

Ph.D Position in THz spectroscopy of Magnetoelectric Multiferroics

Budapest University of Technology and Economics, 1111 Budapest, Budafoki ut 8.

[MTA-BME Lendület Magneto-optical Spectroscopy Research Group](#)

A Ph.D position in THz spectroscopy of magnetoelectric multiferroics is available in the Department of Physics at the Budapest University of Technology and Economics.

In multiferroic materials with simultaneous ferroelectric and magnetic order, tight clamping between the electric field and the magnetization, or complementary between the magnetic field and the electric polarization, can arise. The vast number of possible applications of these materials, ranging from magnetic field sensing to spintronics, triggered an intense research in condensed matter physics and materials science. In the last few years our research group has demonstrated that low-frequency optical excitations of multiferroics show exotic optical phenomena such as unidirectional light propagation (material is transparent in one but not in the opposite direction), giant polarization rotation [1-3]. These effects originating from the dynamical magnetoelectric coupling can pave the way for novel photonic devices; one-way light-guides, polarization rotators, etc.

The applicant will participate in the installation of a THz spectrometer coupled to a cryo-free optical magnet. Based on this new instrument, s/he will study the propagation of THz radiation in several multiferroic crystals. The coupled spin and charge dynamics will be analyzed using analytically solvable models and numerical simulations. We are also going to extend the study of unidirectional light propagation to the infrared-visible part of the spectrum using magnetoelectric metamaterials. The position is funded by the Momentum Program of Hungarian Academy of Sciences.

Qualifications: An MSc. degree in physics, materials science or any of the related areas is required. Experience in THz and/or optical spectroscopy, design of optical systems is an advantage.

Application Instructions: Interested candidates should send a cover letter detailing research interests, technical expertise, publication list and CV with two references to Dr. I. Kézsmárki (kezsmark@dept.phy.bme.hu) and Dr. S. Bordács (bordacs.sandor@wigner.bme.hu) till the 15th of September, 2014.

- [1] I. Kézsmárki et al., *One-way Transparency of Four-coloured Spin-wave Excitations in Multiferroic Materials*, Nature Communications **5**, 3203 (2014).
- [2] S. Bordács et al., *Chirality of matter shows up via spin excitations*, Nature Physics **8**, 734 (2012).
- [3] I. Kézsmárki et al., *Enhanced Directional Dichroism of Terahertz Light in Resonance with Magnetic Excitations of the Multiferroic Ba₂CoGe₂O₇ Oxide Compound*, Physical Review Letters **106**, 057403 (2011).