



STP-Seminar

Am Freitag, **16.08.2019, 11.00 Uhr**

spricht

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über

Parafermions on quantum Hall edges: towards topological qubits

Parafermions are a fractionalization of Majorana zero modes [1,2], similarly to how Laughlin quasiparticles are a fractionalization of electrons. While Majoranas are considered the most promising candidate for implementing topologically protected qubits, parafermions are topologically protected as well and offer the advantage of a larger Hilbert space.

I will start with an introduction to creating parafermionic zero modes at quantum Hall edges and then discuss how a qubit can be built based on parafermions (focusing on how qubit measurement and manipulation can be performed) [3]. I will conclude with an example of how the same parafermionic qubit device can be used as a physics playground, not related to quantum computing [4].

- [1] N. H. Lindner, E. Berg, G. Refael, and A. Stern, "Fractionalizing Majorana Fermions: Non-Abelian Statistics on the Edges of Abelian Quantum Hall States," *Phys. Rev. X* **2**, 041002 (2012).
- [2] D. J. Clarke, J. Alicea, and K. Shtengel, "Exotic non-abelian anyons from conventional fractional quantum Hall states," *Nat. Commun.* **4**, 1348 (2013).
- [3] K. Snizhko, R. Egger, and Y. Gefen, "Measurement and control of a Coulomb-blockaded parafermion box," *Phys. Rev. B* **97**, 081405 (2018).
- [4] K. Snizhko, F. Buccheri, R. Egger, and Y. Gefen, "Parafermionic generalization of the topological Kondo effect," *Phys. Rev. B* **97**, 235139 (2018).

Ort: ITP, Raum 211

Interessenten sind herzlich eingeladen!