

## **A Novel Monolithic Integrated Optical Chaos Emitter: Experiment, Data Analysis and Numerical Predictions**

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A novel photonic integrated device has been designed and evaluated as a transmitter for chaos applications in optical communications. The device consists of a semiconductor laser integrated with a semiconductor optical amplifier, a phase section and a waveguide, forming thus an integrated external cavity laser with adjustable optical feedback and phase. Under diverse operating parameters the device behaves in different modes, from stable operation to limit cycles and hyperchaotic behavior. Chaos data analysis from experimental data is performed in order to quantify the complexity of the experimental reconstructed attractors under the influence of noise. Calculation of the correlation dimension and Kolmogorov entropy are compared with numerical predictions.

**Keywords:** Chaotic simulation, Lyapunov exponents, Correlation dimension, Kolmogorov entropy, Nonlinear noise filtering, State-space averaging