Postdoctoral position: Development of a fast and powerful pulsed power generator for pulsed electric field applications

From December 17, 2019 to January 16, 2020

Context

In the framework of the E2S UPPA project, CEA and UPPA have decided to join forces to set up a partnership junior chair around new topologies of solid state for pulsed power.

Related to the International Chair PULPA (the acronym stands for PULsed Power Applications), awarded to Professor Bucur NOVAC from Loughborough University (UK), the SIAME laboratory of the ‘Université de Pau et des Pays de l’Adour’ is offering a Post-Doctoral Award for a duration of 24 months.

The successful candidate will live at Pau but will also have to perform regular visits to various research centers situated in France (mainland) and in the UK, in order to participate at common scientific experiments. The suggested research subject will be related to the development of a very fast Pulsed Power Generator (PPG), to be used not only as driving power source for two different pulsed electric field (PEF) techniques as a novel way to non-invasively treat cancer using reversible electroporation but also for various defense related applications.

In the medical and food industry domains there are already implemented techniques that are using PEFs. However, the novel techniques to be investigated, will use non-invasive methods that requires an extremely fast PPG, having a voltage output of the order of a few hundreds of kVs with a rise time of the order of a few hundreds of picoseconds.

There will be very important academic partners that will be related to this project: the ‘UMR Vectorologie et thérapeutiques anti-cancéreuses (VTA)’ of CNRS, the ‘Université Paris-Sud à Gustave Roussy à Villejuif’, Paris, the ‘Institut de recherche XLIM de l’Université de Limoges’, the Plasma and Pulsed Power Group of Loughborough University (P3G LU) UK, as well as CEA Gramat for defence applications.

Position and assignments

Both the SIAME laboratory and the P3G LU have a long history of developing very powerful and fast PPGs based both on Marx and Tesla transformer technologies (see photo).
The successful candidate will be required to perform a literature search on various possibilities to build the PPG and then to design a generator with the proper amplitude of voltage output, pulse rise time and repetition frequency. Both an electrical analysis based on a circuit solver and a complete electromagnetic simulation of the possible system will be required, before a conclusion will be drawn on the system’s design in terms of structural complexity, manufacturing costs and performance.

The final objective of this Post-Doctoral contract is to design a powerful fast PPG, to assist in the manufacturing process, to test the PPG and finally to help in the novel PEF technique development, when the PPG will be attached to various loads.

**Hosting laboratory: SIAME**

This Post-Doc position will be hosted at SIAME laboratory that is a research unit located in Pau and Anglet, France.

SIAME has an extensive and highly competitive research program that encompasses fundamental research in thermal transfer, mechanics and electrical engineering.

This position will be a part of the *High Voltage Processes* team headed by Professor L. Pecastaing. This team works particularly in the field of the physics and technology of pulsed power.

**Localisation address:** SIAME, Université de Pau et des Pays de l’Adour, Pau, Nouvelle-Aquitaine, France

**Starting period:** two months after the announcement of the name of the successful candidate and obtaining the candidate written acceptance

**Duration:** 2 years (full-time)

**Gross salary range:** 34 000 € per year
Funding: This postdoc position is funded by the project E2S UPPA (Energy Environment Solutions) which has a core scientific domain focused on Environment and Energy to meet challenges related to the energy transition, geo-resources, aquatic habitats and the environmental effects of natural and anthropogenic changes.


Requirements

Diploma required: PhD Title or an equivalent foreign Diploma in the domain of electrical engineering (e.g., high-voltage, pulsed power or electromagnetism)

Desirable skills:

* Experience in the domain of pulsed power or high-voltage technology would be highly appreciate.
* Experience with electric circuit solvers and/or electromagnetic software.
* Good fundamental knowledge of electromagnetism.
* The candidate must be capable to perform research without day-by-day guidance and to collaborate with foreign researchers (a good level of English is preferable).
* The candidate must be capable to produce reports and manuscripts to be send for publication to international renowned journals.
* The candidate should also be able to present oral contributions at conferences and present the research in front of sponsors at a general audience level.

Application procedure

For more information and for applying for this position, please contact Professor Laurent Pecastaing by email at laurent.pecastaing@univ-pau.fr

Applications must be sent as a single pdf file and must include:

* a CV (max 2 pages)
* a copy of the candidate's PhD thesis diploma
* a motivation letter describing the applicant’s previous research experience and how it is related to the present position (one, or maximum two pages)
* two reference letters
* contact details of at least two relevant professionals who can provide a reference letter based on request

The application can be written in English.
The application will be evaluated based on the following criteria:

* Appropriate education and work/research in related fields.
* Candidate's motivation, knowledge, scientific maturity and curiosity.
* Emphasis will also be placed on personal skills.

Application deadline

Please submit your application to Laurent Pecastaing: laurent.pecastaing@univ-pau.fr before January 16\textsuperscript{th}, 2020, mentioning [Postdoc] in the subject of your email.