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Séminaire SPP

Lundi 10 octobre 11h00

CEA-Saclay Bât 141, salle André Berthelot

A new generation axion helioscope

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Axions appear in extensions of the standard model invoked to solve the strong CP problem. They could compose the dark matter of the Universe, and play important roles in stars and other astrophysical scenarios. Axions produced by the Sun could be detected following Sikivie´s axion helioscope concept. I will review the motivation and status of the experimental searches for axions, and most particularly of axion helioscopes, exemplified by the CERN Axion Solar Telescope (CAST), currently their most powerful implementation. I will review the recent proposal for a new generation axion helioscope, with a potential sensitivity to the axion photon coupling down to a few 10^{-12} GeV^{-1}, 1-1.5 orders of magnitude beyond CAST. Such improvement is conceivable by fully exploiting innovations already introduced by CAST, namely, x-ray focusing optics and low background x-ray detectors, as well as a new magnet with substantially enlarged magnetic volume. If axions also couple to electrons, the Sun produces a larger flux for the same value of the Peccei-Quinn scale, allowing one to probe a broader class of models. Except for the axion dark matter searches, this experiment will be the most sensitive axion search ever, reaching or surpassing the stringent bounds from SN1987A and possibly testing the axion interpretation of anomalous white-dwarf cooling that predicts an axion mass of a few meV. Beyond axions, this new instrument will probe entirely unexplored ranges of parameters for a large variety of axion-like particles (ALPs) and other novel excitations at the low-energy frontier of elementary particle physics.

Le café sera servi 10 minutes avant.

NB : La présentation d'une pièce d'identité est exigée à l'entrée du centre. Tous les auditeurs extérieurs sont priés de prévenir à l'avance Emilie Chancrin, tél. 01 69 08 23 50, e-mail : `emilie.chancrin@cea.fr`. (U.E. : délai de 24 h, hors U.E. : délai de 4 jours).