

Who are we ?

Founded in 1885, Junia trains tomorrow's engineers to meet the great challenges of a world in transition. It has 7 preparatory cycles, 3 engineering degrees -HEI ISA ISEN-, research activities and business services. Located in Lille, Châteauroux and Bordeaux, Junia has more than 5,000 students (including 530 apprentices), 430 employees and 25,200 engineers worldwide, through the JUNIA Alumni network. JUNIA is part of the Catholic University of Lille.

What characterizes us: Versatility of missions, close contact with students, applied and transdisciplinary research, strong proximity to companies and involvement in educational innovation.

Junia is recruiting a PhD student in Electrical Engineering, attached to the L2EP laboratory in Lille (EA 2697 – RESEAUX team), who will bring his expertise on a project related to public electricity transmission and distribution networks. He/She will participate in several of the major stages of this project, in collaboration with the thesis supervision team composed of researchers in the field of electrical networks and engineers from the French transmission system operator (TSO), RTE, and the distribution system operator (DSO) in the Deux Sèvres department, GEREDIS.

Funding: Fixed-term contract (CDD) for 36 months, with a planned start in January 2025.

Localization: JUNIA School, Smart Control Systems and Energies, Electricity, Smart Grids teams, 2 Rue Norbert Ségard, 59800 Lille (France).

Doctoral School: Arts et Métiers – Sciences and Technologies - Doctoral School 432 "Engineering Sciences".

Supervision team: Dr. Moez Belhaouane (Lecturer-Researcher Junia-L2EP), Dr. Arnaud Davigny (Lecturer-Researcher Junia-L2EP), Prof. Benoit Robyns (Thesis Director – Junia-L2EP), Vincent Barbesant (R&D Study Manager – RTE), Julien Callec (R&D Engineer – RTE), Sébastien Haye (Head of Studies and Program Planning Division – GEREDIS).

Context:

This PhD aims to develop an optimized coordination strategy between the Transmission System Operator (TSO) and the Distribution System Operator (DSO) to facilitate the integration of distributed generation sources (e.g., renewable energy sources (RES), energy storage, and electromobility) while minimizing voltage fluctuation issues (i.e., high and low voltage problems) at the interface between the high-voltage transmission network and the medium-voltage distribution network.. The goal is to develop a stochastic model-based approach to capture uncertainties related to energy production and consumption. The developed stochastic optimization solutions will aim to enhance joint management of voltage control and reactive power over a short-term horizon by leveraging the flexibility resources available in both distribution and transmission networks. The proposed control and optimization techniques will be validated through simulations based on a merged transmission/distribution model using real network data from RTE and GEREDIS. Finally, the thesis will also explore updating medium-

Optimized Coordination at the Interface of Transmission and Distribution Electrical Networks for Voltage Management

and long-term planning methods by integrating flexibility mechanisms and implementing the optimized coordination strategy between the TSO and DSO.

Expected Profile:

Candidates should have a master's degree or Engineering degree in electrical engineering. Preference will be given to candidates with the following skills:

- A strong understanding of transmission and distribution electrical networks, as well as their constraints and management.
- Solid skills in modeling and control of high and medium voltage electrical networks ;.
- Expertise in stochastic modeling and optimization applied to electrical systems;
- Proficiency in the MATLAB/Simulink simulation environment and SimPowerSystem (SPS).
- Familiarity with Digsilent PowerFactory software would be an advantage.

As a PhD is a qualification for research positions, an internship related to research activities would be an advantage. The candidate must be able **to work independently** and manage their workload effectively. Strong **communication skills**, both oral and written, in French and English, are essential.

What are the advantages of pursuing a PhD in Electrical Engineering? :

⇒ <https://www.studyrama.com/formations/diplomes/doctorat-l-excellence-dans-la-recherche-97003#:~:text=En%20effet%2C%20le%20doctorat%20permet,ainsi%20qu'un%20recol%20critique>

How to Apply ?

The application must include:

- A Curriculum vitae (CV).
- A cover letter (**mandatory**, one A4 page)
- Transcripts from your last year of higher education, the course syllabus, and a copy of your degree. Any academic or scientific works—published or unpublished—that you wish to submit for review during the application process.

Send your application to the following address: arnaud.davigny@junia.com

Keywords: Transmission System (TS), Distribution System (DS), TS/DS interface, TSO/DSO coordination, integrated TS/DS model, voltage problem, voltage regulation, reactive power management, multi-time scale optimization, stochastic modeling.