

## Focal-plane wavefront sensors for direct exoplanet imaging: theory, simulations and on-sky demonstrations

Bos, S.P.

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## Propositions accompanying the thesis

## Focal-plane wavefront sensors for direct exoplanet imaging: Theory, simulations and on-sky demonstrations

1. Including pupil-amplitude asymmetries in the vector-Apodizing Phase Plate designs enables (high-order) focal-plane wavefront sensing.

(Chapter 2, 3 and 4)

2. Deploying the self-coherent camera with a polarized reference beam allows for a pinhole position closer to the pupil, which strongly relaxes the requirements on the instrument and improves the wavefront sensing performance.

(Chapter 5)

3. The low-wind effect can be controlled with the Fast&Furious focal-plane wavefront sensing algorithm.

(Chapter 6)

4. Generating artificial reference speckles with geometric-phase optics results in a higher astrometric and photometric precision.

(Chapter 7)

- 5. All AO-assisted instruments should deploy dedicated focal-plane wavefront sensors for science operations.
- 6. Astronomical instrumentation research groups should always try to maintain a healthy balance between rapid innovation and maturing technology to design instruments with the best performance.
- Networks that connect early career researchers accelerate the development of these researchers and thus move the entire field forward.
- 8. Combining two areas of expertise results in new ideas and improved instrumentation.
- If we ever truly want to become a spacefaring civilization, we need not only technological advancements, but also cultural advancements that are driven by astronomy.
- 10. With polarization comes great power, and great responsibility.
- 11. Talent is useless without hard work, but hard work does not guarantee success.
- 12. To face the challenges of the 21th century and beyond, we need to reform the European Union governance and institutions.