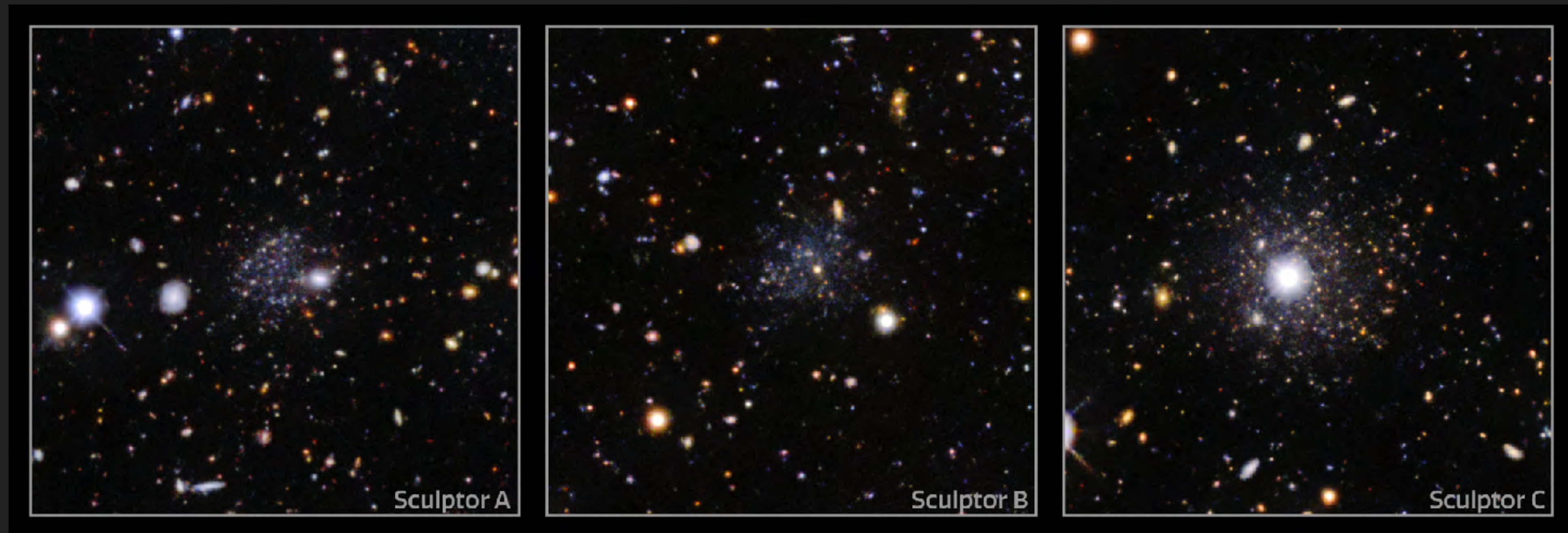


THREE QUENCHED, FAINT DWARF GALAXIES: NEW PROBES OF REIONIZATION & STELLAR FEEDBACK



D. SAND (ARIZONA)

B. MUTLU-PAKDIL, M. JONES, A. KARUNAKARAN, J. ANDREWS, P. BENNET, D. CRNOJEVIC, G. DONATIELLO, A. DRLICA-WAGNER, C. FIELDER, D. MARTINEZ-DELGADO, C. MARTINEZ-VAZQUEZ, K. SPEKKENS, A. DOLIVA-DOLINSKY, L. HUNTER, J. CARLIN, W. CERNY, T. HAI, K. MCQUINN, A. PACE, A. SMERCINA

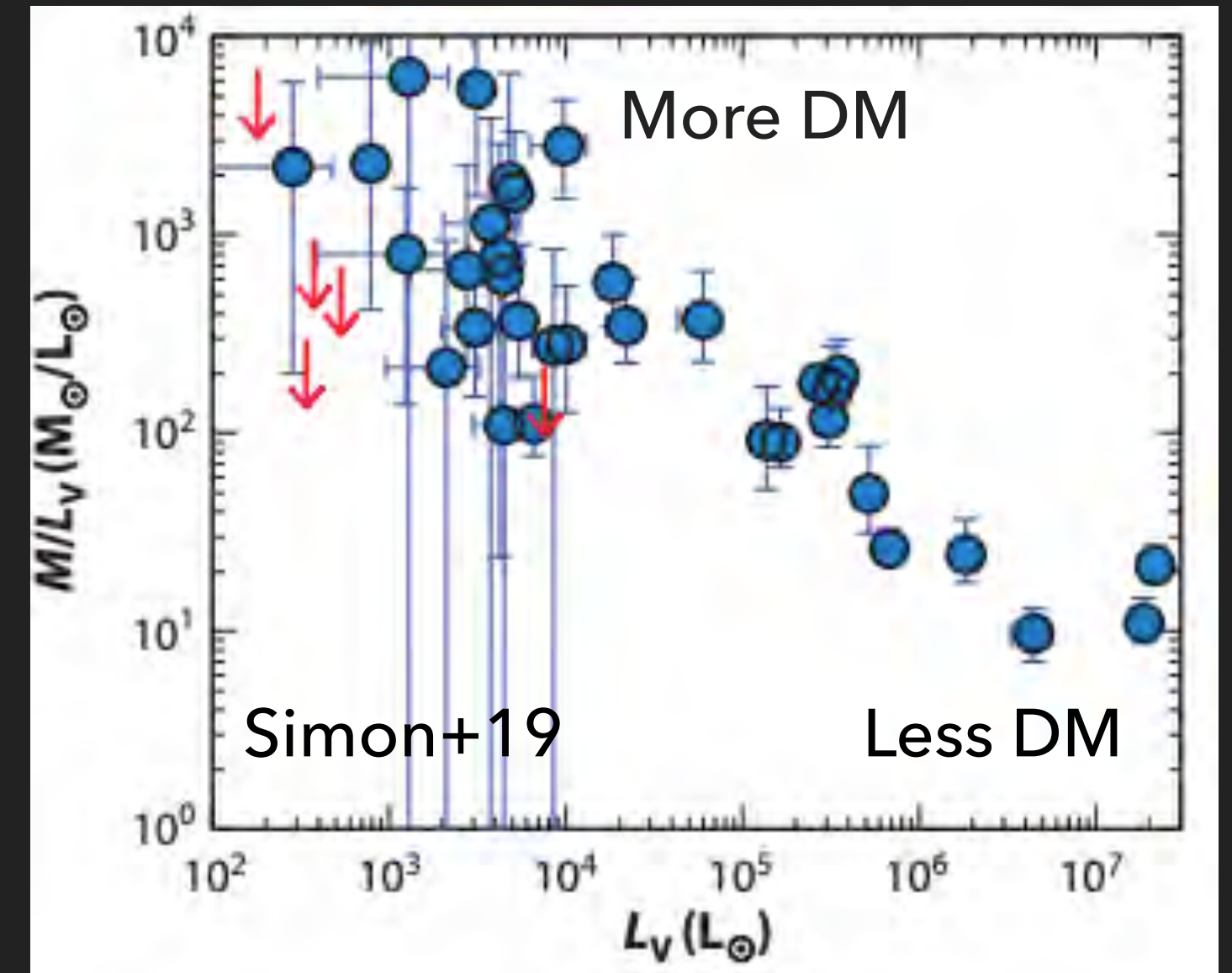


2024, APJ LETTERS, 977, L5
[HTTPS://ARXIV.ORG/ABS/2409.16345](https://arxiv.org/abs/2409.16345)
NORMAL TALK: 365.02 2:20 TODAY

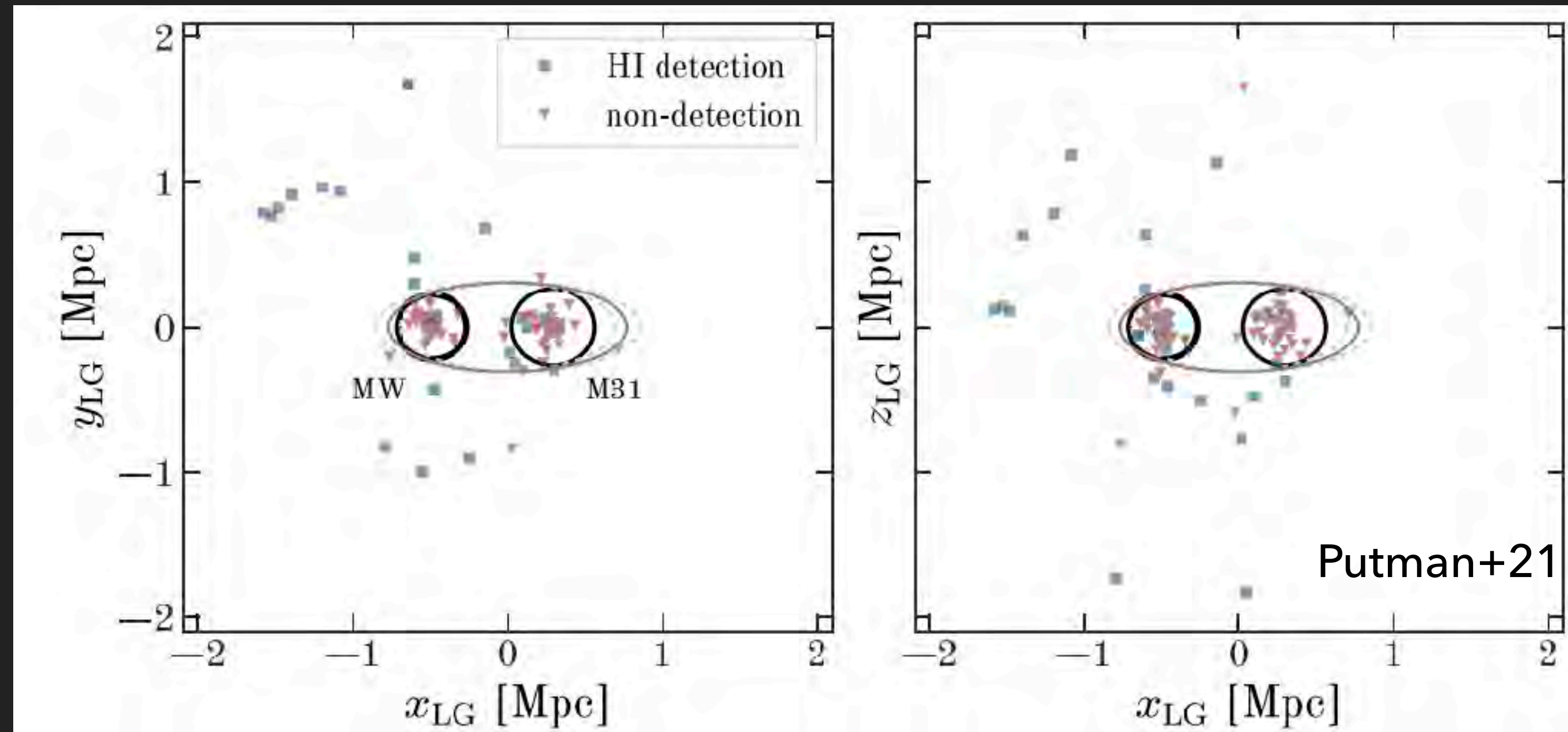


SIGNIFICANCE OF THE FAINTEST DWARF GALAXIES

- ▶ Smallest Dark Matter Halos we know ($<10^9 M_\odot$)
- ▶ Most dark matter dominated, least chemically enriched
- ▶ A great laboratory to understand internal (supernova and star formation) and external (tidal and ram pressure stripping) feedback.
- ▶ **Reionization** in early universe also will leave an imprint

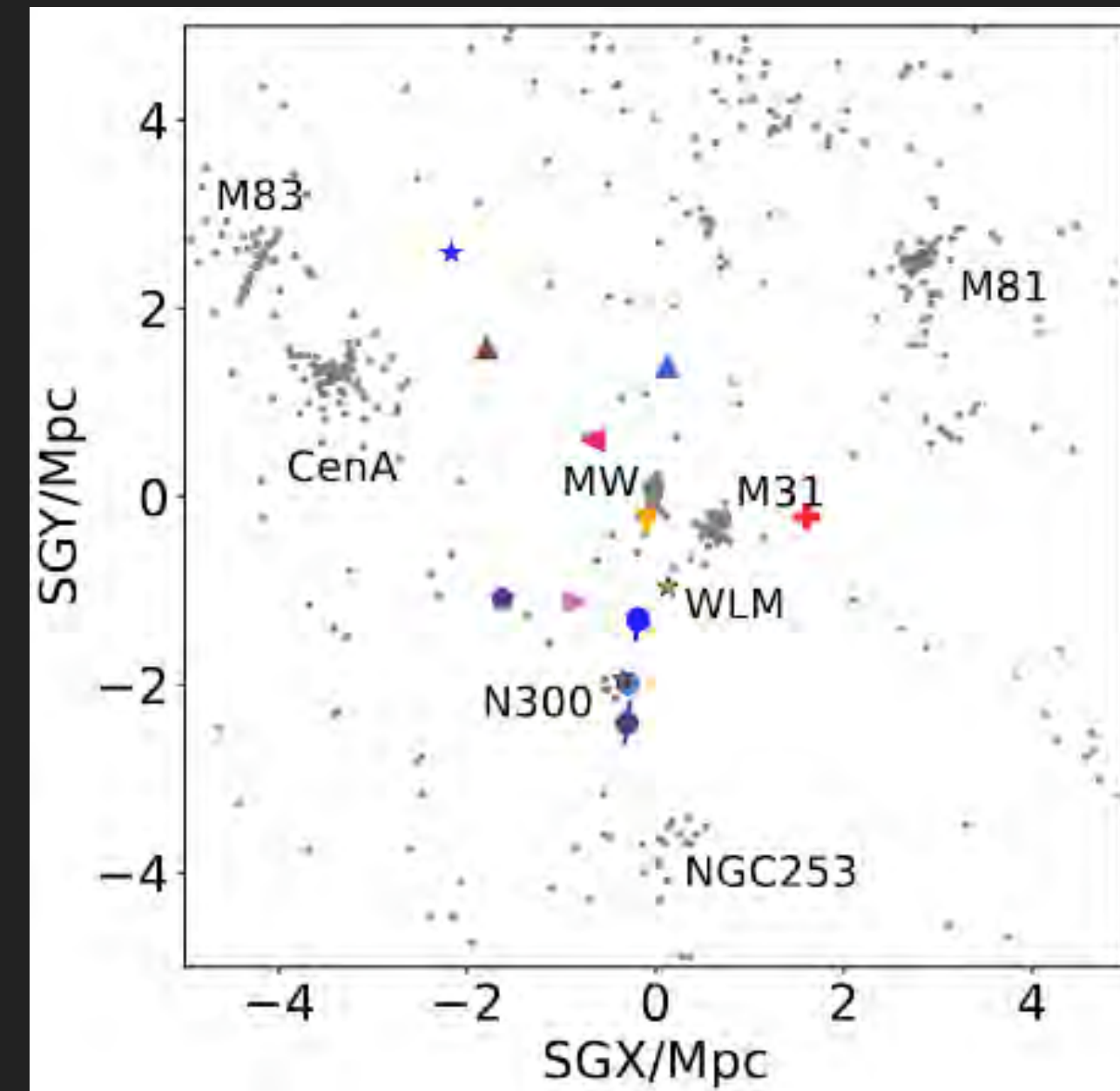


**IN THE LOCAL GROUP (MILKY WAY + ANDROMEDA), ENVIRONMENT MATTERS:
NO HI GAS, NO MORE STAR FORMATION**



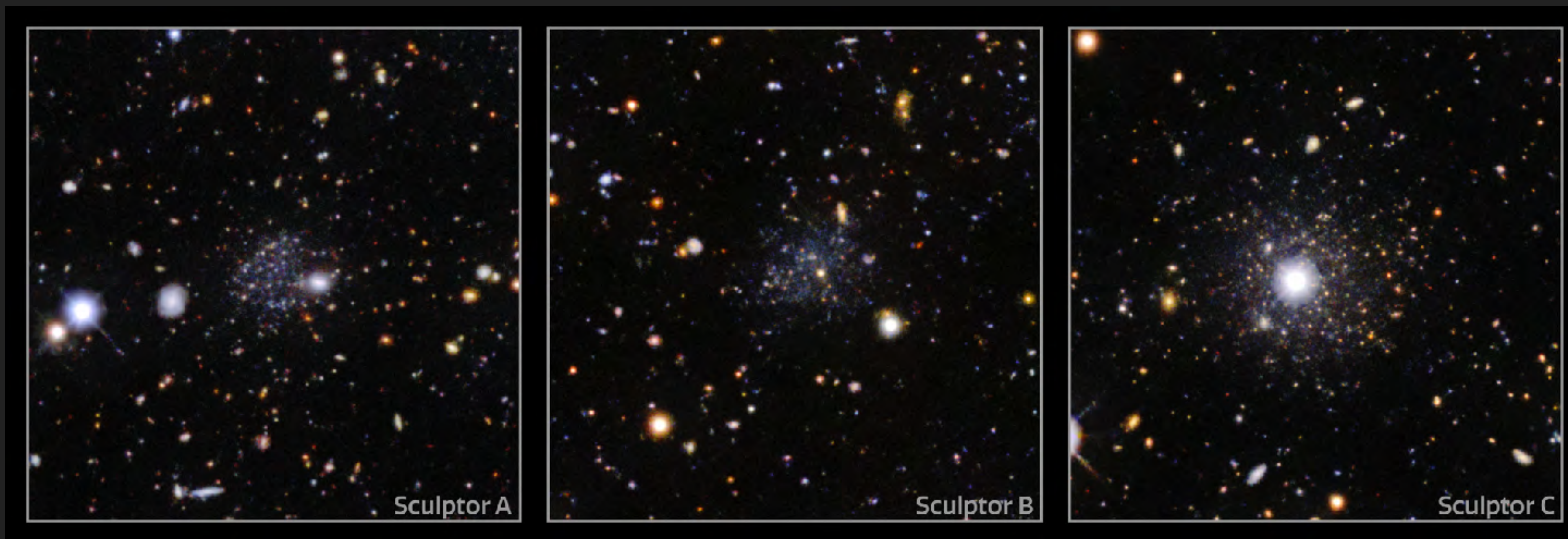
Widely interpreted as ram-pressure stripping of dwarfs by the hot halos of the Milky Way and M31

SEARCH FOR FAINT DWARF SATELLITES AROUND NGC300

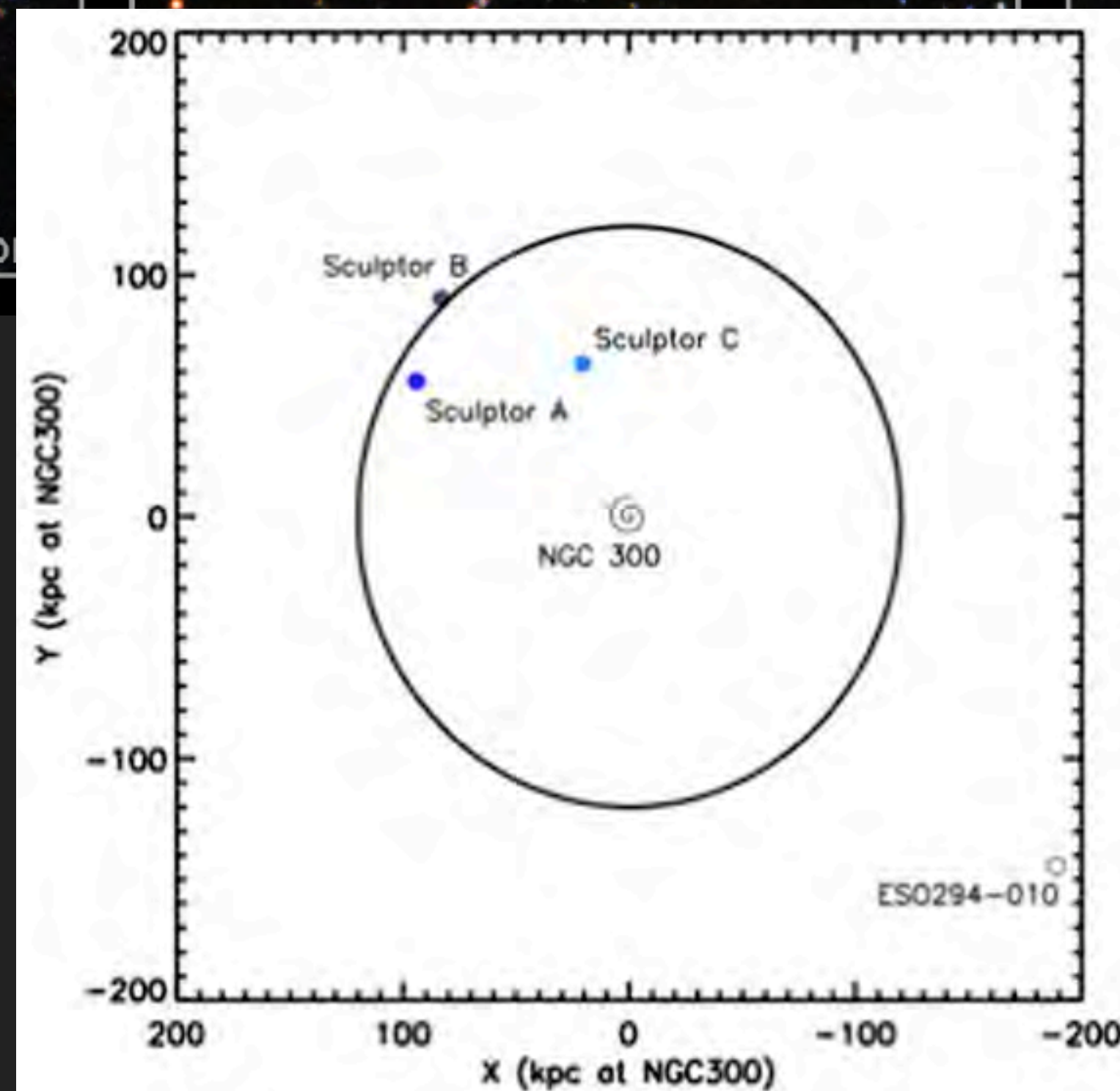
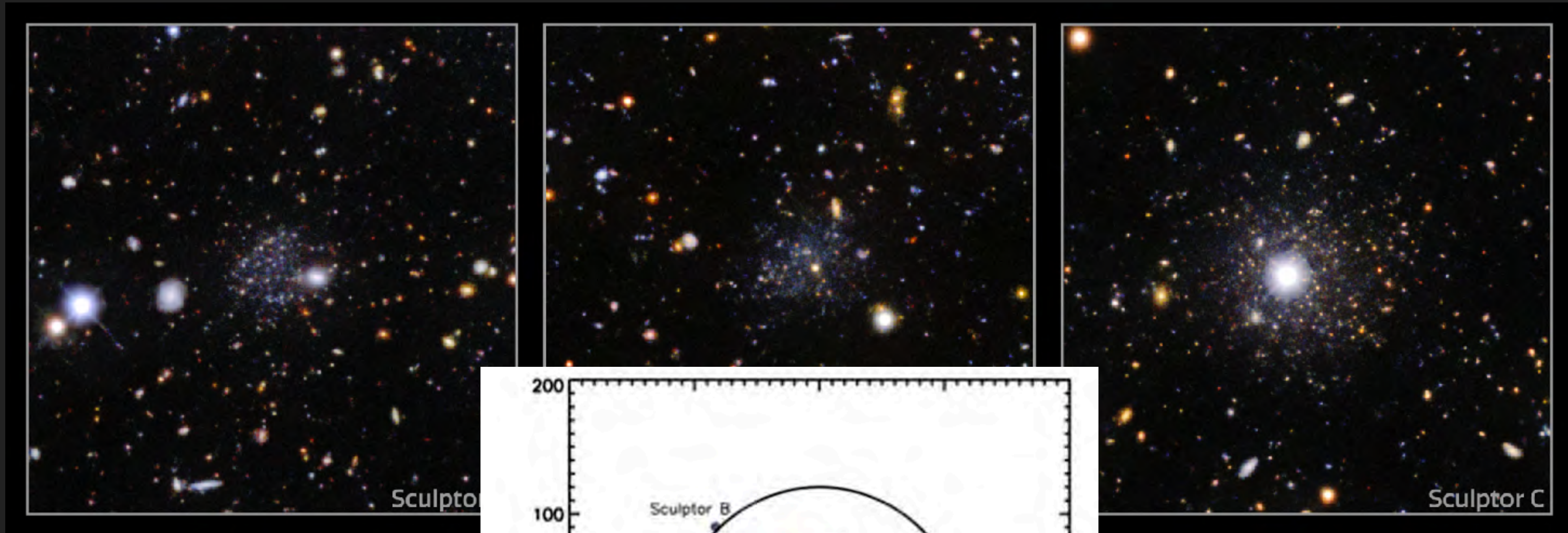


- ▶ NGC300: Small spiral galaxy, $D=2$ Mpc (6.5 million light years)
- ▶ Properties very similar to the Large Magellanic Cloud (LMC), but it is 'isolated' and on its own.
- ▶ Search out to ~ 200 kpc (650 Mlyrs)
- ▶ What effect do LMC-like galaxies have on their satellite population? Will have a weaker tidal field and will lack the hot corona necessary for ram pressure stripping.

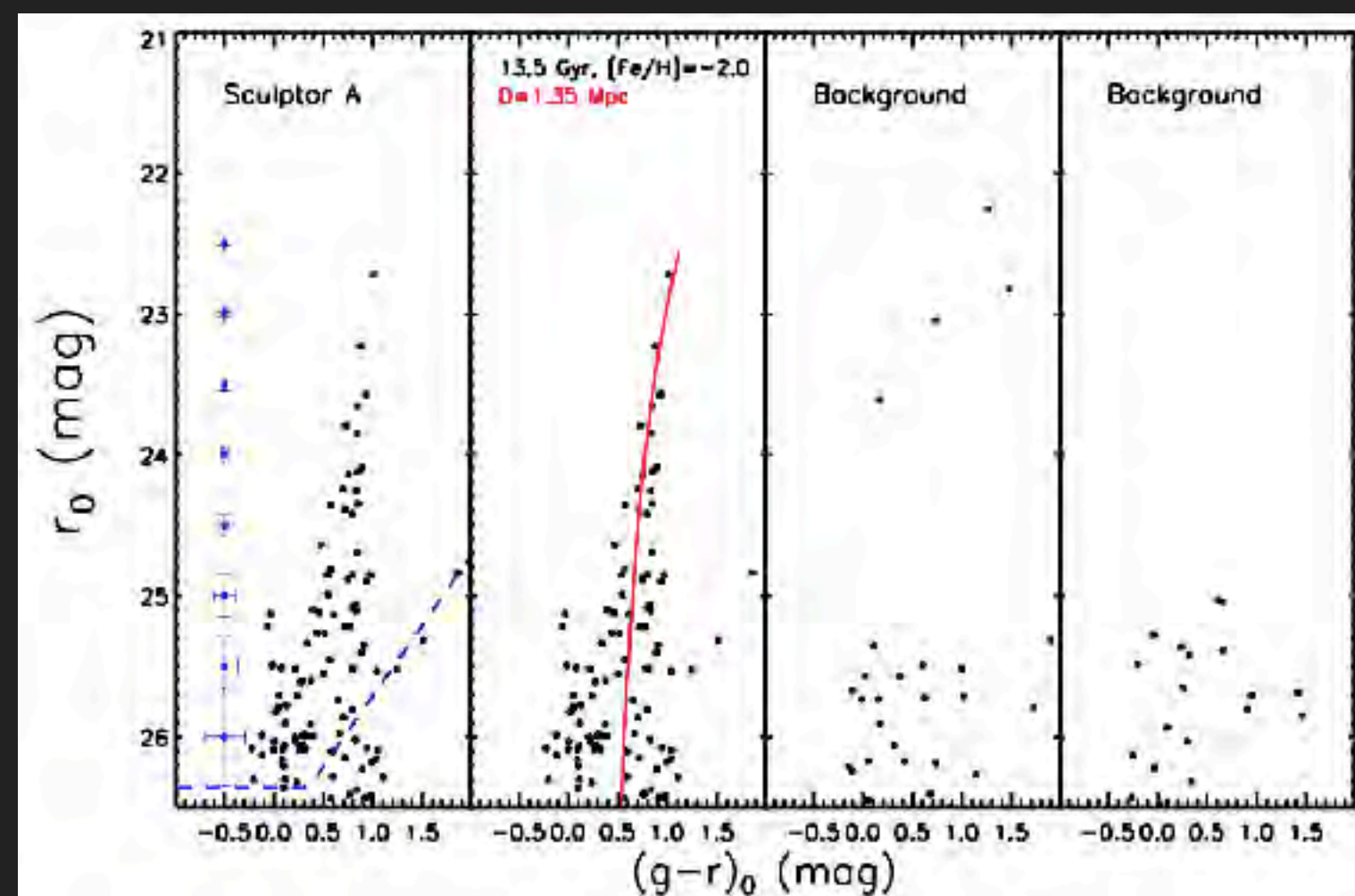
SEARCH FOR FAINT DWARFS AROUND NGC300: THREE STRONG CANDIDATES



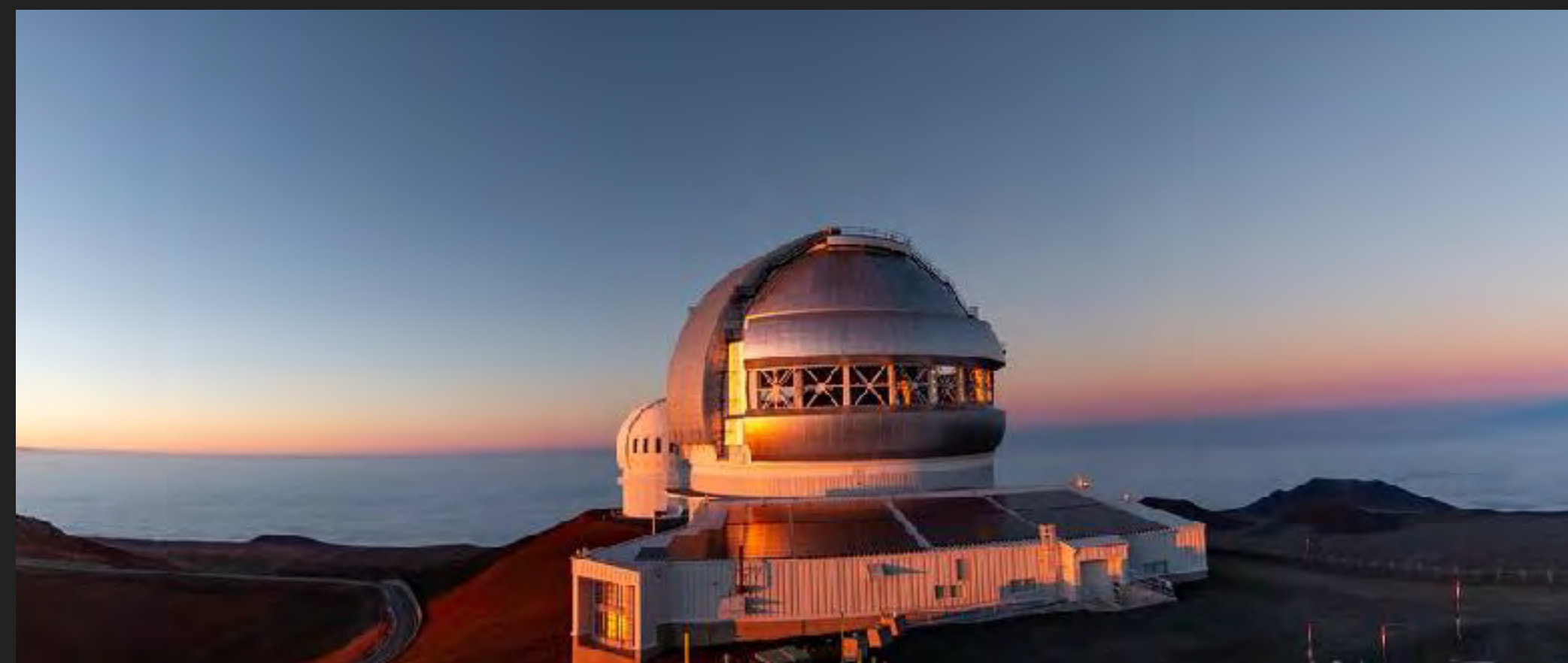
SEARCH FOR FAINT DWARFS AROUND NGC300: THREE STRONG CANDIDATES



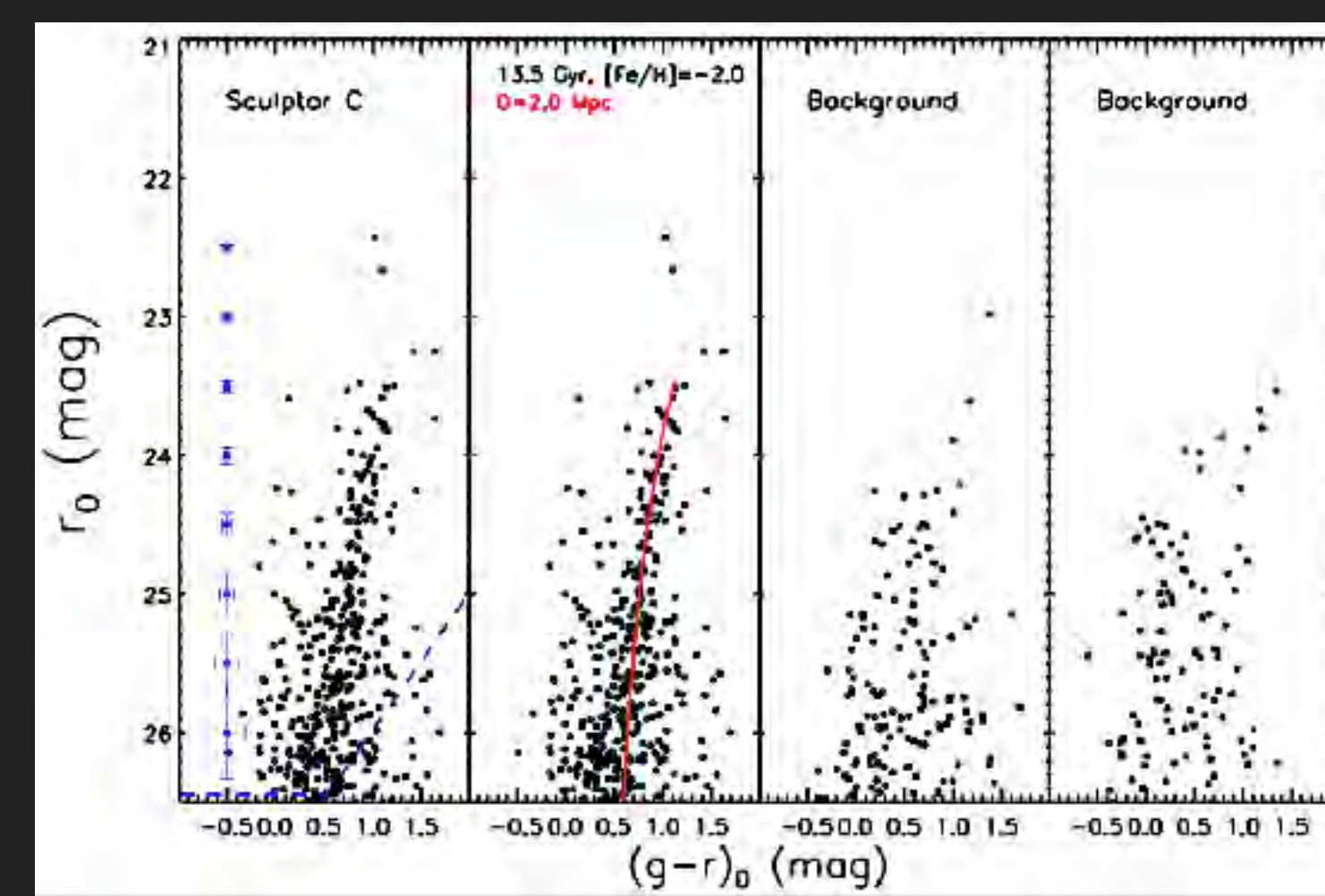
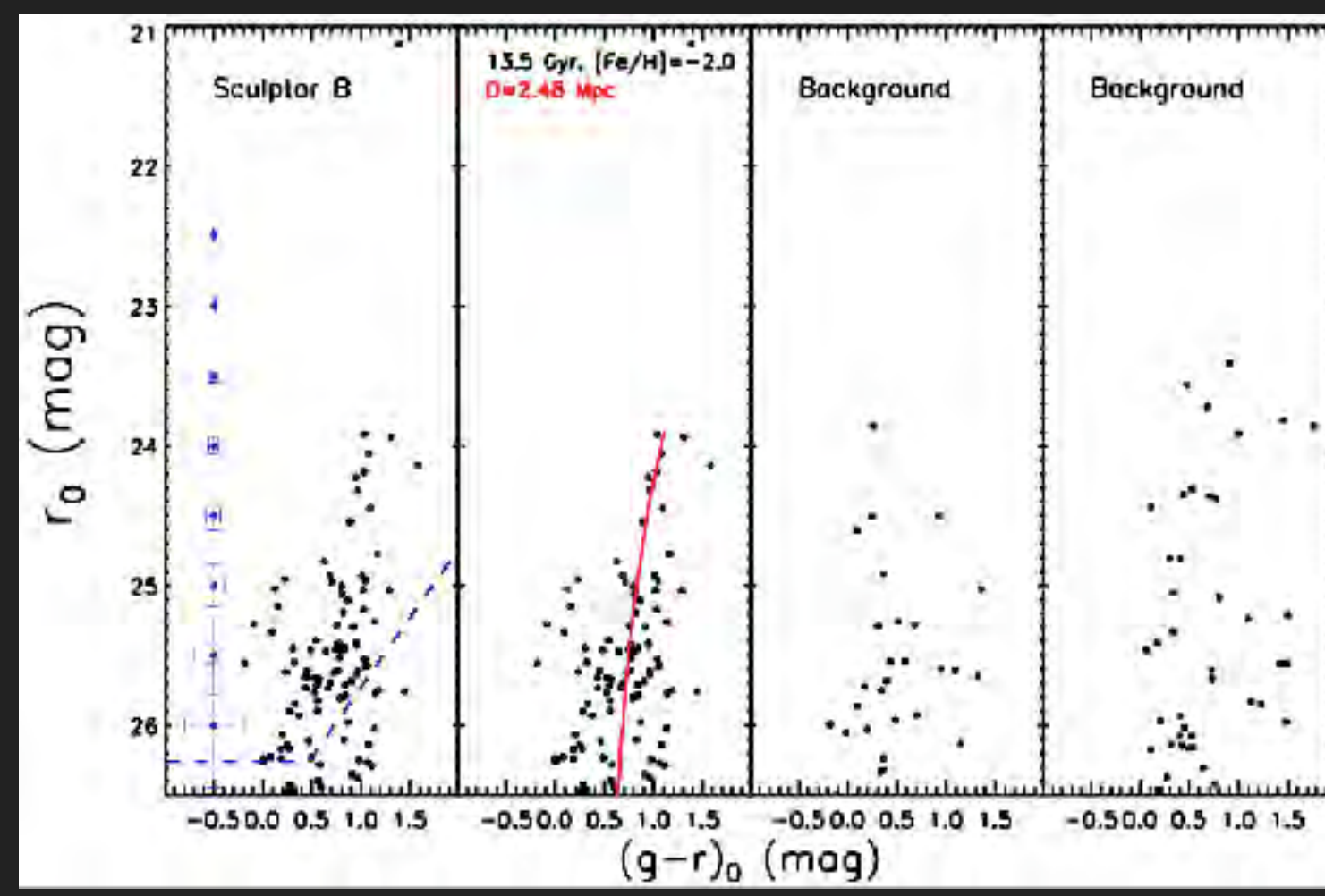
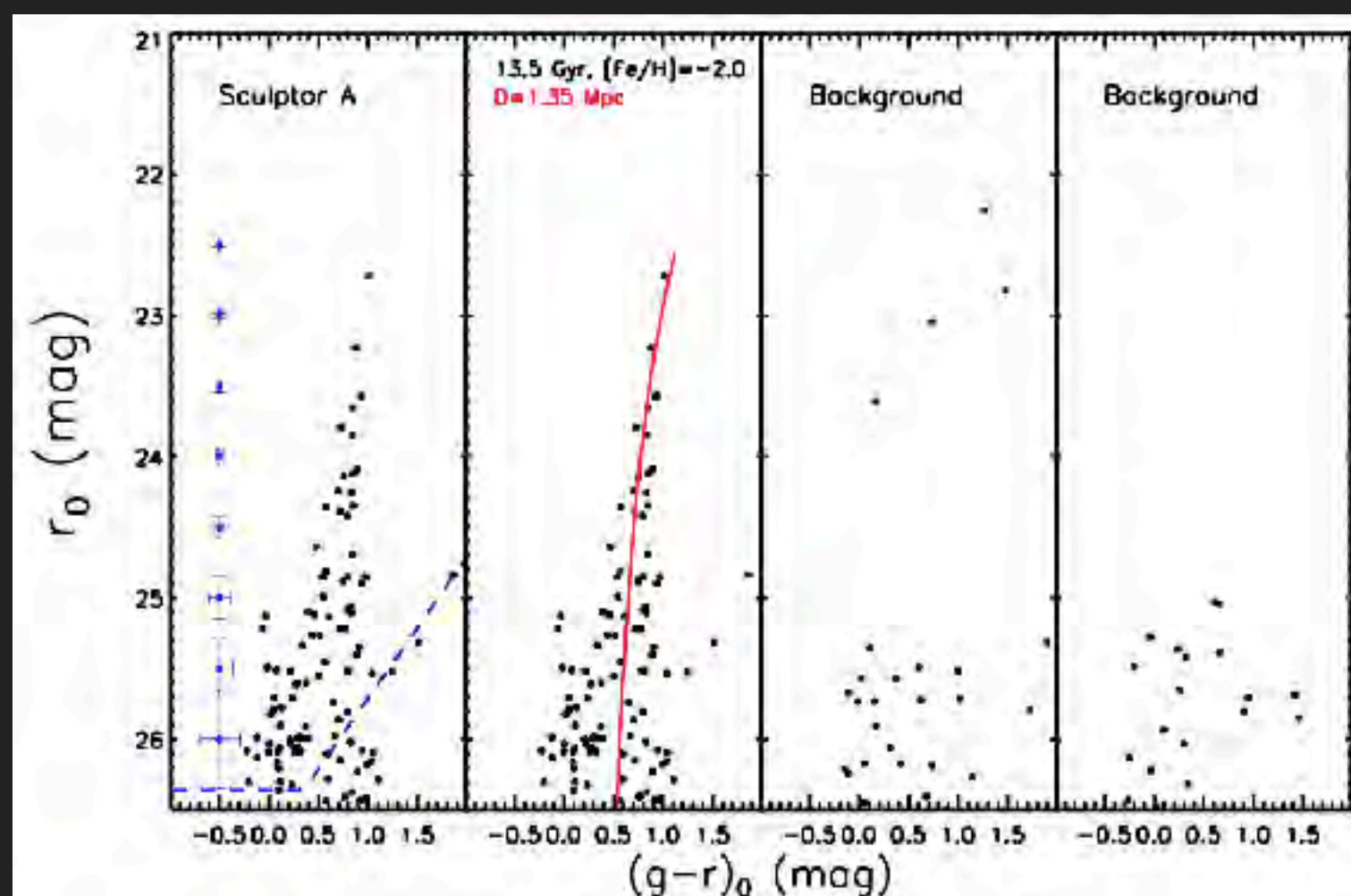
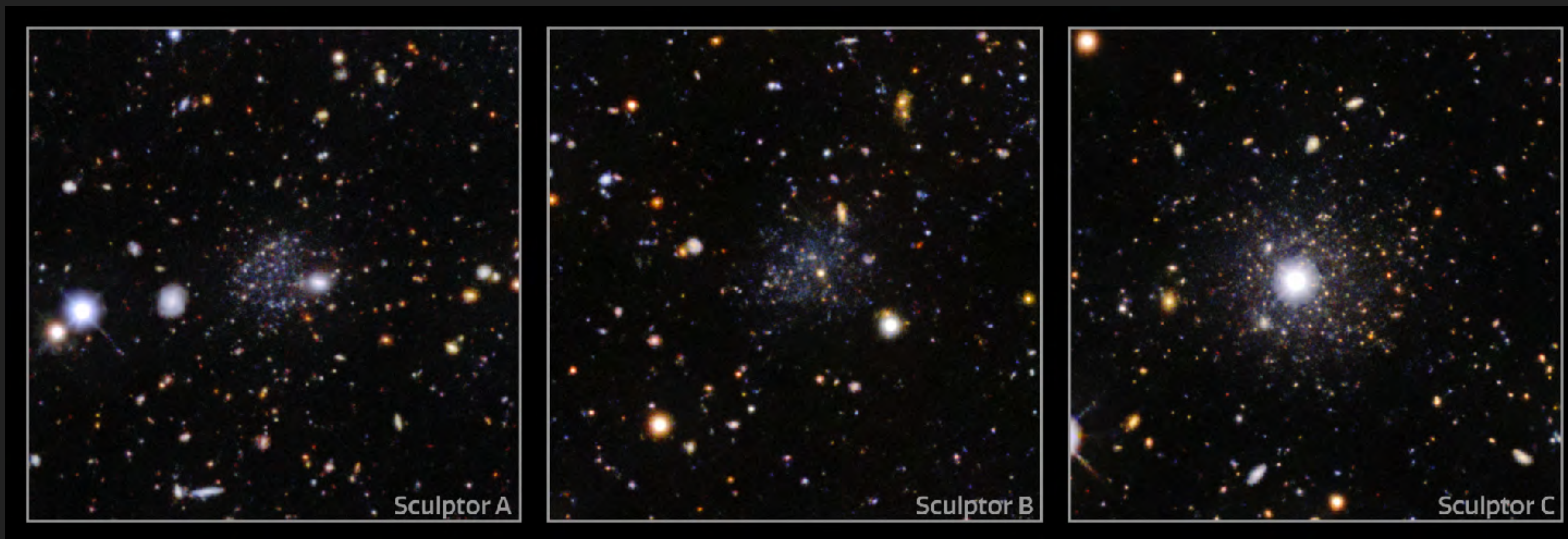
SEARCH FOR FAINT DWARFS AROUND NGC300: THREE STRONG CANDIDATES



Gemini Fast Turnaround Imaging (*excellent* conditions)



SEARCH FOR FAINT DWARFS AROUND NGC300: THREE STRONG CANDIDATES



SEARCH FOR FAINT DWARFS AROUND NGC300: THREE STRONG CANDIDATES

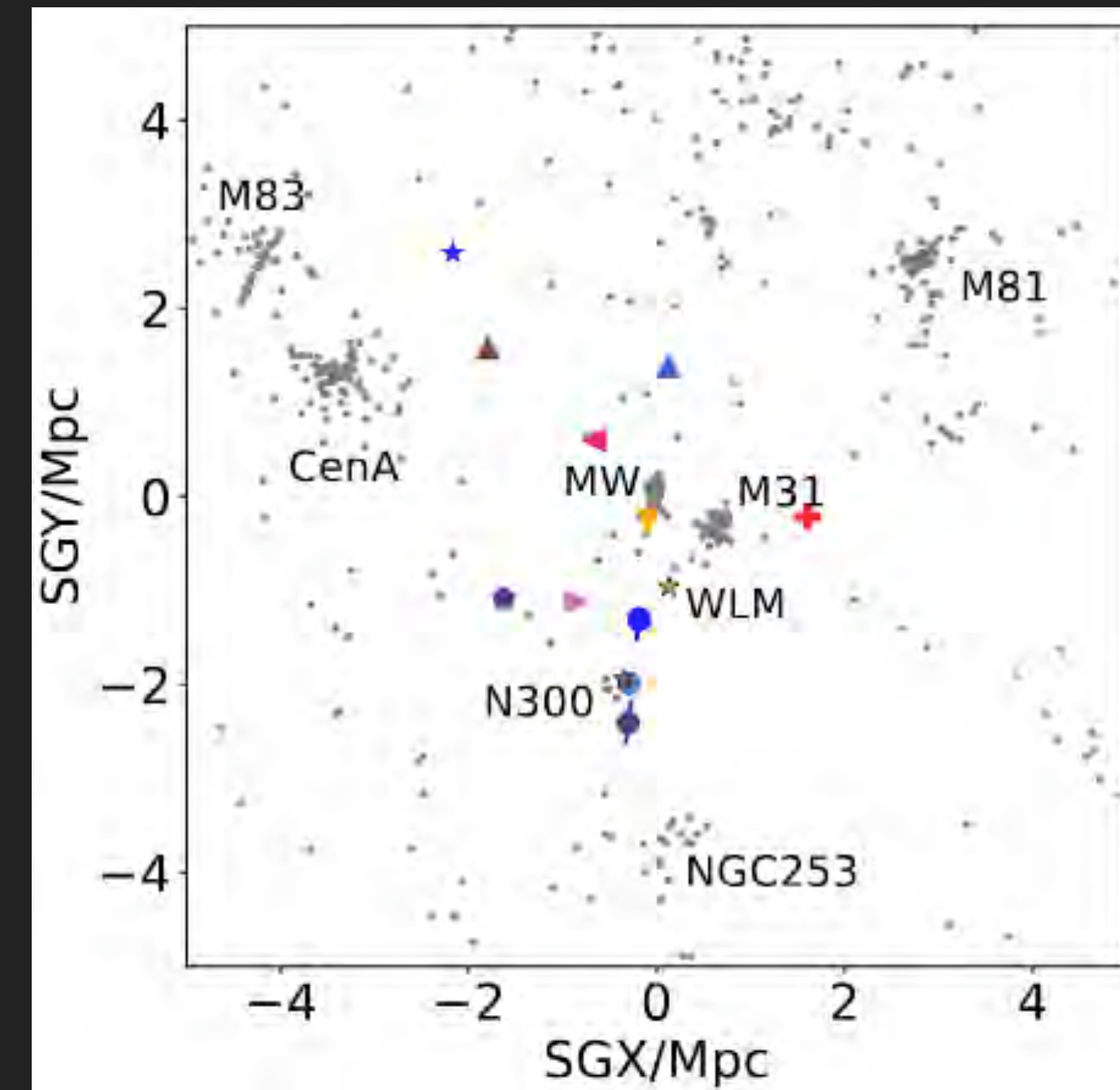
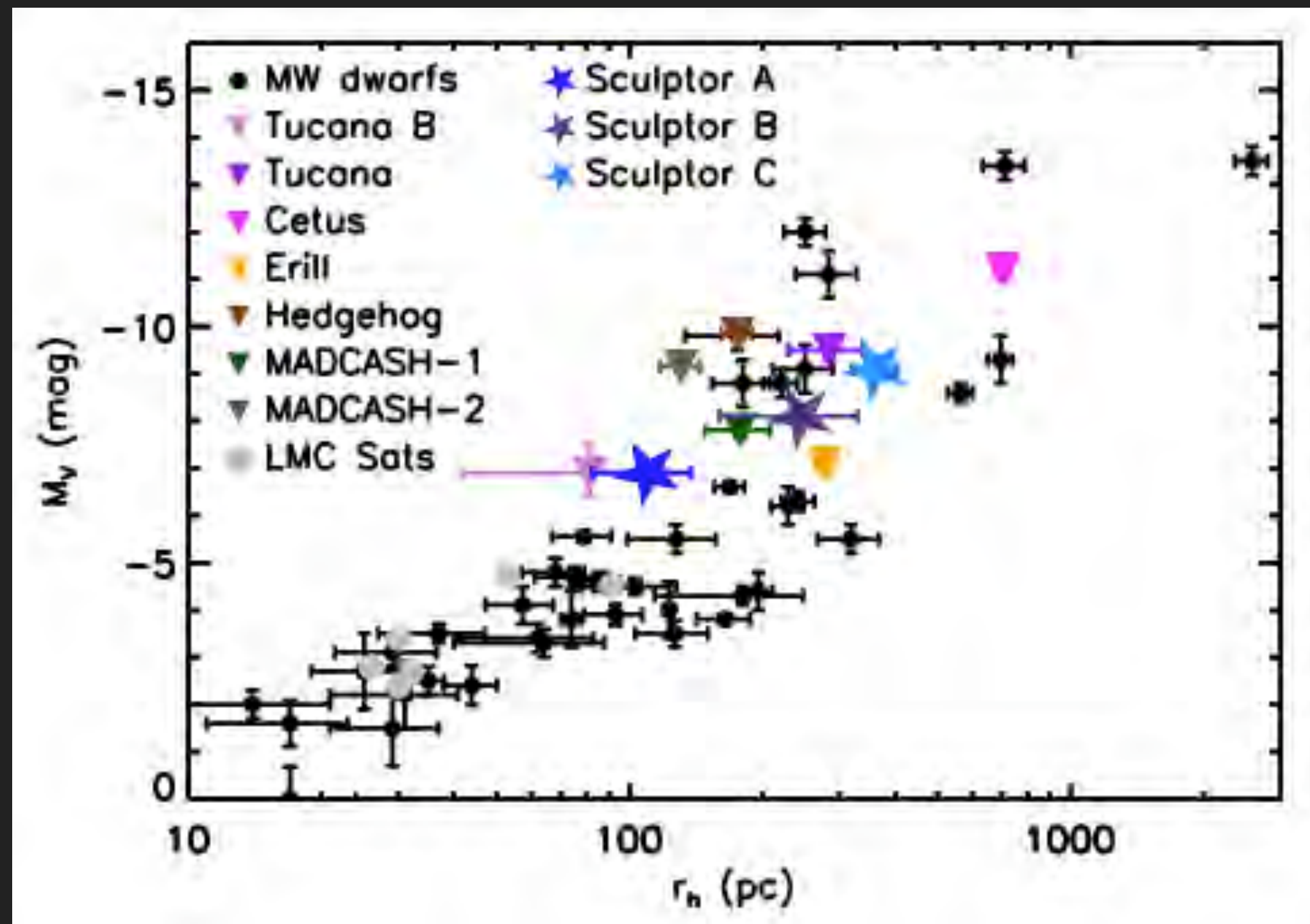


- ▶ All three have stellar populations consistent with a single old, metal poor stellar population (10 Gyr; 10 billion years; $[Fe/H]=-2$, or 1/100th solar)
- ▶ Hubble Space Telescope imaging is in hand for two out of three (third is coming). JWST imaging is needed!
- ▶ No UV emission (so no recent star formation)
- ▶ No HI gas is detectable, although further limits would be useful.

$$\log(\text{SFR}/M_{\odot} \text{ yr}^{-1}) < -6.0 \text{ (based on the FUV band)}$$

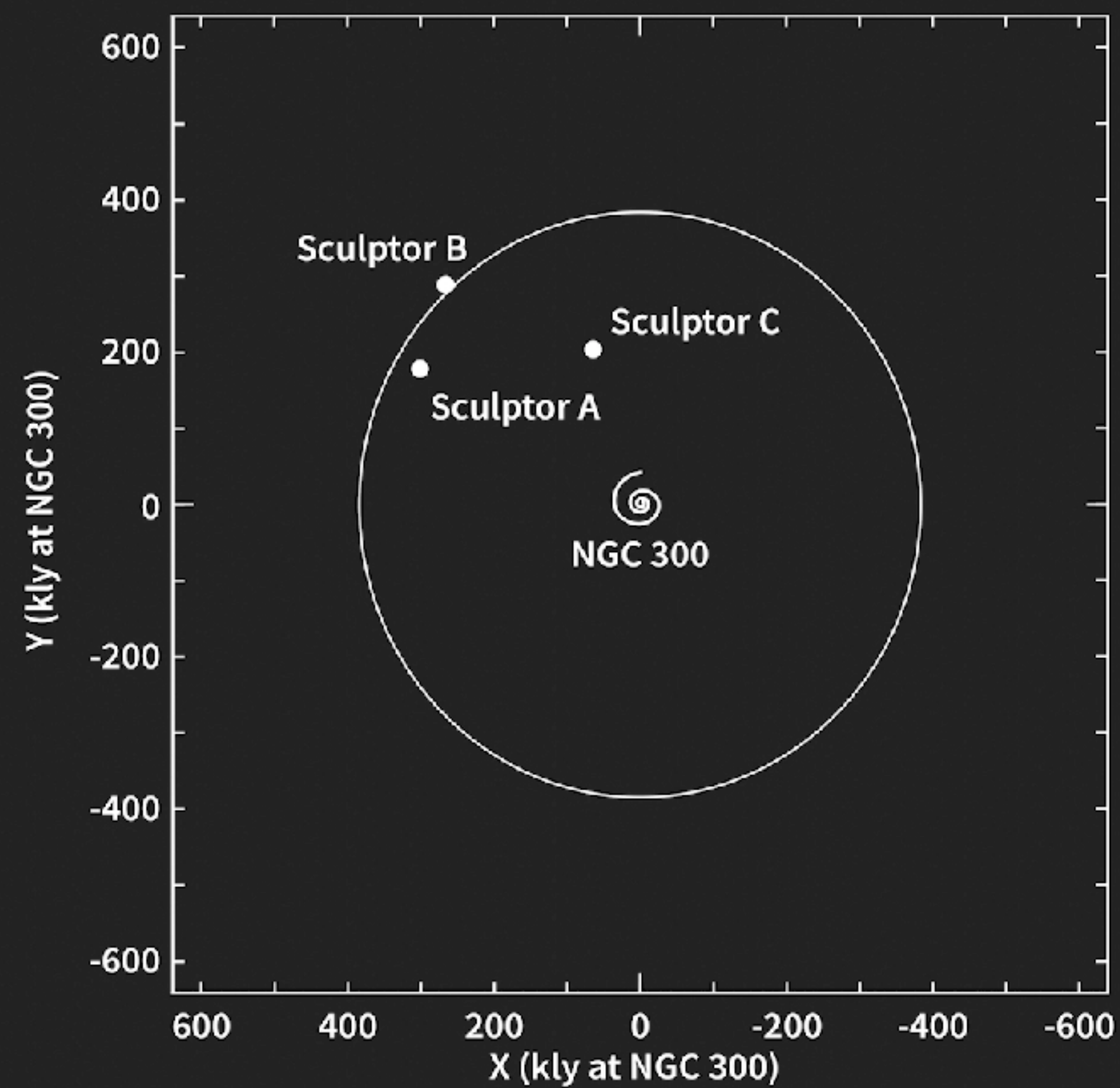
$$\log(M_{\text{HI}}/M_{\odot}) < 5.6$$

ULTRA-FAINT AND FAINT DWARFS IN THE DIRECTION OF NGC300

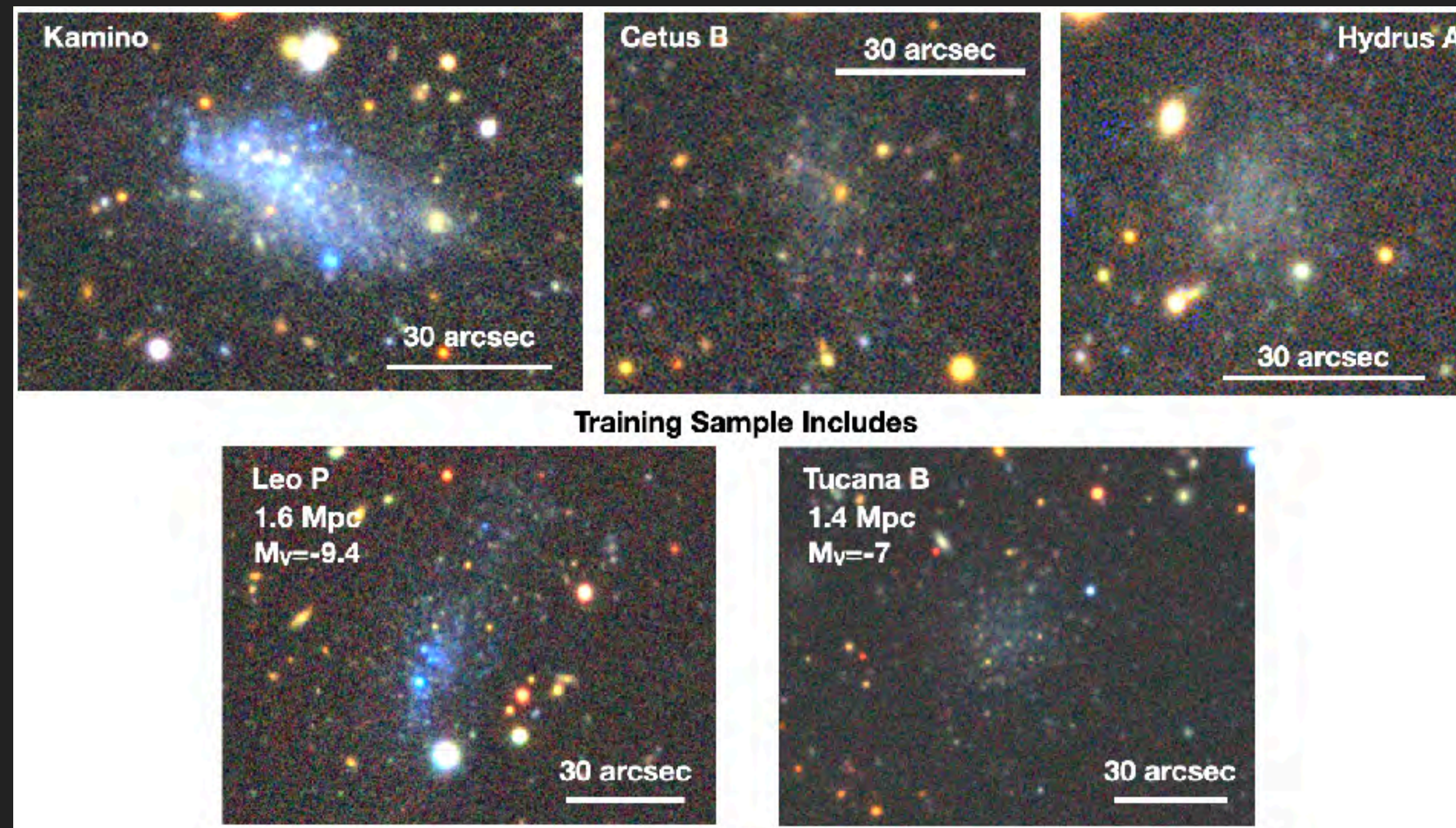


- ▶ Sculptor A is very nearby! 1.3 Mpc or ~ 3 Mlyr. At the edge of the Local Group.
- ▶ Sculptor B is likely associated with NGC300, while Sculptor C needs more investigation.
- ▶ Similar to other LMC-like satellites, but still brighter than the LMC's.

ULTRA-FAINT AND FAINT DWARFS IN THE DIRECTION OF NGC300



NEXT STEP: USING A CONVOLUTIONAL NEURAL NET OVER FULL-SKY



- ▶ Discover faint dwarfs in the 'field' and other new environments
- ▶ Identify potential reionization fossils and deep, space-based follow-up.
- ▶ See Jones+23,24

JWST OBSERVATIONS DOWN TO THE MAIN SEQUENCE TURNOFF WILL PROBE REIONIZATION

- ▶ Deep JWST imaging can discern if there was extended star formation or an abrupt end at reionization for dwarfs in the 'field'.

