



CD Spectroscopy

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CD Spectroscopy

CD's are manufactured with EXTRAordinary technology. So many of them are produced and they become ORDINARY, and escape attention.

CD's are excellent gratings, despite the circular grooves. Spectroscope, spectrograph and spectrometer can be built based on CD gratings.



CD Spectroscopes

Eyeballs are great instruments.

A very simple spectroscope can be built with 1 piece of CD fragment and 1 slit on a cereal box.

Improvement on the bare bone spectroscope can be realized in many ways.

CD Spectroscopy



CD Spectroscope



Compact Fluorescent Lamp (CFL)

- **Very efficient**
Use $\frac{1}{4}$ energy
- **Interesting spectrum**
Mercury discharge
Rare earth phosphors





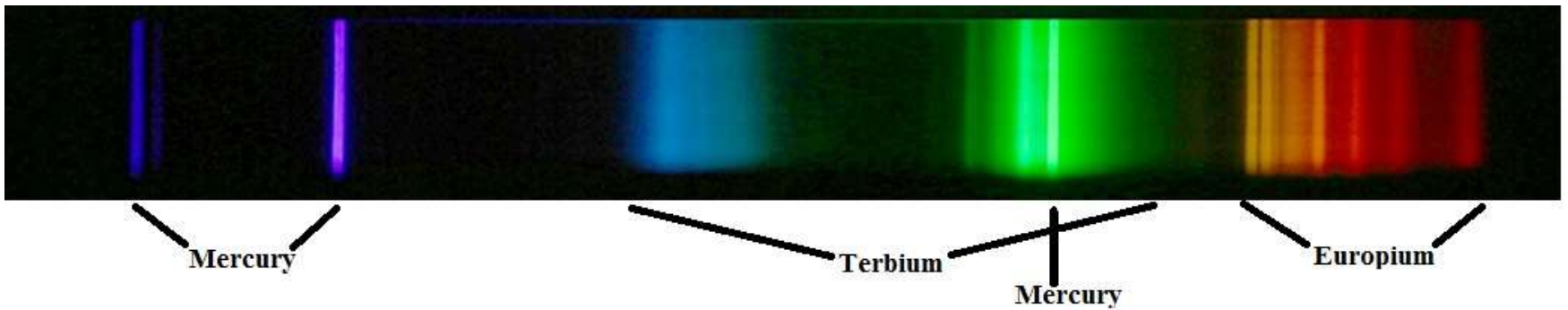
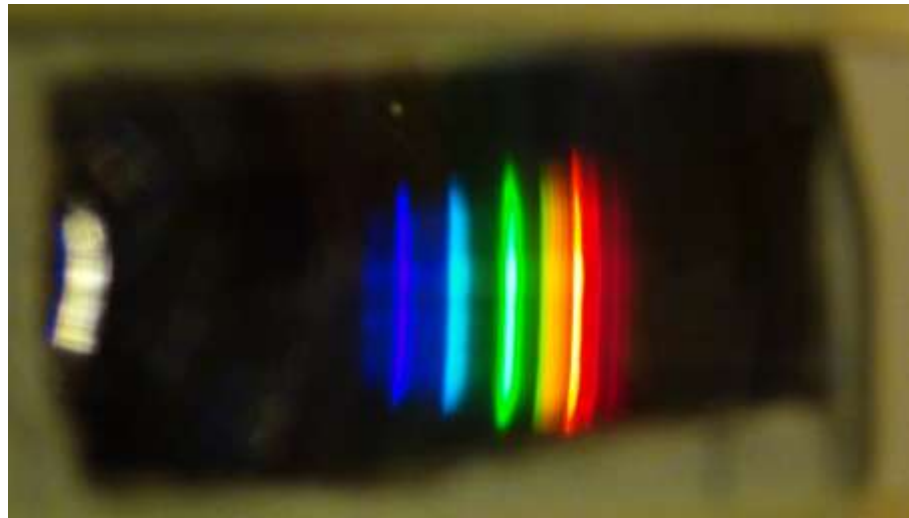
CFL Bulb

It uses rare earth elements to make very efficient phosphors.

It requires rare earth elements yttrium, terbium, and europium.

All CFL bulbs are now manufactured in China, because China produces 80% of rare earth materials.

CFL Spectrum





CFL Spectrum

Mercury discharge produces very sharp spectrum lines in ultraviolet, blue and green.

Ultraviolet light from mercury excites terbium and europium phosphors.

Terbium produces blue and green colors.

Europium produces red color.



Mercury Discharge Lamp

Low pressure discharge mercury discharge lamp has very sharp atomic emission spectrum.

We used its deep UV light to erase UV-EPROMs.

It has sharp line in blue and green.

Mercury Discharge Lamp





Mercury Spectrum





CD Spectrograph

Spectrographs are spectra recorded on photographic plates.

Modern digital cameras have millions of pixels and are capable of recording good spectrographs.

Digital spectrographs still need “development”.

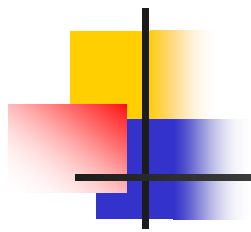
My Spectrograph



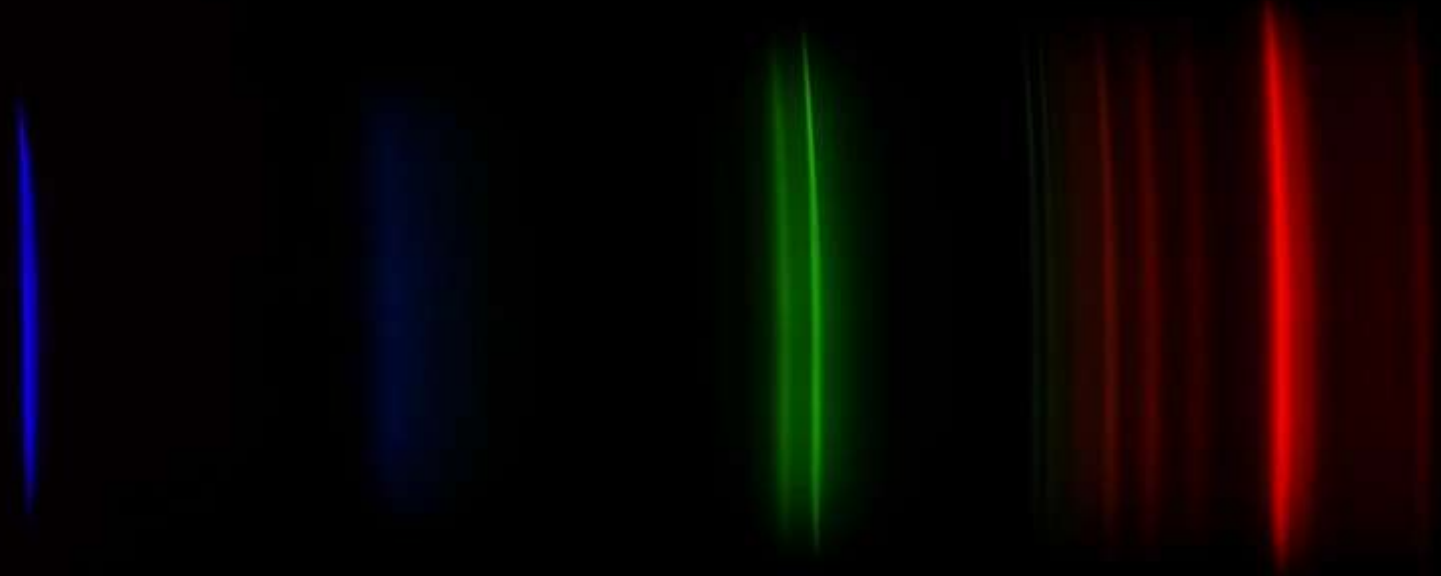


My Spectrograph





Spectrograph of CFL





Fraunhoffer Spectrum

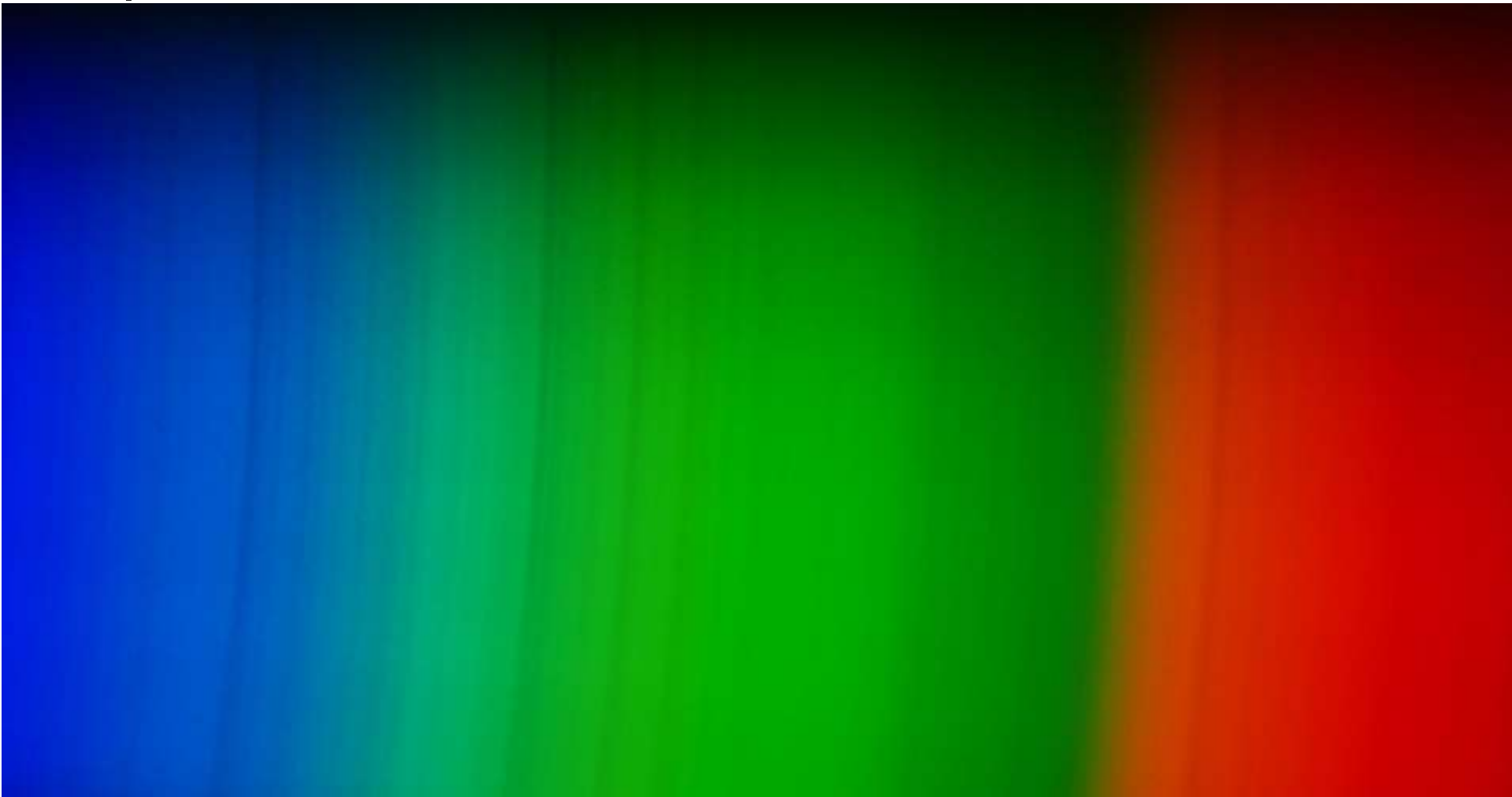
The spectrum of sun has many dark lines, which were first discovery by Fraunhoffer.

The dark lines are caused by absorption of atoms in the atmosphere of sun.

It is not an easy task to photograph the Fraunhoffer lines.



Fraunhofer Lines of Sun

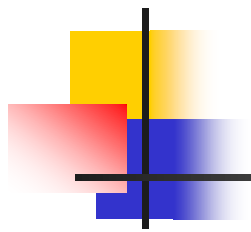




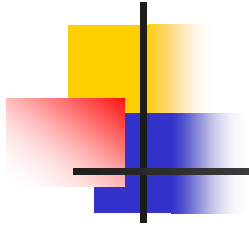
CD Spectrometer

Spectrometers record and display spectra electronically.

When the digital cameras develop smooth computer interfaces, the CD spectrograph I built can be converted to a spectrometer instantly.



Questions?



Thank you very much.