Quantum spin liquid at finite temperatures

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Quantum spin liquids are long-range entangled states of matter with emergent gauge fields and fractionalized excitations. While candidate materials, such as the Kitaev honeycomb ruthenate α-$RuCl_3$, show magnetic order at low temperatures T, here I will present numerical simulations that demonstrate a dynamical crossover from magnon-like behavior at low T and frequencies ω to long-lived fractionalized fermionic quasiparticles at higher T and ω. This crossover is akin to the presence of spinon continua in quasi-1D spin chains, and will be shown to go hand in hand with persistent typicality down to very low T. This, which we argue is a signature of proximate spin liquidity and emergent gauge degrees of freedom more generally, will be useful for the numerical study of many finite-T properties of putative quantum spin liquids.