

Chiral Graviton Theory of Fractional Quantum Hall States

Friday 5 December 2025 10:00 (1 hour)

Online talk - I will present a nonlinear, gauge-invariant effective field theory for the chiral graviton—the spin-2 neutral collective mode seen in polarized Raman scattering experiments on fractional quantum Hall states. The theory is constructed by gauging area-preserving diffeomorphisms with a unimodular spatial metric and introducing a Stueckelberg mass term that opens a tunable gap while preserving gauge redundancy. With a geometric Maxwell sector plus Wen-Zee and gravitational Chern-Simons terms, the theory yields a gapped chiral spin-2 excitation and realizes an isotropic-nematic quantum critical point where the mode softens. I will also outline extensions to fractional Chern insulators and non-Abelian fractional quantum Hall states that capture spin-2 and spin-3/2 neutral modes.

Presenter: DU, Yi-Hsien