ID de la contribución : **40** Tipo : **no especificado**

Proton decay studies with ACTAR TPC

martes, 25 de marzo de 2025 11:30 (30)

The ACTAR TPC [1,2] detector has been designed as a versatile device for reaction and decay studies in nuclear physics. It is a gas detector working as a time projection chamber (TPC), than can be used either in "active target" mode where the gas is used as a target for the nuclear reaction or as an active stopper for implantation-decay experiments. The first experimental campaigns took place at GANIL, where two experiments performed at the LISE3 separator demonstrated that the detector is a powerful instrument to measure the exotic decay modes involving proton emissions. The first experiment aimed at measuring the proton radioactivity of 54mNi isomer (10+), with a very short half-life (155 ns) in order to determine its complete decay scheme [3-5]. In addition, the beam time also allowed elucidating the decay of the first observed proton radioactivity, from the isomeric state (19/2−) of 53mCo [6], involving high angular momentum protons with $\ell = 7$ and 9. The second experiment was dedicated to the study of the 2-proton radioactivity of 48Ni [7], in the context of the recent development of a new theoretical framework (Gamow Coupled Channels calculation) to describe this exotic decay mode at the proton drip-line. During this experiment, many other nuclei in the region of 48Ni where implanted in the active volume of the detector. Despite the device settings were not optimized for this, the beta-delayed emission of 1, 2 or 3 protons from these nuclei can be studied, opening large opportunities for this type of decays. Ideally, the association of a gamma detection to ACTAR TPC, as already foreseen, would significantly benefit to such studies.
The decay experiments performed with ACTAR TPC, from realization to analysis, cover all topics suggested for the workshop.

[1] B. Mauss et al., Nuclear Inst. and Methods in Physics Research, A 940 (2019) 498–504
[2] J. Giovinazzo et al., Nuclear Inst. and Methods in Physics Research, A 953 (2020) 163184
[3] J. Giovinazzo et al., Nature Comm. 12, 4805 (2021), doi.org/10.1038/s41467-021-24920-0
[4] D. Rudolph et al., Physics Letters B, 2022, 830, 137144
[5] J. Giovinazzo et al., Nuclear Inst. and Methods in Physics Research, A 953 (2022) 167447
[6] L.G. Sarmiento, T. Roger et al., Nature Comm., 14, 5961 (2023), doi.org/10.1038/s41467-023-39389-2
[7] A. Ortega Moral, PhD thesis (2023), University of Bordeaux

Presenter(s) : GIOVINAZZO, Jérôme (LP2iB / CNRS-IN2P3 / Univ. Bordeaux)

Clasificación de la sesión : Session 4