The Galactic lithium evolution

via MSE

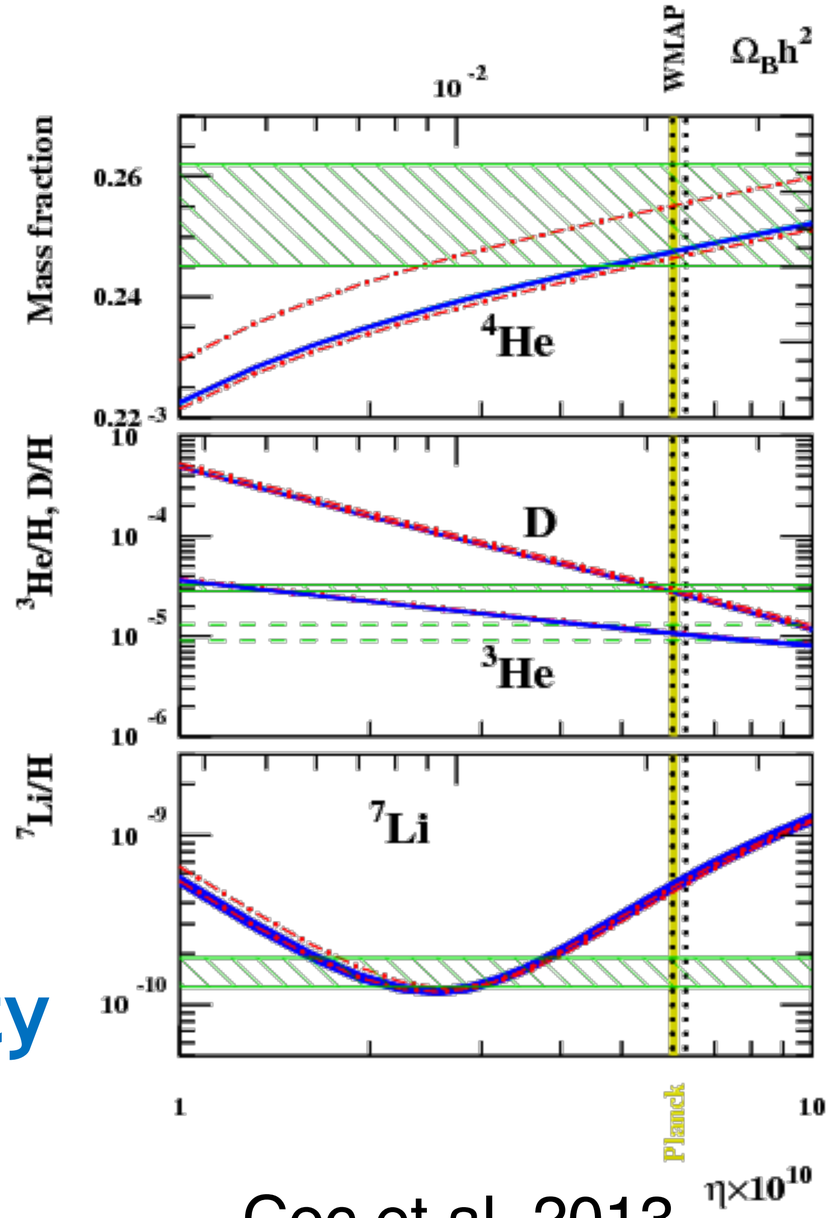
Xiaoting FU 符晓婷

Kavli Institute for Astronomy and Astrophysics (KIAA), China

xiaoting.fu@pku.edu.cn

MSE2020

Insight: to constrain the Standard Big Bang Nucleosynthesis



The primordial abundances:
Only depends on the baryon density

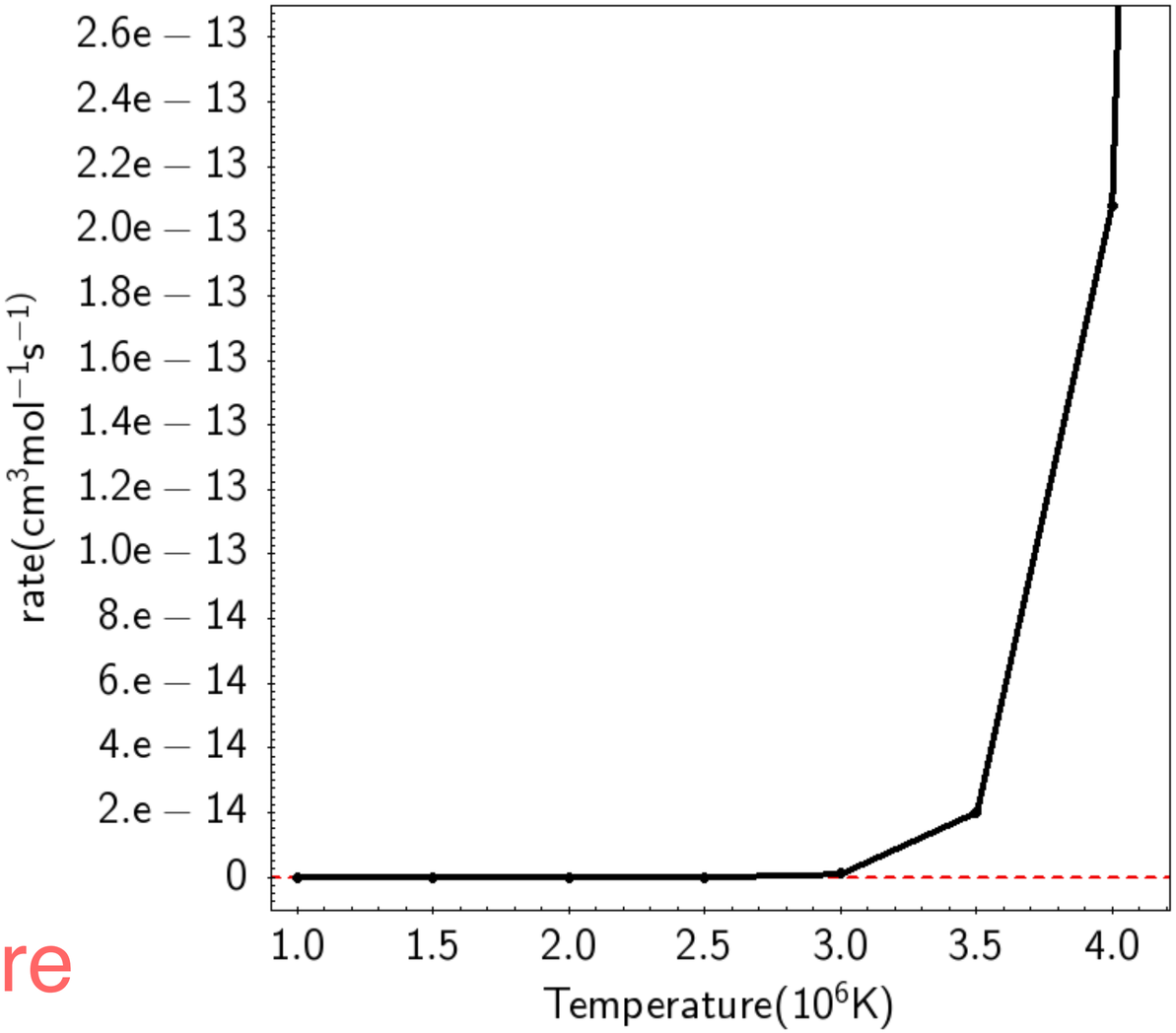
Coc et al. 2013

Insight: a probe of stellar structure

Convection

Stellar nucleosynthesis

Chemical evolution in the galaxy

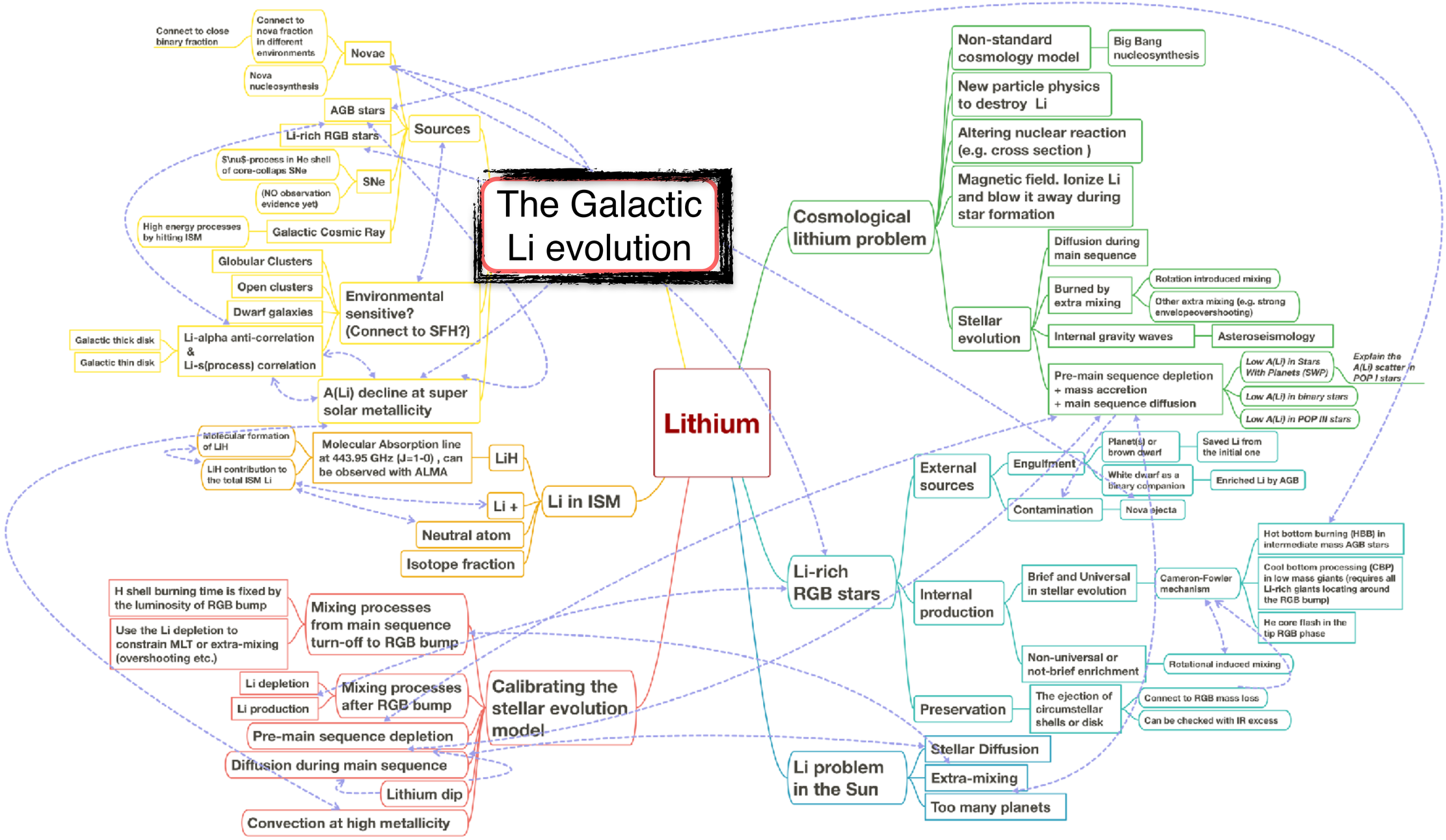


$Li^7 + p \rightarrow He^4 + He^4$

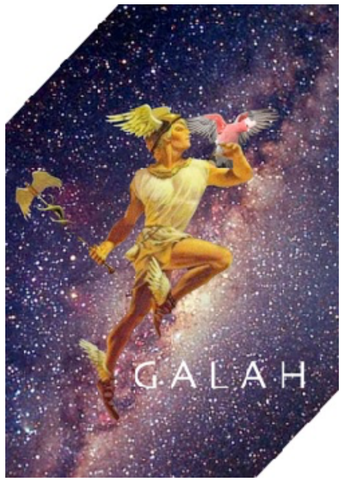
Easily burn at a low temperature

JINA REACLIB database

Roadmap of Li insights (problems):

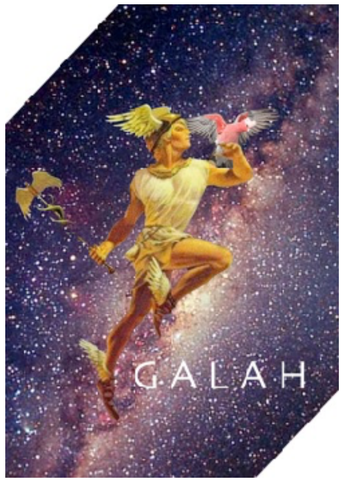


Gaia-ESO survey



large public surveys available for this study

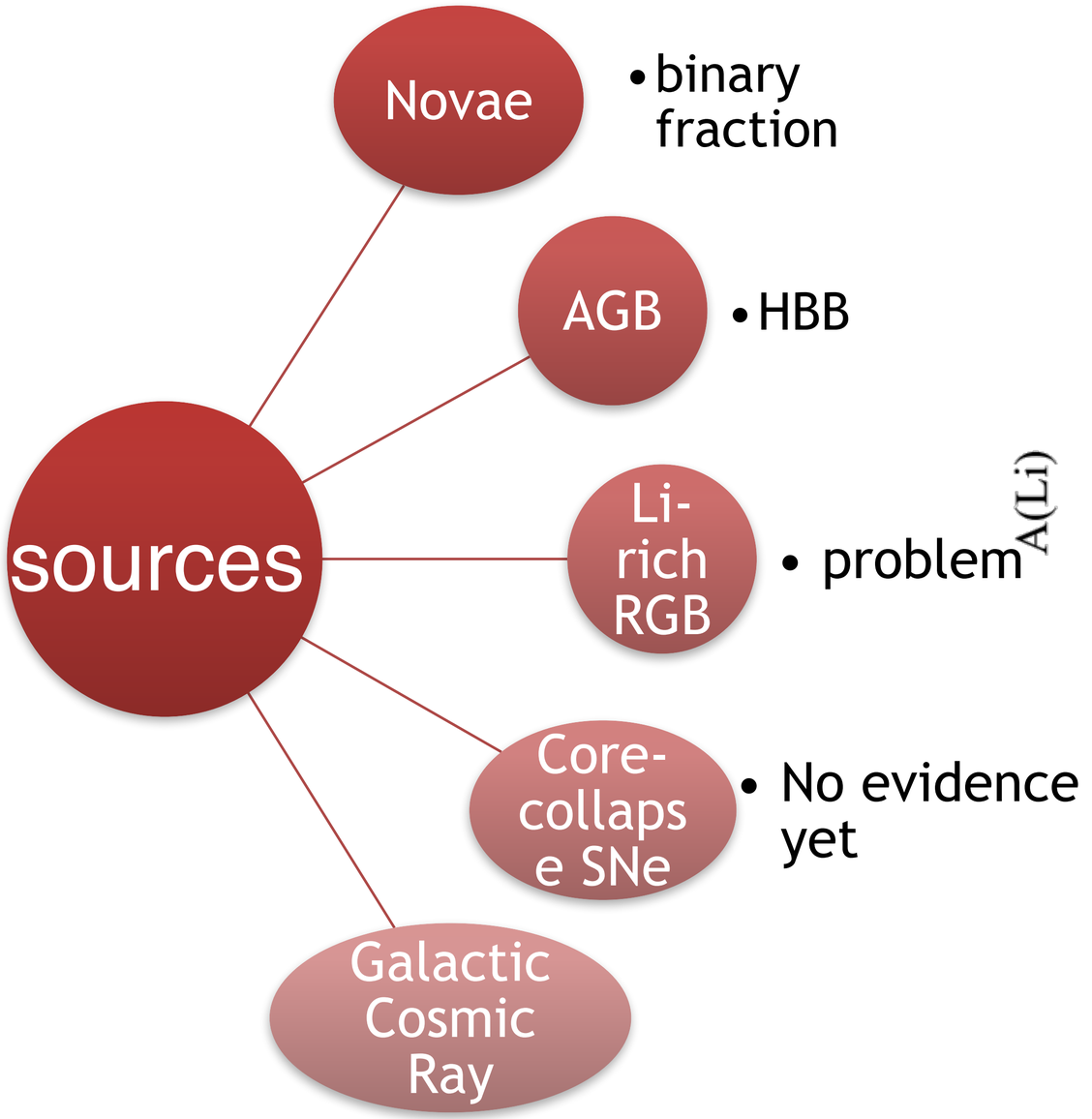
Gaia-ESO survey

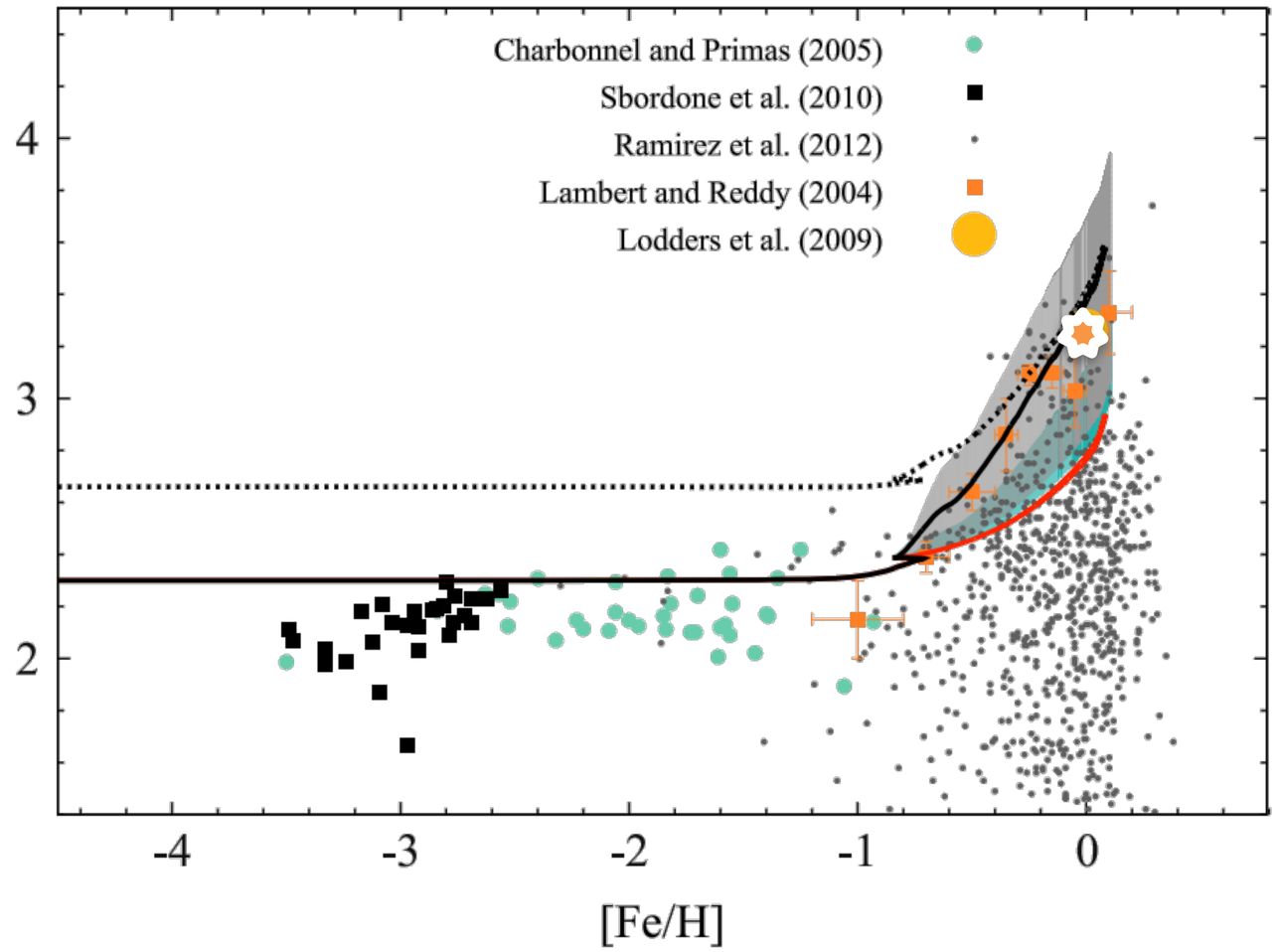


large public surveys ~~available~~ for this study

Maunakea Spectroscopic Explorer

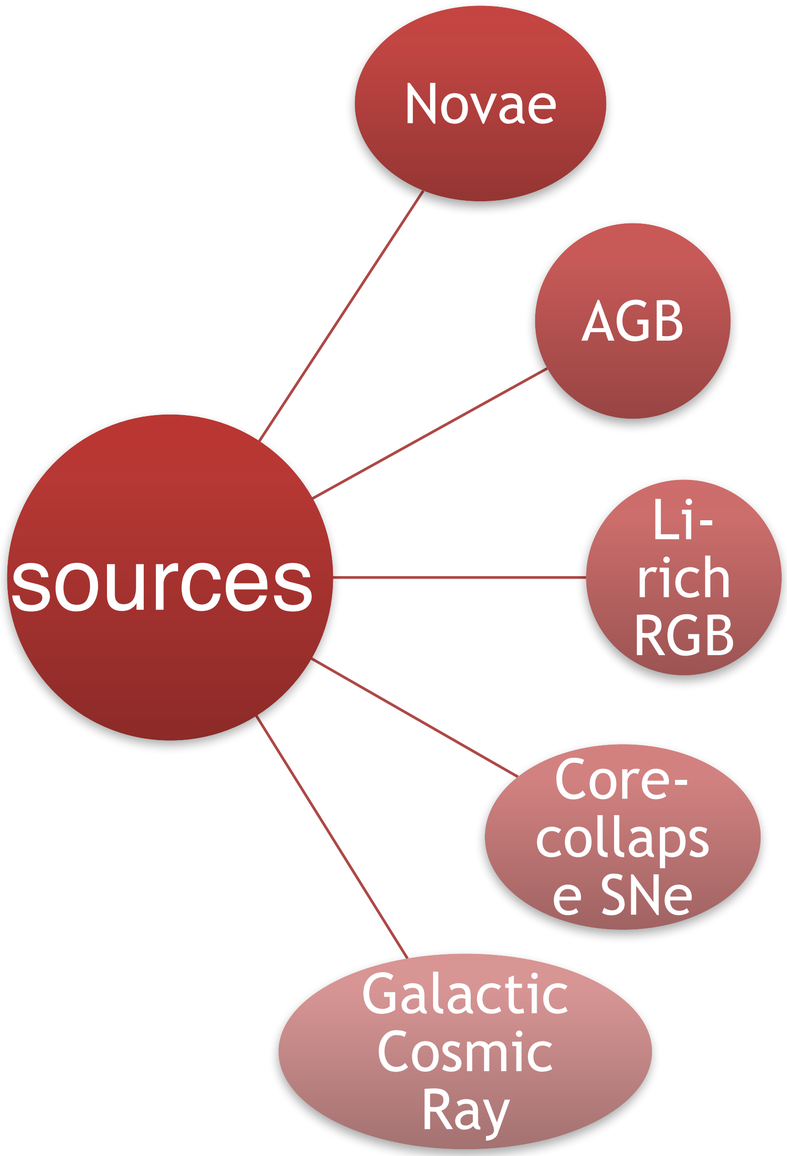
The Galactic Li enrichment





Izzo et al., 2015

The Galactic Li enrichment



The Galactic thick disc

The Galactic thin disc

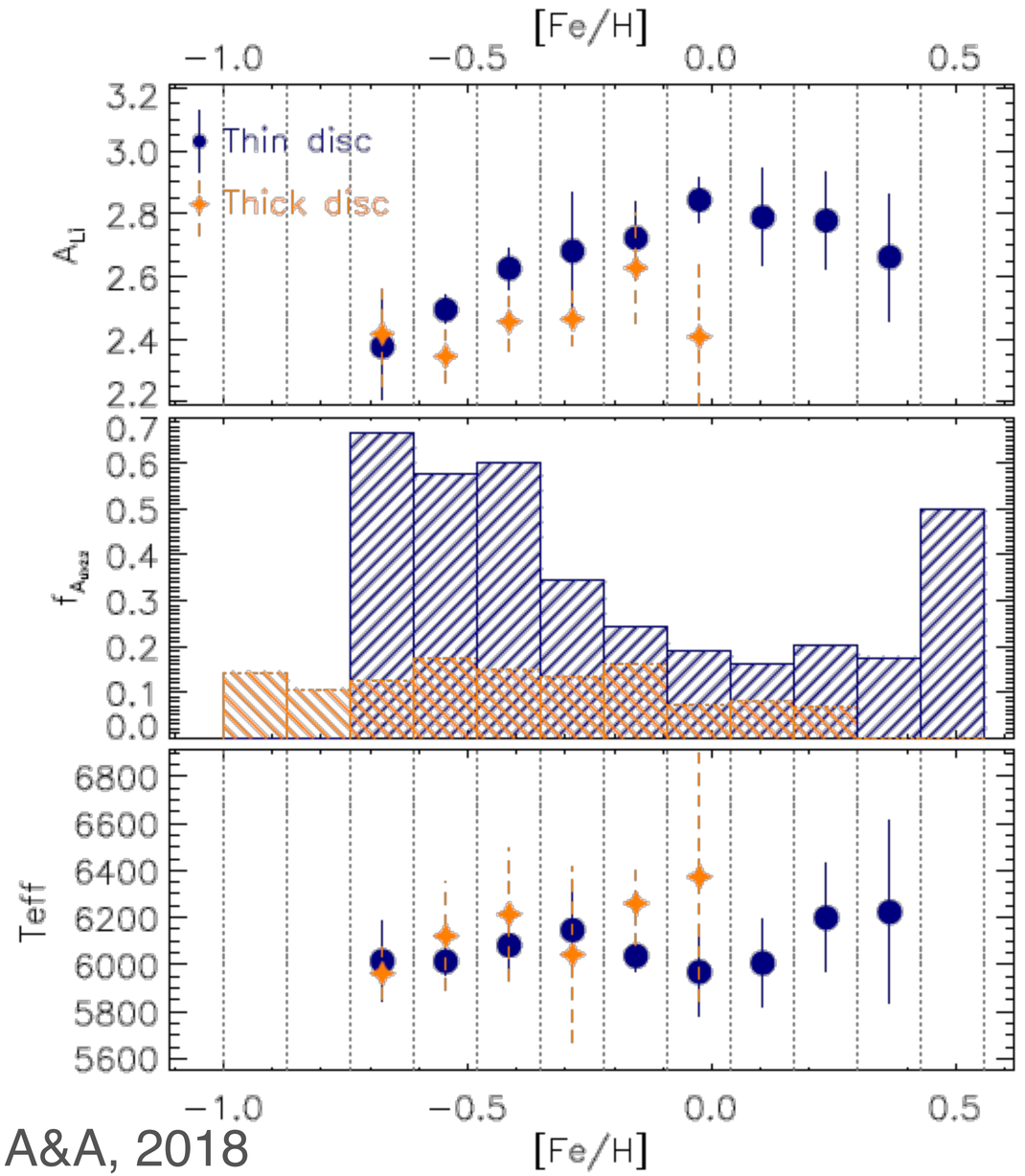
GC, OC, dwarf galaxies…

Galactic Thick/thin disc

stars with enriched Li

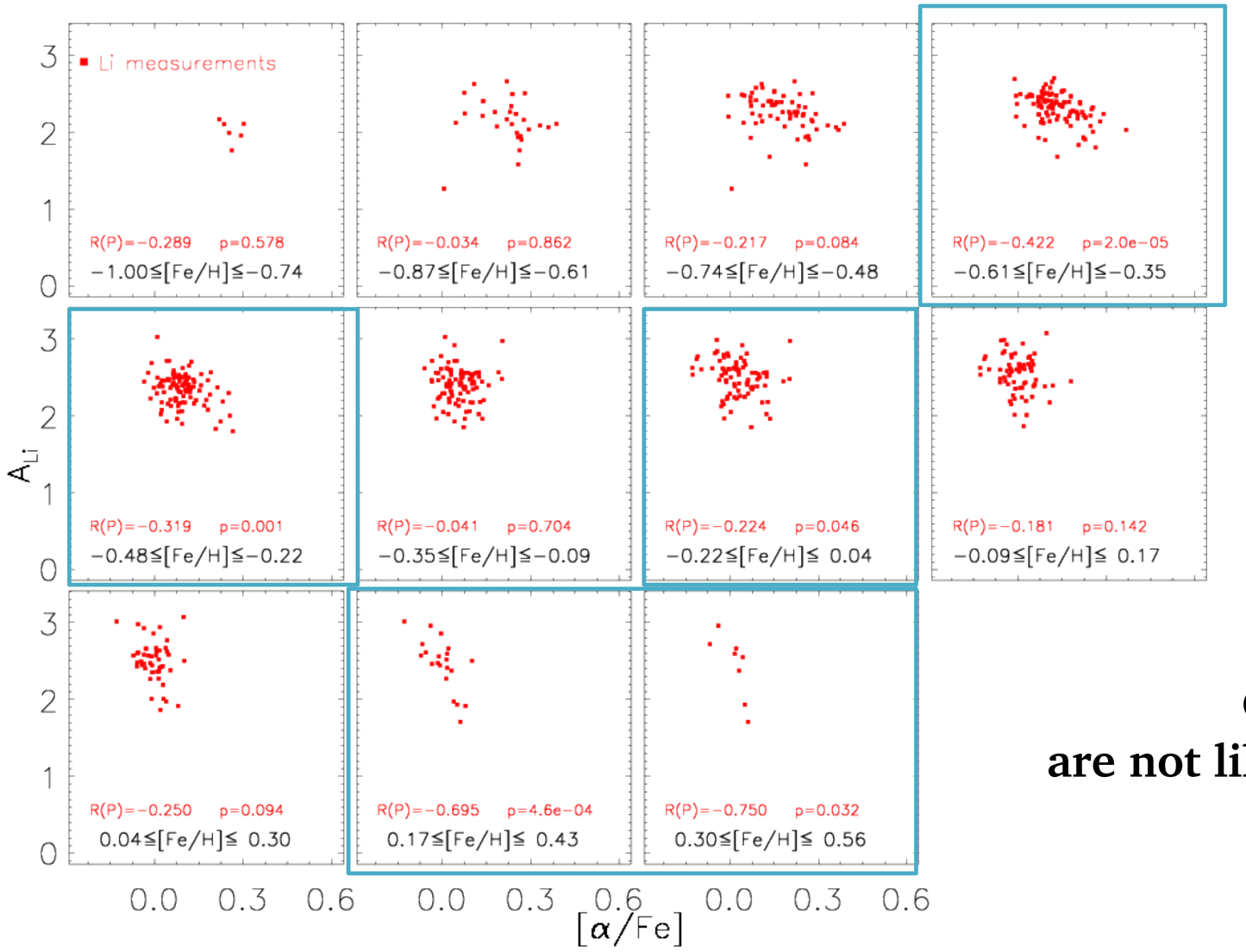
Thin disc:
stronger Li enrichment

Thin disc:
higher overall level of Li enrichment



Fu, GES collaboration, A&A, 2018

Li-[alpha/Fe] anti-correlation



P<0.05

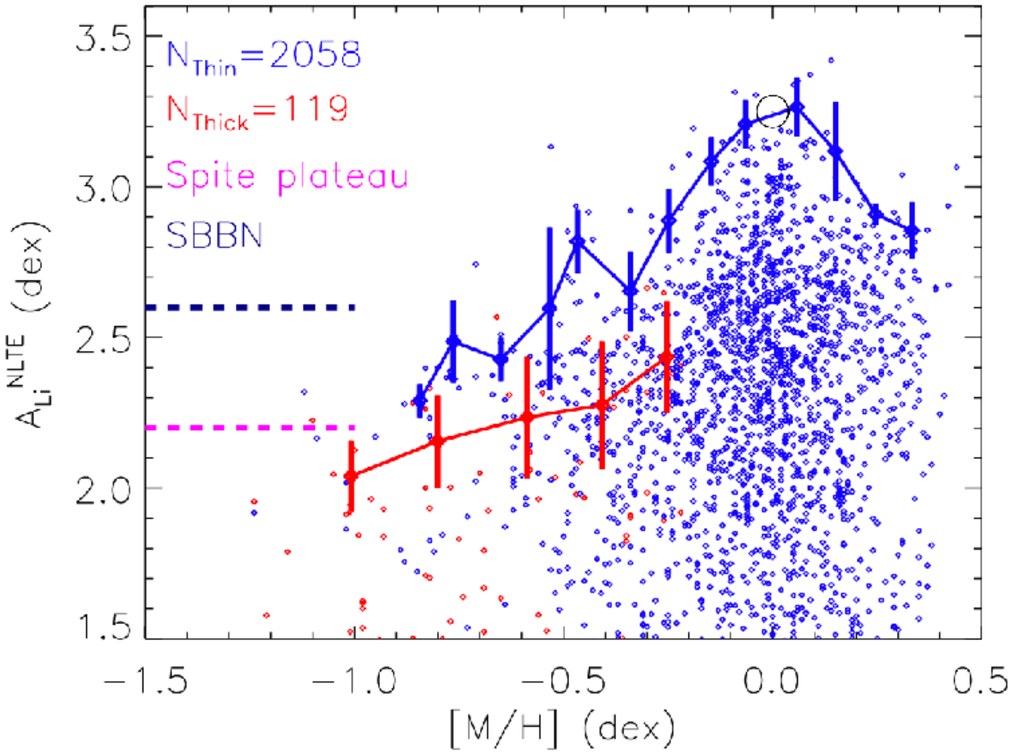
Core-collapse SNe are not likely the main source of 7Li

[Fe/H] binsize= 0.26

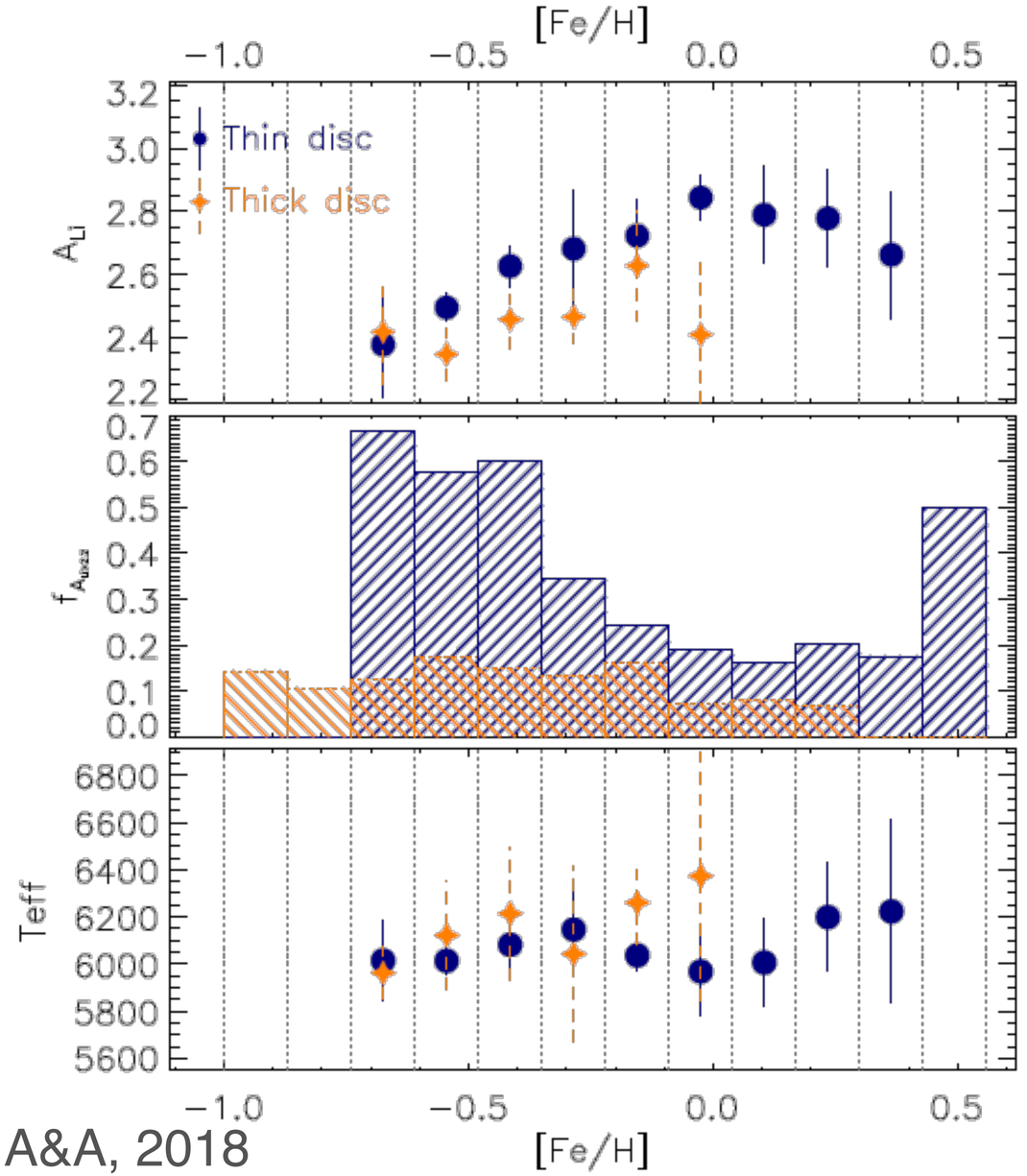
Fu, GES collaboration, A&A, 2018

Galactic Thick/thin disc

stars with enriched Li



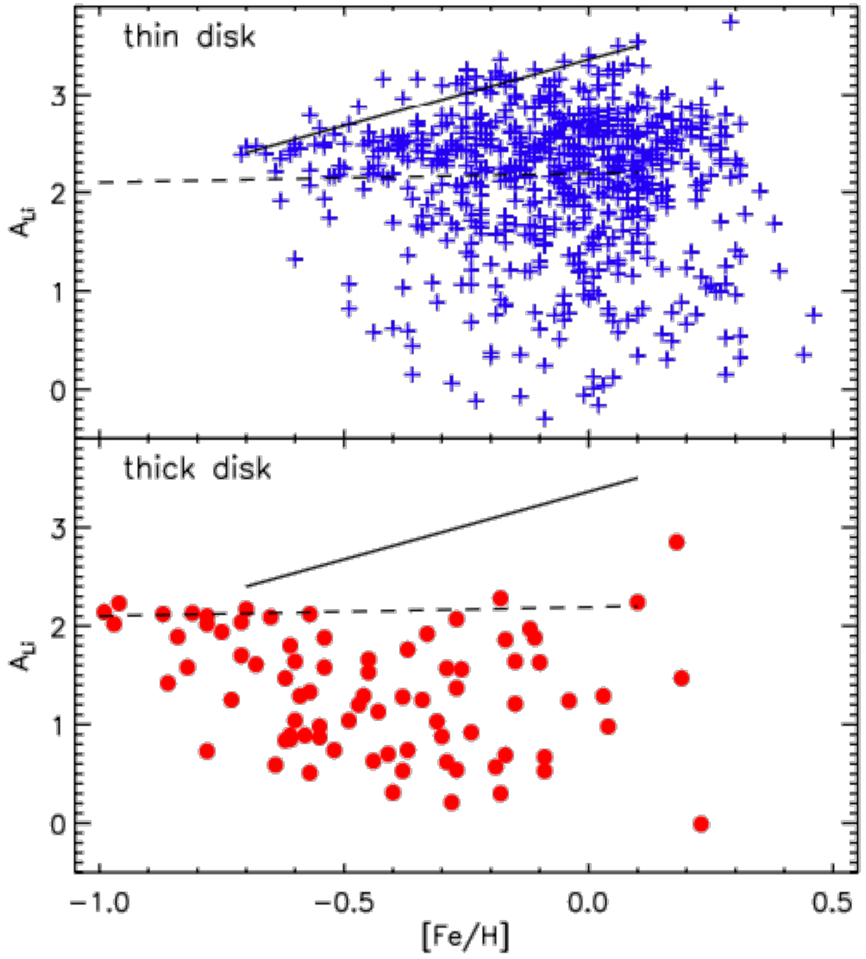
Guiglion et al. 2016



Fu, GES collaboration, A&A, 2018

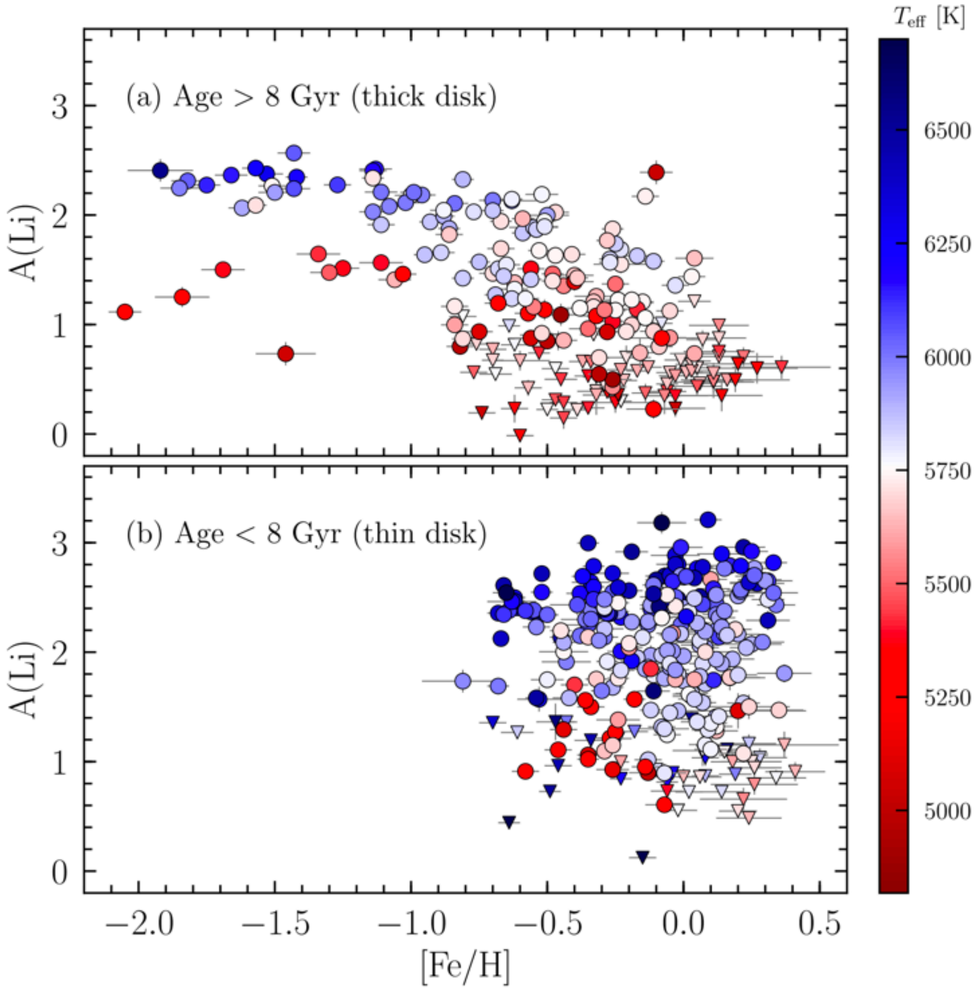
Galactic Thick/thin disc

Li plateau in the thick disc



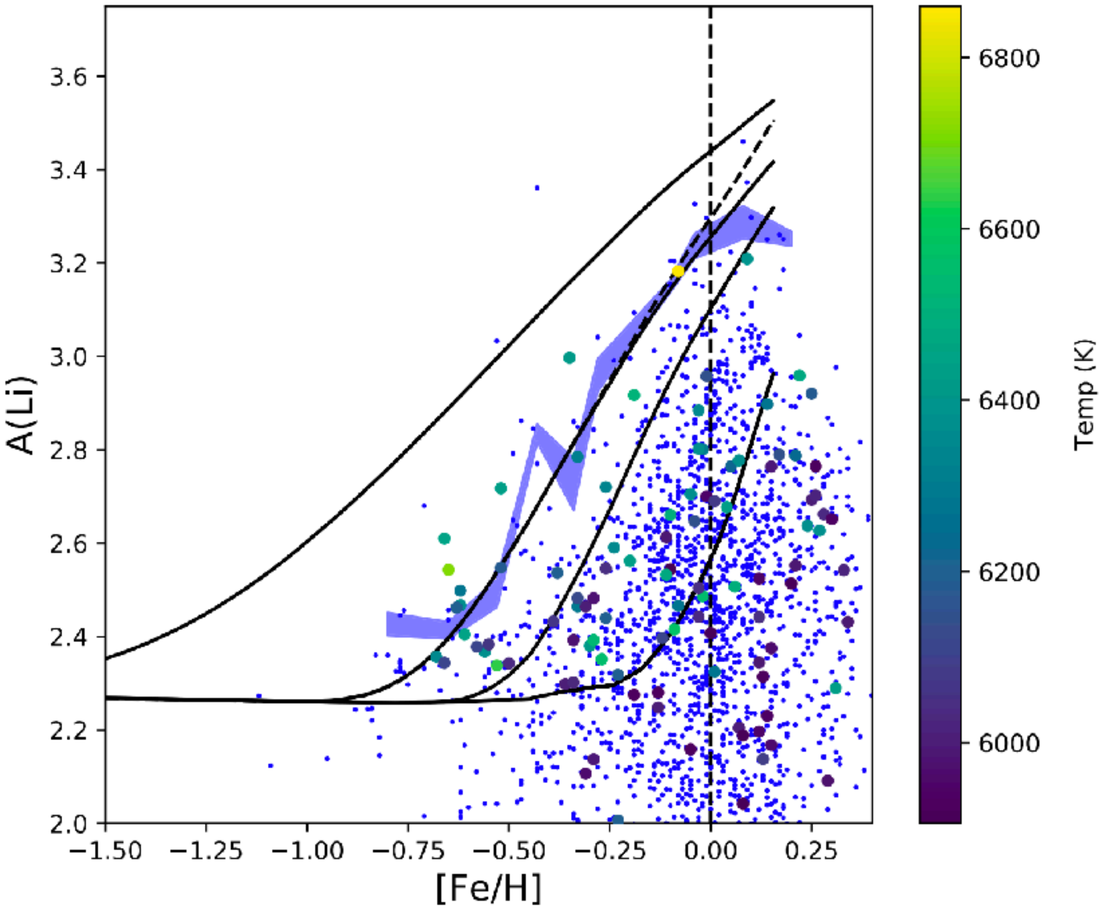
Ramírez et al., 2012

Li decrease in the thick disc



Bensby & Lind, (2018)

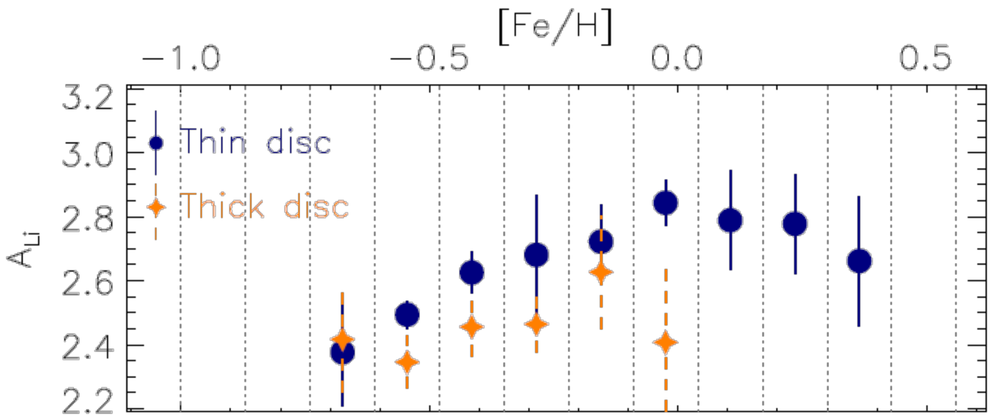
Galactic Thick/thin disc



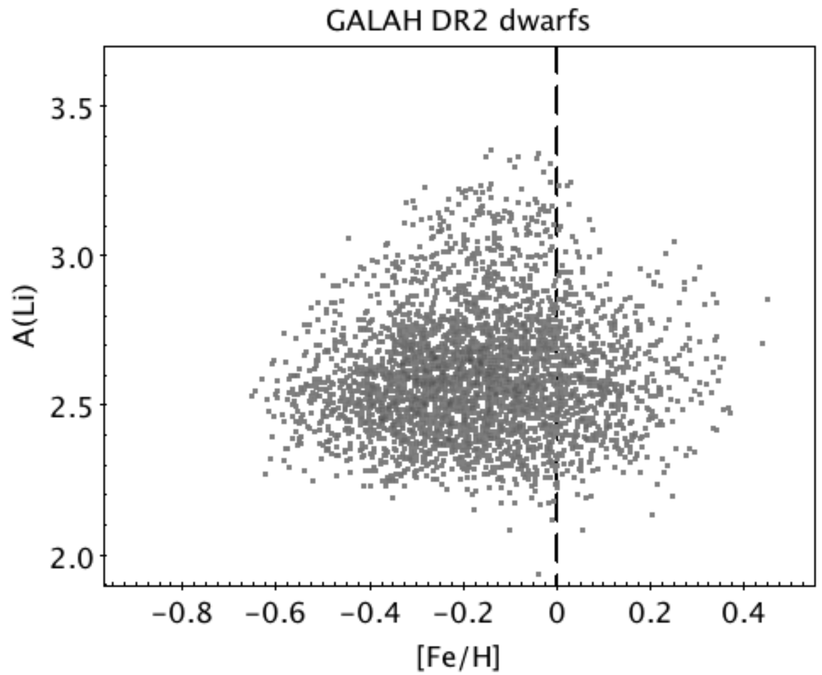
Cescutti & Molaro, (2018)

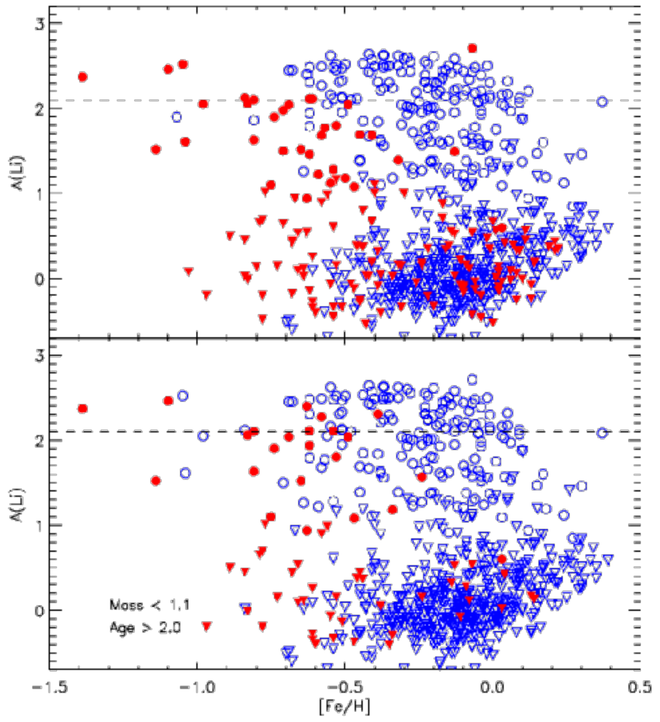
Age and novae are the keys, no matter thick or thin

A(Li) decline at super-solar metallicity

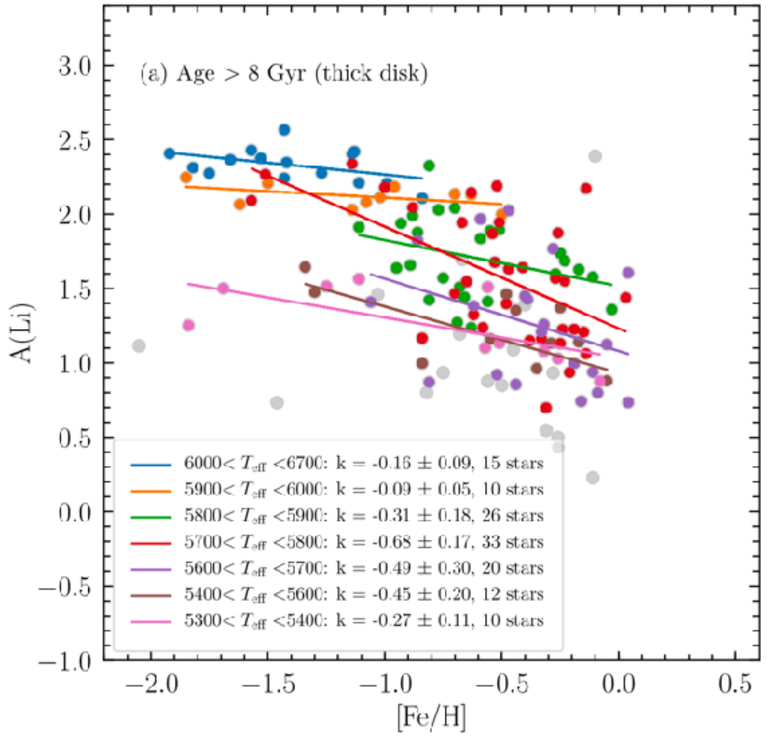


Fu, GES collaboration, A&A, 2018





Delgado Mena et al., 2015



Bensby & Lind, (2018)

A(Li) decline at super-solar metallicity

Possible: contribution from novae declines at super-solar metallicity.

(Grisoni et al., 2019)

Possible: Galactic radial migration.

(Guiglion et al., 2019)

Possible: early stellar evolution deplete Li.

(Randich., et al., 2020)

Possible: HBB in AGB stops at high metallicity.

(e.g. Ventura & D'Antona 2009)

Possible: star formation gaps in the past 5 Gyr.

(Romano et al., 2001)

Possible: a stronger Li depletion in the super metal-rich stars.

(Fu et al., in prep.)

A(Li) decline at super-solar metallicity

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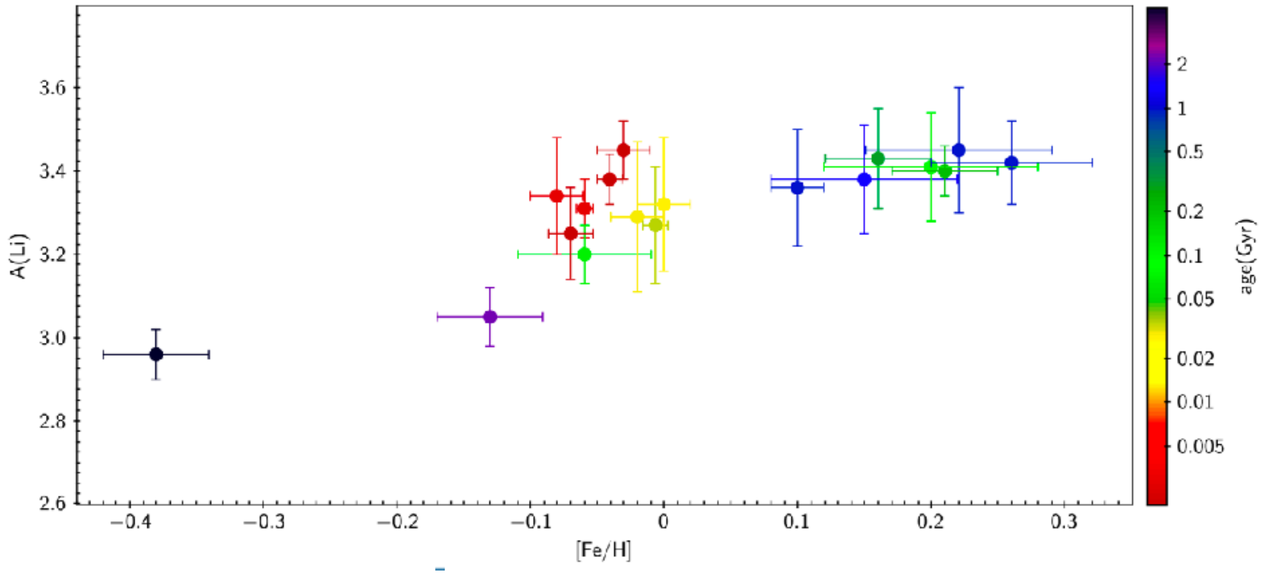
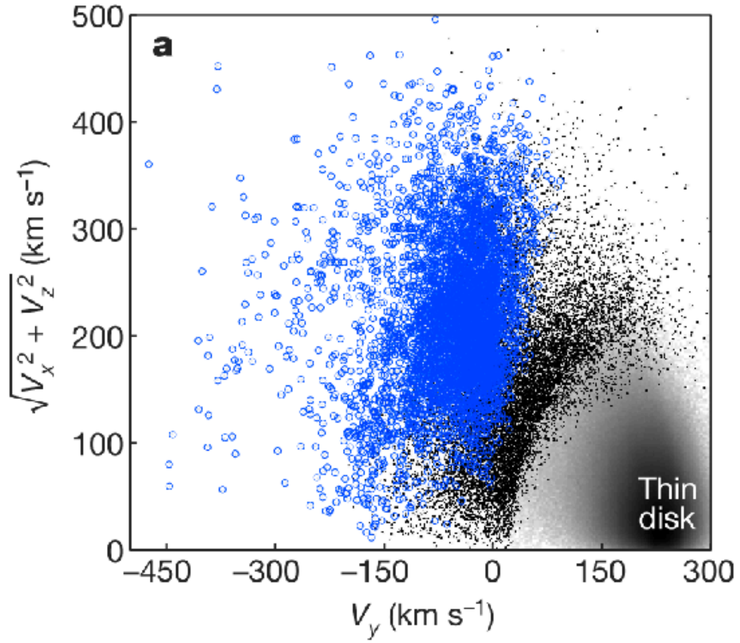
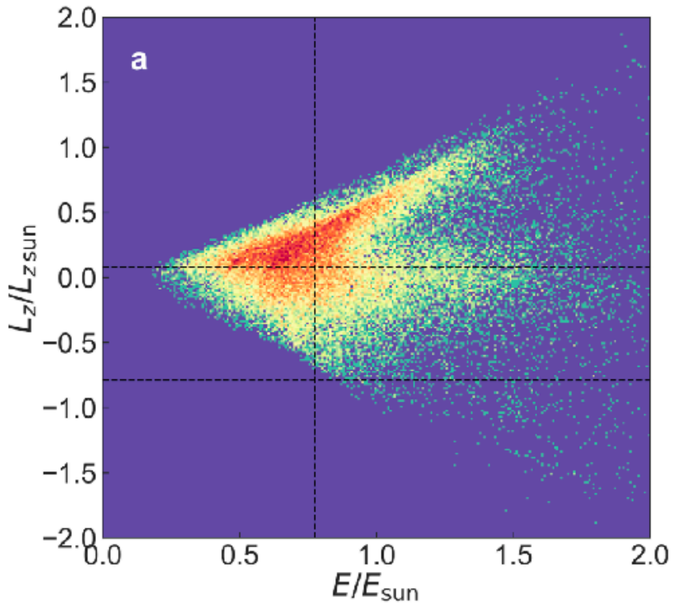


Li evolution in dwarf galaxies

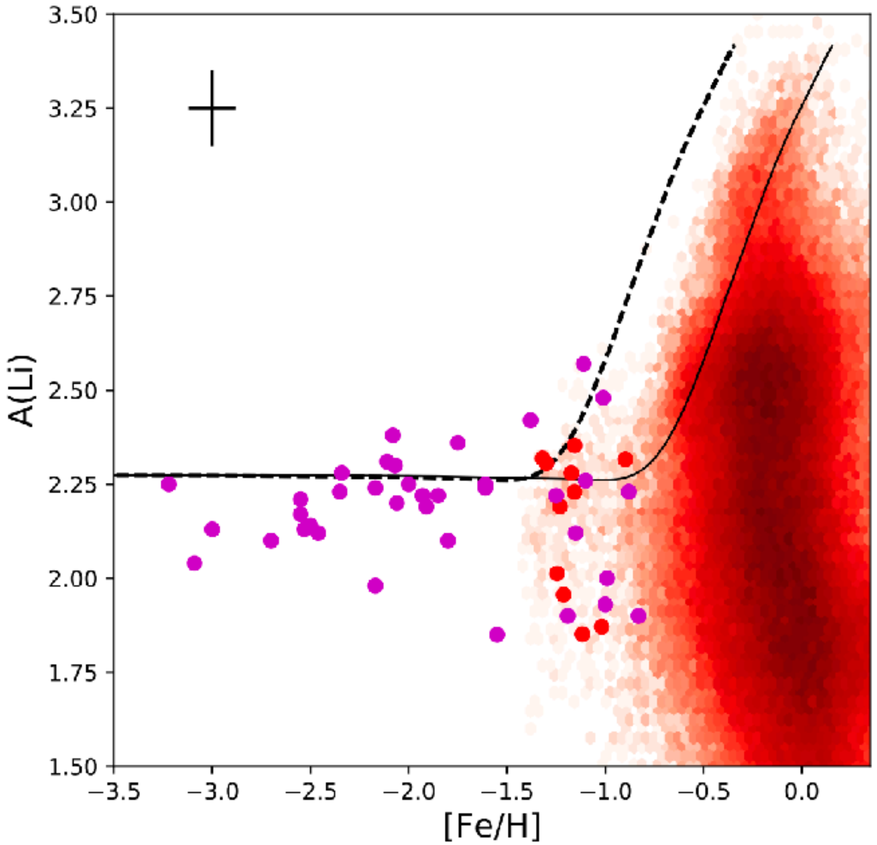


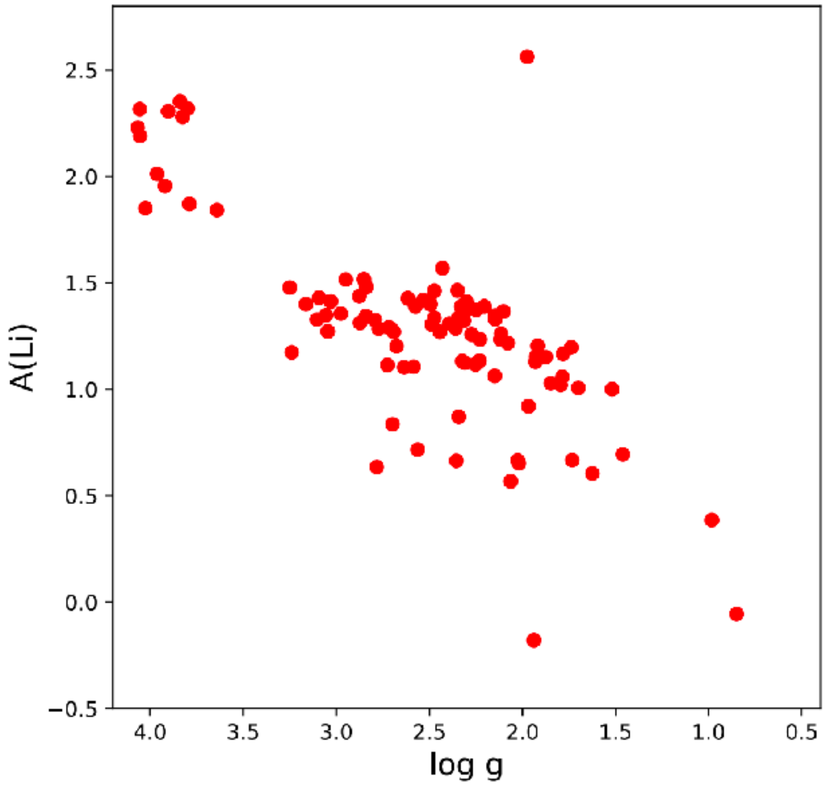


Gaia-Enceladus. Helmi et al., 2018

Li evolution in dwarf galaxies

Li evolution in Gaia-Enceladus

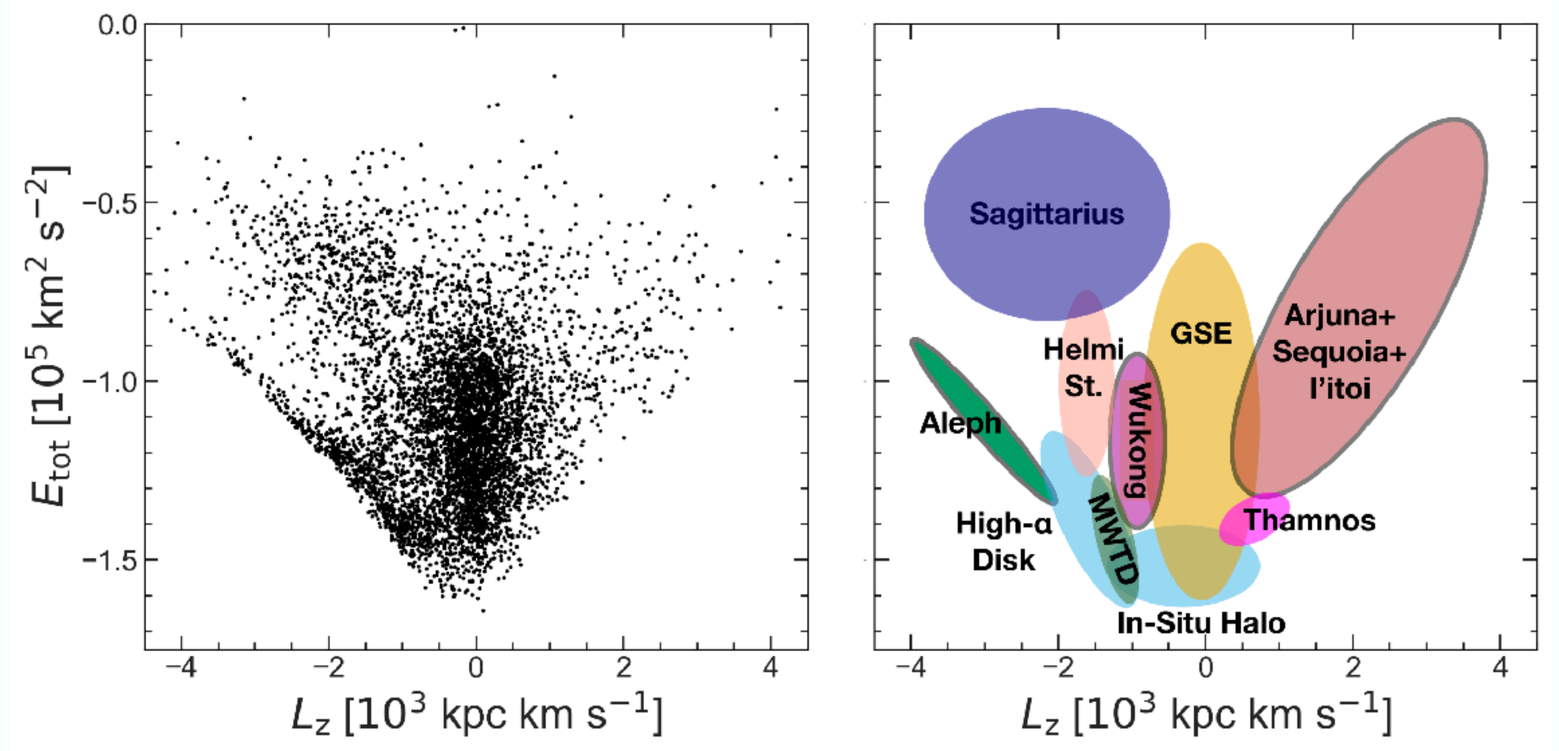




Molaro, Cescutti, Fu, 2020

The Galactic Li evolution in MSE era

Maunakea Spectroscopic Explorer

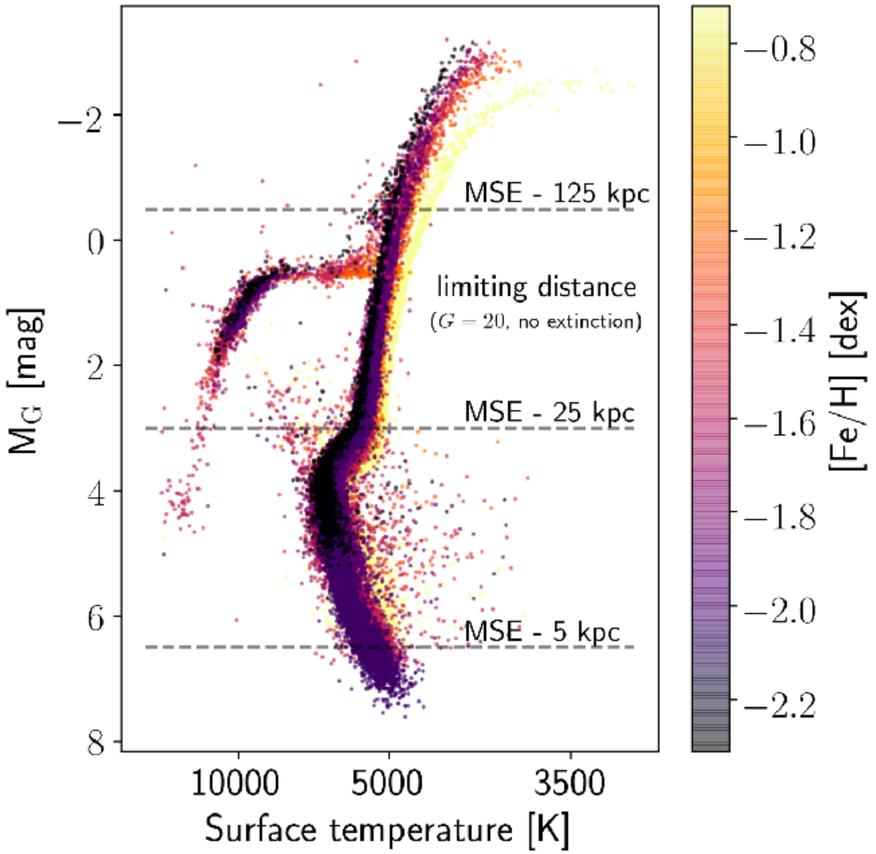


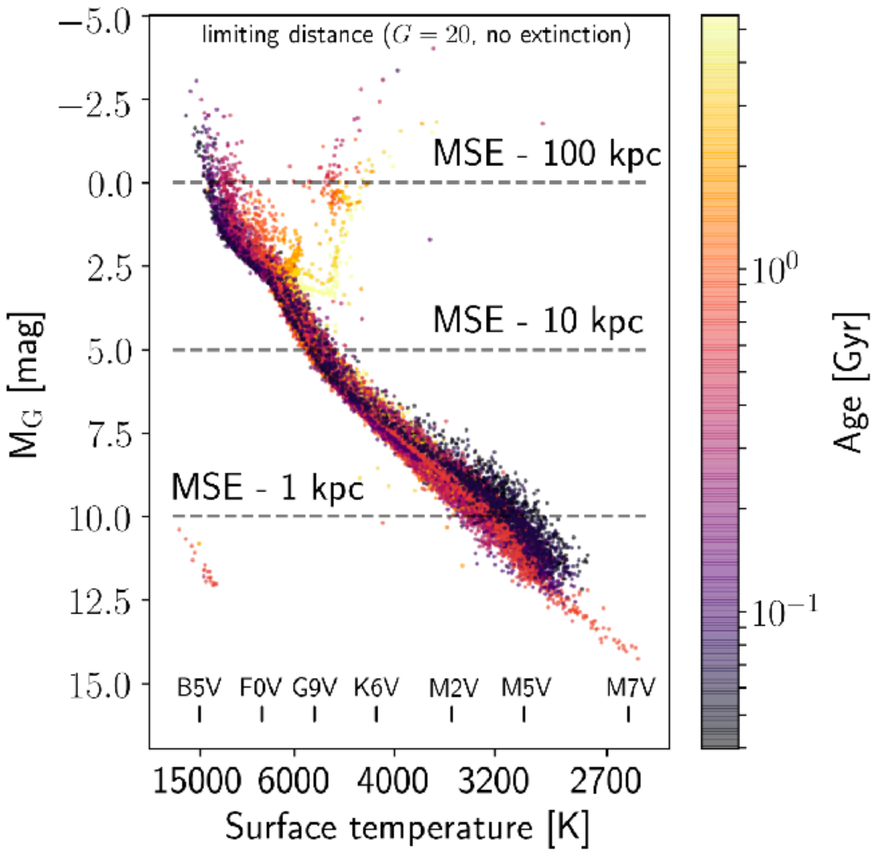
More merger everts.

Naidu et al., 2020

The Galactic Li evolution in MSE era

Maunakea Spectroscopic Explorer





Bergemann et al, 2019

The Galactic Li enrichment