Contribution ID: **1737** Type: **Oral**

MICROSTRIP SILICON DETECTORS IN THE INVESTIGATION OF PROTON RADIOACTIVITY

Thursday 31 October 2024 17:30 (15 minutes)

The study of light unstable isotopes that decay through the emission of protons or neutrons, is a significant area of interest in modern nuclear physics, as many of these processes remain poorly understood. Some decays, such as the true four-proton decay, are yet to be observed experimentally.
The EXPERT (EXotic Particle Emission and Radioactivity by Tracking) project is a part of the SuperFRS Experiment collaboration at FAIR (Facility for Antiproton and Ion Research), GSI, Darmstadt. The main goal of the project is dedicated to investigating nuclear systems in the vicinity of neutron and proton driplines, and exploring the mechanisms of exotic decays. The EXPERT project employs various detector systems, including silicon microstrip detectors FOOT (FragmentatiOn Of Target).
One of the unknown isotopes is 7C, where a true four-proton decay is expected to be observed. An experiment is planned for next year at the FRS (Fragment Separator) facility to produce this isotope and register the decay products using in-flight tracking technique. Study of the angular correlations of 7C decay products will also help to better understand the properties of its mirror isotope 7H. Recently, a test experiment with a secondary 9C beam has been performed at FRS in order to properly set-up and adjust the entire experiment design for the main experimental run.
This presentation will highlight preliminary results on the simulation of the upcoming experiment with a 9C beam, using the ExpertRoot framework. We will also discuss preliminary analysis of data from the FOOT detectors, including its correlation with the information gathered from the standard FRS detectors, which was acquired at FRS during the test run in February 2024. A primary focus will be on the identification of protons. Additionally, employment of MAPS (Monolithic Active Pixel Sensor) for tracking of particles with Z=1,2,3 will be considered and the initial stages of simulation of these detectors will be shown.

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Session Classification: Experimental Nuclear Physics

Track Classification: Experimental Nuclear Physics