



# Monochromator

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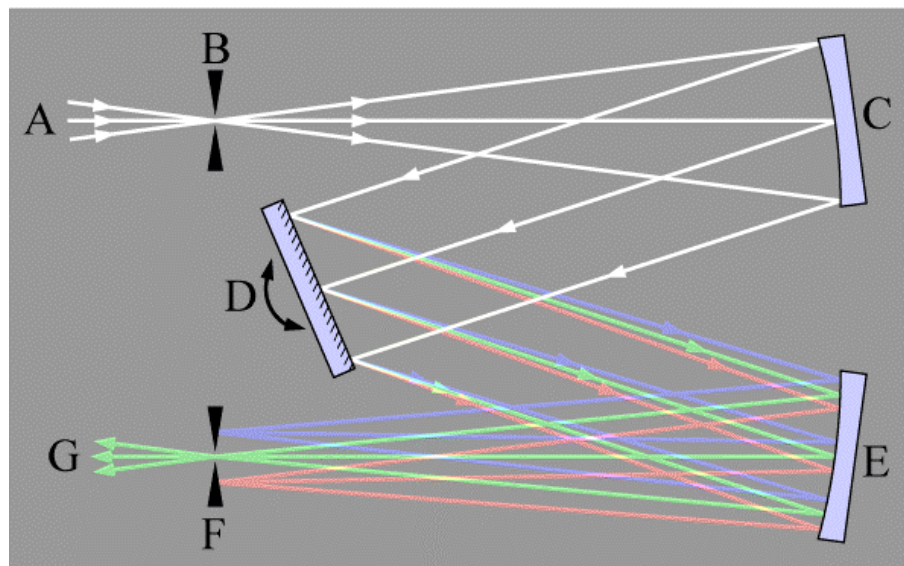
Optics Rotation Spring 2008

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# Czerny-Turner Monochromator

- Device used to extract a thin regions of wavelengths from a wider range of wavelengths
- Would be used for Na lasing experiment to provide cleaner signal



**Ref 1**



# Instrument Sensitivity

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- Resolution of a grating

$$\mathfrak{R} = \frac{\lambda}{\Delta\lambda}$$

$$a \sin \theta = m(\lambda + \Delta\lambda)$$

$$a \sin \theta = \left(m + \frac{1}{N}\right)\lambda$$

$$\mathfrak{R} = mN$$

$$\Delta\lambda = \frac{\lambda}{mN}$$



# Resolution

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- Diffraction Grating
  - Spacing - 1200 g/mm
  - Width - 52.8 mm
- Resolution at 63,360
- At 750 nm sensitivity of .012 nm

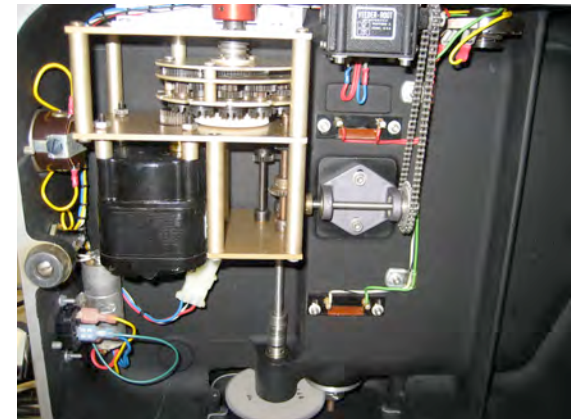
# McPherson Monochromater

- Works well and has excellent sensitivity, but had to be operated manually
- Made data taking slow and often painful



# Electric Motor

- Device came with an electric motor to drive rotate the mirror
- However had outdated power plug and needed to be replaced



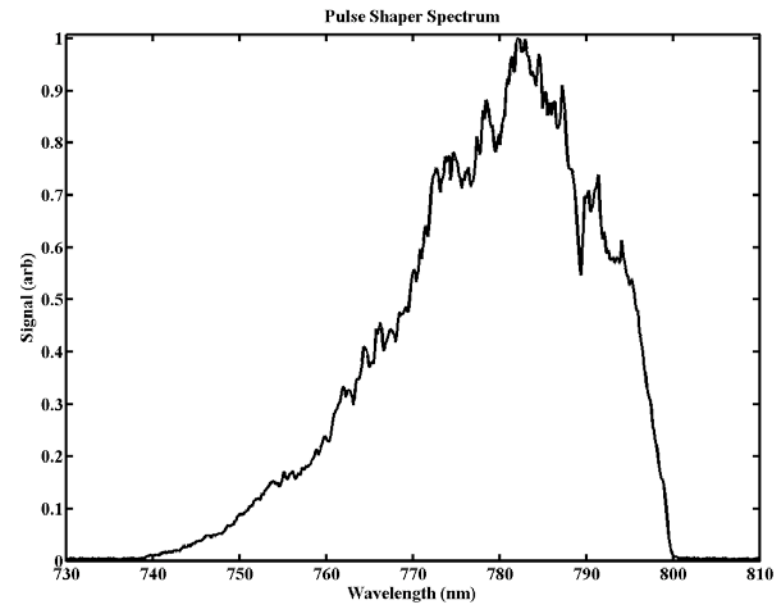
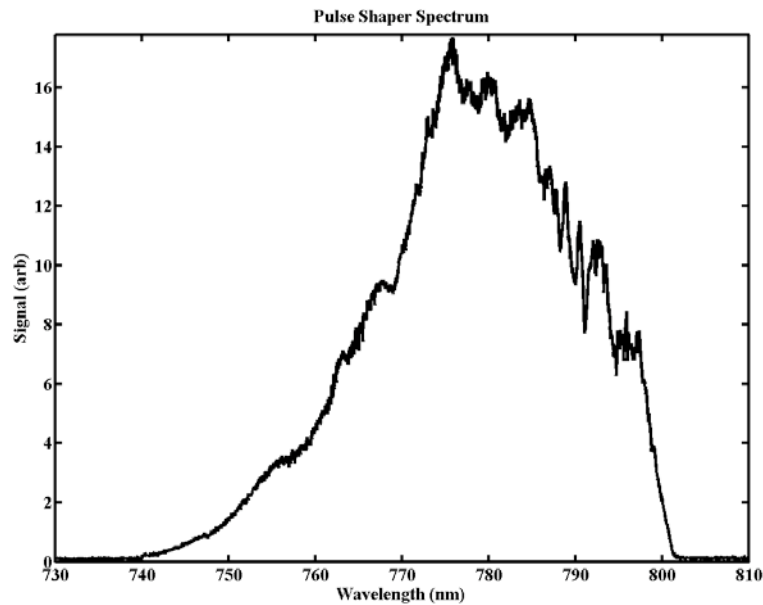


# Data Taking

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- The motor is connected to a series of gears so that the rotation speed can be adjusted in terms of  $\text{nm}/\text{min}$
- Data was taken with a digital oscilloscope
- 30 traces were averaged each second

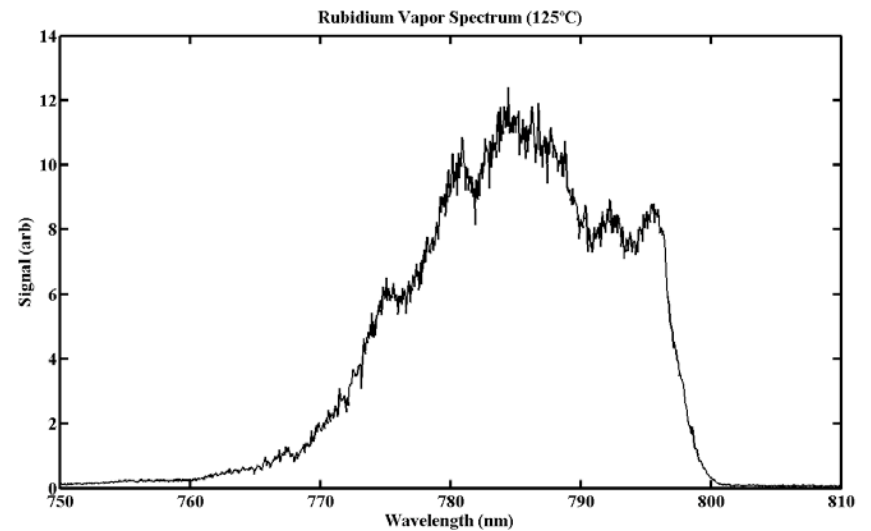
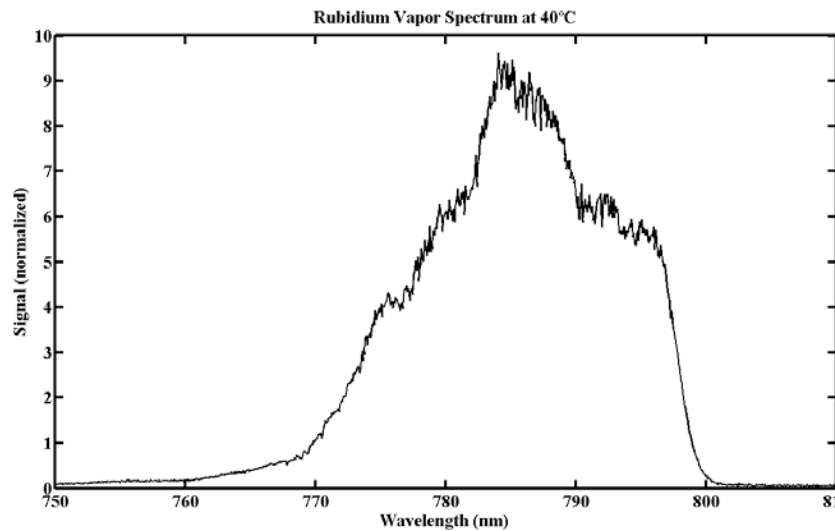
# Pulse Shaper Spectrum



Left - McPherson Monochromator  
Right - Digital Spectrometer



# Rubidium Spectrum



Left - Data with Rb at 40°C

Right - Data with Rb vapor at 125°C



# Thanks and References

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**Special Thanks to Steve Clow, Uvo Hölscher,  
and Tom Weinacht**

**1 - Photo From "Monochromator",  
[http://en.wikipedia.org/wiki/Image:Czerny-  
turner.png](http://en.wikipedia.org/wiki/Image:Czerny-turner.png) 2008**