LABORATORY TRAINING

PROJECT 691688 - LASIG TWIN
LASER IGNITION - A TWINNING COLLABORATION FOR FRONTIER RESEARCH IN ECO-FRIENDLY FUEL-SAVING COMBUSTION

**SCOPE**

Laboratory Training is planned to be a stay of selected INFLPR scientists abroad at the partner institutions; thus, it will be the projects main "Staff Exchange" event. Each stay will have durations of about one to three weeks so intensive training on the techniques and methodologies that the institutions offer can take place.

## LABORATORY TRAINING 1

**Topic:** OPTICAL MEASUREMENT METHODOLOGIES FOR INDUCED PLASMAS, IGNITION AND COMBUSTION PROCESSES

**Date:** 10-21 October 2016

**Address:** University of Bayreuth, Chair of Engineering Thermodynamics and Transport Processes, Universitätsstraße 30, 95447 Bayreuth, Germany, 95440 Bayreuth, Germany

**Hosts:**

Mark BÄRWINKEL, Mr.
eMail: mark.baerwinkel@uni-bayreuth.de

Prof. Dr.-Ing. Dieter BRÜGGEMANN
eMail: brueggemann@uni-bayreuth.de

**Participants:**

Dr. Nicolaie PAVEL
eMail: nicolaie.pavel@inflpr.ro

Dr. Mihai DINCA
eMail: mihai.dinca@inflpr.ro

Gabriela CROITORU, Mrs.
eMail: gabriela.croitoru@inflpr.ro

The purpose of this laboratory training was to establish, for the INFLPR participants, a basic understanding for the characterization of energy transfer from a passively Q-switched Nd:YAG/$Cr^{4+}$:YAG to plasma induced by breakdown in air. The energy transfer was evaluated temporally (global energy transfer) as well as spatially (local energy transfer). Furthermore, how the plasma formation and developing during and after the laser pulse can be imaged was learn by the team from INFLPR.

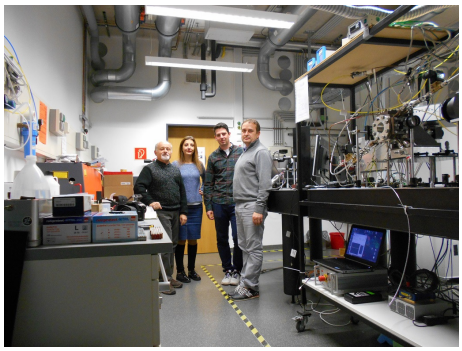
The training was performed with a compact system that was developed at INFLPR for laser ignition. Such a device emitted laser pulses with energy around 3.6 mJ and duration in the 0.9 to 1.2 ns range. Several optical systems, having the focusing lens with a focal length between 11.0 mm and 18.4 mm, were used to focus the laser radiation in a static chamber (property of Bayreuth University).

The energy transfer (global and local transfer) was recorded from vacuum to pressures up to 9 bars in a static chamber. Repetition rate of the laser pulses between 5 Hz and 40 Hz were used.

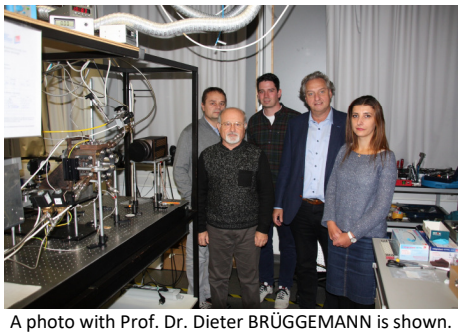
Plasma imaging was done with an ICCD camera (property of Bayreuth University). The repetition rate was 5 Hz and one thousand of images were recorded for each measurement condition. Values of 1 atm and 9 bars were chosen for the pressure in the static chamber, whereas laser pulses with several values of the temporal jitter were considered.

The results of the training are to be evaluated, in near future, by presentation in an international conference or by publishing. On the other hand, such training is expected to increase the capabilities of INFLPR's group with respect to measurement technologies of plasma realization and developing.

The photos show the INFLPR team and the hosts from Bayreuth University in the experimental room.



From left: Mihai Dinca, Gabriela Croitoru, Mark Bärwinkel, Nicolaie Pavel



A photo with Prof. Dr. Dieter BRÜGGEMANN is shown.