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NMR techniques for study of physical properties of reduced dimensionality and nano-scale materials

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Particles, with physical size that is small enough, display properties which differ significantly from the bulk material due to both surface effects and quantum confinement effects. The characterization of electronic states that dictate their physical properties requires sensitive techniques to probe the metallicity of the surface and bulk of material. In addition, such sensitive technique should be able to probe both charge and spin degrees of freedom. NMR spectroscopy offers such sensitive probe of the electronic wave function, correlations, and dynamics. In this talk, I will discuss innovative resonance techniques that we have developed to study quantum size, surface, and spin-orbit coupling effects on the electronic properties of multimetallic, semimetalic, and magnetic nanoparticles (NPs), nanowires (NW), and their thin film structures. A particular focus of my talk will be on ITO (Indium Tin Oxide) based materials.

Biography

Vesna Mitrovic is currently Associate Professor at Brown University. She joined the Brown Physics Department in 2003. A graduate of Illinois Institute of Technology, she received her PhD from Northwestern University in 2001. She has done postdoctoral work at Grenoble High Magnetic Field Laboratory (Grenoble, France). She is A. P. Sloan Fellow. Her research interests include study of the quantum phenomena arising in strongly correlated electron systems at low temperatures and high magnetic fields using NMR spectroscopy.

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