

A Few Interesting Ideas VII

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This paper presents a few ideas for the preparation of simple aids. The article also contains simple ideas for experiments with these aids.

Detection vessel

When teaching the chapter *Magnetism*, I use a number of aids to study the magnetic field: iron filings, sensor foil, detection plate, magnetic field sensor.



Fig. 1. Magnetic field investigation using: iron filings, sensor foils, detection plates, magnetic field sensors.

For spatial (3D) magnetic field investigation, device manufacturers sell various detection vessels.



Fig. 2. Detection vessels for “3D” magnetic field examination

I have made a detection container from a jar.



Fig. 3. Detection vessel from a jar

I made a 25.5 mm hole in the jar lid (outer diameter of PET preform) and attach a PET preform into it using a hot glue gun [1]. I poured about 100 g of iron fillings into the jar. Then I closed the jar with the lid with a PET preform glued on it. Now we can insert a cylindrical magnet in the PET preform with a diameter of 20 mm (maximum diameter) and length about 65 mm (maximum length).



Fig. 4. Cylindrical magnet composed of 6 neodymium magnets (one magnet has a diameter of 15 mm, height of 10 mm)

In Fig. 3 we can see the magnetic field of this cylindrical magnet after we insert it into the PET preform. In Fig. 5 we can see other possibilities of examining the magnetic field of different arrangements of magnets inside the PET preform.



Fig. 5. On the left, two magnets with corresponding poles facing each other and an iron cylinder between them. On the right, an iron cylinder attached to a cylindrical magnet.

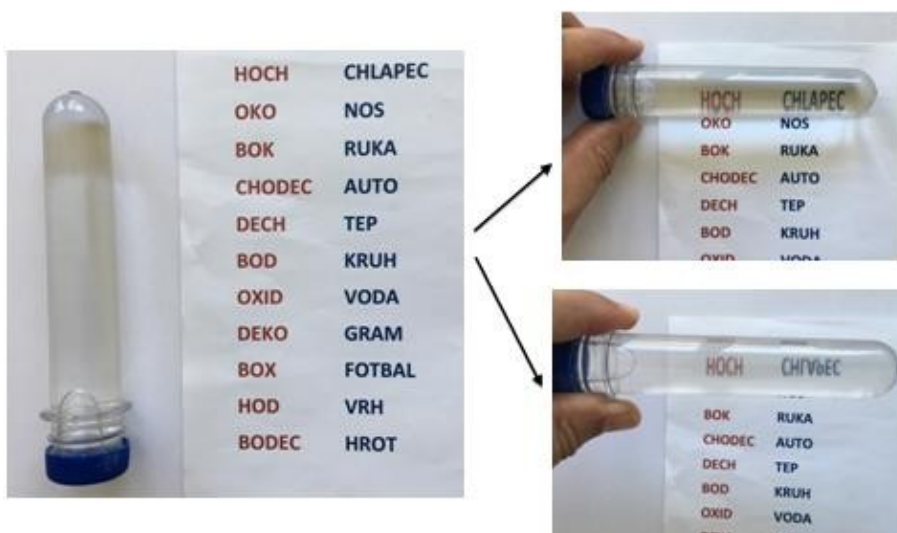


Fig. 6. Demonstration of the use of PET preform in optics

The PET preform can also be used in physics for other purposes. E.g. in optics – see Fig. 6.

Spectrometer

At Heuréka workshop in 2005 [2] and in 2014 [3] we produced simple spectroscopes from “CD” and “diffraction foil”.

This year (2016) I created a spectrometer made from diffraction foil. This spectrometer works the same way as a spectroscopy made of diffraction foil. There is a slit on one side and a grid on the other side. See [4] for a detailed description. Two scales (see Fig. 7) on which it is possible to read the wavelength of light (400 to 700 nm) are added to this configuration. I bought the diffraction foil from Údif [5]. I used 500 lines/mm foil inserted in a slide frame.

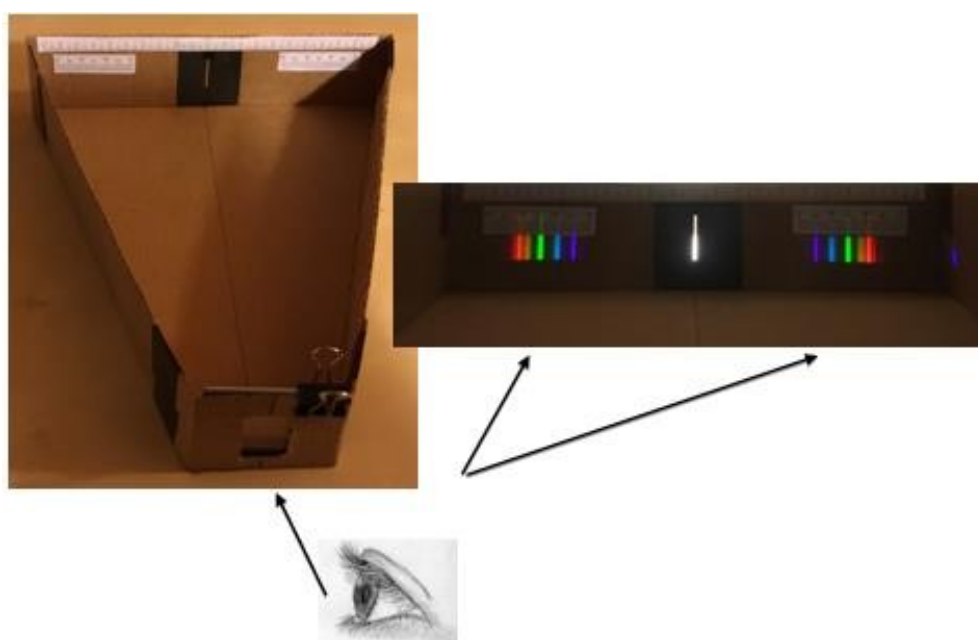


Fig. 7. Spectrometer

I cut out and glued the "body" of the spectrometer from a thin cardboard – see Fig. 8.

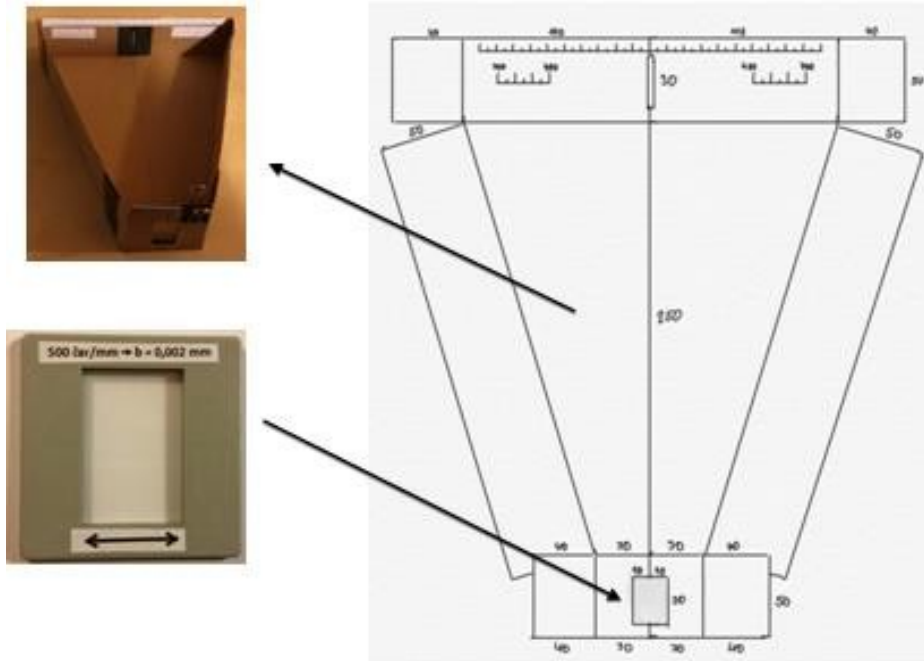


Fig. 8. Making the spectrometer

Using this spectrometer, we can observe the spectra of different light sources: light bulbs, LEDs, fluorescent lamps (see the spectrum in Fig. 7.), discharge lamps, ...

This spectrometer can also be used to measure the wavelength of lasers.

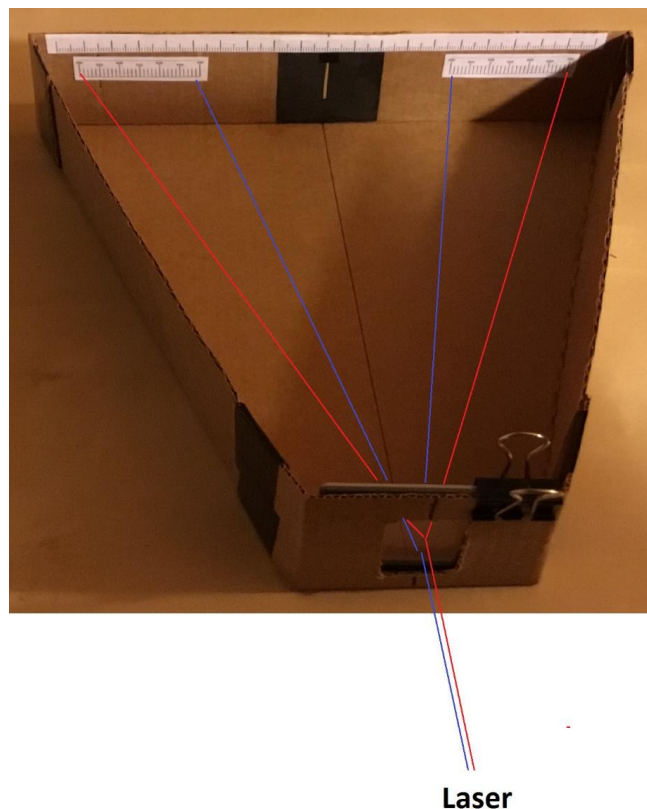


Fig. 9. Example of red and blue laser wavelength measurements

We point a red, green or blue laser into the diffraction grating window. We can read the wavelength of the laser light on the scale (see Fig. 7).

Conclusion

I wish everyone many interesting ideas for the production of simple aids and the joy of discovering (confirming) physical laws.

Literature

[1] <http://www.vyrobalahvi.cz/bema-vyroba/eshop/21-1-Preformy/5-2-PCO/5/272-Preform-PCO-38g-clear>

[2] Schwabacher, A., Pazdera V. *A simple spectroscope*, in *Heuréka Workshop 2005* p. 118

[3] Pazdera, V. *Making a spectroscope*, *Heuréka Workshop 2014*. p. 151.

[4] <http://vnuf.cz/sbornik/prispevky/20-19-Necas.html>

[5] <http://udif.cz/objednavka/distribuce-pomucek>