

*You are cordially invited to attend this seminar to be held on*

**Wednesday, December 28<sup>th</sup>, 16:00**  
**Room 206, Wolfson Mechanical Engineering Building**

## **In-situ X-ray crystallography of functional ferroelectric materials**

**Dr. Semen Gorfman**

Department of Physics, University of Siegen, Siegen, Germany

### **Abstract**

**N**on-destructive characterization tools of X-ray crystallography are pivotal for the knowledge-driven materials design. The recent advances in the crystallographic instrumentation and the data analysis have dramatically extended the length and time scales, typically accessible from an X-ray diffraction experiment. These advances constantly push the traditional X-ray crystallography beyond its state-of-the-art and open new horizons for testing real materials in action. The aim of this talk is to demonstrate the power of in-situ X-ray crystallography for understanding functional ferro- and piezoelectrics. I will show the novel stroboscopic technique for synchrotron and home-lab X-ray diffraction experiments. I will demonstrate that this technique uncovers the mechanisms of strong piezoelectricity and polarization reversal in perovskite-based materials, focusing at the dynamics of mesoscopic (domain patterns and domain wall motion) and atomic structures (symmetry and chemical bonds). I will finally discuss the perspective of most recent and future synchrotron-based methods for advanced analytics of functional materials in-situ and in-operando.

### **Biosketch**



**Semen Gorfman** was born in 1979 in Chelyabinsk, Russia. He studied physics at the Chelyabinsk State University, obtained his doctoral degree from the University of Siegen, Germany (2006) and worked as a postdoc (2008–2011) in the ferroelectrics and crystallography group of the University of Warwick, UK. He is currently the research fellow at the University of Siegen and the temporary substitution professor (Vertretungsprofessor) at the University of Freiburg, Germany. His research interests are crystallography of functional materials, time-resolved and synchrotron X-ray diffraction, piezo- and ferroelectricity, multi-domain systems.