http://spie.org/OPN/conferencedetails/spintronics

Spintronics XIV

Sunday - Thursday 1 - 5 August 2021

Session 14:
Spin Logic and Devices

Digital Forum: On-demand starting 1 August 2021

Reinforcement learning approach for deterministic SOT-MRAM switching

(Invited Paper)

Paper 11805-53

Author(s): Johannes Ender, Simone Fiorentini, Viktor Sverdlov, Technische Univ. Wien (Austria); Wolfgang Goes, SILVACO Europe Ltd. (Austria); Roberto Orio, Siegfried Selberherr, Technische Univ. Wien (Austria)

We employ a reinforcement learning strategy for finding switching schemes for deterministic switching of a spin-orbit torque magnetoresistive random access memory (SOT-MRAM) cell. The free layer of the memory cell is perpendicularly magnetized, and the spin-orbit torques are generated by currents through two orthogonal heavy metal wires. A rewarding scheme for the reinforcement learning approach is defined such that the objective of the algorithm is to find a pulse sequence which leads to fast switching of the memory cell. The reliability of the found switching scheme is confirmed by micromagnetic simulations based on the finite difference method.

Collimating electrons with quantum interference in graphene

(Invited Paper)

Paper 11805-105

Author(s): Ke Wang, Univ. of Minnesota, Twin Cities (United States)

The relativistic charge carriers in monolayer graphene can be manipulated in manners akin to conventional optics (electron-optics): angle-dependent Klein tunneling collimates an electron beam (analogous to a laser), while a Veselago refraction process focuses it (analogous to an optical lens). Both processes have been previously investigated, but the collimation and focusing efficiency have been reported to be relatively low even in state-of-the-art ballistic pn-junction devices. In this talk, we will present a novel device architecture of a graphene microcavity defined by carefully-engineered local strain and electrostatic fields. We create a controlled electron-optic interference process at zero magnetic field as a consequence of consecutive Veselago refractions in the microcavity, which we utilize to localize uncollimated electrons and further improve collimation efficiency.