A NEW METHODOLOGY TO PROBE THE AEROSOL SURFACE

LABORATORY : Institut Lumière Matière
IN COOPERATION WITH : iLM, ONLI-research group

LEVEL : M2
TEAM(S) : ATMOS

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KEYWORD(S) : Nanoparticles / Backscattering / Nonlinear optics

SCIENTIFIC CONTEXT :

As underscored in the latest IPCC report [1], particles in a dilute media are ubiquitous in nature with multitude of impacts on the Earth's climate and public health. Sea-salt particles, silica, titanium oxide particles, and semiconductor particles found in mineral dust are prime examples, existing in the air we breathe. The interaction of these particles with radiation, which govern their ability to warm or cool the Earth's climate, is however far to be completely understood, mainly due to the complexity of these particles, which can be solid or liquid, dielectric or semi-conductors, and present a wide range of sizes, a nonspherical shape and complex refractive indices. The surface of these particles can be highly irregular, sometimes even exhibiting sharp edges. As a result, no analytical solutions to the Maxwell's equations exist for such complex-shaped particles which are difficult to model mathematically while their surfaces are difficult to access to studies [2].

MISSIONS :

The internship targets a better understanding of radiation interaction with condensed matter in dilute mediums, focusing on linear and non-linear physical processes. Current research primarily examines linear processes such as scattering and extinction, leaving out non-linear methods. Recent advancements, like Hyper-Rayleigh scattering, offer precise techniques for studying solid-liquid interfaces. The goal is to combine these linear and non-linear approaches by initiating research collaboration between different groups. The primary objective is to prepare for an experimental proof of concept by comprehending existing experiments and focusing on sea-salt particles. This study aims to characterize the air-water interface using both linear and non-linear techniques on salt samples with varying humidity levels. The internship involves two stages: understanding existing experiments and then focusing on a case study to explore the changes in sea-salt particle shape at different humidity levels and their interaction with the air-water interface.

OUTLOOKS :

Insights on the understanding on the surface of the nanoparticles contained in our atmosphere.

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published on 15/11/2023