1011-49-39 **Irene Fonseca*** (fonseca@andrew.cmu.edu), Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA 15213. *Variational Methods in the Study of Imaging, Foams, Quantum Dots ... and More.*

Several questions in applied analysis motivated by issues in computer vision, physics, materials sciences and other areas of engineering may be treated variationally leading to higher order variational problems and to models involving lower order density measures. Their study often requires state-of-the-art techniques, new ideas, and the introduction of innovative tools in partial differential equations, geometric measure theory, and calculus of variations. In this talk it will be shown how some of these questions may be reduced to well understood first order problems, while in others the higher order plays a fundamental role. Applications to phase transitions, to the equilibrium of foams under the action of surfactants, imaging, micromagnetics and thin films will be addressed. (Received July 29, 2005)