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7<sup>a</sup> edition of the ESARS-ITEC Europe  
International Conference on  
**Electrical Systems for Aircraft, Railway,  
Ship propulsion and Road Vehicles &  
International Transportation  
Electrification Conference**

**Naples (Italy)**

**26<sup>th</sup>-29<sup>th</sup> November 2024**



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## Message from Chairs

Dear Colleagues, Dear Friends,

It is an honour and a pleasure to welcome you to the 7th edition of the **International Conference on Electrical Systems for Aircraft, Railway, Ship Propulsion and Road Vehicles (ESARS) and International Transportation Electrification Conference** which will take place in the city of Naples, Italy, from Tuesday 27th November until Friday 29th November 2024.

The Conference will be devoted to Energy Transition in Electrified Transportation. The aim of the Conference is to promote a forum where people in the electrical transportation systems community can share their experiences and bring perspectives about present and future challenges. The conference will bring together academic and industrial experts in emerging topics related to electrical systems for aerospace, railway, ship, and road vehicles. Academic and industrial work of technical excellence at the forefront of research in the power electronics and power systems fields are encouraged and welcomed.

The Conference will hold meetings, tutorials, technical sessions, industrial workshops, and exhibitions. The Conference will host an exhibition of Electric Vehicles (EVs) on the seafront promenade.

The event is organized by the University of Naples Federico II, the University of Trieste and the University of Cassino, and supported by the University of Nottingham and the University of Toulouse.

Diego Iannuzzi  
Mario Pagano

## 1. Committees

### Chairs

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(Università degli Studi di Napoli Federico II)

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#### Keynote Chair

Babak Nahid-Mobarakeh

#### Track Chair

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Railways: Philippe Ladoux  
Ship: Giorgio Sulligoi  
Road Vehicles: Babak Fahimi

#### Treasurer

Giorgio Sulligoi

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Babak Nahid-Mobarakeh, CA



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## 2. Hosting Universities

### University of Naples Federico II



The University of Naples is named after Federico II (Frederick II), to underline its ancient origins dating back to June 5, 1224, when the Holy Roman Emperor and King of Sicily founded the institution to train secular administrative staff of the Empire. It is recognised as the world's oldest state university and is the third university in Italy by number of enrolled students (i.e., 80,000).

In the long history of the University of Naples Federico II there have been some very influential alumni, including philosopher and theologian Saint Thomas Aquinas who not only studied but later taught at the university. Other notable alumni include former Italian presidents Giovanni Leone, Enrico De Nicola and Giorgio Napolitano.

### University of Trieste



The community of Trieste's wish to establish a University is first documented in the 1800s when the city's port was built. At that time, local leaders asked the Imperial House of Austria to endow the city with a University to support its flourishing trade and establish a suitable institution to provide citizens with education and training in legal and economic studies. In 1920, the school was renamed the 'Institute for Business Studies' and by 1924 it was known as the University of Economics and Business, offering just one degree of the same name. In 1938, a new Faculty of Law and Political Science was opened with two-degree programmes. Henceforth, the institution was referred to as the 'Regia Università degli Studi' (Royal University). In the following years, ten further faculties were added (e.g., Engineering (1942); Literature and Philosophy (1943); Mathematics, Physics and Natural Sciences (1946); etc.).

### University of Cassino



The University of Cassino and Southern Lazio is a public university located in Cassino, Italy. Founded in 1979, it is one of the youngest universities in the country.

The university offers a wide range of courses in the fields of humanities, sciences, engineering, economics, and law. It also has a strong research focus, with a number of research centres and institutes dedicated to various disciplines. The university is located in the heart of the Lazio region, close to the city of Rome and has also a number of satellite campuses in the region, including in the cities of Frosinone, Latina, and Rieti.





## University of Toulouse



The Laboratoire Plasma et Conversion d'Énergie is a Joint Research Unit of the National Center for Scientific

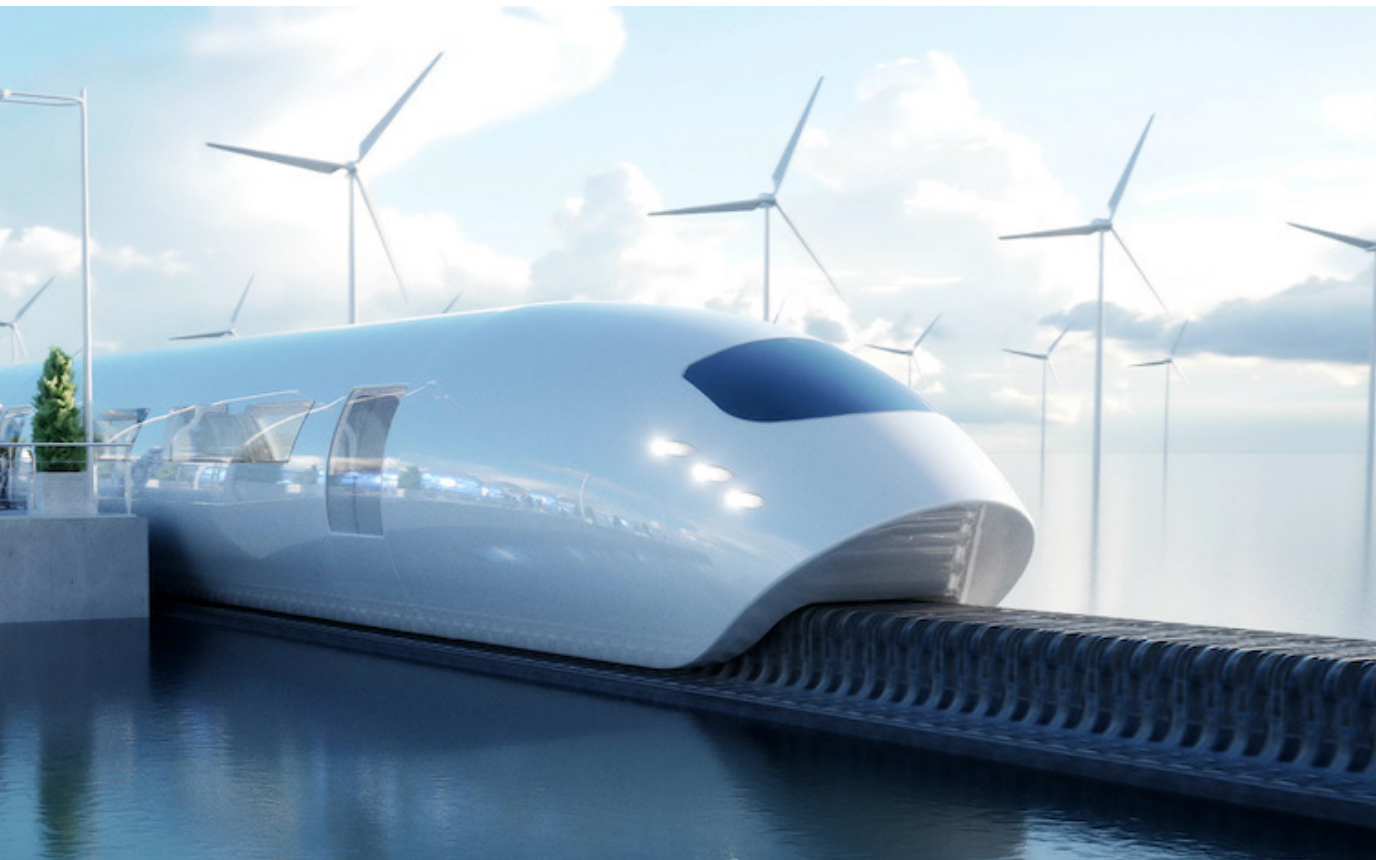
Research (CNRS), the National Polytechnic Institute of Toulouse (INPT), and the Toulouse 3-Paul Sabatier University (UPS). Located on two geographically distant sites a few kilometres apart (on the campuses of the University Paul Sabatier and the National Higher School of Electrotechnics, Electronics, Computer Science, Hydraulics, and Telecommunications), Laplace claims its affiliation with the Federal University of Toulouse Midi-Pyrénées (UFTMiP) and participates in all actions aimed at defining a scientific strategy for the site, involving universities, engineering schools, and research organizations within the field of "Engineering Sciences and Systems."

## University of Nottingham



Nottingham's first civic college was opened in the city centre in 1881, four years

after the foundation stone was laid by former Prime Minister, W E Gladstone. After the First World War, the college outgrew its original building. A generous gift by Sir Jesse Boot, of 35 acres of land at Highfields, presented the solution and in 1928 the College moved to what is now the main campus, University Park. Initially, it was accommodated in the elegant Trent Building and was officially opened by King George V in November of that year. In 1948, the college was awarded the Royal Charter and became The University of Nottingham, now able to award degrees in its own name. During this period the School of Agriculture was established when the Midland College of Agriculture at Sutton Bonington merged with the University. The University of Nottingham continued to grow and still focuses on its development.



### 3. Conference Topics

The Conference hot topic will be on **Energy Transition in Electrified Transportation**. The aim of the Conference is to promote a forum where people involved with transportation electrical systems problems may compare their experiences and present solutions found for actual and further requirements.

The conference will bring together academic, research and industrial experts in emerging topics relevant to electrical systems for aerospace, railways, ship propulsion and road vehicles. This 4-days event will include *plenary, tutorial, and technical sessions* to cover these and cross-border topics; *industrial workshops and exhibitions* will be organised as well.

During the conference an EVs exhibition will be organized on famous Naples's promenade. The EV car makers have the possibility to show their new EVs and organizing eTest Drive. At present day, we have received expressions of interest by Audi, Volkswagen, Porsche, NIO and Nissan.

The main topics of **ESARS-ITEC 2024** include but not limited to:

#### AIRCRAFT ELECTRICAL SYSTEMS

- ✓ Advanced concepts and technologies to enable the all-electric aircraft
  - Embedded Systems
  - Electromechanical actuators
  - Electrical auxiliary systems
  - New storage system
- ✓ Power generation and distribution
  - New sources of aircraft main propulsive power
  - Onboard electrical systems architectures
  - Onboard energy management
- ✓ Electrical Drives and Power Systems
  - Design of Motors and their Control
  - Fault Diagnostics
  - Power Systems Control and Stability
  - Reliability

#### ELECTRICAL RAILWAY TRACTION SYSTEMS

- ✓ Power Supply Systems
  - Substations
  - Wayside storage system
  - Overhead systems and Conductor rail systems
  - Energy management
- ✓ Power Train
  - Innovative converter and motor topologies
  - Onboard Energy management
- ✓ Autonomous and dual mode vehicle
  - New energy sources and storage systems
  - Electric-Hybrid power trains
  - Multi winding transformer and rectifier
- ✓ Modelling, simulation and design methods
  - Complex Systems
  - Load flow, optimization method design and control
- ✓ Electric solutions for improving efficiency
  - Actuators
  - On-Board energy management Power Train
  - Innovative converter and motor topologies
  - Onboard Energy management
- ✓ Electromagnetic compatibility
- ✓ Safety and security systems
- ✓ Railway signalling and interoperability systems
- ✓ Light railways vehicles for urban mobility
- ✓ Metro and underground urban railways systems



## SHIPBOARD ELECTRICAL SYSTEMS

- ✓ Electrical propulsion
  - Converters and Drives
  - All electric and hybrid ships
- ✓ Integrated power systems
  - System integration
  - Storage systems
  - Modelling, simulation and design methodologies
- ✓ Power Generation
  - Power System Control
  - Stability and quality
  - Electrical generators
  - Design methodologies
- ✓ Ship functional safety
  - Reliability and dependability
  - Reconfigurability, diagnostics

## ELECTRIC (EVs), FUEL CELL(FCEVs) PLUG-IN HYBRID VEHICLES (PHEVs) & RANGE-EXTENDED EVs

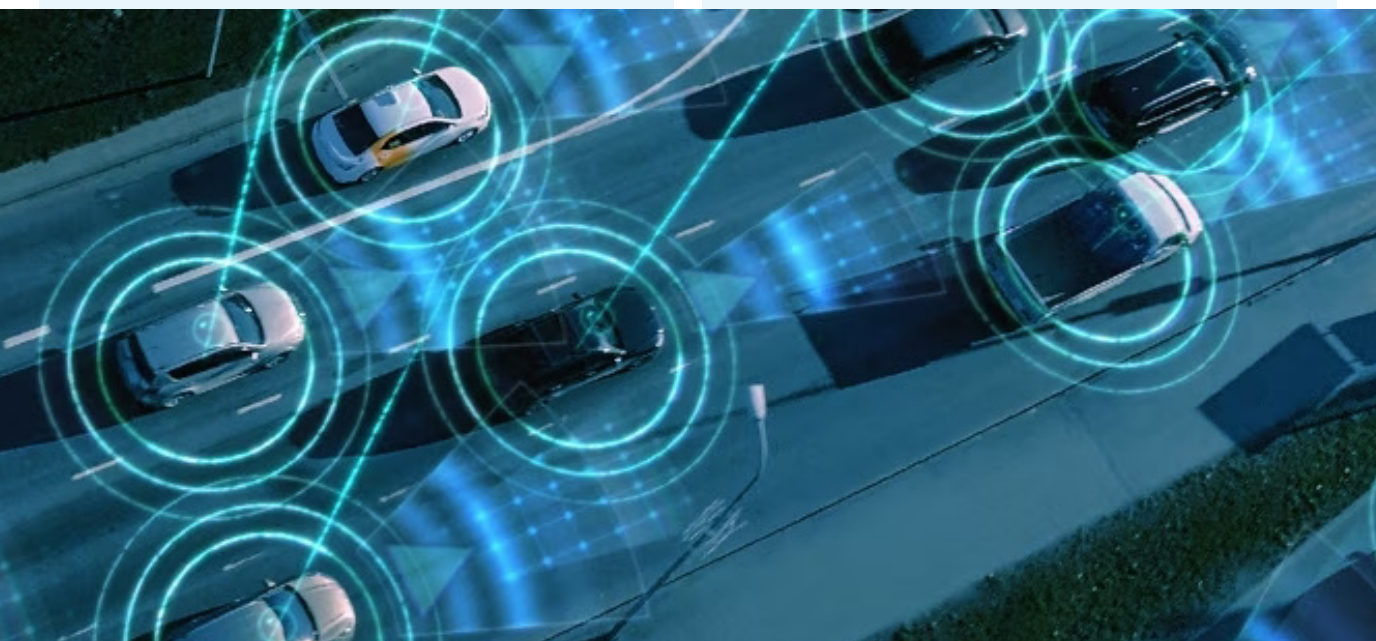
- ✓ Energy Sources Systems
  - Novel onboard energy sources: design, control and integration issue
  - Energy management and control strategies
  - Energy sources validation testing
- ✓ Powertrain Systems
  - Smart electric propulsion systems
  - Smart onboard traction power converter

- Powertrain validation testing
- Transmission and Torque coupling unit
- Smart electric motor
- Fuel Converter
- Control strategies and system identification

- ✓ Auxiliary systems
  - Auxiliary Power Supply
  - Power Steering
  - Hotel Climate Control unit
  - Starter and Generator

- ✓ Drive systems
  - Model Driver
  - Drive cycles
  - Drive intelligence

- ✓ Vehicle
  - EMC issue in the vehicle environment
  - Modelling, simulation and design tools and methods
  - Supervisors
  - Safety and Reliability issues
  - Tools ad methods for onboard diagnostic
  - Range and weight optimization
  - Sustainability in testing
  - Onboard Thermal management
  - Electronic fuel control systems
  - Sensors and actuators





## INFRASTRUCTURE FOR E-MOBILITY & H-MOBILITY

- ✓ E-mobility
  - Grid interface technologies
  - DC and AC Smart and micro-grid for charging Station
  - Hyper charge station
  - Ultrafast charging station (UFCS) and grid impact
  - Vehicle-to-grid (V2G), vehicle-to-infrastructure (V2I), and vehicle-to-home (V2H) interfaces
  - Design optimization and Energy management
  - Energy Storage Systems and RES integration
  - DC & AC Distributed architecture
  - Smart charging for EV Policy scheduling
  - Vehicle-to-grid communication and control
  - Electrification of heavy-duty vehicles and off-road vehicles
  - OCCP protocol for charging station
- ✓ H-mobility
  - Smart and novel hydrogen tank
  - Hydrogen power system generation
  - PEM Fuel Cell converter
  - RES integration for green hydrogen production
  - Sensors and actuators
  - Hydrogen monitoring systems

## BATTERY, FUEL CELL AND ENERGY STORAGE SYSTEMS

- Smart and novel hydrogen tank
- Electrical/Chemical mathematical model of cells and modules
- Cells and module characterization
- Thermal management
- Interface power converter
- Battery Management Systems
- SOC and SOH identification methods
- Aging energy storage mechanism and methodologies for prediction
- Hybrid storage technology and configuration at cell/module level

## BATTERY CHARGERS: WIRELESS, FAST, AND ULTRA-FAST

- On-board/Off-board smart charger architecture
- Isolated and not isolated charger
- Stationary and dynamic wireless chargers in roadways
- Design and control of chargers
- Partial Power Processing Chargers
- Integrated powertrain converter and battery charger



### **CODES, STANDARDS, POLICIES, AND REGULATIONS FOR TRANSPORTATION ELECTRIFICATION**

#### **RAPID PROTOTYPING, REAL-TIME SIMULATION, HIL AND SIL FOR TRANSPORTATION ELECTRIFICATION**

- Advanced tools and methodologies for development, testing, emulation and validation
- Advanced Measurement Technologies
- Battery Test and Emulation
- Powertrain Test and Emulation
- Emission Analysis and Measurement
- Transmission test and emulation
- Energy source test and emulation
- Vehicles test and emulation

#### **CONNECTED AND AUTONOMOUS VEHICLES, SMART MOBILITY, AND VEHICLE FUNCTIONAL SAFETY**

- Advanced Driver Assistance System (ADAS)
- Autonomous Driving (AD) features
- Robustness, reliability and safety issue

### **ENERGY COMMUNITY IN TRANSPORTATION ELECTRIFICATION**

#### **CROSS-BORDER AND ENABLING TECHNOLOGIES FOR ENERGY TRANSITION IN ELECTRIFICATION TRANSPORTATION**

- Electrification of sea, undersea, air, and space vehicles
- Electrified defense vehicles
- Manufacturing technologies
- Renewable Energy Sources (RES) integration
- Smart modules of semiconductors devices
- New frontier of band-gap semiconductors
- Next generation of Energy Storage Devices (Solid State Batteries)
- ICT for electrified vehicles and infrastructures
- Emissions and environmental impacts of transportation electrification.



*The Veiled Christ*



*A baroque Neapolitan church*



*Underground Naples*

## 4. Location

### Location

Naples (Napoli in Italian) is the third largest city in Italy and the regional capital of Campania. Founded by Greeks in the first millennium BC, Naples has never lost its identity and traditions. The city preserves its historic center with ancient churches and historical buildings, unique catacombs and underground paths.

Staying in Naples means to:

- visit astonishing monuments
- get in touch with old traditions
- taste delicious traditional food
- get lost in the ancient ruins of Pompeii and Ercolano
- enjoy the beautiful landscapes of Capri and Amalfi Coast.

Neapolitan traditions remained unchanged for centuries. Napoli moves into the 21st century while still maintaining the traditions of yesteryear, most of them are religious traditions as that of the city Patron, San Gennaro. The production of statues for the Neapolitan crib and the dressing of the saints represents an important tradition for families in Naples. San Gregorio Armeno is a narrow street famous for its nativity workshops and stores.

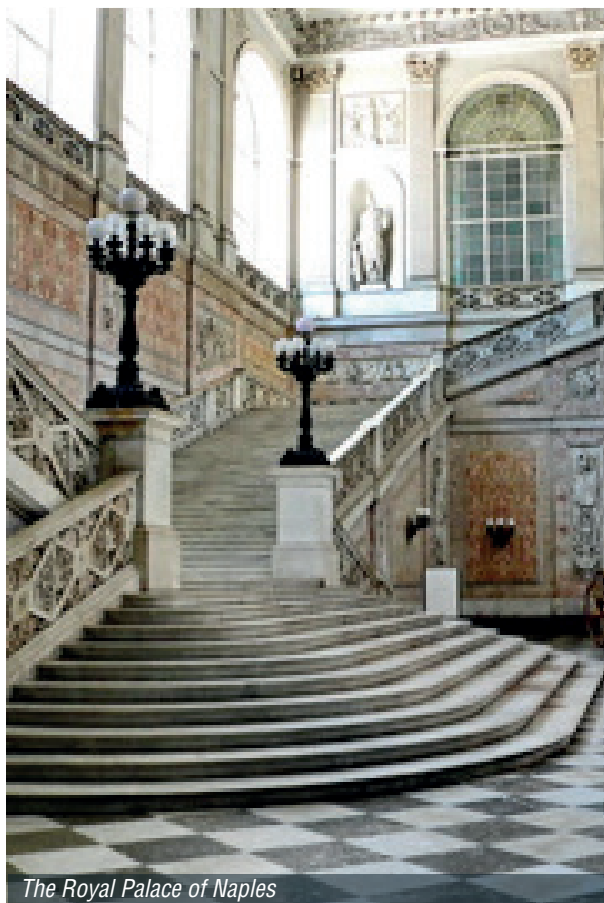
Naples boasts many traditional delicious dishes, excellent seafood, wines, and rich desserts. It's also the home of the Pizza and of limoncello, a lemon liqueur.

### Napoli's surroundings

Who plans a visit in Napoli cannot miss daily trips in our wonderful surroundings.

The ancient Roman cities buried by the Vesuvius are in the immediate surroundings of Napoli. Pompeii and Ercolano have been tourist destinations for over 250 years.

Today they are UNESCO World heritages.



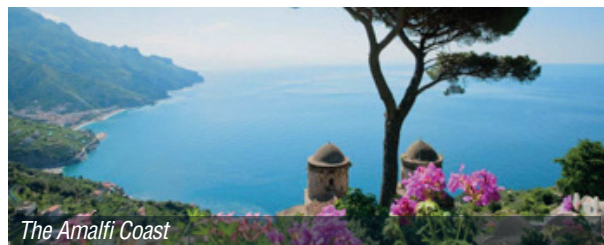
*The Royal Palace of Naples*



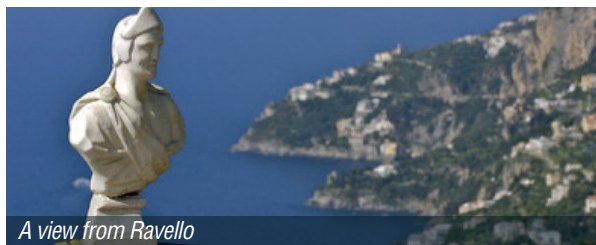
*San Gennaro*



*Statues of the Neapolitan crib*



*The Amalfi Coast*



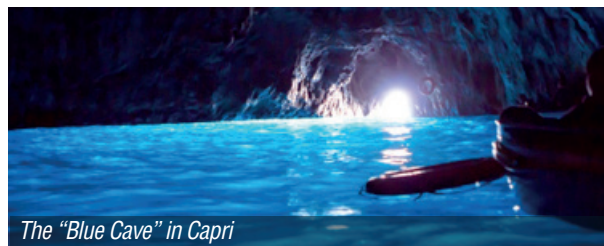
*A view from Ravello*



*Capri: the pearl of the Gulf of Naples*



*Interior of a Pompeii house*



*The "Blue Cave" in Capri*



*Plaster casts of victims still in situ*

## 5. Conference Facilities

The event will be held in the Conference Center of the University of Napoli Federico II, located in the center of a large pedestrian seafront promenade, close to Castel dell'Ovo and a few minutes away from Piazza del Plebiscito.



*"Piazza del Plebiscito", one of the biggest squares in Napoli at a walking distance*



*"Castel dell'Ovo" is located just in front of the conference venue*

### Main rooms and break areas

Technical Sessions will be held at the Conference Center of the University of Napoli Federico II.





## 6. Technical content

We propose the following tentative schedule for the technical content of the conference.

	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
AM		OPENING SESSION	KEYNOTE SESSION	KEYNOTE SESSION
		MAIN CONFERENCE	MAIN CONFERENCE	MAIN CONFERENCE
		EXHIBITION	EXHIBITION	EXHIBITION
		LUNCH	LUNCH	LUNCH
PM	TUTORIALS	MAIN CONFERENCE	MAIN CONFERENCE	MAIN CONFERENCE
	WELCOME RECEPTION	EXHIBITION	EXHIBITION	CLOSING CEREMONY
			CONFERENCE DINNER	

### Tutorials

We propose to organize tutorials (duration about 2 hours) on Tuesday afternoon. In particular, we intend to propose a call for Tutorial Submission. The proposal should concisely describe content and objective of the tutorial, and must include:

- Title;
- Abstract, objectives and motivation;
- Timeliness and intended audience;
- Name, affiliation, and a short biography of the speaker;
- A description of the technical issues that the tutorial will address, emphasizing its timeliness;
- An outline of the content, including its tentative schedule;
- If appropriate, a description of the past/relevant experience of the speaker(s) on the topic of the tutorial;
- A description of previous tutorial experience of the speaker(s), and past versions of the tutorial.

### Opening session and workshop

The opening session will set the theme of the conference. We will invite keynote speakers. After the opening session, we propose to organize workshop sessions on the timely topics.

### Technical sessions

For each of the 5 blocks in the program marked “Main Conference,” we will have 2 successive

session slots (with coffee break in between), and for each slot we can accommodate up to 3 parallel sessions of at most 6 paper presentations. This allows in principle scheduling up to 180 paper presentations. In case of a larger number of papers, poster sessions will be scheduled. Nevertheless, the paper selection procedure will take care to target high-quality papers.

### Exhibition sessions

The Exhibition sessions will be during all three days of conference, giving the possibility to meet companies, start-up with their demos, products into different fields of electrified transport from the ships, railways, aircrafts to moder electrical vehicles (EVs). There will be the possibility to make experience of e-TEST Drives on the new classes of EVs.

### Closing session

The closing session will include summaries of key points made during the conference before announcing the location of the next ESARS-ITEC conference.

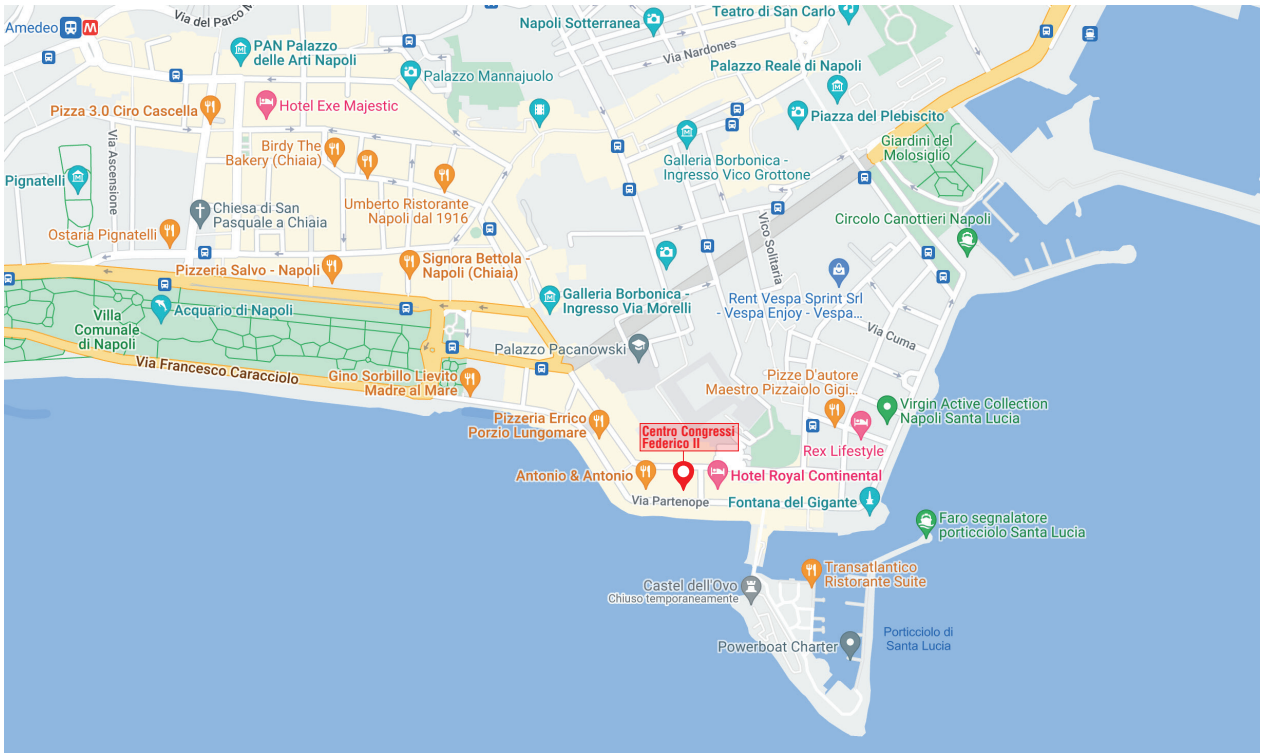
### Companion program

A city tour in a tourist bus could be proposed to companions showing them Naples's main curiosities. This visit could be coupled with a guided pedestrian tour of the historical center. Companions would discover monuments and museums of Naples and its surroundings.

## 7. Hotels

Naples offers a wide range of hotels of different categories (from 1 until 5 stars plus B&B). Many of them are located at a walking distance from the conference venue.

A limited number of rooms will be available at the Royal Continental hotel (Conference venue) at fixed prices. Reservation must be done together with Conference registration and all the details are given in the registration page.



## 8. How to reach Naples



### Arrival by plane

from the Airport of Napoli *Capodichino* ([www.aeroportodinapoli.it](http://www.aeroportodinapoli.it)), take the Shuttle to *Napoli Central - Piazza Garibaldi*. Then take the metro M1 and get off in *Piazza Municipio* station. The it is a 10 minutes' walk to reach the venue.



### Arrival by train

From the central station *Napoli Centrale* you can reach the venue by metro (line M1, get off in *Piazza Municipio* station), bus (line 151), or taxi service.



### Arrival by car

Highway A1 from Rome, A14 from Bari, A3 from Reggio Calabria, direction *Marina/Napoli Centro*.



## ESARS ITEC conference 2024 - contacts:

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