北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Weekly Seminar

Microscopic Studies of the Geometric Aspects in Fractional Quantum Hall Effect

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Time: 4:00pm, Sep. 27, 2017 (Wednesday)

时间：2017年9月27日 （周三）下午4:00

Venue: Room W563, Physics building, Peking University

地点：北京大学物理楼，西563会议室

Abstract

The importance of quantum geometry in strongly correlated topological systems is increasingly appreciated recently, for its roles in the incompressibility gap, phase transitions and emergent classical geometric effects. In this talk I start with a brief overview of the geometric aspects in fractional quantum Hall effect (FQHE), together with the well-established pseudopotential formalism. The latter is very successful in characterizing the rotationally invariant effective two-body interactions and in the construction of model Hamiltonians for some prominent FQH states. This will be followed by a discussion of our recent work in extending this formalism for systems where rotational symmetry is broken, with the construction of the generalized pseudopotentials that are projection operators for the intra-Landau level dynamics and at the same time form a complete basis for arbitrary interactions. I will then illustrate the interplay between geometry and topological orders of the FQH with the generalized pseudopotentials in some common experimental systems, with the focus on how effective interactions can be tuned experimentally within different materials, and the emergent metric from the many-body ground state that in principle can be experimentally measured. I will also briefly discuss the generalized \hypermetric" in three-body interactions, with eight variational parameters and fundamentally different from the metric in two-body interactions. I also discuss possible ways to stabilize non-Abelian states by breaking the rotational symmetry.

About the speaker

Dr. Yang Bo is a research scientist at Institute of High Performance Computing, A*STAR of Singapore. He received his BS degree in Physics and Mathematics from Stanford University, and PhD in Physics from Princeton University, supervised by Prof. Duncan Haldane. His main research interests include fractional quantum Hall effect and strongly correlated topological systems, classical complex systems and traffic theory.