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## Spin-triplet supercurrents of odd and even parity in nanostructured devices

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### Citation

Lahabi, K. (2018, December 4). *Spin-triplet supercurrents of odd and even parity in nanostructured devices*. *Casimir PhD Series*. Retrieved from <https://hdl.handle.net/1887/68031>

Version: Not Applicable (or Unknown)

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**Issue Date:** 2018-12-04

# Stellingen

Behorend bij het proefschrift

## SPIN-TRIPLET SUPERCURRENTS OF ODD AND EVEN PARITY IN NANOSTRUCTURES DEVICES

1. Micromagnetic simulations provide a powerful tool to study and utilize superconducting triplet correlations in hybrid devices. (*Chapter 4 of this thesis*).
2. Generating long-range triplets with a single ferromagnet could substantially enhance our ability to control supercurrents. (*Chapter 5 of this thesis*).
3.  $\text{Sr}_2\text{RuO}_4$  could potentially host two different types of half-quantum vortex: one is spin-polarized while the other is not. (*Chapters 6 and 7 of this thesis*).
4. Mesoscopic structures of  $\text{Sr}_2\text{RuO}_4$  allow theoretical simulations to be directly compared with experiment. (*Chapter 7 of this thesis*).
5. Harvesting the spin-polarization of triplet correlations in magnetic hybrids is usually viewed as their sole application, while their unique potential for controlling transport in superconducting devices is often overlooked.  
*J. Linder and J. W. A. Robinson, Nat. Phys. 11, 307 (2015).*
6. Kalenkov *et al.* developed their model for long-range triplets in a ferromagnetic vortex using a two-dimensional (in-plane) magnetic pattern, while the out-of-plane magnetization of the vortex core appears to be of fundamental importance.  
*Kalenkov et al., Phys. Rev. Lett., 107, 087003 (2013).*
7. The wide-spread assumption that the enhanced superconducting phase of  $\text{Sr}_2\text{RuO}_4$  (the so-called 3 K-phase) has the same pairing symmetry as the intrinsic ( $T_c = 1.5$  K) phase has surprisingly little basis, and is challenged by recent experiments.  
*Steppke et al., Science 355, 6321 (2017).*
8. In their work on  $\text{Sr}_2\text{RuO}_4$  rings, Cai *et al.* have wrongly attributed the large-amplitude magnetoresistance oscillations to vortex-crossing.  
*Cai et al., Phys. Rev. B, 87, 8 (2013).*
9. There is immense potential in allowing those who are passionate about science, but lack the traditional training of a professional scientist, to join research teams and work on a project as a hobby.

*Kaveh Lahabi  
Leiden, December 4, 2018*