Low cost commercial scanning TCT setup
(an update)

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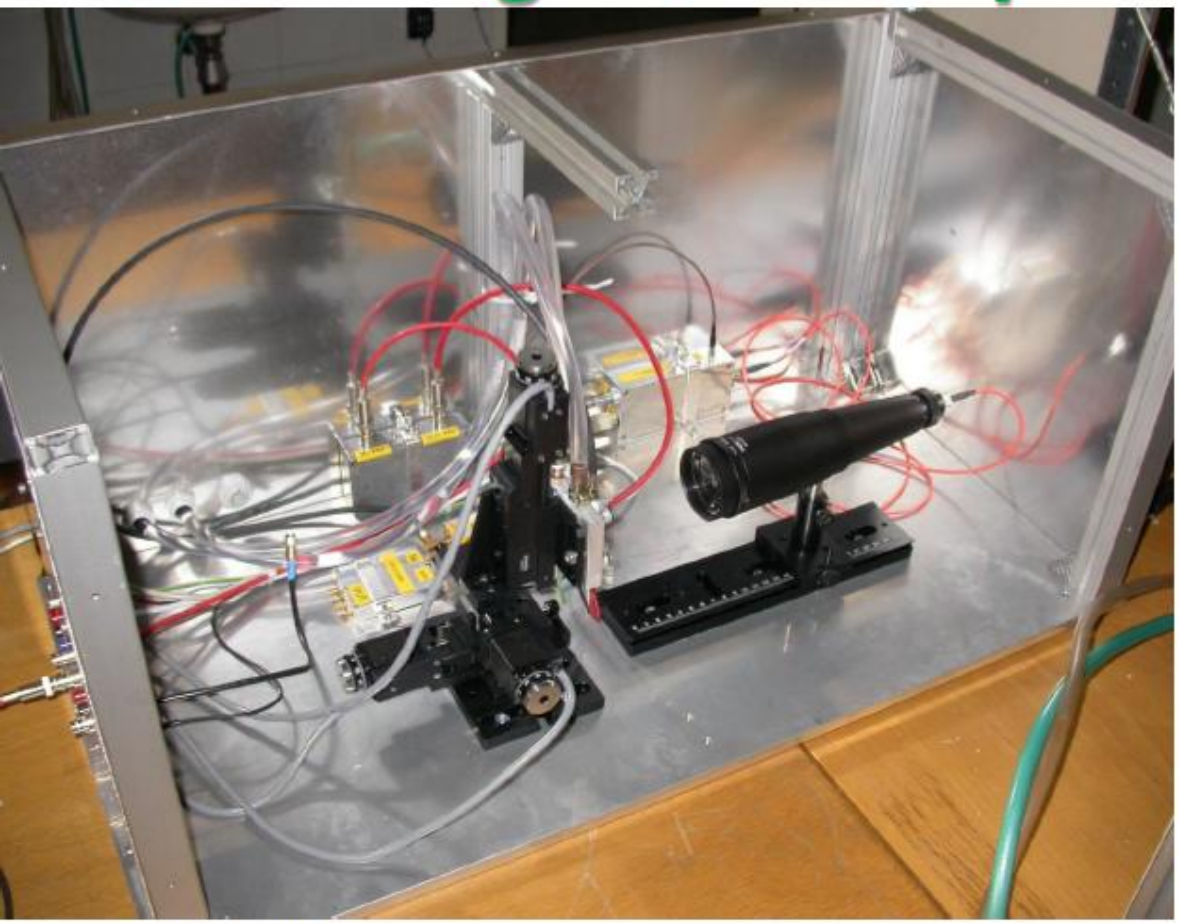
Outline

- This is an update of the two talks from L'pool and CERN
  - Custom made components for Transient Current Technique, RD50 workshop, Liverpool, 2011
  - A low cost scanning TCT, RD50 workshop, CERN, 2011
- Now a fully functional scanning-TCT has been built and can be acquired.
- For the properties of individual components see the above two references. The purpose of this talk is:
  - to show how it looks
  - to show the performance
  - to do advertising

Scanning-TCT setup



Mechanical properties:
- ~>1 μm resolution in x-y-z
- movement range 5 cm (focus range of Red/Infrared)
- table load 2 kg
- USB controlled positioning

Optical properties:
- spot size ~6 μm (red), ~10 μm (IR-1064 nm)
- laser fiber coupled
- Intensity variation – neutral density filter (optional), shutter, reduction of laser pulse width

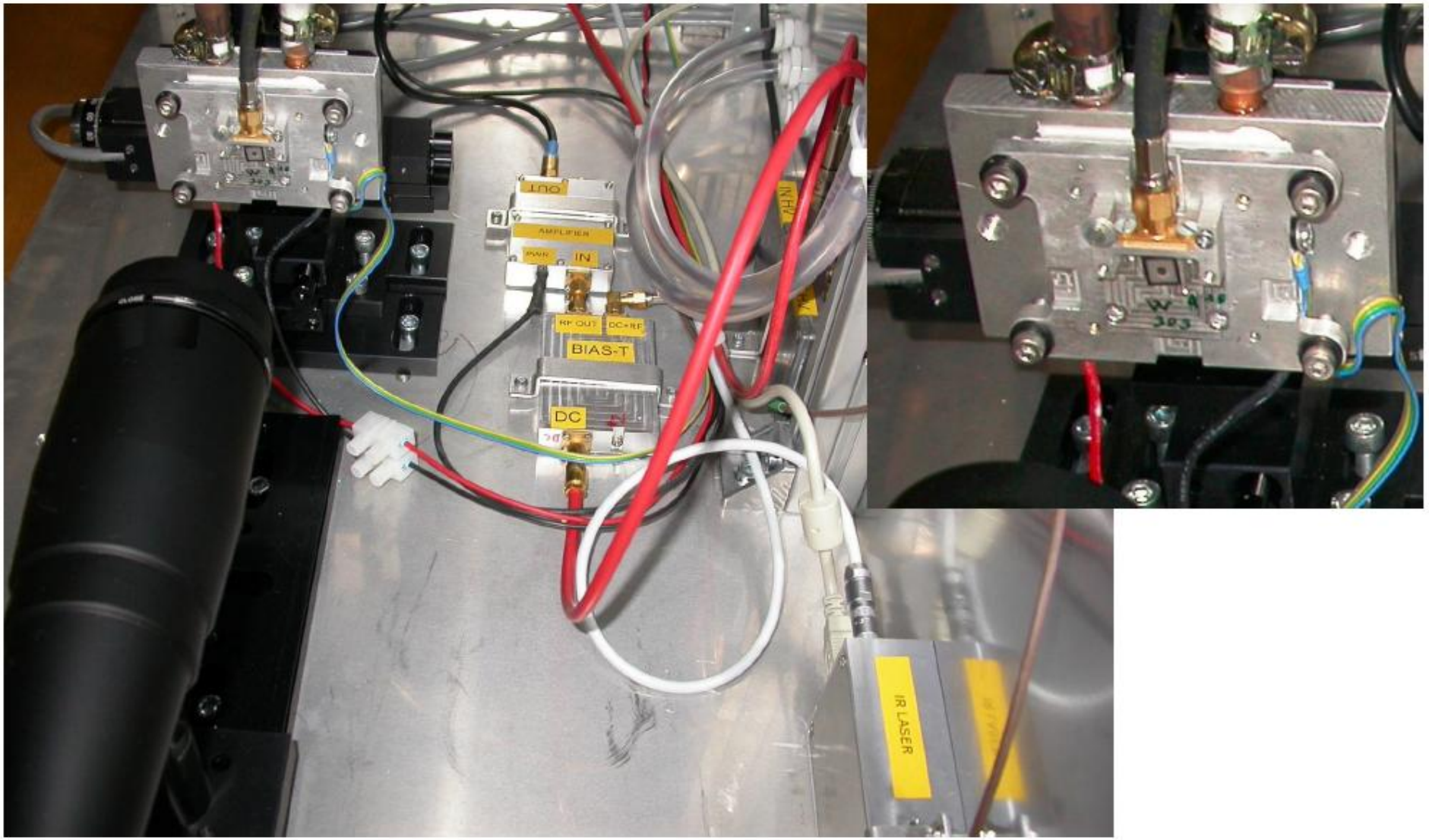
Laser:
- 1064 nm (200 mW in CV)
- From few mip to few 100 mip
- ~350-4000 ps
- USB controlled pattern/width/freq

Amplfiers:
- 52 dB. Flat for <0.3 MHz - >2000 MHz
- 6-15V, 50 Ω termination,
- Coupled to bias-T

Temperature control:
- Water cooled Peltier element
- dry air/gas inlet
- Pt-100 connected to T controller

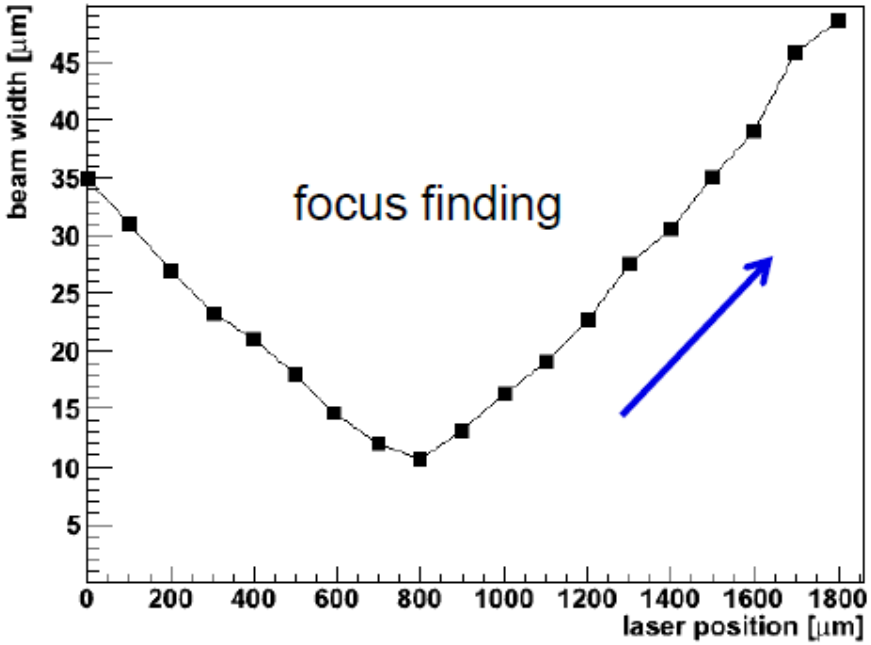
Conectivity:
- LV power supply
- Temperature controller
- HV source
- Oscilloscope

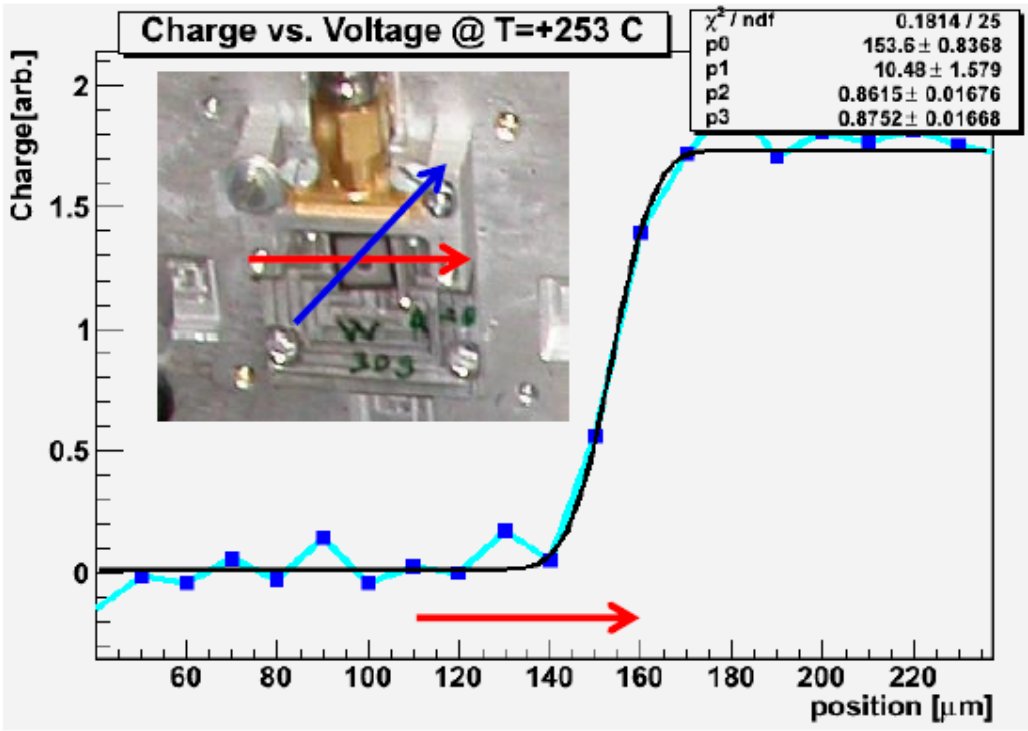
Different detector mounts available (Edge-TCT, Surface-TCT)

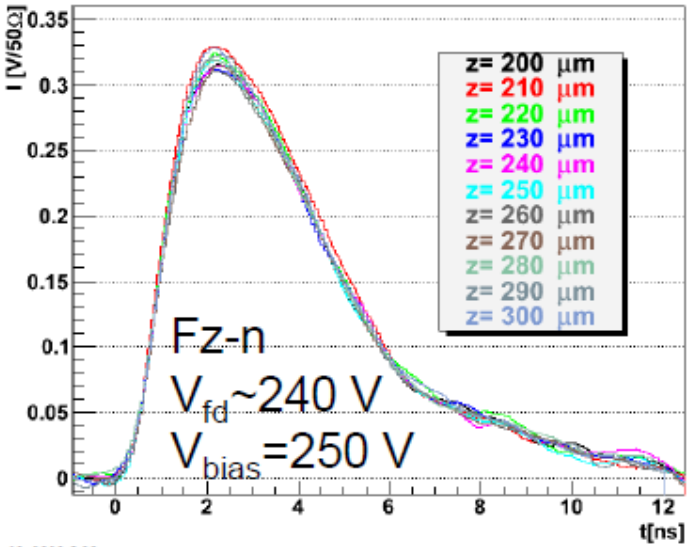


Detector brackets/housings can be provided for Edge-TCT and Surface-TCT use!

Test of performance





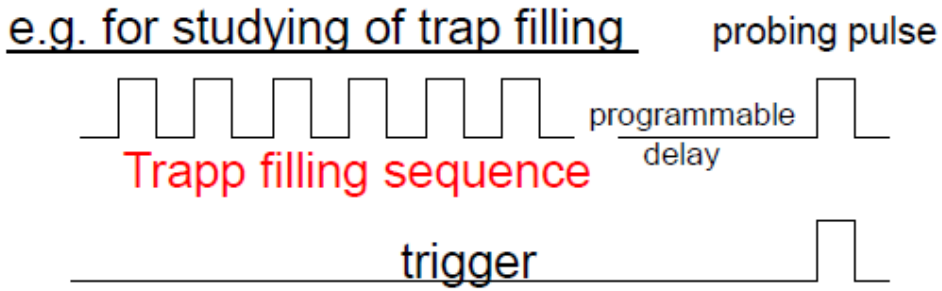


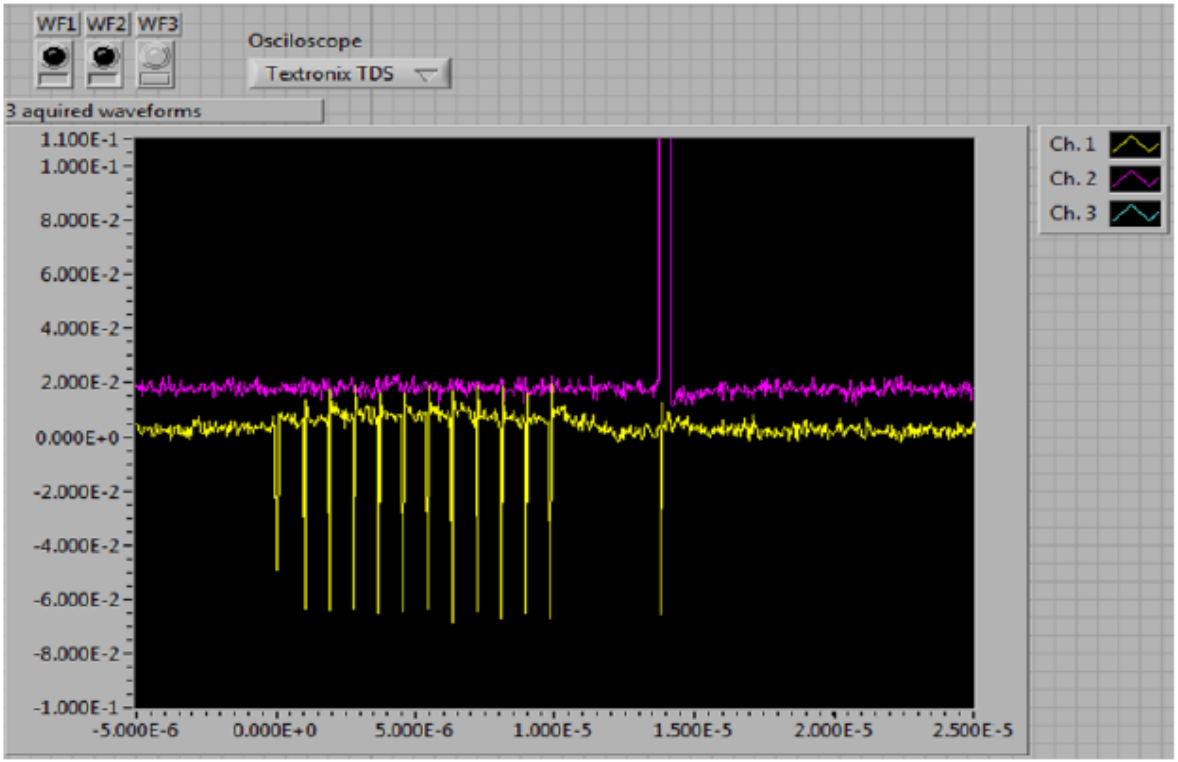
- only 4 curves averaged - fast focus finding
- width of the beam around 10 μm for 1064 nm laser (better for E-TCT)
- Even with low averaging a high-quality TCT curve is obtained

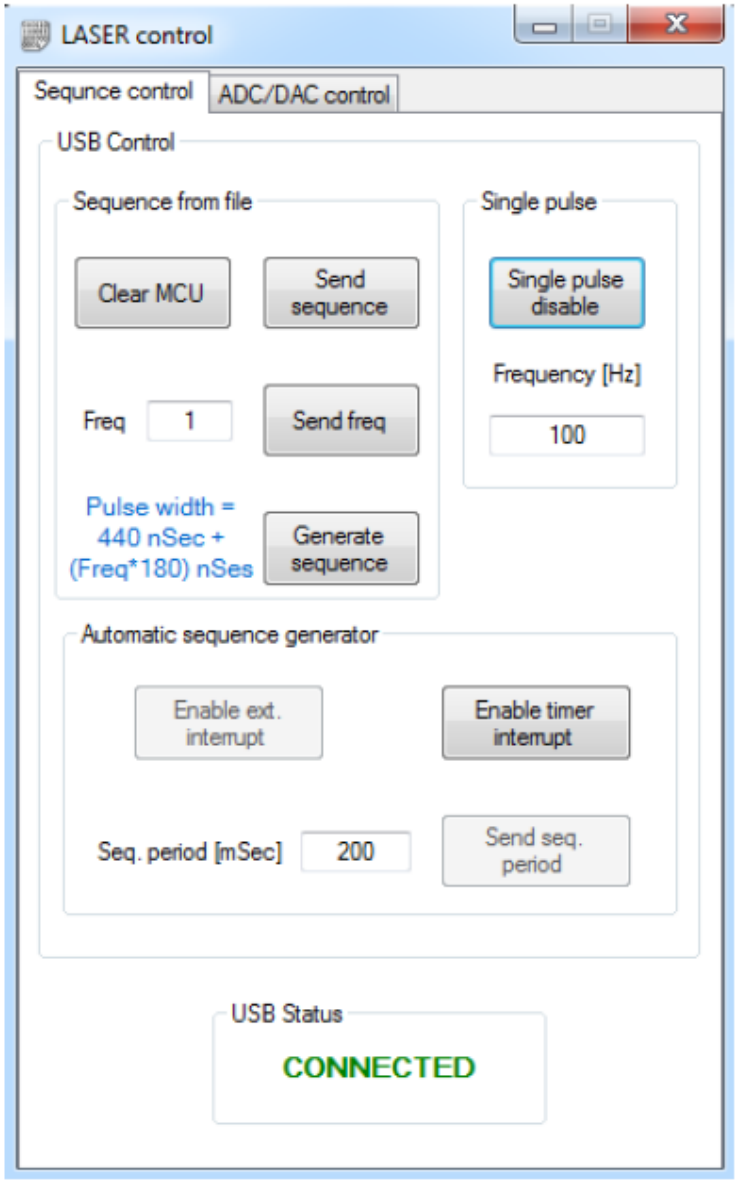
Laser properties

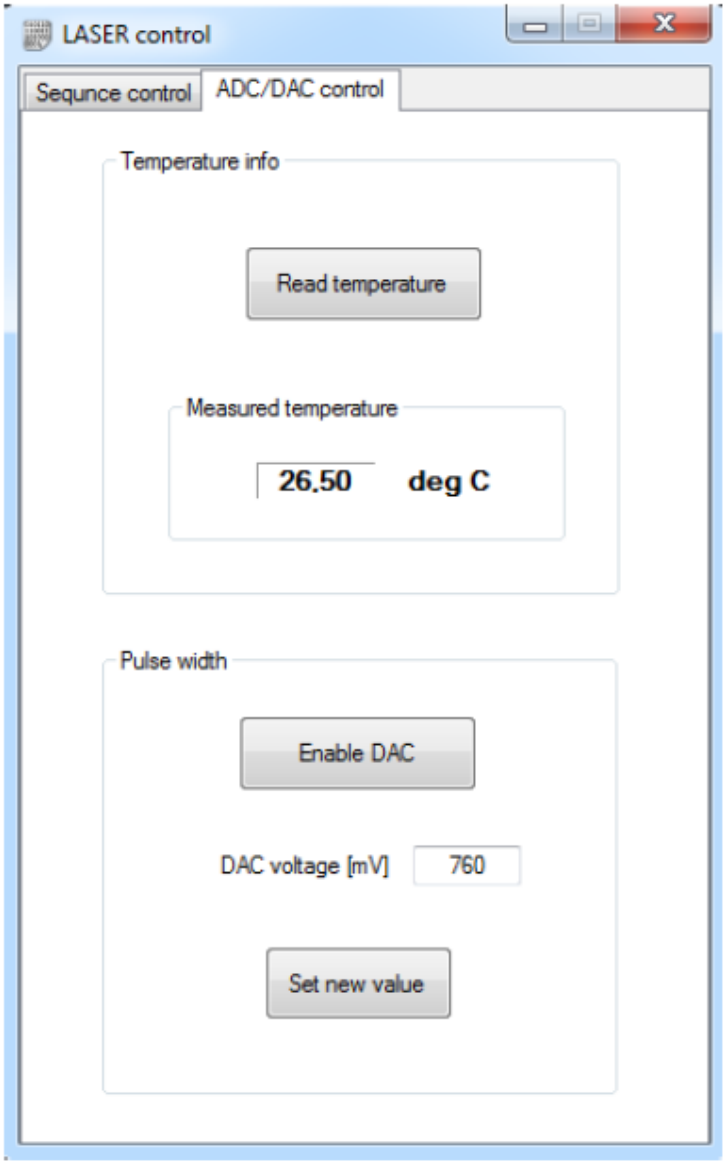
Computer (via USB) controlled light sequences.

- any bit pattern of (1024 deep) can be programed like a sequence which can be repeated with selected frequency
- the width of the laser pulse is programmable (350-4000 ps)
- no afterglow
- Red and IR available
- Reduction of laser width also reduces the pulse power
- head and driver in one box – very compact design
- Labview driver






LASER control
Sequnce control
ADC/DAC control
USB Control
Sequence from file
Clear MCU
Send sequence
Freq
1
Send freq
Pulse width = 440 nSec + (Freq*180) nSes
Generate sequence
Single pulse
Single pulse disable
Frequency [Hz]
100
Automatic sequence generator
Enable ext. interrupt
Enable timer interrupt
Seq. period [mSec]
200
Send seq. period
USB Status
CONNECTED


LASER control
Sequnce control
ADC/DAC control
Temperature info
Read temperature
Measured temperature
26.50
deg C
Pulse width
Enable DAC
DAC voltage [mV]
760
Set new value

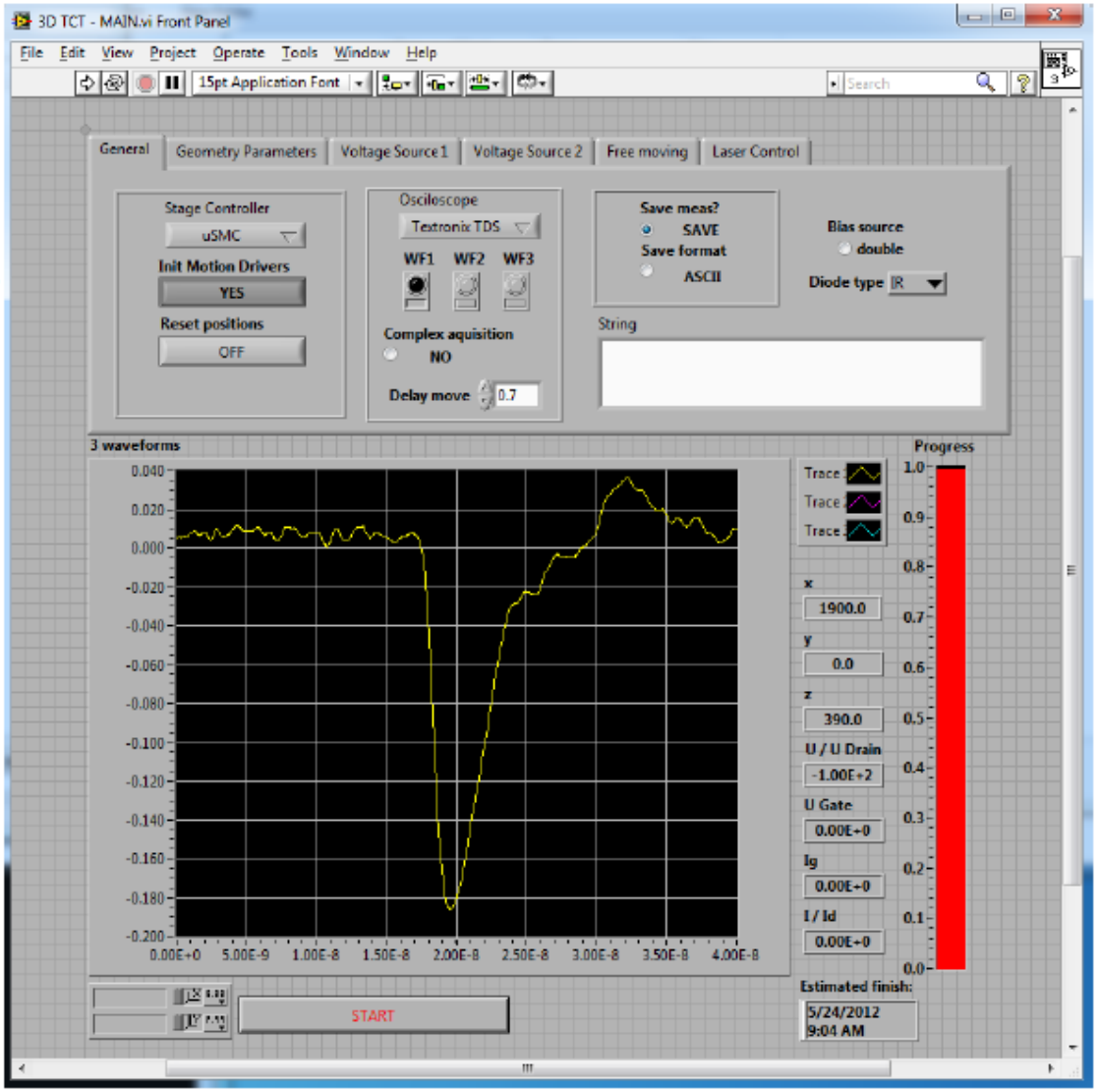
Data acquisition/analysis software

Labview control:

- scan in X-Y-Z directions
- scan for two voltages
- acquisition of up to 3 waveforms
- Full manual control of the stages
- Laser control
- Tested up to several thousand waveforms (300 MB)

Analysis software:

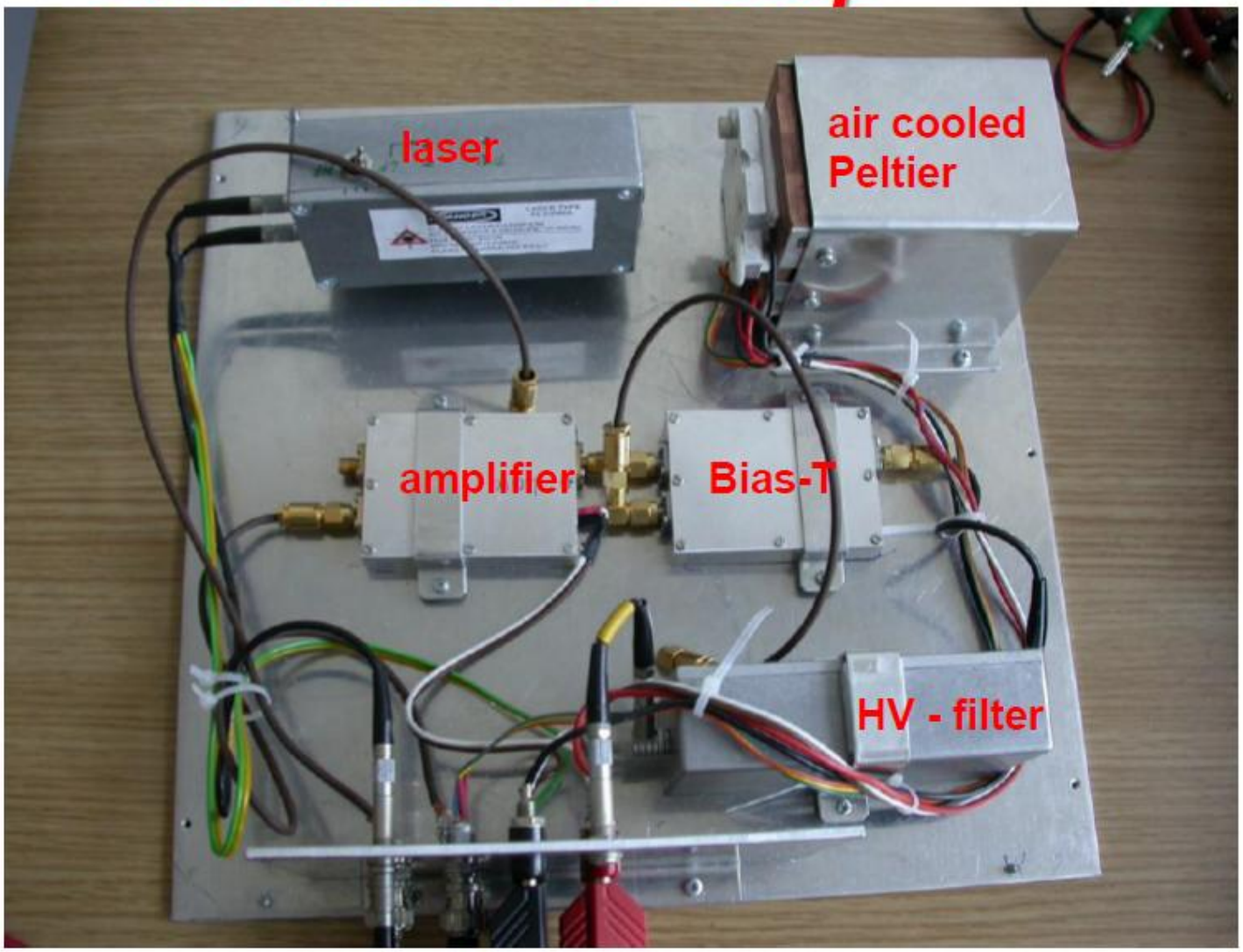
- root based compiled dynamic libraries - used already by some groups
- for linux/windows



If you are interested ...

- in anything (any piece) shown please contact Gregor.Kramberger@ijs.si or Marko.Zavrtanik@ijs.si
- in complete TCT-setups …
  - price tag for single channel setup with DAQ/analysis is between **14-15 kEUR**
  - upgrade to multi channel is optional
  - delivery time around 3 months
- also conventional (non-scanning setup) is available

Classical TCT setup



- red laser – not focused, open (not fiber coupled)
- temperature control via Peltier element [0-60°C]
- lightweight and portable