



DIEI

Department of Electrical and Information Engineering

University of Cassino and Southern Lazio



“

The engineer is the one who,
through scientific knowledge,
logic, and imagination,
creates solutions to the
problems of everyday lives.

”

Adriano Olivetti



“

Alone we can do so little,
together we can do so much.

”

Hellen Keller





50
scholars



10
technicians
and
administratives

- Electric and electronic measurements
- Electrical engineering
- Electrical power systems
- Electronics
- Electromagnetic fields
- Information processing systems
- Mathematical analysis
- Mathematical physics
- Numerical analysis
- Power electronic converters, electrical machines and drives
- Systems and control engineering
- Telecommunications



Teaching

Bachelor



- Ingegneria Informatica e delle Telecomunicazioni
- Industrial Engineering Technology 
- Ingegneria Industriale

Master of Science



- Ingegneria Informatica  
- Ingegneria Biomedica
- Telecommunications Engineering 
- Ingegneria Elettrica

PhD



- Metodi, Modelli e Tecnologie per l'ingegneria  



Teaching

Bachelor

**Ingegneria Informatica
e delle Telecomunicazioni**
(L-8)

Industrial Engineering Technology
(L-9 with DICEM) ✠

Ingegneria Industriale
(L-9 with DICEM)

Master of Science

Ingegneria Informatica (LM-32)

Intelligenza Artificiale e Robotica

Medical Imaging and Applications (MAIA) ✠
(Université de Bourgogne and Universitat
de Girona)

Medical Image Computing (MIC) ✠
(Universitat de Girona)

Ingegneria Biomedica (LM-21)

Inter-University with Università del Molise e Università del Sannio

Telecommunications Engineering (LM-27)

Wireless Communications and Technologies ✠ Dual Degree with Astana IT University, Kazakhstan ✠

Ingegneria Elettrica (LM-28)



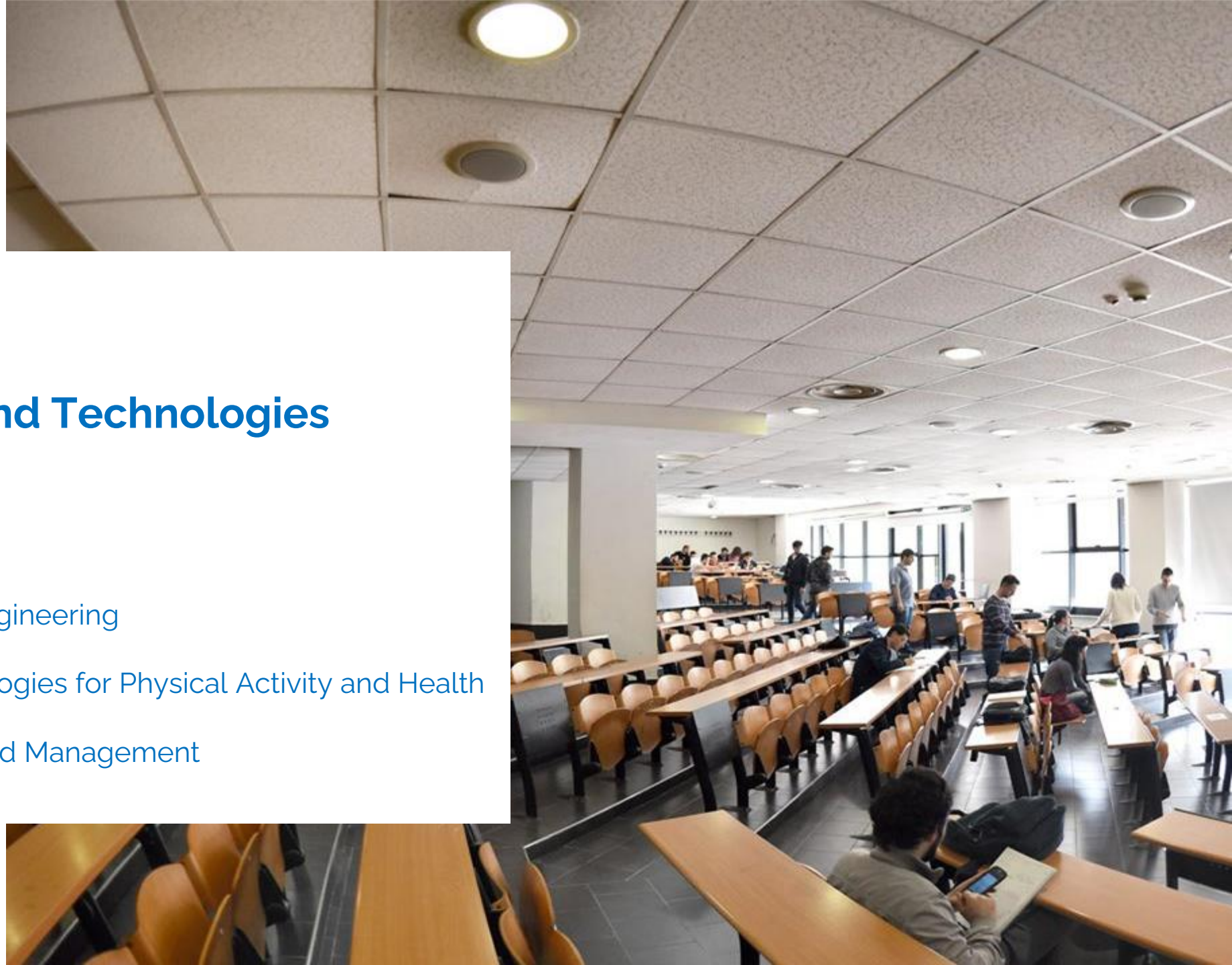
Teaching

PhD

Methods, Models and Technologies for Engineering

5 curriculum

- Civil and Environmental Engineering
- Electrical Engineering
- Environments and Technologies for Physical Activity and Health
- Information Engineering
- Mechanical Engineering and Management



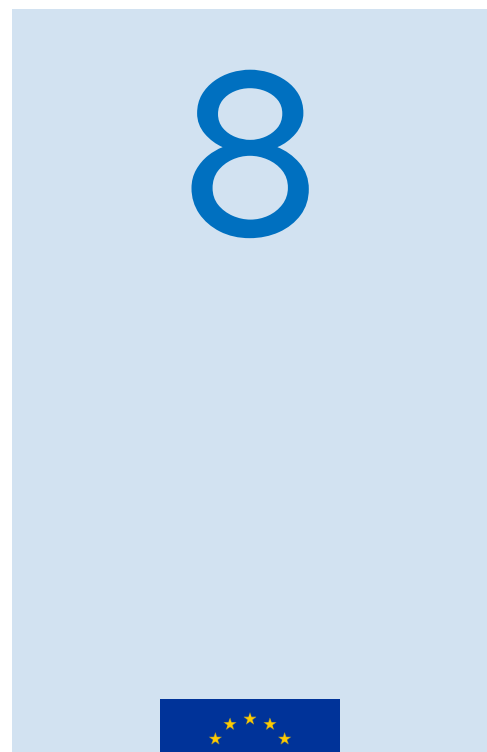
Research activities



DIEI has been designated as a **Department of excellence** for the years 2018-2022 based on a competitive selection process carried out by the Italian Ministry of Education, University and Research for the activity 2011-2014



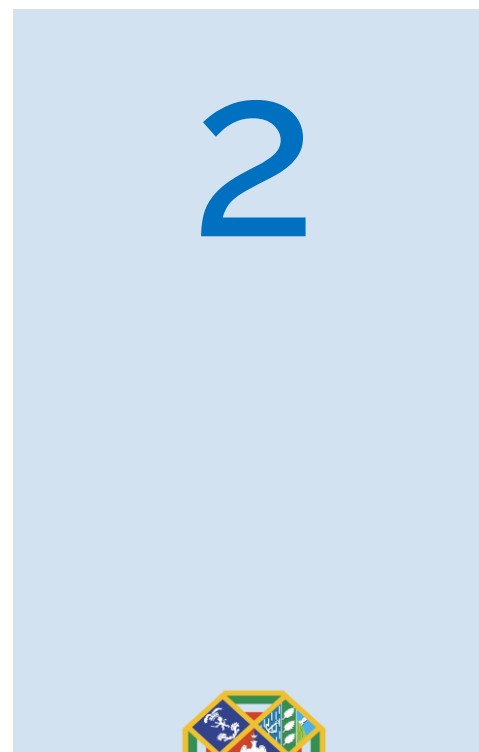
Competitive calls (2022-2024)



European



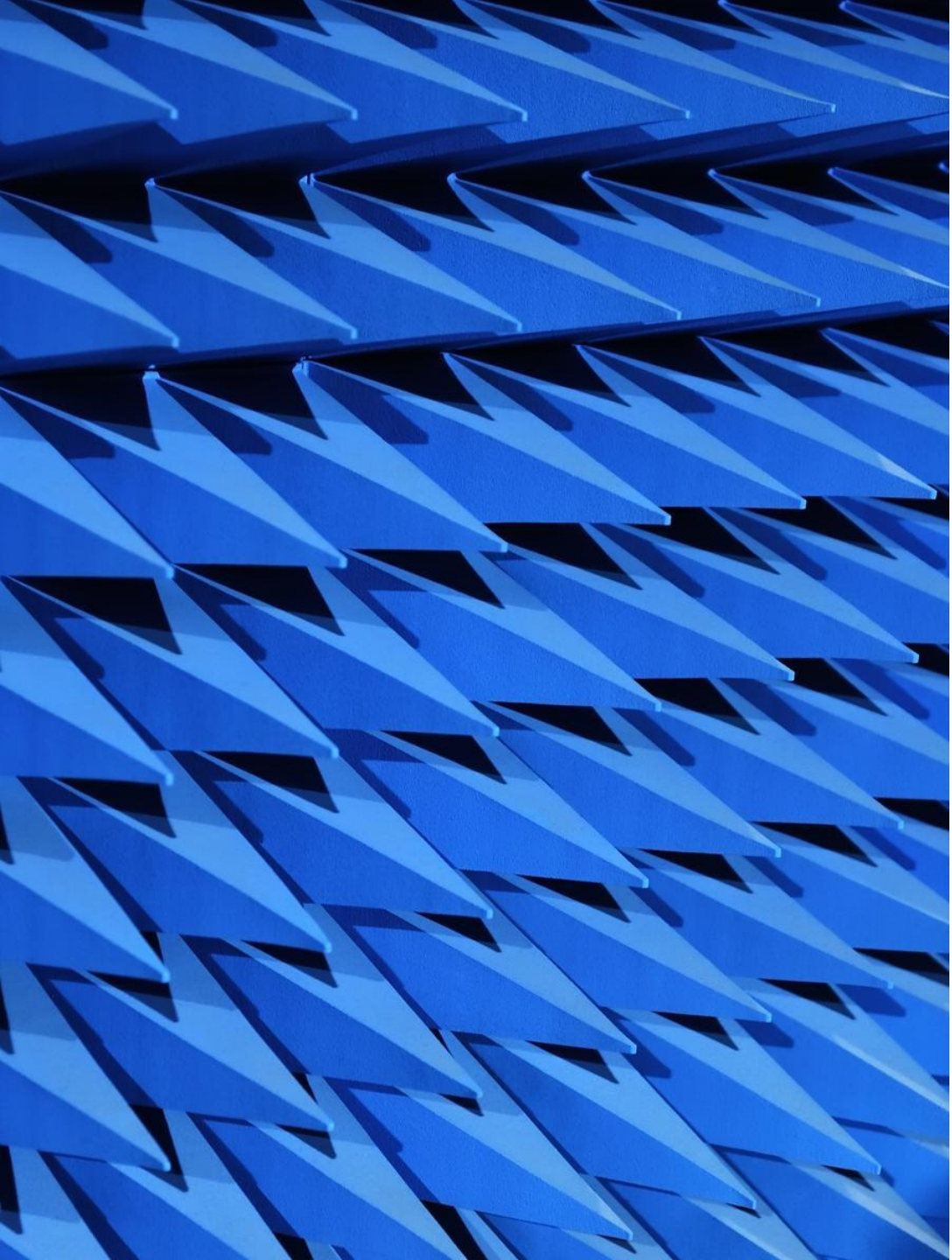
National



Regional

13M€



A decorative background on the left side of the slide featuring a blue 3D geometric pattern of overlapping, pointed shapes that create a sense of depth and movement.

Laboratories

- AIDA – Artificial Intelligence and Data Analysis
- CORE – Communications, Radar, and Networking Laboratory
- EMC²LAB – Electromagnetic Compatibility & Cyber Intelligence Laboratory
- LAI – Industrial Automation and Robotics
- LAMI – Industrial Measurement Laboratory
- LaSE – Power System Laboratory
- LEI – Industrial Electronics
- LEMNDE – Computational Electromagnetism and Nondestructive Evaluation
- μ LAB – Microwave Laboratory



AIDA

Artificial Intelligence Laboratory



Activities

- Biomedical imaging
(mammography, eye fundus)
- Healthcare applications
(Alzheimer, ECG, Gait analysis)
- IoT and smart sensors
(pollutant detection, batteries, smart energies)
- AI in Cultural Heritage
(bible, papyri, gamification)
- Cybersecurity
(intrusion detection, traffic analysis)
- Satellite image processing
(identification of micro-landfills and asbestos roofs)



Referent

Mario Molinara



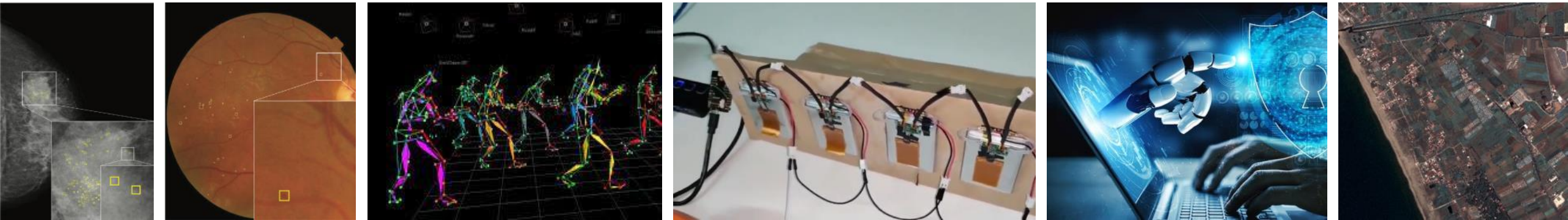
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Website

<https://www.unicas.it/aidalab>



AIDA

Data Analysis Laboratory



Activities

- Homogenization of PDEs
(superconducting multifilamentary composites, metamaterials)
- Inverse problems
(non-destructive electromagnetic diagnosis, ERT)
- Optimal control
(optimal control of ODEs, optimization under uncertainties)
- Nonlinear dynamical systems and applications
(socio-epidemiological models, biomathematics, electrochemistry)
- Pattern formation and bifurcation theory
(wave propagation, self-organization phenomena, spatio-temporal chaos)



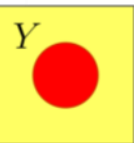
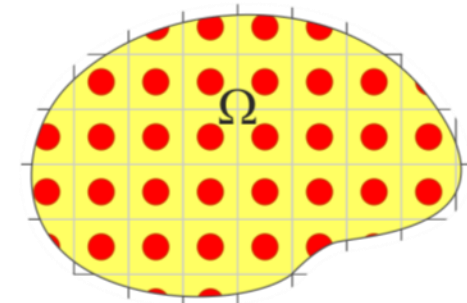
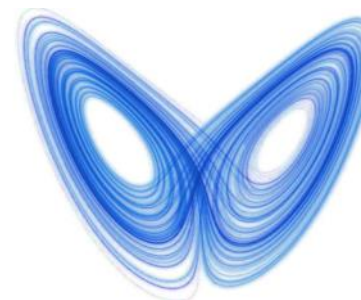
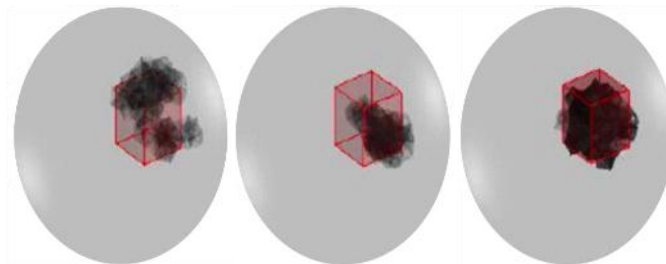
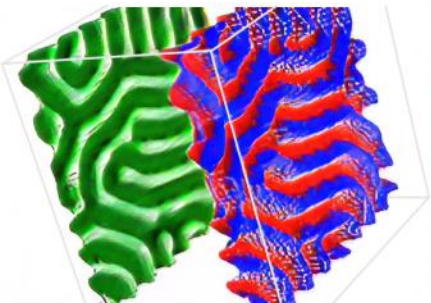
Referent
Antonio Corbo



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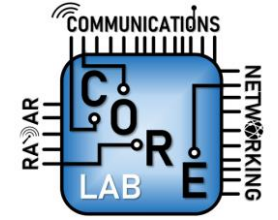


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CORE

Communications, Radar, and Networking Laboratory



Activities

- Wireless Networks technologies for 5G and beyond 5G (massive MIMO, cell-free MIMO, dense networks, high-frequency communications, ambient backscatter communications, metasurfaces, reconfigurable intelligent surfaces, multi-user detection)
- Radar detection and estimation (waveform design, resource allocation, multi-frame processing, MIMO and multi-static systems, opportunistic sensing, integrated sensing and communications)
- Data Mining by big data algorithms (sensing applications, video and audio processing, secure and robust cloud architectures for BigData and IoT)



Referent

Alessio Zappone



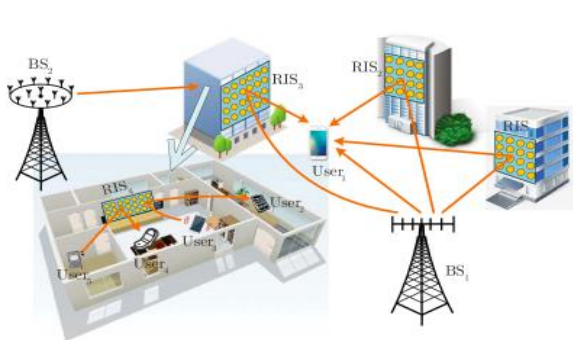
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<https://www.unicas.it/siti/laboratori/corelab-laboratorio-di-comunicazioni-radar-e-networking.aspx>



EMC²LAB

Electromagnetic Compatibility & Cyber Intelligence Laboratory



Activities

- Compact shielded and semi-anechoic chamber for EMC full compliance (3 meters-distance measurements up to 18 GHz)
- Full-compliance electromagnetic compatibility - Directive 2014/30/EU (testing and analysis for civil, industrial and automotive applications)
- Pre-compliance testing for railway, biomedical devices and E-health
- Support for homologations of measurement instruments under the MID - Directive 2014/32/EU
- Electromagnetic compatibility tests for automotive according to UN Regulation No. 10
- Measurements of Supraharmonics (2-150kHz) according to IEC 61000-4-7 and IEC 61000-4-30, for power electronic interfaces of renewable and electric vehicle chargers
- Narrowband and broadband measurements for human exposure evaluation to electric, magnetic and electromagnetic fields
- Modeling for signal integrity analysis



Referent

Domenico Capriglione



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Website

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EMC²LAB

Electromagnetic Compatibility & Cyber Intelligence Laboratory



Activities

- Addresses the level of inadequacy of cybersecurity in many products, and the lack of timely security updates for products and software
- Measurements of QoS in wired and mobile networks (up to 5G)
- Analysis of pre-compliance for CRA (Cyber Resilience Act) Tests
- Side channels cyber security analysis of devices
- Cyber Physic Vulnerability and Cyber Threat Analysis
- Secrecy and privacy Cyber intelligence analysis of exposed and hidden data
- Design and prototype implementation of secure and energy efficient IoT systems



Referent

Domenico Capriglione



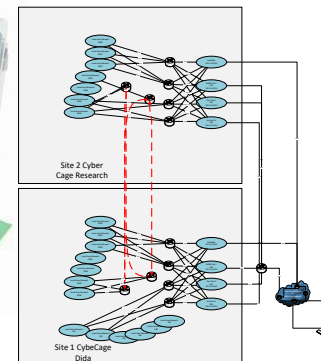
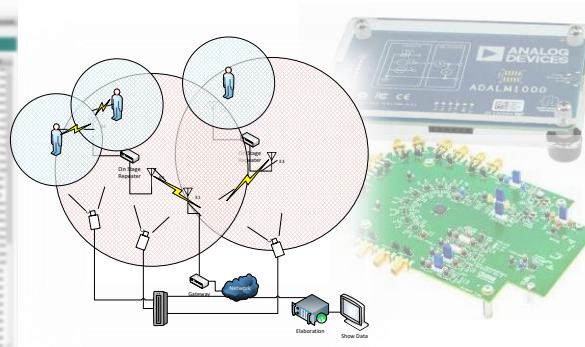
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Industrial Automation Laboratory



Activities

- Electric vehicles
(Battery pack, BMS and TMS, traction control, hybrid systems, high performances powertrain, traction inverters, testing and validation, charging infrastructures)
- Industrial electrical drives
(industrial inverters, control of electric motors, revamping, PLC architectures, optimization)



Referent

Giuseppe Tomasso



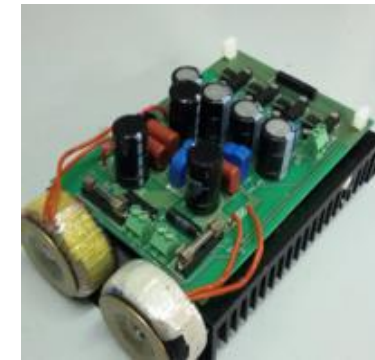
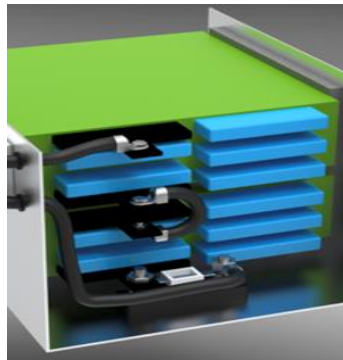
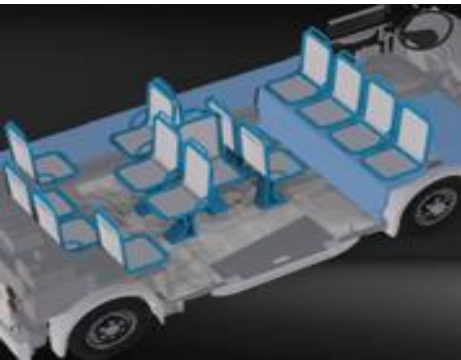
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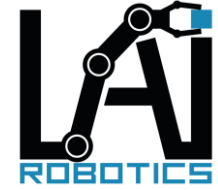
Website

<https://www.unicas.it/siti/laboratori/lai-laboratorio-di-automazione-industriale.aspx>





Robotics Laboratory



Activities

- Industrial & Service Robotics
- Marine Robotics
- Assistive Robotics
- Cooperative Manipulation
- Human-Robot-Interaction
- Multiple-robot systems



Referent

Alessandro Marino



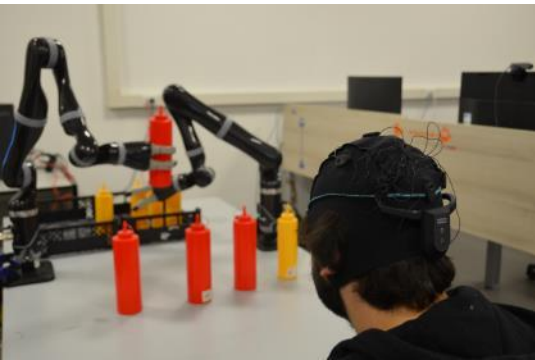
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Activities

- Non-destructive testing and evaluation
- Smart and cognitive measurement systems
- Measurement for medical, biomedical, sport, and healthcare applications
- Synchronization and localization in sensor networks
- Instrumentation and measurement for networking and cybersecurity analysis
- Sensor and measurement systems for environmental monitoring and agrifood
- Sensors and sensor networks for IoT and industrial applications
- Calibration services
- Measurement for smart energy and power quality



Referent

Gianfranco Miele



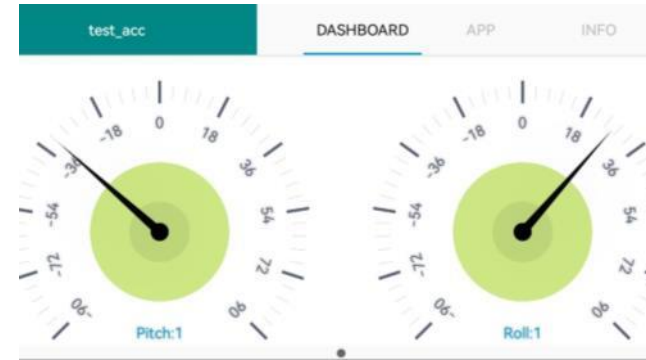
Contacts

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Website

<http://www.lamisura.it> -
<http://www.lat105.it>



Activities

- Renewable energy resources modeling (production estimation and optimization)
- Analysis and control of smart grids
- Strategies for participation in electricity markets
- Power Quality and energy efficiency in electrical systems
- Energy saving and efficiency improvement of road infrastructure lighting systems
- Design, development and testing of smart electric devices
- Automation of industrial electrical systems (SCADA/DCS)
- Verification of electrical safety



Referent

Pietro Varilone



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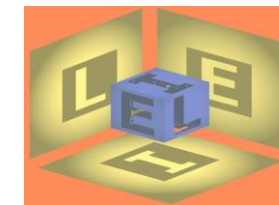
Website

<http://www.unicas.it/siti/laboratori/lase-laboratorio-di-sistemi-elettrici.aspx>



LEI

Industrial Electronic Laboratory



Activities

- Electrical Machines (design and testing)
- Power Electronics and converters



Referent

Roberto Di Stefano



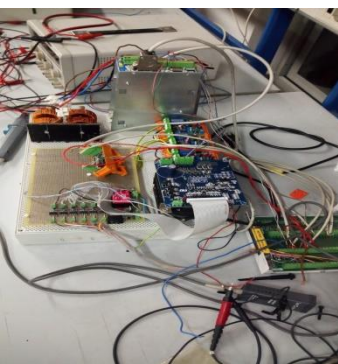
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Website

<https://www.unicas.it/siti/laboratori/lei-laboratorio-di-elettronica-industriale-gianni-d-angelo.aspx>



Activities

- Inverse Problems, Electromagnetic imaging, Nondestructive Testing and Evaluation
- Computational electromagnetism
- Circuits analysis and design
- Nanotechnology



Referent

Antonello Tamburrino



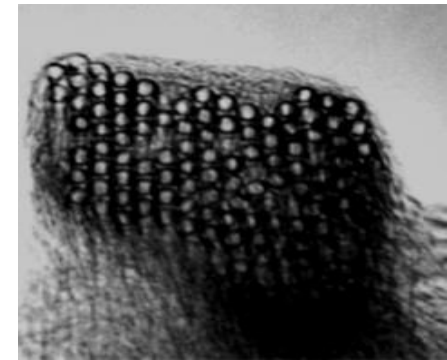
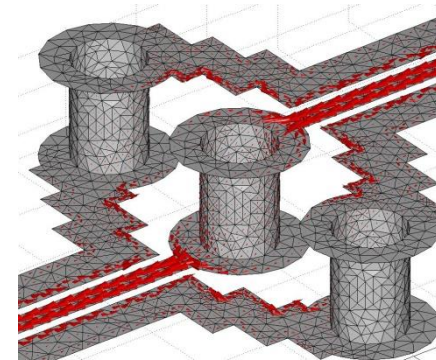
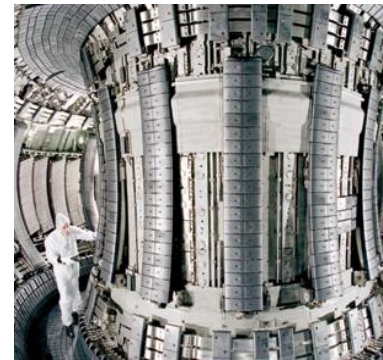
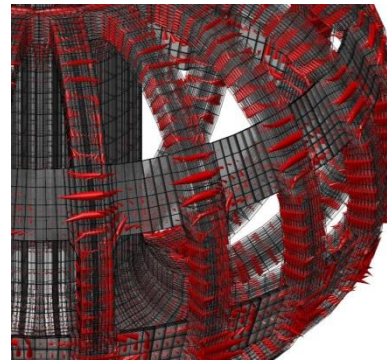
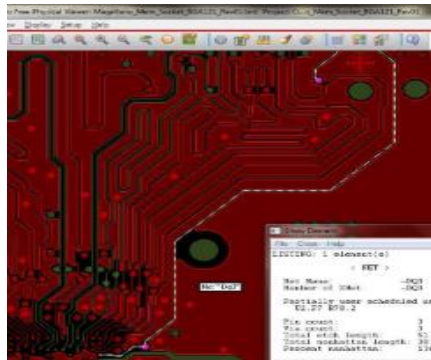
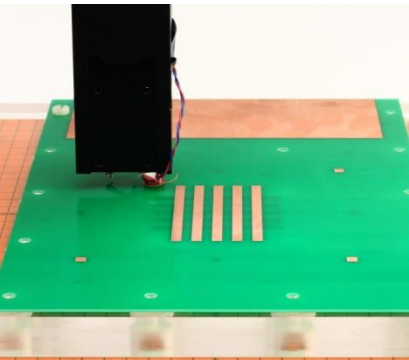
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Website

<https://www.unicas.it/siti/dipartimenti/diei/ricerca/laboratori/lemnde-laboratorio-di-calcolo-elettromagnetico-e-diagnostica-elettromagnetica-non-distruttiva.aspx>



μ LAB

Microwave Laboratory



Activities

- Realization and test of microwave devices
- Antennas and arrays (design, measurement, analysis, diagnosis)
- Biological interactions and microwave heating
- Experimental dosimetry
- RF propagation and EMF measurements
- Numerical and analytical methods for propagation and scattering
- Permittivity measurements



Referent

Marco Donald Migliore



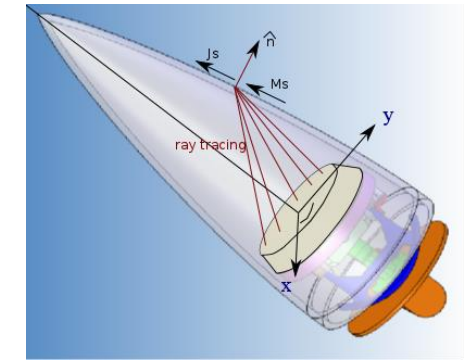
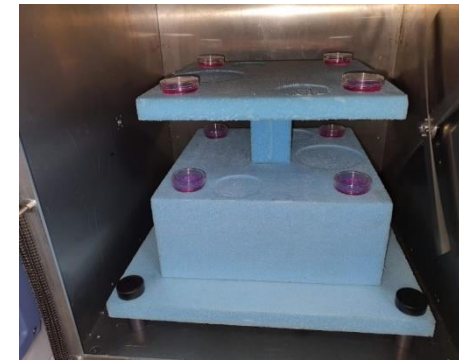
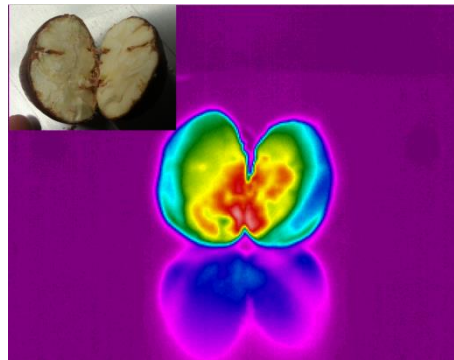
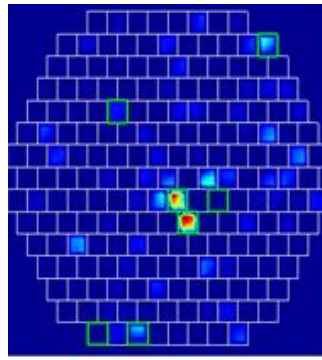
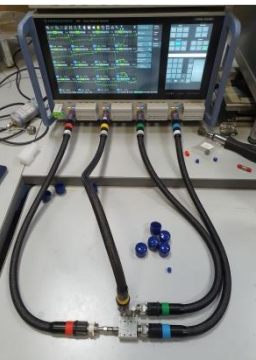
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<http://www3.laboratori.unicas.it/Laboratori-o-di-microonde>



Technology transfer: contracts

Technology transfer: spinoff



LEDA

LEDA, Advanced Electro Dynamics Laboratory provides advanced technology solutions for industry, transportation and biomedical. It is equipped to perform tests and measurements on electronic and electro-mechanic equipment, including electrical machines, drives, power electronics. Most of the profits of LEDA are invested into intellectual property.

www.ledasolutions.it



POD

Power On Demand, established in 2018, operates in the energy sector of photovoltaic systems and power electronic converters. POD deals with the design, development and construction of innovative electricity storage systems for civil and industrial applications.



E-Lectra

E-Lectra is a spin-off of the University of Cassino and part of the FAIST Group. With >1200 sqm of laboratories, E-Lectra is specialized in researching, developing, and manufacturing cutting-edge solutions in the field of power electronics, energy storage systems, and electrical drives for automotive, industrial, aerospace and military applications.

www.e-lectra.it



EveryBotics

EveryBotics was born in the Robotics Research Group of the DIEI. Its activity focuses on Robotics, Artificial Intelligence and Coding for industrial and advanced manipulators.

www.everybotics.it



Technology transfer: 24 patents

- Method and device to detect islanding operation of a part of an electric distribution system
- Sistema e metodo per generare un segnale di uscita che fornisce un risultato finale ottenuto da un soggetto in risposta a compiti di scrittura a mano predefiniti eseguiti dal soggetto
- Process of handwriting recognition and related apparatus
- Purifying apparatus and method based on photocatalysis through modulation of light emission
- Dispositivo e metodo per il rilevamento di una condizione di funzionamento in isola di un sottosistema elettrico
- Apparato depuratore basato su fotocatalisi mediante modulazione dell'emissione luminosa
- High Voltage Fiber Optic Sensor for the Measurement of an Alternating Electric Field
- Resource allocation in mimo multi-cellular networks via submodular optimization
- High voltage fiber optic sensor for the measurement of an alternating electric field
- Coordinated linear beamforming in downlink multi-cell wireless networks
- Azionamento elettrico senza spazzole con due rotori indipendenti per propulsione elettrica ibrida
- Coordinated linear beamforming in downlink multi-cell wireless networks
- Procedimento e apparato di riconoscimento di scrittura a mano
- Coordinated linear beamforming in downlink multi-cell wireless networks
- Distributed inter-cell interference mitigation in OFDMA multi-carrier wireless data networks
- Colonnina di ricarica intelligente per auto, scooter e bici elettriche
- Method and device for controlling the power supply of an electromagnetic actuator
- Metodo e dispositivo per controllare l'alimentazione elettrica di un attuatore elettromagnetico
- Sistema di Alimentazione "Biberonaggio Elettrico" per Imbarcazioni Fluviali e Lagunari.
- Electromagnetic Actuator for a Proportional Solenoid Valve
- Attuatore Elettromagnetico per una Elettrovalvola Proporzionale
- sistema di alimentazione ad alta efficienza per ascensori
- Dispositivo di misurazione della caratteristica coppia-velocità di motori elettrici.
- Misuratore di livello a fibre ottiche



Administration

(2025-2027)



Gianluca Antonelli

Director

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Ida Raimondi

Administrative Manager

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Keep in touch!



University of Cassino and Southern Lazio

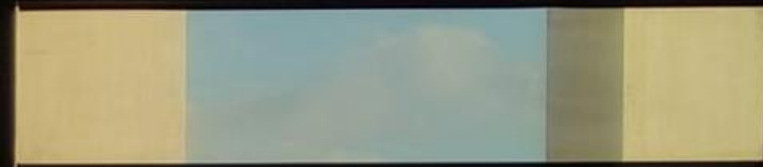
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Thank you!

