Target Vetting

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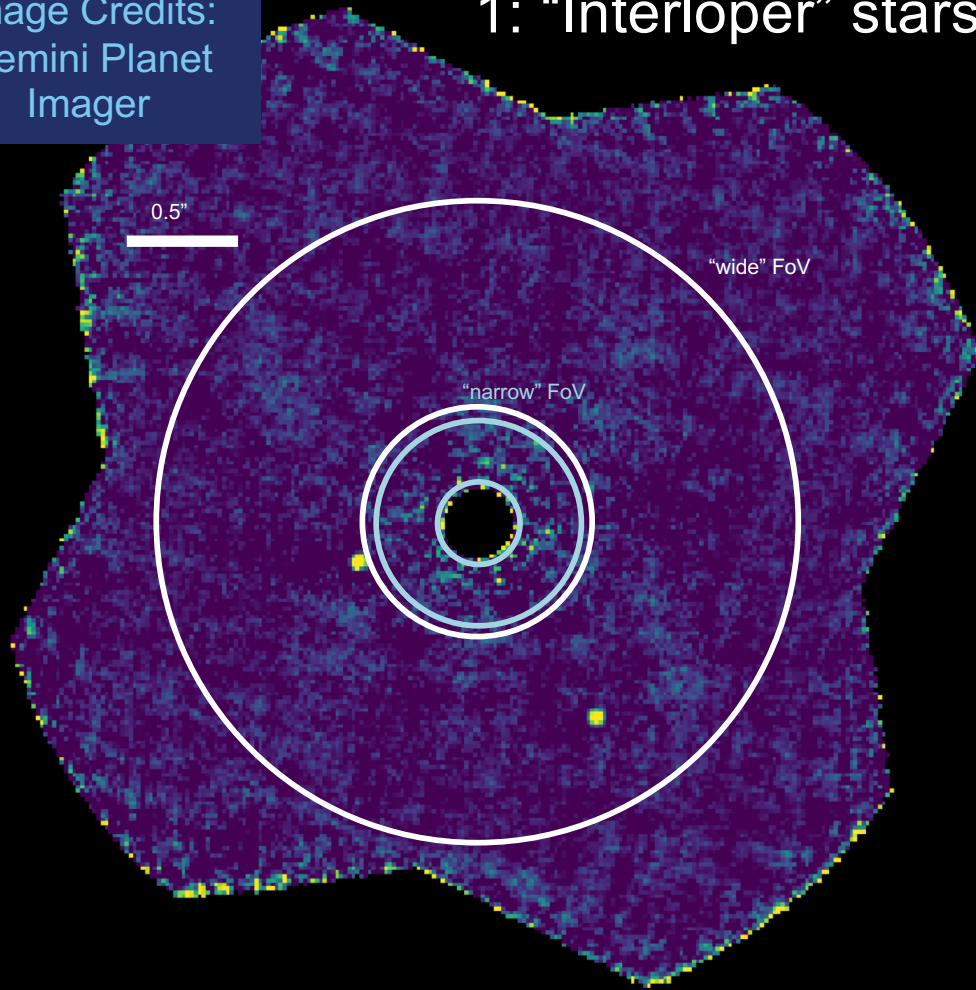
Rob De Rosa (ESO), Tyler Smith (UCI), Garreth Ruane (JPL),
Misty Cracraft (STScI), Bill Sparks (STScI), Maggie Turnbull (SETI)

1: "Interloper" stars

0.5"

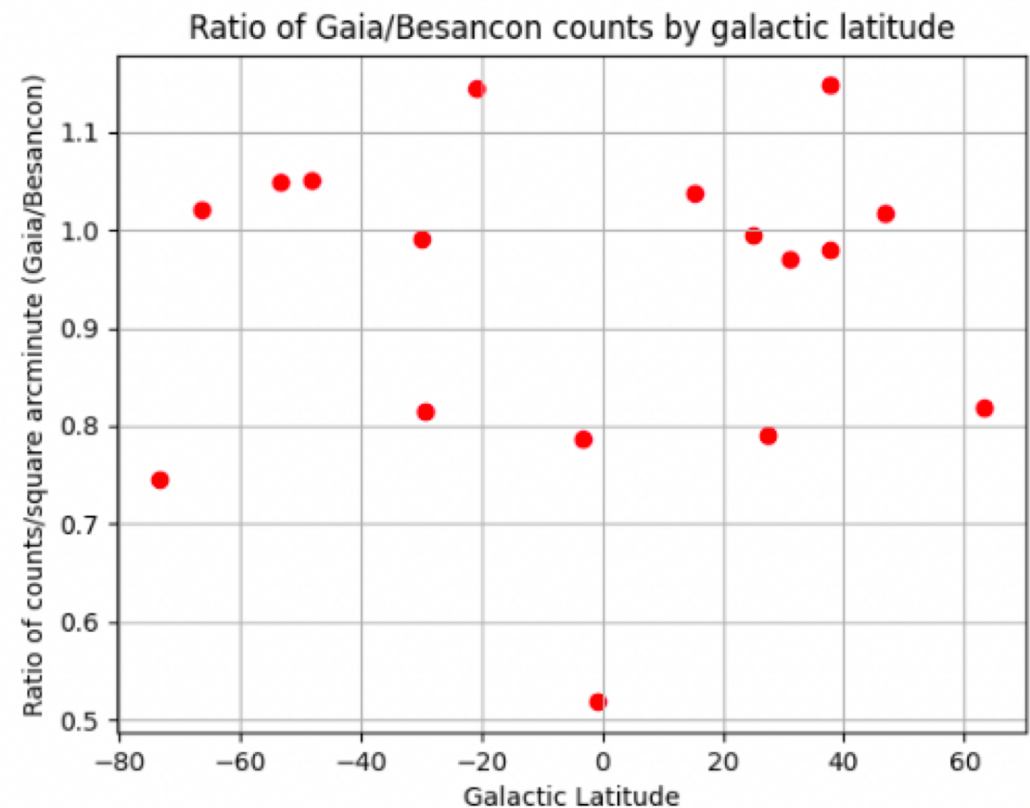"wide" FoV

"narrow" FoV

2: "Glint" stars w/ ADI
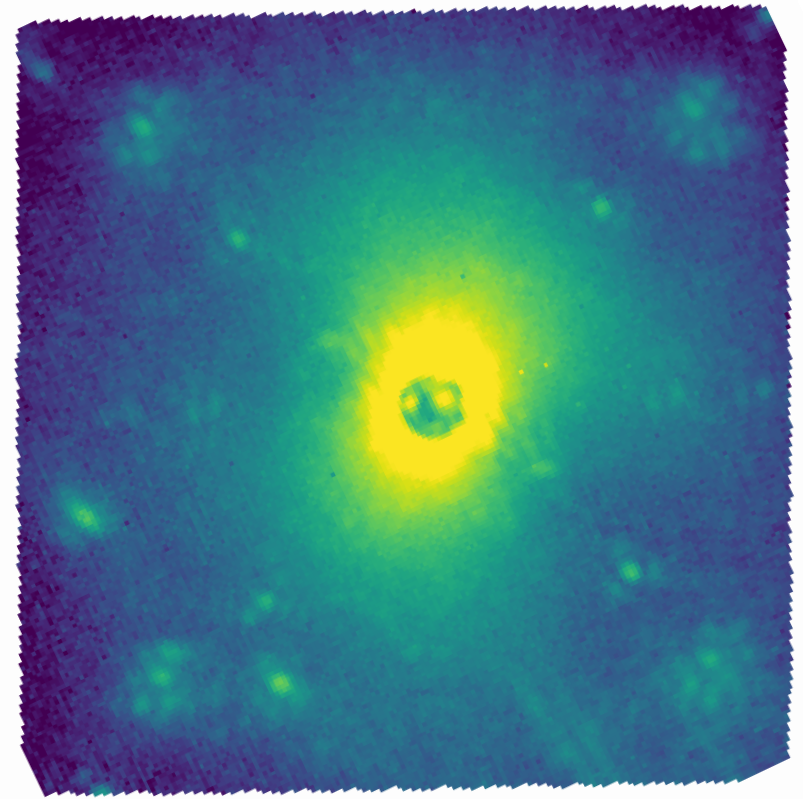
Background Star Simulations

Rob De Rosa, Misty Cracraft

- Generate galactic population model (Besançon/TRILEGAL) w/ realistic dust extinction

- Cross-check w/ Gaia and HST archival imaging.

  - See report by Cracraft et al https://arxiv.org/abs/2110.08097

Ratio of Gaia/Besancon counts by galactic latitude

Far-off-axis PSF profiles used in original analysis

Incomplete model, but best available at the time (2018/19)
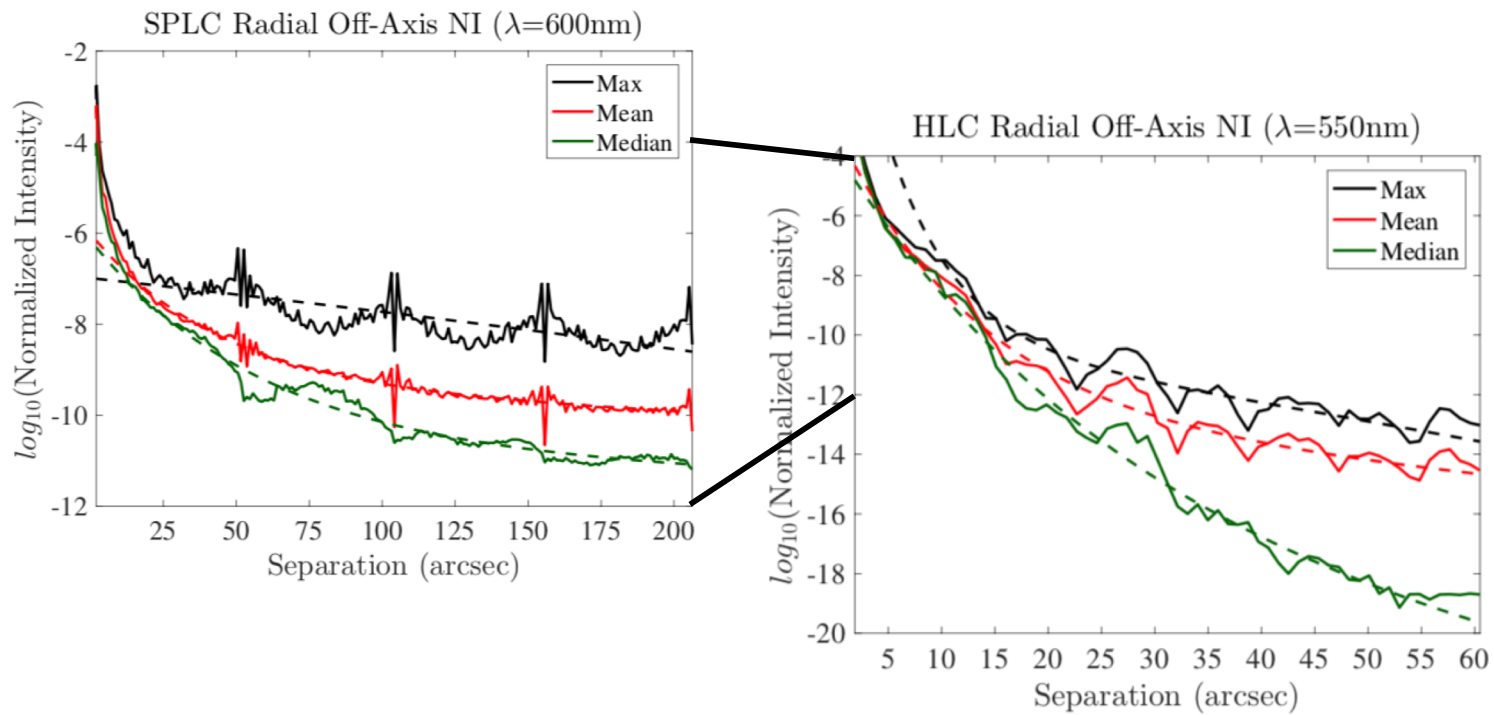
Updated far-off-axis profile
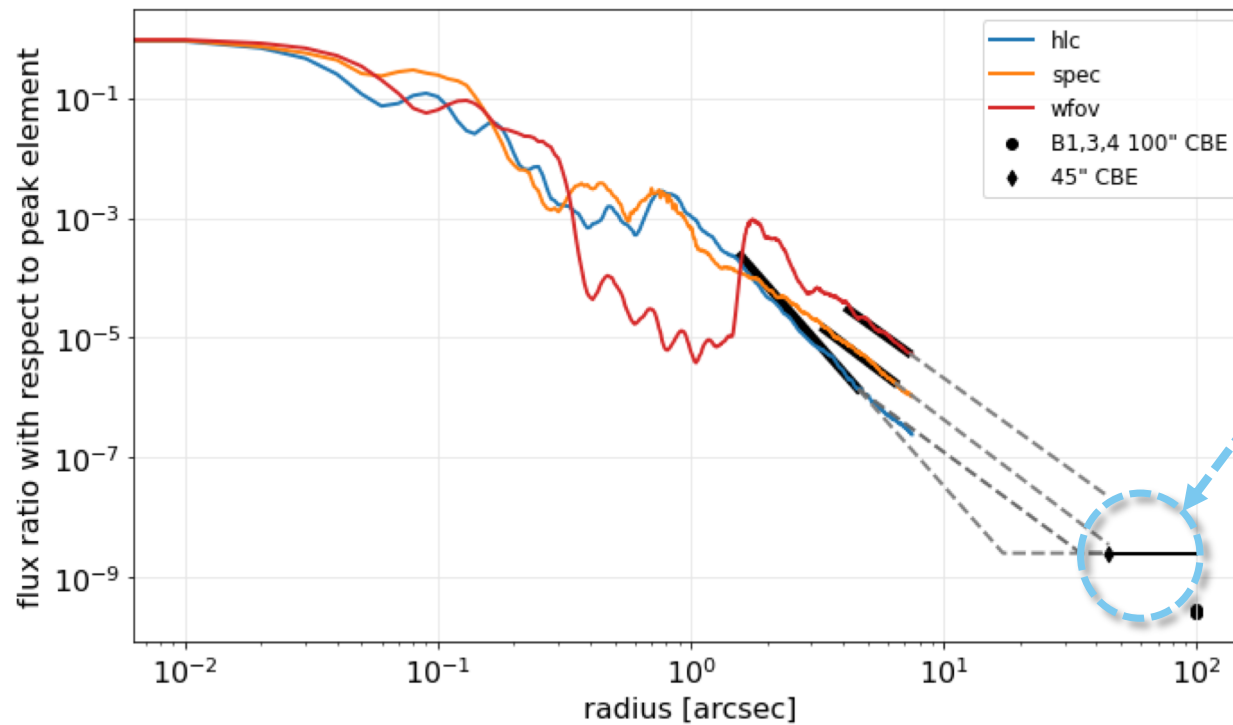
Not incorporated into background star simulations / target vetting yet

Far off-axis value (≥45") is work in progress… Will post to IPAC Instrument Parameters page when complete.

Simulation results

- Band 4 much worse than Band 1 (larger FOV & redder wavelength/less extinction)

- Reference stars have higher rates b/c preferentially in plane (distant O/B). Most 2-3% interloper in Band 1 HLC, but many have near certain glint probability at Band 3 or 4

- Few target stars have >1% interloper prob @Band 1; most have >5% glint probability at band 3 or 4

Mitigations

- Observations of both target and reference at ≥ 2 roll angles
    - glints move around focal plane
- Precursor imaging

Precursor Imaging with NIRC2

Rob De Rosa, Tyler Smith, Garreth Ruane

- Evaluate which sources would be detectable
  - by CGI as 'interlopers' or 'glints'
  - by Keck/NIRC2 in NIR
- NIRC2 can be effective pre-screener for targets with high proper motion
  - Dust extinction drops sharply between 575nm and JHK
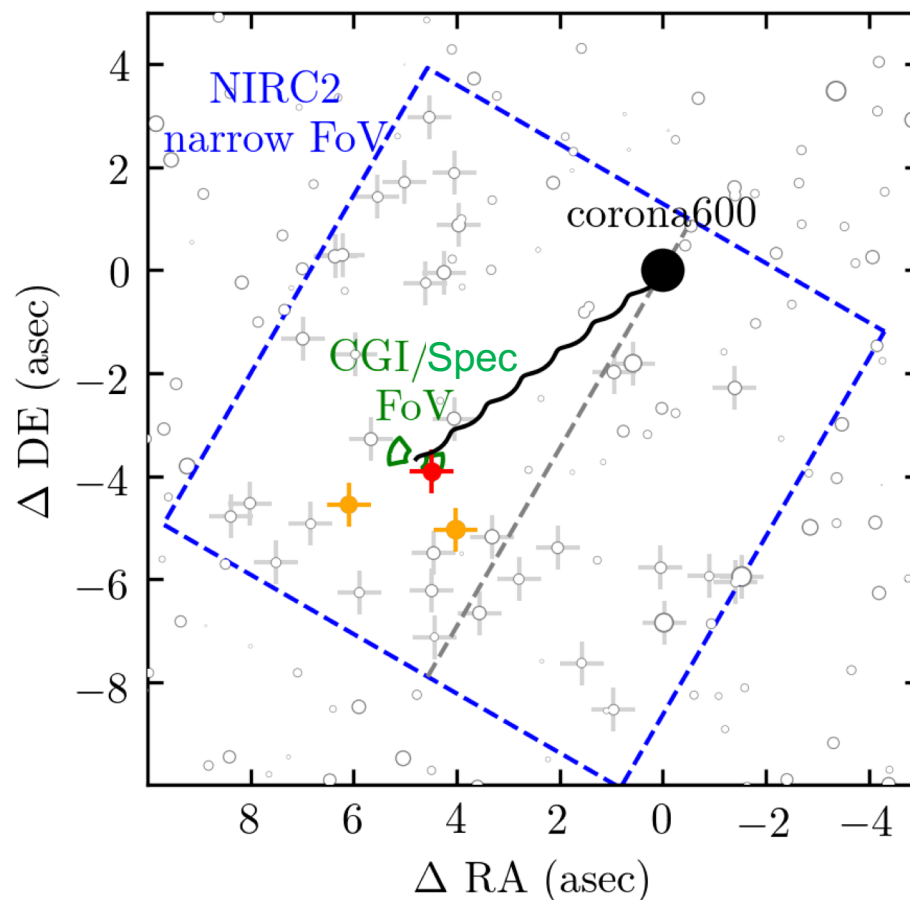
NIRC2 results

Rob De Rosa, Tyler Smith, Garreth Ruane

- Precursor imaging of target stars with Keck
  - half a dozen target stars observed in 2018-2020.
    - Keck is IR=less extinction=meaningful limits if imaged early enough
    - One potential interloper (HD 190360, band 4) and some potential minor glint stars – no deal breakers
  - Reference stars' proper motion is too small to be good use of Keck time

Potential work to go

- catalog searches for visual binaries
- Reference star AO imaging for resolved binaries
  - can be done at any time, since proper motion is small
- CHARA?
- Reference stars: archival and/or new spectroscopy?
- Catalog searches for IR excesses
- … ?

Questions?