Laserpower Measurement Tutorial

Instrument & measuring mode

- Use Powermeter PT 9610
- **Primary switch on** is at the top side of device (On/Off-slider)
  → After use you always have to switch off the primary switch in order to avoid a shift in instruments precision!
- **Secondary switch on** at the bottom of control panel (On/Off-pushbuttons)
- Measure in RMS L Mode X
- Set mode by using buttons: **RMS** and **HF/LF/WB**
- Record the upper value in the spreadsheet
- The measuring field on the detector head is the white spot, try to center the beam in it

General

Always use the same 10x objective (yellow ring, NA=0.3) for measurement. Lasers should be switched on at least 1 hour before measuring to warm up. Set the argon laser emission to approx. 30% for warming up. For measuring boost emission up to 100% (especially important for the argon laser).
Adjust the detector head with a weak laserline (like 458nm) with approx. 30-50% emission. The measuring field is the white spot on the head.
Don't forget to switch the different wavelengths on power meter, too (arrow keys). **Avoid outside light sources** because they will falsify the measurements. Record the values when they are stable.

Measurements are to be recorded in the spreadsheet of the particular microscope. URL:

docs.google.com

Measurements at Zeiss 710 2photon inverted Confocal

1 hour before measurement

- To start the system use the remote control unit next to the monitor
- The key of the remote control unit should always be in "ON" position
- Then shift button "MAIN SWITCH" to "1" for power supply & fan function
- Afterwards separately shift buttons for "SYSTEMS/PC" & "COMPONENTS" to "1"
- Wait at least 5 min before switching on the PC

- To switch on the **2 photon laser** turn the key on the black box below the microscope table to "ON"
- Switch on **argon**-unit (black box on table):
  ⇒ 1st switch button to "1" for power supply & fan function
  ⇒ 2nd minimize emission by turning the "light control" wheel to the left until it stops
  ⇒ 3rd turn key to "1" for laser emission
  ⇒ 4th wait until green LED "Power Stabilized" is on then maximize emission by turning "light control" wheel to the right until it stops for "High Power Mode"
  ⇒ red & green LED should be on now
- **561nm** switch on is made via software (later in procedure)

Directly before measurement

- After boot up start the **ZEN 2009 Software** & choose "Start System" on login popup window

Detector head

- Place detector head with measuring field downwards on dish holder
- While maximizing the first laser emission (later in procedure) center the beam in scan field (you can see the spot from left lower side)
- For this use a low wavelength with approx 50% emission

Software settings

- Load workspace configuration "LPM" (1 Figure A)
- Then load configuration "LPM" (2 Figure A)

Figure A)

Figure B)

- Switch on **DPSS 561-10** (561nm) & open shutter for **Chameleon** (690-1064nm) lines in **Laser menu** (Figure B)

Measurement of visible lines

- Activate emission of all "Lasers" except the 405 & 930nm in Channels menu & push emissions to 100% (Figure C)

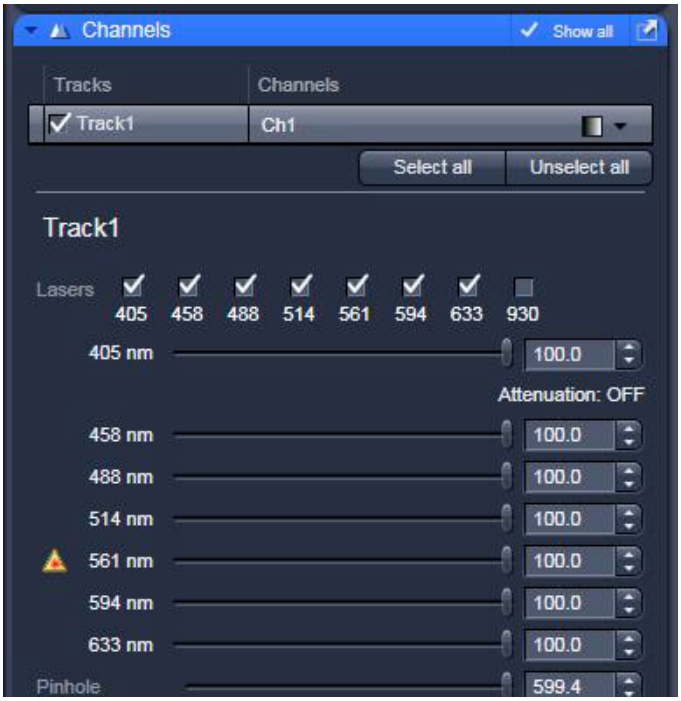

Figure C)

- Choose "MBS T80/20" beamsplitter in "Visible light" -lightpath & "Plate" in "Invisble light" lightpath in **Light Path menu** for measuring visible lines (Figure D)

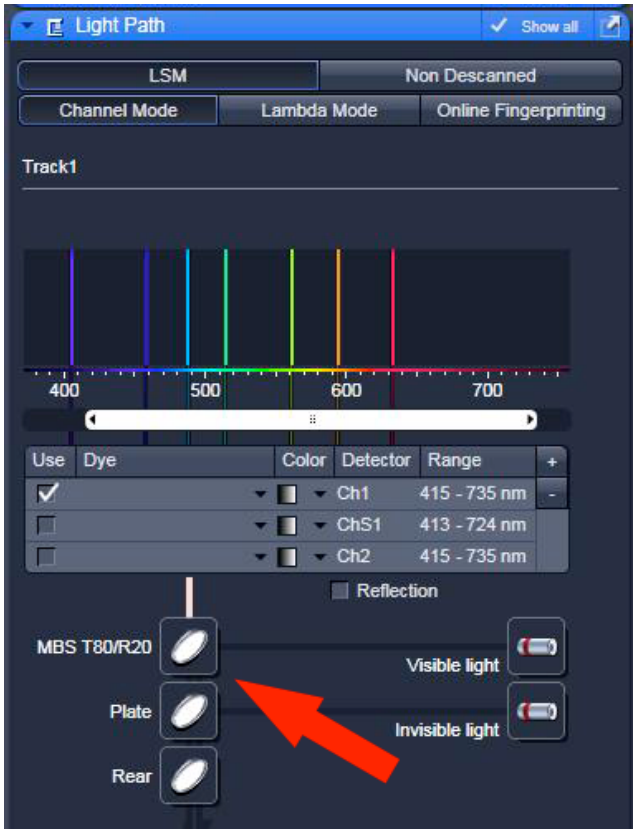

Figure D)

- After loading configuration make sure that **Spot Scan Mode** & the lowest **Scan Speed** are chosen in **Acquisition Mode** menu (Figure E)

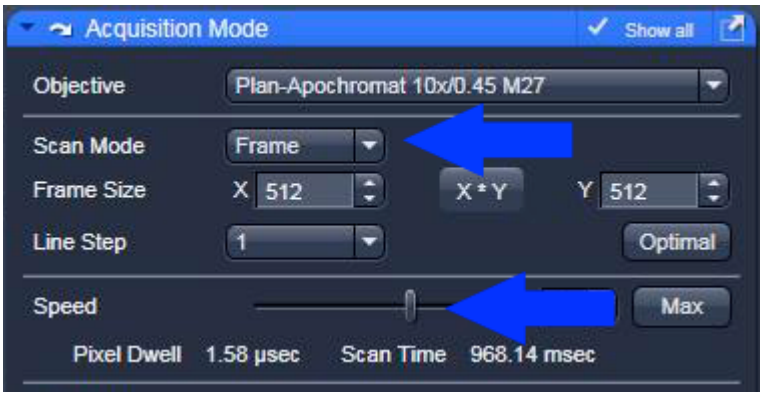

Figure E)

- Choose maximum cycles in **Time Series** menu (Figure F)
- Deselect all "Lasers" in **Channels menu** (Figure C)

Figure F)

- Click on **Start Experiment** (Figure G)
- Check & measure the several visible "Lasers" in **Channels menu** (Figure C) one after another
- Click on red **Stop** after measurement

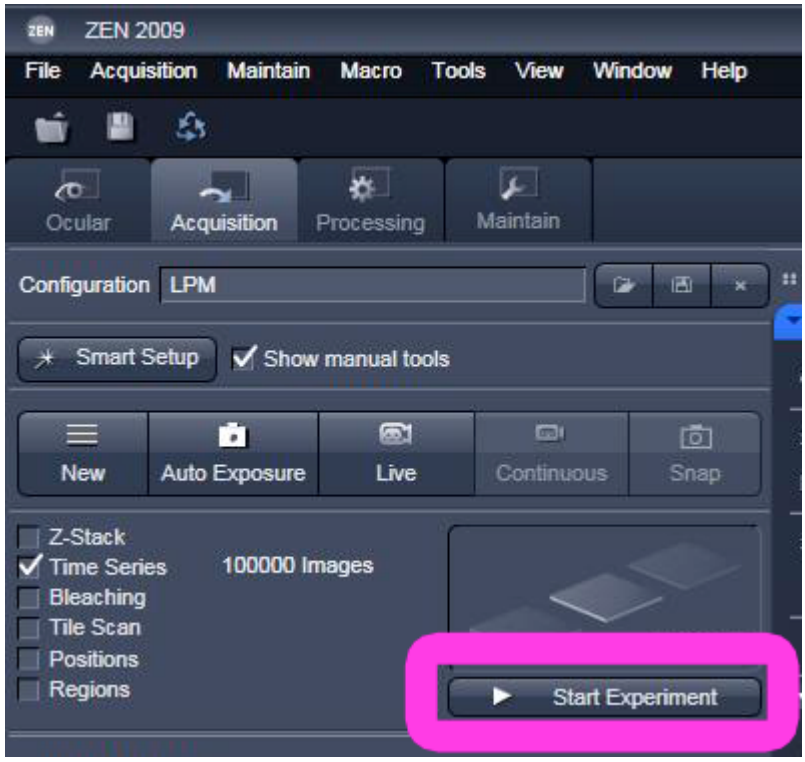

Figure G)

Measurement of invisible lines 405nm & 690-1064nm

- Choose MBS T80/20 beamsplitter in the "Invisible light" -lightpath in **Light Path menu** **only** for measuring invisible light (Figure H)

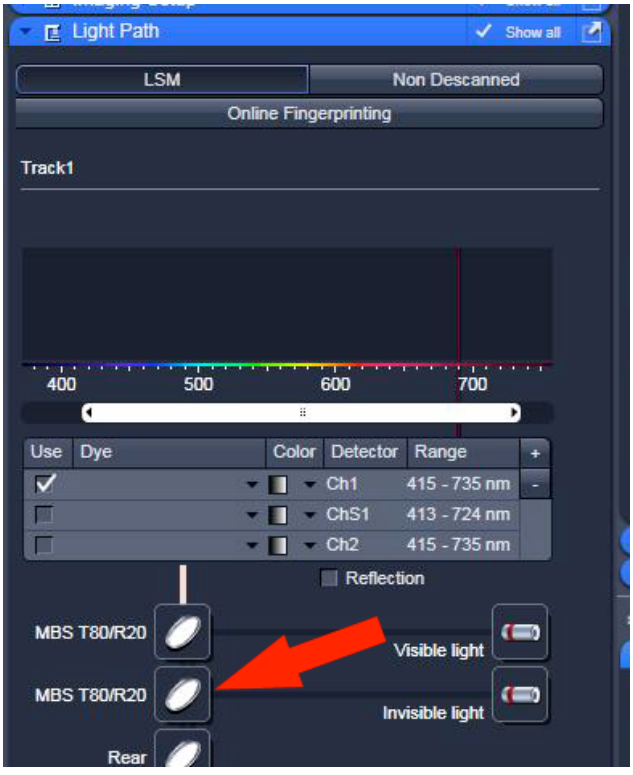

Figure H)

- Activate emission 405nm laser & in **Channels menu** & push emission to 100%
- Click on **Start Experiment** (Figure G)
- Click on red **Stop** after measurement

For measurement of 690-1064nm 2 photon laser use the "LabMax TO" powermeter

ATTENTION 2 PHOTON EMISSION IS INVISIBLE BUT POWERFULL!!!

- Place detector head with measuring field towards objective on dish holder
- On inverted: to make space for the detector you have to turn the condenser upwards
- Push "POWER" on the LabMax
- On display you can see crosshairs
- Push **Setup** button on LabMax & choose wavelength correction via the wheel on right side
- Push the wheel → choose 690nm & push wheel again
- Push **Exit** button → chosen wavelength should be displayed
- Return to software

Figure I)

- Check emission of 960nm in Channels menu (Figure I)
- Push wavelength to 690nm & wait until wavelength isn't marked red anymore
- Click **Start Experiment** (Figure G)
- For targeting push emission **only to 30%**
- Targeting point has to be bouncing in the middle of the crosshairs for correct focus
- Maximize emission to 100%
- After measuring Click red **Stop**
- Repeat procedure with an emission of 800nm, 900nm & 1064nm

After measurement – shutting down routine

- Deselect all "Lasers" in Channels menu (Figure C)
- Push emissions to 0% and choose an 2 photon emission of 900nm
- Close shutter of DPSS 561-10 (561nm) & Chameleon (690-1064nm) lines in **Laser menu** (Figure B)
- Close ZEN 2009 Software & save nothing
- log off windows account

If any user is following

- **Argon**-unit (black box):
  ⇒ Minimize emission by turning the "light control" wheel to the left until it stops

If no user is following
(Basically follow shut down procedure in microscope room!)

- Shut down & switch off the computer
- **Argon**-unit (black box):
  ⇒ minimize emission by turning the "light control" wheel to the left until it stops
  ⇒ Turnkey to "0" position
  ⇒ Wait 5 min to let lasers cool down
  ⇒ Switch button to "0"
- Turn key on 2 photon unit to "STANDBY"

- Shift the buttons for "SYSTEMS/PC" & "COMPONENTS" to "0" on remote control
- Then shift button "MAIN SWITCH" to "0"
- **Never** turn key to "OFF"