Curriculum vitae et studiorum. **GIUSEPPE CHIRICO**

GIUSEPPE CHIRICO is currently professor of Applied Physics at the University of Milano-Bicocca (Dept. of Physics, School of Sciences). His activity is in biophysics, photonics and nanotechnology. He spent two postdoc periods at the European Molecular Laboratory in Grenoble (F) in 1990 on Light Scattering from DNA and at the German Cancer Research Center (DKFZ) in Heidelberg in 1993 on Brownian Dynamics of Chromatin. GC has been visiting professor at the University of Illinois at Urbana-Champaign, Laboratory for Fluorescence Dynamics in 2000. Since 2000 GC is researching in nanotechnology applied to biophysics and medical physics, developing nanosensors for proteins based on the use of gold nanoparticles and non-spherical nanoparticles to be used as localized thermo-loaders for hyperthermia and temperature triggered drug release.
GC is the group leader of the Biophotonics group at the Dept. of Physics, University of Milano-Bicocca. The group is developing photo- and fluorescence correlation spectroscopies and applies them to study the structure and dynamics of proteins and nanoparticles interacting with cells. In-vivo deep tissue imaging is performed through a dedicated two-photon excitation microscope. Part of the research of GC is also devoted to numerical simulation of complex polymeric systems: supercoiled DNA, DNA chromatin, lymph node chemotaxis and red blood cells in capillaries.

Education

- University of Milano, Milano, Italy. PhD in Physics, 1990, Thesis title: DNA dynamics by Dynamic Light Scattering.
- University of Milano, Milano, Italy. Master in Physics, 1981-1986, Thesis Title: Rheology of DNA and proteins solutions.

Academic Positions

- 1990-1999 University Research fellow in Solid State Physics, Università degli studi di Milano, Milano, Italy. Research in Physics and lecturing in the Physics Undergraduate course.
- 2000-2005 Associate Professor in Applied Physics Università di Milano-Bicocca, Milano, Italy. Research in Physics and lecturing in the Physics and Biotechnology Undergraduate courses.
- 2005-present Full professor in Applied Physics Università di Milano-Bicocca, Milano, Italy. Research in Physics and lecturing in the Physics, Biotechnology and Chemistry undergraduate and graduate courses.

Institutional duties

- 1998-2002. member of the scientific committee of the biophysics section of INFM (Istituto Nazionale per la Fisica della Materia);
- 2008-2012 member of the scientific committee of Societa' Italiana di Biofisica Pura e Applicata (SIBPA);
- 2012-present. Editor for PLOSONE, Journal of Biophysics and Biomedical Engineering Online;
- 2015-present. member of the Editorial board of "Current Bionanotechnology".
- 2009-2016. Director of the graduate school in Physics & Astronomy of University Milano-Bicocca (Milano-I).
- 2013-present. director of the training courses for the high school teachers in Physics.
- 2009-2016. Scientific supervisor of LABEX, a laboratory in Modern Physics dedicated to high school pupils.
- 2000-present. Member of the board of the Physics and Astronomy PhD school, Univ. Milano-Bicocca

Organization of Congresses and workshops

- School on confocal and 2-photons micro-spectroscopy, 2006, Milano;
- Workshop: Visualizing Biological Function: Confocal Spectroscopy/Microscopy. 2007, Milano

- Scientific Committee member of the European Biophysical Societies' Association (EBSA) Congress, Genova, 2009.
- Director or the Symposium in Honour of Giancarlo Baldini, "From genomics to proteomics: the challenge of in-vivo dynamic studies. Experimental and theoretical approaches". in EBSA congress 2009, Genoa.
- Scientific Committee member of the XX Congresso Nazionale della Societa' di Biofisica Pura e Applicata, Arcidosso (GR), 2010
- Director of the VI School Of Pure And Applied Biophysics on Multimodal Methods for Cell Imaging and Tracking Location: Venice, Italy, 2012.
- Scientific Committee member of the XXI, Congresso Nazionale della Societa' di Biofisica Pura e Applicata, Ferrara (I) 2012
- Scientific Committee member of the Workshop on Medical Imaging, Varenna (I), 2015.
- member of the program committee of the SPIE (internation. Soc. Opt. phot.) congress on Optical Metrology, Munich, 2017,
- Co-director of the International School of Nanomedicine 3rd Course: "Nanofluidics, Nanoimaging and Nanomanipulation", Ettore Majorana Foundation and Centre for Scientific Culture, April 2018.
- member of the program committee of the SPIE (internation. Soc. Opt. phot.) congress on Optical Metrology, Munich, 2019,
- International School, " Quantitative analysis of optical imaging for Medicine and Biophysics" , Venice 18-22 Jan 2021 (held on-line), SIBPA, Institute Pasteur, CNR-ISASI.
- member of the program committee of the SPIE (internation. Soc. Opt. phot.) congress on Optical Metrology, Munich, 2023

projects as principal investigator

- 2022-2024. Co-PI of the PRIN Italian project VISION: "Characterisation of the role of prometastatic MICAL2 on nuclear envelope and genome integrity through transcriptional control of Lamin A/C"
- 2021-25. In2Sight, H2020-FETOPEN-2018-2020, GA NUMBER 964481, 2021-25, Principal Coordinator (3.5 ML)
- 2017, I-Nano: A multidisciplinary network for smarter bioimaging, competitive funds, Università di Milano-Bicocca, 2017
- 2017, ZCube, Zambon open accelerator program: Photo-thermally active patches with controlled on demand drug release, 2017
- 2010, Coherent Vibrational Microscopy for Biomedicine, Banca del Monte Foundation (Pavia, I),
- 2012-2014, Gold nanorods (NR) and asymmetric nanoparticles (ANP) capped with a biocompatible polymer bearing binding groups for molecules and metal cations: pharmacological and thermal antimicrobial action activated by near-IR irradiation , Cariplo Foundation (2012) , Italy.
- 2010-2014, Raman Microscopy for Biomedical Applications, Regione Lombardia (I).
- 2008-2012, Construction and read out of 2D networks of fluorescent molecules by AFM: towards molecular optical memories, Cariplo Foundation (2008), Italy.
- 2008-2012, ENCITE: European Network for Cell Imaging and Tracking Expertise (FP7: Grant agreement No: 201842, EU), local PI, unit Milano-Bicocca.
- 2003-2005. PRIN MIUR, Physics: "Nanocapsules as a biomimetic system for the study of the molecular crowding by means of advanced spectroscopy and microscopy techniques".
- 2005, Two-photon excitation microscope for in-vivo imaging, Large Infrastructure fundings of the University of Milano-Bicocca
- 2005, Spectral decomposition of two-photon microscopy images, Banca del Monte Foundation (Pavia, I)
- 2000-2001. INFM (Istituto Nazionale per la Fisica della Materia) funding, PAIS, for the project: "Structural and Dynamic studies of proteins by Single Molecule Spectroscopies".
- 2001-2002. INFM (Istituto Nazionale per la Fisica della Materia) funding, PAIS, for the project: "Conformational Dynamics of single molecules by spectroscopy and manipulation".

Awards

Innovation Award 2015, University of Milano-Bicocca. In collaboration with Dr. P. Pozzi, Dr. J. Mapelli, Dr. D. Gandolfi and Prof. E. D'Angelo.

Patents

- "Dispositivo Medico Impiantabile", Raimondi M.T., Cerullo G., Conci C., Zandrini T., Osellame R., Chirico G. prior art 21/12/2017, Italian patent n. 102017000147857, registered on : 6 March 2020
- "Implantable Medical device", Raimondi M.T., Cerullo G., Conci C., Zandrini T., Osellame R., Chirico G. , US11273023B2, 2022-03-15.
- "Film polimerici contenenti nanoparticelle con effetto fototermico e loro applicazione come cerotti termici", Chirico Giuseppe, Collini Maddalena, Borzenkov Mykola, Pallavicini Piersandro. patent n. brevetto N. 102018000004053, 10/04/2020

editorial boards

G.C. is member of the editorial boards of the following journals:

- CURRENT BIONANOTECHNOLOGY (ISSN: 2213-5294) 2016
- Nanomaterials (ISSN 2079-4991) 2021
- PLOS ONE (ISSN: 1932-6203) 2010
- BIOMEDICAL ENGINEERING ONLINE (ISSN: 1475-925X) 2008

bibliometrics

Scopus 7006993811, ORCID https://orcid.org/0000-0001-6578-6460
Pubblications: 208
H factor: 32
Average Citations per Item: 19.4
Sum of Times Cited : 4033

Invited speaker talks (selection)

- G. Chirico, 36th Course of INTERNATIONAL SCHOOL OF BIOPHYSICS, "Fluctuation Spectroscopy for biological Tissues", 2008
- G. Chirico, "Tracking single gfp proteins through unfolding pathways"in Workshop "Theory, Modeling and Evaluation of Single Molecule Measurements", Leiden, April, 2007.
- G. Chirico, XI SCHOOL OF PURE AND APPLIED BIOPHYSICS, Venice (I), 2007. "Single Molecule Spectroscopy: principles and applications", 2007.
- G. Chirico, "In-vitro and in-vivo detection of p53 by fluorescence lifetime on a hybrid FITC-gold nanosensor", Photonics West, SPIE conference on ""Nanoscale Imaging, Sensing, and Actuation for Biomedical Applications VII, SPIE BiOS, San Francisco, California, United States, 2010.
- G. Chirico, Organic-metal Lifetime based bio-sensors, Brazilian Physics Meeting, 2011.
- G. Chirico, International Conference on Nanotechnology in Medicine (NanoMED), University College London in London, "Branched Gold Nanoparticles for Thermal Treatments of Cells", 2012.
- G. Chirico, "Structured illumination fluorescence correlation spectroscopy for velocimetry in Zebrafish embryos" SPIE BiOS, Dynamics and Fluctuations in Biomedical Photonics X, San Francisco, California, United States, 2013.
- G. Chirico, Nanomedicine Symposium, European Center for Nanomedicine, CEN Politecnico di Milano: "Cross-correlation image microscopy for flow mapping in biomedical studies", 2014.
- G. Chirico. Congresso della Societa' nazionale di Fisica, Pisa, Settembre 2014, "Fluorescence Cross-Correlation Spectroscopy for Flow Mapping" 2014.
- G. Chirico, SIBPA,Congresso Nazionale della Società di Biofisica Pura ed Applicata, "CCD Based Fluorescence Cross-Correlation Spectroscopy for In-vivo Blood Velocimetry.", Palermo, 2014.
- G. Chirico, SPIE, BIOS: biophotonics, biomedical optics, and imaging conference, Munich, "Single image correlation for blood flow mapping in complex vessel networks", 2015.
- G. Chirico, "Photothermal effect of gold nanostars inkjet-printed on coated paper substrate

under near-infrared irradiation", SPIE Photonics Europe, Brussel, 2016.
- G. Chirico, SIBPA, Società Italiana di Biofisica Pura e Applicata, Cortona, "Inkjet Printed Gold Nanostar Patterns for Photothermal applications in life science", 2016.
- G. Chirico, Congresso della Società Italiana di Fisica, SIF, Trento, "Image Correlation Microscopy for flow mapping in-vivo", 2017
- G.Chirico, 7th EOS optical meeting, Capri, "3D Flow Field Mapping in Microfluidic Devices by means of Spatio-temporal Image Correlation Analysis", 2017
- G.Chirico, Symposium in memoriam Jörg Langowski, 12 October 2017, DKFZ Heidelberg, Germany, "Jiggling and twisting as a DNA superhelix", 2017
- G. Chirico, Photo-Activated Thermal Imaging at Sub-Diffraction Resolution. SPIE 2019, Optical Metrology conference (Munich, D).
- G. Chirico, Micro-Mapps: a phasor approach to the analysis of collagen microstructure in vitro and in vivo by means of second harmonic generation microscopy. "Nanoengineering for Mechanobiology", Workshop, CNR, March 2018, (Camogli,I).
- G. Chirico, 3R's Center National meeting, IN2SIGHT: a bioengineered chip for a paradigm shift in in-vivo imaging, Tourin October 2021.
- G. Chirico, SPIE Optical Metrology, Munchen 2021 (online), An in vivo bioengineered chip for new validation protocols of biomaterials

Teaching (selection)

Undergraduate:
-General Physics, Biotechnology, University of Milano-Bicocca (2016-present)
-Biophysics and Medical Physics, Physics, University of Milano-Bicocca (2003-2006)
Master:
- Applied Optics, master in Physics, University of Milano-Bicocca (2003-2009)
- Optical Microscopy, master in Physics, University of Milano-Bicocca (2012-present)
- Nanobiotechnology, master in Physics, University of Milano-Bicocca (2009-2011)
- Molecular Biophysics, master in Physics, University of Milano-Bicocca (1999-2002)

Doctorate:
- Optical Microscopy, course for the doctorate in Physics, Politecnico di Milano (2016-2018).

Master students (selection): more than 45 theses supervised

Supervised PhD theses in Physics

Univ. Milano:
S. Beretta, "Light scattering measuerments from hemoglobin solutions: charge effects"; 2001;
Univ. Milano-Bicocca:
F. Cannone, "Single protein fluorescence fluctuations as fingerprints of GFP internal dynamics", 2005;
M. Caccia, "Non linear microspectrometry of Biological Tissues", 2007;
S.Daglio "GFP photoswitchable mutants for intensity modulation imaging" 2012;
V.Quercioli "FCS of photo-activable GFP mutants", 2008;
P. Pozzi "Fluorescence TPE microscopy with an holographic microscope", 2015;
L. Sironi "Nanoparticles for in-vitro and in-vivo biosensing and imaging",2011;
N.G.Ceffa "Microfluidic flow mapping with spim-ics", 2017;
B. Zeynali, 2020, PhD in Physics and Astronomy, "Two-photon assisted direct laser writing of proteinaceous microarchitectures containing plasmonic nanoparticles;characterization and optimization";
R. Scodellaro, 2022, PhD in Physics and Astronomy, "Artificial intelligence to enhance the phasor approach"