TOPIC: Dissipation Equation of Motion Approach to Bath Polarization Dynamics and Nonlinear Bath Couplings
SPEAKER: Ruixue Xu, University of Science and Technology of China
TIME: 11:00am - 12:00pm, Wednesday, September 20, 2017
VENUE: Room 385, Geography Building, ECNU Zhongbei Campus

ABSTRACT OF THE TALK

Quantum dissipation plays crucial roles in many fields of modern science. Almost all existing quantum dissipation theories, from the perturbative quantum master equations to the exact Feynman--Vernon influence functional path integral and its differential hierarchical equations of motion (HEOM) approaches, exploit the Gaussian-Wick's theorem in the bath thermodynamic statistics and assume un-polarized environments. Therefore only weakly perturbed environment is involved.

We propose a dissipation equation of motion (DEOM) approach to study the bath polarization dynamics and nonlinear bath coupling effects that are non-Gaussian. The DEOM approach provides a statistical quasi-particle (dissipation) description for the environment and is established via a close comparison with the celebrated HEOM formalism but addresses both the dynamics of reduced systems and the hybridizing bath degrees of freedom. The algebra readily bridges the Schrödinger equation to the DEOM as a fundamental theory of quantum mechanics in open systems and enables the dissipation approach being naturally extended to high-order nonlinear coupling environments. Validations and demonstrations are also presented in this talk.

BIOGRAPHY

Prof. Xu received her Ph.D. in Physical Chemistry from the University of Science and Technology of China and carried out postdoctoral work at Hong Kong University of science and Technology. Her research interests are in dynamics of complex molecular systems, covering fundamental theory and numerical methods for complex systems dynamics, quantum statistics, quantum control, electron transfer and energy transfer processes, chemical reactions and nonlinear spectroscopy in condensed phases.