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## XXV INTERNATIONAL SCHOOL OF PURE AND APPLIED BIOPHYSICS on

Venice (I), Palazzo Franchetti,
18-22 January, 2021

## Quantitative analysis of optical imaging for Medicine and Biophysics: foundations, applications and perspectives.

Due to Covid-19 pandemic restrictions, the school will take place on-line. No registration fee is requested. Upon registration, the applicants will receive the information to access the hosting platform.

The quantitative analysis of the huge amount of data produced by modern optical microscopy and spectroscopy techniques can dramatically improve our understanding of basic physiological phenomena and foster the application of innovative imaging approaches in medical diagnosis. The school will offer an overview of the foundations and applications of some of the most recent methods for quantitative analysis of data provided by modern optical and multimodal imaging, with a special focus on machine learning approaches. Technical details of the quantitative analysis will be discussed in lectures, and online informal discussion with the lecturers. The participation to the school is limited to 35 students.

**Coorganized by:**

**Società Italiana di Biofisica Pura e Applicata**

**SIBPA**

**Università di Milano-Bicocca Milano**

**Institute Pasteur, Paris**

**INSTITUT PASTEUR**

**CNR, ISASI Napoli**

National Research Council of Italy

**SCIENTIFIC COORDINATORS:**
**Giuseppe Chirico**-UNIMIB (Italy);
**Maddalena Collini** –UNIMIB (Italy);
**Pietro Ferraro** –CNR- ISASI (Italy);
**Cristophe Zimmer** – Institute Pasteur (F)

**DIRECTOR of the school:**
**Prof. Giorgio Giacometti** - IVSLA and Uni. Padua (Italy)

**SPEAKERS:**

Margaux Bouzin, Milano (I)
Silvia Caponi, Perugia (I)
Gastone Castellani, Bologna (I)
Isabella Castiglioni, Milano (I)
Maddalena Collini, Milano (I)
Alberto Diaspro, Genova (I)
Pietro Ferraro, Napoli (I)
Enrico Gratton, Irvine (USA)
Nicola Gritti, Barcellona (E)
Jelle Hendrix, Hasselt (B)
Florian Jug, Dresden (D)
Pasquale Memmolo, Napoli (I)

Francesco Pavone, Firenze (I)
Paolo Pozzi, Modena (I)
Demetri Psaltis, Lousanne (CH)
Gimmi Ratto, Pisa (I)
Laura Sironi, Milano (I)
Yoav Shechtman, Haifa (IL)
Stefan Stanciu, Bucharest (RO)
Ioannis Tsamardinos, Crete (GR)
Devrim Ünay, Izmir (TR)
Giuseppe Vicidomini (I)
Christophe Zimmer (F)

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Additional info at: www.sibpa.it/index.php/scuola-internazionale-di-biofisica-sibpa-ivsla.
Please notice that the school will take place on-line. Upon registration the applicants will receive all the information about the hosting platform (Webex).

# International School of Biophysics

**Quantitative analysis of optical microscopy and spectroscopy in biophysics: foundations, applications and perspectives.**

**University of Milano-Bicocca (I)     Institute Pasteur, Paris (F)     ISASI, CNR, Naples (I)**

## Preliminary program

| 18 Jan 2021 | | BIO-IMAGING: CELL TO TISSUE LEVEL |
|---|---|---|
| Morning session | 9.00 | Deep-STORM: super-resolution single-molecule microscopy by deep learning (Y. Shechtman, Haifa, IL) |
| | 10.00 | Multimodal imaging for biosystems: a synthesis (A. Diaspro, Genoa, I). |
| | **11.00** | break |
| | 11.20 | Probabilistic pipelines to map biomolecule dynamics in heterogenous environments (J-B. Masson, Paris, F) |
| | **12.20** | break |
| 18 Jan 2021 | | SEMINARS |
| Afternoon session | 14.30 | Design, limitation and analysis of an Optical microscopy imaging (M.Collini, Milano, I) |
| | **16.00** | break |
| | 16.30 | Laser-Scanning Microscopy with Single-Photon Detector Array (G. Vicidomini, IIT, Genoa) |
| 19 Jan 2021 | | MACHINE LEARNING and diseases |
| Morning session | 9.00 | Machine Learning for mixed genetic/image stratification (G. Castellani, I) |
| | 10.00 | From Machine Learning to Automated Machine Learning: the JADBIO system (I. Tsamardinos, GR) |
| | **11.00** | break |
| | 11.20 | Beyond vision, Machine Learning for Alzheimer (I. Castiglioni, I) |
| | **12.20** | break |
| 19 Jan 2021 | | IMAGE CORRELATION ANALYSIS |
| Afternoon session | 14.30 | Correlative optical imaging and spectroscopy (S. Caponi, I) |
| | **16.00** | break |
| | 16.30 | Image Correlation Spectroscopy for intracellular studies (M. Bouzin, I) |
| 20 Jan 2021 | | BIO-IMAGING: from tissue to organism, from structure to physiology |
| Morning Session | 9.00 | In-vivo infrared imaging, from animal models to humans (G. Ratto, I) |
| | 10.00 | Machine learning for nanoscopy (C. Zimmer, Paris, F) |
| | **10.30** | break |
| | 11.00 | Non-linear Optical imaging of the brain (F. Pavone, I) |
| | **12.20** | break |
| 20 Jan 2021 | | MACHINE LEARNING FOR IMAGE RECONSTRUCTION/ENHANCEMENT |
| Afternoon session | 14.30 | Content-aware image restoration in fluorescence microscopy. (F. Jug, D) |
| | **16.00** | break |
| | 16.30 | Deep learning for Image reconstruction (F. Renna, P) |
| 21 Jan 2021 | | LEARNING FROM FLUORESCENCE |
| Morning Session | 9.00 | Quantitative mobility and interaction analysis in living cells. (J. Hendrix, B) |
| | 10.00 | Computational Imaging for biophysics. (S. Stanciu, RO) |
| | **10.30** | break |
| | 11.00 | Phasor Analysis for quantitative fluorescence microscopy. (E. Gratton, USA) |
| | **12.20** | break |
| 21 Jan 2021 | | SEMINARS |
| Afternoon session | 14.30 | Phasor analysis for multimodal non-linear histopathology analysis (L. Sironi, I) |
| | **16.00** | break |
| | 16.30 | Deep Brain Microscopy, the Long Road (P.Pozzi, I) |
| 22 Jab 2021 | | COHERENT IMAGING AND MACHINE LEARNING |
| Morning Session | 9.00 | Deep learning in Tomography (D. Psaltis, CH) |
| | 10.00 | Digital holography for biomedical applications (P. Memmolo, I) |
| | **10.30** | break |
| | 11.00 | IRIR: Infrared-mediated image restoration. (N.Gritti, E) |
| | **12.20** | break |
| 22 Jan 2021 | | DIGITAL MICRCOSCOPY |
| Afternoon Session | 14.30 | Coherent Spatio-Temporal Microscopy in Microfluidics (P. Ferraro, I) |
| | 14.45 | TimeSeq: time lapse imaging integration of single cell RNA seq. data. (N.Gritti, E) |
| | **16.00** | break |
| | 16.30 | Smart detection of pathogens (D. Ünay, TR) |

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