Abstract Submitted
for the 4CF17 Meeting of
The American Physical Society

Analysis of Diffusion of a Rhodium Adatom on a Tungsten (111) Surface DILYS RUAN, ERIC PUTNEY, University of New Mexico, BEN COCHRAN, Del Norte High School, MATT KOPPA, DAVID DUNLAP, PAUL SCHWOEBEL, University of New Mexico — Information about the transition rate R governing the movement of an adatom between interstitial sites can be determined by examining field-emission microscope images showing the location of the atom at successive times. Once deposited, an adatom won't stay on a surface for long; it might be stripped off under high fields, or it might migrate out of viewing range, so the data is often limited to a few snapshots. In this case, we examine 6 images taken at 10 second intervals showing the location of a rhodium adatom on a tungsten (111) lattice plane consisting of several hundred tungsten atoms. Assuming reflecting boundary conditions at the step edge, we calculate the likelihood distribution of R, and determine the most probable value along with the uncertainty (full-width at half-max). We compare this outcome to the case where the boundary is absorbing, and quantify the differences. Two different computational methods are employed: (i) a direct time-integration of the master equation using 4^{th} order Runge Kutta, and (ii) a fast diagrammatic method in which the computer is used to enumerate all possible paths.

Dilys Ruan
University of New Mexico

Date submitted: 21 Sep 2017 Electronic form version 1.4