

---

# Accurate asteroseismic surface rotation rates for evolved red giants

Felix Ahlborn<sup>\*1</sup>, Earl Bellinger<sup>2</sup>, Saskia Hekker<sup>1</sup>, Sarbani Basu<sup>3</sup>, and Daria Mokrytska

<sup>1</sup>Heidelberg Institute for Theoretical Studies – Germany

<sup>2</sup>Max Planck Institute for astrophysics – Germany

<sup>3</sup>Department of Astronomy, Yale University – United States

## Abstract

The understanding of the internal stellar rotation and its evolution is crucial for constructing accurate stellar models. To that end, we use asteroseismology to probe the interior rotation of stars, with a focus on red giants. However, the accurate determination of near-surface rotation rates in evolved red giants was previously hindered by large systematic errors inherent to the inversion method (e.g., Ahlborn et al. 2020). To address this issue, we have developed a modification to a currently used rotational inversion method that effectively eliminates these errors (Ahlborn et al. 2022).

Utilizing our improved rotational inversion technique, we aim to determine accurate red-giant envelope rotation rates by employing a broader range of suitable reference stellar models (Ahlborn et al. in prep). We select suitable reference models by matching the large frequency separation and requiring a high degree of correlation of the mixed-mode character between the observations and the reference model. Our results indicate that, given an adequate set of reference models, rotation rates can be accurately recovered.

---

<sup>\*</sup>Speaker