

SCIENCE WITH VUV AND SOFT X-RAY SYNCHROTRON LIGHT SOURCES

M. Altarelli*

Sincrotrone Trieste, Area Science Park, 34012 Basovizza – Trieste, Italy

and

*Abdus Salam International Centre for Theoretical Physics, Strada Costiera 11,
34014 Trieste, Italy*

The development of «third-generation» synchrotron light sources of VUV and soft x-ray radiation has been particularly intense in Europe, but also in the US and in the Far East. These sources provide photon beams characterized by high brilliance, high degree of spatial coherence and also tunable polarization properties. They are particularly important in the determination of the electronic properties of matter, with techniques such as photoelectron spectroscopy, photoabsorption, resonant x-ray scattering and imaging. An important extension of the powerful photoemission techniques for the investigation of electronic states is obtained by the achievement of spatial resolution, from the sub- μm to the $\sim 10\text{nm}$ scale, either by focusing the photon beam with suitable optical elements, or by imaging the photoelectrons by electron optics devices. These techniques have found applications as diverse as the study of catalytic action, the imaging of domains in magnetic nanostructures (exploiting the polarization properties), or the study of growth and deposition processes. The polarization properties are also useful in the study of magnetic and strongly correlated systems by absorption and/or resonant scattering techniques. The emergence of new techniques such as inelastic VUV scattering is also discussed.

* Corresponding author: e-mail: massimo.altarelli@elettra.trieste.it