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Supported by

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L'Openlab

Design, science, education & Innovation



F.D.V.



- ✓ Synchronize any PC with UTC time.
- ✓ Delay controled with microsecond precision (Firing).



Time UTC  
12:45:26.153.825

<http://www.timeBOXutc.com>  
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# UTC time in astronomy

Get the UTC (Coordinated Universal Time) from GPS satellites with great precision ( $4\mu\text{Sec}$ ).

## Astronomy

- Astrometry.
- PHEMU's.
- Asteroid occultation.

PC time synchronization.



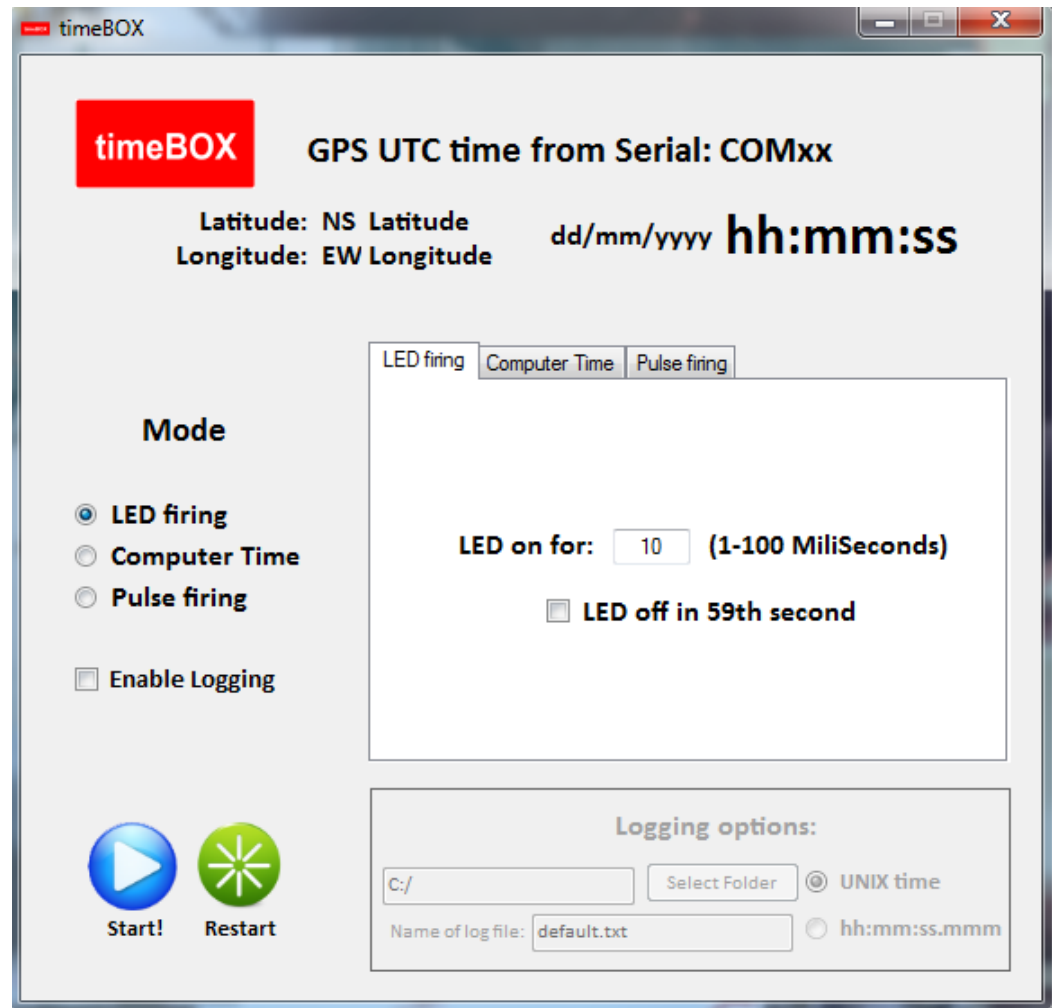
*SYRTE (CNRS, Observatoire de Paris) Atomic Clock tests.*

## LED firing

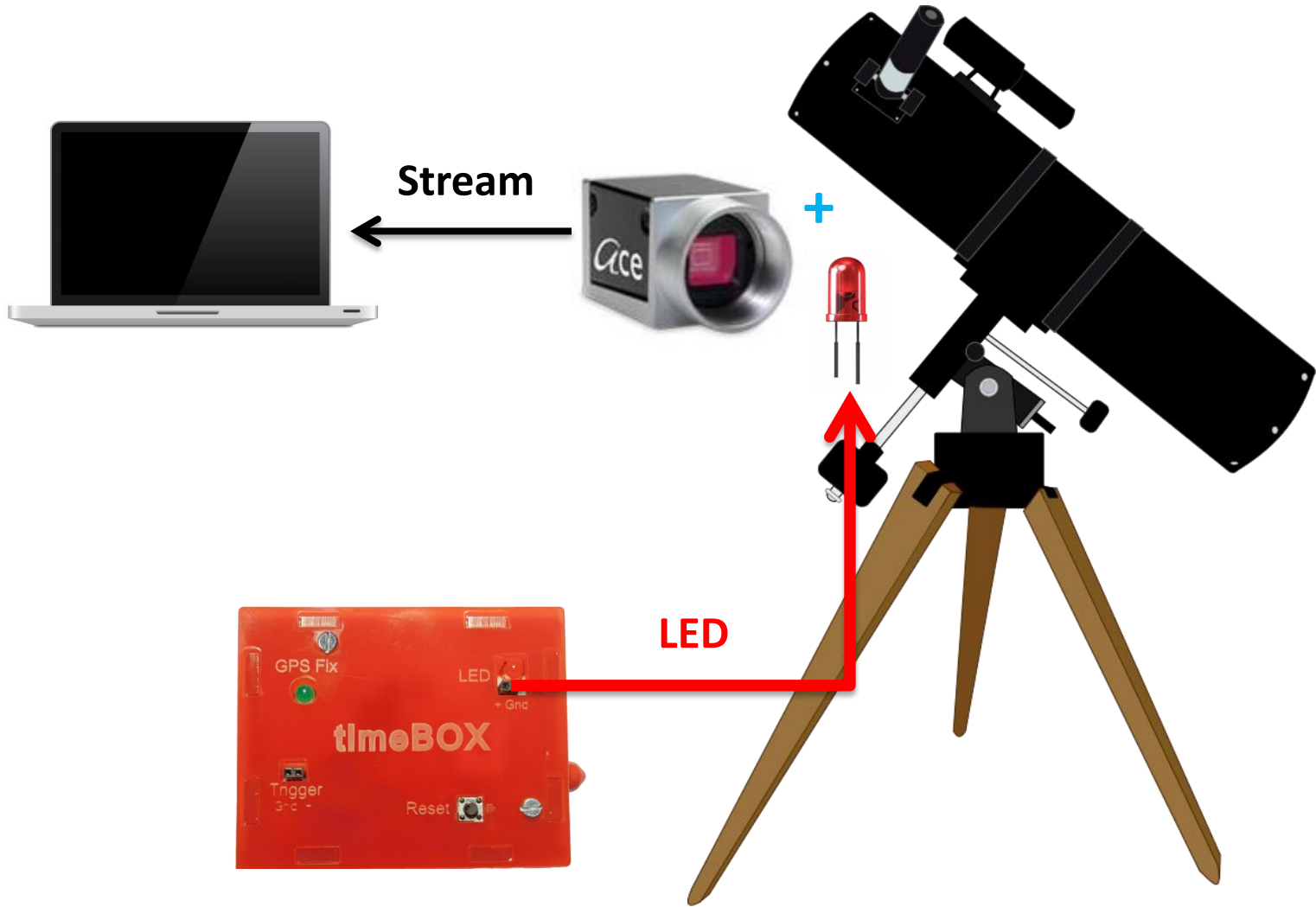
Use the timeBOX LED to insert the UTC time on any video recording:

### Features:

- ✓ Low delay (4 $\mu$ Sec) from UTC.
- ✓ Time-controlled pulse.
- ✓ Disable the 59th second firing (optional).
- ✓ Square pulse suited for triggering (1Hz).



# LED firing

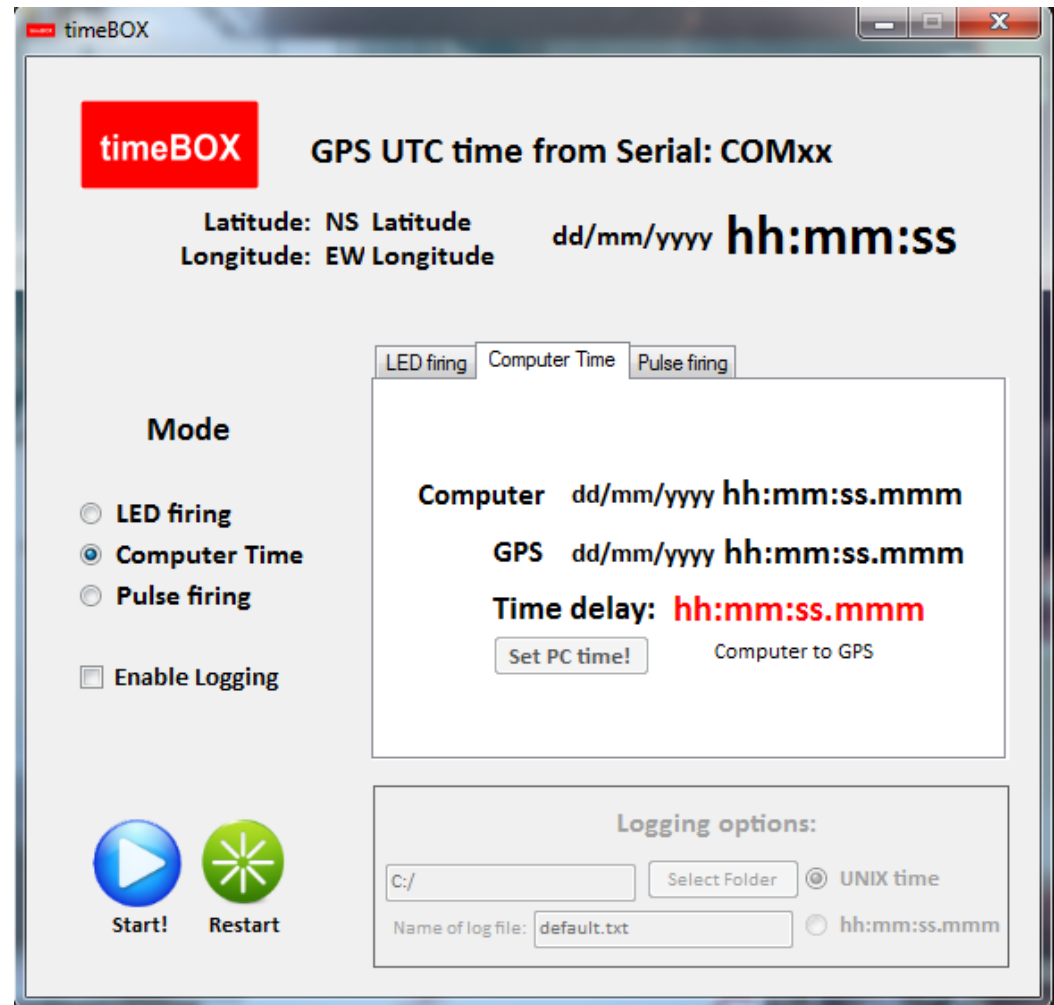


# Computer time synchronization

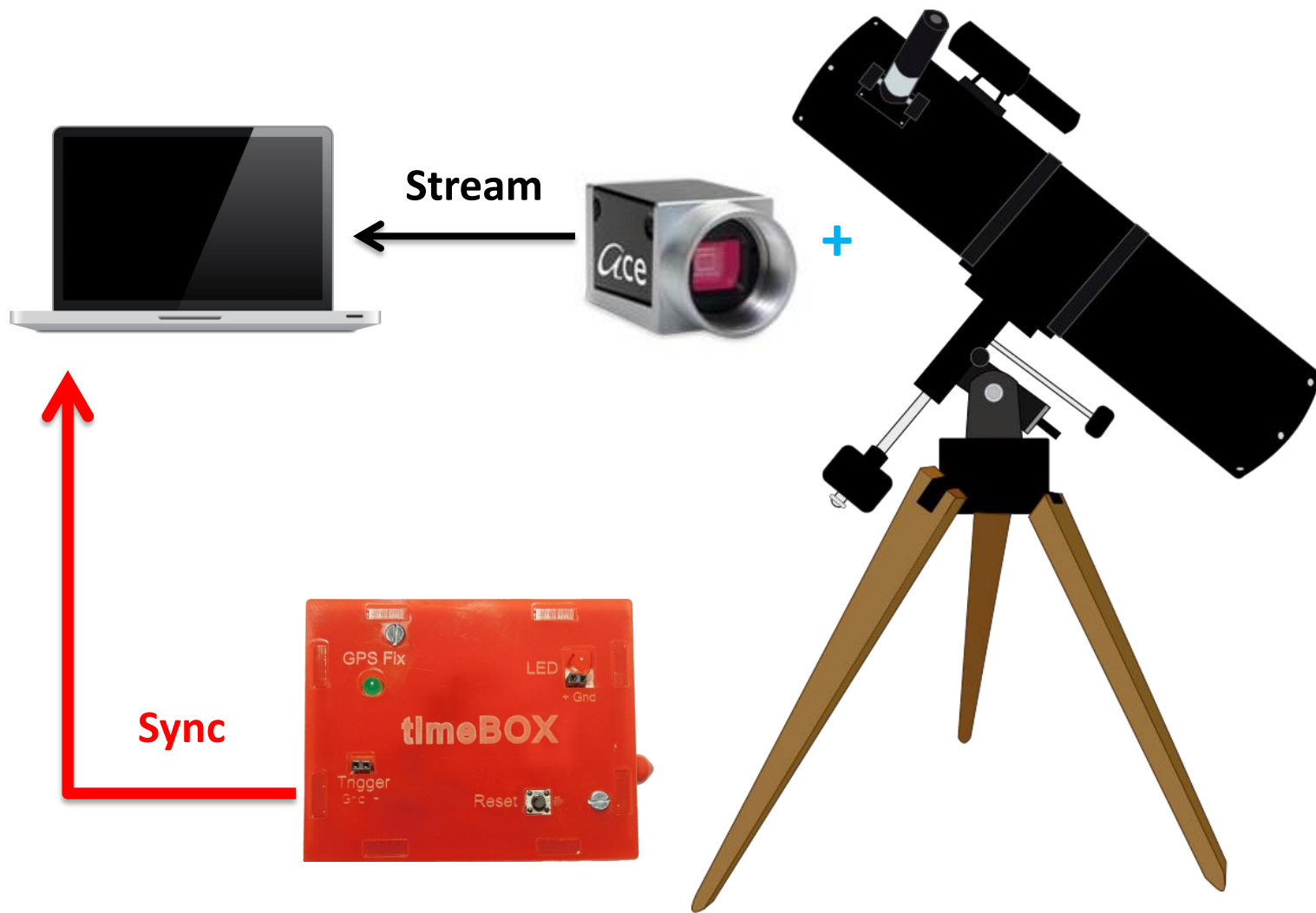
Use the timeBOX to synchronize the PC time with the UTC.

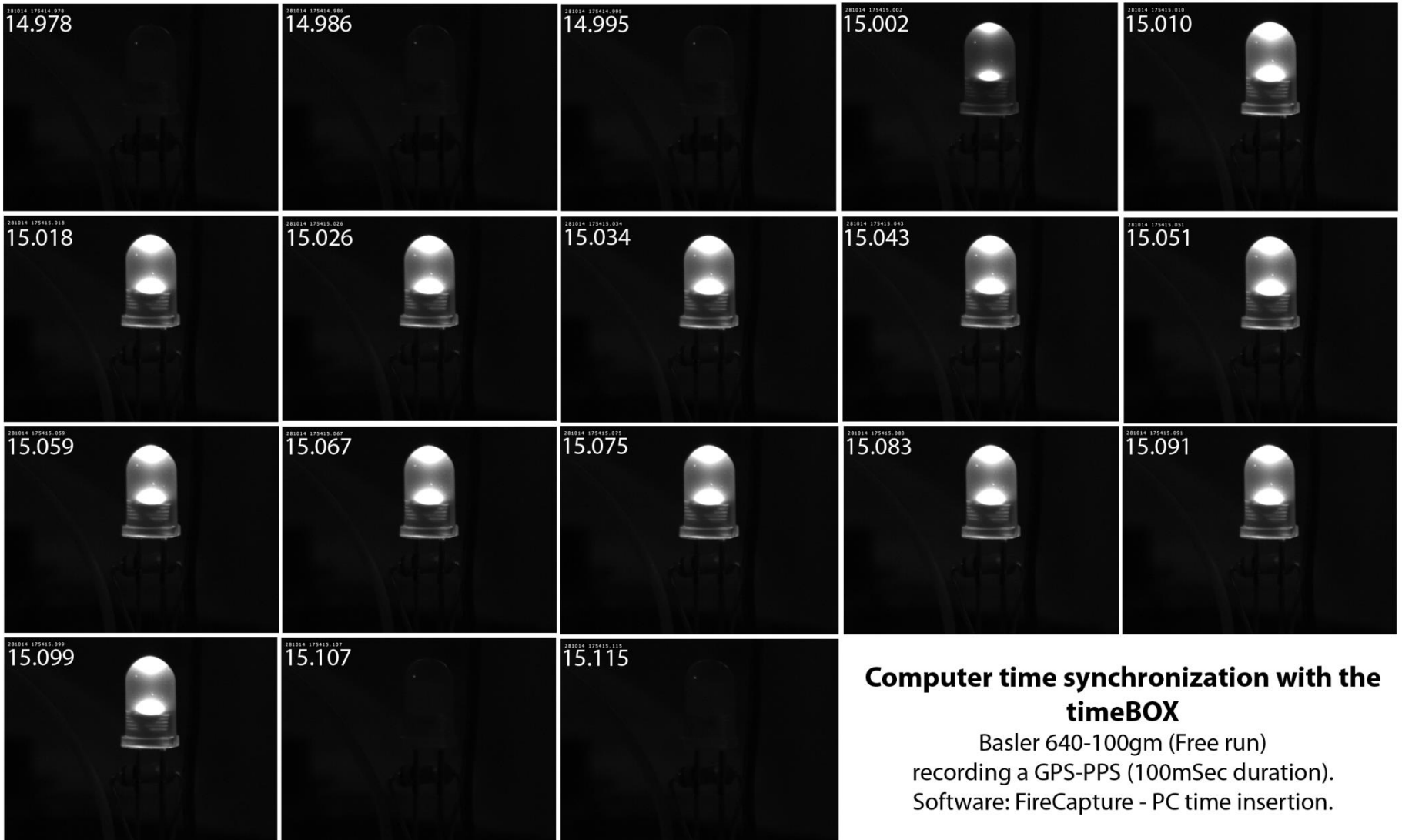
## Features:

- ✓ One-click synchronization of the PC clock.
- ✓ Precise ( $\pm 2$  milliseconds\* UTC).
- ✓ Serial latency estimation to correct the conversion and transmission delay.
- ✓ PC time drift measured over time.



# Computer time synchronization





## Computer time synchronization with the timeBOX

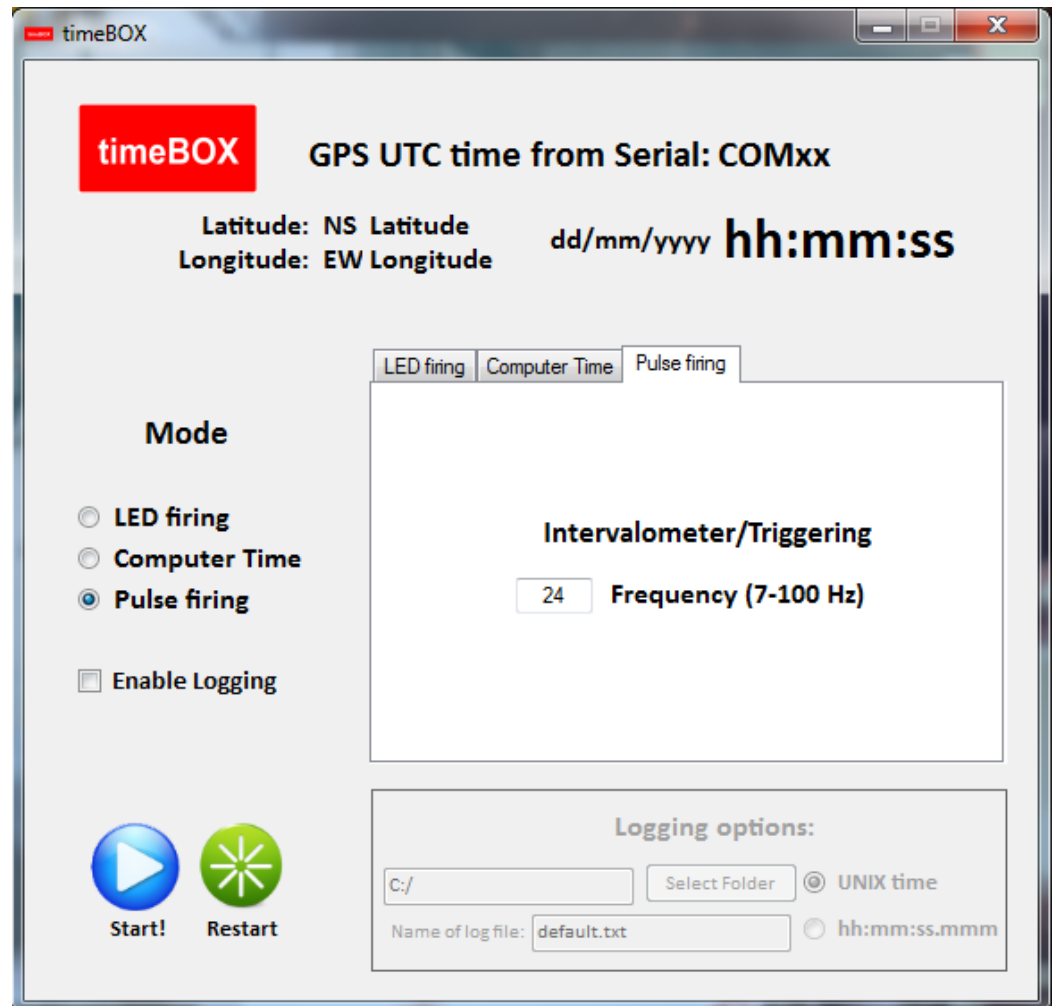
Basler 640-100gm (Free run)  
recording a GPS-PPS (100mSec duration).  
Software: FireCapture - PC time insertion.

# Intervalometer

Use the timeBOX to trigger UTC-phased frames of selected CCD/CMOS cameras.

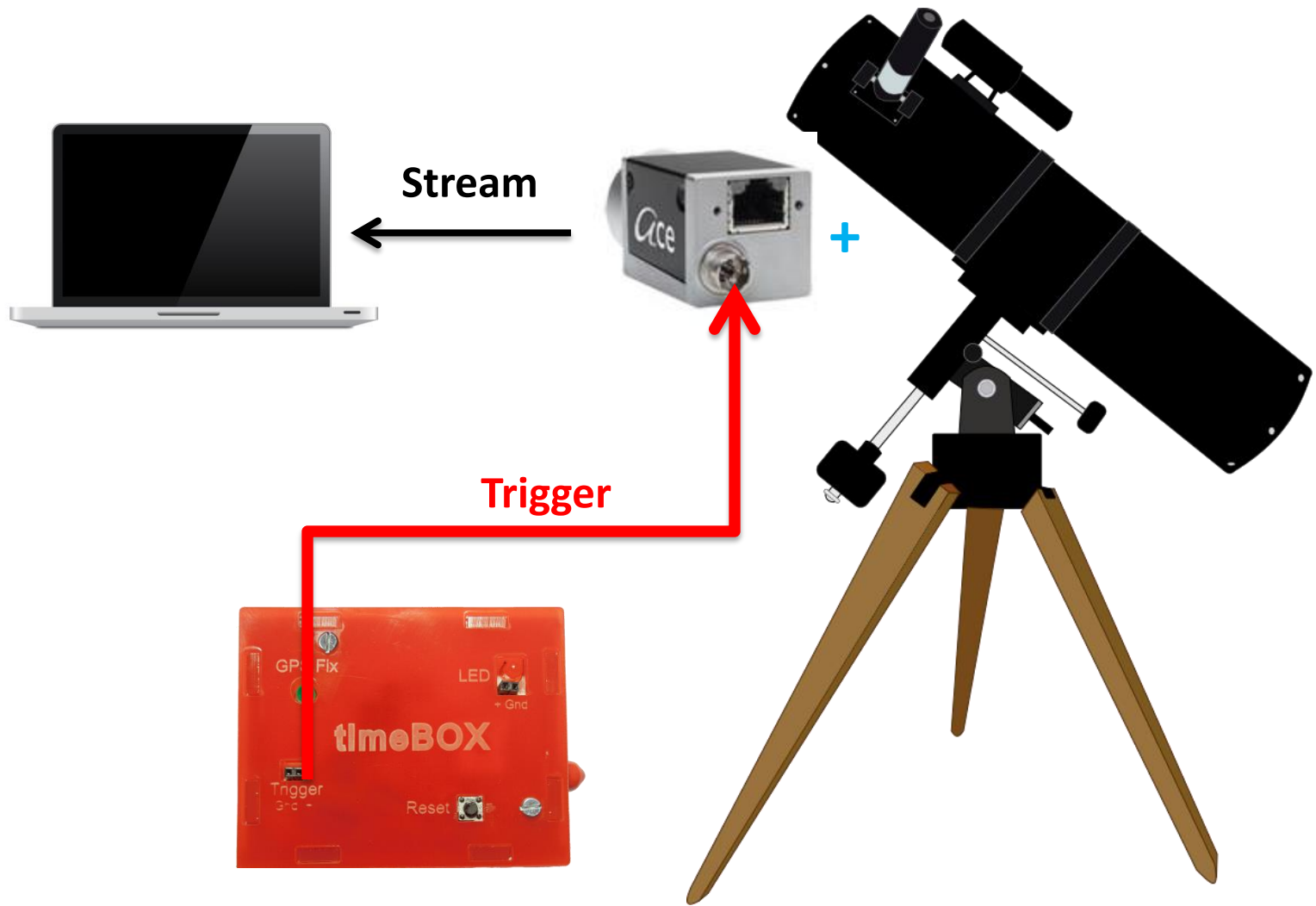
## Features:

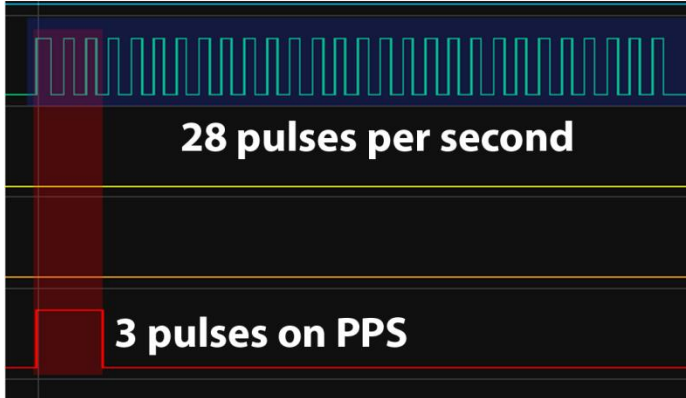
- ✓ Logic square pulses (3.3v).
- ✓ Low delay (4 $\mu$ Sec UTC), Low jitter (<12 $\mu$ Sec @ 24Hz).
- ✓ Phase constant pulses.
- ✓ Wide range frequency (7-100 Hz, variable on demand).





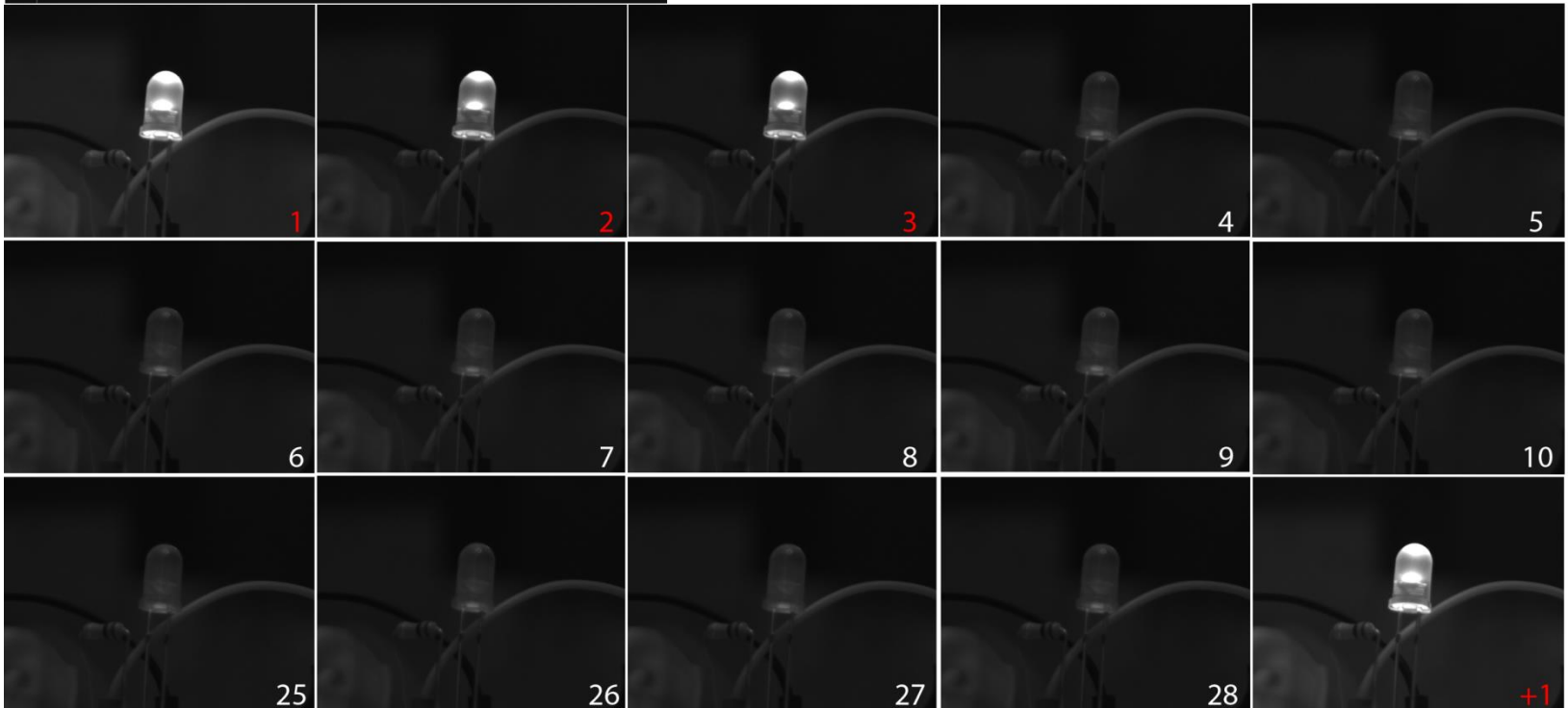
# Intervalometer





## Intervalometer triggering with the timeBOX

Basler 640-100gm (**Trigger mode**)  
recording a GPS-PPS (100mSec duration).  
Software: Pylon Viewer (Basler)



## Frame timing using the LOG file

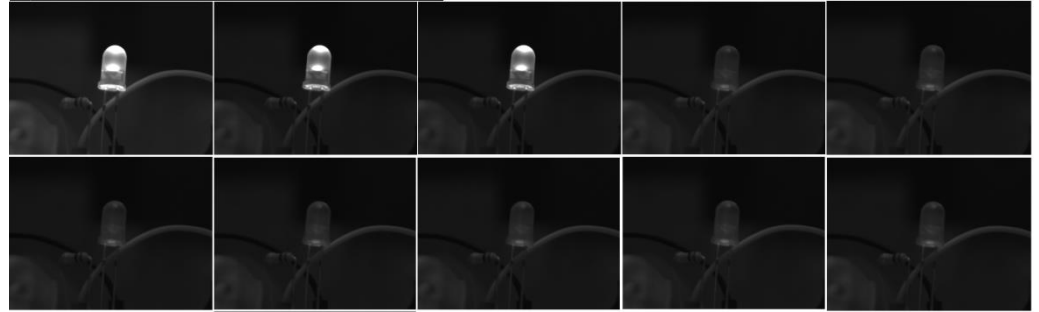
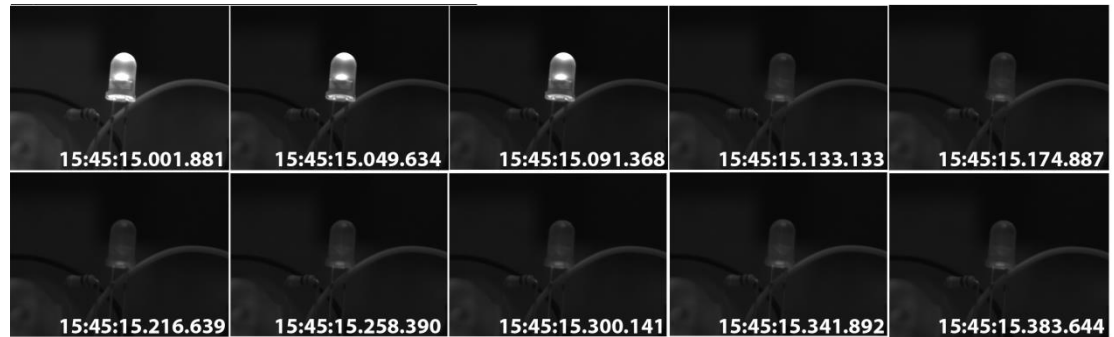
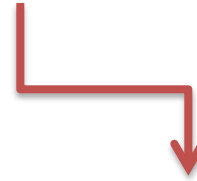


Image stream

```
TriggerLog - Notepad
File Edit Format View Help
timeBox GPS Log v1.0, 06/11/14 20:52:09.882
Mode: Logic trigger at given frequency. Frequency: 24frames/sec.
-----
Computer Time, GPS Time
Pulse number: 1, Time From second (m11Seconds): 1.881, Time from second (microSeconds): 1881
Pulse number: 2, Time From second (m11Seconds): 49.634, Time from second (microSeconds): 49634
Pulse number: 3, Time From second (m11Seconds): 91.368, Time from second (microSeconds): 91368
Pulse number: 4, Time From second (m11Seconds): 133.133, Time from second (microSeconds): 133133
Pulse number: 5, Time From second (m11Seconds): 174.887, Time from second (microSeconds): 174887
Pulse number: 6, Time From second (m11Seconds): 216.639, Time from second (microSeconds): 216639
Pulse number: 7, Time From second (m11Seconds): 258.39, Time from second (microSeconds): 258390
Pulse number: 8, Time From second (m11Seconds): 300.141, Time from second (microSeconds): 300141
Pulse number: 9, Time From second (m11Seconds): 341.892, Time from second (microSeconds): 341892
Pulse number: 10, Time From second (m11Seconds): 383.644, Time from second (microSeconds): 383644
Pulse number: 11, Time From second (m11Seconds): 425.395, Time from second (microSeconds): 425395
Pulse number: 12, Time From second (m11Seconds): 467.146, Time from second (microSeconds): 467146
Pulse number: 13, Time From second (m11Seconds): 508.897, Time from second (microSeconds): 508897
Pulse number: 14, Time From second (m11Seconds): 550.649, Time from second (microSeconds): 550649
Pulse number: 15, Time From second (m11Seconds): 592.4, Time from second (microSeconds): 592400
Pulse number: 16, Time From second (m11Seconds): 634.151, Time from second (microSeconds): 634151
Pulse number: 17, Time From second (m11Seconds): 675.903, Time from second (microSeconds): 675903
Pulse number: 18, Time From second (m11Seconds): 717.654, Time from second (microSeconds): 717654
Pulse number: 19, Time From second (m11Seconds): 759.405, Time from second (microSeconds): 759405
Pulse number: 20, Time From second (m11Seconds): 801.156, Time from second (microSeconds): 801156
Pulse number: 21, Time From second (m11Seconds): 842.908, Time from second (microSeconds): 842908
Pulse number: 22, Time From second (m11Seconds): 884.659, Time from second (microSeconds): 884659
Pulse number: 23, Time From second (m11Seconds): 926.41, Time from second (microSeconds): 926410
Pulse number: 24, Time From second (m11Seconds): 0, Time from second (microSeconds): 0
-----
1415307299.029, 1415307299.000
1415307299.219, 1415307300.000
1415307300.209, 1415307301.000
1415307301.209, 1415307302.000
1415307302.216, 1415307302.000
1415307303.220, 1415307303.000
1415307304.220, 1415307304.000
1415307305.220, 1415307305.000
1415307306.212, 1415307306.000
1415307307.212, 1415307307.000
1415307308.212, 1415307308.000
1415307309.212, 1415307309.000
1415307310.213, 1415307310.000
```

LOG file



Easy determination of each frame UTC time

**Pre-order**

**300 €**



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**Merci pour votre attention**

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