

# Robust Wire Scanner for High Intensity Beam Profile Diagnostics



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## Abstract

Wire scanners are devices for beam characterization in accelerator facilities worldwide. However, prolonged usage with intense particle beams lead to wire damage, requiring costly replacement and beam diagnostic downtime. A fast, robust wire scanner was recently designed and engineered at RadiaBeam. The wire scanner includes swappable and modular wire cards, that accommodate different wire materials under tension. Testing is currently underway at JLab. During the course of the tests, we will test Tungsten, Carbon, and boron-nitride nanotube, provided by BNNT LLC, in wire form. Early tests on BNNT threads show that it has very high thermal thresholds and may withstand the high power during regular operations. Preliminary tests with operation on the beamline are upcoming.

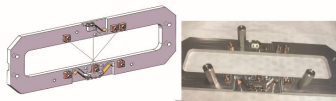
## Wire Scanner

- linear stage
- viewport for optical characterization
- spectrometer, CCD
- incorporated in EPICS controls

## Wire Card

Modular, swappable  
- reduces downtime

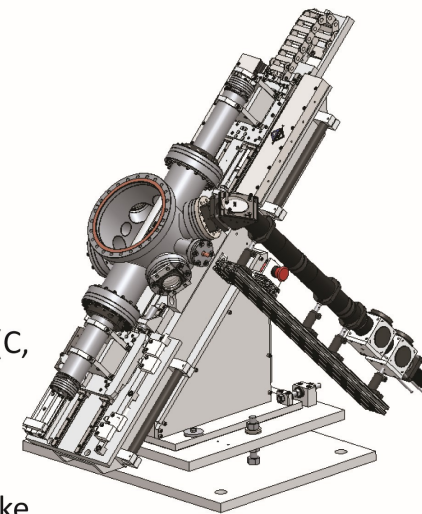
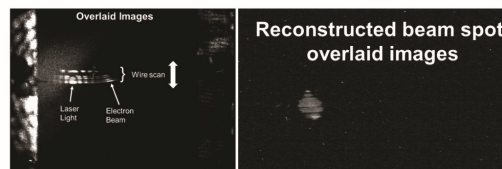
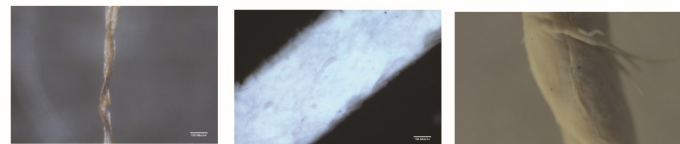
Accommodates different wire materials (W, C, BNNT)  
Tensionsing tests



## Detection

- Secondary electrons, current induced in wires (C, W, and coated BNNT)
- Beam loss monitor w PMT (C, W, BNNT)
- Imaging monitor for BNNT: (quasi-2D image)
- Photodiode optical energy for BNNT. (signals like conventional scanner but easier/cheaper to institute than a PMT and operates in radiation-noisy environments)

## BNNT response



## Future Directions

Wire scanner testing at JLab  
- LERF, CEBAF  
Buckysheet geometry for halo monitor

