TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

Solids4Fun
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Guest Lecture

Title: "Multiferroic: A Daydream?"

Speaker: Prof. Dr. Maximilien Cazayous

Address: Laboratoire Matériaux et Phénomènes Quantiques, Université Paris Diderot, France

Date: Friday, 19th of December 2014
Time: 14:30
Place: Seminar Room CBEG02 (387, Photonics); Gußhausstraße 27

Abstract:

The concept of electromagnetism arises from the fact that electric and magnetic fields are usually not independent. This is exemplified by the celebrated Maxwell equations. The possibility of electromagnetic solids was first suggested by Pierre Curie in 1894 in his analogy between electromagnetic phenomena in vacuum and in solids. This analogy is very important today in light of the recent advances of spintronics for example. Controlling magnetism via electric field is also particularly attractive for applications such as random-access memories or magnetic storage. Until recently however most of the magnetic materials display only modest magnetoelectric effects.

The revival of the magnetoelectric effect is due to the recent surge of interest

for a family of very attractive materials in which both ferroelectric and magnetic orders are present. These materials, known as multiferroics, have attracted much attention worldwide. Multiferroics open the possibility of tuning the polarization direction with a magnetic field and/or the magnetization direction with an applied voltage. Multiferroic materials are therefore prime candidates for the manipulation of spin states via electric fields and the tuning of dielectric properties via magnetic fields, both very desirable for applications. Moreover, multiferroic materials offer the opportunity to look at the underlying mechanism of ferroelectricity that can be induced by the magnetic ordering.

I will introduce this theme through the main discoveries of these last years and with regard to the numerous fundamental questions. I will show how the application perspectives extend the potential of this multifunctional material to transform information from one state variable into another (e.g., charge, spin, light, etc).