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Rectification effect in artificial-spin-ice/superconductor hybrids<sup>1</sup> YONG-LEI WANG, JING XU, Argonne National Laboratory, XIAOYU MA, Univ. of Notre Dame, ZHILI XIAO, Argonne National Laboratory, BOLDIZSAR JANKO, Univ. of Notre Dame, WAI-KWONG KWOK, Argonne National Laboratory — Artificial spin ice, arrays of nanoscale single-domain bar magnets, coupled with a superconducting film can induce novel behavior at the interface of the two materials. Recently, we demonstrated a new twist in the design of artificial spin ice structures that can produce a magnetic charge ice with reconfigurable magnetic charge ordering and symmetries [Science 352, 962 (2016)]. This globally reconfigurable and locally writable magnetic charge ice structure could provide a new setting for designing and controlling the properties of superconducting films and other two-dimensional materials. Here, we present a reconfigurable rectification effect in an artificial-spinice/superconductor hybrid sample. By controlling the magnetic charge symmetries with an in-plane external magnetic field, we can achieve vortex rectification effects with in-situ tunable amplitude and polarization.

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