

# How To Make And Use The NPL Spectrograph

Sarah and Robert Purcell: January 2007



Cut out the main body of the spectrograph along the solid white lines, making sure to cut out the viewing window and either the CD or DVD ports. Cut out the entrance slit, keeping it as narrow as possible. (A craft knife is useful here, but ask an adult for help!)

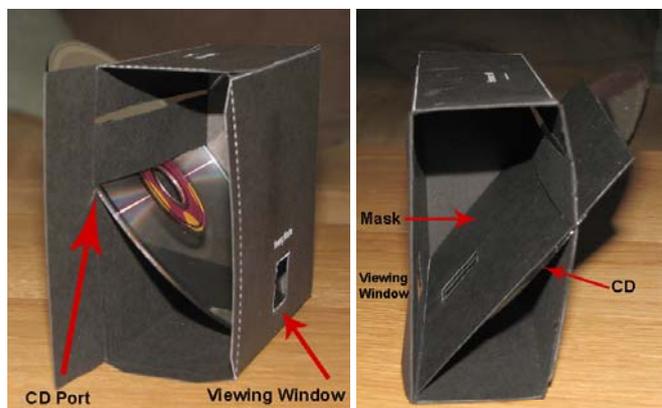
Cut out the disk mask, including the hole in the centre of the bottom edge.

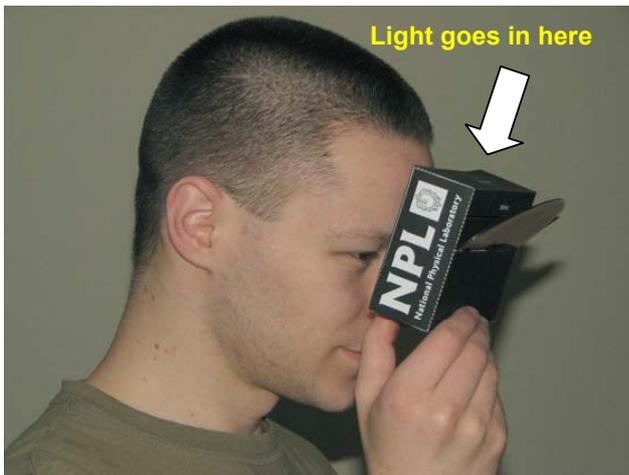
Score along the dotted lines, and make up the box. Glue along the tabs and tuck them in. You can use tape if don't have glue.



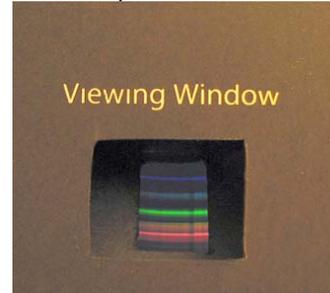
Slide a CD into the CD port, with the silver side towards the viewing window. Angle it so that the bottom edge is close to the viewing window.

Slide the disk mask over the CD so that the majority of the silver surface is covered, leaving a small gap by the viewing window.





What you should see



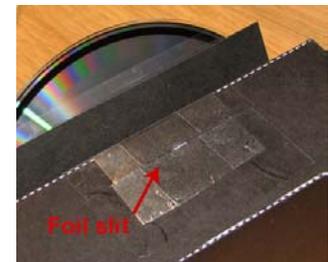
Point the slit at a light source and look through the viewing window at the CD. Looking slightly upwards towards the top of the CD you should clearly see a spectrum, the light split into its constituent colours.

### Things to try

Try looking at different types of light, and see if you can notice any differences between them. Energy saving light bulbs will have a couple of very bright lines, usually one red, one green and one blue. A 'traditional' incandescent light bulb will have a much fuller spectrum. Try looking at bright sunlight reflected off a white wall or piece of paper. Can you notice any faint dark lines?

### Tips

- For a better result try making a very narrow slit. Tape two bits of aluminium foil with very straight edges across the entrance slit. They should be less than 0.5mm from each other.
- **Should I use a DVD or a CD?** The lines on the surface of a DVD are closer together than the lines on the surface of a CD. This splits the light more strongly and you should be able to see spectra more clearly. However not all types of DVD are suitable. The DVDs to use are *data DVDs* such as the ones given away on many computer magazines. DVDs with films often have two layers of lines which gives a confused spectrum and write-able DVDs (+R and -R) have a dye which absorbs red light, i.e. they look blue which distorts the spectrum. If in doubt, use a CD.



### Safety

- **Never** look directly at the sun. It can damage your eyes.
- **Always** ask an adult for help when using sharp knives and scissors. If you already are an adult then please be careful.