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Engineered atom-light interactions in 1D photonic crystals[1]
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— Nano- and microscale optical systems offer efficient and scalable quantum interfaces through enhanced atom-field coupling in both resonators and continuous waveguides. Beyond these conventional topologies, new opportunities emerge from the integration of ultracold atomic systems with nanoscale photonic crystals. One-dimensional photonic crystal waveguides can be engineered for both stable trapping configurations and strong atom-photon interactions,[2] enabling novel cavity QED and quantum many-body systems,[3] as well as distributed quantum networks. We present the experimental realization of such a nanophotonic quantum interface based on a nanoscale photonic crystal waveguide, demonstrating a fractional waveguide coupling of Γ_{1D}/Γ' of 0.32 ± 0.08, where Γ_{1D} (Γ') is the atomic emission rate into the guided (all other) mode(s).[4] We also discuss progress towards intra-waveguide trapping of ultracold Cs.

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[3]D. E. Chang *et al.*, New J. Phys. **14**(6), 063003 (2012).
[4]A. Goban et al., arXiv:1312.3446 (2013).

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