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Transient enhancement of the nonlinear atom-photon coupling via recoil-induced resonances[1] JOEL GREENBERG, DANIEL GAUTHIER, Duke University, QUANTUM ELECTRONICS LAB TEAM — We use an optically dense, anisotropic magneto-optical trap to study recoil-induced resonances (RIRs) in the transient, high-gain regime. In particular, we find that the finite atomic response time and redistribution of momentum-space population govern the atomic dynamics. By simultaneously allowing one to engineer the atomic momentum distribution and exploit gain enhancements due to collective effects, our system is a promising candidate for the realization of few-photon nonlinear optical effects in a traveling-wave geometry for application to quantum information networks.

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