

VLT MUSE and future ELT contributions to the study of a planetary-mass companion candidate

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Recent JWST/NIRCam imaging of the Orion Nebula Cluster has revealed a faint source located 230 mas from the M-dwarf V2376 Ori, situated in the Orion D association, at a distance of ~ 304 parsecs. This object, designated V2376 Ori b, seems to be a candidate young (age < 7 Myr) planetary-mass companion, an understudied object.

To confirm the nature of V2376 Ori b and to characterize its properties, we used the Narrow-Field Mode of VLT/MUSE, which provides both high spectral and spatial resolution.

I will present how we estimated the effective temperature, luminosity and mass of the companion using its spectral energy distribution (SED) and black-body models combined with evolutionary tracks. I will also explain how we used emission lines in the spectrum, notably $H\alpha$, to assess accretion activity and how we estimated the mass accretion rate. The MUSE data cube also enabled us to produce emission line maps and to refine the spectral classification of the host star.

We confirmed the nature of V2376 Ori b as a young planetary-mass companion still undergoing active formation. This system offers a valuable opportunity to study disk evolution and accretion processes in the planetary-mass regime. While MUSE delivered crucial insights, future observations with the ELT, offering better spatial and spectral resolution, will be essential in resolving fine structures in emission lines and probing the inner regions of the circumplanetary environment.