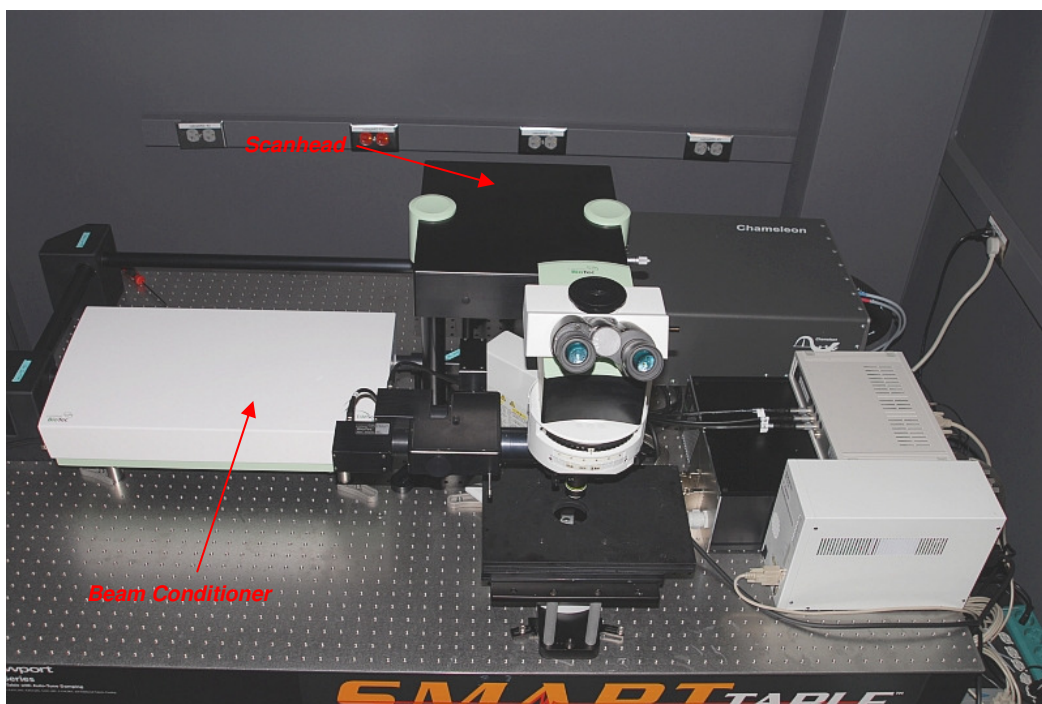


LA VISION BIOTEC TRIM SCOPE II

SECOND GENERATION, SELF ALIGNING 2-PHOTON MICROSCOPE



TriM Scope II @ Yale Medical School, CT

When LaVision BioTec's engineers developed the TriM Scope II single beam 2-photon microscope they had 3 goals to achieve:

The instrument should

- 1. be the perfect 2-photon microscope for a multi user environment.**
- 2. deliver deepest penetration depth and be prepared for OPO technology.**
- 3. be upgradeable to LaVision BioTec's 64 beam-splitting technology.**

User Friendliness and Automated Beam Alignment

The TriM Scope II is the first commercial 2-photon microscope that can be adjusted by software, as the laser beam is guided by piezo driven mirrors and its position is monitored by photo diodes. Therefore the adjustment process is extremely precise, safe and fast. In combination with the latest generation ImSpector software the user can work on the experiment and does not have to spend time for advanced microscope adjustments. Especially in a multi-user environment the TriM Scope II requests minimum training at maximum sample throughput.

Optimized Excitation Optics

Image Quality and Beam Conditioning

In 2-photon microscopy resolution and penetration depth depends mainly on focus quality and the pulse length of the exciting Ti:Sa laser radiation. All optical components between the laser and the objective lens are chosen for highest performance towards efficient excitation setting the industry standard for optical throughput.

Optimized Pulse Length - Pre Chirp Compensation

The image brightness in 2 photon microscopy scales directly with the inverted pulse length. The TriM Scope utilizes a prism based pre chirp compensator to keep the laser pulse length < 150 fs in the object plane.

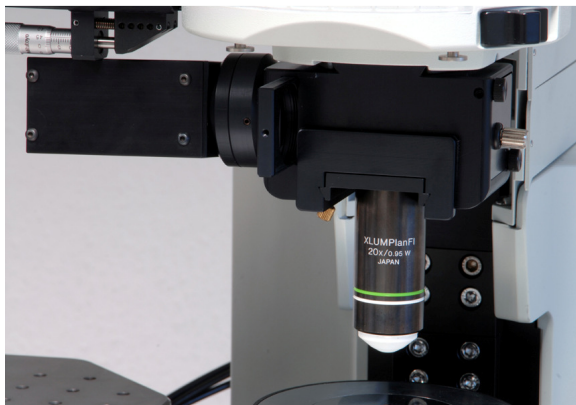
Objective lenses

Focus quality and as a consequence resolution depends mainly on the objective lens that has to be optimized for the final application. To deliver best flexibility the TriM Scope can be combined with most lenses of the mayor suppliers (Leica, Nikon, Olympus and Zeiss). Any objective could be only as good as the laser beam quality. To provide best quality the TriM Scope utilizes only optical components that are optimized for fs infrared pulses without damaging the wave front of the exciting laser radiation.

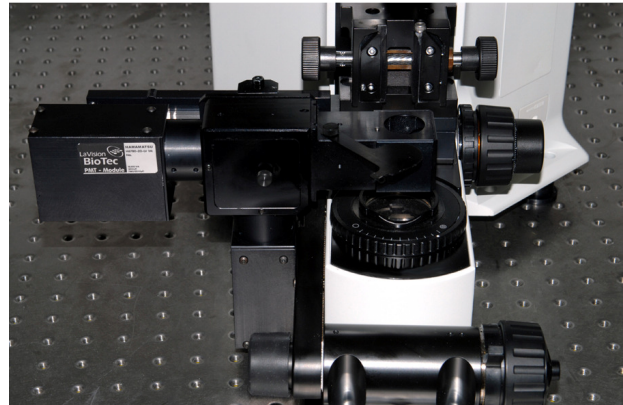
Adaptation to Objective Lenses and Focus Depth - Adjustable Beam Diameter

Next, the TriM Scope includes a triple lens telescope that allows the user to adapt the laser beam diameter to the back aperture of the objective lens and to the focus depth. Maximum beam diameter at the back aperture of the objective lens is 24 mm, which allows the use of all new low magnification high NA objective lenses.

Optimized Detection Efficiency



NDD Detector close to the objective lens



NDD Detector in transmission mounted on a slider

The TriM Scope supports up to 8 non descanned PMT detectors.

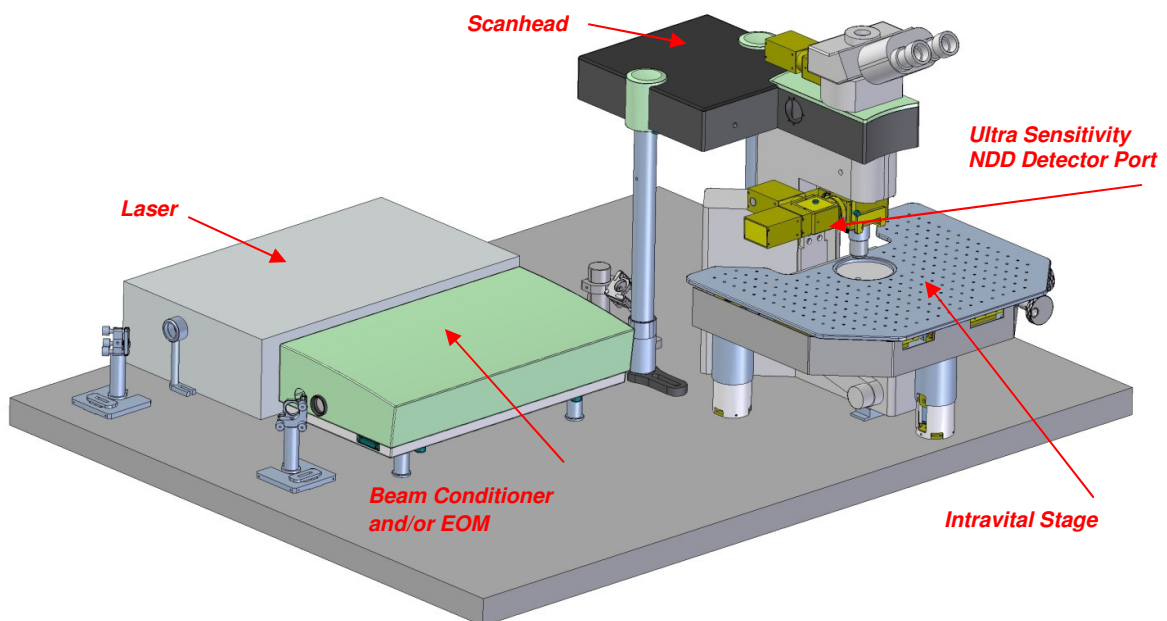
- Up to 2 NDD detectors could be in transmission,
- Up to 4 NDD detectors could be close to the objective and
- Up to 4 detectors could be above the fluorescence arm.

Any NDD detector could be a cooled generation III GaAsP PMT or an APD detector that delivers more than 40% quantum efficiency.

OPO Technology – Excitation of red dyes and proteins

Imaging red dyes is very limited with classical Ti:Sa lasers as the optimal excitation wavelength is in the range of 1125 to 1250 nm, which is not covered by the tuning range of Ti:Sa lasers. OPO technology overcomes the problem as it delivers tunable fs laser pulses in the range >1100 nm. The TriM Scope is the only commercial 2-photon microscope that supports this future key technology.

TriM Scope II Components



1. Scanhead

The scanhead is rigidly mounted on top of the fluorescence arm of most scientific upright microscopes (e.g. Olympus BX51 WI, Nikon FN1...) and allows simultaneous imaging with up to 2 Ti:Sa and one OPO laser beam.

Including:

- **2 axis galvanometric XY-scanner**
Single-beam mode:
up to 1200 lines/s
frame rate: 2.5 fps e.g. 512 x 512
5 fps e.g. 256 x 256
- **Motorized tube lens**
for fast z-scans & objective lens adaptation
- **Motorized triple lens telescope**
Motorized 3 lens telescope for adapting the beam diameter to the back aperture of the objective lens.
- 8 positions definable
- Flexible balancing between optical resolution and throughput, max beam diameter @ objective lens back aperture is 24 mm
- Controlled via ImSpector microscopy software
- **Beam pointing control**
for Ti:Sa and OPO beams by photo diodes.

2. **Optional EOM**

External box including EOM. The EOM is supported by LaVision BioTec's ImSpector software and allows applications like FRAP or photoactivation.

3. **Optional Ti:Sa Beam-Conditioner**

External box to combine up to 2 Ti:Sa laser beams and condition the laser pulse shape. Including:

- **Optional Prism based chirp compensation**
for maximum excitation efficiency in single- and multi-beam mode. Pulse length ~150 fs at the sample
- **Motorized beam attenuator**
attenuation by crossed polarizers
- **Beam combiner slot**
for uniaxial combination by exchangeable dichroic mirror
- **Telescope**
for adapting the collimation of the laser beam and matching the focal planes of both beams.
- **Slot for second telescope**
- **Electro optical beam pointing control**
by 2 four-quadrant photo diodes.

4. **Motorized z-Drive**

Stepper motor for manual microscopes or software integration of motorized microscopes.

5. **Personal Computer**

Processor \geq Intel Core 2 Duo
3 GB RAM
Raid 0 configuration
2x \geq 150 GB HDD
DVD/CD-R/W
1x24" Flat Screen
Microsoft Windows XP

6. **LaVision BioTec ImSpector Software License**

32 bit image acquisition- and processing software
under for Microsoft Windows
Control of all hardware components (TriM Scope, laser, filter wheel, PMT gain)
Acquisition of multi-dimensional data stacks (x, y, z, t, $\lambda_{\text{excitation}}$, $\lambda_{\text{emission}}$), parameters can be arbitrarily combined, e.g. for physiological analysis
Various mathematical evaluation algorithms
Multidimensional linear spectral-unmixing routines
License for one workplace (one acquisition and one data analysis workstation)

The TriM Scope II could be combined with upright stand from Nikon, Olympus and Zeiss and can be upgraded to a 64 multi beam instrument!

Contact

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