm3 (c), and pm4 (d). The FSC curves shown between two independently refined masked (dark solid lines) and unmasked (light dashed lines) half-maps. For the masked FSC, a further calculation was made as to the contribution of the radial (dotted) and helical (dashed) directions, using 3DFSC². Also shown is the map/model FSC calculated with Phenix Mtriage (light solid line)³, which yield model resolution values (for FSC=0.5) of 3.02 Å, 3.27 Å, 2.88 Å, 3.71 Å for pm1, pm2, pm3, and pm4, respectively. The z-percentage is 0.1 in all cases. The final resolution is shown in the plot and was estimated from the value of the FSC curve for two independently refined masked half-maps at 0.143.

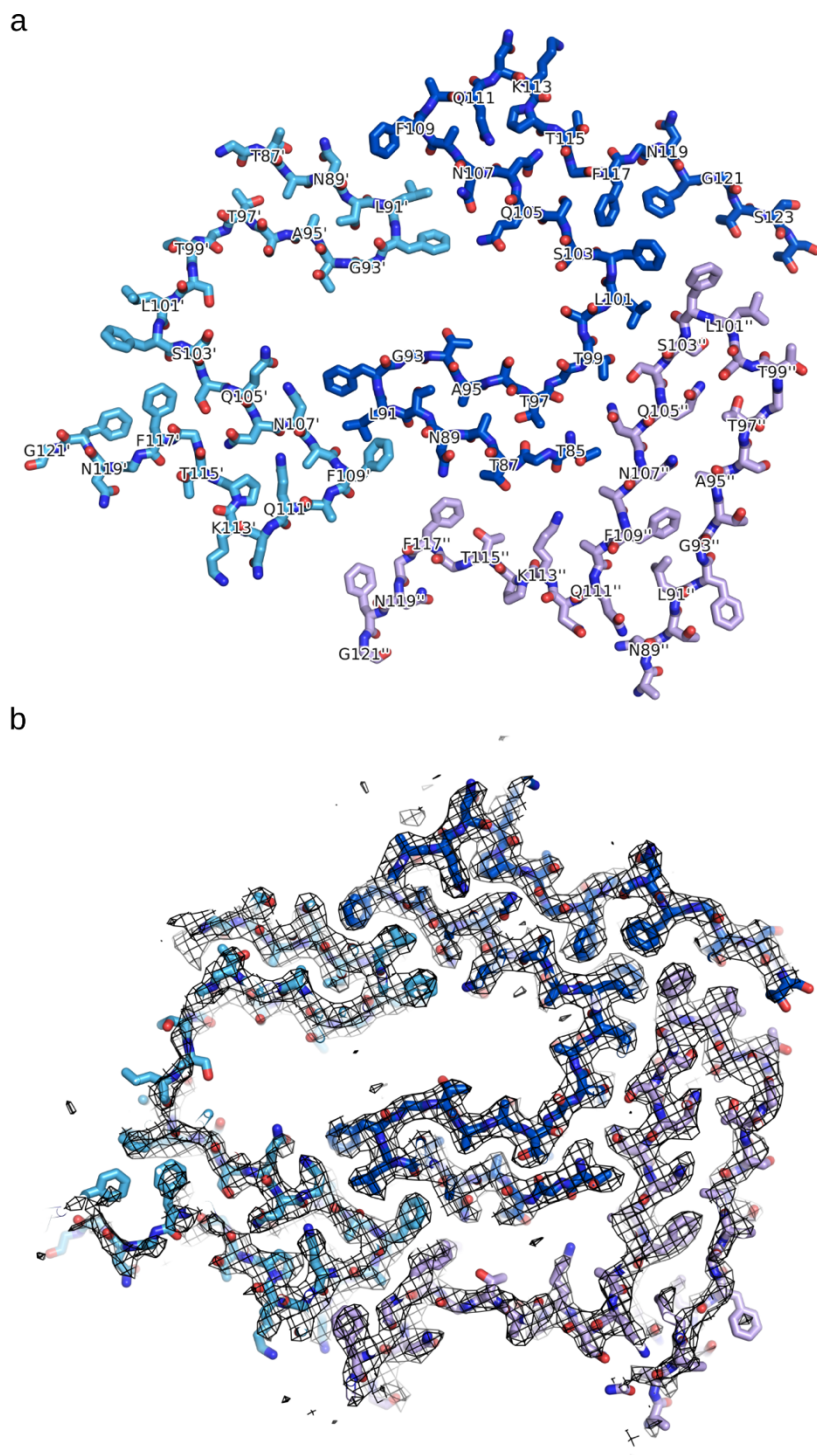


Fig. S8 |

Cryo-EM map and atomic model of the Nup98^{FG85} fibril polymorph 1 (pm1). **a**, Single cross-section of the Nup98^{FG85} fibril polymorph 1 in stick representation. The protofilaments are colored in different shades of blue. Residue identifiers are shown for every second amino acid. Amino acids from the light-colored protofilaments are labeled with an additional prime or double prime. **b**, Superposition of the atomic model and the final cryo-EM map (black isomesh; contour level of 0.05).

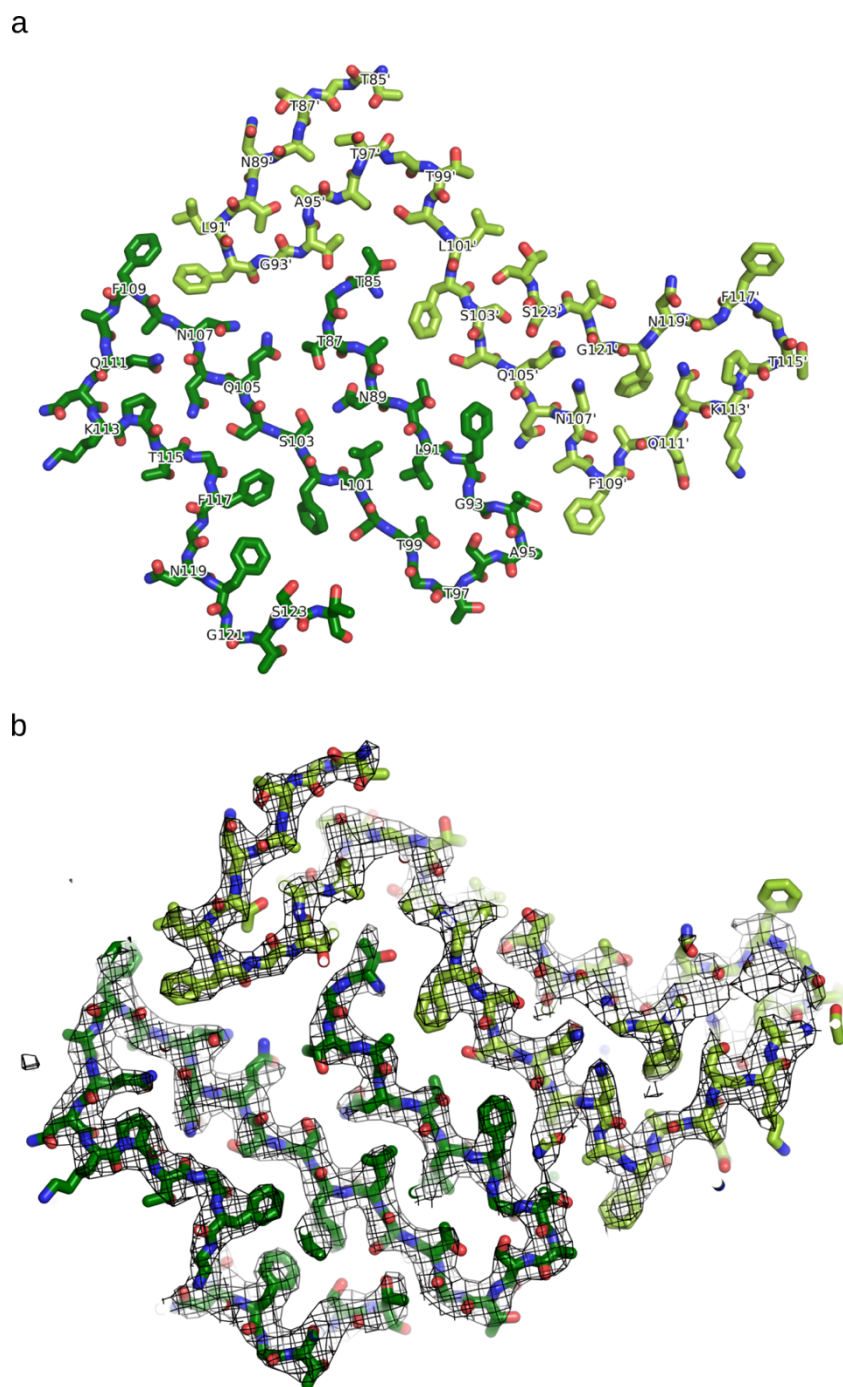


Fig. S9 |

Cryo-EM map and atomic model of the Nup98^{FG85} fibril polymorph 2 (pm2). **a**, Single cross-section of the Nup98^{FG85} fibril polymorph 2 in stick representation. The protofilaments are colored in different shades of green. Residue identifiers are shown for every second amino acid. Amino acids from the light-colored protofilaments are labeled with an additional prime or double prime. **b**, Superposition of the atomic model and the final cryo-EM map (black isomesh; contour level of 0.05).

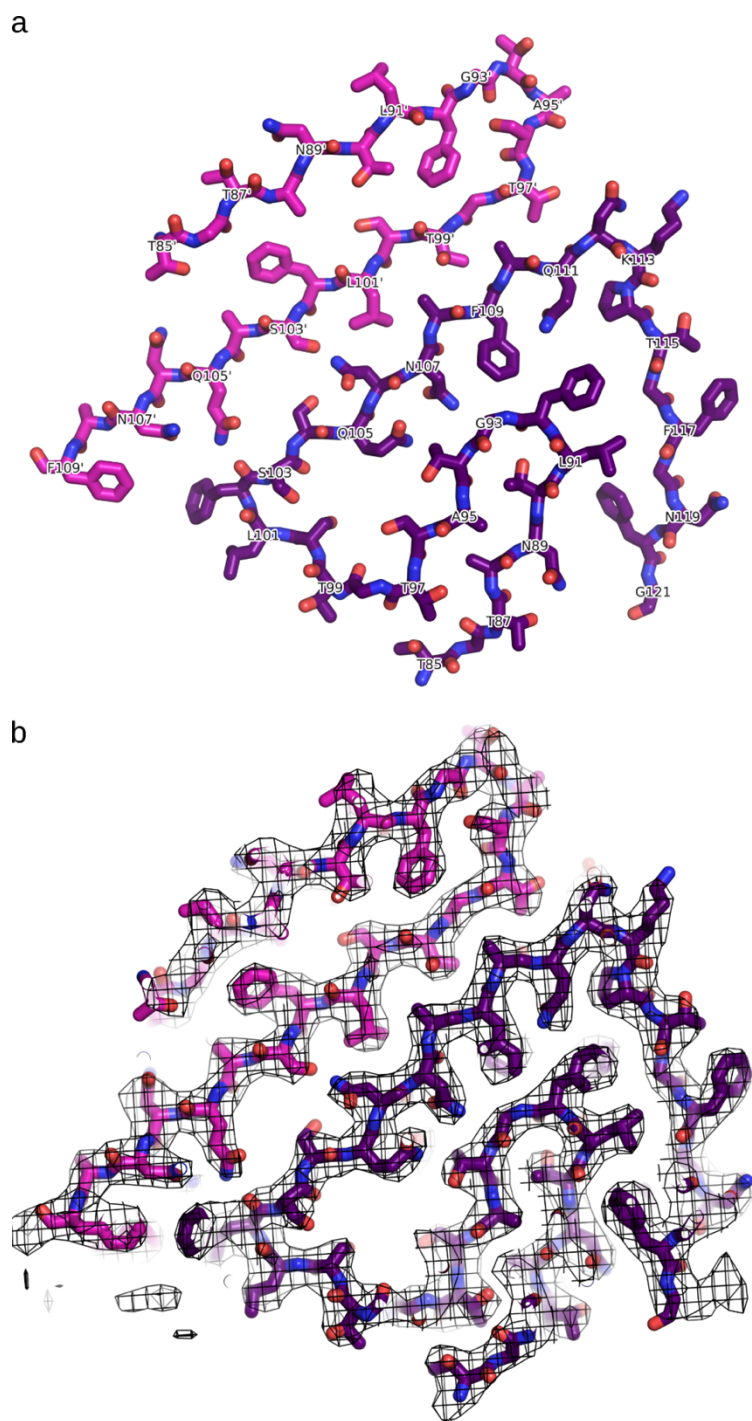
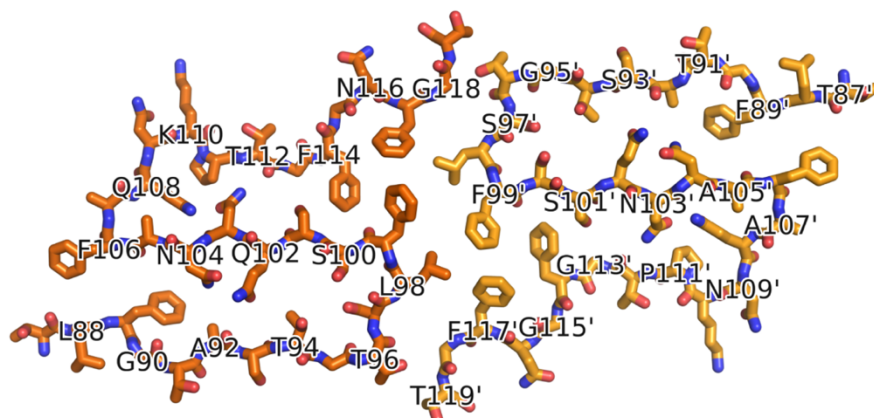


Fig. S10 |

Cryo-EM map and atomic model of the Nup98^{FG85} fibril polymorph 3 (pm3). **a**, Single cross-section of the Nup98^{FG85} fibril polymorph 3 in stick representation. The protofilaments are colored in different shades of violet. Residue identifiers are shown for every second amino acid. Amino acids from the light-colored protofilaments are labeled with an additional prime or double prime. **b**, Superposition of the atomic model and the final cryo-EM map (black isomesh; contour level of 0.05).

a



b

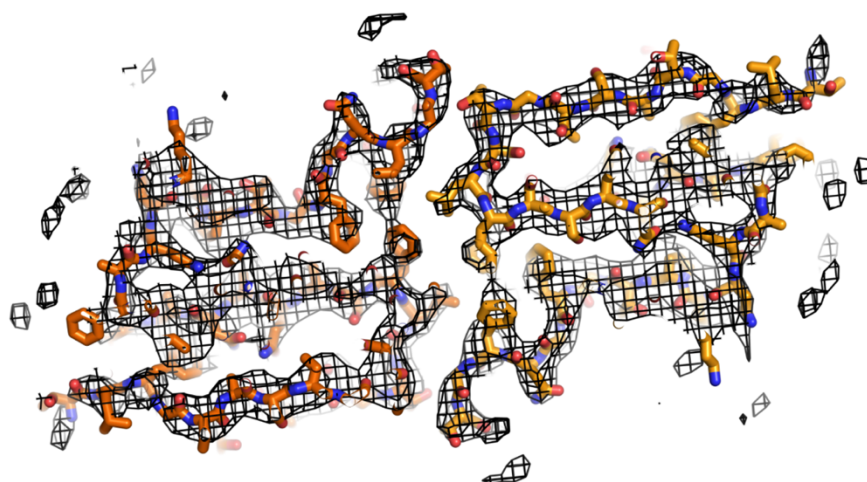


Fig. S11 |

Cryo-EM map and atomic model of the Nup98^{FG85} fibril polymorph 4 (pm4). **a**, Single cross-section of the Nup98^{FG85} fibril polymorph 4 in stick representation. The protofilaments are colored in different shades of orange. Residue identifiers are shown for every second amino acid. Amino acids from the light-colored protofilaments are labeled with an additional prime or double prime. **b**, Superposition of the atomic model and the final cryo-EM map (black isomesh; contour level of 0.04).

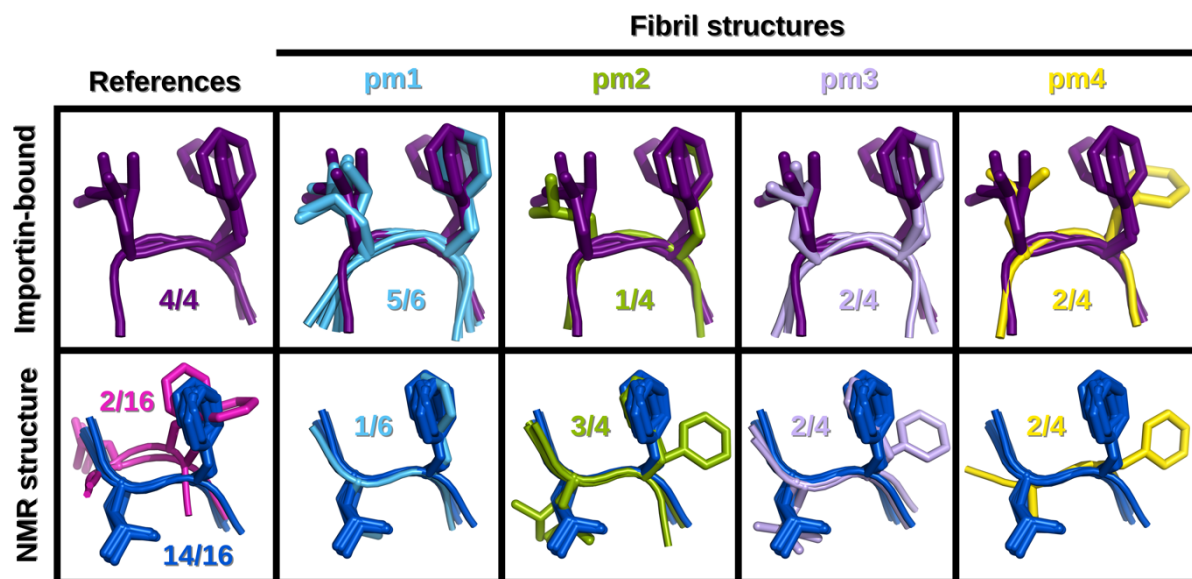


Fig. S12 |

Structures of xLFx motifs of Nup98^{FG85} fibrils. For each polymorph (pm1-pm4; different columns), the structures of their xLFx motifs are compared with the importin-bound GLFG structures (PDB id: 1O6P, purple, top row) and with the TALOS-N calculated structures from NMR data (blue, bottom row). The reference structures are represented alone in the left column. The two NMR-derived structures that have a different conformation are shown in magenta (bottom row; left). The number of structures of each polymorph represented from the total of motifs of that polymorph are displayed next to the structures.

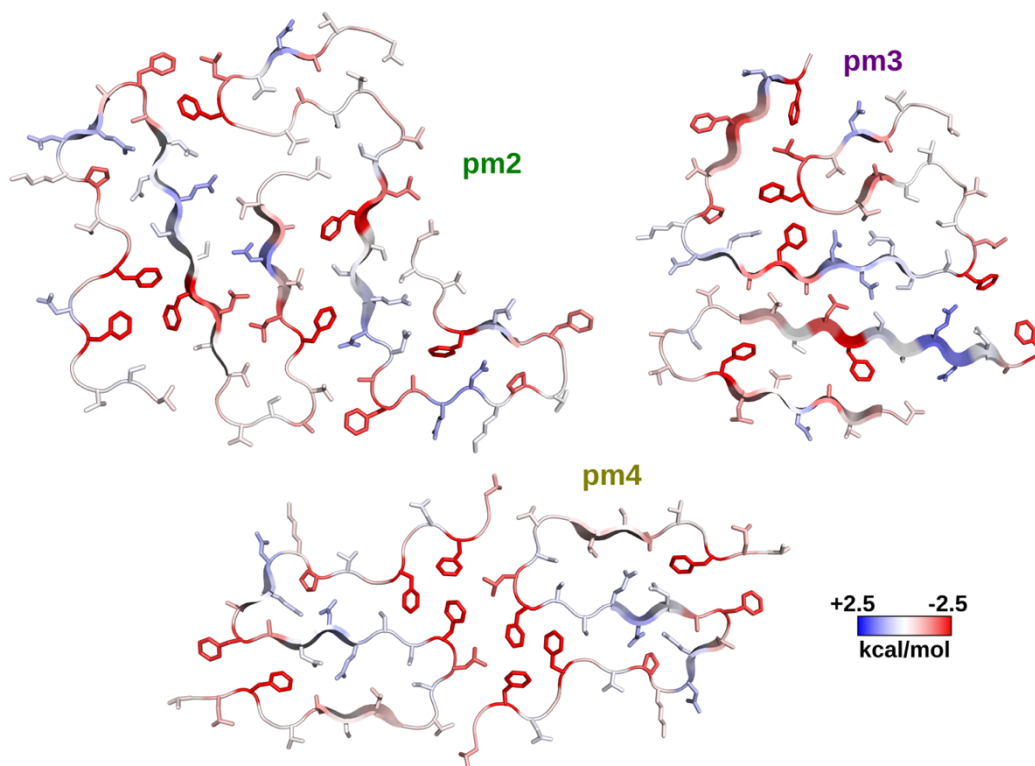


Fig. S13 |

Solvation energy stabilities of the fibril polymorphs 2, 3 and 4 of Nup98^{FG85}. Residue-specific stabilities based on solvation energies mapped onto the structures of the Nup98^{FG85} polymorphs 2, 3 and 4 (pm2-pm4). Red and blue represent high and low stability, respectively.

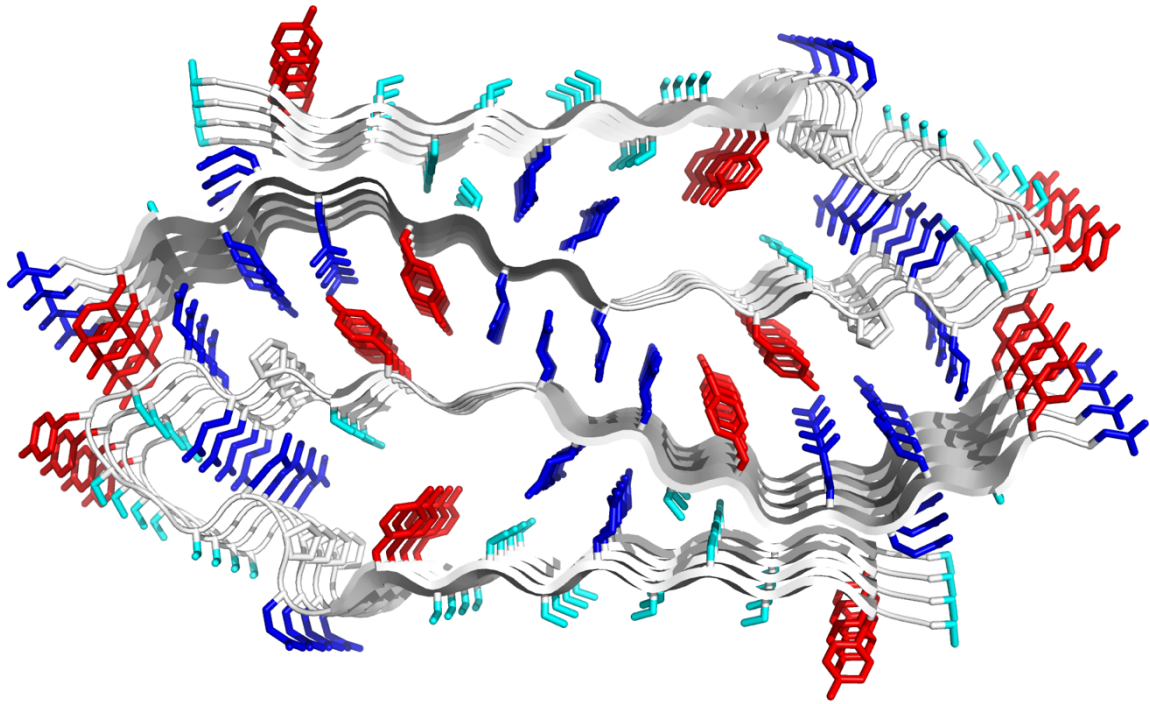


Fig. S14 |

CryoEM structure of FUS-LC fibrils (PDB: 6XFM). Tyrosine side chains are colored in red and polar residues in blue (glutamine and asparagine) and cyan (serine and threonine).

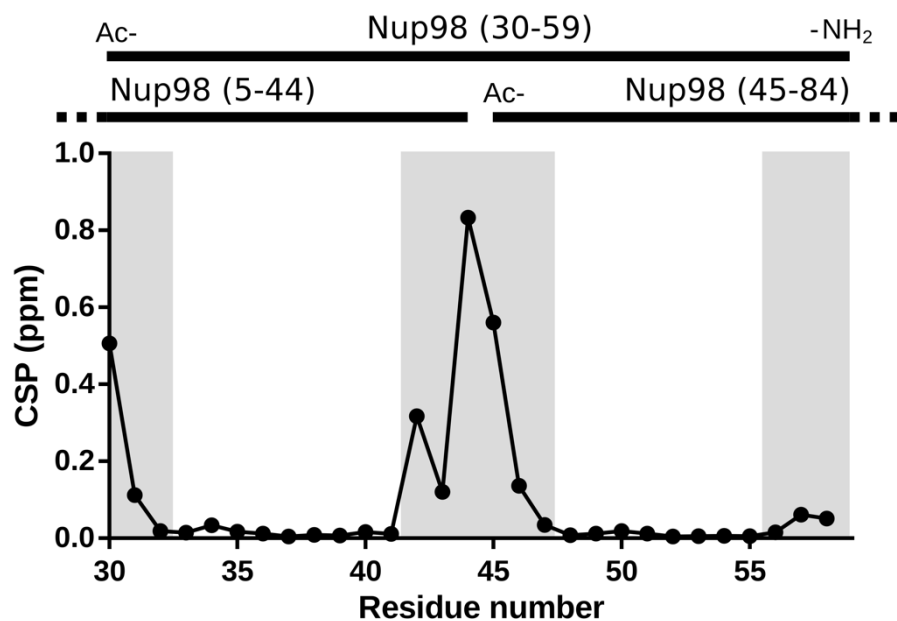


Fig. S15 |

Chemical shift selection from peptide assignments. Normalized and averaged ^1H - ^{15}N chemical shift differences between overlapped peptides. Differences are restricted to the 2-3 terminal residues, which were excluded from the selected chemical shifts for the full Nup98^{FG} assignment.

Supplementary References

- 1 Grelich-Mucha, M. *et al.* Autofluorescence of Amyloids Determined by Enantiomeric Composition of Peptides. *J Phys Chem B* **125**, 5502-5510 (2021).
- 2 Tan, Y. Z. *et al.* Addressing preferred specimen orientation in single-particle cryo-EM through tilting. *Nat Methods* **14**, 793-796 (2017).
- 3 Afonine, P. V. *et al.* New tools for the analysis and validation of cryo-EM maps and atomic models. *Acta Crystallogr D Struct Biol* **74**, 814-840 (2018).

Table S1 | Nuclear magnetic resonance chemical shift assignments of the 17 peptides of Nup98^{FG} and the full 1-384 Nup98^{FG}. For each peptide the fragment name followed by the sequence and the list of chemical shifts are shown. Each chemical shift line includes the residue number, residue type, atom name and chemical shift (ppm).

Nup98^{FG1-15}	8 T CB 69.759	Nup98^{FG5-44}	7 G N 112
MFNKSFGTPF	8 T HA 4.613	SFGTPFGGGT	8 G CA 45.286
GGGTG	8 T HN 8.183	GGFGTTSTFG	8 G HA2 3.925
	8 T N 116.035	QNTGFGTTSG	8 G HA3 3.925
1 M CA 55.148	9 P CA 63.355	GAFGTSAFGS	8 G HN 8.01
1 M CB 33.364	9 P CB 32.043		8 G N 108.431
1 M HA 3.97	9 P HA 4.377	1 S CA 58.221	9 G CA 45.211
2 F CA 57.943	10 F CA 58.201	1 S CB 63.751	9 G HA2 4.035
2 F CB 39.642	10 F CB 39.315	1 S HA 4.37	9 G HA3 4.035
2 F HA 4.637	10 F HA 4.572	1 S HN 8.314	9 G HN 8.411
2 F HN 8.284	10 F HN 8.526	1 S N 119.811	9 G N 108.93
2 F N 121.816	10 F N 120.757	2 F CA 57.899	10 T CA 62.039
3 N CA 52.915	11 G CA 45.37	2 F CB 39.564	10 T CB 69.795
3 N CB 39.061	11 G HA2 3.829	2 F HA 4.654	10 T HA 4.376
3 N HA 4.603	11 G HA3 3.899	2 F HN 8.469	10 T HN 8.328
3 N HN 8.528	11 G HN 8.441	2 F N 122.366	10 T N 113.057
3 N N 122.099	11 G N 111.84	3 G CA 45.101	11 G CA 45.286
4 K CA 56.784	12 G CA 45.245	3 G HA2 3.886	11 G HA2 3.933
4 K CB 42.058	12 G HA2 3.942	3 G HA3 3.94	11 G HA3 3.933
4 K HA 4.192	12 G HA3 3.942	3 G HN 8.464	11 G HN 8.612
4 K HN 8.419	12 G HN 8.046	3 G N 110.737	11 G N 111.485
4 K N 122.541	12 G N 108.172	4 T CA 59.857	12 G CA 45.026
5 S CA 58.398	13 G CA 45.166	4 T CB 69.798	12 G HA2 3.858
5 S CB 63.693	13 G HA2 4.043	4 T HA 4.615	12 G HA3 3.858
5 S HA 4.391	13 G HA3 4.043	4 T HN 8.178	12 G HN 8.263
5 S HN 8.378	13 G HN 8.451	4 T N 116.315	12 G N 108.624
5 S N 116.589	13 G N 108.678	5 P CA 63.381	13 F CA 58.16
6 F CA 58.058	14 T CA 62.133	5 P CB 32.036	13 F CB 39.504
6 F CB 39.648	14 T CB 69.713	5 P HA 4.374	13 F HA 4.599
6 F HA 4.615	14 T HA 4.361	6 F CA 58.333	13 F HN 8.327
6 F HN 8.327	14 T HN 8.36	6 F CB 39.34	13 F N 120.275
6 F N 122.114	14 T N 112.923	6 F HA 4.573	14 G CA 45.336
7 G CA 45.036	15 G CA 44.972	6 F HN 8.497	14 G HA2 3.887
7 G HA2 3.893	15 G HA2 3.883	6 F N 120.952	14 G HA3 3.975
7 G HA3 3.947	15 G HA3 3.926	7 G CA 45.303	14 G HN 8.534
7 G HN 8.416	15 G HN 8.639	7 G HA2 3.823	14 G N 111.129
7 G N 110.356	15 G N 112.176	7 G HA3 3.874	15 T CA 61.844
8 T CA 59.827		7 G HN 8.417	15 T CB 70.016

15 T HA 4.463	23 T N 114.055	32 A CB 19.138	40 S HN 7.903
15 T HN 8.189	24 G CA 45.303	32 A HA 4.245	40 S N 121.388
15 T N 113.534	24 G HA2 3.825	32 A HN 8.301	
16 T CA 61.887	24 G HA3 3.908	32 A N 123.879	Nup98 ^{FG30-59}
16 T CB 69.848	24 G HN 8.46	33 F CA 58.005	GTTSGGAFGT
16 T HA 4.414	24 G N 110.789	33 F CB 39.514	SAFGSSNNTG
16 T HN 8.355	25 F CA 58.039	33 F HA 4.554	GLFGNSQTKP
16 T N 116.345	25 F CB 39.529	33 F HN 8.411	
17 S CA 58.396	25 F HA 4.602	33 F N 119.678	1 G CA 45.361
17 S CB 63.882	25 F HN 8.266	34 G CA 45.328	1 G HA2 3.971
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19 F HA 4.565	27 T N 113.534	36 S CB 63.866	3 T HA 4.428
19 F HN 8.333	28 T CA 61.904	36 S HA 4.444	3 T HN 8.397
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20 G HA3 3.887	28 T N 116.026	37 A CB 19.129	4 S HA 4.469
20 G HN 8.426	29 S CA 58.614	37 A HA 4.255	4 S HN 8.493
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21 Q HN 8.244	30 G CA 45.359	38 F HA 4.57	5 G HN 8.574
21 Q N 119.725	30 G HA2 3.977	38 F HN 8.314	5 G N 111.331
22 N CA 53.317	30 G HA3 3.977	38 F N 121.85	6 G CA 45.144
22 N CB 38.68	30 G HN 8.544	39 G CA 45.286	6 G HA2 3.895
22 N HA 4.77	30 G N 111.145	39 G HA2 3.802	6 G HA3 3.895
22 N HN 8.71	31 G CA 45.085	39 G HA3 3.96	6 G HN 8.317
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23 T HN 8.255	32 A CA 52.479	40 S HA 4.292	7 A HN 8.314

7 A N 123.938	16 S CB 63.727	24 G HN 8.32	2 N CA 53.258
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8 F HA 4.534	16 S N 117.844	25 N CB 39.005	2 N HN 8.704
8 F HN 8.41	17 N CA 53.312	25 N HA 4.759	2 N N 120.52
8 F N 119.71	17 N CB 38.711	25 N HN 8.422	3 N CA 53.294
9 G CA 45.376	17 N HA 4.701	25 N N 118.978	3 N CB 38.624
9 G HA2 3.866	17 N HN 8.511	26 S CA 58.815	3 N HA 4.795
9 G HA3 3.96	17 N N 120.494	26 S CB 63.648	3 N HN 8.54
9 G HN 8.32	18 N CA 53.304	26 S HA 4.407	3 N N 119.471
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13 F N 119.617	22 L CB 42.226		8 F CA 57.734
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17 G CA 45.393	25 S HA 4.394	34 G HA2 3.842	1 A HA 4.328
17 G HA2 3.894	25 S HN 8.211	34 G HA3 3.941	1 A HN 8.466
17 G HA3 3.939	25 S N 118.103	34 G HN 8.4	1 A N 130.162
17 G HN 8.344	26 Q CA 53.667	34 G N 110.907	2 T CA 61.719
17 G N 108.732	26 Q CB 28.972	35 F CA 58.168	2 T CB 69.979
18 L CA 55.267	26 Q HA 4.568	35 F CB 39.569	2 T HA 4.418
18 L CB 42.314	26 Q HN 8.417	35 F HA 4.562	2 T HN 8.364
18 L HA 4.265	26 Q N 123.474	35 F HN 8.303	2 T N 113.292
18 L HN 8.287	27 P CA 63.058	35 F N 120.447	3 S CA 58.406
18 L N 121.693	27 P CB 32.207	36 G CA 45.08	3 S CB 63.735
19 F CA 57.939	27 P HA 4.402	36 G HA2 3.707	3 S HA 4.519

3 S HN 8.5	12 T CA 61.836	20 L HA 4.283	28 T N 113.699
3 S N 118.18	12 T CB 69.844	20 L HN 8.278	
4 T CA 61.486	12 T HA 4.42	20 L N 124.2	Nup98 ^{FG95-124}
4 T CB 69.895	12 T HN 8.172	21 F CA 57.956	ASTGTSLFSS
4 T HA 4.412	12 T N 113.524	21 F CB 39.558	QNNFAQNKP
4 T HN 8.365	13 S CA 58.415	21 F HA 4.617	TGFGNFGTST
4 T N 115.728	13 S CB 63.687	21 F HN 8.3	
5 S CA 58.439	13 S HA 4.56	21 F N 120.864	1 A CA 52.639
5 S CB 63.699	13 S HN 8.593	22 G CA 45.352	1 A CB 19.306
5 S HA 4.5	13 S N 118.47	22 G HA2 3.899	1 A HA 4.305
5 S HN 8.446	14 T CA 62.108	22 G HA3 3.975	1 A HN 8.457
5 S N 118.381	14 T CB 69.844	22 G HN 8.368	1 A N 130.118
6 T CA 62.041	14 T HA 4.375	22 G N 110.846	2 S CA 58.276
6 T CB 69.854	14 T HN 8.356	23 T CA 61.898	2 S CB 63.701
6 T HA 4.33	14 T N 115.665	23 T CB 69.95	2 S HA 4.547
6 T HN 8.275	15 G CA 45.391	23 T HA 4.336	2 S HN 8.615
6 T N 115.545	15 G HA2 4.012	23 T HN 8.174	2 S N 115.500
7 G CA 45.052	15 G HA3 4.012	23 T N 114.755	3 T CA 62.017
7 G HA2 3.841	15 G HN 8.486	24 A CA 52.619	3 T CB 69.775
7 G HA3 3.938	15 G N 111.324	24 A CB 19.204	3 T HA 4.389
7 G HN 8.396	16 T CA 61.932	24 A HA 4.369	3 T HN 8.346
7 G N 110.885	16 T CB 69.927	24 A HN 8.537	3 T N 115.646
8 F CA 58.19	16 T HA 4.334	24 A N 126.78	4 G CA 45.447
8 F CB 39.551	16 T HN 8.192	25 S CA 58.439	4 G HA2 4.039
8 F HA 4.561	16 T N 114.013	25 S CB 63.773	4 G HA3 4.039
8 F HN 8.292	17 A CA 52.815	25 S HA 4.5	4 G HN 8.555
8 F N 120.415	17 A CB 19.172	25 S HN 8.495	4 G N 111.257
9 G CA 45.057	17 A HA 4.301	25 S N 115.679	5 T CA 61.935
9 G HA2 3.714	17 A HN 8.511	26 T CA 62.06	5 T CB 69.879
9 G HA3 3.852	17 A N 126.603	26 T CB 69.864	5 T HA 4.377
9 G HN 8.435	18 N CA 53.345	26 T HA 4.385	5 T HN 8.229
9 G N 111.001	18 N CB 38.768	26 T HN 8.316	5 T N 113.941
10 F CA 58.1	18 N HA 4.712	26 T N 115.631	6 S CA 58.450
10 F CB 39.557	18 N HN 8.532	27 G CA 45.406	6 S CB 63.749
10 F HA 4.607	18 N N 118.253	27 G HA2 4.037	6 S HA 4.452
10 F HN 8.232	19 T CA 62.097	27 G HA3 4.037	6 S HN 8.523
10 F N 120.417	19 T CB 69.807	27 G HN 8.528	6 S N 118.780
11 G CA 45.365	19 T HA 4.27	27 G N 111.323	7 L CA 55.562
11 G HA2 3.9	19 T HN 8.177	28 T CA 61.544	7 L CB 42.142
11 G HA3 3.996	19 T N 114.057	28 T CB 69.752	7 L HA 4.274
11 G HN 8.565	20 L CA 55.344	28 T HA 4.321	7 L HN 8.417
11 G N 111.241	20 L CB 42.161	28 T HN 8.214	7 L N 124.461

8 F CA 57.974	16 A HA 4.245	25 N CB 38.720	2 G HA3 3.909
8 F CB 39.669	16 A HN 8.104	25 N HA 4.675	2 G HN 8.529
8 F HA 4.621	16 A N 124.857	25 N HN 8.267	2 G N 111.069
8 F HN 8.303	17 Q CA 55.866	25 N N 118.797	3 F CA 58.009
8 F N 120.449	17 Q CB 29.354	26 F CA 58.033	3 F CB 39.598
9 S CA 58.344	17 Q HA 4.266	26 F CB 39.374	3 F HA 4.628
9 S CB 63.819	17 Q HN 8.351	26 F HA 4.635	3 F HN 8.275
9 S HA 4.435	17 Q N 119.131	26 F HN 8.432	3 F N 120.143
9 S HN 8.251	18 N CA 52.965	26 F N 120.971	4 G CA 45.23
9 S N 117.345	18 N CB 38.794	27 G CA 45.381	4 G HA2 3.746
10 S CA 58.883	18 N HA 4.669	27 G HA2 3.937	4 G HA3 3.852
10 S CB 63.631	18 N HN 8.492	27 G HA3 4.000	4 G HN 8.45
10 S HA 4.417	18 N N 119.672	27 G HN 8.487	4 G N 110.668
10 S HN 8.494	19 K CA 54.251	27 G N 110.648	5 N CA 53.004
10 S N 118.378	19 K CB 32.498	28 T CA 61.752	5 N CB 38.732
11 Q CA 56.203	19 K HA 4.576	28 T CB 69.947	5 N HA 4.663
11 Q CB 29.275	19 K HN 8.351	28 T HA 4.421	5 N HN 8.263
11 Q HA 4.306	19 K N 122.840	28 T HN 8.187	5 N N 118.733
11 Q HN 8.425	20 P CA 63.124	28 T N 113.586	6 F CA 57.989
11 Q N 121.699	20 P CB 32.164	29 S CA 58.468	6 F CB 39.37
12 N CA 53.322	20 P HA 4.487	29 S CB 63.684	6 F HA 4.628
12 N CB 38.742	21 T CA 62.171	29 S HA 4.559	6 F HN 8.407
12 N HA 4.664	21 T CB 69.908	29 S HN 8.599	6 F N 120.883
12 N HN 8.431	21 T HA 4.281	29 S N 118.602	7 G CA 45.368
12 N N 119.555	21 T HN 8.448	30 T CA 61.650	7 G HA2 3.928
13 N CA 53.372	21 T N 114.782	30 T CB 69.645	7 G HA3 3.99
13 N CB 38.774	22 G CA 45.111	30 T HA 4.332	7 G HN 8.46
13 N HA 4.654	22 G HA2 3.854	30 T HN 8.318	7 G N 110.566
13 N HN 8.440	22 G HA3 3.947	30 T N 116.226	8 T CA 61.768
13 N N 119.728	22 G HN 8.465		8 T CB 69.981
14 A CA 53.181	22 G N 111.133	Nup98 ^{FG115-144}	8 T HA 4.424
14 A CB 18.839	23 F CA 58.048	TGFGNFGTST	8 T HN 8.179
14 A HA 4.181	23 F CB 39.505	SSGGLFGTTN	8 T N 113.405
14 A HN 8.314	23 F HA 4.607	TTSNPFGSTS	9 S CA 58.577
14 A N 124.125	23 F HN 8.303		9 S CB 63.873
15 F CA 57.731	23 F N 120.270	1 T CA 62.117	9 S HA 4.564
15 F CB 39.218	24 G CA 45.205	1 T CB 69.826	9 S HN 8.563
15 F HA 4.572	24 G HA2 3.729	1 T HA 4.272	9 S N 118.356
15 F HN 8.167	24 G HA3 3.851	1 T HN 8.349	10 T CA 61.918
15 F N 118.624	24 G HN 8.458	1 T N 119.179	10 T CB 69.75
16 A CA 52.644	24 G N 111.023	2 G CA 45.156	10 T HA 4.422
16 A CB 19.173	25 N CA 53.033	2 G HA2 3.836	10 T HN 8.385

10 T N 115.744	19 T CB 69.866	28 S HA 4.549	6 S CB 63.958
11 S CA 58.497	19 T HA 4.39	28 S HN 8.34	6 S HA 4.547
11 S CB 63.827	19 T HN 8.352	28 S N 115.756	6 S HN 8.343
11 S HA 4.506	19 T N 116.282	29 T CA 61.918	6 S N 115.401
11 S HN 8.439	20 N CA 53.346	29 T CB 69.719	7 T CA 61.837
11 S N 118.168	20 N CB 38.873	29 T HA 4.45	7 T CB 69.742
12 S CA 58.668	20 N HA 4.806	29 T HN 8.47	7 T HA 4.453
12 S CB 63.822	20 N HN 8.644	29 T N 115.966	7 T HN 8.459
12 S HA 4.481	20 N N 121.778	30 S CA 58.328	7 T N 117.826
12 S HN 8.505	21 T CA 61.869	30 S CB 63.858	8 S CA 58.808
12 S N 118.115	21 T CB 69.738	30 S HA 4.427	8 S CB 63.738
13 G CA 45.407	21 T HA 4.426	30 S HN 8.373	8 S HA 4.448
13 G HA2 3.98	21 T HN 8.349	30 S N 118.749	8 S HN 8.46
13 G HA3 3.98	21 T N 114.773		8 S N 115.486
13 G HN 8.515	22 T CA 62.082	Nup98 ^{FG137-170}	9 G CA 45.35
13 G N 110.987	22 T CB 69.816	SNPFGSTSGS	9 G HA2 3.982
14 G CA 45.175	22 T HA 4.379	LFGPSSFTAA	9 G HA3 3.982
14 G HA2 3.906	22 T HN 8.312	PTGTTIKFNP	9 G HN 8.548
14 G HA3 3.906	22 T N 116.228	PTGT	9 G N 110.973
14 G HN 8.299	23 S CA 58.428		10 S CA 58.368
14 G N 108.726	23 S CB 63.739	1 S CA 58.42	10 S CB 63.842
15 L CA 55.275	23 S HA 4.428	1 S CB 63.833	10 S HA 4.415
15 L CB 42.292	23 S HN 8.409	1 S HA 4.387	10 S HN 8.262
15 L HA 4.256	23 S N 118.239	1 S HN 8.438	10 S N 115.374
15 L HN 8.213	24 N CB 38.884	1 S N 121.421	11 L CA 55.446
15 L N 121.712	24 N HN 8.528	2 N CB 38.87	11 L CB 42.166
16 F CA 57.921	24 N N 121.452	2 N HN 8.681	11 L HA 4.262
16 F CB 39.462	25 P CA 63.682	2 N N 120.971	11 L HN 8.37
16 F HA 4.626	25 P CB 31.901	3 P CA 63.678	11 L N 123.868
16 F HN 8.432	25 P HA 4.334	3 P CB 31.895	12 F CA 57.377
16 F N 120.593	26 F CA 57.87	3 P HA 4.331	12 F CB 39.886
17 G CA 45.368	26 F CB 39.02	4 F CA 57.86	12 F HA 4.697
17 G HA2 3.929	26 F HA 4.634	4 F CB 39.032	12 F HN 8.237
17 G HA3 3.976	26 F HN 8.334	4 F HA 4.634	12 F N 119.508
17 G HN 8.336	26 F N 119.545	4 F HN 8.34	13 G CA 44.646
17 G N 110.636	27 G CA 45.343	4 F N 119.158	13 G HA2 4.059
18 T CA 61.807	27 G HA2 3.889	5 G CA 45.383	13 G HA3 4.093
18 T CB 70.018	27 G HA3 3.971	5 G HA2 3.898	13 G HN 8.228
18 T HA 4.457	27 G HN 8.162	5 G HA3 3.969	13 G N 110.081
18 T HN 8.185	27 G N 110.507	5 G HN 8.16	14 P CA 63.501
18 T N 113.41	28 S CA 58.419	5 G N 110.079	14 P CB 32.168
19 T CA 61.952	28 S CB 63.893	6 S CA 58.408	14 P HA 4.427

15 S CA 58.515	23 G N 111.172	33 G HA3 4.049	7 D CB 40.986
15 S CB 63.765	24 T CA 61.932	33 G HN 8.606	7 D HA 4.678
15 S HA 4.467	24 T CB 69.786	33 G N 111.324	7 D HN 8.6
15 S HN 8.613	24 T HA 4.423	34 T CA 61.635	7 D N 122.964
15 S N 115.643	24 T HN 8.239	34 T CB 69.899	8 T CA 62.305
16 S CA 58.568	24 T N 113.872	34 T HA 4.332	8 T CB 69.542
16 S CB 63.825	25 T CA 62.138	34 T HN 8.235	8 T HA 4.284
16 S HA 4.403	25 T CB 69.848	34 T N 113.388	8 T HN 8.218
16 S HN 8.341	25 T HA 4.348		8 T N 114.606
16 S N 117.49	25 T HN 8.389	Nup98 ^{FG165-204}	9 M CA 55.765
17 F CA 57.851	25 T N 117.666	NPPTGTDTMV	9 M CB 32.646
17 F CB 39.742	26 I CA 61.104	KAGVSTNIST	9 M HA 4.475
17 F HA 4.685	26 I CB 38.562	KHQCTAMKE	9 M HN 8.43
17 F HN 8.284	26 I HA 4.1	YESKSLEELR	9 M N 122.962
17 F N 121.853	26 I HN 8.365		10 V CA 62.669
18 T CA 61.627	26 I N 124.575	1 N CA 51.494	10 V CB 32.635
18 T CB 70.004	27 K CA 55.966	1 N CB 38.354	10 V HA 4.042
18 T HA 4.242	27 K CB 33.244	1 N HA 4.97	10 V HN 8.262
18 T HN 8.124	27 K HA 4.285	1 N HN 8.572	10 V N 120.494
18 T N 117.146	27 K HN 8.482	1 N N 125.768	11 K CA 56.116
19 A CA 52.14	27 K N 126.4	2 P CA 63.19	11 K CB 33.119
19 A CB 19.317	28 F CA 57.419	2 P CB 32.061	11 K HA 4.312
19 A HA 4.25	28 F CB 39.921	2 P HA 4.479	11 K HN 8.557
19 A HN 8.372	28 F HA 4.615	3 P CA 63.013	11 K N 126.5
19 A N 127.251	28 F HN 8.461	3 P CB 32.105	12 A CA 52.666
20 A CA 50.481	28 F N 122.747	3 P HA 4.534	12 A CB 19.208
20 A CB 17.929	29 N CB 39.034	4 T CA 62.101	12 A HA 4.292
20 A HA 4.546	29 N HN 8.53	4 T CB 70.027	12 A HN 8.526
20 A HN 8.44	29 N N 123.627	4 T HA 4.358	12 A N 126.354
20 A N 125.13	30 P CA 61.488	4 T HN 8.48	13 G CA 45.181
21 P CA 63.064	30 P CB 30.894	4 T N 114.75	13 G HA2 3.953
21 P CB 32.108	30 P HA 4.544	5 G CA 45.398	13 G HA3 4.001
21 P HA 4.497	31 P CA 63.047	5 G HA2 4.062	13 G HN 8.538
22 T CA 62.047	31 P CB 32.093	5 G HA3 4.062	13 G N 108.833
22 T CB 69.962	31 P HA 4.5	5 G HN 8.614	14 V CA 62.243
22 T HA 4.341	32 T CA 62.102	5 G N 111.492	14 V CB 32.92
22 T HN 8.456	32 T CB 69.908	6 T CA 61.885	14 V HA 4.191
22 T N 114.504	32 T HA 4.317	6 T CB 69.651	14 V HN 8.127
23 G CA 45.337	32 T HN 8.422	6 T HA 4.361	14 V N 119.671
23 G HA2 4.037	32 T N 114.473	6 T HN 8.277	15 S CA 58.335
23 G HA3 4.037	33 G CA 45.339	6 T N 113.71	15 S CB 63.62
23 G HN 8.592	33 G HA2 4.049	7 D CA 54.586	15 S HA 4.563

15 S HN 8.676	24 C CA 58.641	32 E HA 4.248	40 R N 121.262
15 S N 120.24	24 C CB 27.892	32 E HN 8.302	
16 T CA 61.963	24 C HA 4.52	32 E N 122.819	Nup98 ^{FG189-218}
16 T CB 69.733	24 C HN 8.684	33 S CA 58.823	ITAMKEYESK
16 T HA 4.36	24 C N 122.012	33 S CB 63.761	SLEELRLEDY
16 T HN 8.384	25 I CA 61.67	33 S HA 4.382	QANRKGPQNQ
16 T N 116.293	25 I CB 38.633	33 S HN 8.431	
17 N CA 53.364	25 I HA 4.244	33 S N 117.409	1 I CA 61.675
17 N CB 38.76	25 I HN 8.574	34 K CA 56.634	1 I CB 38.753
17 N HA 4.743	25 I N 122.123	34 K CB 33.175	1 I HA 4.174
17 N HN 8.559	26 T CA 62.248	34 K HA 4.364	1 I HN 8.368
17 N N 121.577	26 T CB 69.684	34 K HN 8.456	1 I N 126.243
18 I CA 61.369	26 T HA 4.271	34 K N 123.725	2 T CA 62.022
18 I CB 38.678	26 T HN 8.321	35 S CA 58.605	2 T CB 69.828
18 I HA 4.211	26 T N 119.07	35 S CB 63.882	2 T HA 4.311
18 I HN 8.29	27 A CA 52.691	35 S HA 4.397	2 T HN 8.356
18 I N 121.675	27 A CB 19.147	35 S HN 8.536	2 T N 118.699
19 S CA 58.49	27 A HA 4.321	35 S N 117.303	3 A CA 52.615
19 S CB 63.753	27 A HN 8.418	36 L CA 56.47	3 A CB 19.182
19 S HA 4.529	27 A N 126.824	36 L CB 41.868	3 A HA 4.315
19 S HN 8.593	28 M CA 55.776	36 L HA 4.245	3 A HN 8.435
19 S N 120.226	28 M CB 32.824	36 L HN 8.455	3 A N 126.768
20 T CA 62.098	28 M HA 4.425	36 L N 123.524	4 M CA 55.674
20 T CB 69.684	28 M HN 8.406	37 E CA 57.964	4 M CB 32.876
20 T HA 4.322	28 M N 120.194	37 E CB 29.794	4 M HA 4.425
20 T HN 8.351	29 K CA 56.585	37 E HA 4.109	4 M HN 8.441
20 T N 116.733	29 K CB 32.939	37 E HN 8.393	4 M N 120.134
21 K CA 55.921	29 K HA 4.25	37 E N 120.151	5 K CA 56.545
21 K CB 32.899	29 K HN 8.47	38 E CA 57.448	5 K CB 32.966
21 K HA 4.264	29 K N 123.149	38 E CB 30.036	5 K HA 4.253
21 K HN 8.336	30 E CA 57.065	38 E HA 4.168	5 K HN 8.481
21 K N 123.575	30 E CB 30.106	38 E HN 8.277	5 K N 123.148
22 H CA 55.612	30 E HA 4.2	38 E N 121.241	6 E CA 56.861
22 H CB 29.378	30 E HN 8.574	39 L CA 55.884	6 E CB 30.298
22 H HA 4.661	30 E N 124.499	39 L CB 42.081	6 E HA 4.191
22 H HN 8.625	31 Y CA 58.38	39 L HA 4.27	6 E HN 8.598
22 H N 120.294	31 Y CB 38.737	39 L HN 8.228	6 E N 122.013
23 Q CA 55.929	31 Y HA 4.506	39 L N 122.156	7 Y CA 58.289
23 Q CB 29.649	31 Y HN 8.263	40 R CA 56.541	7 Y CB 38.774
23 Q HA 4.334	31 Y N 122.832	40 R CB 30.795	7 Y HA 4.504
23 Q HN 8.594	32 E CA 56.646	40 R HA 4.245	7 Y HN 8.269
23 Q N 122.562	32 E CB 30.492	40 R HN 8.171	7 Y N 120.244

8 E CA 56.545	16 R HA 4.253	24 R N 120.543	2 E CB 30.089
8 E CB 30.537	16 R HN 8.316	25 K CA 56.48	2 E HA 4.214
8 E HA 4.253	16 R N 121.188	25 K CB 33.24	2 E HN 8.614
8 E HN 8.307	17 L CA 56.64	25 K HA 4.378	2 E N 121.221
8 E N 122.585	17 L CB 42.005	25 K HN 8.374	3 D CA 54.346
9 S CA 58.661	17 L HA 4.246	25 K N 121.821	3 D CB 40.937
9 S CB 63.716	17 L HN 8.185	26 G CA 44.62	3 D HA 4.547
9 S HA 4.39	17 L N 122.032	26 G HA2 4.084	3 D HN 8.391
9 S HN 8.422	18 E CA 58.14	26 G HA3 4.124	3 D N 121.739
9 S N 117.207	18 E CB 30.462	26 G HN 8.338	4 Y CA 58.914
10 K CA 56.645	18 E HA 4.146	26 G N 109.731	4 Y CB 38.261
10 K CB 33.609	18 E HN 8.364	27 P CA 63.439	4 Y HA 4.442
10 K HA 4.388	18 E N 119.793	27 P CB 32.151	4 Y HN 8.276
10 K HN 8.413	19 D CA 55.562	27 P HA 4.418	4 Y N 121.696
10 K N 123.581	19 D CB 40.969	28 Q CA 55.761	5 Q CA 56.11
11 S CA 58.244	19 D HA 4.534	28 Q CB 29.361	5 Q CB 29.164
11 S CB 64.52	19 D HN 8.201	28 Q HA 4.32	5 Q HA 4.151
11 S HA 4.411	19 D N 120.394	28 Q HN 8.784	5 Q HN 8.246
11 S HN 8.7	20 Y CA 59.677	28 Q N 120.279	5 Q N 121.406
11 S N 117.719	20 Y CB 38.32	29 N CA 53.39	6 A CA 53.349
12 L CA 56.992	20 Y HA 4.388	29 N CB 38.693	6 A CB 18.919
12 L CB 41.796	20 Y HN 8.181	29 N HA 4.681	6 A HA 4.144
12 L HA 4.193	20 Y N 120.768	29 N HN 8.572	6 A HN 8.149
12 L HN 8.555	21 Q CA 56.664	29 N N 119.479	6 A N 123.957
12 L N 122.592	21 Q CB 28.997	30 Q CA 55.78	7 N CA 53.365
13 E CA 58.259	21 Q HA 4.097	30 Q CB 29.475	7 N CB 38.52
13 E CB 29.806	21 Q HN 8.257	30 Q HA 4.283	7 N HA 4.643
13 E HA 4.14	21 Q N 119.957	30 Q HN 8.543	7 N HN 8.343
13 E HN 8.452	22 A CA 53.565	30 Q N 121.165	7 N N 116.32
13 E N 119.631	22 A CB 18.833		8 R CA 56.363
14 E CA 58.13	22 A HA 4.161	Nup98 ^{FG205-244}	8 R CB 30.607
14 E CB 30.099	22 A HN 8.112	LEDYQANRKG	8 R HA 4.287
14 E HA 4.105	22 A N 122.814	PQNQVGAGTT	8 R HN 8.153
14 E HN 8.169	23 N CA 53.48	TGLFGSSPAT	8 R N 121.223
14 E N 120.808	23 N CB 38.713	SSATGLFSSS	9 K CA 56.187
15 L CA 56.658	23 N HA 4.648		9 K CB 33.253
15 L CB 41.991	23 N HN 8.208	1 L CA 55.59	9 K HA 4.375
15 L HA 4.172	23 N N 115.603	1 L CB 42.487	9 K HN 8.428
15 L HN 8.276	24 R CA 56.664	1 L HA 4.272	9 K N 122.446
15 L N 121.726	24 R CB 30.516	1 L HN 8.4	10 G CA 44.607
16 R CA 56.545	24 R HA 4.262	1 L N 127.946	10 G HA2 4.071
16 R CB 30.434	24 R HN 8.061	2 E CA 56.754	10 G HA3 4.122

10 G HN 8.361	19 T HA 4.461	27 S N 119.092	37 F CB 39.535
10 G N 110.195	19 T HN 8.202	28 P CA 63.351	37 F HA 4.66
11 P CA 63.351	19 T N 113.741	28 P CB 32.134	37 F HN 8.429
11 P CB 32.134	20 T CA 61.903	28 P HA 4.422	37 F N 121.002
11 P HA 4.418	20 T CB 69.799	29 A CA 52.744	38 S CA 58.065
12 Q CA 55.783	20 T HA 4.485	29 A CB 19.148	38 S CB 63.935
12 Q CB 29.488	20 T HN 8.452	29 A HA 4.341	38 S HA 4.457
12 Q HA 4.312	20 T N 116.472	29 A HN 8.556	38 S HN 8.268
12 Q HN 8.773	21 T CA 62.108	29 A N 124.408	38 S N 117.626
12 Q N 120.764	21 T CB 69.868	30 T CA 61.743	39 S CA 58.581
13 N CA 53.384	21 T HA 4.361	30 T CB 69.913	39 S CB 63.745
13 N CB 38.819	21 T HN 8.287	30 T HA 4.373	39 S HA 4.484
13 N HA 4.669	21 T N 116.318	30 T HN 8.235	39 S HN 8.583
13 N HN 8.541	22 G CA 45.307	30 T N 113.246	39 S N 118.709
13 N N 119.658	22 G HA2 3.927	31 S CA 58.298	40 S CA 58.401
14 Q CA 55.808	22 G HA3 3.927	31 S CB 63.852	40 S CB 63.852
14 Q CB 29.514	22 G HN 8.486	31 S HA 4.525	40 S HA 4.438
14 Q HA 4.361	22 G N 111.344	31 S HN 8.423	40 S HN 8.406
14 Q HN 8.478	23 L CA 55.21	31 S N 118.123	40 S N 118.697
14 Q N 120.94	23 L CB 42.356	32 S CA 58.463	
15 V CA 62.79	23 L HA 4.272	32 S CB 63.883	Nup98 ^{FG225-264}
15 V CB 32.645	23 L HN 8.177	32 S HA 4.475	TGLFGSSPAT
15 V HA 4.088	23 L N 121.662	32 S HN 8.536	SSATGLFSSS
15 V HN 8.403	24 F CA 57.996	32 S N 118.304	TTNSGFAYGQ
15 V N 122.421	24 F CB 39.37	33 A CA 52.915	NKTAFGTSTT
16 G CA 45.215	24 F HA 4.611	33 A CB 19.148	
16 G HA2 3.955	24 F HN 8.506	33 A HA 4.402	1 T CA 62.26
16 G HA3 3.955	24 F N 121.104	33 A HN 8.514	1 T CB 69.825
16 G HN 8.679	25 G CA 45.267	33 A N 126.448	1 T HA 4.292
16 G N 113.414	25 G HA2 3.878	34 T CA 62.038	1 T HN 8.392
17 A CA 52.749	25 G HA3 3.955	34 T CB 69.919	1 T N 119.482
17 A CB 19.351	25 G HN 8.394	34 T HA 4.336	2 G CA 45.362
17 A HA 4.327	25 G N 111.067	34 T HN 8.193	2 G HA2 3.913
17 A HN 8.387	26 S CA 58.276	34 T N 112.482	2 G HA3 3.913
17 A N 124.283	26 S CB 64.066	35 G HN 8.398	2 G HN 8.634
18 G CA 45.344	26 S HA 4.503	35 G N 111.081	2 G N 111.534
18 G HA2 4.002	26 S HN 8.264	36 L CA 55.204	3 L CA 55.172
18 G HA3 4.002	26 S N 115.698	36 L CB 42.362	3 L CB 42.251
18 G HN 8.612	27 S CA 56.597	36 L HA 4.276	3 L HA 4.272
18 G N 108.576	27 S CB 63.326	36 L HN 8.131	3 L HN 8.137
19 T CA 61.885	27 S HA 4.804	36 L N 121.686	3 L N 121.574
19 T CB 69.919	27 S HN 8.516	37 F CA 57.682	4 F CA 58.024

4 F CB 39.239	13 A CA 52.919	21 T HA 4.437	29 G N 110.958
4 F HA 4.594	13 A CB 19.156	21 T HN 8.328	30 Q CA 55.907
4 F HN 8.5	13 A HA 4.399	21 T N 115.812	30 Q CB 29.41
4 F N 120.992	13 A HN 8.507	22 T CA 62.154	30 Q HA 4.285
5 G CA 45.29	13 A N 126.431	22 T CB 69.783	30 Q HN 8.237
5 G HA2 3.873	14 T CA 62.054	22 T HA 4.343	30 Q N 119.688
5 G HA3 3.955	14 T CB 69.894	22 T HN 8.229	31 N CA 53.36
5 G HN 8.39	14 T HA 4.331	22 T N 116.229	31 N CB 38.688
5 G N 111.073	14 T HN 8.188	23 N CA 53.323	31 N HA 4.638
6 S CA 58.272	14 T N 112.501	23 N CB 38.8	31 N HN 8.597
6 S CB 64.056	15 G CA 45.335	23 N HA 4.74	31 N N 119.68
6 S HA 4.497	15 G HA2 3.925	23 N HN 8.571	32 K CA 56.565
6 S HN 8.247	15 G HA3 3.925	23 N N 121.524	32 K CB 32.997
6 S N 115.685	15 G HN 8.39	24 S CA 58.893	32 K HA 4.323
7 S CA 56.597	15 G N 111.073	24 S CB 63.732	32 K HN 8.427
7 S CB 63.324	16 L CA 55.193	24 S HA 4.378	32 K N 122.052
7 S HA 4.801	16 L CB 42.348	24 S HN 8.441	33 T CA 61.897
7 S HN 8.512	16 L HA 4.273	24 S N 116.645	33 T CB 69.991
7 S N 119.068	16 L HN 8.125	25 G CA 45.279	33 T HA 4.276
8 P CA 63.372	16 L N 121.643	25 G HA2 3.853	33 T HN 8.249
8 P CB 32.122	17 F CA 57.668	25 G HA3 3.916	33 T N 115.227
8 P HA 4.416	17 F CB 39.592	25 G HN 8.48	34 A CA 52.481
9 A CA 52.744	17 F HA 4.66	25 G N 110.585	34 A CB 19.162
9 A CB 19.134	17 F HN 8.415	26 F CA 57.875	34 A HA 4.256
9 A HA 4.331	17 F N 120.972	26 F CB 39.729	34 A HN 8.378
9 A HN 8.554	18 S CA 58.118	26 F HA 4.541	34 A N 126.335
9 A N 124.374	18 S CB 63.964	26 F HN 8.115	35 F CA 58.053
10 T CA 61.73	18 S HA 4.455	26 F N 120.352	35 F CB 39.596
10 T CB 69.907	18 S HN 8.275	27 A CA 52.263	35 F HA 4.593
10 T HA 4.37	18 S N 117.617	27 A CB 19.159	35 F HN 8.321
10 T HN 8.229	19 S CA 58.513	27 A HA 4.255	35 F N 119.96
10 T N 113.213	19 S CB 63.811	27 A HN 8.295	36 G CA 45.299
11 S CA 58.312	19 S HA 4.493	27 A N 125.682	36 G HA2 3.895
11 S CB 63.938	19 S HN 8.53	28 Y CA 58.556	36 G HA3 3.969
11 S HA 4.518	19 S N 118.35	28 Y CB 38.605	36 G HN 8.39
11 S HN 8.415	20 S CA 58.64	28 Y HA 4.442	36 G N 111.073
11 S N 118.103	20 S CB 63.802	28 Y HN 8.161	37 T CA 61.81
12 S CA 58.477	20 S HA 4.543	28 Y N 119.881	37 T CB 69.748
12 S CB 63.815	20 S HN 8.495	29 G CA 45.385	37 T HA 4.416
12 S HA 4.472	20 S N 117.919	29 G HA2 3.795	37 T HN 8.161
12 S HN 8.53	21 T CA 62.09	29 G HA3 3.916	37 T N 113.706
12 S N 118.35	21 T CB 69.688	29 G HN 8.413	38 S CA 58.361

38 S CB 63.815	5 G HN 8.412	14 N CB 38.743	FSKPFGQATT
38 S HA 4.581	5 G N 110.841	14 N HN 8.694	TQNTGFSFGN
38 S HN 8.584	6 T CA 61.808	14 N N 121.566	
38 S N 118.524	6 T CB 70.038	15 P CA 63.96	1 G CA 45.109
39 T CA 62.007	6 T HA 4.403	15 P CB 31.923	1 G HA2 3.809
39 T CB 69.625	6 T HN 8.161	15 P HA 4.402	1 G HA3 3.851
39 T HA 4.451	6 T N 113.311	16 G CA 45.251	1 G HN 8.321
39 T HN 8.484	7 S CA 58.42	16 G HA2 3.938	1 G N 114.231
39 T N 116.418	7 S CB 63.81	16 G HA3 3.938	2 F CA 58.075
40 T CA 61.696	7 S HA 4.565	16 G HN 8.614	2 F CB 39.467
40 T CB 70.002	7 S HN 8.582	16 G N 108.995	2 F HA 4.614
40 T HA 4.331	7 S N 118.071	17 G CA 45.251	2 F HN 8.38
40 T HN 8.2	8 T CA 62.014	17 G HA2 3.912	2 F N 120.048
40 T N 116.238	8 T CB 69.598	17 G HA3 3.912	3 G CA 45.301
	8 T HA 4.434	17 G HN 8.221	3 G HA2 3.869
Nup98^{FG256-275}	8 T HN 8.467	17 G N 108.298	3 G HA3 3.987
KTAFGTSTTG	8 T N 115.878	18 L CA 55.296	3 G HN 8.595
FGTNPGLFG	9 T CA 62.092	18 L CB 42.295	3 G N 111.077
	9 T CB 69.835	18 L HA 4.252	4 T CA 61.822
1 K CA 56.637	9 T HA 4.339	18 L HN 8.203	4 T CB 69.783
1 K CB 33.214	9 T HN 8.215	18 L N 121.339	4 T HA 4.324
1 K HA 4.326	9 T N 115.414	19 F CA 58.009	4 T HN 8.132
1 K HN 8.476	10 G CA 45.162	19 F CB 39.193	4 T N 113.182
1 K N 126.971	10 G HA2 3.835	19 F HA 4.592	5 N CB 38.75
2 T CA 61.548	10 G HA3 3.926	19 F HN 8.531	5 N HA 4.982
2 T CB 70.089	10 G HN 8.429	19 F N 120.836	5 N HN 8.685
2 T HA 4.317	10 G N 110.844	20 G CA 44.954	5 N N 121.805
2 T HN 8.336	11 F CA 58.104	20 G HA2 3.761	6 P CA 63.947
2 T N 115.335	11 F CB 39.616	20 G HA3 3.857	6 P CB 31.93
3 A CA 52.417	11 F HA 4.618	20 G HN 8.371	6 P HA 4.401
3 A CB 19.212	11 F HN 8.321	20 G N 112.107	7 G CA 45.273
3 A HA 4.284	11 F N 120.087		7 G HA2 3.94
3 A HN 8.445	12 G CA 45.304		7 G HA3 3.94
3 A N 126.272	12 G HA2 3.875		7 G HN 8.608
4 F CA 58.057	12 G HA3 3.976		7 G N 109.209
4 F CB 39.628	12 G HN 8.543		8 G CA 45.332
4 F HA 4.603	12 G N 110.816		8 G HA2 3.908
4 F HN 8.37	13 T CA 61.827		8 G HA3 3.908
4 F N 119.791	13 T CB 69.876	Nup98^{FG265-304}	8 G HN 8.216
5 G CA 45.303	13 T HA 4.319	GFGTNPGLF	8 G N 108.621
5 G HA2 3.876	13 T HN 8.144	GQQNQTTSL	9 L CA 55.342
5 G HA3 3.977	13 T N 112.978		9 L CB 42.239

9 L HA 4.255	17 T N 115.84	26 G HN 8.398	35 G CA 45.215
9 L HN 8.2	18 T CA 62.031	26 G N 110.266	35 G HA2 3.86
9 L N 121.602	18 T CB 69.766	27 Q CA 55.664	35 G HA3 3.933
10 F CA 58.065	18 T HA 4.364	27 Q CB 29.716	35 G HN 8.507
10 F CB 39.455	18 T HN 8.286	27 Q HA 4.316	35 G N 110.971
10 F HA 4.598	18 T N 116.664	27 Q HN 8.233	36 F CA 57.877
10 F HN 8.434	19 S CA 58.405	27 Q N 120.14	36 F CB 39.78
10 F N 120.515	19 S CB 63.755	28 A CA 52.637	36 F HA 4.585
11 G CA 45.338	19 S HA 4.436	28 A CB 19.235	36 F HN 8.2
11 G HA2 3.837	19 S HN 8.478	28 A HA 4.378	36 F N 120.426
11 G HA3 3.919	19 S N 118.608	28 A HN 8.58	37 S CA 57.918
11 G HN 8.361	20 L CA 55.342	28 A N 126.059	37 S CB 63.792
11 G N 110.542	20 L CB 42.172	29 T CA 61.83	37 S HA 4.382
12 Q CA 56.088	20 L HA 4.254	29 T CB 69.766	37 S HN 8.26
12 Q CB 29.341	20 L HN 8.356	29 T HA 4.414	37 S N 117.91
12 Q HA 4.305	20 L N 122.579	29 T HN 8.383	38 F CA 58.184
12 Q HN 8.317	21 F CA 57.535	29 T N 114.079	38 F CB 39.505
12 Q N 119.905	21 F CB 39.541	30 T CA 61.712	38 F HA 4.557
13 Q CA 56.088	21 F HA 4.652	30 T CB 69.89	38 F HN 8.52
13 Q CB 29.285	21 F HN 8.233	30 T HA 4.462	38 F N 121.15
13 Q HA 4.303	21 F N 120.14	30 T HN 8.337	39 G CA 45.366
13 Q HN 8.642	22 S CA 58.105	30 T N 116.343	39 G HA2 3.817
13 Q N 121.414	22 S CB 63.869	31 T CA 62.022	39 G HA3 3.936
14 N CA 53.469	22 S HA 4.401	31 T CB 69.783	39 G HN 8.438
14 N CB 38.704	22 S HN 8.167	31 T HA 4.329	39 G N 110.598
14 N HA 4.672	22 S N 117.626	31 T HN 8.324	40 N CA 52.935
14 N HN 8.591	23 K CA 54.384	31 T N 116.718	40 N CB 39.042
14 N N 119.7	23 K CB 32.579	32 Q CA 55.877	40 N HA 4.697
15 Q CA 56.088	23 K HA 4.56	32 Q CB 29.499	40 N HN 8.366
15 Q CB 29.341	23 K HN 8.368	32 Q HA 4.333	40 N N 124.422
15 Q HA 4.304	23 K N 119.714	32 Q HN 8.549	
15 Q HN 8.511	24 P CA 63.169	32 Q N 123.004	Nup98 ^{FG298-327}
15 Q N 120.79	24 P CB 32.052	33 N CA 53.232	TGFSFGNTST
16 Q CA 56.086	24 P HA 4.382	33 N CB 38.745	IGQPSTNTMG
16 Q CB 29.366	25 F CA 58.361	33 N HA 4.754	LFGVTQASQP
16 Q HA 4.38	25 F CB 39.528	33 N HN 8.663	
16 Q HN 8.594	25 F HA 4.553	33 N N 120.671	1 T CA 62.157
16 Q N 121.529	25 F HN 8.356	34 T CA 62.073	1 T CB 69.826
17 T CA 62.055	25 F N 122.579	34 T CB 69.766	1 T HA 4.28
17 T CB 69.766	26 G CA 45.228	34 T HA 4.312	1 T HN 8.363
17 T HA 4.403	26 G HA2 3.792	34 T HN 8.296	1 T N 122.542
17 T HN 8.394	26 G HA3 3.866	34 T N 114.386	2 G CA 45.225

2 G HA2 3.845	10 T HN 8.381	19 M HA 4.487	27 A N 125.953
2 G HA3 3.921	10 T N 116.638	19 M HN 8.452	28 S CA 58.388
2 G HN 8.577	11 I CA 61.62	19 M N 122.341	28 S CB 63.769
2 G N 111.174	11 I CB 38.518	20 G CA 45.327	28 S HA 4.413
3 F CA 57.794	11 I HA 4.142	20 G HA2 3.899	28 S HN 8.434
3 F CB 39.799	11 I HN 8.229	20 G HA3 3.899	28 S N 115.671
3 F HA 4.603	11 I N 123.612	20 G HN 8.434	29 Q CA 53.641
3 F HN 8.236	12 G CA 45.079	20 G N 110.051	29 Q CB 28.951
3 F N 120.444	12 G HA2 3.926	21 L CA 55.136	29 Q HA 4.653
4 S CA 58.068	12 G HA3 3.926	21 L CB 42.288	29 Q HN 8.49
4 S CB 63.815	12 G HN 8.66	21 L HA 4.265	29 Q N 122.947
4 S HA 4.394	12 G N 113.595	21 L HN 8.136	30 P CA 63.166
4 S HN 8.291	13 Q CA 53.38	21 L N 121.51	30 P CB 32.344
4 S N 117.862	13 Q CB 28.889	22 F CA 57.699	30 P HA 4.373
5 F CA 58.271	13 Q HA 4.647	22 F CB 39.446	
5 F CB 39.509	13 Q HN 8.278	22 F HA 4.608	Nup98 ^{FG322-351}
5 F HA 4.558	13 Q N 120.864	22 F HN 8.421	TQASQPGLF
5 F HN 8.37	14 P CA 63.274	22 F N 120.451	GTATNTSTGT
5 F N 119.239	14 P CB 32.261	23 G CA 45.31	AFGTGTGLFG
6 G CA 45.301	14 P HA 4.466	23 G HA2 3.87	
6 G HA2 3.849	15 S CA 58.335	23 G HA3 3.919	1 T CA 62.211
6 G HA3 3.945	15 S CB 63.739	23 G HN 8.367	1 T CB 69.828
6 G HN 8.453	15 S HA 4.504	23 G N 110.597	1 T HA 4.283
6 G N 110.5	15 S HN 8.679	24 V CA 62.542	1 T HN 8.359
7 N CA 53.305	15 S N 116.69	24 V CB 32.854	1 T N 119.794
7 N CB 38.93	16 T CA 61.889	24 V HA 4.189	2 Q CA 55.926
7 N HA 4.799	16 T CB 69.73	24 V HN 8.067	2 Q CB 29.415
7 N HN 8.409	16 T HA 4.368	24 V N 119.731	2 Q HA 4.326
7 N N 119.051	16 T HN 8.364	25 T CA 62.182	2 Q HN 8.66
8 T CA 61.945	16 T N 115.765	25 T CB 69.847	2 Q N 123.075
8 T CB 69.566	17 N CA 53.249	25 T HA 4.332	3 A CA 52.732
8 T HA 4.37	17 N CB 38.767	25 T HN 8.465	3 A CB 19.198
8 T HN 8.349	17 N HA 4.802	25 T N 119.289	3 A HA 4.305
8 T N 114.632	17 N HN 8.574	26 Q CA 55.769	3 A HN 8.522
9 S CA 58.518	17 N N 121.26	26 Q CB 29.591	3 A N 125.338
9 S CB 63.805	18 T CA 62.228	26 Q HA 4.317	4 S CA 58.376
9 S HA 4.524	18 T CB 69.512	26 Q HN 8.604	4 S CB 63.789
9 S HN 8.492	18 T HA 4.317	26 Q N 123.831	4 S HA 4.413
9 S N 118.335	18 T HN 8.34	27 A CA 52.622	4 S HN 8.395
10 T CA 61.946	18 T N 114.835	27 A CB 19.219	4 S N 115.022
10 T CB 69.652	19 M CA 55.893	27 A HA 4.314	5 Q CA 53.624
10 T HA 4.371	19 M CB 32.467	27 A HN 8.55	5 Q CB 28.983

5 Q HA 4.664	14 T CB 69.9	22 F HN 8.357	
5 Q HN 8.433	14 T HA 4.316	22 F N 119.988	Nup98 ^{FG345-384}
5 Q N 122.612	14 T HN 8.3	23 G CA 45.291	TGTGLFGQTN
6 P CA 63.666	14 T N 113.323	23 G HA2 3.886	TGFGAVGSTL
6 P CB 32.073	15 N CA 53.306	23 G HA3 3.977	FGNNKLTTFG
6 P HA 4.427	15 N CB 38.809	23 G HN 8.391	SSTTSAPSG
7 G CA 45.349	15 N HA 4.799	23 G N 112.173	
7 G HA2 3.98	15 N HN 8.585	24 T CA 62.021	1 T CA 61.697
7 G HA3 3.98	15 N N 121.173	24 T CB 69.886	1 T CB 69.727
7 G HN 8.707	16 T CA 62.009	24 T HA 4.369	1 T HA 4.306
7 G N 109.768	16 T CB 69.74	24 T HN 8.235	1 T HN 8.416
8 G CA 45.289	16 T HA 4.382	24 T N 112.968	1 T N 112.6
8 G HA2 3.924	16 T HN 8.331	25 G CA 45.443	2 G CA 45.445
8 G HA3 3.924	16 T N 114.283	25 G HA2 4.025	2 G HA2 4.027
8 G HN 8.336	17 S CA 58.654	25 G HA3 4.055	2 G HA3 4.027
8 G N 108.349	17 S CB 63.743	25 G HN 8.655	2 G HN 8.706
9 L CA 55.303	17 S HA 4.537	25 G N 111.318	2 G N 111.817
9 L CB 42.31	17 S HN 8.529	26 T CA 61.991	3 T CA 61.866
9 L HA 4.254	17 S N 118.132	26 T CB 69.884	3 T CB 69.793
9 L HN 8.258	18 T CA 62.098	26 T HA 4.365	3 T HA 4.374
9 L N 121.354	18 T CB 69.74	26 T HN 8.241	3 T HN 8.239
10 F CA 57.834	18 T HA 4.378	26 T N 112.729	3 T N 113.034
10 F CB 39.505	18 T HN 8.314	27 G CA 45.305	4 G CA 45.361
10 F HA 4.637	18 T N 115.135	27 G HA2 3.896	4 G HA2 3.921
10 F HN 8.429	19 G CA 45.423	27 G HA3 3.926	4 G HA3 3.921
10 F N 120.168	19 G HA2 4.025	27 G HN 8.567	4 G HN 8.583
11 G CA 45.319	19 G HA3 4.025	27 G N 110.987	4 G N 111.272
11 G HA2 3.968	19 G HN 8.483	28 L CA 55.204	5 L CA 55.219
11 G HA3 3.968	19 G N 111.002	28 L CB 42.315	5 L CB 42.272
11 G HN 8.337	20 T CA 61.806	28 L HA 4.26	5 L HA 4.265
11 G N 110.37	20 T CB 69.981	28 L HN 8.163	5 L HN 8.162
12 T CA 61.894	20 T HA 4.312	28 L N 121.396	5 L N 121.705
12 T CB 70.007	20 T HN 8.178	29 F CA 57.967	6 F CA 58.059
12 T HA 4.344	20 T N 113.673	29 F CB 39.228	6 F CB 39.3
12 T HN 8.169	21 A CA 52.54	29 F HA 4.59	6 F HA 4.594
12 T N 113.589	21 A CB 19.095	29 F HN 8.523	6 F HN 8.44
13 A CA 52.723	21 A HA 4.285	29 F N 120.937	6 F N 120.727
13 A CB 19.25	21 A HN 8.455	30 G CA 44.937	7 G CA 45.235
13 A HA 4.403	21 A N 126.24	30 G HA2 3.76	7 G HA2 3.822
13 A HN 8.54	22 F CA 58.08	30 G HA3 3.846	7 G HA3 3.905
13 A N 126.495	22 F CB 39.623	30 G HN 8.394	7 G HN 8.395
14 T CA 61.912	22 F HA 4.582	30 G N 110.736	7 G N 110.747

8 Q CA 55.797	16 V HA 4.053	24 N N 119.393	33 T CB 69.635
8 Q CB 29.541	16 V HN 8.362	25 K CA 56.558	33 T HA 4.449
8 Q HA 4.404	16 V N 120.395	25 K CB 32.823	33 T HN 8.393
8 Q HN 8.278	17 G CA 45.33	25 K HA 4.276	33 T N 116.036
8 Q N 119.926	17 G HA2 3.956	25 K HN 8.353	34 T CA 61.856
9 T CA 62.018	17 G HA3 4.003	25 K N 121.427	34 T CB 69.768
9 T CB 69.756	17 G HN 8.65	26 L CA 55.271	34 T HA 4.395
9 T HA 4.354	17 G N 113.17	26 L CB 42.334	34 T HN 8.265
9 T HN 8.406	18 S CA 58.462	26 L HA 4.419	34 T N 116.425
9 T N 115.547	18 S CB 63.915	26 L HN 8.335	35 S CA 58.215
10 N CA 53.291	18 S HA 4.486	26 L N 122.84	35 S CB 63.922
10 N CB 38.773	18 S HN 8.307	27 T CA 61.941	35 S HA 4.452
10 N HA 4.799	18 S N 115.813	27 T CB 69.786	35 S HN 8.403
10 N HN 8.671	19 T CA 62.116	27 T HA 4.372	35 S N 118.851
10 N N 121.472	19 T CB 69.724	27 T HN 8.261	36 A CA 50.67
11 T CA 62.044	19 T HA 4.337	27 T N 115.228	36 A CB 19.292
11 T CB 69.722	19 T HN 8.368	28 T CA 62.321	36 A HA 4.591
11 T HA 4.3	19 T N 116.423	28 T CB 69.78	36 A HN 8.444
11 T HN 8.282	20 L CA 55.31	28 T HA 4.306	36 A N 127.553
11 T N 114.007	20 L CB 42.225	28 T HN 8.136	37 P CA 63.111
12 G CA 45.29	20 L HA 4.272	28 T N 116.314	37 P CB 32.108
12 G HA2 3.84	20 L HN 8.233	29 F CA 58.096	37 P HA 4.403
12 G HA3 3.918	20 L N 124.146	29 F CB 39.641	38 S CA 58.212
12 G HN 8.452	21 F CA 58.142	29 F HA 4.618	38 S CB 63.811
12 G N 110.892	21 F CB 39.589	29 F HN 8.433	38 S HA 4.376
13 F CA 58.099	21 F HA 4.618	29 F N 123.032	38 S HN 8.499
13 F CB 39.573	21 F HN 8.281	30 G CA 45.268	38 S N 116.329
13 F HA 4.593	21 F N 120.491	30 G HA2 3.858	39 F CA 57.804
13 F HN 8.284	22 G CA 45.301	30 G HA3 3.962	39 F CB 39.574
13 F N 120.453	22 G HA2 3.844	30 G HN 8.47	39 F HA 4.614
14 G CA 45.204	22 G HA3 3.914	30 G N 111.523	39 F HN 8.475
14 G HA2 3.813	22 G HN 8.377	31 S CA 58.351	39 F N 122.728
14 G HA3 3.878	22 G N 110.454	31 S CB 63.97	40 G CA 44.937
14 G HN 8.495	23 N CA 53.236	31 S HA 4.511	40 G HA2 3.771
14 G N 111.149	23 N CB 38.773	31 S HN 8.315	40 G HA3 3.842
15 A CA 52.369	23 N HA 4.693	31 S N 115.874	40 G HN 8.477
15 A CB 18.115	23 N HN 8.412	32 S CA 58.538	40 G N 112.584
15 A HA 4.336	23 N N 119.779	32 S CB 63.815	
15 A HN 8.194	24 N CA 53.502	32 S HA 4.568	
15 A N 124.039	24 N CB 38.72	32 S HN 8.612	Nup98 ^{FG1-384}
16 V CA 62.848	24 N HA 4.658	32 S N 118.147	MFNKSFGTPF
16 V CB 32.608	24 N HN 8.516	33 T CA 62.034	GGGTGGFGTT

STFGQNTGFG	2 F CB 39.642	11 G CA 45.303	19 T HA 4.463
TTSGGAFGTS	2 F HA 4.637	11 G HA2 3.823	19 T HN 8.189
AFGSSNNTGG	2 F HN 8.284	11 G HA3 3.874	19 T N 113.534
LFGNSQTKPG	2 F N 121.816	11 G HN 8.417	20 T CA 61.887
GLFGTSSFSQ	3 N CA 52.915	11 G N 112	20 T CB 69.848
PATSTSTGFG	3 N CB 39.061	12 G CA 45.286	20 T HA 4.414
FGTSTGTANT	3 N HA 4.603	12 G HA2 3.925	20 T HN 8.355
LFGTASTGTS	3 N HN 8.528	12 G HA3 3.925	20 T N 116.345
LFSSQNNFAA	3 N N 122.099	12 G HN 8.01	21 S CA 58.396
QNKPTGFGNF	4 K CA 56.784	12 G N 108.431	21 S CB 63.882
GTSTSSGGLF	4 K CB 42.058	13 G CA 45.211	21 S HA 4.513
GTTNTTSNPF	4 K HA 4.192	13 G HA2 4.035	21 S HN 8.501
GSTSGSLFGP	4 K HN 8.419	13 G HA3 4.035	21 S N 118.596
SSFTAAPTGT	4 K N 122.541	13 G HN 8.411	22 T CA 61.956
TIKFNPTGT	5 S CA 58.398	13 G N 108.93	22 T CB 69.632
DTMVKAGVST	5 S CB 63.693	14 T CA 62.039	22 T HA 4.306
NISTKHQCIT	5 S HA 4.391	14 T CB 69.795	22 T HN 8.278
AMKEYESKSL	5 S HN 8.378	14 T HA 4.376	22 T N 115.958
EELRLEDYQA	5 S N 116.589	14 T HN 8.328	23 F CA 58.167
NRKGPQNQVG	6 F CA 58.058	14 T N 113.057	23 F CB 39.509
AGTTTGLFGS	6 F CB 39.648	15 G CA 45.286	23 F HA 4.565
SPATSSATGL	6 F HA 4.615	15 G HA2 3.933	23 F HN 8.333
FSSSTTNSGF	6 F HN 8.327	15 G HA3 3.933	23 F N 122.83
AYGQNKTAFG	6 F N 122.114	15 G HN 8.612	24 G CA 45.278
TSTTGFGTNP	7 G CA 45.036	15 G N 111.485	24 G HA2 3.755
GGLFGQQNQQ	7 G HA2 3.893	16 G CA 45.026	24 G HA3 3.887
TTSLFSKPG	7 G HA3 3.947	16 G HA2 3.858	24 G HN 8.426
QATTTQNTGF	7 G HN 8.416	16 G HA3 3.858	24 G N 111.484
SFGNTSTIGQ	7 G N 110.356	16 G HN 8.263	25 Q CA 55.852
PSTNTMGLFG	8 T CA 59.827	16 G N 108.624	25 Q CB 29.47
VTQASQPGGL	8 T CB 69.759	17 F CA 58.16	25 Q HA 4.303
FGTATNTSTG	8 T HA 4.613	17 F CB 39.504	25 Q HN 8.244
TAFGTGTGLF	8 T HN 8.183	17 F HA 4.599	25 Q N 119.725
GQNTGFGAV	8 T N 116.035	17 F HN 8.327	26 N CA 53.317
GSTLFGNNKL	9 P CA 63.355	17 F N 120.275	26 N CB 38.68
TTFGSSTTSA	9 P CB 32.043	18 G CA 45.336	26 N HA 4.77
PSEF	9 P HA 4.377	18 G HA2 3.887	26 N HN 8.71
	10 F CA 58.333	18 G HA3 3.975	26 N N 120.15
1 M CA 55.148	10 F CB 39.34	18 G HN 8.534	27 T CA 62.095
1 M CB 33.364	10 F HA 4.573	18 G N 111.129	27 T CB 69.728
1 M HA 3.97	10 F HN 8.497	19 T CA 61.844	27 T HA 4.301
2 F CA 57.943	10 F N 120.952	19 T CB 70.016	27 T HN 8.255

27 T N 114.055	36 A CB 19.138	44 S HN 8.277	53 G CA 45.396
28 G CA 45.303	36 A HA 4.245	44 S N 115.805	53 G HA2 3.856
28 G HA2 3.825	36 A HN 8.301	45 S CA 58.597	53 G HA3 3.907
28 G HA3 3.908	36 A N 123.879	45 S CB 63.727	53 G HN 8.32
28 G HN 8.46	37 F CA 58.005	45 S HA 4.453	53 G N 110.278
28 G N 110.789	37 F CB 39.514	45 S HN 8.544	54 N CA 53.22
29 F CA 58.039	37 F HA 4.554	45 S N 117.844	54 N CB 39.005
29 F CB 39.529	37 F HN 8.411	46 N CA 53.312	54 N HA 4.759
29 F HA 4.602	37 F N 119.678	46 N CB 38.711	54 N HN 8.422
29 F HN 8.266	38 G CA 45.328	46 N HA 4.701	54 N N 118.978
29 F N 120.414	38 G HA2 3.875	46 N HN 8.511	55 S CA 58.815
30 G CA 45.336	38 G HA3 3.972	46 N N 120.494	55 S CB 63.648
30 G HA2 3.887	38 G HN 8.325	47 N CA 53.304	55 S HA 4.407
30 G HA3 3.975	38 G N 111.017	47 N CB 38.695	55 S HN 8.48
30 G HN 8.534	39 T CA 61.792	47 N HA 4.767	55 S N 116.438
30 G N 111.129	39 T CB 70.016	47 N HN 8.491	56 Q CA 55.97
31 T CA 61.844	39 T HA 4.414	47 N N 119.483	56 Q CB 29.446
31 T CB 70.016	39 T HN 8.144	48 T CA 62.232	56 Q HA 4.392
31 T HA 4.463	39 T N 113.318	48 T CB 69.645	56 Q HN 8.556
31 T HN 8.189	40 S CA 58.462	48 T HA 4.333	56 Q N 121.965
31 T N 113.534	40 S CB 63.815	48 T HN 8.291	57 T CA 62.131
32 T CA 61.904	40 S HA 4.424	48 T N 113.926	57 T CB 69.781
32 T CB 70.016	40 S HN 8.506	49 G CA 45.38	57 T HA 4.278
32 T HA 4.452	40 S N 118.367	49 G HA2 3.975	57 T HN 8.254
32 T HN 8.397	41 A CA 52.633	49 G HA3 3.975	57 T N 115.915
32 T N 116.026	41 A CB 19.031	49 G HN 8.574	58 K CA 54.241
33 S CA 58.614	41 A HA 4.233	49 G N 111.331	58 K CB 32.533
33 S CB 63.842	41 A HN 8.422	50 G CA 45.199	58 K HA 4.61
33 S HA 4.478	41 A N 126.071	50 G HA2 3.886	58 K HN 8.471
33 S HN 8.492	42 F CA 58.12	50 G HA3 3.886	58 K N 125.719
33 S N 118.264	42 F CB 39.432	50 G HN 8.318	59 P CA 63.493
34 G CA 45.359	42 F HA 4.545	50 G N 108.822	59 P CB 32.136
34 G HA2 3.977	42 F HN 8.279	51 L CA 55.343	59 P HA 4.415
34 G HA3 3.977	42 F N 119.617	51 L CB 42.226	60 G CA 45.456
34 G HN 8.544	43 G CA 45.289	51 L HA 4.221	60 G HA2 3.959
34 G N 111.145	43 G HA2 3.829	51 L HN 8.199	60 G HA3 3.987
35 G CA 45.085	43 G HA3 3.944	51 L N 121.736	60 G HN 8.673
35 G HA2 3.901	43 G HN 8.349	52 F CA 57.733	60 G N 110.149
35 G HA3 3.901	43 G N 111.204	52 F CB 39.394	61 G CA 45.393
35 G HN 8.293	44 S CA 58.449	52 F HA 4.615	61 G HA2 3.894
35 G N 108.828	44 S CB 63.936	52 F HN 8.409	61 G HA3 3.939
36 A CA 52.479	44 S HA 4.473	52 F N 120.087	61 G HN 8.344

61 G N 108.732	70 Q CB 28.972	79 F CA 58.19	87 T HA 4.334
62 L CA 55.267	70 Q HA 4.568	79 F CB 39.551	87 T HN 8.192
62 L CB 42.314	70 Q HN 8.417	79 F HA 4.561	87 T N 114.013
62 L HA 4.265	70 Q N 123.474	79 F HN 8.292	88 A CA 52.815
62 L HN 8.287	71 P CA 63.058	79 F N 120.415	88 A CB 19.172
62 L N 121.693	71 P CB 32.207	80 G CA 45.057	88 A HA 4.301
63 F CA 57.939	71 P HA 4.402	80 G HA2 3.714	88 A HN 8.511
63 F CB 39.492	72 A CA 52.615	80 G HA3 3.852	88 A N 126.603
63 F HA 4.567	72 A CB 19.161	80 G HN 8.435	89 N CA 53.345
63 F HN 8.443	72 A HA 4.35	80 G N 111.001	89 N CB 38.768
63 F N 120.715	72 A HN 8.667	81 F CA 58.1	89 N HA 4.712
64 G CA 45.456	72 A N 125.037	81 F CB 39.557	89 N HN 8.532
64 G HA2 3.889	73 T CA 61.675	81 F HA 4.607	89 N N 118.253
64 G HA3 3.978	73 T CB 70.034	81 F HN 8.232	90 T CA 62.097
64 G HN 8.313	73 T HA 4.372	81 F N 120.417	90 T CB 69.807
64 G N 110.858	73 T HN 8.294	82 G CA 45.365	90 T HA 4.27
65 T CA 61.841	73 T N 113.448	82 G HA2 3.9	90 T HN 8.177
65 T CB 70.061	74 S CA 58.368	82 G HA3 3.996	90 T N 114.057
65 T HA 4.414	74 S CB 63.823	82 G HN 8.565	91 L CA 55.344
65 T HN 8.178	74 S HA 4.53	82 G N 111.241	91 L CB 42.161
65 T N 113.337	74 S HN 8.499	83 T CA 61.836	91 L HA 4.283
66 S CA 58.564	74 S N 118.151	83 T CB 69.844	91 L HN 8.278
66 S CB 63.825	75 T CA 61.913	83 T HA 4.42	91 L N 124.2
66 S HA 4.497	75 T CB 69.786	83 T HN 8.172	92 F CA 57.956
66 S HN 8.56	75 T HA 4.41	83 T N 113.524	92 F CB 39.558
66 S N 118.242	75 T HN 8.362	84 S CA 58.415	92 F HA 4.617
67 S CA 58.877	75 T N 115.779	84 S CB 63.687	92 F HN 8.3
67 S CB 63.699	76 S CA 58.472	84 S HA 4.56	92 F N 120.864
67 S HA 4.414	76 S CB 63.745	84 S HN 8.593	93 G CA 45.352
67 S HN 8.413	76 S HA 4.498	84 S N 118.47	93 G HA2 3.899
67 S N 117.908	76 S HN 8.446	85 T CA 62.108	93 G HA3 3.975
68 F CA 57.856	76 S N 118.424	85 T CB 69.844	93 G HN 8.368
68 F CB 39.62	77 T CA 62.041	85 T HA 4.375	93 G N 110.846
68 F HA 4.636	77 T CB 69.854	85 T HN 8.356	94 T CA 61.898
68 F HN 8.262	77 T HA 4.33	85 T N 115.665	94 T CB 69.95
68 F N 122.216	77 T HN 8.275	86 G CA 45.391	94 T HA 4.336
69 S CA 58.008	77 T N 115.545	86 G HA2 4.012	94 T HN 8.174
69 S CB 63.863	78 G CA 45.052	86 G HA3 4.012	94 T N 114.755
69 S HA 4.394	78 G HA2 3.841	86 G HN 8.486	95 A CA 52.619
69 S HN 8.211	78 G HA3 3.938	86 G N 111.324	95 A CB 19.204
69 S N 118.103	78 G HN 8.396	87 T CA 61.932	95 A HA 4.369
70 Q CA 53.667	78 G N 110.885	87 T CB 69.927	95 A HN 8.537

95 A N 126.78	104 S CB 63.631	112 N HN 8.492	121 G HA3 3.99
96 S CA 58.439	104 S HA 4.417	112 N N 119.672	121 G HN 8.46
96 S CB 63.773	104 S HN 8.494	113 K CA 54.251	121 G N 110.566
96 S HA 4.5	104 S N 118.378	113 K CB 32.498	122 T CA 61.768
96 S HN 8.495	105 Q CA 56.203	113 K HA 4.576	122 T CB 69.981
96 S N 115.679	105 Q CB 29.275	113 K HN 8.351	122 T HA 4.424
97 T CA 62.017	105 Q HA 4.306	113 K N 122.84	122 T HN 8.179
97 T CB 69.775	105 Q HN 8.425	114 P CA 63.124	122 T N 113.405
97 T HA 4.389	105 Q N 121.699	114 P CB 32.164	123 S CA 58.577
97 T HN 8.346	106 N CA 53.322	114 P HA 4.487	123 S CB 63.873
97 T N 115.646	106 N CB 38.742	115 T CA 62.171	123 S HA 4.564
98 G CA 45.447	106 N HA 4.664	115 T CB 69.908	123 S HN 8.563
98 G HA2 4.039	106 N HN 8.431	115 T HA 4.281	123 S N 118.356
98 G HA3 4.039	106 N N 119.555	115 T HN 8.448	124 T CA 61.918
98 G HN 8.555	107 N CA 53.372	115 T N 114.782	124 T CB 69.75
98 G N 111.257	107 N CB 38.774	116 G CA 45.111	124 T HA 4.422
99 T CA 61.935	107 N HA 4.654	116 G HA2 3.854	124 T HN 8.385
99 T CB 69.879	107 N HN 8.44	116 G HA3 3.947	124 T N 115.744
99 T HA 4.377	107 N N 119.728	116 G HN 8.465	125 S CA 58.497
99 T HN 8.229	108 A CA 53.181	116 G N 111.133	125 S CB 63.827
99 T N 113.941	108 A CB 18.839	117 F CA 58.048	125 S HA 4.506
100 S CA 58.45	108 A HA 4.181	117 F CB 39.505	125 S HN 8.439
100 S CB 63.749	108 A HN 8.314	117 F HA 4.607	125 S N 118.168
100 S HA 4.452	108 A N 124.125	117 F HN 8.303	126 S CA 58.668
100 S HN 8.523	109 F CA 57.731	117 F N 120.27	126 S CB 63.822
100 S N 118.78	109 F CB 39.218	118 G CA 45.205	126 S HA 4.481
101 L CA 55.562	109 F HA 4.572	118 G HA2 3.729	126 S HN 8.505
101 L CB 42.142	109 F HN 8.167	118 G HA3 3.851	126 S N 118.115
101 L HA 4.274	109 F N 118.624	118 G HN 8.458	127 G CA 45.407
101 L HN 8.417	110 A CA 52.644	118 G N 111.023	127 G HA2 3.98
101 L N 124.461	110 A CB 19.173	119 N CA 53.033	127 G HA3 3.98
102 F CA 57.974	110 A HA 4.245	119 N CB 38.72	127 G HN 8.515
102 F CB 39.669	110 A HN 8.104	119 N HA 4.675	127 G N 110.987
102 F HA 4.621	110 A N 124.857	119 N HN 8.267	128 G CA 45.175
102 F HN 8.303	111 Q CA 55.866	119 N N 118.797	128 G HA2 3.906
102 F N 120.449	111 Q CB 29.354	120 F CA 58.033	128 G HA3 3.906
103 S CA 58.344	111 Q HA 4.266	120 F CB 39.374	128 G HN 8.299
103 S CB 63.819	111 Q HN 8.351	120 F HA 4.635	128 G N 108.726
103 S HA 4.435	111 Q N 119.131	120 F HN 8.432	129 L CA 55.275
103 S HN 8.251	112 N CA 52.965	120 F N 120.971	129 L CB 42.292
103 S N 117.345	112 N CB 38.794	121 G CA 45.368	129 L HA 4.256
104 S CA 58.883	112 N HA 4.669	121 G HA2 3.928	129 L HN 8.213

129 L N 121.712	138 N HA 4.971	147 L CB 42.166	156 A CA 50.481
130 F CA 57.921	138 N HN 8.528	147 L HA 4.262	156 A CB 17.929
130 F CB 39.462	138 N N 121.452	147 L HN 8.37	156 A HA 4.546
130 F HA 4.626	139 P CA 63.682	147 L N 123.868	156 A HN 8.44
130 F HN 8.432	139 P CB 31.901	148 F CA 57.377	156 A N 125.13
130 F N 120.593	139 P HA 4.334	148 F CB 39.886	157 P CA 63.064
131 G CA 45.368	140 F CA 57.87	148 F HA 4.697	157 P CB 32.108
131 G HA2 3.929	140 F CB 39.02	148 F HN 8.237	157 P HA 4.497
131 G HA3 3.976	140 F HA 4.634	148 F N 119.508	158 T CA 62.047
131 G HN 8.336	140 F HN 8.334	149 G CA 44.646	158 T CB 69.962
131 G N 110.636	140 F N 119.545	149 G HA2 4.059	158 T HA 4.341
132 T CA 61.807	141 G CA 45.383	149 G HA3 4.093	158 T HN 8.456
132 T CB 70.018	141 G HA2 3.898	149 G HN 8.228	158 T N 114.504
132 T HA 4.457	141 G HA3 3.969	149 G N 110.081	159 G CA 45.337
132 T HN 8.185	141 G HN 8.16	150 P CA 63.501	159 G HA2 4.037
132 T N 113.41	141 G N 110.079	150 P CB 32.168	159 G HA3 4.037
133 T CA 61.952	142 S CA 58.408	150 P HA 4.427	159 G HN 8.592
133 T CB 69.866	142 S CB 63.958	151 S CA 58.515	159 G N 111.172
133 T HA 4.39	142 S HA 4.547	151 S CB 63.765	160 T CA 61.932
133 T HN 8.352	142 S HN 8.343	151 S HA 4.467	160 T CB 69.786
133 T N 116.282	142 S N 115.401	151 S HN 8.613	160 T HA 4.423
134 N CA 53.346	143 T CA 61.837	151 S N 115.643	160 T HN 8.239
134 N CB 38.873	143 T CB 69.742	152 S CA 58.568	160 T N 113.872
134 N HA 4.806	143 T HA 4.453	152 S CB 63.825	161 T CA 62.138
134 N HN 8.644	143 T HN 8.459	152 S HA 4.403	161 T CB 69.848
134 N N 121.778	143 T N 117.826	152 S HN 8.341	161 T HA 4.348
135 T CA 61.869	144 S CA 58.808	152 S N 117.49	161 T HN 8.389
135 T CB 69.738	144 S CB 63.738	153 F CA 57.851	161 T N 117.666
135 T HA 4.426	144 S HA 4.448	153 F CB 39.742	162 I CA 61.104
135 T HN 8.349	144 S HN 8.46	153 F HA 4.685	162 I CB 38.562
135 T N 114.773	144 S N 115.486	153 F HN 8.284	162 I HA 4.1
136 T CA 62.082	145 G CA 45.35	153 F N 121.853	162 I HN 8.365
136 T CB 69.816	145 G HA2 3.982	154 T CA 61.627	162 I N 124.575
136 T HA 4.379	145 G HA3 3.982	154 T CB 70.004	163 K CA 55.966
136 T HN 8.312	145 G HN 8.548	154 T HA 4.242	163 K CB 33.244
136 T N 116.228	145 G N 110.973	154 T HN 8.124	163 K HA 4.285
137 S CA 58.428	146 S CA 58.368	154 T N 117.146	163 K HN 8.482
137 S CB 63.739	146 S CB 63.842	155 A CA 52.14	163 K N 126.4
137 S HA 4.428	146 S HA 4.415	155 A CB 19.317	164 F CA 57.419
137 S HN 8.409	146 S HN 8.262	155 A HA 4.25	164 F CB 39.921
137 S N 118.239	146 S N 115.374	155 A HN 8.372	164 F HA 4.615
138 N CB 38.884	147 L CA 55.446	155 A N 127.251	164 F HN 8.461

164 F N 122.747	174 V CB 32.635	182 I HN 8.29	191 A CA 52.691
165 N CB 39.034	174 V HA 4.042	182 I N 121.675	191 A CB 19.147
165 N HA 4.948	174 V HN 8.262	183 S CA 58.49	191 A HA 4.321
165 N HN 8.53	174 V N 120.494	183 S CB 63.753	191 A HN 8.418
165 N N 123.627	175 K CA 56.116	183 S HA 4.529	191 A N 126.824
166 P CA 61.488	175 K CB 33.119	183 S HN 8.593	192 M CA 55.776
166 P CB 30.894	175 K HA 4.312	183 S N 120.226	192 M CB 32.824
166 P HA 4.544	175 K HN 8.557	184 T CA 62.098	192 M HA 4.425
167 P CA 63.047	175 K N 126.5	184 T CB 69.684	192 M HN 8.406
167 P CB 32.093	176 A CA 52.666	184 T HA 4.322	192 M N 120.194
167 P HA 4.5	176 A CB 19.208	184 T HN 8.351	193 K CA 56.585
168 T CA 62.101	176 A HA 4.292	184 T N 116.733	193 K CB 32.939
168 T CB 70.027	176 A HN 8.526	185 K CA 55.921	193 K HA 4.25
168 T HA 4.358	176 A N 126.354	185 K CB 32.899	193 K HN 8.47
168 T HN 8.48	177 G CA 45.181	185 K HA 4.264	193 K N 123.149
168 T N 114.75	177 G HA2 3.953	185 K HN 8.336	194 E CA 57.065
169 G CA 45.398	177 G HA3 4.001	185 K N 123.575	194 E CB 30.106
169 G HA2 4.062	177 G HN 8.538	186 H CA 55.612	194 E HA 4.2
169 G HA3 4.062	177 G N 108.833	186 H CB 29.378	194 E HN 8.574
169 G HN 8.614	178 V CA 62.243	186 H HA 4.661	194 E N 124.499
169 G N 111.492	178 V CB 32.92	186 H HN 8.625	195 Y CA 58.38
170 T CA 61.885	178 V HA 4.191	186 H N 120.294	195 Y CB 38.737
170 T CB 69.651	178 V HN 8.127	187 Q CA 55.929	195 Y HA 4.506
170 T HA 4.361	178 V N 119.671	187 Q CB 29.649	195 Y HN 8.263
170 T HN 8.277	179 S CA 58.335	187 Q HA 4.334	195 Y N 122.832
170 T N 113.71	179 S CB 63.62	187 Q HN 8.594	196 E CA 56.646
171 D CA 54.586	179 S HA 4.563	187 Q N 122.562	196 E CB 30.492
171 D CB 40.986	179 S HN 8.676	188 C CA 58.641	196 E HA 4.248
171 D HA 4.678	179 S N 120.24	188 C CB 27.892	196 E HN 8.302
171 D HN 8.6	180 T CA 61.963	188 C HA 4.52	196 E N 122.819
171 D N 122.964	180 T CB 69.733	188 C HN 8.684	197 S CA 58.823
172 T CA 62.305	180 T HA 4.36	188 C N 122.012	197 S CB 63.761
172 T CB 69.542	180 T HN 8.384	189 I CA 61.67	197 S HA 4.382
172 T HA 4.284	180 T N 116.293	189 I CB 38.633	197 S HN 8.431
172 T HN 8.218	181 N CA 53.364	189 I HA 4.244	197 S N 117.409
172 T N 114.606	181 N CB 38.76	189 I HN 8.574	198 K CA 56.634
173 M CA 55.765	181 N HA 4.743	189 I N 122.123	198 K CB 33.175
173 M CB 32.646	181 N HN 8.559	190 T CA 62.248	198 K HA 4.364
173 M HA 4.475	181 N N 121.577	190 T CB 69.684	198 K HN 8.456
173 M HN 8.43	182 I CA 61.369	190 T HA 4.271	198 K N 123.725
173 M N 122.962	182 I CB 38.678	190 T HN 8.321	199 S CA 58.605
174 V CA 62.669	182 I HA 4.211	190 T N 119.07	199 S CB 63.882

199 S HA 4.397	207 D N 120.394	216 Q HN 8.773	225 T CA 62.108
199 S HN 8.536	208 Y CA 59.677	216 Q N 120.764	225 T CB 69.868
199 S N 117.303	208 Y CB 38.32	217 N CA 53.384	225 T HA 4.361
200 L CA 56.992	208 Y HA 4.388	217 N CB 38.819	225 T HN 8.287
200 L CB 41.796	208 Y HN 8.181	217 N HA 4.669	225 T N 116.318
200 L HA 4.193	208 Y N 120.768	217 N HN 8.541	226 G CA 45.307
200 L HN 8.555	209 Q CA 56.664	217 N N 119.658	226 G HA2 3.927
200 L N 122.592	209 Q CB 28.997	218 Q CA 55.808	226 G HA3 3.927
201 E CA 58.259	209 Q HA 4.097	218 Q CB 29.514	226 G HN 8.486
201 E CB 29.806	209 Q HN 8.257	218 Q HA 4.361	226 G N 111.344
201 E HA 4.14	209 Q N 119.957	218 Q HN 8.478	227 L CA 55.21
201 E HN 8.452	210 A CA 53.565	218 Q N 120.94	227 L CB 42.356
201 E N 119.631	210 A CB 18.833	219 V CA 62.79	227 L HA 4.272
202 E CA 58.13	210 A HA 4.161	219 V CB 32.645	227 L HN 8.177
202 E CB 30.099	210 A HN 8.112	219 V HA 4.088	227 L N 121.662
202 E HA 4.105	210 A N 122.814	219 V HN 8.403	228 F CA 57.996
202 E HN 8.169	211 N CA 53.48	219 V N 122.421	228 F CB 39.37
202 E N 120.808	211 N CB 38.713	220 G CA 45.215	228 F HA 4.611
203 L CA 56.658	211 N HA 4.648	220 G HA2 3.955	228 F HN 8.506
203 L CB 41.991	211 N HN 8.208	220 G HA3 3.955	228 F N 121.104
203 L HA 4.172	211 N N 115.603	220 G HN 8.679	229 G CA 45.267
203 L HN 8.276	212 R CA 56.664	220 G N 113.414	229 G HA2 3.878
203 L N 121.726	212 R CB 30.516	221 A CA 52.749	229 G HA3 3.955
204 R CA 56.545	212 R HA 4.262	221 A CB 19.351	229 G HN 8.394
204 R CB 30.434	212 R HN 8.061	221 A HA 4.327	229 G N 111.067
204 R HA 4.253	212 R N 120.543	221 A HN 8.387	230 S CA 58.276
204 R HN 8.316	213 K CA 56.48	221 A N 124.283	230 S CB 64.066
204 R N 121.188	213 K CB 33.24	222 G CA 45.344	230 S HA 4.503
205 L CA 56.64	213 K HA 4.378	222 G HA2 4.002	230 S HN 8.264
205 L CB 42.005	213 K HN 8.374	222 G HA3 4.002	230 S N 115.698
205 L HA 4.246	213 K N 121.821	222 G HN 8.612	231 S CA 56.597
205 L HN 8.185	214 G CA 44.62	222 G N 108.576	231 S CB 63.326
205 L N 122.032	214 G HA2 4.084	223 T CA 61.885	231 S HA 4.804
206 E CA 58.14	214 G HA3 4.124	223 T CB 69.919	231 S HN 8.516
206 E CB 30.462	214 G HN 8.338	223 T HA 4.461	231 S N 119.092
206 E HA 4.146	214 G N 109.731	223 T HN 8.202	232 P CA 63.351
206 E HN 8.364	215 P CA 63.439	223 T N 113.741	232 P CB 32.134
206 E N 119.793	215 P CB 32.151	224 T CA 61.903	232 P HA 4.422
207 D CA 55.562	215 P HA 4.418	224 T CB 69.799	233 A CA 52.744
207 D CB 40.969	216 Q CA 55.783	224 T HA 4.485	233 A CB 19.148
207 D HA 4.534	216 Q CB 29.488	224 T HN 8.452	233 A HA 4.341
207 D HN 8.201	216 Q HA 4.312	224 T N 116.472	233 A HN 8.556

233 A N 124.408	242 S CB 63.964	250 F HN 8.115	259 F CA 58.053
234 T CA 61.743	242 S HA 4.455	250 F N 120.352	259 F CB 39.596
234 T CB 69.913	242 S HN 8.275	251 A CA 52.263	259 F HA 4.593
234 T HA 4.373	242 S N 117.617	251 A CB 19.159	259 F HN 8.321
234 T HN 8.235	243 S CA 58.513	251 A HA 4.255	259 F N 119.96
234 T N 113.246	243 S CB 63.811	251 A HN 8.295	260 G CA 45.299
235 S CA 58.298	243 S HA 4.493	251 A N 125.682	260 G HA2 3.895
235 S CB 63.852	243 S HN 8.53	252 Y CA 58.556	260 G HA3 3.969
235 S HA 4.525	243 S N 118.35	252 Y CB 38.605	260 G HN 8.39
235 S HN 8.423	244 S CA 58.64	252 Y HA 4.442	260 G N 111.073
235 S N 118.123	244 S CB 63.802	252 Y HN 8.161	261 T CA 61.808
236 S CA 58.477	244 S HA 4.543	252 Y N 119.881	261 T CB 70.038
236 S CB 63.815	244 S HN 8.495	253 G CA 45.385	261 T HA 4.403
236 S HA 4.472	244 S N 117.919	253 G HA2 3.795	261 T HN 8.161
236 S HN 8.53	245 T CA 62.09	253 G HA3 3.916	261 T N 113.311
236 S N 118.35	245 T CB 69.688	253 G HN 8.413	262 S CA 58.42
237 A CA 52.919	245 T HA 4.437	253 G N 110.958	262 S CB 63.81
237 A CB 19.156	245 T HN 8.328	254 Q CA 55.907	262 S HA 4.565
237 A HA 4.399	245 T N 115.812	254 Q CB 29.41	262 S HN 8.582
237 A HN 8.507	246 T CA 62.154	254 Q HA 4.285	262 S N 118.071
237 A N 126.431	246 T CB 69.783	254 Q HN 8.237	263 T CA 62.014
238 T CA 62.054	246 T HA 4.343	254 Q N 119.688	263 T CB 69.598
238 T CB 69.894	246 T HN 8.229	255 N CA 53.36	263 T HA 4.434
238 T HA 4.331	246 T N 116.229	255 N CB 38.688	263 T HN 8.467
238 T HN 8.188	247 N CA 53.323	255 N HA 4.638	263 T N 115.878
238 T N 112.501	247 N CB 38.8	255 N HN 8.597	264 T CA 62.092
239 G CA 45.335	247 N HA 4.74	255 N N 119.68	264 T CB 69.835
239 G HA2 3.925	247 N HN 8.571	256 K CA 56.565	264 T HA 4.339
239 G HA3 3.925	247 N N 121.524	256 K CB 32.997	264 T HN 8.215
239 G HN 8.39	248 S CA 58.893	256 K HA 4.323	264 T N 115.414
239 G N 111.073	248 S CB 63.732	256 K HN 8.427	265 G CA 45.162
240 L CA 55.193	248 S HA 4.378	256 K N 122.052	265 G HA2 3.835
240 L CB 42.348	248 S HN 8.441	257 T CA 61.897	265 G HA3 3.926
240 L HA 4.273	248 S N 116.645	257 T CB 69.991	265 G HN 8.429
240 L HN 8.125	249 G CA 45.279	257 T HA 4.276	265 G N 110.844
240 L N 121.643	249 G HA2 3.853	257 T HN 8.249	266 F CA 58.104
241 F CA 57.668	249 G HA3 3.916	257 T N 115.227	266 F CB 39.616
241 F CB 39.592	249 G HN 8.48	258 A CA 52.481	266 F HA 4.618
241 F HA 4.66	249 G N 110.585	258 A CB 19.162	266 F HN 8.321
241 F HN 8.415	250 F CA 57.875	258 A HA 4.256	266 F N 120.087
241 F N 120.972	250 F CB 39.729	258 A HN 8.378	267 G CA 45.304
242 S CA 58.118	250 F HA 4.541	258 A N 126.335	267 G HA2 3.875

267 G HA3 3.976	276 Q HA 4.305	284 L N 122.579	293 T HN 8.383
267 G HN 8.543	276 Q HN 8.317	285 F CA 57.535	293 T N 114.079
267 G N 110.816	276 Q N 119.905	285 F CB 39.541	294 T CA 61.712
268 T CA 61.827	277 Q CA 56.088	285 F HA 4.652	294 T CB 69.89
268 T CB 69.876	277 Q CB 29.285	285 F HN 8.233	294 T HA 4.462
268 T HA 4.319	277 Q HA 4.303	285 F N 120.14	294 T HN 8.337
268 T HN 8.144	277 Q HN 8.642	286 S CA 58.105	294 T N 116.343
268 T N 112.978	277 Q N 121.414	286 S CB 63.869	295 T CA 62.022
269 N CB 38.743	278 N CA 53.469	286 S HA 4.401	295 T CB 69.783
269 N HA 4.985	278 N CB 38.704	286 S HN 8.167	295 T HA 4.329
269 N HN 8.694	278 N HA 4.672	286 S N 117.626	295 T HN 8.324
269 N N 121.566	278 N HN 8.591	287 K CA 54.384	295 T N 116.718
270 P CA 63.96	278 N N 119.7	287 K CB 32.579	296 Q CA 55.877
270 P CB 31.923	279 Q CA 56.088	287 K HA 4.56	296 Q CB 29.499
270 P HA 4.402	279 Q CB 29.341	287 K HN 8.368	296 Q HA 4.333
271 G CA 45.273	279 Q HA 4.304	287 K N 119.714	296 Q HN 8.549
271 G HA2 3.94	279 Q HN 8.511	288 P CA 63.169	296 Q N 123.004
271 G HA3 3.94	279 Q N 120.79	288 P CB 32.052	297 N CA 53.232
271 G HN 8.608	280 Q CA 56.086	288 P HA 4.382	297 N CB 38.745
271 G N 109.209	280 Q CB 29.366	289 F CA 58.361	297 N HA 4.754
272 G CA 45.332	280 Q HA 4.38	289 F CB 39.528	297 N HN 8.663
272 G HA2 3.908	280 Q HN 8.594	289 F HA 4.553	297 N N 120.671
272 G HA3 3.908	280 Q N 121.529	289 F HN 8.356	298 T CA 62.073
272 G HN 8.216	281 T CA 62.055	289 F N 122.579	298 T CB 69.766
272 G N 108.621	281 T CB 69.766	290 G CA 45.228	298 T HA 4.312
273 L CA 55.342	281 T HA 4.403	290 G HA2 3.792	298 T HN 8.296
273 L CB 42.239	281 T HN 8.394	290 G HA3 3.866	298 T N 114.386
273 L HA 4.255	281 T N 115.84	290 G HN 8.398	299 G CA 45.215
273 L HN 8.2	282 T CA 62.031	290 G N 110.266	299 G HA2 3.86
273 L N 121.602	282 T CB 69.766	291 Q CA 55.664	299 G HA3 3.933
274 F CA 58.065	282 T HA 4.364	291 Q CB 29.716	299 G HN 8.507
274 F CB 39.455	282 T HN 8.286	291 Q HA 4.316	299 G N 110.971
274 F HA 4.598	282 T N 116.664	291 Q HN 8.233	300 F CA 57.877
274 F HN 8.434	283 S CA 58.405	291 Q N 120.14	300 F CB 39.78
274 F N 120.515	283 S CB 63.755	292 A CA 52.637	300 F HA 4.585
275 G CA 45.338	283 S HA 4.436	292 A CB 19.235	300 F HN 8.2
275 G HA2 3.837	283 S HN 8.478	292 A HA 4.378	300 F N 120.426
275 G HA3 3.919	283 S N 118.608	292 A HN 8.58	301 S CA 57.918
275 G HN 8.361	284 L CA 55.342	292 A N 126.059	301 S CB 63.792
275 G N 110.542	284 L CB 42.172	293 T CA 61.83	301 S HA 4.382
276 Q CA 56.088	284 L HA 4.254	293 T CB 69.766	301 S HN 8.26
276 Q CB 29.341	284 L HN 8.356	293 T HA 4.414	301 S N 117.91

302 F CA 58.271	310 Q HA 4.647	319 F CB 39.446	328 G CA 45.349
302 F CB 39.509	310 Q HN 8.278	319 F HA 4.608	328 G HA2 3.98
302 F HA 4.558	310 Q N 120.864	319 F HN 8.421	328 G HA3 3.98
302 F HN 8.37	311 P CA 63.274	319 F N 120.451	328 G HN 8.707
302 F N 119.239	311 P CB 32.261	320 G CA 45.31	328 G N 109.768
303 G CA 45.301	311 P HA 4.466	320 G HA2 3.87	329 G CA 45.289
303 G HA2 3.849	312 S CA 58.335	320 G HA3 3.919	329 G HA2 3.924
303 G HA3 3.945	312 S CB 63.739	320 G HN 8.367	329 G HA3 3.924
303 G HN 8.453	312 S HA 4.504	320 G N 110.597	329 G HN 8.336
303 G N 110.5	312 S HN 8.679	321 V CA 62.542	329 G N 108.349
304 N CA 53.305	312 S N 116.69	321 V CB 32.854	330 L CA 55.303
304 N CB 38.93	313 T CA 61.889	321 V HA 4.189	330 L CB 42.31
304 N HA 4.799	313 T CB 69.73	321 V HN 8.067	330 L HA 4.254
304 N HN 8.409	313 T HA 4.368	321 V N 119.731	330 L HN 8.258
304 N N 119.051	313 T HN 8.364	322 T CA 62.182	330 L N 121.354
305 T CA 61.945	313 T N 115.765	322 T CB 69.847	331 F CA 57.834
305 T CB 69.566	314 N CA 53.249	322 T HA 4.332	331 F CB 39.505
305 T HA 4.37	314 N CB 38.767	322 T HN 8.465	331 F HA 4.637
305 T HN 8.349	314 N HA 4.802	322 T N 119.289	331 F HN 8.429
305 T N 114.632	314 N HN 8.574	323 Q CA 55.769	331 F N 120.168
306 S CA 58.518	314 N N 121.26	323 Q CB 29.591	332 G CA 45.319
306 S CB 63.805	315 T CA 62.228	323 Q HA 4.317	332 G HA2 3.968
306 S HA 4.524	315 T CB 69.512	323 Q HN 8.604	332 G HA3 3.968
306 S HN 8.492	315 T HA 4.317	323 Q N 123.831	332 G HN 8.337
306 S N 118.335	315 T HN 8.34	324 A CA 52.622	332 G N 110.37
307 T CA 61.946	315 T N 114.835	324 A CB 19.219	333 T CA 61.894
307 T CB 69.652	316 M CA 55.893	324 A HA 4.314	333 T CB 70.007
307 T HA 4.371	316 M CB 32.467	324 A HN 8.55	333 T HA 4.344
307 T HN 8.381	316 M HA 4.487	324 A N 125.953	333 T HN 8.169
307 T N 116.638	316 M HN 8.452	325 S CA 58.376	333 T N 113.589
308 I CA 61.62	316 M N 122.341	325 S CB 63.789	334 A CA 52.723
308 I CB 38.518	317 G CA 45.327	325 S HA 4.413	334 A CB 19.25
308 I HA 4.142	317 G HA2 3.899	325 S HN 8.395	334 A HA 4.403
308 I HN 8.229	317 G HA3 3.899	325 S N 115.022	334 A HN 8.54
308 I N 123.612	317 G HN 8.434	326 Q CA 53.624	334 A N 126.495
309 G CA 45.079	317 G N 110.051	326 Q CB 28.983	335 T CA 61.912
309 G HA2 3.926	318 L CA 55.136	326 Q HA 4.664	335 T CB 69.9
309 G HA3 3.926	318 L CB 42.288	326 Q HN 8.433	335 T HA 4.316
309 G HN 8.66	318 L HA 4.265	326 Q N 122.612	335 T HN 8.3
309 G N 113.595	318 L HN 8.136	327 P CA 63.666	335 T N 113.323
310 Q CA 53.38	318 L N 121.51	327 P CB 32.073	336 N CA 53.306
310 Q CB 28.889	319 F CA 57.699	327 P HA 4.427	336 N CB 38.809

336 N HA 4.799	344 G N 112.173	353 T CB 69.756	361 G HN 8.65
336 N HN 8.585	345 T CA 62.021	353 T HA 4.354	361 G N 113.17
336 N N 121.173	345 T CB 69.886	353 T HN 8.406	362 S CA 58.462
337 T CA 62.009	345 T HA 4.369	353 T N 115.547	362 S CB 63.915
337 T CB 69.74	345 T HN 8.235	354 N CA 53.291	362 S HA 4.486
337 T HA 4.382	345 T N 112.968	354 N CB 38.773	362 S HN 8.307
337 T HN 8.331	346 G CA 45.443	354 N HA 4.799	362 S N 115.813
337 T N 114.283	346 G HA2 4.025	354 N HN 8.671	363 T CA 62.116
338 S CA 58.654	346 G HA3 4.055	354 N N 121.472	363 T CB 69.724
338 S CB 63.743	346 G HN 8.655	355 T CA 62.044	363 T HA 4.337
338 S HA 4.537	346 G N 111.318	355 T CB 69.722	363 T HN 8.368
338 S HN 8.529	347 T CA 61.991	355 T HA 4.3	363 T N 116.423
338 S N 118.132	347 T CB 69.884	355 T HN 8.282	364 L CA 55.31
339 T CA 62.098	347 T HA 4.365	355 T N 114.007	364 L CB 42.225
339 T CB 69.74	347 T HN 8.241	356 G CA 45.29	364 L HA 4.272
339 T HA 4.378	347 T N 112.729	356 G HA2 3.84	364 L HN 8.233
339 T HN 8.314	348 G CA 45.305	356 G HA3 3.918	364 L N 124.146
339 T N 115.135	348 G HA2 3.896	356 G HN 8.452	365 F CA 58.142
340 G CA 45.423	348 G HA3 3.926	356 G N 110.892	365 F CB 39.589
340 G HA2 4.025	348 G HN 8.567	357 F CA 58.099	365 F HA 4.618
340 G HA3 4.025	348 G N 110.987	357 F CB 39.573	365 F HN 8.281
340 G HN 8.483	349 L CA 55.219	357 F HA 4.593	365 F N 120.491
340 G N 111.002	349 L CB 42.272	357 F HN 8.284	366 G CA 45.301
341 T CA 61.806	349 L HA 4.265	357 F N 120.453	366 G HA2 3.844
341 T CB 69.981	349 L HN 8.162	358 G CA 45.204	366 G HA3 3.914
341 T HA 4.312	349 L N 121.705	358 G HA2 3.813	366 G HN 8.377
341 T HN 8.178	350 F CA 58.059	358 G HA3 3.878	366 G N 110.454
341 T N 113.673	350 F CB 39.3	358 G HN 8.495	367 N CA 53.236
342 A CA 52.54	350 F HA 4.594	358 G N 111.149	367 N CB 38.773
342 A CB 19.095	350 F HN 8.44	359 A CA 52.369	367 N HA 4.693
342 A HA 4.285	350 F N 120.727	359 A CB 18.115	367 N HN 8.412
342 A HN 8.455	351 G CA 45.235	359 A HA 4.336	367 N N 119.779
342 A N 126.24	351 G HA2 3.822	359 A HN 8.194	368 N CA 53.502
343 F CA 58.08	351 G HA3 3.905	359 A N 124.039	368 N CB 38.72
343 F CB 39.623	351 G HN 8.395	360 V CA 62.848	368 N HA 4.658
343 F HA 4.582	351 G N 110.747	360 V CB 32.608	368 N HN 8.516
343 F HN 8.357	352 Q CA 55.797	360 V HA 4.053	368 N N 119.393
343 F N 119.988	352 Q CB 29.541	360 V HN 8.362	369 K CA 56.558
344 G CA 45.291	352 Q HA 4.404	360 V N 120.395	369 K CB 32.823
344 G HA2 3.886	352 Q HN 8.278	361 G CA 45.33	369 K HA 4.276
344 G HA3 3.977	352 Q N 119.926	361 G HA2 3.956	369 K HN 8.353
344 G HN 8.391	353 T CA 62.018	361 G HA3 4.003	369 K N 121.427

370 L CA 55.271	378 T HA 4.395
370 L CB 42.334	378 T HN 8.265
370 L HA 4.419	378 T N 116.425
370 L HN 8.335	379 S CA 58.215
370 L N 122.84	379 S CB 63.922
371 T CA 61.941	379 S HA 4.452
371 T CB 69.786	379 S HN 8.403
371 T HA 4.372	379 S N 118.851
371 T HN 8.261	380 A CA 50.67
371 T N 115.228	380 A CB 19.292
372 T CA 62.321	380 A HA 4.591
372 T CB 69.78	380 A HN 8.444
372 T HA 4.306	380 A N 127.553
372 T HN 8.136	381 P CA 63.111
372 T N 116.314	381 P CB 32.108
373 F CA 58.096	381 P HA 4.403
373 F CB 39.641	382 S CA 58.212
373 F HA 4.618	382 S CB 63.811
373 F HN 8.433	382 S HA 4.376
373 F N 123.032	382 S HN 8.499
374 G CA 45.268	382 S N 116.329
374 G HA2 3.858	383 F CA 57.804
374 G HA3 3.962	383 F CB 39.574
374 G HN 8.47	383 F HA 4.614
374 G N 111.523	383 F HN 8.475
375 S CA 58.351	383 F N 122.728
375 S CB 63.97	384 G CA 44.937
375 S HA 4.511	384 G HA2 3.771
375 S HN 8.315	384 G HA3 3.842
375 S N 115.874	384 G HN 8.477
376 S CA 58.538	384 G N 112.584
376 S CB 63.815	
376 S HA 4.568	
376 S HN 8.612	
376 S N 118.147	
377 T CA 62.034	
377 T CB 69.635	
377 T HA 4.449	
377 T HN 8.393	
377 T N 116.036	
378 T CA 61.856	
378 T CB 69.768	

Table S2 | Cryo-EM structure determination statistics.

Data collection				
Microscope	Titan Krios G2			
Voltage [keV]	300			
Detector	K3			
Magnification	81,000			
Pixel size [Å]	1.05			
Defocus range [µm]	-0.7 to -2.0			
Exposure time [s/frame]	2.557			
Number of frames	40			
Total dose [e ⁻ /Å ²]	40.94 (1.02 e ⁻ /Å ² /frame)			
Reconstruction				
Picked segments	356,482			
Box width [pixels]	250			
Inter-box distance [pixels]	13			
Polymorph type	pm1	pm2	pm3	pm4
PDB-ID	7Q64	7Q65	7Q66	7Q67
EMDB-ID	13851	13852	13853	13854
Final segments [no.]	71,697	11,085	28,360	12,674
Final resolution [Å] ^a	2.76	3.32	2.79	3.37
Sharpening B-factor [Å ²]	-92.90	-90.48	-80.93	-111.67
Symmetry imposed	C1	C1	C1	C1
Helical rise [Å]	4.65	4.68	4.67	2.37
Helical twist [°]	-3.09	-2.33	-3.29	178.49

^a The resolution was estimated from the value of the FSC curve for two independently refined half-maps at 0.143.

Table S3 | Model building statistics.

	pm1	pm2	pm3	pm4
PDB-ID	7Q64	7Q65	7Q66	7Q67
Model composition				
Chains	30	22	22	11
Non-hydrogen atoms	7,809	6,204	4,807	2,618
Protein residues	1,100	880	682	363
RMS deviations				
Bond lengths [Å]	0.01	0.02	0.02	0.02
Bond angles [°]	1.34	1.67	1.55	2.21
Validation				
Model resolution (Å)	3.02	3.27	2.88	3.71
MolProbity score	2.34	2.40	2.26	2.96
Clashscore	7.37	3.45	13.59	12.16
Ramachandran plot				
Outliers [%]	0.00	0.00	0.00	0.00
Allowed [%]	8.29	10.53	0.00	16.13
Favored [%]	91.71	89.47	100.00	83.87