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Properties of linear arrays of Josephson junctions capacitively coupled to a diffusive metal[1] ALEJANDRO LOBOS, THIERRY GIAMARCHI, DPMC-MaNEP, University of Geneva, Switzerland — Josephson junctions arrays (JJAs) are strongly-correlated quantum systems showing a rich and complex behavior at low-temperatures.[2] Besides their potential uses in applications, JJAs allow to investigate (under controlled conditions) many aspects of low-dimensional superconductivity which remain to be understood. In this work we study the phase diagram and the low-energy properties of a one-dimensional (1D) JJA capacitively coupled to a diffusive two-dimensional electron gas (2DEG) placed at a distance d, which provides dissipation.[3] We derive an effective field-theoretical model for the 1D JJA coupled to the 2DEG, and predict a superconductor-insulator transition (SIT) at $T = 0$, in agreement with former theoretical predictions. We discuss implications for transport experiments and for the observed SIT in 1DJJAs. Both in the superconducting and insulating phases, the coupling to the 2DEG produces deviations with respect to the resistivity as a function of T predicted for an isolated array.

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[3]A. M. Lobos and T. Giamarchi, Phys. Rev. B **82**, 104517 (2010)

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