Abstract Submitted
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Theory of on-chip integrated microwave-to-optical quantum coherent converter[1] CLEMENT JAVERZAC-GALY, KIRILL PLEKHANOV, LASZLO TOTH, ALEXEY FEOFANOV, TOBIAS J. KIPPENBERG, Ecole Polytechnique Federale de Lausanne — We present a proposal for implementing a direct quantum electrooptical converter based on a nonlinear optical microresonator. The hybrid system combines planar superconducting microwave circuits and integrated nonlinear ultrahigh-Q crystalline whispering gallery mode (WGM) optical microresonator. It features low footprint and scalability. The electrooptical dynamics of the device is similar to that of a cavity quantum optomechanical system and Pockels effect is used as the coupling interaction. We simulate the system and show that high-conversion performance can be achieved with current technology. On-chip, such integrated device holds promise for use in large-scale quantum applications as a first direct microwave-to-optical quantum repeater.

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