



First European School on the Physics of the Electron-Ion Collider

E. Tassi and M. Capua on behalf of the LOC

<https://agenda.infn.it/event/33450/>



Motivation

- The EIC will play an essential role in our understanding of QCD and the structure of nucleons and nuclei. It is very important to introduce and train a new generation of physicists to its physics programme.
- Early 2022 the idea developed to organize an EIC Summer school in Italy featuring lectures and tutorials on theoretical and experimental topics related to the physics of the EIC.
- An EIC summer school exists since 2019 in USA and it is organized by the Center for Frontiers in Nuclear Science (CFNS - Stony Brook) but given the large European commitment in the EIC project we believe it is useful to have a companion summer school also in Europe.
- The school is intended for advanced graduate students and postdocs in nuclear and particle physics. Although in the first edition is organized by the Italian members of the EIC Users Group our aim is to promote it into an international European school.

**1ST EUROPEAN SCHOOL ON
THE PHYSICS OF THE
ELECTRON-ION COLLIDER**
18–22 Jun 2023
Corigliano-Rossano, Italy

TOPICS

- Deep Inelastic Scattering
- Physics at the EIC
- EIC detectors
- PDFs in a free proton and in nuclei
- Transverse-momentum distributions
- Hadron spectroscopy
- Machine learning applications for DIS
- Hands-on sessions

INTERNATIONAL ADVISORY COMMITTEE

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- E. Aschenauer (Brookhaven National Laboratory - USA)
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- P. Rossi (Jefferson Lab - USA & INFN-LNF)
- D. Sokhan (IRFU-CEA, Paris-Saclay University - France)
- J. Wagner (NCBJ - Poland)

ORGANIZING COMMITTEE

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- F. Bellini (Bologna University)
- M. Capua (University of Calabria - Chair)
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- S. Fazio (University of Calabria)
- A. Mastroserio (Foggia University)
- M. Radici (INFN-Pavia)
- E. Tassi (University of Calabria - Chair)
- C. Tuvè (Catania University - Vice Chair)

<https://agenda.infn.it/e/EICschool2023>
email: eicschool2023@lists.infn.it

Committees

Local Organizing Committee

- Pietro Antonioli (INFN-Bologna)
- Francesca Bellini (U. di Bologna and INFN-Bologna)
- **Marcella Capua** (U. della Calabria and INFN-Cosenza) (chair)
- Daniele De Gruttola (U. di Salerno and INFN-Salerno)
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- Marco Radici (INFN-Pavia)
- **Enrico Tassi** (U. della Calabria and INFN-Cosenza) (chair)
- **Cristina Tuvè** (U. di Catania and INFN-Catania) (vice-chair)

International Advisory Committee

- Pietro Antonioli (INFN-Bologna)
- Elke Aschenauer (BNL - USA)
- Silvia Dalla Torre (INFN-Trieste)
- Abhay Deshpande (Stony Brook Univ. and CFNS - USA)
- Barbara Erazmus (Subatech, CNRS-IN2P3 - France)
- Elisabetta Gallo (DESY - Germany)
- Asmita Mukherjee (IIT Mumbai - India)
- Paul Newman (Univ. Birmingham - UK)
- Barbara Pasquini (Univ. Pavia and INFN-Pavia)
- Patrizia Rossi (JLab - USA and INFN-LNF)
- Daria Sokhan (IRFU-CEA, Univ. Paris-Saclay - France)
- Jakub Wagner (NCBJ - Poland)

A special thank to the members of the LOC and IAC for their inputs and work

Sponsoring Institutions



School's Venue

The EIC School took place June, 18-22 at the BV Airone Resort in Corigliano-Rossano (Cosenza).

Few meters away from the Ionian sea, in the village of Corigliano-Rossano (on the Eastern coast of Calabria) a splendid example of a medieval historical center, an ideal place to start exploring a territory full of naturalistic, historical, and archaeological treasures.



Ducal castle of Corigliano



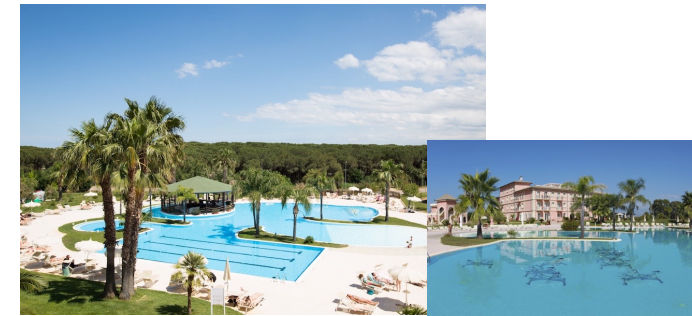
[Video](#) [Wiki](#)

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Archaeological Park of Sibari



BV Airone Resort



Codex Purpureus Rossanensis



Scientific Program

Refer to:

<https://agenda.infn.it/event/33450/>

Sun 18/06

16:00	Welcome, overview of the school program	<i>Pietro Antonioli</i>	16:00 - 16:15
	The Electron-Ion Collider: from an idea to reality	<i>Abhay Deshpande</i>	16:15 - 17:00
17:00	Introduction to Deep Inelastic Scattering	<i>Enrico Tassi</i>	17:00 - 19:00

Mon 19/06

08:00	Experimental results on TMD	<i>Andrea Bressan</i>	08:30 - 09:30
09:00	The Italian contribution to the EIC	<i>Pietro Antonioli</i>	09:30 - 10:30
10:00	Coffee break		10:30 - 11:00
11:00	Monte Carlo Event Generators for EIC	<i>Andrea Bressan</i>	11:00 - 13:00
12:00			
13:00	Lunch break		13:00 - 14:30
14:00			
15:00	Combined session with the Summer meeting of the INFN's "EIC_NET".		14:30 - 16:30
16:00	Coffee break		16:30 - 17:00
17:00	Departures		17:00 - 17:30

Tue 20/06

08:00	Facilities and Experiments for TMD studies	<i>Silvia Dalla Torre</i>	08:30 - 09:30
09:00	The next nucleon microscope: the ePIC detector at EIC	<i>Silvia Dalla Torre</i>	09:30 - 10:30
10:00	Coffee break		10:30 - 11:00
11:00	Overview of the physics case for the EIC	<i>Abhay Deshpande</i>	11:00 - 13:00
12:00			
13:00	Lunch break		13:00 - 14:30
14:00			
15:00	Cooking show: how to extract a TMD from a global fit	<i>Matteo Cerutti</i>	14:30 - 16:30
16:00			
17:00	The case for ions: the physics of nuclear PDF and hadronization studies	<i>Pia Zurita</i>	16:30 - 17:30

Scientific Program

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Wed 21/06

08:00	
09:00	Introduction to Machine Learning techniques <i>Giorgia Miniello</i>
10:00	Coffee break
11:00	Overview on spectroscopy <i>Annalisa D'Angelo</i>
12:00	
13:00	Lunch break
14:00	Hands-on session on QCD DGLAP analyses for PDFs determination <i>Enrico Tassi</i>
15:00	
16:00	
17:00	

Thu 22/06

08:00	
09:00	Experimental results on TMD <i>Andrea Bressan</i>
10:00	The Italian contribution to the EIC <i>Pietro Antonioli</i>
11:00	Monte Carlo Event Generators for EIC <i>Andrea Bressan</i>
12:00	
13:00	Lunch break
14:00	
15:00	Combined session with the Summer meeting of the INFN's "EIC_NET".
16:00	Joint session with EIC/ePIC IT annual meeting
17:00	Departures

Scientific Program

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Scientific Topics

- The Electron-Ion Collider:
From an idea to reality
- Introduction to Deep Inelastic scattering and collinear PDFs (with Hands-on session)
- Theory of TMD distributions and gluon TMDs
- Experimental results on TMDs
- Cooking show:
how to extract TMDs from a global fit
- The case for Ions: the Physics of nuclear PDFs and hadronization studies
- Overview of the Physics case for the EIC
- Overview on Spectroscopy
- Introduction to Machine Learning Techniques
- Monte Carlo Event Generators for EIC
- The ePIC Detector
- The Italian contribution to EIC

Lecturers

- Pietro Antonioli (INFN - Bologna)
- Alessandro Bacchetta (Pavia University and INFN)
- Andrea Bressan (Trieste University and INFN)
- Francesco G. Celiberto (FBK - Trento)
- Matteo Cerutti (Pavia University and INFN)
- Silvia Dalla Torre (INFN - Trieste)
- Annalisa D'Angelo (Tor Vergata University and INFN)
- Abhay Deshpande (Stony Brook University and CFNS - USA)
- Enrico Tassi (University of Calabria, INFN - Cosenza)
- Giorgia Miniello (INFN - Bari)
- Pia Zurita (Regensburg University - Germany)

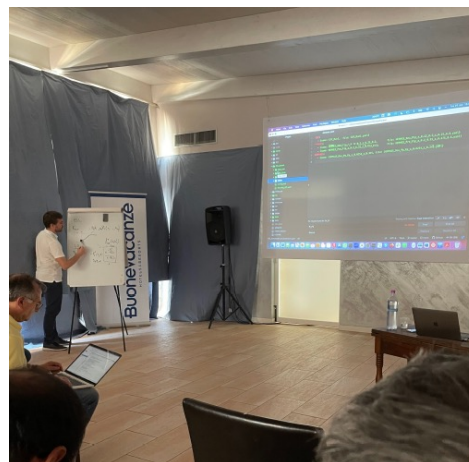
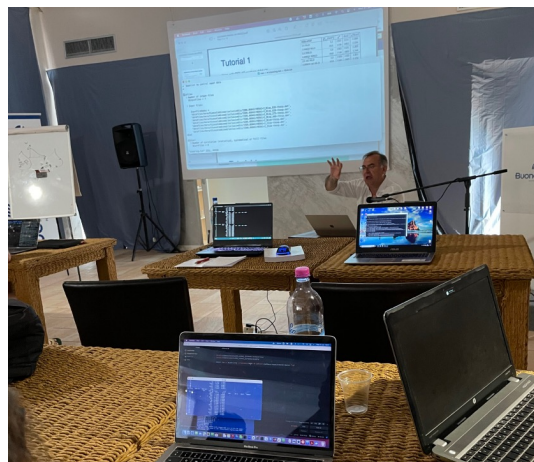
School's Numbers

- 27 Students (9 Female - 33%)
- 1/3 non italian students (although a few working with italian institutes)
- Active participation during the lectures and in the discussion sessions
- Lively poster night session

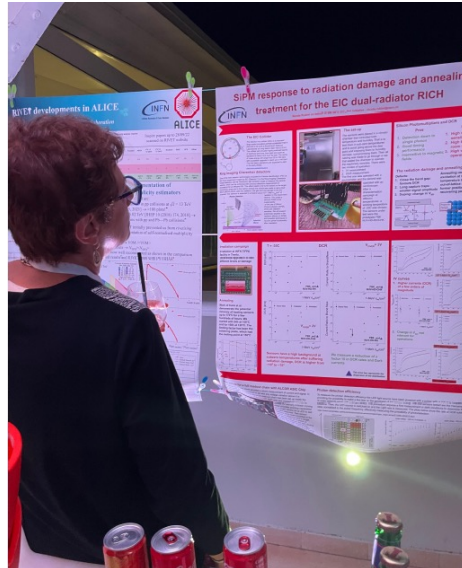
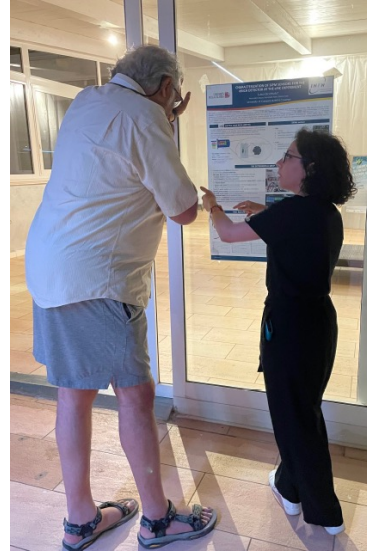
Our first impression is that of a very positive reponse by the students
(will run students' satisfaction survey)

We will discuss the results within the LOC and with the IAC

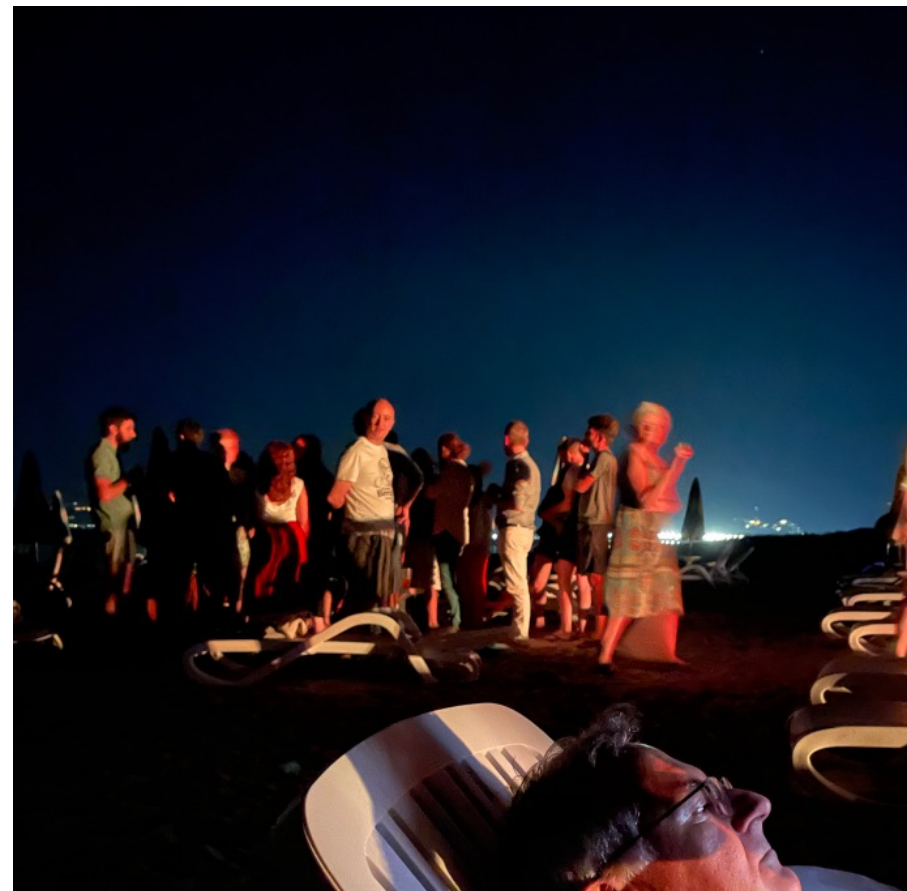
Pictures: Lectures



Pictures: Poster Session



Pictures: Life



Summary

- Contribute to an International effort to promote EIC Science amongst young generations
- First European School on the Physics of the EIC proved very successful
- Larger participation from other European countries important
- Move from here to try to transform this EU school into a regular training event