Abstract Submitted
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Macroscopic quantum tunneling of bound fractional Josephson vortices in multi-gap superconductor tunnel junctions. VAN MAYES, JU KIM, University of Houston - Clear Lake — We investigate macroscopic quantum tunneling of bound fractional Josephson vortex (fluxon) pairs. These fractional fluxons can arise when spatial phase textures (i-solitons) are excited in the broken time reversal symmetry state of a long Josephson junction (LJJ) with two-band superconductors. Similar to the situation in a Y $Ba_2Cu_3O_7-x$ superconductor film grain boundary [1], this spatial dependence of the critical current density can self-generate magnetic flux in the insulator layer, resulting in fractional fluxons with large and small fraction of flux quantum. Interaction between these fraction fluxons are repulsive at short distances, but it is attractive at longer distances, making them to form a fractional fluxon molecule. This factional fluxon molecule can tunnel through the barrier potential at low temperatures when it is placed in a metastable state formed by a microresistor in the insulator layer and bias current to LJJ. This is similar to quantum tunneling of a diatomic molecule through potential barriers. We estimate the temperature dependence of the tunneling rate of the fractional fluxon molecule. 1. R. Mint and I. Papiashvili, Phys. Rev. B 64, 134501 (2001).

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