TMT
THIRTY METER TELESCOPE

A Model for Computing Astrometry Errors Due to Optical Surface Aberrations

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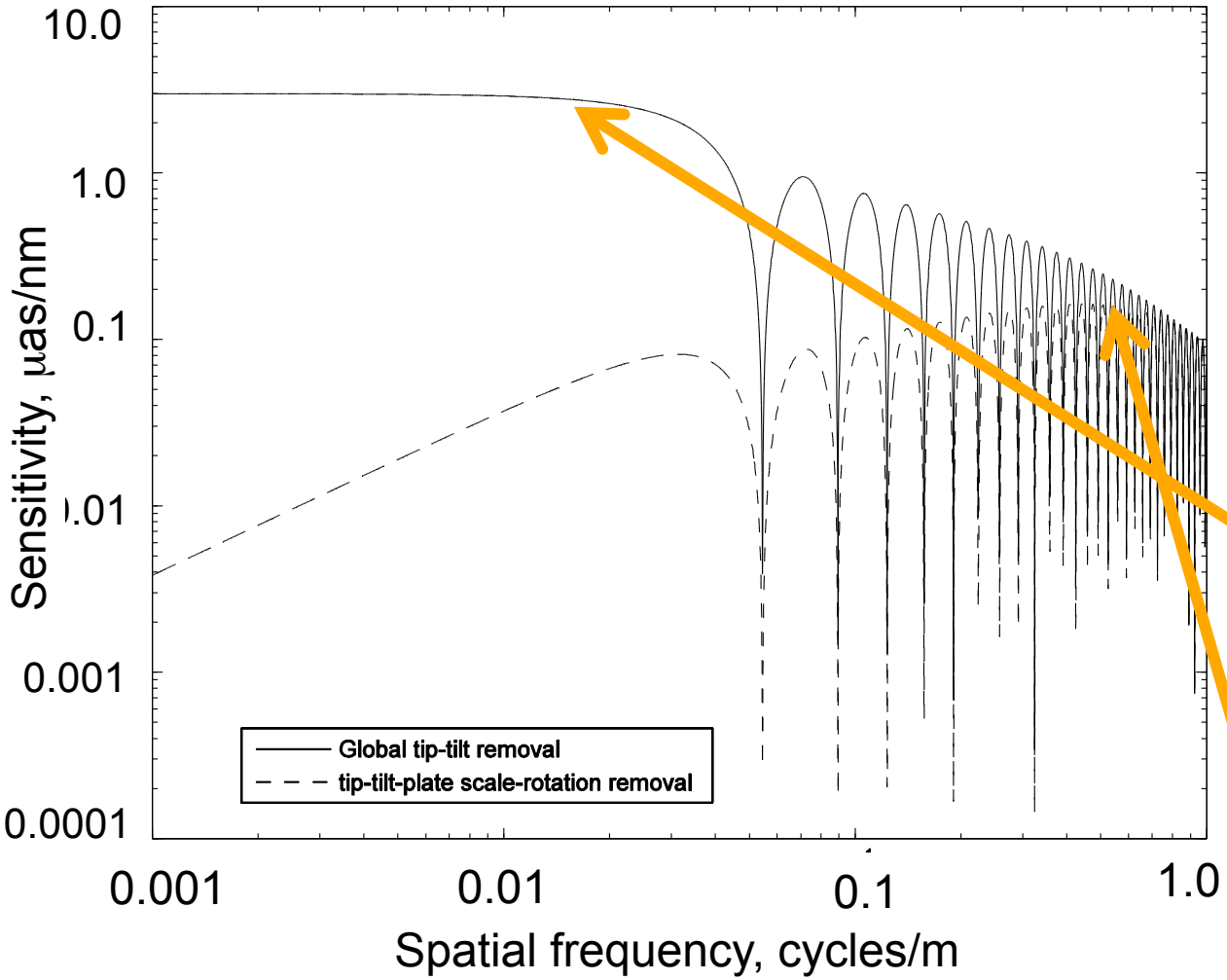
Poster Summary

- Just as for high-contrast imaging, wavefront aberrations in optical systems place limits astrometric accuracy
- Fourier-domain model developed to estimate this effect
- Results given in terms of sensitivity factors:

  (micro arc seconds of astrometry error)/(nm of wavefront error)
- Analytic formulas developed for three special cases:
  - Error due to static aberrations after calibration a reference source grid
  - Error due to quasi-static aberrations after calibration via field stars
    - For example, DM figure drift in an MCAO system such as GeMS
  - Error due to beam translation on surfaces because of line-of-sight dithers or image derotation
- First sensitivity factors computed for Gemini/TMT are not too tight!

Sample Result: Impact of Quasi-Static DM Figure Drift for Astrometry with TMT



- D=30m
- 30” FoV
- 11.2 km DM conjugate range
- 0.5m actuator pitch
- Max. sensitivity of ~2.5 μas/nm with global tip/tilt calibration
- ~0.15 with plate scale calibration