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**Fingerprints of Interacting Hardcore Bosons on a Lattice: Spin Dynamics in Dimer Spin Systems with Field-Tuned Quantum Criticality.**

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Spin-dimer based magnetic insulators are model systems for the experimental and theoretical investigation of field-tuned quantum criticality and, in particular, the ground states of strongly interacting hardcore bosons (triplets), for which there are increasing parallels to ultra-cold atoms in optical lattices. We have investigated corresponding quantum phase transitions by inelastic neutron scattering (INS) in spin systems, which cover both the effect of dimensionality and the degree of quasi-particle mobility. These quantities characterize the triplet excitations and definite the magnon-'BEC' phases above the field-induced quantum critical point in these materials. Inorganic compounds like the 3D copper-halide family $ACuCl_3$ (A=K, Tl, $NH_4$), the strongly frustrated Shastry-Sutherland material $SrCu_2(BO_3)_2$, and quasi-2D $BaCuSi_2O_6$ all show distinct spin dynamics associated with the boson system, which they represent. The fascinating quasi-1D limit is accessible in novel organic materials, which promote a characteristic quantum phase – the Luttinger spin-liquid. Recent INS results, which explore this exciting quantum phase, will be compared to those obtained in higher dimensions and elaborate predictions by theory.