

Table S1. ^2H relaxation data for ~1 mM ubiquitin at 30 °C. Relaxation time constants are given in ms. Errors are given in right columns.

	92 MHz T_1		92 MHz $T_{1\rho}$		115 MHz T_1		115 MHz $T_{1\rho}$	
I3 $^\gamma$	40.8	2.2	13.2	0.7	46.7	2.8	14.5	0.8
I3 $^\delta$	76.3	5.8	19.7	1.1	90.3	7.1	20.4	1.0
V5 $^{\gamma 1}$	40.4	2.0	13.9	0.7	47.5	2.9	15.2	0.9
V5 $^{\gamma 2}$	55.1	3.0	15.8	0.8	65.9	4.3	17.0	0.8
T7 $^\gamma$	38.6	1.7	15.3	0.7	45.9	2.5	17.6	0.9
L8 $^{\delta 1}$	49.6	1.8	32.0	1.3	52.9	1.9	28.9	1.1
L8 $^{\delta 2}$	50.7	1.7	32.8	1.2	55.9	2.1	35.6	1.4
T9 $^\gamma$	48.5	1.7	18.1	0.6	59.1	2.8	22.3	0.9
T12 $^\gamma$	42.2	2.1	14.6	0.7	48.2	2.9	14.3	0.8
I13 $^\gamma$	44.3	1.6	19.2	0.7	53.2	2.3	22.1	0.9
I13 $^\delta$	64.6	3.4	23.1	1.1	80.2	4.9	25.3	1.2
T14 $^\gamma$	38.3	1.7	15.6	0.7	44.5	2.3	15.9	0.8
L15 $^{\delta 1}$	53.0	6.4	19.8	2.1	54.3	7.9	22.1	3.0
L15 $^{\delta 2}$	55.6	4.1	21.7	1.5	63.0	5.2	20.0	1.4
V17 $^{\gamma 1}$	40.2	2.3	13.6	0.8	43.9	2.7	15.6	1.0
V17 $^{\gamma 2}$	27.2	1.8	12.4	1.0	29.6	2.1	12.5	1.0
T22 $^\gamma$	44.6	2.1	13.4	0.7	52.8	3.2	16.2	0.9
I23 $^\gamma$	50.1	3.0	14.7	0.8	55.2	3.8	15.1	0.9
I23 $^\delta$	59.0	3.6	22.5	1.3	66.7	4.5	25.4	1.4

V26 ^{γ1}	38.4	1.8	14.0	0.7	49.3	3.0	16.6	0.9
V26 ^{γ2}	60.2	3.7	14.5	0.7	78.5	6.7	16.8	1.0
I30 ^γ	47.7	2.4	14.6	0.7	57.8	3.7	15.8	0.8
I30 ^δ	67.8	5.2	17.6	1.1	86.7	7.7	21.1	1.3
I36 ^γ	26.9	1.4	12.2	0.7	29.6	1.5	13.8	0.8
I36 ^δ	66.2	3.3	23.2	1.0	78.5	4.1	23.4	0.9
L43 ^{δ1}	39.1	4.9	17.0	2.1	35.1	5.4	21.3	3.8
L43 ^{δ2}	52.7	3.7	21.5	1.4	56.0	4.1	19.5	1.2
I44 ^γ	39.8	2.0	16.5	0.9	50.7	3.3	18.4	1.1
I44 ^δ	74.3	4.1	41.3	2.5	86.1	5.8	33.1	1.8
A46 ^β	55.7	2.8	14.3	0.6	68.1	4.0	17.1	0.8
L50 ^{δ1}	51.5	7.3	15.0	1.8	64.5	12.0	18.1	2.8
L50 ^{δ2}	56.8	7.1	15.7	1.6	70.7	11.9	19.1	2.4
T55 ^γ	39.9	2.0	13.3	0.7	47.3	2.7	15.6	0.8
L56 ^{δ1}	33.8	3.6	16.9	2.1	36.0	5.0	17.2	2.5
L56 ^{δ2}	60.7	6.1	21.0	1.9	75.9	10.8	22.8	2.4
I61 ^γ	53.0	2.8	15.3	0.7	65.5	4.5	15.6	0.8
I61 ^δ	71.7	4.4	22.5	1.2	80.7	5.8	26.4	1.4
L67 ^{δ1}	41.7	1.5	25.2	1.0	45.5	2.0	27.4	1.3
L67 ^{δ2}	49.1	2.2	28.8	1.3	53.3	3.0	29.8	1.7
L69 ^{δ2}	44.7	3.7	19.5	1.6	55.7	4.0	22.8	1.5
V70 ^{γ2}	30.2	1.4	20.0	1.1	33.9	1.7	21.2	1.2

L71 ^{δ1}	46.8	1.6	26.9	1.0	49.8	2.0	30.6	1.3
L73 ^{δ1}	54.7	1.6	41.5	1.5	59.1	1.8	35.0	1.1
L73 ^{δ2}	61.4	1.8	40.1	1.3	64.8	2.1	41.1	1.5

Table S2. ^{13}C T_1 data for 2.2 mM ubiquitin at 30 °C. Errors are given in right columns.

	100 MHz		125 MHz		150 MHz		188 MHz	
I3 ^γ	0.3762	0.0043	0.4264	0.0059	0.4709	0.0030	0.5206	0.0042
V5 ^{γ1}	0.3923	0.0041	0.4509	0.0058	0.4907	0.0030	0.5469	0.0043
V5 ^{γ2}	0.5311	0.0056	0.6057	0.0077	0.6968	0.0046	0.7918	0.0060
L8 ^{δ1}	0.4360	0.0031	0.4727	0.0043	0.5097	0.0023	0.5393	0.0033
L8 ^{δ2}	0.4705	0.0032	0.5079	0.0044	0.5468	0.0024	0.5913	0.0036
I13 ^γ	0.4558	0.0043	0.5239	0.0061	0.5889	0.0034	0.6683	0.0046
L15 ^{δ1}	0.4290	0.0040	0.4708	0.0052	0.5118	0.0028	0.5632	0.0041
L15 ^{δ2}	0.5348	0.0041	0.6067	0.0062	0.6485	0.0034	0.7233	0.0045
V17 ^{γ1}	0.3521	0.0041	0.3982	0.0054	0.4386	0.0027	0.4810	0.0039
V17 ^{γ2}	0.2466	0.0035	0.2756	0.0049	0.3001	0.0022	0.3405	0.0038
I23 ^γ	0.4563	0.0051	0.5277	0.0069	0.5901	0.0039	0.6523	0.0052
V26 ^{γ1}	0.3836	0.0041	0.4347	0.0056	0.4826	0.0029	0.5409	0.0041
V26 ^{γ2}	0.5745	0.0064	0.6824	0.0093	0.7795	0.0055	0.8985	0.0075
I30 ^γ	0.4571	0.0052	0.5412	0.0074	0.5877	0.0039	0.6773	0.0052
I36 ^γ	0.2632	0.0033	0.2866	0.0048	0.3135	0.0022	0.3507	0.0036
L43 ^{δ1}	0.3352	0.0036	0.3676	0.0046	0.3987	0.0023	0.4372	0.0035
L43 ^{δ2}	0.4923	0.0042	0.5604	0.0059	0.6127	0.0033	0.6792	0.0045
I44 ^γ	0.3868	0.0046	0.4380	0.0062	0.4818	0.0032	0.5427	0.0044
A46 ^β	0.5476	0.0059	0.6421	0.0085	0.7142	0.0048	0.8055	0.0064

L50 ^{δ1}	0.4565	0.0049	0.5267	0.0067	0.5829	0.0037	0.6555	0.0049
L50 ^{δ2}	0.6409	0.0070	0.7673	0.0108	0.8595	0.0066	1.0040	0.0090
L56 ^{δ1}	0.3020	0.0034	0.3369	0.0047	0.3615	0.0022	0.3995	0.0035
L56 ^{δ2}	0.5816	0.0052	0.6570	0.0074	0.7347	0.0043	0.8094	0.0056
I61 ^γ	0.5215	0.0058	0.6138	0.0080	0.6868	0.0046	0.7725	0.0060
L67 ^{δ1}	0.3769	0.0029	0.4024	0.0040	0.4281	0.0021	0.4644	0.0031
L67 ^{δ2}	0.4299	0.0033	0.4684	0.0046	0.4984	0.0024	0.5293	0.0035
L69 ^{δ2}	0.4241	0.0042	0.4778	0.0055	0.5259	0.0030	0.5742	0.0041
V70 ^{γ2}	0.2871	0.0032	0.3142	0.0045	0.3351	0.0022	0.3738	0.0035
L71 ^{δ1}	0.4220	0.0030	0.4589	0.0041	0.4794	0.0021	0.5230	0.0033
L73 ^{δ1}	0.4983	0.0028	0.5355	0.0039	0.5694	0.0022	0.6065	0.0032
L73 ^{δ2}	0.5612	0.0033	0.6030	0.0045	0.6383	0.0025	0.6845	0.0035

Table S3. ^{13}C NOE data for 2.2 mM ubiquitin at 30 °C. Errors are given in right columns.

	125 MHz		150 MHz		188 MHz	
I3 ^γ	2.330	0.037	2.468	0.034	2.533	0.028
V5 ^{γ1}	2.342	0.036	2.552	0.035	2.612	0.028
V5 ^{γ2}	2.260	0.033	2.297	0.029	2.420	0.025
L8 ^{δ1}	2.484	0.027	2.564	0.024	2.529	0.020
L8 ^{δ2}	2.475	0.027	2.520	0.023	2.504	0.019
I13 ^γ	2.212	0.028	2.238	0.025	2.311	0.021
L15 ^{δ1}	2.319	0.032	2.590	0.031	2.480	0.025
L15 ^{δ2}	2.437	0.030	2.438	0.027	2.538	0.023
V17 ^{γ1}	2.444	0.039	2.518	0.034	2.559	0.028
V17 ^{γ2}	2.430	0.043	2.570	0.039	2.616	0.031
I23 ^γ	2.320	0.036	2.442	0.034	2.515	0.028
V26 ^{γ1}	2.383	0.035	2.413	0.033	2.492	0.026
V26 ^{γ2}	2.116	0.031	2.247	0.030	2.460	0.027
I30 ^γ	2.258	0.035	2.374	0.033	2.562	0.028
I36 ^γ	2.417	0.039	2.472	0.034	2.525	0.028
L43 ^{δ1}	2.455	0.035	2.540	0.031	2.539	0.026
L43 ^{δ2}	2.447	0.033	2.347	0.027	2.421	0.023
I44 ^γ	2.239	0.034	2.315	0.032	2.406	0.026
A46 ^β	2.217	0.032	2.349	0.030	2.429	0.024

L50 ^{δ1}	2.343	0.037	2.326	0.030	2.447	0.027
L50 ^{δ2}	2.160	0.034	2.275	0.032	2.337	0.026
L56 ^{δ1}	2.501	0.038	2.548	0.033	2.547	0.027
L56 ^{δ2}	2.315	0.032	2.442	0.029	2.507	0.024
I61 ^γ	2.153	0.032	2.339	0.031	2.452	0.026
L67 ^{δ1}	2.568	0.032	2.607	0.028	2.599	0.022
L67 ^{δ2}	2.493	0.031	2.591	0.028	2.573	0.022
L69 ^{δ2}	2.350	0.033	2.460	0.029	2.518	0.025
V70 ^{γ2}	2.412	0.034	2.543	0.033	2.480	0.026
L71 ^{δ1}	2.558	0.028	2.612	0.025	2.603	0.021
L73 ^{δ1}	2.499	0.024	2.545	0.022	2.526	0.018
L73 ^{δ2}	2.573	0.024	2.484	0.021	2.451	0.018