Two Electron Spectra
Helium or Cadmium Emission Lines

Objectives

1. Align the Spectrometer using Schuster's method to setup collimator for parallel rays.
2. Measure wavelength of Helium or Cadmium lines using grating spectrometer. Compare observed values with standard wavelengths and identify sources or error.
3. Identify the transitions corresponding to all the visible lines. Draw energy level diagram to show observed lines. Discuss method of identification.

Learning from this experiment

1. LS and jj coupling of two electrons.
2. Singlet and triplet states
3. Selection rule for allowed transition.
4. Strength of transition and broadening of spectral lines.

Useful Books

1. Advanced Practical Physics for Students, Worsnop and Flint, Methusen & Co. for Schuster's method.
2. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, Robert Eisberg and Robert Resnick, 2nd Edition, John Wiley (2002), Page 347
3. Introduction to Atomic Spectra by H.E.White, Page-184
4. Atomic Spectra and Structure by G.Herzberg

Two Electron Spectra of Helium/Cadmium source

Table I: Observations

Least Count of the spectrometer _____ degree

No. of Grating line _____ Grating spacing _____

Sl.No.	Order	Color	Intensity	Left Scale			Right Scale			Shift from Central Maximum			Calculated Wavelength (nm)
				Main Scale	Vernier Scale	Total (ΦL)	Main Scale	Vernier Scale	Total (ΦR)	Right	Left	Average	
1	Zero	Direct	Very strong										
2	First	Red	Weak										
3		Green	Moderate										
4		Blue	Strong										
5													
6													
7	Second	Red											
8		Green											
9		Blue											
10	Third												

Table II: Identification of observed transitions in Helium/Cadmium Source

Sl.No.	Transition	Color	Intensity	Selection Rules	Observed Wavelength (nm)	Standard Wavelength (nm)	Error
1							
2							
3							