

MEMS for FSO beam forming and steering

P.-A. Blanche

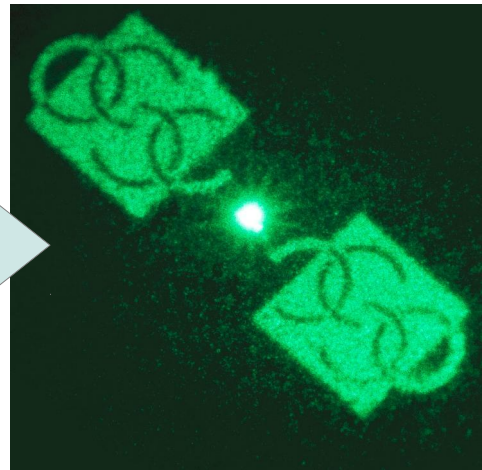
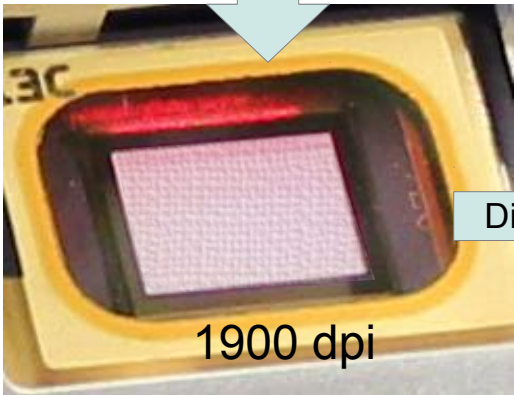
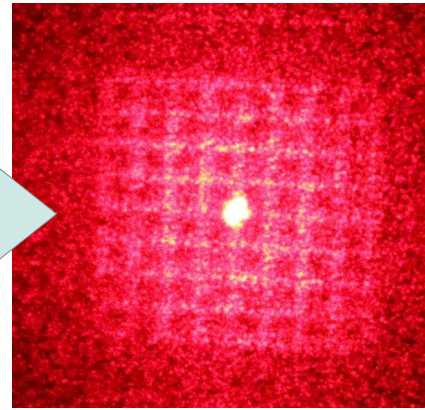
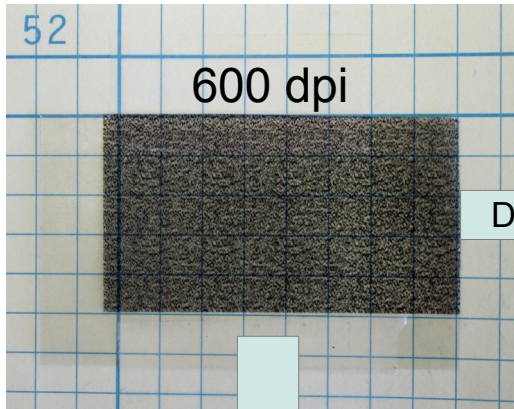
<http://www.optics.arizona.edu/pablanche/>



How it is done

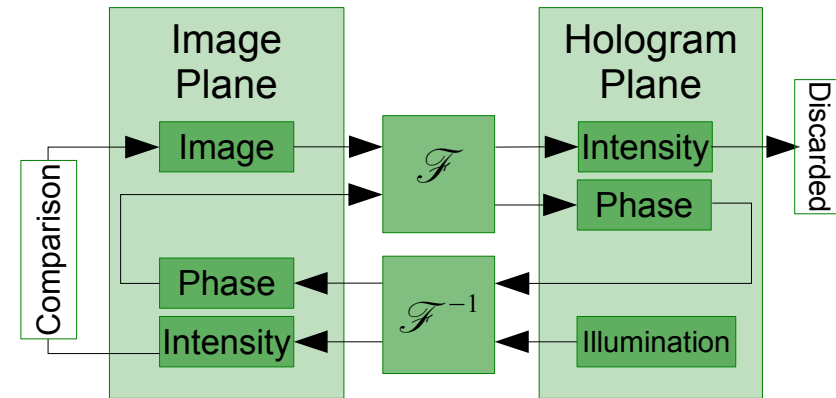
Computer Generated Hologram

Diffraction



LCOS or TI DLP

Gershberg-Saxon algorithm

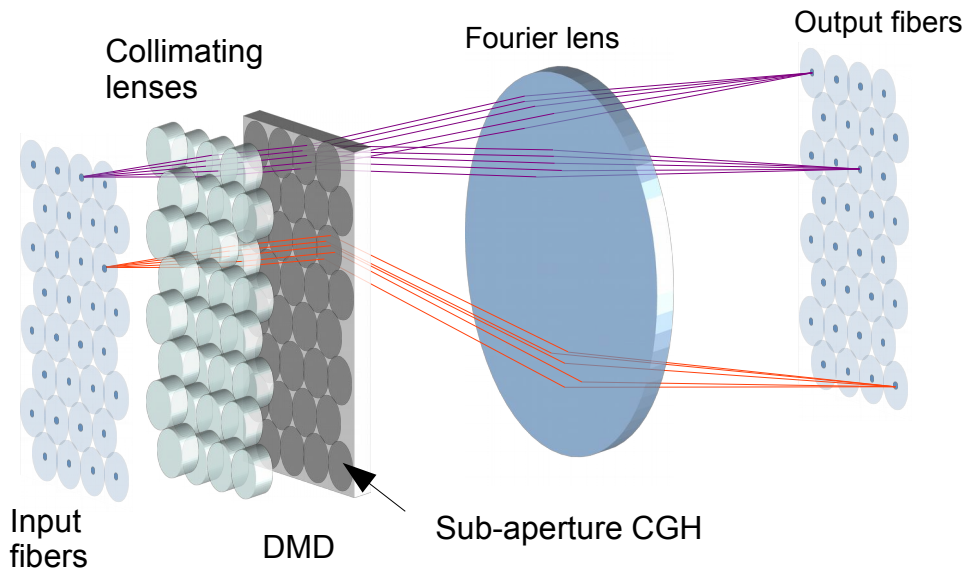


Same as phase array radar



How it works

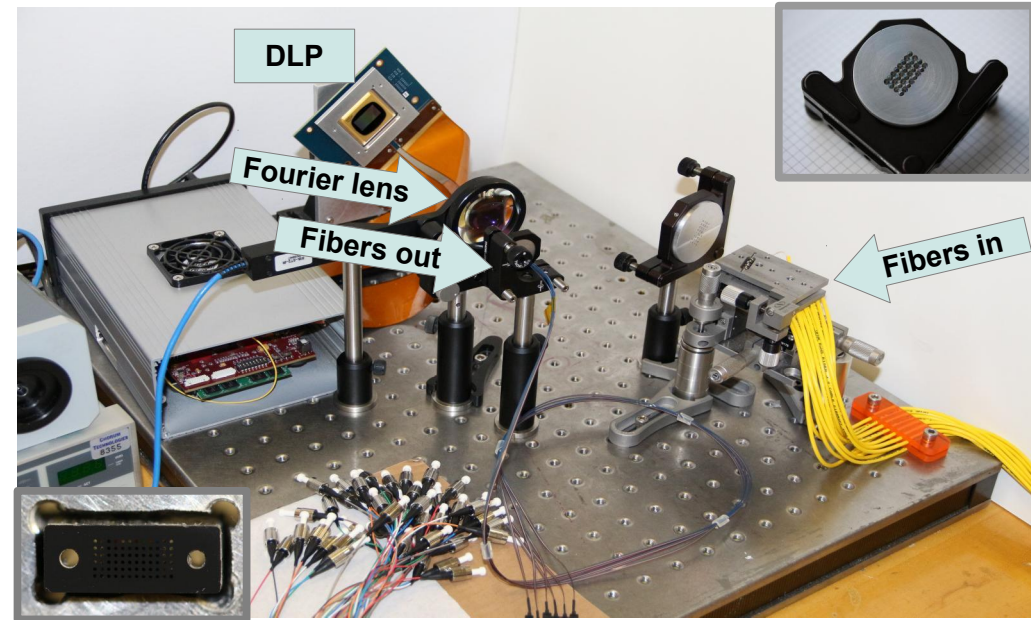
Cross connect schematic



B. Lynn et al. "Design and Preliminary Implementation of an $N \times N$ Diffractive All-optical Fiber Optic Switch", IEEE/OSA Journal of Lightwave Technology, 31 (24), pp 4016 – 4021, December 2013.

How it looks like

Switch Prototype for data center



Collaboration with Microsoft research

Ghobadi, Monia, et al. "Projector: Agile reconfigurable data center interconnect." Proceedings of the 2016 conference on ACM SIGCOMM 2016 Conference. ACM, 2016.

What can it do?

Advantages for FSO networks

Speed: 12 μs reconfiguration time

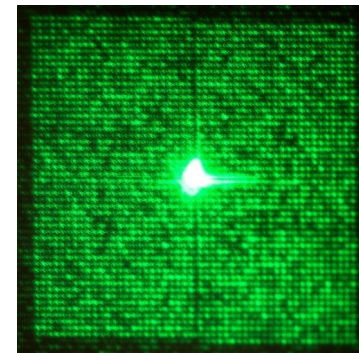
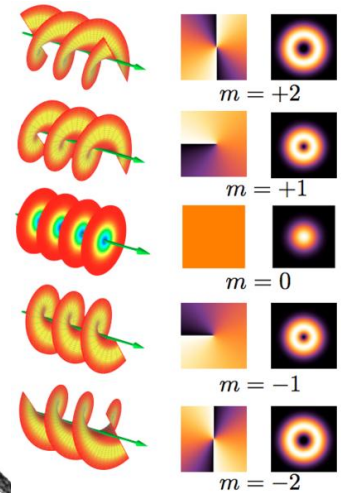
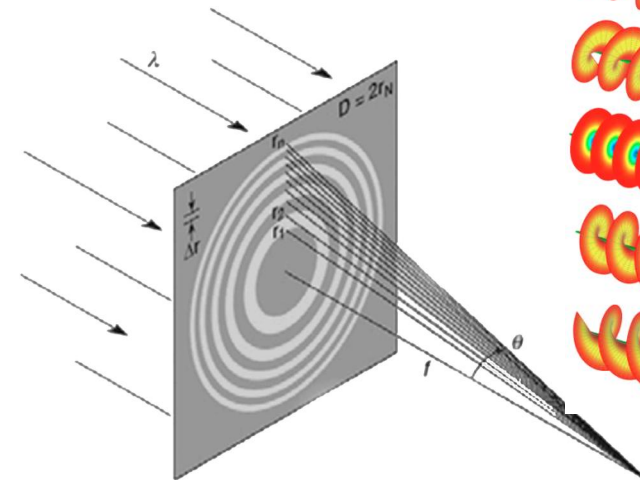
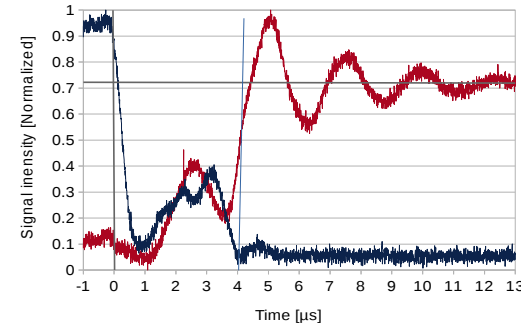
- Real time reconfiguration
- Tracking of moving vehicle

Beam shaping: (Fresnel lens)

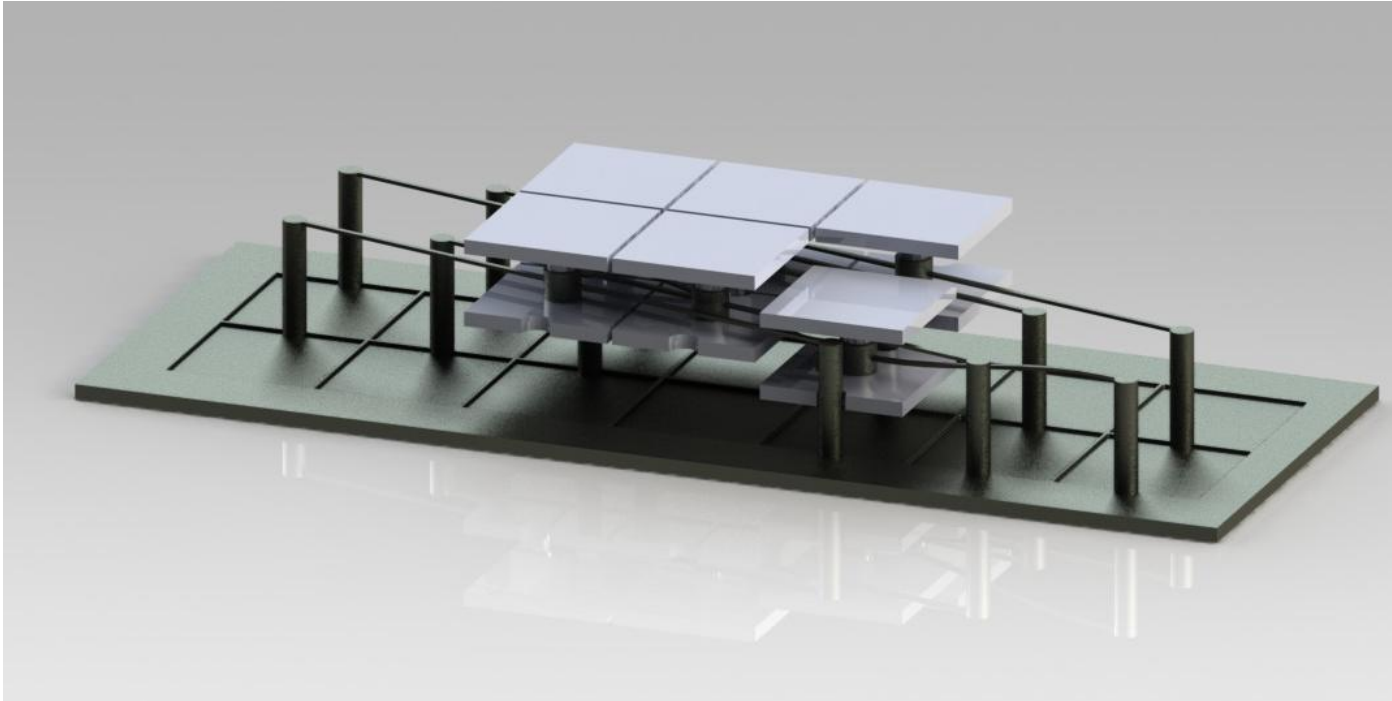
- Atmospheric correction
- Orbital angular momentum multiplexing

Beam splitting:

- Spatial multiplexing: 10,000 output ports
- Signal optimization for \neq users



Where can I buy one? Phase MEMS prototype



Faster than LCOS, more efficient than DMD!
(120Hz → 20 kHz) (40% → 100%)

Collaboration with UC Berkeley and Texas Instruments