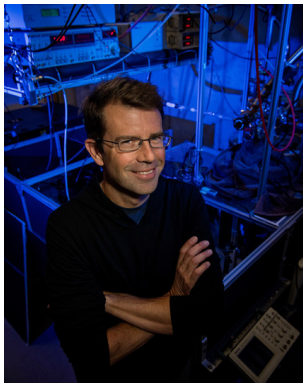
Yale *Physics*

Physics Club

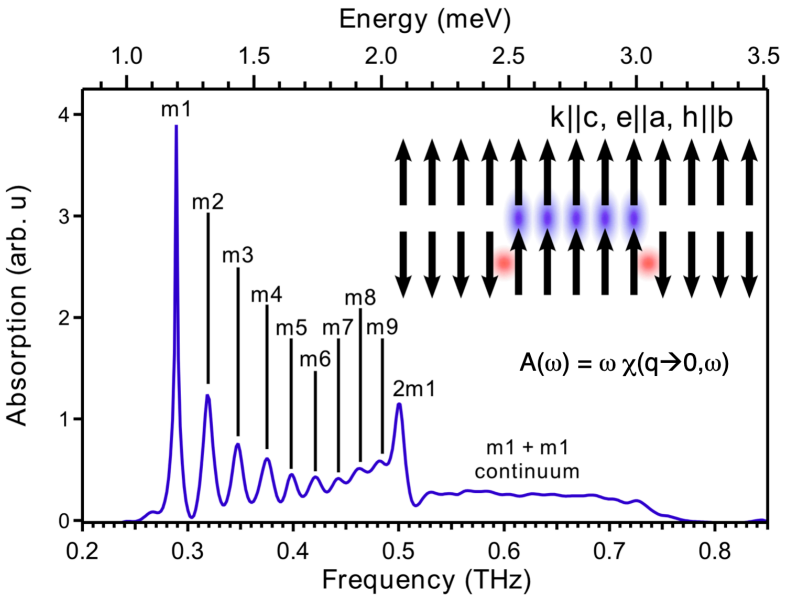


Peter Armitage

Johns Hopkins University

January 29, 2024 at 3:30 pm in SPL 57

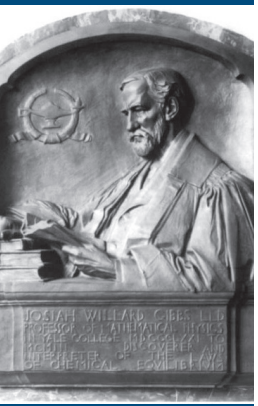
On Ising's Model of Ferromagnetism



The 1D Ising model is a classical model of great historical significance for both classical andquantum statistical mechanics. Developments in the understanding of the Ising model havefundamentally impacted our knowledge of thermodynamics, critical phenomena, magnetism,conformal quantum field theories, particle physics, and emergence in many-body systems. Despite thetheoretical impact of the Ising model there have been very few good 1D realizations of it in actual realmaterial systems. However, it has been pointed out recently, that the material CoNb2O6, has a numberof features that may make it the most ideal realization we have of the Ising model in one dimension. Inthis talk I will discuss the surprisingly complex physics resulting in this simple model and review thehistory of "Ising's model" from both a scientific and human perspective. In the modern context I willreview recent experiments by my group and others on CoNb2O6 that give insight into quantumcriticality, unconventional nonlocal excitations, and Kramers-Wannier duality. In particular I will showhow low frequency light in the THz range gives unique insight into the tremendous zoo of phenomenaarising in this simple model system.

Host: Eduardo da Silva Neto

Connection info: https://yale.zoom.us/j/93660628074; Password: 595687



Physics Club is a weekly colloquium of general interest to the Department of Physics, Applied Physics, Astronomy, and Mathematics. The series is aimed at graduate students, postdoctoral researchers, research staff and faculty. The name dates to the late 1890s, the era of J Willard Gibbs, who influenced the intellectual life at Yale through a number of "graduate clubs". Physics Club is sponsored by the Yale Physics Department and Yale University.