

## Lorenzo Giuffrida CV

**Lorenzo Giuffrida**, PhD, Born in Catania, Italy on 11/04/1979.

**Highest Degree:** PhD degree in Physics (2011) at Messina University, Italy, with a Thesis titled “Ion production from Laser Ion Source (LIS), post-acceleration methods and their applications” mainly performed at the National Institute of Nuclear Physics - LNS (INFN), Catania, Italy.

### **Relevant experiences:**

2011-2012: Post-doc position at CELIA-CNRS, University of Bordeaux1 (France). Topic: Study of the luminescence of an optical fiber, doped with Ce<sup>3+</sup> ions, irradiated by VUV rays.

2012-2014: Post-doc position at CELIA-CNRS, University of Bordeaux1 (France). Topic: Characterization in term of time duration, intensity and spatial distribution of magnetic fields generated by interaction of high intensity lasers with solid targets useful to collimate ultra-relativistic electron beams for the Fast Ignition scheme.

2014 – 2022. Senior Researcher at the FZU-ASCR (Institute of Physics of the Czech Academy of Sciences) in Prague within the ELI-Beamlines pan-European facility, working in ion acceleration driven by ultra-high-intense lasers. Responsible to develop advanced devices for the ELIMAIA user beamline. Responsible of the Open Access Area in E2 hall in HiLASE for developing and testing applications in multidisciplinary fields using the Bivoj sub-GW laser system. Responsible of testing advanced targets useful for modulating laser-driven ion beams. Responsible for carrying out experimental research activities on laser-driven proton boron reaction. Responsible of the Commissioning of the Laser-Plasma Ion accelerator at the ELIMAIA user beamline.

Since January 2023. Head of Department of Ion Acceleration and Applications of High Energy Particles at the ELI Beamlines Facility, the Extreme Light Infrastructure ERIC.

**Publication activity:** 98+ papers in international scientific journals, 1322+ citations, h-index: 20, 1 granted patent and 1 submitted patent.

**Research topics:** Laser driven ion acceleration in different intensity regimes ( $10^{13}$ - $10^{21}$  W/cm<sup>2</sup>); corpuscular real-time diagnostics of plasmas generated by laser-matter interaction; generation of laser-based secondary sources for multidisciplinary applications, including new compact approaches to hadron-therapy for cancer treatment; Ion implantation by laser pulse deposition; magnetic field generation by interaction ultra-high intense laser and solid coil targets; laser-driven nuclear reactions (pB and D-D); nuclear reactions for cancer treatments.

### **Most relevant activities during the last 5 years:**

He has been involved in laser-driven proton Boron nuclear reaction activities since the beginning of his job at the FZU-ASCR in 2014. He was strongly involved in the development of Proton Boron Capture Therapy (PBCT), a new way to treat cancers using the proton Boron nuclear fusion reaction. He is one of the inventor of this method currently under evaluation by the European Patent Office. He was awarded with a 2 year TACR sub-project (GAMA2 project) about the PBCT development. Moreover, he was strongly involved in preparation and operation of several experiments at international laser facilities (PALS, LFEX and GEKKO XII) on laser-driven pB fusion with the final goal to optimize alpha particles generation.

Since November 2022, he is the Working group leader of the WG2 (experiment) of the COST Action project CA21128 PROton BOron Nuclear fusion: from energy production to medical applicatiOns. The main goal of this is

to build a network between different Institutes around the world for putting together the different knowledge in the proton Boron nuclear fusion reaction.

In the field of laser-driven ion acceleration, he was in charge for studying and testing advanced targets (nanostructured, cryogenic and gas targets) allowing to modulate laser-driven proton beams in terms of spatial and energy distribution. He leading activities related with the commissioning of the ELIMAIA plasma-accelerator to be open to external users during the last part of the 2023.

Since January 2023, he is leading the Department of Ion Acceleration and Applications of High Energy Particles, leading activities related to the ELIMAIA/ELIMED user beamline.