

Anyon braiding and interferometry in the Fractional Quantum Hall effect

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The fractional quantum Hall effect (FQHE) is known to host anyons, quasiparticles whose statistics is intermediate between bosonic and fermionic. We examine scénarios inspired by quantum optics and translated in a condensed matter setting which demonstrate the braiding of anyons. By injecting anyons on the edges of a quantum Hall bar we show that Hong Ou Mandel interferometry allows to determine the scaling dimension of the quasiparticle operator, which is related to the statistics of anyons. This universal width of the Hong Ou Mandel dip can be related to the anyonic braiding of the incoming excitations with thermal fluctuations created at the quantum point contact. We also examine other interferometric devices such as Fabry Perot to illustrate braiding in the time domain.

[1] T. Jonckheere, J. Rech, B. Grémaud, and T. Martin, Phys. Rev. Lett. 130 (2023) 186203