

replacing MAR17-2016-000637.

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Triode for magnetic flux quanta.**<sup>1</sup> VITALII VLASKO-VLASOV, Argonne National Laboratory, Argonne IL 60439, FABIANO COLAUTO, Univ. Federal de Sao Carlos, SP, Brazil, TIMOTHY BENSEMAN, CUNY Queens College, NY 11367, DANIEL ROSENMANN, WAI-KWONG KWOK, ANL — We designed a magnetic vortex triode using an array of closely spaced soft magnetic Py strips on top of a Nb superconducting film. The strips act similar to the grid electrode in an electronic triode, where the electron flow is regulated by the grid potential. In our case, we tune the vortex motion by the magnetic charge potential of the strip edges, using a small magnetic field rotating in the film plane. The magnetic charges emerging at the stripe edges and proportional to the magnetization component perpendicular to the edge direction, form linear potential barriers or valleys for vortex motion in the superconducting layer. We directly imaged the normal flux penetration into the Py/Nb films and observed retarded or accelerated entry of the normal vortices depending on the in-plane magnetization direction in the stripes. The observed flux behavior is explained by interactions between magnetically charged lines and magnetic monopoles of vortices similar to those between electrically charged strings and point charges. We discuss the possibility of using our design for manipulation of individual vortices in high-speed, low-power superconducting electronic circuits.

<sup>1</sup>This work was supported by the U.S. DOE, Office of Science, Materials Sciences and Engineering Division, and Office of BES (contract DE-AC02-06CH11357). F. Colauto thanks the Sao Paulo Research Foundation FAPESP (grant No. 2015/06.085-3).

Vitalii Vlasko-Vlasov  
Argonne National Laboratory, Argonne IL 60439

Date submitted: 02 Nov 2016

Electronic form version 1.4