Frontiers in Quantum Magnetism

Magnetism, long considered a well-understood pillar of physics, is revealing a new frontier where quantum mechanics, strong correlations, and geometric frustration conspire to produce entirely unexpected states of matter. In these systems, spins evade conventional order and instead form highly entangled phases such as quantum spin liquids, hosting fractionalized excitations like spinons and exhibiting hidden topological order. This colloquium will introduce the key ideas behind these quantum magnets, highlight recent advances in frustrated lattices and real materials.