Concordia University
Arts and Science
Department of Physics

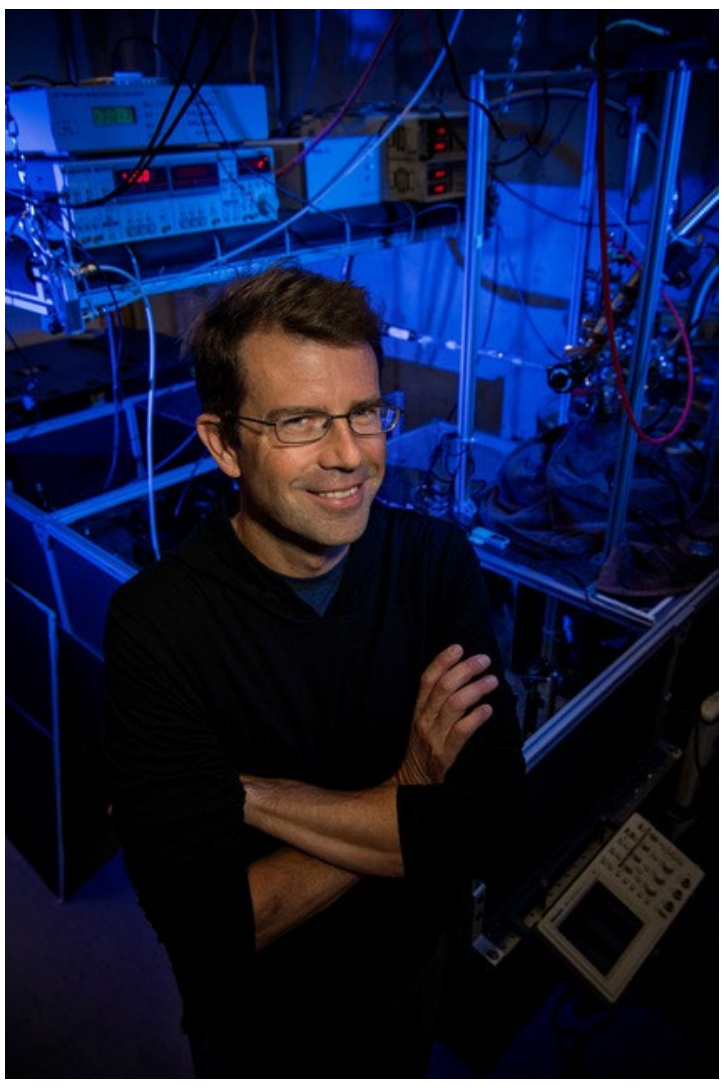
Barry Frank Memorial Lecture

Wednesday, September 9th, 2026, 15h00
HB-130, Loyola Campus of Concordia University
7141 Sherbrooke Street West, H4B 1R6, Montreal

Prof. N. Peter Armitage, Johns Hopkins University

On Ising's model of ferromagnetism

The 1D Ising model is a classical model of great historical significance for both classical and quantum statistical mechanics. Developments in the understanding of the Ising model have fundamentally impacted our knowledge of thermodynamics, critical phenomena, magnetism, 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 of the Ising model in one dimension. 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 model system.



N. Peter Armitage has been on the faculty of the Department of Physics and Astronomy at Johns Hopkins University since 2006. He received his B.S. in Physics from Rutgers University and his Ph.D. from Stanford University in 2002. He is a physicist whose research centers on material systems which exhibit coherent quantum effects at low temperatures, like superconductors and "quantum" magnetism. Dr. Armitage's principal scientific interest is understanding how is it that large ensembles of strongly interacting, but fundamentally simple particles like electrons in solids act collectively to exhibit complex emergent quantum phenomena. He is exploiting (and developing) recent technical breakthroughs using very low frequency microwave and THz range radiation to probe these systems at their natural frequency scales. The material systems of interest require new measurement techniques as their relevant frequencies typically fall between the range of usual optical and electronic methods. He has been the recipient of a DARPA Young Faculty Award, an NSF Career Award, a Sloan Research Fellowship, was a three-time Kavli Frontiers Fellow, the William Spicer Award from the Stanford Synchrotron Radiation Laboratory, the William L. McMillan Award from the University of Illinois, the 2016 Genzel Prize, and a 2023 Brown Foundation Award.

Barry Frank joined the Physics department of Sir George Williams University (one of the predecessors of Concordia) in 1965. He received his MSc and PhD degrees in physics from McGill University and the University of British Columbia, respectively. His field of research was condensed matter physics, in particular critical phenomena. He also had a deep insight in mathematics. Barry had his own unique style of teaching that was admired by the students. Apart from physics, he enjoyed literature and learning languages. Barry Frank Memorial Lecture has been established to commemorate Barry and invite distinguished physicists to give a talk and expose students and colleagues alike to their work..