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Atoms in a Cavity: A Source of Narrowband Photon Pairs

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Coupling atoms to an optical cavity can significantly enhance the directionality of photon emission from atoms. Using such an atoms-cavity system, we have created a high-brightness source of narrowband, identical-photon pairs. The source was applied to two experiments: interferometry and entanglement. Biphoton interferometry holds promise to demonstrate precision beyond the shot noise limit, although the measured interference fringe visibility of 0.84 ± 0.04 only translated to a shot noise limited phase uncertainty. Polarization-time entangled photon pairs were also directly generated via an adjusted optical pumping scheme for the atoms.