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How NEUTRON IMAGING explores time, energy and length scales in condensed matter

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Abstract

Classical neutron imaging is a non-destructive testing method based on the transmission measurement of neutrons working along similar principles as X-ray imaging. Unlike X-ray based methods the interaction with matter occurs not with the electron shell but the nucleus, resulting in different sensitivities for the chemical elements. On the one hand some neutrons show high sensitivity for some light elements (e.g. hydrogen, boron) while other heavier elements (e.g. aluminium, lead) are practically transparent to neutrons. Current neutron radio- and tomography results will be presented.

The main focus of the talk will be given to the neutron grating interferometry (nGI) method which is a novel imaging technique that has gained tremendous momentum in the recent years. The nGI technique can be used for two- and three-dimensional phase contrast imaging and dark-field imaging (DFI). The DFI offers spatially resolved scattering images of samples, sensitive to correlation lengths ranging from several nm up to several tens of micrometers. An overview of experimental highlights and ongoing projects is presented.