Exotic ground states and excitations in triangular lattice quantum spin systems

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[Abstract: Triangular lattice spin systems have been studied since the 1950's, yet we are still far from fully understanding their exotic behavior emergent from interplay of geometric frustration, quantum and thermal fluctuations. In this talk, we will present studies on two triangular lattice spin systems, realized in the $Na_2BaT(PO_4)_2$ (T=Co, Ni) compounds. Through combined experimental/theoretical evidence, I will try to convince you that the Ni (spin-1) compound is a realization of the spin-nematic phase, where the quadrupolar degree of freedom contributes to the superfluidity part of a spin-nematic supersolid; and the Co (spin-1/2) compound is a demonstration of spin excitation continuum without being a quantum spin liquid.]