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# Non-Common Path Aberrations Strategy for the METIS High Contrast Imaging Modes

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## Abstract

Non-common path aberrations (NCPAs) are widely recognized as one of the main limitations of current and future high-contrast imaging instruments. The slow variation of NCPAs generates quasi-static speckles (QSS) that are coherently modulated by the AO speckles. This increases speckle noise and reduces the achievable contrast, thus leading to a significant hit in HCI performance.

In METIS, NCPAs – due to optical imperfections – are kept to a minimum, and the gravity-invariant design should keep the time variation to a low level. Yet the short- and long-term variations, driven by chromatic beam wander, of the NCPAs can lead to a significant hit in HCI performance and two algorithms are being developed to measure and correct for NCPAs: QACITS for tip-tilt sensing in the case of the vortex coronagraph, and Phase Sorting Interferometry (PSI) for higher-order aberrations.

In this contribution we will detail our NCPA modeling and control strategies for METIS, with an emphasis on our implementation and analyses of the PSI algorithm.

We will also shortly discuss the challenge posed by the water vapor turbulence, and the mitigation and limitation of our focal-plane wavefront sensing algorithms in measuring and correcting these dynamical aberrations.

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