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Clocked Single-Spin Source Based On A Spin-Split Superconductor NIKLAS DITTMANN, RWTH Aachen University, Germany and Chalmers University of Technology, Göteborg, Sweden, JANINE SPLETTSTOESSER, Chalmers University of Technology, Göteborg, Sweden, FRANCESCO GIAZOTTO, NEST Istituto Nanoscienze-CNR and Scuola Normale Superiore, Pisa, Italy — In recent years single-electron turnstiles based on superconducting/normal-metal hybrid nanostructures have been well developed, which allow the manipulation of single electrons at high frequencies. In contrast, the implementation of single-spin sources in solid-state devices is only weakly explored. In our work (*N. Dittmann, J. Splettstoesser, F. Giazotto,* ***New J. Phys.*** *18, 083019 (2016)*) we propose a new accurate clocked single-spin source for ac-spintronic applications. The device consists of a superconducting island covered by a ferromagnetic insulator (FI) layer through which it is coupled to superconducting contacts. Single-particle transfer relies on the energy gaps and the island's charging energy, and is enabled by a bias and a time-periodic gate voltage. Accurate spin transfer is achieved by the FI layer which polarizes the island, provides spin-selective tunneling barriers and improves the precision by suppressing Andreev reflection. We analyze realistic material combinations and experimental requirements which allow for a clocked spin current in the MHz regime.

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