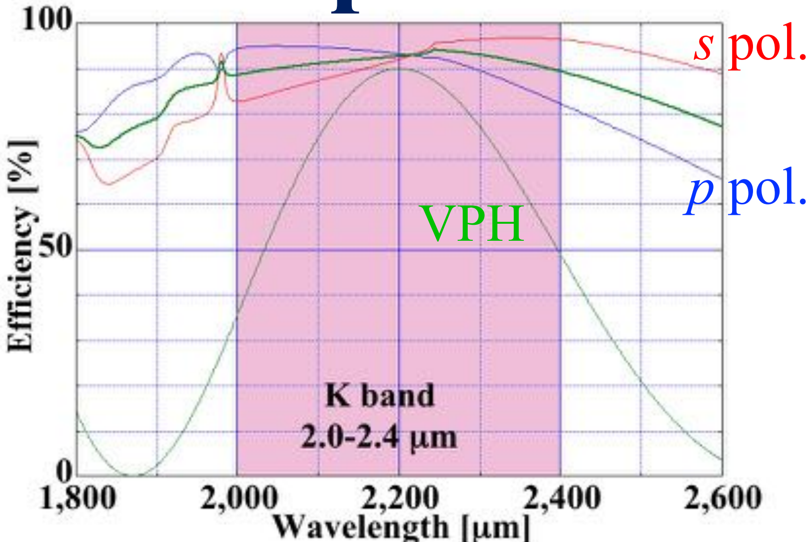
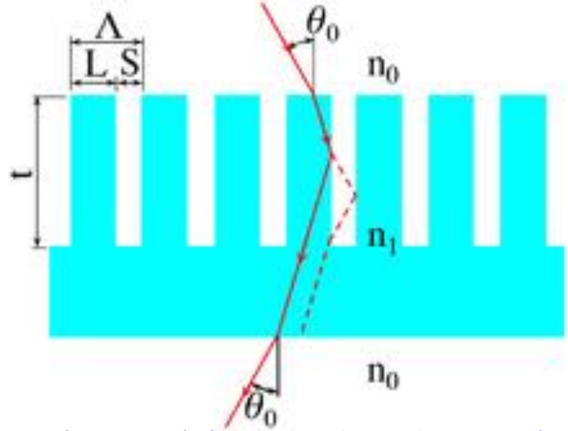
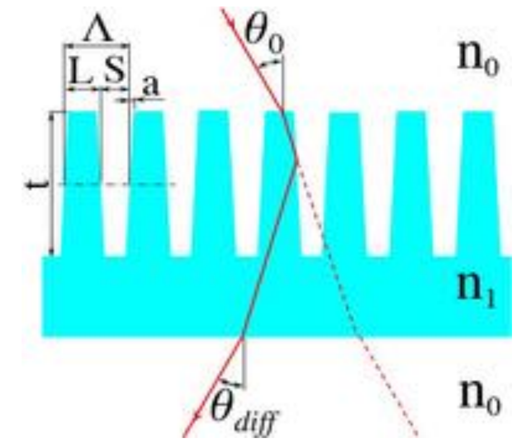
P01 Trapezoid and VB gratings for MOIRCS



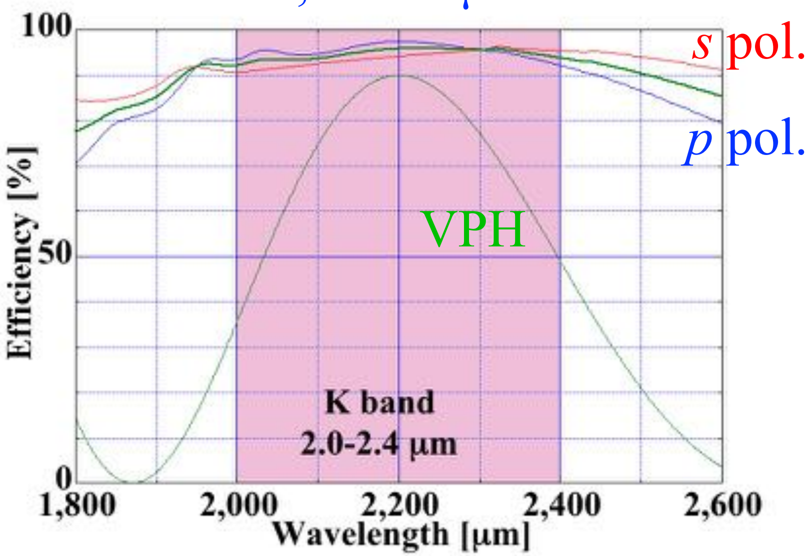
VB grating for K band grism.
L&S=1:1, t=4.25μm.



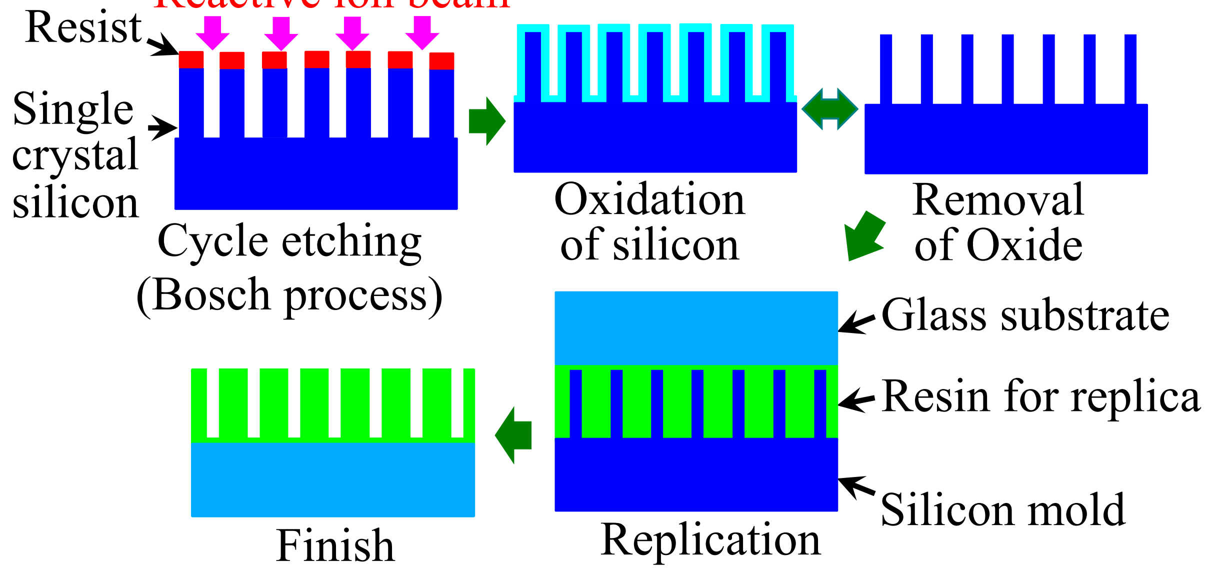
Volume binary (VB) grating.
Can be fabricated directly by plasma etching on quartz glass.



Trapezoid grating.



Trapezoid grating for K band grism.
L&S=0.59:0.39, t=4.5μm, taper: 7.1deg.

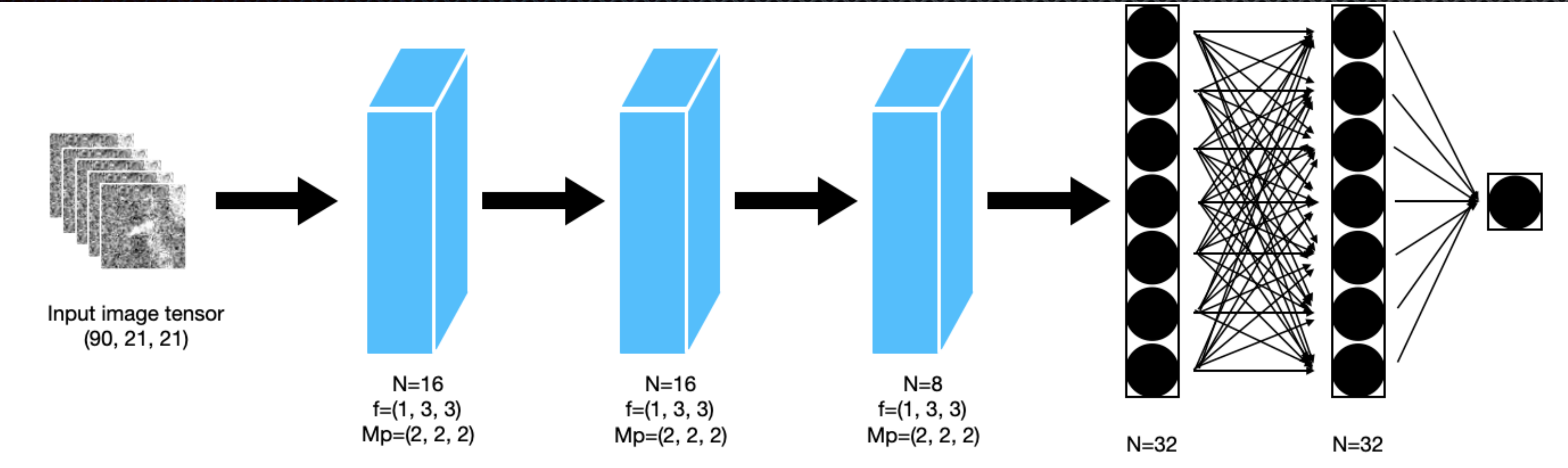


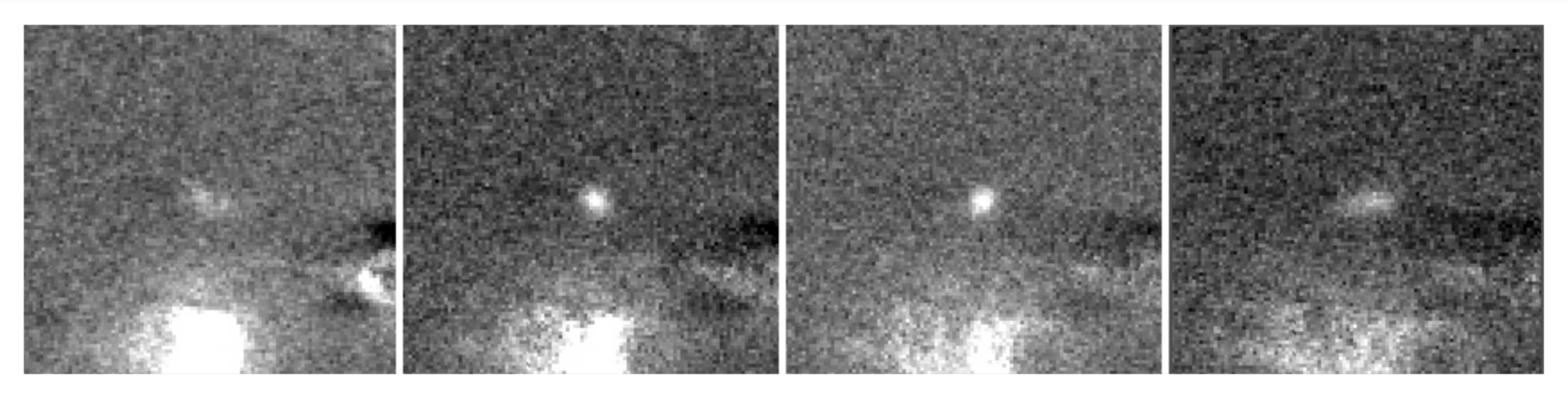
Fabrication method for trapezoid grating.

A Machine Learning Approach to Detecting Kuiper Belt Objects for NASA's New Horizons Extended Mission

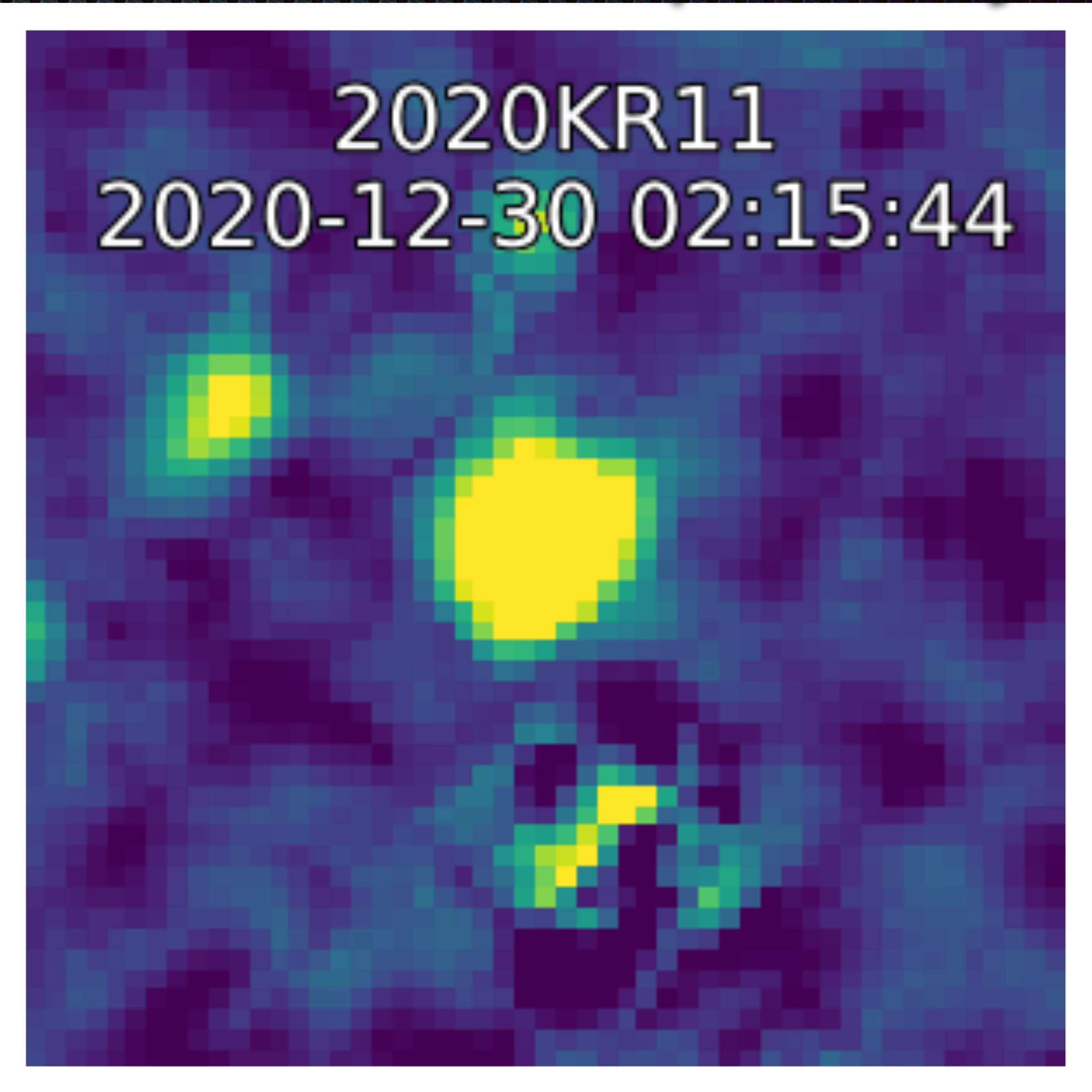
Wesley C. Fraser - National Research Council

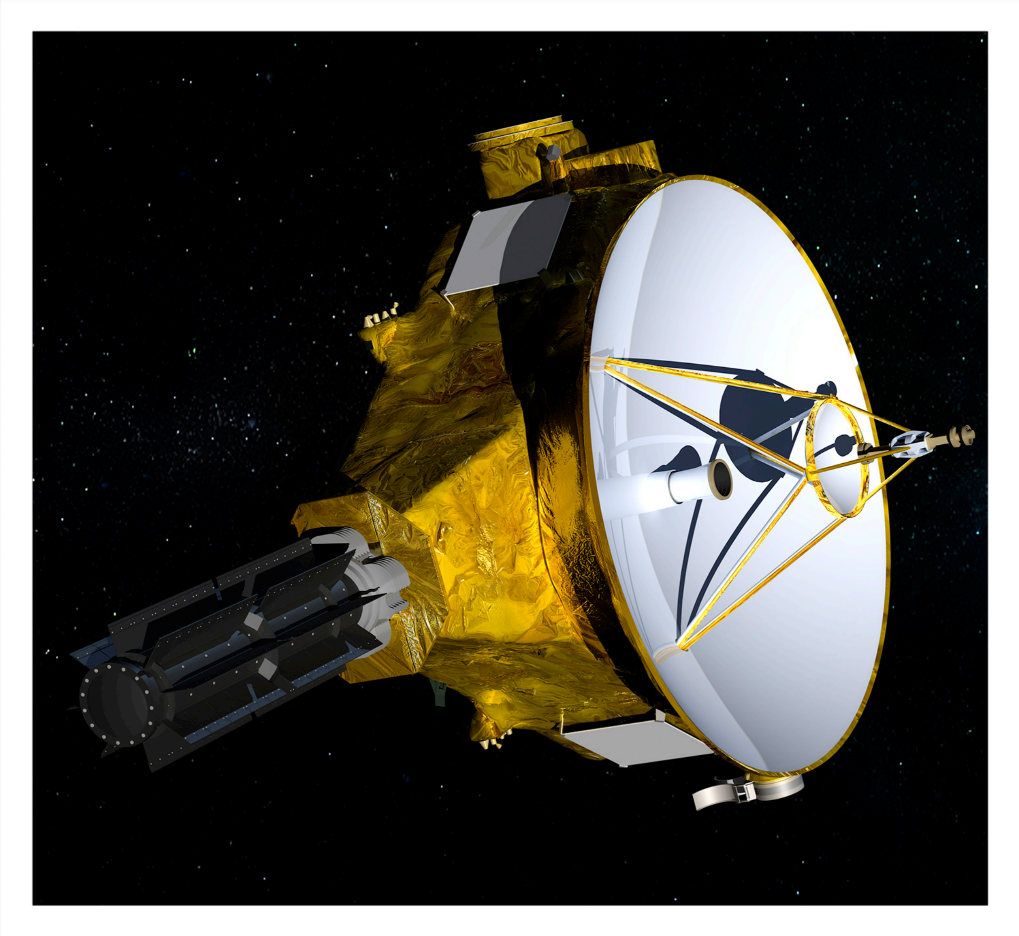
Also see poster by Kavelaars





1.5 "/hr 2.0 "/hr 2.5 "/hr 3.0 "/hr



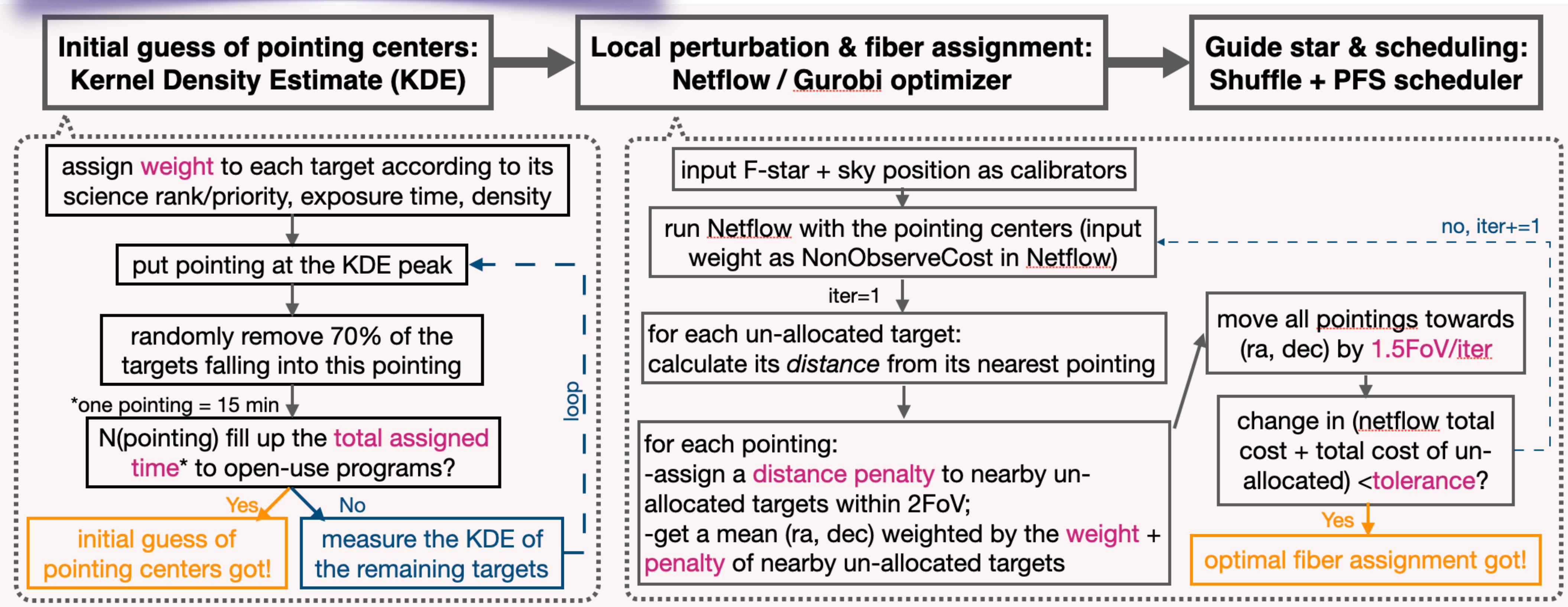


[p4] Optimal algorithm to determine pointing centers for PFS open-use programs

Wanqiu He, Masayuki Tanaka, Miho N. Ishigaki, Masato Onodera (NAOJ) & obsproc member

- Operation Strategy of open-use programs: **share fibers** among multiple open-use programs to efficiently utilize all the fibers
- Problem: **where to point the telescope?** —> samples vary significantly on spatial distribution/exposure/priority
- **PFS Pointing Planner**:
  - to achieve high completeness in rank-A (highest science ranking) samples
  - to maximize fiber allocation efficiency in each exposure (minimize wasted time)

PFS pointing Planner: a general flow-chart



The New Horizons search for distant KBOs

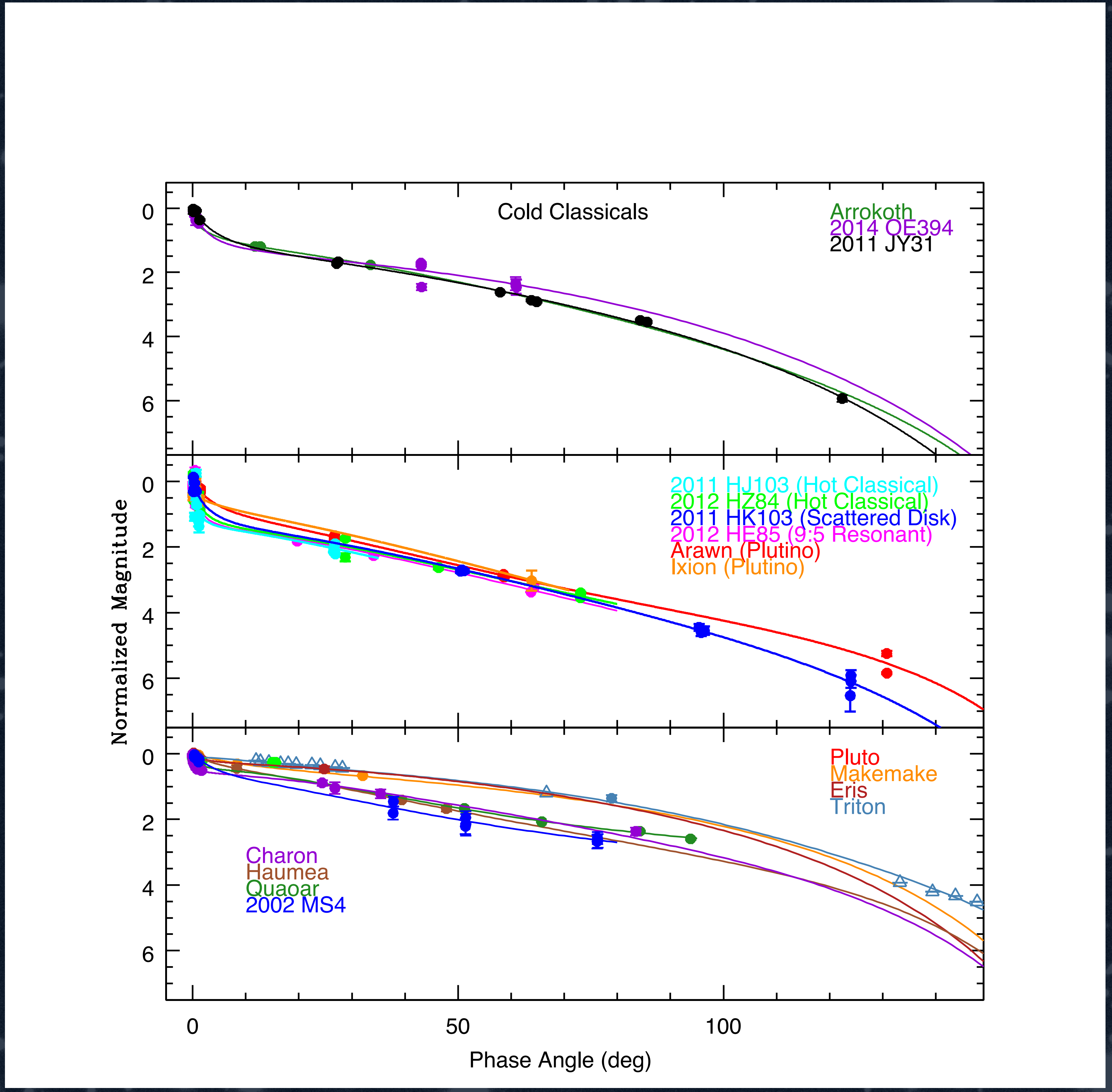
JJ Kavelaars[1], Wesley C Fraser[1], Simon Porter[2], Hsing Wen Lin[3], John Spencer[2], Anne Verbiscer[4], Fumi Yoshida[5], Takashi Ito[6], David Gerdes[3], Susan Benecchi[7], Alan Stern[2], Stephen Gwyn[1], Hal Weaver[8], Marc Buie[2], Lowell Peltier[9], Kelsi Singer[2], the New Horizons LORRI Team, the New Horizons Science Team

1 - Herzberg Astronomy and Astrophysics Research Centre, 2 - Southwest Research Institute, 3 - University of Michigan, 4 - University of Virginia, 5 - University of Occupational and Environmental Health, Japan, 6 - National Astronomical Observatory of Japan, 7 - Planetary Science Institute, 8 - Applied Physics Laboratory, JHU 8 - University of Victoria

Project Goals

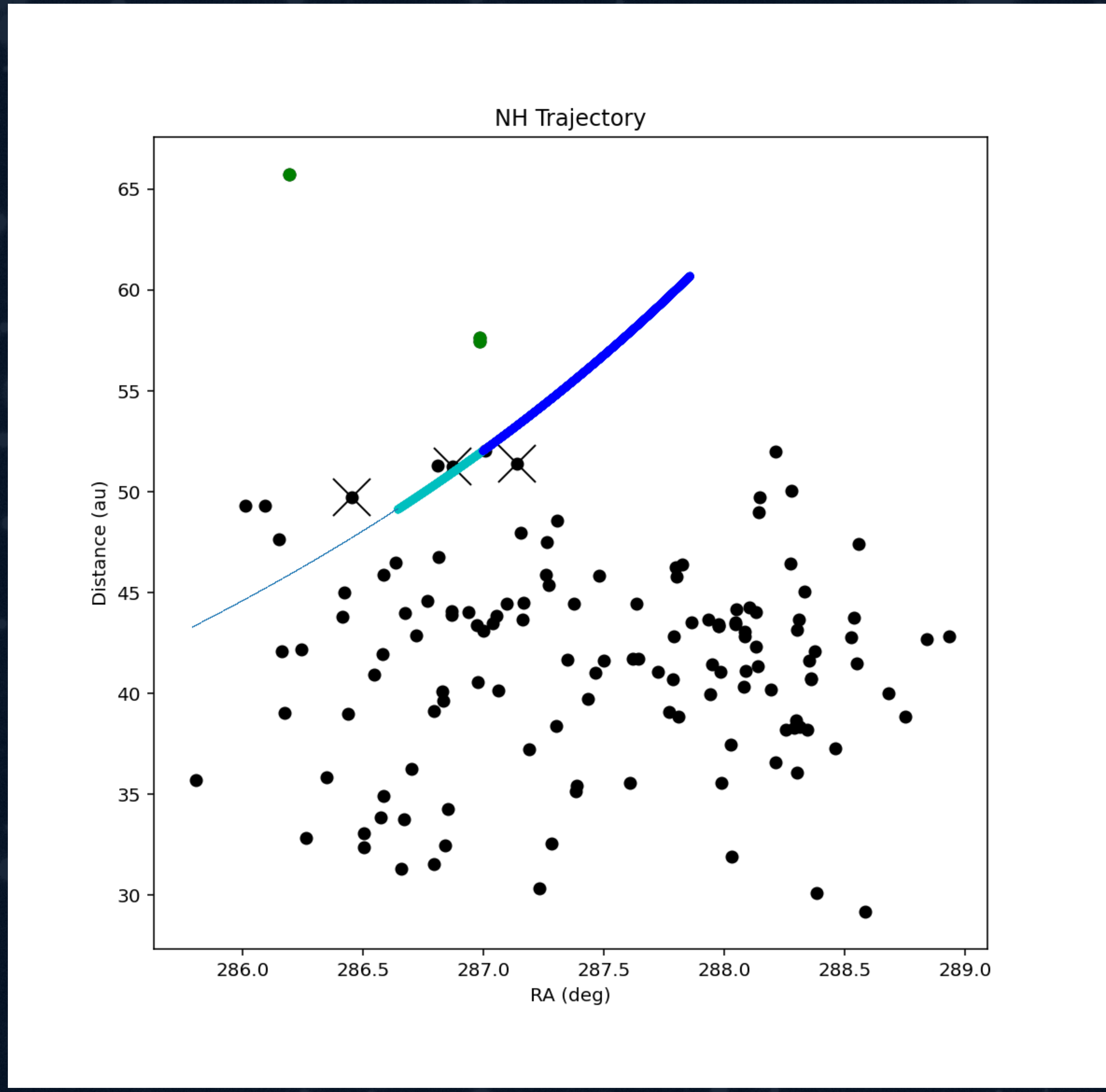
- Use ground-based deep observations to discover new Kuiper Belt Objects bright enough for observation with the LORRI telescope (r_{Earth}~26, V_{LORRI}~21).
- To characterize the phase curves and high-phase light curves of discovered targets
- To search for any potential new flyby targets

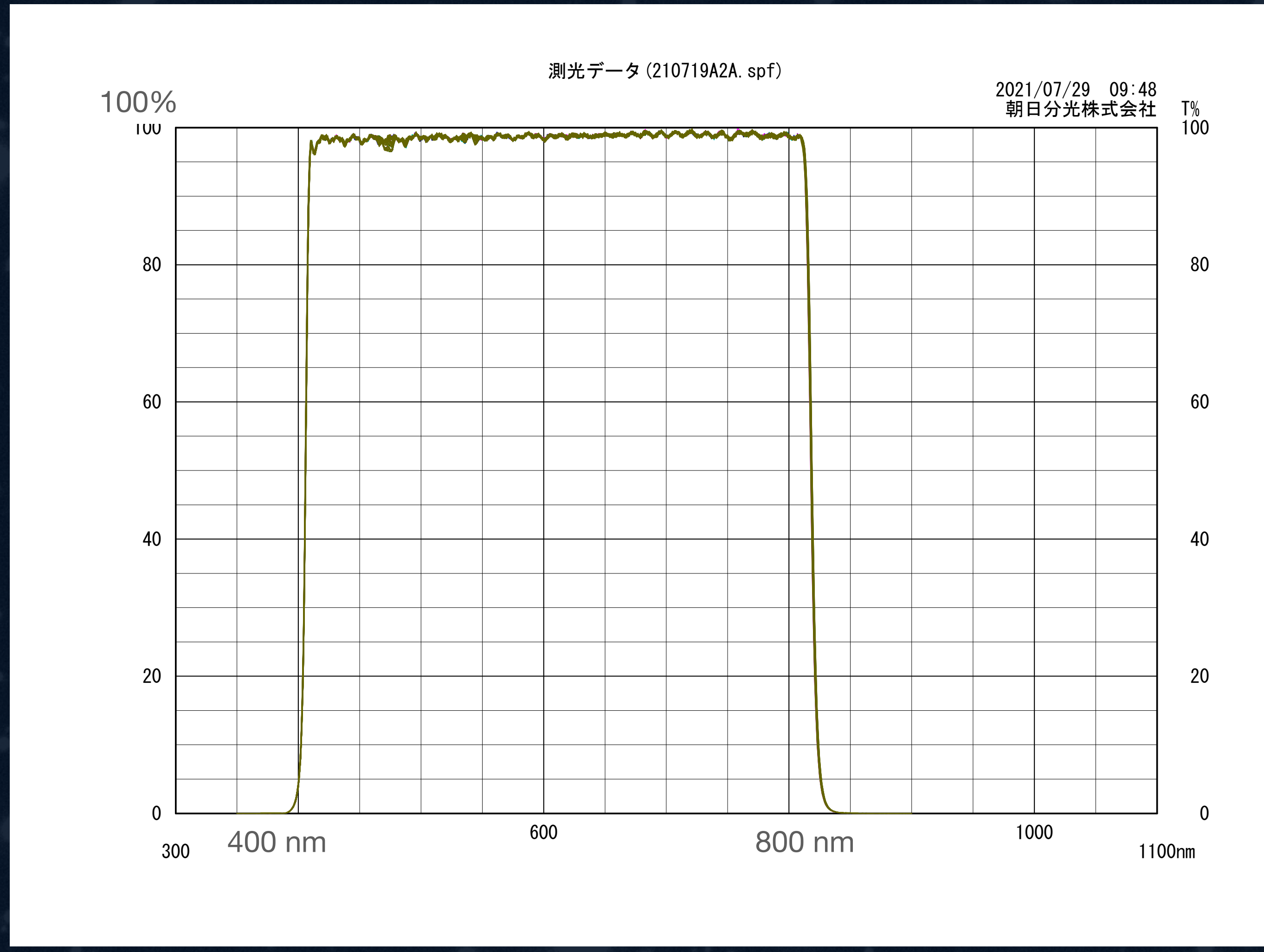
KBO Phase Curves - Surface properties



New Horizons and SUBARU HSC Searches

A group of Japanese solar system astronomers has joined the New Horizons science team. Working together we are searching for new distant KBOs that can be observed from New Horizons. First search was in 2020 with followup searching in 2021 (analysis on-going) and a plan to being a VERY deep search starting in 2023.





New Subaru HSC w Filter

Solar System objects have flat-red spectra. By creating a 'wide' filter that includes most of the optical spectrum we can search 0.5 mags deeper than perviously possible with the r2 filter. We hope this new filter will be available for general use by Subaru by the start of 2023A

Figure presents the RA/DEC/Distance of the 135 KBOs detected in our 2020 search that now have secure orbits. Objects with 'X' have been observed by New Horizons LORRI in 2021. Line indicates the trajectory of New Horizons wth CYAN line indicating the path in 2021 and the blue line indicating the path for 2022 and beyond.

In 2022 we will continue our search, shifting our search fields centres and making use of a new 'wide' filter that New Horizons has commissioned for Subaru HSC.

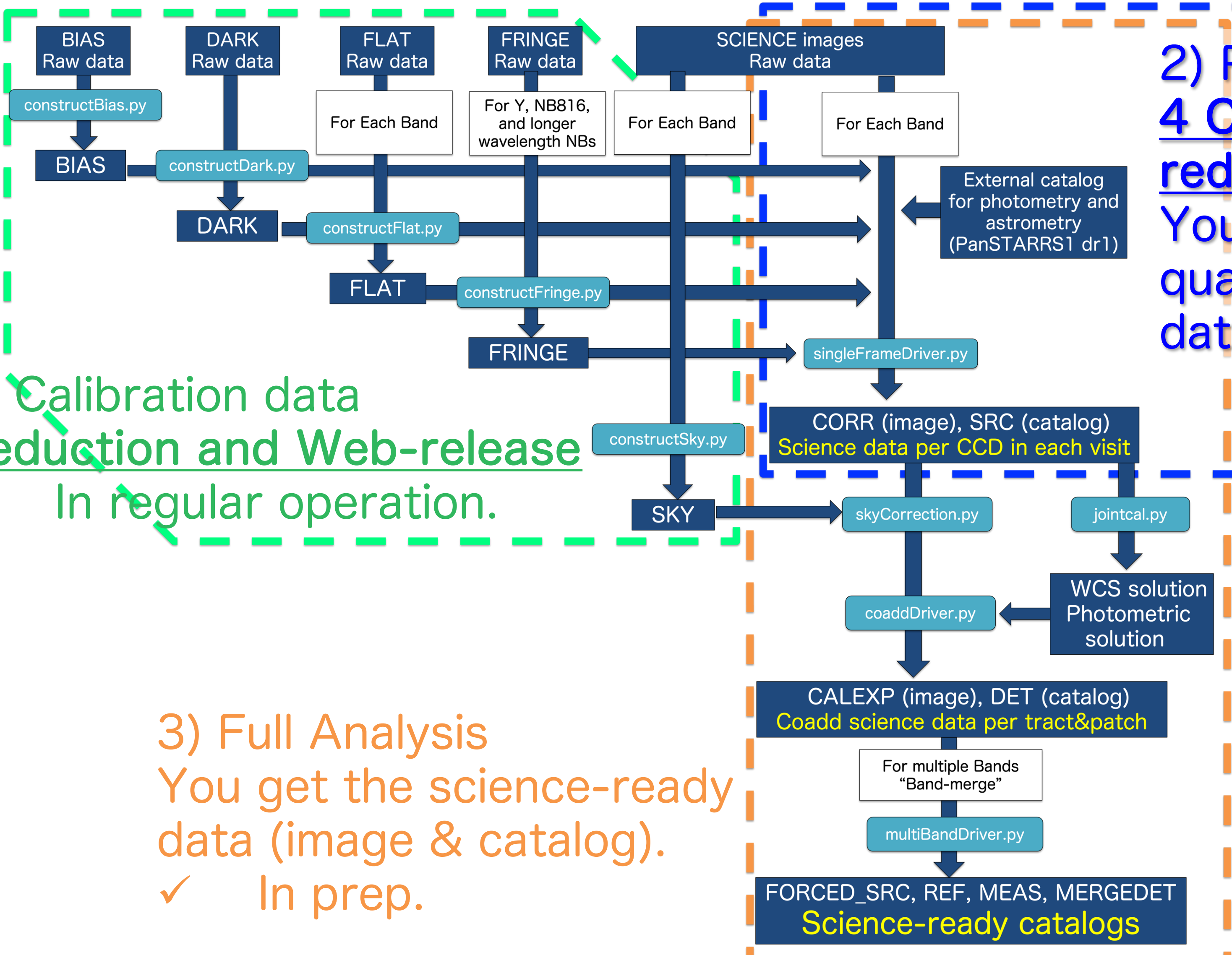
References: TRIPPy - Fraser et al. 2016, AJ, 151, 158 • Verbiscer et al. 2019, AJ,158,123 • LSST Science Pipeline https://pipelines.lsst.io • NH-LORRI - Cheng et al. 2008, SSR, 140, 189.

1 - https://steemit.com/javascript/@petarjs/ 2 - https://towardsdatascience.com

Current status of HSC Standard Data Reduction Service (SDRS)

Ken Mawatari (NAOJ HSC team) et al.

HSC reduction is NOT easy. -> We conduct ALL on behalf of the observers!



1) Calibration data
Reduction and Web-release
✓ In regular operation.

2) Pre-Analysis
4 CCDs reduction
You can check quality of your data.

3) Full Analysis
You get the science-ready data (image & catalog).
✓ In prep.

The z~4 radio galaxy survey with HSC-SSP and FIRST

Yuta Yamamoto, Tohru Nagao, Mariko Kubo, Hisakazu Uchiyama (Ehime Univ.), Takuji Yamashita (NAOJ),
Yoshiki Toba (Kyoto Univ.), Akatoki Noboriguchi (Tohoku Univ.),Yoshiaki Ono, Yuichi Harikane (Tokyo Univ.)

We investigate the properties of High-z (z ~ 4) Radio galaxies (HzRGs) statistically for the first time using Subaru HSC and FIRST.

HzRGs selection

g-dropout LBG galaxies (HSC-SSP S19A) (2,553,430 objects)

↓ ← + Radio catalog (FIRST) and remove low-z galaxies or high-z QSO

HzRG candidates (144 objects)

↓ ← + Near-Infrared catalog (VIKING)

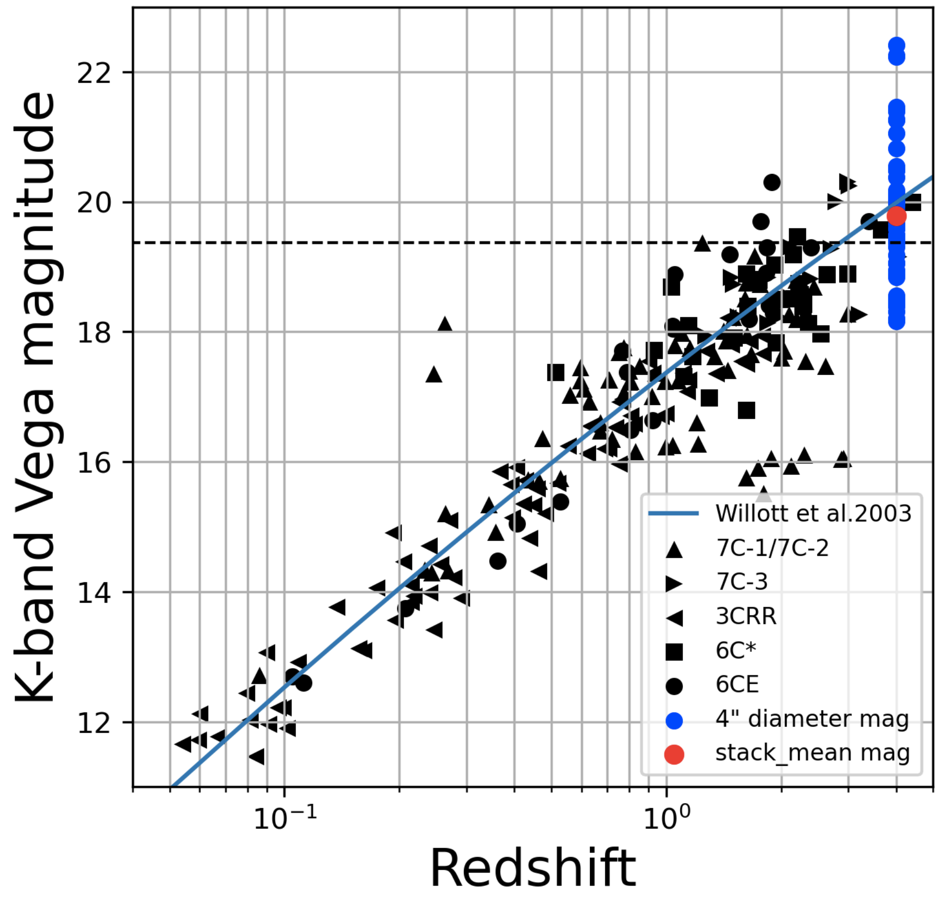
(63 objects) → K-z relation

↓ ← + Mid-Infrared catalog (unWISE)

(34 objects) → SED fitting

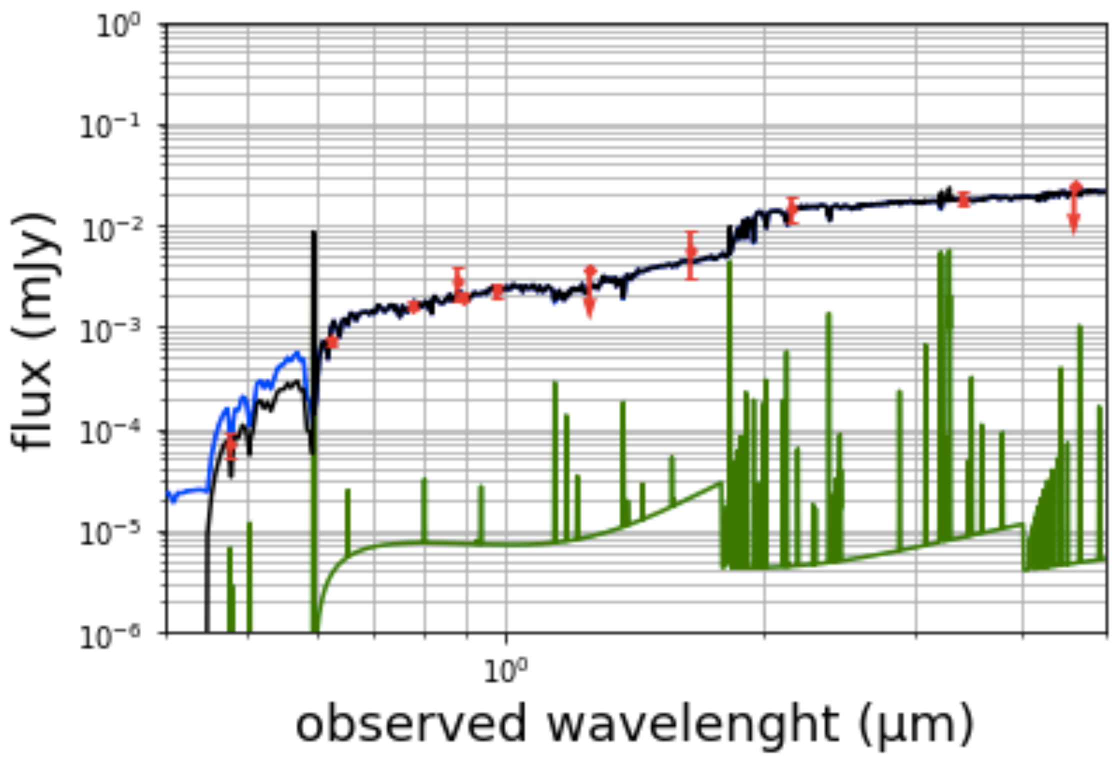
K-z relation

The HzRG candidates in this work are not conflicting with the known in K-z relation.



SED fitting

The SED fit using HSC, VIKING and unWISE



[Result]

- photometric redshift: 18 objects at z_phot ~ 4
- Stellar mass: 2.8×10^{11} to 9.8×10^{11} $M_\odot$
- SFH: Mostly passively evolving