

Abstract Submitted  
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**Superconductor-insulator transition in Josephson junction arrays screened by a superconducting ground plane** JOSHUA PARAMANANDAM, MICHAEL GERSHENSON, Rutgers University — We have studied quantum phase transitions in unconventional Josephson arrays with a large number of interacting nearest-neighbour islands (typically, 10). The range of inter-island interactions was controlled by the presence/absence of a superconducting ground plane placed in close proximity to the array. We have found that the superconductor-to-insulator transition occurs in the arrays with both short- and long-range interactions at  $E_J/E_C \sim 1$ . Here  $E_J$  is the effective Josephson energy per island,  $E_C$  is its charging energy. However, the critical resistance for the arrays with short-range interactions greatly exceeds the quantum resistance, in contrast to the case of arrays with long-range interactions. These experiments clearly show that the ratio  $E_J/E_C$  is the only relevant (for the SIT) parameter, while the critical resistance can vary a great deal depending on the interaction range.

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