

Łukasz Tomków (lukasz.tomkow@pwr.edu.pl)

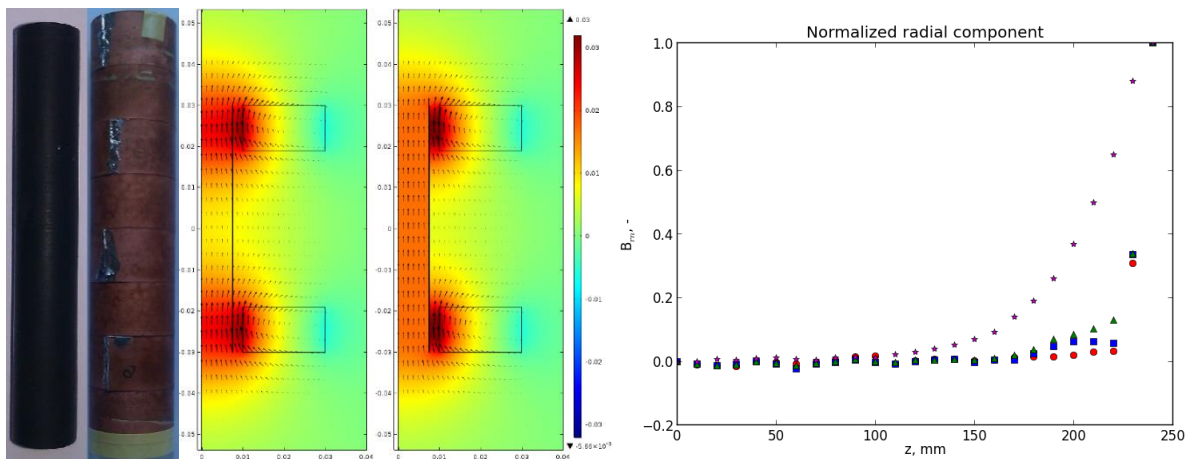
Laboratory: VBLHEP, sector 1, NIKO

Project: Numerical modelling of superconductors and their application for magnetic shielding

Project description:

1. Students will familiarize with the methods of numerical modelling of superconductors. They will improve their knowledge of behaviour of superconductors subjected to external magnetic fields.
2. The major focus will be put on the analysis of HTS (high-temperature superconductor) tapes for the purpose of magnetic shielding and the improvement of the homogeneity of magnetic field.
3. The students will create the numerical model to predict how the presence of the superconducting magnetic shield will affect the distribution of magnetic field and will try to assess the usefulness of few types of tapes.
4. Experimental check of the results obtained from the model will be performed.

The goal of the project is to improve the student's knowledge on the applications and physics of superconductors as well as to teach them basic principles and method of numerical modelling. Short lectures will be given to students to give them the required theoretical background. Then the students will perform modelling and experimental work and will write short paper describing the obtained results. Such approach will allow students to learn the basics of scientific work.



Left – examples of superconducting magnetic shields (bulk and made of tapes), middle – example of the effect of an open superconducting shield on the improvement of homogeneity of the magnetic field, right – example of experimental results with the similar improvement visible

Requirements:

- preferably MSc students or recent graduates of engineering or applied physics
- knowledge of applied superconductivity and cryogenics
- own laptop

Useful links:

<https://aip.scitation.org/doi/abs/10.1063/1.4906399>

<http://iopscience.iop.org/article/10.1088/1742-6596/507/3/032028>