Abstract Submitted
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The Quantum Pinch Effect in Semiconducting Quantum Wires
M.S. KUSHWAHA, Rice University — We investigate a two-component, cylindrical, quasi-one-dimensional quantum plasma subjected to a *radial* confining harmonic potential and an applied magnetic field in the symmetric gauge. It is demonstrated that such a system as can be realized in semiconducting quantum wires offers an excellent medium for observing the quantum pinch effect at low temperatures. An exact analytical solution of the problem allows us to make significant observations: surprisingly, in contrast to the classical pinch effect, the particle density as well as the current density display a *determinable* maximum before attaining a minimum at the surface of the quantum wire. The effect will persist as long as the equilibrium pair density is sustained. Therefore, the technological promise that emerges is the route to the precise electronic devices that will control the particle beams at the nanoscale[1]. 1. M.S. Kushwaha, Appl. Phys. Lett. **103**, 173116 (2013).

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