Westfälische Wilhelms-Universität Münster

FACHBEREICH PHYSIK

# Allgemeines Physikalisches Kolloquium

Donnerstag, 23.10.2014 um 16 Uhr c.t.

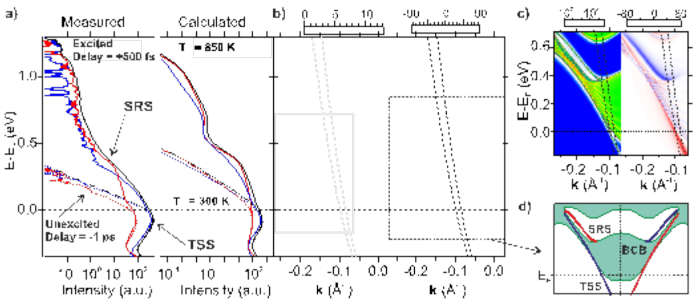

***Prof. Dr. Fulvio Parmigiani***

*Dipartimento di Fisica*

*Università di Trieste*


## Spin and Time resolved Photoelectron Spectroscopy in the momentum space of archetypal topological Insulators

The interaction between light and the topologically protected spin-polarized Dirac particles at the surface of topological insulators (TIs) constitutes the key issue for the development of opto-spintronics devices. Laser-based time and angle resolved photoelectron spectroscopy (tr-ARPES) in the sub-ps time domain represents an important experimental tool to investigate the ultrafast light-induced modification of the electronic properties in TIs. Several studies recently disclosed a very rich scenario, characterized by long-lived electronic population, Floquet-Bloch states, reduction of the electron-phonon coupling and the possibility to tune the Schottky barrier.




Despite the large number of experimental investigations of the out-of-equilibrium electronic properties, a detailed description of the microscopic scattering mechanisms within the surface state and between the bulk conduction band and the surface state is lacking, so far.

Here an overview of the most recent discoveries relevant to the evolution of the electron population optically-injected in the topologically protected state at the surface is reported.

In particular, we prove that only by measuring the spin-intensity signal over several orders of magnitude in spin-time- and angle resolved photoemission spectroscopy (s-tr-ARPES) experiments it is possible to comprehensively describe the optically excited electronic states in TIs materials. Remarkably, the experimental data, interpreted on the base of ab-initio fully relativistic spin resolved photoemission calculations and spin dynamics modeling, unambiguously show that two non-interacting electronic systems, derived from the excited surface and bulk states, are characterizing the non-equilibrium electronic properties of the archetypal TI, $Bi_2Se_3$.

IG1 HS2, Wilhelm-Klemm-Straße 10
Kolloquiums-Kaffee ab 16.00 Uhr vor dem Hörsaal
Im Anschluss an den Vortrag findet ein geselliges Beisammensein mit Getränken und Knabbereien statt.

Kolloquiumsbeauftragter: Prof. Dr. Bratschitsch
Einladender: Prof. Dr. Zacharias