EPS YOUNG MINDS WORKSHOP

on

Fusion and Plasma for Energy, Health, and Accelerators

at the

RAD CONFERENCE

TWELFTH INTERNATIONAL CONFERENCE OF RADIATION, NATURAL SCIENCES, MEDICINE, ENGINEERING, TECHNOLOGY AND ECOLOGY

JUNE 17-21, 2024

HUNGUEST HOTEL SUN RESORT, HERCEG NOVI, MONTENEGRO

The event is organized in collaboration with EPS, EPS-TIG, ELI ERIC, INFN, and CA21128 "PROton BOron Nuclear Fusion: from Energy Production to Medical Applications (PROBONO)"

Chairperson: Gordana Lastovicka-Medin, University of Montenegro

Contact email address: gordana.medin@gmail.com

Laser-driven proton-boron fusion

Laser plasma accelerator

PhD project:
New proposal at ELI ERIC

JT60SA tokamak

ITER tokamak

SPARC tokamak

Laser-driven Ion Acceleration

EuPraxia Project

Magnetic Confinement Fusion

Inertial Confinement Fusion

HB11
ENERGY

Plenary Speaker
Gordana Medin
Chairperson

Faculty of Natural Sciences and Mathematics, University of Montenegro

UCG
Univerzitet Crne Gore

Gordana Laštovička-Medin is an internationally oriented, experimental particle physicist with great working experience in large High Energy Physics (HEP) international collaborations, ARGUS, HERA-B, H1 at DESY, and LCFI in Oxford. In 2019, the University of Montenegro appointed her as a leader of the Montenegro RD50 group (at CERN). The CERN RD50 Collaboration was devoted to R&D on Radiation-hard semiconductor devices for very high luminosity colliders. in 2024 she was appointed as a leader of the Montenegro DRD3 group (at CERN) devoted to the R&D on solid state detectors for future colliders. In 2023 Ministry of Science and Technology in Montenegro nominated her to present Montenegro and to be a member of the MC at the Cost Action PROBONO (PROton BOron Nuclear Fusion: from Energy Production to Medical Applications). In 2022 she joined the European Physics Society -European Technology Innovation Group (EPS-TIG). In 2024, she joined Fusion for Energy Group. G. Medin is PI at projects at ELI ERIC (beam awarded through ELI ERIC user calls).

Since 2016, G. Medin is employed as a full professor at the Faculty of Natural Sciences and Mathematics at the University of Montenegro in Montenegro. She is also the founder and Scientific Adviser of the EPS Young Mind Montenegro Association. She was Chair of the 42nd Workshop of RD50 Collaboration in 2023 and chair of the 3rd EPS-TiG event in Montenegro.

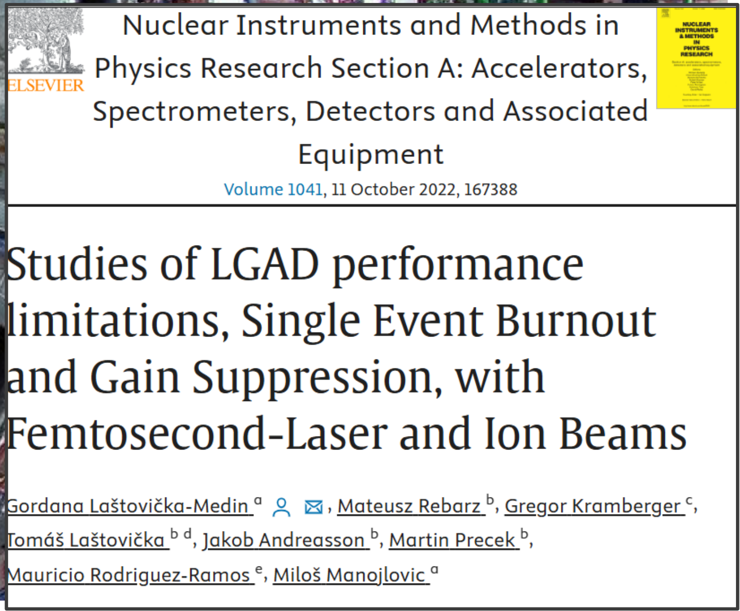
h-index (Scopus): 55
Total citations (Google Schoolar): 9919
Author and co-author on 200 publications with 120 indexed in SCI

Charge-density related effects
In the Si-based detectors with internal gain

Gordana Lastovicka-Medin
University of Montenegro

Abstract

In this contribution, we will present the charge-density phenomena in Low Gain Avalanche diodes such as Single Event Burnout (SEB) and Gain Suppression (GS). Insight into recently discovered ghosts, the most probable originating from the streamer and leader discharging in the micrometer-isolated region between SiO_2 trenches in the inter-pixels area will be discussed too.



Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment

Volume 1041, 11 October 2022, 167388

Studies of LGAD performance limitations, Single Event Burnout and Gain Suppression, with Femtosecond-Laser and Ion Beams

Gordana Laštovička-Medin [a], Mateusz Rebarz [b], Gregor Kramberger [c], Tomáš Laštovička [b d], Jakob Andreasson [b], Martin Precek [b], Mauricio Rodriguez-Ramos [e], Miloš Manojlovic [a]

Plenary Speaker

Jozef Ongena

Royal Military Academy: Brussels, BE
Research Director (Laboratory for Plasma Physics)

Jozef Ongena presently is the Research Director at the Laboratory for Plasma Physics at the Royal Military Academy in Brussels. He received his Ph.D. in Physics from the University of Gent (Belgium) in 1985. With a profound interest in nuclear fusion research, he has led experiments on fusion devices worldwide, including leading roles at the Joint European Torus, the world's largest fusion device. Currently, he leads a collaborative effort with the Max-Planck Institute for Plasma Physics in Greifswald, Germany, focusing on Ion Cyclotron Resonance heating of the Wendelstein 7-X stellarator. He has authored review papers on magnetic fusion research in leading scientific journals. In his capacity as president of the Belgian Physical Society, he installed three EPS Historic Sites in Belgium, emphasizing the important role of Belgian scientists in the advancement of modern physics. He also founded EPS Young Mind sections at several Belgian Universities, fostering the development of young scientific minds. His contributions to the EPS were recognized with the Achievement Award of the European Physical Society in 2016. His innovative work in developing a new heating technique for fusion plasmas using Ion Cyclotron Heating earned him the prestigious Landau-Spitzer Prize jointly awarded by the American Physical Society and the European Physical Society in 2018.

Fusion - an important option for our future energy supply

Jozef Ongena

Abstract

Nuclear fusion research is at the forefront of scientific innovation, offering a transformative solution to the world's energy demands. Unlike nuclear fission, which splits heavy atomic nuclei, fusion merges light nuclei, like hydrogen isotopes, releasing immense energy. This process powers the sun and stars and promises a virtually limitless, clean, and safe energy source.

Fusion reactions produce minimal radioactive waste compared to fission, and the primary fuels—deuterium and tritium—are abundantly available. Moreover, fusion does not emit carbon dioxide, offering a sustainable alternative to fossil fuels.

Achieving controlled nuclear fusion on Earth is complex, requiring extreme temperatures. Prominent methods under investigation include magnetic confinement in tokamaks and stellarators, and inertial confinement using powerful lasers.

Significant progress has been made with devices like the Joint European Torus (JET), which demonstrated record energy production. International projects like ITER in France and JT60-SA in Japan aim to prove the feasibility of large-scale fusion power plants, marking a crucial step toward commercial fusion energy.

Plenary Speaker

Deputy Head of Engineering Unit
ITER Delivery Department

FUSION FOR ENERGY

Alfredo Portone

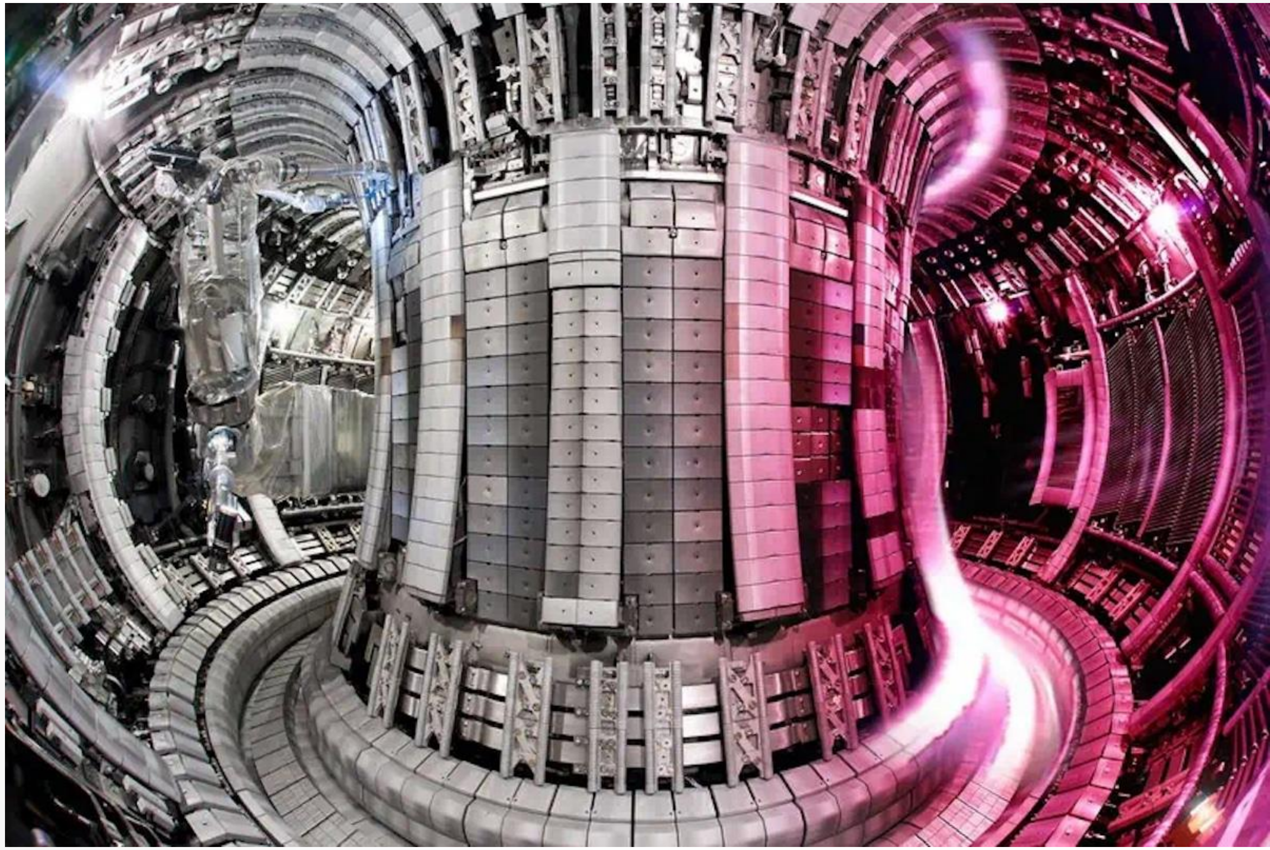
Alfredo Portone received his MSc with Honours in Nuclear Engineering from the University of Bologna in 1987 and in 1994 his Doctor of Philosophy (PhD) in electrical engineering from Imperial College London (UK). Starting in 1989 he has been working for the ITER project, and from 1993 to 2000 he was member of the ITER Joint Central Team in Naka (Japan). From 2000 until 2008 he coordinated R&D activities as Official of the European Commission (DG RTD) in various areas of science and technology (e.g. engineering and control of fusion plasmas, superconducting magnets design, computational models for engineering, etc.) in IPP-Garching (FRG) and Barcelona (Spain). From 2005 to 2011 he served as Project Leader for the design and construction of the European Dipole superconducting magnet test facility (EDIPO). Since March 2008 he joined the ITER European Domestic Agency (Fusion for Energy) in Barcelona as Head of the Engineering Analysis group. On May 2023 he was elected Chair of the EPS Energy Group. Dr Portone is author of over 200 peer reviewed publications in the field of neutronics, plasma engineering and control, superconducting magnet design and operation.

Status of ITER and TOKAMAK FUSION RESEARCH

Alfredo Portone

Abstract.

In this talk, the basic concepts regarding nuclear fusion (e.g. binding energy, power balance, etc.) will be discussed, with particular emphasis on Deuterium-Tritium plasmas. The principles of magnetic confinement will be described and the most successful class of such devices - the tokamak – discussed. The main functioning principles of tokamaks will be presented, with a focus on the largest and most challenging nuclear fusion experiment, the **ITER** tokamak **under construction** in Cadarache (France). An update on its development status will be provided as well as its present challenges. Then the attention will be turned to the present largest tokamak **in operation**, that is the **JT60SA** tokamak, built and operating in Naka (Japan). At last, an update will be provided on the construction of a smaller, high magnetic field and challenging device, the **SPARC** tokamak, **under construction** at Devens, near Boston (USA).



Plenary Speaker

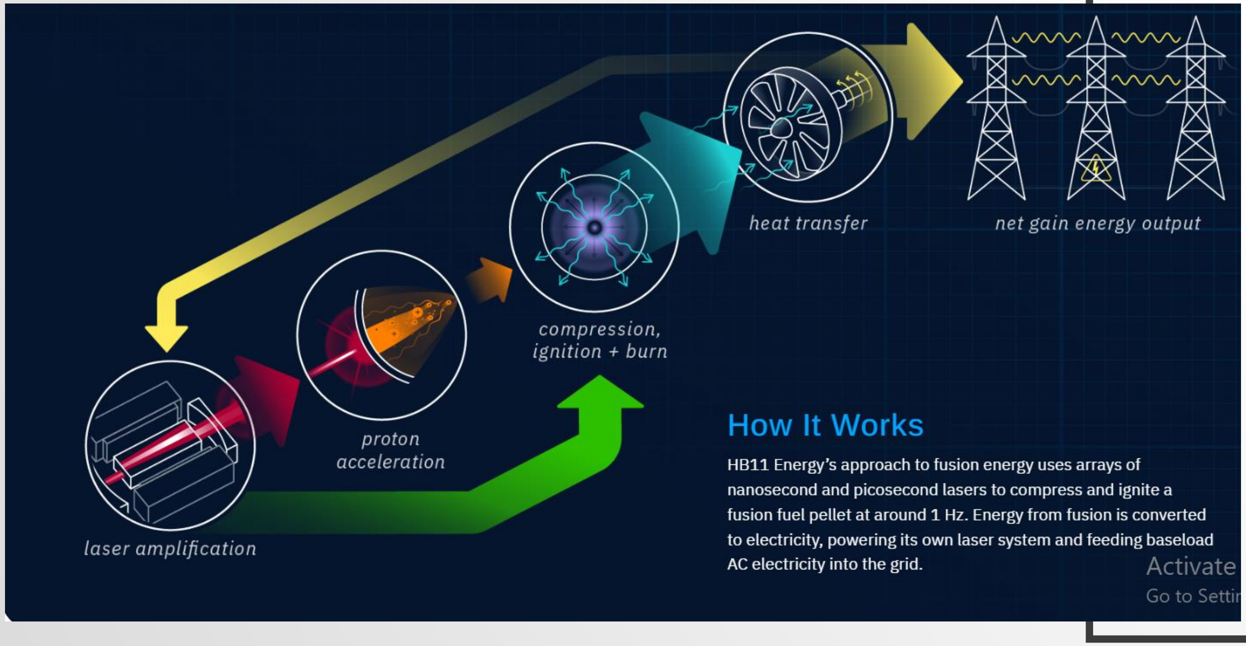
Sergey Pikuz
Head of HB11 R&D

HB11 ENERGY

Dr. Sergey Pikuz leads the R&D team at HB11 Energy. Dr. Pikuz's research background is in experimental high-energy density physics with high-power optical lasers, X-ray free electron lasers, and X-ray plasma diagnostics.

Laser Boron Fusion - HB11 Energy approach to commercial sustainable fusion energy.

Sergey Pikuz
Head of HB11 R&D



How It Works

HB11 Energy's approach to fusion energy uses arrays of nanosecond and picosecond lasers to compress and ignite a fusion fuel pellet at around 1 Hz. Energy from fusion is converted to electricity, powering its own laser system and feeding baseload AC electricity into the grid.

Abstract: This will be shared later.

Plenary Speaker

Massimo Ferrario

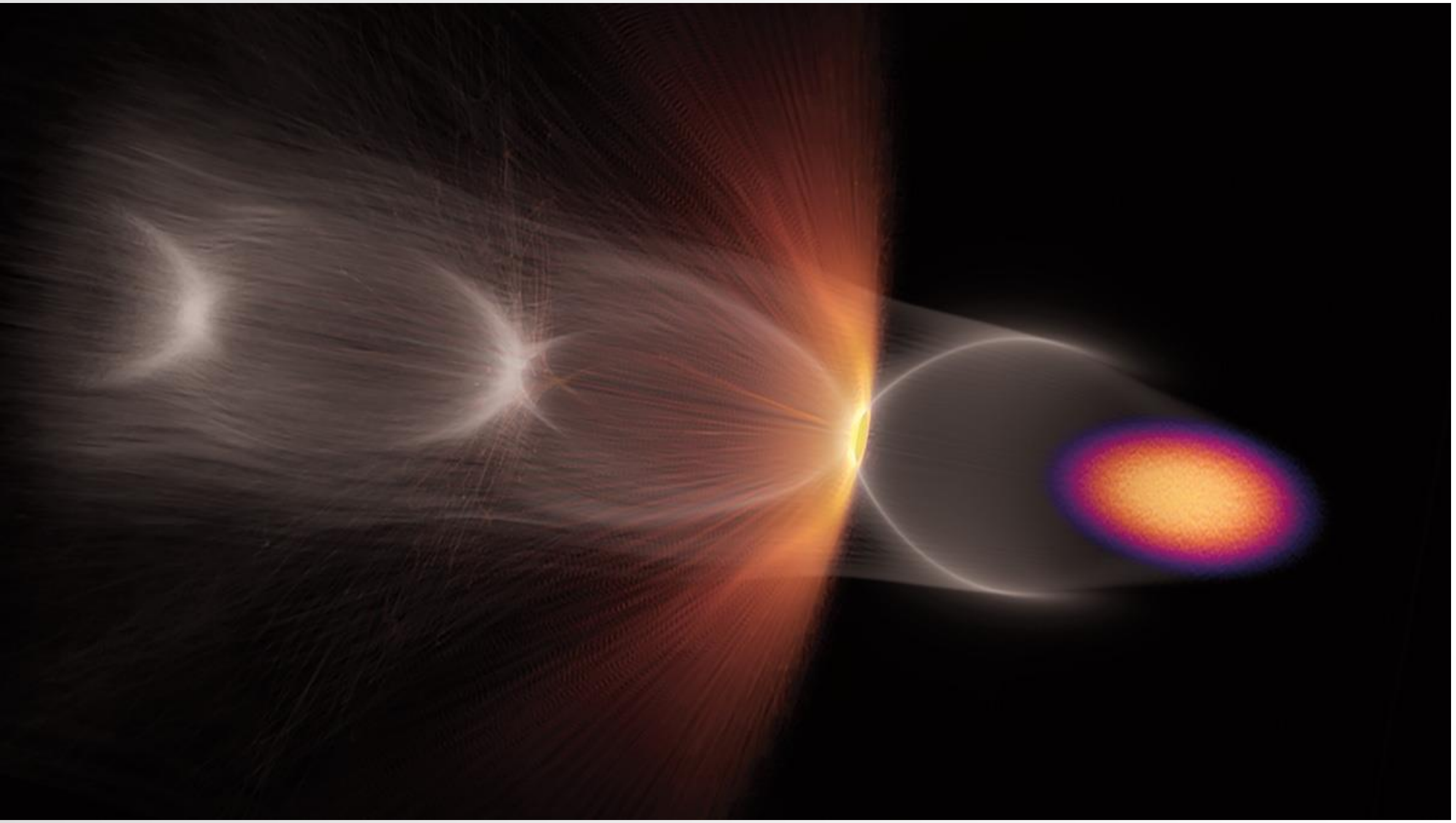
Istituto Nazionale di Fisica Nucleare

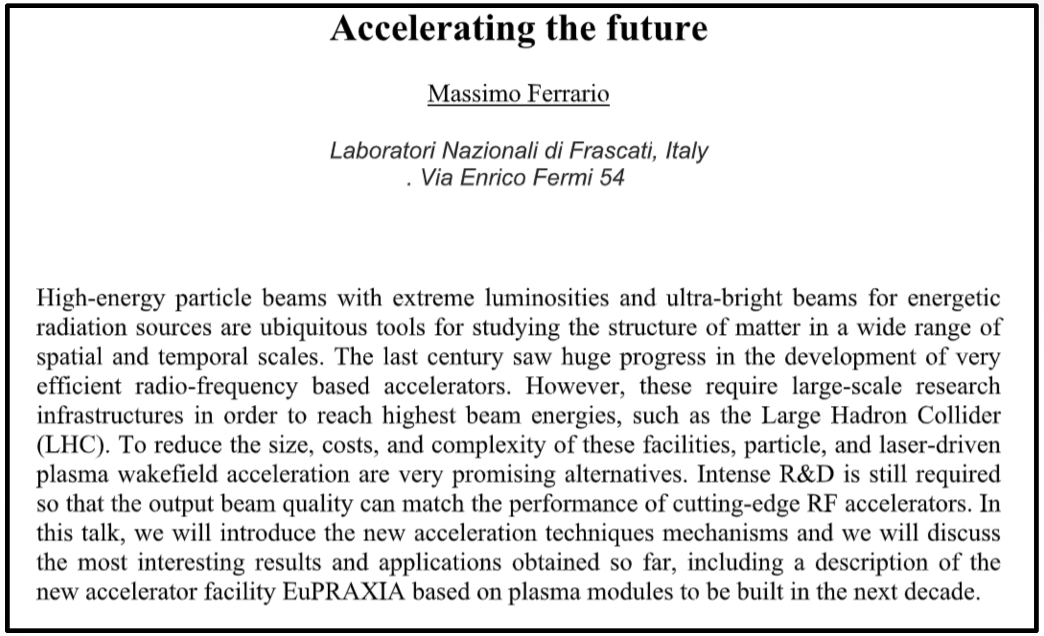
INFN-LNF, leader of the EuPraxia (laser plasma accelerator project) (CERN, INFN, ELI Beamlines)

INFN-LNF

Massimo Ferrario is currently Senior Scientist at INFN, coordinator of the SPARC_LAB facility at the Frascati INFN Laboratories where the first FEL lasing driven by a plasma accelerator has been recently demonstrated. He is also Project Leader of the EuPRAXIA@SPARC_LAB design study which is the plasma beam driven pillar of the EuPRAXIA project. In the last 30 years Massimo has been working in the field of high brightness photoinjectors, free electron lasers and advanced accelerator concepts including plasma accelerators. He is co-chair of the workshops series: "European Advanced Accelerator Concepts" together with Dr. R. Assmann (DESY/INFN) since 2013. He is a member of the CERN Accelerator School (CAS) where he has given several lectures about the Physics of High Brightness Beams and Advanced Accelerator Concepts. He is also currently teaching "High Brightness Beam Physics" at the University of Roma "La Sapienza" for the Accelerator Physics PhD program.

The 2023 Enrico Fermi Prize of the Italian Physical Society (SIF) has been awarded to **Massimo Ferrario**, Lucio Rossi and Frank Zimmermann for their outstanding contributions to accelerator technologies, ranging from plasma acceleration to the realisation of ultra-high energy particle colliders





Accelerating the future

Massimo Ferrario

Laboratori Nazionali di Frascati, Italy
. Via Enrico Fermi 54

High-energy particle beams with extreme luminosities and ultra-bright beams for energetic radiation sources are ubiquitous tools for studying the structure of matter in a wide range of spatial and temporal scales. The last century saw huge progress in the development of very efficient radio-frequency based accelerators. However, these require large-scale research infrastructures in order to reach highest beam energies, such as the Large Hadron Collider (LHC). To reduce the size, costs, and complexity of these facilities, particle, and laser-driven plasma wakefield acceleration are very promising alternatives. Intense R&D is still required so that the output beam quality can match the performance of cutting-edge RF accelerators. In this talk, we will introduce the new acceleration techniques mechanisms and we will discuss the most interesting results and applications obtained so far, including a description of the new accelerator facility EuPRAXIA based on plasma modules to be built in the next decade.

Plenary Speaker

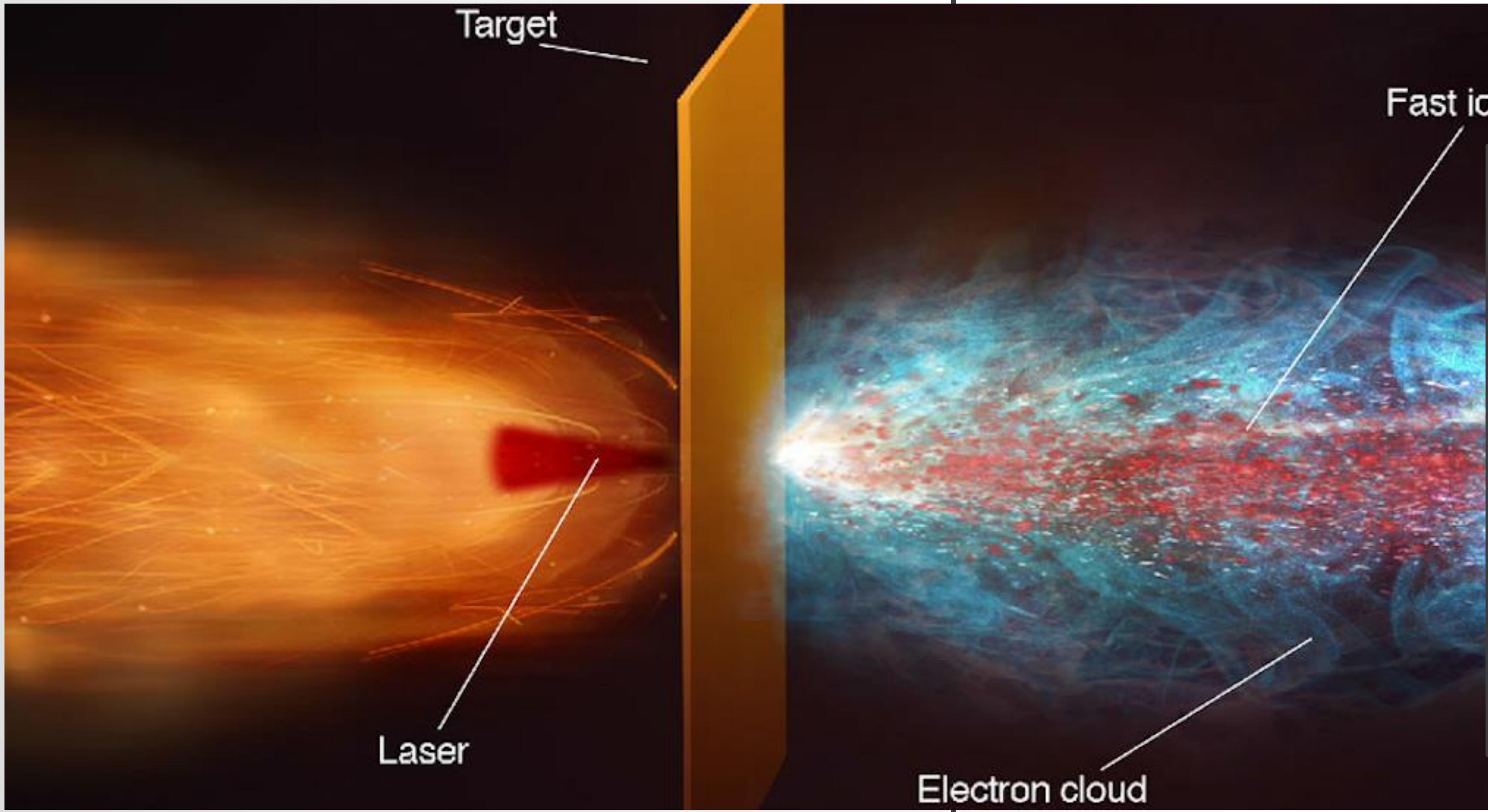
PABLO CIRRONE

INFN-LNS

Dr Pablo Cirrone is a Senior Researcher at the "Laboratori Nazionali del Sud" of the Italian Institute for Nuclear Physics (INFN). He is an expert of Medical Physics, Monte Carlo methods for nuclear physics, and laser-matter interaction for acceleration. Since 2018 Pablo has been responsible of the proton therapy and multidisciplinary beamlines of the INFN-LNS. He was appointed as spokesperson of the MC-INFN (Monte Carlo at INFN) and the ELIMED projects for the acceleration, transport, and measurement of laser-accelerated radiation. In 2020 he became leader of the INFN group within the H2020 IMPULSE project.

Pablo is today responsible for the I-LUCE (INFN Laser indUCEd radiation production) facility development that will install a 500TW/23fs/3Hz laser system at INFN-LNS for acceleration, nuclear and multidisciplinary applications.

h-index (Scopus): 30
Total citations (Scopus): 9410
Number of publications with index (last ten years): 210



Pablo Cirrone

Laser-driven ion acceleration: basic mechanisms and applications

Laser-driven ion acceleration is an emerging technology that utilizes high-intensity laser pulses to accelerate ions to high energies. This technique leverages the interaction between ultra-intense laser fields and matter, producing ion beams with unique properties suitable for applications in medical therapy, material science, and fundamental physics research.

The fundamental mechanism behind laser-driven ion acceleration involves the rapid transfer of energy from the laser pulse to the electrons in the target material. When a high-intensity laser pulse (typically with intensities exceeding 10^{18} W/cm^2) strikes a solid target, it creates a plasma by ionizing the material. The laser interacts predominantly with the electrons, heating them to relativistic energies. These hot electrons generate extremely strong electric fields in the order of 10^{12} V/m, which can then accelerate the ions.

One of the primary acceleration mechanisms is the Target Normal Sheath Acceleration (TNSA). In TNSA, the laser pulse produces a sheath of hot electrons that propagate through the target and escape from the rear surface. This escape creates a strong electrostatic field that pulls ions from the target's rear surface, accelerating them normal to the target's surface.

Laser-driven ion acceleration presents several advantages over conventional acceleration methods, including compactness, high acceleration gradients, and the potential for producing short ion bunches with high brightness. Ongoing research aims to optimize target design, laser parameters, and acceleration mechanisms to improve ion beam quality and energy, advancing this technique towards practical applications.

In this talk, the basis of laser-driven ions acceleration and the status of this technique will be reported together with the main scientific perspectives that this field offers.

Plenary Speaker

Przemysław Tchórz

Institute of Plasma Physics and Laser Microfusion, Warsaw, Poland

Since 2016, Przemysław Tchórz has held the position of research assistant in the High Power Laser Laboratory, Department of Laser Plasma Physics and Applications. His area of interest is related to laser-matter interaction, high energy density physics, laser ion acceleration, and laser fusion. In the past years he actively participated in different laser-plasma oriented experiments covering a wide range of topics such as plasmas in magnetic fields, equation-of-state of materials important for inertial confinement fusion, laser ion acceleration, and electromagnetic pulses (EMP) mitigation in laser-matter experiments; most of them in collaboration with international experimental teams. Recently his field of work is focused on proton-boron fusion, one of the key topics of his PhD dissertation, which is about to be defended by the end of this year.

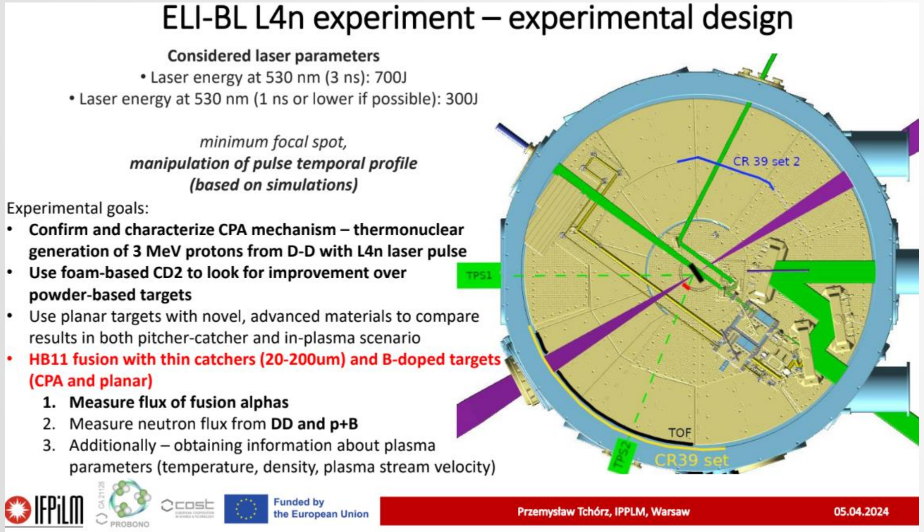
PhD project: New proposal at ELI ERIC

Cavity Pressure Acceleration

Przemysław Tchórz

Institute of Plasma Physics and Laser Microfusion, Warsaw, Poland

The important role of lasers in fusion research can be dated back to the year 1972, when Inertial Confinement Fusion (ICF) was firstly proposed [1]. Presently, in parallel to the pure
ICF research conducted at facilities such as National Ignition Facility (USA) or Laser Megajoule (France), laser ion acceleration (which supposedly would enable Fast Ignition [2] (FI) scenario of laser fusion) is one of the main areas of interest within laser-fusion research. As observed in recent experiments, the Cavity Pressure Acceleration (CPA), mechanism first proposed to be used in the Fast Ignition scenario of ICF, can produce an intense flux of both multi-MeV protons and neutrons when deuterated materials are used inside the cavity [3]. By exploiting this mechanism one does not rely on laser intensity, but rather on thermodynamical parameters of plasma confined in the cavity, which enables moderate-to-low-intensity laser systems to be used in both ion acceleration (up to several MeV) and small-scale fusion experiments where neutron generation is of the interest. This talk will cover the basics of Cavity Pressure Acceleration, the production of neutrons and protons using deuterium-deuterium (DD) reaction and the potential application of these, together with challenges that accompany this approach, in proton-boron fusion experiments that are planned shortly.



ELI-BL L4n experiment – experimental design

Considered laser parameters

- Laser energy at 530 nm (3 ns): 700J
- Laser energy at 530 nm (1 ns or lower if possible): 300J

minimum focal spot,
manipulation of pulse temporal profile
(based on simulations)

Experimental goals:

- **Confirm and characterize CPA mechanism – thermonuclear generation of 3 MeV protons from D-D with L4n laser pulse**
- **Use foam-based CD2 to look for improvement over powder-based targets**
- Use planar targets with novel, advanced materials to compare results in both pitcher-catcher and in-plasma scenario
- **HB11 fusion with thin catchers (20-200um) and B-doped targets (CPA and planar)**
  1. **Measure flux of fusion alphas**
  2. Measure neutron flux from **DD and p+B**
  3. Additionally – obtaining information about plasma parameters (temperature, density, plasma stream velocity)

Przemysław Tchórz, IPPLM, Warsaw 05.04.2024

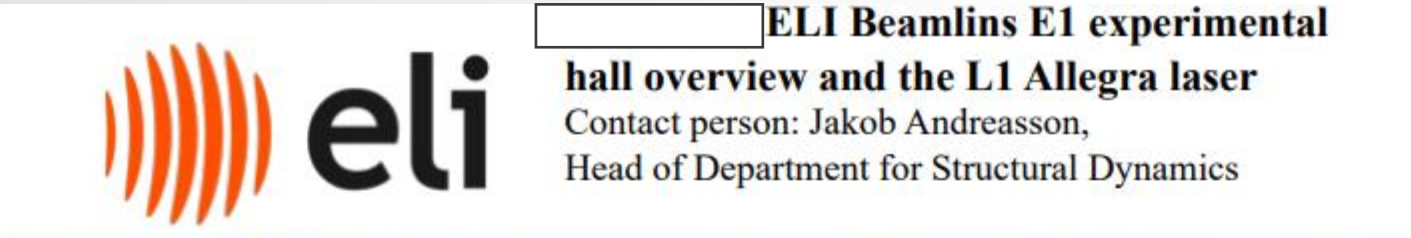
[1] J. Nuckolls, L. Wood, A. Thiessen, and G. Zimmerman, "Laser compression of matter to super-high densities: Thermonuclear (ctr) applications," Nature 1972 239:5368 239, 139–142 (1972).
[2] M. Roth, "Review on the current status and prospects of fast ignition in fusion targets driven by intense, laser generated proton beams," Plasma Physics and Controlled Fusion 51, 014004 (2008).
[3] T. Chodukowski *et al.*, "Neutron production in cavity pressure acceleration of plasma objects," *AIP Adv*, vol. 10, no. 8, Aug. 2020, doi: 10.1063/5.0005977.

Plenary Speaker

Mateusz Rebarz

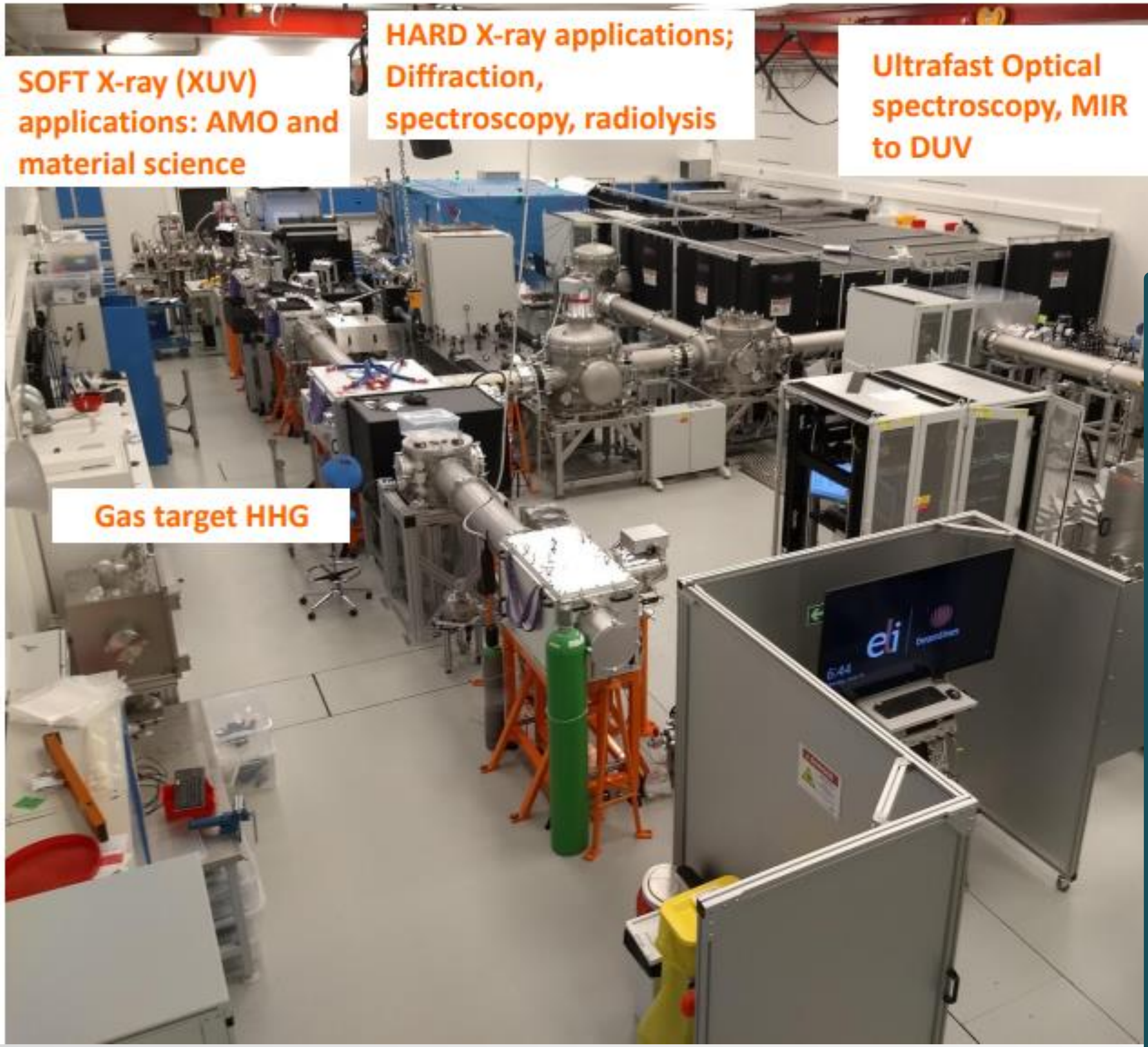
Mateusz Rebarz is an experimental physicist specializing in time-resolved spectroscopy in molecules and condensed matter. He received Ph.D. degree in Physics from Nicolaus Copernicus University (Torun, Poland) in 2007. From 2008 to 2010 he worked as a postdoctoral fellow at Free University of Brussels (ULB, Belgium) in Organic Chemistry and Photochemistry group. Then, he moved to Laboratory of Infrared and Raman Spectroscopy – LASIR (Lille, France) where he worked as CNRS researcher until 2014. Since 2015 he is a researcher at ELI Beamlines facility (Prague, Czech Republic) in Department of Structural Dynamics.

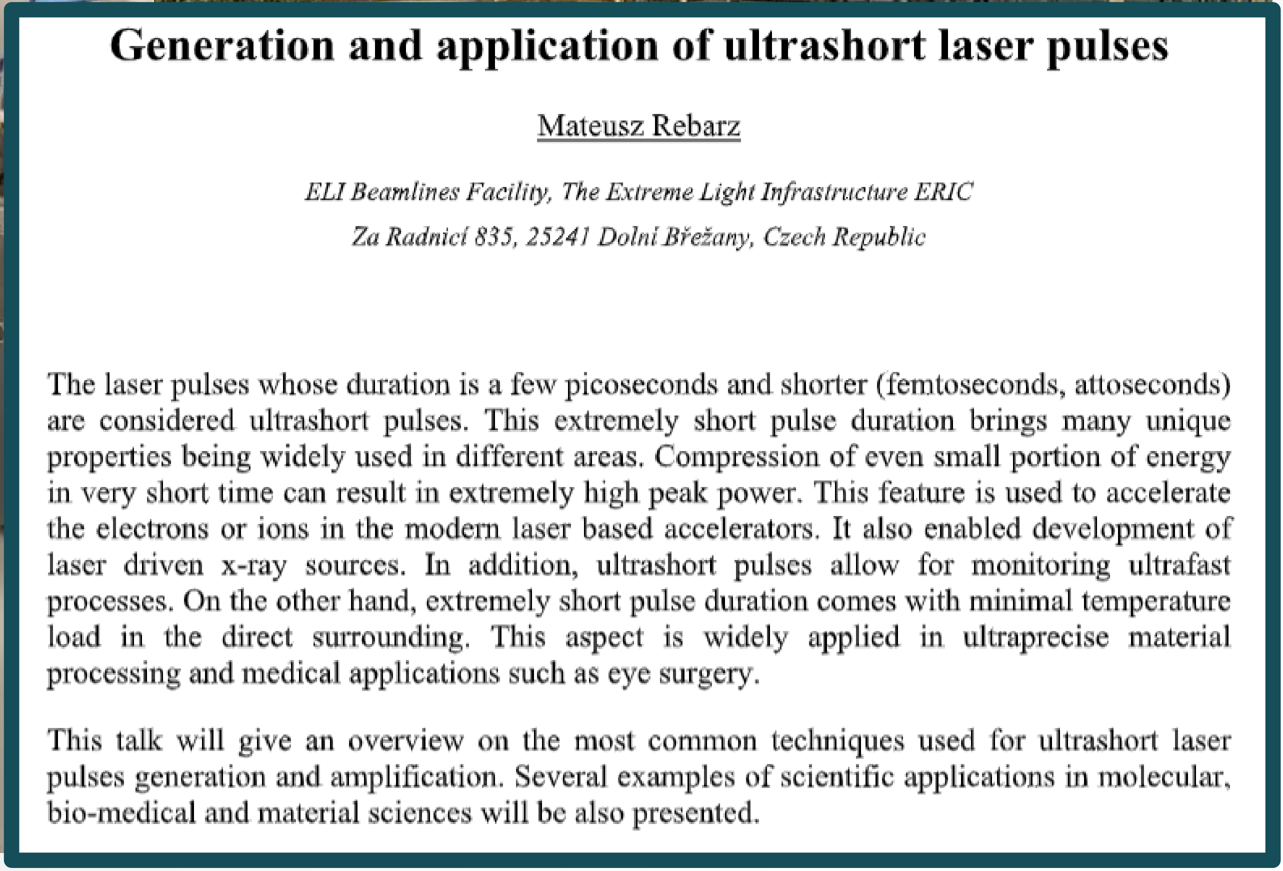
His research interests focus on nonlinear optics and their applications to ultrafast phenomena studied by ultrafast (femtosecond) spectroscopy (absorption, emission, Raman scattering, ellipsometry). His other interests cover also photonics and optoelectronics. He has 20 years of hands-on experience in construction and development of laser-based spectroscopic setups as well as writing of control system software.



ELI Beamlins E1 experimental hall overview and the L1 Allegra laser

Contact person: Jakob Andreasson,
Head of Department for Structural Dynamics





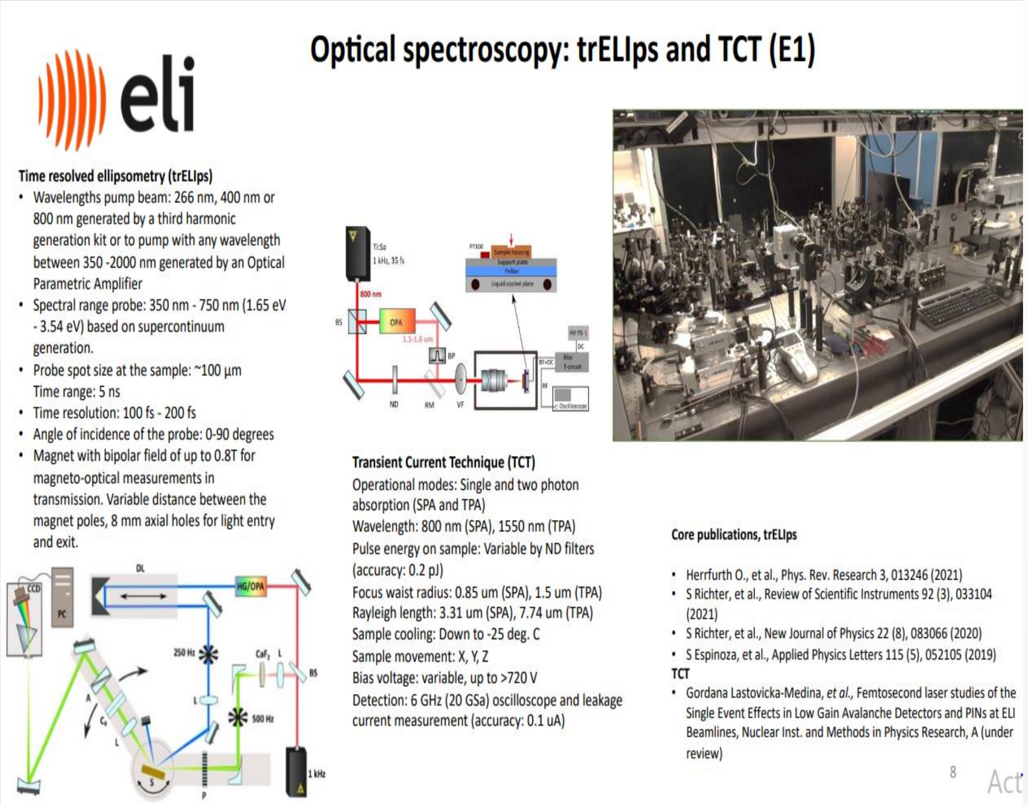
Generation and application of ultrashort laser pulses

Mateusz Rebarz

ELI Beamlines Facility, The Extreme Light Infrastructure ERIC
Za Radnicí 835, 25241 Dolní Břežany, Czech Republic

The laser pulses whose duration is a few picoseconds and shorter (femtoseconds, attoseconds) are considered ultrashort pulses. This extremely short pulse duration brings many unique properties being widely used in different areas. Compression of even small portion of energy in very short time can result in extremely high peak power. This feature is used to accelerate the electrons or ions in the modern laser based accelerators. It also enabled development of laser driven x-ray sources. In addition, ultrashort pulses allow for monitoring ultrafast processes. On the other hand, extremely short pulse duration comes with minimal temperature load in the direct surrounding. This aspect is widely applied in ultraprecise material processing and medical applications such as eye surgery.

This talk will give an overview on the most common techniques used for ultrashort laser pulses generation and amplification. Several examples of scientific applications in molecular, bio-medical and material sciences will be also presented.



Optical spectroscopy: trELIps and TCT (E1)

Time resolved ellipsometry (trELIps)

- Wavelengths pump beam: 266 nm, 400 nm or 800 nm generated by a third harmonic generation kit or to pump with any wavelength between 350 -2000 nm generated by an Optical Parametric Amplifier
- Spectral range probe: 350 nm - 750 nm (1.65 eV - 3.54 eV) based on supercontinuum generation.
- Probe spot size at the sample: ~100 µm
  Time range: 5 ns
- Time resolution: 100 fs - 200 fs
- Angle of incidence of the probe: 0-90 degrees
- Magnet with bipolar field of up to 0.8T for magneto-optical measurements in transmission. Variable distance between the magnet poles, 8 mm axial holes for light entry and exit.

Transient Current Technique (TCT)

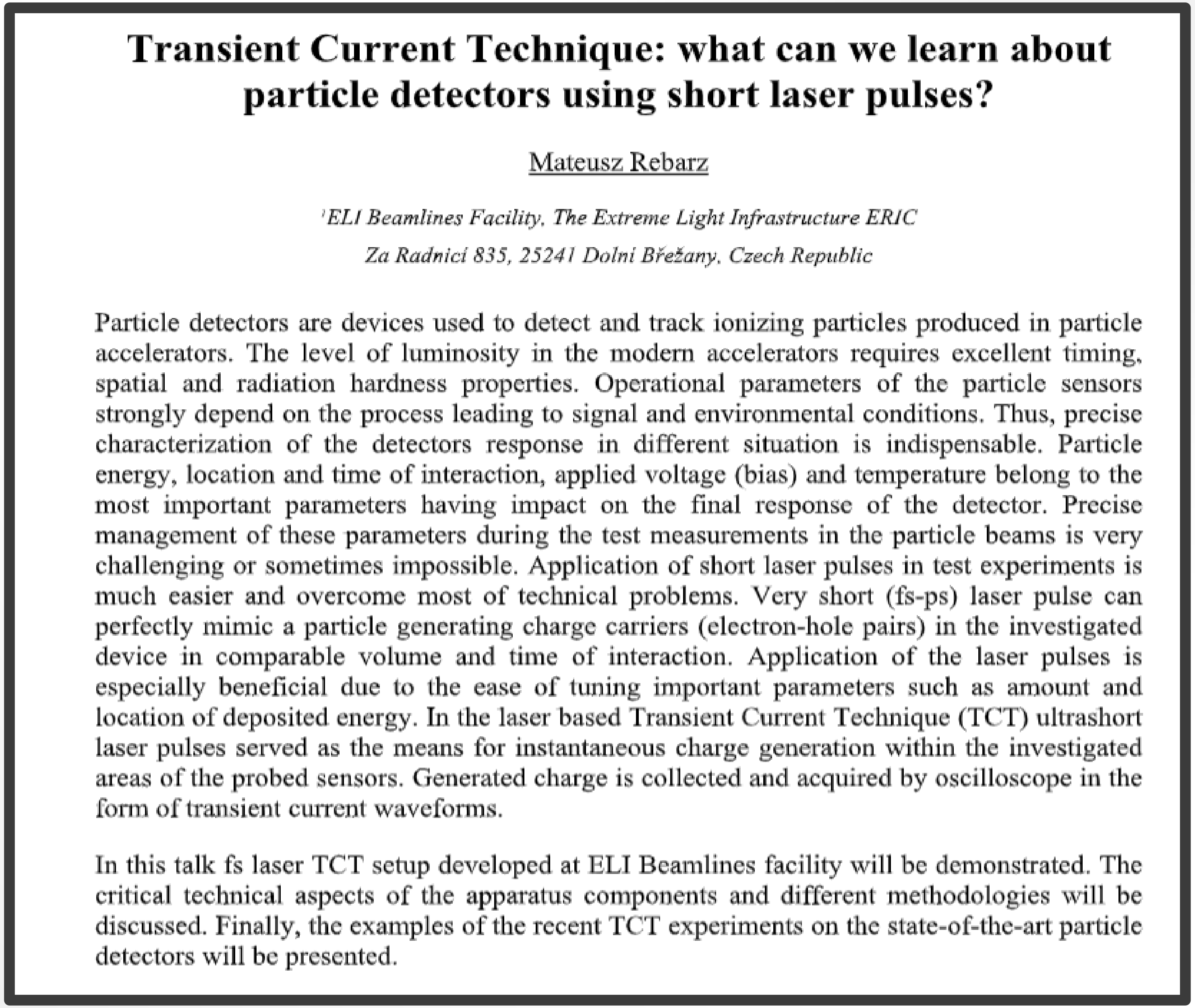
Operational modes: Single and two photon absorption (SPA and TPA)
Wavelength: 800 nm (SPA), 1550 nm (TPA)
Pulse energy on sample: Variable by ND filters (accuracy: 0.2 pJ)
Focus waist radius: 0.85 um (SPA), 1.5 um (TPA)
Rayleigh length: 3.31 um (SPA), 7.74 um (TPA)
Sample cooling: Down to -25 deg. C
Sample movement: X, Y, Z
Bias voltage: variable, up to >720 V
Detection: 6 GHz (20 GSa) oscilloscope and leakage current measurement (accuracy: 0.1 uA)

Core publications, trELIps

- Herrfurth O., et al., Phys. Rev. Research 3, 013246 (2021)
- S Richter, et al., Review of Scientific Instruments 92 (3), 033104 (2021)
- S Richter, et al., New Journal of Physics 22 (8), 083066 (2020)
- S Espinoza, et al., Applied Physics Letters 115 (5), 052105 (2019)

TCT

- Gordana Lastovicka-Medina, *et al.*, Femtosecond laser studies of the Single Event Effects in Low Gain Avalanche Detectors and PINs at ELI Beamlines, Nuclear Inst. and Methods in Physics Research, A (under review)



Transient Current Technique: what can we learn about particle detectors using short laser pulses?

Mateusz Rebarz

[1]ELI Beamlines Facility, The Extreme Light Infrastructure ERIC
Za Radnici 835, 25241 Dolni Břežany, Czech Republic

Particle detectors are devices used to detect and track ionizing particles produced in particle accelerators. The level of luminosity in the modern accelerators requires excellent timing, spatial and radiation hardness properties. Operational parameters of the particle sensors strongly depend on the process leading to signal and environmental conditions. Thus, precise characterization of the detectors response in different situation is indispensable. Particle energy, location and time of interaction, applied voltage (bias) and temperature belong to the most important parameters having impact on the final response of the detector. Precise management of these parameters during the test measurements in the particle beams is very challenging or sometimes impossible. Application of short laser pulses in test experiments is much easier and overcome most of technical problems. Very short (fs-ps) laser pulse can perfectly mimic a particle generating charge carriers (electron-hole pairs) in the investigated device in comparable volume and time of interaction. Application of the laser pulses is especially beneficial due to the ease of tuning important parameters such as amount and location of deposited energy. In the laser based Transient Current Technique (TCT) ultrashort laser pulses served as the means for instantaneous charge generation within the investigated areas of the probed sensors. Generated charge is collected and acquired by oscilloscope in the form of transient current waveforms.

In this talk fs laser TCT setup developed at ELI Beamlines facility will be demonstrated. The critical technical aspects of the apparatus components and different methodologies will be discussed. Finally, the examples of the recent TCT experiments on the state-of-the-art particle detectors will be presented.

Plenary Speaker

Martin Preček | Deputy Head - Department of Structural Dynamics

Martin Precek is a researcher at the ELI Beamlines facility in Prague / Dolní Břežany, Czechia, a member of the Department of Structural Dynamics (~25 researchers). His expertise lies in the fields of radiation chemistry, chemical kinetics, and nuclear chemistry. During and after his M.S. studies (2007) at the Faculty of Nuclear Sciences of the Czech Technical University in Prague, he worked at the Nuclear Research Institute Rez on the project of chemical processing of a fluoride molten salt transmutation reactor. He then moved to the Oregon State University (Corvallis, Oregon, USA) where he received his Ph.D. degree in Chemistry in 2012 for work on aqueous redox kinetics of neptunium. During his PhD studies, he spent several months on internship projects at US national laboratories (Argonne NL, Idaho NL). In 2012 he joined the ELI project (Extreme Light Infrastructure), first as a postdoc, preparing an endstation to perform pulse radiolysis experiments with femtosecond resolution. Between 2013 and 2015 he spent 4 months on a research stay at Université Paris – Sud, Orsay at a Center for the study of Ultrafast Kinetics (ELYSE). Since 2015 he has been involved in designing, equipping, commissioning, and running daily operations of laboratories and experimental endstations for research in the area of structural dynamics of atoms, molecules and materials. He is usually involved with research projects on femtosecond optical and X-ray spectroscopy and radiation chemistry; additionally, he is the main operator of the scanning electron microscope at ELI Beamlines.

Liquid sheet jet methods for optical and X-ray spectroscopy at ELI Beamlines

Martin Preček

ELI Beamlines Facility, The Extreme Light Infrastructure ERIC

Za Radnicí 835, 25241 Dolní Břežany, Czech Republic

Abstract:

At several user endstations of the ELI Beamlines facility, there is a need to repeatedly introduce samples or targets into the various available optical and radiation beams due to the damaging nature of the interaction of these beams. For samples in time-resolved optical and X-ray spectroscopy of various materials, one of the most attractive options is to utilize free-flowing (windowless) liquid sheet jet systems. Currently, there are two systems in on-going development and characterization that can provide this capability – a wire-guided liquid jet and a microfluidic colliding jet. The wire-guided jet is capable of producing a liquid sheet with 100-1000 micrometer thickness, while the colliding jet system is good for a sample thickness of 3-5 micrometers. Examples of utilization of these jet systems are going to be presented.

Round table with Daniele Margarone

ELI Beamlines, DIRECTOR OF SCIENCE AND OPERATIONS

Dr. Daniele Margarone was appointed as the Director of Research and Operations of ELI Beamlines on 1st September 2022.

Dr. Margarone has served as a lecturer in experimental plasma physics at Queen’s University in Belfast, UK and Head of the Department of “Ion acceleration and application of high energy particles” at ELI Beamlines. He joined ELI Beamlines in 2010 and has contributed significantly to the development of ELI Beamlines from the preparatory phase through the implementation and commissioning of technologies, in particular the ion accelerator called ELIMAIA. Dr. Margarone is a recognized scientist in the field of plasma physics and particle acceleration with extensive experience from experiments using high-power lasers. He is actively involved in proton-boron fusion-related experiments.

AGENDA

The First day/18/-6/2024

Time slot	Speaker	Affiliation	Title
10:40-11:40h	Josef Ongena	LPP-ERM/KMS	Fusion - an important option for our future energy supply
11:40-12:40h	Alfredo Portone	Fusion for Energy	Status of ITER and TOKAMAK Research
12:40- 13:20	Sergey Pikuz	HB11 Energy	Laser Boron Fusion - HB11 Energy approach to commercial sustainable fusion energy.
13:20:14:20	Massimo Ferrario	INFN-LNF	Accelerating the Future & EuPraxia Project
14:20 – 15:30	Lunch time		
15:30h-16:15h	Pablo Cirrone	INFN-LNS	Laser-driven ion accelerations: basic mechanism and applications
16:15h-17:00h	Przemysław Tchórz	Institute of Plasma Physics and Laser Microfusion, Warsaw, Poland	Cavity Pressure Accelerations
17:00h-17:30 h	Coffee break		
17:30h-18:30h	Martin Precek	ELI ERIC, ELI Beamlines	Loquid sheet jet methods for optical and X-ray spectroscopy at ELI Beamlines
Gala Dinner: 20:00 - 01:00 Gradska Kafana, Herceg Novi			

Second day/19/06/2024

Wednesday, June 19, 2024 (Hall A – Hunguest Hotel Sun Resort) 10:30 – 12:30
Special Session: High-Intensity Laser-Plasma Particle Sources and Applications
Chairpersons: Pablo Cirrone and Daniele Margarone

10:30 -10:45	Marine Huault,	**Alpha particle production from Laser-driven proton-boron a nuclear reaction in the hole-boring scheme**
10:45 – 11:10	Lorenzo Giuffrida (INVITED),	**Laser Plasma Ion Acceleration for multidisciplinary applications at the ELIMAIA beamlines**
11:10 – 11:35	Giada Petringa (INVITED),	**Diagnostic and dosimetry with Laser-driven proton beams**
11:35 – 12:00	Costanza Panaino (INVITED),	**WHEE with laser-driven electron beams**
12:05 – 12:30	Carmen Altana, (INVITED),	**Status and perspectives of nuclear research in plasma**
12:30 – 12:45	Sahar Arjmand,	**Optimizing Capillary Design for Very High Energy Electrons (VHEE) Applications**
12:45 - 13:00	Benoit Lefebvre,	**Radiation protection at the ELI Beamlines facility**

13:00 -14:00 Round table with Daniele Margarone

15:30 – 17:30: Workshop (continuation)

15:30 -16:15	Mateusz Rebarz	**Generation and Application of ultrafast laser pulses**
16:15 -17:00		**Transient Current Technique: what we can learn about particle detectors**
17:00 – 17:30	Gordana Medin	**Charge-density related effects in Si-based detectors with internal gain**

Boat Excursion with Boat Dance Evening – Škver Harbor

Sponsors

The European Physical Society (EPS) is a not for profit association whose members include 42 National Physical Societies in Europe, individuals from all fields of physics, and European research institutions.

As a learned society, the **EPS** engages in activities that strengthen ties among the physicists in Europe. As a federation of National Physical Societies, the **EPS** studies issues of concern to all European countries relating to physics research, science policy and education.

The **EPS** was created in 1968 "for physicists to make a positive contribution to European cultural unity".
It has evolved to keep pace with changes at the European level.

The **EPS** mission is to promote physics in Europe, notably by providing a forum for the discussion of common issues, and through activities at the the European level.

EPS

eli

INFN
Istituto Nazionale di Fisica Nucleare