ON SOME PERTURBED SERIES OF NEUTRAL STRONTIUM

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SUPPLEMENTARY DATA

Tables of Rydberg Energy Levels and Radiative Lifetimes Up To n=50:

Table I. The perturbed series and perturbing levels of Sr I.

Spectral Perturbed series	*Foreign perturbing levels*	*J*	*Energy [49] (cm^{-1})*
$[Kr]5sns\ (n \geq 6)\ ^1S_0$	$[Kr]5s5p2\ ^3P$	0	35193.442
	$[Kr]5s5p2\ ^1S$	0	37160.234
$[Kr]5snp\ (n \geq 5)\ ^1P^o_1$	$[Kr]5s4d5p\ ^3D^o$	1	36264.151
	$[Kr]5s4d5p\ ^3P^o$	1	37302.731
	$[Kr]5s4d5p\ ^1P^o$	1	41172.054
$[Kr]5snd\ (n \geq 6)\ ^1D_2$	$[Kr]5s5p2\ ^1D$	2	36960.842
	$[Kr]5s9d\ ^3D$	2	43804.89
	$[Kr]5s10d\ ^3D$	2	44286.91
	$[Kr]5s4d2\ ^3P$	2	44729.627
	$[Kr]5s14d\ ^3D$	2	45171.49
	$[Kr]5s15d\ ^3D$	2	45276.65
	$[Kr]5s16d\ ^3D$	2	45350.35
	$[Kr]5s17d\ ^3D$	2	45420.84
	$[Kr]5s18d\ ^3D$	2	45479.88
$[Kr]5snd\ (n \geq 5)\ ^3D_2$	$[Kr]5s5p2\ ^3P$	2	35674.637
	$[Kr]5s4d2\ ^3P$	2	44729.627
$[Kr]5snf\ (n \geq 5)\ ^1F^o_3$	$[Kr]5s4d5p\ ^3F^o$	3	33589.709
	$[Kr]5s4d5p\ ^3D^o$	3	36559.492

Table II. The Calculated coefficients given in equations 7 and 8 for both perturbed and unperturbed series

Spectral energy series	*[Kr]5sns $^1S_0$ (6≤ n ≤ 50)*	*[Kr]5sns $^3S_1$ (6≤ n ≤ 50)*	*[Kr]5snp $^1P^o_1$ (5≤ n ≤ 50)*	*[Kr]5snd $^1D_2$ (6≤ n ≤ 50)*	*[Kr]5snd $^3D_1$ (4≤ n ≤ 50)*	*[Kr]5snd $^3D_2$ (5≤ n ≤ 50)*	*[Kr]5snd $^3D_3$ (5≤ n ≤ 50)*	*[Kr]5snf $^1F^o_3$ (4≤ n ≤ 50)*	*[Kr]5snf $^3F^o_2$ (4≤ n ≤ 50)*	*[Kr]5snf $^3F^o_3$ (4≤ n ≤ 50)*	*[Kr]5snf $^3F^o_4$ (4≤ n ≤ 50)*
a_1	3.292	3.368	2.631	0.657	1.814	1.862	1.834	-2.417	0.112	0.112	0.113
a_2	0.048	0.563	-9.358	-83.958	-0.406	-3.905	-1.943	-22.546	-0.370	-0.408	-0.466
a_3	6.217	-1.277	-209.117	2103.955	5.131	84.410	31.983	-111.833	1.090	2.074	3.195
a_4	-52.406	7.310	1158.626	-36519.092	-1.720	-540.596	-134.319	-2569.361	-6.384	-14.504	-22.176
b_1	3.70E-04		0.081	-0.145		3.02E-04		-0.358			
b_2	0.002		-0.083	-1.82E-06		6.52E-04		0.058			
b_3			4.92E-04	-2.49E-06							
b_4				1.28E-05							
b_5				5.05E-07							
b_6				3.50E-06							
b_7				2.27E-05							
b_8				4.87E-06							
b_9				1.21E-06							
δ_0	3.325	3.451	2.872	1.793	2.012	1.829	1.825	-0.143	0.091	0.091	0.090

Table III. Spectral Energies for *[Kr] 5sns $^1S_0$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.

n^*	Spectral Energies			$\Delta T=T_{Exp}-T_{per}$	n^*	Spectral Energies		
	T_{Exp} [49]	T_{unper}	T_{per}	cm^{-1}		T_{Exp} [49]	T_{unper}	T_{per}
2.67	30591.825	30591.825	30591.825	0.00	25.73		45768.6741	45766.45
3.83	38444.013	38444.013	38444.013	0.00	26.73		45780.6186	45778.62
4.74	41052.324	41052.324	41052.324	0.00	27.73		45791.2993	45789.50
5.74	42596.572	42596.572	42596.572	0.00	28.73		45800.8887	45799.26
6.73	43512.1658	43527.5198	43512.1658	0.00	29.73		45809.5307	45808.05
7.73	44097.1224	44118.8382	44097.1224	0.00	30.73		45817.3461	45816.00
8.73	44492.8348	44515.4340	44493.1477	-0.31	31.73		45824.4373	45823.21
9.73	44773.6707	44794.0452	44773.5882	0.08	32.73		45830.8911	45829.77
10.73	44979.4540	44997.3146	44979.3948	0.06	33.73		45836.7817	45835.75
11.73	45134.9242	45150.2583	45134.8740	0.05	34.73		45842.1728	45841.23
12.73	45255.2295	45268.2957	45255.1887	0.04	35.73		45847.1194	45846.25
13.73	45350.2296	45361.3462	45350.1942	0.04	36.73		45851.6691	45850.86
14.73	45426.5505	45436.0283	45426.5211	0.03	37.73		45855.8632	45855.12
15.73	45488.7860	45496.8977	45488.7628	0.02	38.73		45859.7379	45859.05
16.73	45540.2024	45547.1755	45540.1830	0.02	39.73		45863.3248	45862.68
17.73		45589.1923	45583.1520		40.73		45866.6518	45866.06
18.73		45624.6694	45619.4253		41.73		45869.7433	45869.19
19.73		45654.9006	45650.3249		42.73		45872.6211	45872.10
20.73		45680.8741	45676.8621		43.73		45875.3044	45874.82
21.73		45703.3551	45699.8210		44.73		45877.8105	45877.36
22.73		45722.9442	45719.8172		45.73		45880.1545	45879.73
23.73		45740.1178	45737.3392		46.73		45882.3501	45881.95
24.73		45755.2581	45752.7792					

Table IV. Spectral Energies for *[Kr] 5sns $^3S_1$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with unperturbed levels.

n^*	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$	n^*	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$
	T_{Exp} [49]	T_{unper}	cm^{-1}		T_{Exp} [49]	T_{unper}	cm^{-1}
2.55	29038.773	29038.773	0.00	25.63		45765.16	
3.59	37424.675	37424.675	0.00	26.63		45777.47	
4.61	40761.372	40761.372	0.00	27.63		45788.47	
5.61	42451.16	42451.16	0.00	28.63		45798.34	
6.62	43427.44	43427.66	0.22	29.63		45807.22	
7.62	44043.35	44043.43	0.08	30.63		45815.25	
8.62	44456.25	44456.84	0.59	31.63		45822.53	
9.63		44747.86		32.63		45829.15	
10.63		44960.48		33.63		45835.18	
11.63		45120.56		34.63		45840.71	
12.63		45244.09		35.63		45845.77	
13.63		45341.41		36.63		45850.42	
14.63		45419.45		37.63		45854.71	
15.63		45482.98		38.63		45858.67	
16.63		45535.40		39.63		45862.34	

17.63	45579.14	40.63	45865.73
18.63	45616.04	41.63	45868.89
19.63	45647.43	42.63	45871.82
20.63	45674.37	43.63	45874.56
21.63	45697.66	44.63	45877.11
22.63	45717.94	45.63	45879.50
23.63	45735.69	46.63	45881.74
24.63	45751.32		

Table V. Spectral Energies for *[Kr] 5snp $^1P^o_1$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.

*n**	Spectral Energies			$\Delta T=T_{Exp}-T_{per}$	*n**	Spectral Energies		
	T_{Exp} [49]	T_{unper}	T_{per}	cm^{-1}		T_{Exp} [49]	T_{unper}	T_{per}
2.13	21698.452	21698.452	21698.452	0.00	25.25		45797.6606	45760.12
3.05	34098.404	34098.404	34098.404	0.00	26.25		45806.7287	45772.97
3.95	38906.858	38906.858	38906.858	0.00	27.25		45814.8985	45784.43
5.62	42462.136	42462.136	42462.136	0.00	28.25		45822.2867	45794.70
6.49	43328.04	43858.20	43328.04	0.00	29.25		45828.9911	45803.94
7.42	43938.201	44509.675	43938.201	0.00	30.25		45835.0947	45812.27
8.37	44366.42	44870.34	44366.42	0.00	31.25		45840.6680	45819.82
9.34	44675.737	45095.730	44674.465	1.27	32.25		45845.7713	45826.68
10.32	44903.5	45249.0	44901.7	1.76	33.25		45850.4564	45832.93
11.30	45075.29	45359.56	45073.48	1.81	34.25		45854.7683	45838.64
12.29	45207.83	45442.97	45206.08	1.75	35.25		45858.7458	45843.87
13.28	45311.99	45507.98	45310.43	1.56	36.25		45862.4229	45848.68
14.28	45395.34	45559.96	45393.95	1.39	37.25		45865.8293	45853.10
15.27	45463.02	45602.39	45461.79	1.23	38.25		45868.9910	45857.18
16.27	45518.64	45637.58	45517.62	1.02	39.25		45871.9312	45860.96
17.27	45565	45667	45564	0.90	40.25		45874.6701	45864.45
18.26		45692.3618	45603.1996		41.25		45877.2258	45867.70
19.26		45713.9997	45636.4006		42.25		45879.6144	45870.72
20.26		45732.7513	45664.8278		43.25		45881.8501	45873.53
21.26		45749.1244	45689.3523		44.25		45883.9458	45876.15
22.26		45763.5161	45710.6557		45.24		45885.9130	45878.60
23.25		45776.2417	45729.2775		46.24		45887.7620	45880.89
24.25		45787.5546	45745.6489					

Table VI. Spectral Energies for *[Kr] 5snd* $^1D_2$ in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.

*n**	Spectral Energies			$\Delta T=T_{Exp}-T_{per}$	*n**	Spectral Energies		
	T_{Exp} [49]	T_{unper}	T_{per}	cm^{-1}		T_{Exp} [49]	T_{unper}	T_{per}
4.21	39733.067	39733.067	39733.067	0.00	26.66		45780.3262	45777.77
5.17	41831.448	41831.448	41831.448	0.00	27.65		45791.0083	45788.68
6.14	43021.058	43021.058	43021.058	0.00	28.65		45800.6033	45798.48
7.10	43755.755	43755.755	43755.755	0.00	29.64		45809.2538	45807.31
8.05	44239.4549	44244.7446	44239.4549	0.00	30.64		45817.0795	45815.30
9.00	44578.689	44587.249	44578.689	0.00	31.63		45824.1819	45822.54
9.98	44829.6648	44836.3202	44829.6648	0.00	32.63		45830.6474	45829.14
10.92	45012.0249	45022.8759	45012.0249	0.00	33.63		45836.5498	45835.16
11.87	45153.2785	45166.0442	45153.2785	0.00	34.62		45841.9527	45840.67
12.81	45263.6196	45278.1933	45263.6196	0.00	35.62		45846.9107	45845.72
13.87	45362.1272	45367.6056	45362.1272	0.00	36.62		45851.4714	45850.37
14.83	45433.2717	45439.9908	45433.2717	0.00	37.62		45855.6761	45854.65
15.80	45492.6101	45499.3841	45492.6101	0.00	38.62		45859.5609	45858.61
16.77	45542.2955	45548.6996	45542.0925	0.20	39.61		45863.1573	45862.27
17.75	45584.1831	45590.0826	45583.9436	0.24	40.61		45866.4933	45865.67
18.73		45625.1394	45619.5259		41.61		45869.5933	45868.82
19.72		45655.0911	45649.9944		42.61		45872.4791	45871.76
20.71		45680.8792	45676.2663		43.61		45875.1700	45874.49
21.70		45703.2385	45699.0678		44.61		45877.6831	45877.05
22.69		45722.7491	45718.9776		45.60		45880.0338	45879.44
23.68		45739.8738	45736.4602		46.60		45882.2357	45881.68
24.67		45754.9854	45751.8915		47.60		45884.3011	45883.77
25.66		45768.3868	45765.5780					

Table VII. Spectral Energies for *[Kr] 5snd* $^3D_1$ in cm^{-1} (Tlim= 45932.2036 cm^{-1}) series compared with unperturbed levels.

*n**	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$	*n**	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$
	T_{Exp} [49]	T_{unper}	cm^{-1}		T_{Exp} [49]	T_{unper}	cm^{-1}
1.99	18159.04	18159.04	0.00	26.19		45772.173	
3.17	35006.908	35006.908	0.00	27.19		45783.729	
4.19	39685.83	39685.83	0.00	28.19		45794.077	
5.19	41864.354	41864.354	0.00	29.19		45803.380	
6.19		43071.111		30.19		45811.773	
7.19		43810.618		31.19		45819.373	
8.19		44296.546		32.19		45826.275	
9.19		44632.868		33.19		45832.562	
10.19		44875.234		34.19		45838.306	
11.19		45055.631		35.19		45843.567	
12.19		45193.511		36.19		45848.399	
13.19		45301.253		37.19		45852.845	
14.19		45387.038		38.19		45856.947	
15.19		45456.450		39.19		45860.739	
16.19		45513.405		40.19		45864.251	
17.19		45560.713		41.19		45867.511	

18.19	45600.437	42.19	45870.542
19.19	45634.115	43.19	45873.364
20.19	45662.914	44.19	45875.997
21.19	45687.732	45.19	45878.458
22.19	45709.272	46.19	45880.760
23.19	45728.085	47.19	45882.917
24.19	45744.614	48.19	45884.942
25.19	45759.214		

Table VIII. Spectral Energies for *[Kr] 5snd $^3D_2$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.

n^*	Spectral Energies			$\Delta T=T_{Exp}-T_{per}$	n^*	Spectral Energies		
	T_{Exp} [49]	T_{unper}	T_{per}	cm^{-1}		T_{Exp} [49]	T_{unper}	T_{per}
3.17	35021.989	35021.989	35021.989	0.00	26.15		45771.77	45771.77
4.19	39690.802	39690.802	39690.802	0.00	27.15		45783.36	45783.37
5.20	41869.27	41869.27	41869.27	0.00	28.15		45793.75	45793.75
6.19	43070.268	43070.268	43070.268	0.00	29.15		45803.08	45803.08
7.18	43804.89	43807.02	43804.89	0.00	30.15		45811.50	45811.50
8.17	44286.91	44292.21	44286.91	0.00	31.15		45819.13	45819.12
9.11		44628.66	44609.03		32.15		45826.05	45826.05
10.22		44871.47	44882.03		33.15		45832.36	45832.35
11.19		45052.38	45055.77		34.15		45838.12	45838.11
12.18		45190.73	45192.44		35.15		45843.39	45843.39
13.17		45298.89	45299.88		36.15		45848.24	45848.23
14.17		45385.03	45385.64		37.15		45852.70	45852.69
15.17		45454.74	45455.13		38.15		45856.81	45856.81
16.16		45511.94	45512.20		39.15		45860.61	45860.61
17.16		45559.45	45559.63		40.15		45864.13	45864.13
18.16		45599.35	45599.47		41.15		45867.40	45867.40
19.16		45633.17	45633.25		42.15		45870.44	45870.44
20.16		45662.08	45662.14		43.15		45873.27	45873.26
21.16		45687.00	45687.04		44.15		45875.91	45875.90
22.16		45708.63	45708.66		45.15		45878.37	45878.37
23.16		45727.52	45727.53		46.15		45880.68	45880.68
24.15		45744.11	45744.12		47.15		45882.84	45884.87
25.15		45758.76	45758.77		48.15		45884.87	45884.87

Table IX. Spectral Energies for *[Kr] 5snd $^3D_3$* in cm^{-1} (Tlim= 45932.2036 cm^{-1}) series compared with unperturbed levels.

n^*	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$	n^*	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$
	T_{Exp} [49]	T_{unper}	cm^{-1}		T_{Exp} [49]	T_{unper}	cm^{-1}
3.17	35045.019	35045.019	0.00	26.17		45771.954	
4.20	39703.109	39703.109	0.00	27.17		45783.531	
5.20	41874.859	41874.859	0.00	28.17		45793.898	
6.20	43074.728	43074.728	0.00	29.17		45803.218	
7.19		43810.846		30.17		45811.626	
8.19		44295.410		31.17		45819.238	

9.18	44631.298	32.17	45826.152
10.18	44873.624	33.17	45832.450
11.18	45054.136	34.17	45838.203
12.18	45192.178	35.17	45843.472
13.18	45300.087	36.17	45848.311
14.17	45386.026	37.17	45852.764
15.17	45455.574	38.17	45856.872
16.17	45512.646	39.17	45860.669
17.17	45560.055	40.17	45864.187
18.17	45599.863	41.17	45867.451
19.17	45633.613	42.17	45870.485
20.17	45662.473	43.17	45873.312
21.17	45687.344	44.17	45875.948
22.17	45708.928	45.17	45878.412
23.17	45727.780	46.17	45880.717
24.17	45744.341	47.17	45882.877
25.17	45758.970	48.17	45884.903

Table X. Spectral Energies for *[Kr] 5snf* $^1F^o_3$ in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.

*n**	Spectral Energies			$\Delta T=T_{Exp}-T_{per}$	*n**	Spectral Energies		
	T_{Exp} [49]	T_{unper}	T_{per}	cm^{-1}		T_{Exp} [49]	T_{unper}	T_{per}
4.14	39539.013	39539.013	39539.013	0.00	27.91		45790.99	45791.35
4.99	41519.04	41519.04	41519.04	0.00	28.91		45800.59	45800.93
5.96	42839.589	42839.589	42839.589	0.00	29.91		45809.25	45809.56
6.94	43656.219	43656.219	43656.219	0.00	30.91		45817.08	45817.36
7.94	44189.889	44188.765	44189.889	0.00	31.91		45824.19	45824.45
8.93	44556.48	44554.55	44556.48	0.00	32.91		45830.66	45830.89
9.93	44818.77	44816.50	44818.77	0.00	33.91		45836.56	45836.78
10.92	45012.82	45010.45	45012.77	0.05	34.91		45841.97	45842.17
11.92	45160.29	45158.02	45160.23	0.06	35.91		45846.93	45847.11
12.92	45274.97	45272.89	45274.91	0.06	36.91		45851.49	45851.66
13.92	45365.9	45364.0	45365.8	0.07	37.91		45855.70	45855.85
14.92	45439.16	45437.52	45439.14	0.02	38.91		45859.58	45859.73
15.92	45499.11	45497.66	45499.09	0.02	39.91		45863.18	45863.31
16.92	45548.76	45547.48	45548.74	0.02	40.91		45866.51	45866.64
17.92	45590.32	45589.21	45590.32	0.00	41.91		45869.61	45869.73
18.92	45625.48	45624.51	45625.50	-0.02	42.91		45872.50	45872.61
19.91	45655.49	45654.64	45655.51	-0.02	43.91		45875.19	45875.29
20.91		45680.55	45681.33		44.91		45877.70	45877.80
21.91		45703.00	45703.69		45.91		45880.05	45880.14
22.91		45722.58	45723.20		46.91		45882.25	45882.34
23.91		45739.75	45740.30		47.91		45884.32	45884.40
24.91		45754.90	45755.40		48.91		45886.26	45886.33
25.91		45768.33	45768.78		49.91		45888.08	45888.15
26.91		45780.29	45780.69					

Table XI. Spectral Energies for *[Kr] 5snf $^3F^o_2$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) Series compared with unperturbed levels.

*n**	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$ cm^{-1}	*n**	*Spectral Energies*		$\Delta T=T_{Exp}-T_{unper}$ cm^{-1}
	T_{Exp} [49] cm^{-1}	T_{unper} cm^{-1}			T_{Exp} [49] cm^{-1}	T_{unper} cm^{-1}	
3.91	38750.42	38750.42	0.00	27.89		45791.11	
4.90	41364.60	41364.60	0.00	28.89		45800.71	
5.90	42777.02	42777.02	0.00	29.89		45809.36	
6.89	43623.90	43623.90	0.00	30.89		45817.18	
7.89	44170.80	44170.87	0.07	31.89		45824.28	
8.89	44544.27	44544.35	0.08	32.89		45830.75	
9.89	44810.53	44810.57	0.04	33.89		45836.65	
10.89	45006.93	45006.98	0.05	34.89		45842.05	
11.89	45155.92	45155.99	0.07	35.89		45847.00	
12.89	45271.72	45271.72	0.00	36.89		45851.56	
13.89	45363.22	45363.37	0.15	37.89		45855.76	
14.89	45437.09	45437.20	0.11	38.89		45859.64	
15.89	45497.42	45497.54	0.12	39.89		45863.23	
16.89	45547.30	45547.48	0.18	40.89		45866.56	
17.89	45589.11	45589.28	0.17	41.89		45869.66	
18.89	45624.48	45624.63	0.15	42.89		45872.54	
19.89		45654.78		43.89		45875.23	
20.89		45680.70		44.89		45877.74	
21.89		45703.16		45.89		45880.09	
22.89		45722.73		46.89		45882.29	
23.89		45739.90		47.89		45884.35	
24.89		45755.04		48.89		45886.29	
25.89		45768.46		49.89		45888.11	
26.89		45780.42					

Table XII. Spectral Energies for *[Kr] 5snf $^3F^o_3$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) Series compared with unperturbed levels.

*n**	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$ cm^{-1}	*n**	*Spectral Energies*		$\Delta T=T_{Exp}-T_{unper}$ cm^{-1}
	T_{Exp} [49] cm^{-1}	T_{unper} cm^{-1}			T_{Exp} [49] cm^{-1}	T_{unper} cm^{-1}	
3.91	38752.41	38752.41	0.00	27.89		45791.11	
4.90	41365.48	41365.48	0.00	28.89		45800.71	
5.90	42777.55	42777.55	0.00	29.89		45809.36	
6.90	43624.21	43624.21	0.00	30.89		45817.18	
7.89	44170.99	44171.06	0.07	31.89		45824.28	
8.89	44544.44	44544.46	0.02	32.89		45830.75	
9.89	44810.56	44810.64	0.08	33.89		45836.65	
10.89	45006.98	45007.03	0.05	34.89		45842.05	
11.89	45156.01	45156.03	0.02	35.89		45847.00	
12.89	45271.69	45271.74	0.05	36.89		45851.56	
13.89	45363.43	45363.39	-0.04	37.89		45855.76	
14.89	45437.10	45437.21	0.11	38.89		45859.64	
15.89	45497.43	45497.54	0.11	39.89		45863.23	
16.89	45547.41	45547.48	0.07	40.89		45866.56	

17.89	45589.25	45589.29	0.04	41.89	45869.66
18.89	45624.53	45624.63	0.10	42.89	45872.54
19.89	45654.56	45654.78	0.22	43.89	45875.23
20.89		45680.70		44.89	45877.74
21.89		45703.16		45.89	45880.09
22.89		45722.73		46.89	45882.29
23.89		45739.90		47.89	45884.35
24.89		45755.04		48.89	45886.29
25.89		45768.47		49.89	45888.11
26.89		45780.42			

Table XIII. Spectral Energies for *[Kr] 5snf* $^3F^o_4$ in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) Series compared with unperturbed levels.

*n**	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$ cm^{-1}	*n**	Spectral Energies		$\Delta T=T_{Exp}-T_{unper}$ cm^{-1}
	T_{Exp} [49] cm^{-1}	T_{unper} cm^{-1}			T_{Exp} [49] cm^{-1}	T_{unper} cm^{-1}	
3.91	38755.18	38755.18	0.00	27.89		45791.10	
4.90	41366.67	41366.67	0.00	28.89		45800.70	
5.90	42778.12	42778.12	0.00	29.89		45809.36	
6.90	43624.48	43624.48	0.00	30.89		45817.18	
7.89	44171.32	44171.19	-0.13	31.89		45824.28	
8.89	44544.63	44544.52	-0.11	32.89		45830.75	
9.89	44810.72	44810.67	-0.05	33.89		45836.64	
10.89	45007.11	45007.03	-0.08	34.89		45842.04	
11.89	45156.08	45156.02	-0.06	35.89		45847.00	
12.89	45271.78	45271.73	-0.05	36.89		45851.56	
13.89	45363.35	45363.38	0.03	37.89		45855.76	
14.89	45437.11	45437.20	0.09	38.89		45859.64	
15.89	45497.49	45497.54	0.05	39.89		45863.23	
16.89	45547.39	45547.48	0.09	40.89		45866.56	
17.89	45589.23	45589.28	0.05	41.89		45869.66	
18.89	45624.43	45624.62	0.19	42.89		45872.54	
19.89	45654.70	45654.77	0.07	43.89		45875.23	
20.89		45680.70		44.89		45877.74	
21.89		45703.15		45.89		45880.09	
22.89		45722.73		46.89		45882.29	
23.89		45739.90		47.89		45884.35	
24.89		45755.04		48.89		45886.29	
25.89		45768.46		49.89		45888.11	
26.89		45780.41					

Table VIII. The coefficients for the calculation of Radiative lifetimes of Rydberg series.

Spectral Energy Series	τ_o	α
[Kr]5sns $^3S_1$ *(19 ≤ n ≤ 50)*	1.630E-08	1.718
[Kr]5snp $^1P^o_1$ *(5 ≤ n ≤ 50)*	1.585E-11	4.234
[Kr]5snd $^1D_2$ *(13 ≤ n ≤ 50)*	2.250E-10	2.862
[Kr]5snd $^3D_2$ *(5 ≤ n ≤ 50)*	3.614E-10	3.207
[Kr]5snd $^3D_3$ *(18 ≤ n ≤ 50)*	2.065E-12	4.313
[Kr]5snf $^1F^o_{(3,4,5)}$ *(4 ≤ n ≤ 50)*	5.354E-10	2.805

Table XV. Radiative lifetimes for *[Kr] 5sns* $^3S_1$ in *nS* (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.

n^*	τ_{nS} [47]	$\tau_{cal(nS)}$	n^*	τ_{nS} [47]	$\tau_{cal(nS)}$
15.63	1830.00	1833.63	31.63		6155.76
16.63	2040.00	2039.83	32.63		6493.88
17.63	2240.00	2255.12	33.63		6839.51
18.63	2480.00	2479.35	34.63		7192.61
19.63	2650.00	2712.40	35.63		7553.10
20.63		2954.12	36.63		7920.92
21.63		3204.40	37.63		8296.03
22.63		3463.13	38.63		8678.36
23.63		3730.19	39.63		9067.86
24.63		4005.49	40.63		9464.48
25.63		4288.93	41.63		9868.17
26.63		4580.43	42.63		10278.89
27.63		4879.88	43.63		10696.58
28.63		5187.22	44.63		11121.20
29.63		5502.36	45.63		11552.70
30.63		5825.24	46.63		11991.04

Table XVI. Radiative lifetimes for *[Kr] 5snp* $^1P^o_1$ in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.

n^*	τ_{nS} [48]	$\tau_{cal(nS)}$	n^*	τ_{nS} [48]	$\tau_{cal(nS)}$
3.05	65.00	1.77	26.21		16056.10
3.95	39.20	5.33	27.21		18810.49
5.62	27.10	23.73	28.21		21912.39
6.49	42.70	43.60	29.21		25390.96
7.42	81.00	76.74	30.21		29276.71
8.37	125.00	127.78	31.21		33601.43
9.33	170.00	202.76	32.21		38398.25
10.31	250.00	308.67	33.21		43701.64
11.29	510.00	453.53	34.21		49547.42
12.27	690.00	646.35	35.20		55972.74
13.26	925.00	897.21	36.20		63016.16
14.25	1190.00	1217.26	37.20		70717.57
15.25	1550.00	1618.73	38.20		79118.27
16.24	1890.00	2114.98	39.20		88260.95
17.23	2730.00	2720.48	40.20		98189.69
18.23	4270.00	3450.88	41.20		108949.99
19.23		4322.95	42.20		120588.78
20.22	5650.00	5354.68	43.20		133154.38
21.22		6565.22	44.20		146696.59
22.22	7500.00	7974.94	45.20		161266.61
23.22		9605.44	46.20		176917.12
24.22		11479.54	47.20		193702.24
25.21		13621.31			

Table XVII. Radiative lifetimes for *[Kr] 5snd $^1D_2$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.

n^*	τ_{nS} [42-44]	$\tau_{cal(nS)}$	n^*	τ_{nS} [42-44]	$\tau_{cal(nS)}$
(10.99	210.00	214.27	29.88		3753.99
11.97	308.00	273.80	30.87		3079.64
12.95	340.00	343.39	31.87		3405.94
13.94	365.00	423.79	32.87		3753.99
14.93	517.00	515.73	33.87		4124.43
15.92	640.00	619.92	34.87		4517.92
16.92	738.00	737.09	35.87		4935.10
17.91	866.00	867.92	36.87		5376.61
18.90	1023.00	1013.14	37.87		5843.08
19.90	1190.00	1173.42	38.87		6335.15
20.90		1349.45	39.87		6853.45
21.89		1541.93	40.87		7398.62
22.89		1751.52	41.87		7971.27
23.89		1978.89	42.86		8572.03
24.88		2224.73	43.86		9201.52
25.88		2489.70	44.86		9860.37
26.88		2774.45	45.86		10549.20
27.88		3079.64	46.86		11268.61
28.88		3405.94	47.86		12019.23

Table XVIII. Radiative lifetimes for *[Kr] 5snd $^3D_2$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.

n^*	τ_{nS} [42-44]	$\tau_{cal(nS)}$	n^*	τ_{nS} [42-44]	$\tau_{cal(nS)}$
3.17	16.00	14.65	26.15		12722.60
4.19	32.00	35.87	27.15		14349.29
5.20	74.00	71.40	28.15		16113.75
6.19	108.00	125.25	29.15		18022.14
7.19	232.00	201.87	30.15		20080.64
8.18		305.90	31.15		22295.51
9.18		442.07	32.15		24673.02
10.17		615.25	33.15		27219.49
11.17		830.40	34.15		29941.30
12.17		1092.57	35.15		32844.85
13.16		1406.90	36.15		35936.59
14.16		1778.64	37.15		39222.99
15.16		2213.09	38.15		42710.58
16.16		2715.65	39.15		46405.92
17.16		3291.79	40.15		50315.59
18.16		3947.04	41.15		54446.23
19.16		4687.02	42.15		58804.50
20.16		5517.38	43.15		63397.09
21.16		6443.86	44.15		68230.73
22.15		7472.24	45.15		73312.18
23.15		8608.38	46.15		78648.24
24.15		9858.18	47.15		84245.74
25.15		11227.58	48.15		90111.51

Table XIX. Radiative lifetimes for *[Kr] 5snd $^3D_3$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.

n^*	τ_{nS} [47]	$\tau_{cal(nS)}$	n^*	τ_{nS} [47]	$\tau_{cal(nS)}$
16.17	630.00	337.46	33.17		7473.93
17.17	650.00	437.04	34.17		8495.37
18.17	480.00	557.79	35.17		9620.80
19.17	770.00	702.69	36.17		10857.39
20.17	940.00	874.91	37.17		12212.59
21.17	1130.00	1077.85	38.17		13694.12
22.17	1330.00	1315.17	39.17		15309.98
23.17	1580.00	1590.73	40.17		17068.46
24.17	1770.00	1908.63	41.17		18978.11
25.17		2273.22	42.17		21047.78
26.17		2689.10	43.17		23286.60
27.17		3161.09	44.17		25704.00
28.17		3694.28	45.17		28309.69
29.17		4294.00	46.17		31113.67
30.17		4965.85	47.17		34126.25
31.17		5715.68	48.17		37358.02
32.17		6549.58			

Table XX. Radiative lifetimes for *[Kr] 5snf $^1F^o_{(3,4,5)}$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.

n^*	τ_{nS} [48]	$\tau_{cal(nS)}$	n^*	τ_{nS} [48]	$\tau_{cal(nS)}$
4.14	31.30	28.87	27.91		6092.91
4.99	45.00	48.56	28.91		6725.15
5.96	78.00	79.97	29.91		7398.13
6.94	120.00	122.94	30.91		8112.97
7.94	179.00	178.83	31.91		8870.81
8.93	255.00	249.09	32.91		9672.77
9.93	350.00	335.15	33.91		10519.94
10.93	430.00	438.41	34.91		11413.43
11.92		560.26	35.91		12354.34
12.92		702.05	36.91		13343.77
13.92		865.14	37.91		14382.79
14.92		1050.82	38.91		15472.49
15.92		1260.41	39.91		16613.94
16.92		1495.18	40.91		17808.21
17.92		1756.40	41.91		19056.36
18.92		2045.33	42.91		20359.45
19.92		2363.20	43.91		21718.53
20.92		2711.23	44.91		23134.65
21.92		3090.66	45.91		24608.86
22.92		3502.67	46.91		26142.19
23.92		3948.46	47.91		27735.68
24.92		4429.21	48.91		29390.37
25.92		4946.09	49.91		31107.27
26.91		5500.28			

EXPLANATION OF TABLES:

Table I. **Spectral perturbed series and perturbing levels utilized in equation 8 of text.**

Spectral Perturbed series: Spectral energy series of doubly excited Sr-I, containing perturbing levels

Foreign perturbing levels: The foreign levels having same parity and total angular momentum lies within the vicinity of spectral series.

J: Total angular momentum of perturbers

Energy [49] (cm^{-1}): Energies of perturbers in cm^{-1}

Table II. **The coefficients utilized in equation 6 and 7 of text for both perturbed and unperturbed series.**

Spectral energy series: Spectral energy series of doubly excited Sr-I, with and without perturbation.

a_1: Coefficient of Martin's expression for both perturbed and unperturbed series.

a_2: Coefficient of Martin's expression for both perturbed and unperturbed series.

a_3: Coefficient of Martin's expression for both perturbed and unperturbed series.

a_4: Coefficient of Martin's expression for both perturbed and unperturbed series.

b_1: Coefficient of Martin's expression for perturbed series.

b_2: Coefficient of Martin's expression for perturbed series.

b_3: Coefficient of Martin's expression for perturbed series.

b_4: Coefficient of Martin's expression for perturbed series.

b_5: Coefficient of Martin's expression for perturbed series.

b6: Coefficient of Martin's expression for perturbed series.

b7: Coefficient of Martin's expression for perturbed series.

b8: Coefficient of Martin's expression for perturbed series.

b9: Coefficient of Martin's expression for perturbed series.

δ_0: quantum defects of lowest possible state of each series.

Table III. **Spectral Energies for *[Kr] $5sns^1S_0$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]: Experimental values of spectral energies obtained from NIST.

T_{unper}: Spectral energies computed without perturbation.

T_{per}: Spectral energies computed with perturbation.

$\Delta T=T_{Exp}-T_{per}$: Difference between experimental values and perturbed values of spectral energies.

Table IV. **Spectral Energies *for [Kr] $5sns^3S_1$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with unperturbed levels**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]: Experimental values of spectral energies obtained from NIST.

T_{unper}: Spectral energies computed without perturbation.

$\Delta T=T_{Exp}-T_{unper}$: Difference between experimental values and unperturbed values of spectral energies.

Table V. **Spectral Energies for *[Kr] $5snp^1P^o_1$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]: Experimental values of spectral energies obtained from NIST.

T_{unper}: Spectral energies computed without perturbation.

T_{per}: Spectral energies computed with perturbation.

$\Delta T=T_{Exp}-T_{per}$: Difference between experimental values and perturbed values of spectral energies.

Table VI. **Spectral Energies for *[Kr] $5snd^1D_2$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]: Experimental values of spectral energies obtained from NIST.

T_{unper}: Spectral energies computed without perturbation.

T_{per}: Spectral energies computed with perturbation.

$\Delta T=T_{Exp}-T_{per}$: Difference between experimental values and perturbed values of spectral energies.

Table VII. **Spectral Energies for *[Kr] $5snd^3D_1$* in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with unperturbed

levels

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]*: Experimental values of spectral energies obtained from NIST.*

T_{unper}*: Spectral energies computed without perturbation.*

$\Delta T=T_{Exp}-T_{unper}$*: Difference between experimental values and unperturbed values of spectral energies.*

Table VIII. **Spectral Energies for *[Kr] 5snd*$^3D_2$ in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]*: Experimental values of spectral energies obtained from NIST.*

T_{unper}*: Spectral energies computed without perturbation.*

T_{per}*: Spectral energies computed with perturbation.*

$\Delta T=T_{Exp}-T_{per}$*: Difference between experimental values and perturbed values of spectral energies.*

Table IX. **Spectral Energies for *[Kr] 5snd*$^3D_3$ in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with unperturbed levels**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]*: Experimental values of spectral energies obtained from NIST.*

T_{unper}*: Spectral energies computed without perturbation.*

$\Delta T=T_{Exp}-T_{unper}$*: Difference between experimental values and unperturbed values of spectral energies.*

Table X. **Spectral Energies for *[Kr] 5snf*$^1F^o_3$ in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with both unperturbed and perturbed levels.**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]*: Experimental values of spectral energies obtained from NIST.*

T_{unper}*: Spectral energies computed without perturbation.*

T_{per}*: Spectral energies computed with perturbation.*

$\Delta T=T_{Exp}-T_{per}$*: Difference between experimental values and perturbed values of spectral energies.*

Table XI. **Spectral Energies for *[Kr] 5snf*$^3F^o_2$ in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with unperturbed levels**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]*: Experimental values of spectral energies obtained from NIST.*

T_{unper}*: Spectral energies computed without perturbation.*

$\Delta T=T_{Exp}-T_{unper}$*: Difference between experimental values and unperturbed values of spectral energies.*

Table XII. **Spectral Energies for *[Kr] 5snf*$^3F^o_3$ in cm^{-1} (T_{lim}= 45932.2036 cm$^{-1)}$ series compared with unperturbed levels**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]*: Experimental values of spectral energies obtained from NIST.*

T_{unper}*: Spectral energies computed without perturbation.*

$\Delta T=T_{Exp}-T_{unper}$*: Difference between experimental values and unperturbed values of spectral energies.*

Table XIII. **Spectral Energies for *[Kr] 5snf*$^3F^o_4$ in cm^{-1} (T_{lim}= 45932.2036 cm^{-1}) series compared with unperturbed levels**

n: Effective Quantum number (n*=n-δ0)*

T_{Exp} [49]*: Experimental values of spectral energies obtained from NIST.*

T_{unper}*: Spectral energies computed without perturbation.*

$\Delta T=T_{Exp}-T_{unper}$*: Difference between experimental values and unperturbed values of spectral energies.*

Table XIV. **The coefficients utilized in equation 9 of text for Radiative lifetimes of Rydberg Series.**

Spectral energy series: Spectral energy series of doubly excited Sr-I, with and without perturbation.

τ_o*: coefficients of Rykova's Expression for measuring radiative lifetimes.*

α*: the power of effective quantum number n*, for which Radiative lifetimes are directly proportional.*

Table XV. **Radiative lifetimes for *[Kr] 5sns* $^3S_1$ in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.**

n: Effective Quantum number (n*=n-δ0)*

τ_{nS} [47]*: Experimental values of spectral energies obtained from reference [47].*

$\tau_{cal(nS)}$*: Radiative lifetimes computed by exploiting Rykova's expression and WBEPMT.*

Table XVI. **Radiative lifetimes for *[Kr] 5snp $^1P^o_1$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.**

n: Effective Quantum number (n*=n-δ0)*

$\tau_{nS}^{[48]:}$ *Experimental values of spectral energies obtained from reference [42].*

$\tau_{cal(nS):}$ *Radiative lifetimes computed by exploiting Rykova's expression and WBEPMT.*

Table XVII. **Radiative lifetimes for *[Kr] 5snd $^1D_2$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.**

n: Effective Quantum number (n*=n-δ0)*

$\tau_{nS}^{[42\text{-}44]:}$ *Experimental values of spectral energies obtained from reference [42-44].*

$\tau_{cal(nS):}$ *Radiative lifetimes computed by exploiting Rykova's expression and WBEPMT.*

Table XVIII. **Radiative lifetimes for *[Kr] 5snd $^3D_2$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.**

n: Effective Quantum number (n*=n-δ0)*

$\tau_{nS}^{[42\text{-}44]:}$ *Experimental values of spectral energies obtained from reference [42-44].*

$\tau_{cal(nS)}$*: Radiative lifetimes computed by exploiting Rykova's expression and WBEPMT.*

Table XIX. **Radiative lifetimes for *[Kr] 5snd $^3D_3$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.**

n: Effective Quantum number (n*=n-δ0)*

$\tau_{nS}^{[47]:}$ *Experimental values of spectral energies obtained from reference [47].*

$\tau_{cal(nS):}$ *Radiative lifetimes computed by exploiting Rykova's expression and WBEPMT.*

Table XX. **. Radiative lifetimes for *[Kr] 5snf $^1F^o_{(3,4,5)}$* in nS (T_{lim} = 45932.2036 cm^{-1}) lifetimes compared with experimental values.**

n: Effective Quantum number (n*=n-δ0)*

$\tau_{nS}^{[48]:}$ *Experimental values of spectral energies obtained from reference [48].*

$\tau_{cal(nS):}$ *Radiative lifetimes computed by exploiting Rykova's expression and WBEPMT.*

Table XXI. **Comparison of coefficients for observing the convergence of spectral series**

Spectral energy series: Spectral energy series of doubly excited Sr-I, with and without perturbation.

n: Range of principal quantum number from which every spectral energy series of doubly excited Sr-I initiates and ends.

$a_{1:}$ *Coefficient of Martin's expression for both perturbed and unperturbed series.*

$\delta_{0:}$ *Quantum defects of a lowest possible state of each series.*

$\delta_{50:}$ *Quantum defects of highest state up to which each series expands (n=50).*