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Séminaire Seminar

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Complementary experimental techniques and computational methods for defect investigation in materials science

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Defects have a strong impact on crystalline materials affecting their electrical, optical, mechanical, or chemical properties. Particularly noteworthy are defects that arise from the interaction of materials with ion beams, e.g., due to the bombardment with fission products in nuclear reactors, exposure to cosmic radiation in space missions, or during doping by ion implantation. Understanding the processes of damage formation and transformation is crucial to reduce its negative influence on device performance and lifetime. A combination of experimental and computational approaches is one of the key ways to investigate defects in materials science. This talk will provide a selective presentation of the most common methods used for that purpose, including Rutherford Backscattering Spectrometry in Channeling mode (RBS/C), X-ray Diffraction (XRD), micro-Raman spectroscopy, and Transmission Electron Microscopy (TEM) as well as Molecular Dynamics and Monte Carlo simulations (McChasy code). The complementarity and features of the techniques will be discussed and examples of research on defects in selected nuclear materials and semiconductors will be shown.