

Department of Physics & Astronomy

Dr. Alberto Pimpinelli

*Executive Director
Rice Quantum Institute
Rice University*

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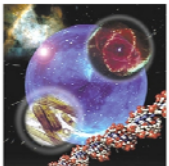
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**Kinetic Processes in the Nanoworld:
A few examples from thin film growth, nanomedicine
and nanoparticle solutions**

Very few natural phenomena happen at thermodynamical equilibrium. Kinetic processes determine the morphology of crystals, the release of drugs from therapeutic devices, as well as the production of steam from a water solution of gold nanoparticles illuminated by sunlight.

I will discuss how statistical mechanics and non-equilibrium thermodynamics allow us to describe and predict these very disparate phenomena.

In all cases, I will show how the coupling of analytical models and numerical methods, such as Monte Carlo and Molecular Dynamics simulations, can lead us to an extensive understanding of the atomistic mechanisms underlying the nucleation of an adsorbate layer or of a crystal plane; of molecular diffusion in nanochannels; and of the interplay between collective photon and heat transport in dense nanoparticle solutions.



Department Contact Information

Dr. Miguel Jose Yacaman • 210.458.6954 • Miguel.yacaman@utsa.edu
Mildred Herrera-Rosales • 210.458.5601 • Mildred.HerreraRosales@utsa.edu
<http://physics.utsa.edu/>