

## Accretion on the PDS 70 planets: a burst-like behavior?

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Giant planets acquire their mass by gas accretion from their natal protoplanetary disk. While some of the gas reaches the planet directly, most of it is channeled through a circumplanetary disk. While the exact process by which the disk is accreted onto the planet is still up to debate, accretion is expected to produce strong emission lines (H $\alpha$ , Paschen Beta, ...) and UV excess. The details of accretion, and interactions with the circumplanetary disk, are expected to dictate the initial energy budget of the planet, and the formation of exomoons.

Only two systems are known to bear accreting planets (3-10 M $_{\text{Jup}}$ ) within a protoplanetary disk: the PDS 70 b and c planets, and the WISPIT 2 b planet. Their very close separation (0.1-0.3") and faint emission lines prevent their study besides low-resolution H $\alpha$  observations. This implies that the interpretation of the emission lines flux from snapshot observations is mostly model-dependent. Instead, planetary-mass companions, wide-orbit (1-2") and higher-mass counterparts (10-20 M $_{\text{Jup}}$ ), have been used as proxies to test the mass-limits of various accretion scenarios in the case of self-evolving systems.

Recent studies have shown that magnetospheric accretion (the accretion process for stars) extends down to brown dwarfs and planetary-mass companions (10-20 M $_{\text{Jup}}$ ), hinting at a common process on a wide range of mass. Magnetospheric accretion occurs when the planet's magnetic field is sufficient to truncate the surrounding disk and lift up material in accretion columns that crash down at the planetary surface. In this scenario, the UV excess is produced at the accretion shock, while the emission lines are produced both at the shock and within the funnel itself. The variability of the emission lines is therefore a combination of both stochastic variability, and that induced by rotational modulation. Still, it is still unclear whether this behavior extends past the deuterium-burning limit or if the protoplanetary disk environment strongly influences accretion processes.

We present HST/WFC3 UVIS2 observations of the PDS 70 system with the F656N narrow-band filter (H $\alpha$ ). Observations span 2 independent years: 6 epochs in 2020, and 6 epochs from early 2024 to early 2025. We find a burst-like behavior of the H $\alpha$  line, hinting at drastic changes of the accretion rate on various timescales as low as a day. We compute their occurrence rate, and interpret this variability in the context of various accretion scenarios and in comparison to wide-orbit companions behavior.