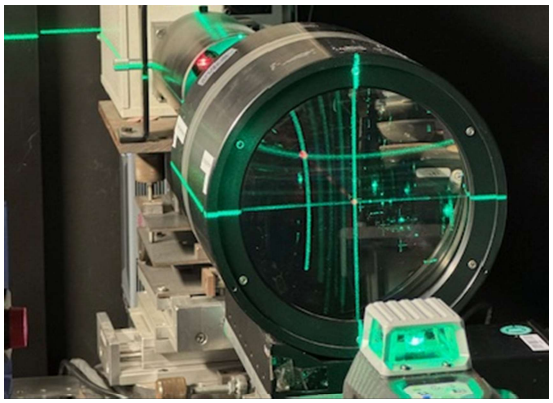
Karlsruher Institut für Technologie

Experimentelle Untersuchung von mehrphasigen Verbrennungssystemen mit laserbasierten Messverfahren

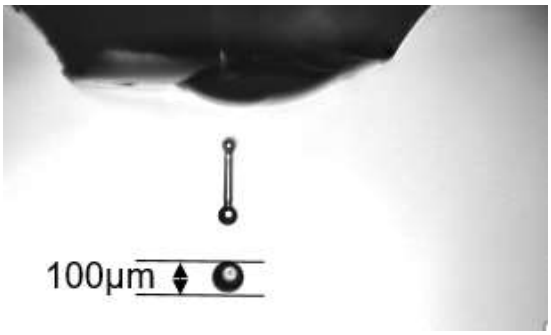
Combustion processes in multiphase systems are becoming increasingly important in today's technical applications (e.g., aircraft turbines, renewable energy). However, compared to pure gas-phase combustion, there are only a few detailed studies available that could provide a comprehensive data basis for the validation of combustion models. Such data, however, are a crucial aid in making the energy conversion process more flexible, less polluting, and thus more sustainable.

Such data are to be obtained at the ITT by investigating a turbulent, statistically radially symmetric, lean natural gas jet flame into which a chain of fuel droplets is introduced using a droplet generator. Laser-optical measurements of chemical species and temperature at various points in the flame are used to examine the influence of the liquid fuel on different regions of the flame gases.



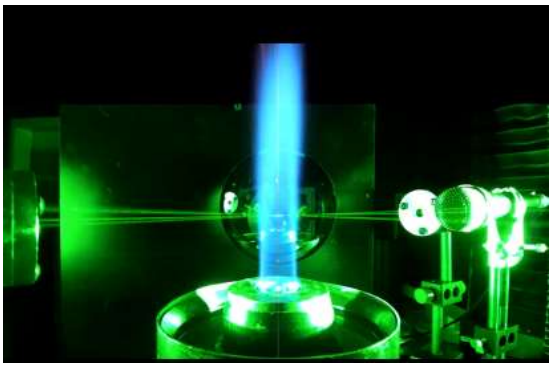
Instrumentation for Raman Measurements

During these laser-based measurements, no droplet may be present directly within the measurement volume, as this could damage the highly sensitive CCD camera being used. Therefore, a light barrier is being developed as a safety device that interrupts the camera exposure within a few nanoseconds in such cases.



Generation of Monodisperse Droplets

As part of a thesis project, Raman measurements are to be conducted in a two-phase flow and the results evaluated. First, the reliability of the developed droplet detection system must be validated to ensure the camera is adequately protected during the Raman measurements.



Determination of the Reliability of Droplet Detection

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