Exploring photonics for neuroscience

ICFO recently hosted the i¿½Hands-on course on MINDLABi? ½, bringing together students and experts to explore adva ced photonics technologies aiming to train the next generatio of neuroscience researchers.

November 22, 2024

The course, organized by five research groups at ICFO, provided a comprehensive look a brain research. Designed to train the next generation of neuroscience researchers, it took a interdisciplinary approach to brain science, spanning molecular to systemic levels. The even featured lectures by ICFO group leaders and invited speakers, paired with hands-on la sessions. Participants joined one of the organizing research groups and attended maste classes during the week. They explored ICFO's state-of-the-art labs, working wit super-resolution microscopes and neurophotonics devices

i¿½ was an exciting event with top international speakers and students, and a successful kick-off for future workshops and initiatives at ICFO covering the molecules and the mindi¿? , comments **Prof. at ICFO Michael Krieg**.

Attendees included students, PhD candidates, and postdoctoral researchers from national

and international institutions, all with diverse scientific backgrounds. **Maddi Olaetxea**, a fourth-year student in Biochemistry and Molecular Biology at the University of the Basque Country, says she wasn't sure what to expect but was not disappointed. i¿½There we e certain concepts that I thought I understood, yet they were limited to a mere concept r theoretical level. This experience has given me the opportunity to put these contents in o practice.i¿½

i¿½Working with the researchers at the SLN facility has been a fantastic experiencei¿½, says **Nuria Camarero**, a postdoctoral researcher at IBEC. i¿½We have been able to see first-ha d the capabilities of this equipment in studying neuronal activity in in-vivo models, and the e tools will be useful in my work, especially for analysing the datai¿½.

Monitoring the brain of neonates

A highlight of the course was the TinyBrains workshop, a European project developing a non-invasive device to monitor the brains of babies with congenital heart defects.

At the opening session **Jennifer Lynch**, a neonatal cardiologist, discussed how innovative optical techniques can improve outcomes, emphasizing the need for better neuromonitoring tools, as current methods cannot predict brain injury risks effectively. **Prof. Martin Lauritzen** presented his team's research on neuromodulator transport and transport of neurotherapeutics across the blood-brain barrier, explaining how they use advanced imaging techniques in mice to understand these mechanisms.

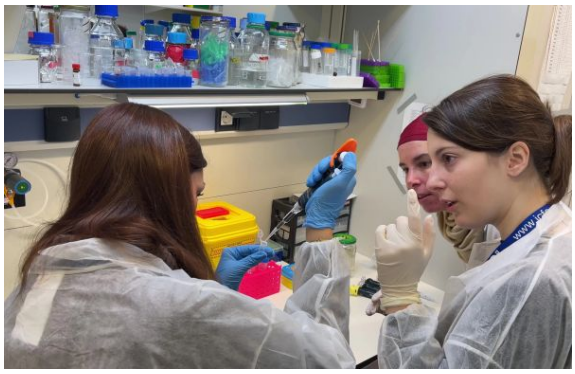
One of the course sponsors, the proof-of-concept LowLightScope, is also focused on bioluminescence imaging. The project is developing a light-efficient microscope for fast volumetric imaging of photon-starved samples

Inspiring the next generation of researchers

The course also featured a sponsor's exhibition, where companies showcased their products and engaged with attendees. During the talk session, the companies Hamamatsu Photonics, Izasa and Pionirs gave more details about their work. The two ICFO-led initiatives TinyBrains and the Barcelona Medical Photonics Network also presented their advancements.

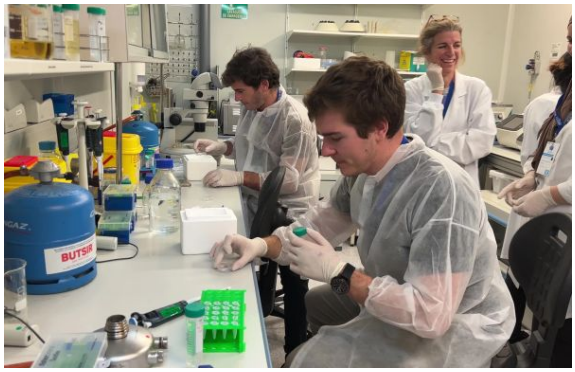
i¿½The most valuable thing this experience has given me is motivation. As a final-ye r student, it has helped me explore and discover different fields, which has encouraged a d motivated me to continue studyingi¿½says Olaetxea, recommending the experience to university students. i¿½I wish I had the chance to attend a workshop like this when I w s studying Pharmacy!i¿½concludes Camarero.

Participants testing the Medical Optics devices. ©ICFO



Participants working at the Neurophotonics and Mechanical Systems Biology lab. ©ICFO

Attendees at the Photon Harvesting in Plants and Biomolecules lab. ©ICFO



Participants working at the Biolab. ©ICFO

Video highlights