Draft Luminosity Monitoring Run Plan – June, 2002

Before beam

- Widen pair spectrometer discriminator widths to 30 nsec. Set 30mV threshold.
- Install appropriate targets. Whether this is on the harp ladder or the PrimEx ladder is to be determined, but a range of target thickenesses is needed – from 10^{-2} to 10^{-4} or so.
- Install NMR probe.
- Install additional PrimEx pair spectrometers cables.
- Move pair spectrometer detectors to *PrimEx* configuration. If surveyors are available, we will have them do this. Otherwise, we can do it with a tape measure. The geometry is shown in figure 1.

With beam

- Establish good beam.
- Plateau detectors. (Implement front-back coincidences. Set at beginning of plateau, *i.e.* not too much gain.)
- Dipole scan.
- ADC runs — rate dependence.
- Measure TAC tagging ratios.
- Rate tests:
  (a)No pair production target rate tests.
  (b)No brems radiator, but with thickest e^+e^- converter.
  (c)Beam steering tests. Move it ± 2 mm in 0.5mm steps, with and without radiator.
  (c)$5 \times 10^{-2} X_o$ pair production target rate tests.
  (d)$5 \times 10^{-3} X_o$.
  (e)$5 \times 10^{-4} X_o$.
- TAC runs *versus* rates
- TAC runs with different brems radiators
- Low priority – Map a target thickness with pair production

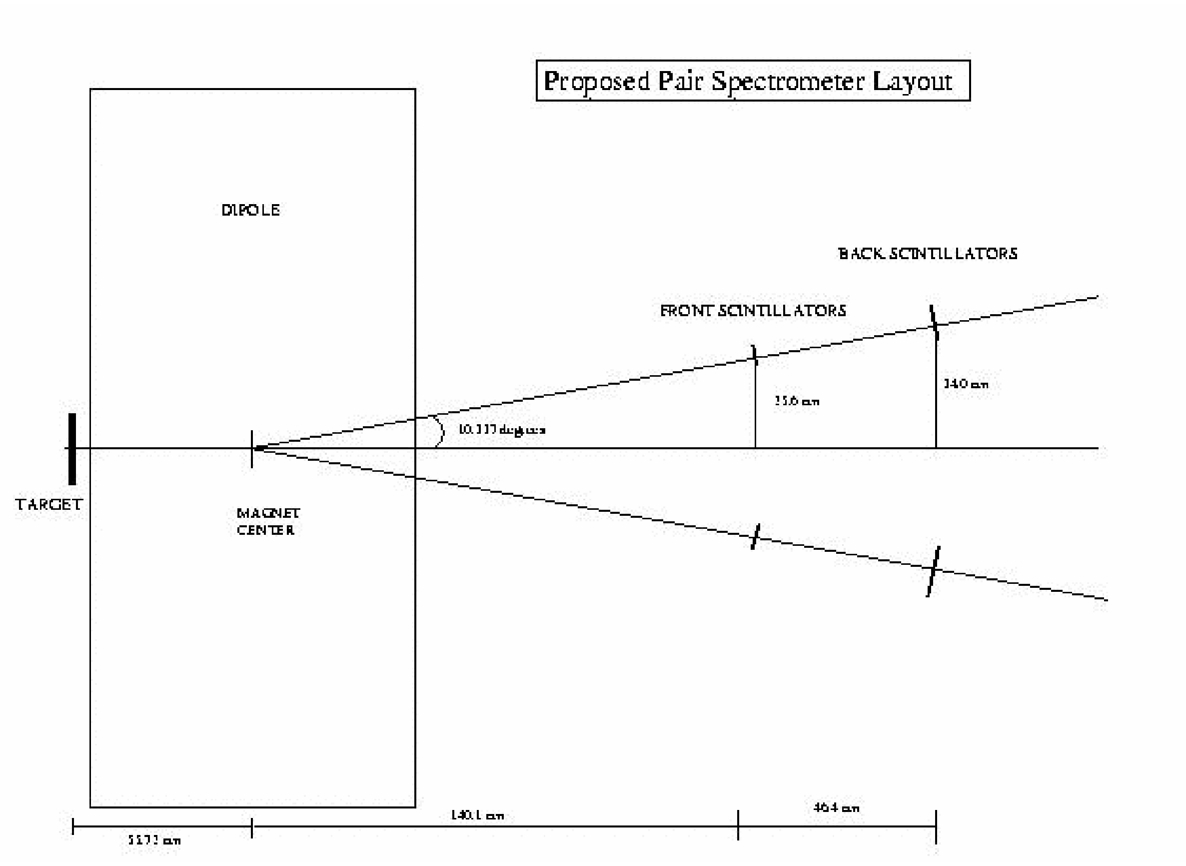

Figure 1: PrimEx pair spectrometer detector positions.

Comments:

Dipole scan:
Here, we vary the magnetic field in the PrimEx pair spectrometer dipole to maximize coincidences with the upper part of the tagger energy acceptance from $0.77E_o$ to $0.95E_o$. A GEANT simulated result is shown in figure 2.

Based on the plot of current *versus* central field (shown in figure 3), one would expect the optimal dipole current to be about 1850 Amps.

I would estimate the dipole scan consisting of measurements at about five different currents taking about a half hour each.

Rates:
Anticipated pair spectrometer - tagger coincidence rates for a 5% radiation length target are expected to be 7 kHz per MHz of electrons on the tagger (MOR rate) on the region of the tagger spanning $0.77E_o < E_\gamma < 0.95E_o$. Singles rates on a given pair spectrometer detector, also for a 5% radiation length target are about 7.5 kHz per MHz on the MOR, roughly independent of pair spectrometer detector. I also note that there are 180 E tagging counters in this region of the tagger focal plane and there is a DAQ limit of about 2000 events/sec.

Rates

$X = 5 \times 10^{-2}$ r.l.

Rates on MOR	Tagged rate per E counter	counts per E counter	run time
50 MHz	2 kHz	10000	15 minutes
30 MHz	1.2 kHz	10000	15 minutes
20 MHz	800 Hz	10000	15 minutes
10 MHz	400 Hz	10000	15 minutes
1 MHz	40 Hz	10000	15 minutes
300KHz	12 Hz	10000	15 minutes
150KHz (TAC in)	6 Hz	10000	1/2 hour
75KHz (TAC in)	3 Hz	10000	1 hour
50KHz (TAC in)	2 Hz	10000	1.5 hour

$X = 5 \times 10^{-3}$ r.l.

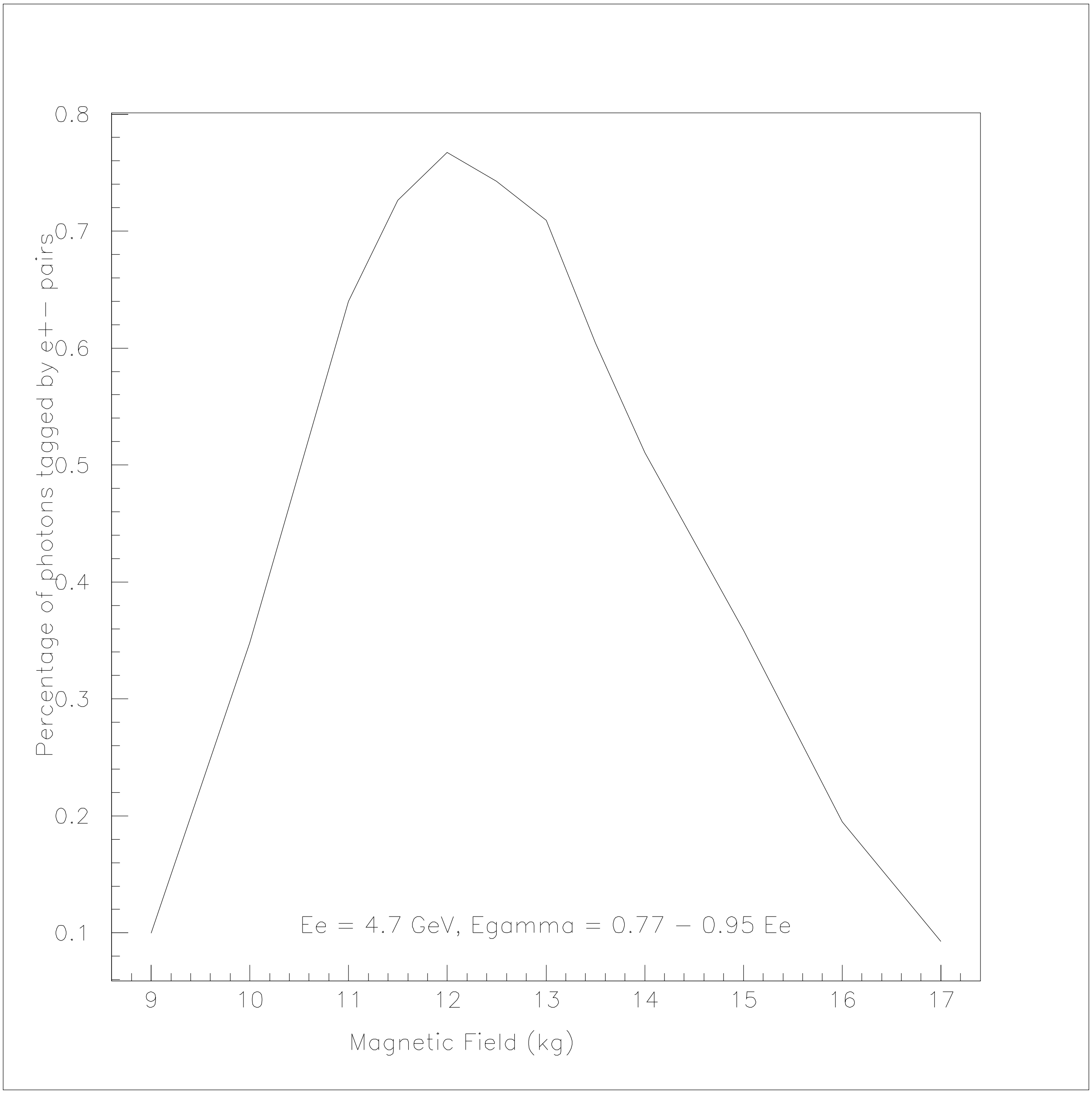

Figure 2: Expected results from PrimEx pair spectrometer dipole scan at $E_e = 4.7 GeV$.

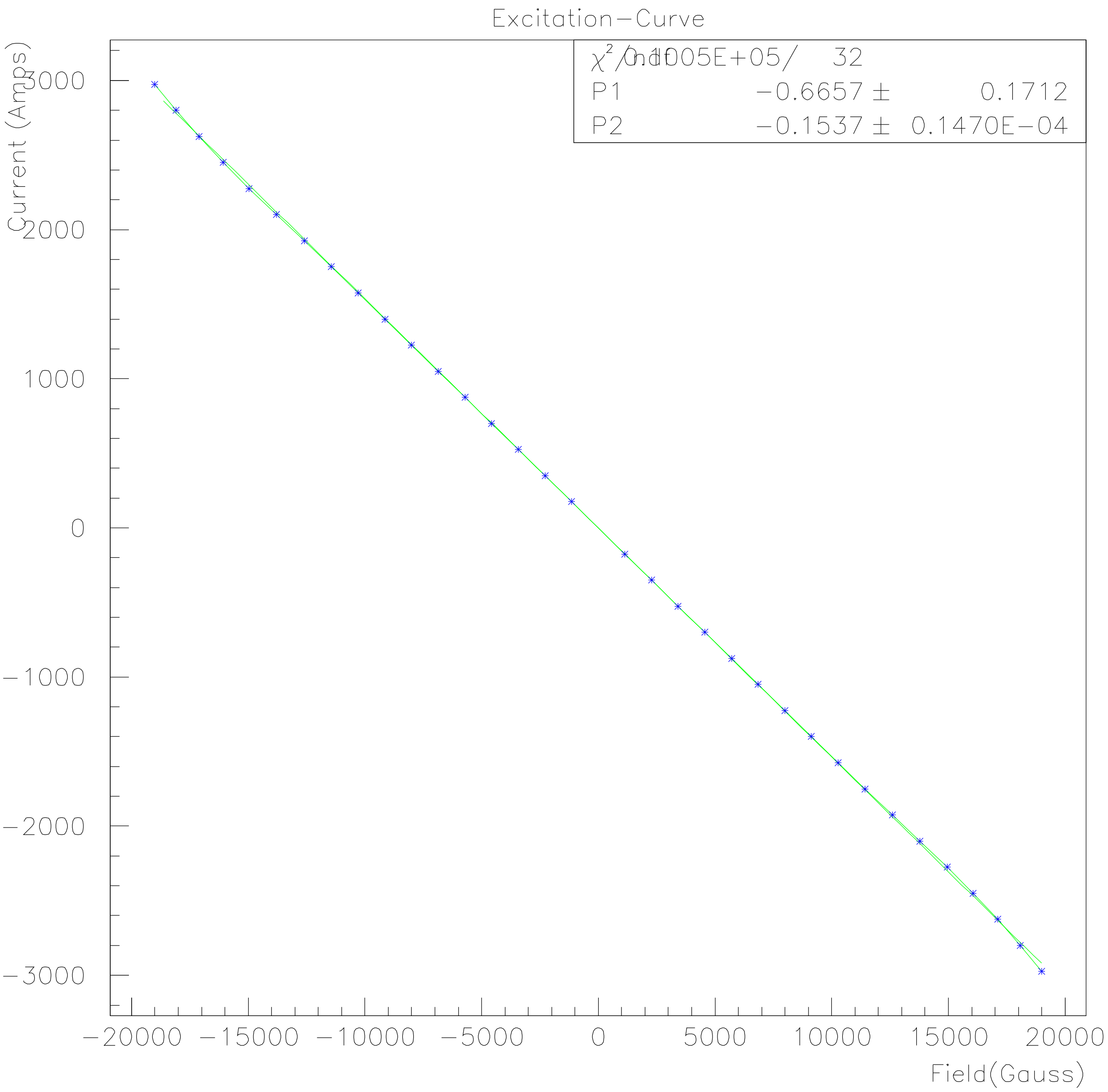

Figure 3: Central field *versus* dipole current.

Rates on MOR	Tagged rate per E counter	counts per E counter	run time
50 MHz	200 Hz	10000	15 minutes
30 MHz	120 Hz	10000	15 minutes
20 MHz	80 Hz	10000	15 minutes
10 MHz	40 Hz	10000	15 minutes
1 MHz	4 Hz	10000	1 hour
300KHz	1.2 Hz	9000	2 hours
150KHz (TAC in)	0.6 Hz	4000	2 hours

$X = 5 \times 10^{-4}$ r.l.

Rates on MOR	Tagged rate per E counter	counts per E counter	run time
50 MHz	20 Hz	10000	15 minutes
30 MHz	12 Hz	10000	15 minutes
20 MHz	8 Hz	10000	1/2 hour
10 MHz	4 Hz	10000	1 hour
1 MHz	0.4 Hz	4000	3 hours

<u>TAC runs:</u>
The limit on the TAC is a few hundred kHz at 65mV threshold.

Estimated time allotments

Plateau detectors and set voltages	6 hours
dipole scan	2 hours
No target rate tests	3 hours
Beam steering tests	2 hours
Rate tests	16 hours
	34 hours + overhead