Abstract Submitted
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Cascading Proximity Effect and Singlet-Triplet Mixing in Rotating Magnetization Junctions[1] ANDREAS BILL, California State University Long Beach, CA 90840-9505, THOMAS E. BAKER, University of California, Irvine, CA 92697, ADAM RICHIE-HALFORD, University of Washington, Seattle, WA 98195 — The proximity of a superconductor to an inhomogeneous magnetic material induces singlet and triplet pair correlations in the hybrid structure. The amount of each component and their presence deep in the magnetic material strongly depends on the magnetic inhomogeneity. We present a comparative study of pair correlations in a diffusive magnetic Josephson junction involving a multilayer with misaligned magnetization, a cosine-type helical structure and a more flexible and realistic domain wall of an exchange spring. Using the cascading effect [1] we demonstrate that the three systems induce qualitatively different mixtures of correlations. In particular, we show that misaligned and continuously rotating magnetizations do not display the same physical state. Analyzing the Gor'kov functions we find that so-called short range singlet correlations can be found deep in the magnetic material and compete with triplet correlations giving rise to the so-called singlet-triplet $0-\pi$ transition [2].

[1] T.E. Baker, A. Richie-Halford, O.E. Icreverzi, and A. Bill, Europhys. Lett. **107**, 17001 (2014).
[2] T.E. Baker, A. Richie-Halford, and A. Bill, New J. Phys. **16**, 093048 (2014). See also the video abstract!

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