Manual SimpleSync

General remarks

The SimpleSync is a small electronic device ('synchronizer') that coordinates the timing of a light source with a digital camera. It is connected to a computer (USB or wireless) and controlled via PIVlab, an open source PIV tool for MATLAB. The synchronizer also acts as a wireless hub for other devices from Optolution, e.g. lens controls and seeding generators.

Before using the SimpleSync, please download the *latest version* of PIVlab from here:

https://github.com/Shrediquette/PIVlab/releases/latest

The communication between PIVlab and the synchronizer in the device is implemented with a serial link. The driver ("CP210x Universal Windows Driver", supplied on the USB stick) must be installed. Check windows device manager to see if the dongle was installed properly:
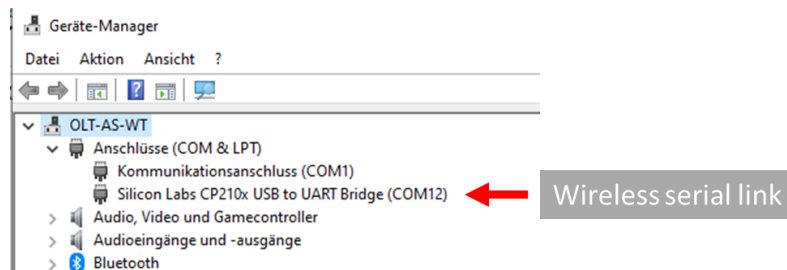

Figure 1: Windows device manager, serial ports.

Check windows device manager to see what COM port number was assigned to the synchronizer. The outputs of the SimpleSync generate a **3.3 V digital signal with a maximum current of 15 mA**.
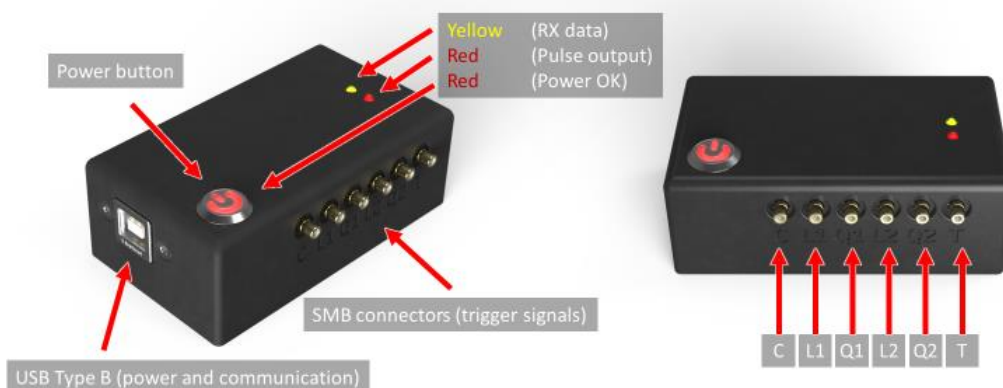
Hardware setup

Figure 2: The SimpleSync and the available interfaces.

- Connect the SimpleSync with the supplied USB cable and press the power button, the LEDs will flash briefly.
- PLEASE ONLY CONNECT ONE SYNCHRONIZER AT A TIME!
- Connect the camera to output "**C**" and the light source to output "**Q1**".
- Start PIVlab's image acquisition module to control the synchronizer (see below).

LEDs

There are three LEDs on the device, indicating the following:

- Red LED on power button: Power OK, ready to emit signals
- Red LED: Flashes with every 2nd pulse that is emitted
- Yellow LED: Data received from PIVlab
- All the LEDs flashing simultaneously: Interframe time too short
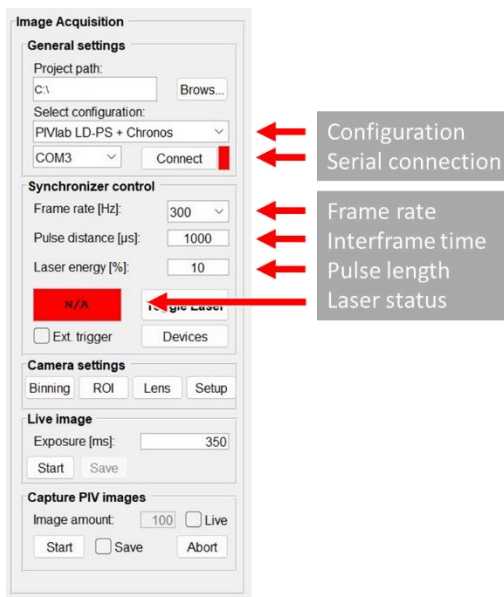
Control from PIVlab

Figure 3: PIVlabs image acquisition module.

Information about the installation of the OPTOcam can be found here:

https://github.com/Shrediquette/PIVlab/wiki/Setup-OPTOcam-camera

Information about the installation of the pco.panda can be found here:

https://github.com/Shrediquette/PIVlab/wiki/Setup-pco-cameras

Select a suitable configuration (for e.g. the OPTOcam select "PIVlab LD-PS + OPTOcam 2/80"), select the correct COM port for the synchronizer and hit connect. When you connect for the first time to your synchronizer, a message box will appear, asking you to insert the ID of the synchronizer (will be inserted automatically). This ID can be found on a small sticker on your device.

After hitting the connect button, the yellow LED on the synchronizer should flash briefly, and the laser status should change to "Laser OFF". Select suitable settings for your setup (frame rate, interframe time and laser energy) and start the synchronizer by clicking "Toggle Laser". The laser status should change to "Laser ON". The synchronizer will now emit pulses for the camera and the light source (indicated by the red led turning on). Click the toggle button again to turn off the laser.

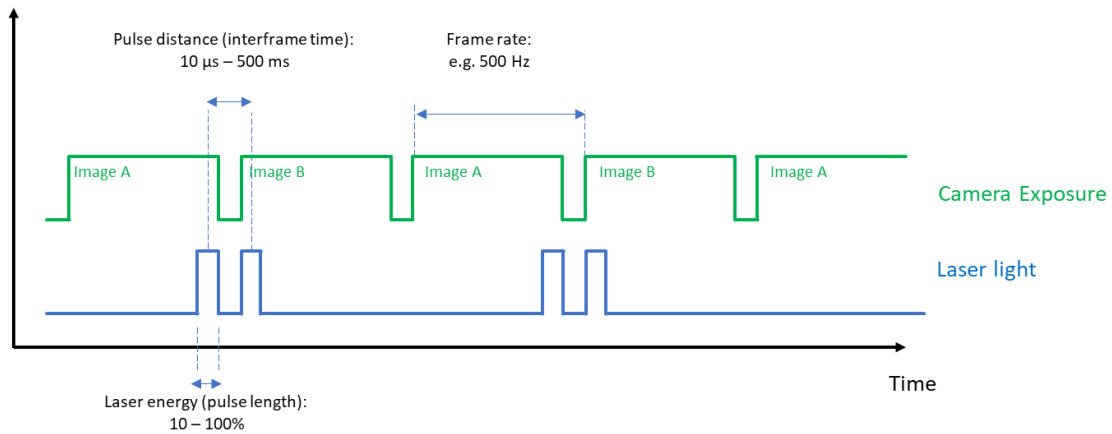"Frame rate", "pulse distance" and "laser energy" are defined in the following figure:

Figure 4: Definition of "Frame rate", "pulse distance" and "laser energy".

The setting for "laser energy" defines the pulse length. A setting of 100% means that the pulse length has approximately the same length as the pulse distance. The exact pulse length depends on a number of parameters, therefore it is in the PIVlab GUI after the synchronizer has been turned on. A higher laser energy makes the particle images brighter, but it will also increase the motion blur.
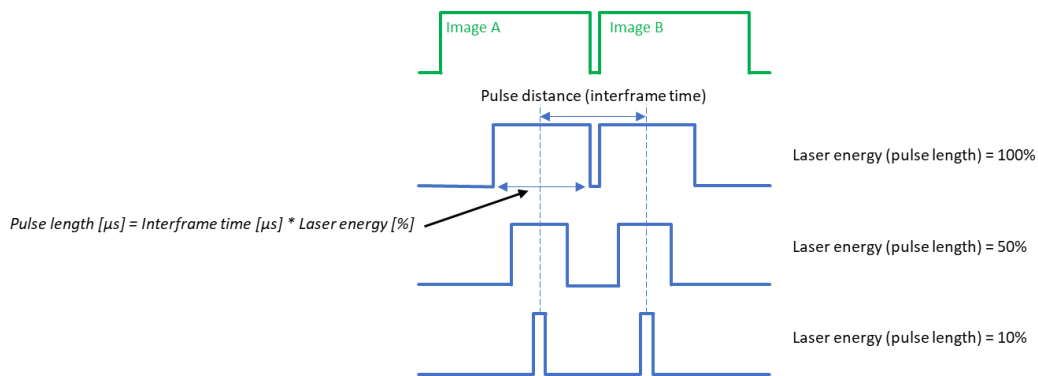

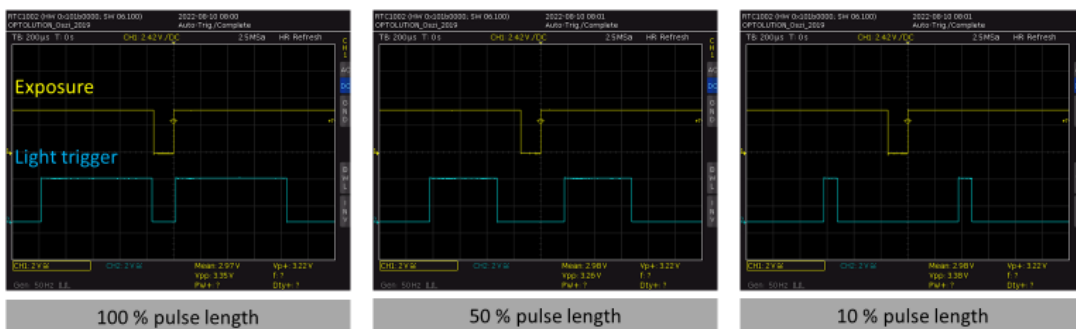*Figure 5:Details on the relation of laser energy and pulse length.*

Figure 6: Oscilloscope trace of the synchronizer. Framerate set to 100 Hz.