

The Department of Physics and Astronomy  
Presents Research Seminar Speaker

# Dr. Mauro Ferrari

UT Anderson Cancer Center, Houston, TX



Friday April 2, 2010  
Time: 2:00-3:00 p.m.  
Location: AET 0.212

## Transport OncoPhysics

The advent of novel engineering technologies affords unprecedented advances toward long-elusive objectives of medical research. Individualized medicine responds to the basic but generally unattainable question of identifying the right therapy, reaching the right therapeutic target in the body at the right time, and securing immediate feedback as for its efficacy and undesired collateral effect. Finally, individualized medicine appears to be a credible general objective in many pathologies, owing to the integration of classical disciplines of clinical medicine, methods of molecular biology, and novel technology platforms.

Nanotechnologies are of great interest in the context of the drive toward individualized medicine, and may prove to be the necessary catalyst for its large-scale implementation. In this talk I will present nanoporous-silicon-based approaches for the individualization of medical intervention: multi-stage vectors for the preferential localization of therapeutic agents; therapeutic monitoring nanotextured chips for the proteomic and peptidomic content profiling of biological samples; nanochannel delivery systems for intelligent time-release from implants, and bionanoscaffolds for post-traumatic osteoregeneration.

While novel nanoplatforms engender direct clinical applications, at the same time they afford the formulation of novel frameworks and hypotheses for the basic understanding of pathological processes. In particular, multistage particulates are the probes that afford the exploration of a new perspective of cancer, that is, that the unifying aspect of the canonical ‘hallmarks of cancers’ all relate to dysregulation of mass transport at scales including the molecular, cellular, microenvironmental, and systemic. These considerations are the starting point for “Transport OncoPhysics”.