COMPACT LASER-PRODUCED PLASMA SOURCES BASED ON GAS-PUFF TARGETS FOR SHORT WAVELENGTH MICROSCOPY

Seminario a cura di

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Over the last few decades, the development of several bright sources (such as Synchrotron light and Free-electron lasers) represented a milestone for scientific progresses on the spatial resolution improvement for microscopy and nanoimaging. Nevertheless, such spread wide-world facilities require a costly and continuous maintenance, allowing a limited access to carry out experiments. By employing table-top laser-produced plasma, sources based on gas-puff targets coupled with Fresnel zone plate diffractive optics have been used. Emitted Soft X-ray (SXR, λ=0.1-10 nm) in the "water window" (λ =2.3-4.4 nm) spectral range and Extreme ultraviolet (EUV, λ =1-120 nm) are generated. The "debris-free" source generates plasma efficiently, providing high photon flux and thousands of laser pulses per day, allowing to acquire images with an exposure time of a few seconds and improving the spatial resolution up to ~50 nm in photon-based microscopes. The small size and versatility of such systems allow different applications, e.g. in biomedicine and microelectronics, as well as in material science and nanotechnology. Development, characterization (e.g. the monitoring of the generated plasma by using innovative visible "blind" Silicon Carbide detectors), and possible applications of the SXR/EUV microscopes will be presented, including a prototype of 3D tomography system.

Short Biography:

Dr. Alfio Torrisi was graduated in Physics at the University of Catania, in 2013. He got the European "Erasmus Mundus" Ph.D. in Optoelectronics at the Military University of Technology in Warsaw (Poland) and, jointly, at the Czech University of Technology in Prague (Czech Republic), working on the development of compact "gas-puff" targets for diffraction microscopy. In 2018 he obtained a Fellowship as Associate Researcher at UCL (University College of London, London, UK), collaborating with the Advanced X-Ray Imaging group, at the Dept. of Medical Physics and Biomedical Engineering. From 2018 to 2020 he carried out his research activity as Postdoc Researcher at the Nuclear Physics Institute of the Academy of Sciences of the Czech Republic, using the ion beam lines at the Tandetron accelerator for applications on materials science and applied physics (on biology, medicine and environmental sciences). From 2021 he is working as Junior Researcher at the University of Salento, Dept. of Mathematics and Physics.

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Aula C, primo piano