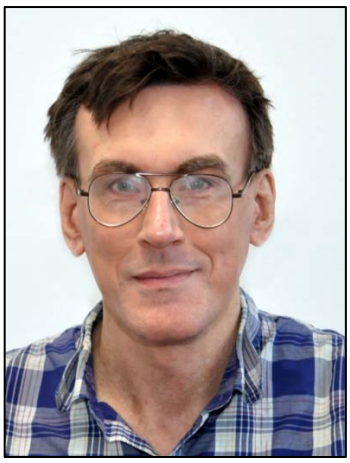

Rafal E. Dunin-Borkowski
Forschungszentrum Jülich, Germany

Short Biography

Rafal Dunin-Borkowski is Director of the Institute for Microstructure Research and the Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons in Forschungszentrum Jülich, Germany. His Ph.D. (1990-1994) was carried out in the Department of Materials Science and Metallurgy in the University of Cambridge. After working as a postdoctoral research scientist in the University of Cambridge, Arizona State University and Oxford University, between 2000 and 2006 he held a Royal Society University Research Fellowship in the University of Cambridge. Between 2007 and 2010, he led the establishment of the Center for Electron Nanoscopy in the Technical University of Denmark. He specializes in the characterization of magnetic and electronic materials at the highest spatial resolution using advanced transmission electron microscopy techniques, including aberration-corrected high-resolution transmission electron microscopy and off-axis electron holography. In 2009 he was awarded the Ernst Ruska Prize of the German Society for Electron Microscopy. In 2012, 2017 and 2019 he was awarded Advanced, Proof of Concept and Synergy Grants by the European Research Council.

Title of the keynote talk: Exploring the nano-world with electrons

Abstract of the keynote talk

Transmission electron microscopy has been revolutionized in recent years, both by the introduction of new hardware such field-emission electron guns, aberration correctors and in situ stages and by the development of new techniques that take advantage of increased computational speed and the ability to control and automate modern electron microscopes. In this talk, I will describe how

electron microscopy can be used to obtain quantitative information about not only local variations in microstructure and composition in materials, but also about the static and dynamic properties of a wide variety of nanoscale magnetic textures. I will present examples of results obtained from studies of magnetic skyrmions, sub-100-nm vortex-like spin textures with particle-like properties that are of interest for future energy-efficient spintronic devices. The examples will include quantitative images of geometrically-confined magnetic skyrmions in nanoscale tracks and disks and twisted rope-like magnetic skyrmion braids. I will conclude with a personal perspective on future directions for the development of transmission electron microscopy, followed by a summary of recent progress towards creating a sustainable distributed research infrastructure for electron microscopy in Europe.