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AER 19, Seminar Room 3.11

Stefan Michalik

Institute of Physics, P.J. Šafárik University in Košice,
Košice, Slovakia

Structural study of metallic glasses using X-rays

Metallic glasses represent relatively a new class of alloys which in many cases exceed the properties of conventional crystalline materials. However our knowledge about their local atomic arrangement is still inadequate. It is mainly due to the fact that the accuracy and precision of scattering measurements from amorphous materials are limited by their inherent structural disorder. The great progress of x-ray sources based on synchrotron storage ring technology revolutionizes x-ray scattering techniques, which became fundamental tools for the matter characterization.

The recent development of the high-energy x-ray diffraction (HEXRD) technique will be discussed and demonstrated on several examples of metallic glasses. It will be shown that the strain distribution is possible to extract from diffraction data not only in the case of crystalline materials. The behaviour of metallic glasses around the glass transition temperature is still questionable and will discuss as too.

Additional powerful technique supporting direct information about nearest atomic neighbours of a selected atom is represented by the x-ray absorption spectroscopy (XAS). It will be demonstrated that HEXRD and XAS offer a unique combination of experimental data suitable for real space 3D atomic modelling using Reverse Monte Carlo simulations.

Host: Anders Madsen