



SACRAMENTO STATE

Department of Physics & Astronomy Fall 2007

Physics Colloquium Series

"How Come Metal Nanowires are Stable at all?"

As most atoms in a metal nanowire are surface atoms with low coordination number, surface effects are classically expected to dominate the stability and dynamics of such wires. Thus, a fluid behavior is expected, leading in particular to wire break-up due to the Rayleigh instability.

On the other hand, very stable long gold and silver nanocylinders have recently been observed using transmission electron microscopy. This points to the presence of an additional stabilizing mechanism. Evidence of electron-shell filling effects, similar to those in metal clusters, has been found in conductance histograms for various metals, suggesting that this stabilizing mechanism comes from the transverse confinement of the electrons within the nanowire.

Using the nanoscale free-electron model, a continuum model of the structural dynamics of simple-metal nanowires, I will discuss how the interplay of surface and electron-shell effects explains the stability and long lifetimes of nanowires, and dramatically modifies many of their properties. I will in particular discuss transport and cohesion properties, as well as the structural dynamics of metal nanowires.

Jérôme Bürki

(Candidate for Faculty Position)

Physics Department, University of Arizona

Thursday, December 6, 2007

4:00-5:20 PM MND 1015

Open & Free to all Students, Faculty & Public