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Supplemental information

Fano resonance line shapes in the Raman spectra of tubulin and micro-tubules reveal quantum effects

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Table S1: Best Model Spectral Fit Parameters for Tubulin in Powdered Form

wavenumber (cm-1)	I0	-1/q	q	Gamma
519.9682331	842.5098391	0.04077851	-24.52272042	11.34384404
544.7770152	1033.330954	0.055522415	-18.01074395	15.10449607
587.4067025	348.0029061	0.065338441	-15.30492593	13.72297555
604.3307658	256.591947	0.060336249	-16.57378469	10.83170764
620.634206	223.6175945	0.061617249	-16.22922179	8.858177257
636.9806264	396.2976762	0.06790355	-14.72677054	5.722265454
675.51271	6032.484163	0.025663125	-38.96641582	7.136481877
710.719557	1692.238098	-0.011914456	83.93165412	6.829705009
742.1197312	288.4670252	0.066369074	-15.06725858	8.070812963
833.0286618	1872.192202	-0.164585452	6.075871153	15.10704951
906.2329997	22.20252708	-0.042489076	23.53546121	1.739186976
921.5160775	305.9177966	-0.042067726	23.7711922	7.198725421
936.5220696	342.6630162	-0.019210234	52.05558662	7.667886366
950.160757	555.0183554	0.009536202	-104.8635505	5.510466445
1001.703824	1092.009718	-0.033596126	29.76533663	6.552897308
1013.95191	602.3586817	-0.038446316	26.01029446	8.678642131
1038.689992	1793.168195	-0.047817115	20.9130141	15.11336412
1070.104449	1232.483808	-0.036972351	27.04723862	18.86166008
1105.332691	525.2338607	-0.01826726	54.74274741	11.83649458
1128.643887	1212.943529	-0.012979349	77.04546661	16.98125217
1205.824398	262.7329802	-0.038924561	25.69072006	5.343759472
1258.553993	599.6986452	-0.025236573	39.6250315	28.73267759
1327.553995	852.6590456	-0.007045843	141.9276586	22.43922218
1360.731008	431.0174794	0.008269953	-120.9196715	19.77129775
1387.016284	271.2019552	0.014998623	-66.67278723	16.29574227
1416.510014	1228.002581	0.021612822	-46.2688306	10.18291729
1457.493181	1430.083862	0.086331123	-11.58330814	13.80273412

Table S2: Best Model Spectral Fit Parameters for Tubulin in Solution Form

wavenumber (cm-1)	I0	-1/q	q	Gamma
521.9645279	163.8559694	0.094519533	-10.57982375	21.98524706
526.7982729	71.05678957	0.01941091	-51.51741984	1.000689643
541.638737	100.9468365	0.029058758	-34.41303307	7.390725293
553.711286	232.2348967	0.06240612	-16.02406943	13.23335634
564.4843611	62.60902648	0.019647503	-50.89705292	2.769760606
578.871516	102.2784281	0.071506072	-13.98482635	13.02620387
592.6492971	181.8877915	0.105278358	-9.498628389	17.38309626
620.1390477	110.6193643	0.133106571	-7.512777112	15.19950921
639.0658295	117.5304571	0.108472771	-9.218903424	7.020480729
651.9958218	34.88054467	0.036316359	-27.53580005	1.001119489
676.9404998	1392.585348	0.061333261	-16.30436705	5.90513194
711.9375545	285.0530492	-0.008693542	115.0279138	7.763379474
741.0210073	55.06133122	0.00630921	-158.4984491	1.405910939
761.6170659	25.88683833	0.093621791	-10.68127398	5.486369809
777.0090221	32.77038642	0.022691481	-44.06940208	1.010397011
814.1949965	12.20626429	-0.067568848	14.79971954	1.135209059
831.5585998	227.401632	-0.190956233	5.23680209	13.94116602
876.4460002	23.76885567	0.073595859	-13.58772102	1.00122416
912.7472872	19.05766561	-0.144391086	6.925635285	6.375465552
927.6642445	88.56629334	-0.137940046	7.249526363	12.35933481
948.0872382	188.415638	-0.048718786	20.52596302	8.556597639
983.7622598	36.18504206	-0.016703803	59.86660642	4.99377664
1007.351499	316.787056	-0.113948713	8.775877969	19.0912025
1043.332	271.7787951	-0.036540388	27.36697815	10.03123325
1068.63307	421.4007851	-0.077804623	12.85270671	21.97398448
1085.507043	65.85010211	-0.013711508	72.93143832	3.554708737
1100.577343	217.7862604	-0.039744169	25.16092361	12.39510721
1110.975897	91.98950463	-0.007392421	135.273681	1.012795477
1121.292931	55.44577721	-0.037569596	26.61726786	12.72167211
1127.704904	245.0192876	-0.067226229	14.87514643	22.86769617
1171.572587	26.51144188	-0.013875199	72.0710384	3.56433054
1186.551667	33.2214219	0.002004392	-498.9044059	3.783129405
1205.973428	38.1045718	-0.028735002	34.80076319	5.793634549
1229.662406	54.80227911	0.007648917	-130.7374626	1.097800932
1247.173372	47.07070994	-0.016602827	60.23070649	14.47818684
1262.059186	46.62525192	0.004599444	-217.4175835	1.152445646
1272.094482	58.16831749	-0.018734607	53.37715384	11.88975975
1298.503008	10.76867117	-0.02559719	39.06678819	18.38950221
1320.813111	48.20391084	-0.00865858	115.4923787	4.594779479
1335.396273	137.8327249	-0.038898885	25.70767774	31.69947651
1366.292882	49.06270377	0.000928321	-1077.213593	1.418991195
1375.882646	48.33394004	-0.000213088	4692.896831	2.820790144
1390.704896	50.32051571	-0.010457643	95.62384182	12.18220345
1418.125778	260.4861333	-0.004214625	237.2690334	9.151470362
1455.14351	196.5719308	0.020124676	-49.69024098	9.977267203
1469.081921	48.22370014	0.02284172	-43.77954024	4.757268481

Table S3: Best Model Spectral Fit Parameters for Microtubules in Powdered Form

wavenumber (cm-1)	I0	-1/q	q	Gamma
522.0651652	3373.956544	0.040318464	-24.80253216	11.11603004
546.5822496	3752.007133	0.04760544	-21.00600268	13.53084256
590.5414268	1516.814804	0.050279233	-19.8889271	12.70314663
609.0030366	982.2566171	0.045921531	-21.77627745	9.750977613
621.2340619	649.3304947	0.026226697	-38.12908656	4.968827447
637.6781825	1719.983462	0.061333739	-16.30423999	7.6732307
677.3258456	23544.84032	0.018375787	-54.41943793	6.436003593
712.6385223	5533.610351	-0.024625096	40.60897874	6.459398023
743.9094781	1242.869845	0.044560286	-22.44150767	9.009602116
834.7641222	6819.473036	-0.137510798	7.272156184	15.14303544
929.2931283	1232.67605	-0.017794722	56.19643847	11.83833963
950.5886732	1895.795061	0.023473121	-42.60191902	6.086725265
1002.480263	3739.986953	-0.013546061	73.8221982	4.715320531
1013.944484	2731.86616	-0.025362507	39.42827892	9.688156784
1041.001433	6436.483138	-0.023107665	43.27568363	13.90460509
1069.933224	4233.645639	-0.019124357	52.28933971	18.15239555
1125.872472	4579.690074	0.014920587	-67.02149185	23.49022518
1207.119804	1037.628556	-0.02182023	45.82903113	6.251082265
1261.465834	2316.152901	0.01550493	-64.49561527	32.55975729
1320.310357	1670.473614	0.017959153	-55.68191328	13.32048665
1339.434553	1691.1208	0.024278785	-41.18822256	16.84028825
1372.309447	1841.751427	0.05363778	-18.64357548	27.40693614
1417.801676	3704.255424	0.052276684	-19.12898683	10.14526705
1459.11642	4452.112063	0.105115907	-9.51330801	14.1762112

Table S4: Best Model Spectral Fit Parameters for Microtubules in Solution Form

wavenumber (cm-1)	I0	-1/q	q	Gamma
520.1883611	6204.432166	0.040698815	-24.57073996	12.66171233
544.9380033	6657.048878	0.047031366	-21.26240603	17.88377405
593.9489569	5176.601787	0.163616713	-6.111845066	35.1577716
642.5767084	4470.2725	0.311668154	-3.208540838	19.8005484
676.9137529	47173.94094	0.02661388	-37.57437848	5.89424527
711.7941487	10965.75315	-0.0202734	49.32571744	9.06659825
740.1215139	3208.242724	-0.195285443	5.120709381	20.24072389
781.7967939	1515.74358	-0.12798165	7.813620156	41.74407067
830.999191	7785.692657	-0.14955578	6.68646842	14.5075804
861.6416749	3218.354258	0.137698558	-7.262240175	27.66460791
921.030107	6097.563595	-0.052353355	19.10097261	36.37672734
951.0984703	3291.875611	0.089974462	-11.11426485	6.185431822
1001.615034	2836.284763	-0.024678859	40.52051191	2.388340833
1010.298455	7640.047873	-0.004314023	231.8021948	18.00024574
1043.42772	7927.828394	0.00077258	-1294.364338	12.04547945
1070.734597	8409.892754	-0.014733983	67.87031042	23.36183829
1103.669874	2201.132739	-0.021647496	46.19471924	7.218527631
1125.899883	6945.082615	-0.073298274	13.64288605	23.9177208
1206.45793	1439.755171	0.103453698	-9.666160025	6.821574547
1267.851275	2623.452544	0.20584533	-4.858016453	35.72003289
1323.769107	2759.818044	-0.05755087	17.37593194	20.19304577
1373.881839	2998.74537	0.189721313	-5.270889096	49.99999996
1418.295679	6508.33869	0.087300814	-11.45464692	8.350317449
1458.108093	5951.711826	0.120574267	-8.293643618	16.8774971

