

Abstract Submitted
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Grazing scattering of anions to explore electronic subbands of nanostructured surfaces¹ HIMADRI CHAKRABORTY, JOHN SHAW, Northwest Missouri State University, Maryville, DAVID MONISMITH, Software Maintenance Group, Tinker AFB, YIXIAO ZHANG, DANIELLE DOERR, Northwest Missouri State University, Maryville — We study the electron dynamics at a monocrystalline prototype surface of Pd(111) with stepped vicinal nanostructures [1]. The unoccupied bands of the surface are resonantly excited *via* the charge transfer interaction of the surface with a hydrogen anion reflected at grazing angles. The dynamics is simulated in a quantum mechanical wave packet propagation approach [2] using parallel computing. Evolution of the wave packet suggests that the electron transfers from the ion to the surface and image subband states of the metal as it evolves through the superlattice. But the electron returns to the ion only from the image subbands. The ion survival probability exhibits modulations as a function of the vicinal-terrace size and shows peaks at energies that access the image subband dispersions [3]. A square well model producing standing waves between the steps on the surface suggests the application of such ion scattering at shallow angles to map electronic substructures in vicinal surfaces. The work serves as proof-of-principle in the utility of our computational method to address surfaces with nanometric patterns. [1] Mugarza and Ortega, *J. Phys. Cond. Matt.* **15**, S3281 (2003); [2] Schmitz *et al.*, *Phys. Rev. A* **81** 042901 (2010); [3] Shaw *et al.*, *Phys. Rev. A* **98**, 052705 (2018).

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