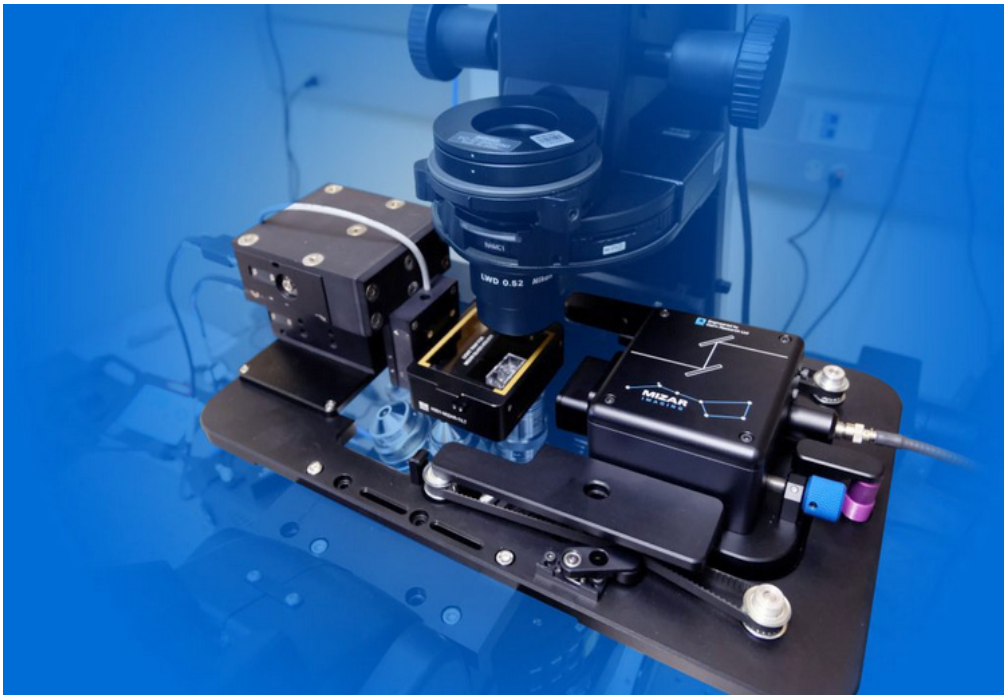
Tilt - High Resolution Light Sheet Imaging

The Tilt from Mizar Imaging is a modular light sheet illumination system designed to image living samples longer and faster than previously possible with minimal photobleaching or phototoxicity. Mounting to most inverted microscopes and having the ability to use high NA/high magnification objectives, the Tilt enables high spatial and temporal resolution light sheet imaging to be easily added to an existing or new microscope system.

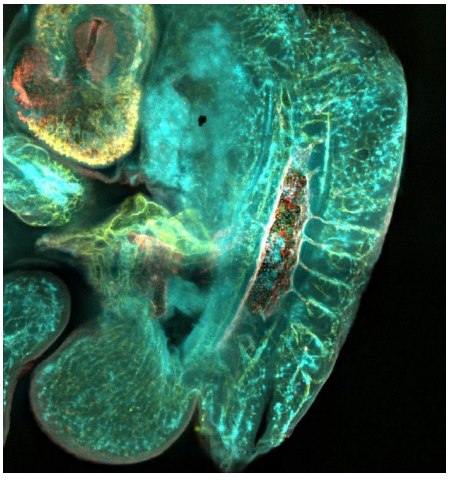
Mizar-Tilt

High-Resolution Light Sheet Imaging



Key Benefits:

- Minimal photobleaching and phototoxicity
- Compatible with a wide range of sample types
- Adapts to most inverted microscopes
- Does not interfere with transmitted light and other modes of illumination
- Designed to work with both high and low NA objectives
- No image reconstruction needed
- Simple to use
- Accepts any single mode laser
- Compatible with any camera
- Fully supported by VisiView Imaging Software

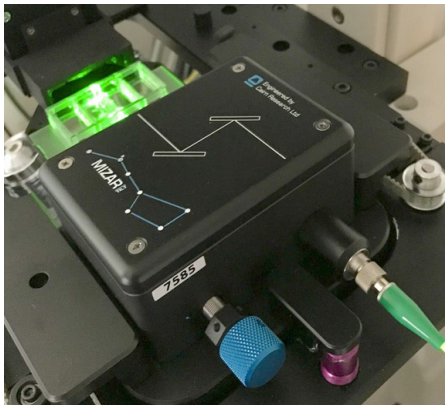


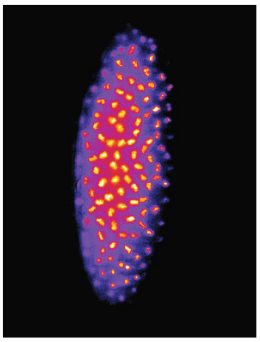
Mizar-Tilt

High-Resolution Light Sheet Imaging

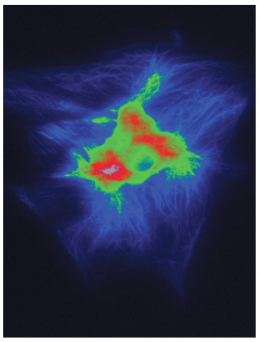
A New Angle on Light Sheet Imaging

Using the patented Lateral Interference Tilted Excitation (LITE) microscopy technique (Fadero, et al., 2018), the Tilt light sheet imaging system employs a specialized light sheet illuminator that is compatible with most inverted microscopes, most detection objectives, including high NA objectives (1.4 and greater) and a wide variety of sample types. Together, LITE allows for higher spatial and temporal resolution imaging of both larger samples as well as tracking intracellular dynamics all without significant photobleaching and phototoxicity. The Tilt system includes the LITE illumination module and an X,Y, PiezoZ substage, enabling light sheet imaging to be performed on a standard inverted microscope.

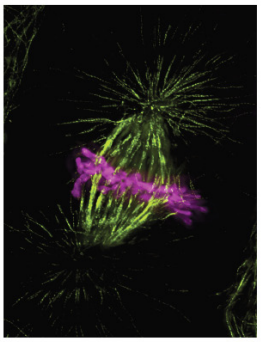




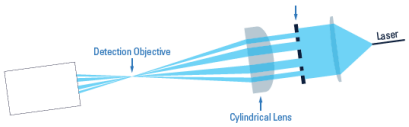
D. melanogaster – RFP-H2B. Embryology 2018

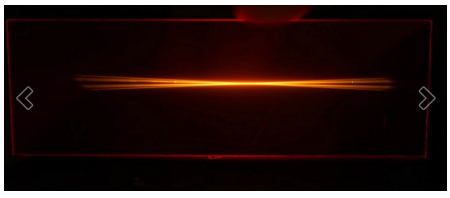


GFP-labelled Microtubules in S3 cells. Embryology 2018



GFP-Tubulin, TO-PRO-3 – Expanded Cells.
Vaughan Lab – University of Washington





Ligh Sheet Specifications:

- Thickness: 4.3 microns (FWHM)
- Length: ~ 300 microns
- Wavelength range: 400 – 700 nm
- Stage XY type: Encoded stepper motor
- Stage XY travel range: 25 mm x 50 mm
- Stage XY control: Serial interface and/or joystick
- Z type: Piezo
- Z travel range: 300 microns
- Z control: Serial interface, analog voltage
- Fiber input: FC/APC or FC/PC

Applications:

- Developmental biology
- C. elegans
- D. melanogaster
- D. rerio
- X. laevis
- Embryogenesis
- Intracellular dynamics
- Imaging of photosensitive cells and tissues
- Plant imaging
- Long term, live cell imaging

VS-LMS Flexible Multiple Laser Engine with highly stable Laser Outputs and Motorized Alignment Option

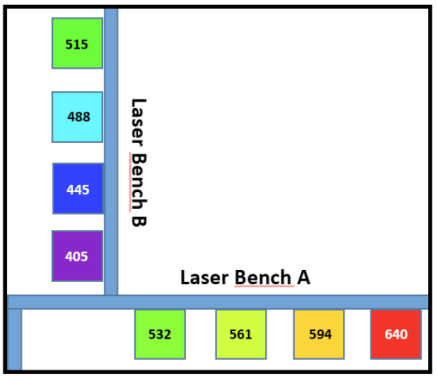
The new generation of Visitron Systems VS-LMS Laser Merge Systems is now available in a very compact design. The unique optics couples up to eight diodes or solid state lasers to a single collinear lasers beam. This beam can be channeled as option into different outputs for simultaneous laser applications like Tilt Light Sheet and FRAP scanner.

Mizar-Tilt

VS-LMS Laser Merge System

Features and Benefits:

- multi-line laser source including up to 8 lasers
- flexible selection of diode and solid state laser modules
- free illumination selection of any laser combination or pattern
- FC-coupling design with focus correction
- thermally managed system
- port Switcher with for multi laser output



Wavelength* (nm)	Maximum Power Rating* (mW)
405	300
445	100
488	200
515	100
532	150
561	200
594	150
640	200

VS-AOM Acousto-Optical Modulator - High Speed Optical Shutter

An acousto-optic-modulator (AOM) is a device which can be used for controlling the power, frequency or spatial direction of a laser beam with an electrical drive signal. It is based on the acousto-optic effect, i.e. the modification of the refractive index by the oscillating mechanical pressure of a sound wave. The AOM is used in the VS-LMS for high speed switching and intensity control of solid state lasers.

Mizar-Tilt

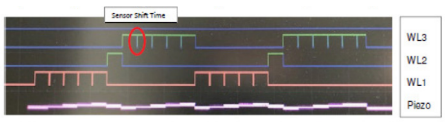
ViRTEx Experiment Control

ViRTEx Visitron Realtime Experiment Control Device

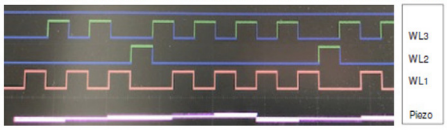
The ViRTEx-100/200 provides sophisticated electronics for experiment control, where highly accurate timing is essential. Typically it is used in Light-Sheet, Confocal, FRAP and TIRF experiments. All of these applications need fast and highly accurate TTL synchronization of scientific interline, frame-transfer or sCMOS cameras with illumination devices like LED or laser systems.
Furthermore for precise Z-stack 3D image acquisition, highly accurate Z-Focus Piezo control is required and now supported by the ViRTEx-200 device.

Features and Benefits:

- TTL synchronization module for fast experiment control e.g. device streaming
- camera / illumination device synchronization
- connection via USB 2.0
- 16 TTL output lines
- 4 analog out channels
- optional up to 8 channels
- 4 camera inputs connector board (exposure signal for stream mode)
- available models: ViRTEx -100 / 200 stand-alone devices

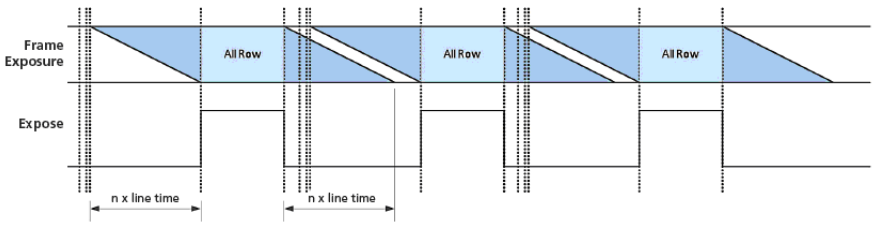


Focus Setting: Do Wavelength for Each Z. Stream ON
Acquire Setting: 3 Wavelengths, Wavelength 2: no z Series, Z-Series: 5 planes, Stream C



Timing sCMOS Cameras

In rolling shutter mode, the rows of an sCMOS camera are continuously exposed and digitized. The pixels of a row are digitized simultaneously, then the next row is digitized. Each row requires about 10µs depending on the digitizer speed. This means that each row is exposed 10µs later than the previous one. With 1000 rows to be digitized, the shift between the first row and the last row adds up to 10ms.
sCMOS sensors are actually digitizing symmetrically to the horizontal center line from top to center and from bottom to center. The following timing diagram thus shows only one half of the chip. As the readout of the two halves takes place simultaneously, the timing diagram on one half describes the timing correctly.



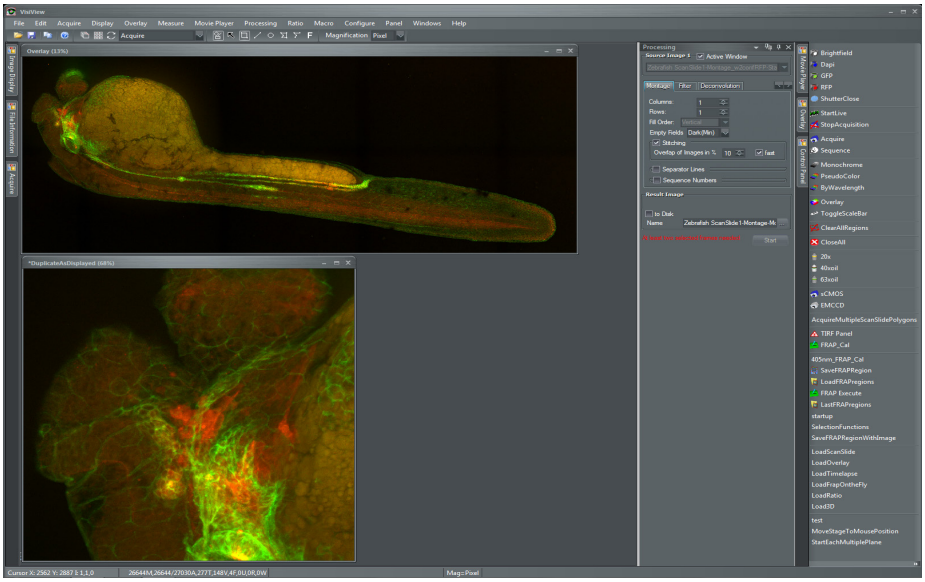
Due to the overlapping exposures, it is not possible to change the illumination or the focus without crosstalk between the exposed frames. So, for fast multiwavelength/ multi-Z sequences, it is necessary to illuminate the sensor only in the time where no overlap with the next/previous frame takes place.
In the figure above, this area is named AllRow. Virtex uses the AllRow output of the sCMOS camera to illuminate the chip with the appropriate timing.

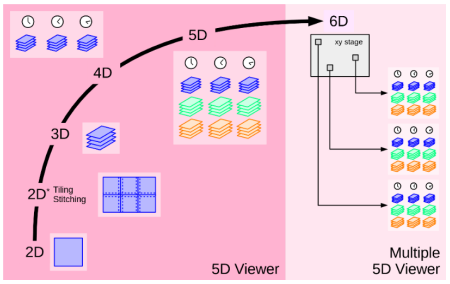
VisiView Mizar Tilt Support and Features

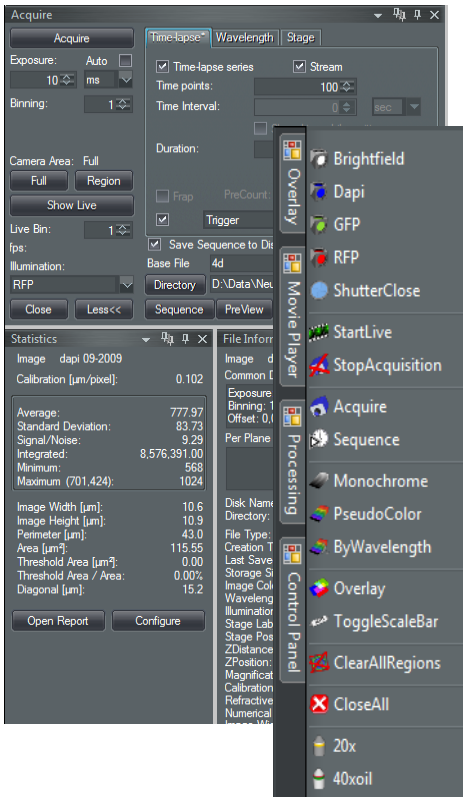
VisiView® is a high performance imaging software for Bio-Medical applications. The software is designed as an integrated imaging software which includes comprehensive microscope control, control of a vast number of peripheral devices, image acquisition and analysis. Its multitasking ability supports realtime image handling and up to 6D multidimensional acquisition. The Mizar Tilt setup, calibration, control of XY-stage, Piezo stage is seamlessly integrated into the VisiView capture mode.

Mizar-Tilt

VisiView® Imaging Software







Time-Lapse Acquisition

Acquire changes in living specimens over time at defined intervals and display the image sequence as a movie to show cellular dynamics. The image sequence will be saved in single TIFF, multifile stack or .nd format.

Single or Multichannel Acquisition

The MDA-Multi Dimensional Acquisition gives you a comprehensive view of your multi dimensional experiment. This means a free combination of z-stack (focus), different wavelengths (channel), time points and different xy stage positions in one sequence acquisition (6D-imaging).

Control of Automated Microscopes

The scope control allows you to control all motorized microscopes from any vendor. We have easy access to any illumination component like filter cube changer, shutter or condenser control. The objectives can be easily selected and calibrated. The focus control allows both the automatic generation of Z-stack images and the software autofocus readjustment to keep your cells in best focus.