





PhD GRANTS 2024

PhD project title: Photochemistry of mixed ice surfaces of environmental and planetary interest using a combination of optical and spectrometric methods

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PhD project summary (max. 20 lines):

The environmental balance and the regulatory measures envisaged to support the energy transition are major societal challenges that we need to address. Anthropogenic activities emit contaminants that travel worldwide on large scales and that can now be found even in the most remote locations such as glaciers. Understanding the evolution and future of atmospheric and polar ice cannot be achieved without studying its photochemistry, which can affect both the Earth's atmosphere and ice reactivity.

The proposed experimental PhD thesis aims to study the physico-chemical processes involved in exposing ice systems analogous to atmospheric and polar ice (enriched with pollutants: microplastics, persistent organic pollutants, black carbon) to ultraviolet (UV) radiation. UV radiation, when interacting with ice and snow cover, can potentially stimulate the formation of new chemical species or the chemical degradation of the organic molecules present in the ice matrix, activate the desorption of fragments of molecules to the gas phase, and affect surface morphology. The photolytic fragments thus returned to the gas phase can influence the concentration of greenhouse gases and enrich the Earth's atmosphere with oxygenated organic compounds that can aggregate and in turn serve as condensation nuclei, impacting cloud cover and precipitation. For this study, the candidate will first take part in setting up and optimizing the experimental set-up, then will investigate the evolution of mixed ices of environmental interest using micro-Raman and Fourier transform infrared spectroscopies, as well as, optical microscopy and mass spectrometry.