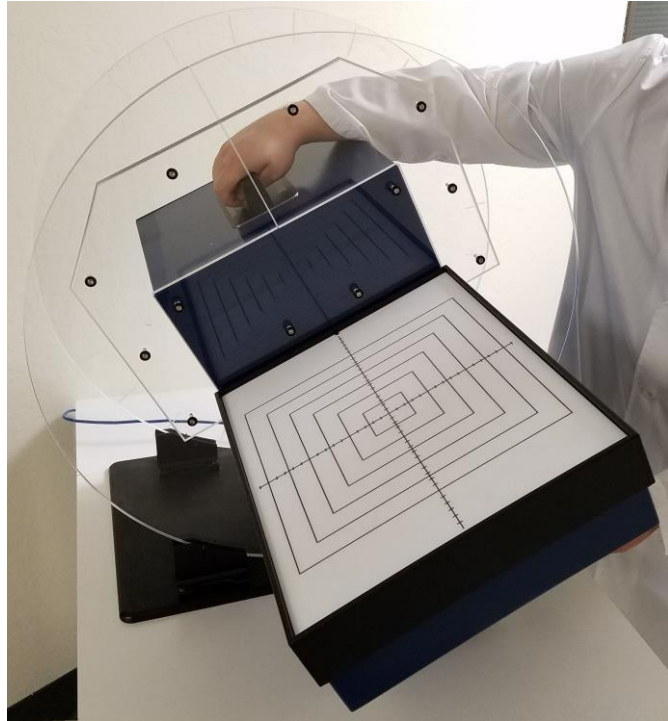


# XRV-4000 Proton Beam Profiler

Proton and X-ray Beam Metrology - Logos Systems Int'l

## Features and Benefits:

- Proton and X-ray beam Quality Assurance
- 42x32 cm field of view
- Real-time PBS beam spot and energy layer 2D geometry capture
- Effective resolution 0.3 mm
- 360 degree rotation with optional Gantry Cradle
- Radiographic transparency for image guidance with fiducials
- 8 and 12-bit capture modes
- BeamWorks Strata software includes GUI or script operation
- 2D and 3D beam profile viewing and measurements
- Bragg Peak detection with the optional LCW-200 wedge phantom
- Export options to Excel, ImageJ, and DICOM applications

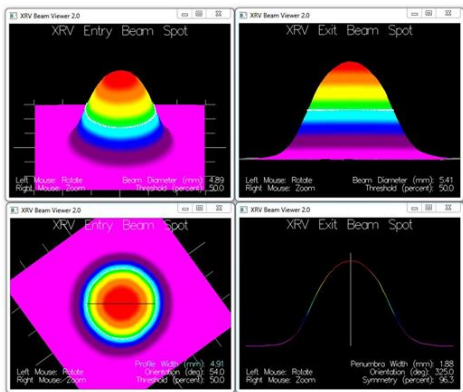


**XRV-4000 Camera Phantom and Gantry Cradle**

The XRV-4000 X-ray Beam Profiler combines high-energy radiation detection with precision two dimensional metrology to form a completely electronic alternative to film-based measurements. The XRV-4000 measures the XY location and profile of radiation beams with unmatched speed and accuracy. Radiation patterns up to 42x32 cm in size may be directed at the scintillator surface from any gantry angle. Automation scripts can be used to record changes or integrate the beam shape, intensity, and location over time.

XRV systems calibrate proton and radiotherapy systems that must deliver precisely dosed amounts of radiation to targeted regions in 3D space. The XRV-4000 was designed to capture the entire patient treatment area during Pencil Beam Scanning proton delivery. Beam dimension measurements are accurate to 0.1 mm and centroid positions to 0.3 mm. Beam viewing software enables viewing of the captured profile data along with FWHM diameter, penumbra and symmetry measurements.

All operations are controlled by a PC supplied with the camera phantom. The XRV comes with a 30 meter (100 feet) USB3 fiber optic cable extender so that the PC and operator can be located safely away from secondary radiation. The digital camera phantom without gantry cradle weighs approximately 16 kilograms (35 pounds).



**3D Beam Profile Viewing**



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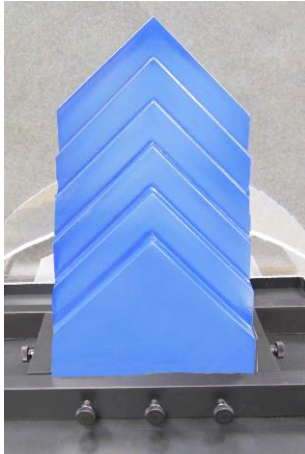
Email: [sales@logosvisionsystem.com](mailto:sales@logosvisionsystem.com) [www.logosvisionsystem.com](http://www.logosvisionsystem.com)

## XRV-4000 End-to-End Testing

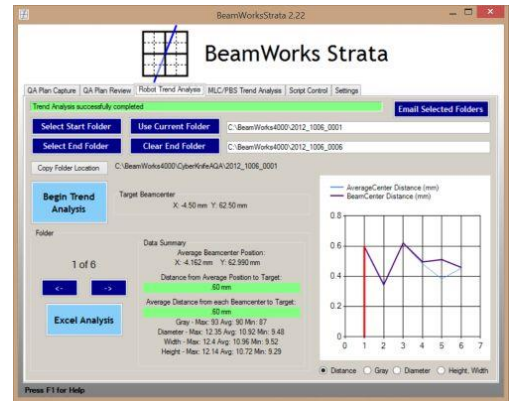
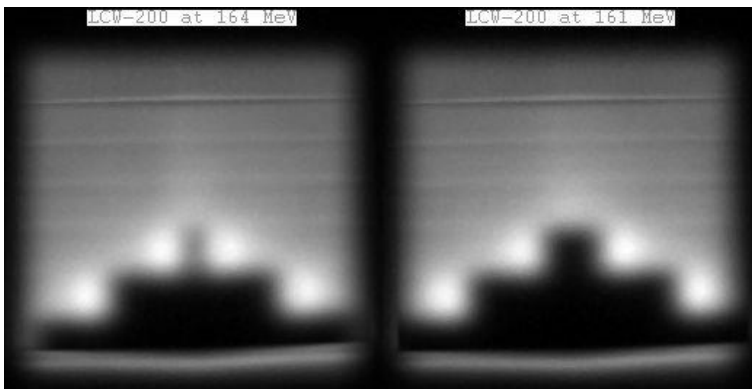
The XRV phantom may first be imaged with a CT scanner so that the fiducials can be used as a target for the treatment dose isocenter. Every beam of the test QA plan can then be measured for delivery accuracy. The XRV technology uses a scintillator to turn the invisible protons or x-rays into a spot of visible light that accurately represents the location and profile of the beam. A sensitive CCD camera then digitizes the beam spot and transfers the bitmap to the XRV computer for analysis and storage.

The BeamWorks Strata 2D software is used to acquire, analyze, and archive XRV images. Beam FWHM diameter, penumbra and symmetry measurements are available from any angle of beam axis rotation. Beam image sequences can be output to DICOM files using our BeamWorksDICOM utility. Automated measurements can be made from the graphical user interface (GUI) or customized with an easy-to-use scripting environment. XML-RPC process control is also available.

The LCW-200 can be used with the XRV-4000 to quickly detect Bragg Peak water equivalent penetration depths up to 230 mm.



Shown below are scintillator images created using a flat PBS energy layer sweeping in a serpentine pattern vertically through the LCW-200 acrylic chevron wedges. The four Bragg Peak regions on each image enable two separate penetration depth measurements for a typical accuracy better than 0.5 mm.



BeamWorks Strata Target Trend Analysis

## XRV-4000 Specifications:

### Accuracy: <sup>1</sup>

XY Beam Center:	+-.3 mm (+-.4 at corners)
Repeatability:	+-.04 mm (typical)
Beam Diameter:	+-.1 mm
Repeatability:	+-.04 mm (typical)

### Optical System: <sup>1</sup>

Resolution:	1600 x 1200 pixels with 8 and 12-bits per pixel
Capture Rate:	1-15 frames/sec
Scintillator Size:	41.5 x 32 cm
Lens MTF:	Megapixel resolution
Camera Interface:	USB3

### Camera Shielding: <sup>2</sup>

Camera Top and Sides:	12.7 mm plastic and wax
CCD Lifetime:	~1,500 X-ray beam hours

### Camera Module Physical:

H x W x D:	76.2 x 48.3 x 34.3 cm
Weight:	16 kg (35 lbs)
Enclosure Material:	Acrylic and PLA plastic

### Interface:

Capture Trigger:	GUI, Script, Network watch-file, or XMLRPC
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### Computer Components:

Configurable to customer requirements

### General:

Electrical Power:	110-220V or battery
Environment:	5 to 30 degrees C; 90% humidity, no condensation; no vibration

### NOTES:

- Contact us for higher camera resolutions or faster frame-rates.
- Contact us for custom shielding requirements. The camera may be replaced for a service fee after approximately 3 years as necessary.

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