Materials Science and Technology Division

"Friedel Oscillations and Quantum Tunneling in Metallic Thin Film Systems"

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HTML/4515, Room 265

ABSTRACT

This talk focuses on the static and dynamical electronic properties of metallic thin film systems. For a freestanding film, we have found an analytical form for the Friedel oscillations in charge density. This form is different from the well-known result by Lang and Kohn in 1970. I'll explain why there is this difference. Furthermore, I'll present our numerical results obtained with the density functional theory of the jellium model, which confirm our analytical result.

We also study the quantum tunneling between two metallic films that are separated by a nano-gap and placed in a constant electric field. Our method is the time-dependent density functional theory of the jellium model. This system can be viewed as a simplified model for two closely-placed metallic mesoscopic particles, where the surface enhanced Raman scattering (SERS) can be achieved. Our results show that the SERS is strongly suppressed by the quantum tunneling for the usual laser intensity used in the lab when the separation between the two nanoparticles is smaller than 0.6nm.

Host: Zhenyu Zhang (576-5346)

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