

A Black Hole and its Metal-Poor Companion:

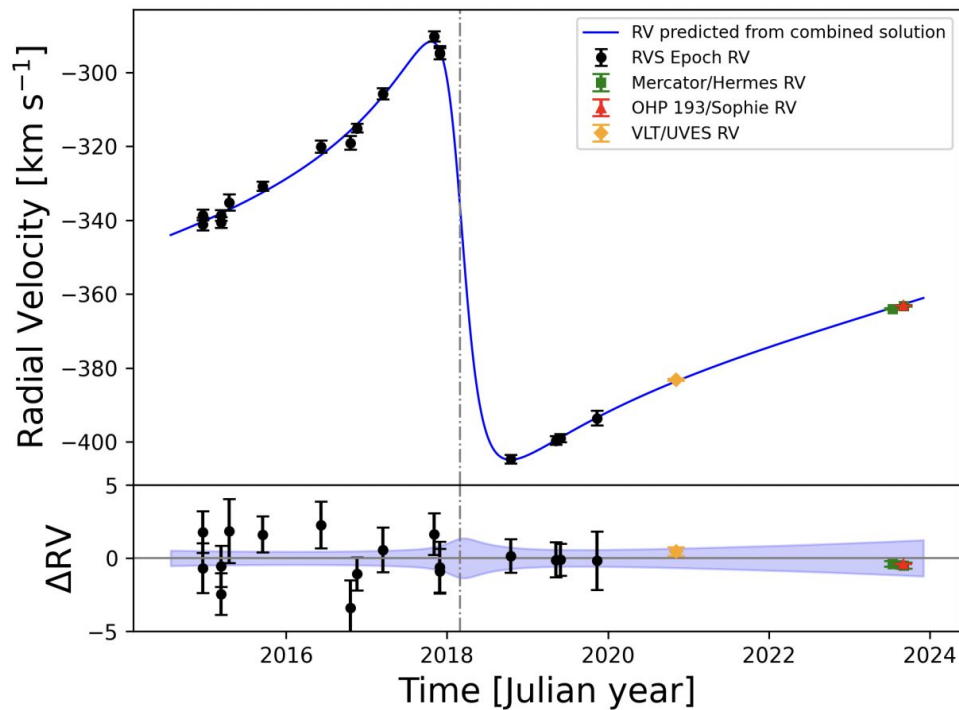
A Full Chemical Analysis of the Red Giant in Gaia BH3

Zoe Hackshaw | sirEN Poster Talk

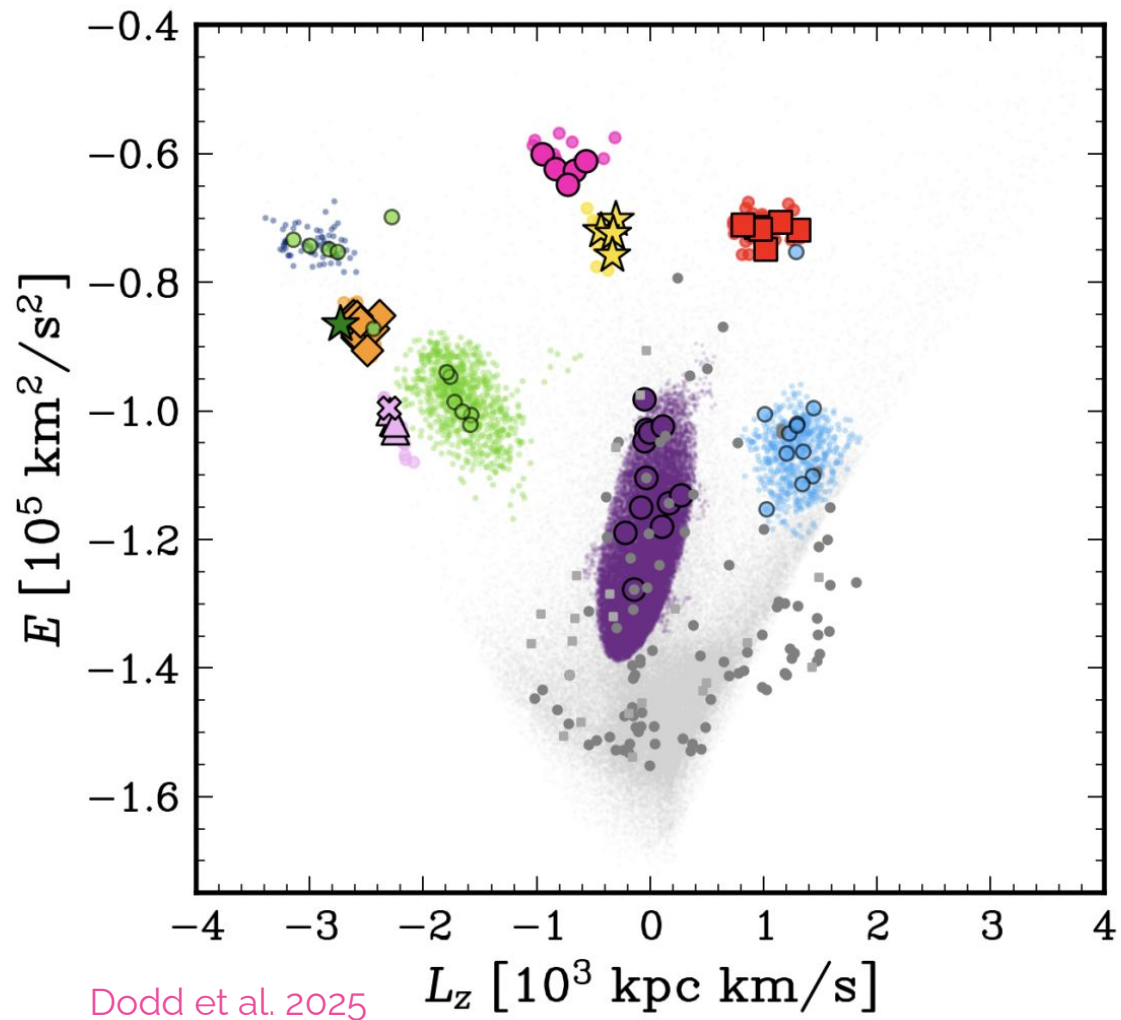
Ph.D. Student at the University of Texas at Austin

In Collaboration with Keith Hawkins, Catherine Manea, Malia Kao, Dionysis Gakis
& Carlos Jurado

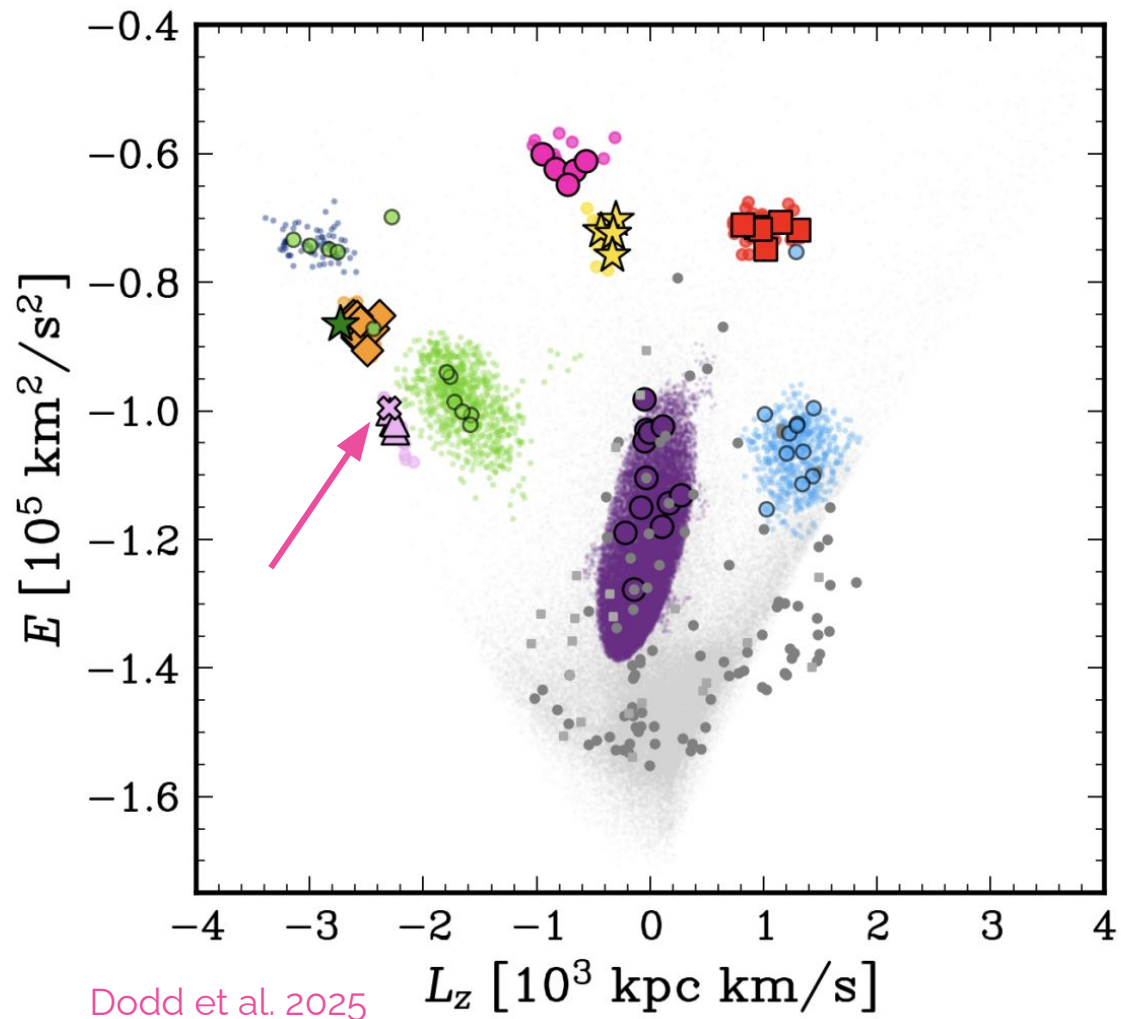
A 33 $M_{\odot}$ companion of a red giant in Gaia DR4



Gaia Collaboration et al. 2024



Dodd et al. 2025



How did this
system form?

How did this system form?

Binary Evolution

How did this system form?

Binary Evolution

Dynamical Interactions

How did this system form?

Binary Evolution

Dynamical Interactions

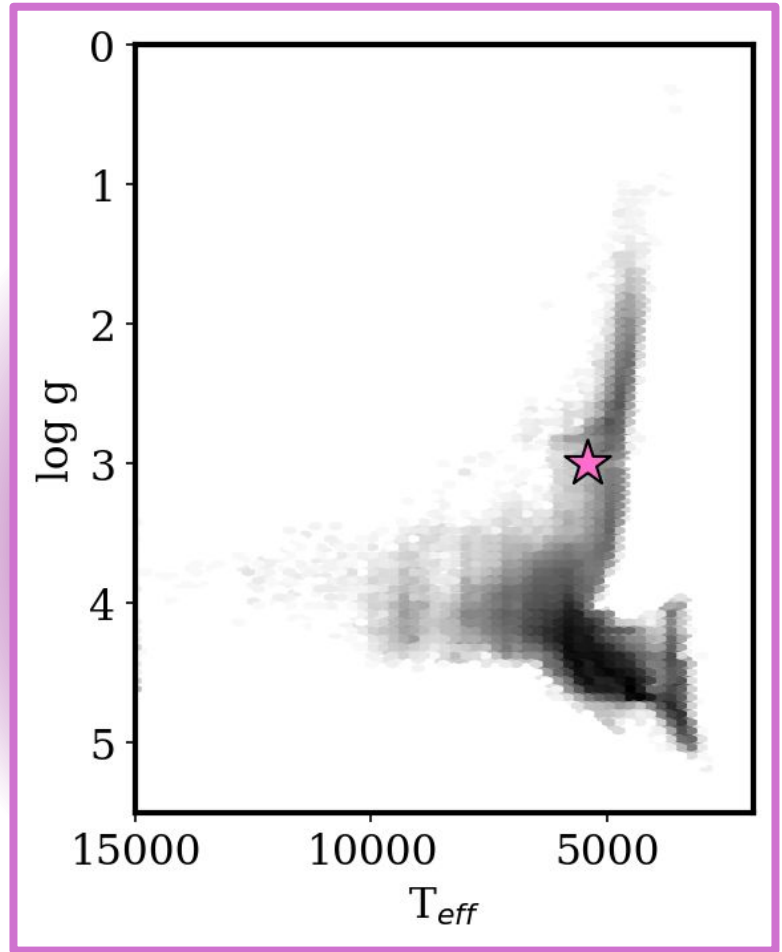
How can the chemistry of this system inform us about its origins?

OUR ANALYSIS

~40 hours of observations

Tull Coudé Spectrograph

2.7m HJST @ McDonald
Observatory



OUR ANALYSIS

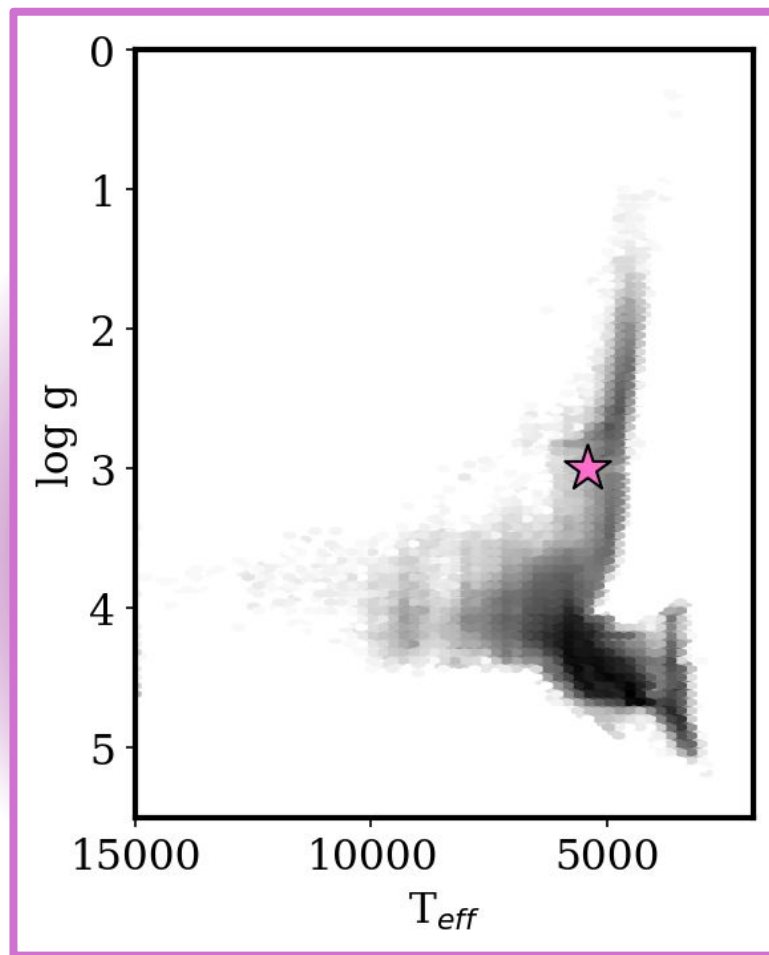
~40 hours of observations

Tull Coudé Spectrograph

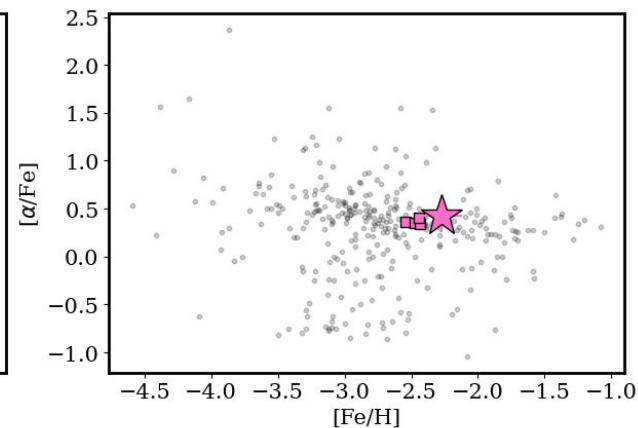
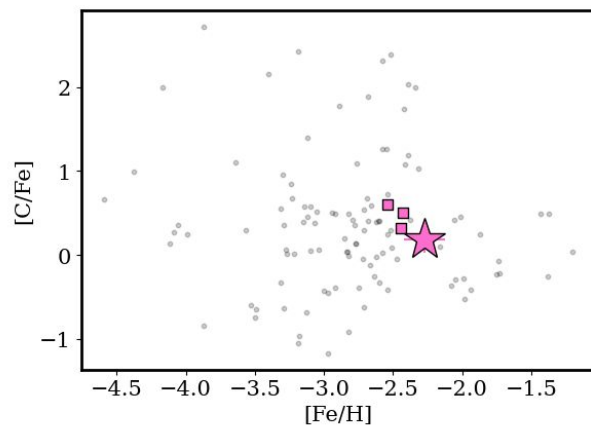
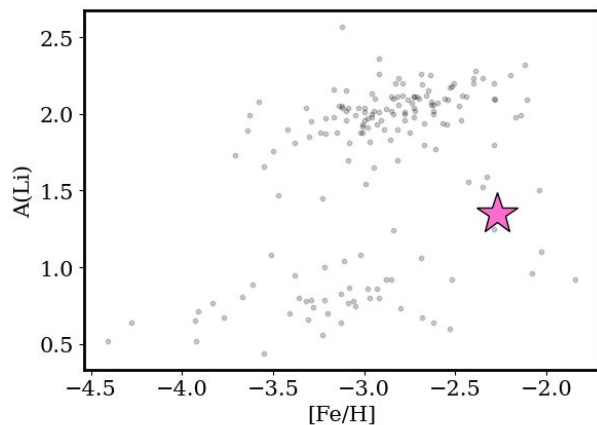
2.7m HJST @ McDonald
Observatory

STELLAR PARAMETERS:

T_{eff}	$5416 \pm 84 \text{ K}$
$\log g$	$3.00 \pm 0.04 \text{ dex}$
$[\text{Fe}/\text{H}]$	$-2.27 \pm 0.14 \text{ dex}$
$[\alpha/\text{Fe}]$	$0.42 \pm 0.17 \text{ dex}$
ξ	$1.54 \pm 0.11 \text{ km/s}$

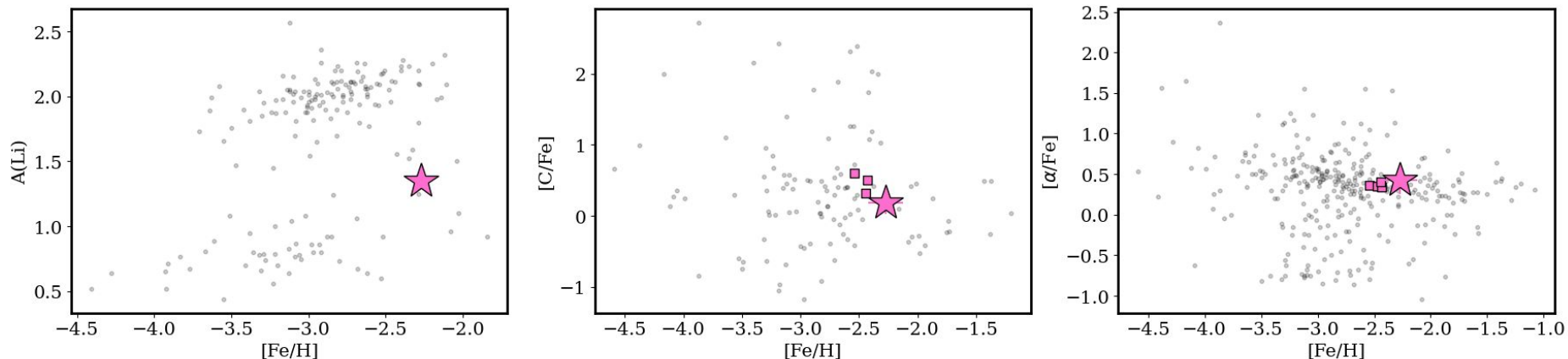


Tour of the Elements: light & alpha



Hackshaw, Hawkins, Manea, et al., in prep.

Tour of the Elements: light & alpha

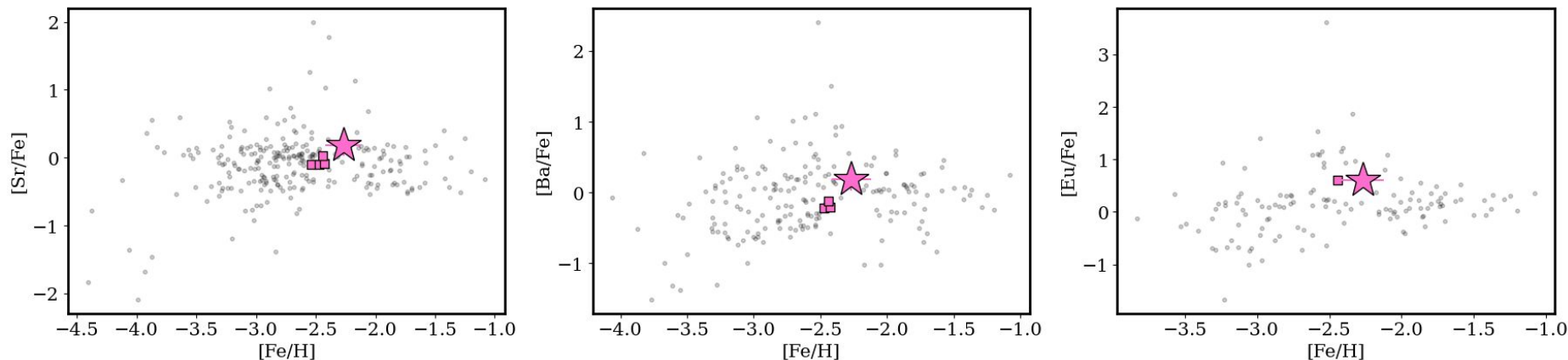


Hackshaw, Hawkins, Manea, et al., in prep.

Grey Points: Roederer+14

Pink Squares: ED-2 Dodd+25

Tour of the Elements: n-cap

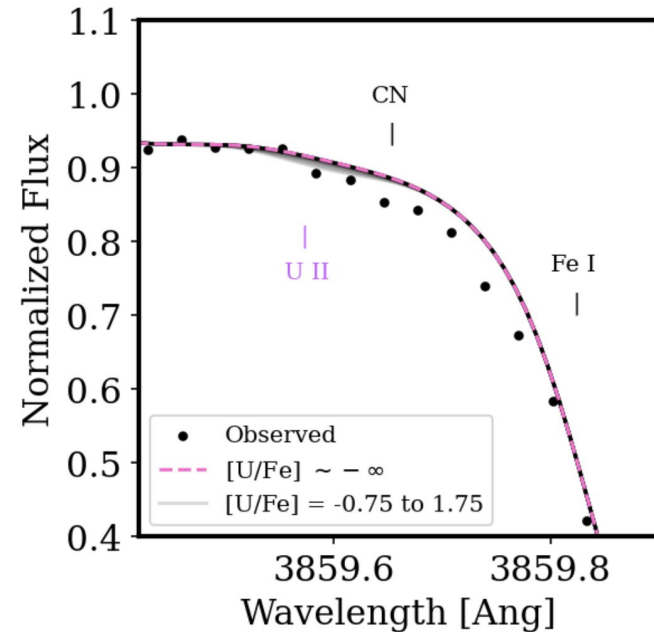
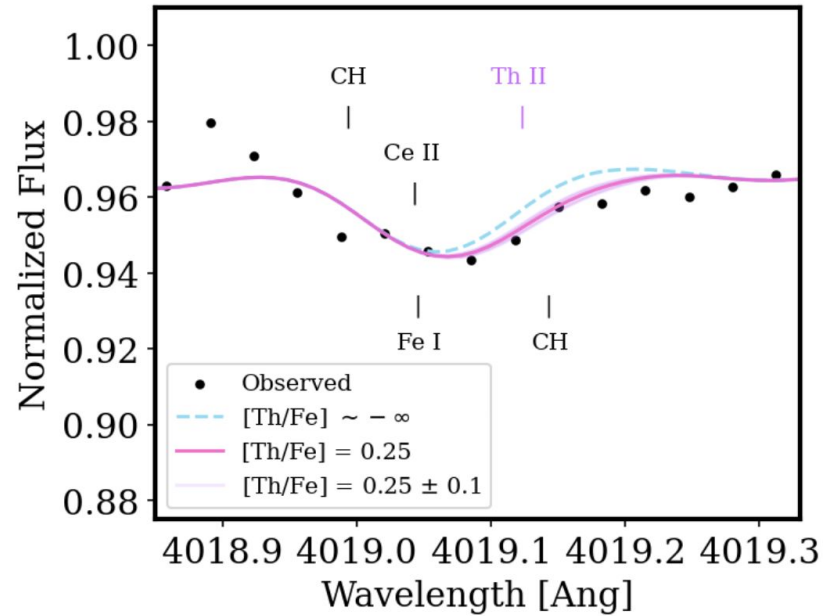


Hackshaw, Hawkins, Manea, et al., in prep.

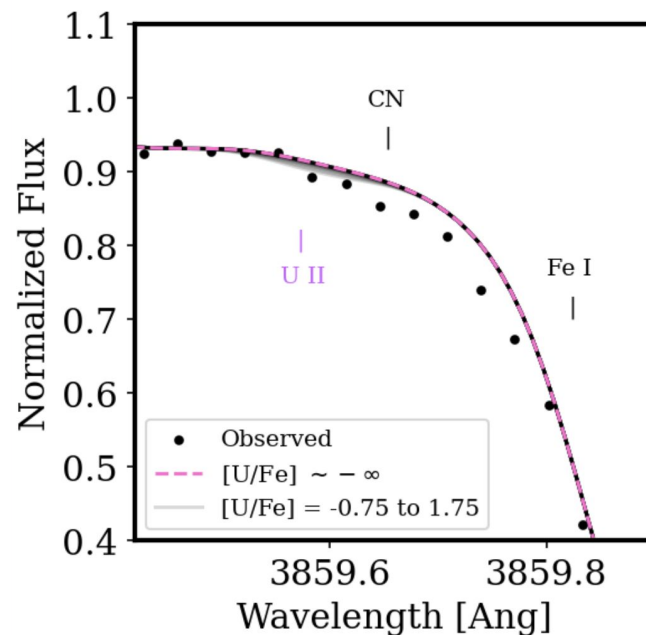
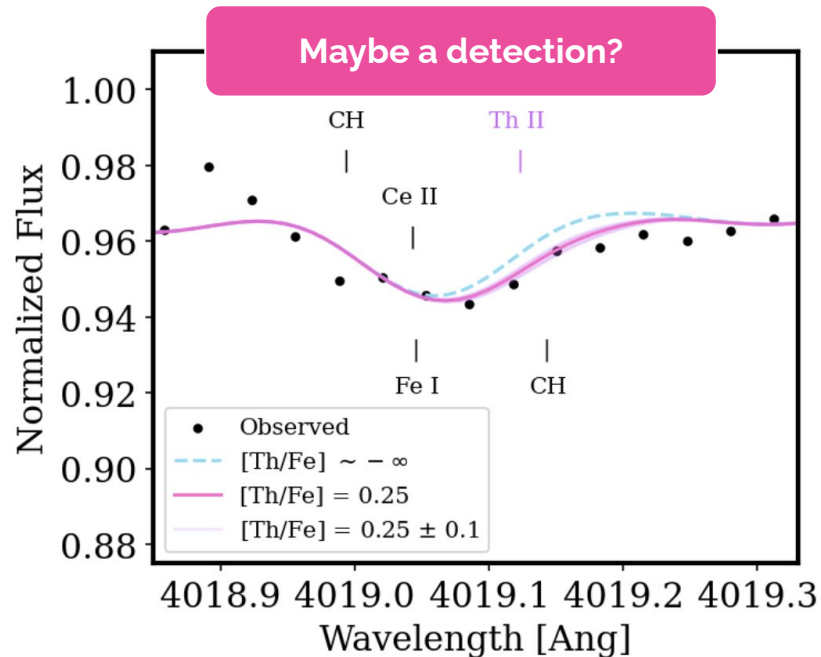
Grey Points: Roederer+14

Pink Squares: ED-2 Dodd+25

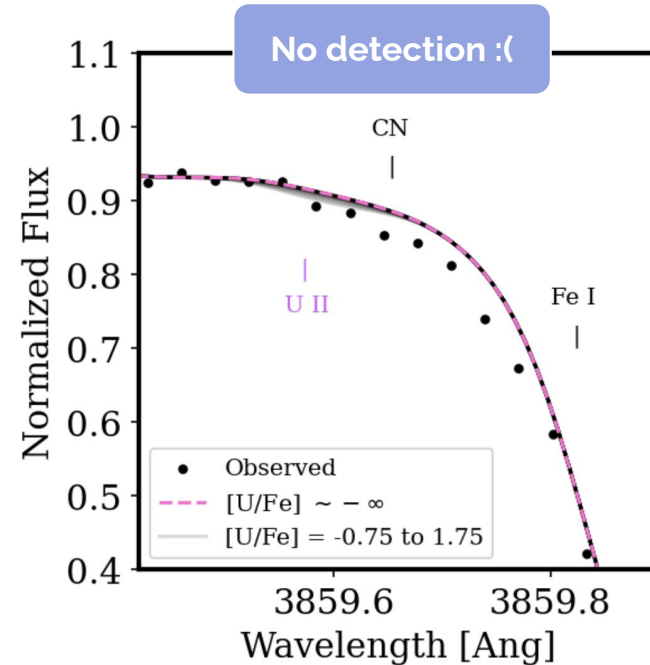
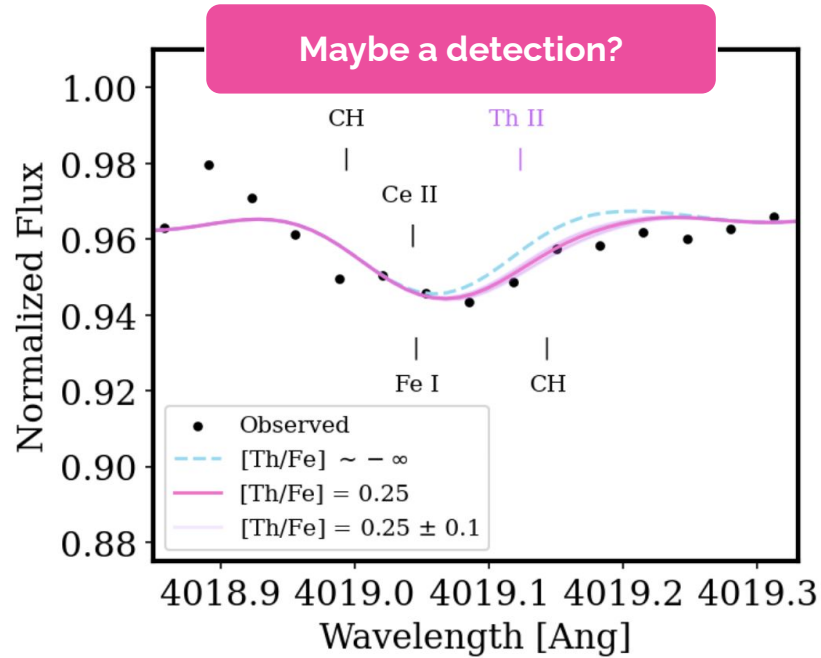
Tour of the Elements: actinide



Tour of the Elements: actinide



Tour of the Elements: actinide





Come visit Poster #6!

Binary Evolution

Dynamical Interactions



Come visit Poster #6!

Binary Evolution

Dynamical Interactions





Come visit Poster #6!

Binary Evolution

Dynamical Interactions



Thank you!
zoeackshaw@utexas.edu