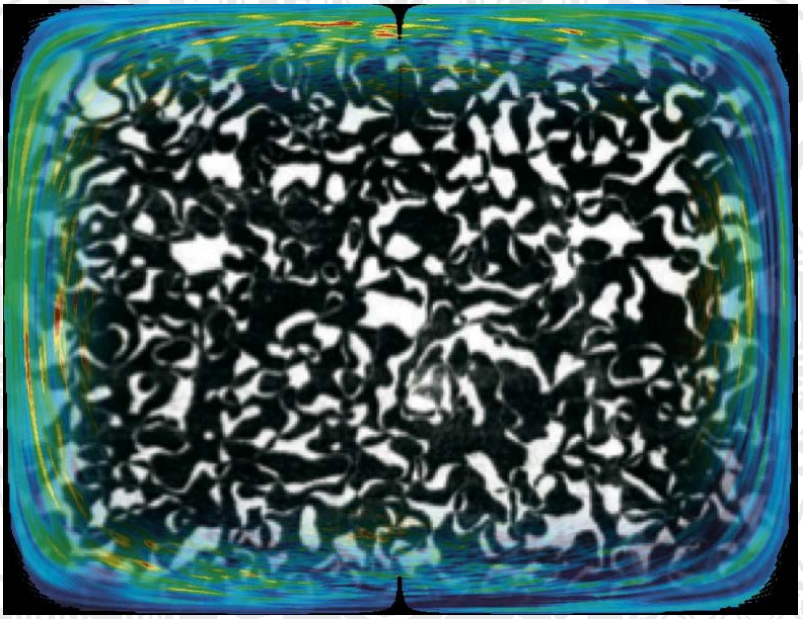
PHYSIKALISCHES KOLLOQUIUM

AM 19. OKTOBER 2015 UM 17 UHR C.T.

IM GROßEN HÖRSAAL



FROM MULTIFERROICS TO COSMOLOGY: STUDYING THE EARLY UNIVERSE UNDER THE MICROSCOPE

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What happened in the early universe just after the Big Bang? This is one of the most intriguing basic questions in all of science, but it is extraordinarily difficult to answer because of insurmountable issues associated with replaying the Big Bang in the laboratory. One route to the answer -- 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 the first unambiguous demonstration of Kibble-Zurek scaling in real materials.