Chip-Scale Frequency Comb Sources for Terabit Communications

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Abstract

High-speed optical interconnects rely on advanced wavelength-division multiplexing (WDM) schemes. However, while photonic-electronic interfaces can be efficiently realized on silicon-on-insulator chips, dense integration of the corresponding light sources still represents a major challenge. Chip-scale frequency comb sources present an attractive alternative for providing a multitude of optical carriers for WDM transmission. In this paper, we give an overview on our recent progress towards terabit communications with chip-scale frequency comb sources. In a first set of experiments, we demonstrate frequency comb generation based on silicon-organic hybrid (SOH) electro-optic modulators, enabling transmission data rates of up to 1.152 Tbit/s. A second set of experiments demonstrates Kerr comb generation in nonlinear integrated microcavities, leading to data rates of up to 1.44 Tbit/s. Our experiments demonstrate that frequency comb generation in chip-scale devices represents a viable approach to terabit/s communications.

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