

## Proposal for KOPIO Microbunching Studies in the D Line

Tests of modeling the microbunched beam structure induced by barrier buckets during extraction are planned. The studies include the voltage dependence of the bunch width, extinction of interbunch protons and the dependence beam stability on momentum spread of the beam in the AGS. The latter investigation doesn't require beam extraction. Measurements will be at 4.4 MHz, the first harmonic of the 2.2 MHz cavity that is currently available.

The method of measurement is to observe the prompt  $\gamma$ 's from the decay of  $\pi^0$ 's produced in the production target with a counter telescope consisting of four thin scintillation counters and a  $\text{PbWO}_4$  crystal which will view the production target through a 1/4 inch collimator aperture. A 3 mm thick lead photon converter located between the first two telescope elements allows the first counter to act as a charged particle veto. The telescope has been built and tested. The telescope, sketched in Figure 1 will view a 2mm thick, 2 mm wide Cu target at  $90^\circ$  in the D Line from a location against the west wall immediately upstream of the dipole D1D7 as shown in Figure 2. The target will be installed with a flag and a SWIC.  $10^{11}$  protons per pulse on the 2 mm thick target have been estimated to result in 3000 counts/pulse in our telescope.

The time reference signal will be provided through a special semi-rigid cable with a corrugated solid copper outer conductor running from Bldg.929 (RF Building) to the data acquisition PC on the east side of the D Line data.

Seven shifts of FY02 SEB running in the D line and one shift of beam stability studies are planned. We plan to run parasitically with E949. The maximum D Line proton intensity required is  $5 \times 10^{11}$  protons per pulse. Switchyard instrumentation and magnet run & test would be best carried out in the period between the RHIC shutdown and the start of AGS proton setup.