

DEVELOPMENT OF SECONDARY ELECTRON TIME DETECTOR FOR ION BEAMS

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We are developing the time-of-flight detector for ion beams. The requirements for the time-of-flight detector in the present work, are few energy loss of ion beams in the detector, the good time performance, and the sufficient detection efficiency. To achieve this purpose, the time-of-flight detector utilizes the thin foil which generate secondary electrons and the isochronous transport of that to the electron detectors. In order to extremely reduce the energy loss of ion beams in the detector, the thin foil is employed. When the charged particle passes through the foil, the secondary electrons are emitted from the both surfaces of the foil. With the crossed electromagnetic field which provides the isochronous transport, the secondary electrons are guided to the two micro-channel plate detectors placed in forward and backward direction of the ion beam. The irradiation tests of the detector were performed with the ⁸⁴Kr beams of 200 MeV/nucleons provided by HIMAC (Heavy Ion Accelerator in Chiba) in NIRS. In the preliminary results, for the time resolution the standard deviation achieved less than 50ps, and the maximum detection efficiency recorded 99% by taking OR of forward and backward direction. In the conference, we will discuss the time performance, and the detection efficiency of the time-of-flight detector in the present work. In future, the time-of-flight detector will be used for the mass measurements with the rare-RI (radioactive isotope) ring at the RI beam factory in RIKEN.