

Colloquium

Department of Physics, Temple University

On Ising's Model of Ferromagnetism

Peter Armitage

Department of Physics, John Hopkins University,

Abstract

The 1D Ising model is a classic model of great historical significance for both classical and quantum statistical mechanics. Developments in its understanding have fundamentally impacted our knowledge of magnetism, thermodynamics, critical phenomena, conformal quantum field theories, particle physics, and emergence in many-body systems. Despite the theoretical impact of the Ising model there have been very few good 1D realizations of it in actual real material systems. However, it has been pointed out recently, that the material CoNb_2O_6 , has a number of features that may make it the most ideal realization we have. In this talk I will discuss the surprisingly complex physics resulting in this simple model and review the history of "Ising's model" from both a scientific and human perspective. In the modern context I will review recent experiments by my group and others on CoNb_2O_6 . In particular I will show how low frequency light in the THz range gives unique insight into the tremendous zoo of phenomena arising in this simple material system, which in different regimes exhibits phenomena as diverse as non-trivial realizations of a non-interacting 1D Schrodinger equation to a prototype for a strongly interacting quantum many body system.

Monday, February 15, 2016 at 3:00pm

SERC, Room 110B

Refreshments served at 2:45pm