

SALONE DELL'ORIENTAMENTO 2025

#TOMORROW STARTS TODAY

EMBEDDED & SMART SYSTEMS DESIGN

Andrea Calimera – Department of Control & Computer Engineering (DAUIN)



**Politecnico
di Torino**

**SCOPRI TUTTI I SERVIZI
OFFERTI DA POLITO**

www.polito.it



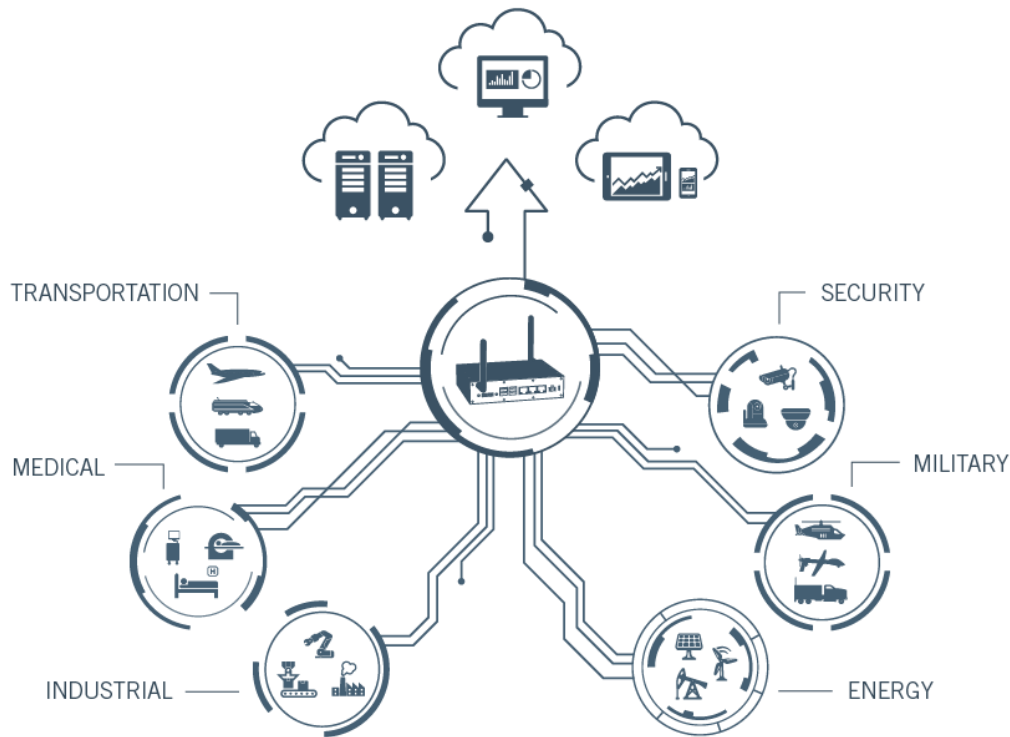
Embedded & Smart Systems (ESSs)

A combination of heterogenous computing units, memories, and input/output peripherals (i.e., sensors/actuators)

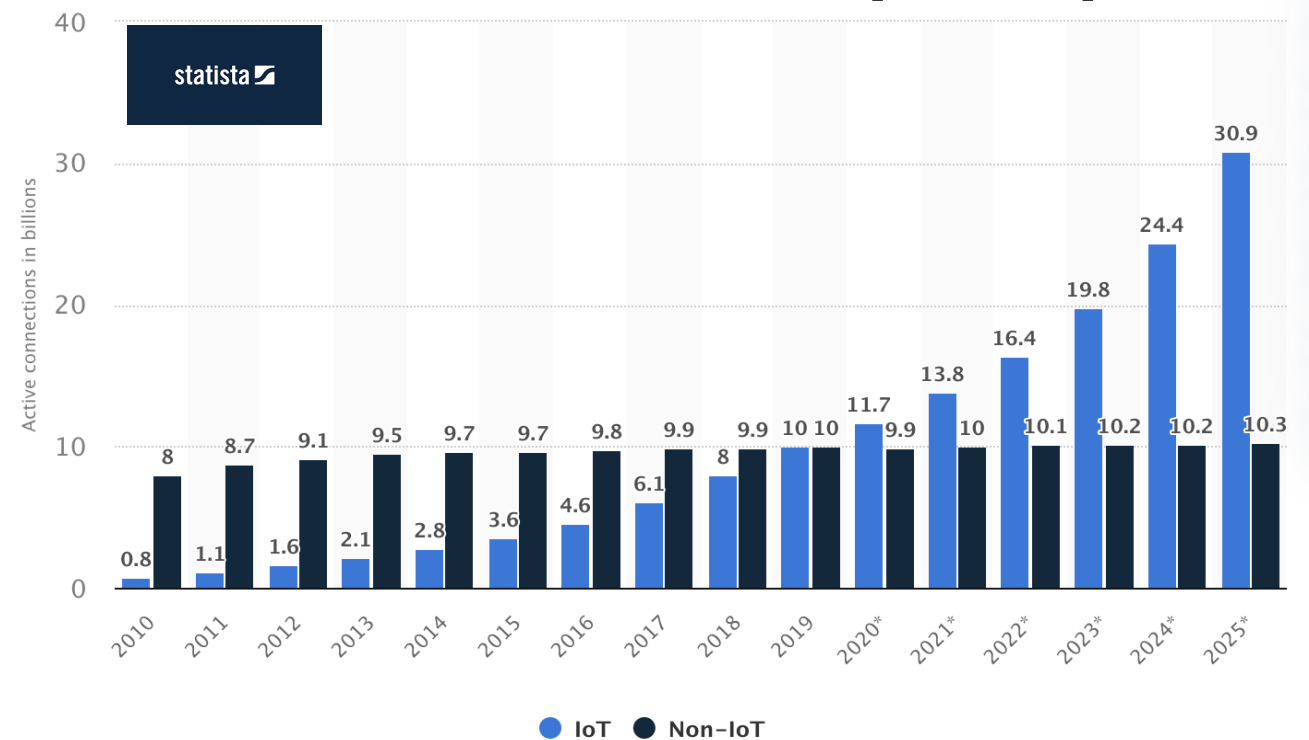
- (i) embedded into a larger mechanical or electronic system and
- (ii) dedicated to specific tasks and applications



ESSs are everywhere!

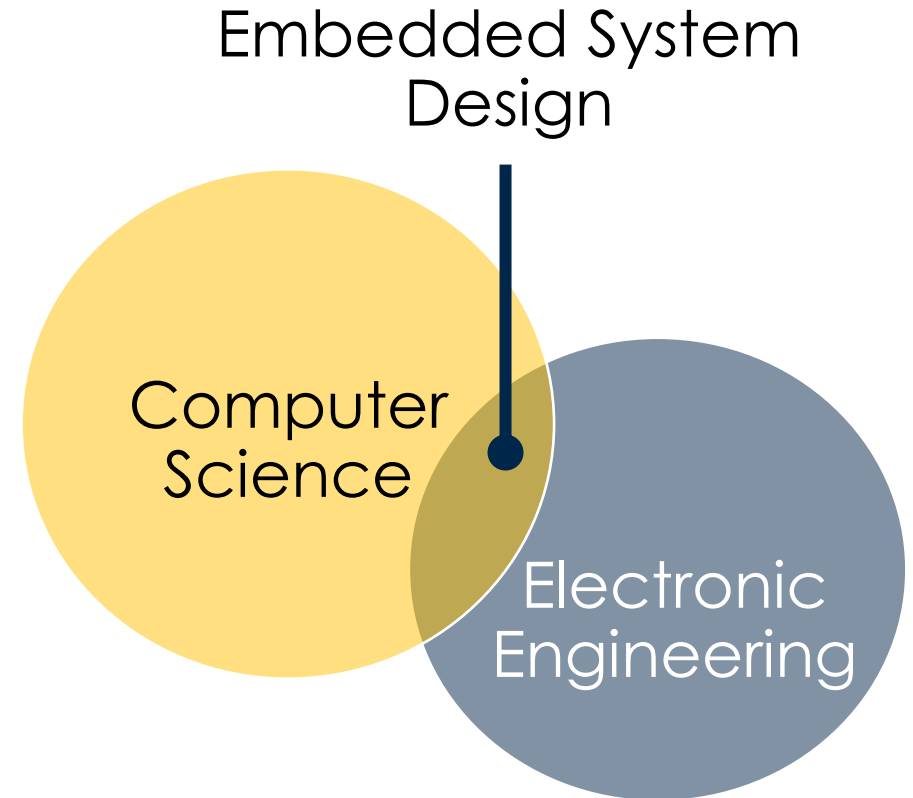


Active connections [Billions]

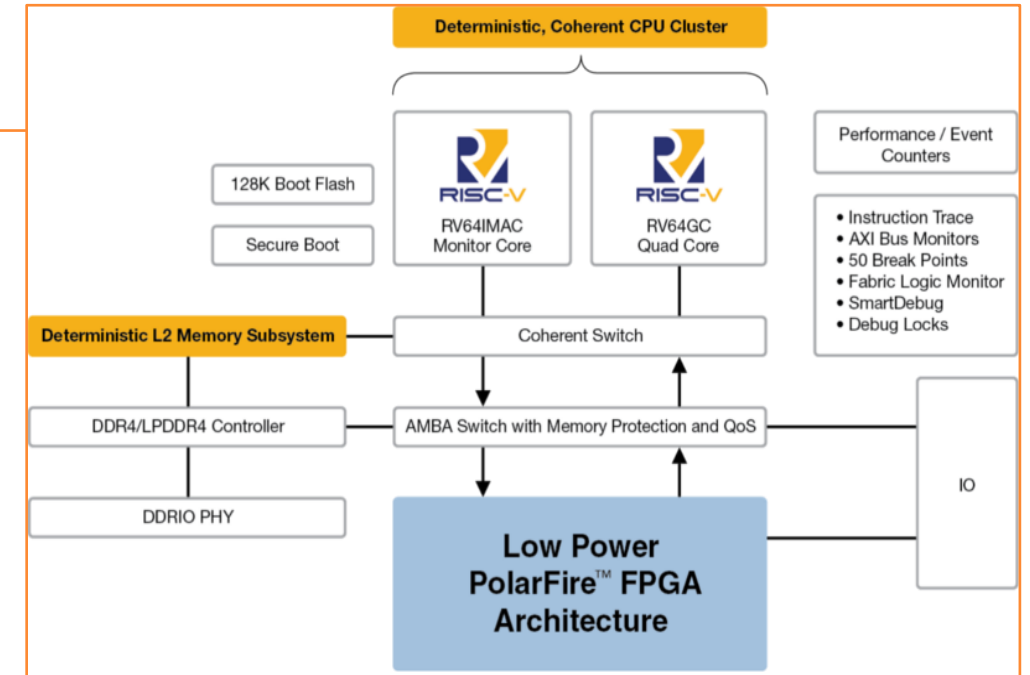
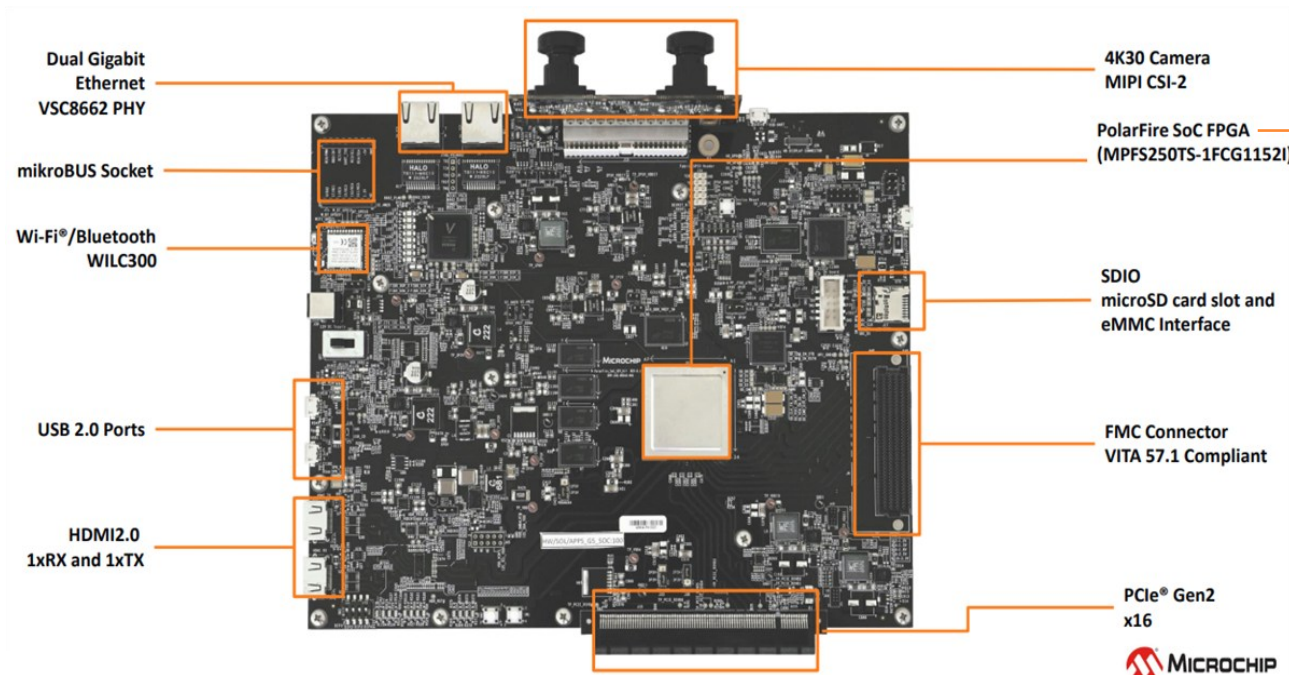


Beyond common computers

- Tighter constraints
 - Limited energy and power budget
 - High speed (real-time) and precision
 - Small form factor
 - High reliability and dependability
 - Security
- Where dedicated HW and dedicated SW flow into each other



Playground



Master the HW-SW co-design flow

- Programming
 - Software
 - Operating systems deployment and customization
 - Firmware development
 - Applications development (e.g., DSP, ML/AI, crypto)
 - Hardware (digital)
 - High-level specifications (ASIC/FPGA)
 - Verification and testing
- Optimization
 - Power, Performance and Area - PPA
 - Testability, safety, security

Hard Skills

Python
C/C++
RTOSs
Software Management
VHDL/Verilog
EDA tools
SoC Architectures
Basic Electronic

Study plan

THESIS | 30 ECTS

Final project (30)
OR
Internship (12) + Final project (18)

ELECTIVE COURSES | 2x6 OR 6+8 ECTS

Challenge (8)

MAIN THEMES

Internet-of-Things

Network & communication

AI & ML

Parallel computing

MANDATORY COURSES | 78 ECTS

Cybersecurity for embedded systems

6 CFU

Software engineering

8 CFU

Operating systems for embedded systems

8 CFU

System-on-chip architecture

6 CFU

Microelectronic systems

6 CFU

Testing and fault tolerance

6 CFU

Energy management for IoT

6 CFU

Synthesis & optimization of digital systems

6 CFU

Specification & simulation of digital systems

6 CFU

Computer architectures

10 CFU

Electronics for embedded systems

10 CFU

Course features



Taught in English



**Interaction with intl.
students and instructors**



Hands-on approach



Erasmus

Semester or
Thesis abroad



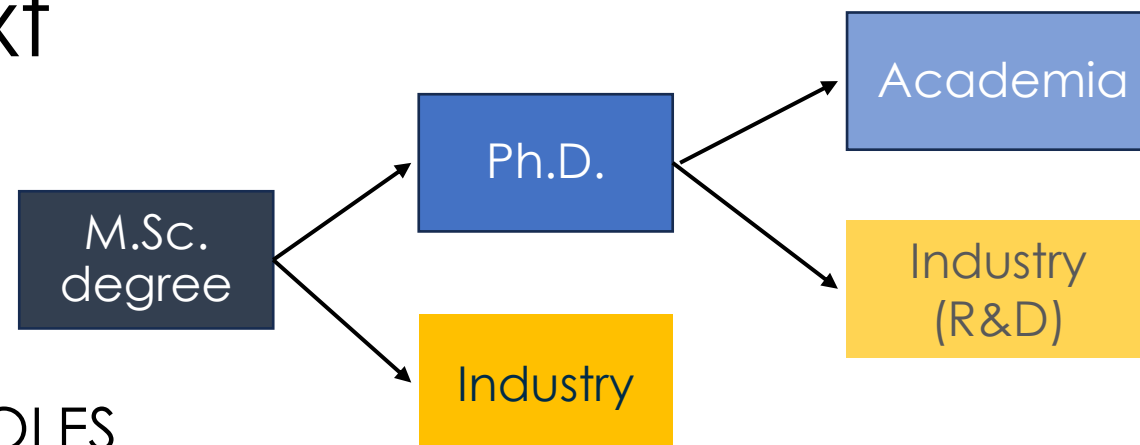
**Double degree
programs**

EURECOM (EU - Fr)
TOP-UIC (USA)



**Connection with
companies & universities**

What's next



PROFILES/ROLES

Embedded Software Engineer

- design, implement, and test at the SW application level

Firmware Engineer

- develop and test routines and procedures to control and manage the functionality of embedded devices

Embedded Systems Architect

- design and verify the system architecture, including hardware and software components.

Embedded Systems Test Engineer

- design, implement and run on-/off-chip test plans and components for HW and SW

Technological innovation



Stefano Ippolito – Sales & Marketing Manager

LA NOSTRA STORIA

1985

Inizia la **collaborazione con VARIAN** (oggi AGILENT TECHNOLOGIES), che continua ancora oggi

1980

Inizia la lavorazione **conto terzi**

1973

Fondazione dell'azienda

2006

Nascita della Divisione Wireless

2007

Ottenimento della **certificazione UNI EN ISO 9001:2015**

2009

Inaugurazione della **nuova sede** di 2000mq

2023

L'azienda festeggia i suoi **50 anni**, avviando il percorso per la certificazione **UNI EN ISO 14001:2015**

2022

Crescita **da Piccola a Media Impresa**

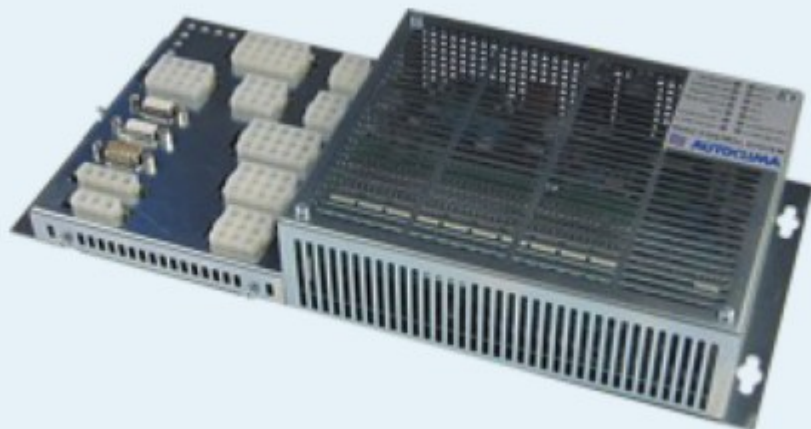
2021

Passaggio generazionale dal fondatore ai tre figli Anna, Luigi e Marco



Nell'azienda ci sono due divisioni principali:

Divisione Industrial



La divisione **INDUSTRIAL** con un approccio altamente consulenziale garantisce un'estrema flessibilità progettuale e una visione a 360° sul ciclo di vita del prodotto ingegnerizzato.

Alcuni esempi: Inverter ad alta frequenza e controller ad alta tensione, Controller per climatizzatori ed accesso porte, Schede e display per serrature elettroniche, Alimentatori ad alta tensione per pompe ioniche, Centraline di controllo per climatizzazione Apparecchiature elettroniche personalizzate per il settore ferroviario.

Divisione Wireless



La divisione **WIRELESS** progetta e realizza datalogger senza fili per diversi tipi di monitoraggio: nata nel 2006 si è rapidamente affermata sul mercato grazie ad affidabilità e precisione di misura.

Alcuni esempi: Datalogger termoigrometrici per l'efficientamento energetico ed il comfort abitativo, Datalogger per la qualità dell'aria ed il conteggio dei consumi, Datalogger fessurimetrici ed inclinometrici per il monitoraggio strutturale di edifici e grandi opere, Datalogger geotecnici per versanti e gallerie.

Innovate. Engineer. Drive.



Francesco Ricciardi - CEO

 **AUTOMOTIVE SPICE**

BYLOGIX

HARDWARE & SOFTWARE PRODUCTS
(CUSTOM & OFF-THE-SHELF)

ISO 26262

ISO 21434 SAE



Turin, Detroit, Maranello, Aosta



E-MOBILITY
E/E ARCHITECTURES
SYSTEM ENGINEERING

BYLOGIX ENGINEERING SERVICES
AUTOMOTIVE ENGINEERING SERVICES

ADAS
AUTONOMOUS DRIVING
TRAINING



ACTIVE AERODYNAMICS



ACTIVE SUSPENSION

LIGHTING



EMBEDDED HARDWARE AND SOFTWARE DEVELOPMENT

Solutions based on customer specs and requirements

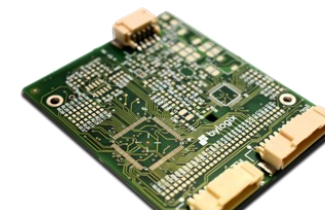
AVAS



VEHICLE CONTROL UNIT



ELECTRONIC PARKING BRAKE



The PhD Journey

Sarah Azimi – Assistant Professor at DAUIN

My PhD is Flying in Space

- EUCLID Space Mission
- Objective: Explore the composition and evolution of the dark Universe
- Mission Duration: 6.25 Years
- **Launch: 1 July 2023**
- Launch Location: Cape Canaveral, Florida, USA
- Launch Vehicle: SpaceX Falcon 9
- Destination: Sun-Earth Lagrange point 2, 1.5 million km from Earth

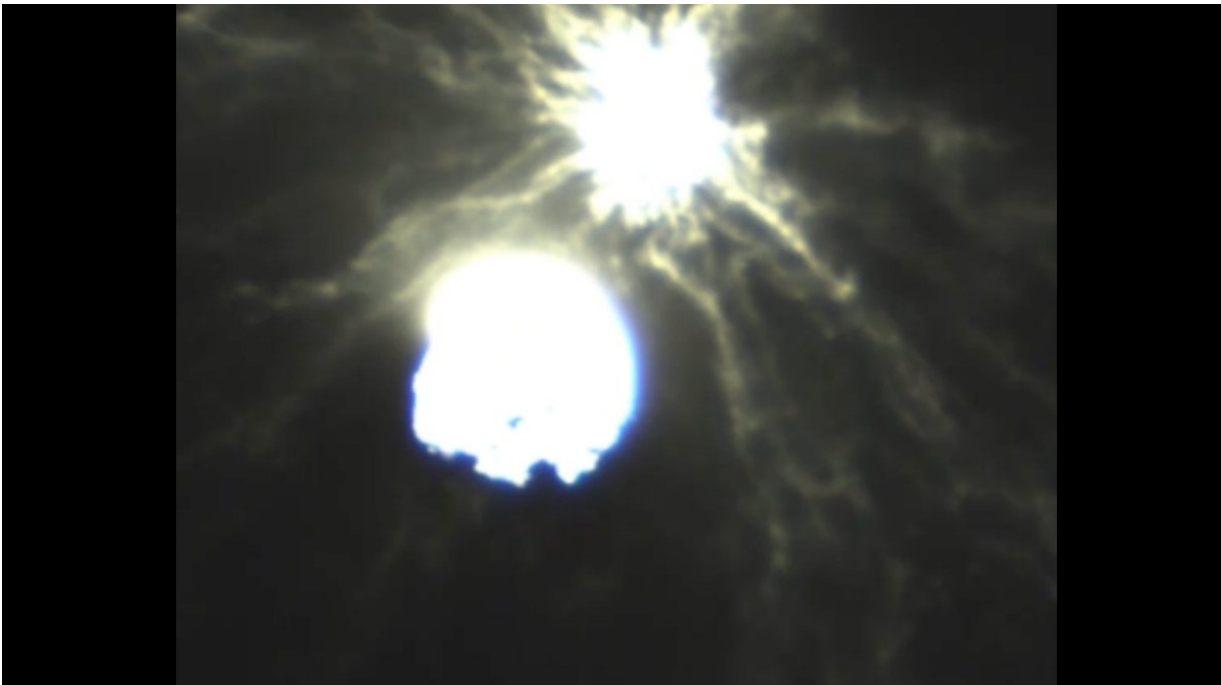


https://www.esa.int/Science_Exploration/Space_Science/Euclid



Nex Space Mission: HERA

- DART
- Objective: to redirect the path of Didymos, an asteroid for the first time in history
- Launched: 24th November 2021



1st image of DART's wild asteroid crash by LICIACube (6U)

- HERA Space Mission: HERA will perform a detailed post-impact survey of the target asteroid.
- Objective: A humankind's first probe to gather scientific data to help scientists and future mission planners understand asteroid composition and structures
- Launch: October 2024
- Duration: 4.24 years



On the Cancer Treatment

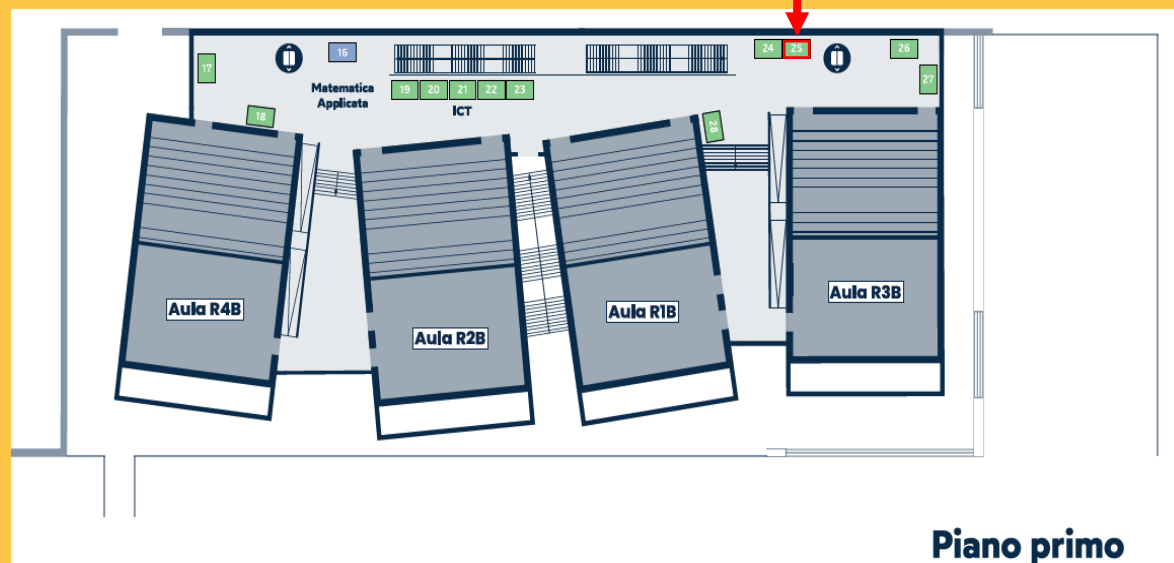
- HONEY – Hybrid ONLINE tEchnology for particle therapy



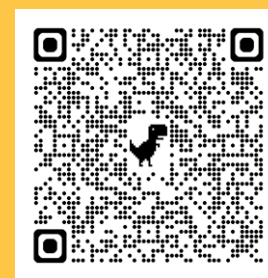
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Visit us at booth #25 15:45 – 18:00



DEGREE
PROGRAMME
REGULATION



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Aperitivo di benvenuto

Martedì **1 aprile** 2025

H. **17:30**

2° piano Dipartimento **DAUIN**, **Corso Castelfidardo 34/d** (ingresso lato MixTo)

Occasione perfetta per fare nuove conoscenze, scoprire i laboratori del collegio ICM ed incontrare i docenti dei relativi corsi di studio!