

Analysis of Astrometry in the JWST North Ecliptic Pole (NEP) Time Domain Field (TDF)

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JWST NEP TDF

- Located within JWST's northern Continuous Viewing Zone centered on the NEP
- Void of bright foreground stars and low galactic foreground extinction
- Community field for time domain science



Background

What is astrometry?



Image Credit: Kiso Observatory, University of Tokyo

Filter Profiles

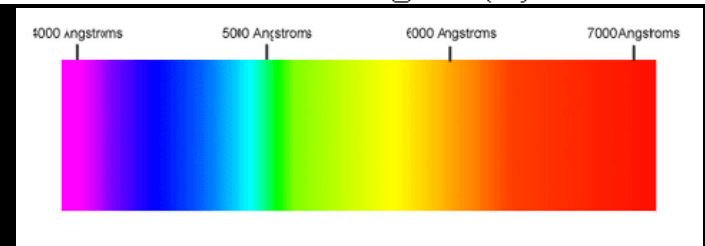
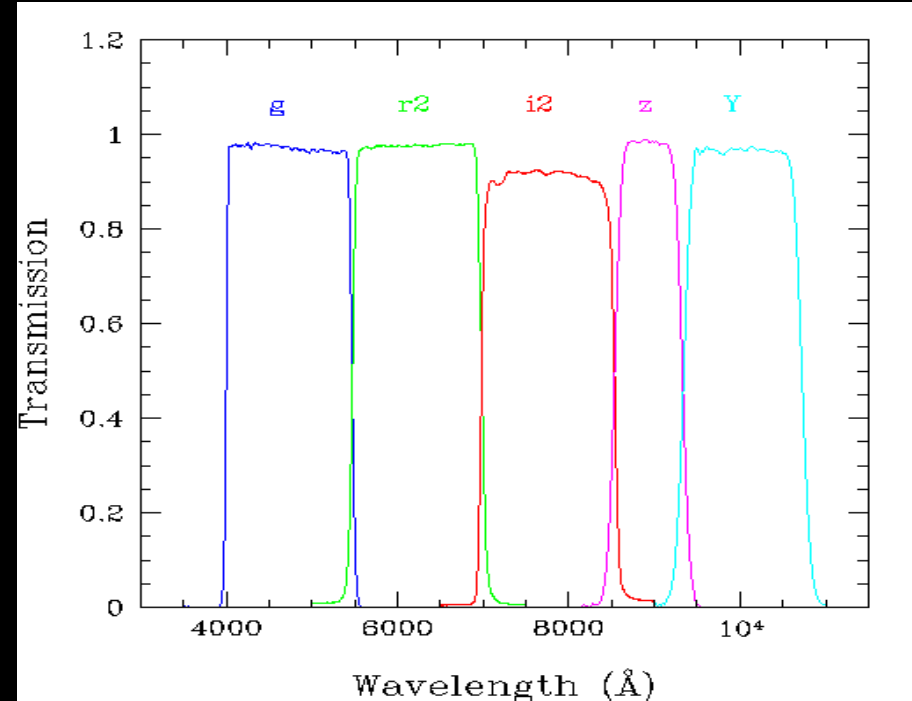


Image Credit: (Top) NAOJ (Bottom) livephysics

Project Outline

- Create artificial images of Subaru data
- Match the Subaru and LBT catalogs by Right Ascension and Declination
- Astrometrically cross-register the Subaru and LBT images with milli-arcsec precision and identify moving objects (comets, galactic stars, brown dwarfs)

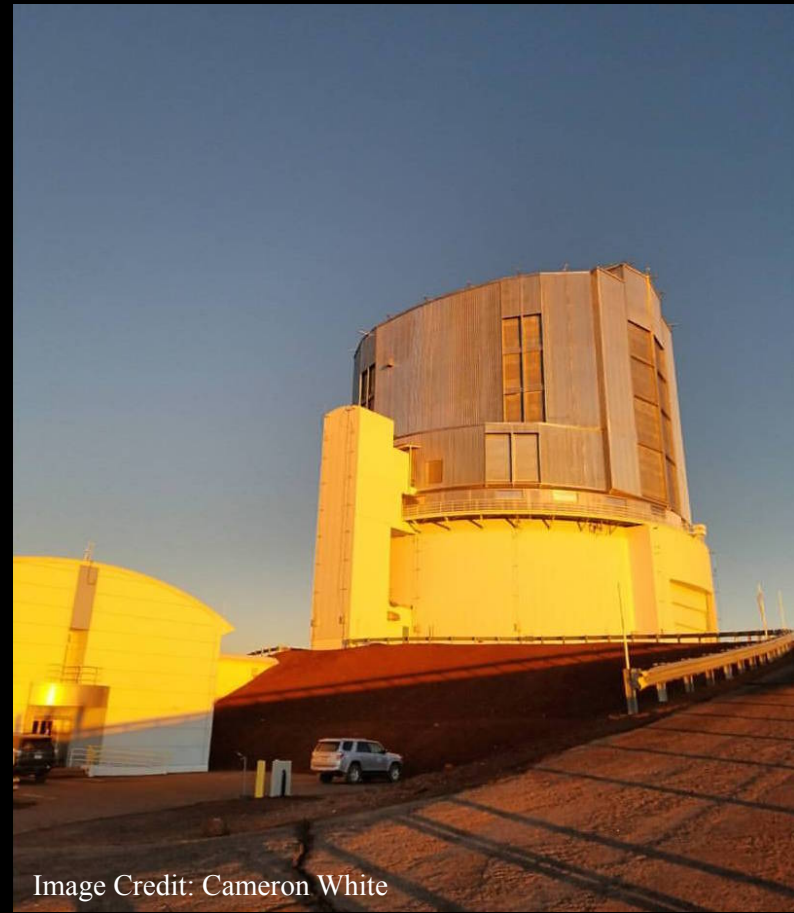
Large Binocular Telescope Data

- Large Binocular Camera Filters (U, g, r, z)
- Observed July 2016 for half a night
 - Equivalent to full night on 8.4 m telescope
 - Median seeing $\sim 0.95''$ with depth ~ 26 AB magnitude
 - Observations part of the field selection

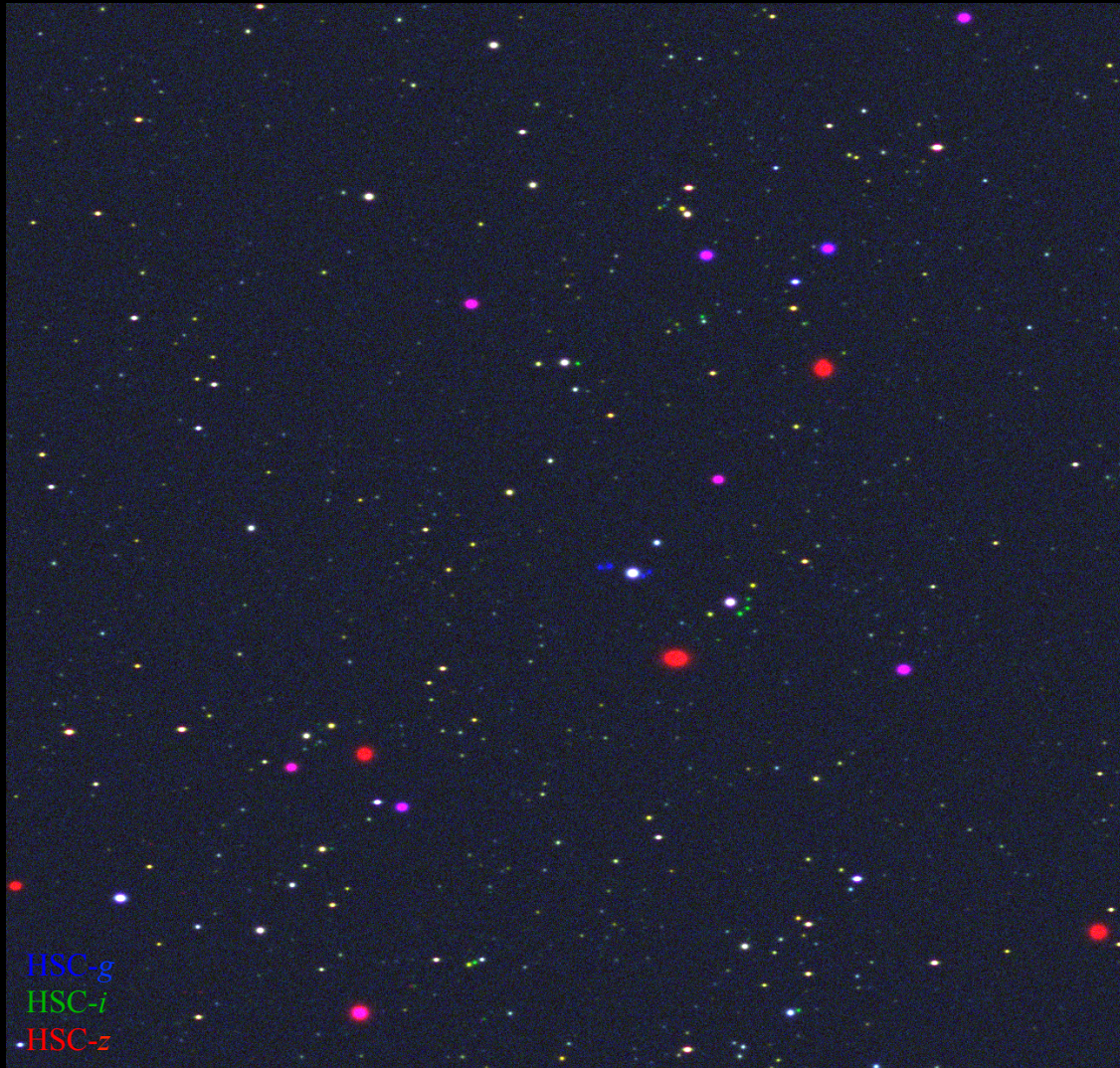


Subaru Observations and Data

- Hyper Suprime-Cam Filters (*g, i, z, NB816, NB921*)
- Observed June 2017 over five nights
 - Seeing between $\sim 0.5''$ and $1.0''$ with depth ~ 24 - 26 AB magnitude
 - Observations part of larger HEROES survey
 - Almost 1 year after LBT data



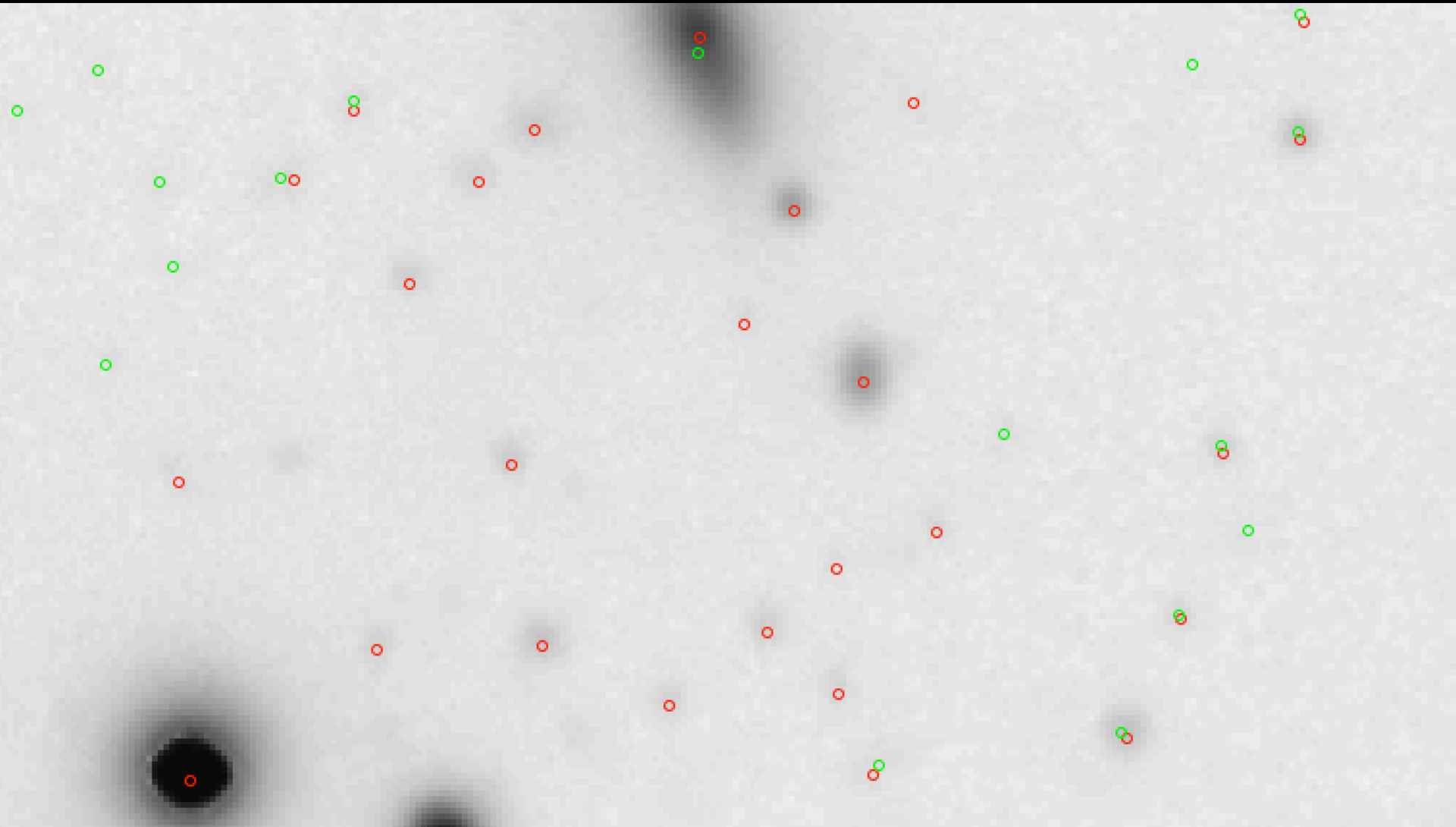
Results: Artificial Images



- Aid in the visual validation of moving objects
- Red and magenta objects correspond to bright sources that saturated the relatively long Subaru exposures in both *g* and *i2*, and just *g*, respectively

Results: LBT Astrometry

- LBT: four separate chips in each camera
 - Must mosaic the images together to get the full picture



Future Work

- Improve the LBT astrometry
- Identify objects that move significantly with respect to instrumental resolution
- Repeat this analysis with the photometry
- Incorporate data taken by *Hubble Space Telescope*
 - Better resolution than either LBT or Subaru
- Publish paper in *Astrophysical Journal*



Acknowledgments

- Collaborators: Rogier Windhorst, Seth Cohen, Teresa Ashcraft, & NEP TDF team
- Guenther Hasinger, Esther Hu, Christopher Waters and the HEROES team at the Institute for Astronomy at University of Hawaii
- ASU/NASA Space Grant Consortium

