Project name: **Development of an automated sustainable process synthesis and intensification methodology**

Vacancy: ***YES***

Summary:

The design of chemical production processes can be considered as the pinnacle task of a chemical engineer, as it encompasses a very wide range of subjects: material and energy balances, transport phenomena, separation design, heat transfer and management, operability and control design, safety and economic considerations, sustainability aspects… Because of this, process synthesis appears to be an extremely challenging task, often carried out by teams of experienced engineers during substantial time periods.

On top of this complexity, the chemical industry is currently searching for more sustainable pathways to produce chemicals, therefore requiring the reevaluation of pre-established ideas such as production process structures. To that end, several methods have been proposed in literature to use optimization strategies and mathematical modeling to automatically identify intensified processes that integrate tasks and resources minimizing the consumption of energy, utilities and raw materials, thus making production processes more efficient, resilient, and ultimately, more sustainable.

This project will consist in the development and implementation of an automated optimization approach for automatic process synthesis and integration, exploring its capabilities and weaknesses. These tasks will be carried out combining process simulation principles and software (such as Aspen Plus or HYSYS) together with programming and optimization software in a Python environment.

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