

New Phases of Magnetic Quantum Matter Studied by Neutrons, Muons and Photons

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Materials made of arrays of quantum spins forming well-defined lattices serve as model systems to study the fascinating phases of magnetic quantum matter like localized quantum-dimer qubits, spin Luttinger-liquids, magnon Bose-Einstein condensates, or spin super-solids. The neutron, muon and photon sources at the Paul Scherrer Institute are unique tools for high-precision studies of such phases, and of their correlations, excitations and out-of-equilibrium behavior. I will present an overview of current frontiers in the field and discuss the results in the broad context of recent developments in computational physics and exciting new opportunities that free electron lasers like the SwissFEL will offer to study the time-dependence and out-of-equilibrium quantum mechanics of such systems.