

DataRay Inc. Application Note

BeamScope-P7 Large Beam Measurement

Beam Profiling ... Engineered as a system
... Delivered as a Solution

Applies to:

- ❑ The BeamScope-P7 with XY slits.
- ❑ Beams above ~3 mm
- ❑ Versions 6.00L and higher of **iDataRayUpdate.exe**.

A. The issue

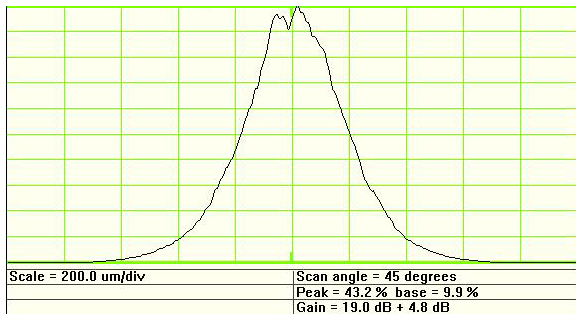
Because BeamScope-P7 software automates a number of the beam Find, Range and Track issues, it is easy for users to assume that software will always achieve the best setup. On a large beam with 'wings' which overlap both slits simultaneously, automation may fail because the two slits have a common detector beneath the slits, i.e. the slits work in parallel and the software can become confused. This Application Note describes how to:

- Verify that your beam is correctly setup and measured.
- Setup correctly for larger beams.

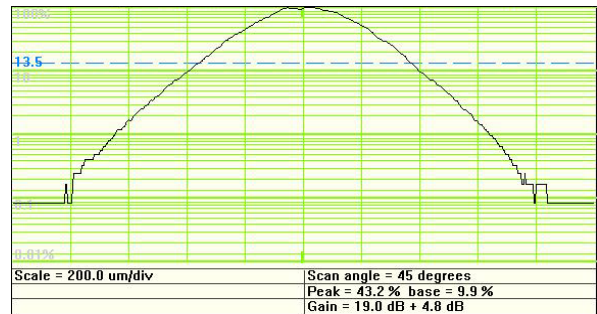
B. Is my beam correctly measured?

BeamScope adaptively sets the baseline by looking at the outer 10% (distance) edges of the beam, making a histogram of the values and finding the histogram peak. It therefore requires a flat edge on *at least one side* of the beam. Since the unit has a 12 bit ADC, this zero will typically sit between 0.025 % and ~0.1 %

In linear mode it can be hard to be sure of this - below left. Right-click on the profiles area and choose log 40 dB mode - below right, and verify that an edge of the beam goes to or below 0.1%. If it does not, then it is not set correctly and the measured diameter will be lower than the actual diameter. [For a Gaussian beam, a 1% error in the set background level leads to a -2% error in the measured $1/e^2$ beam diameter.]



Linear Display



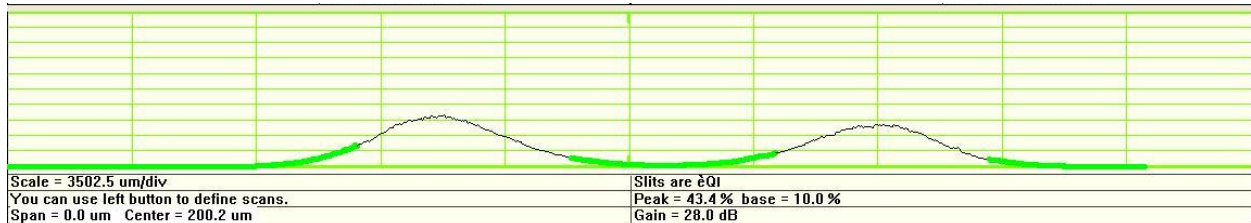
Log 40 dB display of same beam

If you do not see a correct background level, follow Section C on the next page. If you are unsure, go **File, Save, Save current data** and send it to support@dataray.com.

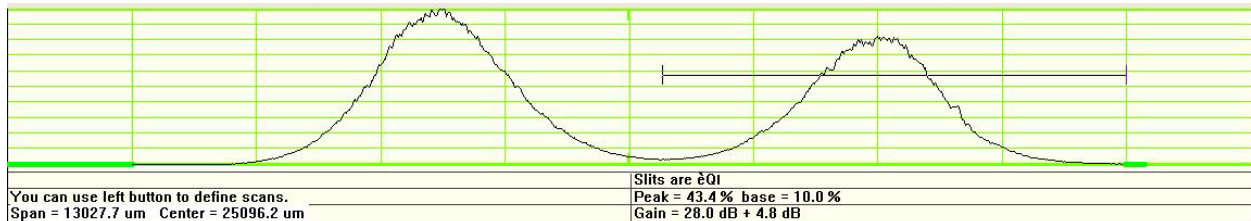
C. Measuring large beams?

If the software auto functions have not set things correctly, you can do this yourself very simply. If you are repeatedly measuring a large beam in the same position (e.g. different assemblies) you can save the manual settings.

- Go **File, Load defaults**, and then right-click on the profile area and unselect **Auto Range**.
- Go **Setup, Device EEPROM programming**, and set **Maximum span in mm** to **36.0**.
- Do a **Find**. See the example which follows on an ~5 mm beam. The thin black line parts of the curve show the default settings from which the software would normally 'auto' its functions.



- Click and drag to **Set as Slit #1** and **Set as Slit #2** per the example below, p. 5-9 in the manual.



IMPORTANT:

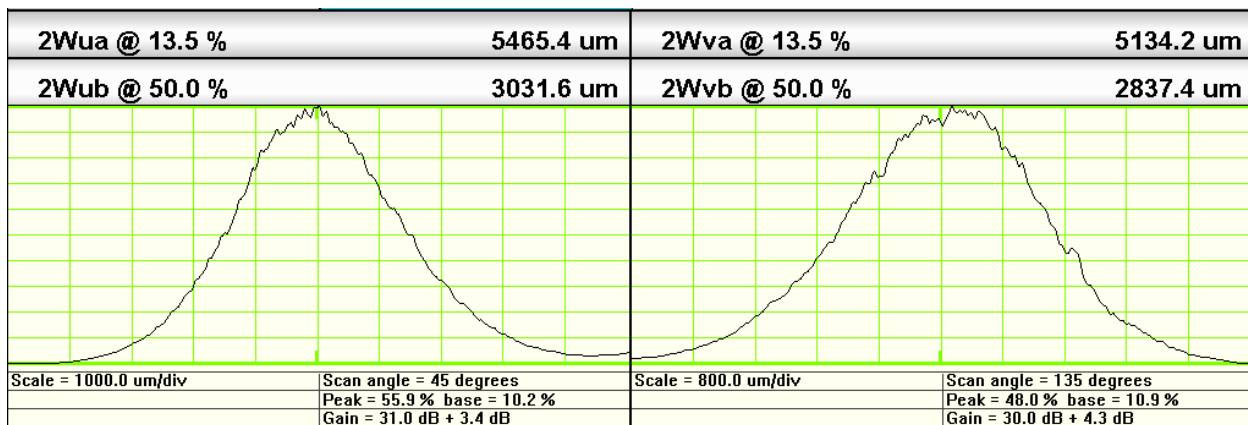
The left hand edge of Slit #1 has been set far to the left in order to get a good zero.

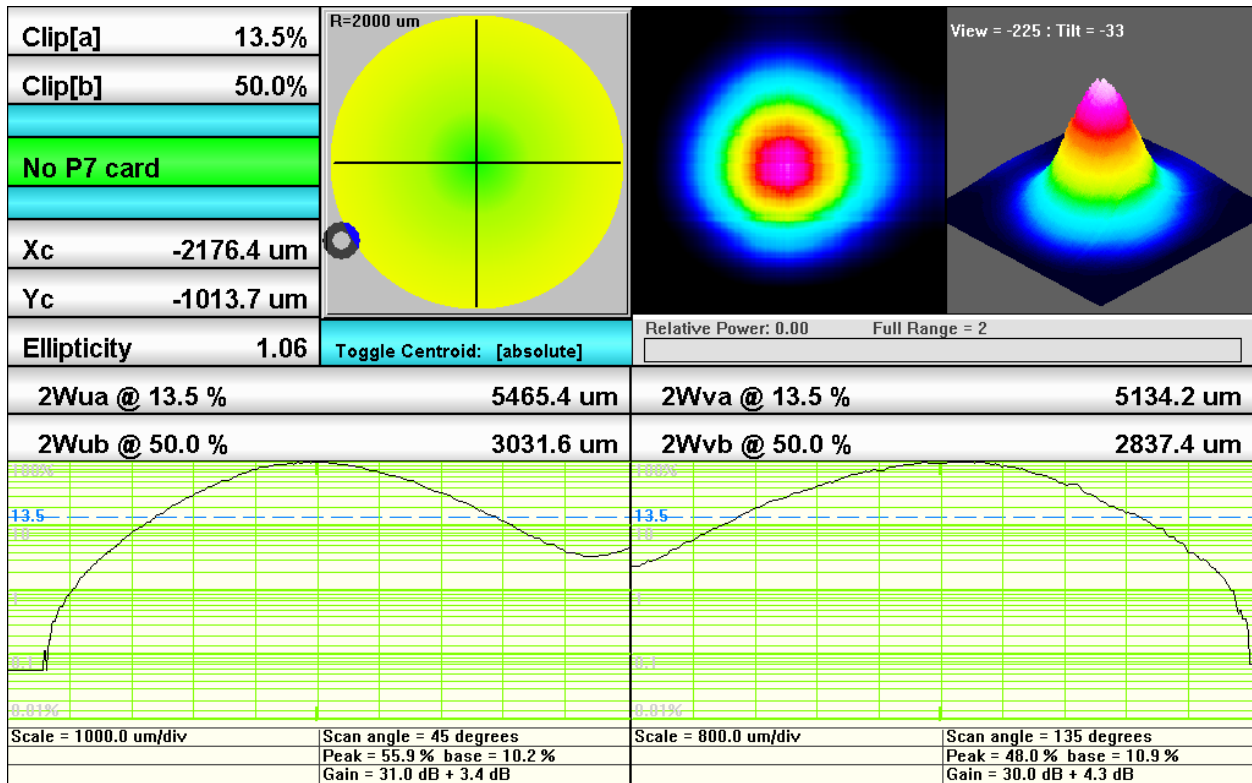
The right hand edge of Slit #1 has been set to the midpoint between the two beams.

The left hand edge of Slit #2 has been set to the midpoint between the two beams.

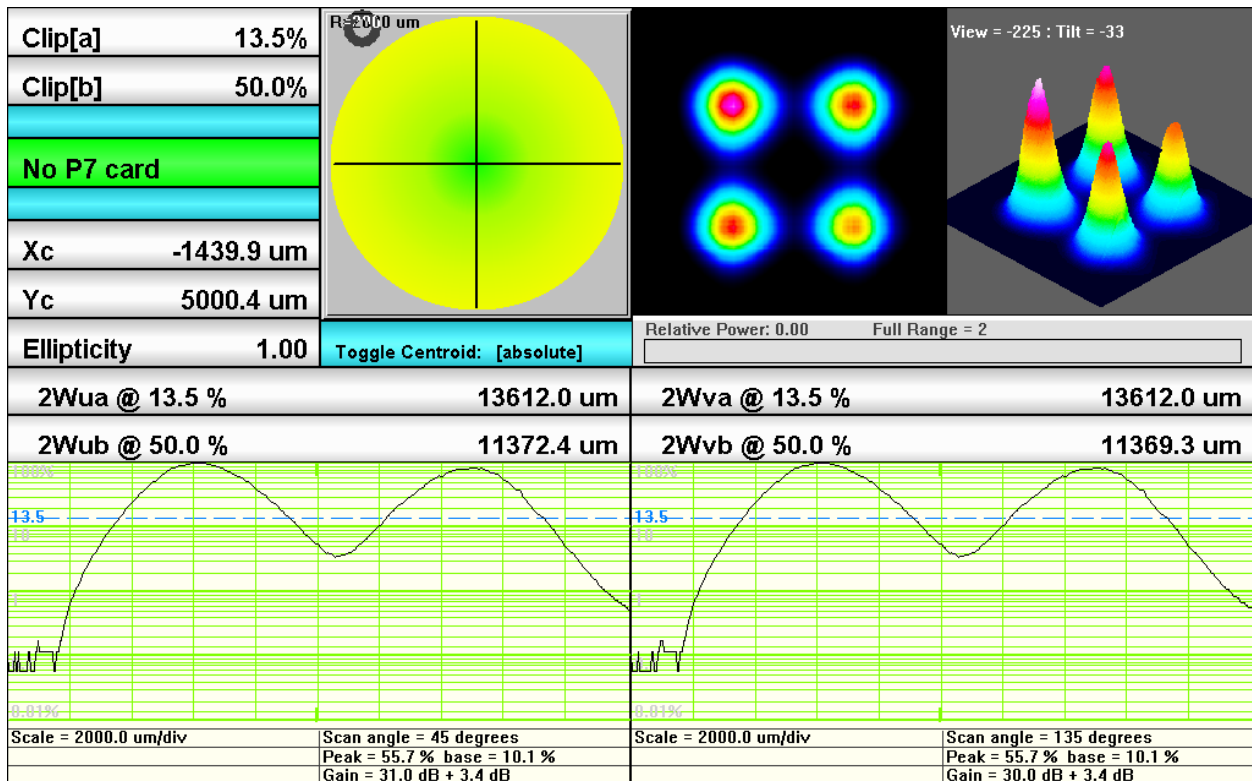
The right hand edge of Slit #2 has been set far to the right in order to get a good zero.

- Press **Go** to see the profiles shown below in **Linear normalized** and **Log 40 dB mode**. Note that in **Log 40 dB mode** the edges of the beam do meet the '<0.1 % on at least one side' criteria for correct zero setting.





If you do not do this and had left the software in default auto mode, you would have got this:



- Finally, go **File, Save Job File**, and save your settings for measurement of future large beams at the same centroid position. When you close the software, it always keeps the current settings, but if you ever 'lose' the settings or **Load defaults**, you can always go **File, Load Job File** to reload the scan settings used here. [If the centroid position varies by more than 0.5 mm, you may have to set the slits every time.]