



Weekly Seminar

Symmetry Breaking and Topology in Superfluid ^3He

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Institute of Physics (IOP), Chinese Academy of Sciences (CAS)



Time: 3:00pm, May. 31, 2023 (Wednesday)

时间: 2023年5月31日 (周三) 下午3:00

Venue: Room w563, Physics building, Peking University

地点: 北京大学物理楼, 西563会议室

Abstract

The p -wave superfluid ^3He exhibits a number of exotic quantum phenomena which are intimately related to symmetry breaking and nontrivial topology, and understanding of those phenomena has significant implications not only on condensed matter physics but also on particle physics and cosmology [1]. In this talk, I will present two experimental studies of novel phenomena arising from symmetry breaking and nontrivial topology of superfluid ^3He . First, I will present the first direct demonstration of time-reversal symmetry breaking in Weyl superfluid ^3He -A phase by showing that electrons immersed in superfluid ^3He -A exhibit an anomalous Hall effect [2]. Second, I will present the direct observation of Majorana surface states formed at a free surface of topological ^3He -B phase by using electrons trapped at the surface [3,4].

[1] G. E. Volovik, *The Universe in a Helium Droplet* (Oxford University Press, Oxford, 2003).

[2] H. Ikegami, Y. Tsutsumi, and K. Kono, *Science* **341**, 59 (2013).

[3] H. Ikegami and K. Kono, *J. Low Temp. Phys.* **195**, 343 (2019) (arXiv:1805.11231).

[4] Y. Tsutsumi, *Phys. Rev. Lett.* **118**, 145301 (2017).

About the speaker

Hiroki Ikegami is a professor at Institute of Physics (IOP), Chinese Academy of Sciences (CAS). He received B. S., M. S., and Ph. D. from the University of Tokyo, all in applied physics. He was an Assistant Professor at Graduate School of Arts and Sciences, the University of Tokyo in 1999–2001, and a research scientist and a senior research scientist at RIKEN in 2001–2022. Since 2022, he is a professor at IOP, CAS. His research is focused on experimental studies of condensed matter systems at ultralow temperatures, in particular on the superfluid ^3He , electrons trapped on a helium surface, and superconducting quantum circuits. He received a Young Scientist Award of the Physical Society of Japan in 2009 and JSPS (Japan Society for the Promotion of Science) Prize in 2015.

