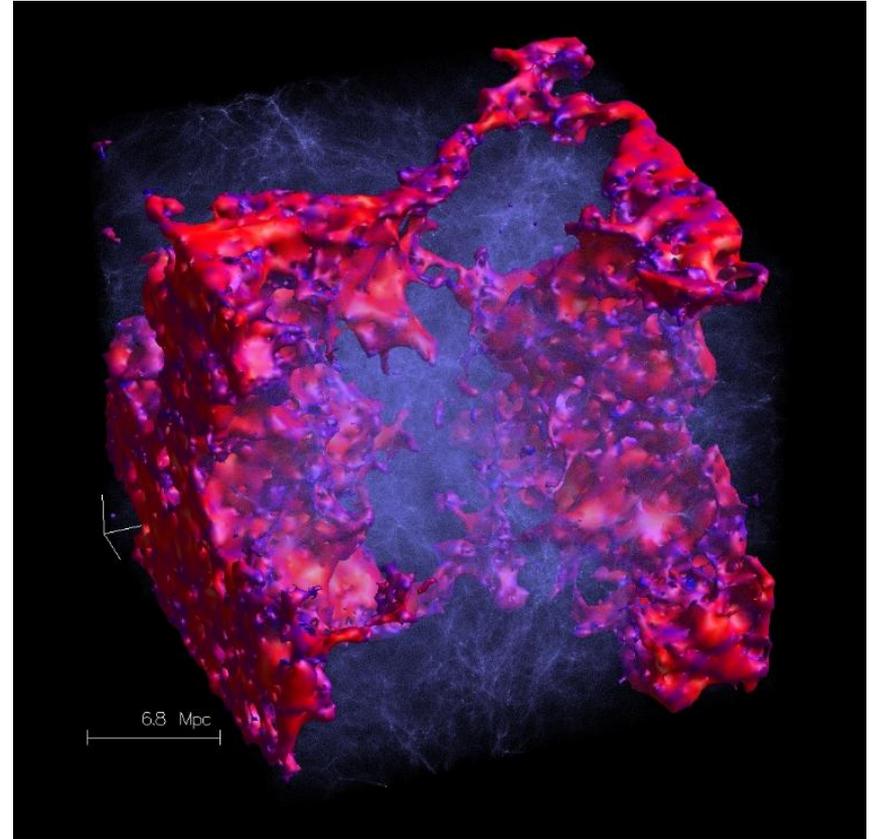
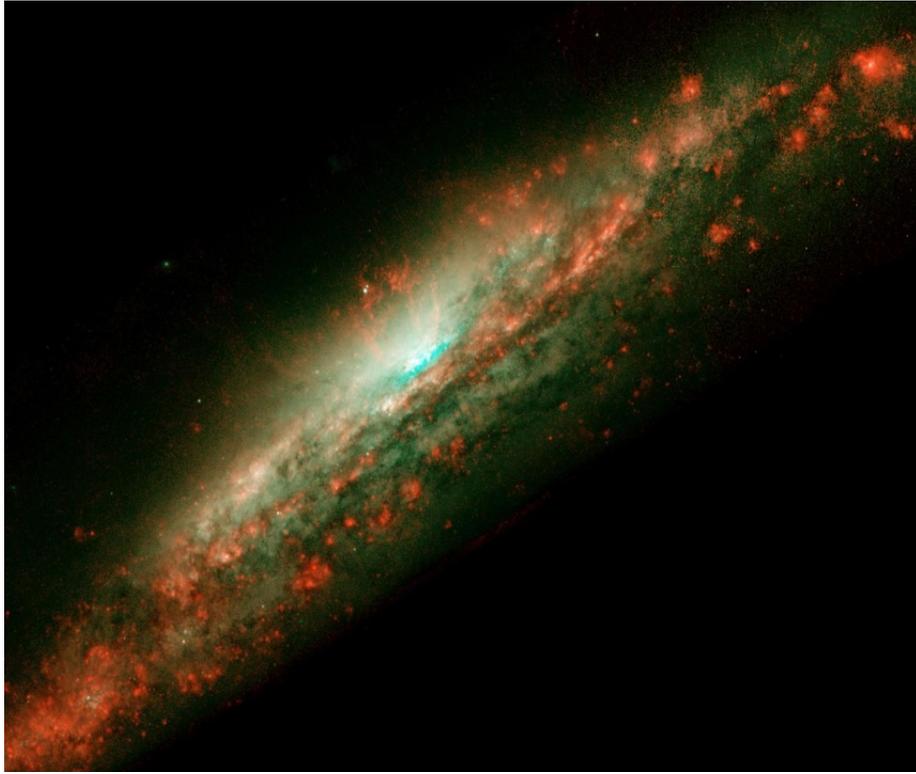


# Beyond the Local Group: II



# Outline

- *Brief* summary of talks (no pix)
- A presentation of issues
- Enough time left for discussion

# First Light

- **Bouwens:** WFIRST produces robust luminosity functions at  $z \sim 8$  to 12. Traces the early build-up of galaxies and places strong constraints on how/when reionization occurred.
- **Stiavelli:** The best hope at detecting the first generation of stars is through pair-instability SNe. WFIRST can find them out to  $z \sim 15$  and JWST can follow-up
- **Inoue:** The proposed JAXA mission WISH would be an ideal complement to WFIRST by extending comparably deep surveys to longer wavelengths and higher redshifts.

# Galaxies

- **Greene:** The Subaru Prime Focus Spectrograph will have strong scientific synergies with WFIRST for galaxy evolution
- **Gladders:** Strongly lensed galaxies provide unique information about the structure and content of high- $z$  galaxies. WFIRST will find thousands and the challenge will be analysis and follow-up
- **Dale:** In the low- $z$  universe WFIRST will provide critical information about the outer regions of galaxies. UV imaging and optical IFU spectra would be needed to realize this potential

# Black Holes and AGN

- **Hopkins:** WFIRST can assess the relative roles of mergers vs. stochastic processes in fueling the formation of supermassive black holes by determining the structures and environments of the host galaxies of an SDSS-sized sample of AGN across a wide range in redshift.
- **Fan:** WFIRST will extend the robust characterization of the QSO luminosity function to  $z \sim 7$  and reveal a population at larger  $z$ , thus tracing the early build-up of the SMBH population

# Issues to ponder:

## 1. Wavelength coverage

- Extension to longer wavelengths (at least to full K\_short) extends redshift range probed
- Add a blue ‘veto filter’ to better study  $z < 10$  (e.g. a z-band added to the HLS that reaches AB  $\sim 27$ )
- A modest extension blue-ward in the wavelength range of the grism would significantly enhance galaxy and QSO science based on emission-line diagnostics
- Deeper data over smaller field than HLS is important for galaxy evolution. “Cheapest” fix would be to add y, F184W, and grism to deep SN field (5 square degrees).

# Issues to ponder:

## 2. Survey Footprints

- QSO luminosity functions prefer a wider, shallower survey than HLS
- To optimize synergy with a) planned massively-multiplexed spectrographs on 8-m-class telescopes (Subaru/PFS, Next-Gen CFHT, MOONS) and b) with suite of GSMTs, it would be better to share the HLS between celestial hemispheres
- ‘Wedding cake’ – is there a case for a survey that is the geometric mean of HLS and Deep SN in terms of area and depth ( $\sim 100$  square degrees to AB  $\sim 28$ )?

# Issues to Ponder:

## 3. Strategy/Sociology

NWNH said that WFIRST rested on three legs:

Dark Energy, Exo-Planets, General Astrophysics

How should the last one be addressed? Two extremes:

1) Allow Dark Energy and Exo-Planets to design the mission and use this as best we can, augmented by a blend of small/medium/large GO programs (HST mode).

2) Take the basic hardware of WFIRST and figure out a strategic community-based plan for a small number of large surveys to address the most important questions

Deciding the correct answer requires a lot of community buy-in and discussion. This meeting is a great first-step.