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Travelling solitons in a one-dimensional spin-orbit coupled fermionic superfluid

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频标楼4楼报告厅

About the Speaker:

Hui Hu received his Ph.D. degree from Tsinghua University, Beijing, in 2001. He was a Postdoctoral Fellow at ICTP (Trieste) and SNS (Pisa) from 2001-2004 in Italy and was a Chair Professor (of AMO physics) at Renmin University of China from 2006-2009. He was a Queen Elizabeth II (QEII) Fellow of the Australian Research Council (ARC) from 2009-2013. He is presently an ARC Future Fellow (Associate Professor) at Swinburne University of Technology. Current research interest: Ultracold atoms and molecules; The theory of quantum fluids. For a career total of over 100 scientific publications, Hu has received over 2,231 citations from the ISI Web of Science with a Hirsch h-index of 28. These include 22 papers in high impact journals: 2 Nature Physics and 20 Physical Review Letters.

Abstract:

We theoretically investigate travelling solitons of a one-dimensional spin-orbit coupled Fermi gas by numerically solving the time-dependent/independent Bogoliubov-de Gennous equations. The properties of static (dark) solitons and of moving solitons are greatly affected by spin-orbit coupling. We find a new critical velocity beyond which the travelling soliton gradually decays by radiating phonons. In particular, in the topological phase above a threshold Zeeman field, we find that the soliton can move at a finite velocity with a constant phase jump \pi. The experimental implementations of these results, in light of the recent observations at MIT, are discussed.

Reference: Phys. Rev. Lett. 113, 130404 (2014), Phys. Rev. A 91, 023610 (2015), arXiv:1509.01803 (2015), Nature 499, 426 (2013), Phys. Rev. Lett. 113, 065301 (2014), arXiv:1507.01047.

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