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Master's Thesis – Laser Spectroscopy

Working on an exciting laser spectroscopic technique for greenhouse gas measurements above the city of Heidelberg

Background

Within the project **Spectroscopy for Environmental Research**, we operate and continuously improve a Dual Comb Spectrometer, designed to measure greenhouse gas concentration above the city of Heidelberg. A laser beam is sent to a mirror 1.5km away, and the absorption properties of different molecules allow us to infer their concentrations. Urban areas worldwide are major sources of greenhouse gas emissions, and accurate measurements are essential on the path to net-zero in the coming decades. The project is a collaboration of the Kirchhoff Institute for Physics, the Institute of Environmental Physics, and the Max Planck Institute for Nuclear Physics, combining expertise in laser physics and environmental research. We are looking for motivated Master's students who are interested in working with us on the instrumental setup to further improve it with the aim of measuring new relevant gases like O₂ or isotopologues of CO₂.



Work Content

The candidate will build a spectral filter based on diffraction gratings to constrain the laser spectrum to a well-defined wavelength range. This enables performing measurements in different spectral ranges and by this measure new molecular species. For the environmental application, this would be valuable to be able to measure O₂ and differentiate between different isotopologues of CO₂. Depending on the candidate's interest and progress, you can then also evaluate the recorded spectra to assess the instrument's performance in measuring these molecules. All work will happen in close collaboration and supervision with our team.

Prerequisites

A strong interest in working in the lab and developing experimental optical setups is necessary, as well as a full-time commitment to the research project. A background (e.g., attended lectures) in atomic, molecular, and optical physics and possibly environmental physics is preferable.

Contact

For any questions or if you are interested in working on this exciting project, please get in touch with us:

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