Abstract Submitted
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Open Quantum System Approach with Sources and Sinks M. SELIGER, S. YOSHIDA, J. BURGDORFER, Vienna University of Technology, C.O. REINHOLD, D.R. SCHULTZ, Oak Ridge National Laboratory, T. MINAMI, M.S. PINDZOLA, Auburn University, E. LAMOUR, J.P. ROZET, D. VERNHET, Universites Paris 6 et 7 — We study the time evolution of electronic states of hydrogenic projectile ions penetrating solids. Multiple scattering inside the solid as well as radiative processes represent strong environmental coupling which can both transiently generate coherences as well as lead to decoherence for longer times. This electronic system is not only open to exchange energy with the environment but also open to probability flux. We therefore have developed a new open quantum system approach [1] that allows for both sources (capture) and sinks (ionization). We calculate the build-up of transient coherences created in electron capture by an initially bare argon projectile in transport through an amorphous carbon foil at 13.6 MeV/amu and its decoherence due to the interaction with the foil. Our results are in close agreement with experimental data. Experiments for thin foils are shown to provide a very stringent test of ion-atom collisions theories. [1] M. Seliger et al Phys. Rev. A 71, 062901 (2005); Submitted to Phys. Rev. A (2006).

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