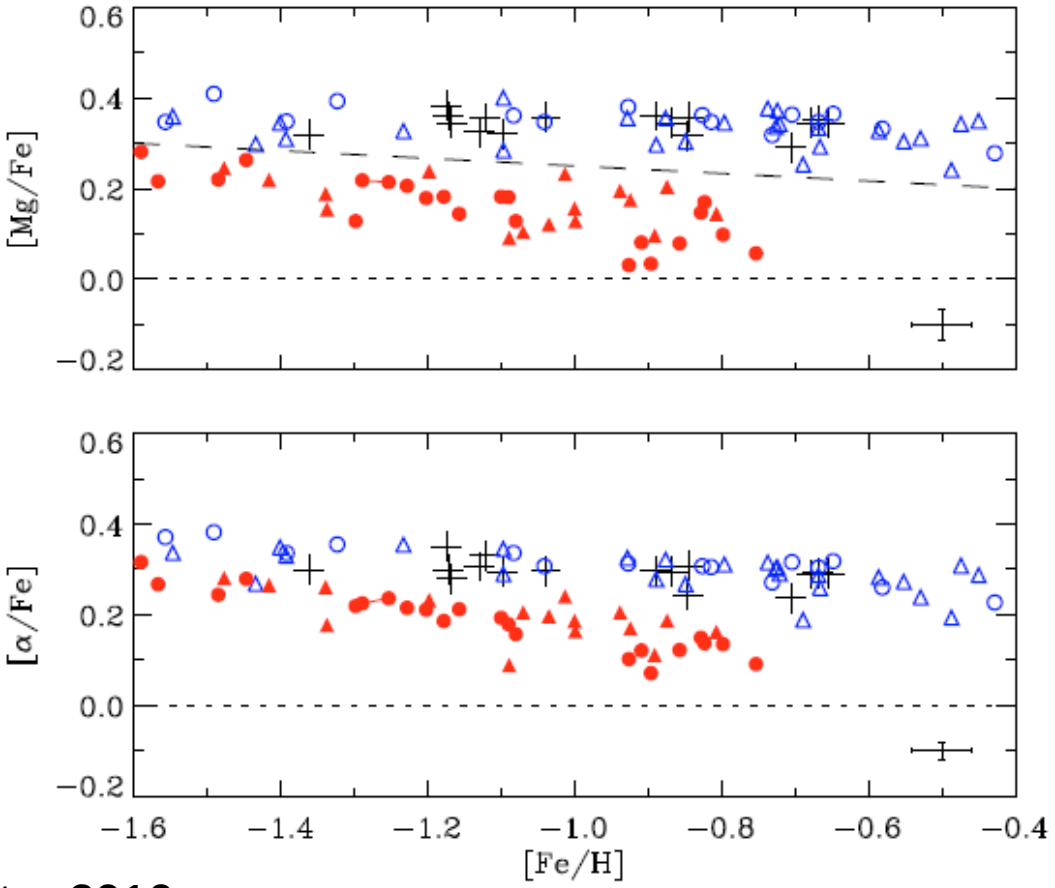
Heavy elements to identify accreted structures in the Milky-Way

Emma Fernández-Alvar & Alejandra Recio-Blanco

Stars without borders: A Galaxy in crisis
Ljubljana, Slovenia (13-16 June)

[α/Fe] to identify accreted stars

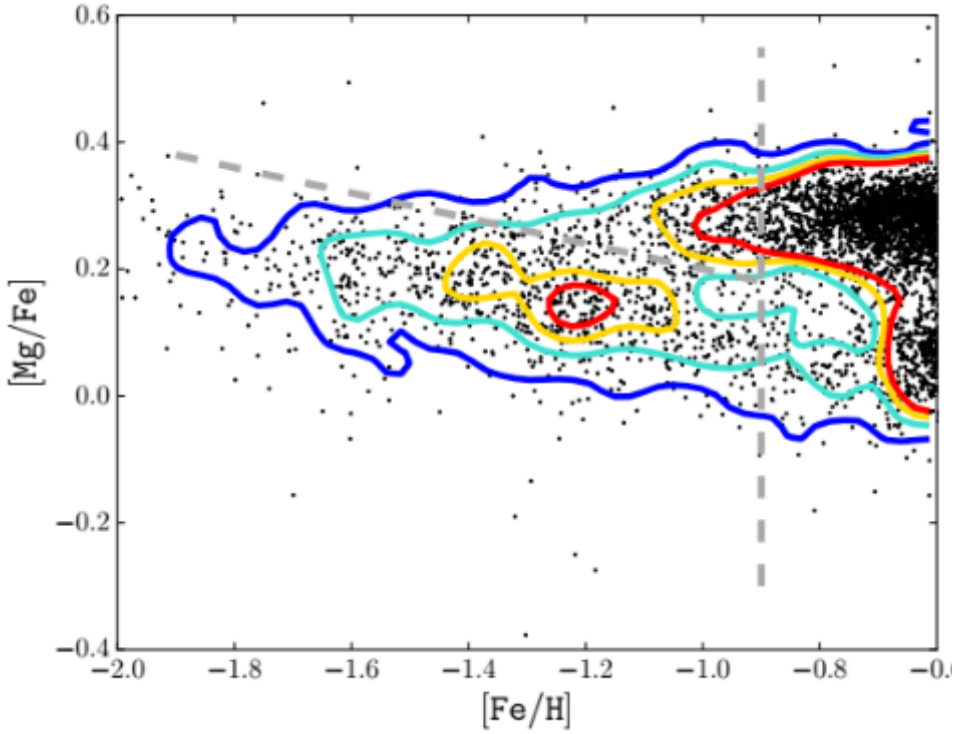
- Fails at [Fe/H] < -1.5

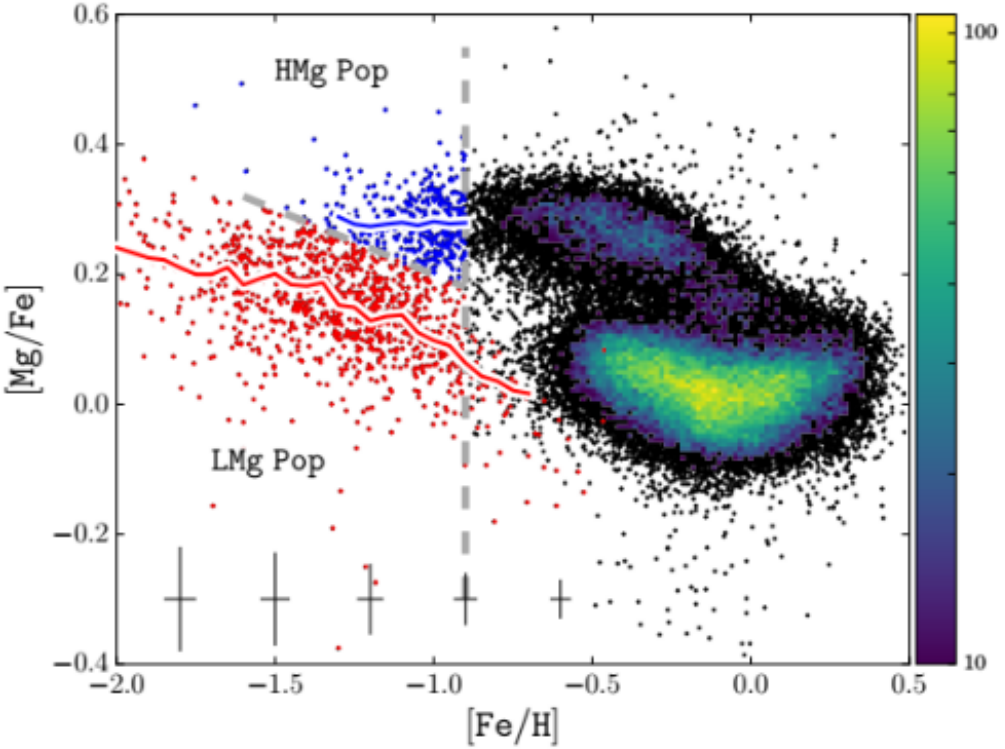


Nissen & Schuster 2010

[α/Fe] to identify accreted stars

- Fails at [Fe/H] < -1.5



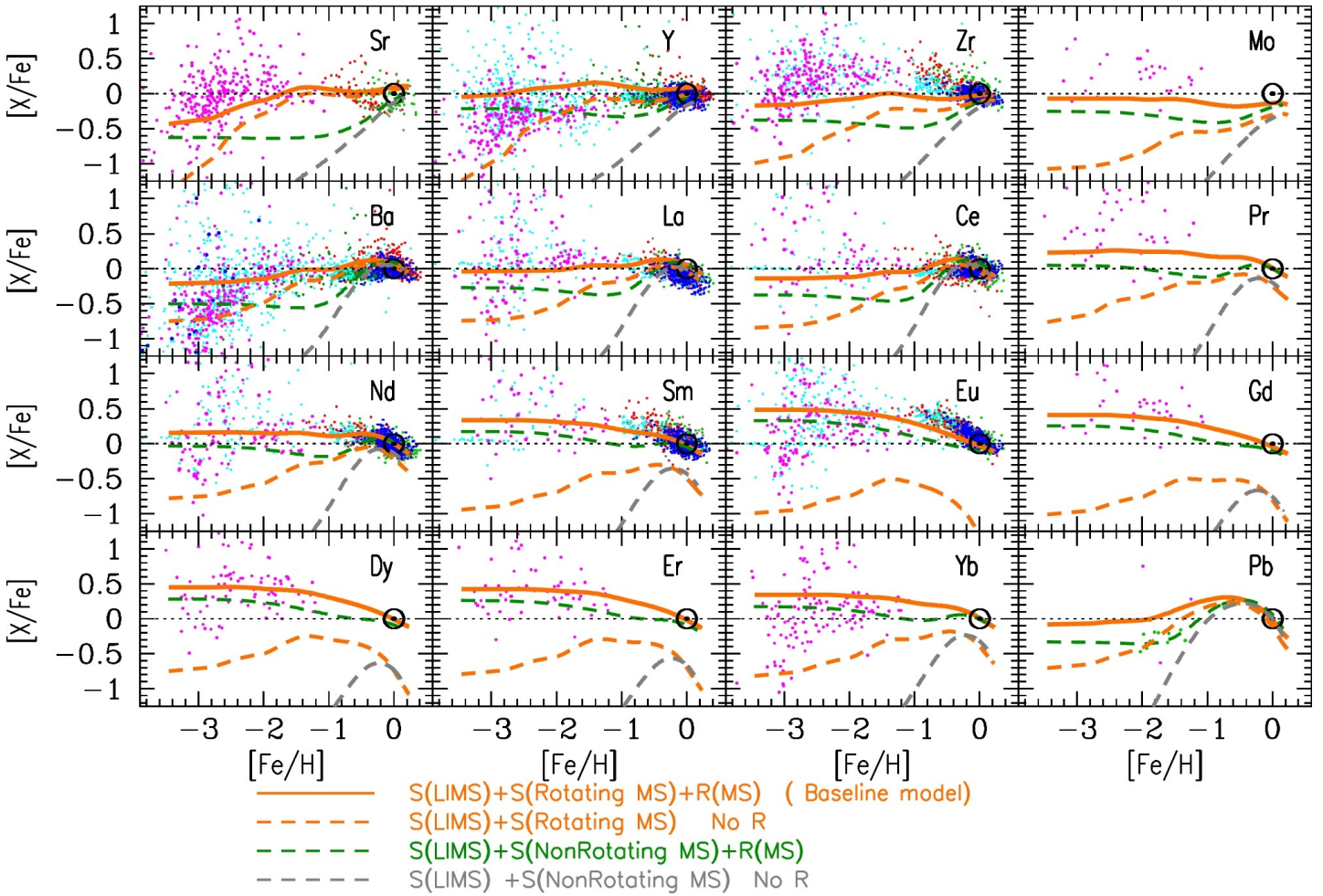


Hayes+2018a

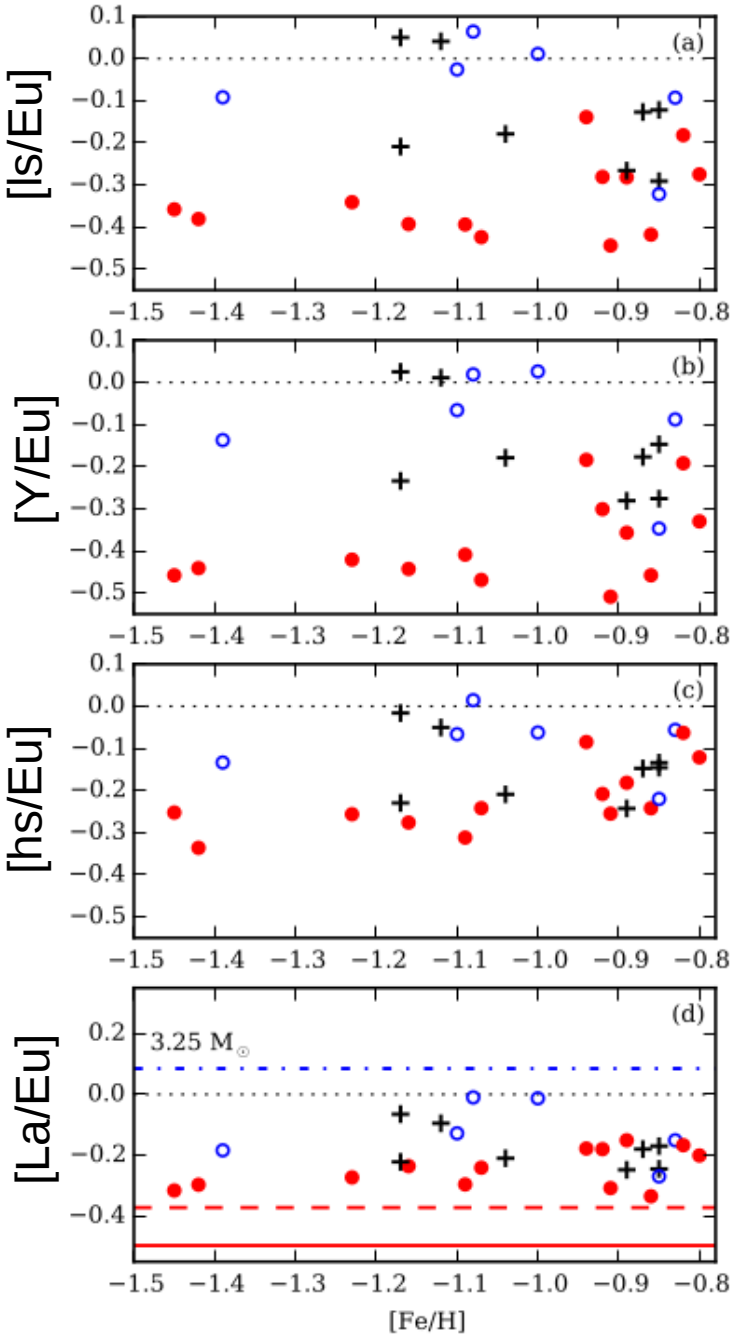
s-/r-process elements: help?

Large dispersion in the Milky Way

Prantzos+2018

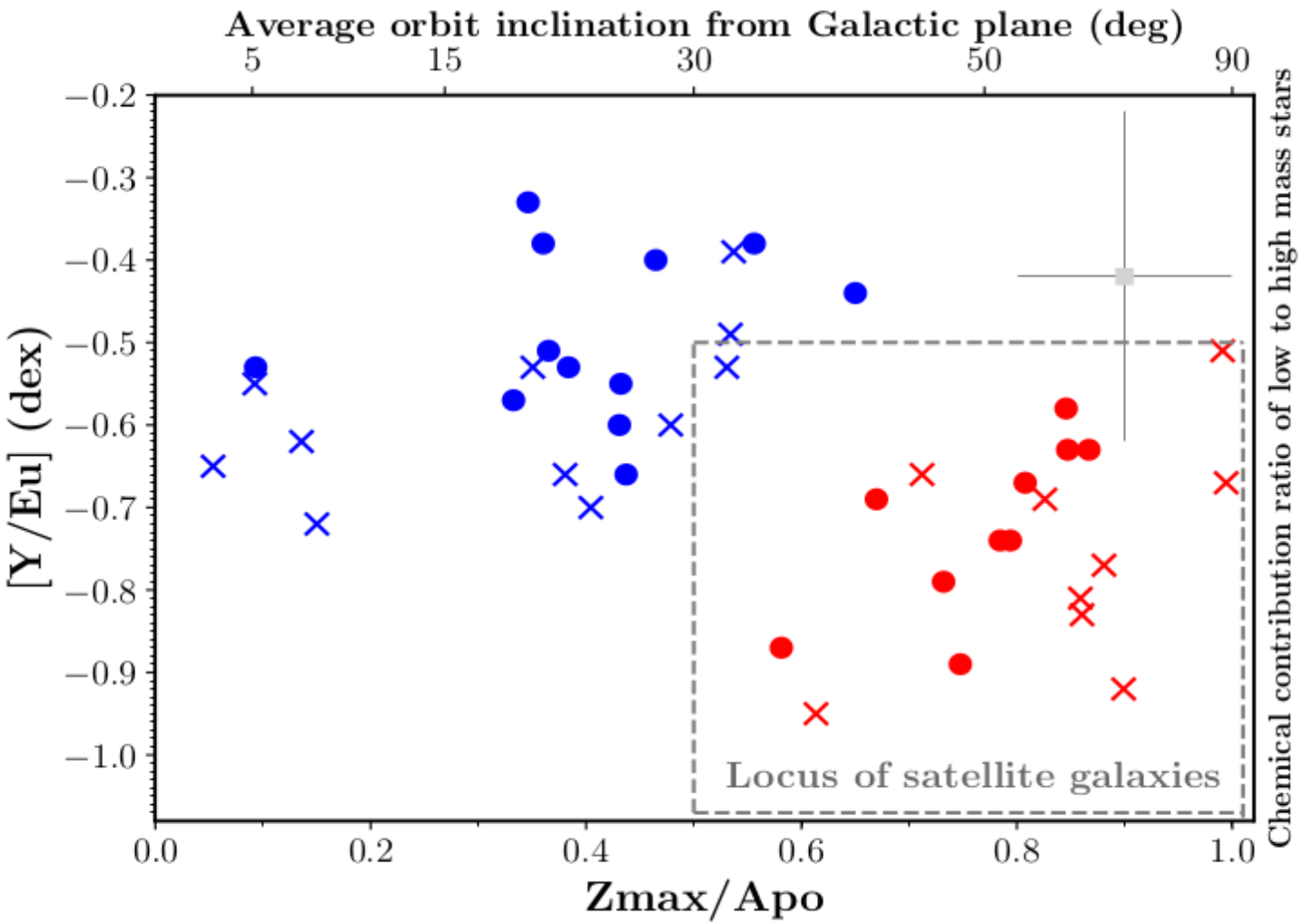


s-/r-process elements: help?



Fishlock+2017
(Nissen&Schuster stars)

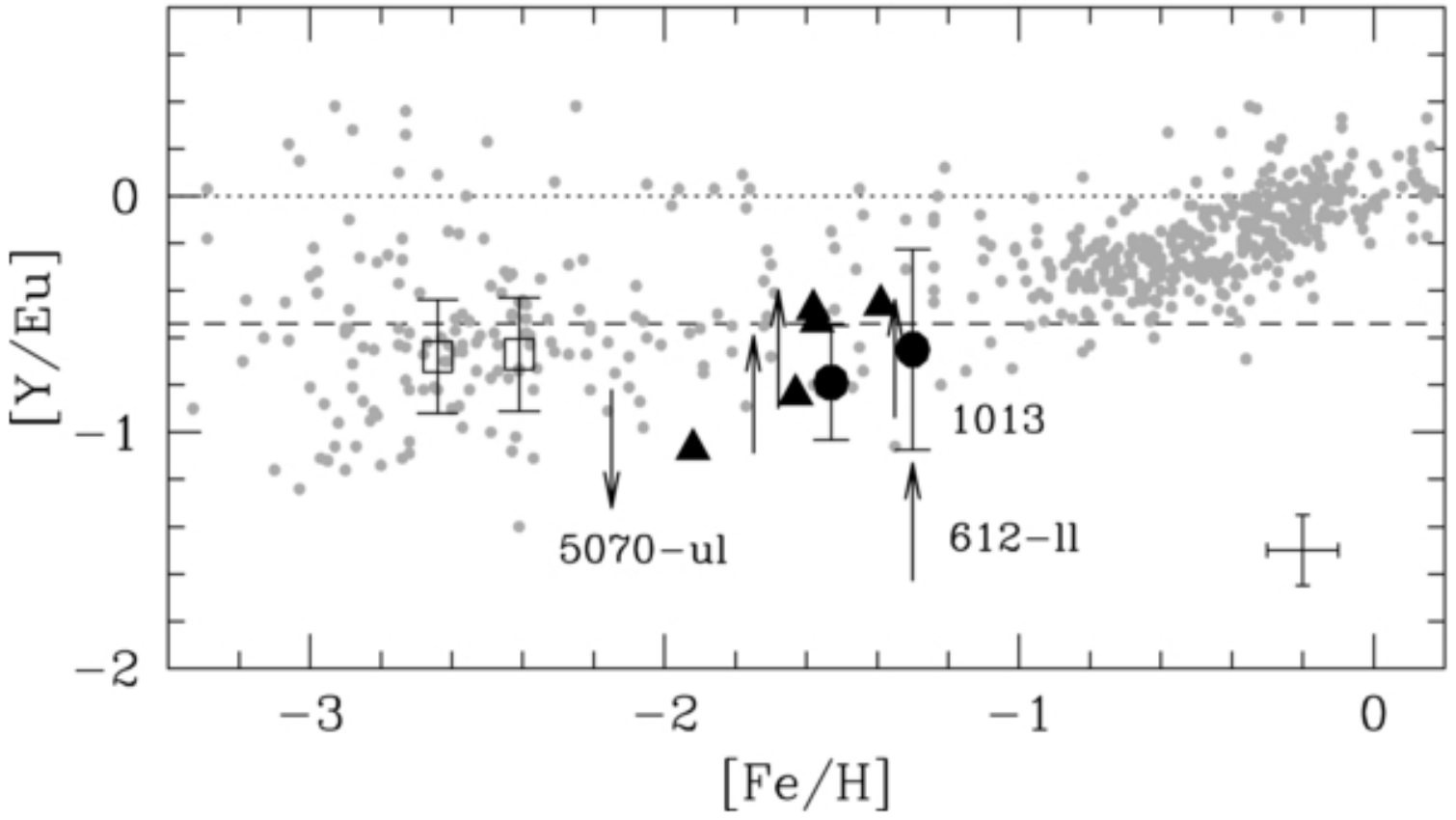
s-/r-process elements: help?



Recio-Blanco+2019 (submitted)

s-/r-process elements: help?

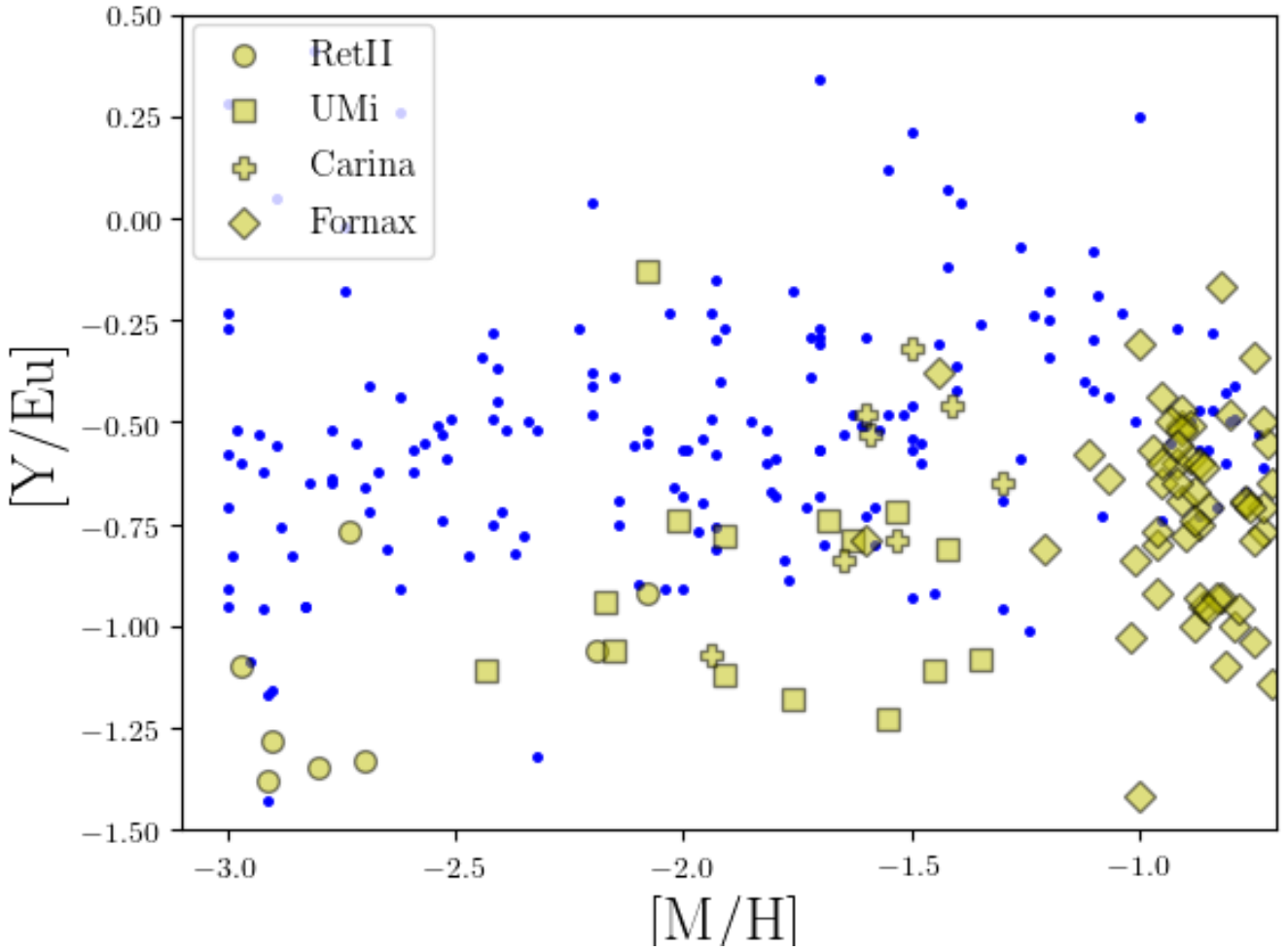
Venn+2012



But this is only one example...

Milky Way and Ultra-Faint/Dwarf Galaxies: [Y/Eu]

SAGA & JINA databases



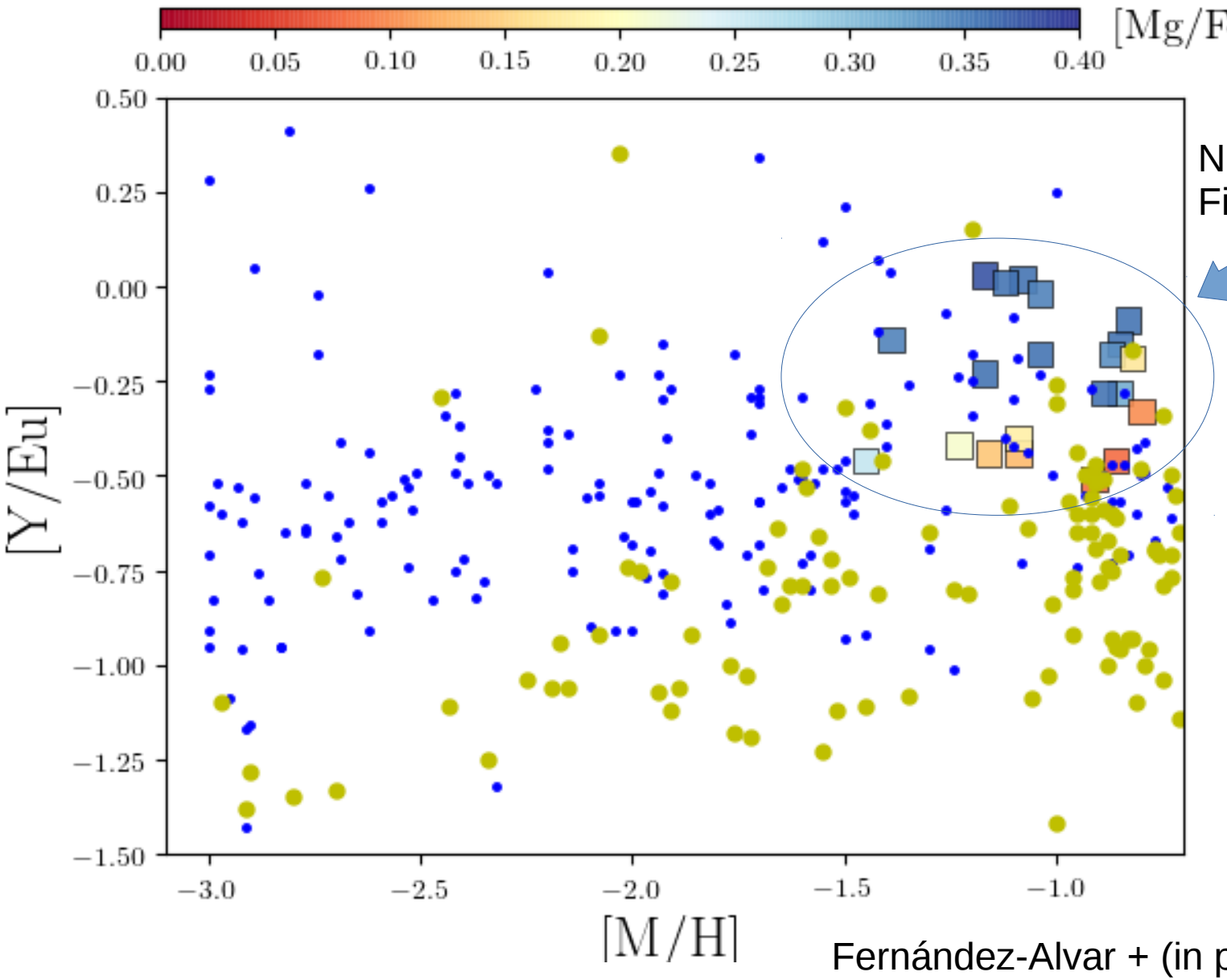
LOWER envelope of the Milky Way bulk of stars.

It could allow to distinguish in-situ and accreted stars!

Trend with metallicity

Fernández-Alvar + (in preparation)

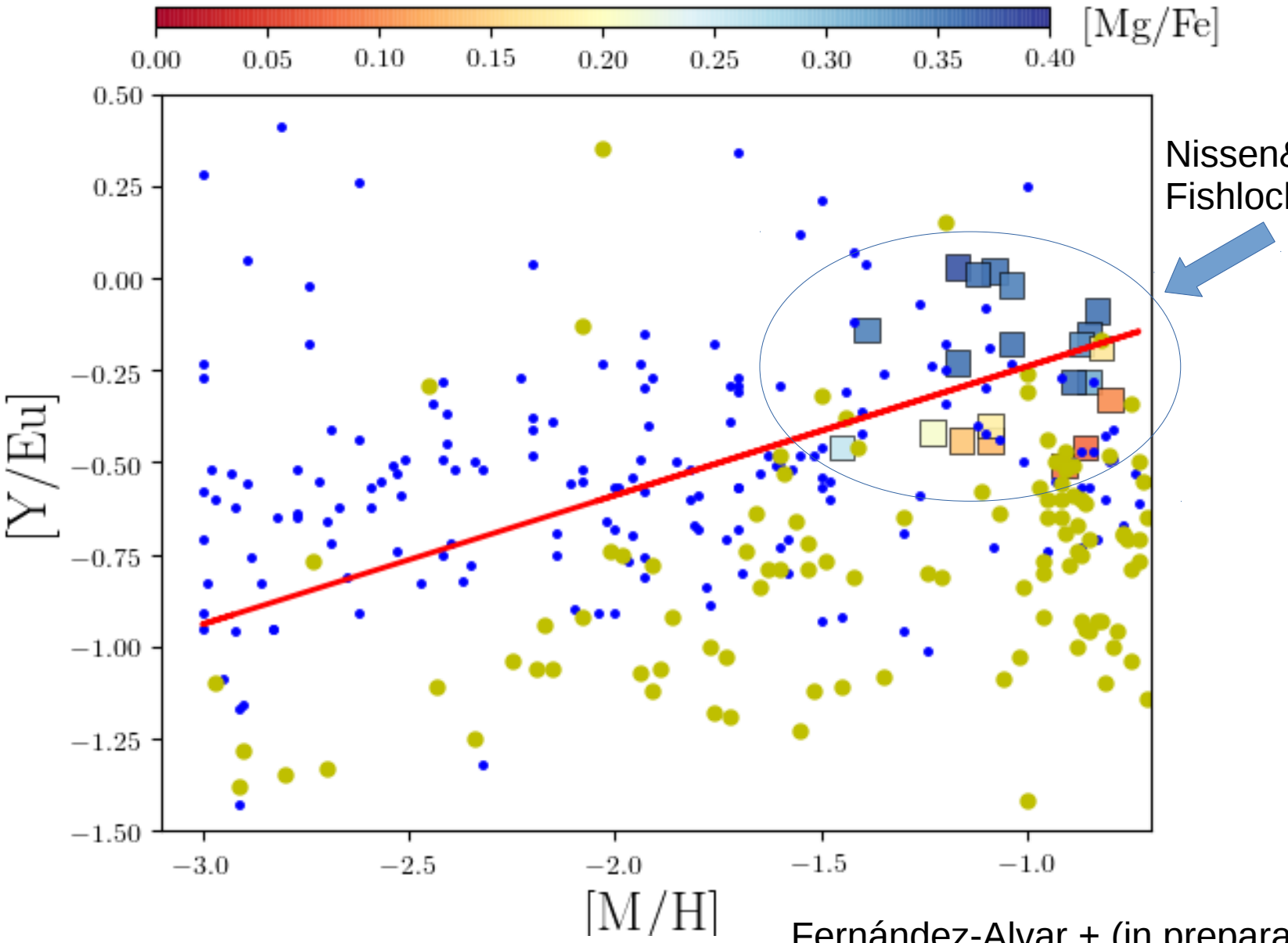
Milky Way and Ultra-Faint/Dwarf Galaxies: [Y/Eu]



Nissen&Schuster/ Fishlock

Fernández-Alvar + (in preparation)

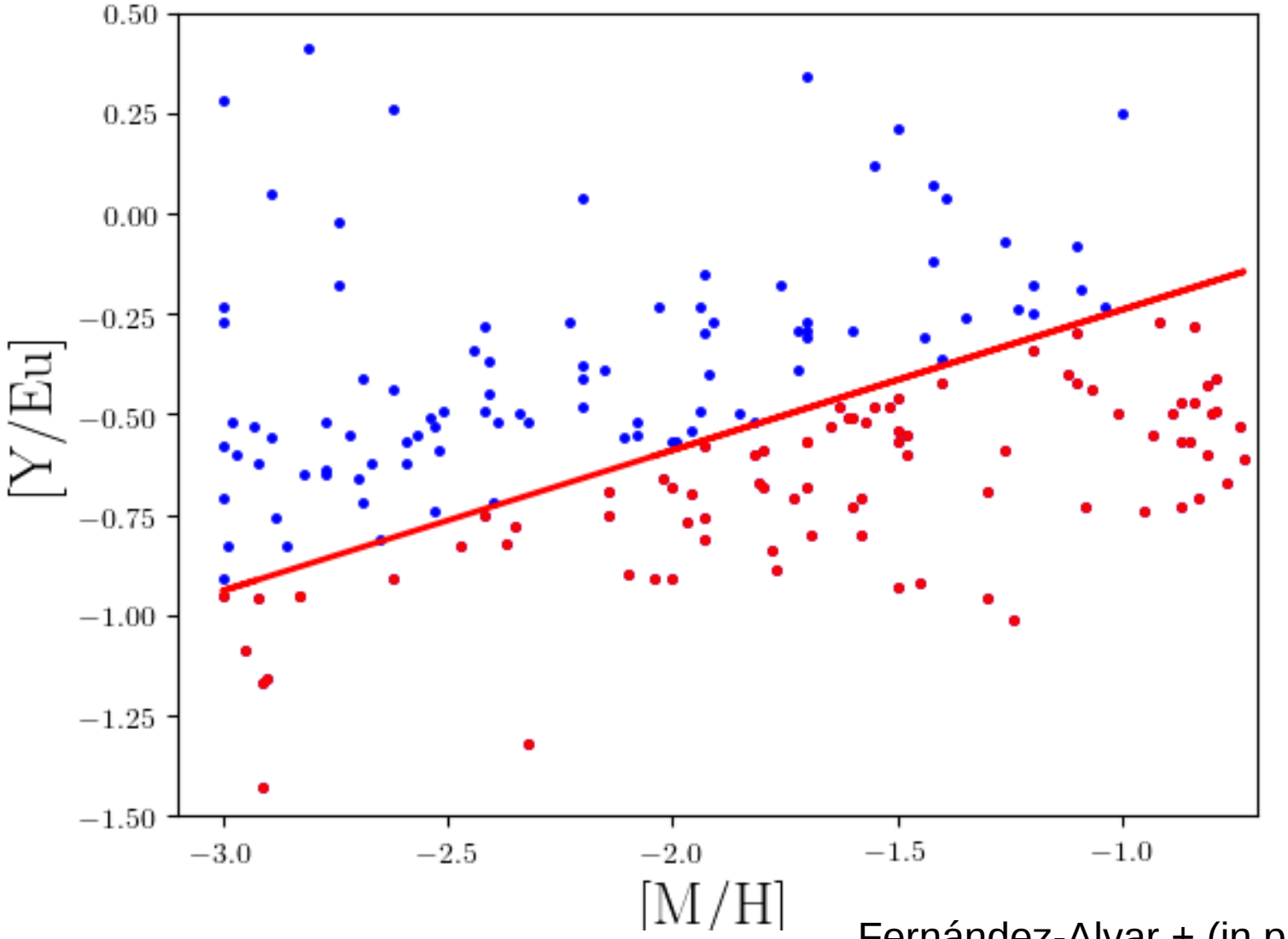
Milky Way and Ultra-Faint/Dwarf Galaxies: [Y/Eu]



Nissen&Schuster/ Fishlock

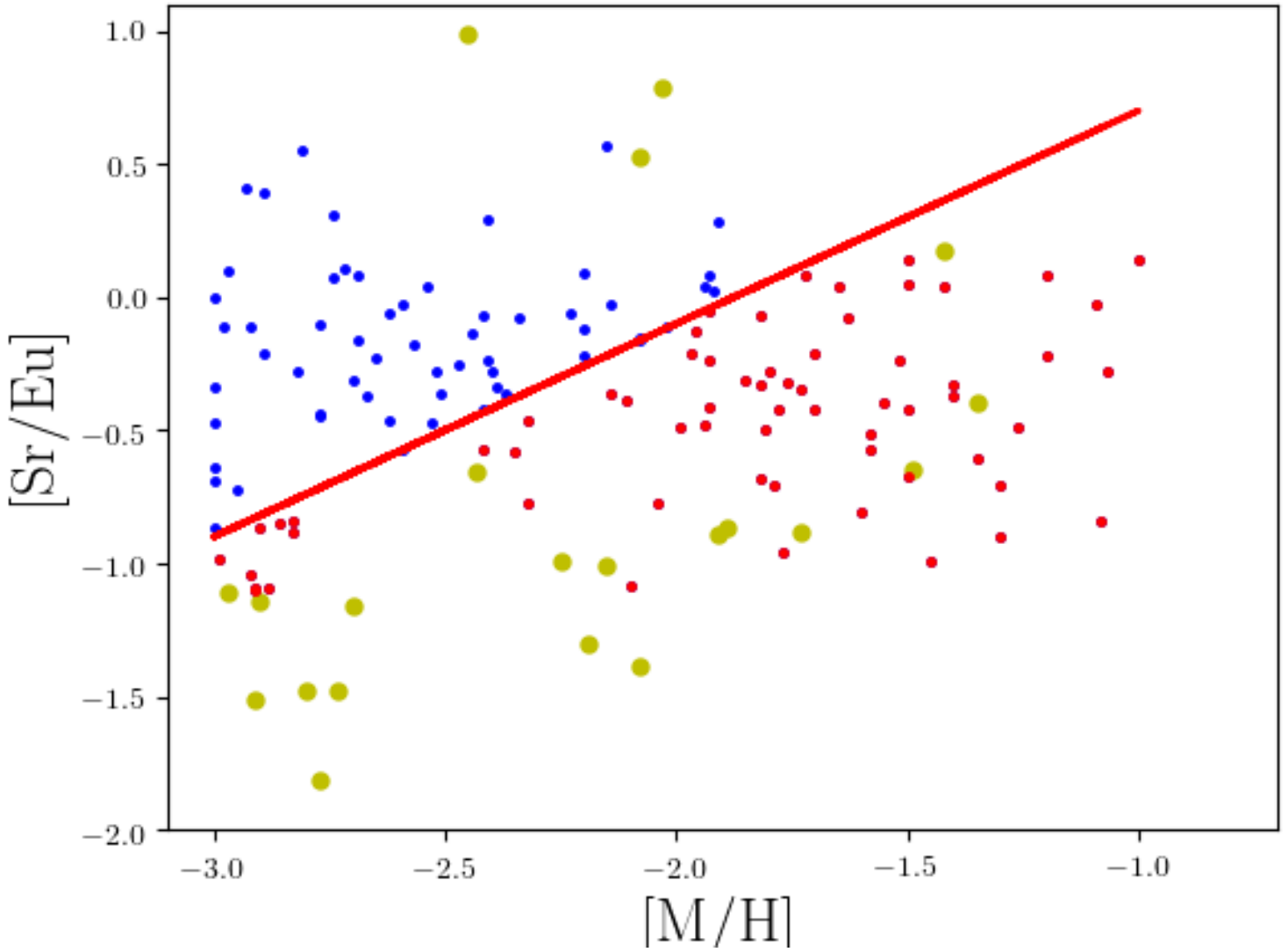
Fernández-Alvar + (in preparation)

Milky Way and Ultra-Faint/Dwarf Galaxies: [Y/Eu]



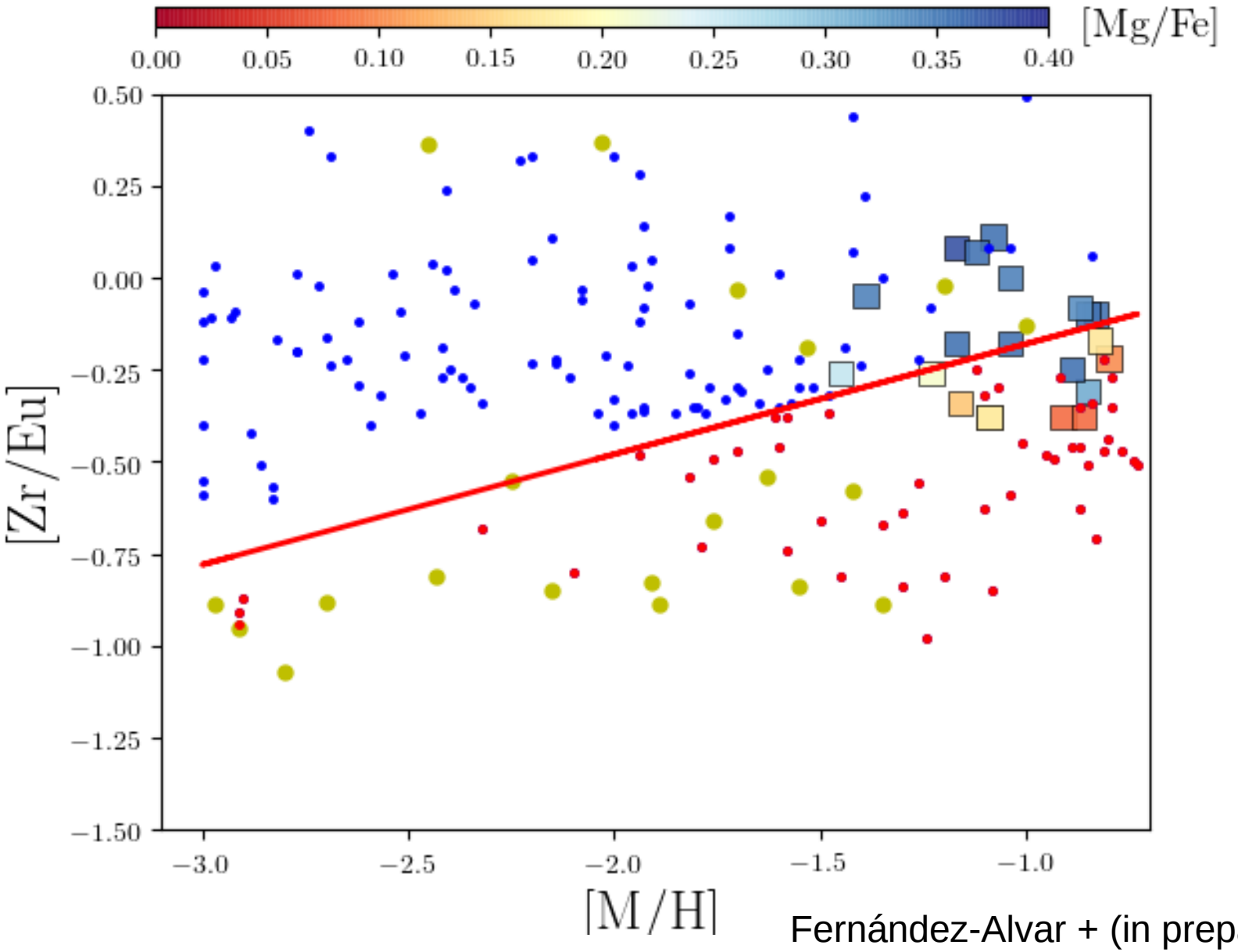
Fernández-Alvar + (in preparation)

Milky Way and Ultra-Faint/Dwarf Galaxies: [Sr/Eu]



Fernández-Alvar + (in preparation)

Milky Way and Ultra-Faint/Dwarf Galaxies: [Zr/Eu]

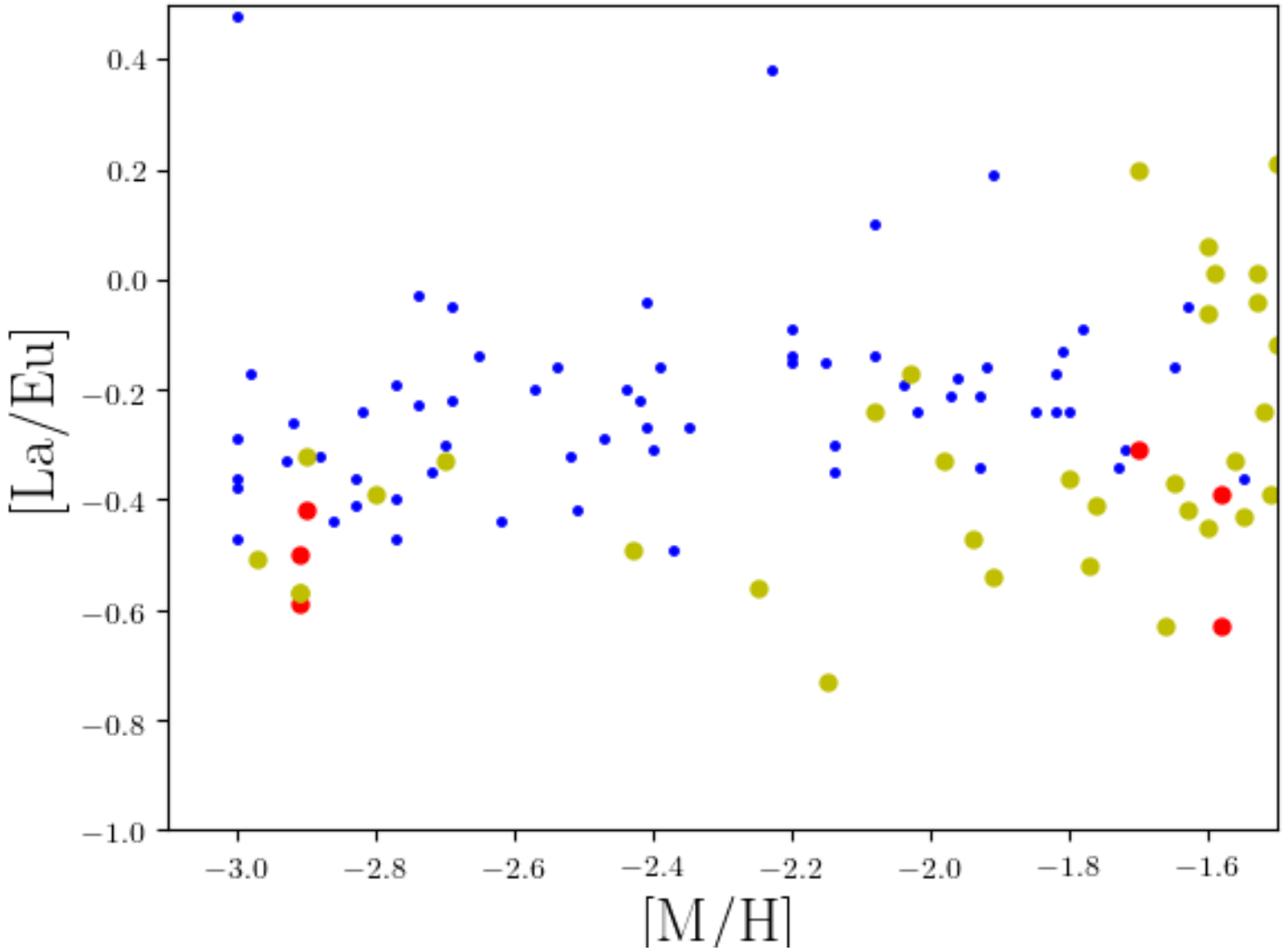


Fernández-Alvar + (in preparation)

Our sample of accreted stars candidates:

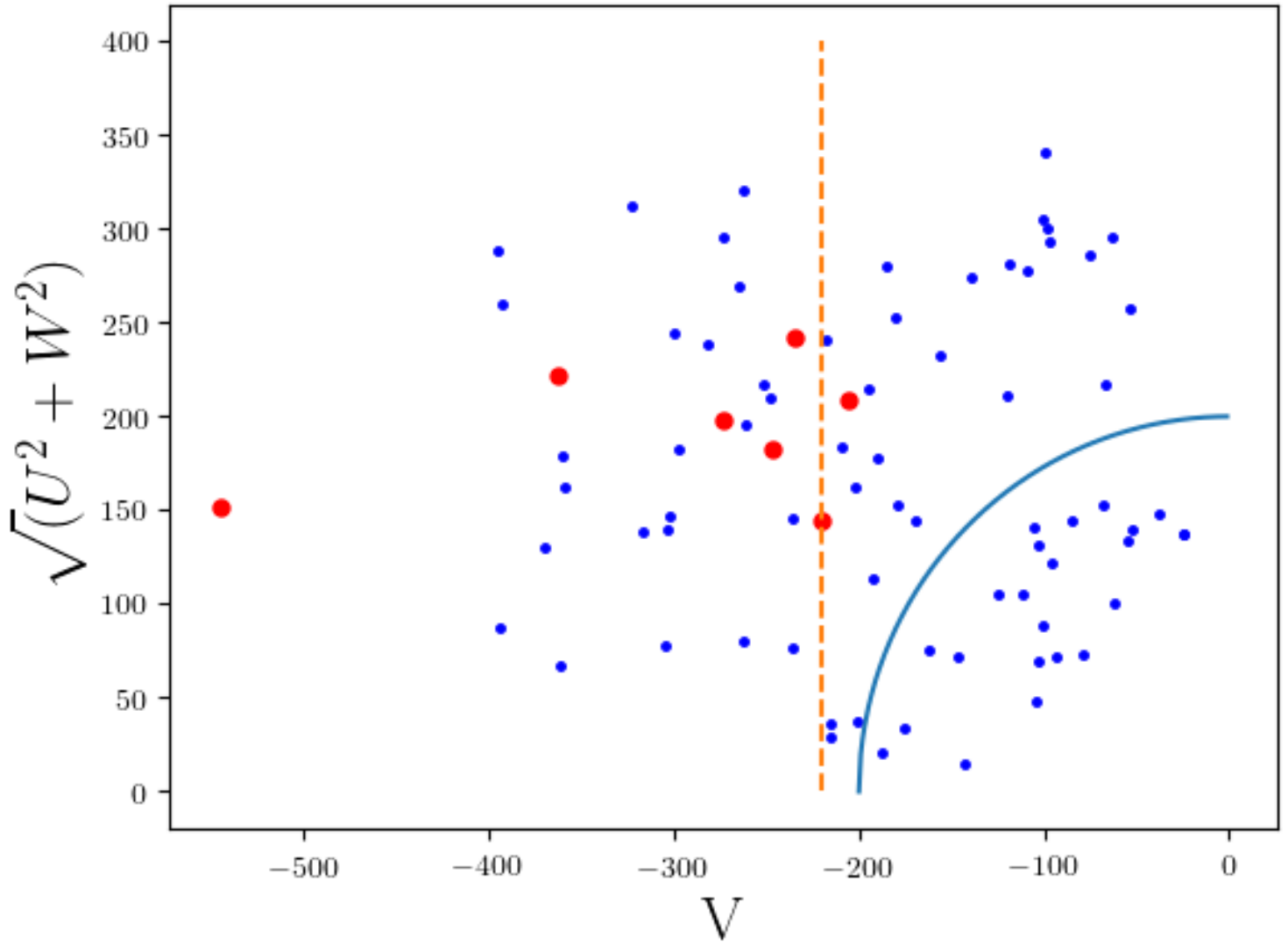
Stars selected in [Y/Eu], [Sr/Eu] and [Zr/Eu] simultaneously

Milky Way and Ultra-Faint/Dwarf Galaxies: [La/Eu] (high-s-process)



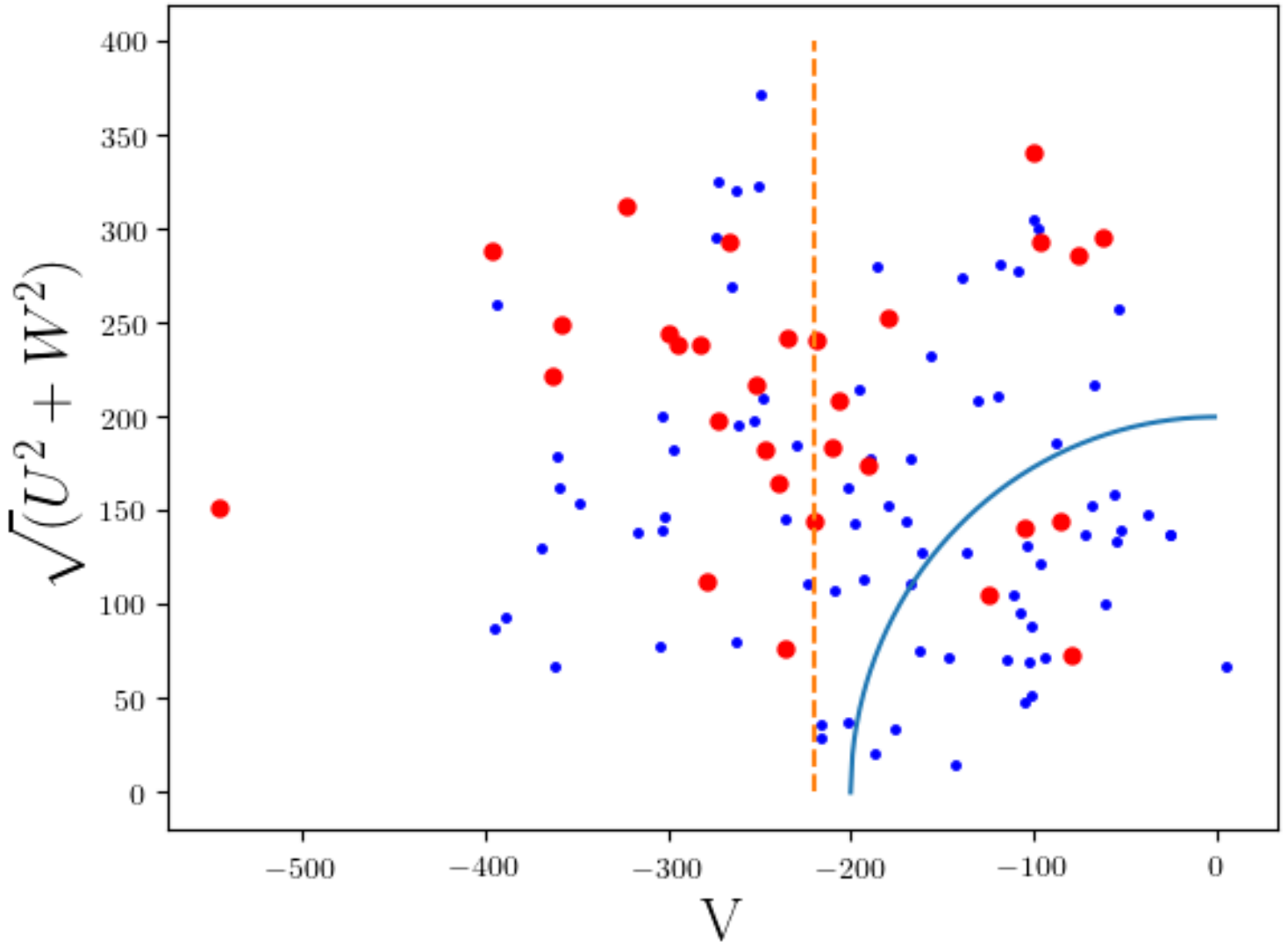
Fernández-Alvar + (in preparation)

Toomre diagram



Fernández-Alvar + (in preparation)

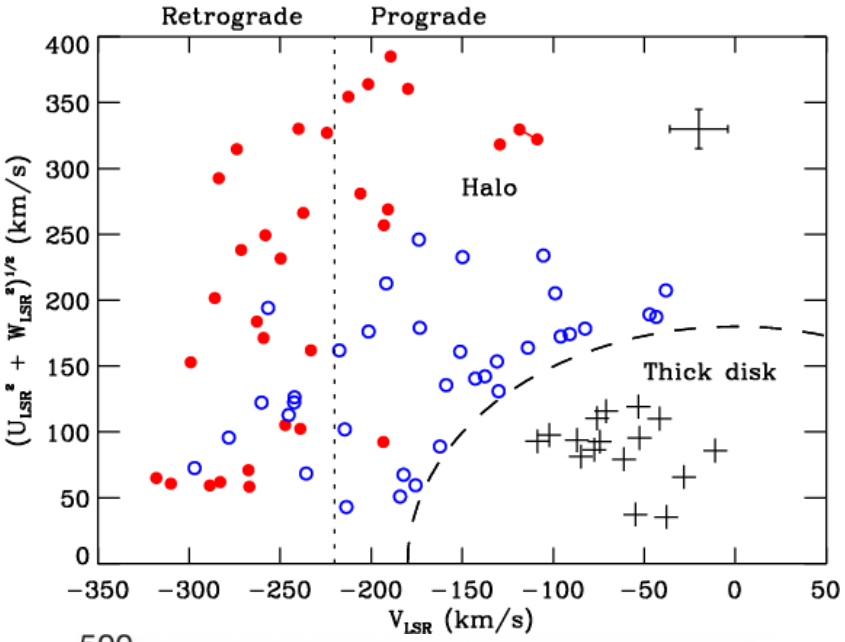
Toomre diagram

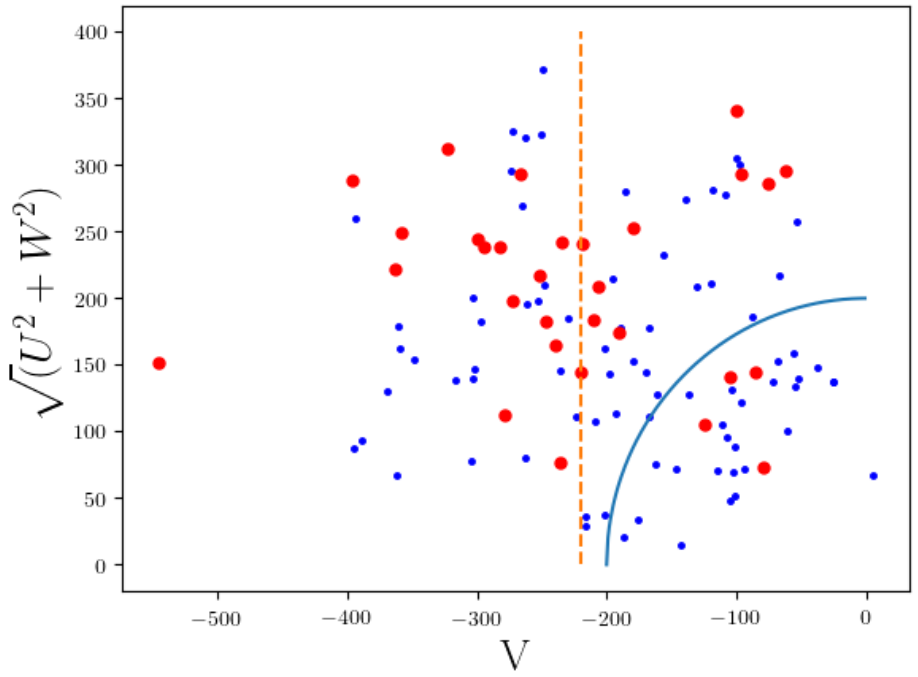


Fernández-Alvar + (in preparation)

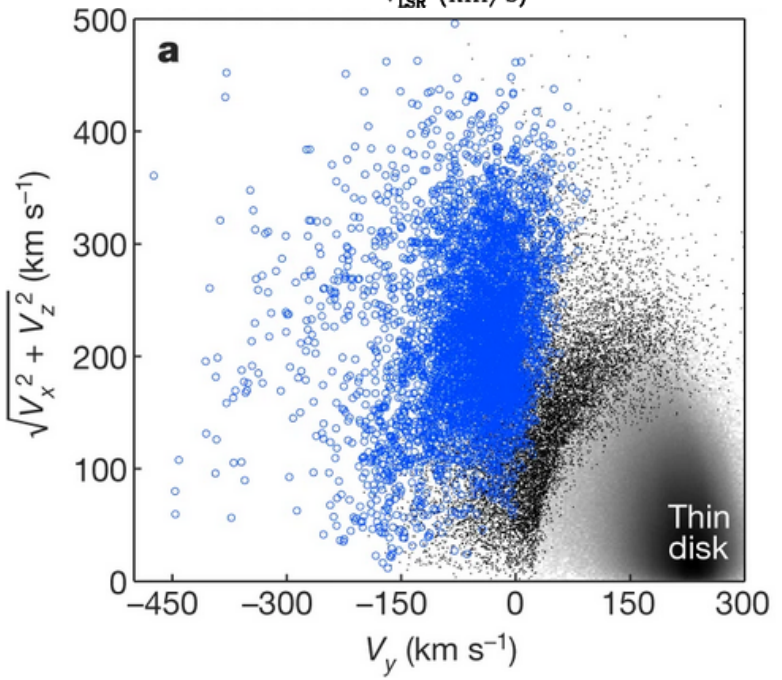
Toomre diagram

Nissen & Schuster 2010





Fernández-Alvar+ (in preparation)



Helmi+2018

Conclusions

- **MW’s satellites** show a [Y/Eu] in agreement with the **lower [Y/Eu] MW’s metal-poor stars**.
- Trend with [M/H].
- Not only in [Y/Eu] but **other low-s-process elements:** Zr and Sr.
- MW’s stars selected with [Y/Eu], [Sr/Eu] and [Zr/Eu] compatible with those observed in satellites are **also in agreement** in [La/Eu] (**high-s**-process element).
- Those stars are among the **kinematically hotter** stars of the MW.

Are the [ls/Eu], [hs/Eu] enhancement the key to detect accreted stars below [M/H] < -1.5?

- Statistical tests to verify it.

TO BE CONTINUED ...

Milky Way and Ultra-Faint/Dwarf Galaxies: [ls/Eu]