## Numerical Analysis for Nonlinear Schrödinger Equations with Low Regularity or Singularity

**Speaker:** Chushan Wang (National University of Singapore)

**Time:** 2025-04-10, 16:10 to 17:00

**Location:** Rm 1801, Guanghua East Tower

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**Abstract:** The nonlinear Schrödinger equation (NLSE) arises from various applications in quantum physics and chemistry, nonlinear optics, plasma physics, Bose–Einstein Condensates, etc. In these applications, it is necessary to incorporate low-regularity or singular potential and nonlinearity into the NLSE. Typical examples of such potential and nonlinearity include the discontinuous square-well potential, the singular Coulomb potential, the non-integer power nonlinearity, and the logarithmic nonlinearity. Such low regularity and singularity pose significant challenges in the analysis of standard numerical methods and the development of novel accurate, efficient, and structure-preserving schemes.

In this talk, I will introduce several new analysis techniques to establish optimal error bounds for some widely used numerical methods under optimally weak regularity assumptions. Based on the analysis, we also propose novel temporal and spatial discretizations to handle the low regularity and singularity more effectively.