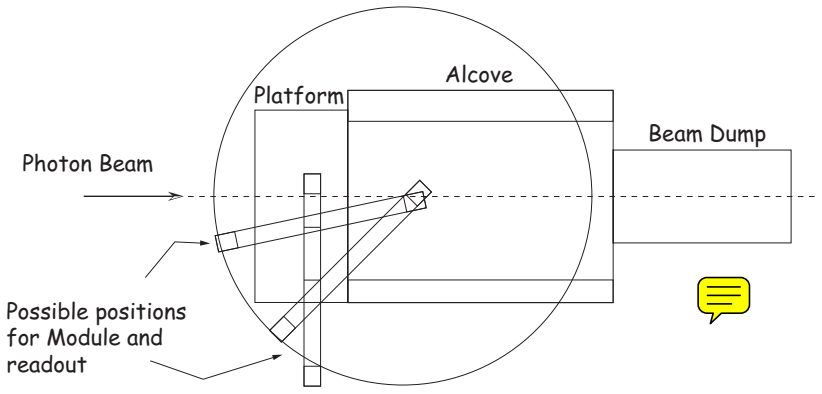
front (RF) PMT's for 120 MeV/c beam. This shows clear peaks for e^+'s, μ^+'s and π^+'s. The effective speed of light in the scintillating fibers was measured by measuring the left-right time difference as a function of position along the module using 120 MeV/c positrons. This yielded $v_{eff} = 16.2 \pm 0.4$ cm/ns. The attenuation length of the fibers was determined to be 307 ± 12 cm. A direct measure of the energy resolution dependence on energy at the two beam energies was obtained by determining the width σ of the distribution ~~in~~ the geometric mean of the ADC's from the left and right PMT's divided by the mean μ of that distribution. The geometric mean is computed as $ADC_{GM} = \sqrt{ADC_L \cdot ADC_R}$. The geometric mean removes the effect of finite attenuation length of the fibers as the beam moves away from the center of the module. It was found that $\sigma/\mu = (24.6 \pm 0.3)\%$ for 120 MeV/c positrons and $\sigma/\mu = (16.9 \pm 0.2)\%$ for 250 MeV/c positrons.

1.3.2 Photon beams at JLab

Module 1 was also tested in a photon beam at JLab by placing the module in the alcove at the downstream end of Hall B. Figure 6 shows a schematic of the alcove area, the platform in front of the alcove and the possible positions for Module 1 with its readout.

Bremsstrahlung photon beam: The bremsstrahlung photon beam in Hall B provided a spectrum of photons from 150 MeV up to 650 MeV produced by the 675 MeV electron beam from CEBAF incident on a radiator. The electron beam current was 1 nA. The scattered electrons were tagged and provide timing and momentum information for the photons. The tagger provides the momentum information from 384 individual scintillator paddles, called E-counters, with a photo-tube on each end. They are arranged so that they each cover constant momentum intervals of $0.003E_0$. Each counter optically overlaps its adjacent neighbour by 1/3 creating 767 individual photon energy bins providing an energy resolution of $0.001E_0$. The timing information is provided by 61 individual scintillator blocks, called T-counters, with phototubes attached at both ends. The T-counters are in two groups. The first 19 narrower counters cover 75% to 90% of the incident electron energy range and the remaining 42 counters cover the 20% to 75% range [?]. The trigger is formed from the Master OR from the tagger of the T-counters and an OR signal from the North and South of the BCAL module. On average, the event rate was around 1 to 4 kHz for the duration of the beam test. The beam was collimated with a 2.6 collimator giving a beam spot size on the BCAL module of 2cm in diameter.



BCAL Module 1 in the Hall B Alcove

Figure 6: A schematic of the detector placement for the BCAL Module 1 beam tests and TRIUMF, including a schematic of the Module 1 readout.