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Maddalena Collini

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Gender: Female **Date of birth:** 05/01/1964 **Nationality:** Italian

ABOUT ME

You can provide a description of yourself here...

WORK EXPERIENCE

[2019 – Current]

Full Professor Applied Physics (FIS/07, 02D1)

Università degli Studi di MIlano Bicocca

City: Milano
Country: Italy

[2007 – 2019]

Associate Professor Applied Physics (FIS/07, 02D1)

Università degli Studi di MIlano Bicocca

City: Milano
Country: Italy

[2000 – 2007]

Researcher in Applied Physics, B01B (SSD FIS/07)

Università degli Studi di MIlano Bicocca

City: Milano
Country: Italy

[1999 – 2000]

Researcher in Applied Physics, B01B (SSD FIS/07)

Università degli Studi di MIlano

City: Milano
Country: Italy

[1997 – 1999]

INFM post-doc fellowships on research projects

National Institute for the Physics of Matter

City: Milano
Country: Italy

[1994 – 1996]

Post-doc fellowship (MURST)

Università degli Studi di MIlano B

City: Milano
Country: Italy

[1993 – 1993]

INFN contract for "Programs for data acquisition on modulated fluorescence by scintillators

National Institute for Nuclear Physics

City: Milano
Country: Italy

EDUCATION AND TRAINING

[1989 – 1992]

PhD in Physics

Università degli Studi di Milano

City: Milano
Country: Italy

[1989]

Masters Degree in Physics (110/110 cum laude)

Università degli Studi di Milano

City: Milano
Country: Italy

INSTITUTIONAL COM-MITMENTS

[05/03/2021 – Current]

Member of PQA (University Quality Committee) of Milano-Bicocca University

[01/10/2018 – Current]

Coordinator of the Bachelor and Master Degree in Physics and of the Master Degree in Astrophysics and Space Physics at UNIMIB

[2012 – 2018] **Supervisor of the Master Degree in Physics at UNIMIB**

[2012 – 2018] **Quality responsable for the Master Degree in Physics at UNIMIB**

[2012 – 2018]

Member of the Commission for thesis and for plan of the studies of the for the Master Degree in Physics at UNIMIB

[2012 – 2018]

Chairman of the Selection Board to the Master courses in Physics and Astrophysics at UNIMIB

[Current]

MC has taken part at 3 examination board for PO, 3 for PA, 6 for Researches, 5 for fellowships, 12 for PhD

SCIENTIFIC RESEARCH

General

MC research activity interest has been the study of the structure and dynamics of biosystems starting from the molecular level *in vitro* up to the cellular level *in vivo* by deve loping new protocols and methods in fluorescence spectroscopy. Since 2000, MC contributed to the setup of the biophysics lab at the Physics dept. A special focus has been given to linear and non linear microscopies, and to image correlation methods to extract the dynamical information. Since 2011 MC is PI of a super-resolution microscope.

From the nanotecnological point of view, MC exploits gold nanoparticles for theranostic aims and for developing smart materials thourgh the hyperthermal effect for

antibacterial and therapeutic action for applied physics. MC has developed a new method for active IR thermography superresolution in order to characterize photothermal nanoparticles distribution in tissues and melanin local concentration in melanoma biopsies.

Recent hot topica in MC research

Flow measurements in small organisms, in microfluidic channels, anomalous diffusion.

Starting from FCS in cross correlation mode, MC developed new methods and setups, also exploiting adaptive optics devices, in order to perform multispot correlation for hemodynamics measurememts. The main results are: Characterization on Zebrafish hemodynamics, Characterization of murine hepatic microcirculation with a single image protocol, Single plane illumination (SPIM) application to detect flows on microfluidic channels of complex geometries, Aberration correction by SLM in flow measuments detection, Anomalous diffusion of nanoparticles in hydrogels. In parallel to setup improvements, efficient protocols for image/data processing have been implemented.

In vivo or ex-vivo optical microscopy:

Characterization of interaction of immune system cells in ex-vivo limphonodes by celle tracking. Second harmonic generation (SHG) on tissue to detect collagen architecture and quantify its relation with tumor progression on murin biopsies. In vivo measurements of a fluorescent microchip implanted in mouse to create an optical atlas for biomaterial testing in mice (FET topic)

Photothermal nanoparticles for nanomedicine and technological applications:

Since ten years MC exploits metal nanoparticles (NPs) of different shapes endowed with photothermal nanoparticles in the NIR region for biosensoring, drug delivery, photothermal therapy. MC has characterized nanoparticles internalization and motions in cells, their cytioxicity in small orgamism and in tissues. MC has developeds smart materials by trapping NPs in polymeric matrices or printed on substrate to obtain antibacterial properties or therapeuticl heat (thermal patches, patented). MC is currently studing the effect of temperature as a stimulus for neuronal cell differentiation by IR irradiation.

Super-resolution optical microscopies:

MC has applied STED microscopy to single molecules studies, and recently developed a new super-resolution approach on thermal IR imaging to map melanine and photothermal NPs distribution in tissues

PROJECTS

(since 2005, PI and team member)

2021 University Funds for Research Infrastructures of Milano-Bicocca, (55 k€)

2020 European Project FET (2020) "An in vivo bioengineered chip as a smart intravital multiphoton imaging window for new validation protocols of biomaterials", PI. G. Chirico , MC co-referent (3.5M€)

2018 Innovation Project Fund of U4I Fundation "*NanoThermoPatch: Novel Patches Capable to Convert Light into Heat for Medical Application*", team member

2018 Strategic Equipment of UNIMIB: "Creation of a department laboratory for Fast Timing Detectors" (1.2M€, 75 k€ to the Biophysics group, co-PI Collini-Chirico).

2017 ZCube, Zambon open accelerator program: "*Photo-thermally active patches with controlled on demand drug release*", 2017

2014 "*Gold nanostars decorated with DNA G-quadruplexes for an unprecedented multimodal targeting of cancer*", UNIMIB internal funds, PI

2011 PI for "Super-resolution microscopy" *UNIMIB funds for Strategic Equipments* (524 k€).

2010 Cariplo Fundation Material Science "*Gold nanorods and asymmetric nanoparticles cappedwith a biocompatible polymer bearing binding groups for molecules and metal cations: pharmacological and thermal antimicrobial action activated by near-IR irradiation*", 470 k€

2009 Project Regionale Accordo Quadro 2009 "Development of a coherent Raman microscopy system for biomedical imaging", (220 k€)

2008 European VII P.Q. "ENCITE: European Network for Cell Imaging and Tracking Expertise"

2008 Prin 2008 , local PI "*Studies of fluorescence correlation spectroscopy of photo-activable proteic constructs for dynamic application in optical microscopy by means of two color excitation*"

2006 Prin 2006, national PI "*Conformational substates and folding-unfolding pathways in green fluorescent protein: an experimental and theoretical study of discrete states in proteins"*

2005 Cariplo Fundation "*Construction and read out of 2D networks of fluorescent molecules by AFM: towards molecular optical memories*".

PATENTS

Film polimerici contenenti nanoparticelle con effetto fototermico e loro applicazione come cerotti termici/Polymeric films containing nanoparticles endowed with photothermal effect and application thereof as thermal patches

Brevetto italiano n. 102018000004053 del 10.04.2020.

Domanda di brevetto europeo (fase regionale PCT) n. 19713044.6 del 26.10.2020. Pubblicazione n. 3773891 del 17.02.2021

Supporto trasparente riscaldabile selettivamente per la crescita o la differenziazione di campioni biologici

Brevetto italiano n. 102021000010988 del 30.04.2021

ASSOCIATIONS

(since 2005)

2005-current Affiliation to the National Consortium Interuniversity of the Physics Sciences of the Matter (CNISM)

2016-current Associate to the Institute of Applied Sciences and Intelligent Systems (ISASI), Pozzuoli, Neaples, for "Innovative techniques for the manipulation of advanceds materials"

2016-current Vice-director and Member of the Scientific Commettee of POLARIS Center

2015-current Member of the Milano Neuroscience Center (NeuroMi).

2016-current Member of the Center of Nanomedicine (NanoMib).

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CONGRESS AND WORK-SHOP ORGANIZATIONS

(since 2015)

18-22/01/2021 XXV INTERNATIONAL SCHOOL OF PURE AND APPLIED BIOPHYSICS "Quantitative analysis of optical imaging for Medicine and Biophysics: foundations, applications and perspectives" online version.

28-29/09/2018 Meetme Tonight 2018, "*Nanostelle d'oro: proièttati nel firmamento della nanomedicina!*", Milano.

4-8/09/2017 International Workshop on Imaging, Varenna, (CO) Italia

5-8/09/2017 International School on Computational Microscopy, Amalfi (SA) Italia.

7-10/09/2015 International Workshop on Medical Imaging, Varenna, (CO) Italia.

20/05/2015 Science Corner for EXPO2015, "*Nanoparticles lab*", Milano

TEACHING/MENTORING

Since 2000 MC held teaching charges for the Physics Department of UNIMIB, for both the Bachelor's (BD) and the Master's (MD) Degree in Physics. Since 2007, MC has always teached not less than 120 hours. Here the details of the last 5 years.

from 2013/14 to: current **Physics 3** (BD)

from 2018/19 to: current **Elements of Biophotonics** (BD)

from 2012/13 to 2018/19 **Biophotonics** (MD)

from 2015/16 to: current **Laboratory of Biophotonics I or II** (MD)

MC has been supervisor of more than 35 students for the Bachelor Degree in Physics, 18 Master students, co-supervisor of more than 10 Master students, 5 PhD students, 1 post-doc student

PUBLICATIONS

Scopus https://www.scopus.com/authid/detail.uri?authorId=57196908184. Institutional Repository https://boa.unimib.it/simple-search?query=maddalena+collini

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C1 **READING** C1 **WRITING** C1

SPOKEN PRODUCTION C1 **SPOKEN INTERACTION** C1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

13/06/2023