Mardi 16 Avril 2024

Day 1 - Session 2: 14h00 – 15h30 • Amphi Dirac

2nd Year PhD Series 2023/24

Antonin DE AZEVEDO – Groupe MATiCE

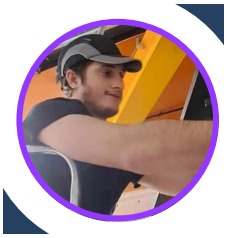
Influence of chromium doping of UO_2 nuclear fuel on fission products speciation in case of severe accident

In current nuclear power plant reactors, energy is produced by the fission of uranium and/or plutonium isotopes, contained in oxide pellets made of single phase UO_2 or polyphase $(U,Pu)O_2$ (MOX). The fission reaction creates fission products that are contained inside the fuel.

UO_2 doped with chromium nuclear fuel is part of "E-ATF" (Enhanced Accident Tolerant Fuel). It is studied for its optimized behavior in case of accidents (power ramp), due to a larger grain size compared to a classical UO_2 fuel. Nevertheless, the added chromium is likely to react with some fission products and form volatile species that would be not found in non-doped UO_2 fuel. In this thesis, we propose to study the speciation of fission products in a Cr-doped simulated UO_2 fuel (SIMFUEL).

For this presentation, the results of the study of Cr-doped UO_2 will be presented. The impact of preparation process and of thermodynamic conditions during sintering on the pellets density, grain size and chromium solubilization and speciation has been studied. The first results of SIMFUEL synthesis will also be presented.

Nicolas MARTINI – Groupe MANOIR



Search of new physics in the neutrino sector with the RICOCHET experiment at ILL

The RICOCHET reactor neutrino observatory aims at measuring the coherent elastic neutrino-nucleus scattering (CEvNS) of antineutrinos at the Institut Laue-Langevin, ILL (Grenoble, France). To that end, RICOCHET employs two cryogenic calorimeter technologies: one based on germanium targets with neutron-transmutation-doped thermistors (the CryoCube) and one based on superconducting targets and a transition-edge sensor readout (the Q-Array).

The CryoCube exploits a combined readout of phonons and ionization to identify nuclear recoil events and reject other backgrounds (electron recoils). The cryogenic facility was first installed and tested at IP2I before being installed at the end of 2023 at ILL. The detector commissioning started in February 2024 with a detector payload of three 40-gram germanium detectors.

In this talk, I will present my participation to this experiment. This will include my work on the caracterization of the CryoCube detectors, the RICOCHET processing and analysis pipelines, the RICOCHET electronics, the tests at IP2I and the installation of the RICOCHET Cryostat at ILL.

Elise JOURD'HUY – Groupe CMS

DiHiggs searches with the CMS experiment

Since the existence of the Higgs boson has been experimentally confirmed by the ATLAS and CMS Collaborations, many of its properties have been measured with high precision. However, one of its main property, the shape of the Higgs potential, remains unknown. The Higgs boson pair (HH) production represents the most direct way of measuring this potential, and any discrepancy observed could be a sign of new physics. According to various BSM theories, an excess of HH signal may result from a new resonance X decaying into two Higgs bosons.

The Run 3 non-resonnant HH searches in the two photons and two b-quarks final state as well as the Run 2 $X \rightarrow HH$ searches are presented.

Lien agenda: https://indico.in2p3.fr/event/32777/