

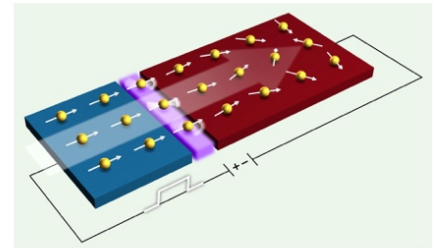
Wednesday October 9th 2019 - 10h 00
Room A005-007

“Ultrafast X-ray imaging of magnetic materials”

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Spin transport is the key for reading or writing bits in spintronic devices by utilizing the Giant Magnetoresistance effect or the spin transfer torque effect. Spin currents have also been shown to play important role in the ultrafast manipulation of magnetization via all optical switching. Hence, detailed understanding of spin currents is a crucial step in development of spintronic devices. In this talk, I will describe our recent experimental studies using emerging synchrotron and free electron laser techniques that can probe these materials with both high spatial and temporal resolution. I will discuss our work on imaging spin dynamics in nano-devices and probing spin transport across ferromagnet/copper interface. We have developed an extremely sensitive spectro-microscopy detection method based on element specific x-ray magnetic circular dichroism to probe spin transport in Co/Cu devices. The sensitivity of this new ‘lock-in’ technique has allowed us to detect the extremely small transient Cu magnetization with sub 100 nm spatial resolution. This technique has also enabled imaging of nanoscale motion of localized nonlinear spin waves in spin torque oscillator, allowing a detailed insight into p-like character of localized spin-wave excitation. I will also discuss our recent work on ultrafast imaging following optical pumping at free electron laser sources.



X-ray imaging of transient spin injection in Cu through a Co/Cu interface



Roopali Kukreja joined Materials Science and Engineering department at UC Davis as an Assistant Professor in Fall 2016. She received her B.S. in Metallurgical Engineering and Materials Science from the Indian Institute of Technology Bombay in 2008 and then her M.S. and Ph.D. degrees in Materials Science and Engineering from Stanford University in 2011 and 2014, respectively. Prior to her appointment at UC Davis, Kukreja worked as a postdoctoral researcher at the UC San Diego, with Profs. Oleg Shpyrko (Physics Department) and Eric Fullerton (Center for Magnetic Recording Research). Her research interests at UC Davis focuses on ultrafast dynamics in nanoscale magnetic and electronic materials, time resolved X-ray diffraction and imaging techniques, thin film deposition and device fabrication. She is recipient of Melvin P. Klein Scientific development award (2015), Air Force Young Investigator Award (2018) and Nuclear Regulatory Commission faculty development award (2019).

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