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Photonic classical and quantum architectures for wideband signal sensing and processing

This talk will give an overview of THALES Research &Technology activities related to the generation, processing and sensing of GHz, THz and optical signals using classical and quantum photonic architectures. We will mainly focus on optical frequency combs, since they provide short pulses and/or the ability to transfer frequency and phase noise in between the different frequency domains. We will present original solutions to generate low phase noise signals from GHz to THz frequency ranges [1] [2], how we use of both frequency combs and fast-tunable lasers for high resolution lidar [3] [4] and for signal processing (high speed sampling/digitization, reception and transmission), or communication [5]. Those combs can also help to build agile and RF- and optical frequency referenced laser sources in near infrared or visible region, which are of great interest for quantum sensing applications, such as rare-earth-ion RF spectral analysis [6], RF sensing using Rydberg atoms [7], and quantum processing applications [8]. In this presentation, some of our works related to photonic integration and packaging will also be presented, compatible with integrated micro-rings developed on SiN substrate.

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