From Precision Attosecond Physics at the Surface of a Needle Tip to a Lightfield-driven Logic Gate in Graphene

P Hommelhoff[1]

[1] *Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany*
Contact Email: peter.hommelhoff@physik.uni-erlangen.de

Strongfield and attosecond physics at the surface of solids as well as inside of solids have made fantastic progress in recent years. I will discuss two examples from our group. In the first part of the talk I will show how two-color few-cycle laser fields allow us to get deep insights to the strongfield dynamics at the surface of metal needle tips. For example, we can now measure the electron emission time window to 710 attoseconds, with an error bar as small as 30 as, representing another example of what might be called precision attosecond physics. The second part of the talk will focus on strongly driven electrons inside of graphene and the graphene-gold interface. Some time ago, we could demonstrate Landau-Zener-Stückelberg-Majorana physics being responsible for current generation in graphene, so subsequent coherent Landau-Zener transitions. Just recently, we could combine these insights with new insights at the strongly driven graphene-gold interface to demonstrate the first logic gate with clock rates potentially approaching the petahertz range. We believe that these results might bring us a good step closer to lightwave electronics.