

ENIGMATIC FIRST STARS AND WHERE TO FIND THEM

IFPU Focus Week

May 15-19, 2023

WHAT IS IFPU?

The **Institute for Fundamental Physics of the Universe** (IFPU) is a joint initiative of:

- the International School for Advanced Studies (SISSA),
- the Abdus Salam International Centre for Theoretical Physics (ICTP),
- the National Institute for Astrophysics (INAF)

and

- the National Institute for Nuclear Physics (INFN) as institutional party

The institute aims at hosting and promoting a vigorous and innovative multi-disciplinary research program focused on investigating the fundamental laws of Nature under a Cosmological and Astrophysical perspective.

Postdoc fellowships of 2+1 years: call for interest published on AJO in the fall.

IFPU PROGRAMS

Focus week programs: small-scale thematic workshops

Team research programs: activity of small groups developing or finalizing a project

Call for proposal for activities planned up to March 2023: now open with a soft deadline on the 6th of June. See the web page for more information.

LOGISTIC INFORMATIONS

ICTP Canteen



GENESIS & MOTIVATION OF THE WORKSHOP

- We know that first stars have existed and that they had to be metal free, but this is almost all we know about them...
- Different communities are looking for indirect (or direct) signatures of their nature, exploring different redshift ranges and different observables.
- Theoretical models are still very uncertain, there is the need to span from stellar to cosmological scales.

Not much progress in the last 20 years

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Is it possible to make some progress or to identify new lines of investigation increasing the interactions among communities?

THEMES OF GENERAL DISCUSSIONS

We have foreseen **3** moments for **general discussions**: Tuesday and Wednesday afternoon and Friday morning

Possible themes of discussion

- Theoretical yields of First Stars: how reliable are they? Why predictions from different groups are so different?
- Can we trust the inferred SFHs and stellar population properties derived from JWST observations?
- Why we have not found metal free stars?

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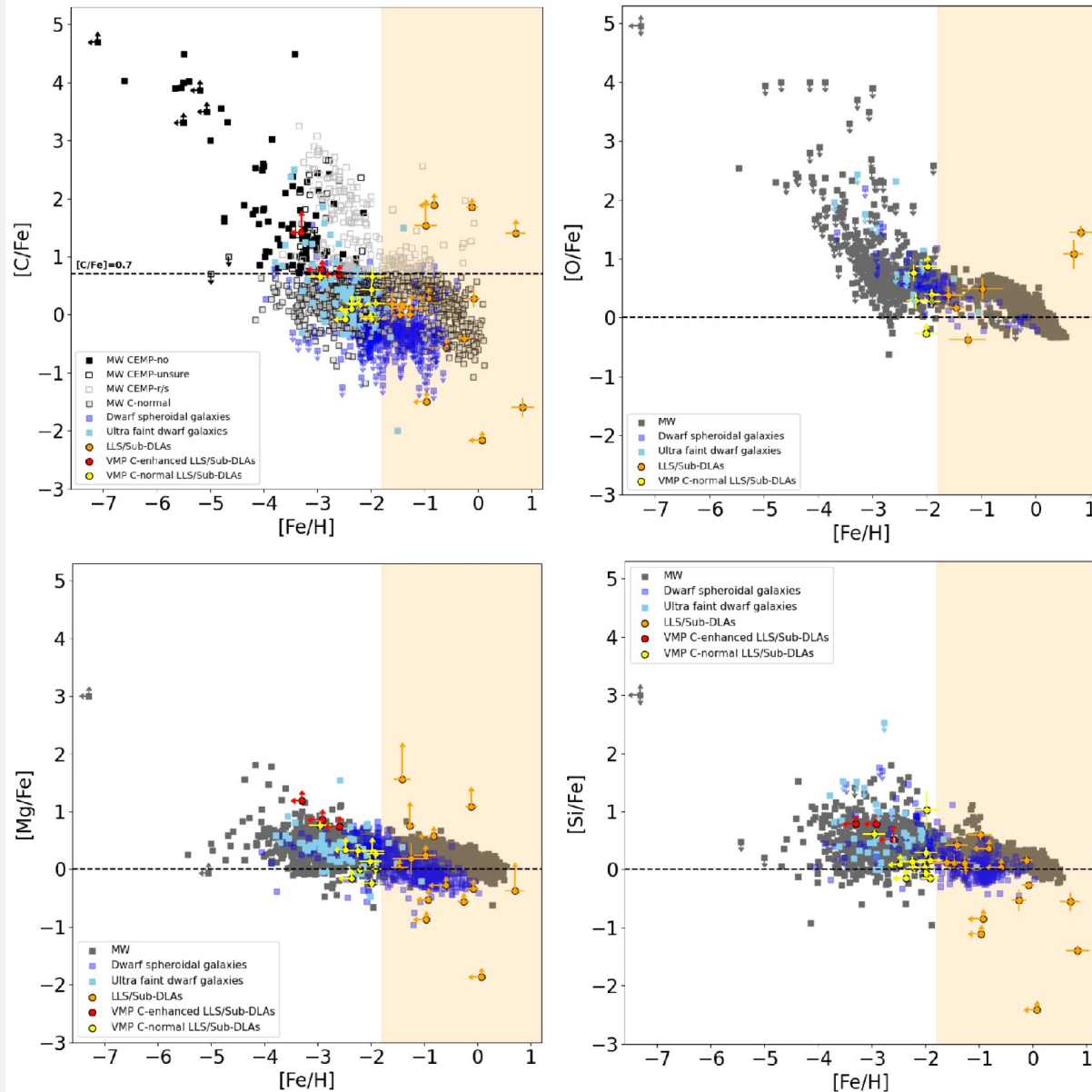
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Review by Nomoto on chemical yields

Signature: odd-even effect

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GENERAL DISCUSSION 17/05

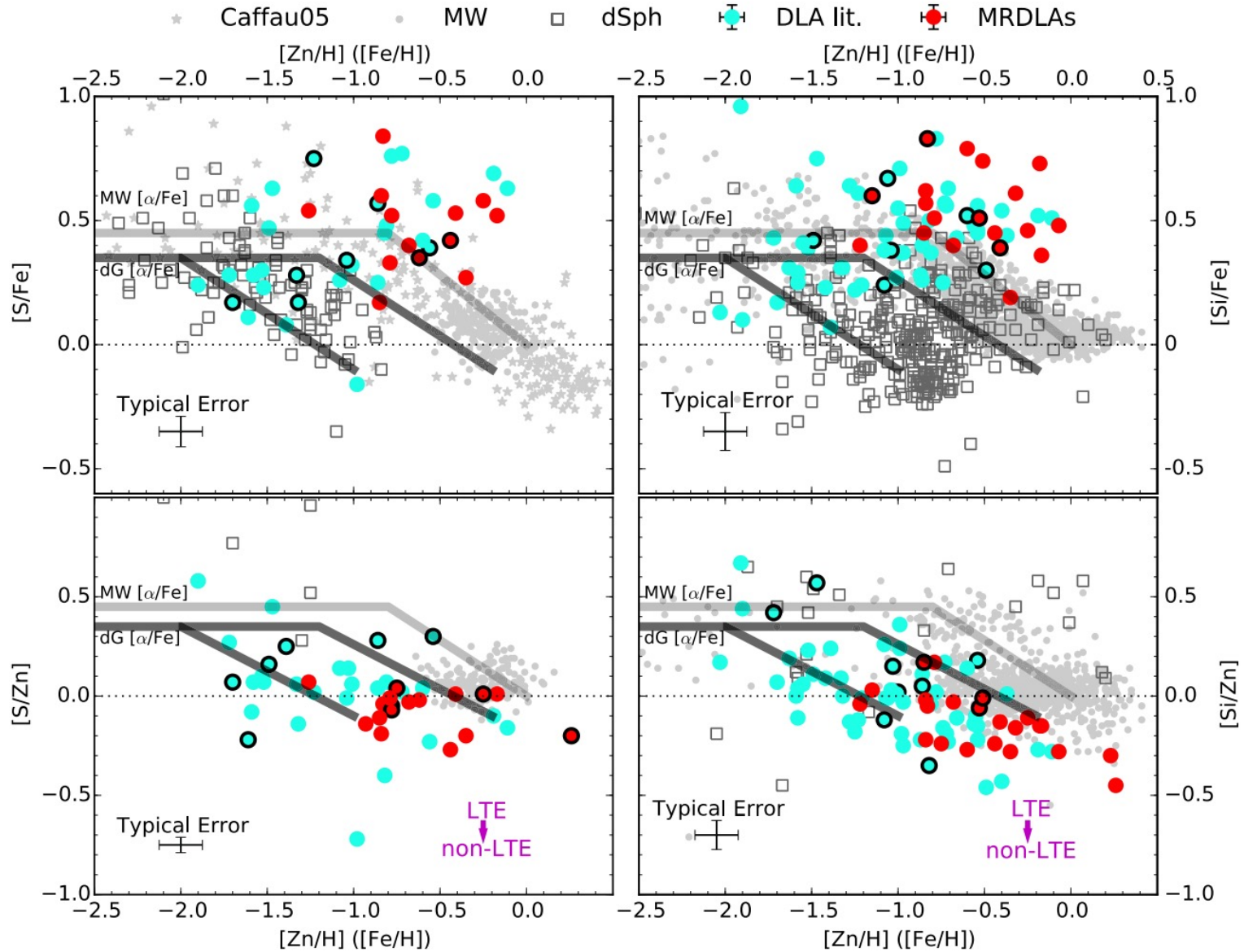


What is the relation between chemical abundances measured in absorption systems (probing the diffuse gas) and in stars?

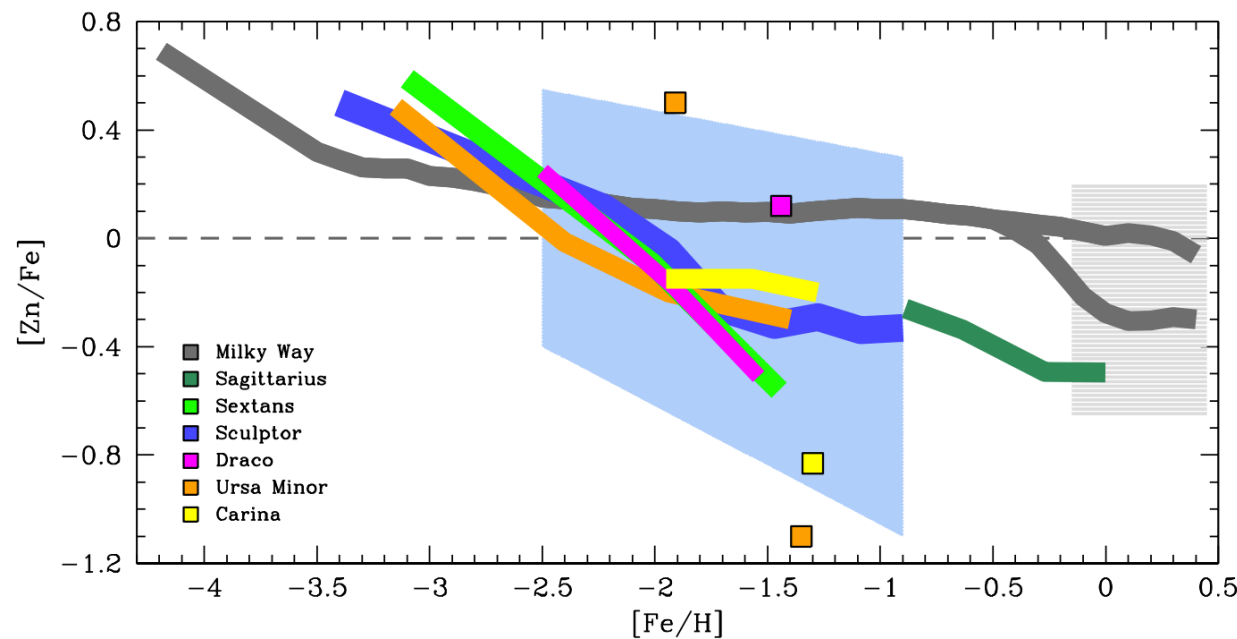
Is it correct to compare them?

Can we consider these absorption systems as the high- z analogues of local ultra-faint dwarf galaxies?

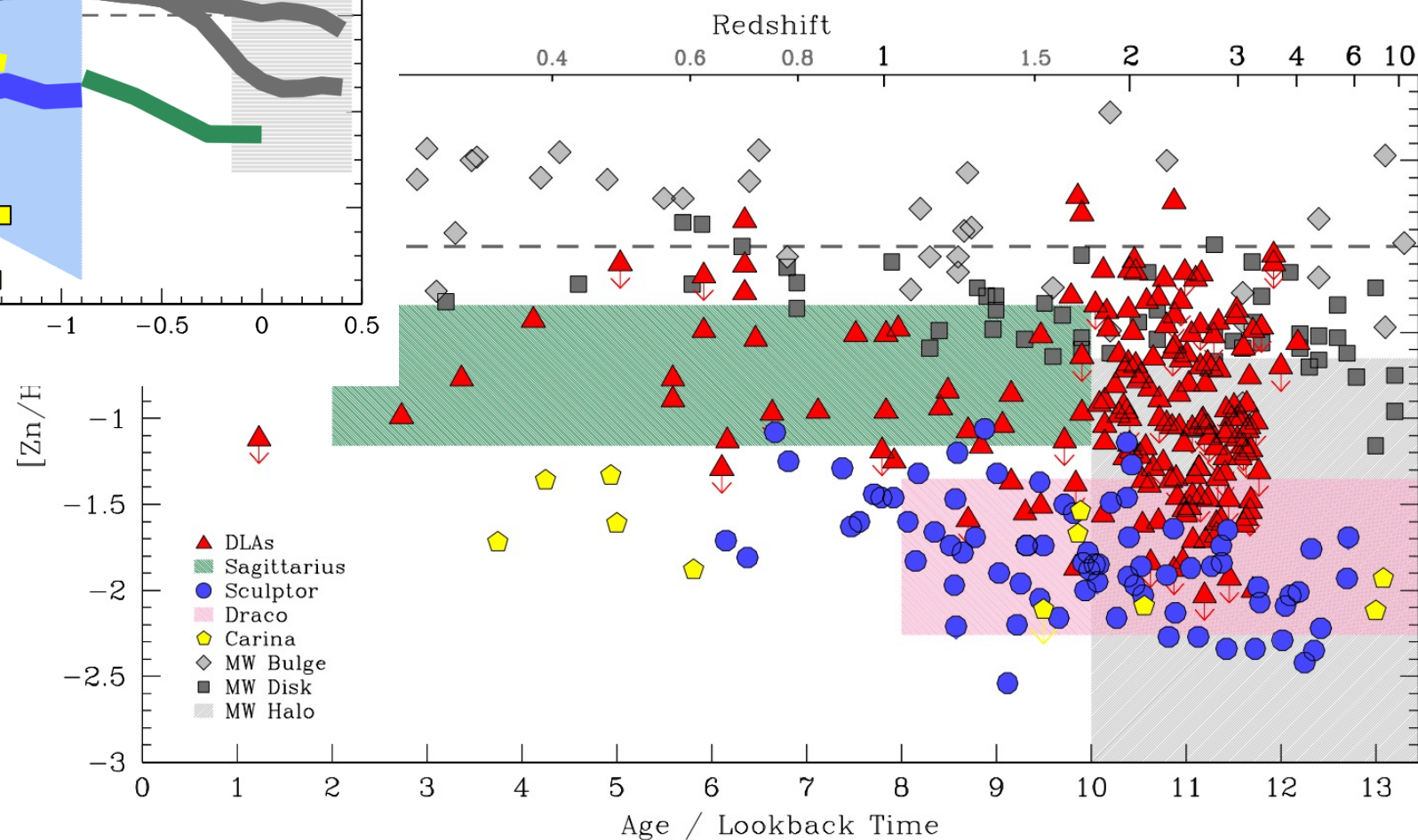
GENERAL DISCUSSION 17/05



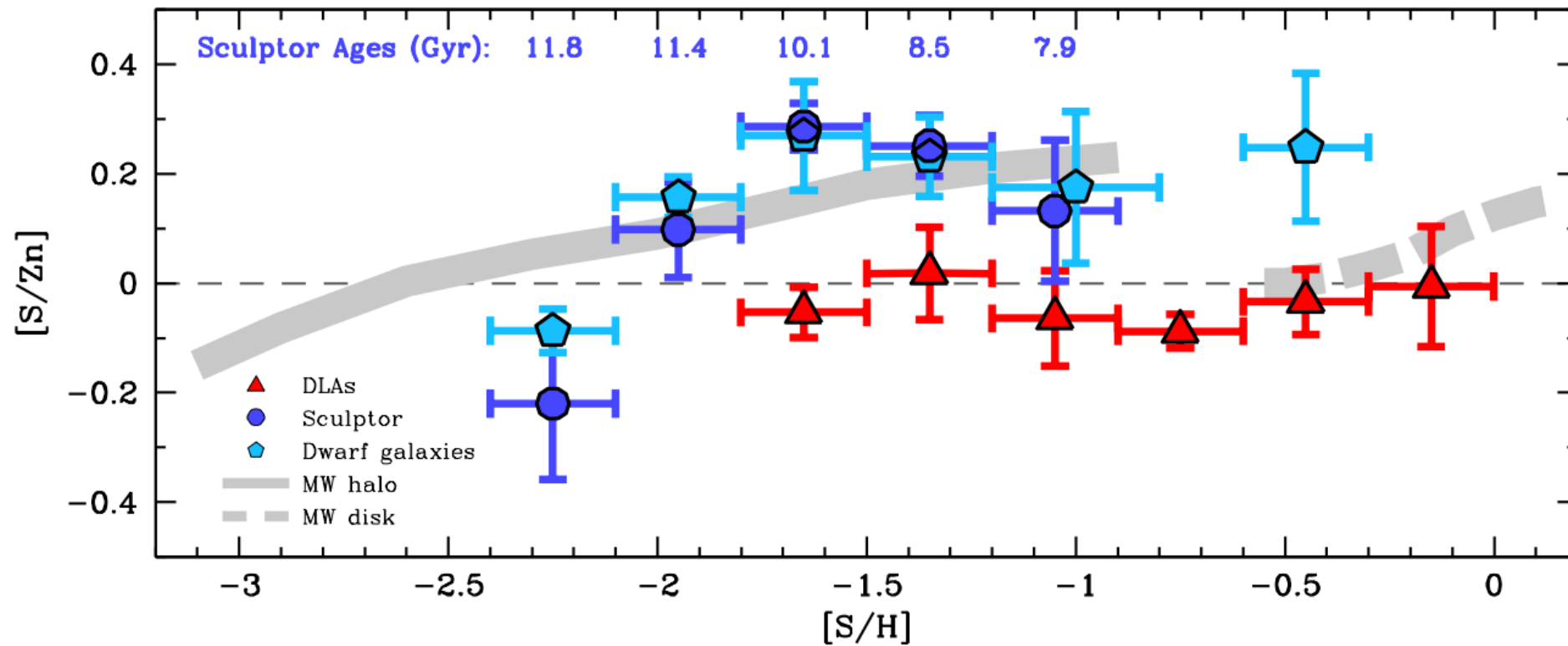
GENERAL DISCUSSION 17/05



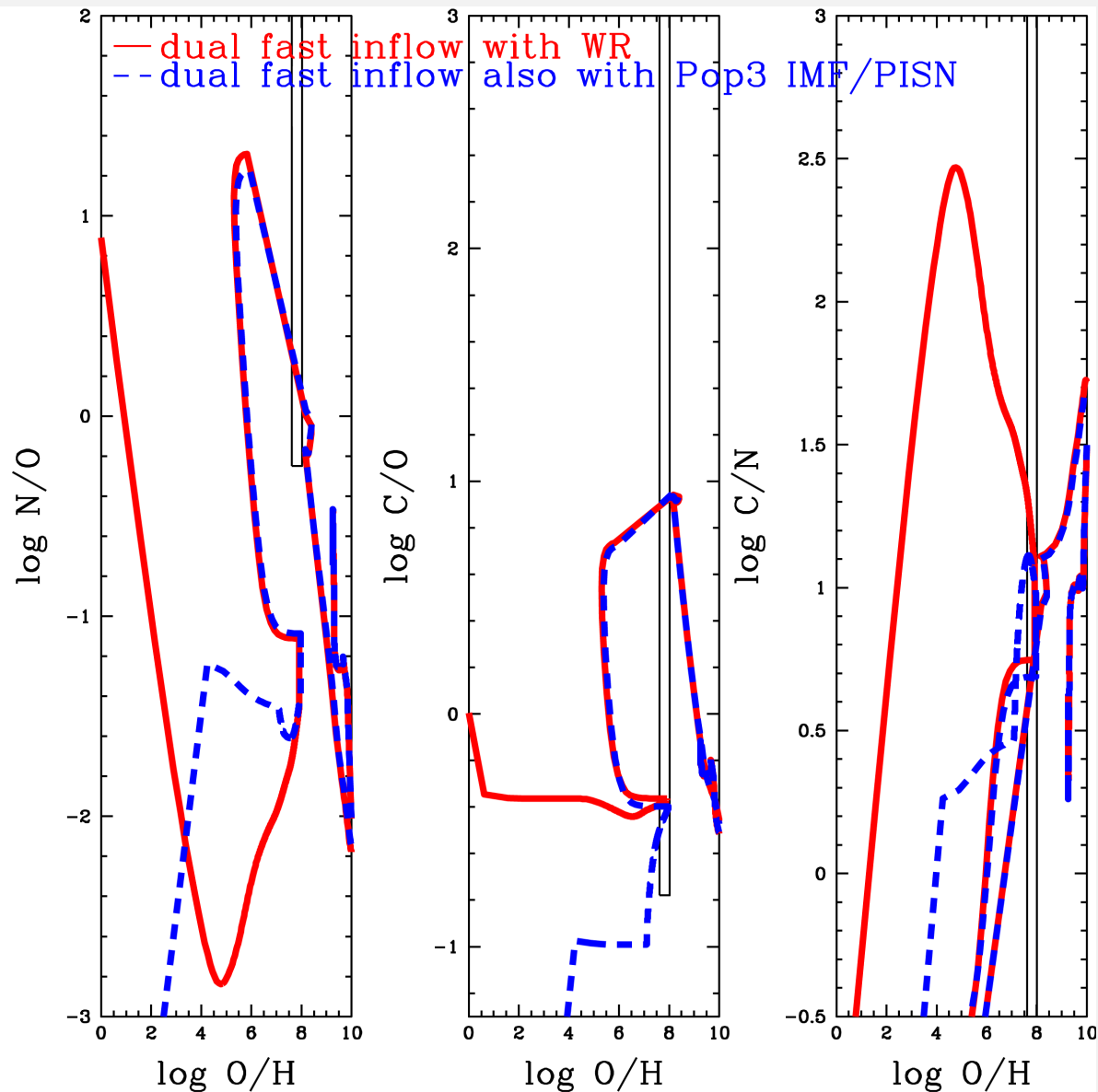
Skuladottir et al. 2018



GENERAL DISCUSSION 17/05



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Chiaki's talk

Comparison of model predictions with
GNz11 abundances

Can we derive the SF history for the observed
chemical abundances?