



Seminar/Talk

Controlled localization of anyons in a graphene quantum Hall interferometer

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Exchange statistics are a fundamental principle of quantum mechanics, dictating the symmetry of identical particle wavefunctions. The exchange-induced unitary transformation of anyonic wavefunctions can be probed using electronic fractional quantum Hall (FQH) interferometers, where quasiparticles on the interfering FQH edge braid with those localized within the cavity. Here, we add a gate-controlled dot/anti-dot in the center of a bilayer graphene FQH interferometer to tune the number of enclosed anyons. We observe hundreds of controlled phase slips in the conductance across the interferometer for both abelian and non-abelian states, consistent with discrete changes in the localized quasiparticle population. For abelian anyons, the observed phase slips agree with the theoretically expected value. At half filling, our results suggest the interfering edge carries charge $|e/e| = 1/2$ abelian excitations, whereas charge $|e/e| = 1/4$ putative non-abelian anyons remain localized in the interferometer cavity. Controlling the population of localized $e/4$ anyons in an interferometer marks a significant milestone towards observing their non-local exchange statistics and building a fault tolerant topological qubit based on non-abelian anyon manipulation.

Wednesday, August 5, 2026 11:00am - 12:00pm

Office Bldg West / Ground floor / Heinzel Seminar Room (I21.EG.101)



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