Abstract Submitted
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Quantum Hall Effect with Composites of Magnetic Flux Tubes and Charged Particles[1] MARIJA TODORIC, DARIO JUKIC, DANKO RADIC, HRVOJE BULJAN, Department of Physics, Faculty of Science, University of Zagreb, Bijenicka c. 32, 10000 Zagreb, Croatia, MARIN SOLJACIC, Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA — Composites formed from charged particles and magnetic flux tubes, proposed by Wilczek, are one model for anyons, particles obeying fractional statistics[1]. Anyons exist in a two-dimensional (2+1 D) space[1]. Apart from the fundamental interest in anyons, non-Abelian anyonic quasiparticles could become the building blocks of fault-tolerant topological quantum computers. Here [2] we propose a scheme for realizing charged flux tubes, in which a charged object with an intrinsic magnetic dipole moment is placed between two semi-infinite blocks of a high permeability (μ_r) material, and the images of the magnetic moment create an effective flux tube. We show that the scheme can lead to a realization of Wilczek's anyons, when a 2D electron system exhibiting the integer quantum Hall effect (IQHE) is sandwiched between two blocks of the high-μ_r material with a temporally fast response (in the cyclotron and Larmor frequency range). The signature of Wilczek's anyons is a slight shift of the resistivity at the plateau of the IQHE. [1] F. Wilczek, Phys. Rev. Lett. 49, 957 (1982). [2] M. Todorić, D. Jukić, D. Radić, M. Soljačić, and H. Buljan, Phys. Rev. Lett. 120, 267201 (2018).

[1]QuantiXLie Center of Excellence

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