IPS II

Interference Pattern Structured Illumination Imaging

→ Way to capture Images:

- no lens.
- create multi-pixel image with single pixel detector
- applicable to any type of wave.
  (light - X-ray - radar - acoustic waves - Quantum waves)

→ Goal to overcome limits of conventional imaging:

- Resolution [wavelength of light & size of optic]
- Working distance.
  (need either short distance from object, or big lens to capture big angle coming from the light)
- Depth of field (range of things which are in focus)
  low Res. → large range
  high Res. → short range
- Field of view.
  for high Res. need large numerical apperture ($n \sin\theta$)
- lenses / Mirror use Multi pixel detector.

Resolution Limit

$$d = \frac{\lambda}{2 n \sin\theta}$$

* How IPSII works:
"Structured illumination Imaging"

Rather than making image onto Multi-Pixel detector,
we control shape of light that's illuminating the object
to gain info. about the object
simply by measuring how light scatters from that pattern

- "LIDAR" → use structure illumination.

- "IPSII" → use Interference Pattern Structured Illumination

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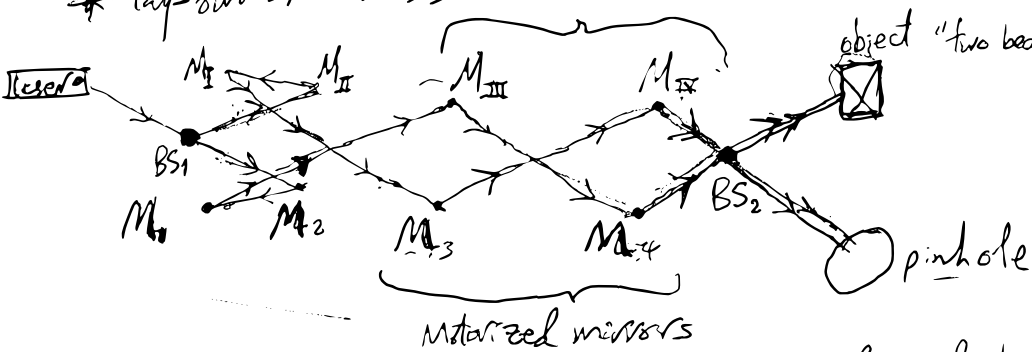
* Advantages of IPSII:
  - No high "numerical aperture" lens/mirror needed
  - No need for being close to object.
  - Depth of field & field of view
  - all waves (x-ray, electron, radar, far IR, acoustic)
  - Compressed sensing
  - 2x resolution
  - similar to MRI tech.

* lay-out of IPSII = "Interferometer"



** we control angel and position of each beam

** (Relative Phase btwn two laserbeams)
determains dark and bright stribes in interferens pattern

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* Future work:

Experimental laser optics
Mechanical design and testing
Data processing methods
Image processing
MRI parallel imaging techniques.
Computer motion control
Digital Holography
Ultra Sonic acoustic imaging
High-Res Long-working-distance microscopes.
Boosting imaging speed.

Radar
"No big dish"

AOM