

Press Release

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Grande tour through Quantum Information, Sensing and Space Application

Summer School of IHP, University of Rome Tor Vergata and University Roma Tre successfully gave insights into latest research results

Frankfurt (Oder). This year's Summer School was the outcome of a collaboration between IHP - Leibniz Institute for High Performance Microelectronics (IHP), the University of Rome Tor Vergata and the University Roma Tre in Italy. 13 young scientists and researchers from five countries broadened their knowledge of cutting-edge microelectronic and photonic technologies addressing future needs for quantum, sensing and space applications.

The Summer School addressed Master and PhD-students in physics, material science, computer science and electrical engineering. From 16th to 21st of September, the participants attended lectures given by experts from academia and industry, took guided laboratory tours, had insightful discussions with professionals and had the opportunity to immerse themselves in social activities as well.

After an introduction at IHP the students learned important aspects about process and technology requirements for quantum technologies, on recent advances in photonic BiCMOS technology and on requirements, circuits and systems for radiation hardened applications. Moreover Dr Patrick Steglich, the CEO and co-founder of HyPhoX held a presentation as well. HyPhoX is a startup company that was founded out of the IHP and still tightly collaborates with the institute. The company develops innovative photonic biosensors and stands out with a patented wafer level production process which makes price sensitive mass productions of complete sensing systems directly on an industry standard silicon wafer possible.

The participants visited the Photonic, Offline-Diagnostic, the Nano Labs and the Cleanroom at IHP, as well as the HyPhoX Lab at Technical University of Applied Sciences Wildau (TH Wildau), which partners with IHP in the Joint Lab Photonic Devices & Thin Film Technologies. This Joint Lab is led by Prof Andreas Mai, head of the Technology department at IHP, professor for Micro- and Nanoelectronics at TH Wildau, and one of the initiators and scientific heads of this long-standing cooperation with Italian universities. He emphasizes the timeliness and relevance of the topics of this year's summer school: "Silicon photonics is a key technology enabling high-speed data transfer, broadband communications or sensing systems. Forward-looking space applications will increasingly require the use of silicon photonics, with increased demand for stability and reliability of components and modules."

In the second half of the week the attendees were welcomed in Italy. First they visited the University of Rome Tor Vergata, where they attended talks on quantum information processing, nanowires and 2D materials. The Joint Lab Intelligent Electro-Optical Sensing has operated together with IHP, was visited and current research on protein-based biosensing, analyzing nanostructures and production aspects for phase-change materials were presented to the students.



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Here the achievements on innovative plasmonic antennas manufactured in the CMOS process at IHP were presented, which are able to detect biological relevant molecules, such as hemoglobin for medical diagnostics and regenerative medicine.

Prof Giovanni Capellini, the head of the Joint Lab and scientist at IHP points out the importance of this collaboration: "I am very happy that the opening of the Joint Lab between the University of Roma Tre and IHP in 2024 has given the opportunity to extend the topics discussed in the IHP Summer School towards the interaction of microelectronic devices with biological materials, aiming at the realization of new biosensing concepts."

Lastly the students went to National Institute for Nuclear Physics (INFN), this time for an excursion through the Laboratories. Broadened knowledge, new networks, insideviews to recent research topics and new friendships were created through five intensive days. Prof Mai and his coopeartion partners are looking forward to the next coming fourth edition for this unique IHP-Summeschool event in 2026.



At IHP attendees were informed about analyzing technologies via the scattering electron microscope by physicist Jens Katzer.
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Students have been taught important aspects about bio-sensing, quantum information processing and production aspects of phase-change materials at the INFN, Italy.
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About IHP:

The IHP is an institute of the Leibniz Association and conducts research and development of silicon-based systems and ultrahigh frequency circuits and technologies including new materials. It develops innovative solutions for application areas such as wireless and broadband communication, security, medical technology, industry 4.0, automotive industry, and aerospace. The IHP employs approximately 365 people. It operates a pilot line for technological developments and the preparation of high-speed circuits with 0.13/0.25 μm SiGe BiCMOS technologies, located in a 1500 m² DIN EN ISO 14644-1 3 certified clean room. www.ihp-microelectronics.com



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