Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Dissipation-driven phase transitions in superconducting wires ALEJANDRO LOBOS, Université de Genève, DPMC, 24 Quai Ernest-Ansermet CH-1211, Geneva, Switzerland, ANíBAL IUCCI, Instituto de Física de La Plata (IFLP)-CONICET and Departamento de Física, Universidad Nacional de La Plata, cc 67, 1900 La Plata, Argentina, MARKUS MÜLLER, The Abdus Salam International Centre for Theoretical Physics, P.O. Box 586, 34100 Trieste, Italy, THIERRY GIAMARCHI, Université de Genève, DPMC, 24 Quai Ernest-Ansermet CH-1211 Geneva, Switzerland — Narrow superconducting wires with diameter $d \ll \xi_0$ (where ξ_0 is the bulk superconducting coherence length) are quasi-1D systems in which fluctuations of the order parameter strongly affect low-temperature properties. Indeed, fluctuations cause the magnitude of the order parameter to temporarily vanish at some point along the wire, allowing its phase to slip by 2π, and to produce finite resistivity for all temperatures below T_c. In this work, we show that a weak coupling to a diffusive metallic film reinforces superconductivity in the wire through a quench of phase fluctuations. We analyze the effective phase-only action of the system by a perturbative renormalization-group and a self-consistent variational approach to obtain the critical points and phases at $T = 0$. We predict a quantum phase transition towards a superconducting phase with long-range order as a function of the wire stiffness and coupling to the metal. Finally we discuss implications for the DC resistivity of the wire.

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Date submitted: 22 Nov 2009 Electronic form version 1.4