



POST-DOCTORAL POSITION

Electronic, Optronics and Signal department (DEOS)
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Area of study : Microelectronics design, integrated image sensors

Title : **ELECTRICAL CHARACTERIZATIONS AND MODELLING OF SEMICONDUCTOR DEVICES AT CRYOGENIC TEMPERATURES FOR IMAGE SENSORS DESIGN**

For many scientific applications, especially in the space field, such as astronomy, it is required to reduce the temperature of CMOS monolithic image sensors in order to improve some performances, including the dark current and noise. This leads to the use of these devices at low temperatures or even cryogenic temperatures (as is the case for the best CCD sensors). This motivation to reduce the dark signal and associated noise also applies to hybridized image sensors on type II-VI and III-V semiconductor materials as photodetectors, which mostly leads to the operation of the associated CMOS reading circuit (ROIC) at cryogenic temperature.

Cryogenic temperature CMOS devices operation impacts some semiconductor mechanisms and parameters. In addition to the exploration of changes in these mechanisms, electrical models must be done, on the basis of characterizations to be carried out, required for imagers or microelectronic readout circuit designs. Indeed, only several technologies have electric models at these low temperatures, and more on parameters such as noise.

MISSION

As a part of the ISAE-Supaero CIMI research team, the main tasks of the candidate, in addition to understand and analyze the low temperature mechanisms in semiconductors, are to:

- Perform characterizations of basic semiconductor devices (MOS transistors, etc.) at cryogenic or deep cryogenic temperatures. The measurements to be carried out are I-V and noise measurements including low frequency noise.
- Develop and optimize low temperature characterization setup and associated characterization methodologies.
- Improve and optimize the extraction methodology for electrical models of basic semiconductor devices (MOS transistors, etc.) developed within the CIMI research team.

CANDIDAT'S PROFILE

The candidate must have a strong knowledge and skills in the following fields: semiconductor physics, electronics and micro/nanoelectronics. The candidate will have to be familiar with semiconductor characterization devices. Knowledge of microelectronic design and simulation tools (CADENCE Virtuoso, Spectre or others) would be highly appreciated.

Good autonomy, work in a small team, for organization and communication skills are essentials.

Candidates should send a resume (cover letter, CV and a publication list and/or their PhD) via email to: philippe.martin-gonthier@isae.fr