The Subaru Prime Focus Spectrograph (PFS) Cosmology Survey: Overview and Progress

Speaker: Dr. Jiaxi Yu (禹佳希)

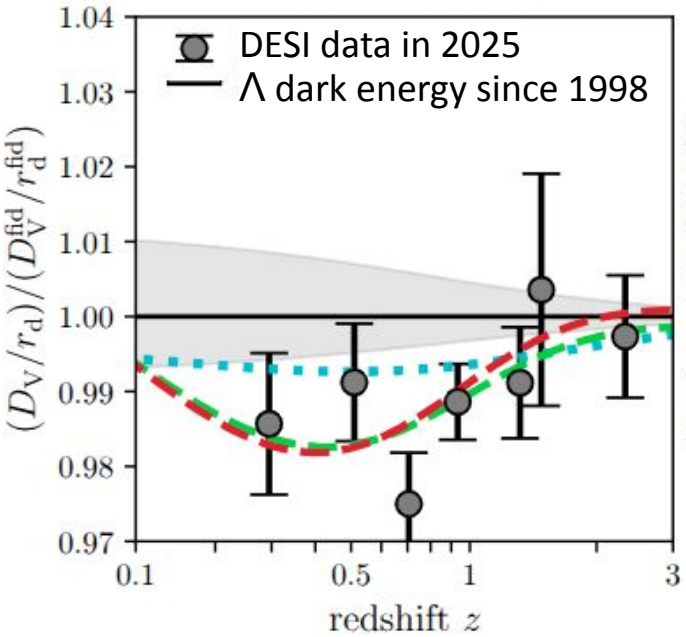
on behalf of the PFS CO working group

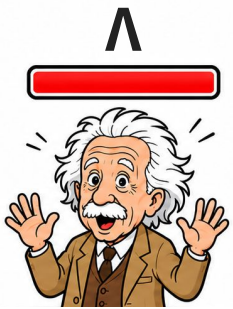
20 Oct 2026

Hangzhou, China

Motivation: Einstein's Λ **Dark Energy**? Or Evolving Dark Energy?

(The dominent component of our Universe today,
Beyond the Standard Model of Particle physics)





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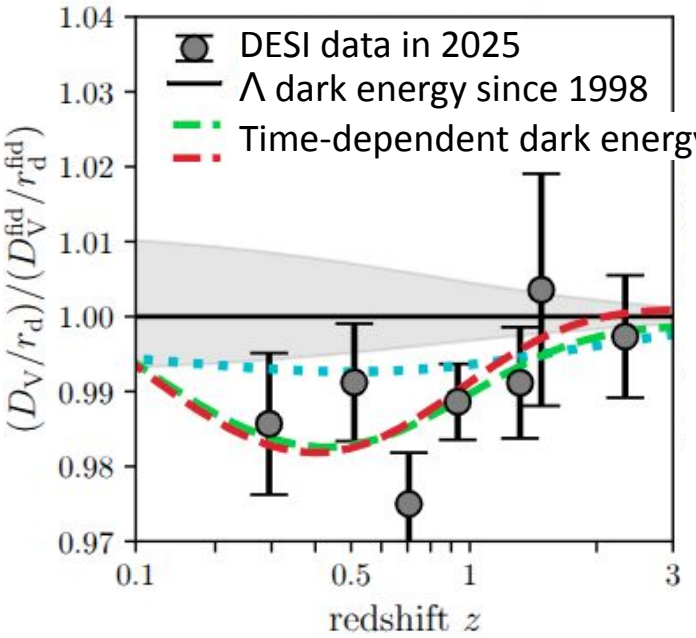

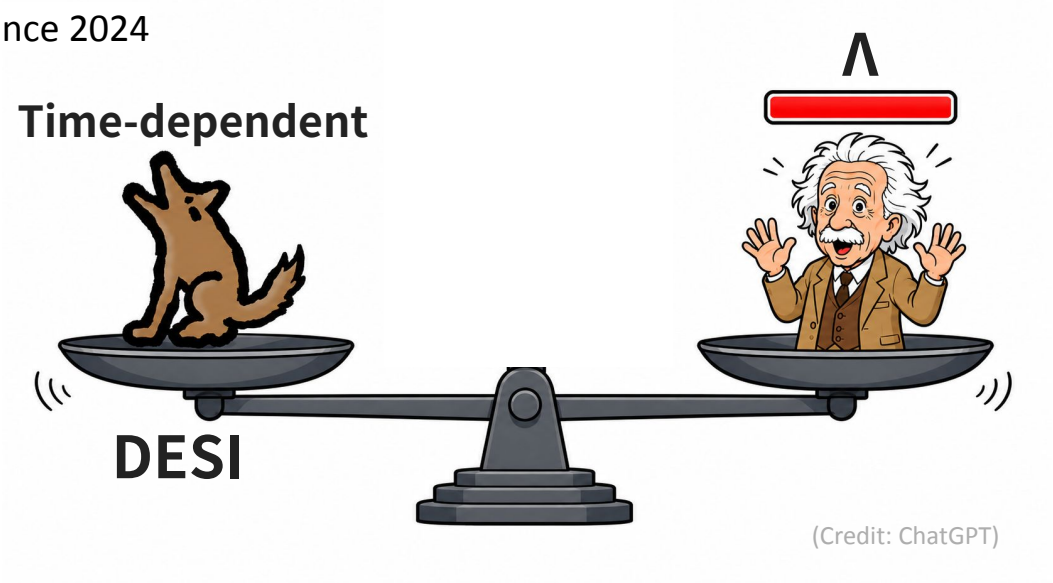

(Credit: ChatGPT)

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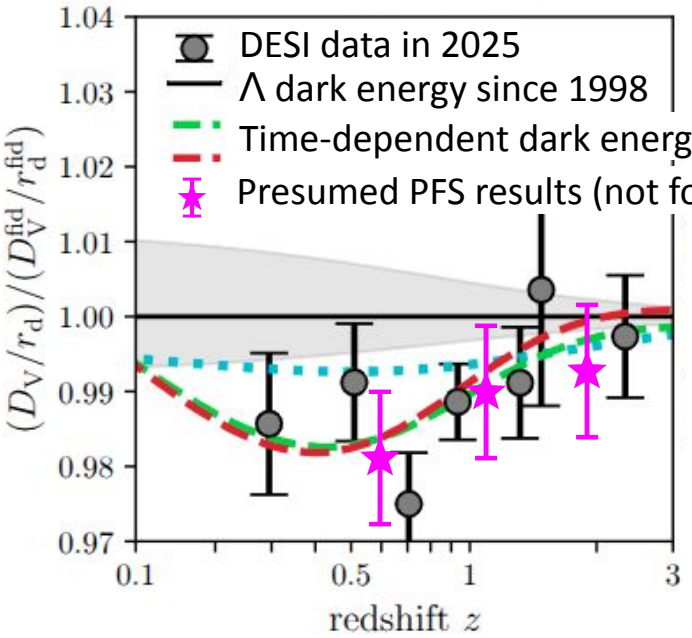
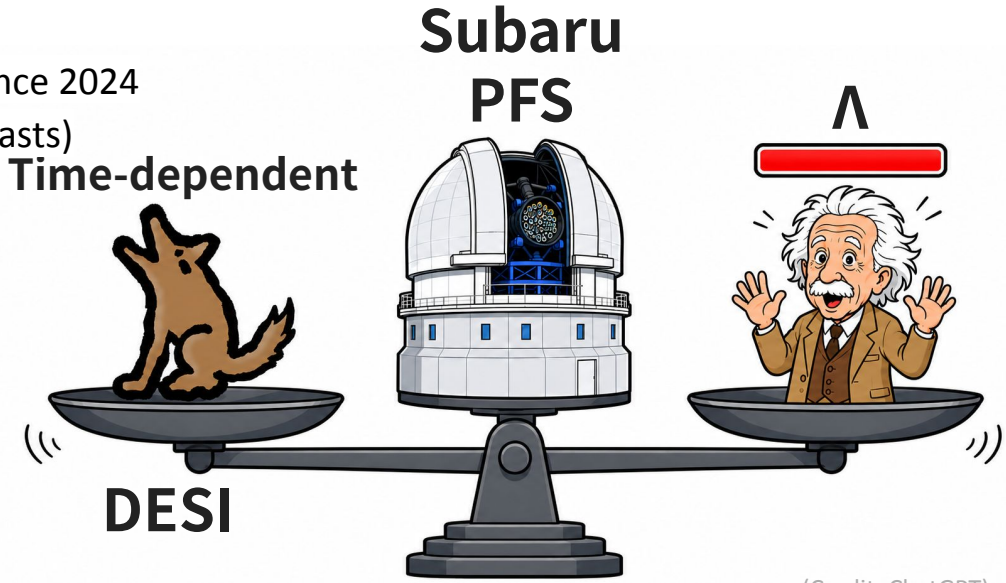




(Credit: ChatGPT)

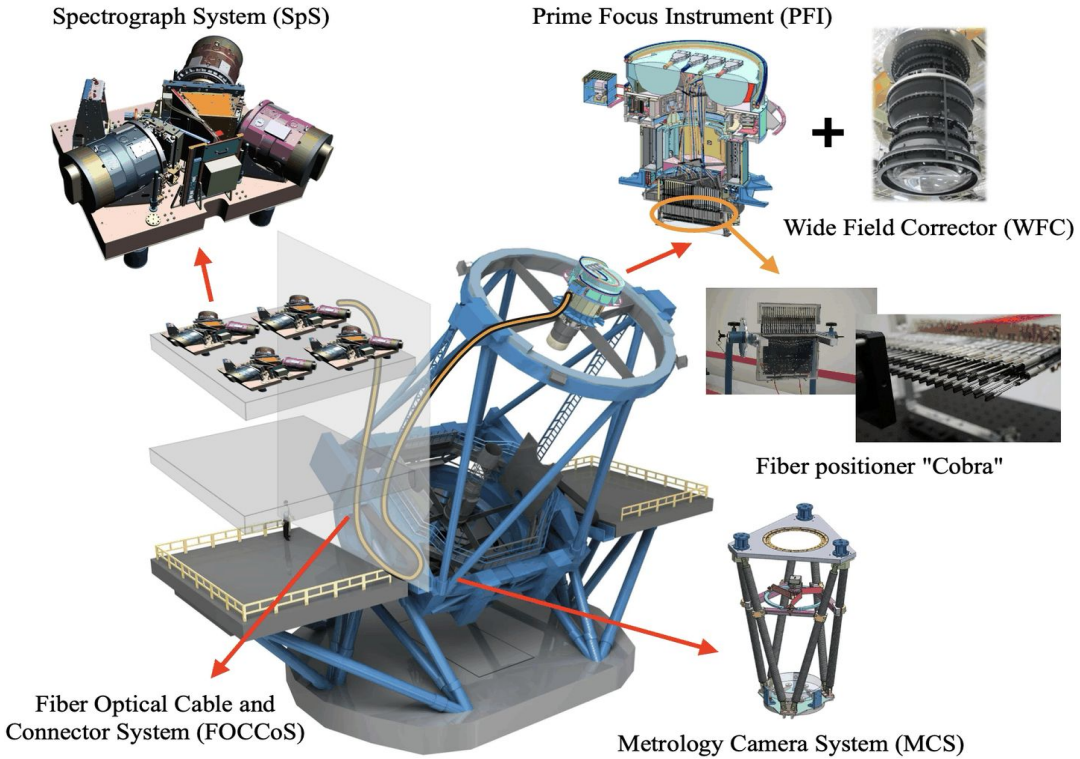


Subaru PFS

A 5-year survey started from Mar 2025

supported by international collaborators

Prime Focus Spectrograph (PFS): Instruments



8.2 m Subaru Telescope

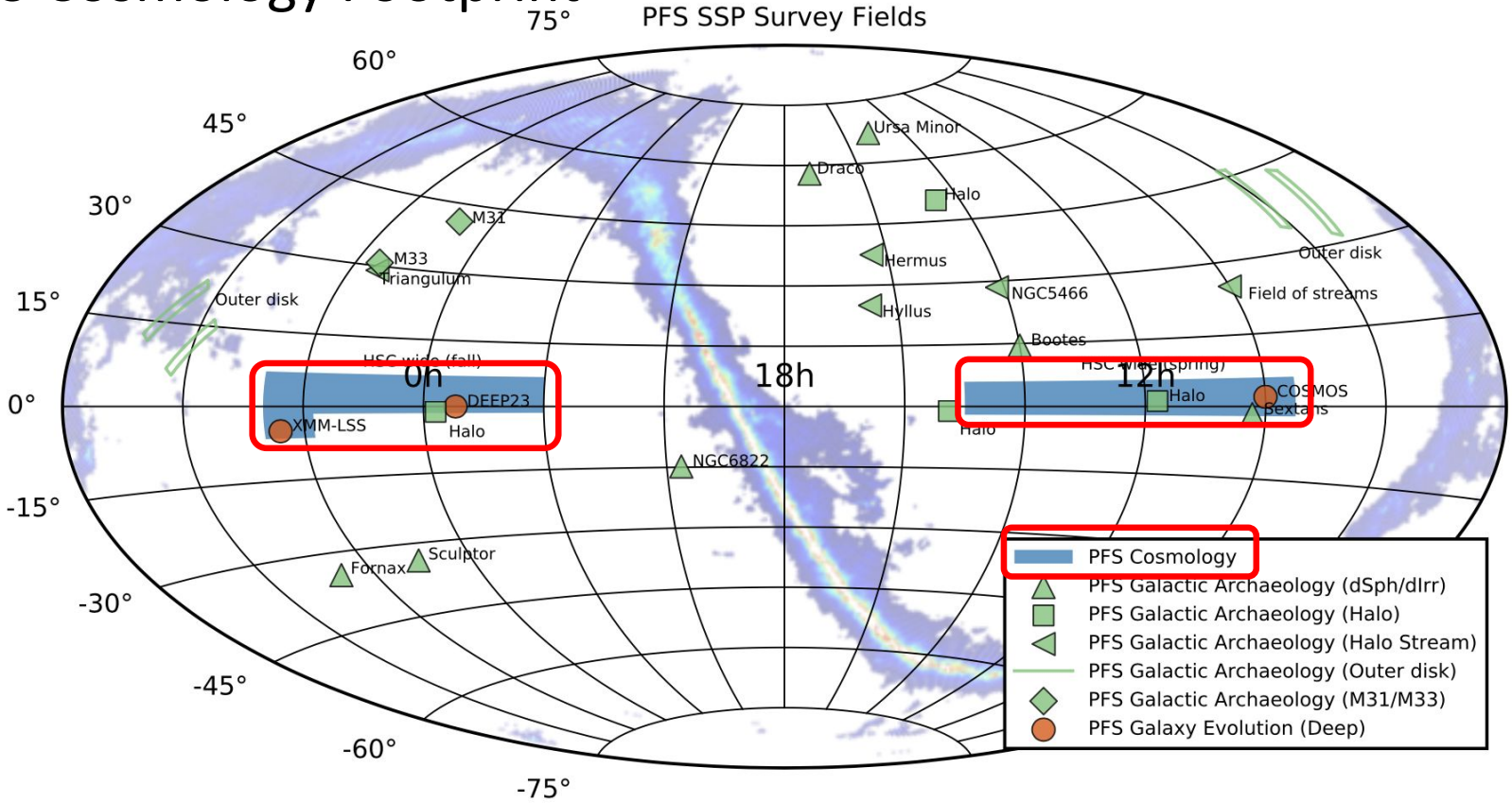
2400 fibers

1.25 deg^2 Field of View

380–1260 nm Spectrograph

blue + red + **NIR** arms, R ≈ 2300–5000

PFS Cosmology Footprint



PFS Cosmology Sciences

- **Test Λ-CDM Universe Model / General Relativity**
  - Explore dark energy model up to z~2.4
  - Test of General Relativity with PFS+HSC
  - The sum of Neutrino masses
  - Bispectra for more precise cosmological measurements
- **Assembly History of Galaxies**
  - Assembly bias and conformity of galaxies with HSC+PFS
- **Importance of Inter-Galactic Medium**
  - Search for emission from stacked spectra

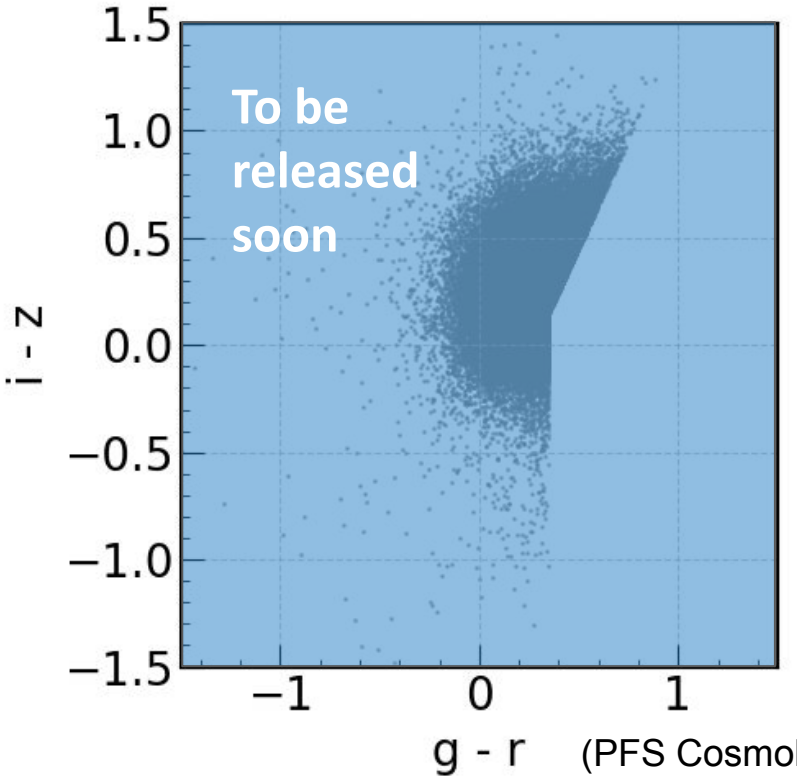
PFS Cosmology Progress:

Mar 2025 **PFS Observation Begins**

S25A **Science verification for the Cosmology Survey**
~0.1 M targets over 5 nights, 30 min – 1 h exposures

Oct 2025 **Target selection finalised**
Color-mag cut decided using S25A data

PFS Cosmology Progress: Target Selection



(PFS Cosmology Target Selection, in prep)

Targets:

- 0.6<z<1.6 [OII] emitters
- 1.6<z<2.4 [OII] emitters

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First main-survey cosmology pointings

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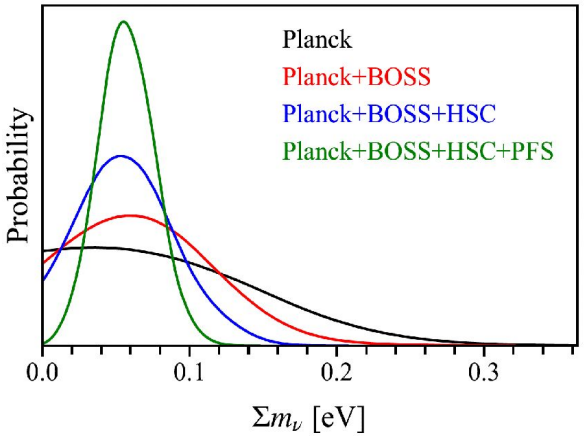
Oct 2026 **10% of the Cosmology Survey complete**
Working towards Science Release 1

PFS Cosmology Progress:

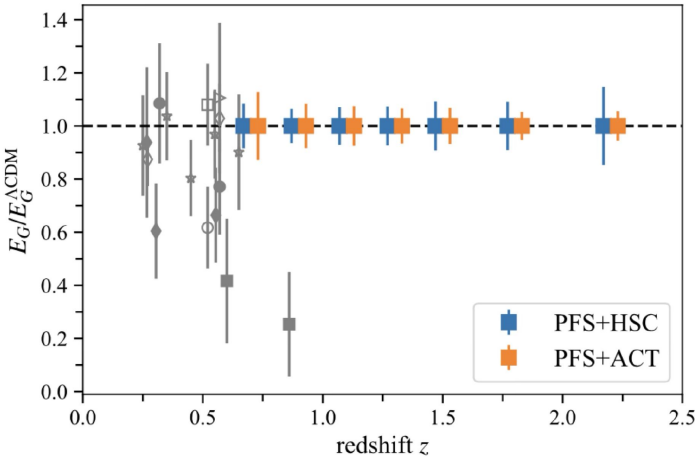
Oct 2026 **10% of the Cosmology Survey complete**

Working towards Science Release 1

- **The First Science Release Publications in 2027**
  - Target Selections, Visual Inspections, Systematics Analysis
  - Science Forecasts, Galaxy-Halo relation



(Sunayama et al. in prep)



PFS Cosmology Progress:

Oct 2026 **10% of the Cosmology Survey complete**

Working towards Science Release 1

- The First Science Release Publications in 2027
- **Construction of the Large-Scale Structure catalogues**
- The Simulation and Flagship Galaxy Mocks

PFS Cosmology Progress:

Oct 2026 **10% of the Cosmology Survey complete**

Working towards Science Release 1

- The First Science Release Publications in 2027
- **Construction of the Large-Scale Structure catalogues**
  - Systematics: imaging, fiber assignment, redshift measurements
  - Random catalogues
- The Simulation and Flagship Galaxy Mocks

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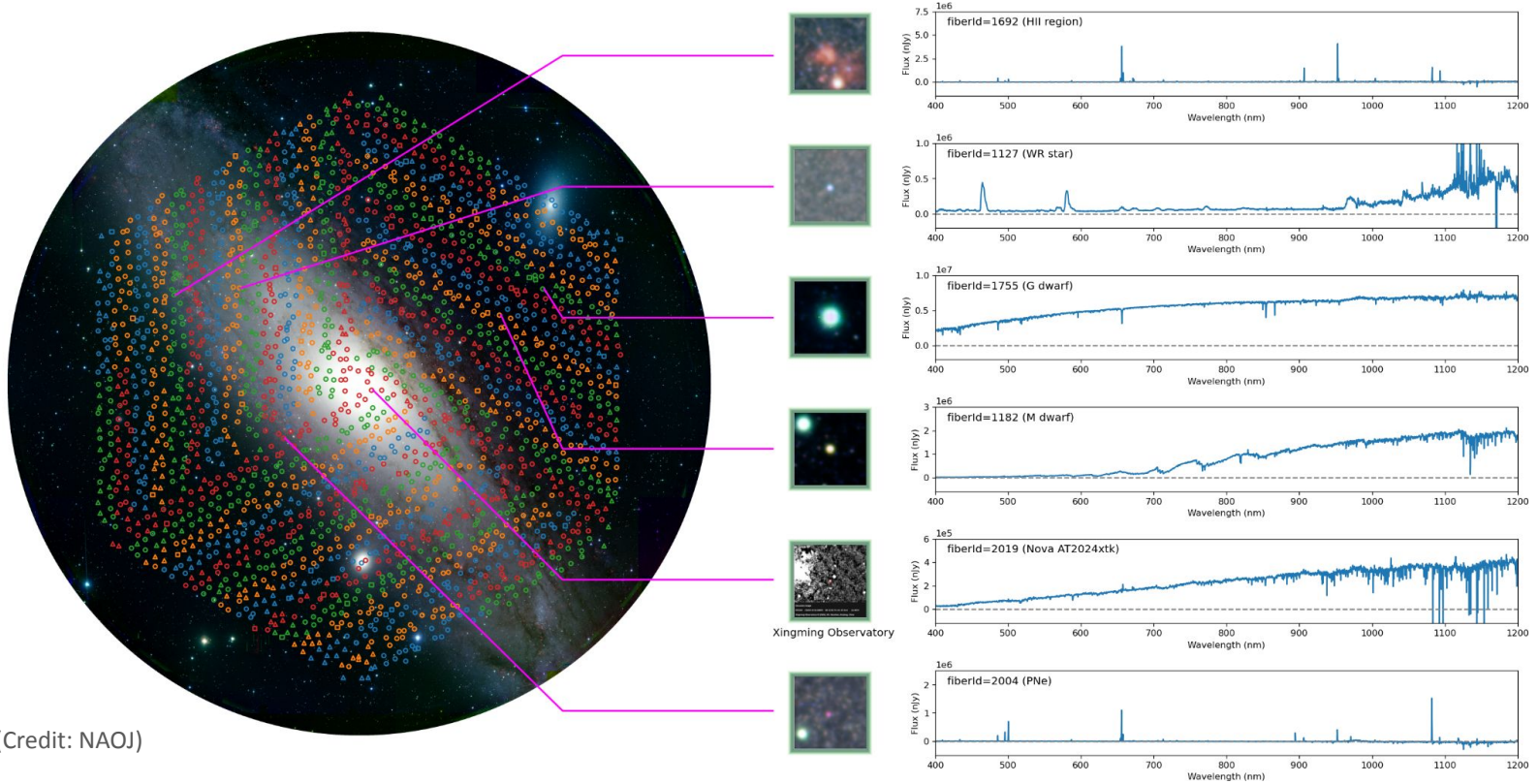
- The First Science Release Publications in 2027
- Construction of the Large-Scale Structure catalogues
- **The Simulation and Flagship Galaxy Mocks**
  - Several Uchuu 2Gpc/h (3e8 Msun/h) + ~1000 Mucho 1 Gpc/h (1e9 Msun/h)
  - The Euclid Flagship mocks tuned to HSC photometry with [OII] Luminosity

See You in the 2027 Subaru PFS Science Release!



(Credit: NAOJ)