

SCRIT electron spectrometer (II)

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The SCRIT electron spectrometer is being constructed at the SCRIT electron scattering facility^{1,2)}. In this report, the current status of the construction is described. The spectrometer, shown in Fig. 1, will be used to measure the cross section for elastic electron scattering off short-lived nuclei to determine their charge-density distributions³⁾. It consists of a dipole magnet, two drift chambers, and a pair of plastic scintillators. The drift chambers sandwich the magnet for trajectory measurements, and the plastic scintillators trigger data acquisition. Knowing the detailed magnetic-field distribution, the momenta, scattering angles, and scattering positions of the electrons are determined. The spectrometer should have large acceptance and a good momentum resolution of the order of 10^{-3} to identify the elastic scattering events.

1 Magnet

The window-frame magnet, the gap region of which is 170 cm (width) \times 140 cm (length) \times 29 cm (height), is employed. The field cramps were carefully designed to reduce the fringing field down to a few gauss at the electron beam position. Magnetic-field measurements have been performed, and the detailed field distribution was obtained⁴⁾. The magnet is placed on a movable platform, as shown in Fig. 2, such that the magnet can be moved away from the beam line by 1.5 m. The re-positioning accuracy was confirmed to be better than 50 μ m. The magnet system will be ready for operation immediately after the power line and cooling water are set up; this is expected to be completed in the first half of 2014.

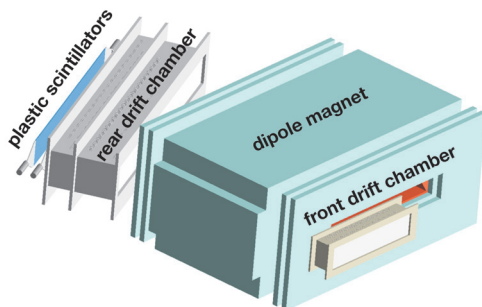


Fig. 1. The SCRIT electron spectrometer.

2 Detectors

A large drift chamber, which is placed in the rear side of the magnet, was constructed in 2013. The small drift chamber used in the previous SCRIT studies will be used as the front drift chamber. A new readout system, RINEI RP 1212N, which digitizes the drift times on board is currently being tested⁵⁾. A pair of large plastic scintillators of dimensions 220 cm (length) \times 30 cm (width) \times 2 cm (thickness) are used for detecting the scattered electrons, and their coincidence triggers data acquisition. To reduce non-negligible false triggers due to cosmic rays, veto detectors will be arranged. The drift chambers and the plastic scintillators will be ready for use in the first half of 2014.

3 Spectrometer commissioning

The SCRIT electron spectrometer will be commissioned using the W-wire target installed inside the SCRIT chamber in the second half of 2014. Using the scattered electrons from the W wire target, one can determine the track-reconstruction efficiency, momentum resolution, etc. After commissioning, we will immediately conduct experiments on electron scattering off a short-lived nucleus, which will be ^{132}Sn . The world's first observation of electrons scattered off an exotic nucleus is expected to take place in the fiscal year 2014.

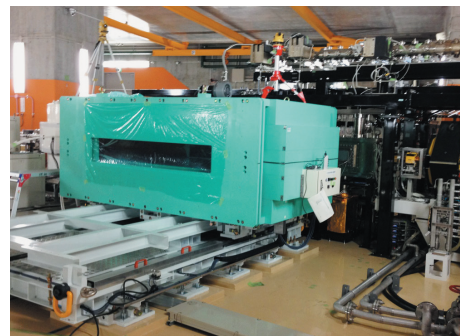


Fig. 2. The magnet with the movable platform.

References

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