

# PHYSICS DEPARTMENT COLLOQUIUM

“Transport of spins with electric fields”

BY

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Five years since "a new paradigm of electronics based on the spin degree of freedom" [Wolf et al., Science 294, 1488 (2001)] was defined featured remarkable advances in experimental detection of spin accumulation by a variety of methods: initially optical but recently pure electrical as well. An overview of these techniques will be presented. The ultimate goal of spintronics is to achieve spin injection, manipulation and detection by electric fields as manipulations by magnetic fields do not lead to desired local selectivity at nanoscale. Spin-orbit coupling, being relatively significant in modern technological semiconductors, represents one of the necessary tools to fulfill this goal. I will discuss various aspects of spin transport based on the spin-orbit interaction: spin-Hall, ac optical and tunneling conductivity. Finally, I will explain a proposal how to generate spin currents in quantum wires without relying on spin-orbit coupling by means of the Coulomb drag effect.

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4:00 PM IN 102 JFB  
REFRESHMENTS AT 3:30 PM IN 219 JFB