# W2S Seminar
## (Webinar series on Spintronics)

## Quantum-classical description of nonequilibrium electrons interacting with dynamical magnetic textures in spintronics and magnonics

Speaker:
Prof. Branislav K. Nikolić
Department of Physics & Astronomy, University of Delaware, Newark, DE 19716, USA

**Date and time:**
**04.02.2021 at**
**10.00 am**
**Via**
**Zoom**

## Abstract

This talk introduces recently developed multiscale formalism combining time-dependent nonequilibrium Green functions (TDNEGF) which describe quantum-mechanically conduction electrons while they interact with dynamical magnetic textures of localized magnetic moments (LMMs) described by the classical Landau-Lifshitz-Gilbert (LLG) equation. The TDNEGF+LLG approach can be applied to a variety of problems of interest to spintronics and magnonics where current-driven spin torque induces the dynamics of LMMs, or LMMs are driven by external fields and generate pumping of spin and charge currents carried by conduction electrons which, in turn, affect the dynamics of LMMs themselves via torque. The talk uses examples of current- or magnetic-field-driven motion of domain walls within magnetic nanowires, including **annihilation of topological solitons** observed in recent experiments, as well as interconversion between electronic and magnonic spin currents at the interface of antiferromagnetic insulators employed in recent experiments on **magnon spin-transfer torque,** to illustrate novel insights extracted from TDNEGF+LLG simulations and visualizations in the form of **pedagogical movies**. In particular, the TDNEGF+LLG formalism captures a number of effects missed by widely used classical micromagnetics, based on solving the LLG equation alone; analytical spin-motive force theory and the corresponding nonlocal generalization of Gilbert damping; and previous quantum-classical approaches employing time-independent NEGFs which can be viewed only as the lowest (adiabatic) order approximation of the full TDNEGF+LLG approach.

If interested to attend then please visit https://www.niser.ac.in/w2s-seminar/index.php