

## Short Curriculum Vitae, Dr. Antonino Picciotto, PhD

**First Name:** Antonino

**Family Name:** Picciotto

**Date of birthday,**

**Place of birth:**

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**Marital status:**

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### 4 Actual **position** and research **interests** — 2006/2021

Since 2006, Dr. Antonino Picciotto is Research Associate at Fondazione Bruno Kessler (FBK), in Trento, Italy.

He works at Micro-Nano Fabrication Facility division fMNF) as R&D researcher and clean room process engineer.

In this role, he is working on the microfabrication of particle and radiation detectors for scientific and industrial applications, participating to national and international projects with research institutes as the Italian National Institute of Nuclear Physics (INFN), Italian National Institute of Astrophysics (INAF), universities as Politecnico di Milano, and private international companies as Horiba ltd.

In the MNF group, he is R&D responsible for PECVD (plasma enhancement chemical vapor deposition), LPCVD (low-pressure chemical vapor deposition), ion implantation and ellipsometry systems.

In addition to this, Dr. Picciotto is involved in the protection and realization of advanced materials for application to non-conventional particles acceleration systems (laser-driven) and to the clean fusion reaction processes in collaboration with European Partners as the Prague Asterix Laser System (PALS).

the HILASE Institute and in particular with the pan-European project defined as, *Extreme Light Infrastructure* (ELI), in Prague, Czech Republic.

Recently, he is involved, as Fondazione Bruno Kessler proponent, in a series of preliminary experiments on the possibility to enhance the efficiency of the standard proton-therapy techniques, by the introduction of the ultra-clean boron-proton ionisation, in collaboration with the INFN Institute, the ELI Institute and the Naples University.

All these activities are well documented by many papers on international scientific journals and national and international patents, accepted, submitted and in press.

## **S Education**

**2006:** PhD in nuclear physics the University of Messina and at the Italian National Institute of Nuclear Physics, with a thesis work titled: “*Temperature characterization of plasmas generated by high power pulsed lasers*”. This work was supported by the INFN projects named as *PLAIA (Plasma Laser Ablation for Ion Acceleration)* and *PLATONE (Plasma Laser Ablation to Obtain Near Electrical field)*. During the PhD course, he worked also at the National Institute of Nuclear Physics (INFN) in Catania and he carried out a Marie Curie Fellowship stage for 4 months (contract N°:434/53/04) at the Institute of Physics of the Czech Republic Science Academy (ASCR) and PALS Laser Centre in Prague, Czech Republic.

**2002:** Master Degree in Physics (applied physics) in the field of laser plasma systems at University of Messina and at Italian National Institute of Nuclear Physics-South National Laboratories (INFN-LNS) in Catania, with a thesis title: “*A study of non-equilibrium plasmas generated by infrared pulsed laser*”. This work was supported by the INFN project *ECLISSE*.

## **4 Main results achieved on detectors realization**

**Since August 2006:** Dr. Picciotto was involved at Fondazione Bruno Kessler, as class A clean room process engineer in the realization of several kinds of particles and radiations silicon detectors, like silicon solar cells, phototransistors, silicon photo multiplier (SiPM) and very low noise silicon drift detectors (SDD). In this last sector, Dr. Picciotto contributed directly on the realization of many type large areas detectors in the framework of the INFN-REDSOX project and LOFT (Large Observatory For X-ray Timing), where in 2016 his group realized the largest silicon drift detectors fully functional in the world. Dr. Picciotto and co-workers visited two times in 2013 and in 2016, Holiba Ltd Company in Kyoto, Japan, as micro technology experts consultant for the Horiba personnel in the framework of silicon drift detectors realization for the NEXRAY-Horiba project.

#### 4 Publications

Dr. Picciotto is author and co-author, at the moment, 8 papers on international scientific peer review journals and conference proceedings (Scopus source). Currently, his h-index is 19.

In the following, a list of ten of the most considerable publications by Dr. Picciotto synthesizing his main research and technology activities:

- **A.Picciotto**, D.Margarone, A.Velyhan, P.Bellutti, J.Krasa, A.Szydlowsky, G.Bertuccio, Y.Shi, A.Mangione, J.Prokupek, A.Malinowska, E.Krousky, J.Ullschmied, L.Laska, M.Kucharik, G.Kom, “*Boron—proton nuclear fusion enhancement induced in silicon targets by low-contrast pulses: 1 laser*”, Physical Review X, 4, 031030 (2014).
- **A.Picciotto**, D.Margarone, M.Crivellari, P.Bellutti, S.Colpo, L.Tourist, J.Krasa, A.Velyhan, and J.Ullschmied “*Microfabrication of silicon hydrogenated: 1 thin targets for multi-MeV laser driven proton acceleration*” Applied Physics Express 4 (2011) 126401.
- **A.Picciotto**, D.Margarone, J.Krasa, A.Velyhan, E.Serra, P.Bellutti, G.Scarduelli, L.Calliari, E.Krousky, B.Rus, and M.Dapor “*Laser-driven acceleration of protons from hydrogenated annealed silicon targets*” Euro Physics Letters 92 (2010) 34008
- **A.Picciotto**, A.Bagolini, P.Bellutti, M.Boscardin “*Influence of interfaces density and thermal processes on mechanical stress of PECVD silicon nitride*” Applied Surface Science 2009, 256, pp. 251-255.
- M.Crivellari, M.Mattevi, **A.Picciotto**, P.Bellutti, A.Collini, L.Torrisi, F.Caridi, S.Gennaro, A.Gasparotto “*Microfabrication of MOSFET sensors based on Pd-gate deposited by pulsed laser ablation*” Sensor and Actuator B (2013) vol. 186, 180-185.
- A.Rachevski, G.Zampa, N.Zampa, R.Cainpana, Y.Evangelista, G.Giacomini, **A.Picciotto**, P.Bellutti, M.Feroci, C.Labanti, C.Piemonte, A.Vacchi “*Large-area linear Silicon Drift Detector design for X-ray Instrumentation*” Journal of Instrumentation (2014) vol. 9, n. P07014, pp.1-17
- R.Quaglia, L.Bombelli, P.Busca, C.Fiorini, M.Occhipinti, G.Giacomini, F.Ficorella, **A.Picciotto**, C.Piemonte “*Silicon Drift Detectors and CUBE preamplifiers for High-Resolution X-ray Spectroscopy*” IEEE Transactions on Nuclear Science Volume 62, Issue 1, 6 February (2015), 7027255, 221-227
- L. Giuffrida, D. Margarone, G.A.P. Cirrone, **A. Picciotto**, G. Cuttone and G. Korn “*Prompt gamma ray diagnostics and enhanced hadron-therapy using neutron-free nuclear reactions*” AIP advances 6, 105204 (2016)

- G.A.P Cirrone, L. Manti, D. Margarone, L. Giuffrida, A. Picciotto, G. Cuttone, G. Milluzzo, G. Petringa, F. Perozziello, F. Romano, F. Schillaci, V. Scuderi, and G. Korn “*First experimental proof of the Proton Boron Capture Therapy (PBCT) to enhance protontherapy effectiveness*” Scientific Reports (2018) 8:1141 pp. 1-15
- M.F.Pantano, E.Iacob, A. Picciotto, B. Marghesin, A. Centeno, A.Zurutuza, C.Galiotis, N. M. Pugno, G. Speranza “Investigation of charges-driven interaction between graphene and different SiO<sub>2</sub> surfaces” Carbon 148, pp. 336-343 (2019)

#### 4 Editorial Activities for Scientific Journals

- **Guest Associate Editor for Interdisciplinary Physics and Topic Editor 2020** of “*Advanced Targets for Laser-Based Particle Acceleration and Nuclear Reactions in Plasma*” Frontiers in Physics — <https://www.frontiersin.org/research-topics/18392>
- « **Guest Editor for Sensors on the topic:** “*Special Issue Advanced Micro and Nano Technologies for Gas Sensing*” Sensors - <https://www.mdpi.com/>

#### 4 Inventor or Co-Inventor of International Patents

- » D.Margarone, G.Korn, **A.Picciotto**, P.Bellutti, “*Niuclear fusion fixed target, device to generate niuclear fusion and method of generating nuclear fusion*” CZ201 30596 (A3)—2015-02-18- published and granted in Czech Republic on 01/12/2016
- D.Margarone, G.Kom, **A.Picciotto**, P.Bellutti, “*Laser Fusion System anJ Methods*” EP2833365 (A1) published and granted
- L.Giuffrida, D.Margarone, G.Korn, G.A.P Cin‘one, **A.Picciotto** “*Device and method for imaging and enllanceJ proton-therapytreatment using nuclear reactions*” submitted to EPO (2016), EP3266470A1, in collaboration with INFN LNS — ELI
- P.Bellutti, M.Boscardin, **A.Picciotto**, D.Matsunaga, N.Zorzi, “*Semicondiictor detector, ra:cliation detector and i adiation detection aypai-atuS*” published and granted US10094939 (B2) 2018-10-09
- G.Borghi, F.Ficorella, G.Giacomini, D.Matsunaga A.Picciotto, N.Zorzi: “*Radiation detection element, radiation detector and radiation Jetection apptiratus*” published and granted US10379231 (B2) 2019-08-13
- F.Ficorella, D.Matsunaga, **A.Picciotto**, K.Yasui, N.Zorzi: “*Radiation detector and radiation detector device*” WO201 8225563 (AI) published 2019-01-09

#### **4 Invited talk to international conferences**

- *EMN Light- Matter Interactions Meeting* taking place at Singapore, from May 10 to 13, 2016
- *EMN Meeting on Energy and Sustainability* 2016 during November 28 to December 2, 2016 in Osaka
- *Laser lab-Europe User Meeting*, 27-29 October 2019, Coimbra, Portugal

#### **4 Oral Communication to international congress**

- PPLA 2003 *Plasma Production by Laser Ablation* 18-19/09/2003
- 2nd Workshop *Production of Intense Beams of Highly charged Ions* and 2nd Workshop *Plasma Production by Laser Ablation* 08-11/06/2005
- SIF 2005 *Congresso Nazionale - Società Italiana di Fisica* 26/09/2005 - 01/10/2005
- *Plasma Production by Laser Ablation* PPLA 2007 14-16/06/2007
- 2nd ELIMED Workshop and Panel 18-19/10/2012
- Società Italiana di Fisica 2014 22-26/09/2014
- Mini Workshop and Meeting *Towards Proton Boron Capture Therapy* 05-06/04/2018
- *TREDI 2019 14th Trento Workshop on Advanced Silicon Radiator Detectors* 25-27/02/2019
- TARG4: *4th Targetry for High Repetition Rate Laser-Driven Sources Workshop* 09-12/06/2019
- *Laserlab-Europe User Meeting*, 27-29 October 2019, Coimbra, Portugal

#### **4 Other professional experiences and scientific awards**

- **2019:** Project leader and international experiment leader at the HiLASE Institute of the science academy of the Czech Republic, Prague titled: *“Laser driven ion implantation for nano structures creation in silicon and germanium materials ”*
- **2018:** Project leader and international experiment leader at the HiLASE Institute of the science academy of the Czech Republic, Prague titled: *“Generation of nanovoids in germanium by laser driven ion implantation”*
- **2012:** Project leader and international experiment leader for the European commission proposal defined Laser Lab Europe N°PALS001770 titled. *“High energy proton acceleration by thin hydrogenated-doped silicon dielectric targets using a sub-nanosecond laser”* PALS laboratory, Prague, Czech Republic
- **2006:** Winner of one-year contract at the Italian Institute for Energy and Environment (ENEA) in Frascati, for a project connected to the realization of a *“Thomson parabola spectrometer- for the determination of the ions distribution velocities ”* in the framework of the inertial fusion confinement studies. He refused the position to move at Fondazione B1'uno Kessler, in Trento.
- **2005:** Kiwanis Junior Club award for scientific divulgation, Messina, Italy.

#### **4 National Scientific Qualification for University Teaching 2018-2020**

- **June 2020:** National Scientific Qualification as Associate Professor (II°) for the following academic field: 02/B1, Experimental Physics of Matter, validation from 06/07/2020 to 06/07/2029
- **July 2020:** National Scientific Qualification as Associate Professor (II°) for the following academic field: 02/A1, Experimental Physics of Fundamental Interactions (Nuclear and Particles Physics), validation from 10/07/2020 to 10/07/2029

#### **4 Academic activities**

- **April 2019:** Member of the faculty board of the Doctorate course (PhD) on Industrial Innovation at the University of Trento, Italy
- **June 2019:** Member of the executive board of the Doctorate course (PhD) on Industrial Innovation at the University of Trento, Italy

H Didactical Experience as Professor Assistant at the Physics Department of University of Messina (2002-2006):

- Physics — Biological Sciences master degree course;
- Physics of Ionizing and Non Ionizing Radiation — Analysis of Natural and Anthropological Risks master degree course;
- Informatics- Veterinary Medicine master degree course;
- Physics- Informatics master degree course;
- Experimental Physics Laboratory: Biological Sciences master degree course;
- Experimental Physics Laboratory: Biology and Marine Ecology master degree course; (BEM);

4 Didactical Experience as Professor for the 2° Master level on nano and microtecnology at Trento **University** Physics Department and at Fondazione Bruno Kessler (2009d

- Theory on LPCVD and PECVD deposition of dielectric materials for microelectronic applications
- Theory on wet and dry etching materials techniques for microelectronic applications

4 Knowledge of languages:

- English: fluently) B1 PET certification received during University degree course
- Italian: Mother tongue)
- Czech: (basic)