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Analysis of spontaneous emission of a lattice trapped atom into free space[1] MICHAEL STEWART, LUDWIG KRINNER, ARTURO PAZMINO, DOMINIK SCHNEBLE, Stony Brook University — It has been predicted [2] that an atom confined in an optical lattice well that is coupled to free space through an internal state transition can exhibit behavior analogous to that of spontaneous emission in a photonic band gap material. We have recently performed a detailed theoretical analysis of such a system in a 1D geometry, including the lattice- confined population evolution, the momentum distribution of the emitted matter waves, and the structure of an evanescent matter-wave state below the continuum boundary [3]. We compare our results for the transition from Markovian to non-Markovian behaviors to those previously obtained for three dimensions, and propose an experimental realization of the system.

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[2]I. de Vega *et al.*, Phys. Rev. Lett. **101**, 260404 (2008)
[3]M. Stewart *et al.*, Phys. Rev. A **95** , 013626 (2017)

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