Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Coulomb four-body problem near threshold in a classical framework AGAPI EMMANOUILIDOU, School of Physics, Georgia Institute of Technology, JAN MICHAEL ROST, Max Planck Institute for the Physics of Complex Systems — We obtain the triple ionization probability from the ground state of Lithium and find it to be in remarkably good agreement with the experiment results [1]. In addition, we confirm the Wannier threshold law $\sigma \propto E^{\alpha}$ for four-body break-up of Lithium with an exponent of $\alpha = 2.16$ in the energy range $0.9 - 2$ eV and it is shown that the experimentally obtained α [1] deviates from the theoretically obtained value due to its determination between $2-5$ eV above threshold. Most importantly in the framework of classical dynamics we develop a new classification scheme for multi-electron trajectories in terms of sequences of binary electron collisions [2]. We believe that this classification scheme is applicable to a general three-electron dynamics. Surprisingly, for the angular distribution of the ionized electrons, we do not find a preferential symmetric break-up with an inter-electronic angle of 120° as predicted by Wannier's theory. Instead we find an angular pattern with two peaks at 90° and 180°. However, we show how the angular pattern we obtain is consistent with our analysis in terms of binary collisions. [1] R.Wehlitz, T. Pattard, M.-T. Huang, I. A. Sellin, J. Burgdorfer, and Y. Azuma, Phys. Rev. A 61, 030704 (R) (2000). [2] A. Emmanouilidou and J. M. Rost, submitted, xxx.lanl.gov/abs/physics/0409034

Agapi Emmanouilidou
School of Physics, Georgia Institute of Technology

Date submitted: 27 Jan 2005 Electronic form version 1.4