



中心系列讲座 ICQM Weekly Seminar Series

Geometrical aspects in fractional quantum Hall systems



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Time: 4:00pm, Apr. 9, 2012 (Monday)

时间: 2012年4月9日 (周一) 下午4:00

Venue: Room 607, Conference Room A, Science Building 5

地点: 理科五号楼607会议室

Abstract

In this talk I will discuss the theoretical understanding of the evolution of topological fractional quantum Hall systems due to geometrical factors. We start from an example of the evolution by inserting fictitious fluxes in an annulus spatial geometry and conjecture exact scaling functions for quasiparticle tunneling amplitudes, which allow the accurate computation of the conformal dimensions of quasiparticles. We then move on to the geometrical aspects induced by anisotropic interaction, which may be realized in cold atomic systems or two-dimensional electron gases. Motivated by the study of fractional quantum Hall effect for ultracold fermions with dipole-dipole interaction, we explore the explicit construction of model quantum Hall wavefunctions, which complements the geometrical description of fractional quantum Hall effect proposed by Haldane. On a torus geometry we numerically check the validity of the geometrical description and reveal the evolution of the ground state from a Laughlin liquid to a Hall smectic, and finally to a Tao-Thouless crystal.

References:

- [1] Hua Chen, Zi-Xiang Hu, Kun Yang, E. H. Rezayi, and Xin Wan, Phys. Rev. B 80, 235305 (2009).
- [2] Zi-Xiang Hu, Ki Hoon Lee, E. H. Rezayi, Xin Wan, and Kun Yang, New J. Phys. 13, 035020 (2011).
- [3] Rui-Zhi Qiu, Su-Peng Kou, Zi-Xiang Hu, Xin Wan, and Su Yi, Phys. Rev. A 83, 063633 (2011).
- [4] Rui-Zhi Qiu, F. D. M. Haldane, Xin Wan, Kun Yang, and Su Yi, arXiv:1201.1983.
- [5] Hao Wang, R. Narayanan, Xin Wan, and Fuchun Zhang, arXiv:1203.1982.

About the Speaker

"Prof. Xin Wan studied physics at Fudan University since 1990 and received his PhD from Princeton University in 2000. He returned to China in 2005 after postdoctoral research at the National High Magnetic Field Laboratory in Tallahassee and the Karlsruhe Research Center. He is now a professor at Zhejiang University. His main research interest is fractional quantum Hall effect and topological quantum computation."