

Chemodynamical Studies of the Galaxy with S-PLUS and *Gaia*

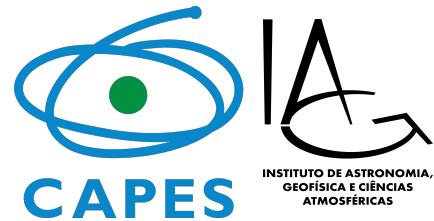
following the nomenclature of Vini Placco's presentation

Guilherme Limberg (+ collaborators!)

PhD Student

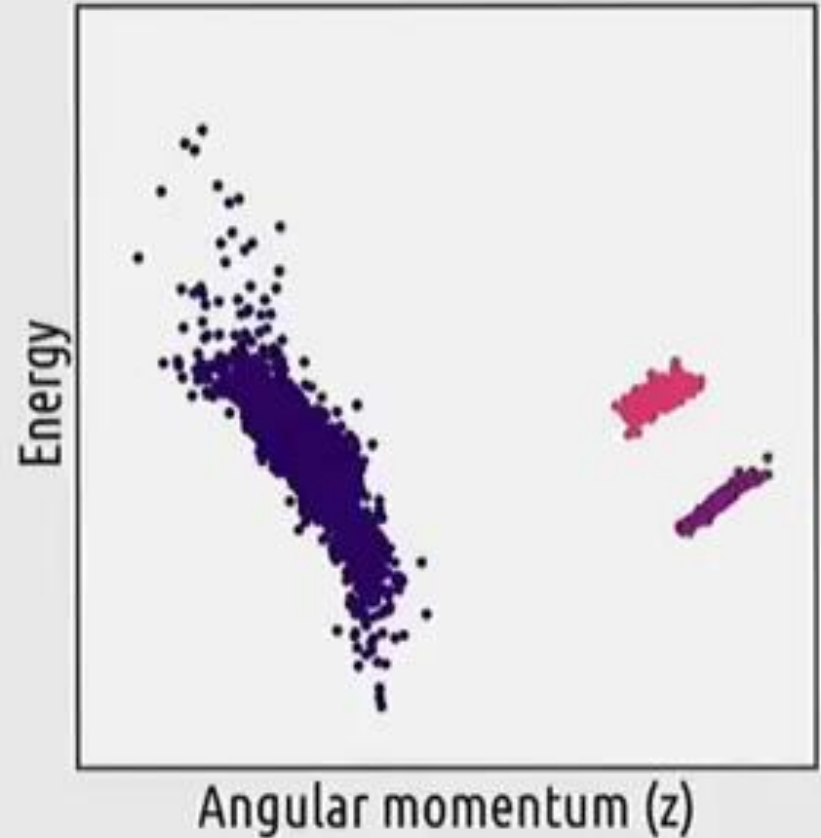
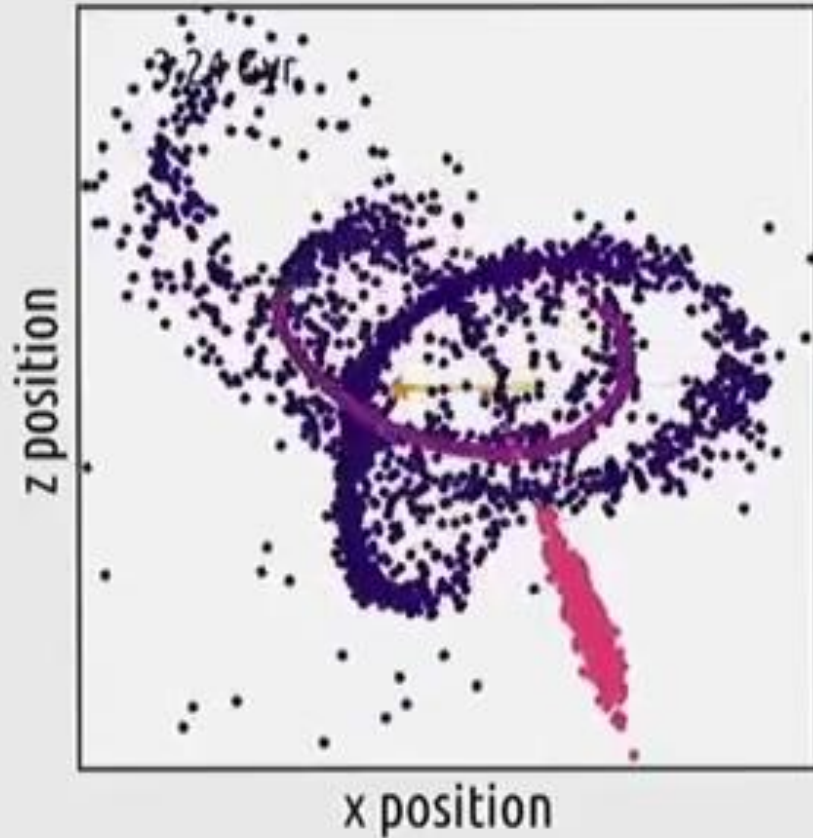
Department of Astronomy
Universidade de de São Paulo

2 June 2021

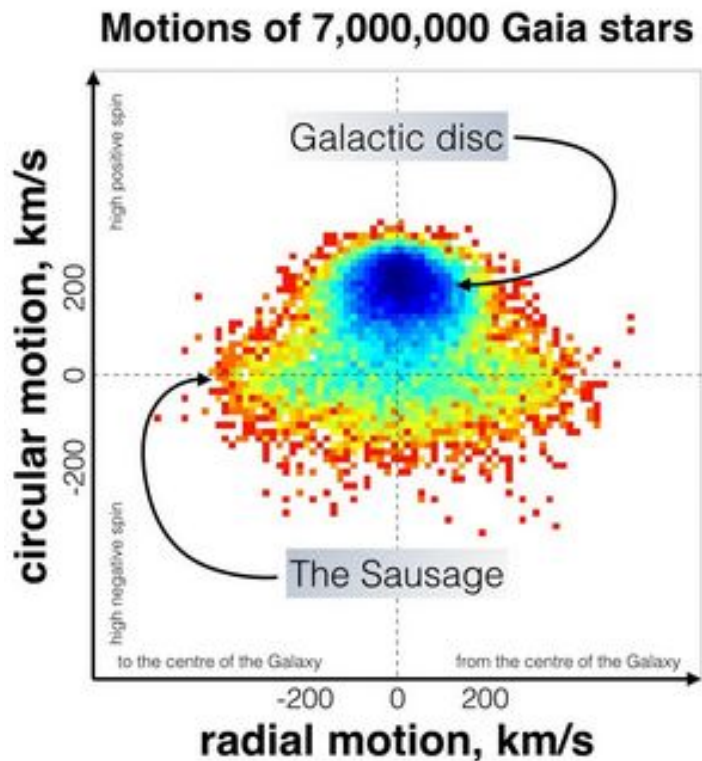


Hierarchical assembly in λ CDM

Credit: Ana Bonaca



A massive merger revealed by *Gaia*



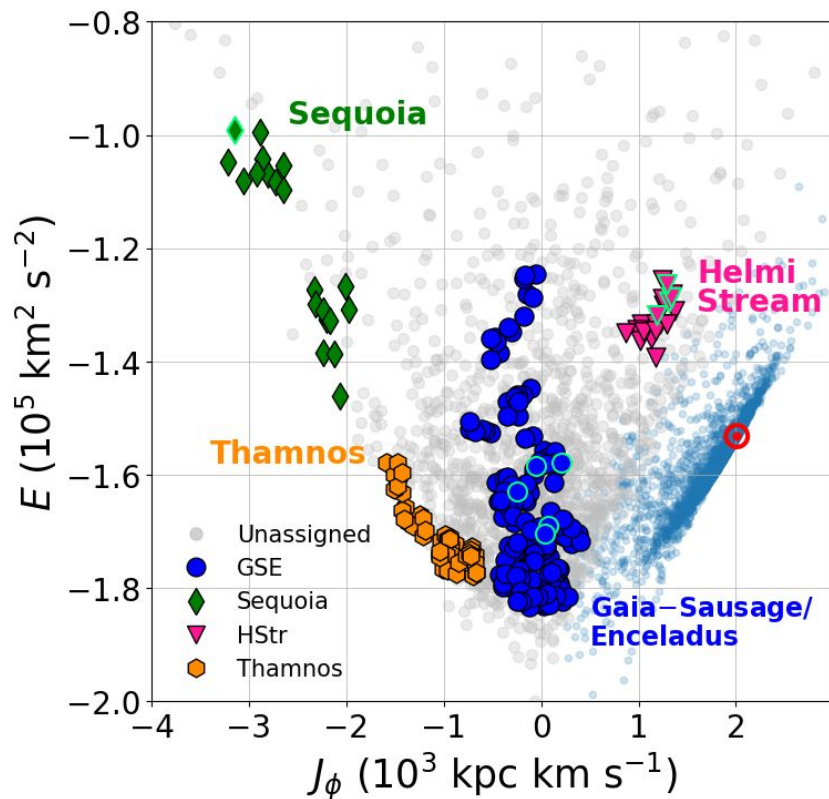
Belokurov et al. (2018)

Gaia-Sausage (or Enceladus)

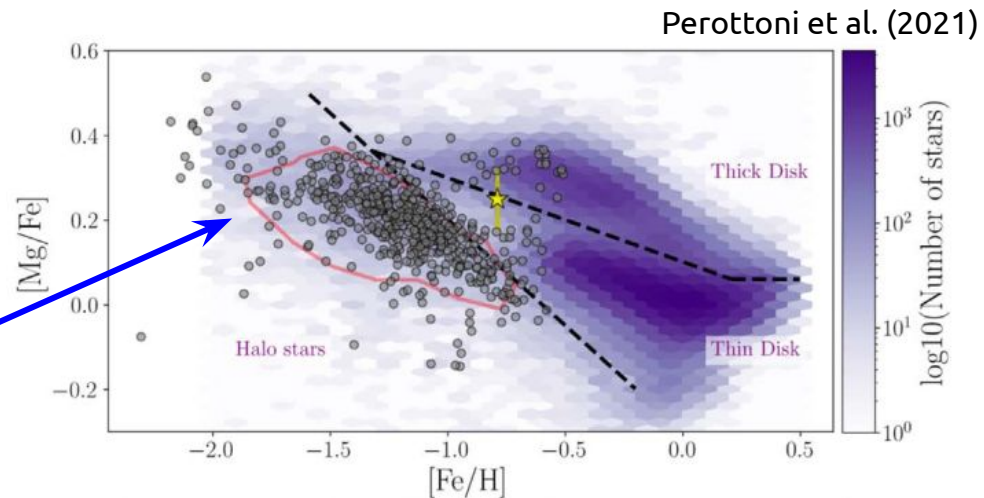
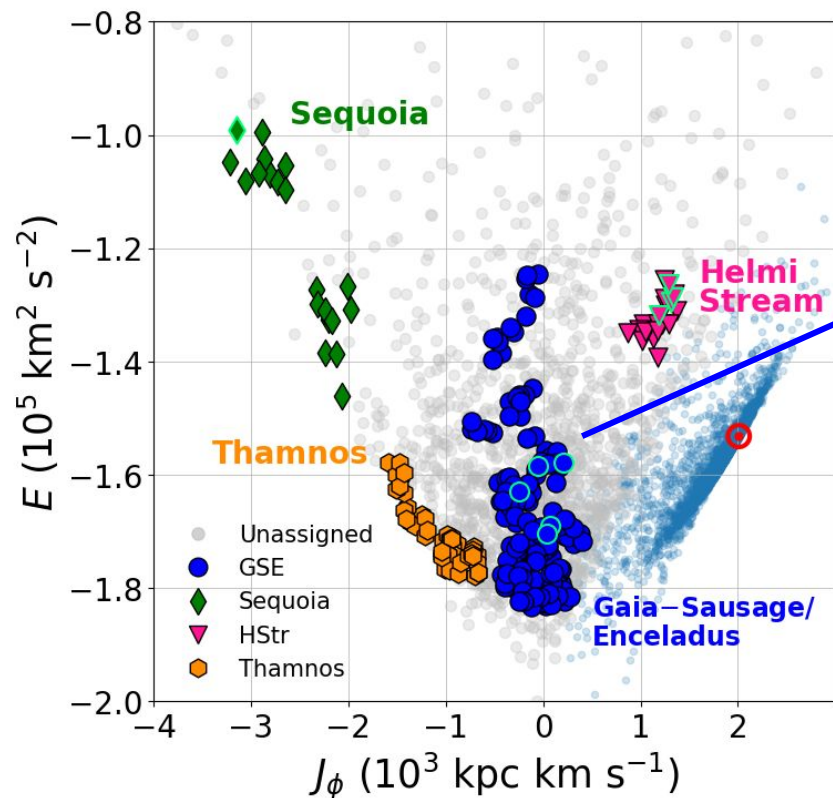
- Substructure of accreted origin
(Belokurov et al. 2018; Helmi et al. 2018; Haywood et al. 2018)
- Low metallicities ($[Fe/H] \lesssim -0.7$)
(Di Matteo et al. 2019; Mackereth et al. 2019)
- Merging event mass ratio $> 1:5$
(Fattahi et al. 2019; Bignone et al. 2019)
- Approximately ~ 10 Gyr ago ($z \sim 2-3$)
(Gallart et al. 2019; Bonaca et al. 2020)

Caution: still under active debate.

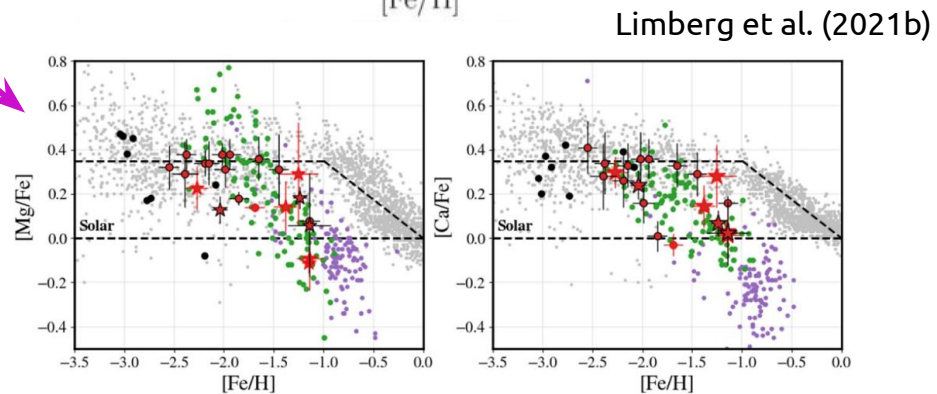
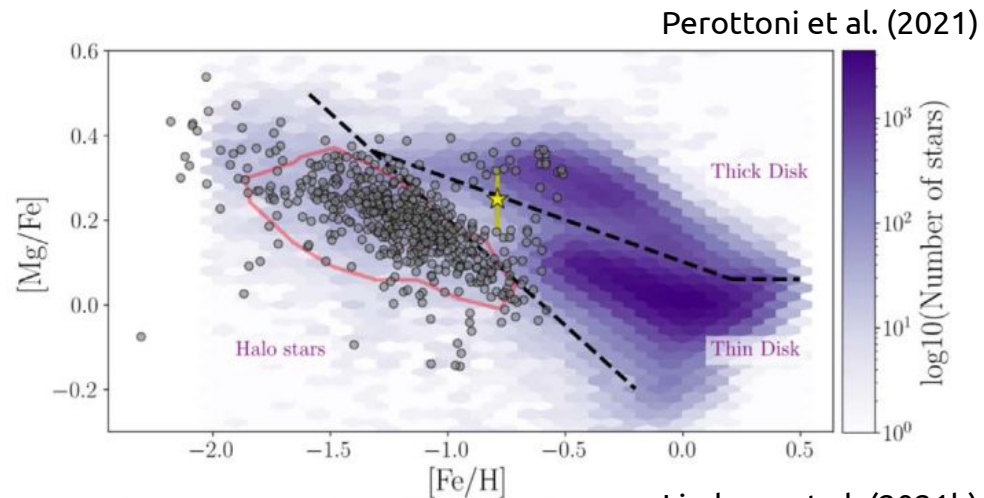
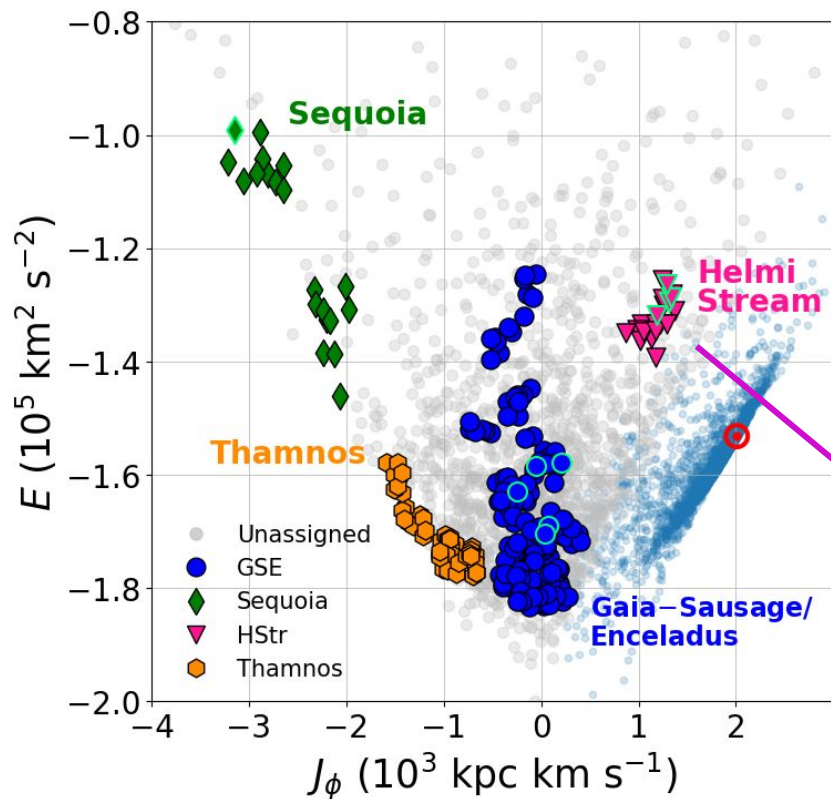
The role of chemical abundances



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The role of chemical abundances



What about S-PLUS?

We can do this with S-PLUS!

- ~12 million stars (star/galaxy classification)
(see Lilianne's talk yesterday; Nakazono et al. submitted)
- ~700 thousand $[\text{Fe}/\text{H}]$ and **A(C)** in Stripe 82 alone
(see Vini Placco's talk yesterday; Whitten et al. 2021)
- Maybe $[\text{Mg}/\text{Fe}]$?
(see Tim Beers's talk tomorrow)
- ~50 thousand RVs in *Gaia* eDR3 alone

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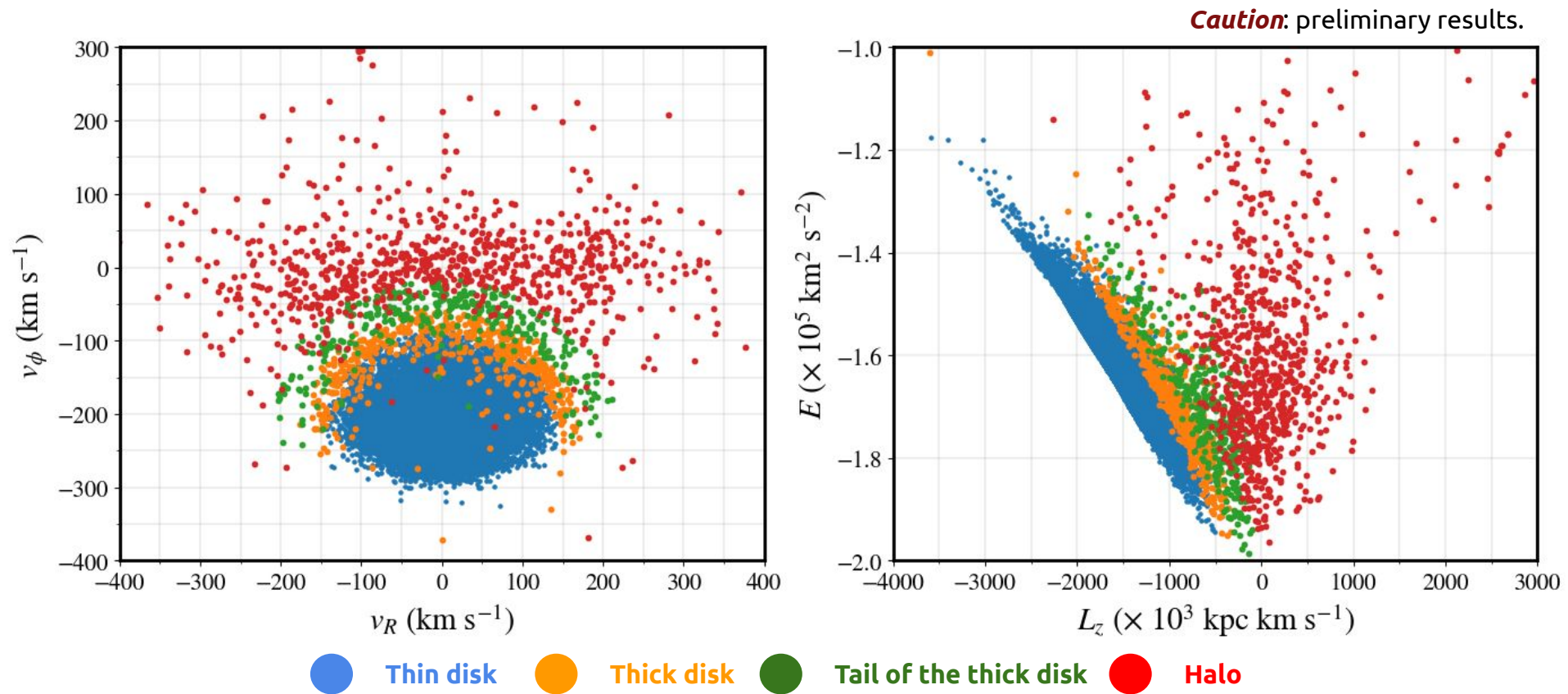
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What are the advantages over other datasets?

- A lot of stars
- Good accuracy on [Fe/H]
- Photometric (biases)
- Potential **C** and **Mg**

Dynamical structure of the Galaxy



Next steps and final messages

S-PLUS can be a powerful dataset to explore the chemodynamical structure of the Galaxy

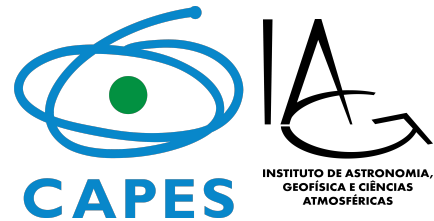
- Determination of **[Fe/H]** for the entire (i)DR3 of S-PLUS
- Estimation of **C** and **Mg** abundances
- Calculation of (a lot of) orbits ★
→ RVs from spectroscopic surveys
- Maybe a VAC?

Check out recent papers on the topic by our group!

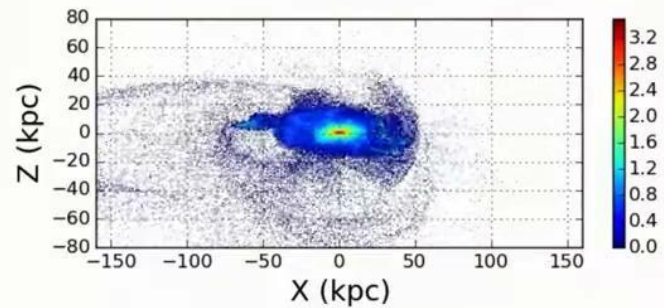
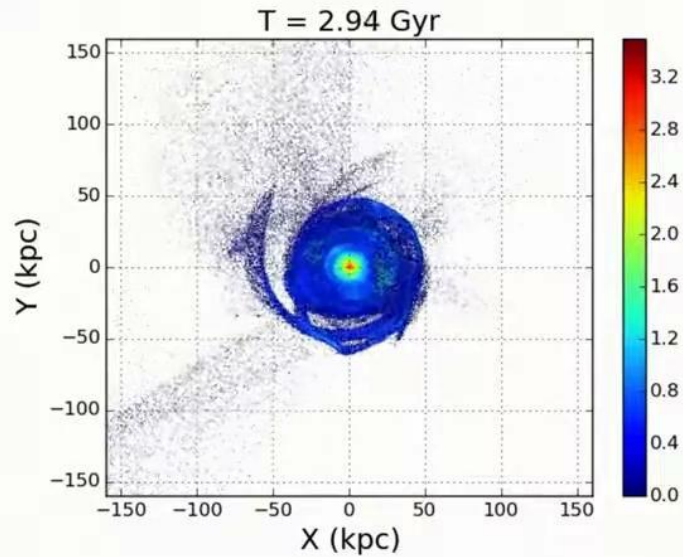
- Limberg et al. 2021a. [arXiv:2011.08305](https://arxiv.org/abs/2011.08305)
- Limberg et al. 2021b. [arXiv:2103.07621](https://arxiv.org/abs/2103.07621)
- Limberg et al. 2021c. [arXiv:2105.05958](https://arxiv.org/abs/2105.05958)
- Perottoni et al. 2021. [arXiv:2104.08306](https://arxiv.org/abs/2104.08306)

Contact me if you are interested!

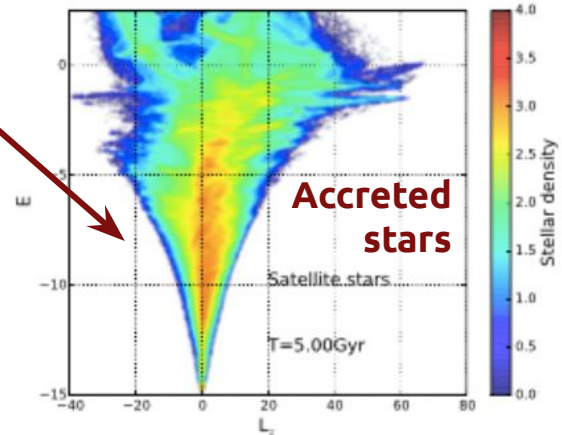
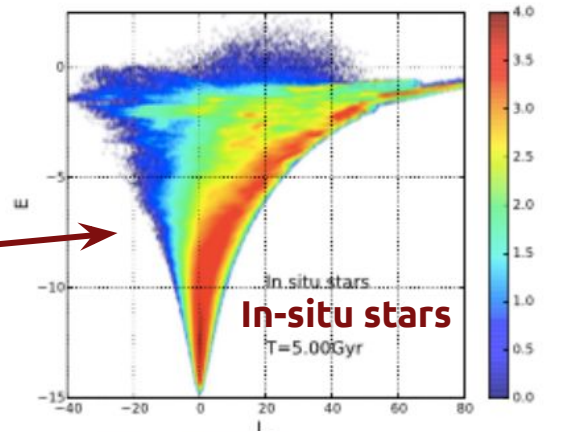
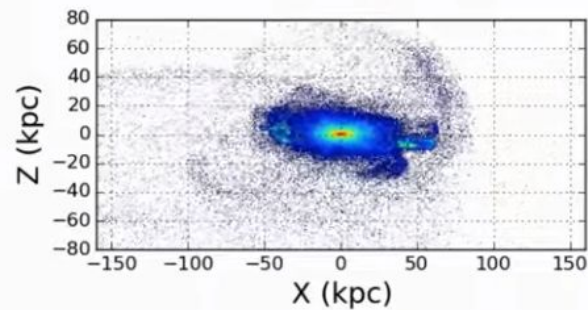
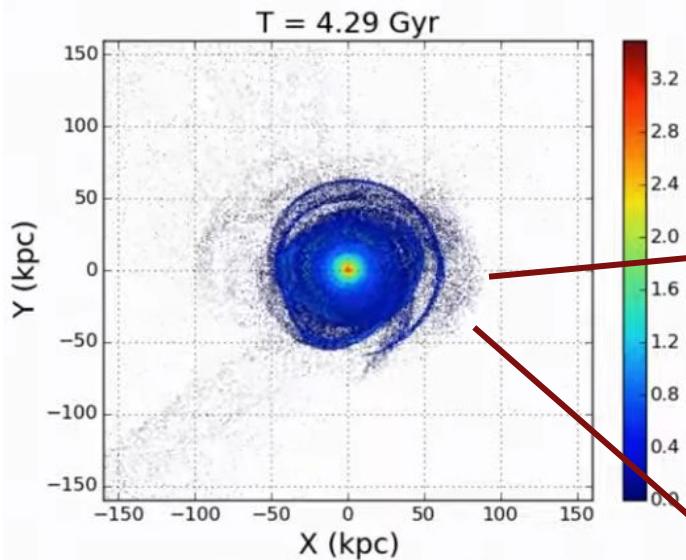
 guilherme.limberg@usp.br



... but is it that simple?



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... but is it that simple?

Can we break this degeneracy?

