

Functionalization of intense laser-matter interaction for condensed matter applications

Z. G. Zhu, A. Moskalenko, J. Berakdar
Martin-Luther University Halle-Wittenberg, Halle, Germany

Modern optical techniques deliver shaped light pulses in a wide frequency and intensity range [1]. In this talk I will discuss how the coupling to electronic states in matter can be utilized to steer the charge and spin dynamics in ring-shaped molecular and semiconductor heterostructures [2].

The light-induced charge oscillations result in a terahertz emission [3] whereas the generated currents can be employed as a local magnetic field for the study of the ultrafast dynamics of nanomagnets.

[1] <<http://www.attoworld.de/sharedPages/People/GoulielmakisEleftherios/GoulielmakisEleftherios.html>>

E. Goulielmakis et al., *Science* **320**, 1614 (2008); *Optics Letters* **33**, 1407 (2008).

[2] Z.G Zhu, J. Berakdar *Phys. Rev. B* **77**, pp 235438 (2008), *Phys. Rev. Lett.* **94**, pp 166801 (2005).

[3] A. Moskalenko, J Berakdar, *Phys. Rev. A* **78**, pp 051804(R) (2008); *ibid* **79**, pp 023822 (2009).