

A sky for all-sky for all

Next-generation All-sky Near-infrared Community survey (NANCY)

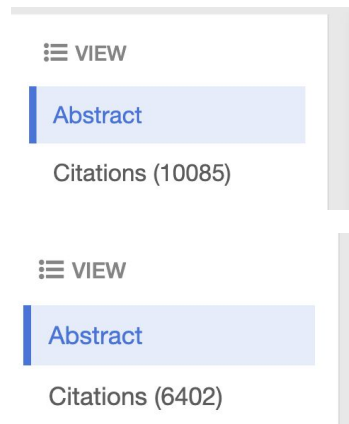
Jiwon Jesse Han, Harvard
+ 206 co-authors

Why go all-sky?

Roman can deliver 0.1" images in IR

2MASS: ~16mag in J/H, ground based resolution.

WISE: ~18mag in W1, ~6" resolution.

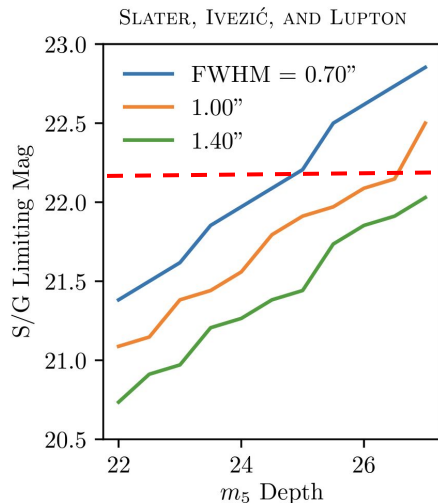
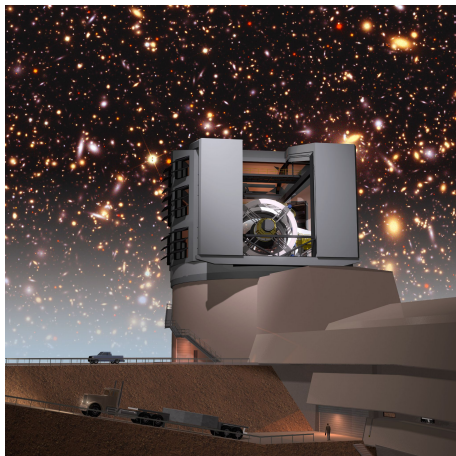


It would be *very feasible* to reach 25 mag with *Roman* across the entire sky.

Why go all-sky?

Synergies with virtually all current/future missions

- Rubin LSST, SPHEREx, eROSITA, DESI, Euclid ...
- Solve star-galaxy separation for ground-based surveys

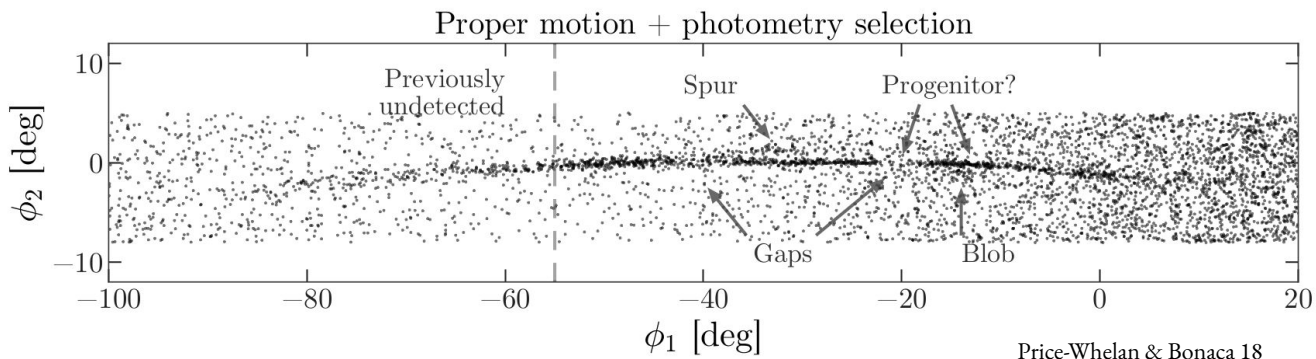


S/G *will* be a problem for Rubin!

Why go all-sky?

Galactic Science

- Enable proper motions of red clump stars out to 250 kpc
- Discover stellar populations covering the entire Local Group.
- Dark matter substructure discovery machine



Why go all-sky?

<insert your science>

The Lightest All-sky Survey

Basic Parameters:

Single Band

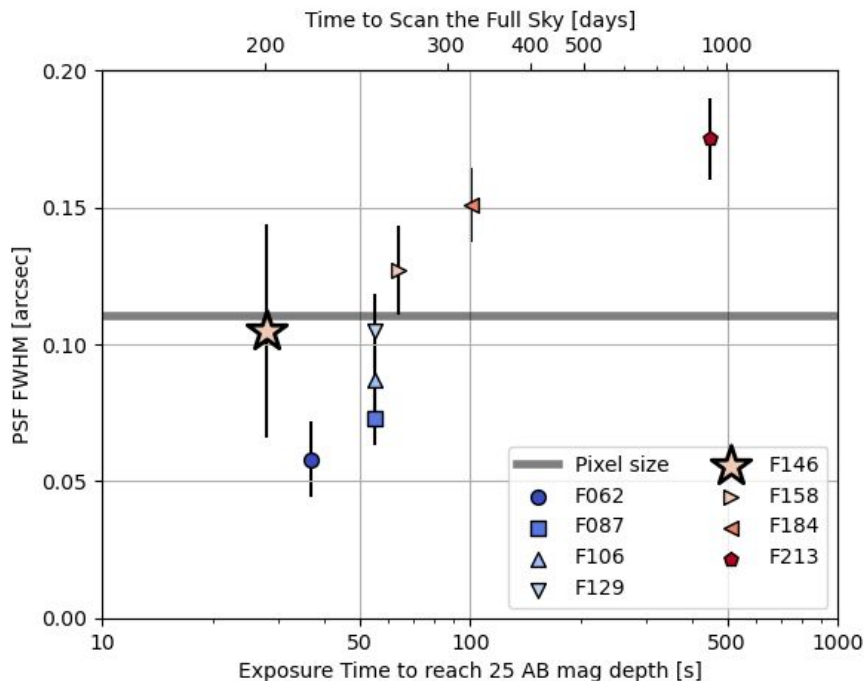
F146 vs. F158

Single Epoch

Follow-up second epoch for PM

Potentially with second filter!

Depth > 25 mag



The Lightest All-sky Survey

Basic Parameters:

Single Band

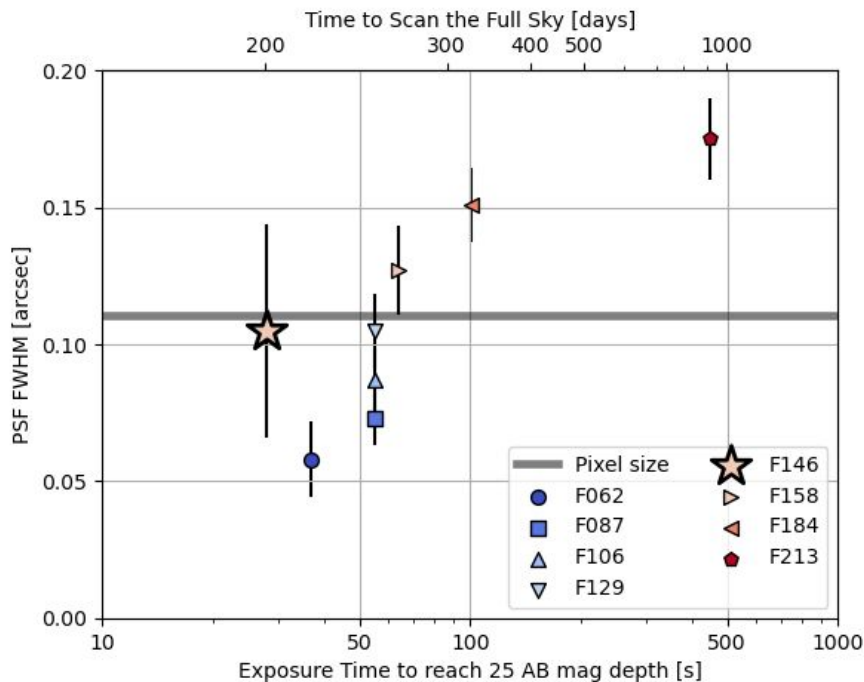
F146 (30s) vs. F158 (60s)

Single Epoch

Forego dither = 120 days (170 days)

2x chip gap dither =

184 days (235 days)



Further Considerations

Imperative to have early epoch for maximal PM baseline ($\propto t^{-1}$).

Strategic to cover Rubin footprint (20k sq. deg) first.

→ can be done in **57 days**.

“Split the bill” with Gal-plane Survey & HLWAS to eat up the whole 4 

(~30 days)

(~505 days)

Takeaways

Roman poses a unique (and *unfollowed*) opportunity to image the entire sky at 0.1" in the IR to 25mag.

This would add an *immense* legacy value to the mission, and enable *new* science jointly with Rubin, Euclid, etc.

All this is possible in 100-200 days.

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