

Abstract Submitted  
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**Study of shake-up states in helium by XUV-IR pump-probe experiments**<sup>1</sup> S. NAGELE, J. FEIST, R. PAZOUREK, E. PERSSON, J. BURGDÖRFER, Institute for Theoretical Physics, Vienna University of Technology, Austria, EU, B.I. SCHNEIDER, Physics Division, NSF, USA, L.A. COLLINS, Theoretical Division, LANL, USA — The rapid progress in the creation of attosecond pulses paves the way towards time-resolved control and observation of ultrafast electronic dynamics. In a recent XUV-IR pump-probe experiment Uiberacker *et al.* [1] studied the ionization dynamics of shake-up states in Neon ions. The overall stepwise structure of the resulting double ionization yield as a function of the delay time between the two pulses results from incoherent tunneling of the excited shake-up states. However, recent theoretical studies [2,3] suggest that coherent effects play an important role as well. In addition, the influence of the IR field on the shake-up process might have significant effects. Since a full *ab initio* treatment of Ne atoms in external fields is not feasible, we will study the process for helium where the full multi-electron dynamics can still be solved numerically. In particular, we will investigate the role of coherent effects, electronic interactions, and the presence of the IR field in the shake-up process. [1] M. Uiberacker et al., *Nature* **446**, 627 (2007) [2] A.K. Kazansky et al., *EPL* **82**, 13001 (2008) [3] S. Nagele et al., *to be published*

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