

# PRad ERR: Beam Delivery

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*November 11, 2015*



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# Outline

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- 1 Status of CEBAF & Hall-B
- 2 PRad Beam Requirements

# Building on HPS Experience

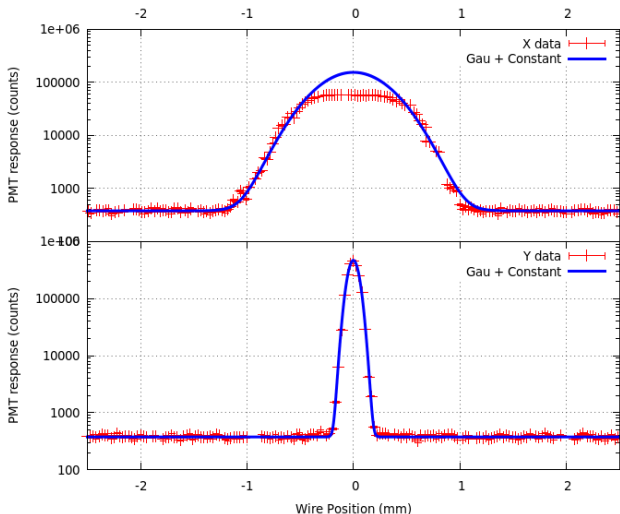
HPS Engineering runs Fall 2014 and Spring 2015

## HPS Beam Transport Challenges

- Target location in the downstream alcove,  $\approx 17\text{m}$  downstream of nominal target location.
- Horizontal ribbon beam,  $\sigma_x \approx 300\mu\text{m}$  and  $\sigma_y \approx 50\mu\text{m}$
- Expensive, sensitive detectors located 0.5 mm from the electron beam.



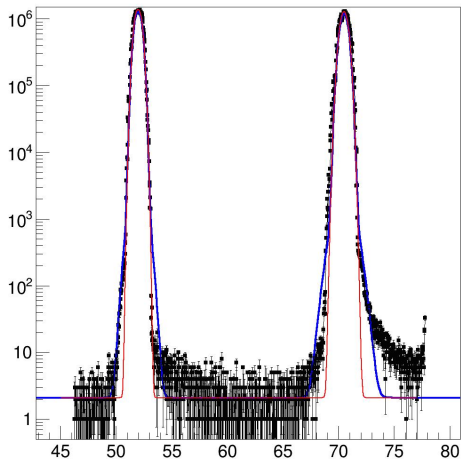
# HPS Ribbon Beam



$$\sigma_x = 294\mu\text{m}$$

$$\sigma_y = 48\mu\text{m}$$

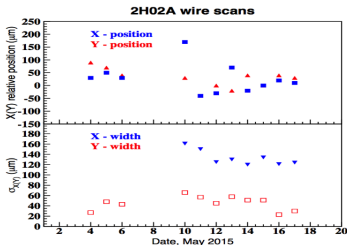
# HPS Halo Measurements



F-X Girod, OPS 2015 StayTreat

## Physics Readiness: Beamline

- Small, stable beams with minimal halo delivered to HPS
- Beams delivered in < half shift for successful nights/weekends running
- Fast Feedback, protection collimator, and Fast Shutdown all worked
- Stable running with SVT ½ mm from beams achieved.



HPS Experiment Overview

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# Hall-B Beam Delivery Procedure

Aside from some minor editing, removing HPS specific steps/elements) following this procedure will result in a successful beam setup.

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## Hall B Beam Delivery Procedure

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**Document Number:** MCC-PR-05-001

**Revision Number:** Rev. 31; July 28, 2015

**Technical Custodian:** Brandi Cade

**Estimated Time to Perform:** Not Applicable

### Procedure Overview

This procedure documents the protocol for establishing and maintaining beam delivery to Hall B during the Heavy Photon Search (HPS) physics run, which requires electron beam delivery to the Hall B Faraday Cup.



Additional Hall B information is maintained by Hall B personnel at the following links:

- [Hall B Running Procedures](http://www.jlab.org/Hall-B/) (web link to <http://www.jlab.org/Hall-B/>)
- [Hall B/HPS Commissioning Plan](https://wiki.jlab.org/hps-run/index.php/Main_Page) (web link to [https://wiki.jlab.org/hps-run/index.php/Main\\_Page](https://wiki.jlab.org/hps-run/index.php/Main_Page))

This procedure is divided into sections as follows:

- Section 1.0 [Establishing Beam to the Tagger Dump on page 2](#)
- Section 2.0 [Optimizing Beam Transport for Electron Physics on page 5](#)
- Section 3.0 [Maintaining Beam Delivery to Hall B on page 6](#)
- Section 4.0 [Optimizing the Electron Beam Aspect Ratio on page 7](#)

# PRad and HPS comparison

	HPS	PRad
Target location wrt CLAS target	$\approx +17$ m	$\approx -11$ m
$\sigma_x$	$\approx 400\mu\text{m}$	$\approx 150\mu\text{m}$
$\sigma_y$	$\approx 50\mu\text{m}$	$\approx 150\mu\text{m}$

PRad round beams, nothing special here.



# Special Requests from PRad

## Halo requirements

- Beam profile peak to tail ratio greater than  $10^7$ .  
This should be better defined.
- Hall/users typically provide these measurements and they are performed **at the end of the line**.  
User diagnostic performance might not be sensitive enough.  
HPS achieved  $10^6$ .
- Single user operations facilitates achieving and maintaining low halo beam.
- Using the B slit, closing it as much as possible, to control the beam current usually delivers low halo beam to hall B.

# Special Requests from Operations

- Test Fast Valve VFV2C21 before valves between VFV2C21 and target are opened.
- Establish agreed upon vacuum trip points in the region between 2C21 and PRad target.

# Summary

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- Hall-B beamline and procedures extensively commissioned during HPS runs.
- Care and attention to vacuum prudent.
- Beam delivery for PRad, *skill of the trade*.