

Abstract Submitted
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Superconducting Memristors¹ MASSIMILIANO DI VENTRA, SEBASTIANO PEOTTA, Univ of California - San Diego — In his original work Josephson [Phys. Lett. 1, 251 (1962)] predicted that a phase-dependent conductance should be present in superconductor tunnel junctions. This effect attracted considerable attention in the past but is difficult to detect, mainly because it is hard to single it out from the background pair current. Here, we propose to isolate it by using a two-junction interferometer where the junctions have the same critical currents but different conductances. The pair current is completely suppressed when the magnetic flux in the loop is half of a flux quantum and the device is characterized by a pure phase-dependent conductance. According to the theory of nonlinear circuit elements this is in fact an ideal voltage-controlled memristor. Possible applications of this memristive device are memories and neuromorphic computing within the framework of ultrafast and low-energy superconducting digital circuits.

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