

Abstracts of Workshop of PhysHOME 2012

(Incomplete list, ordered in the alphabetic order by authors' names)

Leoš Dvořák: Simple charge detector with bipolar transistors

In the workshop the participants build simple detectors of electric charge with 2 or 3 bipolar transistors (and a LED or a small light bulb). The "technology" of these instruments uses small wooden boards and brass nails serving as points to which terminals of components are soldered. This proved to be useful in (much longer) workshops in courses for in-service teacher training. Some experiments utilizing the indicator concerning indicating small currents, establishing polarity of charged bodies or presenting the relation of electric charges and currents are discussed.

Tomasz Greczylo, Wim Peters: Experiments with liquid nitrogen

Use of liquid nitrogen unroll possibilities to demonstrate different aspects of superconductivity when performing simple experiments with YBaCuO pallets and neodymium magnets. Most of the experiments are well known and often exhibited during lectures but we plan to show them in specially designed sequence.

We hope to engage audience in investigating: resistivity versus temperature, persistence of current, levitation, flying train, gadolinium. The experiments will be illustrated with educational materials and movies published at the project's YouTube channel.

Performing this introduction to the phenomena we would like to focus on showing electrical and magnetic properties which define superconductivity. Therefore we are going to illustrate phase transition, pinning phenomena and give an example of measurement of Curie temperature for gadolinium.

During the workshop we will use a collection of experiments so called low and high-tech kits, developed during the realization of EU project MOSEM (Minds-On experimental equipment kits in Superconductivity and ElectroMagnetism for the continuing vocational training of upper secondary school physics teachers – LLP-LdV-TOI-2007-NO/165.009).

Peter Horváth: Simple experiments with CD's

The workshop will be in two parts. In the first, we will show possible usage of slightly modified CDs for demonstration and pupil's experiments in the mechanics of rigid bodies, namely the experiments which may be used to introduce and develop pupils' concept of the moment of inertia.

The second part will be devoted to optics, where we will demonstrate the usage of CDs for measuring wavelength and the index of refraction.

Alexander Kazachkov: In-Service Trainings' Positive Feedback: Low Cost Experiments' Development by the Trainees and Their Students

In-service trainings focused on the creative methods of teaching like inquiry-based education imply for the development of the participants' creativity rather than just sharing ideas and experiences, however bright and efficient. Thus, a real positive feedback from the trainees is their own suggestions on development of the presented activities. Also, the presenter him/herself may learn a lot from the trainees reaction. And possibly the most rewarding is to inspire students' creative ideas and projects.

Memorable examples of all those positive feedbacks are given in a series of low cost

experiments developed by the author due to being both a trainer and a trainee, by the participants of his workshops and by the students. Presented topics include Electrostatics, Gas Laws, Pressure, Buoyancy, Heat Transfer, Balances and other, including creative construction projects. The author owes a bunch of inspirational ideas to PhysHOME participants: Leoš Dvořák, Václav Piskač, Tomasz Greczyło, Peter Horváth, Gorazd Planinšič, and to the workshop leaders of Heureka project.

Václav Piskač: Measure, count and measure again

The method "Measure, count and measure again" combines physical experiments and calculations. First step is to make some measurements, second step is to make calculations and find the value of some quantity. Third step is to make another measurement to confirm the calculated value. This method is very powerful - it attracts the attention of pupils during a school lesson.

I will show several "easy-to-make" physical experiments and use the described method in my workshop.

Zdeněk Polák: Simple experiments with infrared radiation

The workshop presents, how, with very simple and easy accessible things, we can explore such characteristics of material that cannot be felt by our senses. Following given manual, pupils can make a light filter by their own. This filter transmits only short-wave part of infrared spectrum of electromagnetic wave. If you attach this filter to the digital camera, you will see the world in the nonseeable part of the spectrum – infrared radiation. With this equipment, they can find answers to some questions like: what is transparent, bright or dark. What are the sources of the infrared radiation and what are their properties. How different material reacts with this radiation. Which material absorbs it and which transmits it. Whether has the IR radiation the same behaviour as the light has. If it can be refracted, reflected, polarized etc. Pupils will experience how audio signal can be transmitted via IR radiation. All experiments are performed under usual conditions in the class. There is no need for special darkening of the classroom.

Laurence Viennot: Colour phenomena: the role of absorption

Target audience (about 20): physics teachers and teacher educators at any school level. The workshop will illustrate the "MUSE" approach (an EPS-PED project:

<http://education.epsdivisions.org/muse/>). The key ideas of the MUSE process are:

- the need for conducting an in depth-content analysis in direct comparison with students' common ideas and difficulties;
- the importance of reflective awareness of teaching rituals and the shortcomings involved in constraining teaching to routines without resorting to careful and specialized design;
- the educational value of elaborating conceptual links both within and between activities, as well as with situations from everyday life.

-The participants will be invited into a series of activities bearing on Colour and Absorption. These activities will be carried out in five small groups that will work in parallel on the same tasks

-The first set of activities will act as a brief reminder of the classical rules of colour mixing.

-The core of the workshop will be leading participants to go beyond a blind acceptance of

classical rules. This will be done through observations of a very "simple" experiment, easy to reproduce, that often turns out to be thought provoking.

- A whole group discussion will end the session, in order to share the experiences gained in the small groups, and envisage the transfer of the workshop to different audiences (students, teacher educators).

The help received from Gorazd Planinsic and Elena Sassi is gratefully acknowledged.

References:

Ten free-downloadable documents at: <http://education.epsdivisions.org/muse/>, including :

Sassi, E., Planinšič, G., Ucke, C. & Viennot, L. 2011. Added Value in Education.

Planinšič, G. & Viennot, L. 2010. Shadows: stories of light. .

Viennot & de Hosson, 2012. Colour phenomena and partial absorption.
