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PhD Dissertation

Evidence of quantum phase slips in a 1D atomic superfluid

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Abstract

Quantum phase slips are the primary excitations in one-dimensional superconductors and superfluids at low temperatures [1-3]. They have been well characterized in most condensed-matter systems, with the notable exception of superfluids based on ultracold quantum gases, for which the existence of quantum phase slips has not been demonstrated until recently. In this talk I will briefly summarize the main results in the investigation of quantum phase slips from superconductors [4,5] to quantum gases. In particular, I'll focus the attention onto experiments we performed recently on the dissipation in one-dimensional Bose superfluids flowing along a shallow periodic potential, which show the signatures of quantum phase slips [6].

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