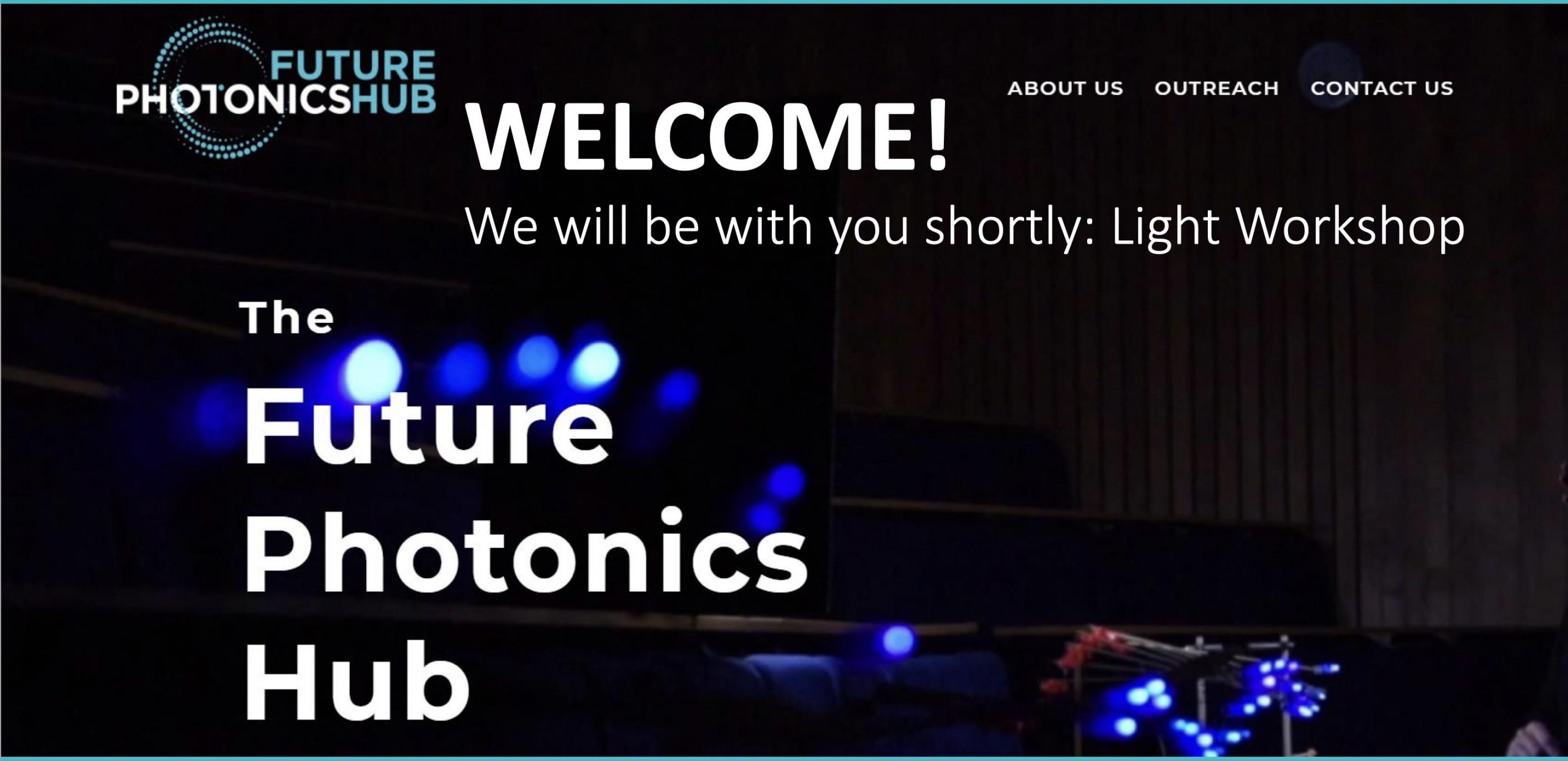
University of Southampton

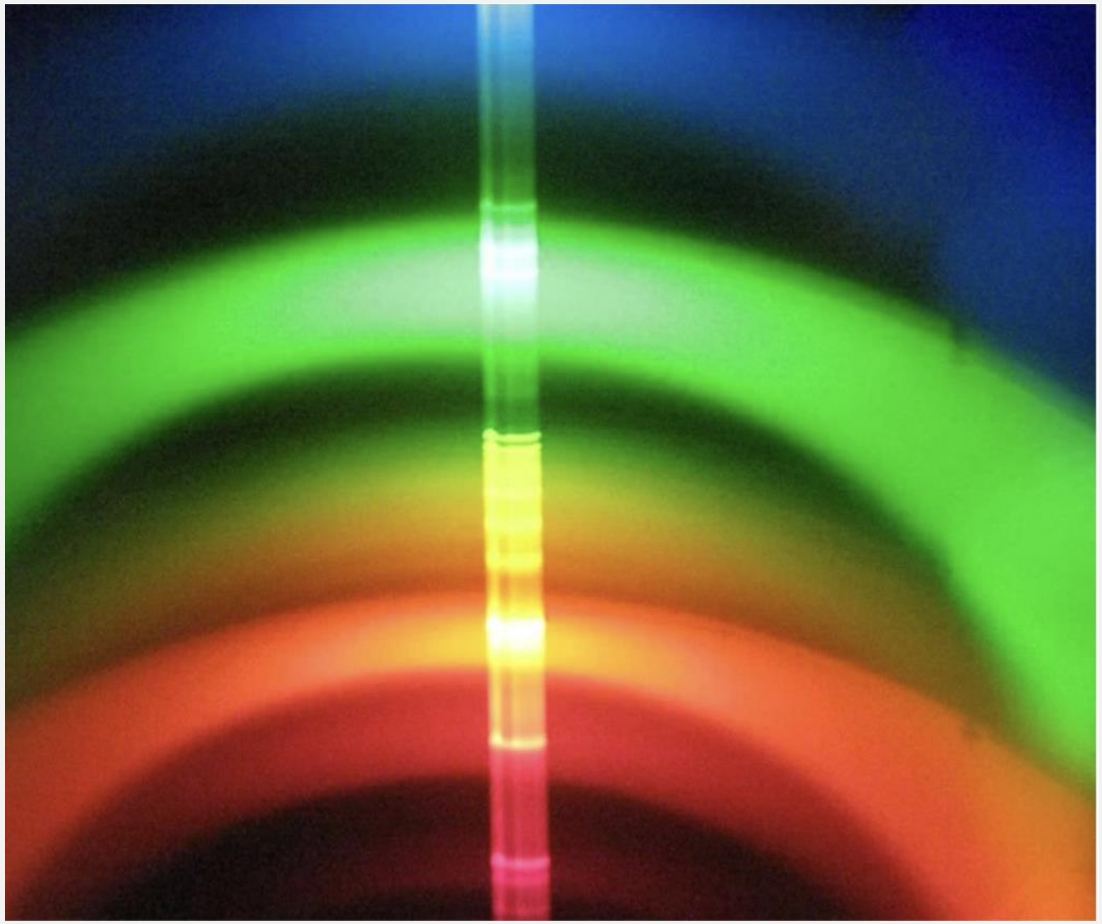


Today's workshop!

Aim: To enjoy learning about light.

Objectives:

- To meet the scientists!
- To make a successful spectroscope.
- To use your spectroscope to observe differences in different light sources.
- To know who uses spectroscopes and why.
- To understand the working principles of spectroscopes (diffraction).



Scopes

Have you ever seen or used a microscope?

Have you ever seen or used a telescope?

Microscope images: KERN Microscope from UK-RS Online, Telescope images: http://scopetheuniverse.com/can-you-use-a-telescope-during-the-day-the-facts/

What is a Spectroscope?

Spectrum

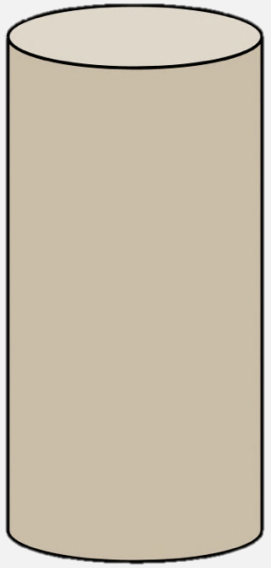
To examine

Spectroscopes: https://digital.sciencehistory.org/works/sb3978660; Science Lab Supplies, Examine: https://writingscientist.com/peer-feedback

Making our spectroscope!

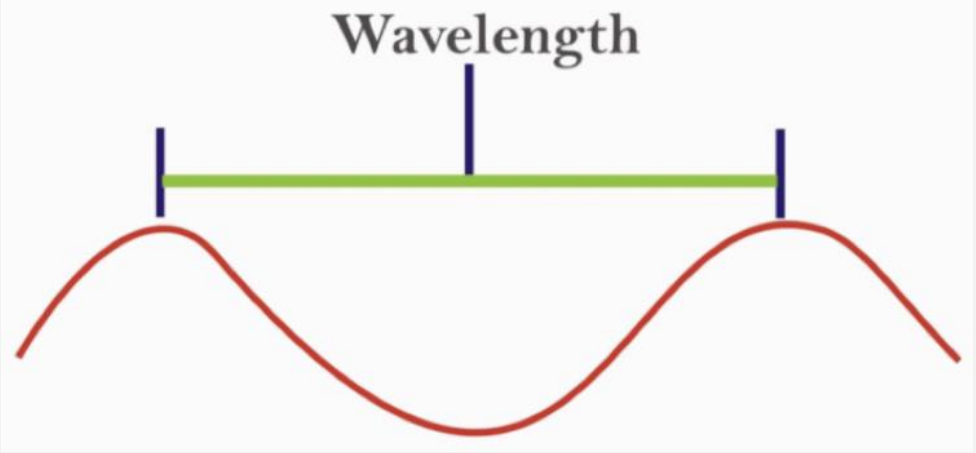
You will need:

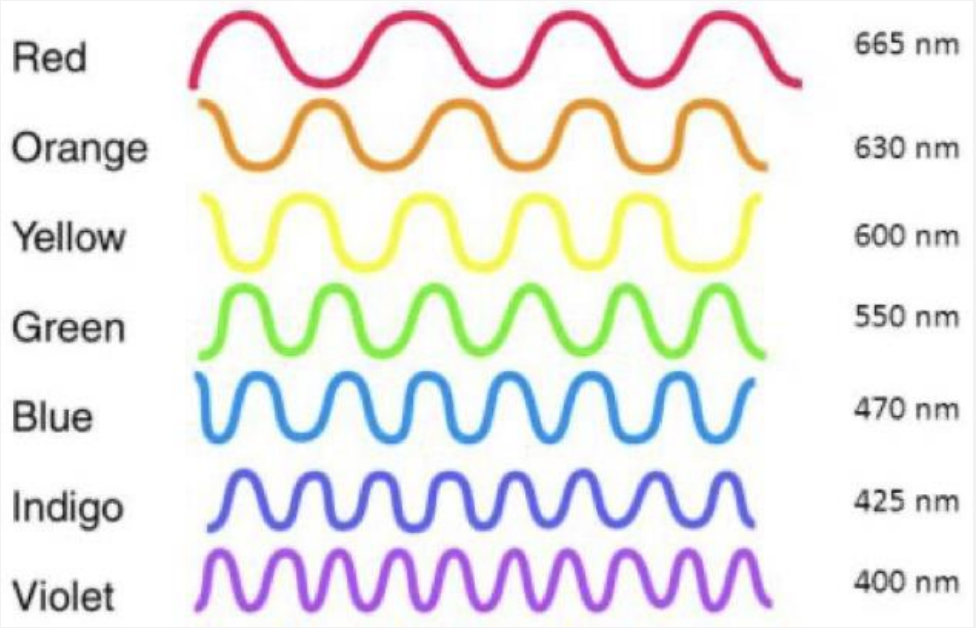
- a CD
- a spectroscope template printed on a card
- a pair of scissors
- a roll of tape
- some pencils/markers for decoration
- different light sources



How do scientists use spectroscopes?

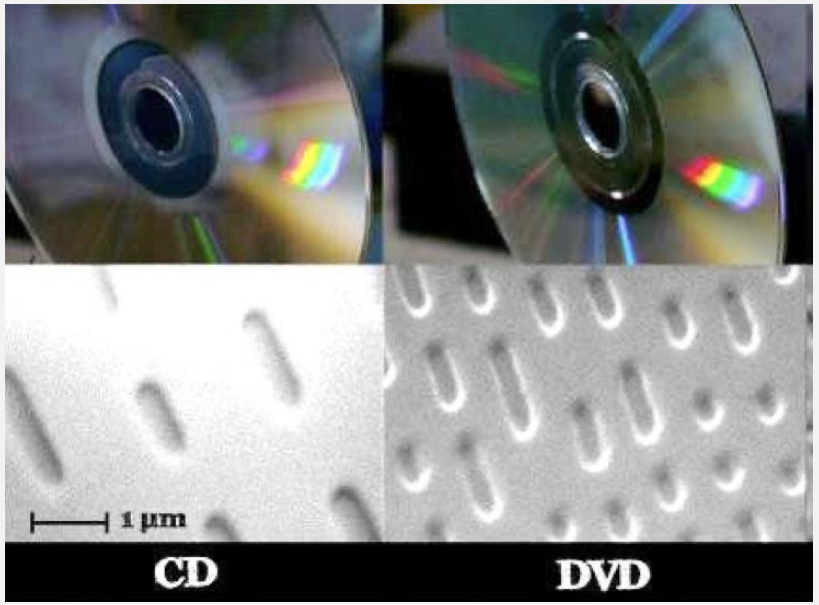
- Light travels in waves.
- Waves are different colours and have different wavelengths.
- Light waves are measured in nanometres (nm).
- A nanometre = 1 billionth of a metre
- A nanometre scale is added to the spectrum.

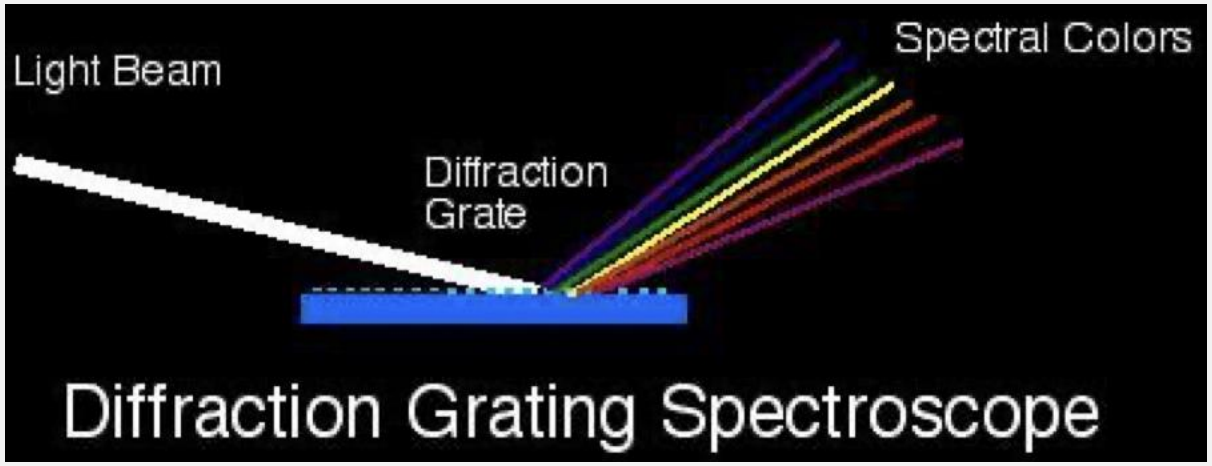




How do spectroscopes work?

- Light from a bulb hits the surface of the CD or DVD.
- Light **diffracts** (bends) around the edges of the rough surface of the CD/DVD.
- **Diffraction** is the bending of light around an object.
- Each colour has a different wavelength, so the light bends different amounts, and the colours split.

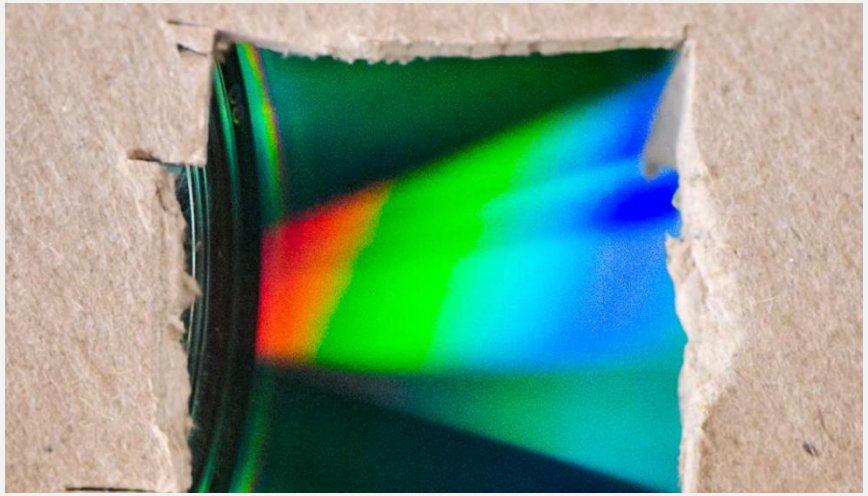




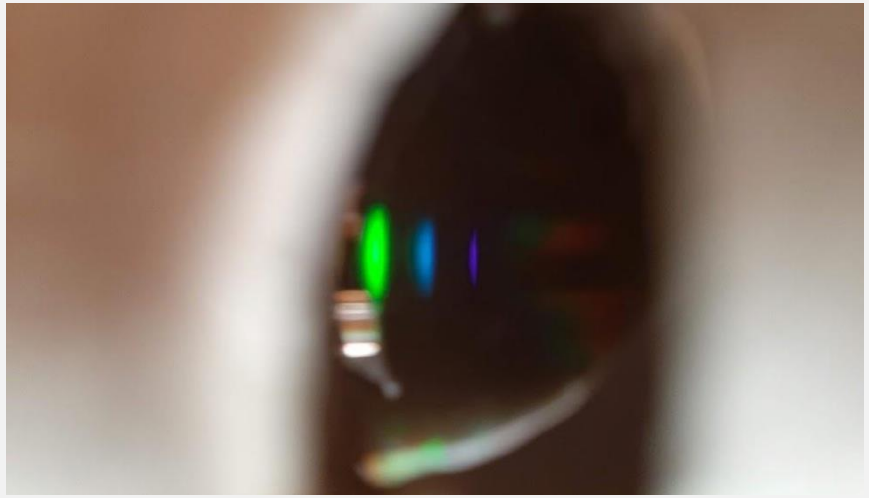
Diffraction gratting: https://www.yourgemologist.com/Spectroscope/spectroscope.html

Using our spectroscope!

Incandescent light bulb seen through a spectroscope

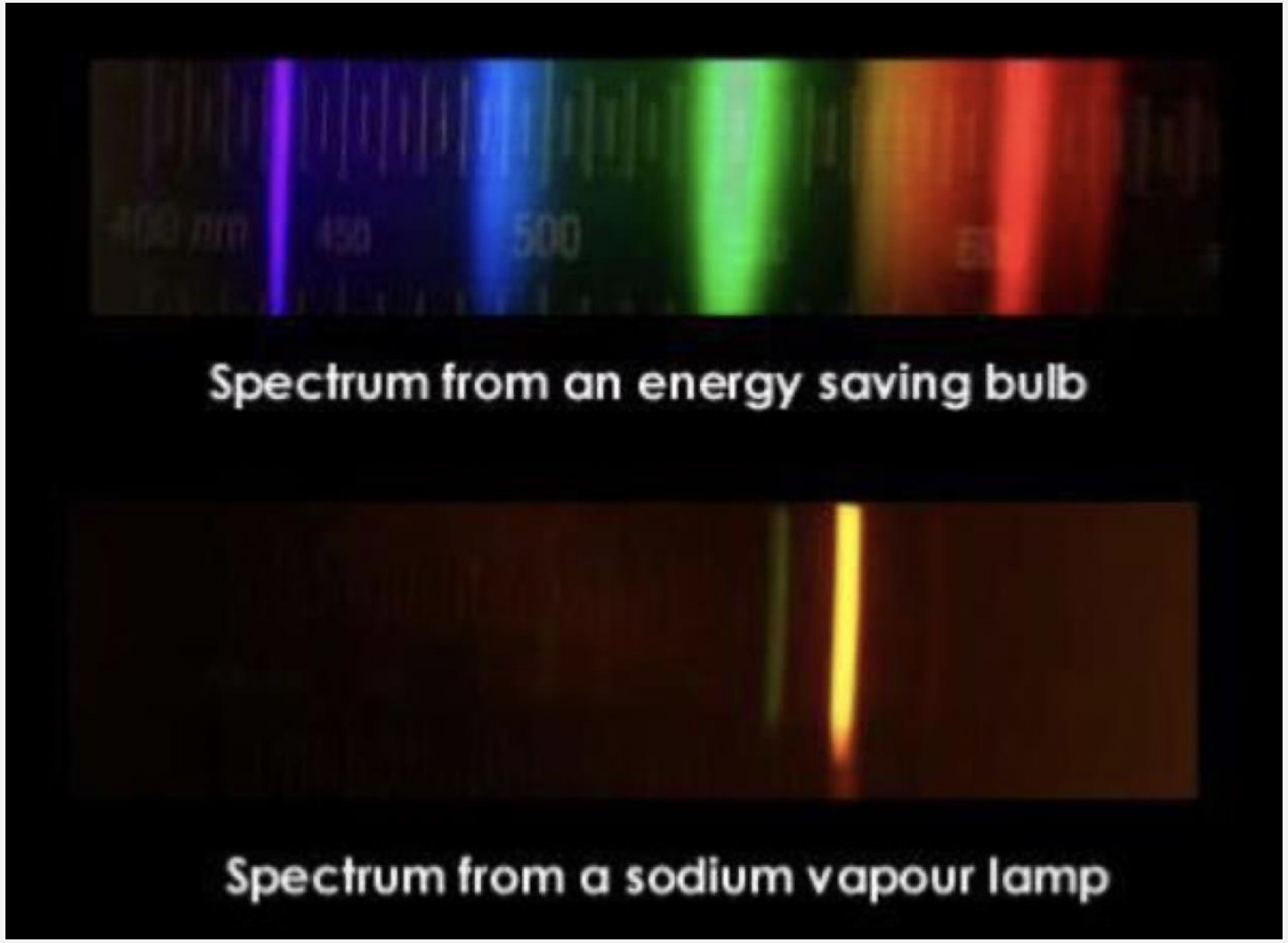


Fluorescent light bulb seen through a spectroscope



Spectroscopes: previous participants images

Comparing light sources



How do scientists use spectroscopes?

Each element has different colours (wavelengths) of light.

Scientists can identify the elements just from the colours they see through a spectroscope.

Emission spectra of the elements: https://uwaterloo.ca/chem13-news-magazine/september-2017/recommended/periodic-table-emission-spectra

What are spectroscopes used for?

- Astronomers use spectroscopes to identify gases in stars.
- Chemists use spectroscopes to identify different elements e.g. in drug testing detecting deadly chemicals at a distance.
- Light scientists use spectroscopes to identify colours of light in lasers.

Questions???