

Abstract Submitted  
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**Superinductor Based Traveling Wave Parametric Amplifier**

MATTHEW BELL, ANA SAMOLOV, University of Massachusetts Boston — A traveling wave parametric amplifier (TWPA) composed of a transmission line made from a “superinductor” element [1] is proposed. The unique nature of this transmission line is that the nonlinearity can be tuned with an external magnetic flux and can even change sign. This feature of the transmission line can be used to perform phase matching in a degenerate four-wave mixing process which can be utilized for parametric amplification of a weak signal in the presence of a strong pump. Numerical simulations of the TWPA design have shown that with tuning, phase matching can be achieved and an exponential gain as a function of the transmission line length can be realized. The proposed TWPA design is well suited for multiplexed readout of quantum circuits or astronomical detectors in a compact configuration which can foster on-chip implementations.

[1] M. Bell et al., “Quantum Superinductor with Tunable Nonlinearity,” PRL 109, 137003 (2012).

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