



Giuliana Tromba – Elettra-Sincrotrone Trieste S.C.p.A

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Udine

Phase contrast micro-CT for plant physiology research: lessons learned and upcoming upgrades at Elettra

SYRMEP (SYnchrotron Radiation for MEdical Physics), the hard X-ray imaging beamline of the Elettra synchrotron light source (Trieste, I), has been operating for over 30 years offering advanced full-field X-ray imaging techniques and multiscale micro-tomography in phase-contrast mode. Powered by a standard bending magnet, SYRMEP had a relatively low X-ray flux and an energy range limited to 8.5-40 keV. This focused its application fields to relatively small samples.

The beamline is supported by two dedicated microfocus sources for conventional micro-tomography experiments (known as 'Tomolab') offering a complementary setup, given their wide X-ray spectrum and large beam, capable of studying bulky samples in a single scan. Being independent setups, access to these sources is always available also during the Elettra shutdown period.

The next generation of SYRMEP, currently under construction as part of the Elettra 2.0 upgrade program, is designed to overcome the limitations of the present beamline and offer state-of-the-art phase contrast imaging techniques with significant advancements, including an extended X-ray energy range, a higher flux and enhanced achievable spatial resolution. In its final configuration, the new setup will operate in an energy range between 10 and 130 keV for monochromatic imaging. This range will be further extended to about 300 keV when using pink beam modality. The broader energy interval will allow to encompass the study of bulky and denser samples and to expand the research horizons to paleontology, paleo-anthropology, materials science and medical research.

This talk will present the outcomes achieved by the beamline in the field of plant imaging and the perspectives offered by the instrumental upgrade.