

COMPUTER CONTROL OF MEASUREMENT IN TARN

M. Takanaka, I. Honma, A. Noda, K. Omata
N. Tokuda, S. Watanabe and M. Yoshizawa

Institute for Nuclear Study, University of Tokyo

We have two small computers (FACOM U400, HP1000). The U400 system is used as a master computer which gives a master timing pulse delivered to injection time controller. It is also used as a computer for data taking with several kinds of interfaces, data processing, data logging into MT, disk and LP. HP1000 system has peripherals such as a graphic display and several interface units and is mainly used as a RF control.

We carry out data logging of beam transport, vacuum, magnet and beam monitoring systems in two modes with U400 to learn characteristics of TARN and to establish the normal operation. In one mode the logging is done periodically every ten minutes, and in the other one it is performed temporarily when the parameters are changed.

Several kinds of beam monitors are installed in TARN. One of them is a scintillation monitor which is used to observe the profile of injected or stacked beam in TARN. In order to obtain the quantitative accuracy of the profile and the exact timing of the movement of the scintillation monitor, we make use of computer control together with CAMAC system. The monitor moves 20 cm along the radial direction in the ring during 0.8 ~ 6.0 second. A signal from the scintillator is taken every 160 μ sec in the repeat mode and 15 signals as well as the position's signal are read in the period of 30 m sec. These data are displayed on a CRT, are served as the control of RF acceleration, and are stored on MT for off-line analysis. The function generation of RF voltage is performed by HP1000, of which the shape is determined by seven parameters and is displayed on CRT. A program of the RF voltage is obtained by considering the phase space area of the injected beam, displacement of the beam from the injection orbit to the stacked orbit and the adiabaticity of beam dynamics through the period of beam deposition. We can find the best parameters for RF stacking, as we observe the beam profile. The typical example of the function of RF voltage and the beam profile is given in Fig. 1.

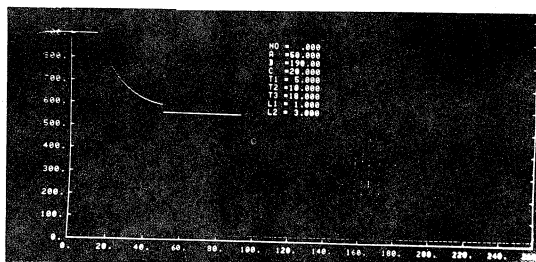


Fig. 1 A beam profile from the scintillation monitor and function of RF voltage.

- (a) A beam profile
 - a horizontal axis (x): the radial direction in the ring.
r = 0 cm at x = 20, r = 20 cm at x = 260.
 - a vertical axis (y) : the charge intensity from the monitor.
Ground level is at y = 20, units being arbitrary.
- (b) Function of RF voltage together with parameters superimposed on the profile.