Contribution ID: **30** Type: **Talk**

The experimental set-up of the RIB in-flight facility EXOTIC

Thursday, 26 January 2017 12:30 (30 minutes)

We will present the experimental set-up [1] of the Radioactive Ion Beam (RIB) in-flight facility EXOTIC [2-6] consisting of: a) two position-sensitive Parallel Plate Avalanche Counters (PPACs), dedicated to the event-by-event tracking of the produced RIBs and to time of flight measurements; b) the new high-granularity compact telescope array EXPADES (EXotic Particle DEtection System), designed for nuclear physics and nuclear astrophysics experiments employing low-energy light RIBs. EXPADES is a compact, versatile and portable array that consists of eight \DeltaE-Eres telescopes arranged in a cylindrical configuration around the reaction target. Each telescope is made up of two Double Sided Silicon Strip Detectors (DSSSDs) with a thickness of 40/60 \mu m and 300 \mu m for the \DeltaE and Eres layer, respectively. For experiments requiring the detection of more energetic particles than those stopped in the Eres layer, few 1 mm-thick DSSSDs were recently purchased, to substitute the 300 \mum -thick DSSSDs or to be used in addition to the previous stages. Additionally, eight ionization chambers were constructed to be used as an alternative \DeltaE stage or, in conjunction with the entire DSSSD array, to build up more complex triple telescopes. Very innovative readout electronics was designed for both DSSSD stages. New low-noise multi-channel charge-sensitive preamplifiers and spectroscopy amplifiers, associated with constant fraction discriminators, peak-and-hold and Time to Amplitude Converter circuits were developed for the electronic readout of the \DeltaE stage. Application Specific Integrated Circuit-based electronics was employed for the treatment of the Eres signals. An 8-channel, 12-bit multi-sampling 50 MHz Analog to Digital Converter, a Trigger Supervisor Board for handling the trigger signals of the whole experimental set-up and an ad-hoc data acquisition system were also developed.

The components of the EXPADES array can be easily reconfigured to suit many experiments. Moreover, it can be used as an ancillary detection system with \gamma-ray (like the BaF2 scintillators of the SERPE array or other detectors) and neutron arrays.

EXPADES and PPAC B (the second PPAC of the RIB monitoring system) are housed in the reaction chamber, placed at the final focal plane of the EXOTIC facility and designed for an optimal use of EXPADES in different configurations . To allow the realization of experiments with RIBs impinging on both solid and gas reaction targets (like experiments studying \alpha clustering phenomena in light exotic nuclei or experiments of astrophysical interest with RIBs impinging on gas targets in inverse kinematics), a small chamber housing the PPAC B was built. When requested, this small chamber isolates, through a 2 \mu m-thick Havar window, the two PPACs and the beam line (held at vacuum) from the reaction chamber that is filled with gas at pressures ranging from 0.4 to 1 bar. In this case, the reaction between the RIB and the gas target can occur at any point along the RIB trajectory inside the reaction chamber.

References

[1] D. Pierroutsakou et al., Nucl. Instr. and Meth. A 834 (2016) 46
[2] V.Z. Maidikov et al., Nucl. Phys. A 746 (2004) 389c
[3] D. Pierroutsakou et al., Eur. Phys. J. Special Topics 150 (2007) 47
[4] F. Farinon et al., Nucl. Instr. and Meth. B 266 (2008) 4097
[5] M. Mazzocco et al., Nucl. Instr. and Meth. B 266 (2008) 4665
[6] M. Mazzocco et al., Nucl. Instr. and Meth. B 317 (2013) 223

Primary author: PIERROUTSAKOU, Dimitra (NA)

Presenter: PIERROUTSAKOU, Dimitra (NA)

Session Classification: Projects