EUROPEAN CURRICULUM VITAE FORMAT

PERSONAL INFORMATION

Name	ENRICO MASSIMILIANO ALLARIA
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Nationality	Italian, German and Argentinean
Date of birth	10, 01, 1973

WORK EXPERIENCE

• Dates (from – to)	**FROM APRIL 2008**
• Name and address of employer	Sincrotrone Trieste S.C.p.A., Strada Statale 14 - km 163,5 in AREA Science Park, 34012 Basovizza, Trieste ITALY
• Type of business or sector	Research
• Occupation or position held	Staff researcher
• Main activities and responsibilities	Starting from **January 2019** head of machine physics of FERMI. In charge of coordinating the machine R&D and experiments oriented at the optimization of the FEL and development of new configurations for users. Starting from **September 2016** responsible for the EEHG experiment at FERMI. In charge of managing the experimental project that include modification to the FERMI layout. Starting from **2013** member of the FERMI steering team and responsible for the FEL studies. Responsible of machine dedicated experiment and close collaborator of selected user experiments. Proponent of FEL experiment and future options upgrades of FERMI. Report about FERMI progress and results of FEL to Machine Advisory Committee. Starting from **2010** part of the FERMI commissioning team responsible for the planning and the organization of the various commissioning phases of the FERMI accelerator and FELs. Report about the status, progress and results of FEL commissioning at FERMI to the management and Machine Advisory Committee and the Scientific Advisory Council of the Sincrotrone Trieste laboratory. Involved in the commissioning activity with shifts and meetings. Starting from March **2009** responsible for FERMI Physics Liaison Support for FEL physics. Report directly to the FERMI Project Office providing the information needed to make informed decisions regarding the FEL. Coordinate the FEL optimization studies.
• Dates (from – to)	**JULY 2015**
• Name and address of employer	SLAC National Accelerator Laboratory, Menlo Park, CA
• Type of business or sector	Research
• Occupation or position held	Visiting physicist
• Main activities and responsibilities	Discussions and preliminary experiments on micro-bunching effects on LCLS.
• Dates (from – to)	**JULY 2012**
• Name and address of employer	SLAC National Accelerator Laboratory, Menlo Park, CA
• Type of business or sector	Research
• Occupation or position held	Visiting physicist

• Main activities and responsibilities	Studies and simulations to investigate possibilities to enhance the capability of LCLS to emit harmonic radiation. Participate to machine studies shifts.
• Dates (from – to)	**FROM APRIL 2011 TO MAY 2011**
• Name and address of employer	SLAC National Accelerator Laboratory, Menlo Park, CA
• Type of business or sector	Research
• Occupation or position held	Visiting physicist
• Main activities and responsibilities	Studies and simulations to investigate different possibilities for the polarization control at LCLS free electron laser. Free electron laser simulations for the use of second harmonic after burned undulator in LCLS.
• Dates (from – to)	**FROM MARCH 2005 TO MARCH 2008**
• Name and address of employer	Sincrotrone Trieste S.C.p.A., Strada Statale 14 - km 163,5 in AREA Science Park, 34012 Basovizza, Trieste ITALY
• Type of business or sector	Research
• Occupation or position held	Collaboration as a researcher
• Main activities and responsibilities	From **2007** collaboration to the Free Electron Laser optimization studies in the framework of the FERMI project for the construction of a new Free Electron Laser facility. From **2005** collaboration on the Storage Ring Free Electron Laser experimental activities.
• Dates (from – to)	**FROM SEPTEMBER 2003 TO MARCH 2005**
• Name and address of employer	University of Florence, Dept. of Physics, Via G. Sansone 1, Sesto Fiorentino (FI), Italy
• Type of business or sector	Research, Education
• Occupation or position held	Collaboration as a researcher
• Main activities and responsibilities	Collaboration with the Department of Physics at the University of Florence in the framework of the Italian Research Project “Science and Technology in the society of Knowledge: Economics and Complexity”. - Experimental, theoretical and numerical activity in nonlinear dynamics in laser. - January 2004 and November 2004: Guest researcher at the University Rey Juan Carlos, Mostoles (Spain). - Preparation of the Integrated Action project Azione Integrata Italia-Spagna “Controllo e Sincronizzazione di Dinamiche Laser e Sistemi Spazialmente Estesi” approved and financed by the MIUR for the years 2004-2005 (IT1348). - I collaborated in the management of the MIUR project “Science and Technology in the society of Knowledge: Economics and Complexity” for the Florence unit.
• Dates (from – to)	**FROM SEPTEMBER 2000 TO SEPTEMBER 2003**
• Name and address of employer	Istituto Nazionale di Ottica Applicata, Largo E. Fermi 6 (FI), Italy
• Type of business or sector	Research,
• Occupation or position held	Pre Doc fellowship
• Main activities and responsibilities	Pre-Doc Fellowship at the Istituto Nazionale di Ottica Applicata in the framework of the European project "Control, Synchronization and Characterization of Spatially Extended Nonlinear Systems" (HPRN-CT-2000-00158). - Experimental, theoretical and numerical activity in nonlinear dynamics in laser. - Preparation of the project Azione Integrata Italia-Spagna “Sincronizzazione e controllo in sistemi ottici nonlineari” approved and financed for the years 2002-2003 (IT853). - Collaboration in the management of the ECC project “Control, Synchronization and Characterization of Spatially Extended Nonlinear Systems” for the INOA unit.
• Dates (from – to)	**FROM APRIL 2000 TO SEPTEMBER 2000**
• Name and address of employer	Istituto Nazionale di Ottica Applicata, Largo E. Fermi 6 (FI), Italy
• Type of business or sector	Research,
• Occupation or position held	Scientific collaboration
• Main activities and responsibilities	Scientific collaboration with the Istituto Nazionale di Ottica in the framework of the CNR project n° 970072.CT02 for the study of synchronization problems in a Chaotic CO2 laser. - Experimental, theoretical and numerical activity in nonlinear dynamics in laser.
• Dates (from – to)	**FROM APRIL 1999TO APRIL 2000**
• Name and address of employer	Istituto Nazionale di Ottica Applicata, Largo E. Fermi 6 (FI), Italy

• Type of business or sector	Research,
• Occupation or position held	Graduation thesis
• Main activities and responsibilities	Graduation thesis at the Istituto Nazionale di Ottica; parallel to the experimental work of the Thesis, I participated in experiments for the characterization of chaotic dynamics in a CO2 laser with large Fresnell number.

EDUCATION AND TRAINING

• Dates (from – to)	**from 2003 to 2006**
• Name and type of organisation providing education and training	University of Florence, Dept. of Engineering
• Principal subjects/occupational skills covered	***Ph.D. in "Nonlinear Dynamics and Complex Systems"***

4-5 December 2006 Workshop on the Physics of Seeded Short-Wavelength FEL's, Bessy, Berlin, Germany.

2-14 October 2005 CERN Accelerator School "Accelerator Physics (Intermediate level)" Abdus Salam International Center for Theoretical Physics Adriatico Guesthouse, Trieste, Italy

13-15 April 2005 Workshop "1st FERMI@Elettra Workshop" Elettra, Trieste.

6-8 October 2004 Workshop "Lectures in Complex Systems" Polo Scientifico, Università di Firenze.

29 July - 10 August 2004 40th Course of the "International School of Quantum Electronics - OPTICAL CHEMICAL SENSORS", Erice, Sicily - Italy

23,24 April 2004 Workshop "Integration between vehicle routing algorithms and microscopic simulation", Dipartimento di Sistemi e Informatica - Università di Firenze.

11 July 2003 Workshop "Fisici in finanza: Professione, Ricerca, Formazione", Politecnico di Milano, Milano.

8-11 May 2003 Workshop "Signal Analysis for Synchronization, Control and Modeling of Spatially Extended Systems", University of Mining and Metallurgy, Krakow Poland.

• Title of qualification awarded	PhD. Degree, April 2007
• Dates (from – to)	**From 2000 to 2002**
• Name and type of organisation providing education and training	University of Florence
• Principal subjects/occupational skills covered	***Specialization diploma on Optics***

The Thesis has been discussed the 19 December 2002 (70/ 70 cum Laude) [70 the best].

The courses I attended were:

Laboratory of Optics I, General Optics, Technique and application of Lasers, Infrared techniques, Quantum Optics, Optical Fibers, Laboratory of Optics II, Optoelectronic systems.

10-15 Mach 2002 The 7th Minerva Winter School "Frontiers In Non-Linear Physics", at the Weizmann Institute Of Science in Rehovot (Israel).

• Title of qualification awarded	Specialization master on Optics, December 2002
• Level in national classification	70 cum Laude (70 the best)
• Dates (from – to)	**From 1992 to1999**
• Name and type of organisation providing education and training	University of Florence
• Principal subjects/occupational skills covered	***Degree in Physics*** at the University of Florence, the 1994-1995 academic year has been done at the University of Mainz in Germany in the framework of the European Project ERASMUS; the Degree's Thesis has been discussed the 18 April 2000.

During my degree on Physics besides the standard courses I attended the courses on :

Optics, Physics of Low Temperatures, Laboratory for the Physics of Matter, Superior Physics (Quantum Physics, NonLinear Systems), Electronics' Laboratory.

• Title of qualification awarded	Degree in Physics, April 2000
• Level in national classification	102 (110 the best)

PERSONAL SKILLS AND COMPETENCES

Acquired in the course of life and career but not necessarily covered by formal certificates and diplomas.

MOTHER TONGUE — **ITALIAN**

OTHER LANGUAGES

SPANISH

• Reading skills	Excellent
• Writing skills	Good
• Verbal skills	Excellent

FRENCH

• Reading skills	Good
• Writing skills	Good
• Verbal skills	Good

ENGLISH

• Reading skills	Good
• Writing skills	Good
• Verbal skills	Good

GERMAN

• Reading skills	Minimal
• Writing skills	Minimal
• Verbal skills	Minimal

SOCIAL SKILLS AND COMPETENCES

Living and working with other people, in multicultural environments, in positions where communication is important and situations where teamwork is essential (for example culture and sports), etc.

During my experience at Elettra Sincrotrone Trieste, at the University of Florence and at INOA I had the possibility of productively work in international teams in direct collaboration with researchers of other groups visiting the Institute or by distance collaborations.
I'm involved in the activities done at Elettra Sincrotrone Trieste to promote the work done at the laboratory with guided tours for schools.
I'm part of a group of colleagues organizing running activities (competitions, excursions, ..).

At Sincrotrone Trieste I have collaborated to the work of master and PhD students at Univeristy of Trieste and Nove Gorica (Francesca Curbis, Simone Spampinati, Eugenio Ferrari, Vanessa Grattoni).
At INOA I participated at the graduation work thesis at the University of Florence of the student David Cinotti in 2002 and Francesco Salvadori in 2004/2005.
I collaborated with Dr. R. Meucci in the preparation of courses in Quantum Optics for the diploma on Optics at the University of Florence.
I collaborated in the preparation of the 8thExperimental Chaos Conference organized in Florence in June 2004. I have been involeved in the organization of few workshops organized by Elettra Sincrotrone Trieste.

ORGANISATIONAL SKILLS AND COMPETENCES

Coordination and administration of people, projects and budgets; at work, in voluntary work (for example culture and sports) and at home, etc.

As responsible for the EEHG experiment I'm in charge of coordinating the activities of all the groups and collaborators involved.
From 2009 I have been part of the team responsible to organize the commissioning of the FERMI free electron laser in order to achieve the project goals. The work required a continuous interaction with the project director and implied the coordination of a group of about 20 people with the other teams involved in the project and working on the laboratory.
During my working experiences I collaborated in the administrative processes for the management of National and International projects involving my groups.

TECHNICAL SKILLS

I have a good experience of working with the control system TANGO used for the Elettra and

AND COMPETENCES
With computers, specific kinds of equipment, machinery, etc.

FERMI.
I have expertise in the main operative systems (Windows, Linux, MacOS) and its main programs for: Office Automation (MS Office, Open Office, etc.); Data elaboration (Origin, Matlab, Igor, etc.)
I have programming experience in Python, Fortran, C, Matlab and other mathematic software for numerical calculation and data analysis, and LabView for automatic data acquisition routines.
I have used FEL numerical codes like GINGER and GENESIS.

ARTISTIC SKILLS AND COMPETENCES
Music, writing, design, etc.

basket player, runner

OTHER SKILLS AND COMPETENCES
Competences not mentioned above.

REFEREE OF SCIENTIFIC JOURNALS, PHYS. REV., EUROP. PHYS. JOURN. D, CHAOS, OPT. COMMUN.. IEEE JOUR. OF QUANT. ELECT, COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION, NATURE.

DRIVING LICENCE(S)

Italian driving license A and B

ADDITIONAL INFORMATION

SCIENTIFIC REFERENCES

Dr. Giovanni De Ninno
Sincrotrone Trieste
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ANNEXES

SCIENTIFIC ACTIVITY AND LIST OF SELECTED PUBLICATIONS

Scientific activity of Enrico Massimiliano Allaria

During the first part of his career Enrico has been working (as part of the PhD program) at the Italian National Institute of Applied Optics (INOA) in Florence. During these years the work done in collaboration with Prof. F.T. Arecchi and Dr. Meucci has been focused to nonlinear dynamic studies in laser systems and coupled chaotic oscillators. Experiments, done on a specially designed CO_2 laser, have allowed the investigation of several problems related to the synchronization and the control of chaotic coupled systems. The experimental setup prepared at INOA has been used as a benchmark for a number phenomenon previously predicted by the theory of complex and chaotic systems [1,2]. During this period he has been involved in the experiment preparation and execution as well as in the data analysis and the modeling. Further experiments performed at INOA have been dedicated to the study of the mode and polarization dynamics in multimode and quasi-isotropic optical cavities [3]. The CO_2 laser has been also used for developing new techniques for optical measurements at 10.6μm [4].

In 2005 at the end of his PhD Enrico joined the accelerator group at Elettra - Sincrotrone Trieste (henceforth: Elettra) when the preparation of the Conceptual Design Report has just started. The design of FERMI has been focused in extending the capabilities of other existing and planned FELs by improving on the longitudinal coherence of emitted pulses. Given the target spectral range of FERMI (VUV and soft-X-ray) the choice fell upon an externally seeded FEL in the High Gain Harmonic Generation (HGHG) scheme.

In parallel with the design of the new FERMI facility he has been part of a small team lead by Dr. G. De Ninno and conducting the experimental activities at the existing Storage Ring Free Electron Laser (SR-FEL) in Elettra. Well before FERMI became available, the existing SR-FEL, previously operated in the oscillator configuration, has been modified to be operated in a seeded mode using an external laser [5]. This gave to the team a direct, extensive experience of the problems and the issues of seeded FELs. Most of the work done on the SR-FEL has been instrumental in guiding the design of FERMI. Several of these studies, notably the one on the characterization of the nonlinear harmonic emission [6], have been crucial for the final definition of the FERMI parameters.

Enrico's scientific interest was not purely instrumental, from the very beginning (i.e., the development of the SR-FEL), and it has been looking for collaborations with scientists interested in using the specific properties of the radiation being produced, whose properties were complementary to the radiation normally available at a storage ring. A pioneering pump-probe experiment has been done using the SR-FEL [7] and has resulted in more extensive ones on FERMI and LCLS [8].

Since 2009, near the end of the construction phase of FERMI, he has been leading the group in charge of FEL studies. As a result of the studies on the efficiency of harmonic generation it has been possible to extend the tuning range of FERMI beyond the original 10 nm proposed in the CDR, in response to a strong drive from the Users' community to reach the carbon 1s edge. Users can now request wavelengths down to 4 nm, and proof-of-principle emission has been obtained at 1.3 nm. The large tuning range of the FERMI facility requires the use of two different FEL sources, Enrico has significantly contributed to the commissioning and optimization of both FEL-1 covering the range 100 – 20 nm [9] and FEL-2 for the 20 – 4 nm [10] spectral range.

When the operations of FERMI FEL-1 started in 2010, as part of the FERMI Commissioning Team, Enrico was

responsible for FEL studies and experiments, and he has been leading the efforts towards an optimized FEL, and towards meeting or exceeding the design parameters. For the characterization of the FEL polarization [11], that is one of the important parameters that can be adjusted at FERMI, Enrico has assembled and managed a collaboration with scientists from various laboratories, and coordinated a dedicated experimental campaign.

Since 2013 as a member of the FERMI steering team coordinated by Dr. L. Giannessi, he has been involved in machine operations and experiments. Given the unique capabilities of FERMI, and the many possible development directions, it has been extremely important to establish a strong interaction between the people working on the machine (accelerator and FEL) and the scientists interested in using the produced FEL radiation. Taking advantage of this fruitful collaboration Enrico has actively contributed to the developed of new operational modes and schemes that have been implemented at FERMI during the years [12,13,14]. These new operational modes that take full advantage of the coherence of FERMI are now available and successfully used by the FERMI users with FEL-1.

With the idea of extending the new capabilities and schemes to the spectral range of FEL-2 in 2016 Enrico have proposed an experiment to demonstrate for the first time the benefits of Echo Enabled Harmonic Generation (EEHG) in the VUV – soft X-ray spectral region. From 2017 to 2018 he has been in charge of the EEHG experiment at FERMI that required few modification to the hardware and an integration with the FERMI schedule with the operations for users. EEHG experiment has successfully concluded in August 2018 with the first demonstration of EEHG FEL amplification in the soft X-ray and evidence of coherent signal at harmonic as high as 101 [15].

Since 2019 Enrico is in charge for the machine development of FERMI that includes both organization of R&D machine time and work toward the design of future upgrades of FERMI.

Beside his work at FERMI over the last year Enrico has been also collaborating with other laboratories. In 2011-12 he has been working with SLAC on the on the preparatory studies for the DELTA polarized undulator successfully tested and used at LCLS. Over the years he has been invited to Advisory Committees for the Shanghai FEL, the Swedish FEL and he has been involved in few of the seeding experiment performed at SINAP.

Since the beginning of his scientific career Enrico is contributing to the reviewing process of scientific journals such as Phys. Rev. Lett., Nature Commun, PRAB, NIM, New Journal of Physics, Opt. Commun, … .

Over the past years Enrico has been invited to present results of his research at several international conferences.

List of selected articles:

[1] C.S. Zhou, J. Kurths, E. Allaria, R. Meucci, … F.T. Arecchi, "*Noise-enhanced synchronization of homoclinic chaos in a CO2 laser*", Phys. Rev. E **67**, 015205, 152051-152054 (2003).

[2] M. Thiel, M.C. Romano, J. Kurths, E. Allaria, F.T. Arecchi, "*Influence of observational noise on the recurrence quantification analysis*", Physica D **171**, 138-152 (2002).

[3] I. Leyva, E. Allaria and R. Meucci, "*Transient polarization dynamics in a CO2 laser*", Opt. Commun. **217**, 335-342 (2003).

[4] E. Allaria, S. Brugioni, S. De Nicola, … and R. Meucci, "*Digital holography at 10.6 μm*", Opt. Commun. **215**, pp. 257-262 (2003)

[5] G. De Ninno, E. Allaria, …, and M. Trovò, "*Generation of Ultrashort Coherent Vacuum Ultraviolet Pulses Using Electron Storage Rings: A New Bright Light Source for Experiments*" Phys. Rev. Lett. **101**, 053902 (2008).

[6] C. Spezzani, E. Allaria, … , and G. De Ninno, "*Coherent Light with Tunable Polarization from Single-Pass Free-Electron Lasers*" Phys. Rev. Lett. **107**, 084801 (2011).

[7] M. Sacchi, C. Spezzani, E. Allaria, … , and G. De Ninno, "*Time resolved pump-probe scattering in MnAs/GaAs(001): A look into the dynamics of alpha-beta stripe domain*" Applied Physics Letters **100**, 211905 (2012)".

[8] C. Spezzani, E. Ferrari, E. Allaria, … , and M. Sacchi, "*Magnetization and Microstructure Dynamics in Fe/MnAs/GaAs(001): Fe Magnetization Reversal by a Femtosecond Laser Pulse*", Phys. Rev. Lett. **113**, 247202 (2014); F.Vidal, …, E. Allaria, …, and M. Sacchi, "*Ultrafast Structural Dynamics along the β–γ Phase Transition Path in MnAs*" Phys. Rev. Lett. **122**, 145702 (2019).

[9] E. Allaria, *et al.*, "*Highly coherent and stable pulses from the FERMI seeded free-electron laser in the extreme ultraviolet*", Nat. Photon. **6**, 699–704 (2012).

[10] E. Allaria, *et al.*, "*Two-stage seeded soft-X-ray free-electron laser*", Nat. Photon. **7**, 913 (2013).

[11] E. Allaria *et al.*, "*Control of the Polarization of a Vacuum-Ultraviolet, High-Gain, Free-Electron Laser*", Phys. Rev. X **4**, 041040 (2014).

[12] K.C. Prince, E. Allaria, *et al.*, "*Coherent control with a short-wavelength free-electron laser*", Nat. Photon. **10**, 176 (2016).

[13] D. Gauthier, *et al.*, "*Generation of Phase-Locked Pulses from a Seeded Free-Electron Laser*", Phys. Rev. Lett. **116**, 024801 (2016).

[14] E. Ferrari, *et al.*, "*Widely tunable two-colour seeded free-electron laser source for resonant-pump resonant-probe magnetic scattering*", Nat. Commun. **7**, 10343 (2015).

[15] P. Rebernik, … and E. Allaria, "*Coherent soft x-ray pulses from an echo-enabled harmonic generation free-electron laser*", Nat Photon. **13**, 555 (2019)