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Unpuzzling the star formation scenario of the Canis Major stellar nursery

J. V. Corrêa-Rodrigues[1], J. Gregorio-Hetem[1] and T. Santos-Silva[1]

[1]*Instituto de Astronomia, Geofísica e Ciências Atmosféricas da Universidade de São Paulo (IAG/USP), R. do Matão, 1226 - Butantã, São Paulo - SP, 05508-090.*

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Corresponding author: joaov.crodrigues@usp.br

We present preliminary results of ongoing work that aims to investigate the Canis Major star-forming region. Based on optical spectra, we found 27 stars with Li I λ 6708 Å absorption line, which are probably T Tauri stars. We additionally identified a few stars with indications of Hα excess, probably due to accretion, by analyzing photometric data.

The Canis Major Association OB1/R1 (CMa) is a peculiar star-forming region with several proposals attempting to explain its formation history (e.g. Herbst & Assousa, 1977; Reynolds & Ogden, 1978). Recent studies suggest that three runaway stars were probably expelled by successive events of supernovae (SN) that occurred ∼6, ∼2, and ∼1 Myr ago (Fernandes et al., 2019). These events affected the environment and evolution processes of the association's young stellar objects.

Our team acquired optical spectra of more than one hundred stars in the region associated with FZ CMa using the Gemini Multi-Object Spectrograph (GMOS). About 20% of the stars are counterparts of X-ray sources. This population is probably mixed in terms of age, lying between a younger group associated with the star Z CMa (< 5 Myr) and an older one associated with GU CMa (> 10 Myr). Our goal is an attempt to improve the *census* of the young low-mass population, which is essential to investigate the interplay between SN and the CMa star-forming region.

The GMOS data are currently under analysis after a careful data reduction process. We are looking for typical spectral indicators of this evolutionary stage, including the Li I absorption line (λ 6708 Å), which indicates their youth (e.g. Fernandes et al., 2015), and the Hα emission line, used to distinguish disk-bearing stars from stars without active accretion disk.

The preliminary results show the presence of 27 stars with the lithium line, these being the T Tauri stars candidates (Fig. 1). In addition, we found 5 stars without the Li I line but showing the Hα emission line. These stars could also be young, and further investigation is needed to understand their characteristics.

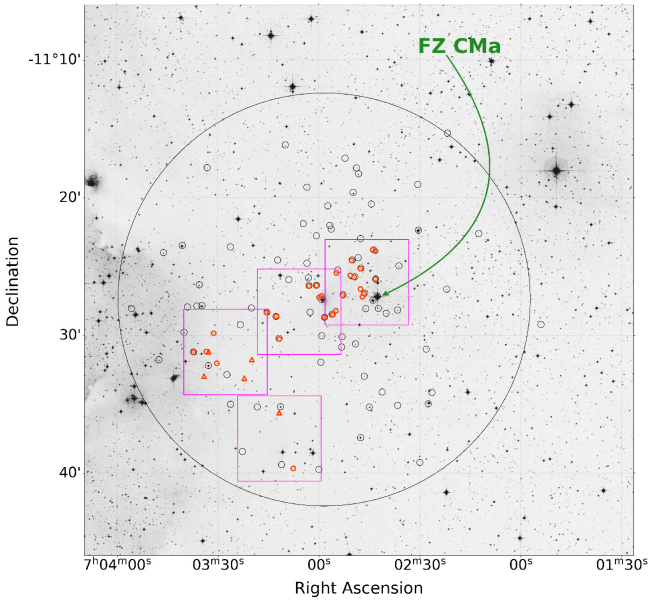

Figure 1. DSS image (R band) from the region associated with the star FZ CMa. Magenta squares: GMOS fields. Black small circles: X-ray sources found by Santos-Silva et al. (2018). Red circles: stars showing the Li I absorption line. Red triangles: stars showing Hα emission, without Li I line.

In parallel, we are exploring multiband photometric data from the 12-filter Southern Photometric Local Universe Survey (S-PLUS) DR4 available for the stars in the region. The results so far indicate the same trends reported by Gregorio-Hetem et al. (2021), however with less scattering. We also found a few stars with indications of Hα excess, likely caused by accretion.

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