UNIVERSITÀ
POLITECNICA
DELLE MARCHE

Supervisor: Prof. Franco Moglie

Dept. of Information Engineering (DII)

Project idea: Quantum-Classical simulations and measuremnts for EMC

Research topics

- My research focuses on **electromagnetic numerical techniques** using **high performance computers**, specifically the application of **reverberation chambers** for compliance testing, metrology, measurements of shielding effectiveness and multipath propagation. Lately, **quantum electromagnetic** and electromagnetic algorithms for quantum computers and their emulators have been approached.
- My international experience includes a tenure as a **Visiting Researcher** at the University of Maryland (2011).
- I contributed to **international standards**, by participating in several IEEE Standards Working Groups and by serving as Secretary for IEEE Std 2718.

Main Projects:

- From 2013: Principal Investigator of five European Project **PRACE** (Partnership for Advanced Computing in Europe).
- 2014-19 Member of Italian Management Committing for the European Project **COST** Action IC1407, "Advanced characterization and classification of radiated emissions in densely integrated technologies (**ACCREDIT**)".
- 2021-24. Local Scientific Manager for the European Project H2020: **RISE-6G**: Reconfigurable Intelligent Sustainable Environments for 6G Wireless Networks.
- 2024-2028 Beneficiary for the **NEPIT** project (Marie Skłodowska-Curie Action (MSCA) Training & Mobility Actions (TMA) Doctoral Network (DN)

Main achievements

- 2026- : **Chair** of IEEE EMC Italy Chapter.
- **Mentor** of 5 PhD students, and of many thesys for Master and Bachelor degrees at UNIVPM.
- **ORCID ID** "0000-0003-4421-4396", **SCOPUS ID**: 6701782205, **ResearcherID**: E-6187-2012, http://**scholar.google**.it/citations?user=sHLOZ-kAAAAJ&hl=it
- **H-Index**: 42 (Google Scholar), 32 (Scopus), 29 (Web of Science).
- Inclusion in Elsevier's "**World's Top 2% Scientist**" list for last years.

UNIVERSITÀ POLITECNICA DELLE MARCHE

Supervisor: FRANCO MOGLIE

Description

Recent Journal Publications

- Colella E., Baldwin B.A., Kelso S.F., Bastianelli L., Mariani Primiani V., **Moglie F.**, Gradoni G. “Variational Quantum Based Simulation of Cylindrical Waveguides,”(2025) **IEEE Journal on Multiscale and Multiphysics Computational Techniques**, 10, pp. 104 – 111.
- Colella E., Bastianelli L., Mariani Primiani V., Peng Z., **Moglie F.**, Gradoni G., “Quantum Optimization of Reconfigurable Intelligent Surfaces for Mitigating Multipath Fading in Wireless Networks,” (2024) **IEEE Journal on Multiscale and Multiphysics Computational Techniques**, 9, pp. 403 – 414.
- Bastianelli L., Diamanti R., De Leo A., Colella E., Colombo M., Mariani Primiani V., **Moglie F.**, Micheli D., “Investigation of Water and Mud Effects on the Propagation of Real 5G Signal by Using the Reverberation Chamber,” (2025) **IEEE Access**, 13, pp. 121868 – 121879.
- Colombo M., Diamanti R., Bastianelli L., Gradoni G., Colella E., Mariani Primiani V., **Moglie F.**, Micheli D., “Experimental Investigation of 5G Base Station Functionalities in Reverberation Chamber at Millimeter-Wave,” (2023) **IEEE Access**, 11, pp. 121702 – 121711.
- Colella E., Beloin S., Bastianelli L., Mariani Primiani V., **Moglie F.**, Gradoni G., “Variational Quantum Shot-Based Simulations for Waveguide Modes,” (2024) I**EEE Transactions on Microwave Theory and Techniques**, 72 (4), pp. 2084 – 2094.
- Colella E., Russer J., Baharuddin M.H., Russer P., Haider M., Thomas D.W.P., Gradoni G., Bastianelli L., **Moglie F.**, Mariani Primiani V., “IEEE P2718 Working Group Activity: Open Source Code Development for the Characterization of Unintentional Stochastic Radiators,” (2024) **IEEE Electromagnetic Compatibility Magazine**, 13 (1), pp. 43 – 50.

SUN RISE SMALLER (STRATEGIC) UNIVERSITIES NETWORK FOR REGIONAL INNOVATIVE AND SUSTAINABLE EVOLUTION

HR EXCELLENCE IN RESEARCH

UNIVERSITÀ POLITECNICA DELLE MARCHE

Supervisor: FRANCO MOGLIE

Staff, equipment and laboratories

Tenured Staff

Alfredo De Leo:
Senior Technical Officer

Valter Mariani Primiani:
Full Professor

Franco Moglie:
Associate Professor

Staff

Luca Bastianelli:
Post Graduated Grant

Emanuel Colella:
PhD Student
(Defense: 19 Mar 2026)

Jawad Ali: MSCA NEPIT
PhD Student (2nd year)

Paola Tili: MSCA NEPIT
PhD Student (2nd year)

HR EXCELLENCE IN RESEARCH

Electromagnetic Compatibility (EMC) Laboratory

The EMC Laboratory is dedicated to the analysis of electromagnetic interference (EMI) and its impact on electrical and electronic equipment. The facility conducts both conducted and radiated electromagnetic emission testing, as well as immunity verification of equipment against electromagnetic threats. Recently, the laboratory's scope has been expanded to include functional and interference testing of 5G base stations operating in harsh environments—specifically reverberant conditions characterized by high multipath propagation.

Equipment of EMC Lab

TEM Cell for Electronic Device Tests	ESD Simulator for PCB and Electronic Device Tests	Reverberation Chamber for EMC and Mobile Devices Tests
		

UNIVERSITÀ POLITECNICA DELLE MARCHE

Supervisor: FRANCO MOGLIE

Project idea

Title: Quantum-Classical simulations and measuremnts for EMC

The project will develop **electromagnetic hybrid quantum–classical simulation methods** for both traditional and innovative electromagnetic structures, supported by **experimental measurements** in a **electromagnetic reverberation chamber** compliant with IEC 61000-4-21 from 300 MHz to 40 GHz.

The **tests** will implement standardized procedures for electromagnetic compatibility (**EMC**) and radiated immunity assessment, alongside quantitative measurements of shielding effectiveness and antenna efficiency.

A unified hybrid classical–quantum computational pipeline will be deployed across **classical and quantum HPC infrastructures**. The framework will integrate quantum **simulation** for wave–device interactions, quantum **optimization** for **test** configuration and design, and **quantum machine learning** for fast surrogate modelling in order to improve advance quantum-enabled workflows for practical EMC engineering.

HR EXCELLENCE IN RESEARCH