

## **Design and characterization of microring resonators for the generation of Optical Frequency Combs**

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Time and frequency metrology is a key enabler for both forefront science and innovation. Scientific breakthroughs as the first-ever black hole image or recent tests on relativity would not exist if time were not the most accurate measurable physical quantity. However, the best Atomic Frequency Standards (AFSs) in terms of accuracy and stability are very large and complex, and they are usually operated only at specialized laboratories. Still, science, technology, and society would largely benefit from the miniaturization of such AFSs while keeping the highest performances.

Huge efforts have been performed in the last decades for the miniaturization of the latest generation of atomic clocks, i.e. the optical ones, both regarding techniques for on-chip laser stabilization to atoms and frequency division. The latter is obtained using frequency combs, that facilitate the measurement and use of atomic references by providing a set of clock-referenced lines, equally spaced in terms of frequency, that span more than an octave. Miniaturized frequency combs (or microcombs) rely on nonlinear parametric oscillation and cascaded four-wave mixing driven by a CW laser, performed on optical microresonators.

We present the ongoing research activity focused on the design and characterization of such microcombs, realized in thick silicon nitride.