数学与系统科学研究院学术报告

报告题目：The Dimensional-Scaling Method for the Schrödinger Equation in Atomic and Molecular Quantum Mechanics

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摘要：

The Schrödinger equation with a Coulomb potential is a fundamental model in atomic and molecular quantum mechanics. Its analysis and solutions are challenging. When one tries to develop a perturbation/asymptotic expansion method for such an equation, there is not a suitable parameter to form a perturbation/asymptotic series as all of the coefficients are normalizable. However, E. Witten suggested a method using the space-dimension D as a parameter and let D tend to infinity. D. Herschbach developed proper scaling using using D and then derived either exact or highly accurate approximations for the ground state energy of some simple atoms and molecules.
In this talk, the speaker will first describe how the dimensional scaling method works, and then give proofs to justify the mathematical rigor of such a scaling method for the hydrogen atom and the power-law potentials.
This is joint work by G. Chen, Z. Ding, and their collaborators.