Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Electron Capture and Ionization in Laser–Assisted Collisions
THOMAS NIEDERHAUSEN, UWE THUMM, James R. MacDonald Laboratory, Kansas State University, Manhattan, KS 66506-2604 — We study laser-assisted ion–atom collisions in a strong laser field (above 10^{12} W/cm^2) by solving the time dependent Schrdinger–equation on a 3-dimensional numerical grid. This way we obtain benchmark results for electron capture and ionization probabilities that are compared with other theoretical approaches, such as the non–perturbative basis-generator method (Kirchner, Phys. Rev. Lett. 89-093203), time–dependent scattering theory (Li et al., J. Phys. B 35-557) or grid-models of reduced dimensionality (Niederhausen et al., Phys. Rev. A 70-023408). Our results for impact-parameter dependent ionization and capture probabilities for a colliding proton with a hydrogen atom in the presence of circularly polarized light show a strong dependence on both, the absolute laser phase and the laser helicity. In particular, we find an interesting strong dependence of the ionization probability on the impact parameter and laser phase that might enable the measurement of the absolute laser phase.

Thomas Niederhausen
James R. MacDonald Laboratory, Kansas State University
Manhattan, KS 66506-2604

Date submitted: 28 Jan 2005 Electronic form version 1.4