The 934th IMS colloquium
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THz-APRES band structure movies of Dirac surface currents

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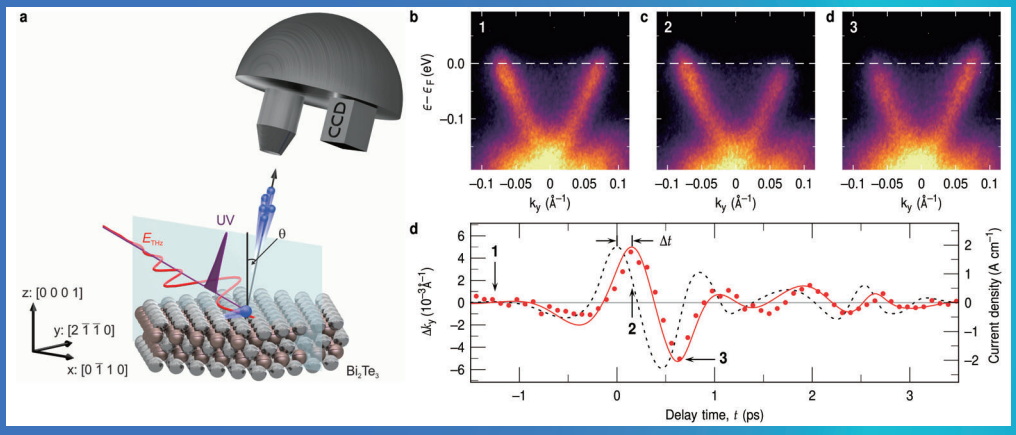
Date & Time: 2019/11/12 (Thu.) 16:00-
Place: IMS Research Building Room 201

Time-resolved photoelectron spectroscopy combines femtosecond pump-probe techniques with angle-resolved photoelectron spectroscopy (ARPES). New opportunities for this powerful technique arise in combination with THz excitation. As an example, I will explain how THz-ARPES can be used to measure electron transport in the Dirac surface state of a three-dimensional topological insulator in a contact-free fashion and with femtosecond time-resolution. We induce electrical currents in these states with strong THz transients and directly access their dynamics in momentum space with subcycle time resolution. As a result of spin-momentum locking, the accelerated spin-polarized electrons reach ballistic mean free paths of several hundreds of nanometers. Topological insulators are thus promising materials for future light-wave-driven electronics [1].

Future applications of subcycle THz-ARPES are expected to benefit from the availability of high laser harmonics lab sources for photoemission or from combined THz + UV beamlines at synchrotrons or FELs. THz-ARPES of adsorbed molecules at surfaces should, e.g., make it possible to perform orbital tomography during chemical reactions.

[1] J. Reimann *et al.*, Nature **562**, 396 (2018).



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