

Status of Test Beams at SLAC

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Snowmass, August 2005

FFTB (Final Focus Test Beam)

Primary Beams

- 28.5GeV electrons (but up to 50GeV possible)
- $1-2 \times 10^{10}$ particles per puls
- 1-10 Hz (up to 30Hz possible)
- 3ps pulse length down to sub-pico-seconds (SPPS)

Secondary Beams (e.g. good for EMC calibrations)

- 1-28.5GeV
- usually 1 electron per pulse
- 1-30Hz

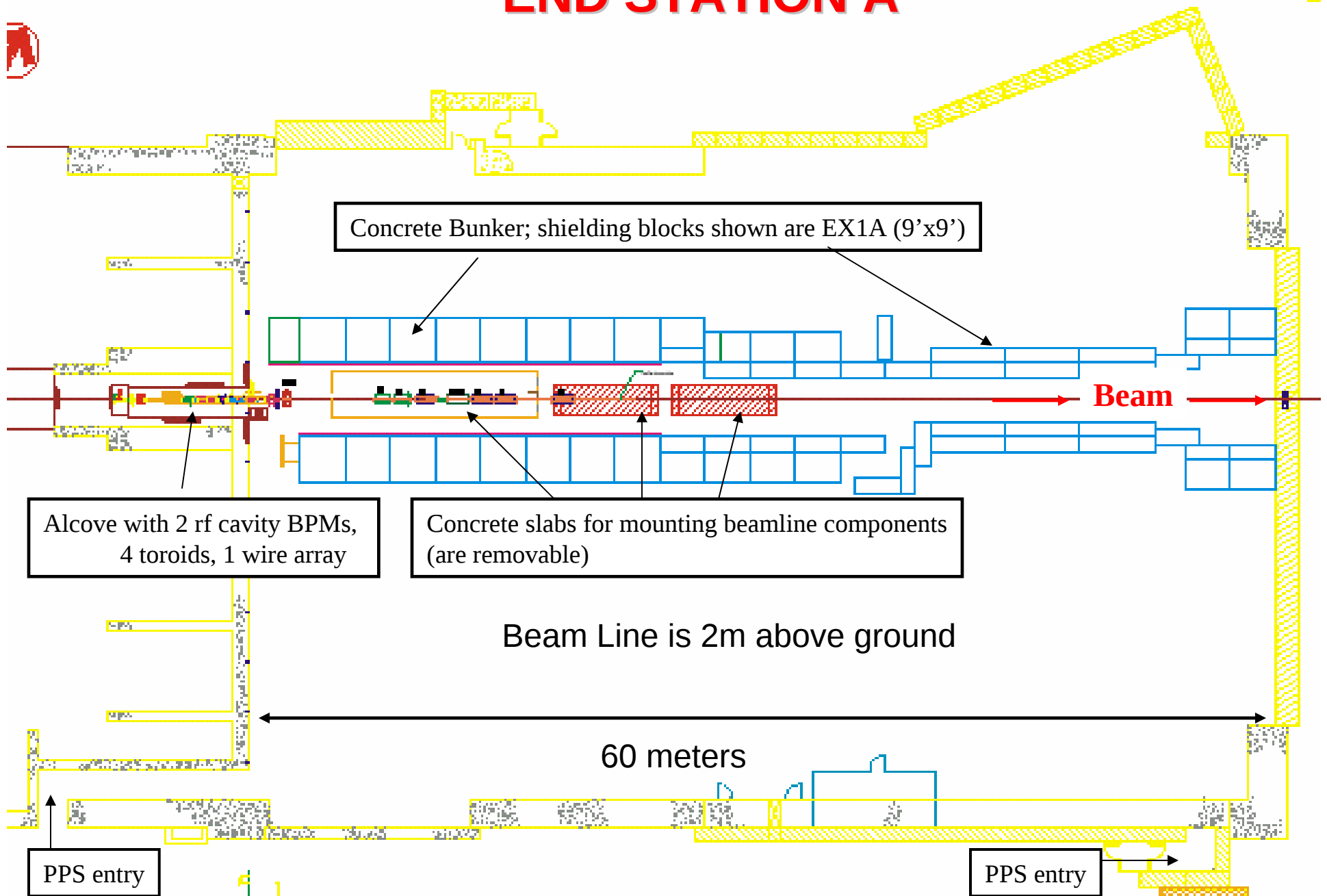
FFTB Program

- FFTB will be dismantled mid 2006 to make space for LCLS construction
- Several Experiments have already requested bigger chunks of beam time until then
- Nevertheless there are plenty of opportunities for test beam experiments with a duration of a day or up to a week each
- October 3rd a 5 week shutdown starts → good opportunity to have a look around and see what is available and what can be done

End Station A



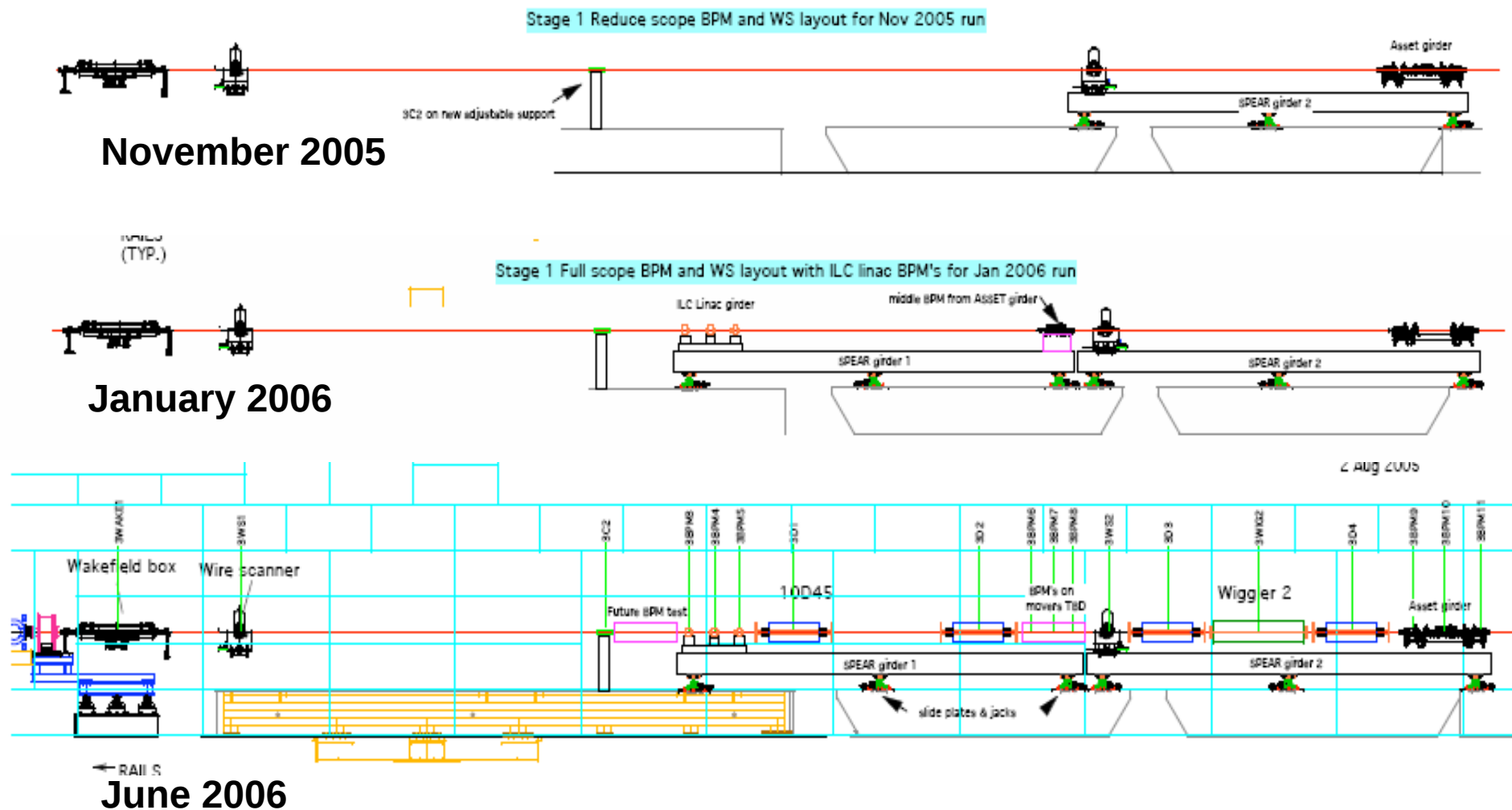
END STATION A



Currently we are designing the beam line and support structure for 3 ILC Test Beams

Collimator Wakefield, BPM Energy and Synchrotron Stripe Energy Spectrometer

<http://www-project.slac.stanford.edu/ilc/testfac/ESA/esa.html>



How to Request a Test Beam

- Send a brief description of your experiment, what beams you want and your support needs to Roger Erickson (roger@slac.stanford.edu) or Clive Field (sargon@slac.stanford.edu)
- There are some safety precautions to take before you can work at SLAC: Safety classes some general introduction to the infrastructure etc. Details can be found at:
http://www.slac.stanford.edu/~hast/EFD/Safety/RY/RY_Safety/
- There is some SLAC support available for design, construction and installation of your equipment

Test Beams in FFTB

- Running of ESA or FFTB are mutually exclusive, though we managed rather quick swaps this summer
- FFTB will go away in mid 2006 to make place for LCLS
- Until then there are many opportunities to schedule beam tests in FFTB

Test Beams in ESA

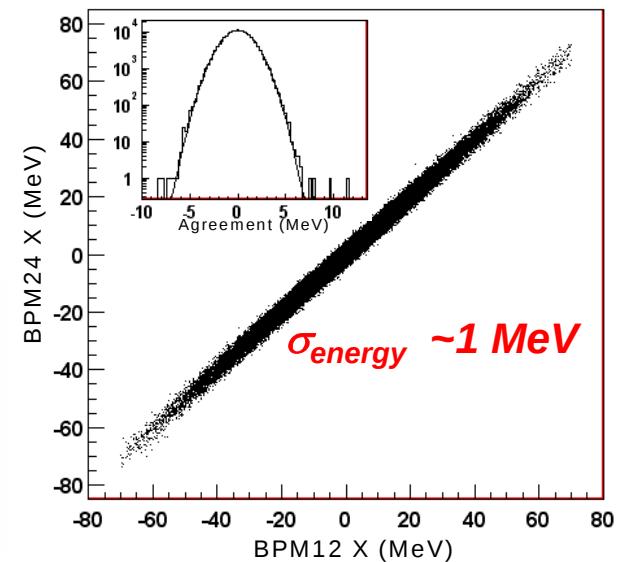
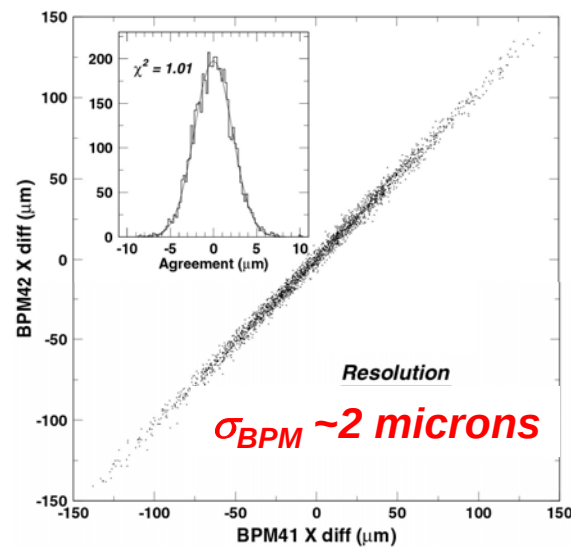
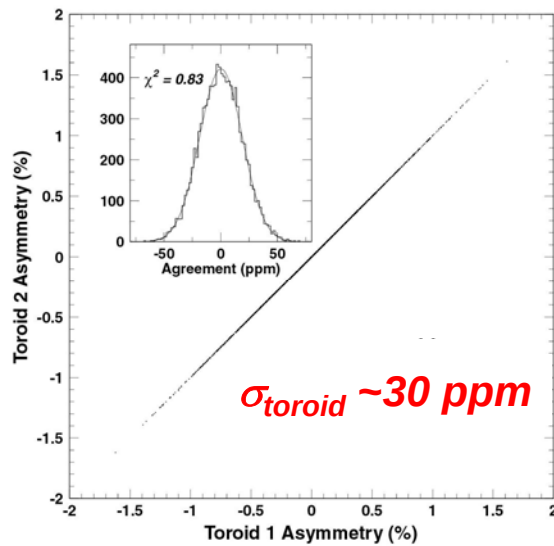
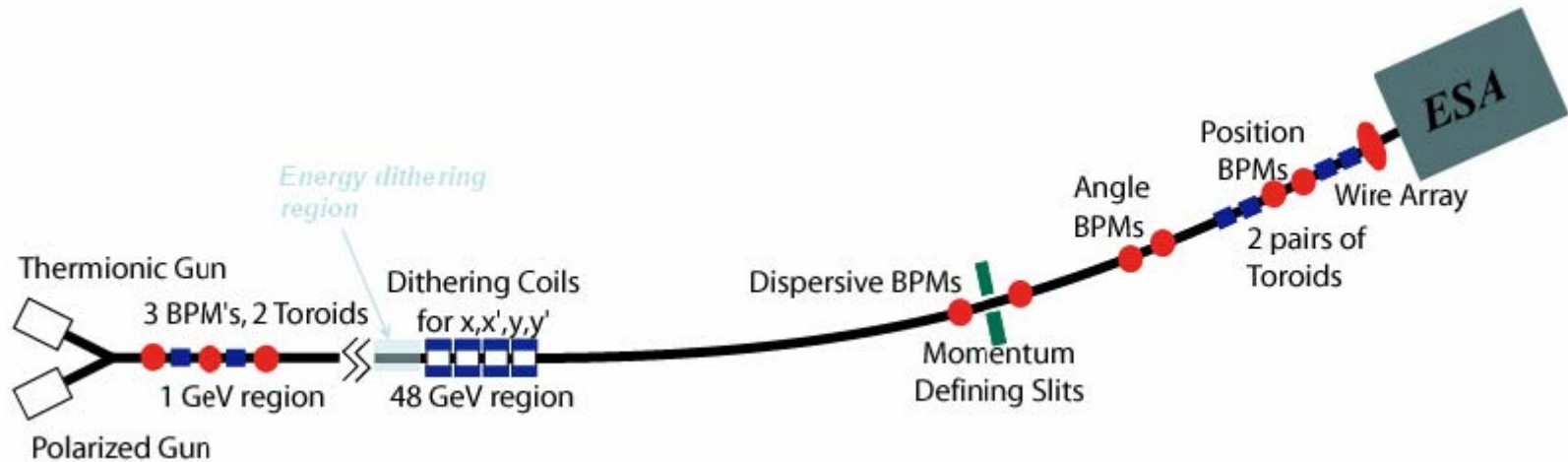
- ESA is available for single particle tests now
- Primary beam running: Some PPS issues have to be settled. We are hopeful that the first ILC Test Beam can run November 2005.
- Plans are to run more ILC test beams in January and June 2006. These are good opportunities to tag on new requests.
- 5 month shutdown summer/fall 2006 for PEP/BaBar upgrade and LCLS installation. Beams back in winter 2006 (no FFTB any more).
- Early 2007 2 month of GLAST calibration running
- Before that and thereafter many opportunities for Test Beams

Details of ESA Beams

Beam Parameters at SLAC ESA, NLC-500, and TESLA-500

Parameter	SLAC ESA	NLC-500	TESLA-500
Charge/Train	5×10^{11}	14.4×10^{11}	
Repetition Rate	10-30 Hz	120 Hz	5 Hz
Energy	25-50 GeV	250 GeV	250 GeV
e ⁻ Polarization	85%	80%	80%
Train Length	270ns / 340ns	267ns	1 ms
Microbunch spacing	0.3ns / 340ns	1.4ns	337 ns
Bunches per train	2		2820
Bunch Charge	2.0×10^{10}		2.0×10^{10}
Energy Spread	0.15%	0.3%	0.1%

Beam Diagnostics for E-158



Secondary Beams to ESA

POSITRON PRODUCTION



HADRON PRODUCTION

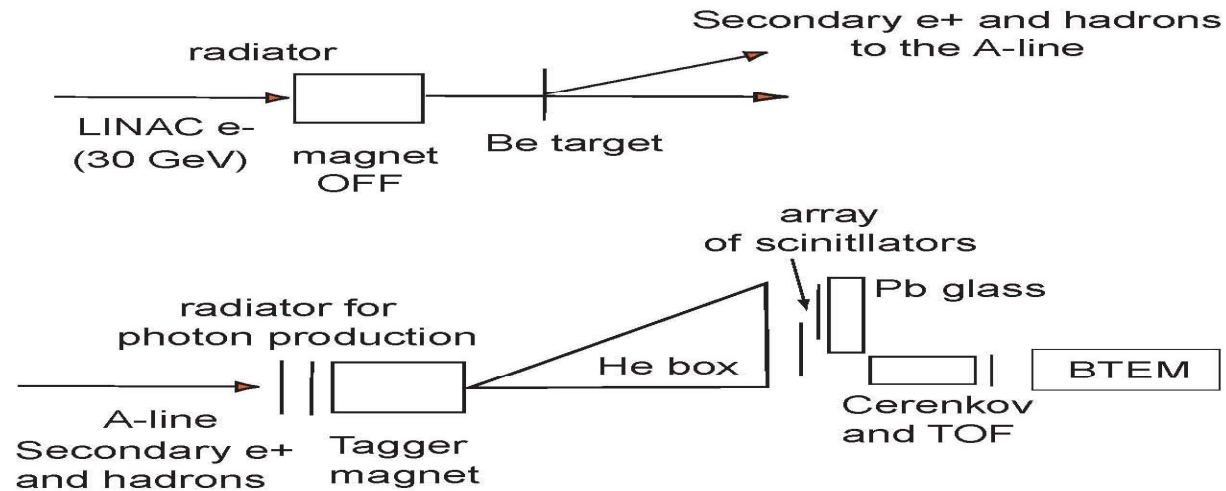


Figure 2: A schematic drawing (not to scale) of the experimental set-up.

Secondary Beams to ESA cont.

These low intensity beams have been useful for many calorimeter and other tests

1) Secondary electrons

- 500 MeV to 20 GeV
- usually one particle/pulse, but 3-4 mm rms half-width spot
- good momentum resolution

2) Tagged photon beam using secondary e- (see above) on a bremsstrahlung target with tagging magnet and detector in the end station

3) Hadrons and positrons are produced with a 0.5 r.l. Be target in Beam switchyard (BSY)

- Accepted into A-line at a 0.5 degree production angle. Small Acceptance 2.3x4 cm over 80 m drift.
- Averaging one particle/pulse allows use of TOF and Cherenkov techniques for particle identification for 5-20 GeV.

- At 14.5 GeV for 0.4 particles/spill total, the yield was

0.25 e⁺/spill

0.17 hadrons(K⁺,π⁺)/spill

0.01 protons/spill

see GLAST 1999 test results, SLAC-PUB-8682