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### **Connecting trapped ions and quantum dots with photons**

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Coupling individual quantum systems lies at the heart of building scalable quantum networks. Here, we report the first direct photonic coupling between a semiconductor quantum dot and a trapped ion and we demonstrate that single photons generated by a quantum dot controllably change the internal state of an  $\text{Yb}^+$  ion. We ameliorate the effect of the sixty-fold mismatch of the radiative linewidths with coherent photon generation and a high-finesse fiber-based optical cavity enhancing the coupling between the single photon and the ion. The transfer of information presented here via the classical correlations between the  $\sigma_z$  projection of the quantum-dot spin and the internal state of the ion provides a promising step towards quantum state-transfer in a hybrid photonic network.