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TOWARDS A COMPLETE STUDY OF THE INITIAL MASS FUNCTION AND EARLY KINEMATICS EVOLUTION OF THE 25 ORIONIS STELLAR GROUP

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RESUMEN

Presentamos los avances de un proyecto en marcha para construir fotométrica y espectroscópicamente la función de masa inicial del sistema del grupo estelar 25 Orionis con una muestra estadísticamente completa en el rango completo de masa del grupo ($0.01< m/\mathrm{M}_\odot <10.0$), junto como un estudio cinemático de sus miembros con masa intermedia y alta.

ABSTRACT

We present the advances of an ongoing project to construct the photometric and spectroscopic system-IMF of the 25 Orionis stellar group with a statistically complete sample across the whole mass range of the group ($0.01< m/\mathrm{M}_\odot <10.0$), together with a kinematic study of its intermediate- and high-mass members.

Key Words: clusters and associations: individual (25 Orionis) — stars: intermediate-mass — stars: low-mass

The ∼7-10 Myr old stellar group 25 Orionis (25 Ori) is one of the most numerous and spatially dense populations at this age within 400 pc and also presents minimum extinction ($\bar{A}_V \approx 0.30$ mag.; Briceño *et al.* 2005, 2007; Downes *et al.* 2014; Suárez *et al.* 2017). These properties make to 25 Ori an ideal laboratory to study the Initial Mass Function in its entire mass range and its kinematics with most of the intermadiate- to high-mass members.

We have optical and near-infrared photometric data covering 25 Ori from 10 $\mathrm{M}_\odot$ down to $< 10\mathrm{M}_{\mathrm{Jup}}$. The optical data come from observations with DECam at CTIO (PI: G. Suárez), the CIDA Deep Survey of Orion catalog (Downes *et al.* 2014) and the public database of UCAC4 (Zacharias *et al.* 2013). The near-infrared data are from the VISTA science verification program (Petr-Gotzens *et al.* 2011) and the 2MASS catalog (Skrutskie *et al.* 2006).

These data allow us to construct the i vs $i-J$ color-magnitude diagram to select the 25 Ori photometric candidates down to the near-planetary mass range with an efficiency of 86% (Downes *et al.* 2014).

Additionally, we have collected spectra for most of the 25 Ori photometric candidates: *i*) OAN-SPM/Echelle spectra of 100% of the expected members with $m >2.0$ $\mathrm{M}_\odot$. *ii*) SDSS-IV/APOGEE-2 high-resolution spectra to cover ∼90% of the expected members with masses $0.40< m/\mathrm{M}_\odot <6.0$. iii) 50 new confirmed M0-M6 spectral type members using SDSS-III/BOSS low-resolution optical spectra (Suárez *et al.* 2017). iv) MMT/Hectospec low-resolution spectra for ∼80% of the expected members with masses $0.03< m/\mathrm{M}_\odot <0.60$. *v*) GTC/OSIRIS low-resolution spectra of ∼70% of the expected members with $m <0.02$ $\mathrm{M}_\odot$ (Downes *et al.* 2015, Downes *et al.* in prep.).

To spectroscopically determine the memberships of the 25 Ori photometric candidates, we considered several criteria summarized in Suárez *et al.* (2017).

High-resolution spectra (OAN-SPM, APOGEE-2) provide precise radial velocities to study, together with available proper motions, the kinematics of the group to determine if 25 Ori is gravitationally bound.

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