

# MASTER'S THESIS INTERNSHIP OFFER

## DESCRIPTION

- › **Title :** *Potentialities of agile X-band radiating surfaces*
- › **Hosting organization:** University of Limoges - Xlim Research Institute
- › **Lab:** Xlim
- › **Research Team:** Antennas and Signals
- › **Scientific pole:** RF Systems
- › **Starting date (month/date):** 27 février 2023

› **Short description of the internship offer (up to 5 sentences):**

The objective of this internship is to study the potentialities of a pixel antenna for X band applications (8-12 GHz) with consideration of technological constraints. The array antenna built with pixels are called "surface antenna" because the pixels are joined together. These surfaces are particularly interesting civil, space and military applications. Previous works have already shown very interesting results in L and S bands as it allows high steering angle on a wide bandwidth with few elements in comparison with the state of the art.

› **Objectives (up to 5 sentences):**

The general objective to be achieved during the thesis (which will follow the internship) is the development of a surface antenna with agile beam ability in one direction on a wide bandwidth (at least the X band). The challenges are linked on the one hand to the miniaturization of the structure and on the other hand to the material to use.

› **Description of the internship offer:**

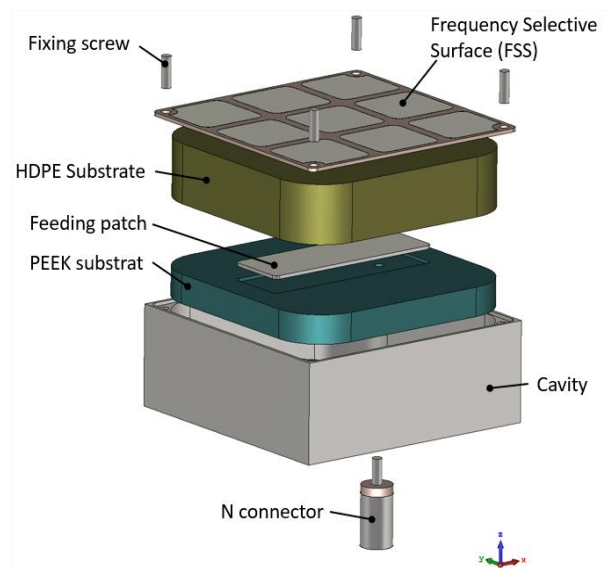
Whether for defense or telecommunications applications, the need for broadband antennas capable of achieving high angular steering, for up to  $\pm 60^\circ$  and higher, is increasing. These antennas must achieve those performances while maintaining



relatively low side-lobes levels (SLLs). The antennas must also have a large half-power beam-width (HPBW) to allow a good gain to be maintained during steering. One of the structures that combines both wide band with high HPBW is the Agile Radiating Matrix Antenna (ARMA) which has been developed in the laboratory for about ten years. These antennas are composed of several joined elements called pixels which are low-profile and high gain and give to the matrix its characteristics.

Following a learning phase on the numerical tools used in this context (CST microwave studio) the candidate will be able to design a pixel and make the choice of the feeding probe and the dielectrics in order to ensure a good behavior in the X-band. This first phase will continue by studying the antenna array by evaluating its performance (agility, coupling, bandwidth) and adapting it to the constraints of realization. Finally, a prototype will be realized and its performances will be compared to the literature.

› **Photo (optional)**



Design example of a pixel

› **Description of the research team:**

The thesis will be carried out within the antennas and signals team of the Xlim laboratory and supervised by E. Martinod and J. Andrieu. The Antennas & Signals team conducts research on new architectures and technological solutions to address the advanced functionalities of antenna systems (agility, efficiency, ...), in the fields of telecommunications, radar and space.

**SKILLS**



› **Expected skills of the applicant:**

Knowledge of the basic notions concerning radio frequencies (S parameters, basic antenna concept). Knowledge of electromagnetic simulation software (CST or HFSS). Autonomous, curious and dynamic. The applicant must be of European Union nationality.

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## PHD THESIS OPPORTUNITIES

› **PhD thesis opportunity after the Master course:**

Yes       No

› **If yes, financing already obtained:**

Yes       No

› **If yes, what kind of funds:** Cliquez ou appuyez ici pour entrer du texte.

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## CONTACT & APPLICATION

› **Surname and first name of the internship supervisor(s):**

Edson Martinod – Joël Andrieu

› **Email of the supervisor(s):** [edson.martinod@xlim.fr](mailto:edson.martinod@xlim.fr) – [joel.andrieu@xlim.fr](mailto:joel.andrieu@xlim.fr)

› **Phone number of the supervisor(s):** Cliquez ou appuyez ici pour entrer du texte.

› **The application shall be sent to the email:** [edson.martinod@xlim.fr](mailto:edson.martinod@xlim.fr) – [joel.andrieu@xlim.fr](mailto:joel.andrieu@xlim.fr)

› **Closing date for applications:** 31 décembre 2022

