NEUTRONS AND PHOTONS: PROBES OF CONDENSED MATTER

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Abstract

Synchrotron X-rays and neutrons provide unique microscopic information on the structures and dynamics of condensed matter. These probes are essential tools for biologists, chemists, physicists and materials scientists and have become increasingly important in a remarkably wide range of disciplines, from palaeontology to medicine. The electron storage rings producing synchrotron radiation, and fission reactor or spallation neutron sources, are usually situated at major national or international laboratories. Such central research facilities are exemplified by the two international laboratories in Grenoble, the European Synchrotron Radiation Facility and the Institut Laue-Langevin. After a discussion of the sources used to produce synchrotron radiation and neutron beams, some of the instrumentation and methods used in the investigation of materials will be described, with illustrative examples of recent research. Finally, some major X-ray and neutron sources under construction or at the planning stage will be described, including several where linac technology plays an important role (e.g. the XFEL at DESY and the SNS at ORNL).

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