ID de Contribution: **41**

Type: **Oral presentation**

Exotic Nuclei for Astrophysics—First Spectroscopy of ^{110}Zr

vendredi 29 novembre 2019 11:50 (20 minutes)

Exotic, extremely radioactive nuclei play a key role in the nucleosynthesis processes responsible for heavy element production in cataclysmic events in the universe, such as recently observed in the binary neutron star merger detected via gravitational waves [1] . The nucleosynthesis yields depend on the details of the underlying quantum structure of these nuclei, largely unknown as such exotic species are difficult to create and study in the laboratory, and theoretical predictions diverge. I will present the first spectroscopy results of one such exotic nucleus, ^{110}Zr, where a stabilization effect in a spherical or pyramidal shape had been predicted which would explain a long-standing discrepancy in nucleosynthesis simulations. The experiment was performed at the Radioactive Isotope Beam Factory (RIBF) in Japan, where ^{110}Zr was created via in-flight fission of a ^{238}U beam and subsequent proton removal on a cryogenic liquid hydrogen target. Gamma rays from nuclear deexcitation were detected with a 4π scintillator array, and Doppler correction enabled via event-by-event vertex reconstruction in a time-projection-chamber developed at CEA-Saclay. Results show no evidence for a spherical or pyramidal shape, but rather suggest that this nucleus is extremely deformed, beyond expectations from mean-field based approaches, and thus cannot explain the deficiencies in nucleosynthesis models in this mass region [2].

[1] Abbott et al, Phys. Rev. Lett. 119, 161101 (2017).
[2] N. Paul et al, Phys. Rev. Lett. 118, 032501 (2017).

Language

English

Auteur principal: PAUL, Nancy (Laboratoire Kastler Brossel)

Orateur: PAUL, Nancy (Laboratoire Kastler Brossel)

Classification de Session: Remise des prix Jeunes Chercheurs/euses 2018 / Talk des 2 Lauréats

Classification de thématique: Physics