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The self-coherent camera temporally modulated: a satisfactory paradox

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The self-coherence camera (SCC) wavefront sensor exploits efficiently the coherence of light for active correction of quasi-static speckles and for data post-processing. Many attempts have been made over years to improve the potential of the sensor for active optics, fine cophasing optics, and more recently as a support to adaptive optics. The requirements on the optical beam footprint to illuminate the SCC reference channel and fringes sampling in the coronagraphic image usually make difficult its implementation in existing setups, and precludes the correction of fast-living residual atmospheric aberrations. An upgrade of the SCC, called the fast-modulated SCC, where the reference channel creating the interferences in the coronagraphic image is placed close to the pupil boundary, and modulated temporally, solves these original shortcomings. A review of the concept state-of-the-art will be given and the fast-modulated SCC presented. The fast-modulated SCC represents a complete game changer for the sensor: full compatibility with any type of coronagraph, easy installation in existing high-contrast instruments and testbeds, and versatility by accessing short- and long-time exposure measurements and applications.

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