EMPLOYMENT PORTAL SECTION	PHD STUDENT
Title of post	Study of new detector types in the SWIR (Short Wave InfraRed): extension of the operating band beyond 1.7 µm
General information	CIFRE PhD Grant from THALES Group, in partnership with LAM
Description the thesis subject	In imaging, both in the scientific and military fields, only certain specific optical spectral bands are used. Historically, their exploitation is linked to the availability of detectors and / or sources or to the transmission of atmosphere. Since about thirty years, the band Infrared (3-5µm) is used, this band allowing at the same time to exploit the emissivity of the bodies and the photons coming from the day sun. For a little more than a decade, SWIR detectors (1 to 1.7µm) have been developed in France by THALES. This band provides capabilities to observe lasers, offers high reflectivity objects and offers very different contrasts depending on the moisture content of the targets observed. It allows high resolution and high image quality. In this thesis, we will focus on the extension of the SWIR band beyond 1.7µm. In astronomy, the advent of ELTs requires the construction of large focal planes and simultaneously sees new applications appear for infrared sensors (for example for wavefront sensors). The availability of detectors in the 1-2.5µm band at scientific level and reasonable cost-per-pixel performance is changing the paradigm of detection. One possible way is the development of high-performance III-V semiconductor systems that have comparatively lower production costs than the II-VI (HgCdTe) systems and less stringent implementation constraints, particularly in terms of cooling. However, scientific level sensors are currently limited mainly to the 0.9-1.7µm band and the extension of this range to 2.5µm or more is a key element for the use of these detectors for ground-based or space scientific applications. The study of this band, ranging between 1.5µm and 3µm, is a major issue both civilian and military for the development of new features in imaging. This thesis includes several tasks: - The study of the materials and their structure to realize the transducer, it will be done in collaboration with the III-V Lab (THALES-NOKIA), - The definition and simulation of the physical characteristics of the chosen material, we will focus in particular to define the cutoff limit of the detection function. This cut-off length will be validated by a set of simulations and measurements according to the chosen applications, - The characterizations of the components (realized within the LAM) - The implementation of the detector realized This thesis is at the intersection of several scientific fields: the study of semiconductor materials, crystallography, electronics, characterization, measurement and simulation. This thesis is positioned in a very competitive international context.
Work context	The thesis will take place at the Laboratory of Astrophysics of Marseille (LAM). Frequent travel will be expected at THALES and III-V Lab (Paris).
Constraints and risks	Part of the work will be pursued in a Restricted Access Zone (ZRR) @ LAM
Supplementary information	This thesis is part of the activities of the Joint Laboratory "Optical Systems and Embedded Instrumentation" between the LAM and the THALES group.