In recent years, it was recognized that non-Hermitian Hamiltonians with parity-time (PT) and anti-PT symmetries can exhibit entirely real spectra, raising the possibility for extending the quantum theory to complex domain. Particularly, many proposals have been presented for realizing PT-symmetric Hamiltonians in various physical systems and many useful applications have been discussed. Among all different realizations, atomic systems possess many unique advantages, including the possibility to obtain authentic PT-symmetric refractive indexes, the capability to actively control and precisely manipulate system parameters in situ, and the possibility to acquire large Kerr nonlinearity based on the resonance character between light and atoms. In this report, we shall review various schemes for the realization of PT symmetry with atomic gases, elucidate their interesting properties and discuss their potential applications. In particular, the nonlinear optical effect in the PT-symmetric atomic systems are described, which may be served as useful building blocks for developing novel photonic devices with active light control at very low power level.

Biography:

Chao Hang received his Ph.D. degree in 2007 from Department of Physics at East China Normal University. His research areas are nonlinear physics and optics. Dr. Hang is currently a researcher and doctoral supervisor at the State Key Laboratory of Precision Spectroscopy at East China Normal University. His current research is mainly focused on nonlinear and quantum optical effects in light-atom interaction system, and have achieved a number of results. Dr. Hang has published more than 50 papers in renowned journals including Phys. Rev. Lett. and Adv. Phys. X, and has presided over 3 NSFC projects.