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Frequency-Agile Photonic Integrated Lasers – from the visible to the infrared

Ultra-low noise lasers are essential tools in various applications, ranging from communication to sensing, and optical metrology. Thanks to recent advances in integrated photonics, photonic integrated lasers were demonstrated to outperform the state-of-the-art laser systems in key metrics, such as phase noise and frequency tuning performance. Moreover, the variety of integrated photonic platforms and architectures available allows for lasers covering a wide range of operating wavelengths and performance characteristics, paving the way for a widespread adoption of this technology across numerous applications and different fields.

Here, I will review our recent work on photonic integrated lasers, presenting a few key achievements and photonic integrated laser implementations spanning from the UV/visible range to the short-wave infrared. I will introduce the different laser architectures, including self-injection locking, extended distributed Bragg grating (E-DBR) and Vernier, as well as the different photonic integrated platforms, silicon nitride, lithium niobate and lithium tantalate, that we leveraged in our work. I will present a selected number of performance and application demonstrations and review the future research prospects in our lab.

References

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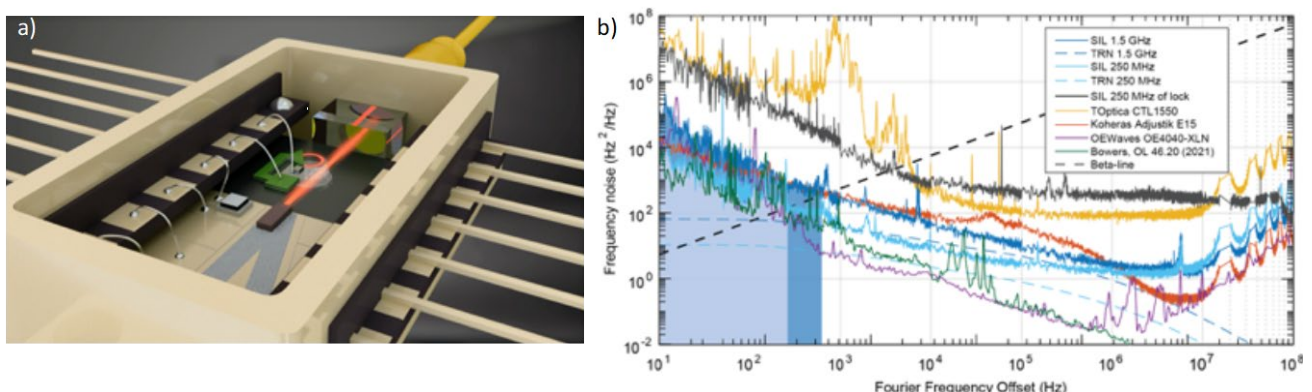


Figure 1: Schematic of the architecture and packaging of a photonic integrated laser. b) Frequency noise performance of self-injection locked photonic integrated lasers compared with state-of-the-art legacy lasers.