



**DOIT**  
plenoptic



# DOIT 3D MICRO

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[www.the3dmicroscope.com](http://www.the3dmicroscope.com)

# 3D MICROSCOPY FOR ALL

Transform your microscope into a 3D digital microscope

Devices based on DOIT<sup>®</sup> (Digital Optical Imaging Technology) register many images from different perspectives in a single-shot, thus allowing to perform live 3D imaging.



# DOIT 3D MICRO

The first plenoptic eyepiece in the market.



Universal

Versatile

Handy

Plug & Play

Affordable

DOIT 3D MICRO is a small and manageable device that allows you to convert a conventional microscope into a 3D digital microscope.

It is easily inserted and removed from the ocular port, therefore changing from 2D to 3D visual inspection and vice-versa is immediate. You can record live 3D videos of your samples instantly!

**It works with visible or infrared light source, and it is**

**sensible to CCD or CMOS sensors.**

## DOIT 3D MICRO

is exchangeable and fits in different microscopes.



Transform any microscope into a  
3D light-field microscope.

See the microscopic world through  
**the eyes of an insect.**

Just like an insect's compound eye works. With the microlens array, we can capture multi-perspective images that unveil the hidden volumetric information.

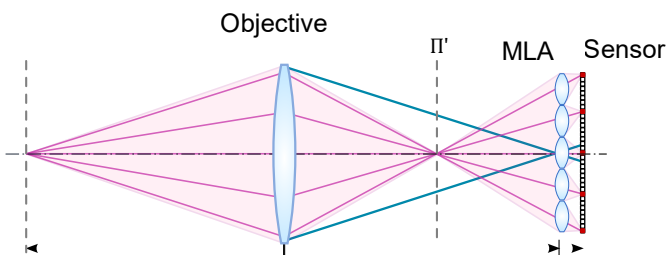


# DOIT<sup>®</sup> applied to microscopy

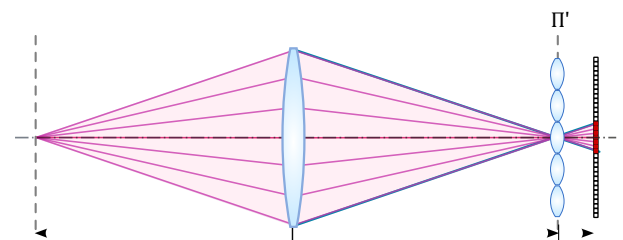
The key difference with the conventional methods for light-field applied to microscopy capture is that every device based on DOIT<sup>®</sup> registers the aperture stop of the objective on the microlens array instead of behind each microlens. In this way, our device directly registers a set of orthogonal views, which leads to increased resolution, and it enables it to be used with objectives of different numerical apertures.

DOIT<sup>®</sup> represents a paradigm shift in the capture of plenoptic information. Instead of capturing this information near the image plane, our design captures it in a plane where the space-angular information appears transposed. In this way, the orthographic perspectives are obtained directly and without the need for any digital process.

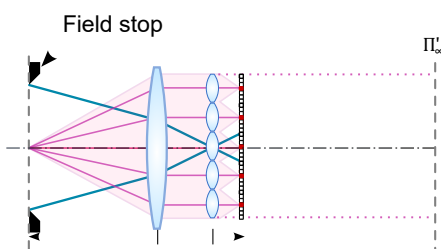
**Focused mode**



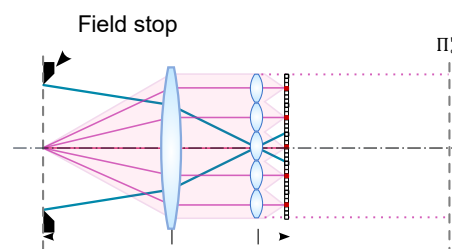
**Unfocused mode**



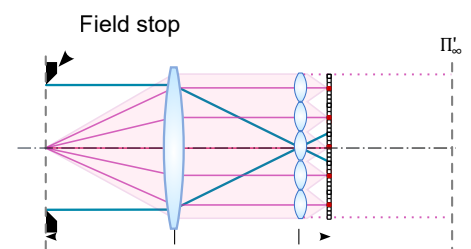
**Orthographic mode**



(a)



(b)

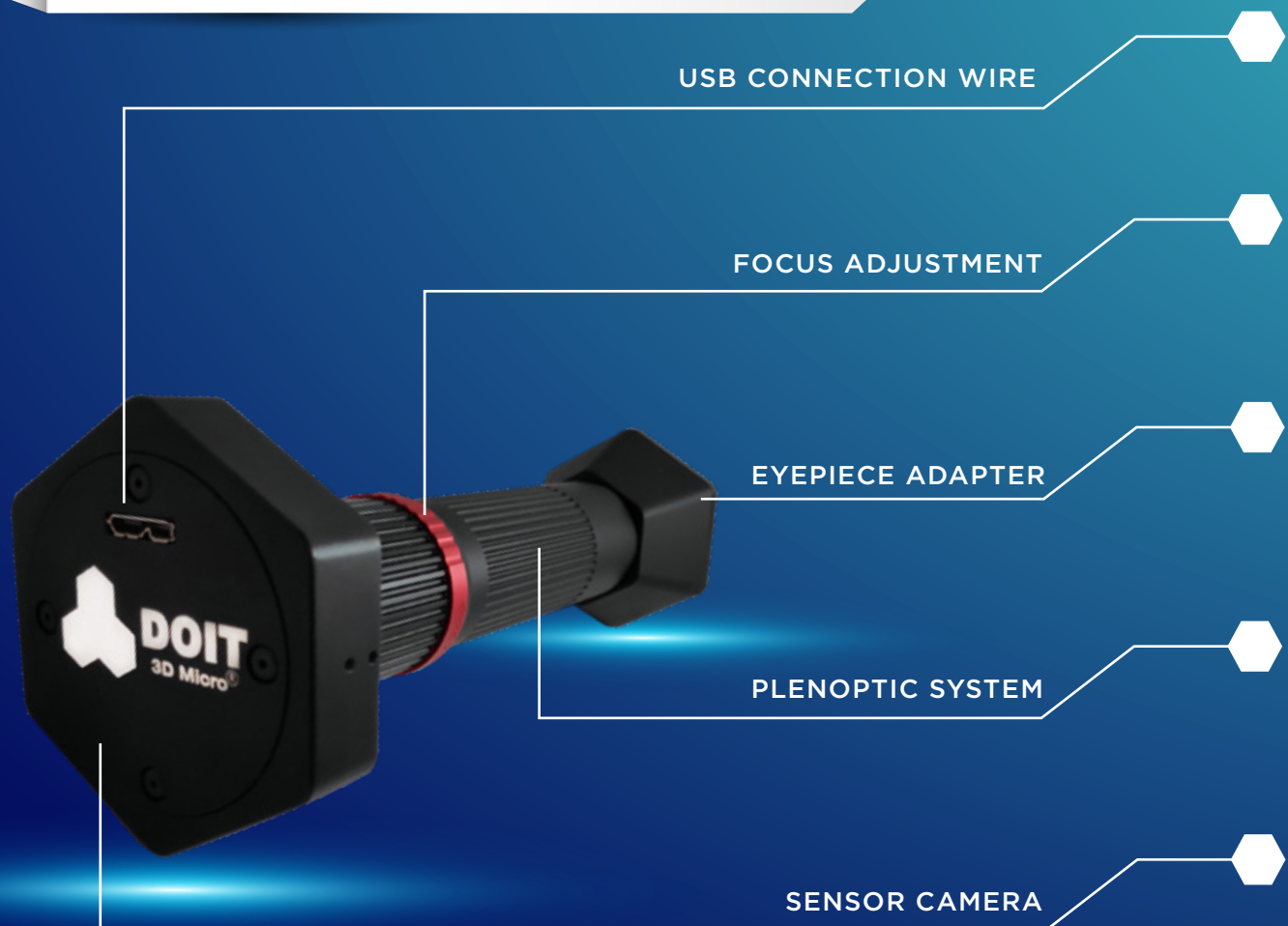


(c)

# Light-field microscopy problems solved!

- No need for coupling between the numerical aperture of the objective and that of the microlenses.
- No need to work with excessively small microlenses.
- No poor resolution.
- No vignetting effect.
- No complex, expensive, and huge mechanisms.

## Parts of the device



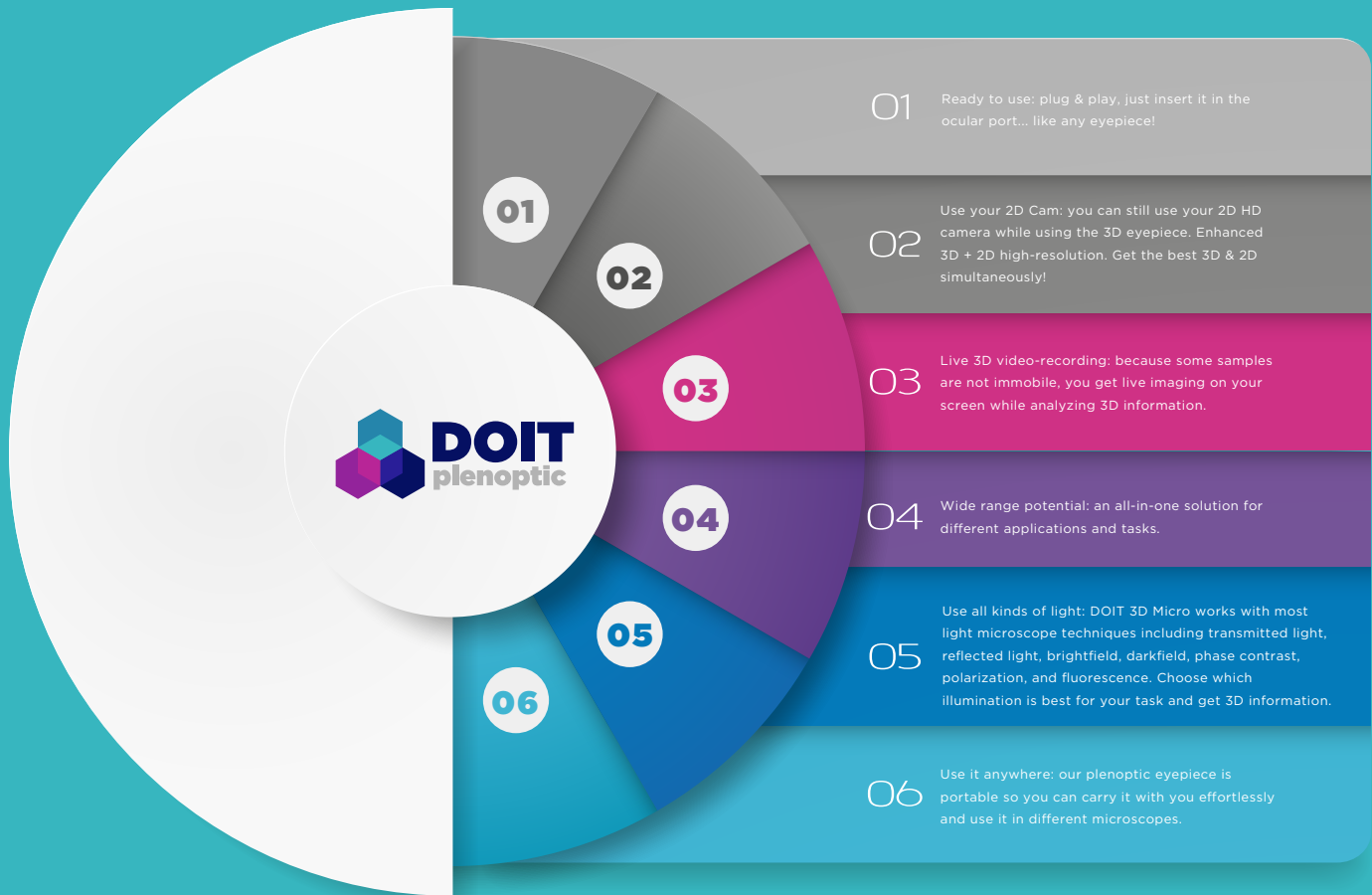
# DOIT 3D MICRO

## PERFORMANCE


Results obtained with a Nikon Microscope Mod.  
Eclipse and a 200 mm focal length tube lens.

PARAMETER IN MICRONS	ONLY BRIGTFIELD	OPTIMIZED FOR FLUORESCENCE	ONLY BRIGTFIELD	OPTIMIZED FOR FLUORESCENCE
Lateral Field of View	776	776	339	353
Effective Lateral Resolution at Object Plane	2.5	4.9	0.9	2.2
Depth of Field	160	160	35	35
Minimun Axial Step	4.0	8.5	1.0	1.7
OBJETIVES	20X NA 0.5		40X NA 0.75	

# BENEFITS



## Minimum system requirements

System requirements		Microscope requirements
Interface	USB 3.0 port	 Tube lens focal length 180mm to 200mm
CPU	Intel i5 or better	
Memory	min. 2 GB	
Disk space	min. 500MB	
Operating System	Windows,64-bit	
Screen resolution	min. 1920x1080	



# Applications



## Life Sciences

01

### Biochemistry

3D imaging help to see chemical processes that occur within organisms

02

### Bacteriology

3D imaging allows to study and identify bacteria, corresponding to the field of microbiology

03

### Biotechnology

3D imaging for development of genetically modified organisms in the food or health sector

04

### Neuroscience

3D live imaging of neural activities to improve research of aging degenerative diseases

05

### Pharma & Biology

3D imaging of in-vivo cells and organoids for new pharmacological developments

01

### Aerospace

3D imaging allows you to see details in metallic materials, plastics, wood, glass, etc. All this related to the inspection of aerospace parts, such as capsule satellites and rockets

02

### Forensics

3D imaging samples relevant for forensic medical and crime scene investigations reconstruction, to ensure its validity and subsequent acceptance in court

03

### Microelectronics

3D imaging for electronic circuit development, device manufacturing, and assembly

04

### Agri-food

3D imaging to carry out quality control on food manufacturing

05

### Education

3D imaging to educate students in scientific degrees

## Clinical

01

### Embryology

3D imaging for the study of gametes, embryos, and fetuses

02

### Cell culture

3D imaging allows studying the cultivation of fungi and microbes, to follow-up their growth and development

03

### Pathological Anatomy

3D imaging on every hospital for the analysis of pathologies in tissues and organs

04

### Microsurgery

For neurosurgery, reconstructive, pediatric, ophthalmology, ENT, spine surgery, plastic surgery, microdentistry

05

### IVF & Embryology

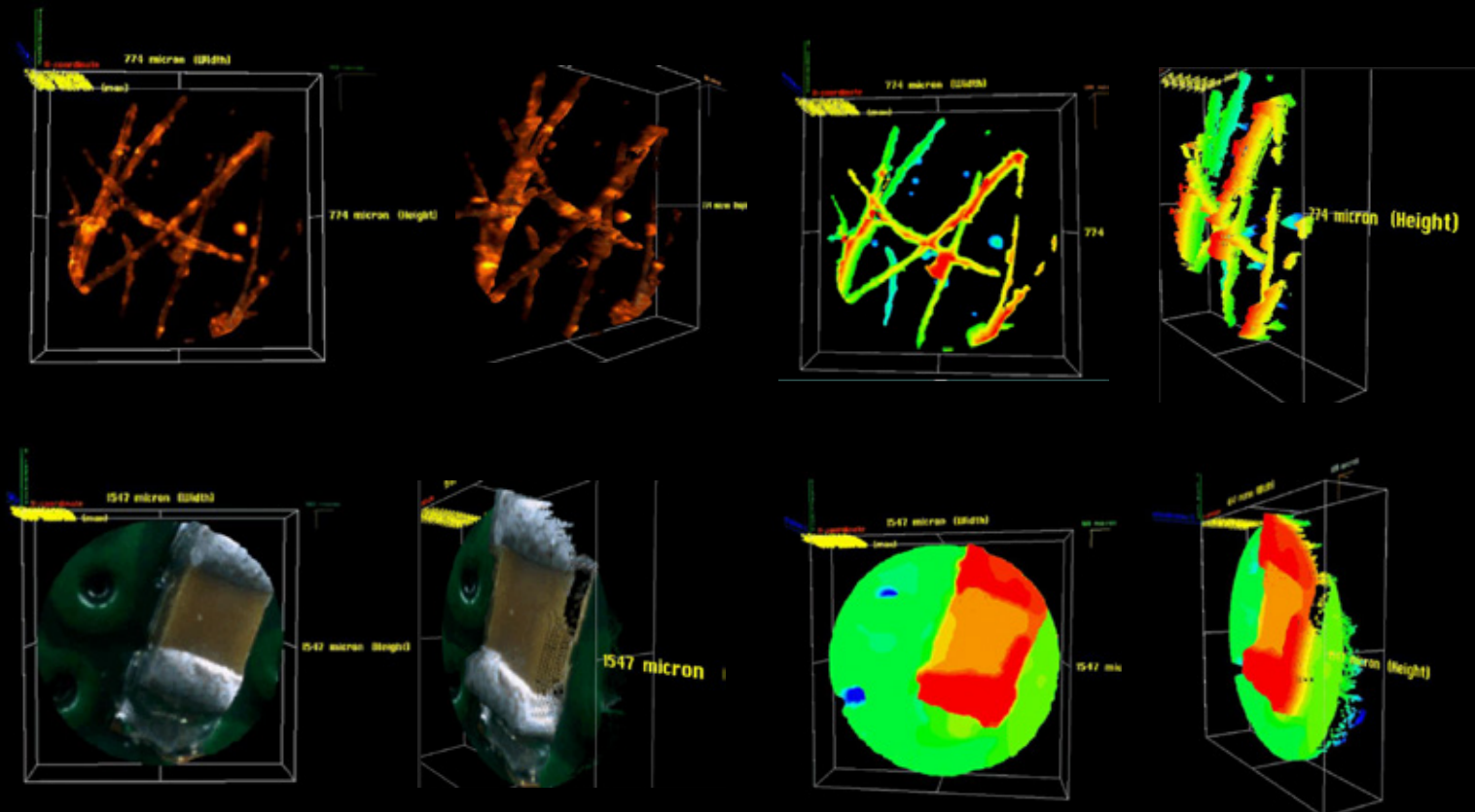
3D imaging for quality control of the ovule and collected sperm. Embryo studying

# The software

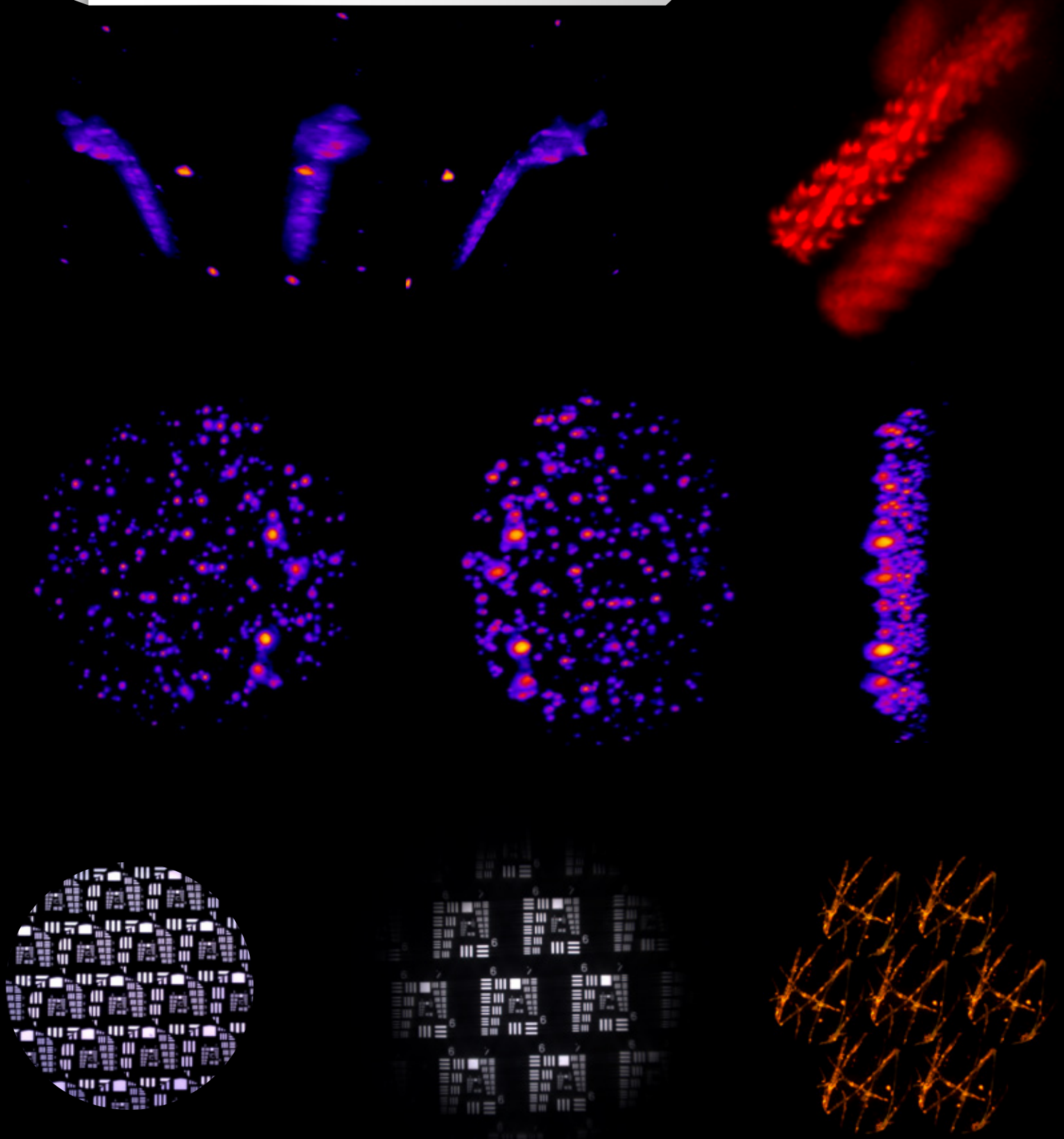
To display the images, the eyepiece is connected to a computer with a screen.

Through our powerful software, the perspectives are processed, and the 3D images are presented to the user in different ways. Apart from the conventional 2D flat image, the image is displayed in 3D modes. Different modules enhance different characteristics for a detailed analysis according to the techniques and standards required for each application.

These characteristics are views from different observation points, a volumetric reconstruction of the sample, visualization of occluded parts of the scene, a selection at will of the focus plane—with great optical sectioning capacity—, a color-coded depth map, or a topography map of the surface of the sample, among others. In addition, the views can be transformed into a stereo pair that allows seeing the three-dimensional scene with virtual reality glasses. Moreover, they can also be transformed into an integral 3D image that can be seen from an autostereoscopic or holographic light-field display



# Light-field microscopy





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