Current-driven quantum switch\textsuperscript{1} M.V. MILOSEVIC, Departement Fysisca, Universiteit Antwerpen, Belgium, A. KANDA, S. HATSUMI HATSUMI, Institute of Physics and TIMS, University of Tsukuba, Japan, F.M. PEETERS, Departement Fysisca, Universiteit Antwerpen, Belgium, Y. OOTUKA, Institute of Physics and TIMS, University of Tsukuba, Japan — As a key component of a ballistic quantum switch proposed by Mel’nikov and Vinokur [Nature 415, 60 (2002)], we realize the current-driven giant-vortex splitting in a mesoscopic superconducting square, in a given perpendicular magnetic field. We also demonstrate the controllable current-induced transitions between the states with different angular momenta, which provide the stepwise behavior of the up-down sample conductance as a function of applied current (not field). Theoretical simulations using time-dependent Ginzburg-Landau theory are fully corroborated by transport measurements, where vortex states are monitored using the small-tunnel-junction technique.

\textsuperscript{1}This work was supported by the Flemish Science Foundation (FWO-Vl), the Belgian Science Policy, and the Sumitomo Foundation.

Milorad Milosevic
Departement Fysica, Universiteit Antwerpen, Belgium

Date submitted: 21 Nov 2008

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