Lucia Giuliano

Curriculum Vitae

Education

2018–Present **PhD school in Accelerator physics**, *La Sapienza*, *University of Rome*, Supervisor: Professor Luigi Palumbo .
Co-supervisor: PhD Luigi Faillace

2017 **Master's degree of Biomedical Engineering**, *La Sapienza*, *University of Rome*, *110/ 110*.
Title of thesis: "Use of a CMOS Image Sensor for Beta-emitting radionuclides measurement" (Possible endo laparoscopic applications of CMOS for the identification of tumor residues in radio-guided surgery)
Supervisors: Professor Vincenzo Patera and Professor Riccardo Faccini

2014 **Bachelor of clinical engineering**, *La Sapienza*, *University of Rome*, *98/110*.
Title of thesis: "Shape memory alloy use in the cardiovascular field"
Supervisor: Professor Maria Grazia Bonicelli

Languages

Italian Mother tongue

English Fluent

Courses and Stages

Jan-Feb 2019 **Joint Universities Accelerator School (JUAS), Course on Particle Accelerator Physics** , *European Scientific Institute*, *Archamps*, France.

2019 **Course on Longitudinal and transverse beam dynamics in particle accelerators**, *held by prof.M. Migliorati*, La Sapienza , Rome .

2019 **Course on Physics of high brilliance accelerators**, *held by M. Ferrario*, La Sapienza, Rome.

2019 **Accelerator physics laboratory**, *held by A. Gallo (hands-on activity)*, LNF-Laboratori Nazionali di Frascati.

2018 **24 CFU for teaching qualification**.

Research Activities

Flash therapy.

Radiation therapy (RT) is an essential contributor for the cancer cure. The goal of the RT is destroy the tumor cell and avoid side effects in the healthy tissues. The FLASH Therapy, an innovative technique in radiation therapy, has shown that short pulses of electrons(<500ms) at very high dose rates (>100Gy/s) are less harmful to healthy tissues but just as efficient as conventional dose rate radiation to inhibit tumor growth.

Medical accelerator for FLASH therapy.

Institut Curie has installed a new prototype of linear accelerator, dedicated to FLASH-RT preclinical trials and basic research: the ElectronFlash4000. Lucia Giuliano curated the electromagnetic design of the structure in S band (2.998 GHz).Lucia saw the assembly of the structure (and related problems) at the company headquarters $S.I.T.Spa$ that produced the accelerator .The linac is able to reach an average dose rate of 4000 Gy/s and an instantaneous dose deposition of 1 to 15 Gy per pulse.

RF measurement.

In the Accelerators laboratory at the SBAI Department of Sapienza Univeristy of Rome, L.Giuliano made several measures electromagnetic field inside closed RF structures (so called bead-pull method). Those measurements allowed Lucia to have a good mastery of VNA (Vector Network Analyzer) and of different codes for validating measurements on the structures.

C-band: Rf design.

The final goal of the Flash therapy is its use in clinical practice. For the treatment of depth tumor an energy about 100 MeV is required and the compactness is the priority to ideally fit the accelerators in the existent vaults. For this reason, we investigated the use of the C-band: several tuning of the C-band cavities are required to obtain the desidered $Shunt\ Impedance$ and $Frequency$. Also the Side Coupled Cells are been studied as possible geometry to use in the future linac.

Beam dynamics of RF gun and linac.

Lucia Giuliano made several beam dynamics simulation for the C-band linac and for the thermionic gun. In this study two different software are used, one for the field map inside the gun and one for the simulations inside the complete structure (gun and linac). Lucia Giuliano defined a script where the initial properties of the beam, the type of interactions to consider and the spatial constraints derived from the geometry of the gun and the linac, are set.

Research performances

Research performances.

3 presentations at national and international conferences (2 Oral Presentations and 1 Poster Presentation).

Attended Conferences

Sept 2019, Oral Presentation

105 Italian Physical Society Congress - L'Aquila (Italy), FLASH THERAPY: an innovation in radiation therapy.

International Conference on Medical Accelerators and Particle Therapy - Seville (Spain), FLASH THERAPY: an innovation in radiation therapy.

Poster

April 2018, Poster Presentation — **X medical physics National congress - Bari (Italy),** Feasibility study of imager CMOS as beta- detectors in radio-guided surgery, L. Alunni Solestizi et al..

Scientific Publications

October 2020, publication — **Article**, *L. Giuliano Flash therapy: an innovation in radiation therapy* , IL NUOVO CIMENTO, 43 C,125, October 2020.

July 2018, publication — **Article**, *L. Alunni Solestizi et al. Use of a CMOS Image Sensor for Beta-emitting radionuclides measurement.* , Journal of Instrumentation, Volume 13, July 2018.

Society memberships and Awards

From 2013 **Member of AIIC (Italian clinical engineering Society) .**

November 2019 — **Award for best oral presentation in "105 Italian Physical Society Congress ,** *L'Aquila*, Italy.

July 2019 — **Award of University Calls 2019 "Initial Research Projects"(Bando avvio alla Ricerca 2019)**, *Rome*, Italy.

Teaching Activities

2019–2020 — **Lectures assistant**, *Course of Physics II (Electromagnetism and optics)*, for Electronic engineer students held by Professor M.Migliorati and co-professor L.Ficcadenti.
SBAI Department, "Sapienza", University of Rome

2019–2020 — **Lectures assistant,** *Course of Physics (Thermodynamics)*, for Civil engineer students held by Professor L.Palumbo and co-professor A.Sinibaldi.
SBAI Department, "Sapienza", University of Rome

2018–2019 — **Lectures assistant**, *Course of Physics II (Electromagnetism and optics)*, for Electronic engineer students held by Professor L.Palumbo and co-professor L.Ficcadenti.
SBAI Department, "Sapienza", University of Rome

2018–2019 — **Physics laboratory assistant**, *Electronic laboratory*, for Electronical Engineer students held by co-professor L.Ficcadenti.
SBAI Department, "Sapienza", University of Rome

Work Experience

May2017–Nov2018 — **Field service engineer for Althea industrial Group.**
I supervised a team of engineers ensuring the electric safety verification and quality control protocols for medical devices.

Computer skills

Excellent knowledge of CST STUDIO SUITE- Computer Simulation Technology (CAD design), Matlab. I have a good mastery of VNA (Vector Network Analyzer).

Excellent knowledge of Microsoft Office and Open Office. Good knowledge and Linux, root and program language C.

Appointments

Jan -Jun 2021 **Research activity at Institute Marie Curie (Orsay-France).**
Supervisors Sophie Heinrich and Annalisa Patriarca.

Reference

Prof. ***Palumbo*** Luigi, Vice Rector for Strategic Planning - Full Professor at Dept. of Basic and Applied Science for Engineering, Sapienza University of Rome.

Prof. ***Patera*** Vincenzo, Full Professor at Dept. of Basic and Applied Science for Engineering, Sapienza University of Rome.

Ing. ***Mostacci*** Andrea,Associate Professor at Dept. of Basic and Applied Science for Engineering, Sapienza University of Rome.

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Roma 17/11/2020