

PhD Offer

Ultra-Fast Reconfigurable Antenna Arrays For Telecom and Airborne Applications

- **Key words**

Reconfigurable antennas arrays, phased arrays, reflectarrays, real-time reconfiguration.

- **Context and overview of the problem**

Next-generation communication / security / surveillance / sensing systems for civilian, defense space or airborne applications will require real-time ultra-fast self-reconfigurable operations to efficiently optimize their performances (data rate, quality of service, resolution, etc.). In particular, reconfigurable antenna arrays (which present the capability to modify working frequency, bandwidth and/or radiation pattern) are becoming a key challenge for the next ten years. They are often based on semiconductors, MEMS or tunable materials. These methods suffer from limited switching time and interactions between the RF and DC bias signals. On the opposite, optical reconfiguration enables to separate steering and microwave (MW) signals, increasing the complexity of the antenna architecture but decreasing the design constraints on the MW parts and their integration. Different solutions have been developed based on organic materials to fabricate phototransistors or photoswitches, or inorganic ones such as Vanadium dioxide (VO₂). VO₂ offers an extremely promising and emerging new technology to fabricate ultra-fast switches (sub-nanosecond) with high-isolation over a very broad frequency band, and high contrast between the on/off states.

The proposed PhD thesis will be carried out in the frame of a collaborative research project between the IETR laboratory (www.ietr.fr) and TE-OX (<http://www.te-ox.com/>), funded by the French Research and Technology National Association (ANRT, www.anrt.asso.fr), through a CIFRE agreement.

- **Description of work**

The aim of this PhD project is to design, optimize, prototype and characterize ultra-fast (sub-nanosecond) reconfigurable phased array antenna and advanced reflectarray using VO₂ ultra-fast switches. The thesis is organized into three main steps:

- Detailed bibliography study on reconfigurable phased arrays and reflectarray antennas,
- Numerical and experimental study of a reconfigurable phased array antenna using VO₂ switches,
- Numerical and experimental study of an advanced optically reconfigurable reflectarray using VO₂ switches.

- **Candidate profile**

The PhD candidate should hold a Master degree in electrical engineering (microwaves) or an equivalent title. In particular, he/she should master electromagnetic theory, microwave theory, antennas and circuit analysis. A good level of spoken and written English is required.

- **How to apply?**

Motivated candidate should send by email 1) a detailed CV, 2) a motivation letter, 3) a recommendation letter and 4) marks obtained over the last 3 years, to Erwan FOURN (erwan.fourn@insa-rennes.fr), to Ronan SAULEAU (Ronan.Sauleau@univ-rennes1.fr), and Guy GARRY (guy.garry@te-ox.com).

Deadline to apply: as soon as possible (but before Sept. 15, 2018)