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# Photonic Integrated Circuits for functions and systems in THALES

Advances in Photonic Integrated Circuit (PIC) technology support the growing use of photonics and optoelectronics, enabling new possibilities for compact, photonics-based military capabilities. Their potential application in military equipment offers innovative engineering approaches to integrated optoelectronic sensors and communication systems, reducing size, weight, and power consumption.
This presentation provides an overview of current developments at Thales Research and Technology, where the benefits of PIC are schematically threefold. First, recent advances in PIC technologies and heterogeneous integration now enable the integration of active and passive building blocks on the same chip without compromising performance. This is critical for applications such as coherent sensing (LiDAR, distributed acoustic sensing [1]) that require both compactness and resilience in harsh environments, as well as high-performance photonic building blocks. Then, high-performance PICs are a key technical solution for compactifying high-complexity photonic front-ends for positioning, navigation, and timing (PNT), cold atoms [2], and quantum systems [3], which is a prerequisite for out-of-the-lab deployment of these technologies. Finally, PIC also enables new functionalities, for instance, in domains such as integrated RF photonic systems and optical communications [4].

## References

[1] Dandé, G., et al., Optics Express 33 (2025), 17192-17202
[2] H. Snijders, et al., Applied Physics Letters, 127 (2025)
[3] Welinski et al., Optics Express, 32 (2024), 20992-21006
[4] Billault et al., Optics Express, 29 (2021), 33134-33143

## Figures

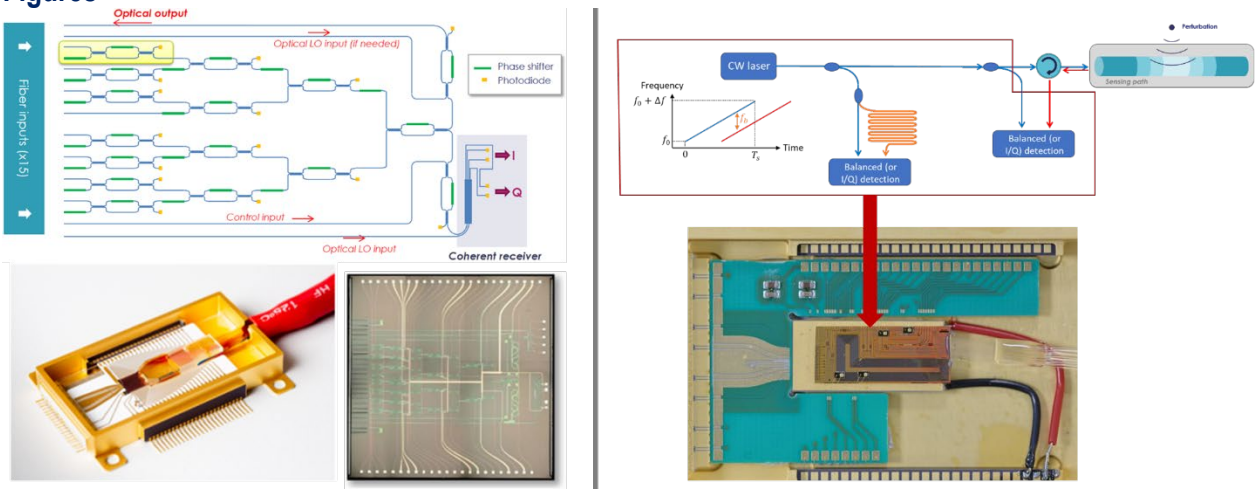


**Figure 1:** Left: Silicon photonic chip for free-space optical communication multimode receiver for atmospheric turbulence mitigation. Right: Fully integrated FMCW engine for distribruted acoustic fiber sensing, with InP coupons transfer-printed on low-loss SiN carrier.