



ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

DEPARTMENT  
OF PHYSICS AND ASTRONOMY  
"AUGUSTO RIGHI"

## 6th Physical Sensing and Processing Summer School

REGISTRATION  
DEADLINE  
June 30th

# PHYSICS

## FOR A BETTER PLANET

08/12  
JULY  
2024

ACCELERATORS  
AI  
BIOINFORMATICS  
CLIMATE  
GEOPHYSICS  
HEALTH  
MATERIALS  
SOCIETY

In English  
Up to 50 participants  
No participation fee  
Lunch and  
coffee breaks provided

### INVITED SPEAKERS:

Matteo Della Porta, HUMANITAS Research Hospital - Milano

Pietro Liò, Department of Computer Science and Technology - Cambridge (UK)

Fabio Monforti, Joint Research Centre - European Commission

Angelo Rosa, SISSA - Trieste

Guido Sanguinetti, SISSA - Trieste

With the support of ERA-HDHL EU SYSTEMIC project n 896295



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40126 BOLOGNA (ITALY)





# Physics for a Better Planet

DIFA Summer School on Physical Sensing and Processing – VI edition

July 8 – 12, 2024

ALMA MATER STUDIORUM · University of Bologna

Day 1 – July 8, 2024

Aula Magna, via Irnerio, 46, 40126 Bologna BO

**13.00 – 14.00**      **Registration**

**14.00 – 14.45**      **Welcome and Introduction**

- Welcome to the 6<sup>th</sup> edition of the DIFA Summer School and Introduction about the topics discussed during the event

*Prof. Daniel Remondini – Department of Physics and Astronomy (Bologna)*

**14.45 – 16.00**      **Artificial Intelligence in Medicine**

- Applications of generative AI in Personalize Medicine

*Prof. Matteo Della Porta – HUMANITAS Research Hospital (Milano)*

**16.00 – 16.30**      **Coffee Break**

The coffee break includes refreshments served outside the BP-2B classroom

**16.30 – 17.45**      **Bioinformatics**

- Machine learning methods for single-cell transcriptomic data

*Prof. Guido Sanguinetti – SISSA (Trieste)*



## Day 2 – July 9, 2024

Aula BP-2B, viale Berti Pichat, 6/2, 40127 Bologna BO

### 8.30 – 9.00 Registration

### 9.00 – 10.15 Statistics and Data Analysis

- Statistics in the AI era: Obsolete discipline or essential tool?

*Dr. Aldo Gardini – Department of Statistical Sciences (Bologna)*

### 10.15 – 10.30 Coffee Break

The coffee break includes refreshments served outside the BP-2B classroom

### 10.30 – 11.45 Neuroscience

- Water motion to map brain connectivity

*Prof. Claudia Testa – Department of Physics and Astronomy (Bologna)*

### 10.30 – 11.45 Social Network and Data Analysis

- Human digital traces: mobility and social media

*Dr. Francesco Durazzi – Department of Physics and Astronomy (Bologna)*

### 13.00 – 14.00 Lunch Break

Lunch is served in classroom BP-2A on the same floor of the classroom

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### 14.00 – 16.00 Neuroscience Laboratory

- Laboratory for brain connectomics

*Dr. Mattia Ricchi – Department of Physics and Astronomy (Bologna)*

### 16.00 – 16.30 Coffee Break

The coffee break includes refreshments served outside the BP-2B classroom

### 16.30 – 18.30 Data Analysis Laboratory

- I Will Survive (or Not?): Our World in Data

*Dr. Nico Curti – Department of Physics and Astronomy (Bologna)*



## Day 3 – July 10, 2024

Aula BP-2B, viale Bertè Pichat, 6/2, 40127 Bologna BO

### 9.00 – 10.15 Science of Climate

- Dispersion of pollutants in cities: a high-resolved modelling approach

*Dr. Carlo Cintolesi – Department of Physics and Astronomy (Bologna)*

### 10.15 – 10.30 Coffee Break

The coffee break includes refreshments served outside the BP-2B classroom

### 10.30 – 11.45 Nuclear Physics

- Treating tumors with particle beams: status and perspectives

*Prof. Roberto Spighi – INFN (Bologna)*

### 10.30 – 11.45 General Science

- A scientific mindset is good for the world, and for science

*Prof. Marco Lenci – Department of Physics and Astronomy (Bologna)*

### 13.00 – 14.00 Lunch Break

Lunch is served in classroom BP-2A on the same floor of the classroom

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### 14.00 – 16.00 Nuclear Physics Laboratory

- Call of Duty against tumors

*Prof. Mauro Villa – Department of Physics and Astronomy (Bologna)*

### 16.00 – 16.30 Coffee Break

The coffee break includes refreshments served outside the BP-2B classroom

### 16.30 – 18.30 Science of Climate Laboratory

- Is solar radiation a lever or a barrier for the dispersion of pollutants in an urban canyon? An investigation using fluid dynamics computational

*Dr. Carlo Cintolesi – Department of Physics and Astronomy (Bologna)*



## Day 4 – July 11, 2024

Aula BP-2B, viale Bertoni Pichat, 6/2, 40127 Bologna BO

### 9.00 – 10.15 BioMedical Physics

- Neural networks, pharmacodynamics and precision medicine

*Dr. Martina Tarozzi & Dr. Federico Magnani – Department of Medical and Surgical Sciences (Bologna)*

### 10.15 – 10.30 Coffee Break

The coffee break includes refreshments served outside the BP-2B classroom

### 10.30 – 11.45 Geophysics

- Understanding Earth's past, present, and future using geophysical data

*Prof. Luca De Siena – Department of Physics and Astronomy (Bologna)*

### 10.30 – 11.45 Physics of Condensed Matter

- Materials Modelling and Design: H<sub>2</sub> production and Tribology as case studies

*Prof. Maria Clelia Righi – Department of Physics and Astronomy (Bologna)*

### 13.00 – 14.00 Lunch Break

Lunch is served in classroom BP-2A on the same floor of the classroom

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### 14.00 – 16.00 Physics of Condensed Matter Laboratory

- Simulating materials functioning by molecular dynamics

*Dr. Paolo Restuccia – Department of Physics and Astronomy (Bologna)*

### 16.00 – 16.30 Coffee Break

The coffee break includes refreshments served outside the BP-2B classroom

### 16.30 – 18.30 Geophysics Laboratory

- The Geophysical Model Generator: 4D imaging of Earth's structure and dynamics with Julia and Paraview

*Prof. Luca De Siena – Department of Physics and Astronomy (Bologna)*



## Day 5 – July 12, 2024

Aula Magna, via Irnerio, 46, 40126 Bologna BO

### 9.00 – 10.15 **Bioinformatics**

- Polymer physics of the genome

*Prof. Angelo Rosa – SISSA (Trieste)*

### 10.15 – 10.30 **Coffee Break**

The coffee break includes refreshments served outside the BP-2B classroom

### 10.30 – 11.45 **Artificial Intelligence in Medicine**

- Diffusion and geometric models for medicine

*Prof. Pietro Liò – Department of Computer Science and Technology (Cambridge)*

### 11.45 – 13.00 **General Science**

- From Science to Policy. Some experiences from the European Commission's Joint Research Centre

*Prof. Fabio Monforti – Joint Research Centre (European Commission)*

### 13.00 – 13.30 **Acknowledgement**

Acknowledgement and greetings