Test Beam Capabilities at SLAC

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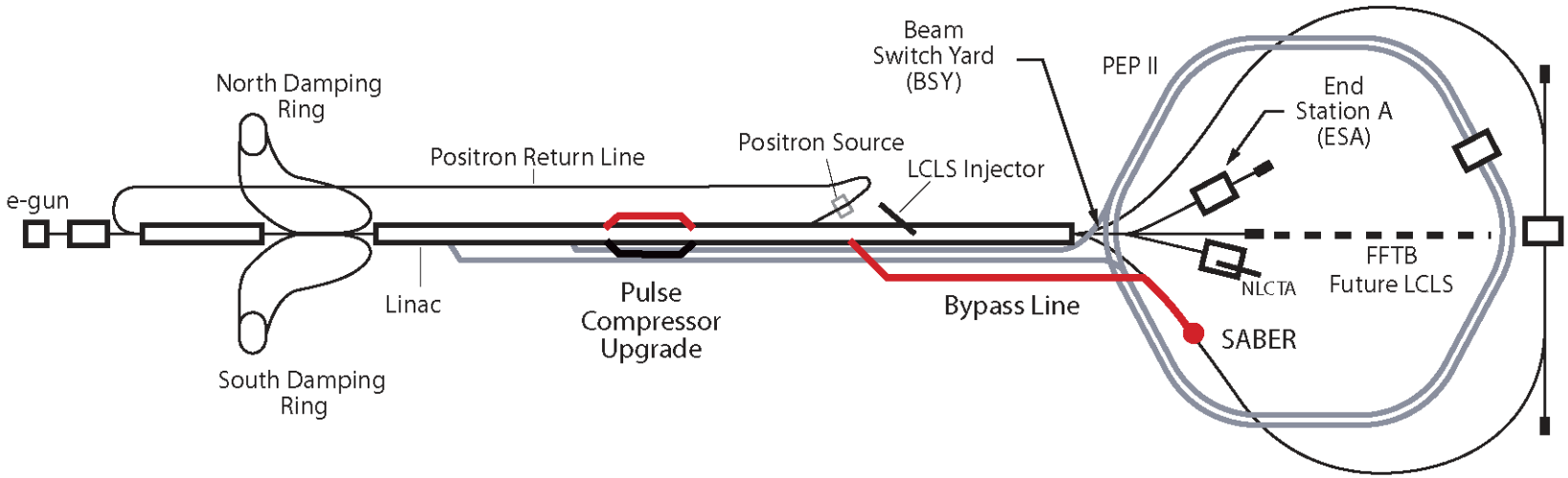
Stanford Linear Accelerator Center

- SABER, “maybe” a new facility in the South Arc (South Arc Beam Experimental Region)
- End Station A (ESA) in 2007
- ILC Test Beams in 2008
- Test Beams beyond 2008 in the LCLS Area

Test Beams at SLAC



SABER

South Arc Beam Experimental Region

Mainly a facility for accelerator physics (Plasma-Wakefield)
Primary Electron or Positron beams with low emittance and compressed bunches

Energy: 28.5 GeV with PEP-II or LCLS with bypass line
Charge: 2 (3.5) x 10^{10} e- or e+
Spot size at IP: < 10 μm

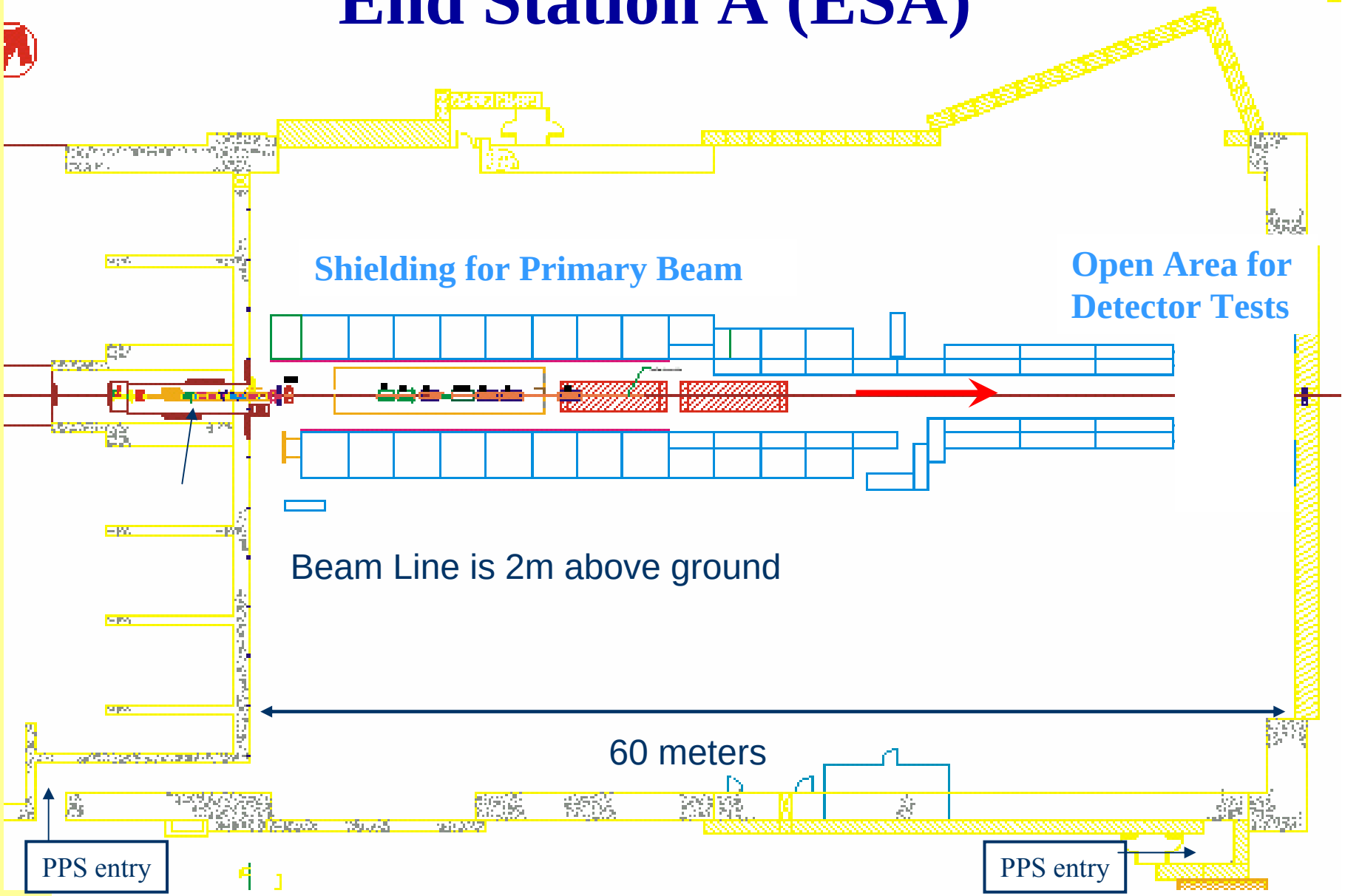
Experimental section is about 100 feet long and can be extended
Infrastructure has to be developed

Currently not funded

End Station A (ESA)

- ESA is large (60m x 35m x 20m)
- 50/10 t crane
- Electrical power, cooling water
- DAQ system for beam and magnet data
- Experiments typically bring their DAQ

End Station A (ESA)



End Station A (ESA)

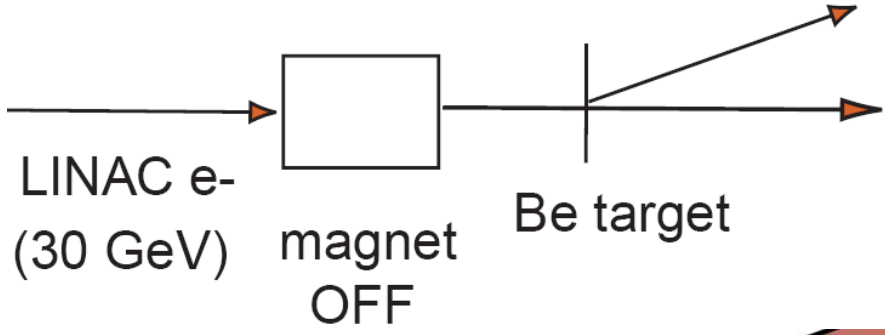
ESA has excellent momentum resolution, great timing resolution, great infrastructure

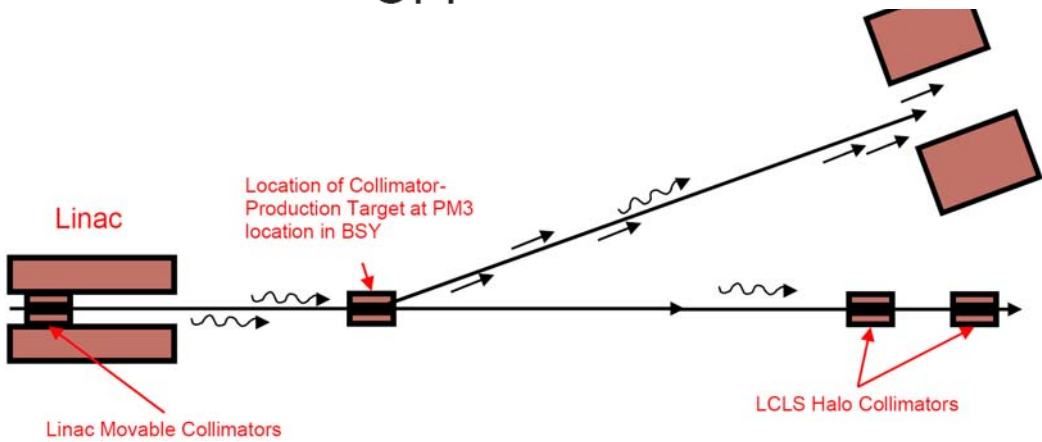
primary electron beam

Parameter	LINAC
Repetition Rate	10 Hz
Energy	28.5 GeV
Bunch Charge	2.0 x 10^{10}
Bunch Length	300-1000 µm
Energy Spread	0.2%
rms Spotsize (x,y)	100,600 µm

Parameter	LCLS
Repetition Rate	120 Hz
Energy	14.5 GeV
Bunch Charge	2.0 x 10^{9}

Secondary hadrons and positrons to ESA





Test Beams at SLAC until end of FY 2007

ANITA (2006)
T-469 Fast Focusing Cherenkov Detector (2005-2007)

ILC-MDI:
BPM energy spectrometer (T-474/491)
Synch Stripe energy spectrometer (T-475)
Collimator design, wakefields (T-480)
Bunch length diagnostics (w/ LCLS, T-487)
IP BPMs/kickers—background studies (T-488)
Linac BPM prototypes
EMI (electro-magnetic interference)

2007 Runs dates:
T-489 Measurement of induced and residual Activity,
SLAC/CERN Rad. Physics Group
ILC-MDI, March 7-26, Run 3

Coming up 2007:
June 29 - July 8, T490 w/ LCLS primary beam
July 9-25, Run 4
August, Cherenkov Test with secondary particles from LCLS beam

Test Beams at SLAC until end of FY 2008

- PEP II will be running until end of September 2008
  - 28.5 GeV electron beam is available for SABER and ESA with a typical rate of 10 Hz
- LCLS has started commissioning
  - Availability of primary beams will be very much limited for ESA and SABER but my guess is that there will be beam time available
- End Station A will (most likely) run for 2 times 2 weeks for ILC related beam tests, continuing our ILC-MDI program. Open for more requests from ILC detector community.
- If SABER is approved it comes online next year and can deliver primary beams and secondary electrons
  - Infrastructure has to be build
  - Secondary hadron beam is unlikely

ILC (primary or secondary) test beam requests until end of 2008 can be handled in ESA

Test Beams at SLAC in LCLS Era 2009

- **LCLS** starts full operation in 2009 (10 month/year)
  - Uses last 1/3 of Linac
  - Basically no primary beams available for anything else

- **SABER**
  - If approved, some accelerator R&D in 2008 possible
  - Difficult to predict how much beam time in 2009
  - A bypass line is planned to be installed in 2009 which would make SABER operation independent of LCLS
  - Starting in 2010 up to four month/year of operation is suggested
  - Primary e- or e+ and secondary e- or e+ (no hadrons) available for accelerator R&D and test beam requests

- There is currently no commitment of SLAC to run **ESA** at all beyond 2008
  - PPS System needs to be upgraded
    - That would allow using parasitic secondary beam from LCLS all the time at 120 Hz
  - Revival and upgrade of kicker magnets (10Hz of LCLS beam to ESA)
    - 15GeV primary electron beam
  - Possible extension of SABER bypass line into ESA
    - 30GeV primary beam and secondary electrons and hadrons (10Hz)

Test Beams at SLAC in LCLS Era

(rather uncertain…)

A SLAC study group has prepared a document to discuss the future of test beams with SLAC directorate. Has been submitted mid May. Currently we are waiting for a new PPA director to be appointed so we can discuss it.

Good chances to get a 120 Hz secondary beam from the LCLS beam halo into ESA for 10 month per year starting 2009

Slim chances to "steal" 14.5 GeV primary beam pulses from LCLS either for ESA or SABER

Hopefully starting 2010 SABER and ESA can get 10-30 Hz beam independent of LCLS for a combined beam time of up to 4 month per year