

LASER IGNITION SUMMER SCHOOL 2017

19-22 July 2017, Brasov, ROMANIA



LASER IGNITION SUMMER SCHOOL 2017
19-22 JULY 2017, BRASOV, ROMANIA
NATIONAL INSTITUTE FOR LASER, PLASMA and RADIATION PHYSICS, Magurele, ROMANIA





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LASIG-TWIN: A project funded from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No. 691688.



LASER IGNITION - A TWINNING COLLABORATION FOR FRONTIER RESEARCH IN ECO-FRIENDLY FUEL-SAVING COMBUSTION

PROJECT TYPE: H2020 - TWINN - 2015 - Twinning
FINANCING: EUROPEAN UNION, Horizon 2020 Research and Innovation Programme
PROJECT NUMBER: LASIG-TWIN 691688

Project Title: Laser Ignition - A Twinning Collaboration for Frontier Research in Eco-Friendly Fuel-Saving Combustion

Period: 36 months: 01 January 2016 - 31 December 2018

Website: www.lasig-twin.eu

20 July 2017: 9:00-9:30





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PARTNERS

- **INFLPR:** National Institute for Laser, Plasma and Radiation Physics, Magurele, ROMANIA
(<http://www.inflpr.ro/>)
- **UBT:** UNIVERSITY OF BAYREUTH, Bayreuth, GERMANY (<http://www.lttt.uni-bayreuth.de/en/index.html>)
Prof. Dr. Dieter BRÜGGEMANN
- **UL:** THE UNIVERSITY OF LIVERPOOL, Liverpool, UNITED KINGDOM
(<https://www.liverpool.ac.uk/engineering/>)
Prof. Dr. Geoffren DEARDEN
- **CNRS:** CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, Châtenay-Malabry, France
(http://www.em2c.ecp.fr/le_laboratoire_em2c)
Prof. Dr. Laurent ZIMMER
- **IOF:** FRAUNHOFER INSTITUTE FOR APPLIED OPTICS AND PRECISION ENGINEERING, Jena, GERMANY
(<http://www.iof.fraunhofer.de/>)
Dr. Erik BECKERT

MAXIMUM GRANT
AMOUNT:

1.066.112,50 EUR.

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• INFLPR



• UBT



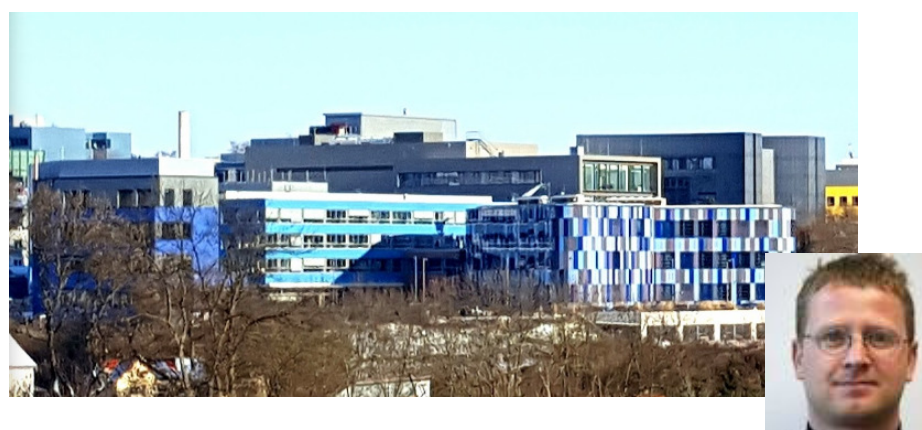
• UL



• CNRS



• IOF



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HOW WE STARTED?

- **2013, 1st Laser Ignition Conference, 23-25 April 2013, Yokohama, Japan**
 - Prof. Geoffrey Dearden, University of Liverpool
 - Prof. Laurent Zimmer, CNRS, France
- **2014, 2nd Laser Ignition Conference, 22-25 April 2014, Yokohama, Japan**
 - Sebastian Lorenz, Bayreuth University
 - Pol Ribes-Pleguezuelo, Fraunhofer IOF, Jena
- **2015: PREPARATIONS**



9:30

5/17 -



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• OBJECTIVES

- To create a **networking collaboration** between the National Institute for Laser, Plasma and Radiation Physics (INFLPR) from Romania and its Laboratory of Solid-State Quantum Electronics (ECS) and four other high renowned institutes from Germany (Bayreuth University, Bayreuth and the Fraunhofer Institute for Applied Optics and Precision Engineering IOF, Jena), the UK (University of Liverpool, Liverpool) and France (CNRS, Laboratoire EM2C, Châtenay-Malabry).
- To provide an **opportunity** for INFLPR and its partners to **increase** their **science excellence** and **visibility, technology innovation capacity** and **industrial exploitation capability** in the **fields** of **laser spark plug** for efficient fossil energy consumption, as well as for understanding scientific aspects like combustion fundamentals and applications.

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HOW? → 7 WORKPACKAGES

● REALIZING TEAMS OF EXCELLENCE

- TEAM 1: Standardization for science to application transfer in laser ignition measurement and characterization (ECS-INFLPR & Bayreuth University)
- TEAM 2: Integration approaches for harsh environmental suitable laser systems (ECS-INFLPR & IOF Jena)
- TEAM 3: Team 3: Frontier applications for laser ignition systems (ECS-INFLPR & Univ. Liverpool & CRIS)

⇒ EACH TEAM: 2 meetings / year.

→ At
for
→ This
by



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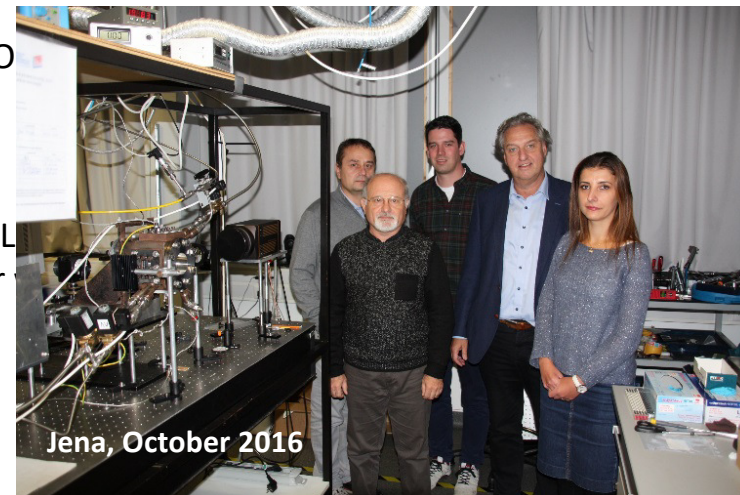


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● TRAINING PROGRAM & LECTURES

- TRAINING 1: **OPTICAL MEASUREMENT METHODOLOGIES FOR INDUCED PLASMAS, IGNITION AND COMBUSTION PROCESSES (BAYREUTH University)**
- TRAINING 2: CAR ENGINES TEST STANDS (Univ. Liverpool, UK)
- TRAINING 3: AERONAUTICAL ENGINES TEST STANDS (CNRS, France)
- TRAINING 4: PACKAGING AND BONDING TECHNOLOGY (IOF Jena, Germany)

→ Learning of the competencies of a partner by scientists from INFLPR scientists at a laboratory of each partner (for a period up to four months)



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● WORKSHOPS

- ▷ WORKSHOP 1: Bucharest, Romania, 29-30 September 2016
- **HISTORY, STATUS AND FUTURE OF LASER IGNITED COMBUSTION**
- ▷ WORKSHOP 2: Bayreuth, Germany, 10-11 November 2016:
- **LASER IGNITION MEASUREMENT and CHARACTERIZATION**
- ▷ WORKSHOP 3: Jena, Germany
- High temperature and harsh environment suitable laser setups and packaging
- ▷ WORKSHOP 4: Liverpool, UK
- Car engine applications of laser ignition
- ▷ WORKSHOP 5: Paris, France
- Aeronautical and rocket engine applications of laser ignition
- ▷ WORKSHOP 6: Bucharest, Romania
- Road-mapping conclusions



Bucharest, September 2016



Bayreuth, November 2016



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- **LASER IGNITION CONFERENCE,**
LIC 2017: 21-23 June 2017, Bucharest, Romania

- **2017: LASER IGNITION SUMMER SCHOOL**
2018: LASER IGNITION SUMMER SCHOOL

- **- B2B MEETINGS**
- STAKEHOLDER ASSEMBLY TALKS
- GENERAL MEDIA

The technological topic addresses the major challenge of mankind to lower the carbon footprint for efficient energy usage: LASIG-TWIN will also have a significant societal impact!



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AGENDA

THURSDAY, 20 JULY

9:30-10:30 **Compact Nanosecond Laser System for the Ignition of Aeronautic Combustion Engine**

FREYSZ Eric, Université de Bordeaux 1, France

10:30-11:00 **Pumping Configurations for Solid-State Lasers**

PAVEL Nicolaie, INFLPR, Magurele, Romania

11:00-11:15 **COFFEE BREAK**

11:15-12:00 **Packaging of Laser Systems for Harsh Environments**

BECKERT Erik, Fraunhofer Institute, IOF, Jena, Germany

12:00-12:45 **Laser Processing from Macro- to Micro- and Nanoscale**

ZAMFIRESCU Marian, INFLPR, Magurele, Romania

12:45-14:00 **LUNCH**

14:00-15:00 **Growth of Laser Crystals and its Influence on the Laser Performance**

KRÄNKEL Christian, Leibniz-Institut für Kristallzüchtung, Berlin, Germany

15:00-16:00 **Laser Materials Processing: Thin Films Deposition and Patterning**

DINESCU Maria, INFLPR, Magurele, Romania

16:00-16:15 **COFFEE BREAK**

16:15-18:00 **POSTER SESSION**

19:00-20:30 **OFFICIAL DINNER**

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AGENDA

FRIDAY, 21 JULY

8:30-9:15 **Application of Optical Measurement Techniques for the Characterization of the Laser Ignition Process**
BÄRWINKEL Mark, Universität Bayreuth, Bayreuth, Germany

9:15 -10:15 **X-ray Tomography/Fluorescence by Synchrotrons and Conventional X-ray Sources. Application for Imaging and Metrology of Automotive Parts**
TISEANU Ion, INFLPR, Magurele, Romania

10:15 -10:30 COFFEE BREAK

10:30 -11:30 **Basic of Crystal Growth from Melt**
VIZMAN Daniel, West University of Timisoara, Timisoara, Romania

11:30 -12:00 **Fs-Laser Inscribed Waveguides in Crystals for Compact and Versatile Lasers**
KRÄNKEL Christian, Leibniz-Institut für Kristallzüchtung, Berlin, Germany

12:00-13:00 LUNCH

13:00 -14:00 **Laser Ignition of a Gasoline Engine Automobile**
PAVEL Nicolaie, INFLPR, Magurele, Romania

14:00-19:00 **SOCIAL PROGRAM**
Visit to "CANIONUL 7 SCARI"

19:30-21:00 DINNER

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SATURDAY, 22 JULY

9:00-10:30 Closing Session
 Handing over the Diplomas of Attendances
 Poster Session Awards

10:30-Speakers and students departure

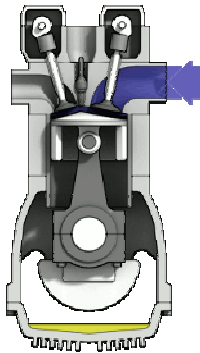
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MOTIVATION FOR LASER IGNITION

1



Ignition induced by
laser of air-fuel mixtures
in internal combustion
engines

— ADVANTAGES —→

- No quenching effects on the developing flame kernel due to the absence of a spark plug electrode
 - The location of the ignition point can be chosen
 - Multiple-point ignition in the same cylinder
 - Combustion of leaner air-fuel mixtures
- ↓
- Better engine performances

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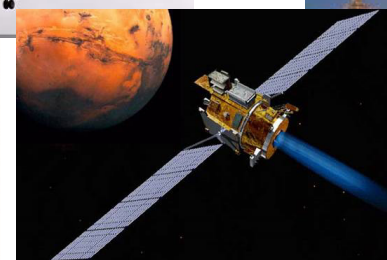


APPLICATIONS

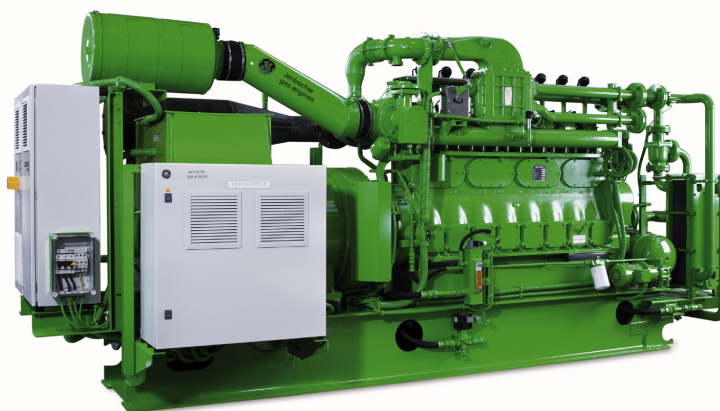
- Automobile industry!



- Aeronautics,
naval transportation,
space/rocket engines,
satellite
maneuvering!



- Energy cogeneration!



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WELCOME TO THIS EVENT!



WE, THE ORGANIZERS HOPE THAT YOU WILL HAVE A GOOD TIME TO THE SCHOOL AND IN BRASOV!



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