



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

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Info: difa.pspschool@unibo.it
VIA IRNERIO 46
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 6th 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 Personalized 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)

11.45 – 13.00 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

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)

11.45 – 13.00 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

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)

11.45 – 13.00 Physics of Condensed Matter

- Materials Modelling and Design: H₂ 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

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