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Ionization and trajectory control in strong-field photoemission from tungsten needle tips with a two-color laser field PHILIP DIENSTBIER, TIMO PASCHEN, Department of Physics, University of Erlangen-Nuremberg (FAU), Erlangen, Germany, LENNART SEIFFERT, THOMAS FENNEL, Institute of Physics, University of Rostock, Rostock, Germany, PETER HOMMELHOFF, Department of Physics, University of Erlangen-Nuremberg (FAU), Erlangen, Germany — Two-color laser fields with well-defined relative phase allow probing and controlling electronic dynamics on the sub-femtosecond time scale. With two-cycle fundamental pulses we can reach the strong-field regime of photoemission at nanometer sharp tungsten needle tips. When superimposing a weak second harmonic field, we expect a strong modulation of the emission yield[1,2], and, in the strong-field regime, also trajectory modifications[3]. Here we show our experimental findings for field-driven and ionization-related electron dynamics in energy spectra as a function of the phase between fundamental and second harmonic. The comparison with time-dependent Schrödinger equation and simple-man's model simulations shows excellent agreement. This allows us to define characteristic markers and use them to disentangle ionization from trajectory modifications, giving insight into the rescattering mechanism by the fundamental field alone and its modification by the second harmonic, in the nearfield and at the surface of a nanoscale needle tip.

[1]Förster et al., PRL **117**, 217601 (2016)
[2]Paschen et al., J. Mod. Opt. **64**, 10-11, 1054 (2017)
[3]Seiffert et al., J. Phys. B. **51**, 134001 (2018)

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