

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

Tuesday, 19 May 2015 15:15 (25 minutes)

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  $12\times 8$  mm<sup>2</sup> 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.

This material is based on work supported by the DOE under Grant No. DE-SC0004835, Japanese MEXT Grant-in-Aid for Scientific Research on Innovative Area Grant No. 24105004 and the National Research Foundation of Korea under grant No. 2012M7A1A2055596.

- [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).

**Primary author:** JHANG, Genie (Department of Physics, Korea University, Seoul 136-701, Republic of Korea)

**Co-authors:** HONG, Byungsik (Department of Physics, Korea University, Seoul 136-701, Republic of Korea); LEE, Jung Woo (Department of Physics, Korea University, Seoul 136-701, Republic of Korea); TSANG, ManYee Betty (NSCL, Michigan State University, East Lansing, Michigan, 48824, USA); PALNI, Prabhakar (NSCL, Michigan State University, East Lansing, Michigan, 48824, USA); SIIRIT COLLABORATION,  $S\pi$ RIT collaboration ( $S\pi$ RIT collaboration); ISOBE, TadaAki (RIKEN Nishina Center, Hirosawa 2-1, Wako, Saitama 351-0198, Japan); MURAKAMI, Tetsuya (Department of Physics, Kyoto University, Kita-shirakawa, Kyoto 606-8502, Japan); LYNCH, William (NSCL, Michigan State University, East Lansing, Michigan, 48824, USA); AYYAD, Yassid (Research Center for Nuclear Physics, Osaka University, Ibaraki, Osaka, 567-0047, Japan and NSCL, Michigan State University, East Lansing, Michigan, 48824, USA)

**Presenter:** AYYAD, Yassid (Research Center for Nuclear Physics, Osaka University, Ibaraki, Osaka, 567-0047, Japan and NSCL, Michigan State University, East Lansing, Michigan, 48824, USA)

**Session Classification:** Session 7

**Track Classification:** Technical issues