

Abstract Submitted  
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**Counting intrinsic localized modes in an antiferromagnet**<sup>1</sup> M. SATO, A.J. SIEVERS, LASSP, Cornell University — Intrinsic localized modes (ILMs), also called discrete breathers or lattice solitons, are responsible for energy localization in the dynamics of discrete nonlinear lattices [1]. Here we report on the observation of countable ILMs in an atomic lattice by means of a novel nonlinear energy magnetometer [2]. The instrument first produces frequency locked ILMs in the spinwave spectrum of an antiferromagnet and then measures the four wave mixing signal emitted by the sample versus time. This technique makes observable in nonlinear emission the small number of ILMs that remain locked to the driver in steady state. The disappearance of each ILM registers as a step in the time dependent emission power with the surprising result that the energy staircase of ILM deexcitation is uniquely defined. These experiments identify a new direction where future applications may lead to smart materials and directed energy transfer. 1. A. J. Sievers and S. Takeno, *Phys. Rev. Lett.* **61**, 970 (1988). 2. M. Sato and A. J. Sievers, *Nature* **431**, Nov. 25 (2004).

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