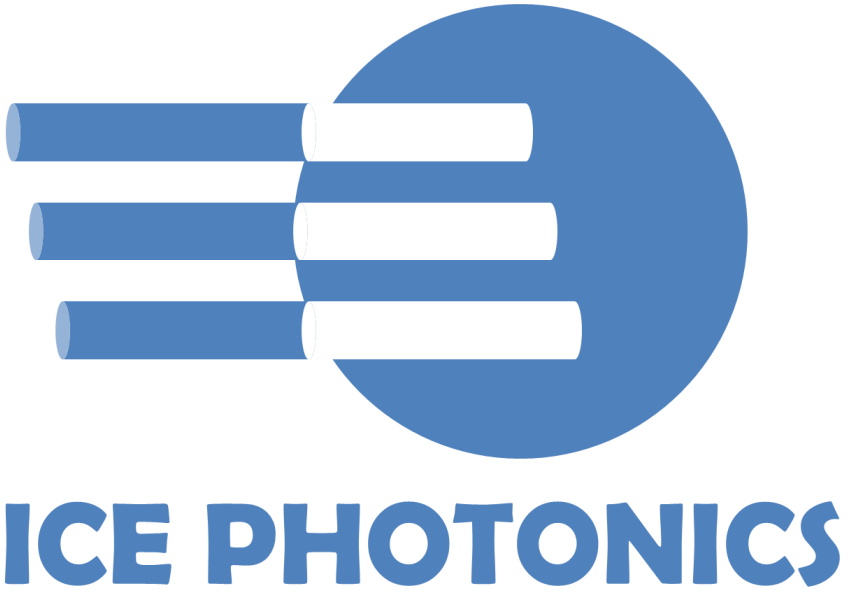
Control dinámico de haces láser mediante moduladores espaciales de luz



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Experts in SLM technologies

SPATIAL LIGHT MODULATORS – Pixelated devices that impose a spatially varying modulation on a light beam

Two main current SLM mature technologies are basically:

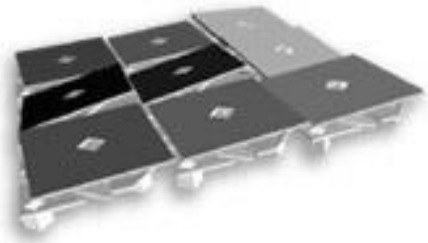
DLP – Digital Light Processors displays

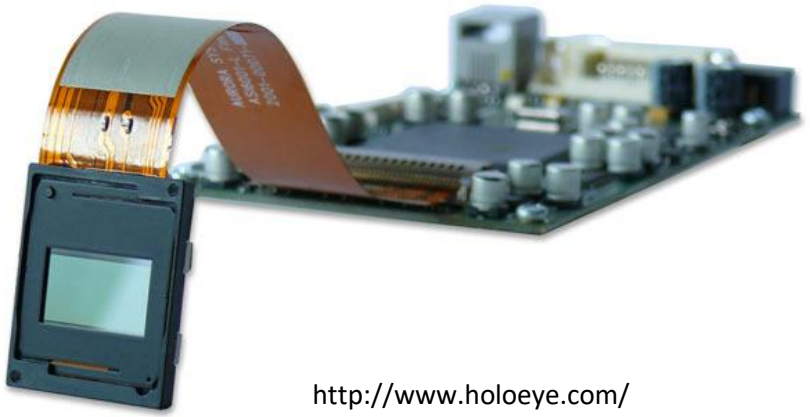
- Based on micromirror MEMs technology.
- Fast refleshing rates.
- Only binary-intensity modulation.
- Phase modulation can be encoded with digital holography.
- Wavelength insensitive.

LCD – Liquid Crystal Displays

- Based on the optical anisotropy of LC materials.
- Require polarized light.
- Slow rates.
- Wavelength sensitive.
- Direct modulation of the intensity, the phase, or the state of polarization.

http://www.ti.com/





http://www.holoeye.com/

Experts in SLM technologies

Current SLM spatial resolution allow the realization of diffractive patterns.
Phase-only modulation can be achieved for certain state of polarization.

They can be used as **programmable optical elements, with applications in:**

- **Wavefront sensing and adaptive optics**
- **Customized light beam shaping**
- **Pulse shaping**
- **Optical metrology techniques**
- **Reconfigurable interconnects**
- **Wavelength selective switches**
- **Beam-steering devices**
- **Optical communications**
- **Quantum information processing**
- **Quantum optical computing;**
- **Holographic displays**
- **Displays for augmented and virtual reality**
- **Holographic microscopy**
- **Optical trapping and tweezing**
- **Computational imaging**
- **Holographic material laser fabrication**
- **Massless lithography and 3-D printing**

http://www.holoeye.com/

Our expertise in SLMs

After 25 years, the experience and competences of our team include:

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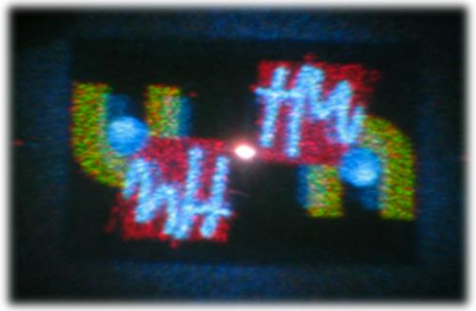

1. Selection of SLM for desired application: DLP vs LC, LCOS vs transmissive, twisted vs parallel alignment, nematic vs ferroelectric phase.
2. Evaluation of SLM characteristics: phase modulation, flatness, flicker, fringing.
3. Precise control and optimization of SLM performance for programmable optics; polarization configurations for optimal operation: diffraction efficiency budget.
4. Design and computing of holographic elements for customized light control.
5. Multiwavelength operation; Polarimetric control and polarimetric imaging.
6. Customized design for new optical modulator devices.

Our role in SLMs based projects

Customers and collaborators

SLM suppliers

Customized LC components

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Some examples – Device selection and operation

https://www.hamamatsu.com/

HAMAMATSU – LCOS-SLM series

Wavelength range:	355 nm - 1550 nm
Spatial Resolution:	1272 x 1064 pixels
Panel Active Area:	9.9 mm x 7.7 mm
Pixel Pitch:	12.5 µm

https://www.thorlabs.com/

THORLABS Exulus

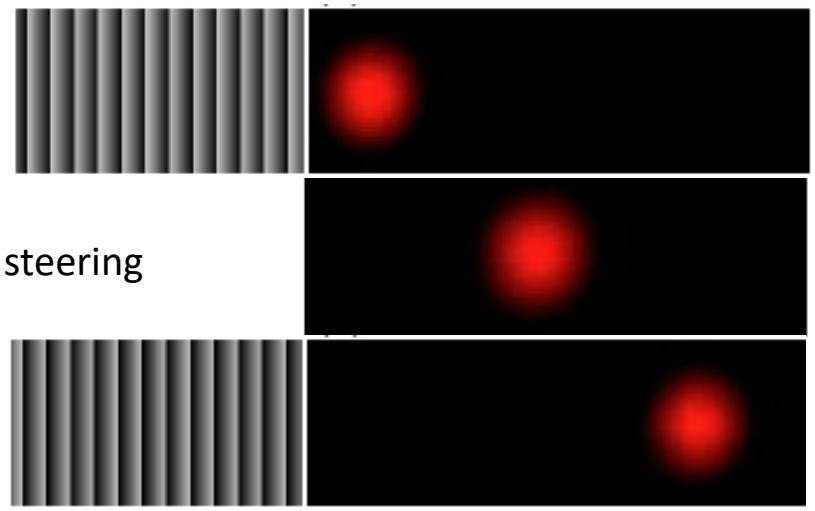
Wavelength range:	400 nm - 850 nm
Spatial Resolution:	3840 x 2160 pixels (4K UHD)
Panel Active Area:	15.6 mm x 9.2 mm
Pixel Pitch:	3.74 µm
Damage threshold:	CW - 5 W/cm

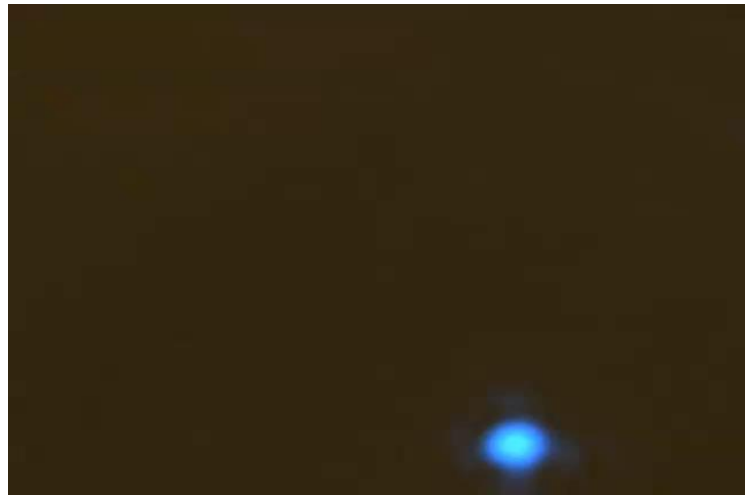
Transmissive TN displays offer a much lower cost alternative.

But they require a precise in a selective polarization configuration, achieved with our systematic procedure.

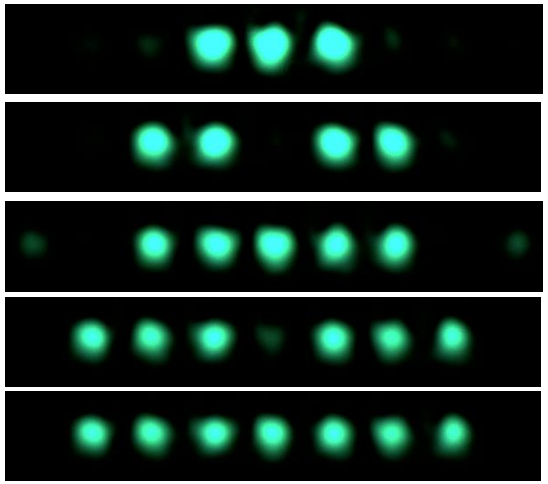
Laser beam control

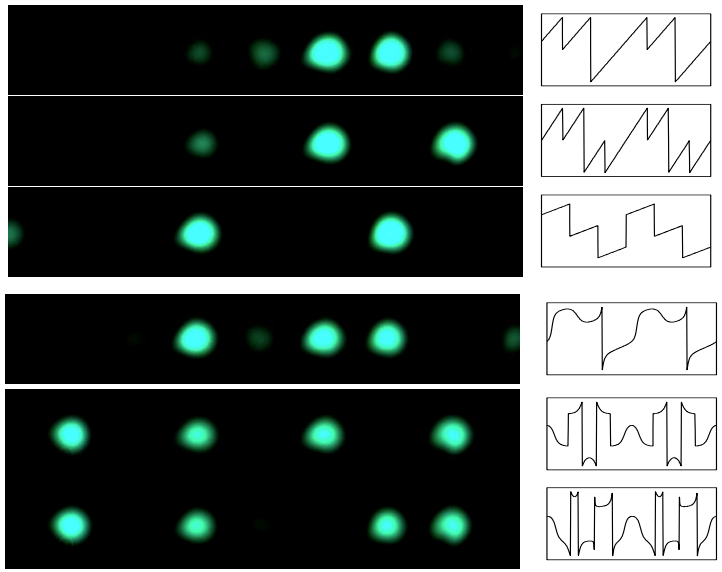
1. Laser beam steering



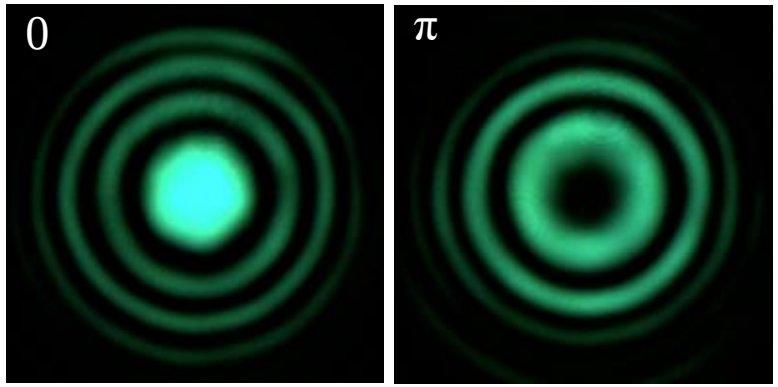


2. Laser beam splitting



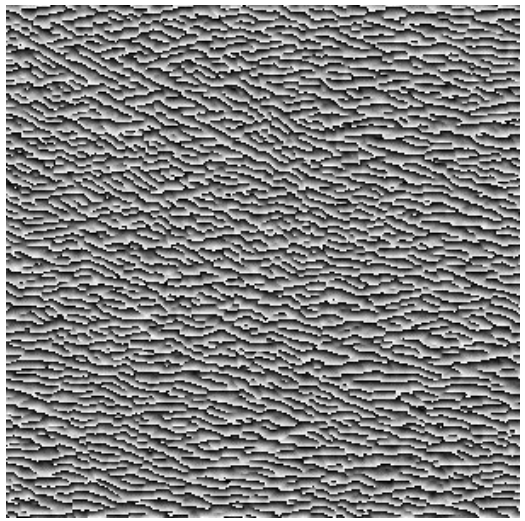


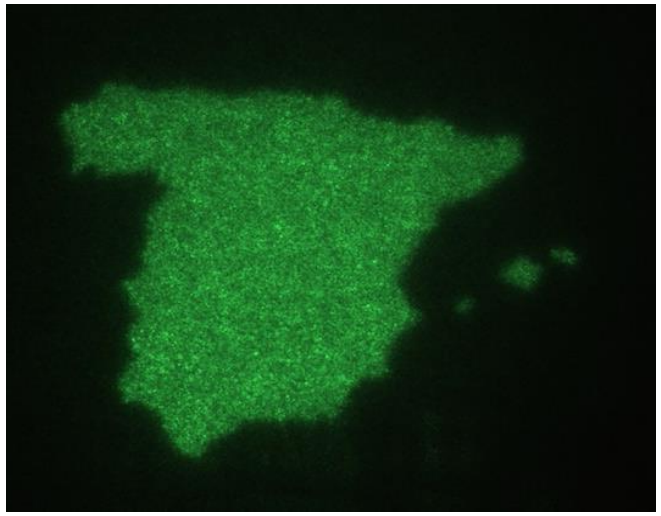
3. Phase shifting



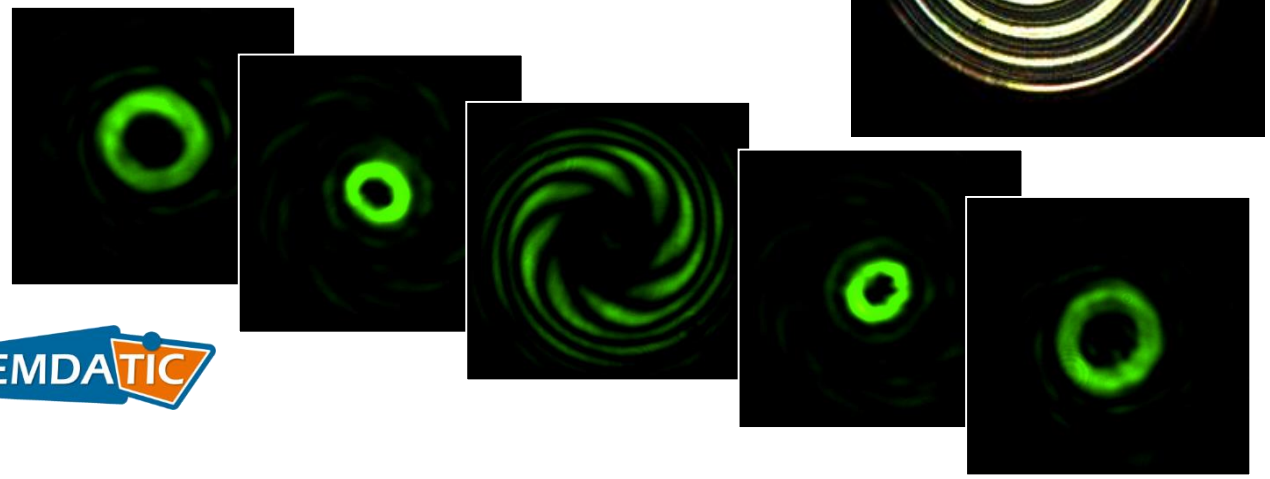
Laser beam control

4. Holographic laser projection

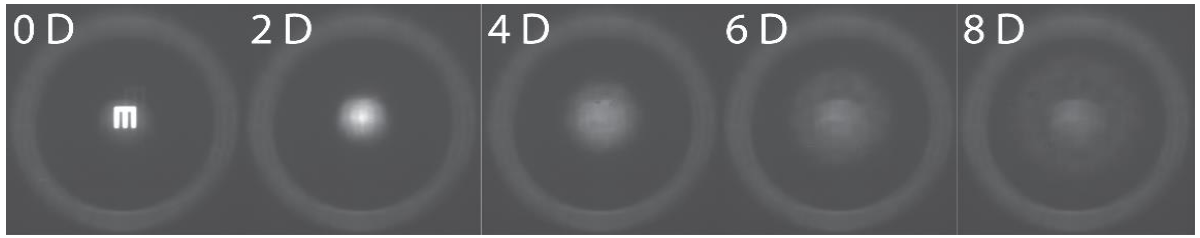




5. Customized LC multifocal vortex lens for OAM based detection



6. Adaptive optics with SLM based holographic correction



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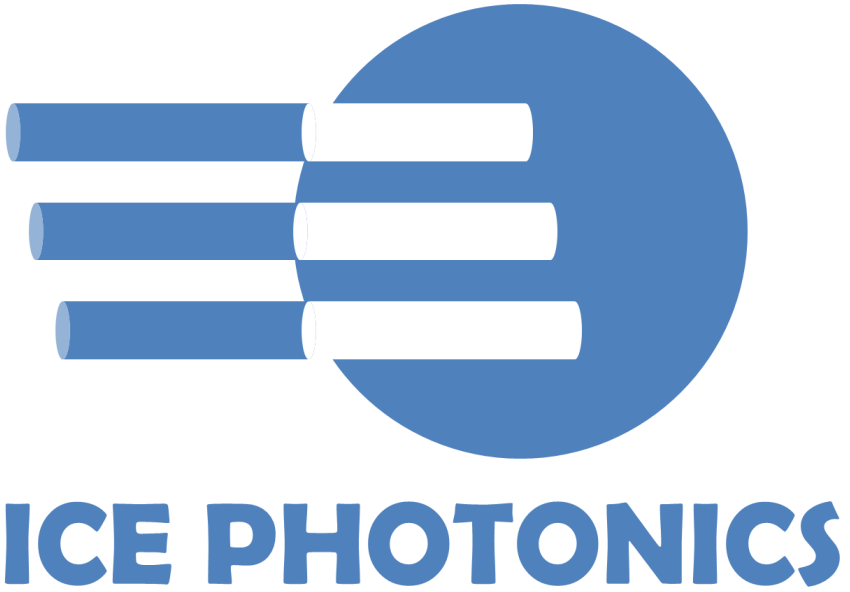

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