

HLIS



roman-hlis-cosmology.caltech.edu



github.com/Roman-HLIS-Cosmology-PIT



Fast IMCOM: Unlocking New Scientific Frontiers with High-Fidelity Image Coaddition

Presenter: Kaili Cao (The Ohio State University)

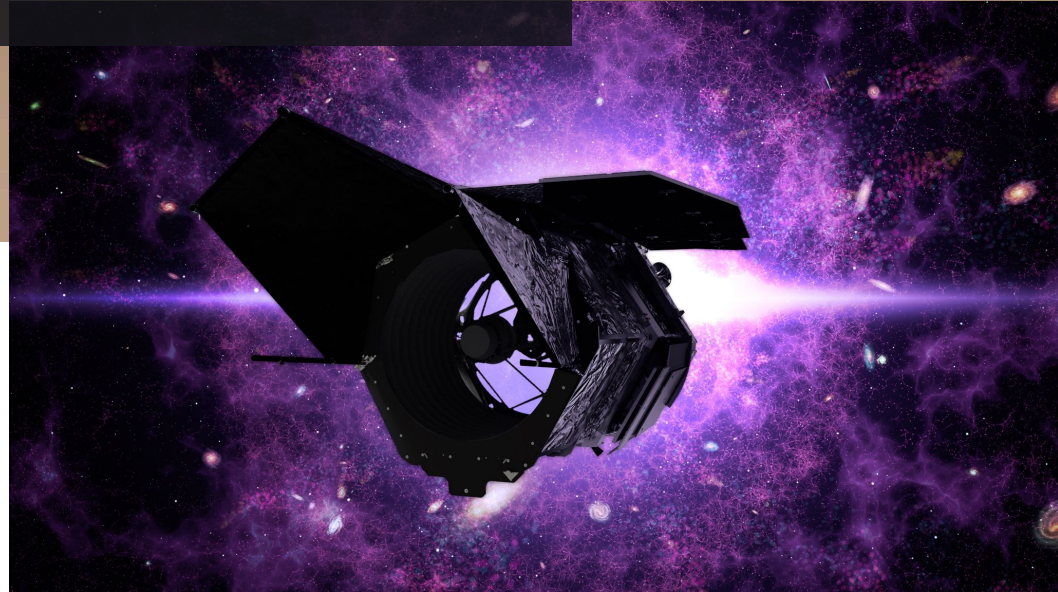
The 247th Meeting of the American Astronomical Society, January 6, 2026

11:20 AM – 11:30 AM, Tuesday, January 6, 2026

Blurred image: a photo of a table of dishes, from Visit Phoenix.

Ready for lunch?
Ready for **launch**!

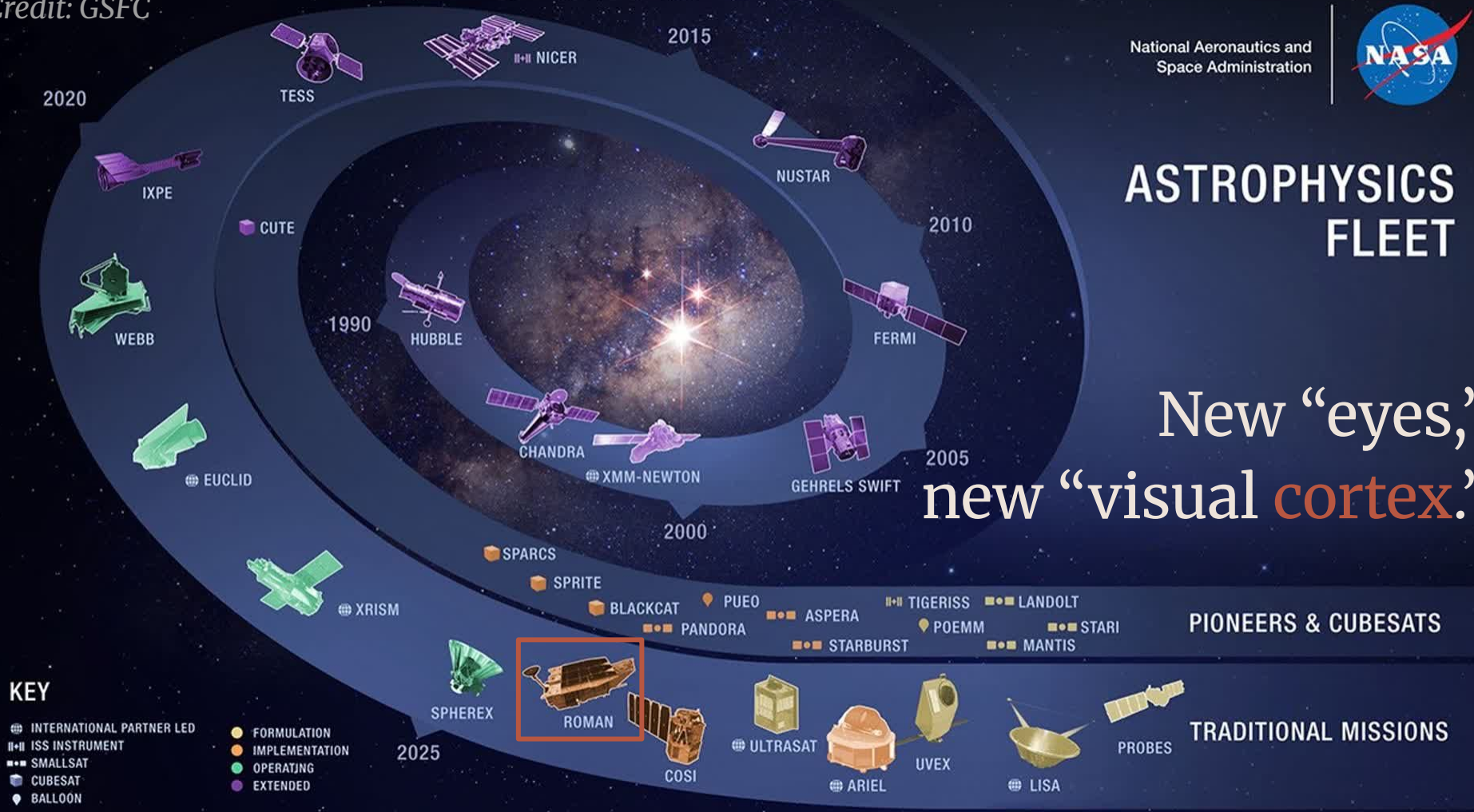
Credits: ↑ Visit Phoenix, → GSFC/SVS





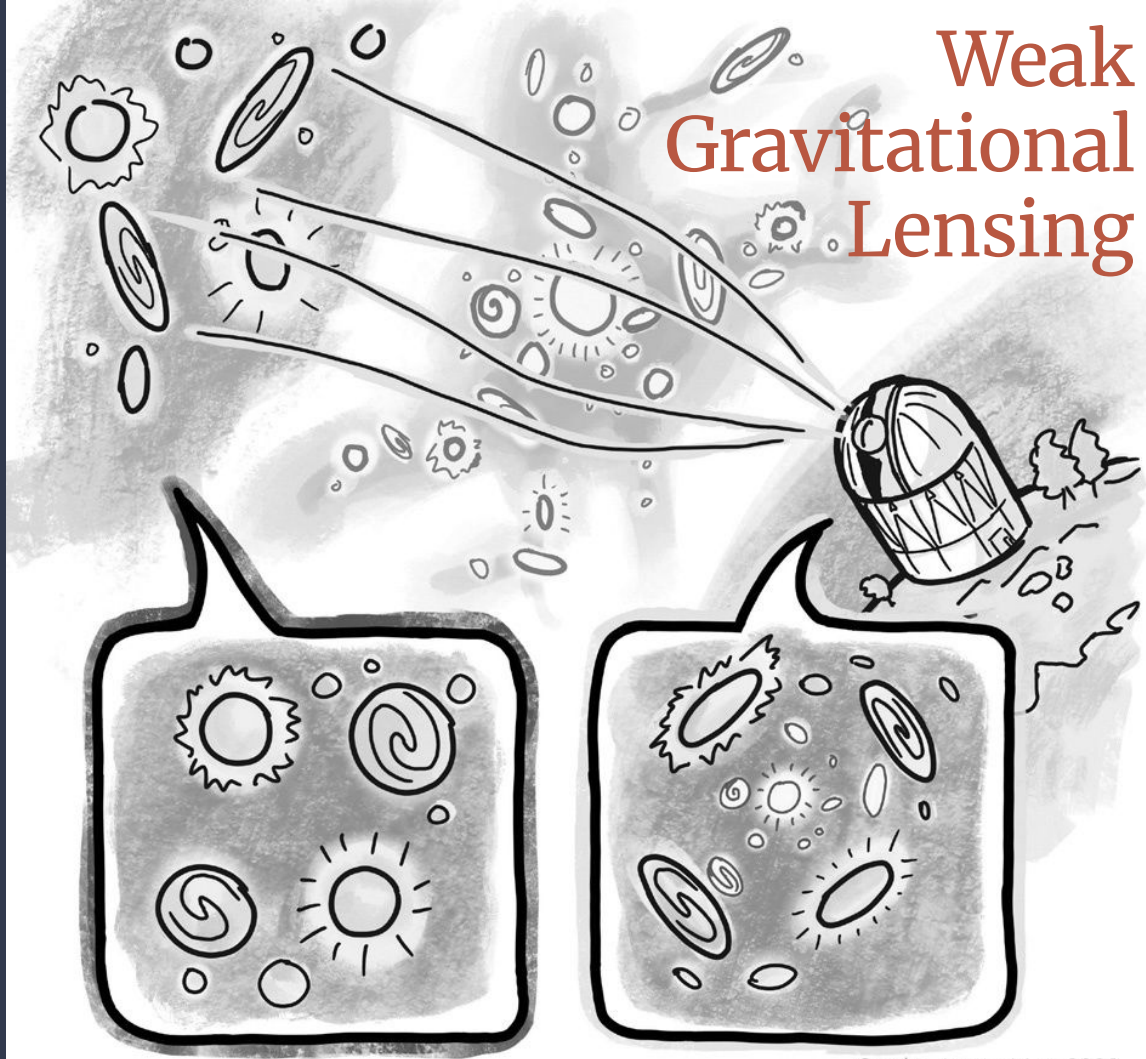
ASTROPHYSICS FLEET

New “eyes,”
new “visual cortex.”

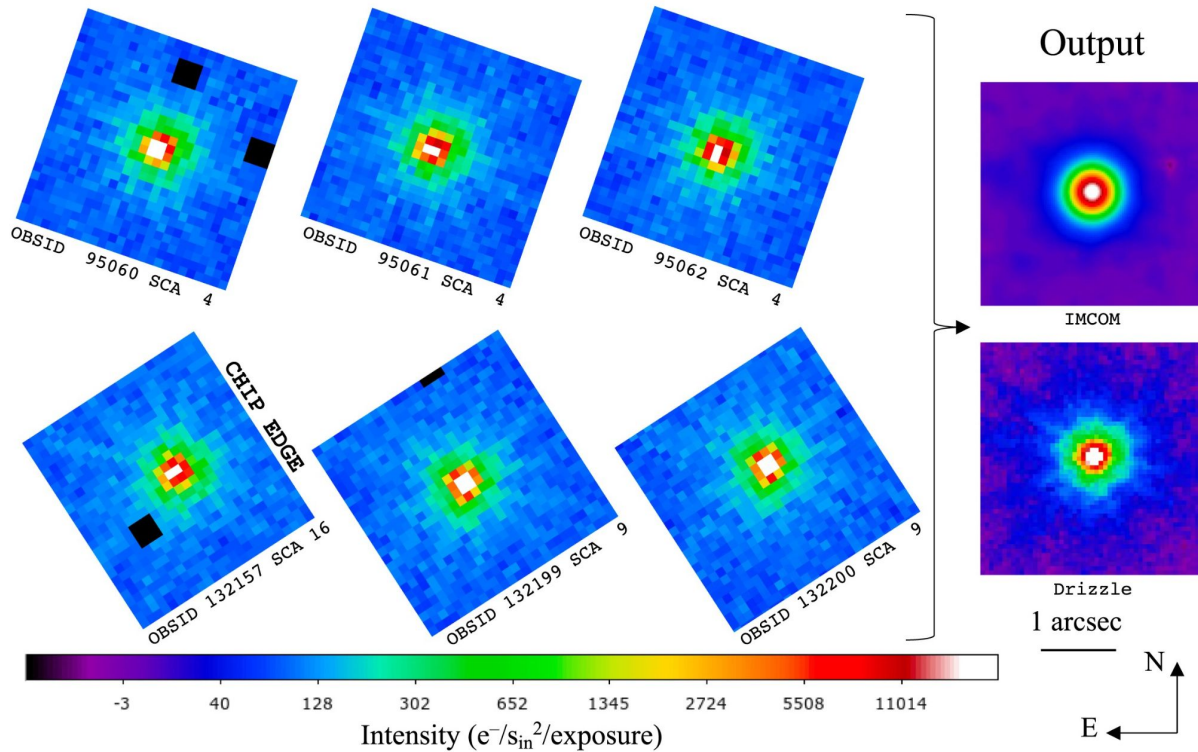


Our Project
Infrastructure
Team:
Maximizing
Cosmological
Science with the
Roman High
Latitude
Imaging Survey

Weak
Gravitational
Lensing



IMCOM (B. Rowe et al. 2011): Image Coaddition with Control over Output Point Spread Function



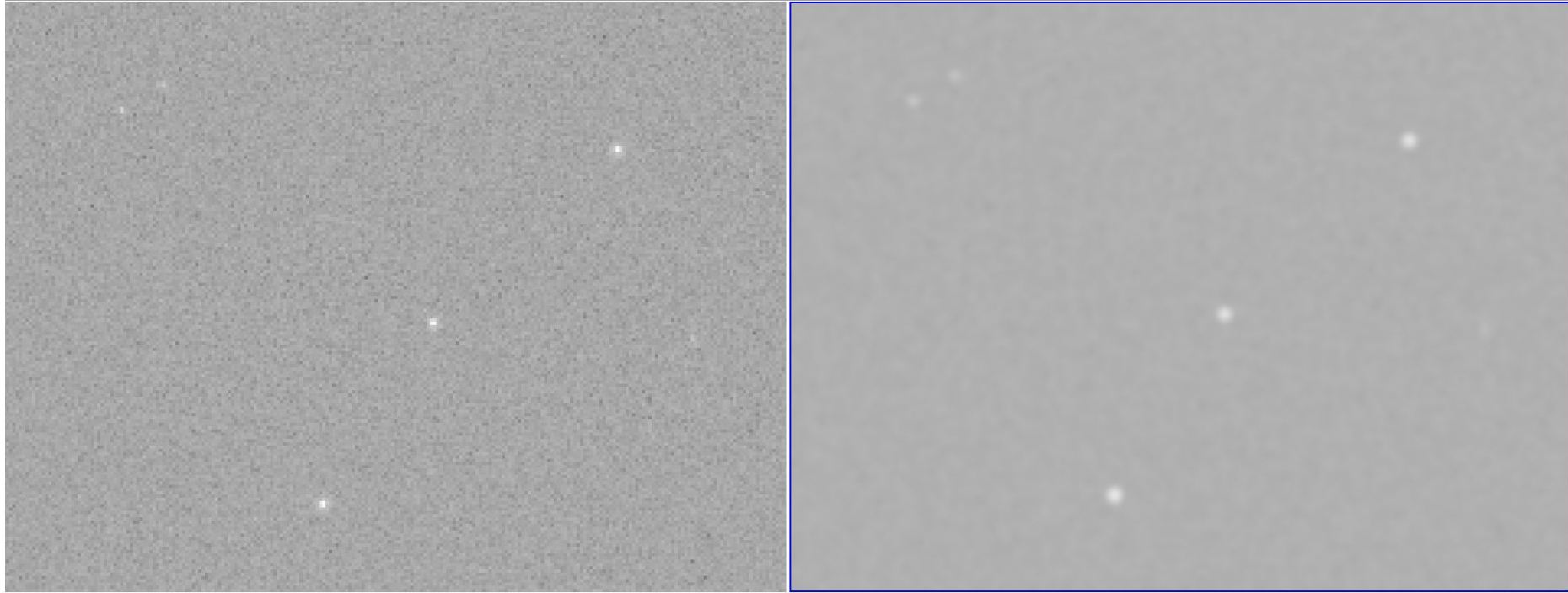
←: 3 dithers × 2 passes
(typical for Medium and
Wide Tiers of HLWAS)

↗: IMCOM (IMage
COMbination) – **optimal**
image coaddition

↘: Drizzle – **efficient**
image coaddition

*Credit: Figure 9 from
C. Hirata et al. 2024*

IMCOM $\rightarrow$ **Fast** IMCOM (K. Cao 2025):
11k $\rightarrow$ 0.4k core hours per filter per deg²



↖: Single Exposure with STIPS (Credit: B. Williams); ↗: Coadd of Two Exposures.

The area of
90
full moons



HIGH-LATITUDE TIME-DOMAIN SURVEY



180 days, primarily in two years



30 hours every five days



18 square degrees



Supernovae



Transients



Galaxies



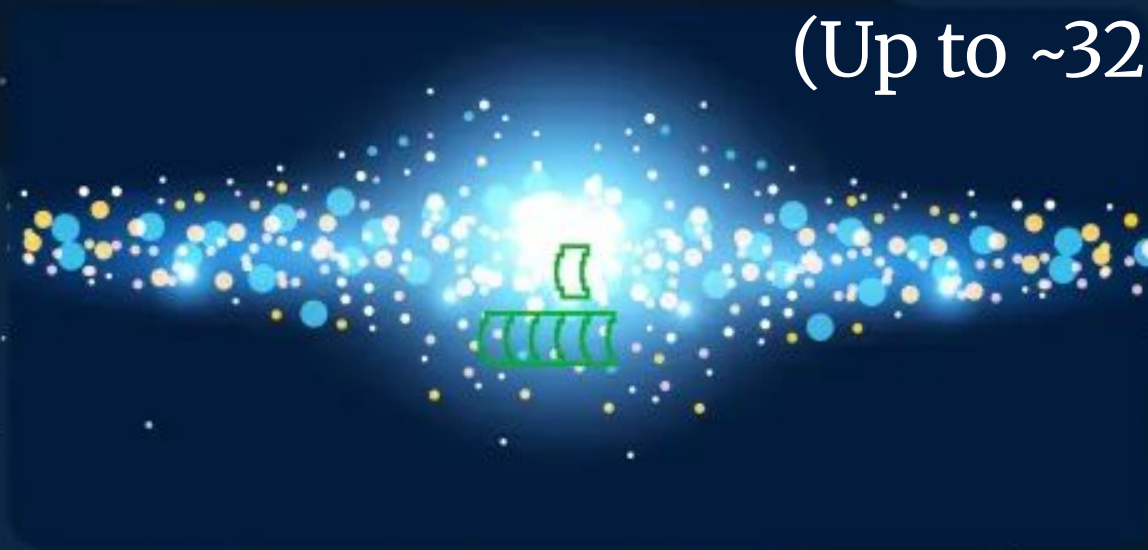
Dark Energy

New Frontiers:
Nearby Galaxies
High- z Supernovae

GALACTIC BULGE TIME-DOMAIN SURVEY

New Frontiers: Faint Objects (Up to ~32 mag)

The area of
8.5
full moons



Exoplanets



Transients



Black Holes



438 days, primarily in six sets of 72 days each



Full survey area imaged every 12 minutes



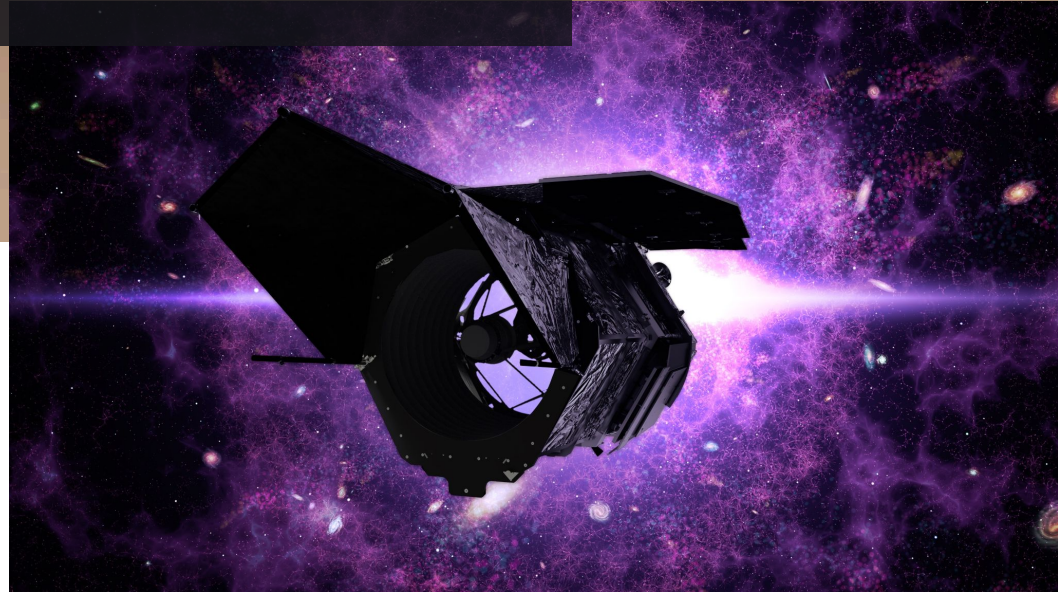
1.7 square degrees

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