

3D and 4D X-ray imaging techniques for comprehensive microstructural analysis of materials: from geological applications to natural and cultural heritage studies

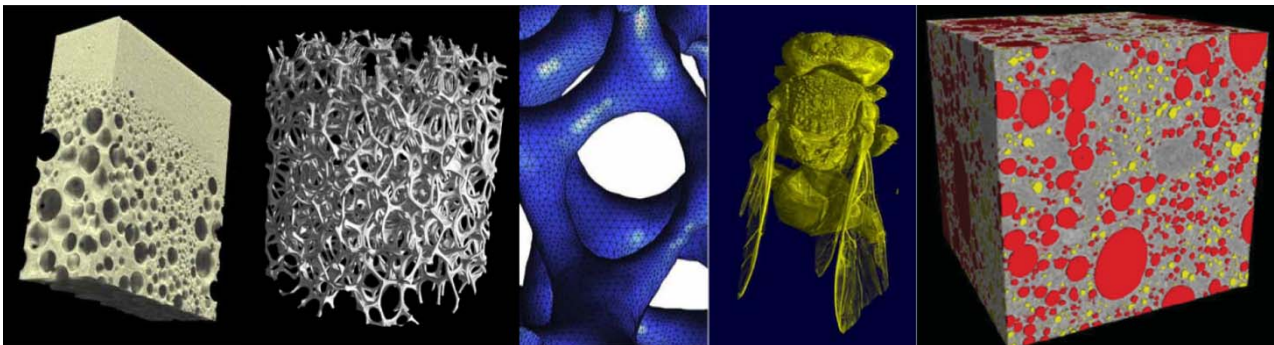
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Webinar “Live” on-line at Zoom link:

<https://unipd.zoom.us/j/82978693795?pwd=TmlBSDBVRFVNL3NwTUUpGSW8rWFdpQT09>

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Imaging techniques play an important role in several research fields: medicine, biology, material science, geosciences and archaeology. Optical and scanning electron microscopy are widely adopted tools for the investigation of the morphological and textural properties of a large range of materials and biomaterials. Imaging techniques based on hard X-rays are also of particular interest and microradiography has proved to be a precious tool for clinical diagnostics and for the investigation of crystal growth. In recent years, great interest has been posed on X-ray computed microtomography (μ CT) techniques, employing microfocus sources and the unique possibilities offered by third generation synchrotron radiation sources. Synchrotron X-ray μ CT measurements produce three-dimensional (3D) or 4D (dynamic μ CT) images of the internal structure of objects with a spatial resolution at the micron- and submicron- scale. Investigations performed directly in the 3D domain overcome the limitations of stereological methods usually applied to microscopy-based analyses and a non-destructive approach is more suitable for further complementary analyses and for rare or unique samples (fossils and archeological finds, in-vivo imaging, etc...). An intriguing challenge is to extract directly from 3D images quantitative parameters related to the physical, chemical and structural properties of the studied materials. However, accurate image processing and analysis methods for an effective assessment of these parameters are still an open issue in several applications. Several scientific applications of advanced hard X-ray imaging techniques will be presented in this seminar.

Proposer: **Prof. Bernardo Cesare**