



Barcelona Institute
of Science and
Technology



Universitat
Pompeu Fabra
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BIST Winter School

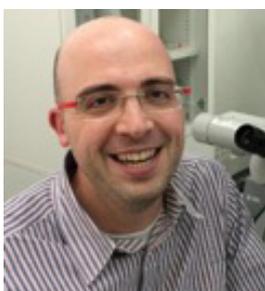
Microscopy, Nanoscopy and Imaging Sciences

Part of the training program of the Master of Multidisciplinary Research in Experimental Sciences

Advanced microscopy techniques have nowadays become essential tools in experimental sciences and fundamental for top-level research. Technological developments at all levels in microscopy (from sample preparation, to signal detection and data processing) have become more and more sophisticated, bringing with them opportunities to tackle questions which previously could not be approached. Furthermore, the combination of such advances with robotics have allowed for the appearance of automated microscopes capable of performing systematic and repetitive tasks, such as screening libraries.

In the last decades we have certainly seen an unprecedented evolution in the field, including shifting from a micro scale to both macro and atomic scales or from postmortem characterization to in vivo measurement of biological samples and in-situ measurements of nanomaterials. We are now thus able, for example, to observe the movement of cells inside an organism, resolve molecules and watch processes at the nano and atomic-scales in real time, determine the chemical and physical properties of nanostructures or follow in vivo the development of an embryo for hours!

As new scientific challenges are met, the technologies continue to be developed, both as a cause and a consequence of the research activities. **An exciting and continuously developing field, microscopy is nowadays a “must know” for anyone interested in following a career in experimental sciences.**



“ Because *SEEING* the world is understanding...
and understanding builds
the knowledge of our society. ”

Jordi Arbiol

ICREA Professor and Group Leader at ICN2
Coordinator of the Winter School

Syllabus: During this intensive winter school (worth 5 ECTS), theoretical classes (lectures and research seminars) will be combined with hands-on training activities in specific experimental techniques, broadly covering the following topics:

Optical Microscopy (16hrs)
Electron Microscopy (16hrs)
Scanning probe Microscopy (10hrs)
Raman Imaging and Spectroscopy (6hrs)
Imaging technology and approaches in Astrophysics / Cosmology (16hrs)

The final day (8hrs) will be devoted to a closing seminar, including short talks and discussions on all of the previous topics, featuring both internal and invited experts in the various fields.

By the end of the Winter School, the dedicated student should have:

- Acquired general knowledge in current advanced microscopy, nanoscopy and imaging techniques currently being used in experimental sciences
- Developed minimal hands-on practical and technical skills in specific experimental techniques
- Gained experience working in groups

Team and Location: This winter school will be delivered by scientists from several of BIST research centers. It will be hosted by ICN2, in collaboration with IRBB, CRG and ICFO. Furthermore, practical training will be undertaken at each center benefitting from their research and training facilities as well as of their staff's expertise.

Coordinator: Jordi Arbiol (ICN2)

Lecturers: Jeremy David (ICN2), Belén Ballesteros (ICN2), Jordi Arbiol (ICN2), Marcos Rosado (ICN2), Sara Martí-Sánchez (ICN2), Francisco J. Belarre, Julien Colombelli (IRB Barcelona), Timo Zimmermann (CRG), María García-Parajo (ICFO), Juan Cortina (IFAE), Aitor Mugarza (ICN2), Jordi Fraxedas (ICN2), Neus Domingo (ICN2).

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