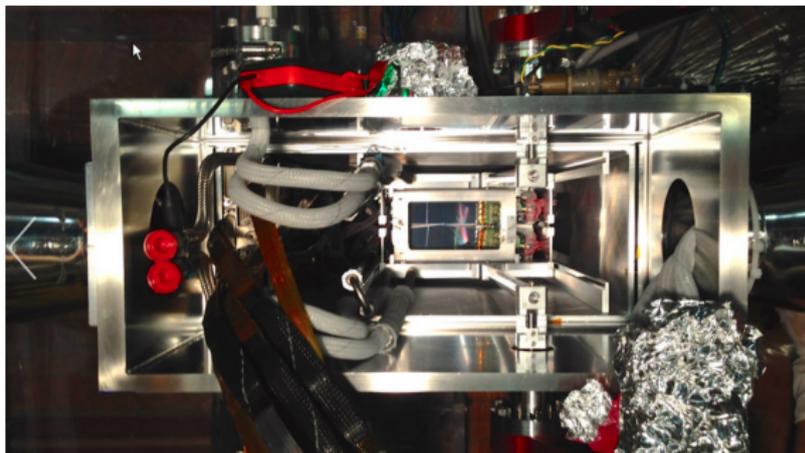
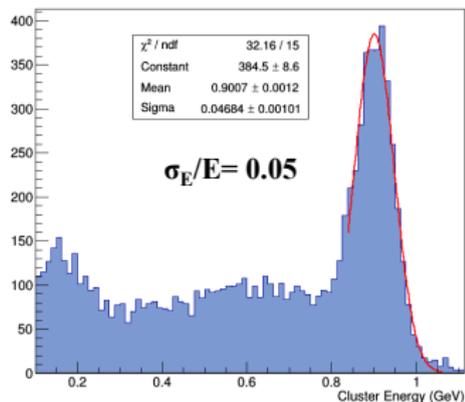


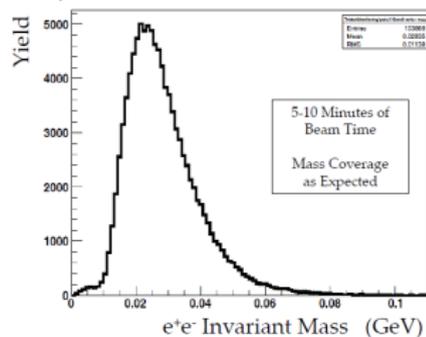
HPS in a nutshell



eW -> eX scattering



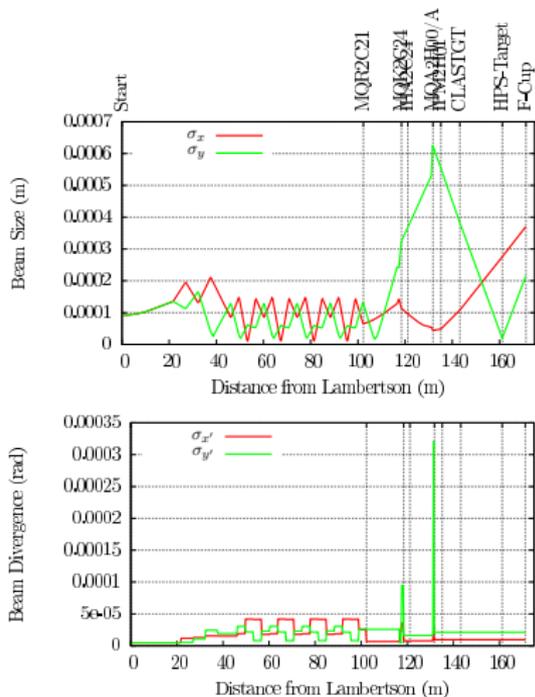
e⁺e⁻ Invariant mass



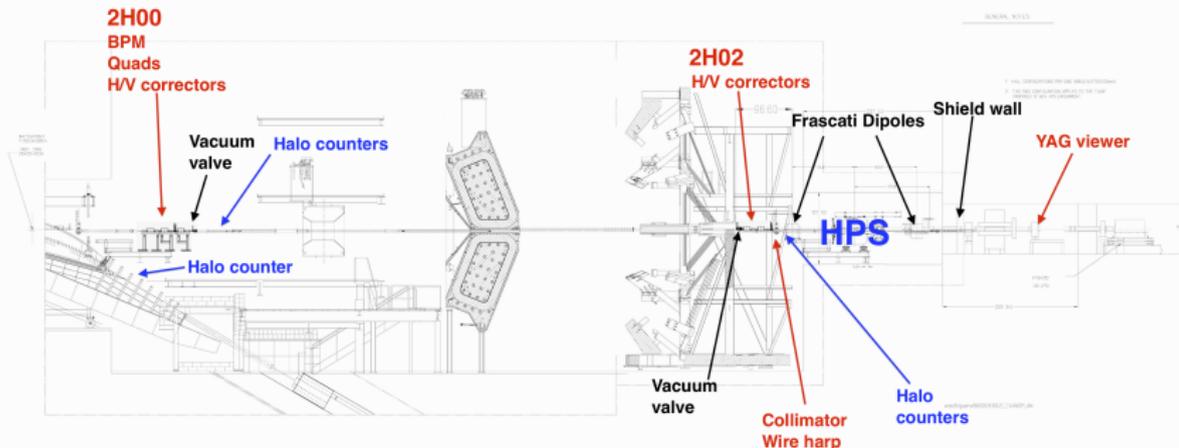
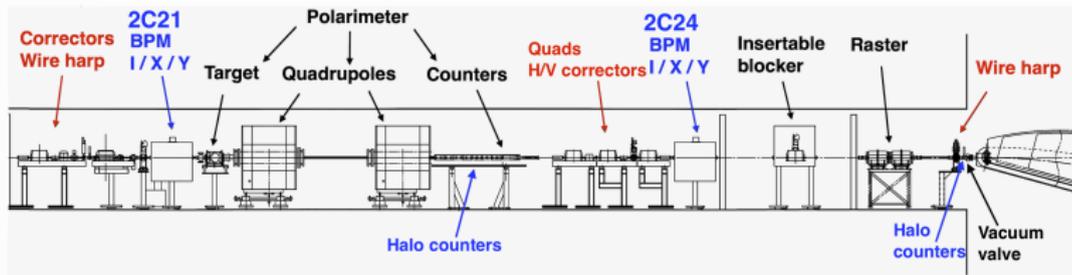
HPS beam requirements

Parameter	Requirement			Unit
	1100	2200	6600	
E	1100	2200	6600	MeV
$\delta E/E$	$< 10^{-4}$			
Current	< 200	< 400	< 500	nA
Current Instability	< 5			%
σ_x	< 300			μm
σ_y	< 50			μm
Position Stability	< 30			μm
Divergence	< 100			μrad
Beam Halo ($> 5\sigma_Y$)	$< 10^{-5}$			

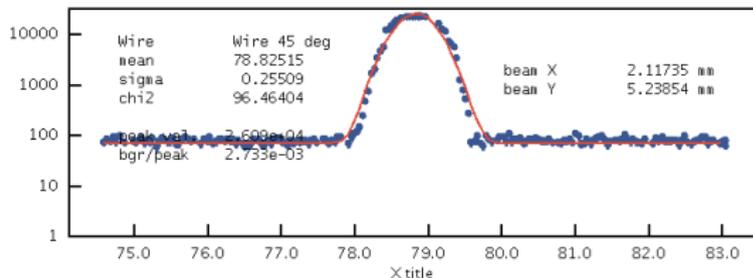
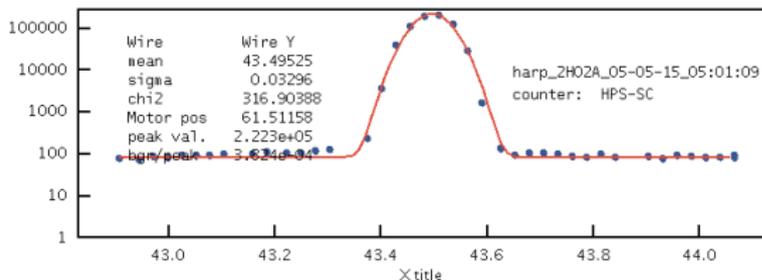
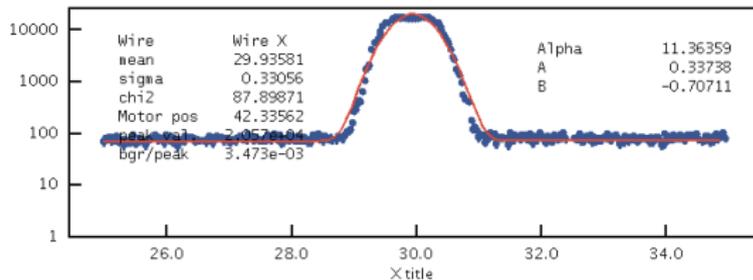
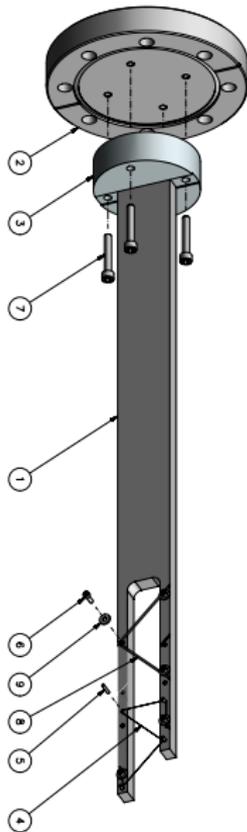
asymmetric beam to improve track momentum resolution, without overheating the target foil
 fast feedback orbit locks for beam position stability
 vacuum throughout the system to keep occupancies low



Hall beamline overview

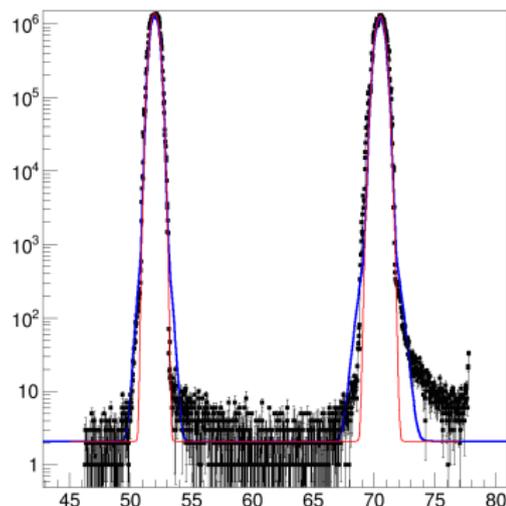
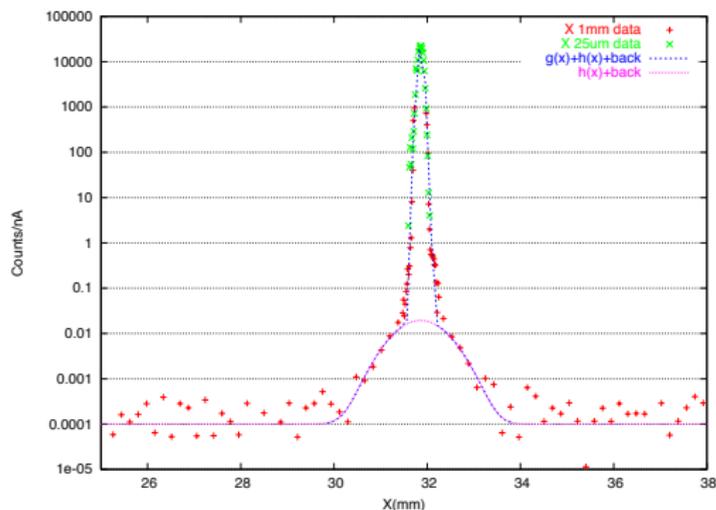


Harp scan results



Understanding the beam tails

- Using thin and thick harp wires
- Combine data from low and high gain counters
- Fit profile with convolution function



Procedure for establishing the beam

Check beam trajectory and profile quality in the upstream tunnel
before sending the beam through the hall to the Faraday cup

First low current beam through HPS : chicane off and SVT retracted 7mm away
Center moving items : collimator, target, SVT (using dedicated wires)

Running on evenings, nights, and weekends : **heroic efforts** from accelerator physicists
Requires early BPM calibration to define proper trajectory and orbit locks

Procedure to restore the beam after a trip : retract SVT if end station triggered FSD
Operators were well aware of our particular needs, smooth recovery most of the time
BPM calibration correlates to minimum current when bringing beam back

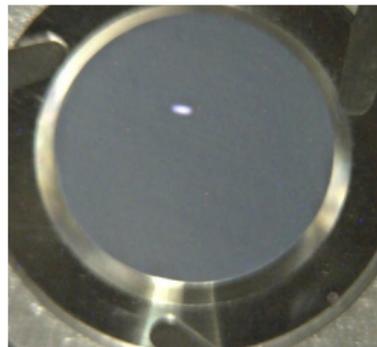


Beam stability

SVT support structure $500 \mu\text{m}$ away from the beam (active region 1.5 mm) :
Beam position instabilities can damage the detector, an entire layer may be lost
the detector was designed for easy layer replacement. May lose a couple of days.

We have seen more instabilities during multiple halls beam tune
Instabilities in beam energy induce vertical fluctuations in Hall B

Elliptical beam spot also has a tilt angle
Significant skewness in the November-December run
New skew quad at 2H01, and downstream OTR viewer
Shielding in the Lamberston seemed to have eliminated the issue



Other items

- Restore rapid access system
For work away from the beamline, Hall B used to have a rapid access system
Needs to test and acquire enough experience with the system

- Bleedthrough
PbWO₄ calorimeter sometimes picks up bleedthrough not seen anywhere else
Usually fixed by adjusting the chopping slit aperture

- Fast ShutDown
Test of beam stability when FSD triggers using a thick wire close to the beam
No instability found, but difficulty to keep track of FSD trigger

