Speaker: Dr. Arthur Ramirez

Affiliation: University of California Santa Cruz

When: Monday, September 19, 2022 3:00 pm – 4:00 pm

Title: The Eminuscent phase in frustrated magnets - a challenge to quantum spin liquids

Abstract: Some geometrically frustrated magnets are claimed to host a quantum spin liquid (QSL) state. The QSL is a theoretically-proposed many-body state that is fully quantum coherent and, if achievable, may offer a new route to quantum computation. We show that the response of such materials to small amounts of disorder cannot be explained in terms of the canonical source-field construct and suggests a temperature-dependent permeability with a hidden energy scale where short-range order among spins is established. This particular type of short range order mediates long range interactions and is called the eminuscent phase, best described within the Coulomb representation. The instability of the eminuscent phase to spin glass formation in 3D and random singlets in 2D, in addition to the short range order itself, pose serious challenges to the viability of the QSL state.

Bio: Arthur P. Ramirez: Art Ramirez joined Bell Labs in 1984 after completing his Ph.D. at Yale on spin solitons in a 1D ferromagnet. At Bell he studied a variety of topics including heavy fermions, cuprate and C_{60} superconductivity, geometrical frustration, colossal magnetoresistance, and organic electronics. After a stint at Los Alamos, he returned to Bell in 2003. He entered academia in 2009 at UC Santa Cruz as dean of engineering and is now professor of physics.