



POST DOC POSITION IN NUMERICAL SIMULATION OF THE PROPAGATION OF SHORT HIGH-VOLTAGE PULSES IN DISPERSIVE COAXIAL LINES

- Recruitment grade: young researcher/post-doc position (i.e. with PhD)
- Location: Pau, France
- Duration: 24 months, starting late September 6th, 2021
- Deadline: April 1st, 2021
- Gross Salary Range: 2848 euros / month

CONTEXT AND AIMS

The Energy and Environment Solutions initiative (E2S UPPA) invites candidates to apply for a post-doc position to work on a research program in partnership with the CEA. These are part of a substantial, multi-year growth plan (<https://e2s-uppa.eu/en/index.html>). Problem-oriented, inter-disciplinary and transverse research in Energy and Environment is pursued, and emphasis on either industry relevance or high visibility in leading academic journals is fostered.

UPPA is a leading research and teaching university, one of the top 20 in France, located in the beautiful, culturally rich and highly diverse area of the Atlantic Pyrenees. E2S UPPA is the completion of established collaborations between the main national research centers, i.e. the INRAE, INRIA, CNRS, CEA and BRGM. These host several laboratories engaged in research in the core areas of Energy and Environment.

In the framework of the E2S UPPA project, CEA and UPPA have decided to join forces to set up a research program around new solid-state topologies for pulsed power called High Voltage Solid Switch (HiVoSS) within the common laboratory SAGE. One of the subjects included in the project will be to work on a new design of high voltage transport lines combined with a solid-state breaker for a e-beam accelerator for a x-ray flash radiographic application. High power generators dedicated to future multi-pulse radiographic machines are designed to deliver successive high-voltage pulses within a short delay (in the microsecond range). It has been demonstrated, over the past few years, that is quite easy to achieve high quality requirements for the first pulse. However, it is a much more difficult for the following ones because their shape is strongly altered by the multiple bounces (oscillations) due to the previous voltage waves going back and forth between the generator and its load (induction cells).

HOST LAB

The young researcher recruited will be hosted by the SIAME laboratory that is a research unit located in Pau, France. SIAME has got an extensive and highly competitive research program that encompasses fundamental research, particularly in electrical engineering. The post-doc will conduct research in the High Voltage Processes team headed by Professor L. Pecastaing. This team works primarily in the field of pulsed power physics and technology.

More information on the research group is available on the website:

<https://siame.univ-pau.fr/fr/organisation/equipes/equipe-procedes-haute-tension.html>



PARTNER

The French Alternative Energies and Atomic Energy Commission (CEA) is a key player in research, development and innovation in four main areas:

- defence and security,
- low carbon energies (nuclear and renewable energies),
- technological research for industry,
- fundamental research in the physical sciences and life sciences.

Drawing on its widely acknowledged expertise, CEA actively participates in collaborative projects with a large number of academic and industrial partners. More information is available from this website: <http://www.cea.fr/english>

Within the context of this research project, CEA develops, operates and maintains High Pulsed Power (HPP) systems for different applications ranging from a lab-scale simulation of both radiative and non-radiative extreme environments to large accelerator and laser facilities. In order to support this activity, CEA has built over time a strong expertise in electrical engineering that relies on both modelling and experimental approaches.

TASKS AND PROPOSED METHODOLOGY

The x-ray spot quality of a flash radiography machine is linked to the electron beam quality. As a consequence, it leads to the development of high performances pulsed power to produce successive reproducible high-voltage pulses. Two ways could be investigated in order to:

- Temporarily isolate these successive pulses by the design of specific long transport lines from the generator to the induction cells. These lines must be compact, able to transport 500kV pulses without attenuation and distortion and ensure a 2 μ s isolation.
- Attenuate the voltage bounces. This could be made by dispersive lines (loaded coaxial cables) with an attenuation rate in the right high-frequency band so that bounces are minimized but pulses shape (especially rise and fall edges) is not disturbed.

This subject is divided in two stages:

- The first stage will be the study, design and modelling of the first version of the dispersive line in order to reproduce characteristics in numerical simulation with the combination of CST MicroWave Studio and LTSpice solvers.
- The second stage will be to test the first line with experimentations, in order to introduce a future PhD student on the same topic.

FUNDING

This position is funded by CEA and by the project E2S-UPPA.

CONTACT

Head Laboratory: Laurent Pecastaing (SIAME-UPPA) & Michel Caron (CEA)

Project Leader: Larbaig Jean-Marie (SIAME-UPPA)

For additional information, please contact: jeanmarie.larbaig@univ-pau.fr



YOUNG RESEARCHER SKILLS REQUIRED

- Experience in the domain of pulsed power or high-voltage technology would be highly appreciated
- Experience with electric circuit and/or electromagnetic solvers software
- Good fundamental knowledge of electromagnetism
- The candidate must be capable to perform research without day-by-day guidance, to collaborate with foreign researchers (a good level of English is preferable) and to be able to make new proposals.
- 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.

SALARY

The salary of the successful candidate will be based on level chart for teaching and research personnel in the salary system of French universities. The salary will be 2848 euros/month (gross salary).

APPLICATIONS AND DEADLINE

Please submit your application by email to jeanmarie.larbaig@univ-pau.fr. Please attach the following documents as a single pdf file:

- A detailed CV
- A cover letter
- Contact details of at least two people, from your work environment, who can be contacted for further reference
- 1 significant publication

The deadline for submitting the application is May 2, 2021.