# LaserCam HR II "Ghosting images"

With the introduction of the LaserCam HR II CCD camera, many improved performances have been realized. Lower overall noise, increased sensor sizing, and extension of the product due to obsolescence issues of the CMOS predecessor. It is important to understand that, due to the chip structure, camera pixels on the memory layer, and the process to get the data to the processor, there are Interactions with IR wavelengths that exhibit some vertical artifacts that can negatively impact calculations of beam diameter.

The 1/2" version of the camera is more susceptible to this than the 2/3" version, but both of these cameras can exhibit unacceptable errors in some situations. Understanding the methods to compensate for these errors is crucial.

- Increasing the integration time and attenuation reduces this effect significantly. The best tradeoff on accuracy and frame rate is near 100ms, but the 2/3" camera performs acceptably at integration times as low as 10ms.

- Adding an inclusion zone that effectively subtracts unwanted artifacts from the camera calculation will improve the behavior considerably.
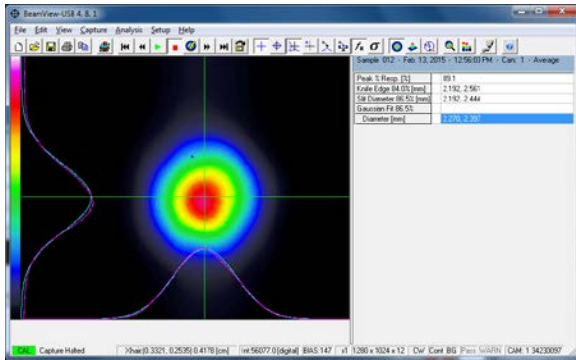
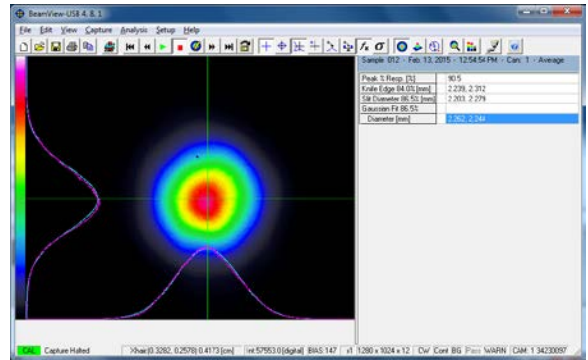**Examples of Ghosting and the effects of integration time:**
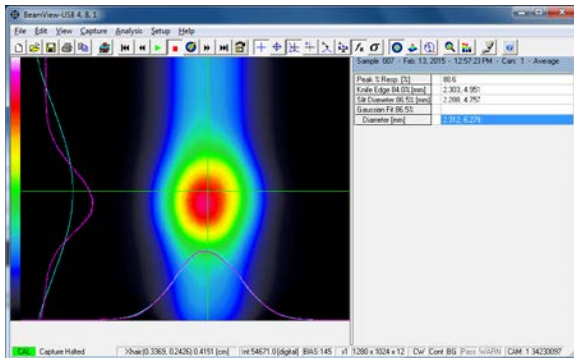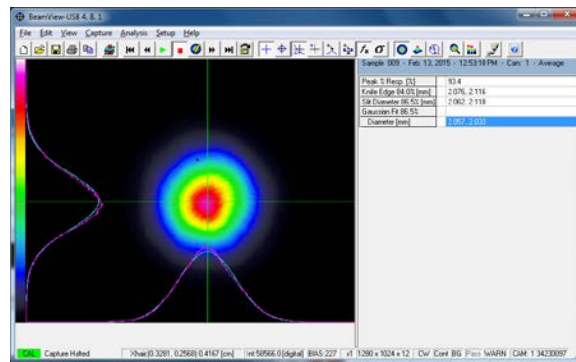

1ms integration time
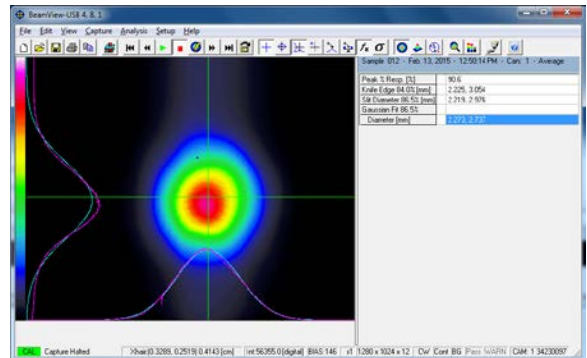
5ms integration time

10ms integration time
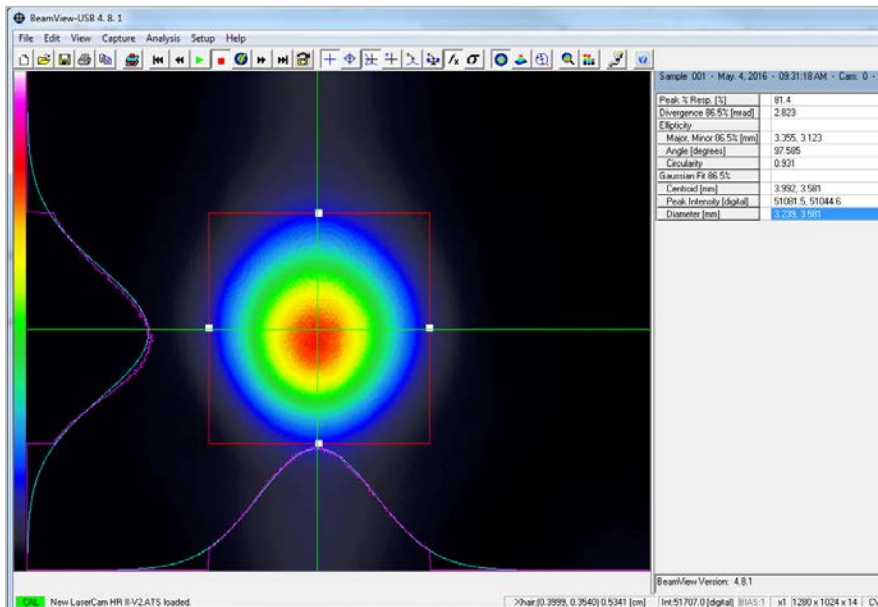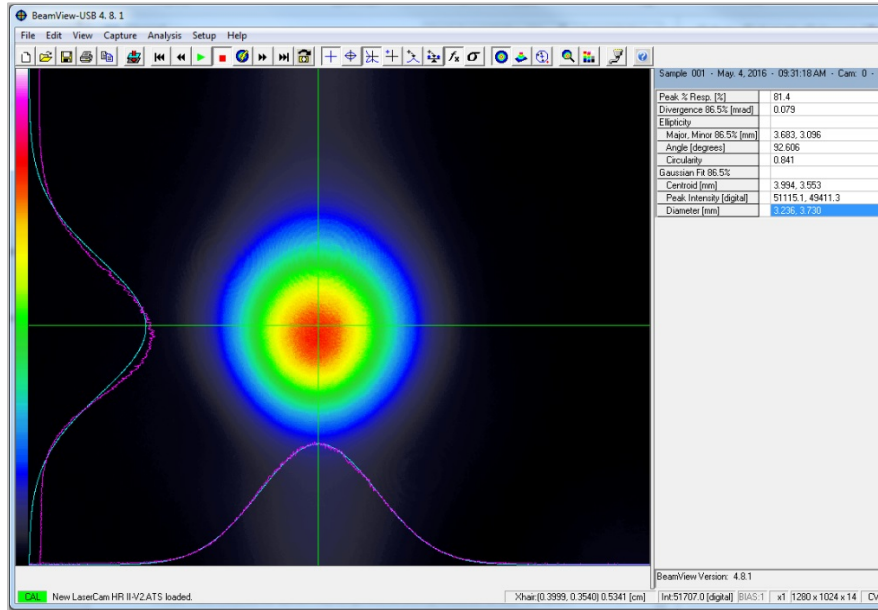

100ms integration time

1s integration time

You can see how the camera picks up the artifacts with the use of our 1047nm laser. The effects of integration time have a significant impact on the ghost image. When using the LaserCam HR 2/3" camera the effects of ghosting are almost eliminated with a 10ms integration time.

![Coherent logo]

Examples of use with Inclusion Zone:

Using "Inclusion Zone" selects the area which the camera will use in its data calculations. This effectively discards all data outside of the selected area.