TECHNISCHE UNIVERSITÄT DRESDEN

Bereich Mathematik und Naturwissenschaften Fachrichtung Physik

PHYSIKALISCHES KOLLOQUIUM

Referentin: **Prof. Dr. Nicola Spaldin**
ETH Zurich
Materials Theory

Thema: **From Materials to Cosmology: Studying the early universe under the microscope**

Zeit und Ort: Dienstag, 23.05.2017, 16:40 Uhr
Recknagel-Bau, Hörsaal REC/C213, Haeckelstr. 3

Leiter: Prof. Dr. Lukas M. Eng

Kurzfassung: The behavior of the early universe just after the Big Bang poses one of the most intriguing basic questions in all of science, which is extraordinarily difficult to answer because of insurmountable issues associated with replaying the Big Bang in the laboratory. One route to approaching the problem -- which lies at the intersection between cosmology and materials physics -- is to use laboratory materials to test the so-called "Kibble-Zurek" scaling laws proposed for the formation of defects such as cosmic strings in the early universe. Here I will show that a popular multiferroic material -- with its coexisting magnetic, ferroelectric and structural phase transitions -- generates the crystallographic equivalent of cosmic strings. I will describe how straightforward solution of the Schroedinger equation for the material allows the important features of its behavior to be identified and quantified, and present experimental results of what seem to be the first unambiguous demonstration of Kibble-Zurek scaling in real materials. I will end with some very recent data showing that things might be less unambiguous than they seem.

Biographie: Nicola A. Spaldin is the Professor of Materials Theory in the Department of Materials at ETH Zürich. She studied Natural Sciences at Cambridge University, where she obtained a B.A. in Natural Sciences in 1991. She then moved to the University of California, Berkeley, where she earned her PhD in Chemistry in 1996. She next worked as a postdoctoral researcher in the Applied Physics Department at Yale University, before moving back to California, where she was Assistant Professor (1997-2002), Associate Professor (2002-2006) then Full Professor (2006 - 2010) in UC Santa Barbara's Materials Department. She moved to ETH in 2011. Spaldin has been a visiting professor at several institutions: Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India (2000), Department of Earth Sciences, Cambridge University, UK (2003), Department of Materials Science and Engineering, University of California, Berkeley, CA, USA (2007) and the Materials Theory Division at Uppsala University (2010).