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## **Spintronics XI**

Sunday - Thursday 19 - 23 August 2018

### **Session 16A:**

#### **Emerging Concepts in Spin Transport**

Thursday 23 August 2018

10:30 AM - 12: PM

Session Chair: Siegfried Selberherr, Technische Univ. Wien (Austria)

#### **Spin correlations at hopping in magnetic structures: from tunneling magnetoresistance to single-spin transistor (*Invited Paper*)**

Paper 10732-112

Time: 10:30 AM - 11:00 AM

Author(s): Viktor Sverdlov, Siegfried Selberherr, Technische Univ. Wien (Austria)

The Coulomb interaction leads to strong repulsion on the trap - a Coulomb blockade, while the Pauli exclusion results in spin-dependent correlations at transport. The spin correlations result in unusual transport properties at trap-assisted hopping between ferromagnetic electrodes as well as in magnetic tunnel junctions. The spin correlations are due to spin-dependent escape rates, which result in a non-zero spin on a trap. Because the average spin is a vector property, it leads to an unusual behavior in multi-terminal devices with ferromagnetic electrodes. In particular, we demonstrate a single-spin switch with transfer characteristics similar to those of a single-electron transistor.

#### **Strain-induced tunneling Hall effect in magnetically proximitized graphene electric field control of magnetism (*Invited Paper*)**

Paper 10732-114

Time: 11:00 AM - 11:30 AM

Author(s): Alex Matos-Abiague, Wayne State Univ. (United States); Igor Zutic, Univ. at Buffalo (United States)

We theoretically investigate the tunneling transport through a localized region of uniaxial strain in a graphene nanoribbon. When a tunneling current flows along the nanoribbon, the gauge field generated by local strain induces a finite tunneling valley Hall response. A top gate located in the strained region can be used for selective switching of Klein tunneling in dependence of the momentum of the tunneling carriers. This produces a large valley Hall response, which, in the presence of proximity-induced magnetization leads to the emergence of a charge Hall conductance, even when the magnetization lies in the plane of the nanoribbon.

#### **Magnetic phase transitions in multiferroic systems (*Invited Paper*)**

Paper 10732-115

Time: 11:30 AM - 12:00 PM

Author(s): Satoshi Kokado, Shizuoka Univ. (Japan); Masakiyo Tsunoda, Tohoku Univ. (Japan)

The anisotropic magnetoresistance (AMR) effect is a fundamental phenomenon in which the electrical resistivity depends on the relative angle between the magnetization direction and the electric current direction. The AMR effect has been experimentally studied for various ferromagnets since about 150 years ago. The intuitive explanation about the AMR effect, however, has scarcely been reported. In this study, we derive a general expression of the AMR ratio and give the intuitive explanation about the AMR effect. In addition, we show that the negative AMR ratio is a necessary condition for half-metallic ferromagnets.