

# 物性研究所談話会

標題：On Ising's model of ferromagnetism

日時：2018年12月5日(水) 午後4時～午後5時

場所：物性研究所本館6階 大講義室(A632)

講師：Prof. N. Peter Armitage

所属：The Johns Hopkins University

要旨：

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  $\text{CoNb}_2\text{O}_6$ , 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  $\text{CoNb}_2\text{O}_6$ . I want to give some perspective about how those of interested in the physics of condensed matter can go searching for material systems that are realizations of particular Hamiltonians. And 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. It is remarkable that in a system as simple as this quasi-1D chain, analogies to phenomena and mathematical structures as diverse as quark confinement, quantum number fractionalization, Majorana fermions, Airy functions, and a 248 dimensional Lie algebra(!) can be found.

## 【講師紹介】

Armitage 先生は、スピン系・超伝導・トポロジカル物質などの様々な物質群を対象として、主にテラヘルツ電磁応答を活用してその基底状態の応答を明らかにしてきた世界的に著名な研究者です。Ising モデルの歴史的背景や、このシンプルなモデルから生まれる最新の研究トピックまで講演していただく予定です。是非、皆様ご参加ください。Armitage 先生は来年2月末まで物性研に滞在します。

