武汉物数所精密测量物理研究部学术报告

Title: Quantized conductance through the quantum evaporation of bosonic atoms

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报告地点：波谱楼十楼会议室

About the speaker:

David Papoular, born on June 10th, 1984 in Paris, now working as a faculty researcher at CNRS. He defended his PhD with the topic 'Manipulation of Interactions in Quantum gases: a theoretical approach' in 2011 (supervisor: Prof. G.V. Shlyapnikov). Then he did his Post-doctor at the BEC Center in University of Trento from 2011 to 2015 (Advisors: Profs. S. Stringari & L.P. Pitaevskii). Until now, he has 11 publications in peer-reviewed journals (including 4 in Phys. Rev. Lett.and 1 in Nat. Comm.) . He is also a member of the American Physical Society and frequent referee for PRL, PRA, JSTAT. His research interest covers Atomic, Molecular and Optical Physics, Condensed Matter Physics, and Quantum Physics.

Abstract:

We analyze theoretically the quantization of conductance occurring with cold bosonic atoms trapped in two reservoirs connected by a constriction with an attractive gate potential. We focus on temperatures slightly above the condensation threshold in the reservoirs. We show that a conductance step occurs, coinciding with the appearance of a condensate in the constriction. Conductance relies on a collective process involving the quantum condensation of an atom into an elementary excitation and the subsequent quantum evaporation of an atom, in contrast with ballistic fermion transport. The value of the bosonic conductance plateau is strongly enhanced compared to fermions and explicitly depends on temperature. We highlight the role of the repulsive interactions between the bosons in preventing them from collapsing into the constriction. We also point out the differences between the bosonic and fermionic thermoelectric effects in the quantized conductance regime.

http://journals.aps.org/pra/abstract/10.1103/PhysRevA.94.023622