

## Colloquium

# Goong Chen

Texas A&M University and Taida Institute for Math. Sci.- National Taiwan University

Friday, September 24, 2010 at 3pm in Bell Hall 143

### The Dimensional Scaling Method in Chemical Physics

The dimensional scaling (D-scaling) method is an effective asymptotic method in chemical physics, where one uses the spatial dimension  $D$  as a parameter by embedding the Schrödinger equation with a Coulomb potential into a general  $D$ -dimensional space and by letting  $D$  tend to infinity. For the hydrogen atom, by the proper scaling of  $D$  of Dudley Herschbach (Nobel laureate in chemistry 1986), one can obtain the exact value of the ground state. As  $D$  tend to infinity, one obtains a singularly perturbed differential equation which shows the condensation phenomenon that the wave functions condense into a classical particle at the unit Bohr radius. Recently, the speaker and his collaborators have analysed the D-scaling technique and the corresponding theory of calculus of variations in order to put D-scaling on a solid mathematical foundation. The rigorous mathematical procedures will be outlined, and some recent progress will be surveyed.