

武汉物数所理论交叉学术交流系列报告

(第八十九期)

Bulk Thermoelectric and Thermodynamic Probes of non-Abelian Anyons in Topological States of Matter

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2014年05月30(周五) 上午10:30-12:00

频标楼4楼报告厅

About the speaker:

杨昆教授于 1989 年毕业于复旦大学物理系,1994 年获得美国印第安纳大学理学博士学位。1994-99 年期间分别在美国普林斯顿大学和加州理工学院从事博士后研究,1999 年至今一直就职于美国国家强磁场中心和佛罗里达州立大学物理系,长期从事凝聚态物理和统计物理的理论研究。他的主要兴趣集中在强关联多体电子系统(如量子 Hall 系统、非常规超导和无序量子磁体等)、相变和量子临界现象等。在研究中发表论文 100 多篇,其中 Phys. Rev. Lett. 30 余篇,论文他引上千余次。在重要国际会议邀请报告 38 次,学术交流邀请报告百余次。曾获得美国斯隆研究奖(Alfred P. Sloan Research Fellowship),海外华人物理协会(OCPA)杰出青年研究奖(Outstanding Young Researcher Award)等荣誉,并于 2011 年当选美国物理学会会士(APS Fellow)。



Abstract:

Topological states of matter support quasiparticle excitations with fractional charge and possibly exotic statistics of the non-Abelian type, known as non-Abelian anyons. Most current experimental attempts to reveal such exotic statistics focus on interference involving edge transport. After a brief introduction of topological states, in this talk we will discuss how one can reveal the non-Abelian quasiparticle statistics in bulk probes. We show that bulk thermopower is a promising way to detect their non-Abelian nature, and measure the quantum dimension (a key parameter that quantifies non-Abelian statistics) of these anyons. We also demonstrate a novel cooling effect associated with them. We discuss application of these ideas to the specific candidate system of FQH liquid at filling factor $5/2$, and topological insulator-superconductor hybrid systems. Some of the predicted behavior has been observed in recent experiments, which will also be discussed. This body of work has also motivated further theoretical efforts of using thermal probes to study non-Abelian anyons.

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