



Europass Curriculum Vitae

Personal information

First name(s) / Surname(s) **Giuseppe Dattoli**
Work Address ENEA Centro Ricerche Frascati, Via E. Fermi, 45
00045 Frascati (Rome) Italy
HOME ADDRESS
Telephone(s)
E-mail
Nationality
Date of birth
Gender

Professional Career

Theory of electromagnetic processes of classical and quantum nature, for the study of laser processes of conventional or Free Electron type.
Theory and Design of Free Electron Lasers including undulator based devices and millimetre waves
Theory of Special Functions and development of Algorithms based on new computational methods
Applied Analysis

Dates 2016-2020
Occupation or position held ENEA CONSULTANT

Retired from may 1-st 2020

LAST POSITION

Director Senior Scientist at ENEA Fusion Department

Main activities and responsibilities

Responsible of the CARM project task force. Theory of relativistic wave equations and development of new methods for the relevant solution. Development of the theory of Cyclotron Auto Resonance Maser (CARM), Task Force leader for the design of a new source of coherent radiation in the microwave range for plasma heating experiments and coordinator of the Conceptual Design Report, and from 2015 to 2019 Responsible (for ENEA) of the EUPRAXIA EU project and Responsible for ENEA of the FEL SPARC project.

Dates 2010-2015

Occupation or position held Director of the unit of Mathematical models at ENEA FRASCATI CENTER

Main activities and responsibilities

Development of symbolic computational methods for the solution of Evolution equations and of transport equations and Energetic Models for cancer mass evolution.
Theory of Undulator Free Electron Laser-Design of new operating Schemes-Theory of Instabilities in high current density accelerators-High Quality electron beam transport.

Dates	2011
Occupation or position held	Visiting professor at university Paris XIII
Main activities and responsibilities	Theory of indicial umbral calculus-Design of X-ray Free Electron Laser and study of the relevant performances-Study of non linear Harmonic generation in Free Electron Laser.
Dates	1994-2010
Occupation or position held	Director of the Unit of Theoretical Physics and applied Mathematics at ENEA FRASCATI CENTER
Main activities and responsibilities	Responsible for ENEA of the FEL SPARC projectDesign of SPARX FEL facility. Development of symbolic computational methods for the solution of Evolution equations and of transport equations. Development of MAGNETIC undulators- study of exotic undulators and theory of FEL operating with biharmonicundulators.
Dates	1990-1995
Occupation or position held	Responsible (for ENEA) of the FEL project for the fusion program with heavy ions
Main activities and responsibilities	Design of FEL operating in the VUV region of the spectrum-Study of FEL operating with Storage Ring Theory of high gain FEL and of FEL instability Theory of Saw Tooth instability Theory of Instability Suppression and Landau Damping.
Dates	1985-1990
Occupation or position held	Responsible for ENEA of the Cerenkov FEL in collaboration with Dartmouth college
Main activities and responsibilities	Development of new experimental lines for Cerenkov FEL and realization of the first FEL source operating with microtron at the ENEA FrascatiCenter. Development of FEL design theory.
Dates	1984
Occupation or position held	Visiting Scientist at Dartmouth College (Dartmouth, N. H. USA)
Main activities and responsibilities	Theory of Cerenkov Free Electron Laser-Development of FEL Quantum –Realization of A Cerenkov FEL at the ENEA Frascati centre.
Dates	1983
Occupation or position held	Visiting Scientist at university of California at Santa Barbara.
Main activities and responsibilities	Theory of FEL oscillators, modelling of Santa-Barbara FIR experiment Study of FEL oscillators operating at higher harmonics and design of a Cerenkov FEL to be operated at the ENEA RFRASCATI centre.
Dates	1982
Occupation or position held	Visiting Scientist at Stanford University
Main activities and responsibilities	Classical FEL theory, Theory of Mode locked FEL, theory of FEL super-modes , development of FEL design theories, development of techniques for the solution of time dependent Schroedinger equation.
Dates	1979
Occupation or position held	Visiting Lecturer at the International Center of Theoretical Physics (Trieste)
Main activities and responsibilities	Classical Free Electron Theory.
Dates	1979-1982
Occupation or position held	Staff Member at CNEN
Main activities and responsibilities	Theory of FEL and Design of FEL operating in the IR region with microtrons, study of the radiation emitted by relativistic in magnetic undulators-FEL oscillator design.
Dates	1977-1978
Occupation or position held	Fellowship at CNEN (now Enea)

Main activities and responsibilities Theory of Free Electron Laser (FEL) and participation at the LEDA project (design of a Storage Ring FEL) .

Dates 1976-1977

Occupation or position held INFN-LNF ASSOCIATE

Main activities and responsibilities Construction of a source of high intensity GAMMA rays Via Compton Backscattering of laser photons on 1.5 GeV ADONE electrons (LADON PROJECT)
Study of the Nucleon Polarizabilities
Physics of high energy, electromagnetic properties of Charmed Hadrons and development of group theoretical particle classification.

Education and training

Dates 1976-1977

Title of qualification awarded Postgraduate School in High Energy Physics

Principal subjects/occupational skills covered High Energy Physics Theoretical and Experimental

Name and type of organisation providing education and training University of Rome La Sapienza – Italy

Dates 1971-1976

Title of qualification awarded Laurea Degree (cum laude) in Physics

Principal subjects/occupational skills covered Thesis c/o Laboratori Nazionali di Frascati, LADON PROJECT, and work on Nuclear structure, nucleon structure and of electromagnetic properties of Charmed Hadron

Name and type of organisation providing education and training University of Rome La Sapienza – Italy

Participation to committees

Dates 2017-2020

committee Member of ENEA Scientific Technical Committee.

Dates 2003-2008

committee Member of ARPA LAZIO technical board.

Dates 2008-2012

committee Member of INFN board of directors.

Dates 2000-2007

committee Member of SPARX project technical board.

Dates 1994-1998

committee Member of Inertial Fusion with heavy ions project technical board.

Dates Rome August 1994

committee Co-chairman of 1996 International FEL conference.

Professor Adjunct

Dates 2000-2016

	<p>Courses at Rome University, La Sapienza (Roma) – Italy (Department of Medicina e Chirurgia)</p> <ul style="list-style-type: none"> - General Physics (Undergraduate Level) - Technical Physics (Graduate Level) - Elementary Calculus (under graduate level)
Dates	2008-2009
	<p>Courses at Third Rome University –Italy (Department of Physics)</p> <ul style="list-style-type: none"> - Group Theory (Graduate Level) - Mathematical Methods for Physics (Graduate Level) - Physics of Free Electron Laser (Graduate Level)
Dates	2003
	<p>Course of at Rome University La Sapienza (Roma) Italy - (Physics Department)</p> <ul style="list-style-type: none"> - Physics of Accelerators
Dates	1988
	<p>Courses at Napoli University Federico II - Italy</p> <ul style="list-style-type: none"> - Free Electron Lasers (Specialistic Course)
Awards & Honors	
Dates	1978
committee	Recipient prize of Italian Society of Physics for young Scientists.
Dates	1994
committee	Recipient of the International FEL prize.
	2015
	LOMONOSOV CONFERENCE (MOSCOW)
	INVITED SPEAKER
	2015
	European Physical Society Conference (Lisbon)
	Invited Speaker
	2017
	Award
	Long Life Achievements
	of the
	Society For Applications of Mathematics
	MANIPAL UNIVERSITY JAIPUR INDIA
Supervisor Activity	
	Advisor of 20 Laurea thesis in Physics and Mathematics and of 2 P.h.D. thesis
Personal skills and competences	

Mother tongue(s) **Italian**

Other language(s)

Self-assessment

European level (*)

English

French

Understanding				Speaking				Writing	
Listening		Reading		Spoken interaction		Spoken production			
C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
C1	Proficient user	C1	Proficient user	C1	Proficient user	C2	Proficient user	B2	Independent user

Hobbies

Scientific Divulgator

Novel Writer

**Scientific publications
1977-2000**

Author of about 1000 papers on peer reviewed journals covering different aspects of physics and technology of accelerators, of lasers and Free Electron Lasers. A significant part of them is also devoted to mathematical physics and new computation techniques, including symbolic languages.

H-Index

42-with self citations

34-without self citations

A partial list summarizing 43 years of scientific career is given below

The complete list can be found at

https://www.researchgate.net/profile/Giuseppe_Dattoli2/research

PEER-REVIEWED JOURNAL ARTICLES (PARTIAL)

G. Dattoli, G. Matone and D. Prospero, Hadron polarizabilities and quark models, Lett. Nuovo Cimento, 19, 601 (1977)

G. Dattoli and A. Renieri, Storage Ring operation of the Free Electron Laser: The oscillator, Il NuovoCimento 59-B, 1 (1980)

G. Dattoli, A. Marino, A. Renieri and F. Romanelli, Progress in the Hamiltonian Picture of Free Electron Laser, IEEE-JQE 17, 1371 (1981)

G. Dattoli, S. Solimeno and A. Torre, Algebraic time-ordering techniques and harmonic oscillator with time-dependent frequency, Phys. Rev. A , 34, 2646 (1984)

W. B. Colson, G. Dattoli and F. Ciocci, Angular-Gain Spectrum in Free Electron Laser, Phys. Rev. A 31828 (1985)

G. Dattoli, J. C. Gallardo and A. Torre, Binomial Sates of the Quantized Radiation Field: A Comment, JOSA B-4, 185 (1987)

G. Dattoli, J. C. Gallardo and A. Torre, An Algebraic View to Operator Ordering and to its Application in Optics, La Rivista del NuovoCimento Vol. 11-1 (1988)

- G. Dattoli, R. Mignani and A. Torre, Non Hermitian Evolution of two-level quantum systems, *Phys. Rev. A* 42, 1467 (1990).
- F. Ciocci, G. Dattoli, A. De Angelis, B. Faatz, F. Garosi, L. Giannessi, P. L. Ottaviani and A. Torre, Design Considerations of a High power VUV FEL, *IEEE-JQE* 31, 1242 (1995)
- G. Dattoli, P. L. Ottaviani, A. Torre and L. Vazquez, Evolution operator equations: Integration with algebraic and finite difference methods. Applications to physical problems in classical and quantum mechanics and quantum field theory, *La Rivista del NuovoCimento*, vol. 20-1, (1997)
- G. Dattoli, Generalized polynomials, operational identities and their applications. *J Comp Appl Math Elsevier*. 2000;118(12):111–123.
- G. Dattoli and P. L. Ottaviani, Semi analytical models of free electron laser saturation, *Optics Commun.* 204, 283 (2002)
- G. Dattoli, C. Guiot, P. P. Delsanto, P. L. Ottaviani, S. Pagnutti, T. S. Deisboeck, Cancer Metabolism and Dynamics of metastasis, *Journal of theoretical biology*, (2008)
- D. Babusci, G. Dattoli and M. Quattromini, Relativistic equations with fractional and pseudo-differential operators, *Phys. Rev.* 83- A (2011)
- G. Dattoli, K. Gorska, K. Penson, D. Babusci and G. H. E. Duchamp, Operator Solution for Fractional Fokker Planck equations, *Phys. Rev. E*, 85, 031138 (2012)
- M. Artioli and G. Dattoli, "The Geometry of Hermite Polynomials"
<http://demonstrations.wolfram.com/TheGeometryOfHermitePolynomials/> Wolfram Demonstrations Project Published: March 4, 2015
- E. Di Palma, G. Dattoli, E. Sabia, S. Sabchevski and I. Spassovsky, "Beam-wave interaction from FEL to CARM and associated scaling laws", *IEEE Transection on Electron Device*, Vol. 99, 21August 2017, pp.1-8.
- G. Dattoli, Di Palma E, Sabia E, et al. Operational versus umbral methods and the Borel transform. *Int J Appl Comput Math*. 2017;3:1–22.
- G. Dattoli, E. Di Palma, S. Pagnutti, E. Sabia, "Free Electron Coherent Sources: from Microwave to X-rays", *Physics Reports (A Review Section of Physics Letters)* 739 (2018), 1-51.
- G. Dattoli and F. Nguyen, *Free Electron Laser and Fundamental Physics*, *Progress In Particles and Nuclear Physics*, 2018
<https://doi.org/10.1080/10652469.2019.1684487>
- Reference: JPPNP 3659
- Dattoli G, Licciardi S, Pidotella RM. Theory of generalized trigonometric functions: from Laguerre to airy forms. *J Math Anal Appl*. 2018;468(1):103–115.
- N. Behr, G. Dattoli, A. Lattanzi and S. Licciardi, Dual Numbers and Operational Umbral Methods *Axioms*, 83 (7), 77 (2019)
- G. Dattoli and S. Licciardi, Operational, umbral methods and negative operator techniques, *INTEGRAL TRANSFORMS AND SPECIAL FUNCTIONS* 2020, VOL. 31, NO. 3, 192–220

BOOKS

D. Babusci, G. Dattoli, S. Licciardi and E. Sabia "Mathematical Methods For Physicists" World Scientific (Singapore) 2019

G. Dattoli, A. Doria, E. Sabia and M. Artioli, Charged Beam Dynamics, Particle Accelerators and Free Electron Lasers (IOP Expanding Physics) (English Edition) IOP publishing 2017

M. Artioli e G. Dattoli, Appunti di Relatività Ristretta, Aracne Editrice Rome (2013)

F. Ciocci, G. Dattoli and A. Boccia, Lezioni di Calcolo, Edizioni universitarie Kappa (2009)

F. Ciocci, G. Dattoli, A. Torre and A. Renieri, InsertionDevices, World Scientific (2000)

G. Dattoli and A. Torre Theory and Application of Generalized Bessel Functions, Aracne-Editrice (Rome) (1996)

G. Dattoli, A. Renieri and A. Torre, Lectures on Free Electron Laser Theory and on Related Topics, World Scientific, (1995)

G. Dattoli and A. Torre "Theory of Generalized Bessel functions and applications to electromagnetic problems" Aracneeditrice (Rome) 1990

G. Dattoli and A. Renieri, Theoretical and Experimental Aspects of Free Electron Laser, In Laser Handbook Vol. IV ed. by M. L. Stitch and M. Bass, North Holland (1985).

F. Ciocci and G. Dattoli "Appunti di Fisica Generale Applicata"

Available at

https://www.researchgate.net/profile/Giuseppe_Dattoli2/publication/260750163_APPUNTI_DI_FISICA_GENERALE_APPLICATA/links/0deec5321e69aacb77000000/APPUNTI-DI-FISICA-GENERALE-APPLICATA.pdf

the lectures are divided in three parts covering Mechanics, Physics of fluids, Thermodynamics and electromagnetism

The book has been used as support text for the Lectures given at the Courses of General Physics at Rome university

G. Dattoli, J. V. Rau, M. Del Franco, Elementi Di Fisica Tecnica Ambientale, RT/2012/14/ENEA

Available at

https://www.researchgate.net/publication/233857483_ELEMENTI_DI_FISICA_TECNICA_AMBIENTALE

The book has been used as support text for the Lectures given at the Courses

Fisica Tecnica Ambientale At the university la Sapienza (Rome)

In preparation

G. Dattoli, E. Di Palma, S. Sebagevsky and I. Spassovsky, High Frequency Coherent Radiation Sources and Applications to Fusion Plasmas (to be published by IOP Expanding Physics in 2020)

G. Dattoli and S. Licciardi "Umbral Methods and Special Functions" (to be published by World Scientific Singapore in 2021)

G. Dattoli and S. Licciardi, A new point of view to the theory of Bessel Functions, (to be published by World Scientific, Singapore 2022)

G. Dattoli, Elements of Quantum Mechanics (to be published by Taylor and Francis in 2022)