TECHNISCHE UNIVERSITÄT DRESDEN

Faculty of Physics

PHYSICS COLLOQUIUM

Speaker:

Dr. Alina M. Deac
Helmholtz-Zentrum Dresden-Rossendorf,
Dresden High Magnetic Field Laboratory,
Dresden

Topic:

Spin-transfer effects in structures with different magnetic configurations
Introduction for habilitation

Time and place:

Tuesday, January 30, 2024, **2:50 pm** – hybrid event
The colloquium will be held in REC/C213.
Online participation possible:
Zoom-Meeting: Meeting-ID: 631 3817 8900 / passcode: PC-WiSe23
https://tu-dresden.zoom-x.de/j/63138178900?pwd=am9nSzYyeUh3SWxMdnNBWkpUaXl5UT09

Host:

Prof. Jochen Wosnitza

Abstract:

Since their initial prediction in 1996, spin-transfer induced/assisted phenomena have become one of the most relevant fields in magnetism in recent years, with valid industrial applications. In a nutshell, a spin-polarized current flowing through a ferromagnet exerts a torque on its magnetization at the nanoscale, thereby providing means of manipulating it. In a nano-size magnet, spin-transfer torques can induce either magnetization reversal or steady-state precession. These phenomena can be exploited to design a range of devices ranging from more obvious applications such as embedded magnetic memories (currently in production by several companies, including in Dresden), to a more distant potential implementation as wireless radio-frequency oscillators for mobile communications, which could potentially cover the THz gap, or for neuromorphic computing. Presently, there remain countless aspects being investigated, spreading from the very applied to the very fundamental. Here, I will focus on fundamental issues, while still connecting to application-related requirements. The talk will cover experimental, theoretical and/or micromagnetic modelling analysis of spin-transfer driven precession in MgO-based tunnel junctions versus basic metallic nanopillars and spin-transfer switching/precession in junctions with non-collinear magnetization configurations. Further fundamental topics that will be briefly addressed include investigating the potential of almost compensated ferrimagnets as active layers for spin-transfer driven oscillators in the THz gap and whether thermal gradients - naturally occurring in asymmetric structures such as the nanopillars used for spin-

torque devices - can be functionalized to assist torques induced by direct electrical bias, as predicted by ab-initio calculations.

Bio: Alina M. Deac obtained her degree in Physics from the Babes-Bolyai University (Cluj-Napoca, Romania) in 2000, and her Master and PhD from the Joseph Fourier University (Grenoble, France) in 2001 and 2005, respectively. The focus of her PhD work was spin-momentum transfer-induced phenomena, which she carried out at SPINTEC. She continued her research in the same field as a JSPS Fellow at AIST, Tsukuba (Japan), a Marie Curie Fellow at NIST, Boulder (USA) and Forschungszentrum Jülich (Germany), and finally as an Ambizione Fellow at EPFL (Switzerland). Since October 2011, she is leader of the Spintronics group at HZDR.