Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Ion neutralization as a probe to study electronic dynamics on clean and nanostructured surfaces[1] HEE SUK LEE, RYAN O'CONNELL, ANDREW SCHMITZ, JOHN SHAW, HIMADRI CHAKRABORTY, Northwest Missouri State University — Resonant charge transfer in ion-surface collisions is a classic tool to explore the surface electronic structure. Using the Crank-Nicholson propagation [1] we solve the time-dependent Schroedinger equation to simulate electrons' motion during the interaction of a H^- anion with clean, nanostepped, and nanolayered metal surfaces. Ion survival from a clean surface is found to depend adiabatically on the metal band gap, but for the fast (diabatic) ion-speed perpendicular to the surface interactions with image states dominate [2]. For larger distance of ion's closest approach, however, the image interaction intrudes the adiabatic region. For the stepped surfaces, conversely, the survival is found to depend on the ion speed parallel to the surface from super-lattice sub-band effects, resulting in rich structures in the survival probability. Electrons that populate a nanolayered surface, in contrast, are found to modify the Shockley surface state and image states by inducing standing waves in the direction perpendicular to the surface.

[1] Chakraborty et al., *Phys. Rev.* A **70**, 052903 (2004);
[2] Schmitz et al., *Phys. Rev.* A **81**, 042901 (2010).

[1]Supported by NSF and Applied Research NWMSU.

Himadri Chakraborty
Northwest Missouri State University

Date submitted: 16 Dec 2010 Electronic form version 1.4