Coulomb-mediated pairing in graphene Fabry-Pérot quantum Hall Interferometer

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Abstract

Fabry-Pérot quantum Hall Interferometers are prototypical devices for achieving anyon braiding and accessing anyonic statistics. However, at filling factors superior to 2, an exotic regime of electron pairing has been observed, which defies understanding and may pose problems for anyon braiding experiments(3). In this talk, we will talk about the interference behavior of a graphene-based FPI, where its bias voltage and plunger gate dependence are used as a new tool to identify and discriminate the contributions of each channel to the interference. We evidence a common synchronized pairwise motion between channels, stemming from electron-electron interaction between the channels. It leads to the observed conductance oscillation periodicity determined by summing the Aharonov-Bohm phase of all the closed electron paths, manifested as electron paring and tripling at bulk filling factors 2 and 3 respectively. We further reveal such behavior is affected by edge-bulk interaction.

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