



**POLITECNICO**  
MILANO 1863

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DIPARTIMENTO DI ENERGIA

**DEPARTMENT OF ENERGY**  
**RESEARCH, EDUCATION, INNOVATION.**





# POLITECNICO DI MILANO

Established in 1863, Politecnico di Milano is one the most outstanding technical universities in Europe, and the largest Italian university in Engineering, Architecture and Design, with over 48,000 students.

The university has seven campuses located in Milan and in other nearby Italian cities: Lecco, Cremona, Mantova and Piacenza. It is organized in 12 Departments and in 4 Schools, respectively devoted to research and education.



# QS WORLD UNIVERSITY RANKINGS BY SUBJECT 2024

The prestigious QS World University Rankings continues to reward the Politecnico di Milano's policy in terms of excellence in training, competitive research and special attention to the needs of the labour market.

The ranking "by Subject" 2024 lists the Politecnico di Milano among the world top 25 in all three specific areas:

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**23° Engineering & Technology**

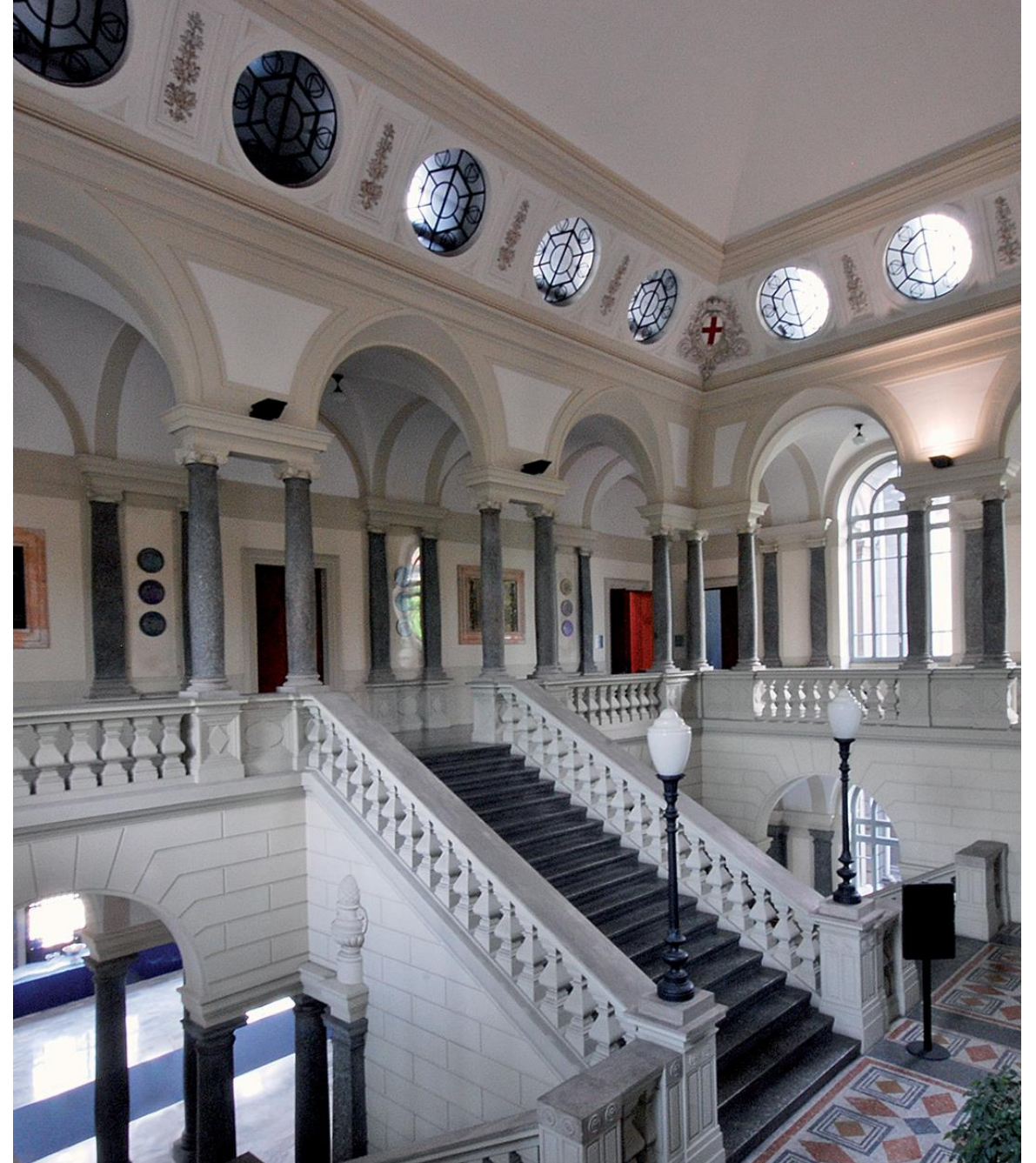
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**7° Architecture/Built Environment**

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**7° Art&Design**

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# PERSONS

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1,829

Teaching Staff

512 Full Professors

768 Associate Professors

549 Researchers

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1,382

Tech/Admin Staff

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# FACILITIES

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250

Research Laboratories

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35

Inter-department Labs

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48,500

BSc and MSc Students

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2,880

PhD Students

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1,065

Research Fellows

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8

Large Infrastructures

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# EDUCATIONAL EXCELLENCE

Politecnico di Milano is recognised as a leader in education. It offers programmes at all levels:

- 26 Laurea (BSc),
- 46 Laurea Magistrale (MSc) (41 taught in English)
- 20 Dottorato di Ricerca (PhD) taught in English
- 182 Specializing masters and post-graduate courses.

Polimi has a growing national and international appeal and an outstanding employment rate for its graduates (97%, within a year of graduation).

# INTERNATIONALIZATION STRATEGY

8.802 Foreign students enrolled

1.966 Bachelor of Science

6.174 Master of Science

662 PhD

2023/24 DATA





# POLITECNICO DI MILANO

## EXCELLENCE IN RESEARCH

**189 MLN € - 34 ERC**

HORIZON 2020 (2014 – 2020)

**153 MLN € - 302 funded projects**  
(35 ERC - 65 Marie Curie)

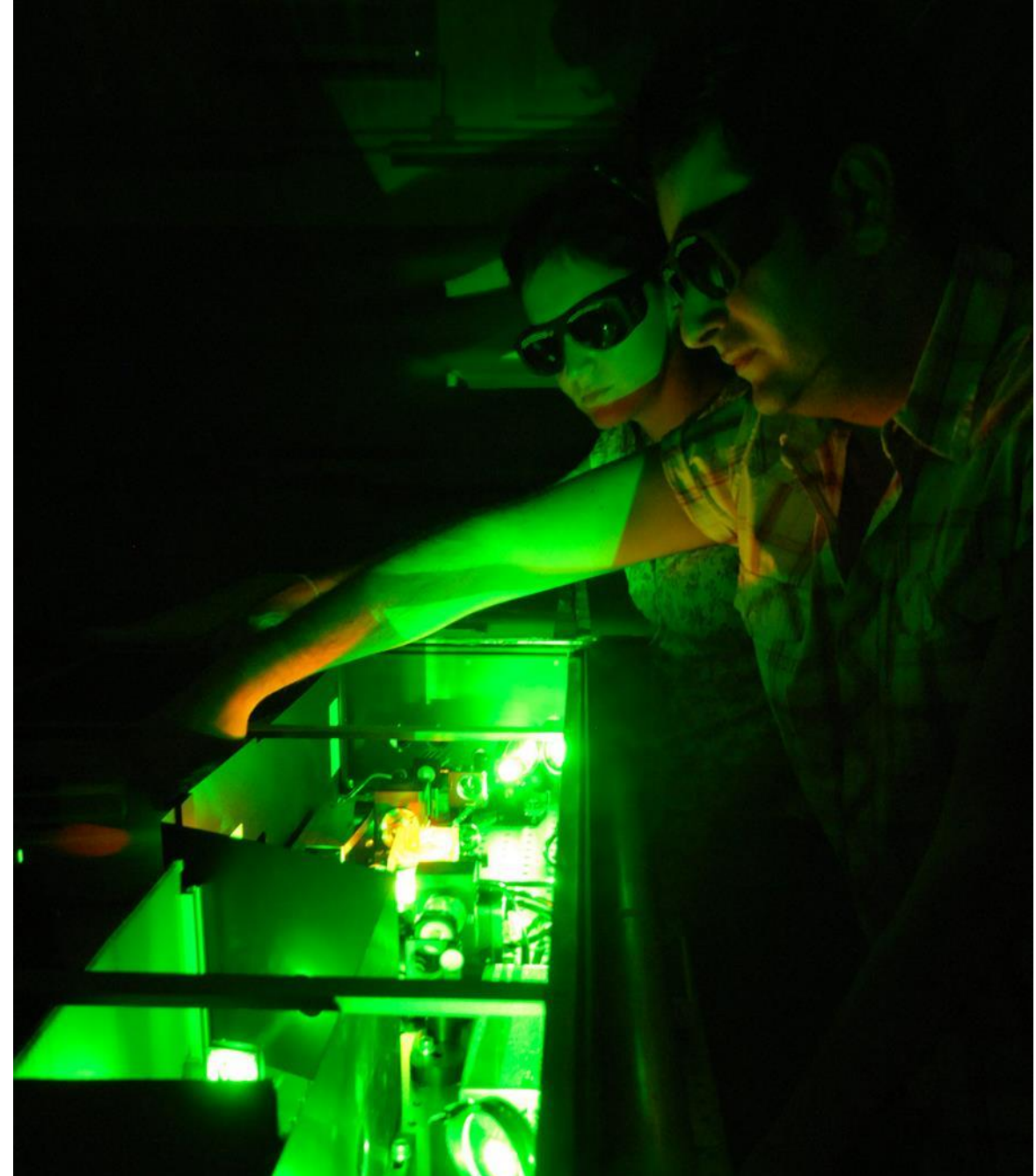
HORIZON EUROPE (2021-2024)

**206 MLN €**

SELF-FINANCING (2023)

**53 Joint Platform, 3.080 Agreements**  
**3408 patents, 135 start-up, 119 spin-off**

RESEARCH ACTIVITIES WITH COMPANIES AND INSTITUTIONS  
(since 2010)





POLITECNICO DI MILANO

SCIENTIFIC RESEARCH: DEPARTMENTS

AEROSPACE SCIENCE AND TECHNOLOGY

ARCHITECTURE AND URBAN STUDIES

ARCHITECTURE, BUILT ENVIRONMENT AND CONSTRUCTION ENGINEERING

CHEMISTRY, MATERIAL AND CHEMICAL ENGINEERING

CIVIL AND ENVIRONMENTAL ENGINEERING

DESIGN

ELECTRONICS, INFORMATION AND BIOENGINEERING

**ENERGY**

MANAGEMENT, ECONOMICS AND INDUSTRIAL ENGINEERING

MATHEMATICS

MECHANICAL ENGINEERING

PHYSICS





# DEPARTMENT OF ENERGY

The new building EN:lab (2024)





## THE VISION

The Department brings together the scientific expertise necessary to explore, develop and disseminate research and technologies related to Energy.

It is one of the most relevant structures in Europe in the energy sector for the high level of teaching. It is a primary interlocutor for research, active and proactive partnership with Companies and Institutions, at national and international level.



# PERSONS



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48

Full Professors

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61

Associate Professors

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40

Researchers

---

67

Technical and  
Administrative Staff

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255

PhD Students

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68

Research Fellows

Updated  
Jan. 2025



# RESEARCH AREAS

**Fossil, Renewable and Nuclear Energy Sources**

**Energy Conversion Systems, Processes and Components**

**Energy Storage, Transportation and Distribution**

**Efficiency in End Use**

**Energy scenarios and integrated models for impact and risk assessment**



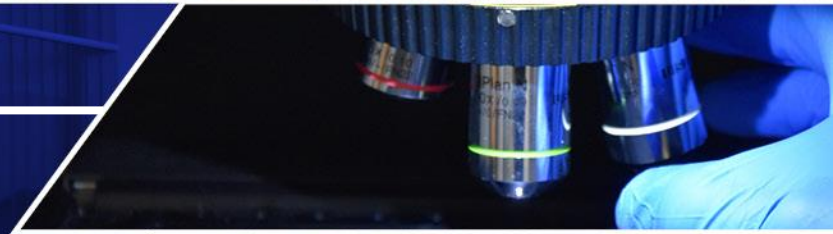
# LABORATORIES

**8.350** m<sup>2</sup> dedicated to research and education

**42** Research laboratories



**9** Testing and certifications laboratories



**21** Laboratory for educational activities





# RESEARCH – 2020/2024

## COMPETENCES AND KNOWLEDGE

**79 UE Funded Projects | 22.4 M€**

(2020-2023)

**19 PNRR Projects | 15.9 M€**

**25 PRIN Projects | 6.3 M€**

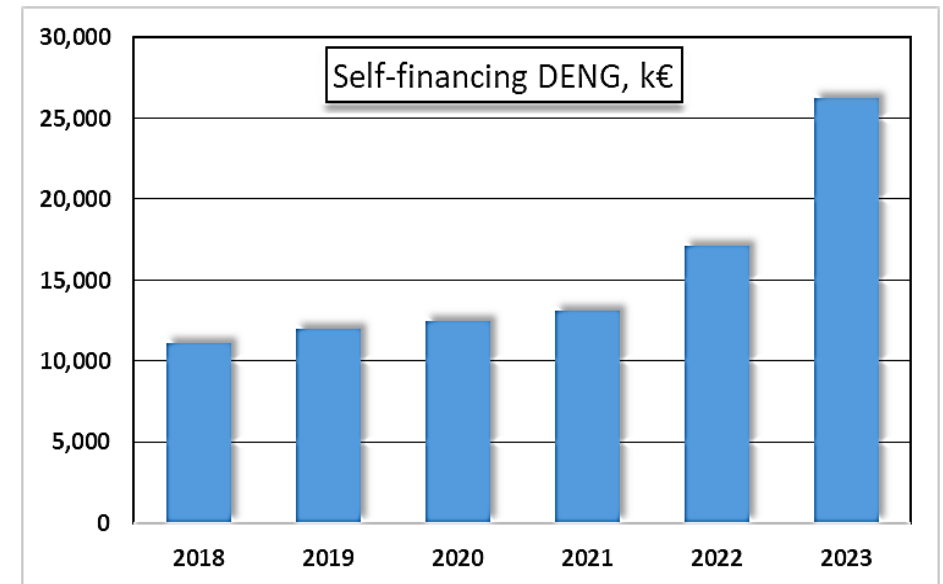
**26.2 M€ self-financing in 2023**

(from external Institutions)



European Research Council

Established by the European Commission





# RESEARCH – 2017/2022

## COMPETENCES AND KNOWLEDGE

**54 Patents**

**3,036 Scientific Publications** (Scopus)

1,942 published in International Journals

964 presented at Conferences

**41,436 Citations** (Scopus)

32,399 from external papers (Scopus)

Updated  
Oct. 2023



# FIGURES

5

## SPECIALIZED DIVISIONS

working together to study, analyze, develop the disciplines and technologies related to the **production, conversion, transport, distribution** and **use of energy**.

18

## RELATED RESEARCH GROUPS

to perform international and high-level research activities.

43

## ADVANCED LABORATORIES

over **8.350 m<sup>2</sup>** dedicated to research, education, services to the industry.



# SPECIALIZED DIVISIONS

Chemical Technologies and Processes  
and Nanotechnology

Electrical Engineering

Nuclear Engineering - CeSNEF

Fluid Machines, Propulsion, Energy Systems

Thermal Engineering and Environmental  
Technologies





## SPECIALIZED DIVISION

# CHEMICAL TECHNOLOGIES AND PROCESSES AND NANOTECHNOLOGY

HEAD OF DIVISION | **PROF. ANDREA LI BASSI**

Research activity involves on the one hand the development and study of advanced nanomaterials with microscopic and spectroscopic techniques and, on the other hand, the study of catalytic materials, reactors and processes for the production of energy vectors and the reduction of pollutants from stationary and onboard combustion processes.

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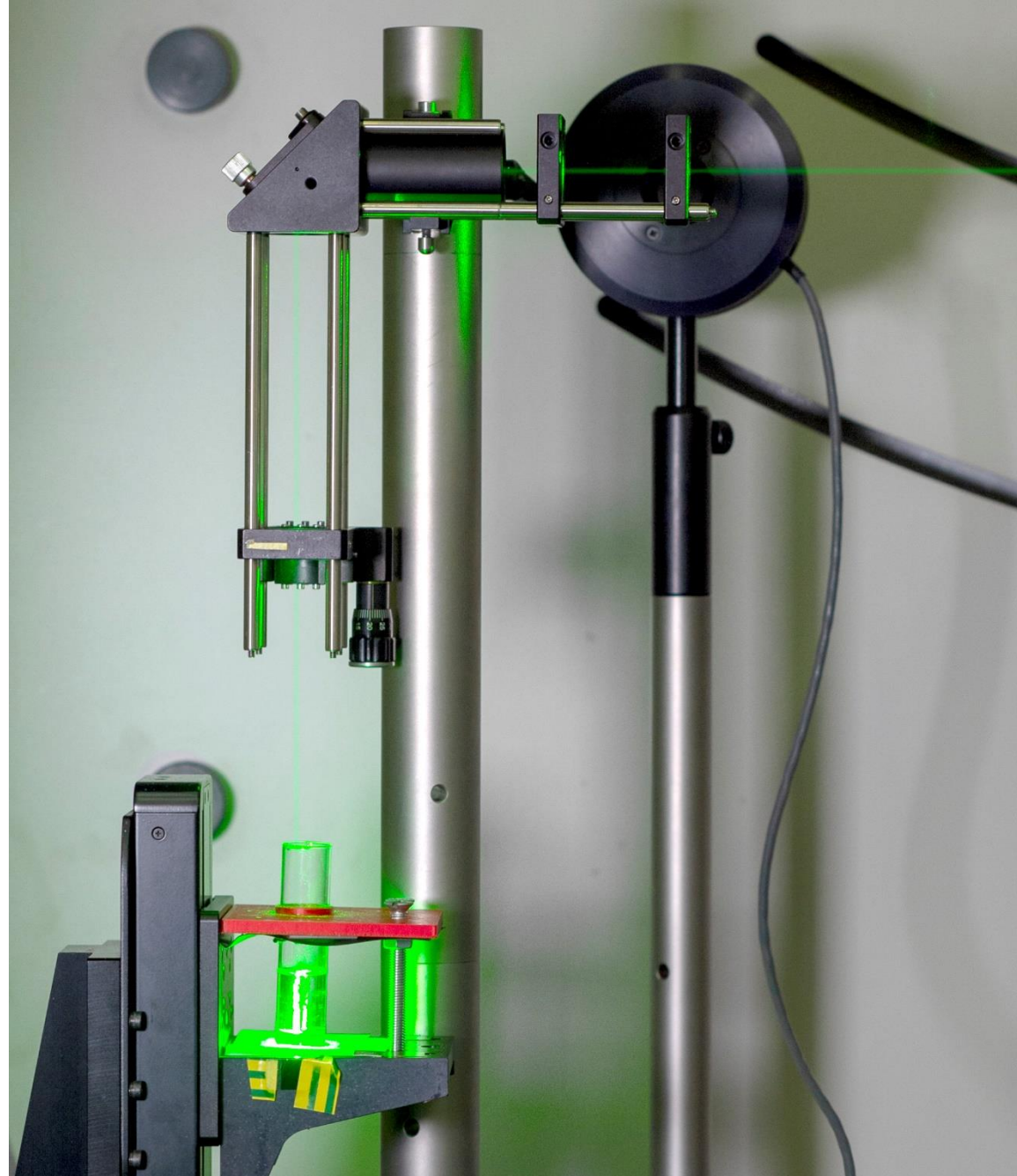
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Labs

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3

Research groups



## SPECIALIZED DIVISION

### CHEMICAL TECHNOLOGIES AND PROCESSES AND NANOTECHNOLOGY

#### 3 RESEARCH GROUPS

##### **Laboratory of catalysis and catalytic processes – LCCP** (head of group: Prof. Enrico Tronconi)

Focuses on the design and optimization of innovative chemical processes using heterogeneous catalysts, with applications in energy, sustainable fuels, and exhaust gas treatment.

##### **Micro and nanostructured materials – NanoLab** (head of group: Prof. Andrea Li Bassi)

Specializes in the synthesis and characterization of innovative materials for energy applications, including photovoltaics, photocatalysis, and nuclear technologies, leveraging advanced nanotechnology.

##### **Battery materials engineering – BMEL** (head of group: Prof. Benedetto Bozzini)

Dedicated to the research and development of advanced materials for lithium and post-lithium batteries, improving performance and lifespan for sustainable energy storage solutions.



# SPECIALIZED DIVISION

## ELECTRICAL ENGINEERING

HEAD OF DIVISION | **PROF. ROBERTO FARANDA**

Research activities are related to the design of components and their integration into electric power systems. In particular, production, transmission, distribution and final uses of electricity are investigated, from both the theoretical and the experimental point of view, including subjects such as Smart Grids, efficiency in consumption and electric transportation systems.

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7

Labs

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3

Research groups



# SPECIALIZED DIVISION

## ELECTRICAL ENGINEERING

### 3 RESEARCH GROUPS

#### **Converters, electrical machines and drives – CEMD** (head of group: Prof. Antonino Di Gerlando)

Designs and controls innovative electric machines and converters for advanced applications, such as wind turbines and motors for Formula E.

#### **Electrical engineering and measurement – EEM** (head of group: Prof. Sonia Leva)

Develops technologies for monitoring and optimizing complex energy systems, focusing on micro-grids, energy harvesting, and wireless charging.

#### **Electric systems for energy and transportation – ESET** (head of group: Prof. Dario Zaninelli)

Studies the integration of renewable sources, smart grids, and storage systems to promote sustainable mobility and resilient energy infrastructures.



# SPECIALIZED DIVISION

## NUCLEAR ENGINEERING

HEAD OF DIVISION | **PROF. ANDREA POLA**

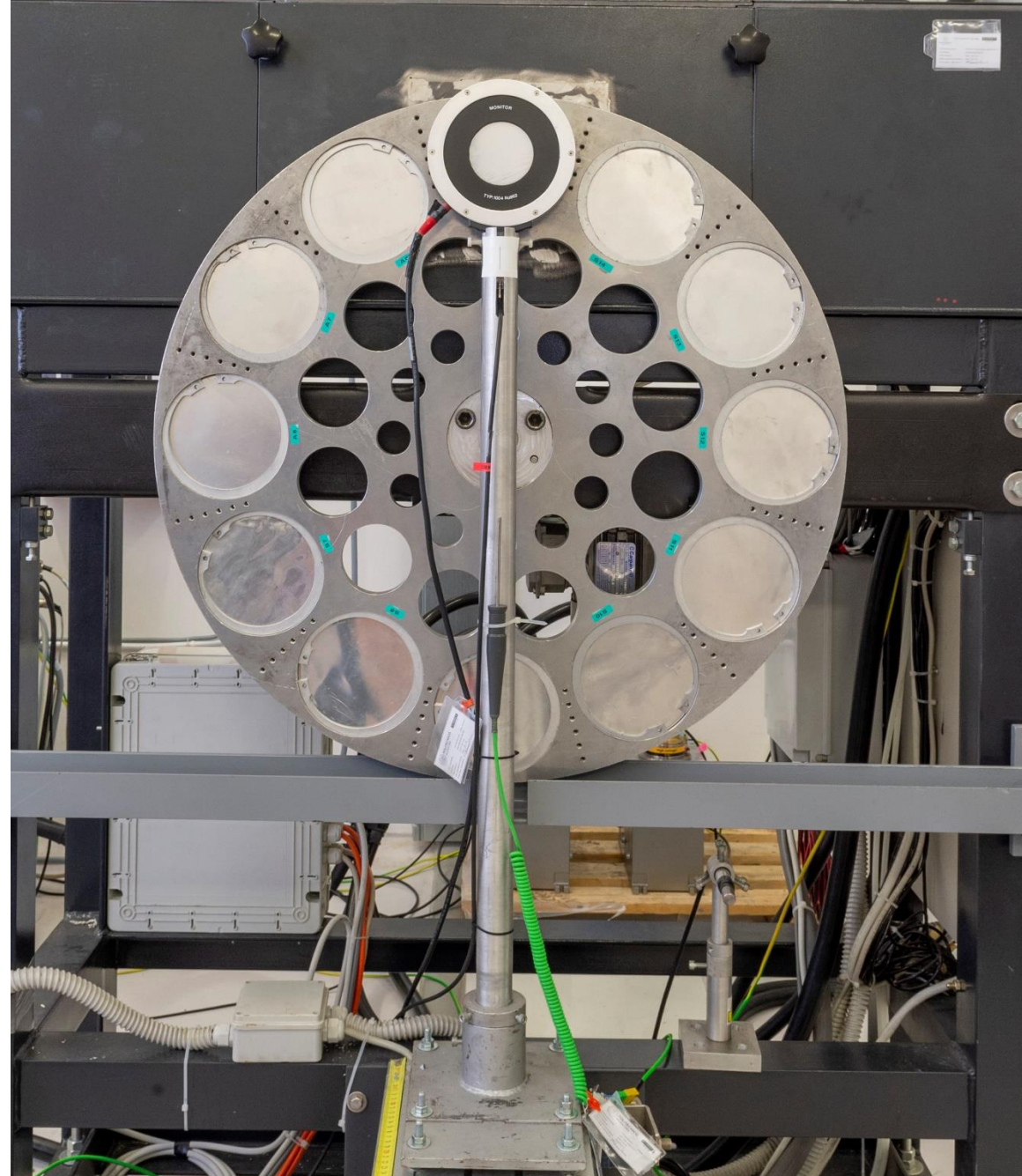
The Division deals with the theoretical-modelling and experimental development of the sector's most characteristic topics: reactor physics, nuclear instrumentation and measurements, nuclear plants and systems, risk analysis, reliability and safety, radiation dosimetry and the development of sensors, radiochemistry and decommissioning.

7

Labs

3

Research groups



# SPECIALIZED DIVISION

## NUCLEAR ENGINEERING

### 3 RESEARCH GROUPS

#### **Lab of Analysis of Systems for the Assessment of Reliability Risk and Resilience – LASAR<sup>3</sup>** (head of group: Prof. Enrico Zio)

Analyzes the reliability and risk of nuclear and industrial systems, enhancing their safety, maintenance, and resilience.

#### **New generation Nuclear Reactors – NRG** (head of group: Prof. Marco Ricotti)

Explores next-generation nuclear reactors for advanced energy systems and applications such as space propulsion.

#### **Radiation Detection and Measurements – RDM** (head of group: Prof. Stefano Agosteo)

Develops innovative tools for characterizing radiation fields, with applications in scientific, industrial, and medical fields.



# SPECIALIZED DIVISION

## FLUID MACHINES, PROPULSION AND ENERGY SYSTEMS

HEAD OF DIVISION | **PROF. PAOLO CHIESA**

Theoretical and experimental research deals with thermo-fluid dynamics of machines, CFD modelling, combustion and propulsion, analysis of systems and processes for energy conversion and storage, with low/zero emissions of greenhouse gases.

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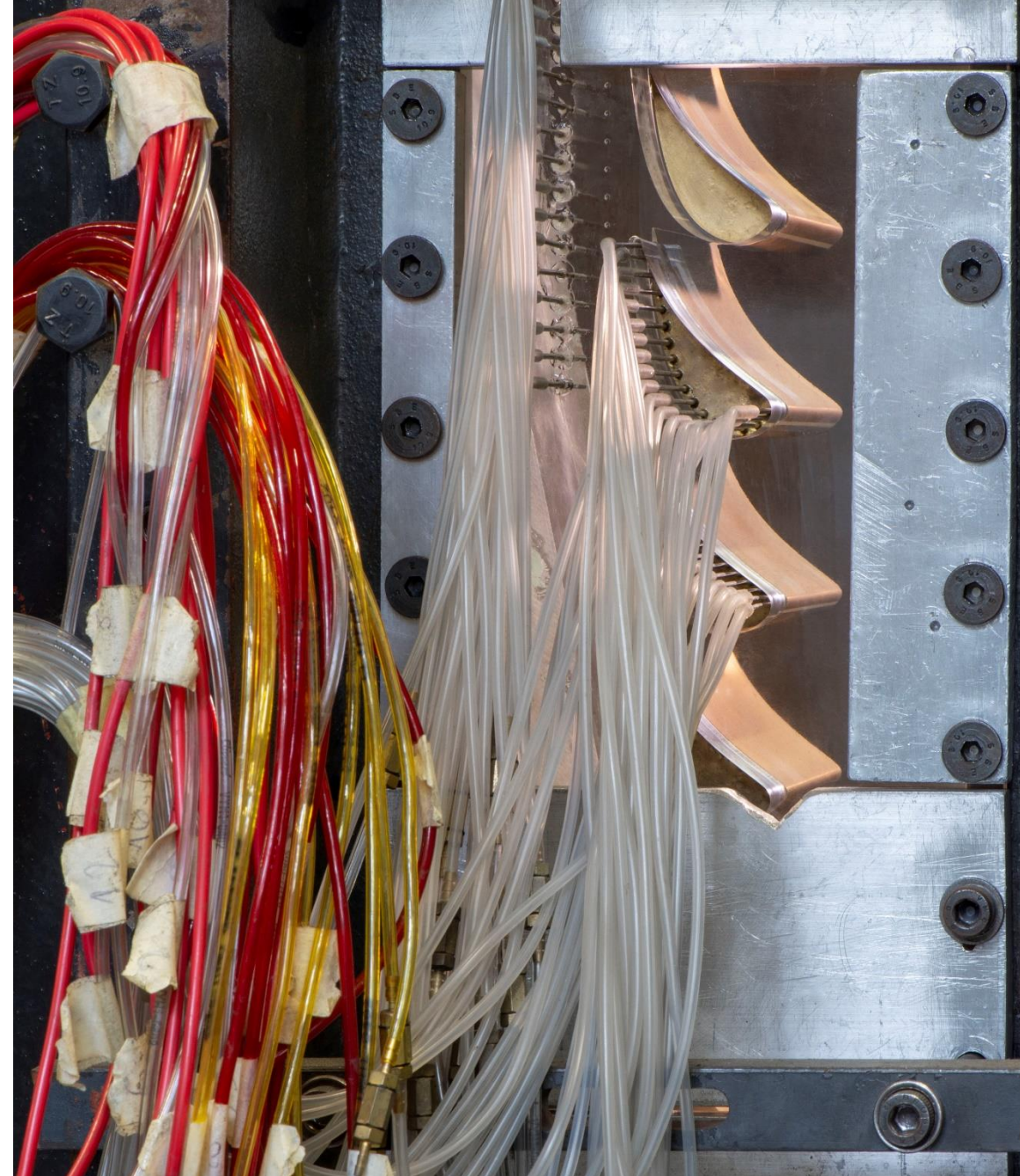
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Labs

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4

Research groups



## SPECIALIZED DIVISION

### FLUID MACHINES, PROPULSION AND ENERGY SYSTEMS

#### 4 RESEARCH GROUPS

##### **Laboratory of fluid machines – LFM** (head of group: Prof. Vincenzo Dossena)

Specializes in the thermo-fluid-dynamic optimization of turbomachinery, including wind and hydropower turbines, for advanced and low-environmental-impact energy applications.

##### **Internal combustion engines – ICEG** (head of group: Prof. Angelo Onorati)

Focuses on the development of low-emission internal combustion engines, studying alternative fuels and optimizing combustion and gas exchange processes.

##### **Propulsion, optical diagnostic and combustion – PODC** (head of group: Prof. Fabio Cozzi)

Focuses on experimental analysis of flames, sprays, and combustion processes in energy and propulsion systems, aiming to reduce environmental impact.

##### **Energy conversion systems – GECOS** (head of group: Prof. Giovanni Gustavo Lozza)

Develops advanced technologies and processes for energy conversion and storage, focusing on CO<sub>2</sub>, hydrogen, e-fuels, and the sustainable energy transition.



# SPECIALIZED DIVISION

## THERMAL ENGINEERING AND ENVIRONMENTAL TECHNOLOGIES

HEAD OF DIVISION | **PROF. ANDREA CASALEGNO**

The division carries out fundamental and applied research in heat, mass and momentum transfer while developing innovative solutions to support design of devices and processes for a broad spectrum of engineering applications, which includes production, distribution and use of energy, as well as civil and industrial HVAC systems and components.

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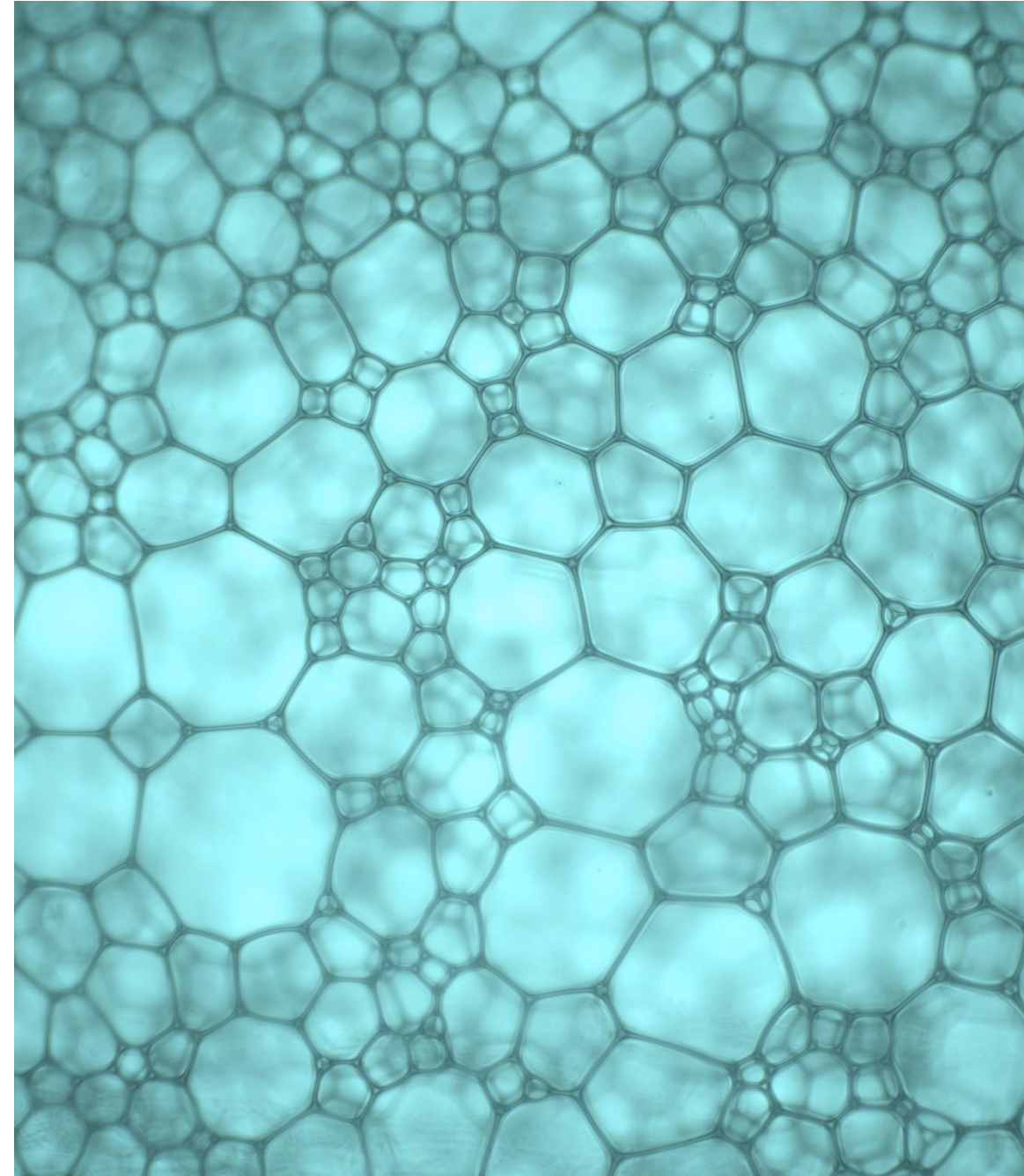
18

Labs

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5

Research groups



## SPECIALIZED DIVISION

### THERMAL ENGINEERING AND ENVIRONMENTAL TECHNOLOGIES

#### 5 RESEARCH GROUPS

**Advanced technologies for environmental conditioning – HVAC** (head of group: Prof. Stefano De Antonellis and Prof. Luca Molinaroli)

Designs technologies for climate and energy control in buildings, with a focus on the conservation of cultural heritage.

**Buildings' environment and energy systems – BEES** (head of group: Prof. Livio Mazzarella and Prof. Mario Motta)

Studies integrated solutions for energy efficiency and comfort in buildings, focusing on sustainability and environmental quality.

**Sustainable energy system analysis and modelling – SESAM** (head of group: Prof. Fabio Inzoli and Prof. Emanuela Colombo)

Models sustainable energy systems to support the energy transition and promote energy access in developing countries.

**MRT Fuel Cell and battery – MRT FC&B** (head of group: Prof. Andrea Casalegno)

Optimizes fuel cells and batteries for sustainable energy conversion and storage, combining experimentation and modeling.

**Heat and mass transfer – HMT** (head of group: Prof. Alfonso Niro and Prof. Luigi Colombo)

Studies heat and mass transfer for energy, biomedical, and aerospace applications, improving efficiency and safety.



# EDUCATION

The programs supported by the Department of Energy merge with the research activities in contact with the companies. Courses are offered also in many other BSc and MSc Programmes (e.g. Aerospace Eng., Chemical Eng., Management Eng., Materials Eng., Mechanical Eng., Architecture, etc.)

2

## Bachelor of Science

Energy engineering | Electrical engineering

3

## Master of Science

Energy Engineering | Electrical Engineering  
Nuclear Engineering

2

## PhD

Energy and Nuclear Science and Technology  
Electrical Engineering

6

## Post-graduate Education (Specializing Masters)

Ridef 2.0 | ENI Energy Innovation | ENEL  
O&M | ENEL Smart Grids | HE for Africa |  
Nuclear Safeguards

# CONTACTS

## THE DEPARTMENT OF ENERGY

Campus Bovisa Sud  
via Lambruschini 4, 20156 Milano  
Tel. 02.2399.3800  
[pecenergia@cert.polimi.it](mailto:pecenergia@cert.polimi.it)  
[energia@polimi.it](mailto:energia@polimi.it)

## THE HEAD OF DEPARTMENT

Prof. Giovanni Gustavo Lozza

Email to:  
[direzione.energia@polimi.it](mailto:direzione.energia@polimi.it)

