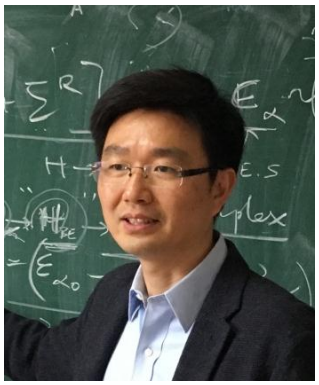
Seminar

Machine learning the quantum Hall effect



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Time: 10:00am, Dec. 13, 2018 (Thursday)

时间：2018年12月13日 （周四）上午10:00

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

Machine learning has been successfully applied to identify phases and phase transitions in condensed matter systems. In this talk I will discuss its application to quantum Hall systems, focusing on the effect of disorder and guiding center anisotropy. In the first part, I will discuss the effort to quantify critical fluctuations at the plateau transition of an integer quantum Hall system. We develop a finite-size scaling approach based on a convolutional neural network and analyze the critical behavior of the transition. The localization length critical exponent can be obtained from the worst performance of the neural network due to critical fluctuations. In the second part, I will discuss the study of the internal metric of several fractional quantum Hall states with the help of principle component analysis. We show that the response of the metric to interaction anisotropy remains unchanged from 1/3 to 2/5 in the same Jain sequence, but is drastically different at 1/5 filling.

About the speaker

EDUCATION
Ph.D. (2000), M.A. (1997), Princeton University
B.Sc. (1995), Fudan University

PROFESSIONAL EXPERIENCE
Professor of Physics (2005 to present), Zhejiang Institute of Modern Physics, Zhejiang University,
Wissenschaftlisher Mitarbeiter (2003—05), Karlsruhe Research Center, Germany
Postdoc Research Associate (2000--03), National High Magnetic Field Laboratory

RESEARCH INTEREST
Recent research focuses on topological phases of matter and topological quantum computation. The goal is to understand and to bridge the connections between condensed matter systems, low-dimensional field theories, low-dimensional topology, and quantum information science. Such connections may, hopefully, lead to the eventual realization of quantum computers in exotic condensed matter systems such as non-Abelian fractional quantum Hall liquids.