### 2.3.4  Scintillating Fiber Monitor

The combined lepton beam quality and position throughout the TPE run was monitored using a scintillating fiber (SciFi) monitor installed upstream of the target. This device was custom designed, built and tested at FIU, and shipped to JLab for installation. Fig. 30(a) shows the schematic of this device. It consists of a 6×6 inch aluminum frame with a 1 inch frame width, supporting 32 square (1×1 mm) multiclad Bicron (BCF-12) fibers with 42 cm radiation length. Half of the fibers are positioned horizontally (x-fibers) and half in the vertical direction (y-fibers) for a two-dimentional readout. Each set of 16 fibers were glued to a 16-pixel Hamamatsu H8711 photomultiplier tube that amplified and transfered the signals gathered by the fibers to readout electronics. Furthermore, a slight modification to the online run monitor software (EPICS), allowed the live display of the SciFi readout during the experiment. Fig. 30(b) shows the result of an ID current scan for individual lepton beams (with the other beam blocked), monitored by the SciFi. This allowed the determination of the ID magnet setting that optimized the centering of the lepton beam spot [19, 39].
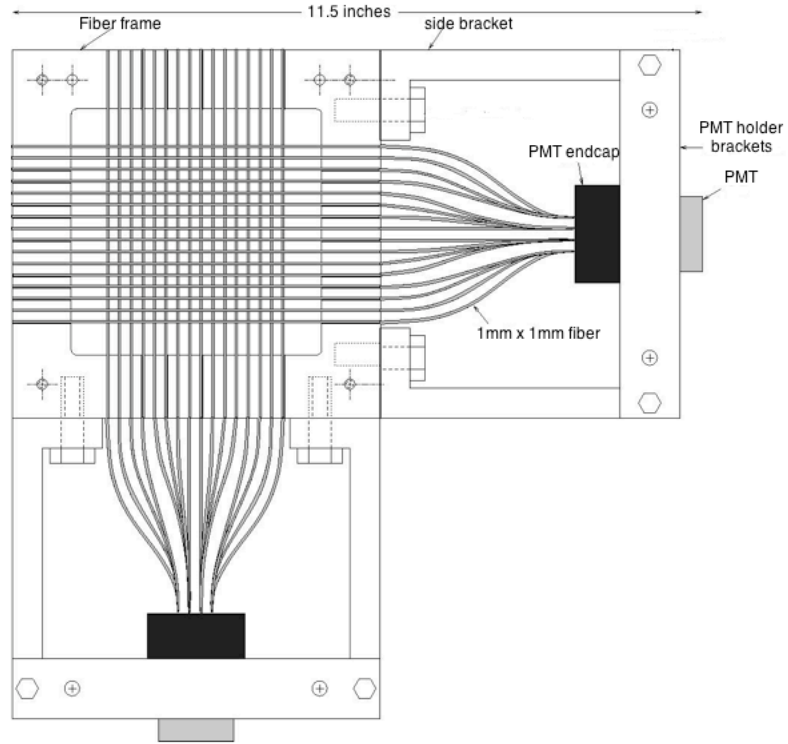
(a)
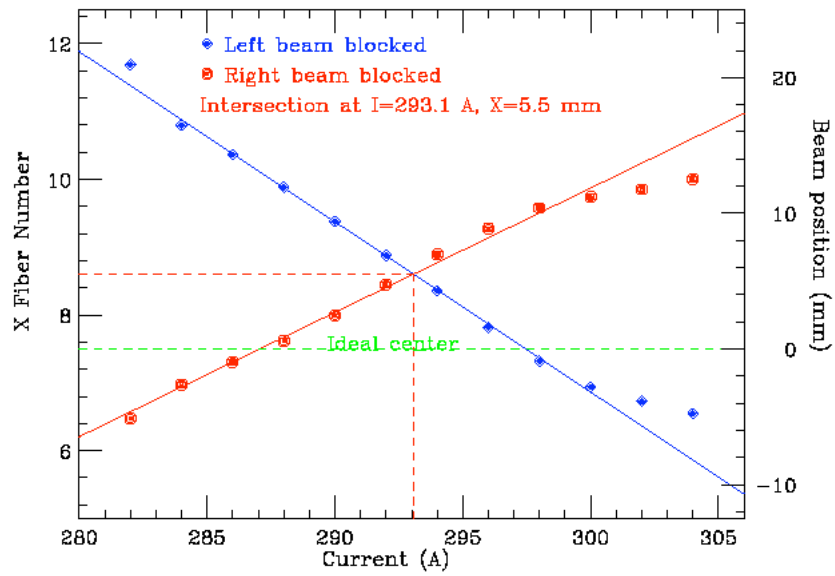


(b)

Figure 30: Schematic of the TPE fiber monitor (SciFi), designed at Florida International University. (a) The PMTs (black squares) are held by supporting frames for x- and y-fibers. (b) Beam position vs. current scan for different ID magnet currents used to find the optimal magnet setting. Lines are fit to points 2-10, with the crossing indicating where the two lepton beams converge.