

BEAM DIAGNOSTIC PROBES OF THE RILAC

M. KASE, I. YOKOYAMA, M. HEMMI, M. YANOKURA, J. SCHIMIZU*
and M. ODERA

Institute of Physical and Chemical Research (Riken)

* Present address: Accelerator Center, Tsukuba University

The RILAC is intended to accelerate every elements in the periodic table heavier than carbon by use of the variable frequency scheme. Such multiparticle and variable frequency operations necessitate supplying the operator the complete information of the status of the beam under acceleration. To this end, a number of the various beam diagnostic probes were designed, tested and set along the beam line. Those are slit systems, beam stoppers, beam profile monitors, beam-bunch-picking-up monitors, emittance monitors, a beam-intensity degrader and solid state detector for the determination of ion species. Figure 1 shows the distribution of these probes. The probes other than the beam stoppers and slits are set in the diagnostic probe containers. Introduction of mechanical movement into vacuum of these probe elements is made via devices using welded bellows and no grease is allowed at any vacuum seals.

There are two types of the slit system. For one type, slit width is manually adjusted and for the other, it is remotely movable in the horizontal direction. The beam stoppers are plunged into or pulled out from the beam course swiftly by the pneumatic cylinders. Some stoppers are also connected with the interlock networks to prevent the beam from hitting the vacuum gate valves which are closed, or from entering the experimental area of which shielding doors are opened. Thus the stoppers have the double jobs of the current measurements and the protection of the instruments or men. The beam profile monitor has two wire probes, horizontal and vertical, and they are driven across the beam at 45° to the horizontal by a pneumatic cylinder. Current signals from each wire are amplified and recorded on the screen of a storage oscilloscope. The beam bunch monitor is described in a separate paper¹⁾. Two types of the emittance monitors were made. One is a large one for the precise measurement, and the other is a compact one which is intended to make a possible rough but quick emittance measurements.

There are a beam intensity attenuator and an energy measuring devices set downstream of the linac. The former attenuates beam by a factor larger than 10^5 using a wedge slit. In the latter there are a foil holder and a detector. At first the foil is inserted in the beam and by measuring the Rutherford scattering intensity, the extent of beam attenuation can be ascertained. If sufficiently small beam current is achieved, the foil is withdrawn and the detector is inserted in the ion stream in order to investigate whether any impurity ions are being accelerated or not.

1) This conference abstract: M. Yanokura et al, "BEAM BUNCHER ... "

