Abstract Submitted
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Avalanches of Bose-Einstein-Condensates from open optical lattices[1] TSAMPIKOS KOTTOS, Department of Physics, Wesleyan University, Connecticut-USA and MPI for Dynamics and Self-Organization, Gottingen-Germany, GIM SENG NG, Department of Physics, Wesleyan University, Connecticut-USA, HOLGER HENNIG, RAGNAR FLEISCHMANN, THEO GEISEL, MPI for Dynamics and Self-Organization, Gottingen-Germany — We investigate, the outgoing atomic flux of BECs loaded in large OLs using a mean field (Discrete Non-Linear Schroedinger Equation–DNLSE) approach. We show that for some critical values of the rescaled (with respect to the lattice size) interatomic interaction strength, the current decays in avalanches that follow a power-law distribution indicating the existence of a novel phase transition. The origin of this phenomenon is identified to be the collisions between stable and moving breathers which co-exist at the lattice. Using a reduce map we are able to provide bounds for the power law exponent of the avalanche distribution which reflect the complexity of the underlying classical phase-space. Due to the inter-disciplinary nature of the DNLSE, we expect that the same phenomenon will be observed in several other branches of nonlinear physics, ranging from nonlinear optics to polarons and biological molecules.

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Tsampikos Kottos
Department of Physics, Wesleyan University, Connecticut-USA and
MPI for Dynamics and Self-Organization, Gottingen-Germany

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