



Institut Supérieur de l'Aéronautique et de l'Espace

## RESEARCH MASTER INTERNSHIP

Department of Electronics, Optoelectronics and Signals

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### INTERNSHIP DESCRIPTION

Domain : High Frequency Electronics

Title : **CMOS SUBMILLIMETRIC DETECTION FOR 2D IMAGING**

The use of submillimetric wavelength radiations for imaging is currently a subject of growing interest for many application domains (biological research, medical diagnosis, security, etc...). Development of detectors able to be assembled into imaging arrays is though an important issue to be investigated. A recent demonstration by a German team proved that the implementation of a CMOS focal plane array operating in a non coherent detection mode at 600GHz is now possible, opening the way to the use of large diffusion technologies for implementing imaging arrays in the submillimetric domain.

The goal of the internship is to evaluate the feasibility of submillimetric detectors using advanced CMOS process. In a first step, in-depth study of elementary detection architecture (pixel) should be performed, having in mind a later assembly of such pixel to form an array.

Two points are to be examined:

-the feasibility of the antenna associated with each pixel taking into account the possibilities and limitations of the existing advanced CMOS process regarding the available metal levels and dielectrics.

-the evaluation and the choice of the detection principle considering the properties of active elements available in the processes and architectures that can effectively be implemented in a pixel. Both points will be considered on bibliographic aspects, analytical calculations and simulations using the tools suited to the targeted frequency domain and considering the processes being potential candidates for the implementation.

Methods: analytical calculation and simulation of pixel antenna (electromagnetic simulation) and detection circuits (analog simulation). Preliminary layout of pixel elements (Cadence Virtuoso)

30 % Theoretical Research

40 % Applied Research

30 % Experimental Research

Possibility to go on a Ph.D.:

Yes

No

### APPLICANT PROFILE

Knowledge and required level:

Master level in High Frequency Electronics and Micro-Electronics  
Knowledge in antennas and CMOS circuits required