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Fractional Little-Park effect in hybrid superconductor-ferromagnet proximity cylinders

We argue that the Little-Parks effect, i.e., the oscillations of the superconducting critical temperature T_c as a function of the magnetic flux threaded the superconducting cylinder, exhibits the feature of the fractional quantized flux when a ferromagnetic metal filled in the thin-walled superconducting shell, which caused by the exchange interaction. Our analysis is based on the transport-like proximity effect theory in the diffusive regime of Takahashi-Tachiki and shows explicitly that the extremum of T_c in the vortex state L corresponds to the fractional values of fluxoid, and in particular the fractional flux quantum occurred at the $L = 1$ vortex state.

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