SPIN TRANSPORT IN EXCHANGE SPRING SUPERLATTICES

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The spin degree of freedom of electrons, in addition to the electronic charge degree, provides the prospect of spintronics, *i.e*. the manipulation of electron states via spin. Due to the inhomogeneous distribution of magnetic moments in exchange spring systems, versatile spin transport can be realized in it: GMR (spin transport in non-collinear magnetization), spin torque (spin transport affecting the magnetization) *etc*.

Exchange-spring GMR in $DyFe_2/YFe_2$ exchange spring superlattices, which can be viewed as similar to domain wall magneto resistance, has been observed [1]. Spin transfer torque driven magnon emission is predicted theoretically for exchange spring nanopillars [2]. We aim at the experimental implementation of spin transfer torque in exchange spring superlattices.

Spin polarization is an important parameter in spintronic applications, and point contact Andreev reflection (PCAR) is a simple method to measure it routinely. The spin polarization of the building blocks of our exchange spring systems, $DyFe_2$, YFe_2 and $ErFe_2$ rare earth-transition metal intermetallic compounds, has been measured using this method. It is found that their values are similar to the spin polarization of Fe P=0.42 [3].

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