

Heavy Rydberg States: extremely large amplitude vibrations

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TABLE I. Table of energy, effective quantum number, and width at half maximum in cm^{-1} for the resonances $n = 130 - 190$ for $J = 0 - 2$. The resonances are calculated from the spectrum calculated from the total eigenphase of scattering matrix \mathbf{S} .

$J = 0$			$J = 1$			$J = 2$		
E (au)	n	width (cm^{-1})	E (au)	n	width (cm^{-1})	E (au)	n	width (cm^{-1})
-0.554933	129.99	22.167 ^a	-0.554889	130.09	32.512 ^a	-0.554781	130.35	15.782 ^a
-0.554634	130.71	25.821	-0.554616	130.75	26.580	-0.554563	130.88	26.506
-0.554260	131.63	22.228	-0.554246	131.66	22.211	-0.554218	131.73	23.705
-0.553887	132.56	19.507	-0.553873	132.60	20.244	-0.553849	132.66	20.963
-0.553518	133.51	18.364	-0.553505	133.54	18.349	-0.553482	133.60	19.055
-0.553157	134.45	17.979	-0.553144	134.49	17.965	-0.553121	134.55	17.941
-0.552804	135.40	16.899	-0.552791	135.43	16.890	-0.552769	135.49	17.568
-0.552458	136.34	16.550	-0.552445	136.38	17.228	-0.552423	136.44	16.516
-0.552116	137.30	16.885	-0.552104	137.33	16.872	-0.552082	137.39	16.850
-0.551781	138.25	17.198	-0.551769	138.29	17.188	-0.551748	138.35	16.504
-0.551450	139.21	17.493	-0.551441	139.24	17.483	-0.551420	139.30	16.812
-0.551126	140.18	17.135	-0.551117	140.20	17.758	-0.551097	140.26	17.103
-0.550808	141.14	16.787	-0.550799	141.16	17.398	-0.550780	141.22	16.756
-0.550497	142.10	16.448	-0.550488	142.13	17.047	-0.550469	142.19	16.418
-0.550192	143.06	16.119	-0.550181	143.10	16.705	-0.550165	143.15	16.684
-0.549893	144.02	15.798	-0.549882	144.06	15.786	-0.549864	144.12	16.352
-0.549600	144.99	16.057	-0.549589	145.02	15.474	-0.549571	145.08	15.455
-0.549310	145.96	15.178	-0.549302	145.98	15.170	-0.549285	146.04	15.151
-0.549029	146.92	14.882	-0.549019	146.95	14.322	-0.549004	147.01	14.304
-0.548750	147.89	14.051	-0.548743	147.92	14.583	-0.548726	147.98	14.565
-0.548480	148.85	14.309	-0.548470	148.89	13.771	-0.548455	148.94	13.754
-0.548212	149.82	13.514	-0.548205	149.85	13.505	-0.548188	149.91	14.009
-0.547951	150.79	13.255	-0.547942	150.82	13.248	-0.547926	150.88	13.232
-0.547694	151.76	13.002	-0.547685	151.79	12.996	-0.547669	151.85	12.980
-0.547441	152.73	12.266	-0.547434	152.75	12.749	-0.547419	152.82	12.734
-0.547193	153.70	12.035	-0.547186	153.73	12.509	-0.547171	153.79	12.494
-0.546950	154.67	11.810	-0.546943	154.70	12.275	-0.546928	154.76	12.261
-0.546711	155.64	11.590	-0.546704	155.67	12.047	-0.546690	155.73	12.033
-0.546476	156.61	11.376	-0.546468	156.65	11.369	-0.546454	156.71	11.811
-0.546246	157.58	11.167	-0.546238	157.62	11.160	-0.546224	157.68	11.147
-0.546019	158.56	10.961	-0.546013	158.59	10.956	-0.545999	158.65	10.943
-0.545797	159.53	10.762	-0.545789	159.57	10.326	-0.545775	159.63	10.314
-0.545577	160.51	10.145	-0.545571	160.54	10.561	-0.545558	160.60	10.549
-0.545364	161.48	9.961	-0.545356	161.52	9.956	-0.545343	161.58	9.945
-0.545152	162.46	9.784	-0.545146	162.49	9.777	-0.545133	162.55	9.766
-0.544946	163.44	9.609	-0.544938	163.47	9.604	-0.544926	163.53	9.594
-0.544741	164.42	9.438	-0.544734	164.45	9.434	-0.544722	164.51	9.423
-0.544541	165.39	8.886	-0.544535	165.42	9.267	-0.544523	165.48	9.257
-0.544344	166.37	8.730	-0.544338	166.40	8.726	-0.544326	166.46	8.716
-0.544150	167.35	8.577	-0.544145	167.38	8.573	-0.544133	167.44	8.564
-0.543960	168.33	8.428	-0.543954	168.36	8.424	-0.543943	168.42	8.415
-0.543772	169.31	8.283	-0.543768	169.34	8.279	-0.543756	169.40	8.270
-0.543589	170.29	7.787	-0.543584	170.32	8.137	-0.543573	170.38	8.128
-0.543408	171.27	7.655	-0.543403	171.30	7.998	-0.543392	171.36	7.990
-0.543230	172.25	7.866	-0.543226	172.28	7.520	-0.543215	172.34	7.854
-0.543056	173.23	7.733	-0.543051	173.26	7.393	-0.543041	173.32	7.386
-0.542884	174.21	7.273	-0.542878	174.25	7.269	-0.542868	174.31	7.262
-0.542715	175.19	7.151	-0.542710	175.23	6.823	-0.542699	175.29	7.141
-0.542548	176.18	7.033	-0.542544	176.21	7.028	-0.542533	176.27	7.021
-0.542385	177.16	6.602	-0.542379	177.19	6.913	-0.542369	177.25	6.905
-0.542223	178.15	6.802	-0.542219	178.17	6.490	-0.542209	178.23	6.483
-0.542065	179.13	6.386	-0.542061	179.15	6.687	-0.542051	179.21	6.680
-0.541910	180.11	6.582	-0.541904	180.14	6.279	-0.541895	180.20	6.273
-0.541756	181.10	6.181	-0.541752	181.12	6.178	-0.541742	181.18	6.172
-0.541605	182.08	6.081	-0.541600	182.11	6.078	-0.541591	182.17	6.072
-0.541456	183.06	5.983	-0.541452	183.09	5.696	-0.541443	183.15	5.975
-0.541309	184.05	5.607	-0.541305	184.08	5.885	-0.541297	184.14	5.879
-0.541166	185.03	5.794	-0.541161	185.07	5.791	-0.541152	185.13	5.785
-0.541024	186.02	5.703	-0.541020	186.05	5.428	-0.541012	186.11	5.423
-0.540884	187.01	5.346	-0.540880	187.03	5.610	-0.540872	187.09	5.605
-0.540748	187.99	5.262	-0.540743	188.02	5.260	-0.540734	188.08	5.255
-0.540612	188.98	5.180	-0.540607	189.01	5.178	-0.540600	189.06	5.173
-0.540478	189.96	4.845	-0.540475	189.99	5.097	-0.540467	190.05	5.092

^a Width inaccurate due to strong background phase shift.

TABLE II. (Continued) Table of energy, effective quantum number, and width at half maximum in cm^{-1} for the resonances $n = 191 - 230$ for $J = 0 - 2$. The resonances are calculated from the spectrum calculated from the total eigenphase of scattering matrix \mathbf{S} .

$J = 0$			$J = 1$			$J = 2$		
E (au)	n	width (cm^{-1})	E (au)	n	width (cm^{-1})	E (au)	n	width (cm^{-1})
-0.540347	190.95	5.021	-0.540344	190.98	4.768	-0.540336	191.04	4.763
-0.540218	191.94	4.944	-0.540214	191.97	4.695	-0.540206	192.03	4.690
-0.540091	192.92	4.868	-0.540087	192.96	4.866	-0.540079	193.02	4.862
-0.539966	193.91	4.794	-0.539962	193.94	4.792	-0.539954	194.00	4.788
-0.539842	194.90	4.722	-0.539838	194.93	4.720	-0.539831	194.99	4.716
-0.539721	195.89	4.418	-0.539716	195.92	4.649	-0.539709	195.98	4.645
-0.539601	196.87	4.352	-0.539597	196.91	4.579	-0.539590	196.96	4.575
-0.539483	197.86	4.287	-0.539479	197.90	4.511	-0.539472	197.95	4.507
-0.539366	198.85	4.224	-0.539362	198.89	4.444	-0.539356	198.94	4.440
-0.539252	199.84	4.161	-0.539248	199.87	4.378	-0.539242	199.93	4.374
-0.539139	200.83	4.100	-0.539135	200.86	4.098	-0.539128	200.92	4.310
-0.539028	201.82	4.040	-0.539024	201.85	4.038	-0.539017	201.91	4.035
-0.538918	202.80	3.982	-0.538914	202.84	3.979	-0.538907	202.90	3.976
-0.538810	203.79	3.924	-0.538806	203.83	3.922	-0.538800	203.89	3.918
-0.538702	204.79	3.867	-0.538700	204.82	3.865	-0.538693	204.88	3.862
-0.538597	205.78	3.811	-0.538595	205.80	3.810	-0.538588	205.86	3.807
-0.538494	206.77	3.757	-0.538491	206.79	3.756	-0.538485	206.85	3.752
-0.538392	207.76	3.633	-0.538389	207.78	3.632	-0.538383	207.84	3.628
-0.538291	208.74	3.582	-0.538288	208.78	3.580	-0.538282	208.84	3.577
-0.538192	209.74	3.531	-0.538189	209.76	3.530	-0.538183	209.82	3.527
-0.538094	210.72	3.482	-0.538091	210.76	3.480	-0.538085	210.82	3.477
-0.537997	211.72	3.433	-0.537995	211.75	3.431	-0.537989	211.80	3.429
-0.537902	212.71	3.385	-0.537899	212.74	3.383	-0.537893	212.80	3.381
-0.537808	213.70	3.338	-0.537806	213.73	3.337	-0.537800	213.79	3.334
-0.537716	214.69	3.292	-0.537713	214.72	3.291	-0.537707	214.78	3.288
-0.537624	215.68	3.247	-0.537622	215.71	3.246	-0.537616	215.77	3.243
-0.537534	216.67	3.203	-0.537531	216.70	3.201	-0.537526	216.76	3.199
-0.537445	217.66	3.159	-0.537443	217.69	2.992	-0.537438	217.75	2.989
-0.537358	218.65	2.952	-0.537355	218.68	3.115	-0.537350	218.74	3.112
-0.537271	219.65	3.074	-0.537268	219.68	2.911	-0.537263	219.74	2.909
-0.537185	220.64	2.873	-0.537183	220.67	3.032	-0.537178	220.73	3.029
-0.537102	221.63	2.835	-0.537099	221.66	2.991	-0.537094	221.72	2.989
-0.537018	222.62	2.953	-0.537016	222.65	2.796	-0.537010	222.72	2.794
-0.536936	223.62	2.760	-0.536934	223.64	2.912	-0.536929	223.70	2.910
-0.536855	224.61	2.742	-0.536853	224.64	2.741	-0.536848	224.70	2.739
-0.536775	225.60	2.706	-0.536773	225.63	2.705	-0.536768	225.69	2.703
-0.536696	226.59	2.671	-0.536694	226.62	2.670	-0.536690	226.68	2.794
-0.536619	227.58	2.761	-0.536616	227.62	2.760	-0.536611	227.68	2.633
-0.536541	228.58	2.601	-0.536539	228.61	2.600	-0.536535	228.67	2.598
-0.536466	229.57	2.568	-0.536464	229.60	2.567	-0.536459	229.66	2.565
-0.536391	230.56	2.535	-0.536389	230.59	2.534	-0.536384	230.66	2.653
-0.536317	231.56	2.502	-0.536315	231.59	2.501	-0.536310	231.65	2.500
-0.536244	232.55	2.471	-0.536242	232.58	2.470	-0.536237	232.64	2.468
-0.536172	233.54	2.439	-0.536170	233.57	2.438	-0.536165	233.64	2.552
-0.536101	234.54	2.408	-0.536098	234.57	2.407	-0.536094	234.63	2.405