

# An array of integrated atom-photon junctions

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Photonic chips that integrate optical elements on a single device can process vast amounts of information rapidly. A new branch of this technology involves coupling light to cold atoms or Bose-Einstein condensates, the quantum nature of which provides a basis for new information-processing methods. The use of optical waveguides gives the light a small cross-section, making coupling to atoms efficient. In this Letter, we present the first waveguide chip designed to address a Bose-Einstein condensate along a row of independent junctions, which are separated by only 10  $\mu\text{m}$  and have large atom-photon coupling. We describe a fully integrated, scalable design, and demonstrate 11 junctions working as intended, using a low-density cold atom cloud with as little as one atom on average in any one junction. The device suggests new possibilities for engineering quantum states of matter and light on a microscopic scale.

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