

PhD GRANTS 2024

PhD project title: Spectroscopic characterization of stable and unstable atmospheric precursors as well as their micro-solvation in the gas phase.

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PhD project summary (max. 20 lines):

Large quantities of volatile organic compounds (VOCs) are emitted into the atmosphere by natural sources (e.g. terrestrial and marine ecosystems, volcanoes, etc.) and anthropogenic sources (e.g. combustion of fossil materials, industrial activities, etc.). VOCs undergo a series of oxidation and degradation in the atmosphere, disrupting air quality. They are considered precursors of secondary organic aerosols (SOA) and have a direct or indirect impact on human health and also affect the overall energy balance of the planet by scattering or absorbing incoming solar radiation or by acting as cloud condensation nuclei. SOAs represent the greatest source of uncertainty in climate modeling because their composition, formation and evolution remain poorly understood and deserve greater attention. Their effects on the climate are very complex and far from being well known. The first step in the formation of AOS is the process of pre-nucleation by a molecular complex which forms the "critical core" and then, through continuous condensation, grows to a detectable aerosol size. Experimental approaches are becoming a necessity in order to understand the role of VOCs in the formation of aerosols, particularly at the molecular scale. This project combines experimental and theoretical methods via the use of spectrometers and calculation resources present at the PhLAM laboratory. It is based on rotational spectroscopy in the centimeter and millimeter range, with the support of quantum chemical calculations.