

# Automation of Optical Spectrometer

Arun C.H.,<sup>1</sup> A. Robson Benjamin,<sup>2</sup> Audline Jini,<sup>3</sup>  
J.T.T.Kumaran<sup>4</sup>

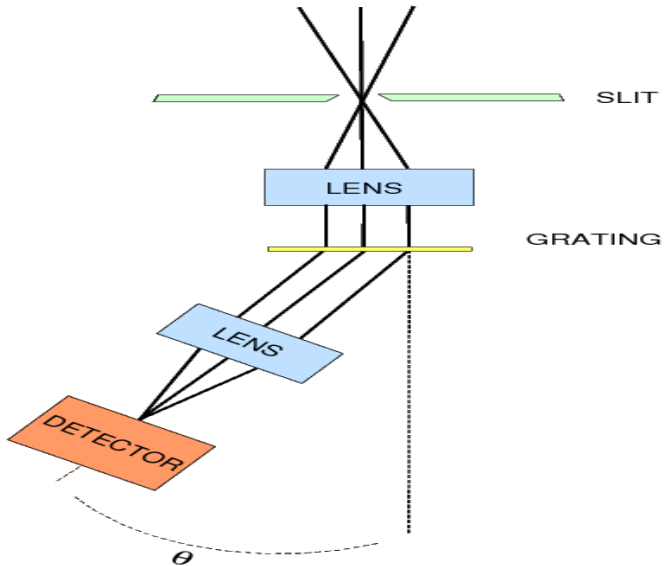
<sup>2</sup>The American College, Madurai, India

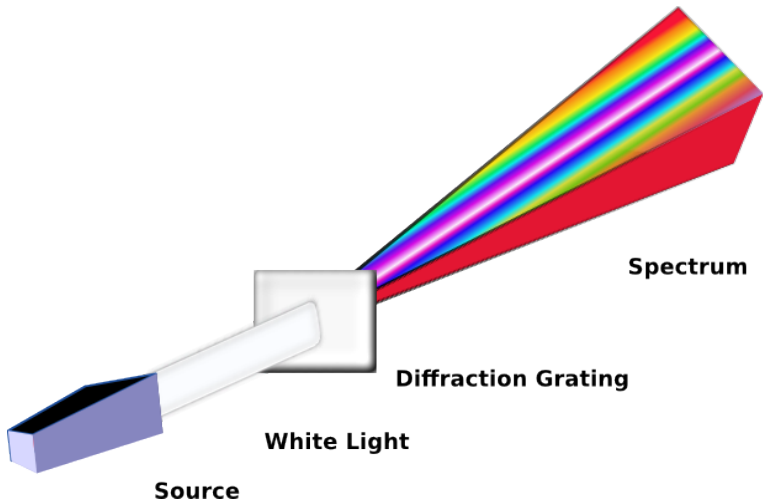
<sup>1,3,4</sup>N M Christian College, Marthandam, India

SciPy.in, 2010

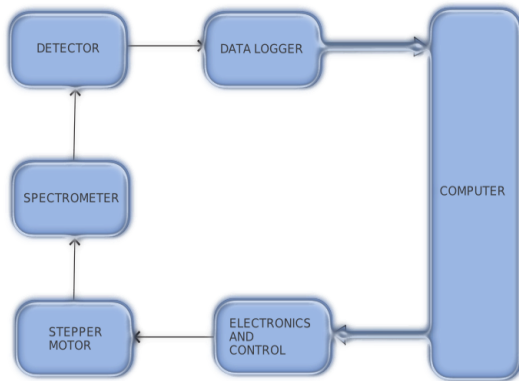
- “AUTOMATION OF OPTICAL SPECTROMETER” is an attempt to build an optical spectrometer which is computer interface-able and which scans angle, in turn, calculate wavelength.

# Spectrometer Schematic Diagram





# Block Diagram

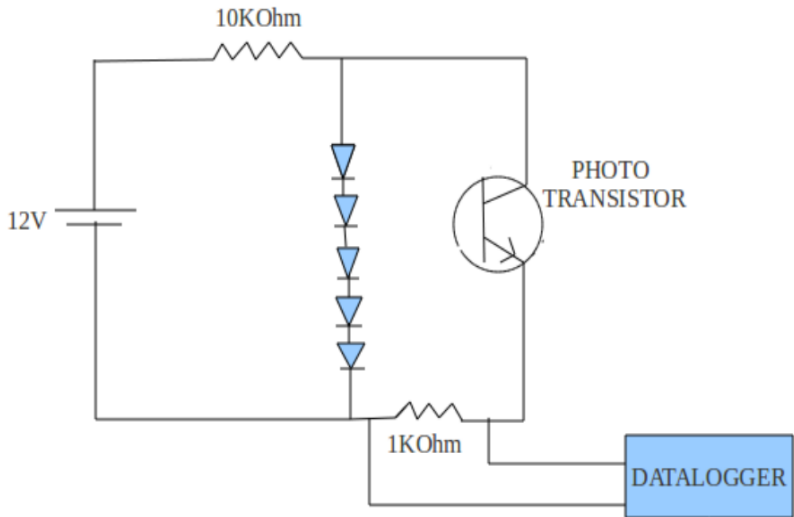


- A stepper-motor is used to turn the Photo transistor(Detector). A circuit has been built with a Photo transistor to detect light.
- Data-logger is used for data acquisition.
- Interfacing with the computer has been done with IPython(Interactive Python) on a LINUX environment.

# Spectrometer shown with photo transistor detector mounted on a pipe



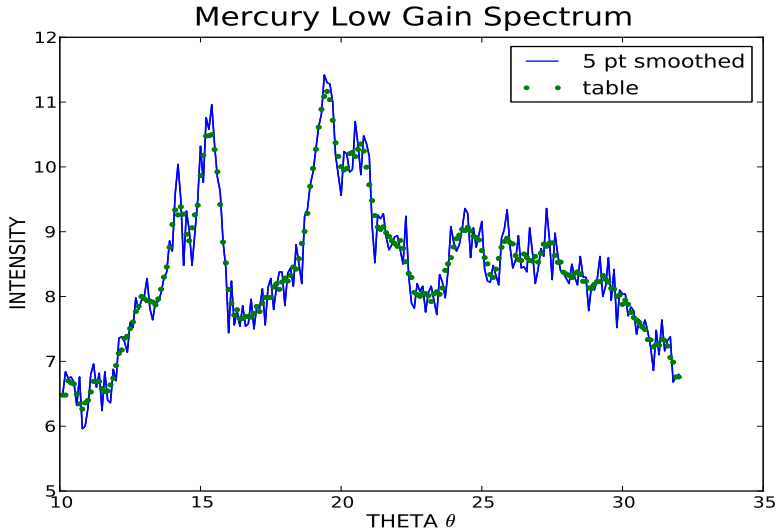
# Photo transistor(Detector) Circuit Diagram

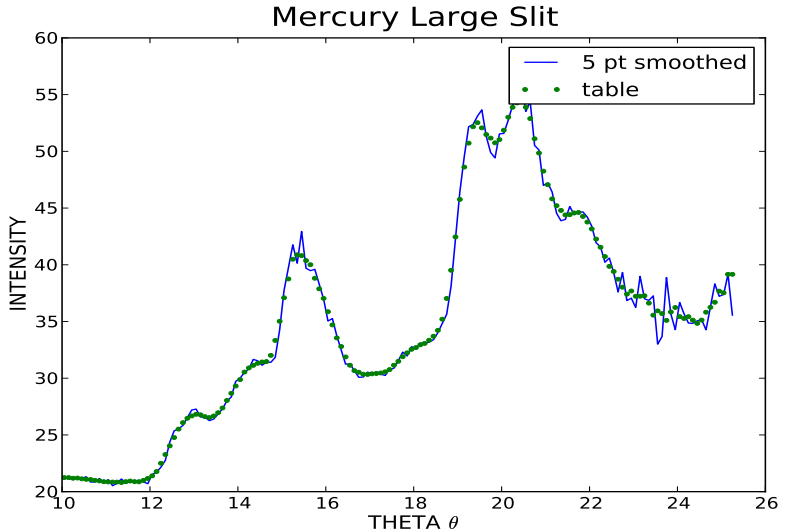




- Stepper motor and the Data Logger are configured on two different serial ports.
- PySerial python library is used for serial communication.
- The serial port of the stepper motor is hooked to port 0 of the computer with baud rate 9600  
**serial.Serial('/dev/ttyS0', 9600, timeout=0.5)**
- The serial port of the data logger is hooked to port 2 of the computer with baud rate 9600  
**serial.Serial('/dev/ttyS2', 9600, timeout=0.5)**

- Data from the data logger is acquired in the computer. This data is plotted using matplotlib library.  
**plot(x,y,'color')**
- When the data is non averaged and the detection system has low gain the plot is just a profile which shows up as scatter





- Averaged spectrum for larger gain gives good results for small slit widths. Use of CCD camera will enhance sensitivity.

COLOUR	$\theta$ Expected	$\theta$ obtained
Violet	14.28	14.3 $\pm$ .1
Blue	15.29	15.8 $\pm$ .1
Green	19.29	19.0 $\pm$ .1
Yellow	20.51	21.0 $\pm$ .1
Red	23.53	24.1 $\pm$ .1

- The data obtained is close to the expected value and hence the calibration is good.

# Thank You!

SciPy.in 09