Martina Carillo

Ph.D. student

Golden Paragraph

I am a **PhD student** in the Accelerator Physics Program at Sapienza University of Rome. My passion for accelerator physics was born during my undergraduate studies: I achieved my **bachelor's degree in Physics** in 2018 by discussing the thesis "Proton Linear Accelerator for Adrotherapy: TOP-IMPLART". Later I continued my studies in the field of high energy physics and obtained my **master's degree in Physics** in 2021. My thesis "Analysis and simulation of cryogenic hybrid C-Band Photo-injector" is focused on a project that arises from the collaboration of **Sapienza** University of Rome with **UCLA, University of California Los Angeles**. The work was focused on the development of code for simulation and analysis of beam dynamics within RF structure, under the supervision of **Prof. Palumbo** and **Prof. Rosenzweig**. Afterwards, I chose to continue the collaboration with the accelerator research group in Sapienza and with the UCLA group, starting the PhD course in Rome that I am carrying out today. In the first year, in addition to continuing my individual studies on beam dynamics, I successfully attended and passed training courses: in February 2021 I attended at joint Universities Accelerator school (**JUAS**) the Course on Particle Accelerator, which allowed me to acquire basic knowledge on accelerating structures. During these first two years of her PhD, I carry out significant analytical and simulation results. I presented this at several conferences as the International Particle Conference Accelerators in May 2021 (**IPAC21**) and recently at **IPAC22**. In both conferences I was also co-author and presenter of other works. In the last year I start to work also with **SPARC group** at Laboratori Nazionali di Frascati (**LNF**) where I collaborate on experimental measurements. This experience provided me basic experimental knowledge on accelerator structures.

Education

2020–present **Ph.D. in Accelerator physics**, *Sapienza, University of Rome* , Rome, Italy.

2017–2020 **Master's Degree in Physics**, *Sapienza, University of Rome*, Rome, Italy.
- Physics, High Energy physics, Computer Programming, Mathematical physics, Medical Application.
- Laboratory experience of Radio Frequency systems, INFN, Frascati (Rome)

2013–2017 **Bachelor's Degree in Physics**, *Sapienza, University of Rome*, Rome, Italy.
- Mathematics, Physics, Optics, Electronics, Computer Programming (C language), Quantum Mechanics, Relativistic Mechanics, Fluidodynamics, Chemistry, Atmospheric Physics.

2014 **High school leaving qualification**, *Scientific High School Cavour*, Rome, Italy.

Master's Thesis

Title *Analysis and simulation of cryogenic hybrid C-band photo-injector*

Supervisor Professor Daniele del Re

Co-Supervisor	Professor Luigi Palumbo
Description	Development of code for simulation and analysis of beam dynamics within RF structure. Physical analysis of beam dynamics.

Affiliation

2020-present	**Istituto Nazionale di Fisica Nucleare (INFN).**

Courses and Stages

Jan-Feb 2021	**Joint Univeristies Accelerator Schiool (JUAS), Course on Particle Accelerator,** *European Scientific Insitute, Archamps,* France.
Feb-Jun 2021	**Physics of High Brilliance Accelerators**, Professor M. Ferrario, Sapienza Univeristy of Rome, Rome, Italy.
Sep-Oct 2021	**Physics, Technology and Applications of Linear Accelerators**, Professor D. Alesini, Sapienza Univeristy of Rome, Rome, Italy.

Attended Conference

May 2021	**International Particle Accelerator Conference 2021- online conference**, *Three-Dimensional Space Charge Oscillations in a Hybrid Photoinjector*, Poster Oral presentation.
June 2022	**International Particle Accelerator Conference 2022**, Bangkok, Thailand, *Space charge analysis for low energy photoinjector*, Posters Oral presentation.

Computer skills

Programming languages	**Python**, **C**
Calculation codes	**Matlab**, **Mathematica**
Simulation codes	**General Particle Tracer (GPT)**: a 3D particle tracer designed to simulate the movement of charged particles in the presence of electric and magnetic fields.
	A Space Charge Tracking Algorithm (ASTRA): beam dynamics code that tracks the particles of a distribution under the influence of internal and external fields.
	High-Frequency Structure Simulator (HFSS): electromagnetic (EM) 3D simulation software for designing and simulating high frequency electronic products.
	Poisson Superfish: a collection of programs for calculating static magnetic and electric fields and radio-frequency electromagnetic fields in either 2-D Cartesian coordinates or axially symmetric cylindrical coordinates.
	CST Studio Suite: simulation platform for all kinds of electromagnetic field problems and related applications.

Teaching Activities

2020-2021 **Lecture assistant** *Course of Physics I (Mechanics and Thermodynamics)*, for Electronic engineering students held by Professor L.Faillace. Sapienza, University of Rome.

2020-2021 **Lecture assistant** *Course of Physics (Mechanics, Thermodynamics and Electromagnetism)*, for Gestional engineering students held by Professor R.Li Voti. Sapienza, University of Rome.

2021-2022 **Lecture assistant** *Course of Physics II (Electromagnetism and Optics)*, for Aerospace engineering students held by Professor L. Palumbo. Sapienza, University of Rome.

2021-2022 **Lecture assistant** *Course of Physics I (Mechanics and Thermodynamics)*, for Clinic engineering students held by Professor M.C.Larciprete. Sapienza, University of Rome.

Languages

English Advanced

Italian **Mother tongue**

Scientific Publications

August 2022 **Journal paper**,F. Bosco, O. Camacho, M. Carillo, E. Chiadroni, L. Faillace, A. Fukasawa, A. Giribono, L. Giuliano, N. Majernik, A. Mostacci, L. Palumbo, J.B. Rosenzweig, B. Spataro, C. Vaccarezza, and M. Migliorati, "A fast tracking code for evaluating collective effects in linear accelerators", submitted on PRAB

June 2022 **Conference proceedings**, M. Carillo, M. Behtouei, F. Bosco, O. Camacho, E. Chiadroni, L. Faillace, *et al.*,"Space Charge Analysis for Low Energy Photoinjector",in *Proc. 13th International Particle Accelerator Conference (IPAC'22)*, Bangkok, Thailand, Jun. 2022, pp. 2272–2275. doi:10.18429/JACoW-IPAC2022-WEPOMS017

June 2022 **Conference proceedings**, L. Faillace, R.B. Agustsson, M. Behtouei, F. Bosco, D.L. Bruhwiler, O. Camacho, M. Carillo, *et al.*, "Start-to-End Beam-Dynamics Simulations of a Compact C-Band Electron Beam Source for High Spectral Brilliance Applications", in *Proc. 13th International Particle Accelerator Conference (IPAC'22)*, Bangkok, Thailand, Jun. 2022, pp. 687–690. doi:10.18429/JACoW-IPAC2022-MOPOMS023

June 2022 **Conference proceedings** , M. Behtouei, F. Bosco, M. Carillo, F. Di Paolo, L. Faillace, S. Fantauzzi, *et al.*, "Studies of a Ka-Band High Power Klystron Amplifier at INFN-LNF", in *Proc. 13th International Particle Accelerator Conference (IPAC'22)*, Bangkok, Thailand, Jun. 2022, pp. 683–686. doi:10.18429/JACoW-IPAC2022-MOPOMS022

June 2022 **Conference proceedings** ,F. Bosco, O. Camacho, M. Carillo, E. Chiadroni, L. Faillace, A. Fukasawa, *et al.*, "Modeling and Mitigation of Long-Range Wakefields for Advanced Linear Colliders", in *Proc. 13th International Particle Accelerator Conference (IPAC'22)*, Bangkok, Thailand, Jun. 2022, pp. 2350–2353. doi:10.18429/JACoW-IPAC2022-WEPOMS045

June 2022 **Conference proceedings** , D. Alesini, M.P. Anania, A. Battisti, M. Bellaveglia, A. Biagioni, F. Cardelli, M. Carillo *et al.*, "The New SPARC-LAB RF Photo-Injector", in *Proc. 13th International Particle Accelerator Conference (IPAC'22)*, Bangkok, Thailand, Jun. 2022, pp. 671–674. doi:10.18429/JACoW-IPAC2022-MOPOMS019

June 2022 **Conference proceeding**, L. Giuliano, D. Alesini, M. Behtouei, M.G. Bisogni, F. Bosco, M. Carillo, *et al.*, "Proposal of a VHEE Linac for FLASH Radiotherapy", in *Proc. 13th International Particle Accelerator Conference (IPAC'22)*, Bangkok, Thailand, Jun. 2022, pp. 2903–2906. doi:10.18429/JACoW-IPAC2022-THPOTK054

June 2022 **Journal paper**, L. Faillace, R. Agustsson, M. Behtouei, F. Bosco, D. Bruhwiler, O. Camacho, M. Carillo, *et al.*, "High Field Hybrid Photoinjector Electron Source for Advanced Light Source Applications", Phys. Rev. Accel. Beams 25, 063401 (2022). doi:10.1103/PhysRevAccelBeams.25.063401

May 2021 **Conference proceedings**,M. Carillo, M. Behtouei, F. Bosco, L. Faillace, L. Ficcadenti, A. Giribono, *et al.*, "Three-Dimensional Space Charge Oscillations in a Hybrid Photoinjector", in *Proc. IPAC'21*, Campinas, SP, Brazil, May 2021, pp. 3240–3243. doi:10.18429/JACoW-IPAC2021-WEPAB256

May 2021 **Conference proceedings**, L. Faillace, R.B. Agustsson, M. Behtouei, F. Bosco, M. Carillo, A. Fukasawa, *et al.*,"Beam Dynamics for a High Field C-Band Hybrid Photoinjector", in *Proc. IPAC'21*, Campinas, SP, Brazil, May 2021, pp. 2714–2717. doi:10.18429/JACoW-IPAC2021-WEPAB051

May 2021 **Conference proceedings**, F. Bosco, M. Behtouei, M. Carillo, L. Faillace, A. Giribono, L. Giuliano, *et al.*,"Modeling Short Range Wakefield Effects in a High Gradient Linac",in *Proc. IPAC'21*, Campinas, SP, Brazil, May 2021, pp. 3185–3188. doi:10.18429/JACoW-IPAC2021-WEPAB238

May 2021 **Conference proceedings**, L. Giuliano, D. Alesini, M. Behtouei, F. Bosco, M. Carillo, G. Cuttone, *et al.*,"Preliminary Studies of a Compact VHEE Linear Accelerator System for FLASH Radiotherapy", in *Proc. IPAC'21*, Campinas, SP, Brazil, May 2021, pp. 1229–1232. doi:10.18429/JACoW-IPAC2021-MOPAB410

September 2021 **Journal paper**, M. Behtouei, B. Spataro, L. Faillace, M. Carillo, M. Comelli, A. Variola, M. Migliorati, "A Novel method to calculate the magnetic field of a Solenoid generated by a surface current element", arXiv, (2021). doi:10.48550/arXiv.2109.04464

September 2021 **Journal paper**, B. Spataro, M. Behtouei, F. Cardelli, M. Carillo, V. Dolgashev, L. Faillace, M. Migliorati, L. Palumbo, "A hard open X-band RF accelerating structure made by two halves", arXiv, (2021). doi:10.48550/arXiv.2109.03954

September 2021 **Journal paper**, M. Behtouei, B. Spataro, L. Faillace, M. Carillo, A. Leggieri, L. Palumbo, M. Migliorati, "Relativistic approach to a low perveance high quality matched beam for a high efficiency Ka-Band klystron", arXiv, (2021). doi:10.48550/arXiv.2109.03520

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. **Migliorati** Mauro, Associate Professor at Dept. of Basic and Applied Science for Engineering, Sapienza University of Rome.

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

Prof.ssa **Chiadroni** Enrica, Associate Professor at Dept. of Basic and Applied Science for Engineering, Sapienza University of Rome.

Prof. **Rosenzweig** James, Distinguished Professor of Physics at the Department of Physics and Astronomy , University of California, Los Angeles.