

A Josephson relation for $e/3$ and $e/5$ fractionally charged anyons

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Anyons occur in two-dimensional electron systems as excitations with fractional charge in the topologically ordered states of the fractional quantum Hall effect (FQHE). Their dynamics are of utmost importance for topological quantum phases and possible decoherence-free quantum information approaches, but observing these dynamics experimentally is challenging.

Here, we report on a dynamical property of anyons: the long-predicted Josephson relation $fJ = e^*V/h$ for charges $e^* = e/3$ and $e/5$, where e is the charge of the electron and h is Planck's constant [1]. The relation manifests itself as marked signatures in the dependence of photo-assisted shot noise (PASN) on voltage V when irradiating contacts at microwaves frequency fJ . The validation of FQHE PASN models indicates a path toward realizing time-resolved anyon sources based on levitons. The method may be of interest to provide a demonstration of anyonic statistics, a pre-requisite for topological quantum computing.

- [1] A Josephson relation for fractionally charged anyons, M. Kapfer, P. Roulleau, M. Santin, I. Farrer, D. A. Ritchie, and D. C. Glattli, *Science* Vol. 363, Issue 6429, pp. 846-849 (2019); DOI: 10.1126/science.aau3539.