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Generation of strongly correlated photons in a nonlinear one-dimensional system MOHAMMAD HAFEZI, DARRICK E. CHANG, VLADIMIR GRITSEV, EUGENE DEMLER, MIKHAIL D. LUKIN, Harvard University — We present a theoretical investigation of a photonic system obeying the quantum non-linear Schrödinger equation in a finite size system. Such systems are now being implemented using a hollow-core fiber loaded with trapped alkali atoms. The tight transverse confinement of the photonic modes enables a large atom-field coupling strength. We investigate the effects of large nonlinearity on quantum correlations of transmitted and reflected photons. The widely tunable nonlinearity in the system enables one to coherently control statistical properties of photon fields and to create photonic Luttinger liquids.

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