北京大学量子材料科学中心

Weekly Seminar

Youjin Deng

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Time: 4:00pm, Sept. 16, 2015 (Wednesday)

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Venue: Room W563, Physics Building, Peking University

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Abstract

The fermonic Hubbard model is one of the "standard models" of quantum statistical physics, and is believed to be the paradigmatic model for high-temperature superconductors. Despite intensive studies in past decades, its reliable phase diagram in two and higher dimensions has remained elusive. We address the Hubbard model on the square lattice in the region of moderate on-site repulsion $U<4$ and filling $n < 0.7$ without uncontrolled approximations, and obtain an accurate ground-state phase diagram in the (n,U) plane, describing the competition between the p-- and d--wave superfluid states. Our method is a combination of unbiased bold-line diagrammatic Monte Carlo with an additional ladder-diagram summation trick and semi-analytic BCS treatment of weak instability in the Cooper channel. We also claim the values of the dimensionless BCS coupling constants controlling the superfluid critical temperature at the phase boundaries, which prove to be very small up to $U = 4$; $n = 0.6$.

About the Speaker

Prof. Youjin Deng got his bachelor degree from Beijing Normal University, and Ph.D in physics at Delft University of Technology, Netherlands. He has been a professor of physics at Division of Theoretical Physics, Department of Modern Physics, University of Science and Technology of China since 2009. His research focuses on Theory of phase transition and critical phenomena in classical and quantum lattice models; development and application of highly efficient Monte Carlo algorithm; and Quantum simulations based on cold atoms and optical lattices.