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SAMURAI in its operation phase for RIBF users

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SAMURAI is one of the basic and critical devices of the RIBF facility, which provides opportunities for nuclear spectroscopic studies using RI beam, especially for reactions with multi-particle final states. It consists of a superconducting dipole magnet with 7 Tm bending power coupled with sophisticated detectors for beam tracking and detection of reaction residues.

The commissioning run of SAMURAI was performed in 2012 after 5 years construction. Then SAMURAI has entered into the phase of physics experiments since then. Already in 2012, the “day-one experimental campaign” was performed with neutron-nucleus coincidence measurements. In 2013, experiments detecting two residues in coincidence on the focal plane of SAMURAI were performed. Those experiments used a SAMURAI magnet configuration rotated 30 degree rotated with respect to the beam line. DALI2 was placed at the target to detect prompt gamma rays for tagging excited states in residual nuclei of the relevant reactions. In the year 2014, two experimental programs were dedicated to detection of recoil particles from the target in inverse kinematics measurements.

In parallel with conducting those experiments, SAMURAI international collaboration forms several subgroups. Developments continue in order to expand and maximize the multi purpose properties of SAMURAI. The SAMURAI-TPC subgroup also know as SAMURAI pion Reconstruction Ion Tracker, SpiRIT, collaboration is developing TPC for multi particle detection in Equation of State studies. In summer of 2014, the SpiRIT collaboration tested performances of the TPC installed in the SAMURAI chamber with the magnetic field of 0.5 T. The SAMURAI-Si subgroup is developing a Si detector system for tracking heavy reaction product and one or more protons in coincidence. The Si detectors with their new readout circuits will be tested using heavy ion beams at the HIMAC facility this year. In the near future, spectroscopy of long lived fission products (LLFP) using SAMURAI is also planned as basis for technological developments for nuclear transmutation.

SAMURAI is now in operation for user experiments with further technical developments, status of these development will be discussed in the presentation. The SAMURAI collaboration welcomes new ideas of experiments including development of devices to be coupled with SAMURAI.

1) T. Kobayashi, et. al., Nucl. Instr. Meth. B 317 (2013) 294-304.

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