University of Pavia

Ph.D. School in Electronics, Computer Science and Electrical Engineering
Ph.D. School in Microelectronics
National Ph.D School in Micro- and Nano-Electronics

Neutron detectors for spallation sources: from meV to GeV

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Abstract: Neutron spallation sources are advanced facilities that accelerate protons before colliding them with heavy metal targets, resulting in the release of neutrons. These high-flux and pulsed sources have diverse applications, ranging from material science to medical research. In this presentation, we explore the sophisticated domain of neutron detection technology, which is essential for exploiting the capabilities of neutron spallation sources. We differentiate between the detection of fast neutrons, crucial in applications like irradiation of microelectronics, with energies from MeV to GeV, and moderated thermal neutrons, which are in the meV range and primarily used for neutron scattering and materials research. These varying applications necessitate specialized detector technologies for different energy spectra. For thermal neutrons, helium-3 detectors have been the traditional choice due to their high absorption cross-section, but advancements have led to the adoption of scintillators incorporating boron or lithium reactions. When it comes to fast neutrons, the talk will explore the cutting-edge solid-state detectors, such as those made from silicon or diamond, and in general, detectors based on threshold reactions. We will show how these technologies are tailored to the unique challenges posed by the energy range and the desired application.

Organizer

Prof. Lodovico Ratti

Ph.D. Coordinators

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The seminar will take place in English.
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