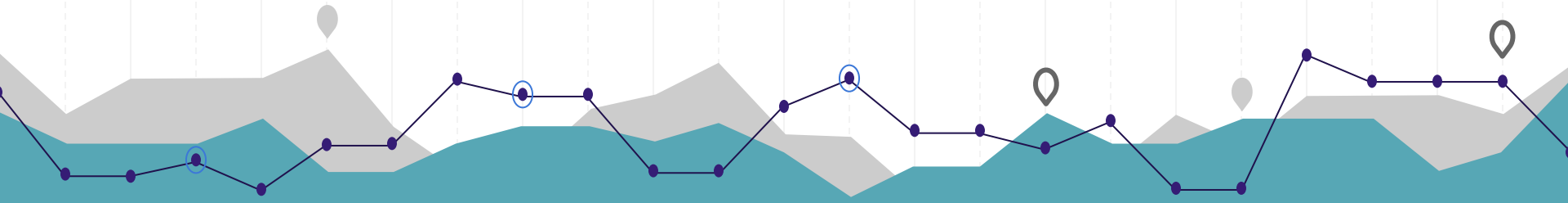
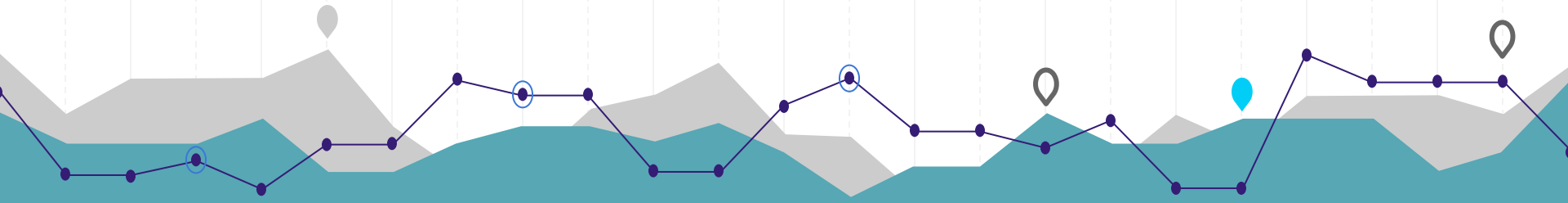
Kristy Sakano
ASTR 503
November 9th, 2016
arXiv: 1610.05301



Nearest Neighbor: The Low Mass Milky Way Satellite Tucana III



Simon, et. al. (2016)

"Present(ing) Magellan/IMACS spectroscopy of the recently discovered Milky Way satellite Tucana III."

In Tuc III, 26 member stars have been identified, from which a mean radial velocity, velocity dispersion, and a mean metallicity have been found.

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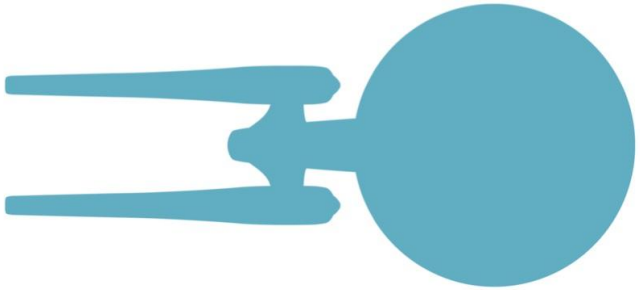
What sort of galaxy/group/cluster is Tucana III?



Theories of Tucana III

Dwarf Galaxy

Globular Cluster

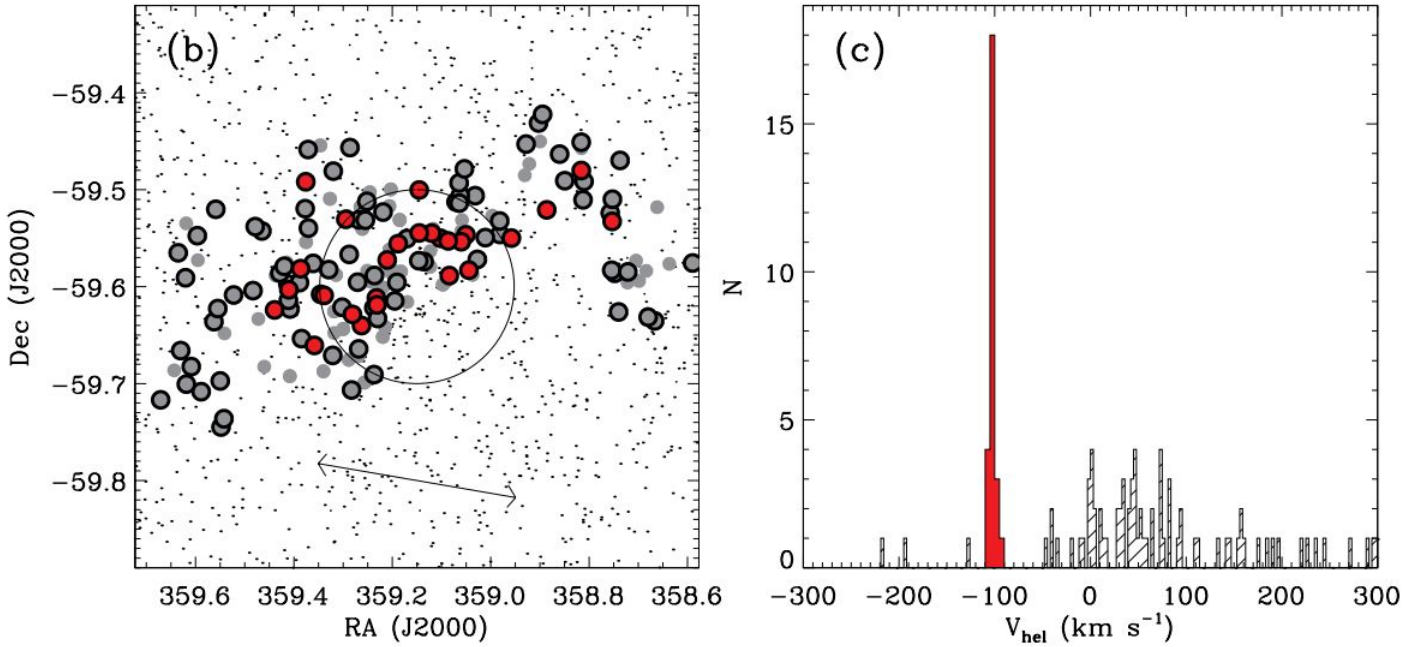
Method of Measurement & Target Selection

Prioritization of Stars:

1. Stars that met the RGB selection
2. Stars within 0.02 mag in *g-r* of either boundary.
3. Subgiants & MS stars with membership probabilities higher than 0.5
4. Subgiants & MS stars with membership probabilities between 0.1 and 0.5 and red HB candidates.
5. Unlikely stars

Magellan Baade Telescope

Spatial and Radial Velocity Distribution of Observed Stars



Small black dots are stars within 18' of the center of Tucana III. Filled grey dots are stars selected for spectroscopy. Black outlined dots represent stars for which successful velocity measurements were obtained. Red dots are identified members of Tucana II.

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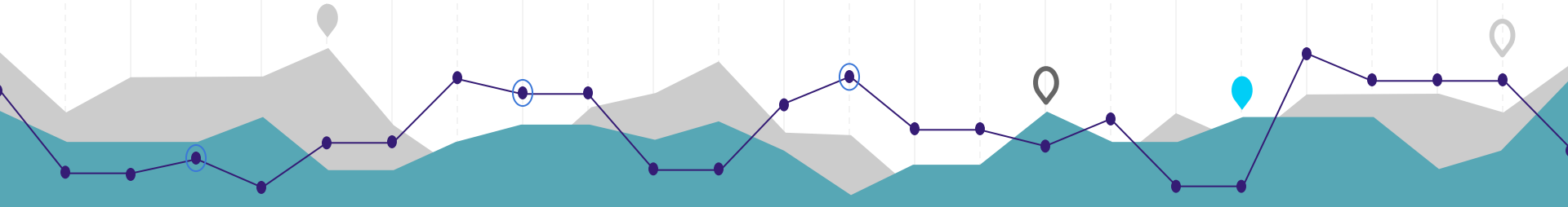
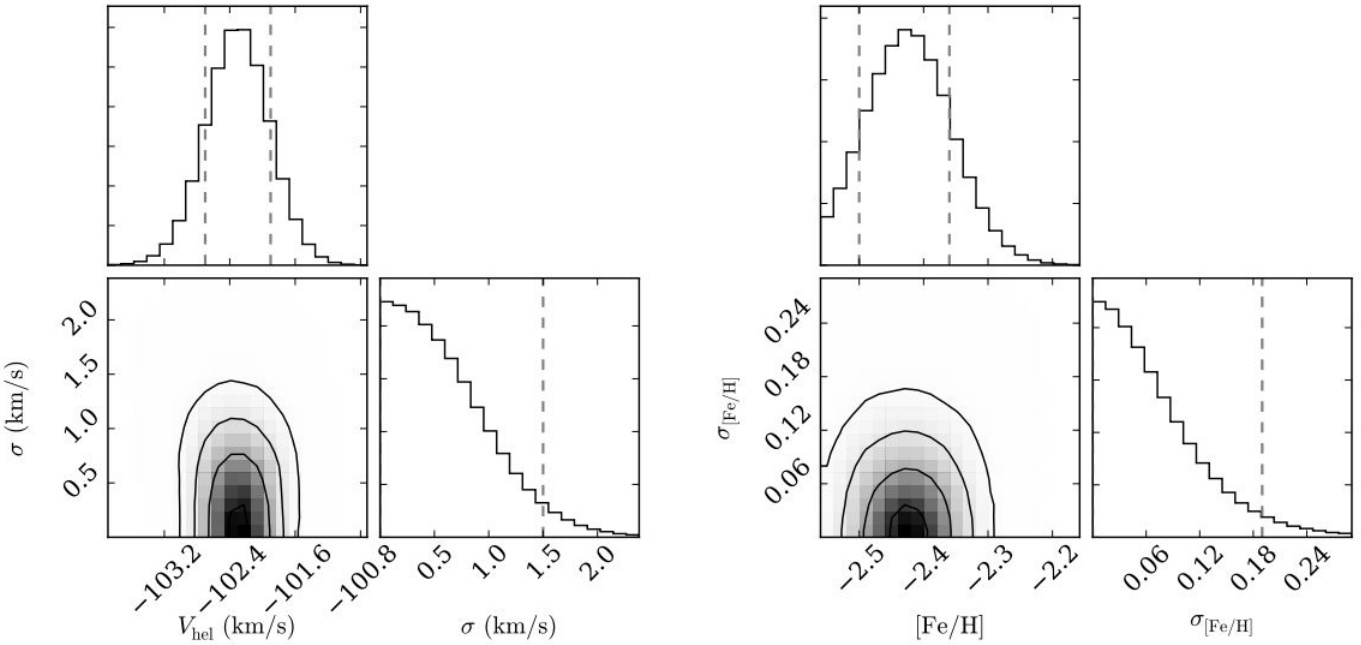
“[...] Statistical uncertainties on each velocity measurement were calculated by performing Monte Carlo simulations in which normally distributed random noise is added to the observed spectrum and the template fitting is repeated.”



Velocity Dispersion and Mass Calculations



Posterior probability distribution from a maximum likelihood fit for the systemic velocity, velocity dispersion, and metallicity dispersion.

Upper Limits	90%	94.4%	99.7%
Jacobi Radius	142 pc	162 pc	219 pc

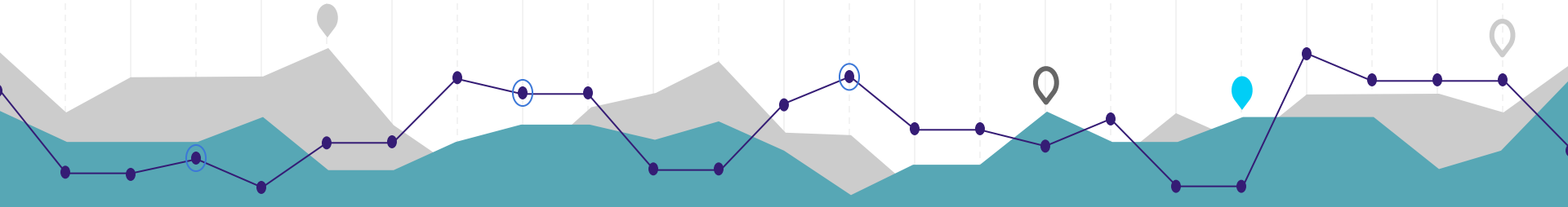
The Tidal Stripping Dilemma

The tidal tails around Tucana III have a similar luminosity to the bound core, suggesting that at least ~50% of the initial stars have been stripped.

If Tucana III has suffered more significant stripping, its unusually low velocity dispersion makes it consistent with a classical dwarf spheroid.

However, its metallicity is lower than expected for such a large dwarf.

The larger velocity dispersions of most other ultra-faint dwarfs are not consistent with the tidal evolution of more luminous systems.



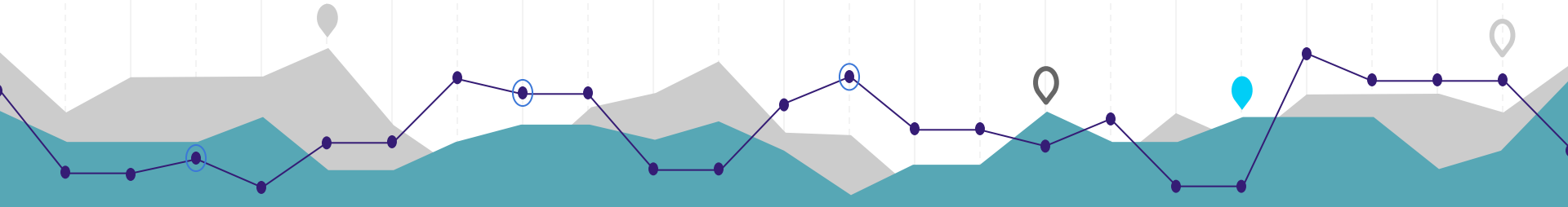
Classifying of Tucana III

~~**Globular Cluster:**~~ too low mean metallicity, too large radius.

Ultra-Faint Dwarf Galaxy?

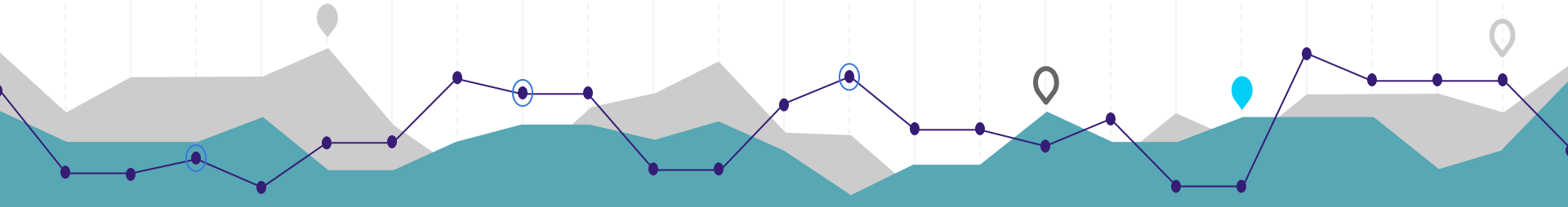
Remnant of a more luminous system?

~70% of Tucana III's stars have been stripped



“

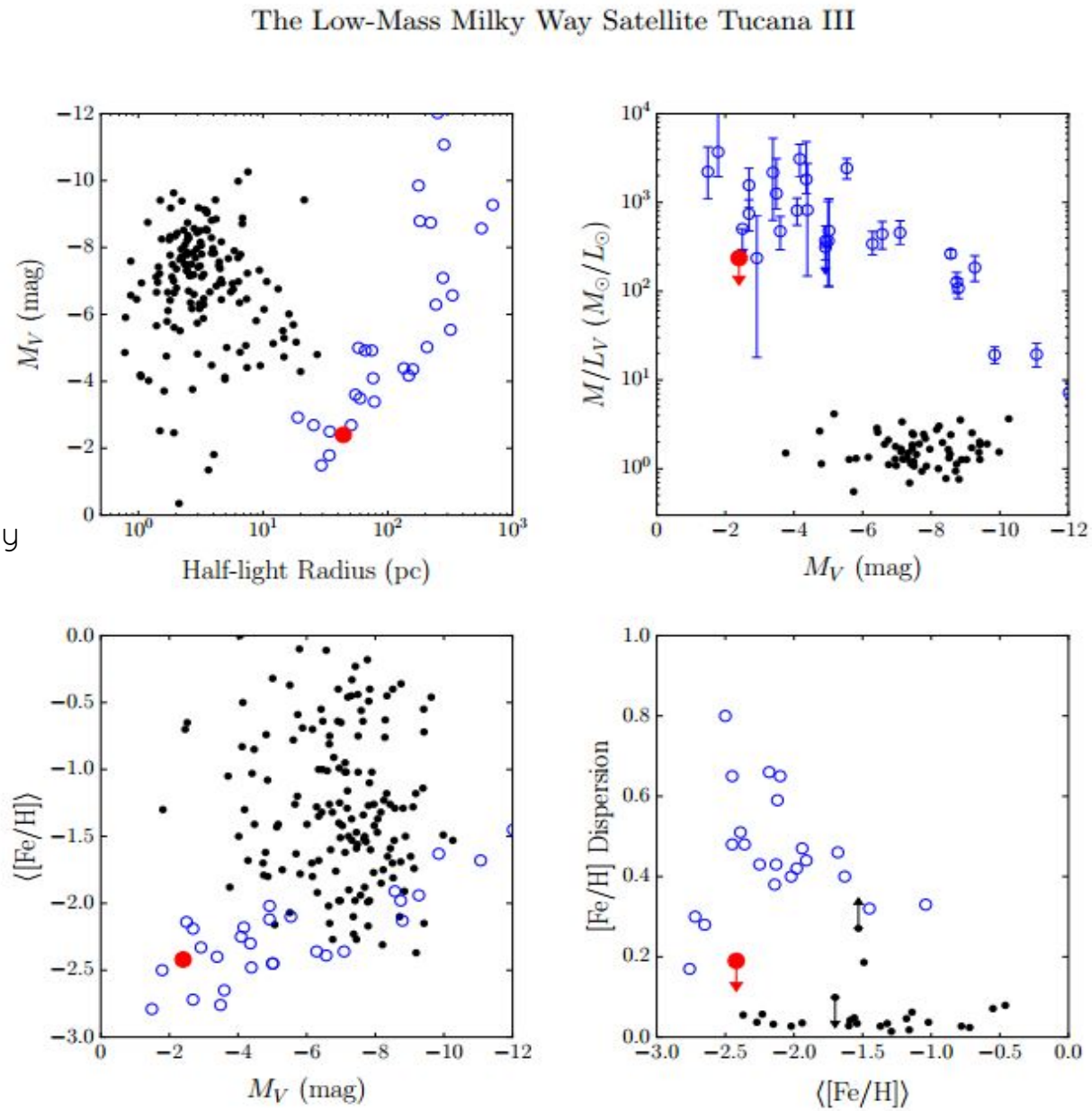
“This classification can be confirmed by much more accurate (~ 0.1 km s−1) radial velocity measurements or by additional and/or more accurate metallicities demonstrating the existence of a spread of iron abundances.



Black dots are globular clusters.

Blue circles are spectroscopically-confirmed Milky Way satellite galaxies.

Red Dot is Tucana III.



Citations and References

arXiv: 1610.05301

ESO: Spectroscopic Standards

Presentation Template by SlidesCarnival

Dwarf Galaxy

Globular Cluster

Magellan Baade

Enterprise