

X-ray microstructural analysis at SYRMEP: applications in cultural heritage, archaeology and palaeoanthropology.

F. Bernardini¹, A. Cicuttin¹, M.L. Crespo¹, D. Dreossi², L. Mancini², N. Sodini², G. Tromba², C. Tuniz¹, F. Zanini², C. Zanolli¹

¹ The Abdus Salam International Centre for Theoretical Physics (ICTP), 34151 Trieste, Italy

² Sincrotrone Trieste, 34149 Basovizza-Trieste, Italy

Conventional analytical techniques to study the microstructure of ancient samples are destructive and do not give access to their three-dimensional structure. It is necessary to use a non-invasive method to avoid any damages to cultural, archaeological and paleontological remains, which are a non-renewable resource.

The third-generation synchrotron radiation source of the SYRMEP beamline appears as a well suited investigation tool for paleoanthropology and cultural heritage, due to beam monochromaticity - which avoids beam hardening artifacts on the images - high beam intensity and high spatial coherence leading to visualize sample phases with very small differences in the mass density.

Moreover a conventional microtomographic station (TOMOLAB) is available at Elettra allowing complementary analyses both from the point of view of the energy range and the sample size. Thanks to a recent collaboration with the MLAB of the ICTP, a new conventional tomographic station has been developed especially designed for the investigation of paleontological and archaeological finds of large dimensions.

Combining the features of the SYRMEP beamline and of the two conventional stations available at Trieste, we have the potential to image samples with different sizes and at variable spatial resolution and to increase the visibility of the structures by means of phase-contrast imaging techniques.