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Josephson Effects of the Monopole Superconductors[1] JUNJIA ZHANG, Johns Hopkins University, XINYU SUN[2], Institute for Advanced Study, Tsinghua University, YI LI, Johns Hopkins University — As an exotic type of three-dimensional topological superconductors, monopole superconductors have unconventional pairing symmetry characterized by monopole harmonic functions and can be potentially realized in doped magnetic Weyl semimetals. Phase sensitive transport measurements have been crucial to obtaining a clear understanding of pairing properties of superconductors. We study the Josephson effects between two monopole superconductors and between a monopole superconductor and an s-wave superconductor. We find that a Josephson junction coupling two identical monopole superconductors exhibits similar behaviors to that coupling two identical chiral p-wave superconductors, while a junction coupling two monopole superconductors related by time-reversal symmetry behaves similarly to that coupling two chiral p-wave superconductors with opposite chirality. For a Josephson junction coupling a monopole superconductor and an s-wave superconductor, however, its current phase relation exhibits 2π-periodicity, which is a distinctly different feature from the π-periodicity of the current phase relation for a junction between chiral p-wave and s-wave superconductors. Combining the results above provides a distinguishing feature to identify monopole superconductors in experiments.

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[2]First two authors contributed equally to this work.

Junjia Zhang
Johns Hopkins University

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