

## Nondestructive Detection of an Optical Photon

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### Author(s):

Andreas Reiserer, Stephan Ritter, Gerhard Rempe

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<http://dx.doi.org/10.1126/science.1246164> [2]

All optical detectors to date annihilate photons upon detection, thus excluding repeated measurements. Here, we demonstrate a robust photon detection scheme that does not rely on absorption. Instead, an incoming photon is reflected from an optical resonator containing a single atom prepared in a superposition of two states. The reflection toggles the superposition phase, which is then measured to trace the photon. Characterizing the device with faint laser pulses, a single-photon detection efficiency of 74% and a survival probability of 66% are achieved. The efficiency can be further increased by observing the photon repeatedly. The large single-photon nonlinearity of the experiment should enable the development of photonic quantum gates and the preparation of exotic quantum states of light.

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