

Micol Colella

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Nationality: Italian

CURRENT POSITION

[09/2021 – Current]

Postdoctoral Research position with the BioEMLab (assegnista di ricerca vincitore di concorso Legge 240/2010), Department of Information Engineering, Electronics and Telecommunications (DIET), University of Rome “La Sapienza”, Rome, Italy

Research activity focused on numerical modeling of electromagnetic fields:

(1) Numerical modelling and computational dosimetry of invasive and noninvasive, magnetic and electric stimulation of the central and peripheral nervous system, with standard and innovative techniques. The aim is to investigate their physiological effects on human and small animals.

(2) LF, RF and mmW computational modelling and numerical dosimetry for assessment of human body exposure.

Other activities: Managerial activities as Project Assistant for EU H2020-FET OPEN Project RISEUP (Nr. 964562).

WORK EXPERIENCE

[02/2021 – 08/2021]

External collaboration (ICE contract according to ART. 7, COMMA 6, D. LGS. 165/2001)

Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome

City: Rome | **Country:** Italy

Activity dedicated to the numerical assessment of the human body exposure to a vehicular antenna in military scenarios. Activity carried out by means of computational tools for numerical dosimetry and numerical exposure assessment. Activity commissioned by the society Larimart SpA

EDUCATION AND TRAINING

[01/11/2017 – 31/01/2021]

PhD in Information and Communication Technology (ICT)

Dept. of Information Engineering, Electronics and Telecommunications, Sapienza University of Rome

City: Rome | **Country:** Italy | **Final grade:** Cum Laude | **Thesis:** Noninvasive electric and magnetic stimulation of the brain: numerical modeling and dosimetrical assessment

[25/08/2019 – 06/09/2019]

Visiting PhD student

IT'IS Foundation

City: Zurich | **Country:** Switzerland |

Topic: Assessment of new neuronal models to study noninvasive stimulation techniques of the peripheral nervous system

[11/12/2017 – 22/12/2017]

Visiting PhD student

Neuro-radiology research laboratory, Ospedale San Raffaele

City: Milan | **Country:** Italy |

Activity: Segmentation of ischemic lesions from MR images of patients recruited in the I-NIC project .

[2015 – 2017] **Master Degree in Biomedical Engineering**

Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome

City: Rome | **Country:** Italy | | **Final grade:** Cum Laude | **Thesis:** Variability factors in a computational model of a 1.5 T RF birdcage coil

[2012 – 2015] **Bachelor Degree Clinical Engineering,**

Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome

City: Rome | **Country:** Italy | | **Final grade:** 109/110 | **Thesis:** Thin film photosensors for Lab-on-Chip systems

RESEARCH EXPERIENCES ABROAD

[09/2019 – 03/2020] **Graduate Research Assistant**

Graduate Research Assistant under supervision of Prof. Giorgio Bonmassar at the Athinoula A. Martinos Center for Biomedical Imaging (Boston, MA, USA).

Activity: Development and computational modelling of the second generation of miniaturized coil for ultra-focal transcranial magnetic stimulation. The activity consisted in carrying out computational electromagnetic studies to evaluate methodologies to improve the first generation of miniaturized coil for application on the central nervous system.

One prototype of the second second generation of miniaturized coil was realized and characterized electrically.

[05/2018 – 10/2018] **Graduate Research Assistant**

Graduate Research Assistant under supervision of Prof. Giorgio Bonmassar at the Athinoula A. Martinos Center for Biomedical Imaging (Boston, MA, USA).

Activity: Development and computational modelling of an ultra-focal TMS system for peripheral nerve stimulation. The activity consisted in carrying out combined Electromagnetic and neurofunctionalized computational studies in a multiphysics approach to evaluate several miniaturized coils geometries and select the most efficient one to achieve peripheral nerve stimulation.

The most efficient coil geometry was realized, electrically characterized and tested on human healthy subjects.

PROJECTS

[2021 – Current] **RISEUP: Regeneration of injured spinal cord by electro pulsed bio-hybrid approach**

Funding Program: H2020-FET OPEN Project 964562

Research Unit (RU): UNIROMA1 (BioEMLab, Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome)

Scientific Activity: Numerical evaluation of the novel developed electro pulsed biohybrid (EPB) device for regeneration of injured spinal cord. By means of advanced dosimetric tool, the *in vivo* experiments carried out to assess the effectiveness of the EPB are numerically reproduced to evaluate the conditions that guarantee exposure levels necessary to achieve neuronal regeneration. Furthermore, engineeristic support have been provided during the *in vivo* experiments carried out at the Center de Investigacion Principe Felipe. The support consisted in ensuring the correct connection between the

EPB device and the external voltage generator, by current, voltage and impedance measurements. This guaranteed the delivery of the correct stimulation parameters

Managerial Activity: Project assistant of the RISEUP coordinator Dr. Claudia Consales. The role of project assistant requires to: schedule advancement meetings and report minutes; follow up each work package activity to ensure accomplishment of tasks and respect of deadlines; writing of reports and administrative documents.

[2020 – 2023] **The Effective Navigated (En-)TMS**

Funding Program: POR-FESR LAZIO 2014-2022

Research Unit (RU): UNIROMA1 (BioEMLab, Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome)

Activity: Development of a software for EM dosimetry to be integrated in a system for navigated TMS. The aforementioned software builds anthropomorphic and anisotropic head models from processed magnetic resonance imaging (MRI) and tractography (DTI) data. It calculates the induced E-field by TMS using an improved version of the admittance method. By exploiting DTI data it also extracts the E-field component along the axonal directions, i.e., the effective E-field (E_{eff}), to support the interpretation of the physiological response to TMS.

[2018 – Current] **Development and modeling of an ultra-focal TMS system for cortical and peripheral nerve stimulation**

Funding Program: NIH/NIMH RFA-MH-16-810

Institution: Athinoula A. Martinos Center for Biomedical Imaging (Boston, MA, USA).

Activity: Development of the first, second and third generation of ultra-focal coil for magnetic stimulation (mCoils) on human (first and second generation) and small animals (third generation). The mCoils are investigated numerically with in a multiphysical approach to be optimized.

[2017 – Current] **Investigation of the neuroprotective effect of low frequency (LF) and low intensity (LI) pulsed magnetic fields (PMFs) on ischemic lesions of real patients, by means of a computational semi-specific head model**

Details: ClinicalTrials.gov, NCT02767778, I-NIC project

Institution: BioEMLab, Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome

Activity: Development of a fast and reliable computational dosimetric strategy to assess the neuroprotective effect of low frequency and low intensity pulsed magnetic fields on ischemic lesions of patients. The strategy proposed is the semi-specific approach. This novel approach for computational dosimetry is a promising tool to assess all those novel electroceutical therapies that undergo clinical trials with a high samples of patients for their evaluation.

[02/2023 – 09/2023] **Heprosys project**

Funding Source: Larimart S.p.A, Rome, Italy

Institution: Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome

Activity: Numerical evaluation of military operator exposure to several vehicular antennas in realistic working scenarios studied with computational dosimetric tools

[2021 – 2024] **WPT4WID: Wireless Power Transfer for Wearable and Implantable Devices**

Funding Program: PRIN2017

Research Unit (RU): UNIROMA1 (BioEMLab, Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome)

Activity: Assessment of numerical approaches for accurate computational dosimetry at 5G frequency bands

[02/2021 – 08/2021] **Heprosys project**

Funding Source: Larimart S.p.A, Rome, Italy

Institution: Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome

Activity: Numerical evaluation of military operator exposure to a vehicular antenna working in the range 2 – 30 MHz with computational dosimetric tools.

[2017 – 2020] **Study of MRI compatibility with partially implanted electrodes**

External collaborator: U.S. Food and Drug Administration, Silver Spring, MD, USA.

Institution: Dept. Information Engineering, Electronics, and Telecommunications, Sapienza University of Rome

Activity: Numerical evaluation of the compliance of commercial lead for interventional-MRI with exposure guidelines

ROLES AS PRINCIPAL INVESTIGATOR

Project in the frame of "Avvio alla ricerca" funding

Project nr: AR223188B47FE891

Institution: Sapienza University of Rome

Project Title: Hi-SILICO: Highly detailed Skin models for Improved Computational dosimetry.

Project aim: The project aims to overcome the limitations of existing computational models to assess numerically the exposure in the 5G-frequency band. At these frequencies, an accurate modelling of the skin layers is fundamental and requires improvements.

ORGANIZATION OF SCIENTIFIC CONFERENCES

Partecipation as Local Organizing Committee

- WIRS Young Scientist event: "Empowering waves: The radiant role of women in Radioscience" (February 16th 2024, Rome Italy): Member of the Organizing Steering Committee.
- 5th World Congress of Electroporation (15-19 September 2024, Rome, Italy), Member of Local Organizing Committee, Responsibility for Young Scientist activities and Initiatives.
- European Microwave Week 2022 (25-30 September 2022, Milan, Italy), Supporting the Young Scientist Activity Chair in coordinating the Volunteer Staff
- XXXIV General Assembly and Scientific Symposium (GASS) of the International Union of Radio Science (28 August - 4 September 2021, Rome, Italy) Supporting the Local Organizing Committee in coordinating the Volunteer Staff for online and onsite work.

Workshops

- BIOEM Annual Meeting 2024, Chania, Greece: *Breakthroughs in numerical and experimental EMF exposure assessment: The contribution of BIOEM young scientists*, co-chair: Dr. Giulia Sacco.
- BIOEM Annual Meeting 2023, Oxford, UK: *Spinal cord injuries and possible strategies to repair them. New updates on the use of stem cells electrical stimulation for tissue regeneration*, co-chair: Dr. Claudia Consales
- European Microwave Week 2022, Milan, Italy: *Dosimetry and microdosimetry applied to emerging wireless technologies: from human to cell level*, co-chair: Prof. Maxime Zhadobov

Sessions

- Special session S09, 5th World Congress of Electroporation, Rome, Italy: *Treatment of spinal cord injury: novel strategies and updates from the RISEUP project*, co-chair: Dr. Claudia Consales.
- Session KD1, URSI-AT RASC 2024, Gran Canaria, Spain: *RF wearable devices for body area network: from numerical modeling to manufacturing*, co-convenor: Dr. G. Paolini.
- Session K09, URSI-AT RASC 2024, Gran Canaria, Spain: *Breakthroughs in noninvasive brain stimulation: from numerical assessment to clinical application*, co-convenor: Dr. A. M. Cassarà.
- Session K12, URSI-GASS 2023, Sapporo, Japan: *Biomedical applications of static and low frequency EMF*, co-convenors: Prof. Masaki Sekino, Prof. Akimasa Hirata

INVITED SPEAKER

[12/09/2023]

International Conferences

- Invited speaker for Special Session "*Electromagnetics in biomedical applications: advances in nervous system stimulation*", International Conference on Electromagnetics in Advanced Applications (ICEAA) 2024, Lisbon, Portugal. Title of the talk: "Towards the validation of the semi-specific model to assess PEMFs neuroprotective effect through numerical dosimetry"
- Invited speaker for Special Session "*RF and Microwaves for Biomedical and eHealth Applications: Overview of the Recent Young Professionals Research Highlights*", IEEE International Microwave Biomedical Conference (IMBioC) 2023, Leuven, Belgium. Title of the talk: "Effect of realistic body models on plane wave reflection at mmWaves".

[15/11/2022]

Seminar

Invited speaker for the Seminar "*WIE Seminar on Bioelectromagnetics*", University of Salento

Title of the talk: "Numerical dosimetry as a tool to assess standard and novel noninvasive brain stimulation techniques"

ACADEMIC SERVICES

Lectures

- Yearly Lecture for the class "Electromagnetic Compatibility", Biomedical Engineering Degree, Sapienza University of Rome. Topic: "Numerical evaluation of the RF-induced heating when in presence of interventional catheter during MRI exams"
- 12/03/2024: Lecture for the class "Therapeutic applications of Low Frequency Electromagnetic fields", Biomedical Engineering Degree, Sapienza University of

Rome. Topic: "RISEUP: Regeneration of injured spinal cord by electro pulsed bio-hybrid device"

- 26/05/2020: Lecture for the class "Therapeutic applications of Low Frequency Electromagnetic fields", Biomedical Engineering Degree, Sapienza University of Rome. Topic: "The m-Coil: a miniaturized coil for noninvasive magnetic stimulation"

[01/2018 – Current] **Thesis supervisor**

- Trainer for 21 Master students in Biomedical Engineering during their intern period, under the direction of Prof. Micaela Liberti, and Dr. Alessandra Paffi. With thesis on:
 - Numerical evaluation of the induced electric field in techniques of transcranial brain stimulation for human and animal applications;
 - Development of the 3D model of the cortex pain matrix to conduct numerical dosimetric evaluation on the nociceptive effect of non-invasive brain stimulation techniques.
 - Numerical evaluation of the RF-induced heating when in presence of interventional catheters.
- Trainer for 10 bachelor students in Clinical Engineering during their intern period, under the direction of Prof. Micaela Liberti and Prof. Francesca Apollonio. With thesis on:
 - Numerical evaluation of the exposure of ischemic tissue to LF-LI-PMF;
 - Investigation on the role of tissue heterogeneity in the highly detailed, multimodal image-based anatomical model of a human head and neck, namely the MIDA model.
 - Numerical evaluation of the induced electric field in techniques of transcranial brain stimulation.
 - Numerical exposure assessment in millimeter wave scenarios

Tutoring

- 2020-2022:Tutor for the course of "Therapeutic applications of low frequency electromagnetic fields" (Biomedical Engineering Degree, Sapienza University of Rome) under the direction of Prof. Micaela Liberti and Prof. Francesca Apollonio
- April-September 2019: Tutor (*i.e. Domain expert*) for the GamificationLab (DigiLab, Department of Informatics, Sapienza University of Rome) during the development of a didactic game on non-invasive brain stimulation techniques, under the supervision of Prof. Francesco Lutrario and Prof. Micaela Liberti.
- 2018-2019: Tutor for the course of Electromagnetic Fields under the direction of Prof. Francesca Apollonio and Prof. Micaela Liberti.
- 2018-2019: Tutor for the course of "Electromagnetic Fields and Nanosystems" (Engineering of nanotechnologies Degree, Sapienza University of Rome) , under the direction of Prof. Micaela Liberti and Prof. Francesca Apollonio.

[2021 – Current] **Exams commission**

Part of the exam commission for the class "Electromagnetic Compatibility", Biomedical Engineering Degree, Sapienza University of Rome

HONOURS AND AWARDS

[2024] **Young Scientist Award Awarding institution:** URSI-AT-RASC 2024

[2021] **Young Scientist Award Awarding institution:** URSI-GASS 2021

[2019] **Joseph James Morrissey Award Awarding institution:** BioEM2019 Annual Joint Meeting
1st place Platform Presentation Award

[2019] **Student Travel Award Awarding institution:** BioEM2019 Annual Joint Meeting

[2019] **Student Travel Award Awarding institution:** BMES/FDA Frontiers Conference

41st EMB Conference 2019 Open finalist Awarding institution: IEEE EMBS

Entitled to receive student support

REVISION ACTIVITY

[2021 – Current] **Reviewer for international journals**

- Frontiers in Neuroscience (2 papers)
- Journal of neuronal engineering (6 papers)
- IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology (1 paper)
- Bioelectromagnetics (1 paper)
- Physics in Medicine and Biology (4 papers)

[2021 – Current] **Reviewer for International conferences**

- BIOEM2024, Chania, Greece
- URSI-AT-RASC 2024, Gran Canaria, Spain
- URSI-GASS 2023, Sapporo, Japan
- European Microwave Week 2023, Berlin, Germany
- European Microwave Week 2022, Milan, Italy

MEMBERSHIP

[2023 – Current] **URSI Italian Chapter of Women in Radioscience (WIRS)**

Founding Member

[2021 – Current] **URSI**

Fellow

[2023 – Current] **IEEE Young Professionals**

[2023 – Current] **IEEE Member (IEEE Microwave Theory and Technique Society)**

[2022 – 2023] **European Microwave Association (EuMA)**

Member

[2021 – Current] **BIOEM**

Member

[2019 – 2020] **IEEE Student Member (IEEE Engineering in Medicine and Biology Society)**

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C2 READING C2 WRITING C2

SPOKEN PRODUCTION C2 SPOKEN INTERACTION C2

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

In compliance with the Italian legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details contained in this document.

Rome, 08/07/2024