Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Influence of Fermi Surface Geometry and Geometric Phases on Spin-Triplet correlations in Superconductor-Ferromagnet Hybrid Structures[1] MATTHIAS ESCHRIG, Royal Holloway, University of London — During the past 15 years a new field has emerged, which combines superconductivity and spintronics, with the goal to pave a way for new types of devices for applications combining the virtues of both, namely quantum coherence and interference on one side, and spin-selectivity and spin magnetism on the other. The building block of this new "superspintronics" are spin-triplet Cooper pairs, which are generated at the interface between a conventional superconducting and a ferromagnetic material. Non-collinear magnetic inhomogeneity mixes triplet pairs among each other, thus creating long-ranged equal-spin Cooper pairs in the ferromagnet, and non-coplanar inhomogeneity introduces geometric phases giving rise to unusual current phase relations. Considerable Fermi surface mismatch is unavoidable for hybrid structures involving strongly spin-polarized ferromagnets. We perform calculations showing that Fermi surface geometry has important implications for the sign and magnitude of induced triplet correlations in the superconductor, as well as for the generation of spin currents. We discuss under which conditions spin currents are generated, and how the triplet correlations can be maximized for applications.

[1]This work is supported by the Engineering and Physical Science Research Council (EPSRC Grant No. EP/J010618/1).

Matthias Eschrig
Royal Holloway, University of London

Date submitted: 14 Nov 2014 Electronic form version 1.4