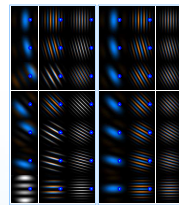


# Nulling interferometry in space does not require a rotating telescope array

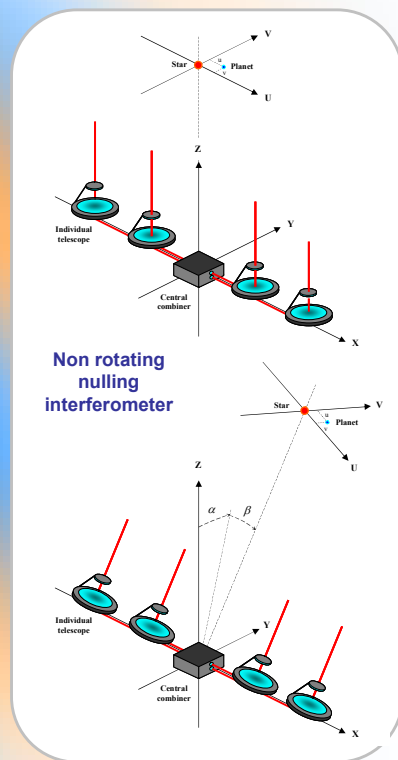
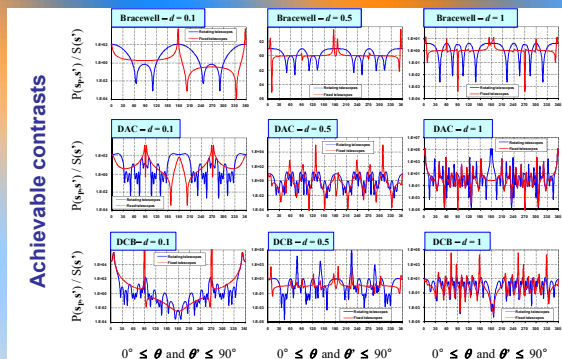
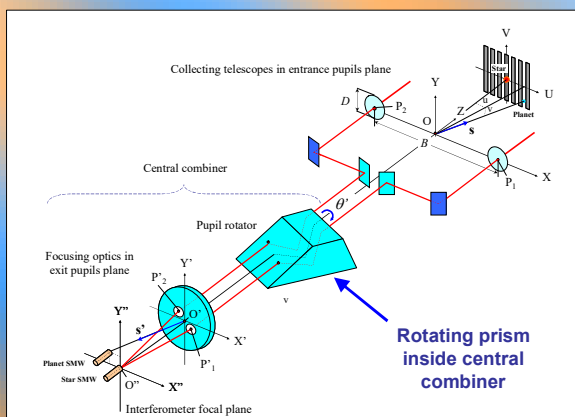
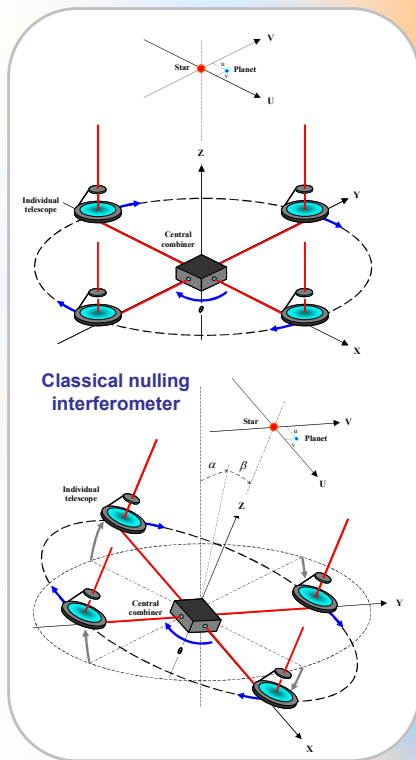
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## Summary

Space borne nulling interferometry in the mid-infrared waveband is one of the most promising techniques for characterizing the atmospheres of extra-solar planets orbiting in the habitable zone of their parent star, and possibly discovering life markers. One of its most difficult challenges is the control of free-flying telescope spacecrafts moving around a central combiner in order to modulating the planet signal, within accuracy better than one micrometer at least. Moreover, the whole array must be reconfigured regularly in order to observe different celestial targets, thus increasing the risk of loosing one or more spacecrafts and aborting the mission before its normal end. Here is described a simplified optical configuration where the telescopes do not need to be rotated, and the number of necessary array reconfigurations is minimized. It allows efficient modulation of the planet signal, only making use of rotating prisms or mirrors located into the central combiner.



## Conclusion

The conceptual design of a nulling interferometer operating in space without needing a rotating telescope array is composed of:

- A set of two or more fixed collecting telescopes arranged in a linear array, either onboard of free-flying spacecrafts or mounted onto a truss structure,
- Altazimuthal drives of the collecting telescopes, allowing them to explore a wide field of view,
- Long range delay lines systems integrated into the spacecrafts,
- Multi-axial beam combining optics comprising a pupil rotator made of prisms or mirrors, and located in the central spacecraft,
- A dedicated observation sequence allowing both detection and characterization modes of extrasolar planets.