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Theoretical and experimental study of optoelectronic oscillators (OEO) for telecommunications, metrology, and artificial intelligence

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The optoelectronic oscillators (OEO) consist of closed-loop oscillators characterized by an optical path with local nonlinearity and a linear frequency-filtered electrical path. This para-digmatic system is an ideal benchmark for the investigation of delay-based infinite-dimensional systems, which provide a higher complexity than low-dimensional nonlinear systems. The OEOs find their numerous main technological applications in areas such as ultra-stable microwave generation, optical communications, information processing, artificial intelligence, sensing, random numbers generation, and more, with performances surpassing other systems.

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