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Truth Forum of Science

物理系学术报告 Physics Department Colloquium

12月10日，周五，16:00-17:00，教12-201

**New developments in the study of small
superconductors**

刘荧 教授

Pennsylvania State University

摘要

Small superconductors have been at the forefront of superconductivity research. The work began with the study of quantum size effects on superconductivity in samples so small that Cooper pairs can barely form. The destruction of superconductivity in these superconductors occurs when the energy level spacing of electrons in the sample becomes comparable with the superconducting energy gap of the bulk, corresponding to a sample size of a few nanometers. It was found, surprisingly, that how superconductivity destroyed in such ultrasmall superconductors depends on whether the number of electrons in the superconductor is even or odd when the total number of electrons is as many as a few hundred thousands. More recently, small superconductors known as mesoscopic superconductors featuring a sample size much larger than the minimal size for superconductivity, but sufficiently small to allow only few vortices in the sample (corresponding to a sample size of a few micron) have also attracted a lot of attention. We have recently expanded the study of small superconductors to samples with an intermediate size lying between the minimal size for superconductivity and that of traditional mesoscopic superconductors, featuring in addition a specific sample topology or an unconventional pairing symmetry. Novel physical phenomena have been observed, which appears to suggest quantum-size effects of Cooper pairs. In this talk I will present our experimental results on ultrasmall singly and doubly connected s-wave superconductors. I will also discuss briefly our work on islands of conventional s-wave superconductors bordered by an unconventional, chiral p-wave superconductor.

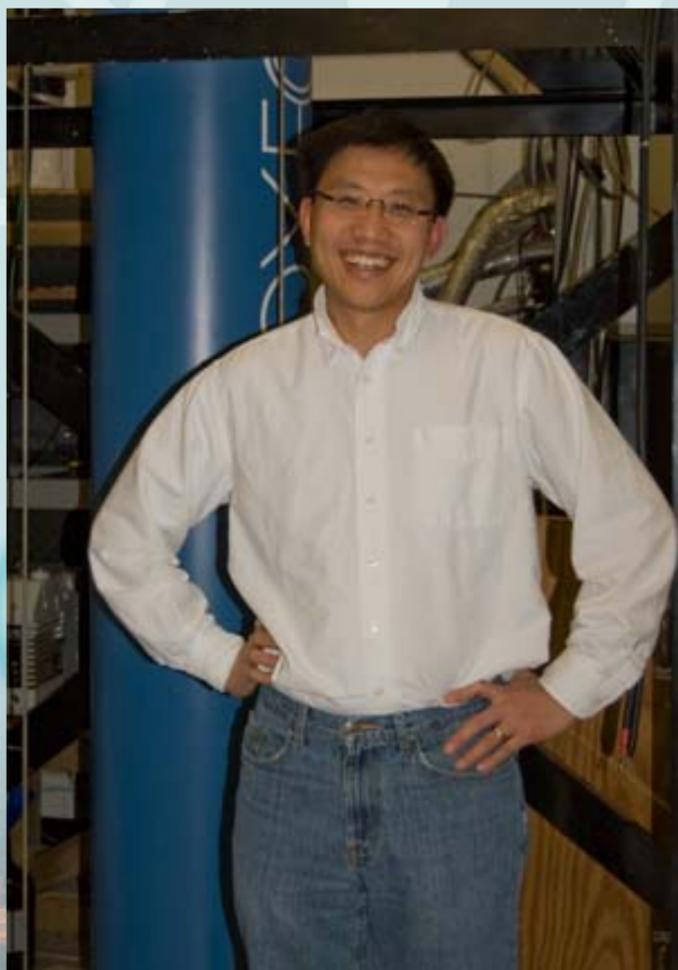


刘荧教授简介：

刘荧，美国宾夕法尼亚州州立大学物理系教授。1982年毕业于北京大学物理系，1984年中国科学院物理学硕士，1991年美国明尼苏达大学物理系博士。在美国科罗拉多大学波尔得分校从事了三年博士后研究工作，随后于1994年受聘于美国宾夕法尼亚州州立大学物理系助理教授，并于2005年成为正教授。

曾获得美国自然科学基金委的事业奖（**NSF Career Award**），中国杰出青年基金（海外），受聘于浙江大学任长江讲座教授。同时也是美国物理学会 fellow。

主要研究方向为凝聚态物理和材料物理，在二维超导超薄薄膜的超导—绝缘态相变、纳米结构超导的反常性质、反常超导体、和强关联体系的物性等方面的研究上取得了世界公认的突出成果，发表论文逾百篇，其中 **Nature** 1 篇，**Science** 3 篇，**Nature Phys.** 1 篇，**Phys. Rev. Lett.** 9 篇。



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