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Project Work, Master
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Investigation into Photoionization of Combustion Particles

Abstract

This work focuses on the design of an experimental setup for the photoionization of combustion particles. In this context, photoionization means charging the combustion particles, due to the irradiation with short wavelength light.

The work addresses the question, how a setup for the ionization can be designed. Therefore the theoretical basics needed for the design are described. Thereby it is shown, that the charging process consists of two main mechanisms, the photoionization as well as the diffusion charging.

Based on the results of the literature review, an own setup is designed. Measurements with the setup show, that the developed setup is usable to measure the charge of particles in the femto-ampere range and yields reproducible results. To enable these measurements an appropriate shielding is necessary, as the device is very sensitive to electromagnetic disturbances.

However, the own measurements differ from the expected results of the literature review. It is shown, that the influence of the diffusion charging is predominant which is attributed to the own dimensioning of the setup.

Nevertheless, an efficient particle ionization could be realized, caused by diffusion charging. This allows a reproducible charging of dust particles and has the advantage of being independent of the particle material.

Examiner: Prof. Dr.-Ing. Uwe Meier