Some Notes on the Support Stand for the TAC and Scintillating Fiber Monitor for the *PrimEx* Two Day Luminosity Test

Dan Dale, October 8, 2003

For our upcoming luminosity test, we wish to have the capability to move two detectors in and out of the beam – the Total Absorption Counter (TAC, see figure 1), and the Scintillating Fiber Array (see figure 2). In addition, we would like the capability to have neither in the beam. We would also like to stack some lead bricks in front of the TAC to form a $4cm \times 4cm$ collimator, to mock up the potential collimating effect of the HYCAL. This will consist of a wall of lead bricks which is four inches thick, with the hole in the center. The central part of the collimator is shown in figure 3.

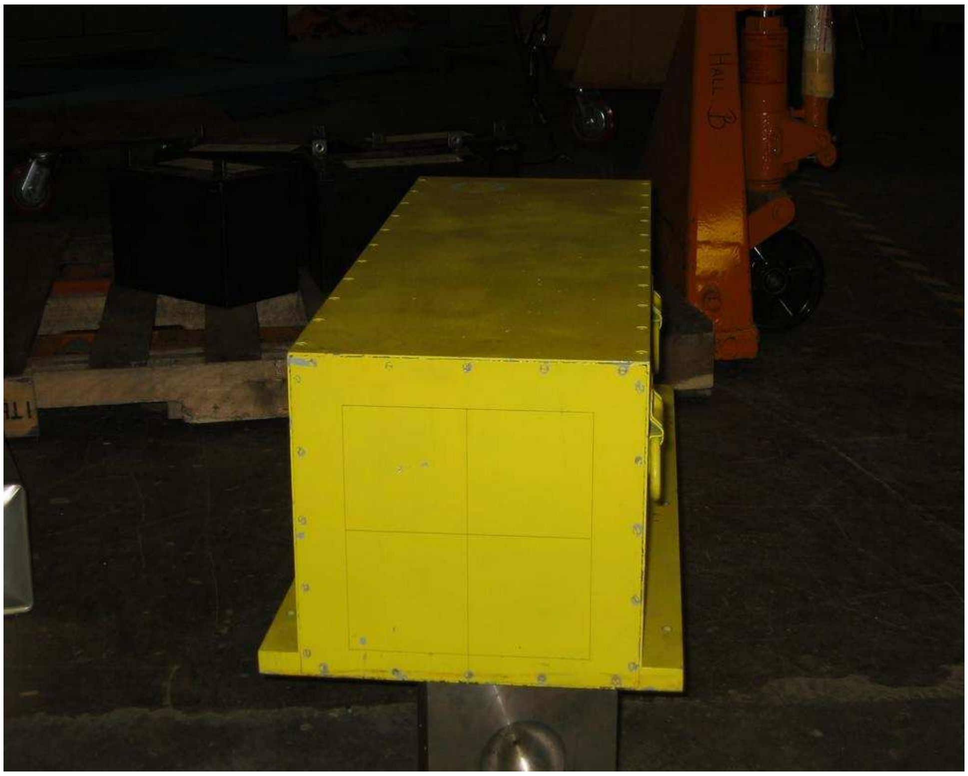

Figure 1: The TAC.

Since during these runs we will generally have the PrimEx dipole on, it is preferable to have the detectors, when they are out of the beam, to be parked above or below it to keep them out of backgrounds which are expected in the median plane of the pair spectrometer magnet. In other words, the primary motion should be in the vertical.

When in the beam, the center of the TAC should be within two millimeters of the beam spot. Horizontal movement is not required for the TAC. However, it is highly desirable to be able to illuminate all fibers in the scintillating fiber monitor (both x and y). This requires motion in two dimensions for the scintillating fiber monitor.

The proposed stand is the HYCAL0 stand, pictured below in figure 4. It has 30 inches of vertical travel and the front posts have brackets on which a shelf could be attached to stack the collimator.

The hardware to drive this (x and y) could be cannibalized from the HYCAL transporter, but this could interfere with HYCAL transporter development. To construct a separate system would require:

- a VME card, good for 4 channels (maybe about $2k).
- a motor box, assembled here, configured to drive two axes of motion.
- 2 motors (less than $1k each).

The software exists. Having a separate system (as opposed to cannibalizing from the full HYCAL) will mean that for the experiment, we will have spare parts in case something goes wrong.

There are two options for the relative placement of the two detectors and the "blank" position. (1)The scintillating fiber array can be placed directly on top of the TAC. In this case, the "blank" would have to be below the TAC (that is, when both detectors are parked, they are above the beam). Otherwise, there is not enough vertical travel to clear the top of the scintillating fiber monitor and its cables which stick out the top (see figure 2). (2)The "blank" position could be between the TAC (which is presumably on the bottom because it is heavier) and the scintillating fiber monitor. In either case (case (1) or (2)), we request that in the blank position, no obstruction be within four inches of the beam.

As mentioned, it is highly desirable to have x (in addition to y) motion to illuminate all of the fibers on the scintillating fiber monitor. In the event this is not possible, we have discussed two rather inferior options. (1) Construct the mounting of the scintillating fiber detectors so that it is possible to rotate, by hand, the fibers which are normally vertical. In this case, vertical motion of the stand would sweep all fibers through the beam. We could then, again by hand, rotate one plane of the detector back so the planes are perpendicular for normal operation of the monitor. (2) In the mounting of the scintillating fiber monitor, at the very least allow for slotted holes so that, in the event the one or two vertical fibers which the beam is hitting have a problem, we can translate the entire detector horizontally a centimeter or so to illuminate other fibers. This would not allow for calibration of all the fibers in the beam.

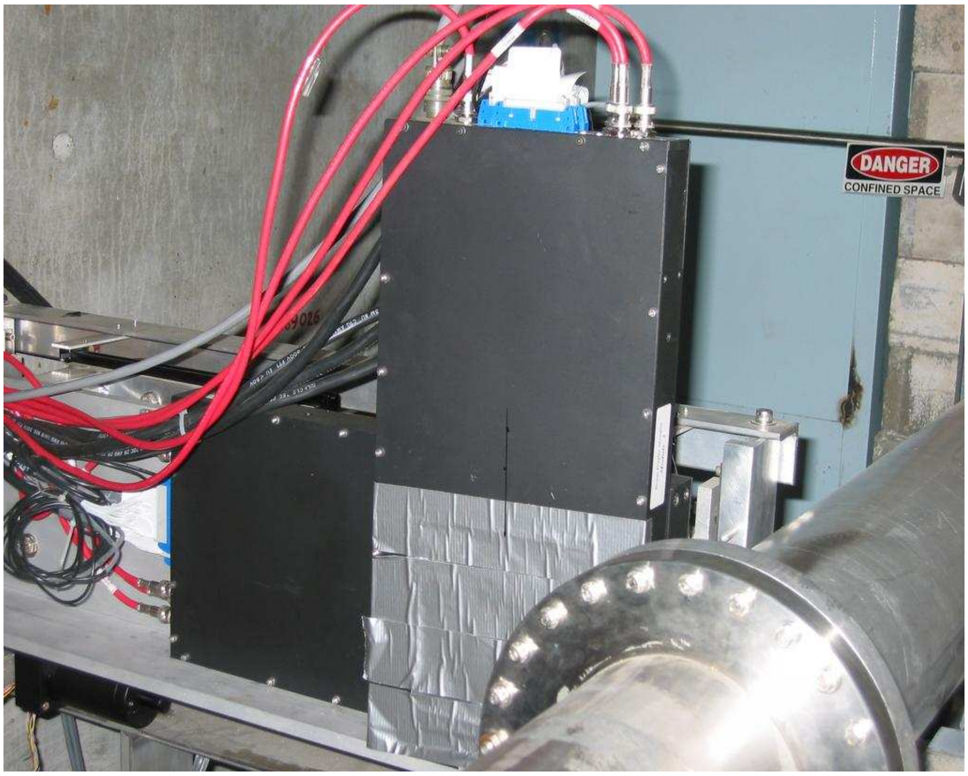

Figure 2: The scintillating fiber detector. This is the one currently on the beamline.

Figure 3: Central part of the $4cm \times 4cm$ collimator to be placed in front of the TAC to mock up the central hole in HYCAL.

Figure 4: The HYCAL0 stand.