

A review on security and technology research activities for terrestrial and space applications

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In this presentation we will focus on the capabilities of our group in applying both theoretical research and empirical technologies to solve specific needs in different industrial sectors. These technologies can be applied to a broad range of areas, e.g. communication, sensing, metrology, automotive, textile or maritime and either for space or for terrestrial domains.

First we will talk about photonic integration. Photonic integration is emerging as a new standard for providing cost effective and high-performance miniaturized and optical systems for a wide range of applications. The possibility of integrating complex and advanced photonic functionality into a single chip enables system designers and manufacturers to unite various optical devices into a single package, thereby offering significant enhancements in energy consumption, system size, costs and reliability. We will show the use of Integrated Photonics design/fabrication/characterization applied to optical communications (microwave/RF, FTTH, datacom), sensing and quantum technologies (communication CV-QKD and computation).

Concerning the space domain we will show our expertise developing complete space systems based on small satellites including all the lifecycle of the space mission. All of our internal engineering and management processes are based on the ECSS standards philosophy properly tailored. This allows us to achieve high quality and reliable results in our projects and to successfully design, manufacture, assembly, integrate, test and operate 3 Cubesats in recent years and to prepare for launching four new satellites in forecoming years.

Finally, we will show our strong expertise in the field of quantum cryptography in discrete variable quantum key distribution systems being recognized as international experts in the analysis of the security of these systems. We have also collaborated in several projects with several experimental groups, which has allowed know first-hand the problems associated with implementations of QKD systems.