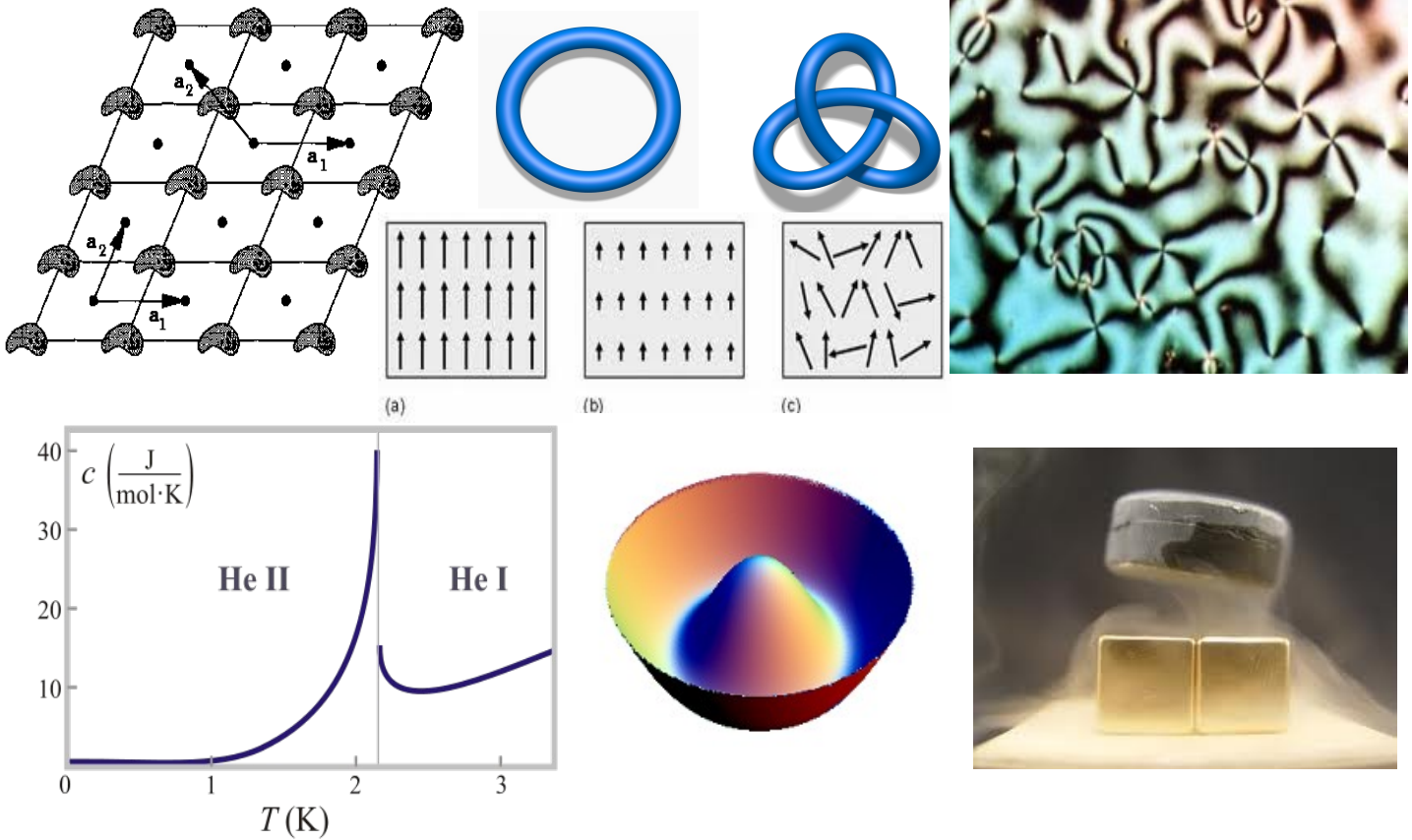


# Symmetry, Topology and Coherence in Condensed Matter Physics

## February 2 - March 31, 2015



### Course description

The aim of the course is to two-fold. Our first goal will be to discuss the concepts of condensed matter theory such as symmetry, topology and their relation to different types of ordering in many-particle systems. Our second goal will be to provide a gentle introduction to methods of quantized fields and their applications in many-body physics. We shall try to emphasize the physical and visualizable aspects of the subject. While the course is intended for students with a wide range of interests, many examples will be drawn from condensed matter physics and atomic physics.

### Topics (tentative):

Symmetries and broken symmetries. Conservation laws, hydrodynamics.  
 Symmetries and phase transitions. Goldstone theorem.  
 Second quantization, path integrals in QM.  
 Topology of Bloch bands. Chern invariant and quantization of observables.  
 Symmetry breaking (SB). Spontaneous SB, phase transitions. Superfluidity, magnetism.  
 Anomalous SB. Chiral anomaly and scaling anomaly in condensed matter systems

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