

Bachelor's Thesis

How Do Soot Particles from Aviation Interact with Light?

Motivation

Aviation contributes to climate change not only through carbon dioxide emissions but also through the release of airborne particles. Soot particles, in particular, can absorb and scatter solar radiation, thereby influencing the Earth's radiative balance. Their optical properties depend on factors such as particle size, morphology, and chemical composition, and may vary with the fuel used and the combustion conditions. A fundamental understanding of these relationships is therefore essential for characterizing the interaction of combustion-generated particles with light and assessing their potential effects on the Earth's radiative balance.

Project description

The objective of this Bachelor's thesis is to experimentally investigate the optical properties of soot particles formed during the combustion of aviation fuels. For this purpose, the particles will be prepared in an aerosol measurement system and investigated using laser-based diagnostic techniques at different wavelengths.

The focus is on characterizing the optical behavior of the particles, analyzing potential influencing factors, and interpreting the results in relation to their physical and structural properties. The findings are expected to contribute to a better understanding of the interaction between combustion-generated aerosols and electromagnetic radiation.

Tasks

- Literature review on soot particles formed during aviation fuel combustion and aerosol diagnostics
- Generation, dilution, and preparation of suitable particle aerosols
- Experimental investigation of particle optical properties using laser-based diagnostics at different wavelengths
- Processing, analysis, and interpretation of experimental data
- Analysis and discussion of potential factors influencing the optical behavior of the particles
- Scientific interpretation of the results and presentation at the institute seminar

Background knowledge

Students of engineering, physics, chemistry, or related disciplines. An interest in experimental research, aerosol and particle technology, optical measurement techniques, and data analysis is particularly welcome.

Date, location

Starting immediately or by arrangement, Campus South

Contact

Interested in the topic? Feel free to get in touch:

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