

TWO-DIMENSIONAL MAPPING OF IN-CYLINDER AIR/FUEL RATIOS IN A RAPID COMPRESSION MACHINE

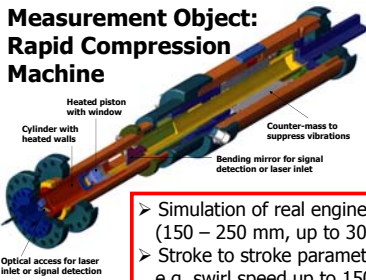
U. Leidenberger, C. Hüttl and D. Brüggemann

LTTT, Bayreuth Engine Research Center (BERC), Universität Bayreuth, 95440 Bayreuth, Germany, www.lttt.uni-bayreuth.de, lttt@uni-bayreuth.de

Objectives:

- Quantitative and time resolved examination of injection
- Development of an effective method to determine local λ -values
- 2-D λ -mapping at variable in-cylinder plains

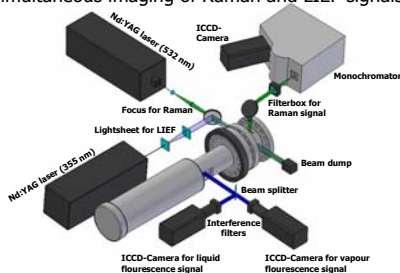
Measurement Object: Rapid Compression Machine



- Simulation of real engine strokes (150 – 250 mm, up to 3000 rpm)
- Stroke to stroke parameter variations, e.g. swirl speed up to 1500 rad/s
- Emission gas recirculation

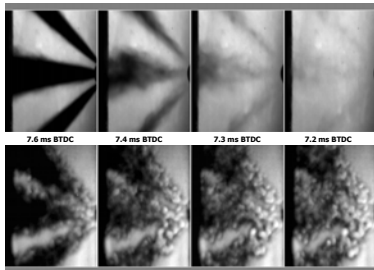
Experimental Setup:

Simultaneous imaging of Raman and LIEF signals



High Speed Imaging:

Shadow images (liquid phase)



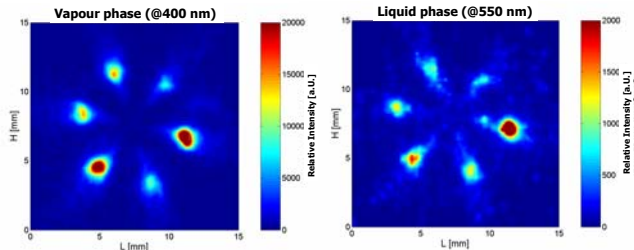
Schlieren images (liquid and vapour phase)

Time resolved visualization:

- Start of injection
- Start of fuel evaporation
- Spray/vapour propagation

Laser Induced Exciplex Fluorescence (single shot images)

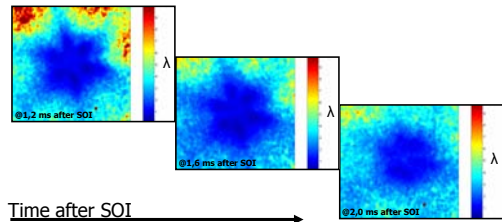
Cross-section images of a diesel fuel direct injection (6-hole-nozzle):



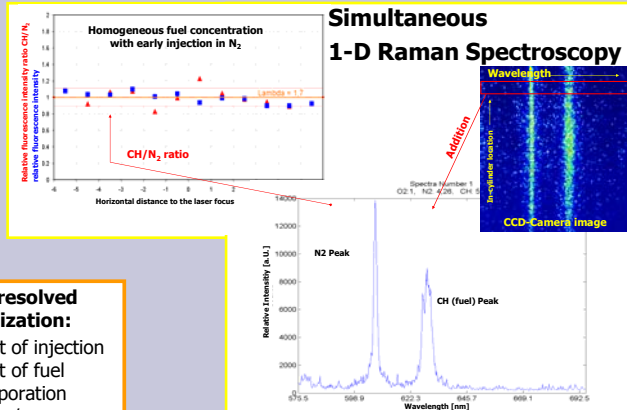
Simultaneous acquisition of liquid and vapour phase:

- Quantitative predictions on evaporation and mixture formation
- 2-D visualization of spray propagation
- Quantification through calibration ($f(p, T, p_{O_2})$)

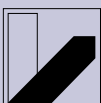
Result: Time Resolved Lambda Mapping



Simultaneous 1-D Raman Spectroscopy



- Quantitative determination of molar concentrations
- ⇒ Verifying LIEF measurements



UNIVERSITÄT
BAYREUTH



LEHRSTUHL FÜR
TECHNISCHE
THERMODYNAMIK UND
TRANSPORTPROZESSE
PROF. DR.-ING. D. BRÜGGE MANN

