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**12.30 h, SALA DE GRADOS**
**Facultad de Ciencias**

# *XtremeD: a high-intensity neutron diffractometer for extreme conditions*


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Research under extreme conditions such as high and low temperature, high pressure and magnetic field provides invaluable information for understanding fundamental interactions in condensed matter and design of functional materials with extraordinary properties. Interatomic interaction and coordination environments often undergo dramatic changes as a function of external stimuli leading to groundbreaking discoveries. High-temperature superconductivity in $La_3Ni_2O_7$ and $LaH_{10}$, high-pressure synthesis of metastable superhard carbon and field-induced boson condensation into a spin-nematic phase recently observed in $SrCu_2(BO_3)_2$ are among such outstanding findings. Therefore, the ability to probe the crystal structure under extreme conditions opens up new and exciting possibilities to learn more about bonding and properties of conventional and more exotic materials, often unstable under ambient conditions. In this context, neutron diffraction is a key method for locating light elements in a heavy matrix, telling apart isotopes or elements with similar atomic numbers or studying magnetically ordered systems.

XtremeD is a new thermal neutron diffractometer recently commissioned at the Institute Laue-Langevin (ILL), Grenoble, France. The instrument is operated by the Aragon Nanoscience and Materials Institute (INMA, CSIC), in the format of a Collaborating Research Group (CRG). Beam time is allocated to the research proposals submitted both through the ILL and Spanish national CRG proposal calls (via spins.unizar.es). The instrument has been conceived to get the most out of the relatively small sample gauge volumes in bulky sample environments such as high-pressure cells and magnets through maximizing the incident neutron flux and detector solid angle.

In this talk, the rationale behind the XtremeD project will be outlined and latest instrument updates will be discussed and illustrated by the results of recently performed official experiments.

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