PhD Position (2025-2028)

Study of the Impact of Industrial Transition on the Physico-Chemical and Optical Properties of Fine Atmospheric Particles

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https://lpca.univ-littoral.fr/recherche/thematiques/thematique-actes/

The ongoing industrial transition in Dunkirk, marked by the establishment of battery giga-factories and the decarbonization of the steel industry, presents environmental challenges, particularly concerning atmospheric emissions. While these new facilities are considered cleaner, they can still be sources of fine particulate matter. Moreover, the transformation of the territory will lead to changes in emissions from transport (road, rail, and maritime), with a potential increase in non-exhaust emissions.

In this context, this thesis project aims to analyze the impact of these industrial changes on air quality in the Hauts-de-France region. The objective is to assess the influence of the evolution of industrial transition on the composition and mixing state of fine particles during pollution episodes. An essential aspect of the work will be to identify potential sources of fine particle emissions (PM2.5, PM1) using an Aerosol Chemical Speciation Monitor (ACSM), which allows in-situ analysis of the inorganic fraction of non-refractory particles, in combination with filter sampling for qualitative analysis using Scanning Electron Microscopy (SEM) coupled with EDX detectors. The analysis of the collected data will improve pollution forecasting models and provide recommendations for air quality management and the protection of local populations.

The PhD candidate will conduct field measurement campaigns to collect data on the composition and properties of atmospheric particles. They will process and analyze datasets from atmospheric and meteorological measurements. The interaction between industrial emissions and meteorological conditions will be investigated in depth to better understand the mechanisms influencing pollutant dispersion. The obtained results will be disseminated through scientific publications and presentations at specialized conferences, contributing to the advancement of knowledge in the field of air pollution and its environmental impact.

Keywords: aerosols, air quality, ACSM, SEM-EDX

Applications: Preferably before May 2025. Please send a CV and a cover letter.

Salary: ~€2200 gross salary (1750€ net salary).