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Fractional charge revealed in computer simulations of resonant tunneling in the fractional quantum Hall regime EVGUENI TSIPER, George Mason University — The concept of fractional charge is central to the theory of the fractional quantum Hall effect (FQHE). Quasiparticles of fractional charge have been first observed by Goldman and Su [1] in resonant tunneling through a quantum antidot. In [1] a periodic sequence of resonant tunneling events was observed as either the magnetic field H or the backgate voltage Vg were varied. The tunneling events are thought of in terms of a quasiparticle tunneling through the bulk of the fractional state between the outer edge of the sample and the inner edge formed around the antidot. The periodicities in H and in Vg were related to the quasiparticle charge e*. Here I use exact diagonalization as well as configuration space renormalization (CSR) to study finite clusters large enough to contain two independent edges. I analyze the conditions of resonant tunneling between the two edges. The "computer experiment" reveals a periodic sequence of resonant tunneling events consistent with the experimentally observed fractional quantization of electric charge in units of e/3 and e/5 [2].
[1] V.J. Goldman and B. Su, Science, 267, 1010, 1995.
[2] E.V. Tsiper, Phys. Rev. Lett., 97, 76802, 2006.

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