

AVVISO DI LEZIONI

17 e 19 Ottobre 2022 ore 10.00, aula U1-07 (Marchetti)



Prof. Robert A. Robinson

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"Introduction to Neutron Science"

Neutron scattering is a powerful research technique for the study of materials in all manner of applications. In this talk, I will outline the way in which neutrons are produced, either with nuclear reactors (by fission) or using particle accelerators (by spallation or other nuclear reactions), and also the main techniques: diffraction, spectroscopy, small-angle scattering, reflectometry and imaging. I will touch on how neutron beams (the neutron is uncharged, but is a dipole magnet) can be polarized, and how polarized neutrons are useful. I will describe the main methods for determining neutron energies and wavelengths, the types of detectors, and other aspects of how the diffractometers and spectrometers are constructed and function. I will review the current sources and facilities worldwide.

"Neutrons for Energy and Food"

The use of neutron scattering, originating from nuclear physics and starting out in condensed-matter physics, spread to chemistry in the 1970s and to biology, engineering, cultural heritage and palaeontology since then. In this talk, I will outline its application to current issues in energy materials and food science. The neutron is ideal for studies of hydrogen and other light elements, so it is very useful in studies of all aspects of the "hydrogen economy" as well as important components (like lithium and carbon) in lithium-ion batteries. In addition, many important electronic materials are oxides, and neutrons are useful to determine both structures and diffusion in these materials. The main techniques are neutron diffraction (for the structures of materials), neutron spectroscopy (to determine how the atoms and ions move) small-angle neutron scattering and neutron reflectometry to study structure on the nano-scale, and finally neutron imaging (to visualize and quantify how macroscopic structures are formed, and how fluids move, in real devices. The same techniques are growing in importance in food materials science, as there is important structure at all length scales from the atomic right up to that of a loaf of bread.

Colleghi, studenti e tutti gli interessati sono invitati a partecipare

Per informazioni rivolgersi a: Dott.ssa Daniela Di Martino (daniela.dimartino@unimib.it)
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