

## XXV INTERNATIONAL SCHOOL OF PURE AND APPLIED BIOPHYSICS on




Venice (I), Palazzo Franchetti,  
17-22 January, 2021

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

In case of Covid-19 restrictions, the school will be postponed to June 2021 (notification by 5 november 2020).


The quantitative analysis of the huge amount of data produced by traditional and 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 recent machine learning approaches. Technical details of the quantitative analysis will be discussed in extended lectures, hands-on sessions and free informal discussion with the lecturers. The participation to the school is limited to 35 students.

#### Coorganized by:

Società Italiana di  
Biofisica Pura e  
Applicata 

Università di Milano-Bicocca  
Milano 

Institute Pasteur,  
Paris 

CNR, ISASI  
Napoli 

#### 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](http://www.sibpa.it/index.php/scuola-internazionale-di-biofisica-sibpa-ivsla).

Please notice that the registration fee is due only after confirmation of the acceptance and in any case after the 5<sup>th</sup> November 2020. Further details will be emailed to the applicants in due time.

**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	Coffee break
	11.20	Probabilistic pipelines to map biomolecule dynamics in heterogenous environments (J-B. Masson, Paris, F)
	12.20	Lunch break
18 Jan 2021		PRACTICAL SESSION
Afternoon session	14.30	Design, limitation and analysis of an Optical microscopy imaging (M.Collini, Milano, I)
	16.00	Coffee 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	Coffee break
	11.20	Beyond vision, Machine Learning for Alzheimer (I. Castiglioni, I)
	12.20	Lunch break
19 Jan 2021		IMAGE CORRELATION ANALYSIS
Afternoon session	14.30	Correlative optical imaging and spectroscopy (S. Caponi, I)
	16.00	Coffee 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	Coffee break
	11.00	Non-linear Optical imaging of the brain (F. Pavone, I)
	12.20	Lunch 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	Coffee 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	Coffee break
	11.00	Phasor Analysis for quantitative fluorescence microscopy. (E. Gratton, USA)
	12.20	Lunch break
21 Jan 2021		PRACTICAL SESSION
Afternoon session	14.30	Phasor analysis for multimodal non-linear histopathology analysis (L. Sironi, I)
	16.00	Coffee break
	16.30	Deep Brain Microscopy, the Long Road (P.Pozzi, I)
22 Jan 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	Coffee break
	11.00	IRIR: Infrared-mediated image restoration. (N.Gritti, E)
	12.20	Lunch break
22 Jan 2021		DIGITAL MICROSCOPY
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	Coffee break
	16.30	Smart detection of pathogens (D. Ünay, TR)

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