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Proximity effect in superconductor/conical magnet/ferromagnet heterostructures[1] JAMES ANNETT, DANIEL FRITSCH, University of Bristol — At the interface between a superconductor and a ferromagnetic metal spin-singlet Cooper pairs can penetrate into the ferromagnetic part of the heterostructure with an oscillating and decaying spin-singlet Cooper pair density. However, if the interface allows for a spin-mixing effect, equal-spin spin-triplet Cooper pairs can be generated that can penetrate much further into the ferromagnetic part of the heterostructure, known as the long-range proximity effect. Here, we present results of spin-mixing based on self-consistent solutions of the microscopic Bogoliubov-de Gennes equations incorporating a tight-binding model. In particular, we include a conical magnet into our model heterostructure to generate the spin-triplet Cooper pairs and analyze the influence of conical and ferromagnetic layer thickness on the unequal-spin and equal-spin spin-triplet pairing correlations. It will be shown that, in agreement with experimental observations [1], a minimum thickness of the conical magnet is necessary to generate a sufficient amount of equal-spin spin-triplet Cooper pairs allowing for the long-range proximity effect [2].
[1] J. W. A. Robinson, J. D. S. Witt, and M. G. Blamire. Science **329**, 59 (2010).
[2] D. Fritsch and J. F. Annett, arXiv:1311.3278 (2013).

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