

# The $S\pi$ RIT-TPC data acquisition system and analysis framework

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The SAMURAI- $S\pi$ RIT project will aim to constrain the symmetry-energy term of the nuclear Equation of State (EoS) at supra-saturation densities [1]. For such purpose, a Time Projection Chamber (TPC) was recently constructed in order to measure  $\pi^-/\pi^+$  and  $t/3\text{He}$  yield ratios in central collisions of neutron-rich heavy ions. The TPC will be installed inside the SAMURAI superconducting dipole magnet (at RIKEN, Japan) to benefit from its large magnetic rigidity. To deal with the large particle multiplicities, the pad plane is highly segmented in 12,096 pads of  $12\times 8\text{ mm}^2$  of area. Signals are digitized and read out by the General Electronics for TPC system [2,3], with a maximum of 512 time buckets at 1 to 100 MHz of sampling rate. In order to process the large amount of data expected (Hundreds of MB/s) and to combine the data from auxiliary detectors, the NARVAL data acquisition system was adopted. Moreover, an advanced analysis framework is also being developed by our collaboration to reconstruct the relevant observables by using sophisticated tracking algorithms, and transport codes to simulate the underlying physics. In this contribution we report the performance and present status of the  $S\pi$ RIT-TPC data acquisition system and the dedicated analysis framework, called  $S\pi$ RITROOT.

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[1] R. Shane et al., Nucl. Instrum. and Meth. A (accepted for publication).

[2] T. Isobe et al., RIKEN Accel. Prog. Rep. 46, 151 (2014).

[3] E. Pollaco et al., Physics Procedia 37, 1799 (2012).

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