

# Phenotypic Fingerprinting school



14-25 October 2024  
18-29 November 2024

Trieste



# Organizers



Within the framework of Research Infrastructure project  
"Pathogen Readiness Platform for CERIC-ERIC Upgrade" – PRP@CERIC"



# Scientific program

Many metabolic pathways are involved in host cell response to infection, such as glycolysis, TCA cycle, pentose phosphate pathway, amino acid synthesis, fatty acid synthesis and oxidation, lipidome and proteome changes. The aim of the Phenotypic Fingerprinting school is to shed light on fingerprints of the cellular metabolic pathways perturbed by infection and drug-response by exploiting complementary approaches and fostering their integration. Hints of techniques for the preparation of biological substrates will be also given.

The following seven thematic modules will be addressed during the school:

- 1) Host-pathogen interaction models and high-throughput screening (HTS) imaging;
- 2) Genomics advancements through -omics NGS approaches: from DNA to single cell transcriptome;
- 3) Atomic Force Microscopy (AFM) biomechanical imaging;
- 4) Micro- and nano-machining for biology;
- 5) Infrared (IR) chemical cytology (cellular imaging);
- 6) Ultraviolet (UV) - Raman chemical cytology (cellular imaging);
- 7) Data analysis, integration, and management.

For each of the first six modules, selected internationally recognized invited speakers, with sector-specific skills and expertise, will provide a theoretical overview offering a perspective of the field.

The lessons held by the invited speakers will be open to interested people and will be available in hybrid mode, preferentially in person at the Area Science Park Convention Centre and remotely.

At the beginning of each module of the school that involves the use of laboratories, a training session is planned for students regarding specific safety rules, operating procedures and guidelines required for equipment use and sample handling.

Morning and afternoon lessons will include a short break (15-30 minutes), variable depending on the needs/requests of the teacher.

TIMETABLE - SESSION I		
1. Host-pathogen interaction models and high-throughput screening (HTS) imaging		
Monday 14 October		
13:30-14:00 Welcome coffee		Location: Conference Hall, Building C1 Area Science Park, Padriciano 99
14:00-14:30 Welcome session		
Theoretical session (14:30-16:00) <a href="#">Luca Braga</a>	High Throughput Functional Screenings: from large libraries to functional hits	Location: ICGEB - Padriciano (Functional Cell Biology Lab, room 232)
Practicals/hands-on (16:00-18:00) <a href="#">Luca Braga / Raffaella Klima</a>	High Throughput Functional Screenings: from large libraries to functional hits	
Tuesday 15 October		
Practical/hands-on (09:00-13:00) <a href="#">Luca Braga / Raffaella Klima</a>	Principles of arrayed library handling and preparation	Location: ICGEB - Padriciano (Functional Cell Biology Lab, room 232)
Practical/hands-on (14:00-18:00) <a href="#">Luca Braga / Raffaella Klima</a>	Principles of HTS cell-based assay development	Location: ICGEB - Padriciano (Functional Cell Biology Lab, room 232)
Wednesday 16 October		
Practical/hands-on (09:00-13:00) <a href="#">Luca Braga / Raffaella Klima</a>	Principles of HTS microscopy and image analysis	Location: ICGEB - Padriciano (Functional Cell Biology Lab, room 232)
Invited speaker (14:00-18:00) <a href="#">Prof. Peter Horvath</a>	<u>OPEN LECTURE</u> (hybrid mode) 14:00-15:45 Lecture "High Throughput Screenings in Drug Discovery" (first part) 15:45-16:15 Coffee break 16:15-18:00 Lecture "High Throughput Screenings in Drug Discovery" (second part)	Location: Conference Hall, Building C1 Area Science Park, Padriciano 99
2. Genomics advancements through -omics NGS approaches: from DNA to single cell transcriptome		
Tuesday 17 October		
Invited speaker (09:00-13:00) <a href="#">Prof. Piero Carninci</a>	<u>OPEN LECTURE</u> (hybrid mode) 09:00-10:30 Lecture "My travel from genomic technologies to biology" (first part) 10:30-11:00 Coffee break 11:00-12:00 Lecture " My travel from genomic technologies to biology " (second part) 12:00-12:45 Q&A session and discussion	Location: Conference Hall, Building C1 Area Science Park, Padriciano 99
Practical/hands-on (14:00-18:00) <a href="#">Danilo Licastro</a> <a href="#">Margherita Degasperi</a> <a href="#">Simeone Dal Monego</a>	Quality Control and Execution of Next-Generation Sequencing (NGS) Run	Location: Area Science Park - Basovizza (Building Q1, LAGE Basovizza)
Friday 18 October		
Practical/hands-on (09:00-13:00) <a href="#">Danilo Licastro, Margherita Degasperi</a> <a href="#">Simeone Dal Monego</a>	Single-Cell RNA-Seq library preparation part 1	Location: Area Science Park - Basovizza (Building Q1, LAGE Basovizza)
Practical/hands-on (14:00-18:00) <a href="#">Danilo Licastro, Margherita Degasperi</a> <a href="#">Simeone Dal Monego</a>	Automated Preparation of Single-Cell NGS Libraries or Nanopore libraries preparation	Location: Area Science Park - Basovizza (Building Q1, LAGE Basovizza)

Monday 21 October		
Data analysis and integration (09:00-13:00) <a href="#">Danilo Licastro</a>	Introduction to Bioconductor and NGS data analysis	<i>Location: Aula Informatica, Building E3 Area Science Park, Padriciano 99</i>
Data analysis and integration (14:00-18:00) <a href="#">Danilo Licastro</a>	Single-Cell RNA-Seq data analysis or long reads data analysis	<i>Location: Aula Informatica, Building E3 Area Science Park, Padriciano 99</i>
3. Atomic Force Microscopy (AFM) biomechanical imaging		
Tuesday 22 October		
Invited speaker (09:00-13:00) <a href="#">Prof. Nuria Gavara Casas</a>	OPEN LECTURE (hybrid mode) 09:00-10:45 Lecture "Mechanobiology of the cytoskeleton" (first part) 10:45-11:15 Coffee break 11:15-14:00 Lecture "Mechanobiology of the cytoskeleton" (second part)	<i>Location: Conference Hall, Building C1 Area Science Park, Padriciano 99</i>
Theoretical lesson (14:00-18:00) <a href="#">Loredana Casalis/ Luca Puricelli</a>	Principles of AFM imaging and spectroscopy in liquid	<i>Location: Conference Hall, Building C1 Area Science Park, Padriciano 99</i>
Wednesday 23 October		
Practicals/hands-on (09:00-13:00) <a href="#">Loredana Casalis/ Luca Puricelli</a>	AFM imaging in liquid: cells and biomimetic systems	<i>Location: Elettra Sincrotrone Trieste Building T (Basement) - NanoInnovation Lab SS 14 Km 163,5 in Area Science Park, Basovizza</i>
Practicals/hands-on (14:00-18:00) <a href="#">Loredana Casalis/ Luca Puricelli</a>	AFM spectroscopy: cells and biomimetic systems	<i>Location: Elettra Sincrotrone Trieste Building T (Basement) - NanoInnovation Lab SS 14 Km 163,5 in Area Science Park, Basovizza</i>
Tuesday 24 October		
Practicals/hands-on (09:00-13:00) <a href="#">Loredana Casalis/ Luca Puricelli</a>	AFM: Interaction of nanoparticles with cells	<i>Location: Elettra Sincrotrone Trieste Building T (Basement) - NanoInnovation Lab SS 14 Km 163,5 in Area Science Park, Basovizza</i>
Practicals/hands-on (14:00-18:00) <a href="#">Loredana Casalis/ Luca Puricelli</a>	Nanoindenters for tissue nanomechanics	<i>Location: Elettra Sincrotrone Trieste Building T (Basement) - NanoInnovation Lab SS 14 Km 163,5 in Area Science Park, Basovizza</i>
4. Data analysis, integration and management		
Friday 25 October		
Data management (09:00-13:00) <a href="#">Marco Prenassi</a>	Mechanobiology and genomic data management and curation	<i>Location: Aula Informatica, Building E3 Area Science Park, Padriciano 99</i>

TIMETABLE - SESSION II		
1. Micro- and nano-machining for biology		
Monday 18 November		
Invited speaker (14:00-18:00) Prof. Gianluca Grenzi	OPEN LECTURE (hybrid mode) 14:00-15:45 Lecture "Micro systems for live cell imaging" (first part) 15:45-16:15 Coffee break 16:15-18:00 Lecture "Micro systems for live cell imaging" (second part)	Location: Conference Hall, Building C1 Area Science Park, Padriciano 99
Tuesday 19 November		
Practical/hands-on (with theory) (09:00-13:00) Simone Dal Zilio	Principles of sample patterning	Location: CNR-IOM – Sancrotti room, Building Q2 SS 14 Km 163,5 in Area Science Park, Basovizza
Practical/hands-on (14:00-18:00) Simone Dal Zilio	Sample patterning	Location: CNR-IOM – Sancrotti room, Building Q2 SS 14 Km 163,5 in Area Science Park, Basovizza
Wednesday 20 November		
Practical/hands-on (with theory) (09:00-13:00) Simone Dal Zilio	Micro and nano fabrication	Location: CNR-IOM – Sancrotti room, Building Q2 SS 14 Km 163,5 in Area Science Park, Basovizza
Practical/hands-on (14:00-18:00) Simone Dal Zilio	Sample Etching	Location: CNR-IOM – Sancrotti room, Building Q2 SS 14 Km 163,5 in Area Science Park, Basovizza
Thursday 21 November		
Practical/hands-on (09:00-13:00) Simone Dal Zilio	Metrology/characterization	Location: CNR-IOM – Sancrotti room, Building Q2 SS 14 Km 163,5 in Area Science Park, Basovizza
2. Infrared (IR) chemical cytology (cellular imaging)		
Invited speaker (14:00-17:00) Prof. Bernhard Lendl	OPEN LECTURE (hybrid mode) 14:00-15:45 Lecture "Novel analytical methodologies for molecular spectroscopies" 15:45-16:15 Coffee break 16:15-17:00 Q&A session and discussion	Location: Conference Hall, Building C1 Area Science Park, Padriciano 99
Theoretical lesson (17:00-18:00) Lisa Vaccari	Novel analytical methodologies for molecular spectroscopies	
Friday 22 November		
Theoretical lesson with hands-on (09:00-13:00) Lisa Vaccari / Federica Piccirilli	MicroFTIR spectroscopy on biosystem	Location: Elettra Sincrotrone Trieste Building S (Elettra experimental hall) - Sissi-Bio Lab SS 14 Km 163,5 in Area Science Park, Basovizza
Theoretical lesson with hands-on (14:00-18:00) Lisa Vaccari / Federica Piccirilli	Submicron FTIR-spectroscopy on biosystem	Location: Elettra Sincrotrone Trieste Building S (Elettra experimental hall) - Sissi-Bio Lab SS 14 Km 163,5 in Area Science Park, Basovizza

Monday 25 November		
Data analysis and integration (09:00-13:00) <a href="#">Lisa Vaccari / Giovanni Birarda</a>	IR data management. Biospectroscopy: what an IR spectrum can tell us?	<i>Location: Elettra Sincrotrone Trieste Building T (1st floor) - Aula didattica SS 14 Km 163,5 in Area Science Park, Basovizza</i>
Data analysis and integration (14:00-18:00) <a href="#">Lisa Vaccari / Federica Piccirilli</a>	Nanospectroscopy on biosystem Near-field IR spectroscopy and imaging	<i>Location: Elettra Sincrotrone Trieste Building T (1st floor) - Aula didattica SS 14 Km 163,5 in Area Science Park, Basovizza</i>
3. Ultraviolet (UV)-Raman chemical cytology (cellular imaging)		
Tuesday 26 November		
Invited speaker (09:00-13:00) <a href="#">Prof. Igor Lednev</a>	OPEN LECTURE (hybrid mode) 09:00-10:45 Lecture "Advanced Chemometrics: Biological Applications of NIR and ultraviolet Raman spectroscopy" (first part) 10:45-11:15 Coffee break 11:15-14:00 Lecture "Advanced Chemometrics: Biological Applications of NIR and ultraviolet Raman spectroscopy" (second part)	<i>Location: Auditorium, Building C1 Area Science Park, Padriciano 99</i>
Theoretical lesson with hands-on (14:00-18:00) <a href="#">Barbara Rossi, Francesco D'Amico</a>	Raman spectroscopy of biological specimens: basic principles and practice - Theoretical lesson (14:00-16:00) <a href="#">Barbara Rossi</a>	<i>Location: Elettra Sincrotrone Trieste Building TF - General Fermi Room SS 14 Km 163,5 in Area Science Park, Basovizza</i>
	Collection of visible Raman spectra in macro and micro-mode sampling - Hands-on (16:00-18:00) <a href="#">Francesco D'Amico</a>	<i>Location: Elettra Sincrotrone Trieste Building T (Basement) Raman instrument, NanoInnovation Lab SS 14 Km 163,5 in Area Science Park, Basovizza</i>
Wednesday 27 November		
Theoretical lesson with hands-on (09:00-13:00) <a href="#">Francesco D'Amico</a> <a href="#">Fatima Matroodi / Denis Rajnovic</a>	UV Resonance Raman for analytical and biophysical chemistry - Theoretical lesson (09:00-11:00) <a href="#">Francesco D'Amico</a>	<i>Location: Elettra Sincrotrone Trieste Building TF - General Fermi Room SS 14 Km 163,5 in Area Science Park, Basovizza</i>
	Collection of UV Raman spectra on biological samples Hands-on (11:00-13:00) <a href="#">Fatima Matroodi / Denis Rajnovic</a>	<i>Location: Elettra Sincrotrone Trieste Building S (Elettra experimental hall) IUVS 2.0 Lab SS 14 Km 163,5 in Area Science Park, Basovizza</i>
Theoretical lesson with hands-on (14:00-18:00) <a href="#">Francesco D'Amico</a> <a href="#">Fatima Matroodi / Denis Rajnovic</a>	Micro-UVRR spectroscopy: applications in nanotechnology and material science - Theoretical lesson (14:00-16:00) <a href="#">Francesco D'Amico</a>	<i>Location: Elettra Sincrotrone Trieste Building S (Elettra experimental hall) IUVS 2.0 Lab SS 14 Km 163,5 in Area Science Park, Basovizza</i>
	Collection of UV Raman spectra on biological samples Hands-on (16:00-18:00) <a href="#">Fatima Matroodi / Denis Rajnovic / Francesco D'Amico</a>	<i>Location: Elettra Sincrotrone Trieste Building S (Elettra experimental hall) IUVS 2.0 Lab SS 14 Km 163,5 in Area Science Park, Basovizza</i>
Thursday 28 November		
On hand training (09:00-13:00) <a href="#">Silvia Di Fonzo</a>	Raman and UV Raman data management: from Raman spectra to biochemical fingerprint	<i>Location: Elettra Sincrotrone Trieste Building TF - General Fermi Room SS 14 Km 163,5 in Area Science Park, Basovizza</i>
On hand training (14:00-18:00) <a href="#">Francesco D'Amico</a>	Raman and IR data management and integration	<i>Location: Elettra Sincrotrone Trieste Building TF - General Fermi Room SS 14 Km 163,5 in Area Science Park, Basovizza</i>
4. Data analysis, integration and management		
Friday 29 November		
Data management (09:00-13:00) <a href="#">Marco Prenassi</a>	Spectroscopy and imaging data management and curation	<i>Location: Aula Informatica, Building E3 Area Science Park, Padriciano 99</i>

# Speakers

## Invited Speakers

Prof. Piero Carninci	Fondazione Human Technopole, Milano
Prof. Nuria Gavara Casas	Universidad de Barcelona
Prof. Gianluca Grenci	National University of Singapore
Prof. Peter Horvath	Biological Research Centre, Szeged
Prof. Igor Lednev	University at Albany – State University of New York
Prof. Bernhard Lendl	Technischen Universität Wien

## PRP@CERIC Speakers

Giovanni Birarda	Elettra Sincrotrone Trieste
Luca Braga	ICGEB
Loredana Casalis	Elettra Sincrotrone Trieste
Simeone Dal Monego	Area Science Park
Simone Dal Zilio	CNR - Istituto Officina dei Materiali
Francesco D'Amico	Elettra Sincrotrone Trieste
Margherita Degasperi	Area Science Park
Silvia Di Fonzo	Elettra Sincrotrone Trieste
Raffaella Klima	ICGEB
Danilo Licastro	Area Science Park
Fatima Matroodi	Elettra Sincrotrone Trieste
Federica Piccirilli	Area Science Park
Marco Prenassi	Area Science Park
Luca Puricelli	Area Science Park
Denis Rajnovic	ICGEB
Barbara Rossi	Elettra Sincrotrone Trieste
Lisa Vaccari	Elettra Sincrotrone Trieste



# Information

## Project information and coordinator

The Phenotypic Fingerprinting School is organized as part of the “Pathogen Readiness Platform for CERIC-ERIC Upgrade” – PRP@CERIC project and promoted by Area Science Park, Elettra Sincrotrone Trieste, ICGEB and CNR-IOM.

The PRP@CERIC project is financed under the PNRR (National Recovery and Resilience Plan) under Mission 4 “Education and Research”, Component 2 “From Research to Enterprise”, Investment Line 3.1 “Fund for the creation of an integrated system of research and innovation infrastructures”, funded by the European Union – Next Generation EU, and the project coordinator is Area di Ricerca scientifica e tecnologica di Trieste - Area Science Park.

## School general Coordinators

Federica Mantovani	Area Science Park
Loredana Casalis	Elettra Sincrotrone Trieste
Chiara De Vita	Area Science Park

## Scientific module Coordinators

Luca Braga	ICGEB
Loredana Casalis	Elettra Sincrotrone Trieste
Simone Dal Zilio	CNR-IOM
Danilo Licastro	Area Science Park
Barbara Rossi	Elettra Sincrotrone Trieste
Lisa Vaccari	Elettra Sincrotrone Trieste

# Information

## Locations

Area Science Park – Padriciano Campus  
ICGEB  
Padriciano, 99  
34149 Trieste

Area Science Park – Basovizza Campus  
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Istituto Officina dei Materiali CNR  
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## Organizing Secretariat



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