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Searching for P-rich stars in bulge Globular Clusters

Morgan Sabino Camargo

First Name:	Morgan
Last Name:	Sabino Camargo
Institution/Affiliation:	IAG USP
Country of Residence:	Brazil
Preferred type of presentation	Oral
Will you attend in person or online?	—
Email	cmorgan@usp.br

Abstract

Among metal-poor giant stars (in the range of $[Fe/H] \geq -1$) there is a detected pattern of Phosphorous enhancement ($[P/Fe] \geq 0.8$) found in 78 field stars (Masseron et al. 2020, Brauner et al. 2023, Brauner et al. 2024). As the main sources of Phosphorous nucleosynthesis are still unknown, investigating this behaviour of enrichment may reveal clues to missing factors in current chemical evolutionary models. Another important result from Brauner et al. (2023) was the detection of a P-rich star in the globular cluster M4, which raises the question of what is the main mechanism of P enhancement that is occurring in some clusters only. This work investigated a sample of bulge GCs stars searching for signs of P enrichment, studying the $P\ I\ 15711.622\ \text{\AA}$ and $16482.932\ \text{\AA}$ lines, using H-band high resolution spectra ($R \sim 22500$). These stars were observed in the bulge Cluster APOgee Survey (CAPOS) and APOGEE-2, and the selected sample is in a range of similar metallicities to the P-rich field stars.