

From new ways of free electron control to the coherence of multi-electron pulses

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Electric and magnetic fields generated from microstructures allow complex field configurations. We use this approach to build chip-based guides, i.e., two-dimensional Paul traps, for free low-energy electrons (1 eV to a few keV level). In addition, we have demonstrated guided electron beamsplitters and other elements, ideally suited for matter wave experiments with electrons. In the second part of the talk, I will show that fully coherent electron beams can be easily generated from needle tip emitters, including coherent electron pulses with femtosecond time resolution. Because of the charged nature of the electrons, their coherence is reduced even for a mean number of 1 electron per pulse due to Poisson distribution.