

Seminario di Dipartimento SMFI

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terrà un seminario dal titolo

(MAGNETIC) NEUTRON DIFFRACTION AT THE ISIS SPALLATION SOURCE

Abstract:

In the last 80 years neutron diffraction has become a standard technique to characterize ordered structures in condensed matter research. With the current state of the art sources, it is possible tackle many of the current challenges in condensed matter physics, materials and life science. Taking advantage of the intrinsic characteristics of the neutron, particularly its long penetration length in most materials, it is possible to perform experiment under extreme conditions like high magnetic fields, high pressure, and ultra-low temperatures down to 50 mK. It is also possible to study materials in in-operando conditions, as example during a charge/discharge cycles of a battery material or observe the absorption of gaseous species inside MOF materials. Another important characteristic of the neutron is that it possesses a magnetic moment which give rise to an interaction with the unpaired electrons in the materials, of the same order of magnitude of the neutron-nuclei one. This gives the possibility, by performing magnetic neutron diffraction measurements, to investigate the magnetic spin correlations and in the case of long range magnetically ordered structure to determine the relative spin orientations and more importantly the system magnetic symmetry. This allows to study magnetic materials from the fundamental science point of view by understanding the nature of the magnetic ordering, its implication regarding the material macroscopic properties and the cross coupling with other degrees of freedom. In this talk I will start by introducing the ISIS spallation source (Oxfordshire UK) and its suites of diffractometers for the study of crystalline materials. I will then focus the attention on the state-of-the-art cold neutron diffractometer WISH on the second target station. I will show you some examples where we pushed the limit of magnetic neutron diffraction to small samples and small signal in complex sample environment like uniaxial stress and high pressures. Finally, I will focus the attention on the use of magnetic symmetry to understand material properties and show how much information can be collected from the knowledge of the full system symmetry.

15/5/2025, ore 16:30, Aula Maxwell (plesso fisica)