this talk, we present an argument for using delay-coupled reservoirs using multiple feedback terms with different delays. We present a theoretical analysis of the resulting system, discuss surprising effects pertaining to the precise choice of delays, and provide a guideline for the optimal design of such systems.

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Photonic reservoir computing using a small network of micro-ring resonators

In this talk, we describe a photonic architecture based on a small network of nonlinear micro-resonators integrated on a Silicon chip. We demonstrate based on extensive numerical simulations that this photonic integrated circuit can be used as a reservoir computer to perform nonlinear binary-type tasks, such as the XOR task, at bitrate exceeding tens of Gb/s. Then, we make a comparative performance analysis between our new architecture and the previous one based on purely passive elements (i.e. delay lines, combiner, and splitter). We show that the level of performance can exceed that of this previous chip under specific operational conditions. Finally, we provide a detail analysis of tunable parameters (i.e. optical detuning and the injected optical power) on the level of performance of our architecture. This work provides evidence this type of architecture is suitable for high-speed neuromorphic information processing in the field of optical telecommunications.