

Abstract Submitted  
for the DAMOP18 Meeting of  
The American Physical Society

**A coherent perfect absorber for matter waves** CHRISTIAN BAALS, Department of Physics and Research Center OPTIMAS, TU Kaiserslautern / Graduate School Materials Science in Mainz, ANDREAS MÜLLERS, BODHADITYA SANTRA, JIAN JIANG, JENS BENARY, Department of Physics and Research Center OPTIMAS, TU Kaiserslautern, RALF LABOUVIE, Department of Physics and Research Center OPTIMAS, TU Kaiserslautern / Graduate School Materials Science in Mainz, DMITRY A. ZEZYULIN, ITMO University, St. Petersburg / Centro de Fisica teorica e Computacional and Departamento de Fisica, Faculdade de Ciencias, Universidade de Lisboa, VLADIMIR V. KONOTOP, Centro de Fisica teorica e Computacional and Departamento de Fisica, Faculdade de Ciencias, Universidade de Lisboa, HERWIG OTT, Department of Physics and Research Center OPTIMAS, TU Kaiserslautern — Coherent perfect absorption (CPA), i.e. the complete extinction of bidirectional incoming radiation by a complex potential in a waveguiding medium, is an effect that relies on the destructive interference of reflected and transmitted waves. It has been observed in many different linear systems like for example for light interacting with absorbing scatterers or for sound waves. Extending the concept of CPA to non-linear systems we find that the conditions for CPA can be achieved easier than in the linear case since localised absorption in a non-linear medium stabilises the system. We experimentally demonstrate CPA for matter waves with an atomic Bose-Einstein condensate in a one-dimensional optical lattice with an absorptive site where the absorption is introduced by an electron beam.

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Date submitted: 07 Feb 2018

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