

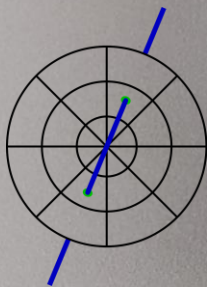
**Logos
Systems**

XRV-3000 Eagle Proton and X-Ray Beam Quality Assurance

LogosVisionSystem.com

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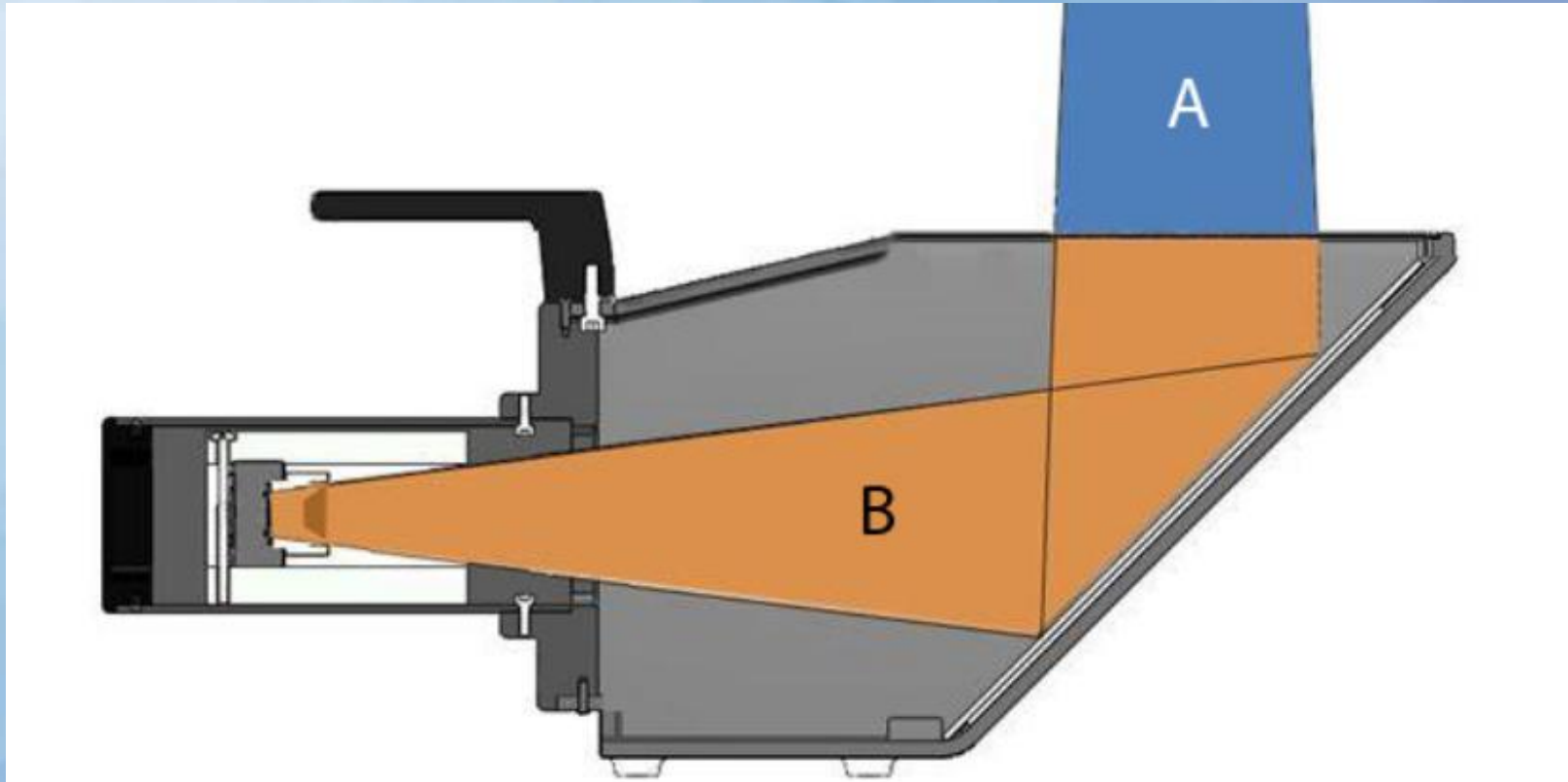
XRV-3000 Eagle QA Phantom



Logos
Systems

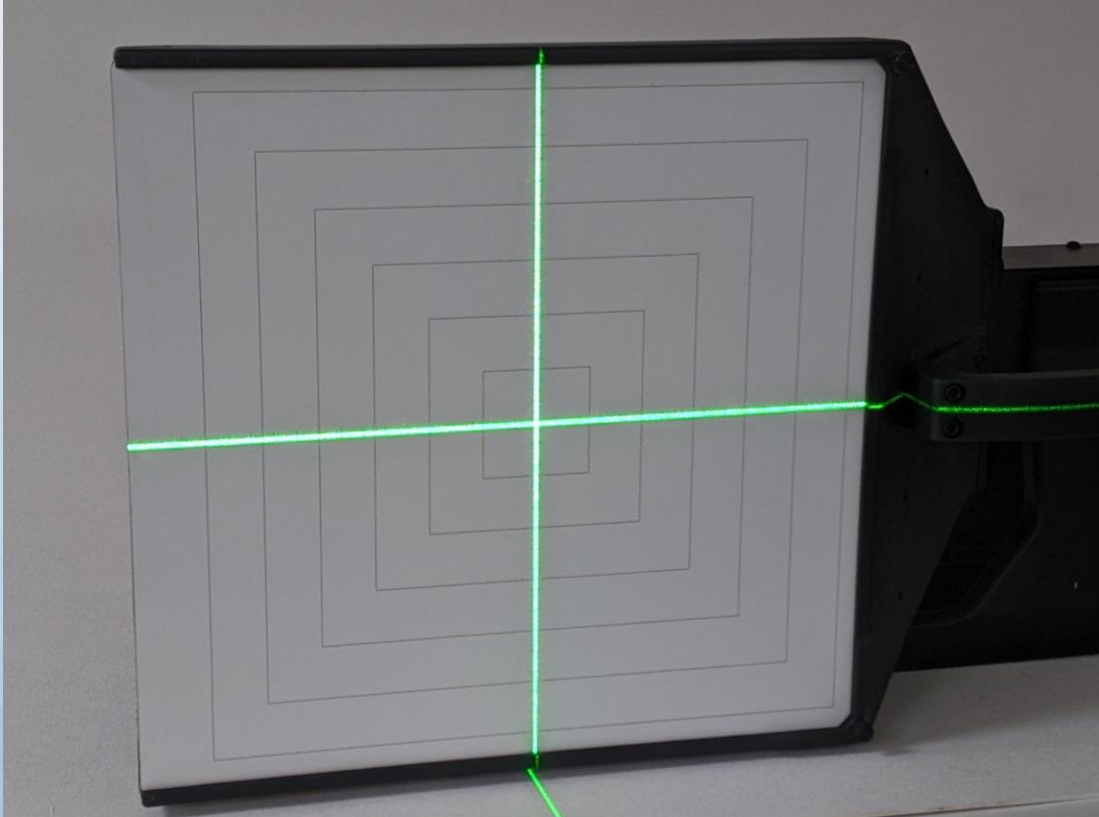
XRV-3000 Eagle

XRV-3000 Eagle Operation



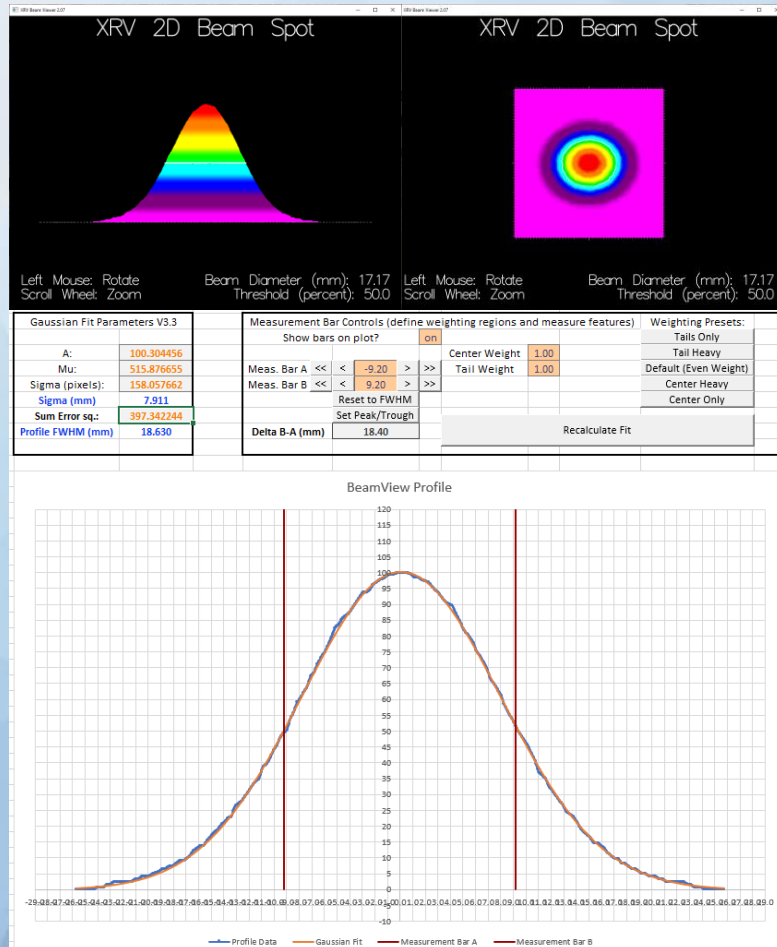
The planar scintillator converts the invisible radiation beam (A) into visible light (B), which reflects off the angled mirror and is captured by the CCD or high speed CMOS camera. Data is then processed in the included software

Easy Setup Process



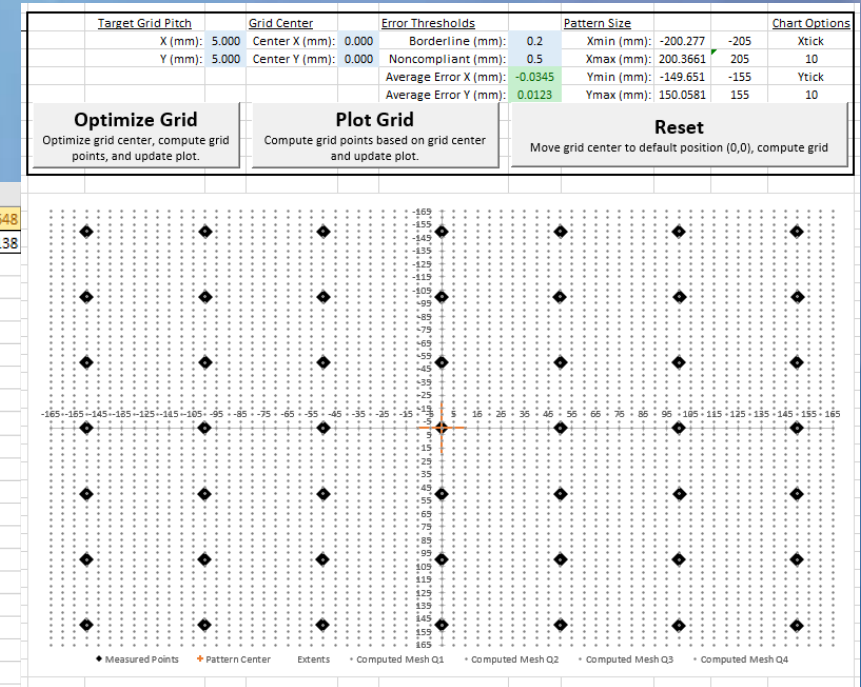
Target and side markings for fast laser setup
Six embedded tungsten fiducials for kV image alignment

Beam Profile and XY Grid Analysis



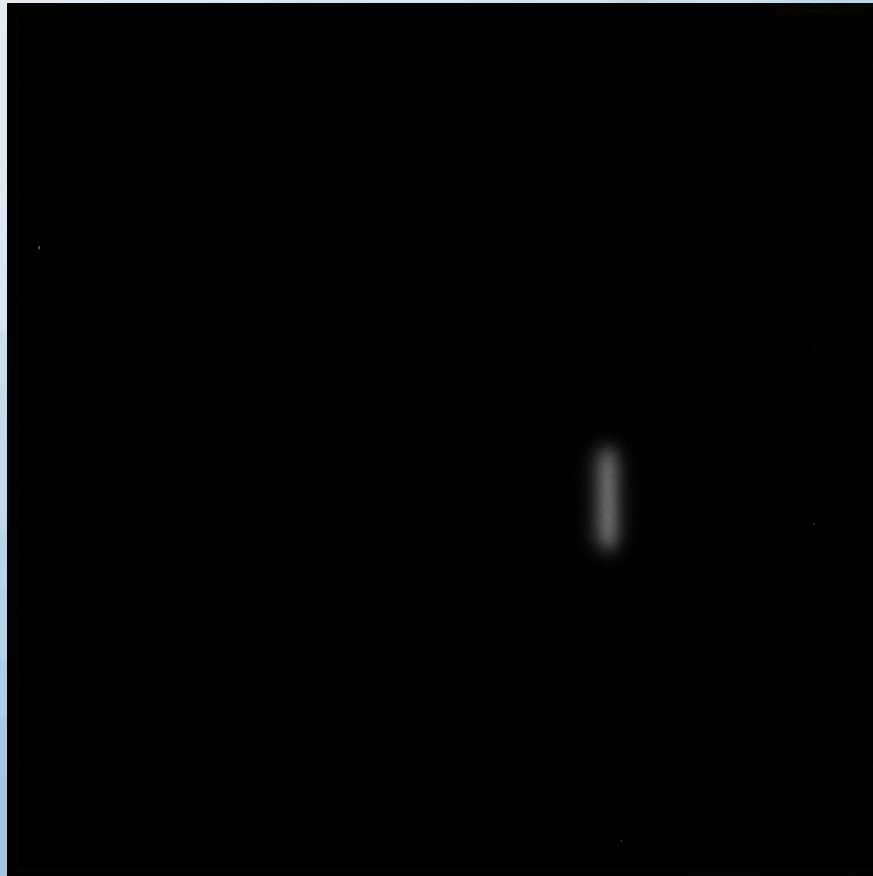
3D viewing of spot profiles
and dual orientation
Gaussian fitting

Spot Distance from Grid		Average Spot-to-grid distance:	0.271648
X Dist from grid (mm)	Y Dist from grid (mm)	Total Spot-to-grid distance:	17.1138
		Abs. Dist from grid (mm)	
0.2774	0.3487	0.445581025	
0.1499	0.3487	0.379554607	
0.0225	0.3487	0.349425157	
-0.105	0.3487	0.364165745	
-0.2324	0.3487	0.419048267	
0.1943	0.3487	0.399179383	
0.0668	0.3487	0.355040744	
-0.0606	0.3487	0.353926617	
0.3661	0.3487	0.505589656	
0.0003	-0.1149	0.114900392	
-0.1271	-0.1149	0.171337153	
0.0225	-0.1149	0.117082279	
0.1721	-0.1149	0.206930955	
-0.2324	0.1619	0.283233773	
-0.3599	0.1619	0.394638594	
0.3439	0.1619	0.380103696	
0.2164	0.1619	0.270260189	
0.089	0.1619	0.184750129	

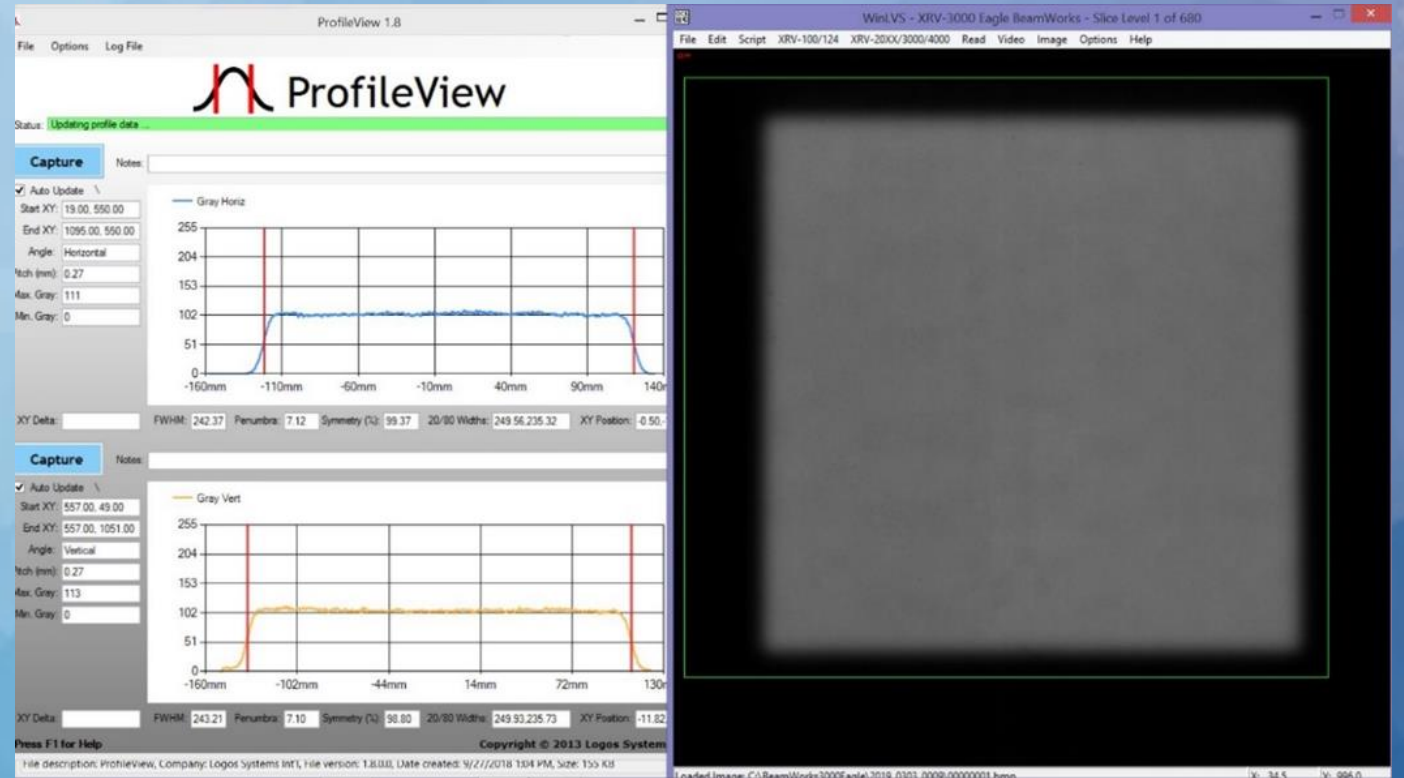


Export captures to Excel with color coded distance thresholds, measurements, and automatic grid plotting

Proton Field Assembly and QA

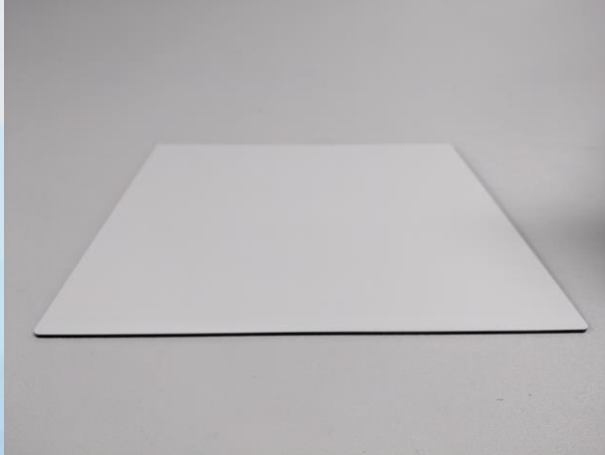


Beam streaks can be assembled into a larger field using software integration



Analysis of a proton field can be done on either an assembled field with any scintillator or a single frame integration with a ClearView scintillator

Scintillator Modules



**Standard
Gadox Scintillator**

High sensitivity for individual spot profiles and XY pattern QA



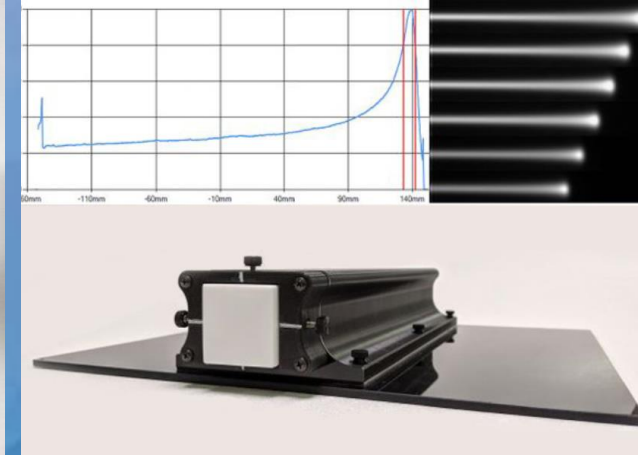
**ClearView
Plastic Scintillator**

Medium sensitivity, designed for even response large field QA



**ClearView UHDR
Glass Scintillator**

Lowest sensitivity for ultra high dose rate captures and FLASH experimentation



**Ranger-300
Plastic Scintillator**

Medium sensitivity for fast, single beam, any angle Bragg Peak QA

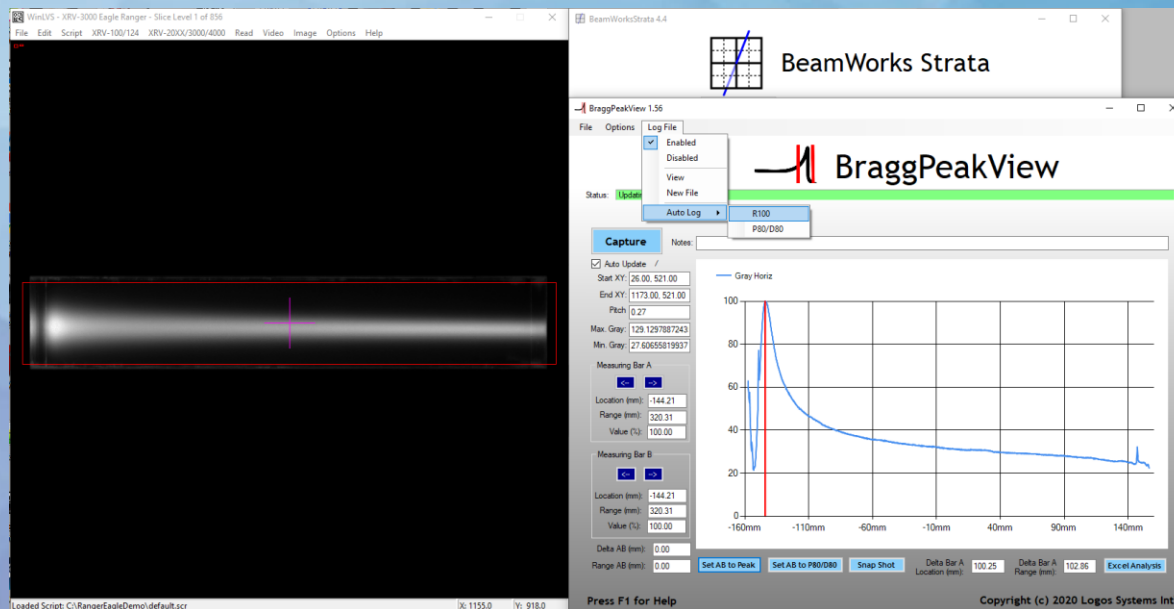
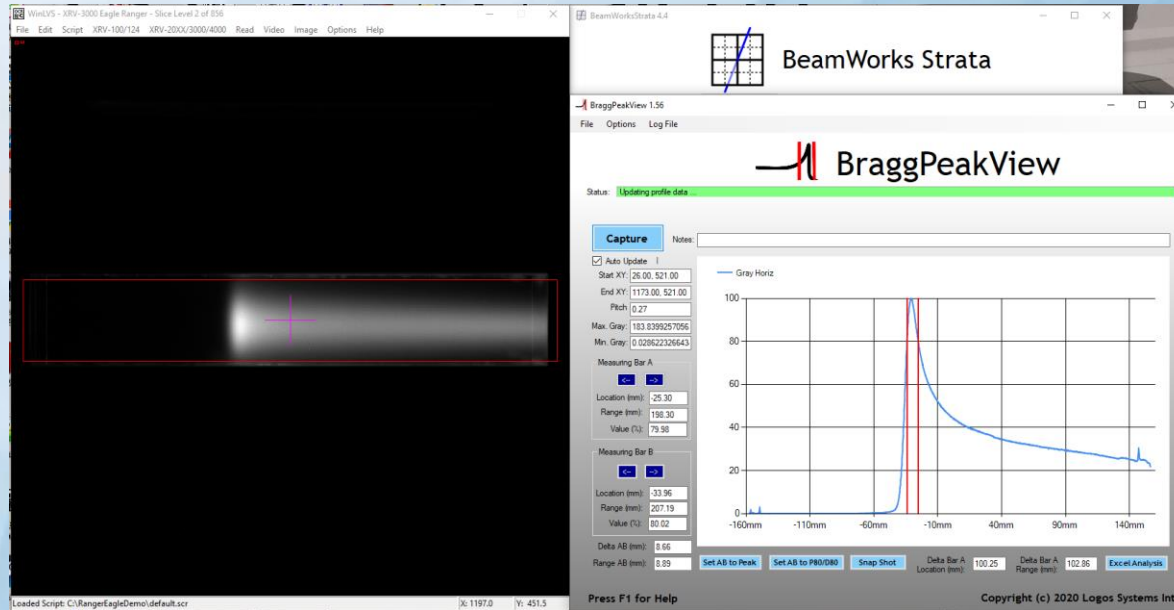
Ranger-300 Plus Mounted in XRV-4000 Hawk



**Double
Width
Ranger
for the
Eagle
and
Hawk**

Proton Range Verification with the Ranger-300

BraggPeakView can quickly and automatically record a series of R100 and P80/D80 measurements into a CSV log file.

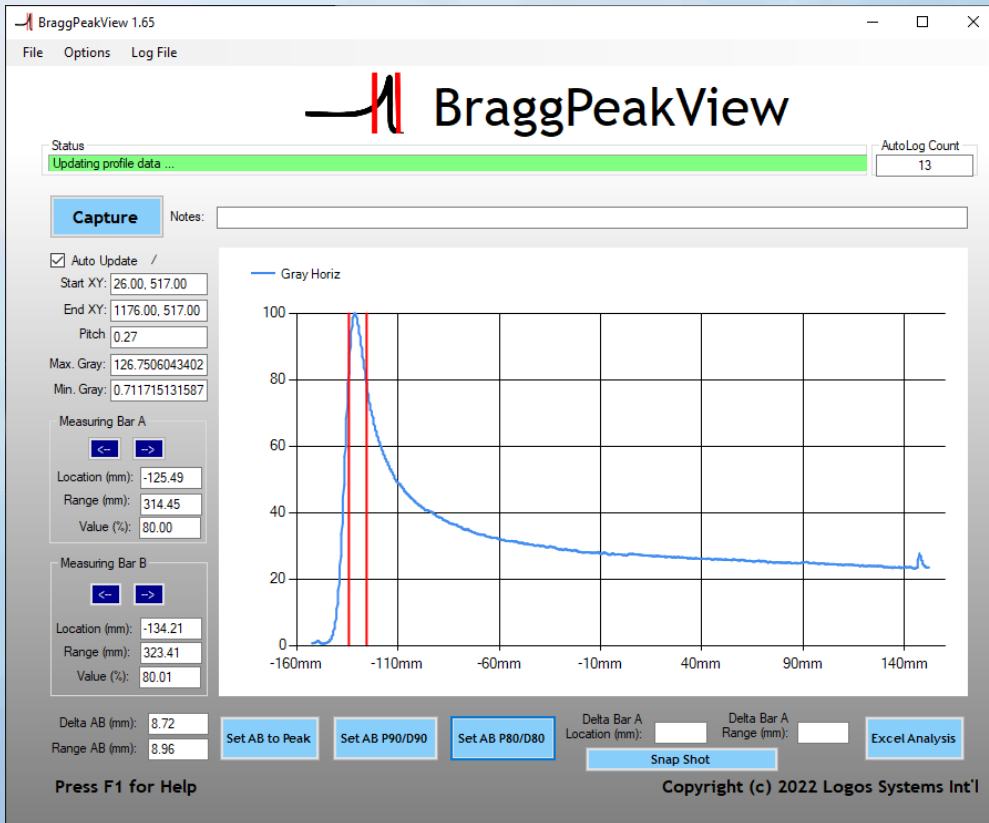


```
Profile_20210113_0001.log - Notepad
File Edit Format View Help

BraggPeakView R100 Autolog
Count: ,7
Date: , 01/13/2021,11:57:04
Notes:

Image , R100 Range
Index , (mm)
1, 320.31
2, 203.91
3, 193.49
4, 173.54
5, 154.71
6, 136.14
7, 33.28
```

Proton Range Verification with the Ranger-300



Ranger_Export.xlsx - Excel

Summary

	P80 (mm)	P90 (mm)	R100 (mm)	D90 (mm)	D80 (mm)	D20 (mm)	Average (mm)	NIST-BPV D80 (mm)
9 Average Delta	0.15	-0.21	-0.12	-0.03	0.00	0.11	-0.02	-0.16
10 Average ABS Delta	0.34	0.28	0.34	0.28	0.15	0.30	0.26	0.30
11 Max. Delta	1.10	1.29	1.00	0.44	0.36	0.65	0.80	0.87
12 Std. Dev.	0.42	0.55	0.39	0.18	0.19	0.32	0.31	0.35
13 Spread (MaxΔ - MinΔ)	1.89	1.54	1.53	0.74	0.69	1.10	1.25	1.23

Alternate vs. Bragg Peak View (A-BPV)

	P80 (mm)	P90 (mm)	R100 (mm)	D90 (mm)	D80 (mm)	D20 (mm)	Average (mm)
17 Average Delta				-0.25	-0.23	0.11	-0.12
18 Average ABS Delta							
19 Max. Delta				0.39	0.38	0.44	0.40
20 Std. Dev.				1.28	1.37	1.43	1.36
21 Spread (MaxΔ - MinΔ)							

Bragg Peak View Data

Count	P80 (mm)	P90 (mm)	R100 (mm)	D90 (mm)	D80 (mm)	D20 (mm)
1	275.99	278.52	281.99	284.99	286.17	291.59
2	263.25	265.77	268.86	272.40	273.50	278.73
3	239.07	241.53	245.09	247.67	248.62	253.58
4	215.24	217.26	220.44	223.61	224.55	229.26
5	214.32	216.25	219.46	221.50	221.50	227.31
6	250.94	253.04	256.25	258.67	259.63	264.22
7	229.01	231.14	234.19	236.87	237.73	242.08
8	208.40	210.37	213.57	215.37	216.35	220.62
9	188.02	190.13	193.26	194.88	195.76	199.91
10	168.99	170.70	172.95	175.10	175.94	179.86
11	150.57	152.27	154.92	156.53	157.34	160.78
12	133.18	134.89	137.14	138.73	139.47	142.67
13	116.98	118.29	120.25	121.68	122.36	125.38
14	101.63	102.75	104.54	105.80	106.42	109.12
15	86.79	87.88	89.65	90.77	91.35	93.84
16	72.96	74.07	75.60	76.77	77.20	79.53
17	60.45	61.37	62.73	63.61	64.02	66.02
18	48.45	49.28	50.69	51.34	51.69	53.40
19	37.65	38.51	39.84	40.58	40.90	42.51

Buildup Compensation (mm)

81	245	356.99	359.52	362.99	365.99	367.17	372.59
81	240	344.25	346.77	349.86	353.40	354.50	359.73
81	230	320.07	322.53	326.09	328.67	329.62	334.58
81	220	296.24	298.26	301.44	304.61	305.55	310.26
81	210	274.32	276.25	279.46	281.61	282.50	287.31
81	200	250.94	253.04	256.25	258.67	259.63	264.22
81	190	229.01	231.14	234.19	236.87	237.73	242.08
81	180	208.40	210.37	213.57	215.37	216.35	220.62
81	170	188.02	190.13	193.26	194.88	195.76	199.91
81	160	168.99	170.70	172.95	175.10	175.94	179.86
81	150	150.57	152.27	154.92	156.53	157.34	160.78
81	140	133.18	134.89	137.14	138.73	139.47	142.67
81	130	116.98	118.29	120.25	121.68	122.36	125.38
81	120	101.63	102.75	104.54	105.80	106.42	109.12
81	110	86.79	87.88	89.65	90.77	91.35	93.84
81	100	72.96	74.07	75.60	76.77	77.20	79.53
81	90	60.45	61.37	62.73	63.61	64.02	66.02
81	80	48.45	49.28	50.69	51.34	51.69	53.40
81	70	37.65	38.51	39.84	40.58	40.90	42.51

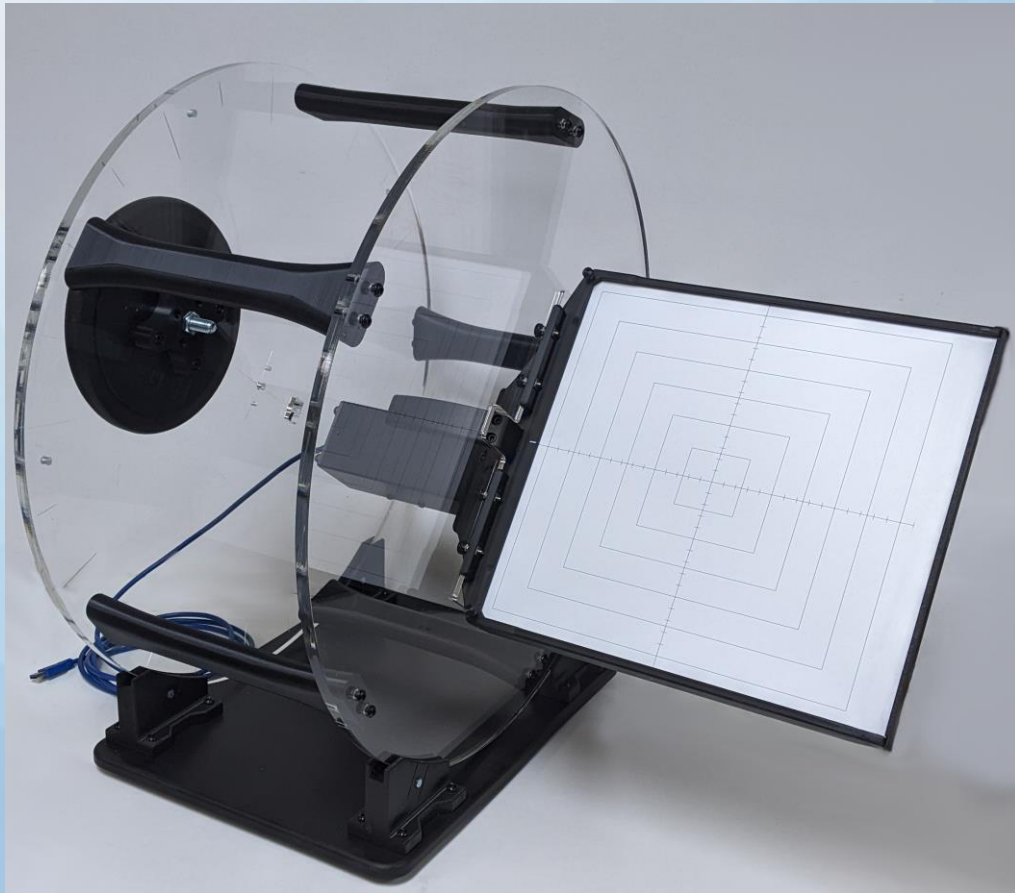
Commissioning Bragg Peak Measurements

Energy (MeV)	P80 (mm)	P90 (mm)	R100 (mm)	D90 (mm)	D80 (mm)	D20 (mm)
245.0	1	357.12	359.39	363.01	365.74	368.74
240.0	2	344.73	346.85	350.55	353.27	356.27
230.0	3	320.69	322.62	326.62	329.62	332.62
220.0	4	296.38	298.35	301.85	304.52	307.52
210.0	5	273.22	274.56	278.46	281.20	283.20
200.0	6	250.75	252.48	255.98	258.64	261.24
190.0	7	229.08	230.83	234.33	236.65	239.65
180.0	8	208.31	209.73	213.23	215.47	218.47
170.0	9	188.39	190.11	193.61	195.76	199.04
160.0	10	169.36	170.55	173.95	175.94	179.42
150.0	11	151.28	152.44	155.84	157.84	160.78
140.0	12	133.75	134.84	137.24	138.84	140.84
130.0	13	117.03	118.15	119.95	121.81	123.81
120.0	14	101.35	102.21	104.01	105.77	107.77
110.0	15	86.68	87.57	89.17	90.69	92.69
100.0	16	73.09	73.83	75.23	76.62	78.62
90.0	17	60.42	61.11	62.31	63.45	65.45
80.0	18	48.65	49.21	50.21	51.23	53.23
70.0	19	38.44	38.76	39.76	40.47	42.47

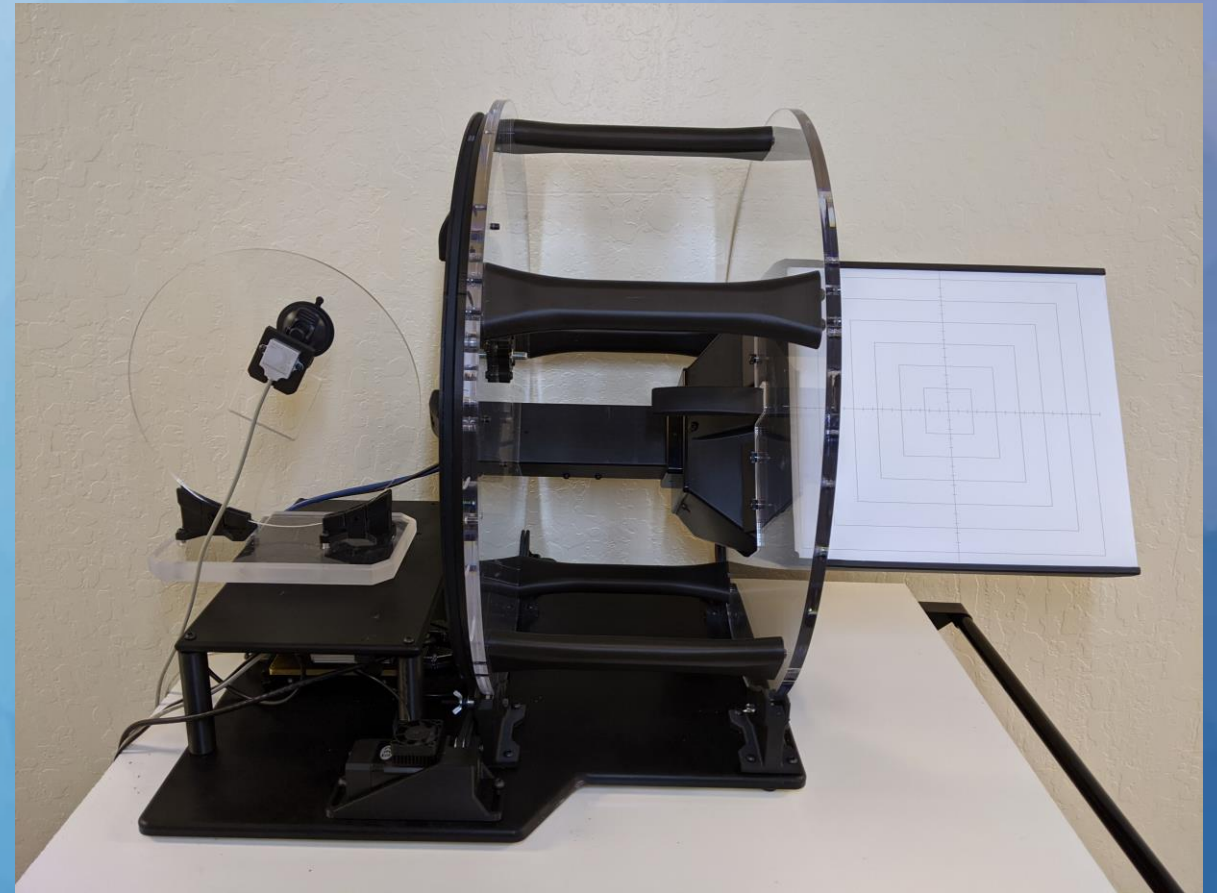
BraggPeakView integrates, corrects for quenching in the scintillator, and performs measurements on each beam

Automatic export into Excel for a summary of P80, P90, R100, D90, D80, and D20 deviations from input values and an in-depth analysis for each beam

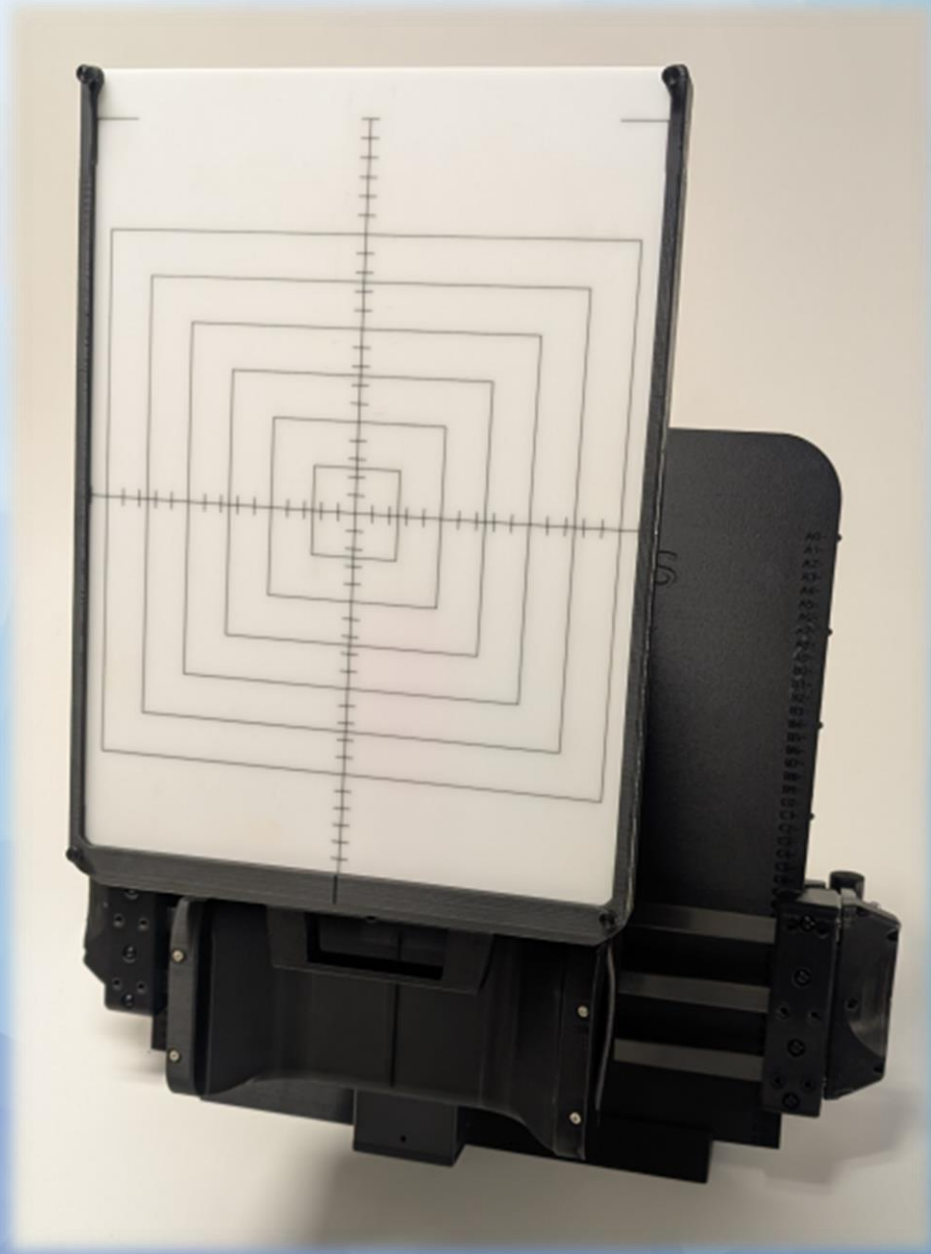
Manual and Motorized Gantry Cradle Options



Manual Gantry Cradle
for individual gantry
angle deliveries



Motorized Gantry Cradle for
automatic gantry following,
step/shoot, or programmed motion



The **LTCA** (Logos Treatment Chair Adapter) allows Eagle and Hawk phantoms to be attached to upright patient chairs at vertical index positions (XRV-4000 Hawk shown)

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