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Continuous Nondestructive Detection of Individual Photons KRISTIN BECK, MAHDI HOSSEINI, YIHENG DUAN, WENLAN CHEN, VLADAN VULETIĆ, Department of Physics and Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA — The nondestructive detection of optical photons is an enabling technology with applications in quantum information, simulation and communication. We present a detection scheme that continuously detects photons without destroying them. Photons to be measured (signal photons) are sent through an ensemble of ^{133}Cs atoms, where they travel as slow-light polaritons that are, in turn, coupled to a high finesse optical cavity. The atomic component of the polariton rotates the polarization of light that is transmitted through the cavity, which we detect. We show that the system is capable of non-destructively detecting individual signal photons by measuring a second-order correlation function between the signal and detection paths of $g_2(0) > 5$.

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