Telescopes with resilient astrometric response

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Abstract

Building on the concept of Three-Mirror Anastigmats, it is possible to deploy a family of telescopes with aperture diameter in the range 1 m to 2 m, focal length 15 m to 30 m, and field of view of order of 0.5 square deg, of interest to astrometric applications.
The design is compatible with 4 micron CMOS or 10 micron CCD pixels, operating in the visible and/or near IR.
Circular symmetry is enforced in the design, to ensure uniform optical response over the field of view, easing calibration and reducing the sensitivity to perturbations. Manufacturing, alignment and monitoring issues (e.g. by onboard metrology) are also alleviated.
The compact layout ensures that the largest size payload may fit on top of a given size spacecraft.
We present a range of optical design options, which may be tailored to different science cases: exoplanets, dark matter detection through the dynamics of selected targets (dwarf spheroidal galaxies, distant Hyper Velocity Stars, sets of Milky Way halo stars), light deflection around the Sun, and a GW antenna.
Optimization of the instrument configuration and operation may require additional subsystems, e.g. calibration and monitoring devices, or a beam combiner for multiple field simultaneous observations (Gaia-like).

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