<https://www.naoj.org/staff/guyon/publications/2018/2018-06-11_SPIE/TMTpsi/proceedings/wfscTMTpsi.pdf> PSI must deliver 1e-5 image contrast at ≈ 15 mas separation at λ ≈ 1µm − 1.5µm

<https://www.stsci.edu/files/live/sites/www/files/home/jwst/about/history/white-papers/_documents/Astro2020-white-paper-BeichmanC.pdf> Chart

Description automatically generated

JWST’s long wavelength sensitivity will enable it to study <1 Mjup at above ~1 arcsec

<https://arxiv.org/ftp/arxiv/papers/1510/1510.04567.pdf> Table 1 shows the imaging capabilities of JWST with NIRCam, NIRISS, and MIRI providing Nyquistsampling of JWST’s diffraction limited point spread function at angular resolutions of 64 mas, 130 mas, and 250 mas at wavelengths of 2, 4, and 8 microns, respectively.

<https://www.tmt.org/page/iris> TMT has angular resolution of 0.004 arcseconds at (0.84 - 2.4 μm)

<https://arxiv.org/pdf/1808.09632.pdf> Optimistic resolution EQ: lambda/D, pessimistic 3 Lambda/D

Seagar: planet/star contrast goes as Lp/Lstar = p \* (sin(alpha)+(pi-alpha)cos(alpha))/pi \* (Rp/a)^2 + E^(hc/lambda k Tp) - 1 / (E^(hc/lambda k Tstar) – 1)

Teff of Jupiter = 124 K, Teff of Sun = 5772 K

Peak lambda of Jupiter = 23.4 microns, Peak of Sun = 0.5 microns

From Mathematica: Assuming geometric albedo is constant (it isn’t but whatevs), and that the phase is pi/2 (where it’s furthest from the star in our line of sight):

Jupiter signal at it’s peak of emission: 7.8 \* 10^-6, signal at Sun’s peak: 1.3\*10^-9

Calculated resolution of TMT at Jupiter peak is 0.002/0.0034/0.0084 arcsecs for optimistic/classic theoretical/pessimistic

Calculated max distance TMT could detect Jupiter: 32 pc

<https://www.spiedigitallibrary.org/conference-proceedings-of-spie/8446/84461K/Second-Earth-imager-for-TMT-SEIT--concept-and-its/10.1117/12.926039.short?SSO=1> Second Earth imager looking at contrast of 8\*10^-8 at 0.01 arcseconds

<https://www.tmt.org/page/exoplanets> Aiming to increase contrast really close to the star, specifically over 4x closer than what Gemini South’s GPI can do, which is 10^-6 contrast at 0.2-1 arcseconds