

Nonreciprocity with optomechanical cavity

(یکسو سازی فوتونی در کاواک های اپتومکانیکی)

Speaker

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Abstract

Nonreciprocal circuit elements form an integral part of modern measurement and communication systems. Mathematically they require breaking of time-reversal symmetry, typically achieved using magnetic materials and more recently using the quantum Hall effect, parametric permittivity modulation or Josephson nonlinearities. Here, we demonstrate an on-chip magnetic-free circulator based on reservoir engineered optomechanical interactions. Directional circulation is achieved with controlled phase-sensitive interference of six distinct electro-mechanical signal conversion paths. The presented circulator is compact, its silicon-on-insulator platform is compatible with both superconducting qubits and silicon photonics, and its noise performance is close to the quantum limit. With a high dynamic range, a tunable bandwidth of up to 30 MHz and an in-situ reconfigurability as beam splitter or wavelength converter, it could pave the way for superconducting qubit processors with integrated and multiplexed on-chip signal processing and readout.

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