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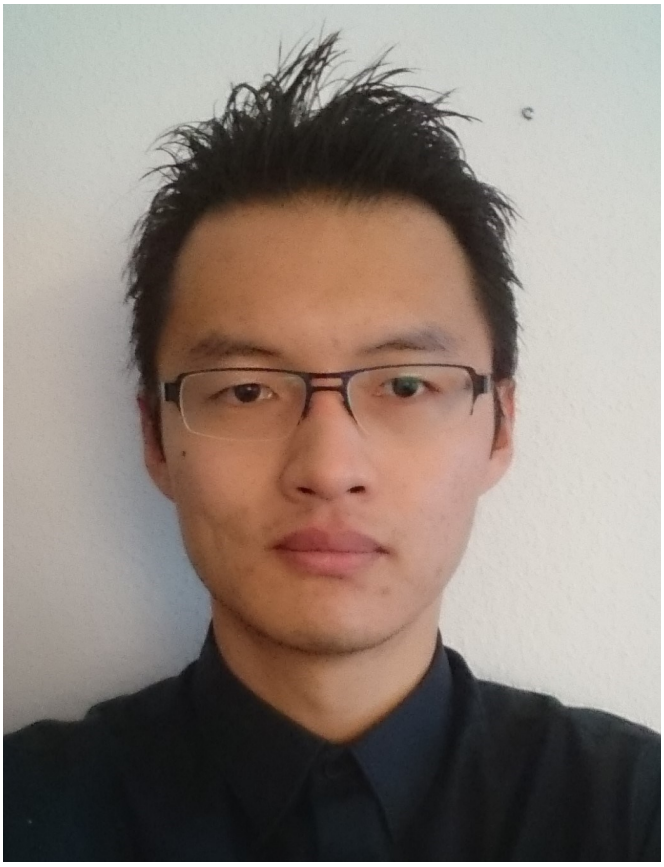

HOSTED BY ERIC E. FULLERTON

SEMINAR TALK BY

GUANQIAO LI

Radbound University, Institute for Molecules and Materials, Nijmegan, The Netherlands

when:

FRIDAY. FEBRUARY 2, 2018

10:30 AM Refreshments
11:00 AM Lecture
12:00 PM Lunch

where:

JKW AUDITORIUM

CMRR Building

- biography -

Guanqiao Li was born in Beijing (China) on August 31 1989. He came to the Netherlands at the age of 3. He obtained his master's degree Experimental Physics (graduated in 2016) from Utrecht University (the Netherlands). Currently, he is a PhD student in Prof. Alexey Kimel's group at Radboud University Nijmegen (the Netherlands). His research focuses on exploring the field of THz spintronics and (sub)picosecond photocurrent phenomena. Specializing in THz spectroscopy, and ultrafast photocurrents and spintronics in magnetic heterostructures.

- abstract -

THz Spintronics in Magnetic Heterosctructures: The Role of Interfaces

THz spectroscopy provides a convenient way to directly probe the dynamics of photocurrents and spins on the picosecond and sub-picosecond timescale. Recently it was shown that circularly polarized femtosecond laser excitation in a Co/Pt bilayer can effectively generate an ultrafast photocurrent pulse at the interface [1]. The direction of this photocurrent is parallel to the in-plane magnetization of the Co layer and can be controlled by both the magnetic polarity of Co and the chirality of the circularly polarized light. Simultaneously, an ultrafast spin current pulse is generated in the Co layer, which is converted to a charge current in the Pt layer via the inverse Spin-Hall effect [2]. This charge current is in-plane and perpendicular to the magnetization of Co. Moreover, its direction can be controlled by the net spin orientation of the ultrafast spin current by switching the magnetization orientation of Co. A convenient way to probe these ultrafast phenomena is to employ THz time-domain emission spectroscopy. The basic principle of this method is that the (sub) picosecond currents will generate electric radiation in the THz frequency that can be probed via a technique called electro-optical sampling. Since the polarization of THz radiation generated by the two charge currents are perpendicular with respect to each other, one can study each phenomenon separately using wire-grid polarizers. The role of the interfaces between magnetic and non-magnetic layers will be discussed, in particular the generation of the ultrafast photocurrents in Co/ZnO/Pt, Co/Cu/Pt trilayers. The separation of the Co/Pt interface with interlayers of different characteristics is shown to give a better understanding of the role of the interface on the generation of ultrafast photocurrents.

[1] Huisman, T. J., et al. "Femtosecond control of electric currents in metallic ferromagnetic heterostructures." Nature nanotechnology (2016).
[2] Kampfrath, T., et al. "Terahertz spin current pulses controlled by magnetic heterostructures", Nature nanotechnology (2013).