

Injected Beam Imaging at SPEAR3 with a Digital Optical Mask

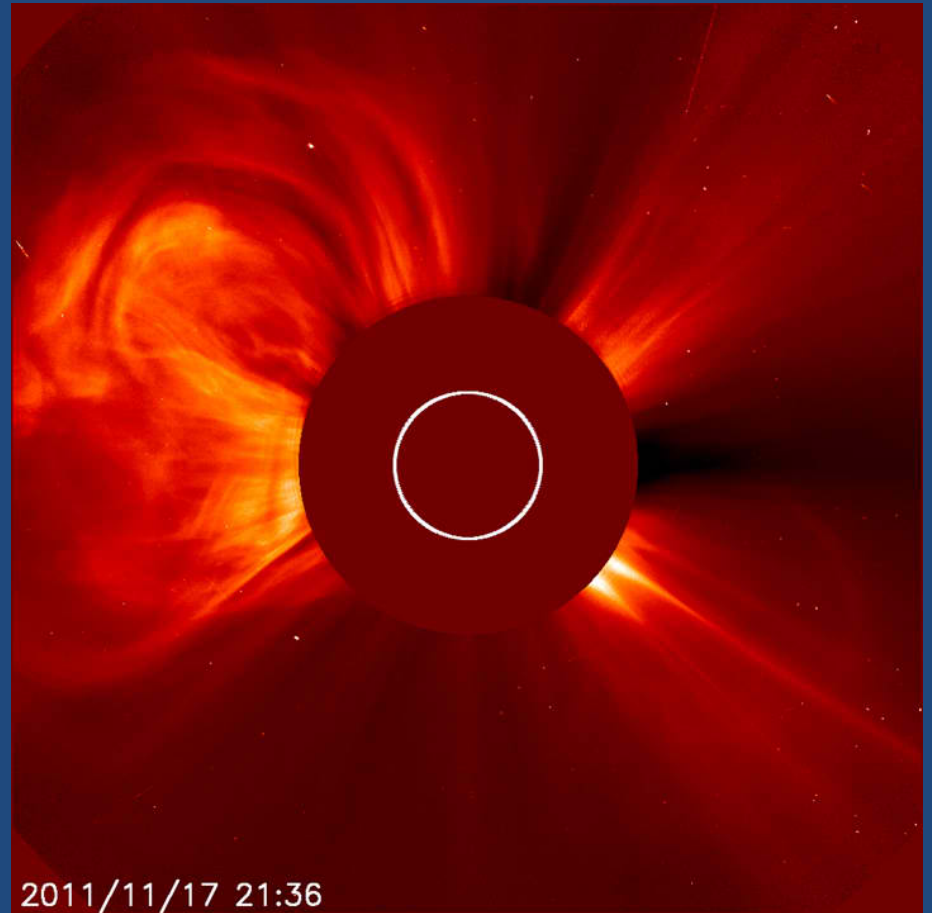
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Maryland, College Park, MD

J. Corbett, K. Tian, and A. Fisher, SLAC, Menlo Park, CA



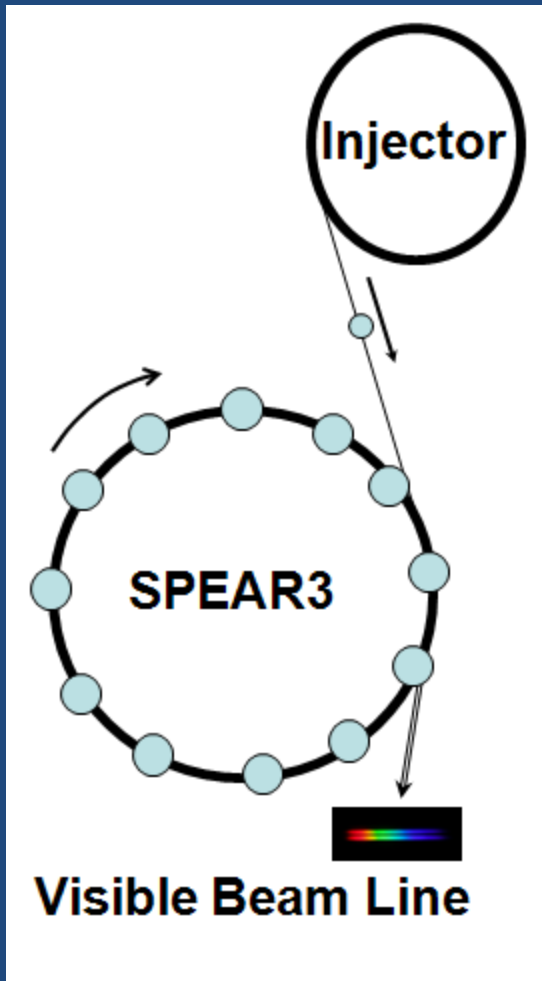
Outline

- Motivation
- Experimental setup
- Experimental results
- Conclusion



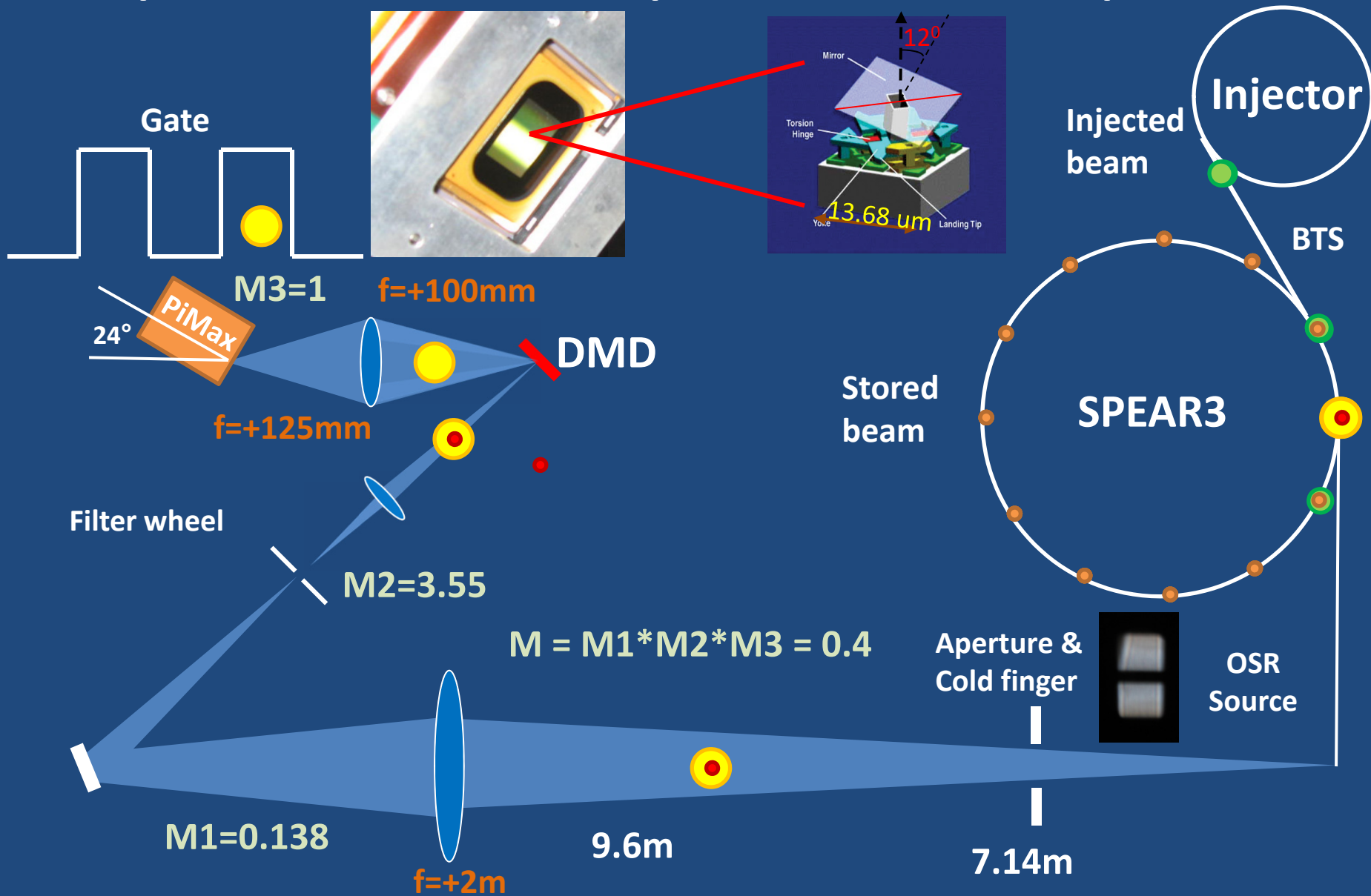
From <http://soho.nascom.nasa.gov>

Motivation

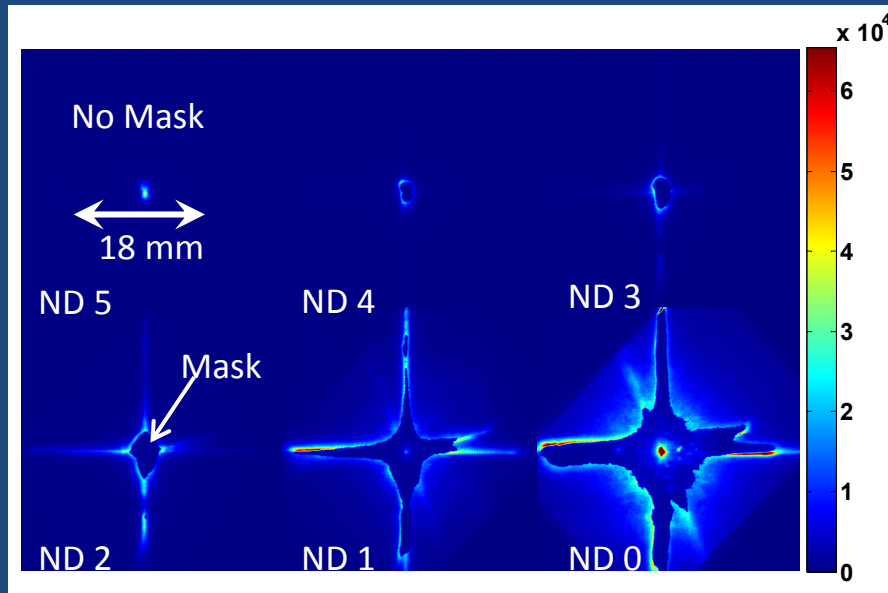


- Image injected beam
 - Matching
 - Filamentation and decoherence
 - Damping physics
 - Beam-beam kick
 - Under general operations
 - **But limited by the S/N ratio**
- System point-spread function(PSF)

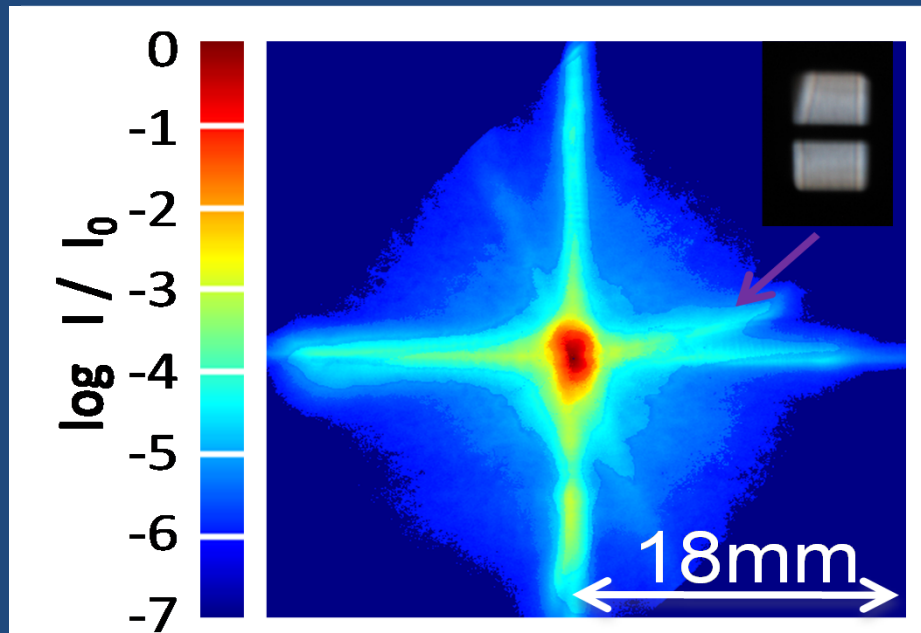
Experimental Setup and data acquisition



PSF measurement of the stored beam

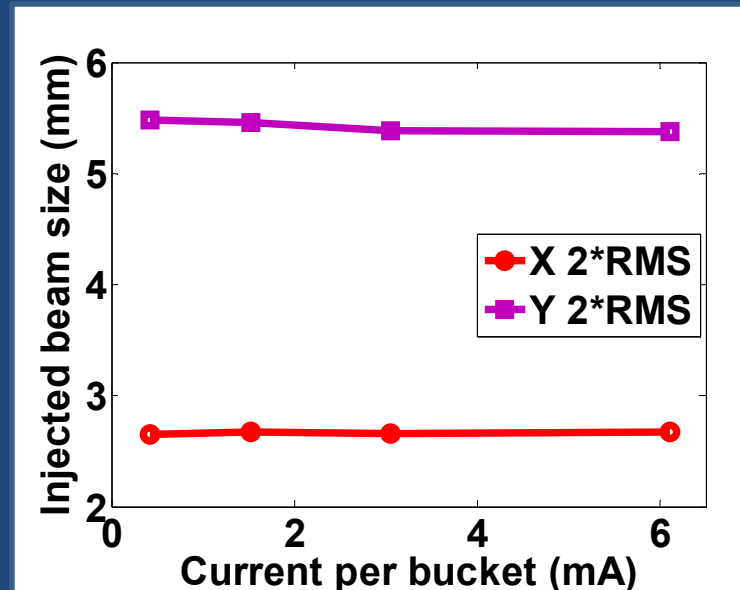
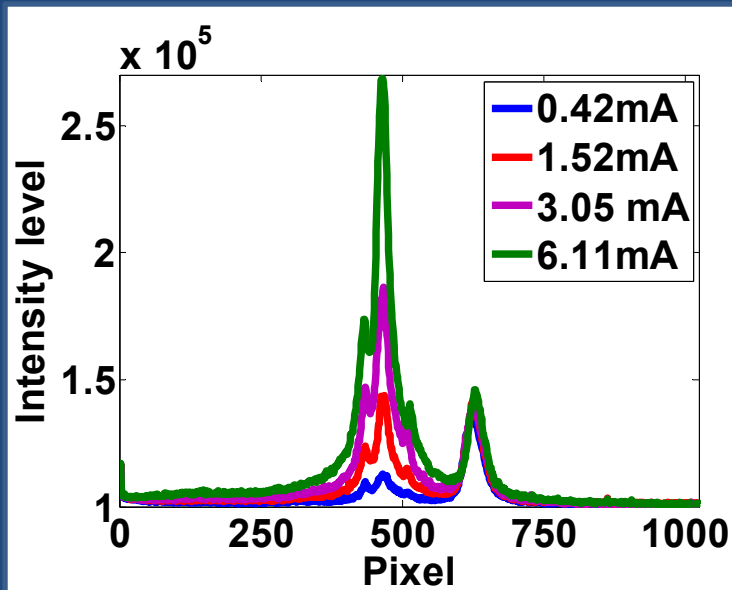
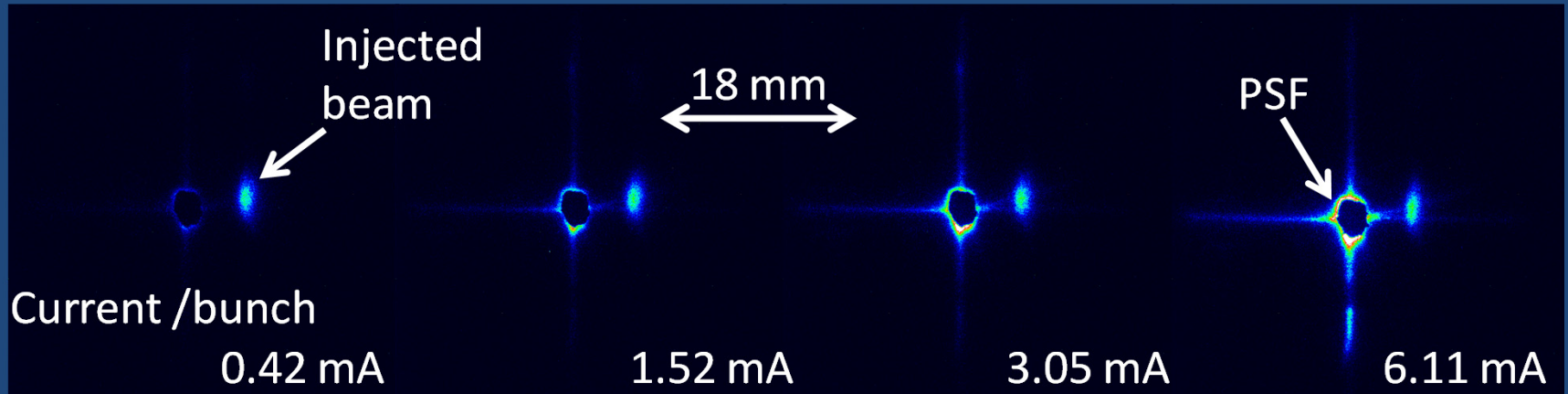


- 2 ms shutter mode
- Increase the mask size by changing the intensity threshold level

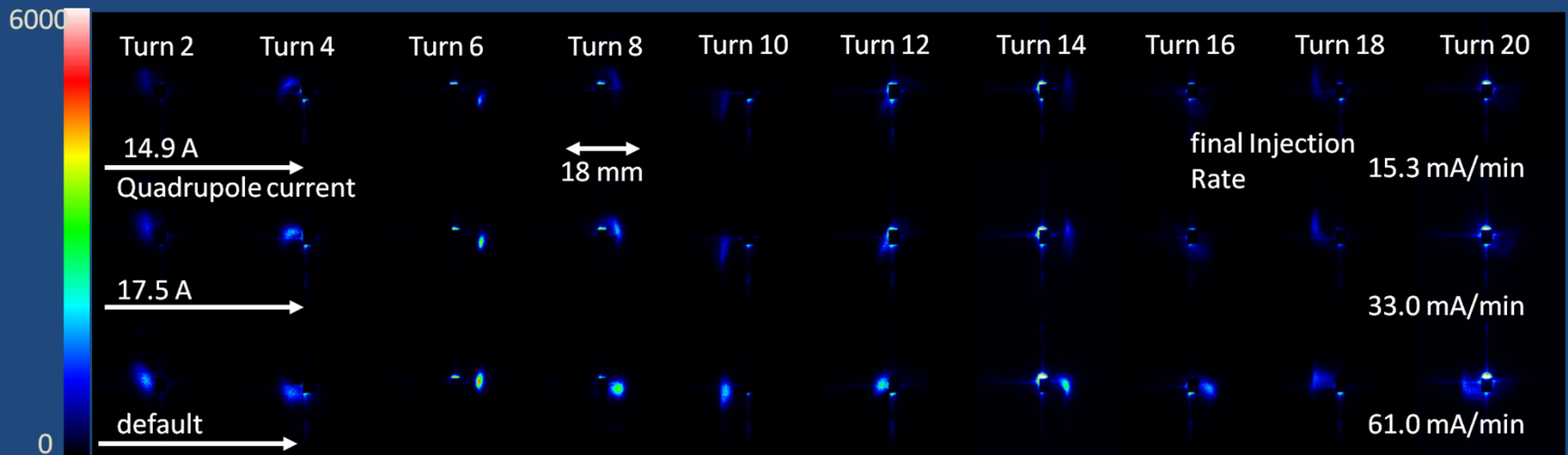


- ND filter from ND =5 to ND = 0

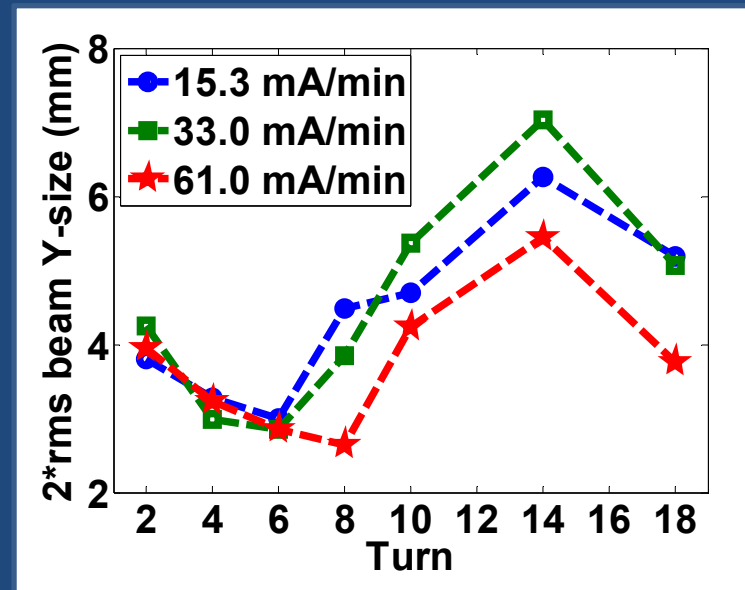
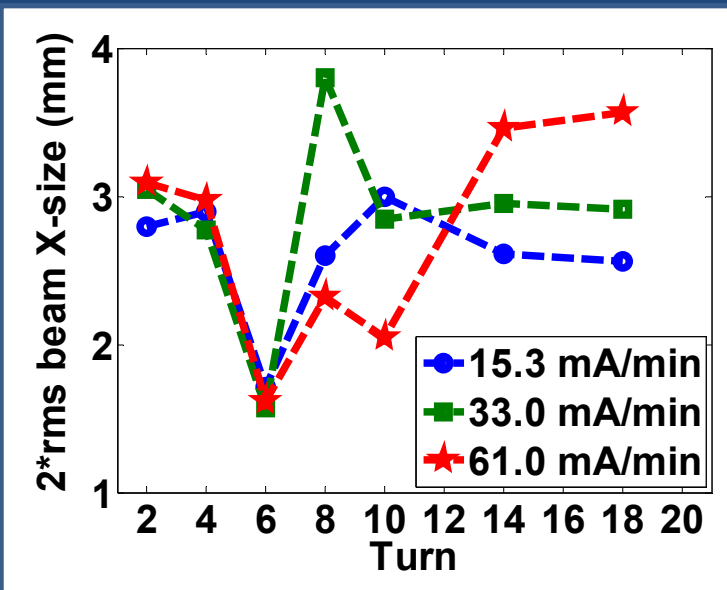
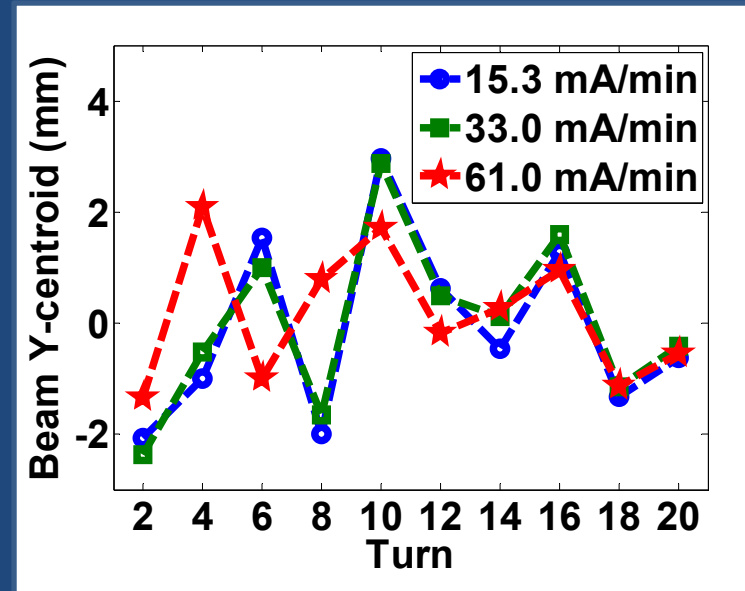
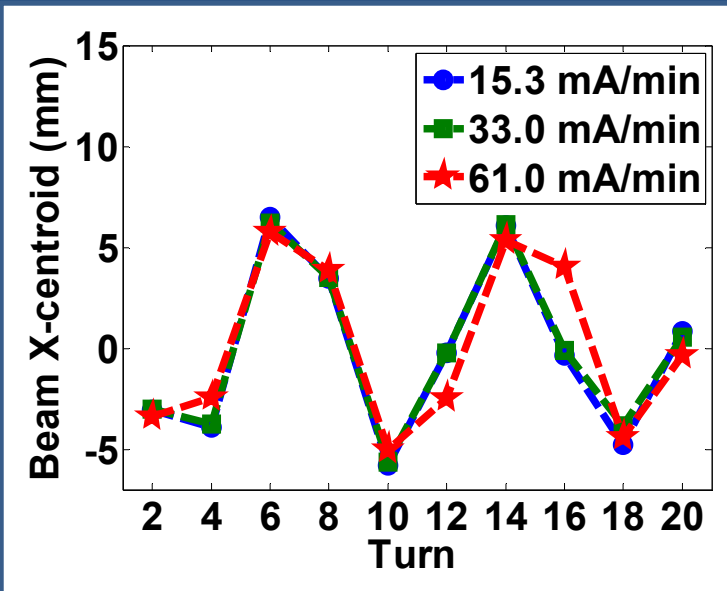
Injected beam with presence of stored beam with different currents



Three matching condition by altering the quads in the BTS

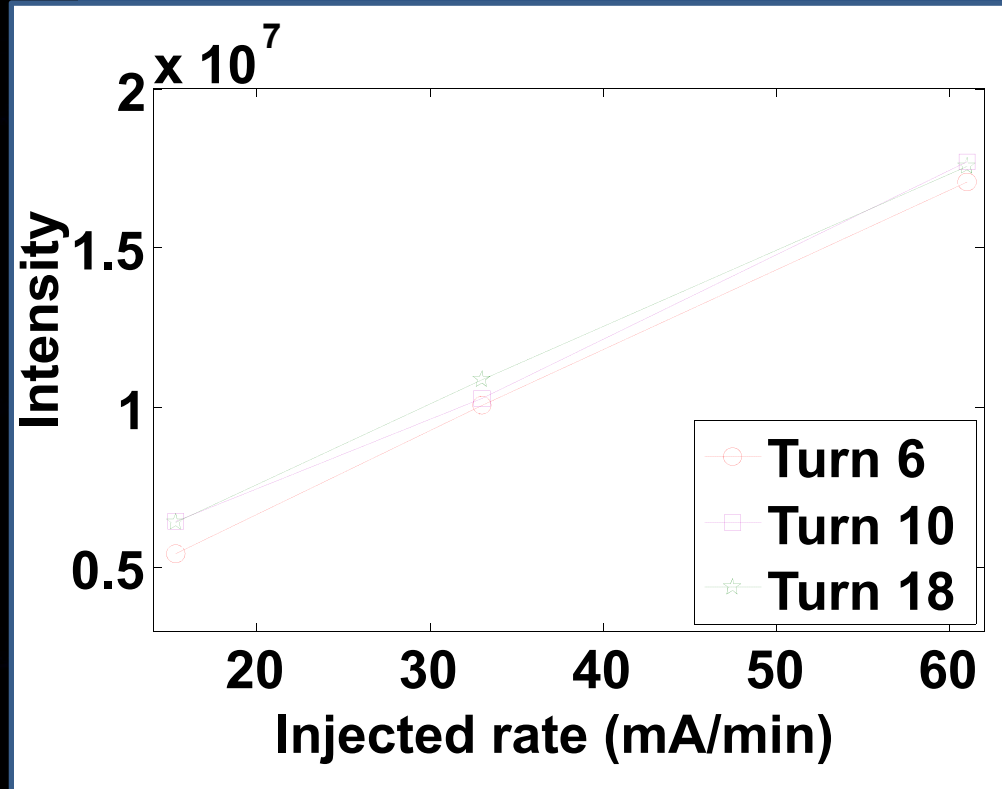


Evolution of Beam centroid and beam size



Beam intensity VS Injected rate

Turn 6 Turn 10 Turn 18



Conclusion and Outlook

- Employed a novel DMD masking method to image the visible OSR from the SPEAR3 electron beam with high dynamic range.
- Develop a method to measure the PSF of system.
- Be able to study the injected beam dynamics in the presence of the stored beam.

- Optimal matching of the BTS
- Understand nonlinear filamentation and decoherence processes
- Improved capture efficiency at SPEAR3

Acknowledgement

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Thank you