Abstract Submitted
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Proximity Effect in Mesoscopic Superconductor-Normal-Superconductor Arrays[1] SERENA ELEY, SARANG GOPALAKRISHNAN, University of Illinois Urbana-Champaign, PAUL GOLDBART, Georgia Institute of Technology, NADYA MASON, University of Illinois Urbana-Champaign — Systems of superconducting islands on normal metal films provide a tunable medium with which to study the superconducting proximity effect, phase transitions, and vortex dynamics. Such systems are predicted to exhibit 2D zero-temperature metallic states. Although there has been experimental evidence of such states, they cannot be explained by conventional transport theory. Here, we report transport measurements on triangular arrays of mesoscopic, proximity-coupled Nb islands placed on normal metal Au films. The arrays undergo a two-step transition to a superconducting state; we characterize the superconducting transitions in these systems as a function of island thickness and spacing. The temperature of the first step of the transition linearly decreases with increasing island spacing, and the spacing-dependence of the second step deviates from conventional theories. Moreover, the trends of both steps suggest that the system is approaching zero-temperature metallic states. Through a phenomenological model, we resolve these transitions as a consequence of intra- and inter-island coupling between superconducting phases of individual Nb grains.

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Serena Eley
University of Illinois Urbana-Champaign

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