Experimental demonstration of a crossed cubes nuller for coronagraphy and interferometry

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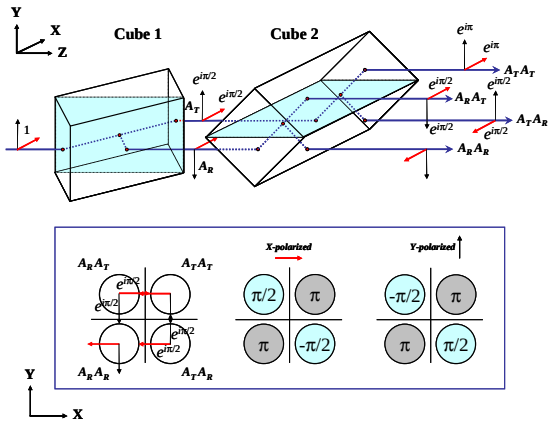
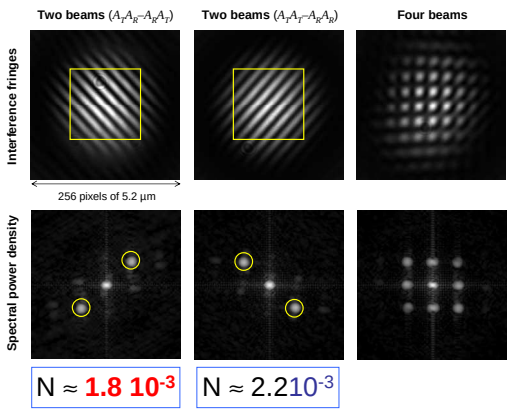


Cubes polarization model

Summary

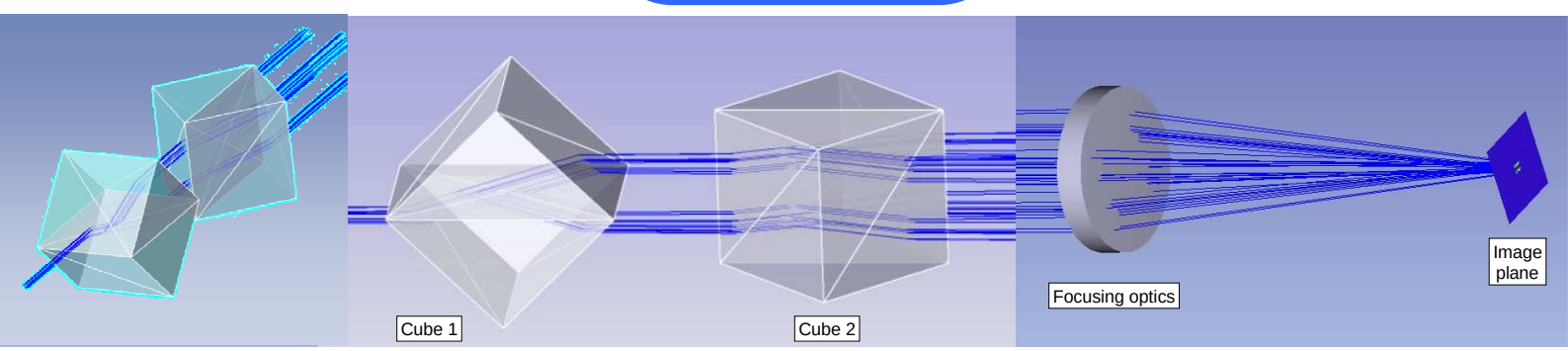
- Two "crossed" beamsplitter cubes have their semi-reflective layers perpendicular one to the other
- The input beam propagates parallel to both cubes layers. It is spitted into four parallel beams, being recombined axially
- Only **two** of those beams are used to generate a "null" at the focal plane centre
- It is independent of wavelength and polarization orientation

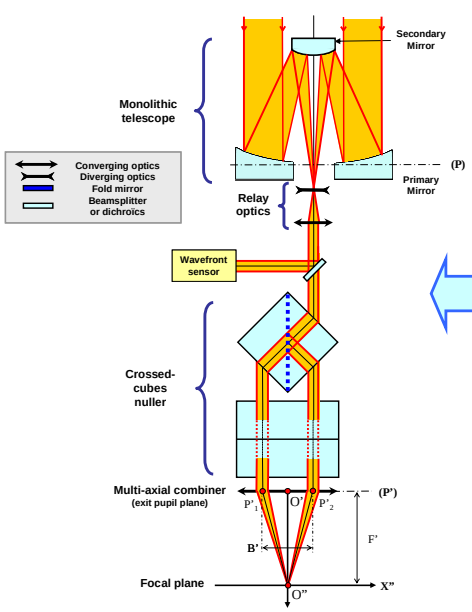
→ This is actually an **Achromatic phase shifter**



N ≈ **1.8 10^{-3}** N ≈ 2.2 10^{-3}

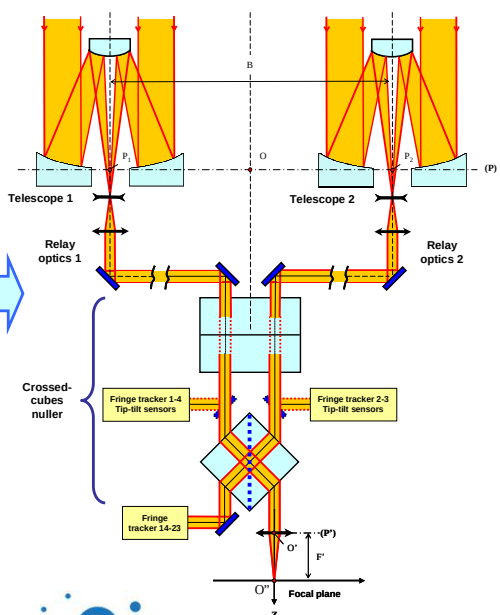
First fringes





Advantages

- Simple, compact, low mass and volume
- Reasonable manufacturing tolerances
- Potentially not expensive
- Not sensitive to chromatic flux mismatch
- Can be implemented into a nulling **coronagraph** telescope or a **sparse-aperture** nulling interferometer
- Very small Inner working angle (IWA) when used as a coronagraph
- Capacity for fringes rotation and baseline modulation
- Good candidate for future space missions characterizing extra-solar planets atmospheres



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