# CORRELATION INDUCED SPIN CURRENT POLARIZER

**Piotr Stefański**
Institute of Molecular Physics of the Polish Academy of Sciences
ul. Smoluchowskiego 17, 60-179 Poznań, Poland

We propose a spin polarizer device [1] composed of a quantum dot connected to the spin polarized leads. The spin control of the current flowing through the device is entirely due to the Coulomb interactions present inside the dot. We show that the initial polarization present in the source lead can be reverted or suppressed just by manipulating the gate voltage acting on the dot. The most effective spin current switching is for the gate voltages when the dot level hubbard subbands cross the chemical potential in the leads. The effect is robust to the increase of temperature and favored by inevitably encountered experimental conditions: asymmetry of the dot-lead coupling and partial lose of the initial current polarization at the dot-lead interface. It also offers a new, correlation-based mechanism for recently experimentally observed sign change of the tunneling magnetoresistance for semiconductor quantum dots coupled to ferromagnetic leads. Moreover, the model can also be applied to the transport description through layered heterostructures with spin-polarized components, where at the interface bound states can be formed due to the spatial confinement and energy structure mismatch.
[1] P. Stefański, Phys. Rev. B 77, 125331 (2008).

9.7 cm

13.4 cm

**Subject category :**
4. Spin Electronics and Magneto-Transport

**Presentation mode :**
oral

**Corresponding author :**
Piotr Stefański

**Address for correspondence :**
Institute of Molecular Physics of the Polish Academy of Sciences
ul. Smoluchowskiego 17, 60-179 Poznań, Poland

**Email address :**
piotrs@ifmpan.poznan.pl