

SERVICE DE METROLOGIE NUCLEAIRE NUCLEAR ENGINEERING

INTERNSHIP

Academic year 2021-2022

*The topics listed below correspond more to **themes** in which master theses can be realized, than to a detailed description of topics. Depending on the interest of the students, more theoretical or instead industry-related topics will be developed. Some of the proposed themes are more convenient for an internship, to be made before the master thesis.*

*The themes proposed are preferably **accessible mainly to students in engineering physics and in electromechanical engineering.***

17. Performance of the SERPENT Monte-Carlo code when applied to a full core geometry of a Small Modular Reactor (in collaboration with Tractebel Engie)

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12-week internship !!!

Tractebel is looking for an intern for our business line Nuclear in the department of Nuclear Processes, more precisely the Nuclear Core & Fuel Studies, to analyse the performance of the SERPENT Monte-Carlo code when applied to a full core geometry of a Small Modular Reactor.

Internship at Tractebel

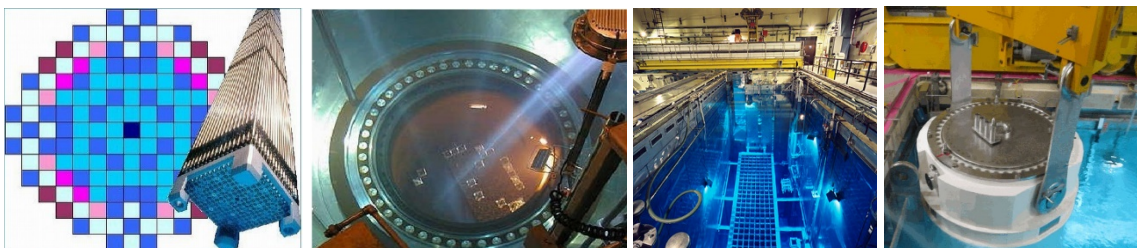
Brussel.

The ENGIE Tractebel offices in Brussel are located next to the North station, making it easy accessible by public transport.

Who is Tractebel?

Tractebel, part of Engie group, had more than 150 years of experience and is one of the world's largest engineering consultancy companies. Tractebel offers his clients multidisciplinary solutions in the fields of energy, nuclear, water and urban. Our teams are responsible for all the phases of a project, from the feasibility studies to implementation.

You will work as intern for the business line Nuclear in the Nuclear Core & Fuel Studies group which is responsible for the fuel management calculations of the Belgian Nuclear Fleet. These calculations span the entire spectrum of nuclear fuel applications, i.e. from the core reload design and the in-core thermal-hydraulics to studies for the spent fuel pools and spent fuel containers. Or as a figure says more than a 1000 words:



In the framework of Tractebel's spent fuel services and operational support, it is important to

characterize the decay heat of a spent fuel assembly with a high degree of certainty. This decay heat is an important parameter to determine the safety margins of the spent fuel pool and the compliance with spent fuel cask's thermal limits. Such decay heat calculations require a large set of codes and tools, together with a validation database. To remain competitive, Tractebel continuously follows the evolutions of different other codes used in the domain, whilst upgrading the existing validation database.

How will your day look like?

We are looking for a motivated intern to evaluate the decay heat of spent fuel coming from Boiling Water Reactors to extend the validation database, and determine the uncertainty on the prediction of the decay heat.

This means that you will use state of the art industrial fuel evolution codes applied to Boiling Water Reactors. Thus:

- You will develop knowledge on boiling water reactor operation and the associated fuel modelling.
- You will develop competences in the use of the SCALE software package, more specifically with the SAS2H, TRITON and/or ORIGEN-S modules.
- You will analyse the predicted decay heat and compare to experimental data from the different facilities such as CLAB.
- You will perform statistical analysis on the ratio between the measured data and the calculated value to determine the code uncertainty.

Who are we looking for?

- You are a studying physics or engineering with a sound basis of nuclear physics and nuclear reactor theory and you wish to get hand-on experience with an internship in an engineering company for at least 6 weeks. ***This subject can also be transformed in a Master Thesis.***
- Knowledge of Linux, Bash, Python, ... is required.
- You are fluent in English and know either Dutch or French
- You are curious and have an initiative mindset
- You appreciate teamwork
- You are well organized and possess a strong team spirit
- You are eligible for a nuclear security permit delivered by FANC as you'll be working with nuclear data.

What do we offer?

- An interesting and varied internship in an international environment, within a young and dynamic team.
- Being able to work in an environment that allows you to strengthen your professional and technical skills
- The opportunity to work in a team of experienced and motivated professionals and to receive appropriate professional guidance

How to apply?

Do you think Tractebel is the perfect fit for your internship?

Send us an e-mail to recruitment@tractebel.engie.com with your CV, motivation and for which project you apply.

We hope to see you soon !