# Comparative analysis of a binary system HD 135344 with a protoplanetary disk

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## Introduction

The chemical composition of a young (10 Myr) binary star system HD 135344 is studied. Both stars are early-type; their slowly mixing envelopes may bear the chemical imprint of recently accreted protoplanetary disk material. Since binary stars are form from the same gas and dust cloud, they are expected to have the same initial chemical composition. To study the protoplanetary disk around the secondary star we characterize both the primary and secondary star for a comparative analysis. The HD 135344B disk has asymmetrical properties in scattered light and thermal radiation. Photometric images of near-infrared scattered light shows two big spiral arms and an internal dust-free cavity.

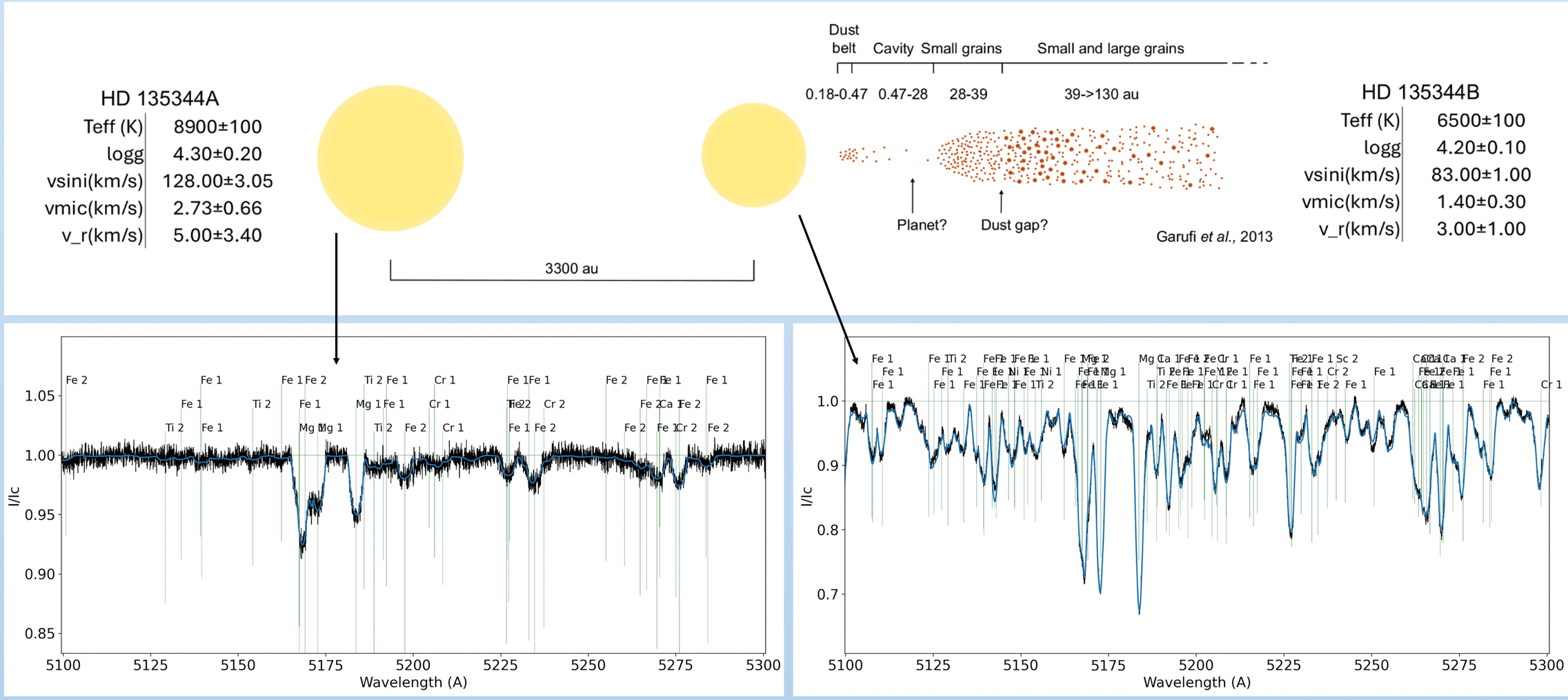


Figure 1. Above - Artistic representation of the HD 135344 system, not in scale. Top right depicts a cross section of the protoplanetary disk surrounding HD 135344B. Bottom left - HD 135344A spectrum from HARPS@ESO with synthetic spectrum. Bottom right - HD 135344B spectrum from ESPaDOnS@CFHT with synthetic spectrum.

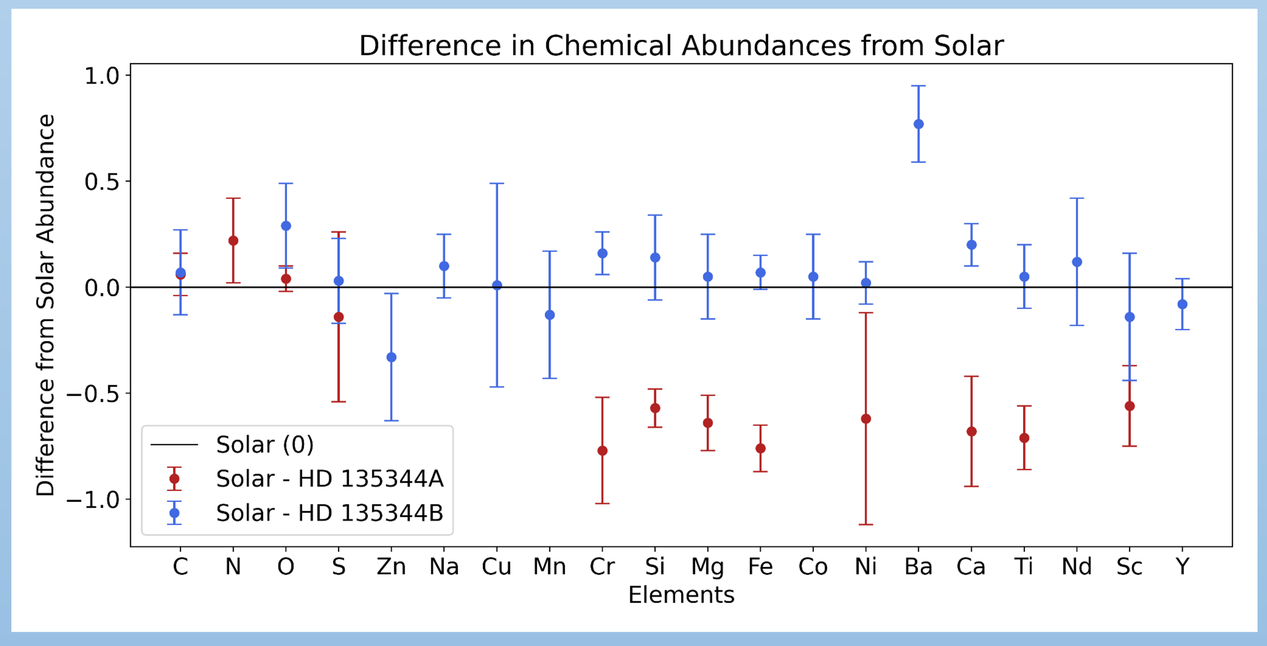


Figure 2. Difference in Chemical Abundances from Solar.

## Method

Spectrum synthesis: ZEEMAN

Model atmospheres: ATLAS9

Line data: VALD

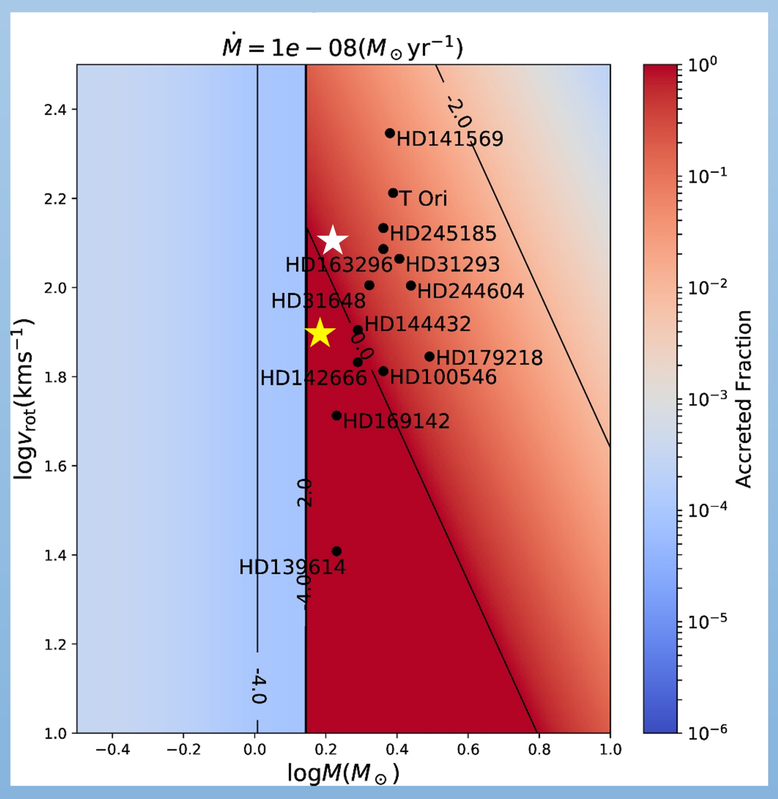


Figure 3. Photospheric abundance of accreted material by Jermyn and Kama 2018 models. White star is HD 135344A and yellow star is HD 135344B.

## Discussion

HD 135344A:

Deficiency in refractory element abundances

- Sign of a recently accreted disk?
- λ Boötis star?

HD 135344B:

No clear deficiency nor excess in abundances

- Dust gap is young?
- Is the outer convective layer deeper?
- Is the accretion rate unexpectedly low?

**References**

Garufi, A., Quanz, S. P., Avenhaus, H. *et al.,* (2013). A&A, 560:A105.
Jermyn, A.Š. and Kama, M. (2018). MNRAS, 476(4):4418–4434.

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