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BeamProfiler pd1©

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Functional Interfaces // Ultrafast Spectroscopy

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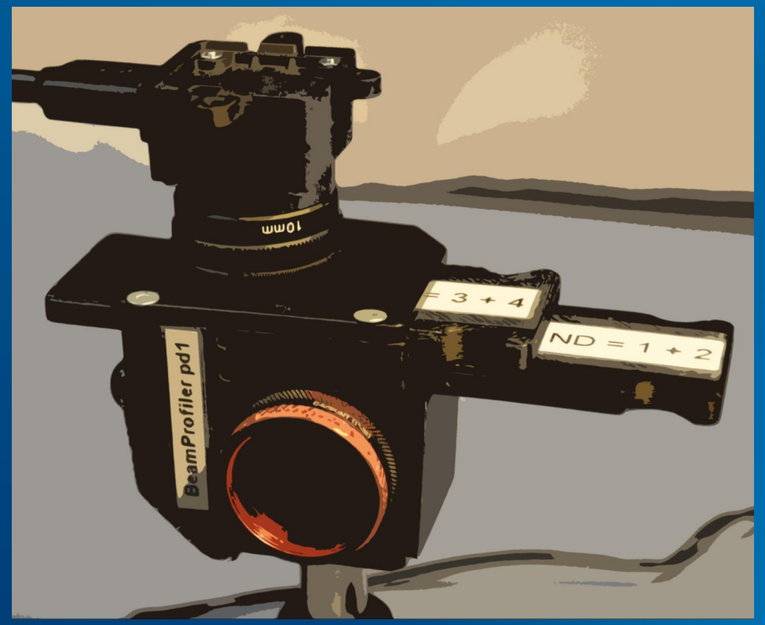

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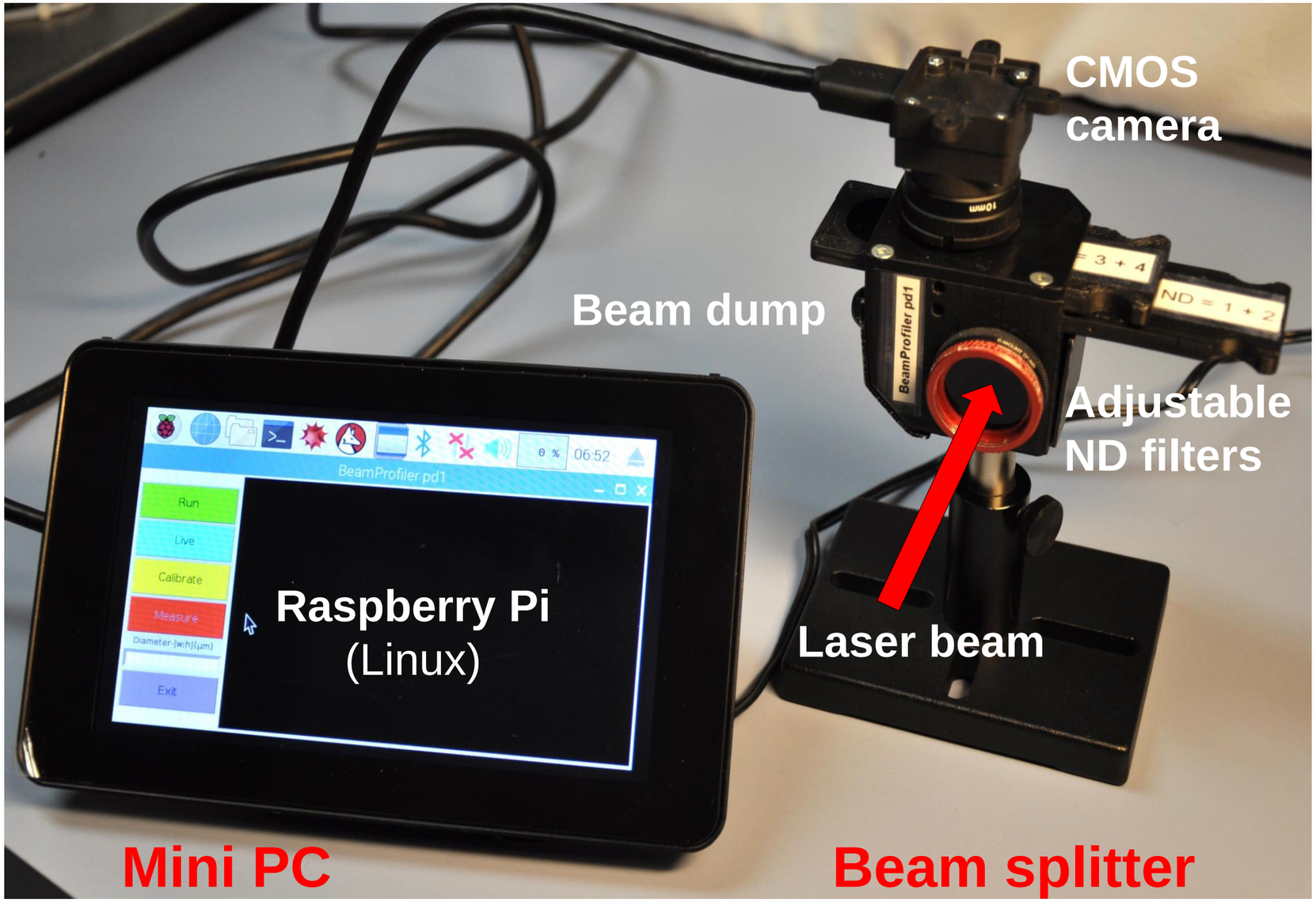
Components of the BeamProfiler pd1©



Camera parameter

- Sensor Size: 5,7 x 4,28 mm
- Pixel: 2592 x 1944
- Pixel Size: 2,2 x 2,2 µm

Laser beam

- Beam diameter: up to 4 mm
- Wavelength: 350 – 950 nm

BeamProfiler results

- Beam diameter $1/e^2$
- Width and height
- Image with scale

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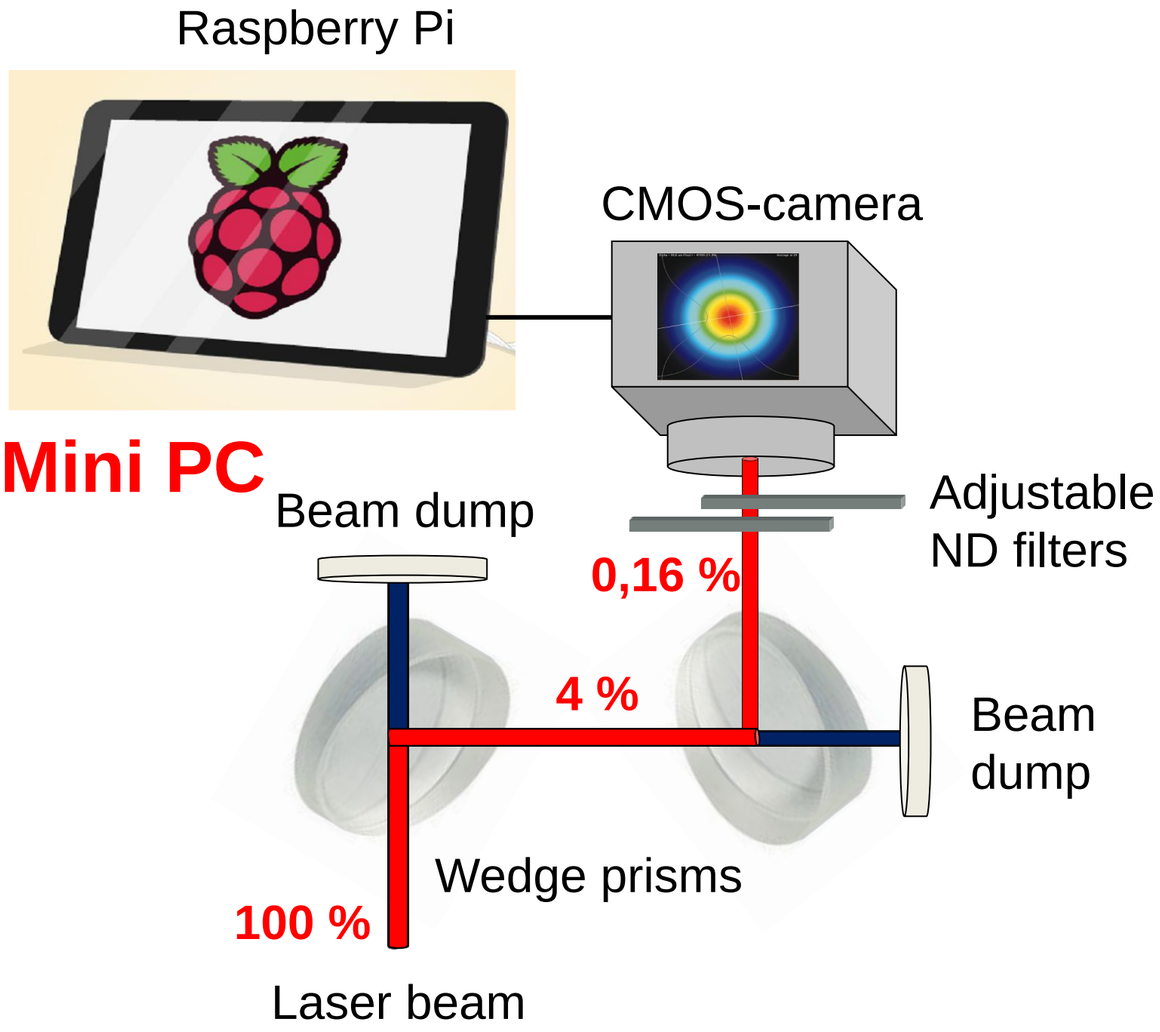
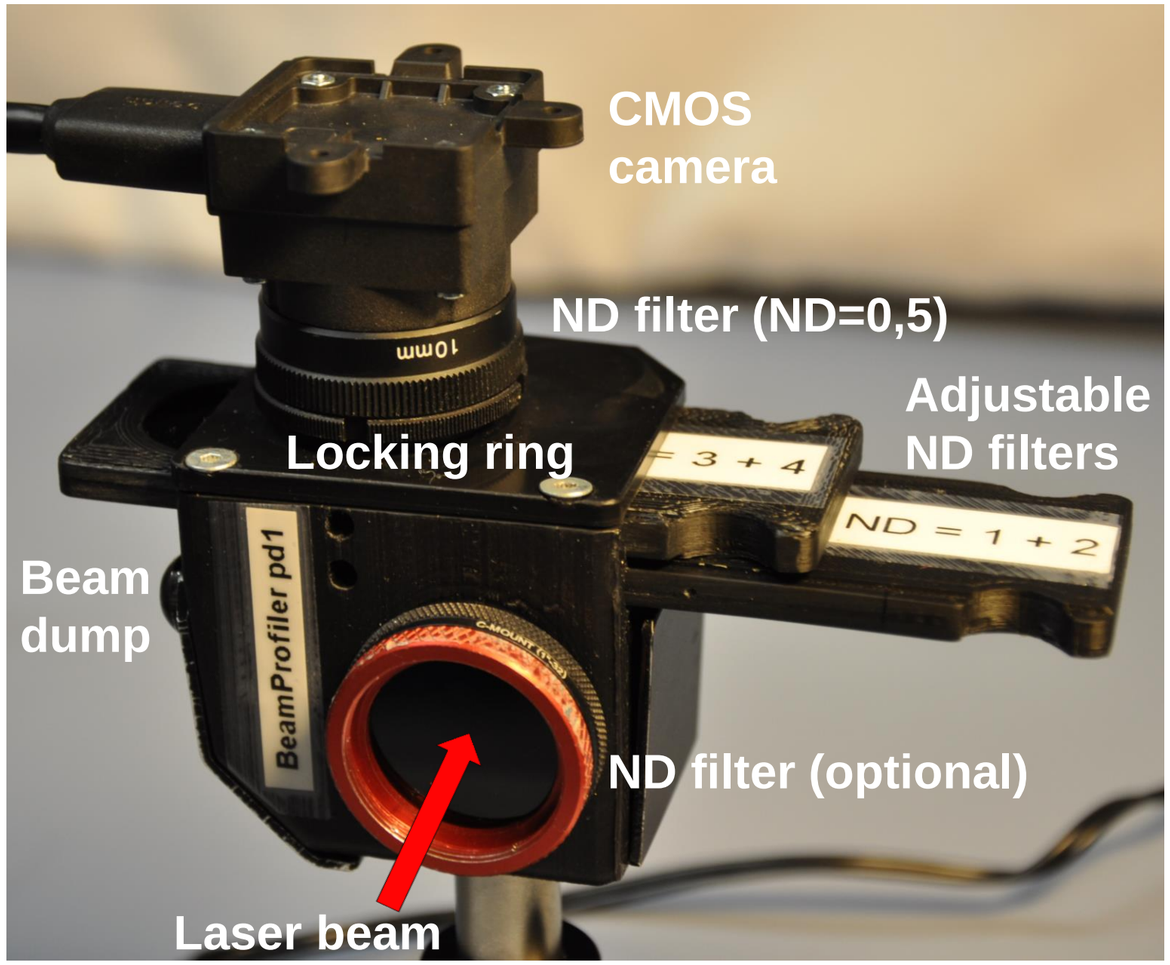
Setup of the BeamProfiler pd1©





Beam splitter

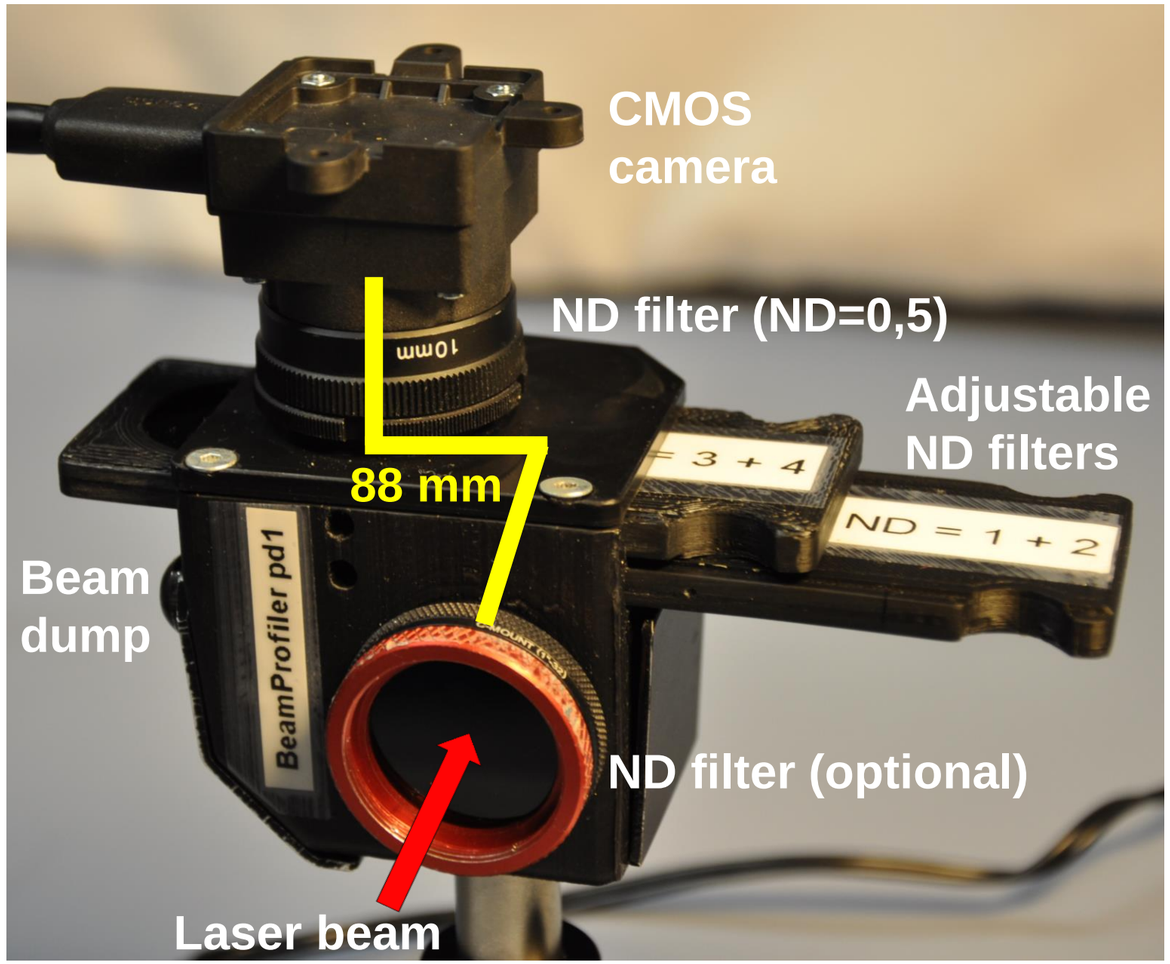
Adjustment of the BeamProfiler pd1©

Avoiding a damage of eyes and sensor

- Use the laser with the **lowest power**.
- **Attenuate the laser power** by external reducers (i.e. neutral density filter wheel).

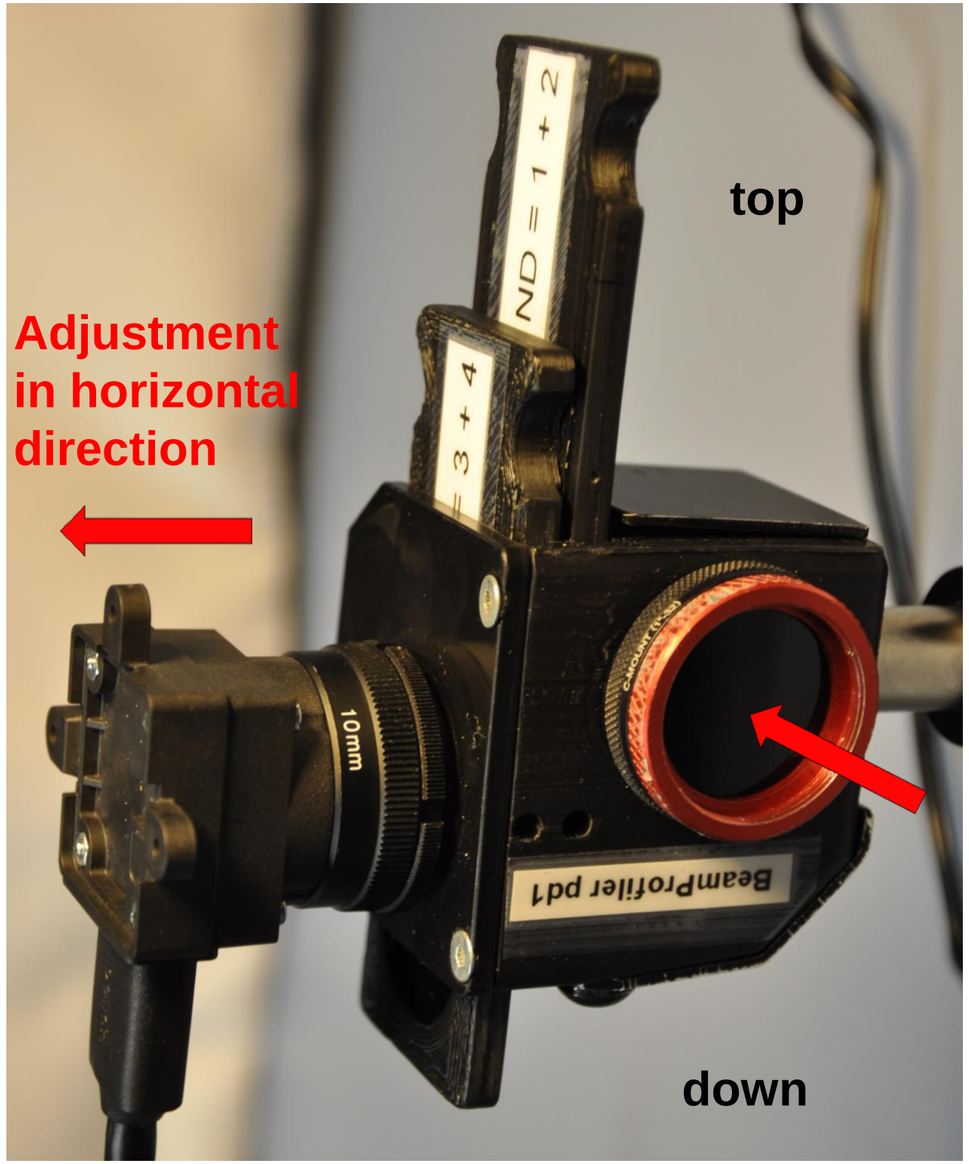
Adjustment of the BeamProfiler pd1©

- **Position the beam splitter** at the right position. Consider the **distance of about 88 mm** from entrance to the sensor.
- **Adjust the laser** through the beam splitter primarily without the camera to find the weak signal behind the wedges.
- **Turn off the camera** together with the ND filter very carefully from the beam splitter.
- **Put a white card** or a diffusion disk on the exit of the beam splitter and **adjust carefully the laser to the exit** of the beam splitter. Pay attention to the **laser safety**!
- **Turn on the camera** after adjusting the laser into the center of the exit of the beam splitter.



Beam splitter

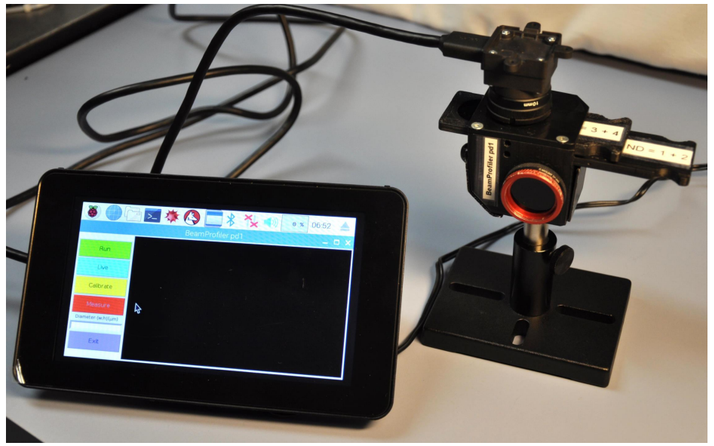
Changing the direction of the BeamProfiler



Operation of the BeamProfiler pd1©

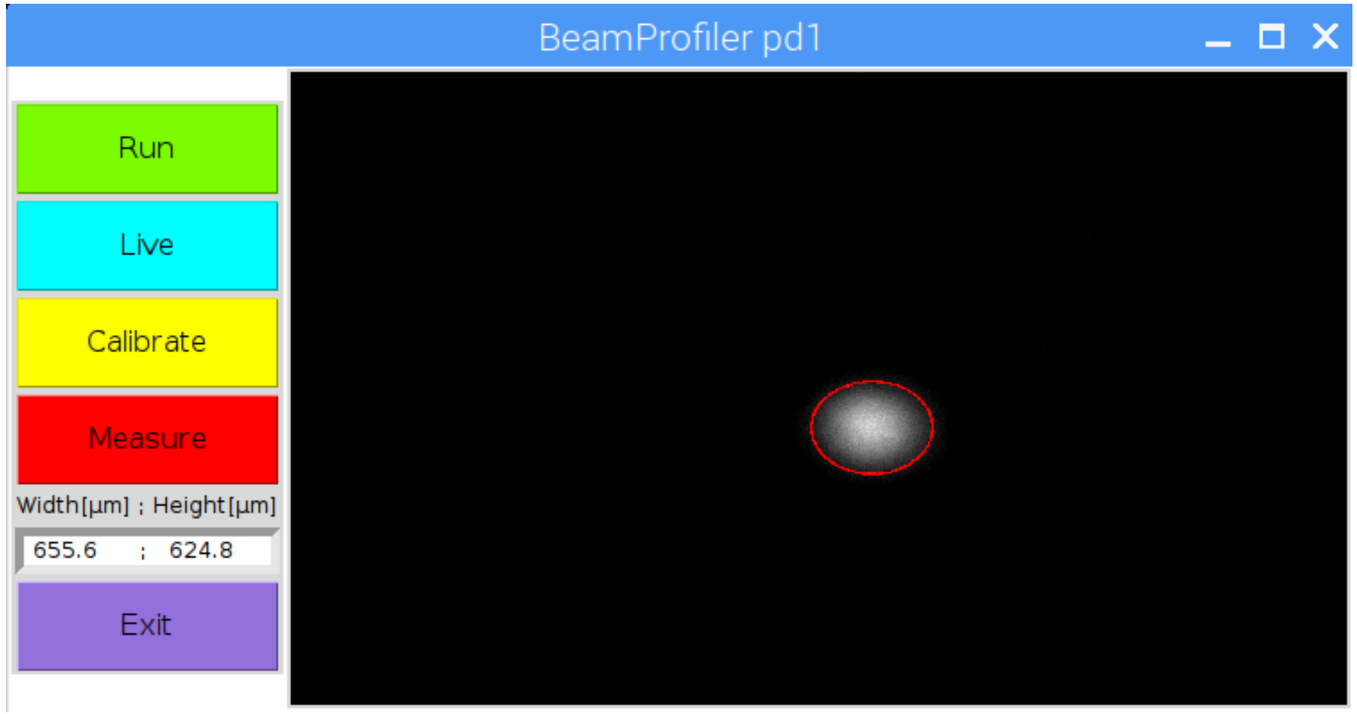
Operating with the Raspberry Pi

- **Connect the camera** with the single-board computer Raspberry Pi by a **Micro USB cable**.
- **Start the Raspberry Pi** by connecting the power cable.
- **Start the shell** “BeamProfiler.sh” in the top left of the desktop.

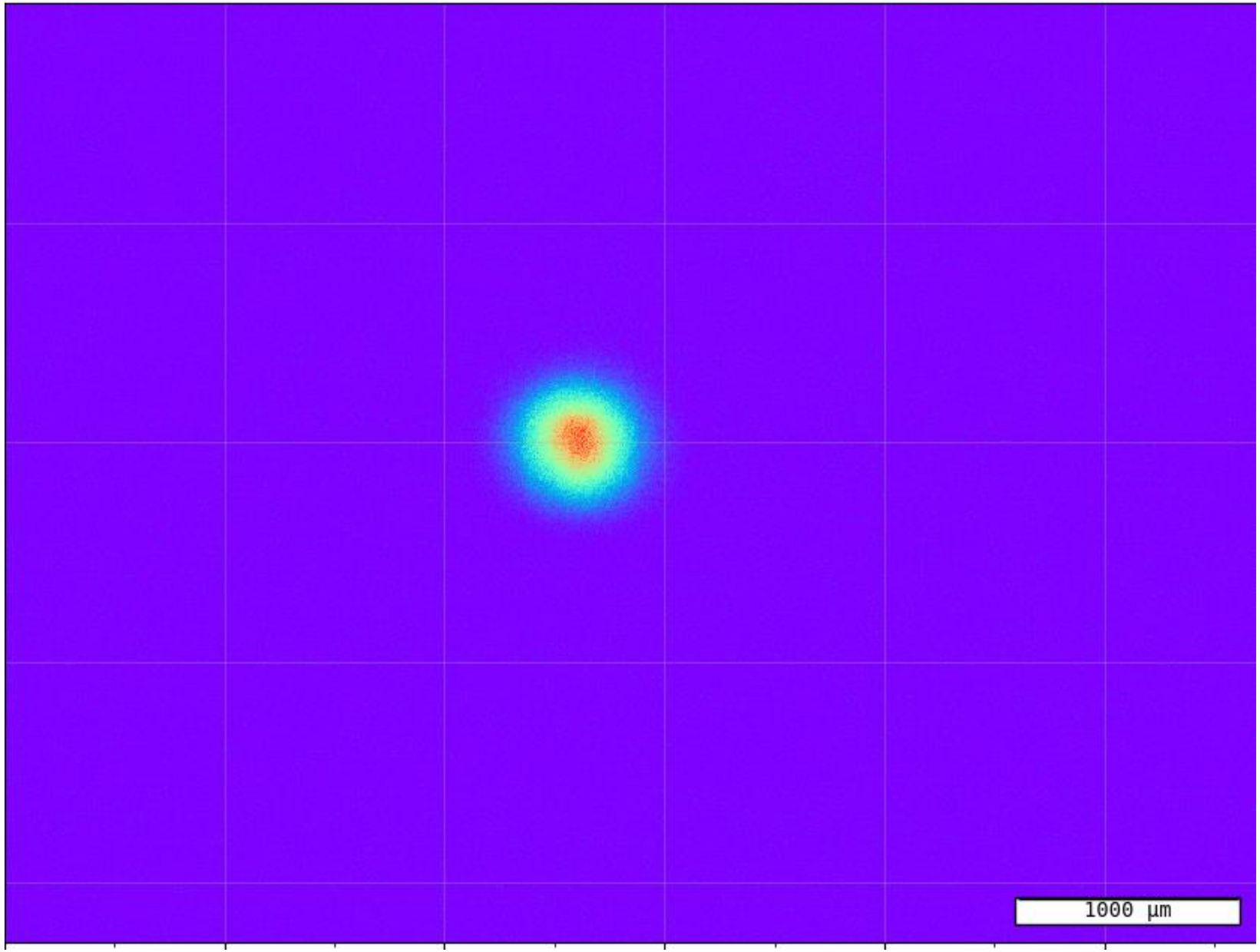


Measurement of a laser beam profile

- **Run:** for visualization of the laser beam during adjustment (Adjust the laser onto the camera carefully by adjustable ND filters).
- **Live:** for preliminary measurements of the laser beam profile
- **Calibrate:** for background correction (measurement without laser)
- **Measure:** for precise measurements of width and height of the laser beam ($1/e^2$) and saving the beam profile and beam parameter
- **Exit:** for finishing the software



Output of the image and the measurement result

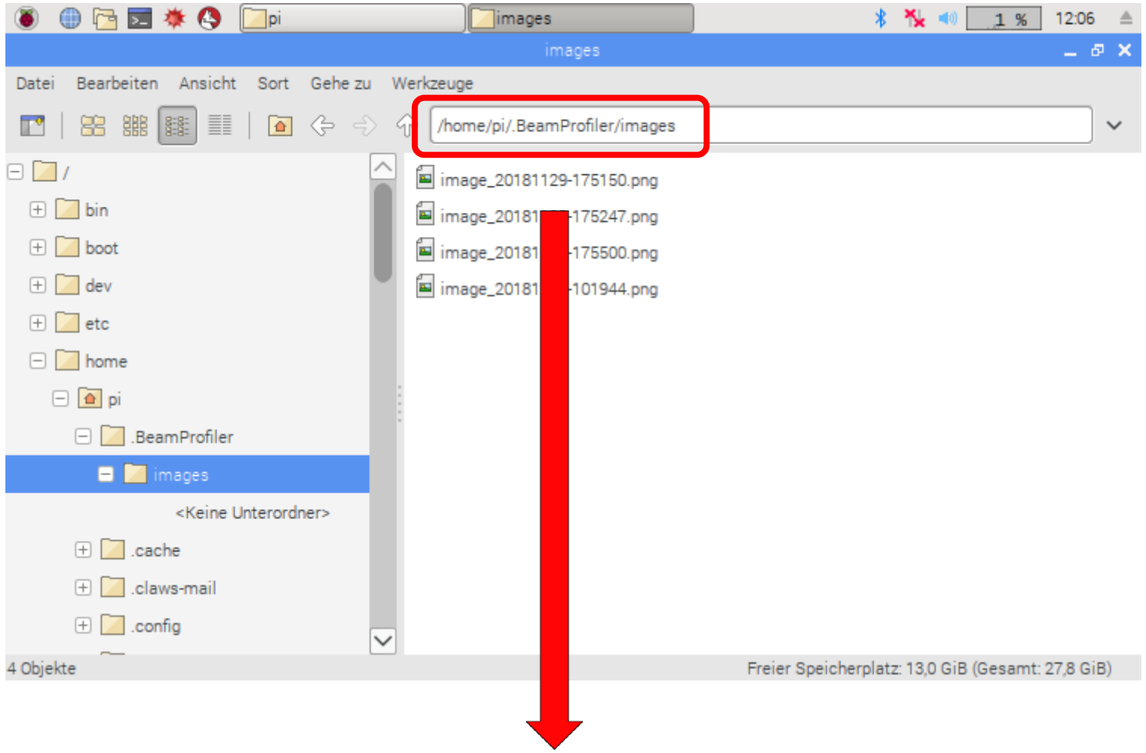


Beam paramter

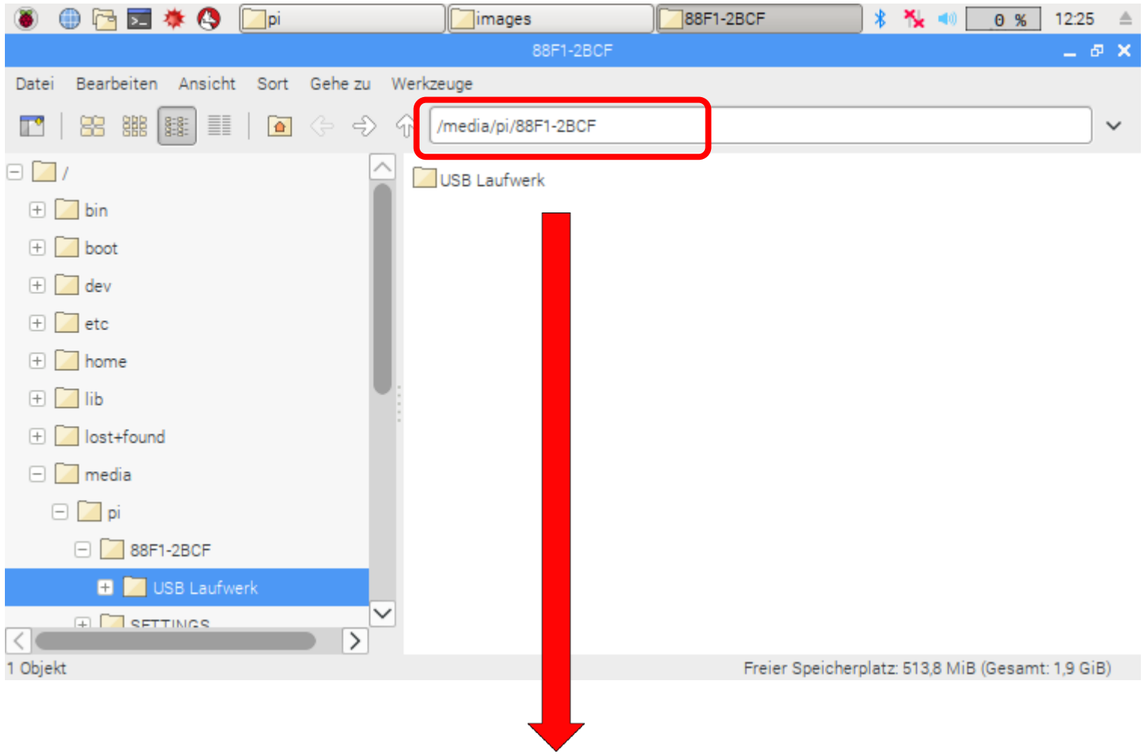
- Beam diameter $1/e^2$
- Width and height in µm

Directory structure of the Raspberry Pi

Directory for images



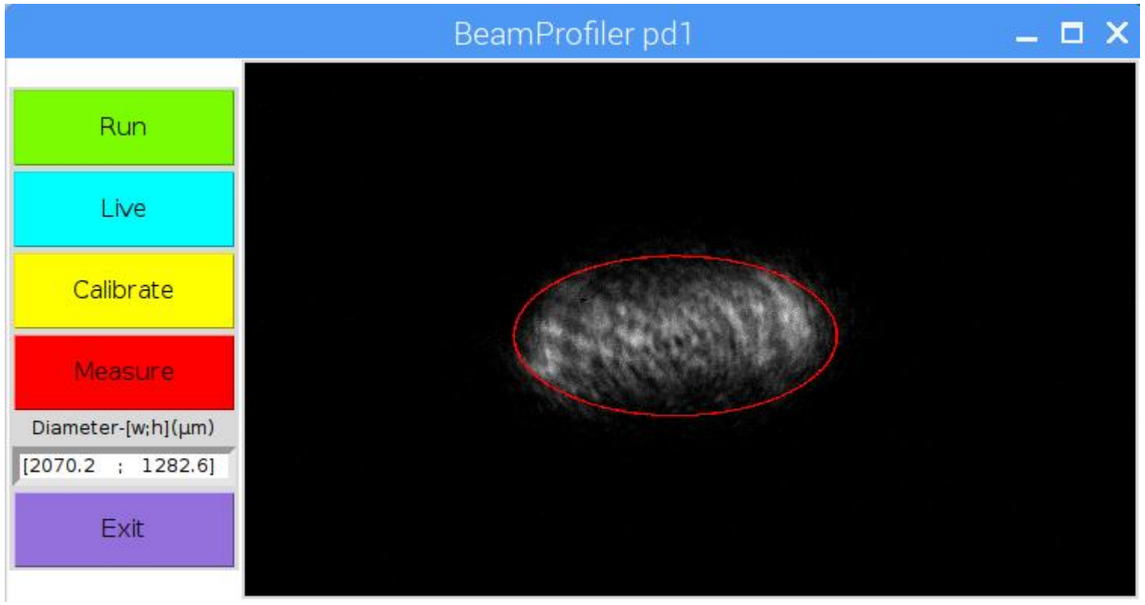
Directory for USB stick

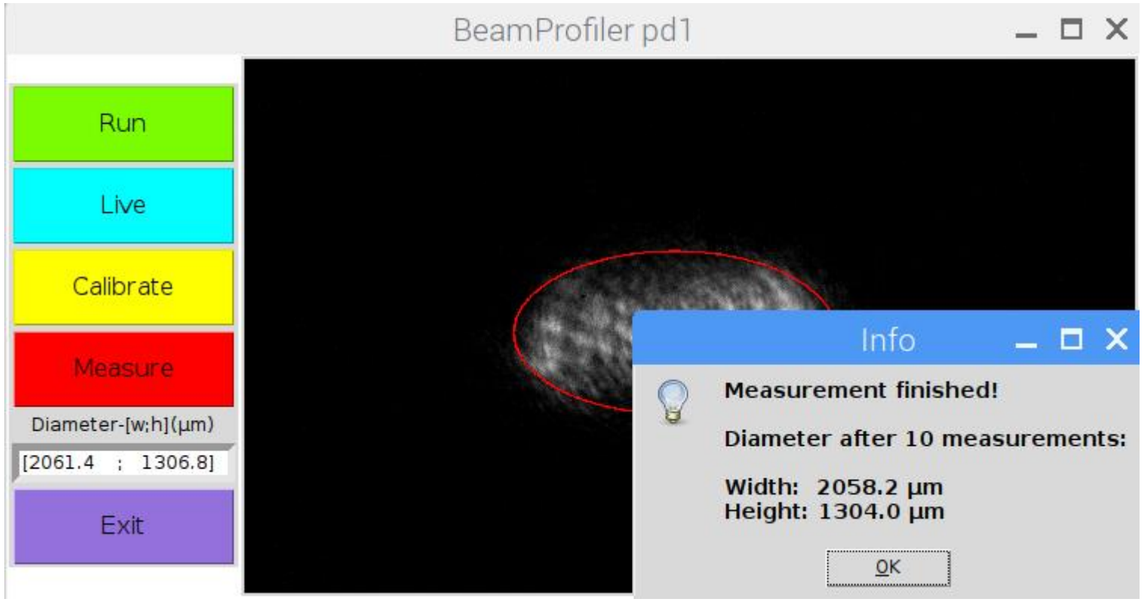


/home/pi.BeamProfiler/images

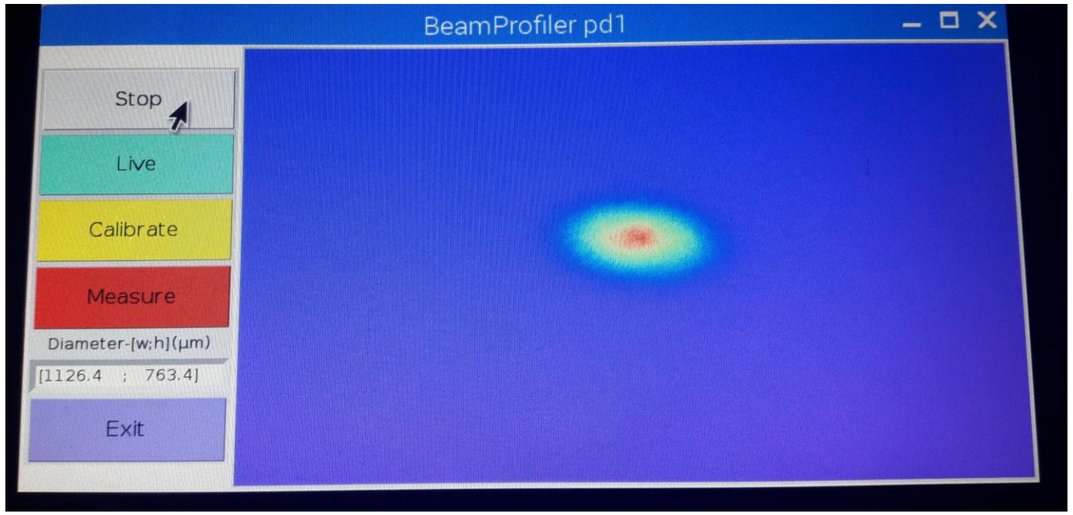
/media/pi/88F1-2BCF

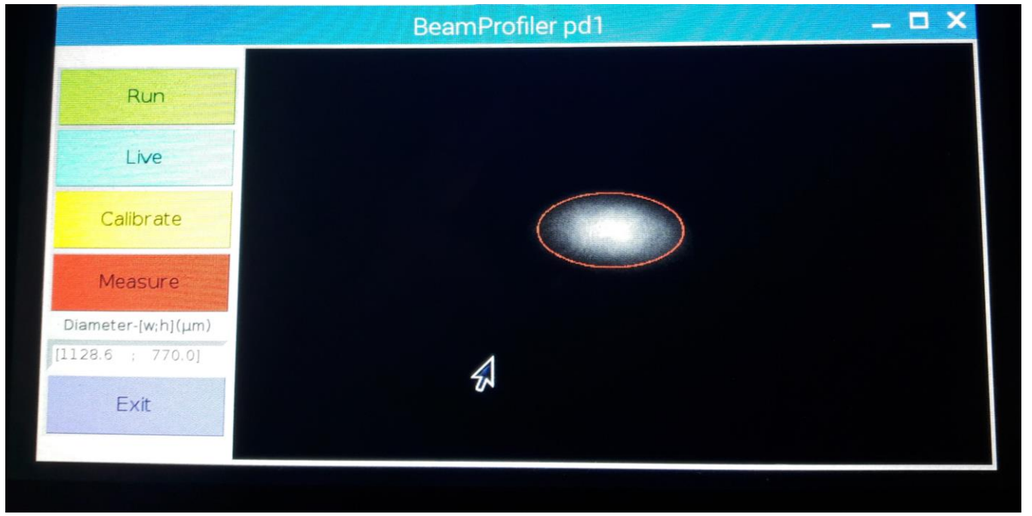
Examples: beam profile of a laser pointer

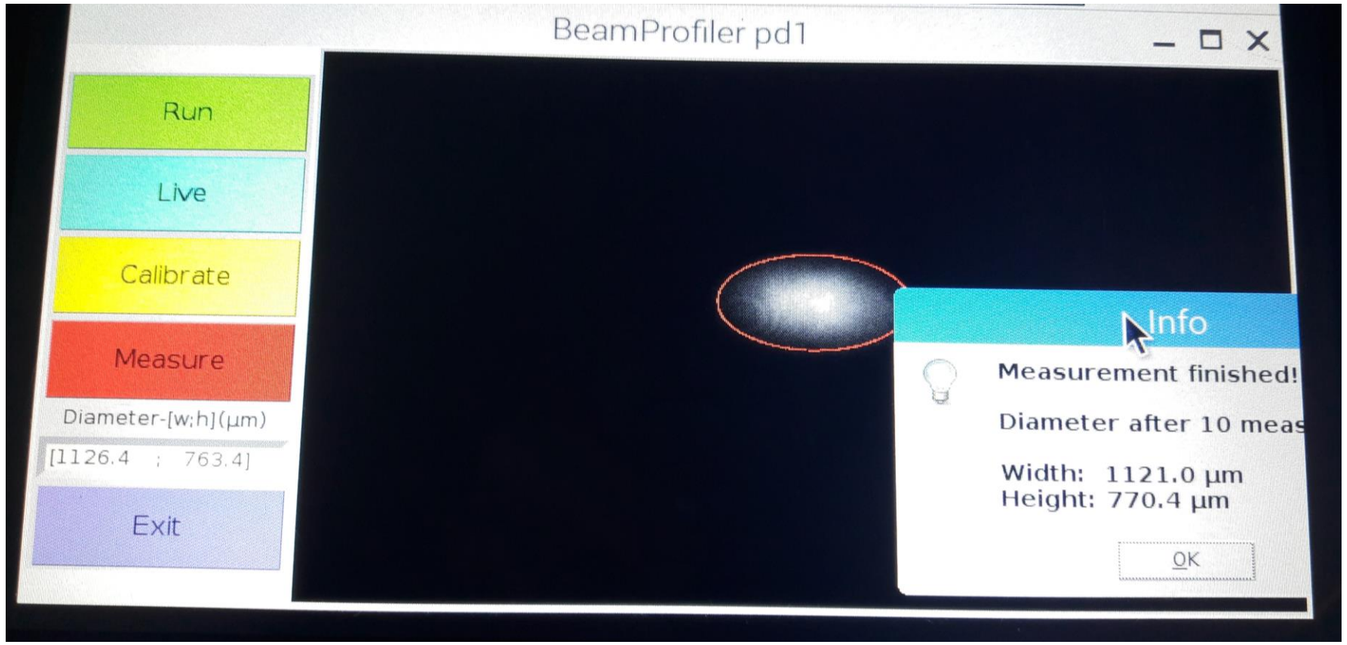




Examples: beam profile of the Tsunami laser (S21, streak camera)







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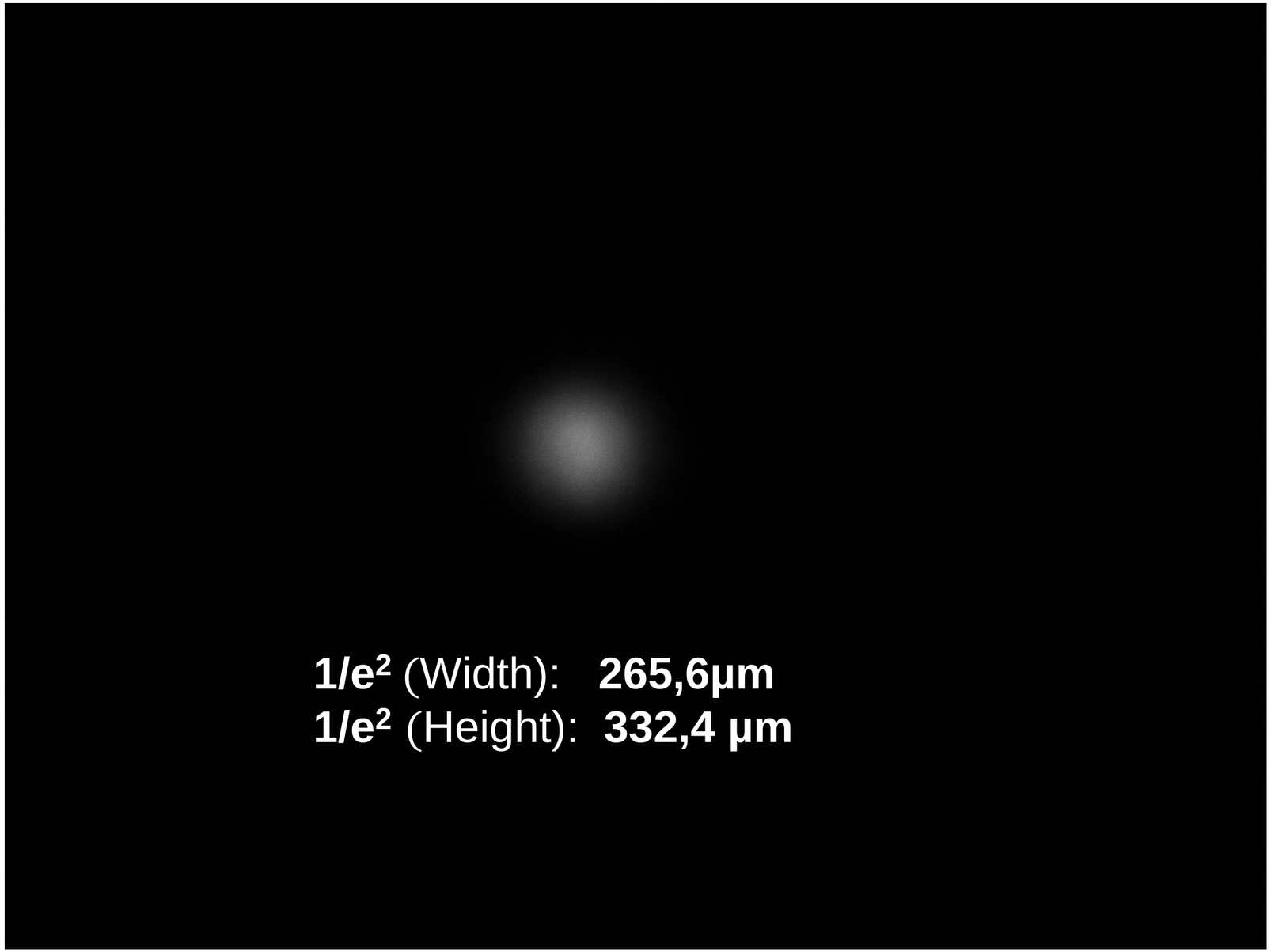
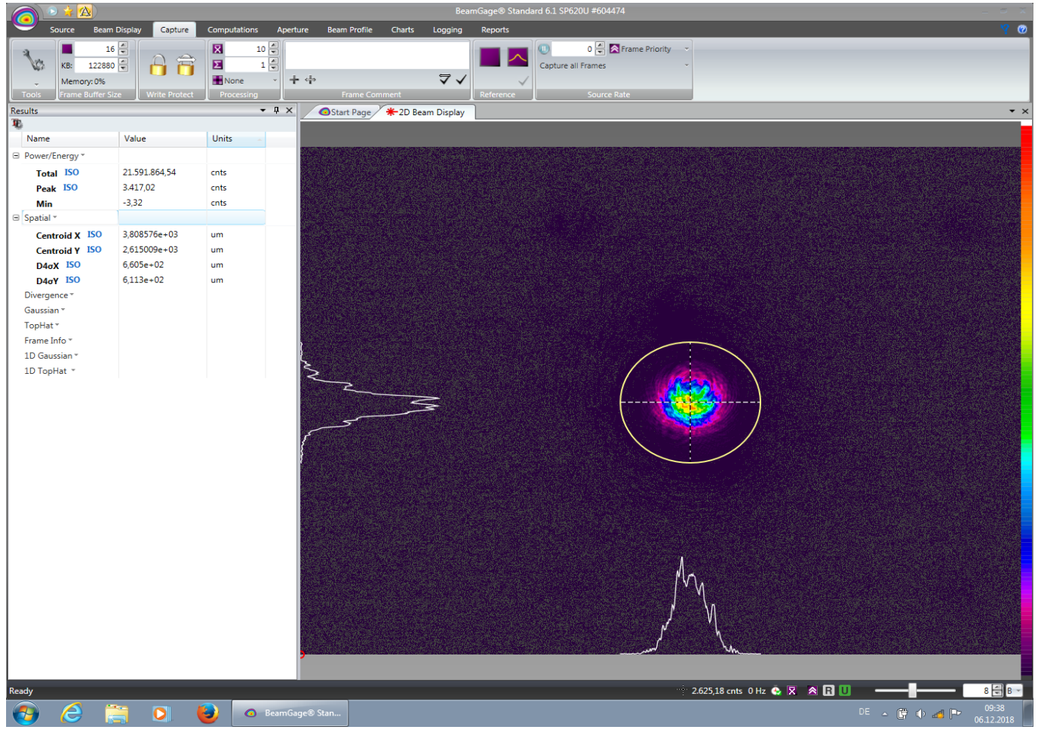
Examples: beam profile of the Legend (191.1, TA)



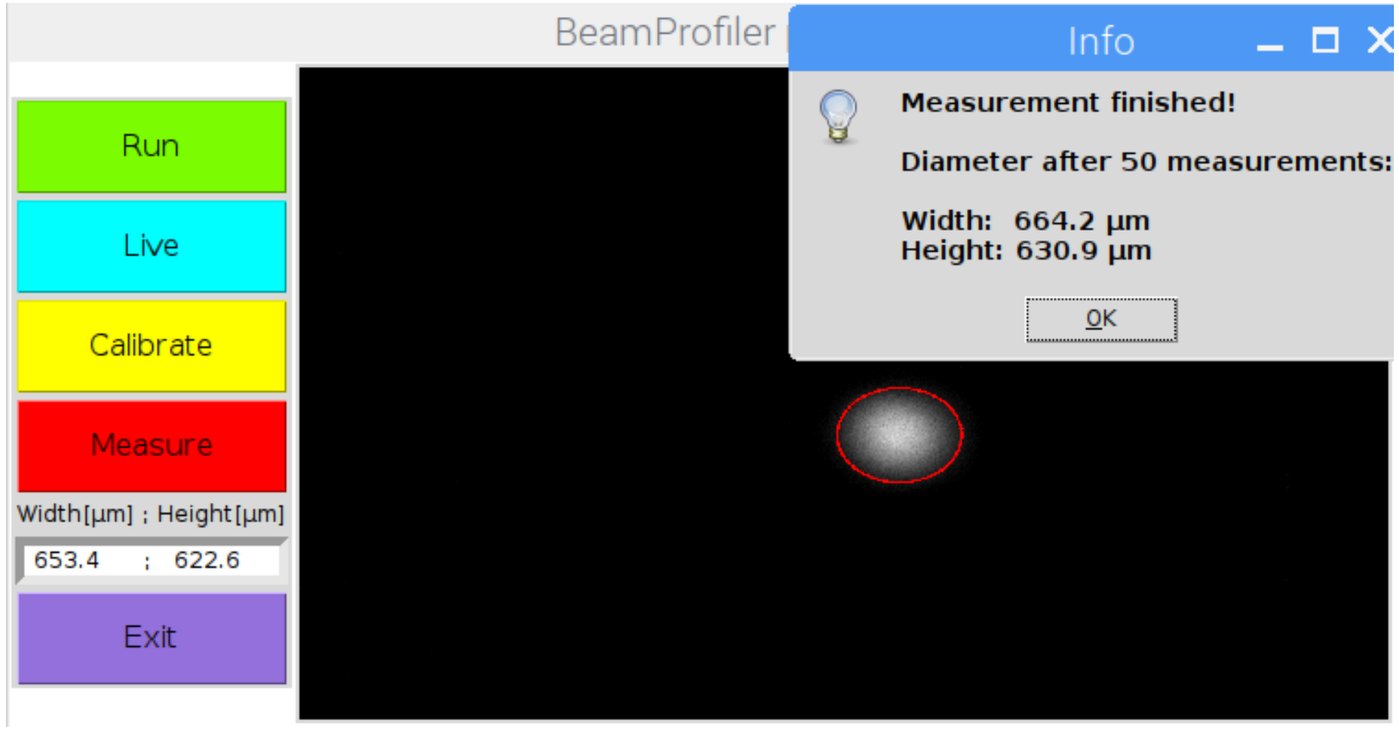
Comparison with commercial BeamProfiler (laser diode, LTG 218)

BeamGage (Spiricon)



D4σX (1/e²-Width): **660,5µm**
D4σY (1/e²-Height): **611,3 µm**

BeamProfiler pd1 (IPHT)



1/e² (Width): **664,2µm**
1/e² (Height): **630,9 µm**

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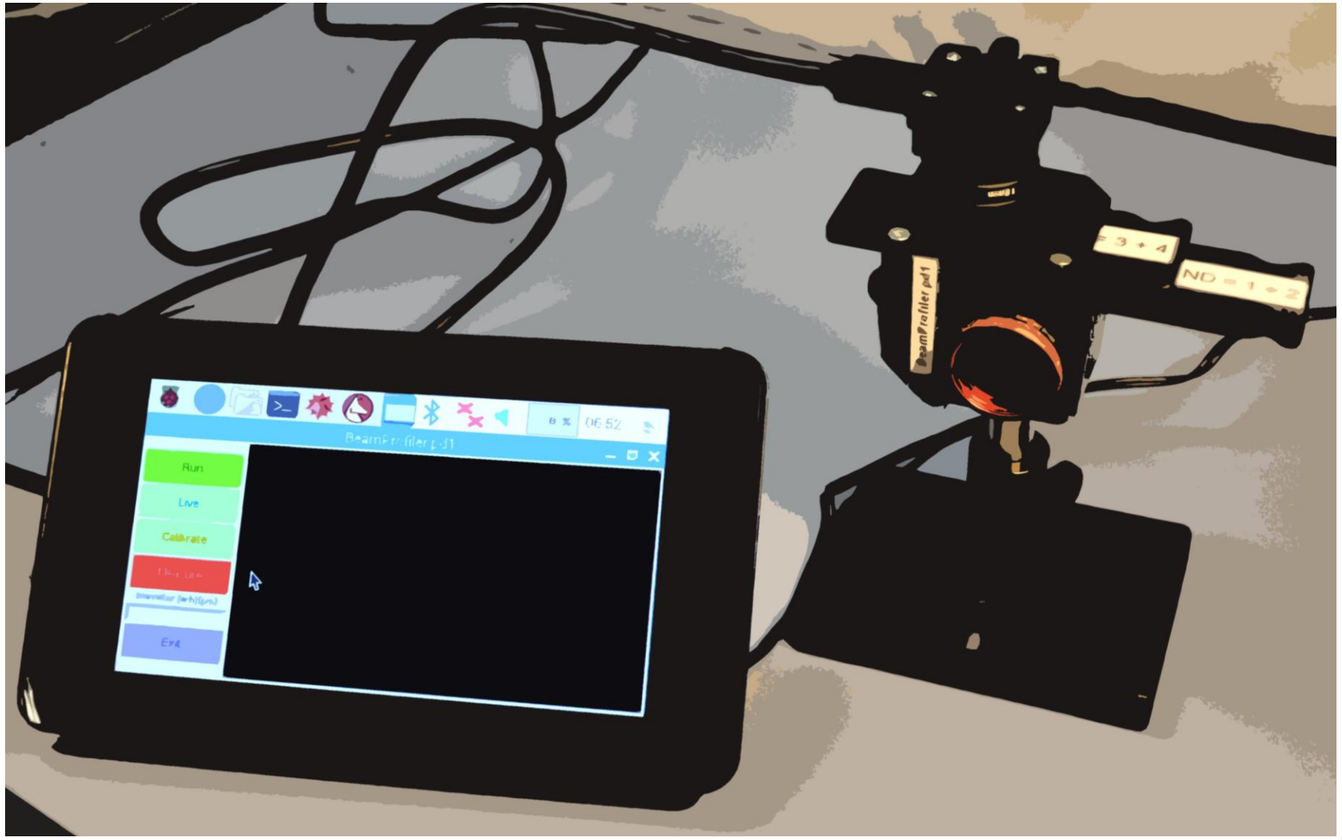
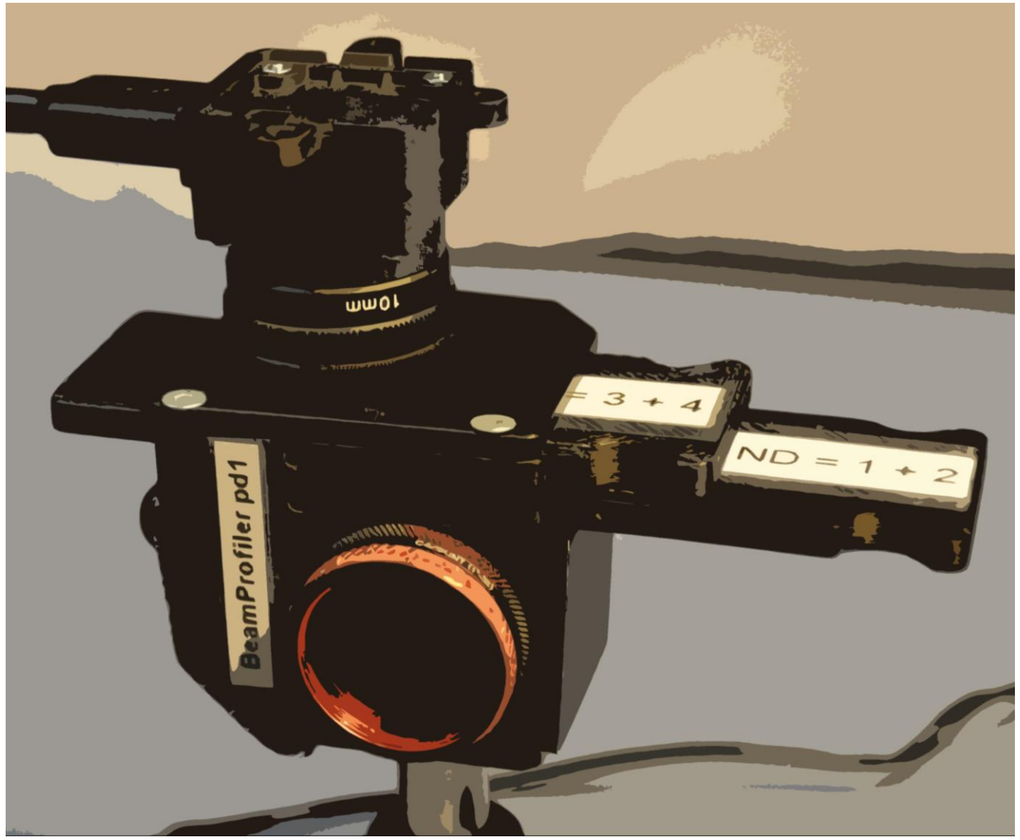
BeamProfiler pd1© - Questions?





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