A VLT/MUSE Survey for Accreting Planets/Jets in 67 Protoplanetary Disks

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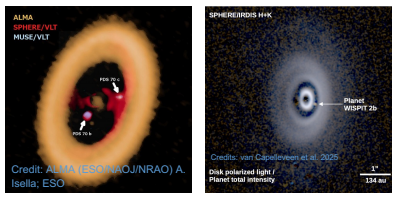
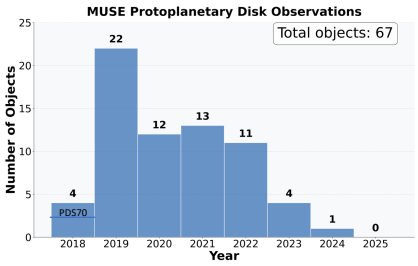
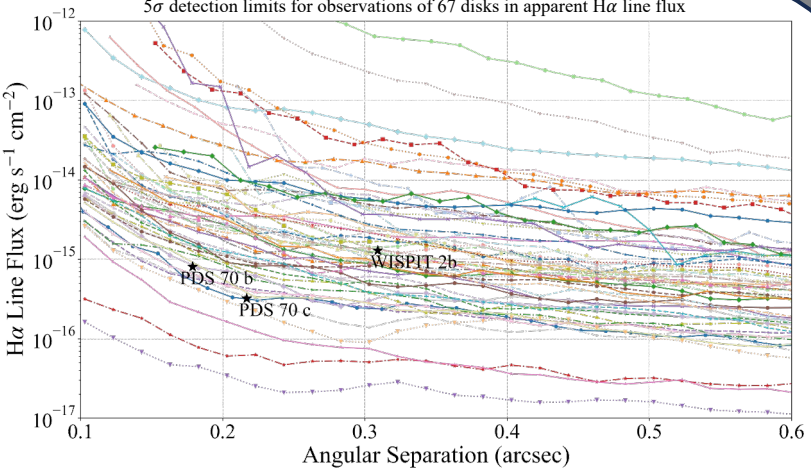
Three confirmed planets with accreting Hα emission





- Disks observed by MUSE as a function of year

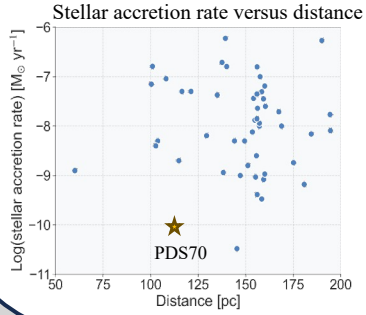
5σ detection limits for observations of 67 disks in apparent Hα line flux



- Each line represents one disk observation
- Planets above the curve are detectable (brighter than the 5σ detection limits)
- Since almost all curves lie above PDS 70 b/c, MUSE can't detect similar planets

why do most observations yield higher line-flux limits?

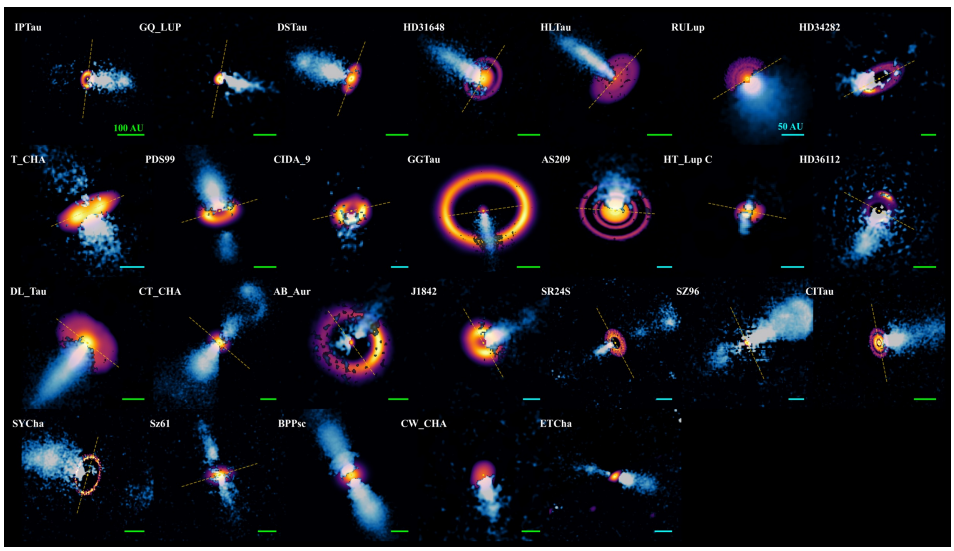
Stellar accretion rate versus distance



Favorable conditions for planet detection: longer exposure time, closer distance, and fainter stellar Hα

- Exposure time: 80% of disk observations have longer integration times than PDS70
- Most targets are farther and/or higher-accreting, so stellar Hα is brighter → lower sensitivity than the PDS 70 observation

Jet gallery



The blue regions reveal collimated jet/outflow structures traced by [O I] λ6300, Hα, [N II] λ6583, and [S II] λλ6716, 6731, whose orientations can be compared to the outer-disk position angle (yellow dashed line) and the ALMA continuum morphology (red parts)

- MUSE is a powerful IFU for studying jet morphology across multiple emission lines
- CW Cha, GQ Lup, and DS Tau show only redshifted jets, suggesting an asymmetric jet-launching mechanism
- Jets are usually perpendicular to the inner disk, but some (e.g., AB Aur) are misaligned with the outer disk, implying some observable effects like shadows