# Spin-dependent tunneling current in magnetic tunnel junctions

**N. Sandschneider and W. Nolting**
Festkörpertheorie, Institut für Physik
Humboldt-Universität zu Berlin, Newtonstr. 15, 12489 Berlin, Germany

The tunneling current through a hybrid structure where a confined nonmagnetic insulator is sandwiched between two ferromagnetic metals is calculated within the non-equilibrium Keldysh formalism. The metals are assumed to be band ferromagnets, such as Co, and are described by the single-band Hubbard model. The interaction is treated both in Mean Field (MF) and the Spectral Density Approximation (SDA) which takes into account higher correlations. It is found that the SDA gives better physical results over a broad parameter range than the simple MF approximation.
Special emphasis is made to explain the tunneling current features in terms of the quasi-particle density of states of the materials. Also the relationship between the current and the inter-layer exchange coupling is discussed. Furthermore we show how a generalization of the model presented here can be used to model current-induced switching of magnetization in a self-consistent way.

9.7 cm

13.4 cm

**Subject category :**

4. Spin Electronics and Magneto-Transport

**Presentation mode :**
poster

**Corresponding author :**
Niko Sandschneider

**Address for correspondence :**
Humboldt-Universitaet zu Berlin, Institut fuer Physik, Newtonstr. 15, 12489 Berlin, Germany

**Email address :**
niko.sandschneider@physik.hu-berlin.de