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Giancarlo Gatti
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Curriculum Vitae

-Born on the fifth of April 1978 in Cassino (Italy).

-Italian citizen.

Languages

Italian: mother tongue.

English: proficient listening, reading, writing production and speaking level.

Two summer schools attended in Ireland in 1993 and 1994.

In occurrence of a professional collaboration with UCLA university during PhD, a six-month activity in Los Angeles was carried out.

Schools attended within the PhD path and reported in the educational section were held in foreign countries and requested auditing and examinations in English.

French: basic knowledge.

Spanish: intermediate knowledge. Able to carry out a speech and read/understand a text. Basic writing level.

Education and Working timeline

1998-04

Electronic engineering Master degree at “La Sapienza” university in Rome.

2004

Experimental thesis work at INFN National Laboratories (LNF) in Frascati (Italy) within the SPARC Free Electron Laser project framework, featuring laser and photoemitters physics and technology. Dissert. 108/110.

Attending JUAS (Joint University Accelerator School) school on particle accelerators physics and technology, held in Archamps (France) and organized by CERN. Courses lectures and final exams in English language.

Final mark for both courses: A.

2004-08

Access to Ph.D. for electromagnetic fields at “La Sapienza” university in Rome. Main topics: photonics applied to the last generation of advanced light sources (Free Electron Lasers).

USPAS (United States Particle Accelerator School) school in advanced particle accelerator physics, held in Phoenix (Arizona). Final mark: A.

Ph.D. activity at LNF and in collaboration with other international research institutions.

Six months stay at pbpl (particle beam physics laboratory) laboratory in UCLA (University of California Los Angeles).

Attending PhD course on FEL light sources and physics at UCLA.

2008

Ph.D. thesis on laser-driven electron bright sources, optical based diagnostics for electron beams, thin metal films deposition techniques (by laser ablation), laser diffraction guiding structures, electron acceleration by high power lasers.Ph.D. activity at LNF and in collaboration with other international research institutions.

2008

Employment at LNF laboratories as a temporary term technological researcher, still deeply involved in optical/photonic based activities, and, furthermore, earning additional experience on magnetic devices design, implementation, external procurement procedures with the necessary interfaces to the related involved companies.

2009

Coordinating SPARC_LAB laboratory laser activities, and interfacing with the new integrated facility featuring different multi TW Ti:Sa laser systems.

2010

Head of the laser group at LNF. Leading all the activities featuring the high power lasers of the whole laboratories.

Local coordinator for high gradient laser based acceleration activities at LNF (Self Injection Test Experiment of electron beams from gas target).

2011

Achieving researcher permanent position at LNF. Local coordinator for activities on Compton radiation sources based on optical electron sources from high gradient plasma acceleration. Involvement in solid target laser interactions for proton acceleration by high power lasers.

Participating international E.Fermi school in Varenna (Italy) on laser-plasma interactions for particle beam generation/acceleration organized by SIF (Italian physical society).

2012

Applying for Italian ministry call for young researcher activities (FIRB 2012 ref: RBFR12NK5K) within LNF team. Aim: investigate electron beam generation by high field plasma interactions.

The call, encompassing the following three years of activity has been won.

2013

Participating the Eurogammas consortium proposal for delivering a linac/laser based compton source within the tender for the nuclear physics pillar of the ELI project (Extreme Light Infrastructure).

2014

Applying as Principal Investigator for Italian ministry funding. Funding, for High power laser FLAME upgrade has been issued, in order to boost up laser based high gradient acceleration activities within the Sparc_lab framework.

Head for Norcia (Novel Researches Challenges In Accelerators) experiment, aimed for developing new generation of high gradient RF acceleration devices.

2015

Achieving a position at the CLPU (Centro de Láseres Pulsados) in Salamanca (Spain) as Director's advisor for laser technology during the installation of the VEGA PW laser.

2016

Achieving the position of head of the scientific division at CLPU, coordinating the experimental activities on the whole laser facility, included the VEGA tandem of 20TW-200TW-1PW.

Experience

Topics: Activities dealing with scientific/technological applications of lasers, optics and optoelectronics mainly applied to the particle accelerators fields of the last generation light sources (FELs). Deep experience in high power ultrafast lasers with a special focus on novel particle acceleration techniques and advanced plasma based radiation sources. Wide experience about electromagnetic fields, intense ultrafast lasers, radiation/matter interaction at high intensities.

Experience: Extensive use of different types of conventional laser sources, Nd:Yag, fiber doped, diode pump solid state, Excimer), as much as thermal sources (arc lamps), or particle based sources (Free Electron Laser, Cherenkov radiation, transition and diffraction radiation, Compton). Dealing with optical systems and detectors going from IR, THz, to UV wavelengths with experience also in the X/γ rays range.

The activities carried out so far, have dealt with experiments, in planning/design phase, with studies of feasibility (calculations, computer simulations), implementation of experiments, measurements activity and data analysis, plus the essential reporting/communication activity, either for internal use for the outside world (e.g. conferences or periodicals publications). Duties have been carried out independently as much as by means of team working, when necessary.

Experience in the full management of the activity of a high power (250 TW) laser laboratory. Though the main effort was dedicated to scientific topics, the different duties also involved all the necessary steps in order to operate in the laboratory. Procurement phase of spare parts as much as with possible upgrades evaluation and design of the laboratory, plus supervising and coordinating the job of all the people involved in the laboratory activity (technicians, students, researchers, other divisions' people and different companies). Interface to the users' side in order for them to access the facility and during the experiments optimizing the efforts in order to effectively achieve results. Support to the users' experiments during preparation, data taking and post processing. Interface to the technical/administrative divisions, for the necessary supporting duties. Scheduling and responsibility on the maintenance of the different ancillary installations (electrical, air, water, laser). Reporting to his supervisors and working according to the scientific guidelines

foreseen for the laboratory. Participating dedicated meetings meant to establish new activities and suggest new proposals.

Participating to the proposal for the delivering of a γ-ray source to the ELI-NP pillar, through the eurogammas consortium, which won the tender and is currently building the source.

Safety systems: During the design phase of the laboratory (FLAME laser lab. in Frascati), an active collaboration took place between the radioprotection department and my activity. Such collaboration lead to the implementation of the overall radioprotection safety system of the laser, developed in house and approved by the Italian minister. The main task I had to undertake was to translate the safety standards, already employed in the traditional particle accelerators to the laser installation, with the help of the radioprotection department for the shielding dimensioning. The scope of the work was to build a safety hardware system able to guarantee a safe activity with the high intensity laser, according to Italian law (redundancy and so on), and also streamline the laser activity, avoiding damage to the laser infrastructure in case of danger/interlocks and minimizing the downtime of the activity. Moreover, such infrastructure was meant to operate in connection with a close particle accelerator (named SPARC). The safety system needed to operate in connection with the other environment (the accelerator one) in a consistent way, as much as independently. All the activity scenarios have been evaluated and tested successfully.

Recently I have been involved in the design and dimensioning of an attenuator and a beam dump for the 200TW class laser and also for the PW laser part of the VEGA system at CLPU (Spain). These devices will operate in close connection with the safety system implemented at CLPU and now under test. The aim of these devices is to guarantee operational level in the laser bay at full power and allow people to work in the experimental area to without danger.

Publications: I supply a partial list of my publications, but more informations are available through the following links.

My Researcher ID in the ISI Web of Knowledge framework: K-3345-2013

My Orcid account: 0000-0001-7730-7893

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Partial Publication list

1. Agosteo, S. *et al.* The LILIA (laser induced light ions acceleration) experiment at LNF. *Nucl. Instruments Methods Phys. Res. Sect. B Beam Interact. with Mater. Atoms* **331,** 15–19 (2014).

2. Alesini, D. *et al*. The project PLASMONX for plasma acceleration experiments and a Thomson X-ray source at SPARC. *2005 Ieee Part. Accel. Conf. (Pac), Vols 1-4* 2661–2663 (2005).

3. Alesini, D. *et al*. Experimental results with the SPARC emittance-meter. *2007 Ieee Part. Accel. Conf. Vols 1-11* 677–679 (2007).

4. Bacci, A. *et al*. Electron Linac design to drive bright Compton back-scattering gamma-ray sources. *J. Appl. Phys*. **113,** 194508 (2013).

5. Bacci, A. *et al*. Status of Thomson source at SPARC/PLASMONX. *Nucl. Instruments Methods Phys. Res. Sect. A Accel. Spectrometers, Detect. Assoc. Equip*. **608,** S90–S93 (2009).

6. Chiadroni, E. *et al*. Production of high power terahertz radiation through the SPARC Free-Electron Laser. *35th Int. Conf. Infrared, Millimeter, Terahertz Waves (Irmmw-Thz 2010)* (2010).

7. Chiadroni, E. *et al*. The THz radiation source at SPARC. *Ix Int. Symp. Radiat. From Relativ. Electrons Period. Struct*. **357,** (2012).

8. Chiadroni, E. *et al*. The THz Radiation Source at the SPARC Facility. *6th Work. Infrared Spectrosc. Microsc. With Accel. Sources* **359,** (2012).

9. Chiadroni, E. *et al*. Characterization of the THz radiation source at the Frascati linear accelerator. *Rev. Sci. Instrum*. **84,** 022703 (2013).

10. Chiadroni, E. *et al*. The SPARC linear accelerator based terahertz source. *Appl. Phys. Lett*. **102,** 094101 (2013).

11. Cianchi, A. *et al*. Non-intercepting diagnostic for high brightness electron beams using Optical Diffraction Radiation Interference (ODRI). *Ix Int. Symp. Radiat. From Relativ. Electrons Period. Struct*. **357,** (2012).

12. Cianchi, A. *et al*. High brightness electron beam emittance evolution measurements in an rf photoinjector. *Phys. Rev. Spec. Top. - Accel. Beams* **11,** 032801 (2008).

13. Cianchi, A. *et al*. Challenges in plasma and laser wakefield accelerated beams diagnostic. *Nucl. Instruments Methods Phys. Res. Sect. A Accel. Spectrometers, Detect. Assoc. Equip*. **720,** 153–156 (2013).

14. Cultrera, L. *et al*. Photoemission characteristics of PLD grown Mg films under UV laser irradiation. *J. Phys. D. Appl. Phys*. **40,** 5965–5970 (2007).

15. Cultrera, L., Gatti, G. & Lorusso, A. Photoemission studies on yttrium thin films. *Radiat. Eff. Defects Solids* **165,** 609–617 (2010).

16. Cultrera, L., Gatti, G., Miglietta, P., Tazzioli, F. & Perrone, A. The role of the adsorbed gases on the photoelectron performance of Mg-based photocathodes. *Nucl. Instruments Methods Phys. Res. Sect. A Accel. Spectrometers, Detect. Assoc. Equip*. **587,** 7–12 (2008).

17. Cultrera, L. *et al*. Electron emission characterization of Mg photocathode grown by pulsed laser deposition within an S-band rf gun. *Phys. Rev. Spec. Top. - Accel. Beams* **12,** 043502 (2009).

18. Cultrera, L. *et al*. Mg based photocathodes for high brightness RF photoinjectors. *Appl. Surf. Sci.* **253,** 6531–6534 (2007).

19. Cultrera, L. *et al*. Photoelectron Emission from Yttrium Thin Films Prepared by Pulsed Laser Deposition. *J. Nanosci. Nanotechnol.* **9,** 1585–1588 (2009).

20. Dupraz, K. *et al*. Design and optimization of a highly efficient optical multipass system for γ-ray beam production from electron laser beam Compton scattering. *Phys. Rev. Spec. Top. - Accel. Beams* **17,** 033501 (2014).

21. Faccini, R. *et al*. Multi-GeV electron spectrometer. *Nucl. Instruments Methods Phys. Res. Sect. A Accel. Spectrometers, Detect. Assoc. Equip.* **623,** 704–708 (2010).

22. Faccini, R. *et al*. Multi-GeV electron spectrometer. *Nucl. Instruments Methods Phys. Res. Sect. A Accel. Spectrometers, Detect. Assoc. Equip.* **623,** 704–708 (2010).

23. Ferrario, M. *et al*. IRIDE: Interdisciplinary research infrastructure based on dual electron linacs and lasers. *Nucl. Instruments Methods Phys. Res. Sect. a-Accelerators Spectrometers Detect. Assoc. Equip.* **740,** 138–146 (2014).

24. Ferrario, M. *et al*. Direct measurement of the double emittance minimum in the beam dynamics of the sparc high-brightness photoinjector. *Phys. Rev. Lett.* **99,** (2007).

25. Ferrario, M. *et al*. SPARC_LAB present and future. *Nucl. Instruments Methods Phys. Res. Sect. B Beam Interact. with Mater. Atoms* **309,** 183–188 (2013).

26. Ferrario, M. *et al*. Laser comb with velocity bunching: Preliminary results at SPARC. in *Nucl. Instruments Methods Phys. Res. Sect. A Accel. Spectrometers, Detect. Assoc. Equip.* **637,** (2011).

27. Ferrario, M. *et al*. Experimental Demonstration of Emittance Compensation with Velocity Bunching. *Phys. Rev. Lett.* **104,** 054801 (2010).

28. Ferrario, M. & Gatti, G. SUMMARY OF WORKING GROUP 1: ELECTRON SOURCES. *Int. J. Mod. Phys. A* **22,** 4013–4021 (2007).

29. Filippetto, D. *et al*. Phase space analysis of velocity bunched beams. *Phys. Rev. Spec. Top. - Accel. Beams* **14,** 092804 (2011).

30. Frederico, J. *et al*. Simulation of an iris-guided inverse free-electron laser micro-bunching experiment. *2007 Ieee Part. Accel. Conf. Vols 1-11* 3465–3467 (2007).

31. Gallo, A., Bellaveglia, M., Gatti, G. & Vicario, C. Laser and RF synchronization measurements at SPARC. in *Proc. IEEE Part. Accel. Conf.* 992–994 (2007).

32. Gatti, G. *et al*. Power tests of a PLD film Mg photocathode in a RF gun. *2007 Ieee Part. Accel. Conf. Vols 1-11* 3194–3196 (2007).

33. Gatti, G. *et al*. Magnesium film photocathodes for high brilliance electron injectors. *2005 Ieee Part. Accel. Conf. (Pac), Vols 1-4* 4046–4048 (2005). doi:10.1109/PAC.2005.1590758

34. Gatti, G. *et al*. MEASUREMENTS OF QUANTUM EFFICIENCY OF MG FILMS PRODUCED BY PULSED LASER ABLATION DEPOSITION FOR APPLICATION TO BRIGHT ELECTRON SOURCES. *Int. J. Mod. Phys. A* **22,** 4051–4060 (2007).

35. Gatti, G., Cook, A., Rosenzweig, J. & Tikhoplav, R. Coherent Cherenkov radiation as a temporal diagnostic for microbunched beams. in *Proc. IEEE Part. Accel. Conf.* 998–1000 (2007).

36. Giannessi, L. Superradiant Cascade in a Seeded Free-Electron Laser. *Phys. Rev. Lett.* **110,** (2013).

37. Giannessi, L. *et al*. Self-amplified spontaneous emission for a single pass free-electron laser. *Phys. Rev. Spec. Top. - Accel. Beams* **14,** 060712 (2011).

38. Giannessi, L. *et al*. High-Order-Harmonic Generation and Superradiance in a Seeded Free-Electron Laser. *Phys. Rev. Lett.* **108,** 164801 (2012).

39. Giannessi, L. *et al*. Self-Amplified Spontaneous Emission Free-Electron Laser with an Energy-Chirped Electron Beam and Undulator Tapering. *Phys. Rev. Lett.* **106,** 144801 (2011).

40. Giannessi, L. *et al*. Superradiant cascade in a seeded free-electron laser. *Phys. Rev. Lett.* **110,** (2013).

41. Giulietti, D. *et al*. Control of the propagation of intense laser pulses in gas for laser plasma acceleration. *Nukleonika* **57,** 221–225 (2012).

42. Gizzi, L. A. *et al*. Laser-Plasma Acceleration and Radiation Sources for Applications. *2013 Conf. Lasers Electro-Optics Pacific Rim* (2013).

43. Gizzi, L. A. *et al*. Acceleration with self-injection for an all-optical radiation source at LNF. *Nucl. Instruments Methods Phys. Res. Sect. B-Beam Interact. With Mater. Atoms* **309,** 202–209 (2013).

44. Gontad, F. *et al*. Characterisation of Photocathodes Based on Pb Thin Film Deposited by UV Pulsed Laser Ablation. *J. Mater. Sci. Technol.* **30,** 37–40 (2014).

45. Grittani, G. M. *et al*. High energy electrons from interaction with a 10 mm gas-jet at FLAME. *Laser Accel. Electrons, Protons, Ions Ii; Med. Appl. Laser-Generated Beams Part. Ii; Harnessing Relativ. Plasma Waves Iii* **8779,** (2013).

46. Grittani, G. *et al*. High energy electrons from interaction with a structured gas-jet at FLAME. *Nucl. Instruments Methods Phys. Res. Sect. A Accel. Spectrometers, Detect. Assoc. Equip.* **740,** 257–265 (2014).

47. Labat, M. *et al*. High-gain harmonic-generation free-electron laser seeded by harmonics generated in gas. *Phys. Rev. Lett.* **107,** (2011).

48. Labate, L. *et al*. A self-injection acceleration test experiment for the FLAME laser. *Radiat. Eff. Defects Solids* **165,** 787–793 (2010).

49. Marcus, G. *et al*. Time-domain measurement of a self-amplified spontaneous emission free-electron laser with an energy-chirped electron beam and undulator tapering. *Appl. Phys. Lett.* **101,** 134102 (2012).

50. Mostacci, A. *et al*. Chromatic effects in quadrupole scan emittance measurements. *Phys. Rev. Spec. Top. Beams* **15,** (2012).

51. Musumeci, P. *et al*. Multiphoton photoemission from a copper cathode illuminated by ultrashort laser pulses in an rf photoinjector. *Phys. Rev. Lett.* **104,** (2010).

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53. Petrarca, M. *et al*. White-light femtosecond Lidar at 100 TW power level. *Appl. Phys. B* **114,** 319–325 (2013).

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55. Petrarca, M. *et al*. White-light femtosecond Lidar at 100 TW power level. *Appl. Phys. B* **114,** 319–325 (2013).

56. Petrillo, V. *et al*. Observation of Time-Domain Modulation of Free-Electron-Laser Pulses by Multipeaked Electron-Energy Spectrum. *Phys. Rev. Lett.* **111,** (2013).

57. Petrillo, V. *et al*. Dual color x rays from Thomson or Compton sources. *Phys. Rev. Spec. Top. Beams* **17,** (2014).

58. Pompili, R. *et al*. First single-shot and non-intercepting longitudinal bunch diagnostics for comb-like beam by means of Electro-Optic Sampling. *Nucl. Instruments Methods Phys. Res. Sect. a-Accelerators Spectrometers Detect. Assoc. Equip.* **740,** 216–221 (2014).

59. Ronsivalle, C. *et al*. Large-bandwidth two-color free-electron laser driven by a comb-like electron beam. *New J. Phys.* **16,** (2014).

60. Ronsivalle, C. *et al*. Comparison between SPARC e-meter measurements and simulations. *2007 Ieee Part. Accel. Conf. Vols 1-11* 3185–3187 (2007).

61. Rosenzweig, J. B. *et al*. Optimum electron bunch creation in a photoinjector using space-charge expansion. *2007 Ieee Part. Accel. Conf. Vols 1-11* 2288–2290 (2007).

62. Rosenzweig, J. B. *et al*. Experimental testing of dynamically optimized photoelectron beams. *Int. J. Mod. Phys. a* **22,** 4158–4178 (2007).

63. Rossi, A. R. *et al*. The External-Injection experiment at the SPARC_LAB facility. *Nucl. Instruments Methods Phys. Res. Sect. a-Accelerators Spectrometers Detect. Assoc. Equip.* **740,** 60–66 (2014).

64. Tikhoplav, R. *et al*. The UCLA helical permanent-magnet inverse free electron laser. *2007 Ieee Part. Accel. Conf. Vols 1-11* 2299–2301 (2007).

65. Vaccarezza, C. *et al*. Status of the SPARC-X project. *2007 Ieee Part. Accel. Conf. Vols 1-11* 3200–3202 (2007).

66. Valente, P. *et al*. Development of a Multi-GeV spectrometer for laser-plasma experiment at FLAME. *Nucl. Instruments Methods Phys. Res. Sect. a-Accelerators Spectrometers Detect. Assoc. Equip.* **653,** 42–46 (2011).

67. Vicario, C. *et al*. Drive laser system for SPARC photoinjector. *2007 Ieee Part. Accel. Conf. Vols 1-11* 3203–3205 (2007).

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68. Villa, F. *et al*. Laser pulse shaping for multi-bunches photoinjectors. *Nucl. Instruments Methods Phys. Res. Sect. a-Accelerators Spectrometers Detect. Assoc. Equip.* **740,** 188–192 (2014).

Salamanca, December 19th, 2016.