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Engineering superconductivity in metal/spin ice heterostructures
JIAN-HUANG SHE, CHOONG HYUN KIM, CRAIG FENNIE, Cornell University, MICHAEL LAWLER, Binghamton University and Cornell University, EUN-AH KIM, Cornell University — How to understand and control unconventional superconductivity is among the most fundamental and pressing challenges in modern condensed matter physics. Although spin fluctuation induced pairing has long been discussed as a mechanism for unconventional superconductivity, it has been challenging to prove the mechanism or use such insight to control superconductivity. We propose an artificial heterostructure consisting of metallic layer deposited on top of quantum spin ice which could exhibit unconventional superconductivity mediated by the spin fluctuations in the spin ice. We will discuss material candidates that are amenable for film growth and their expected band structure as well as their potential for topological superconductivity.

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