Producing Light-Curves for Accreting T-Tauri Stars with Transitional Disks

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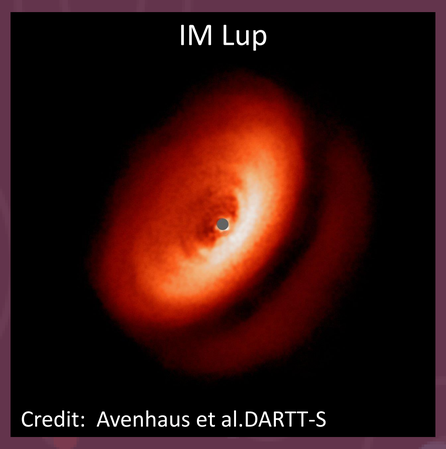
Disks and Accretion

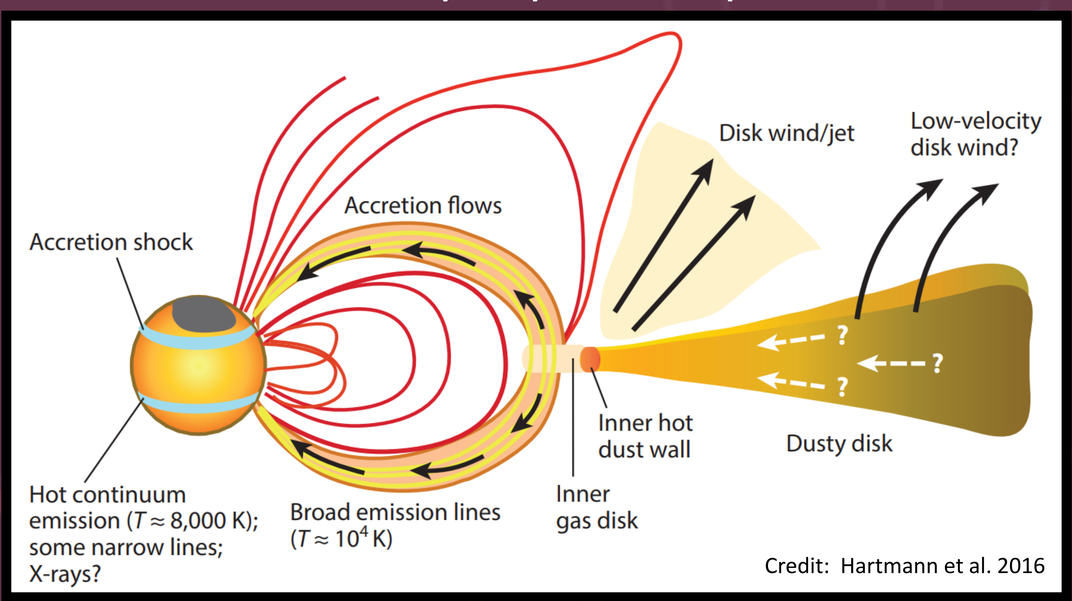


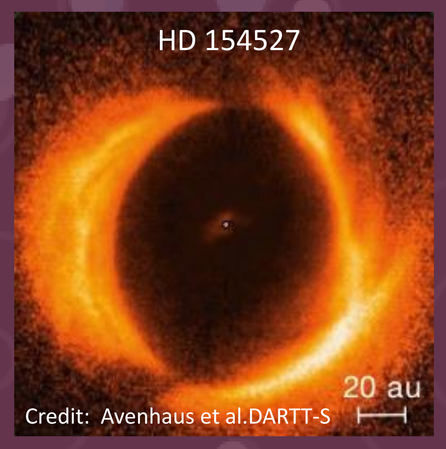
T-Tauri Stars & Disks

Stars form from the gravitational collapse of molecular hydrogen gas. Over time, the collapse of such gas clouds form a disk, from which the star grows via accretion. This is known as the *T-Tauri* phase, and stars in this phase are called *T-Tauri stars*.

Accretion

The magnetic field of a T-Tauri star is strong enough ($\sim kilo\ G$) to couple to the inner disk at a radius roughly (6-7) times the stellar radius. Material from the disk is funneled along field lines and crashes on to the stellar surface, producing excess Hα emission. A hot spot is created on the surface of the star when the material shocks, which can be detected as photometric (brightness) variability in the ultraviolet and optical parts of the spectrum.





Transitional Disks

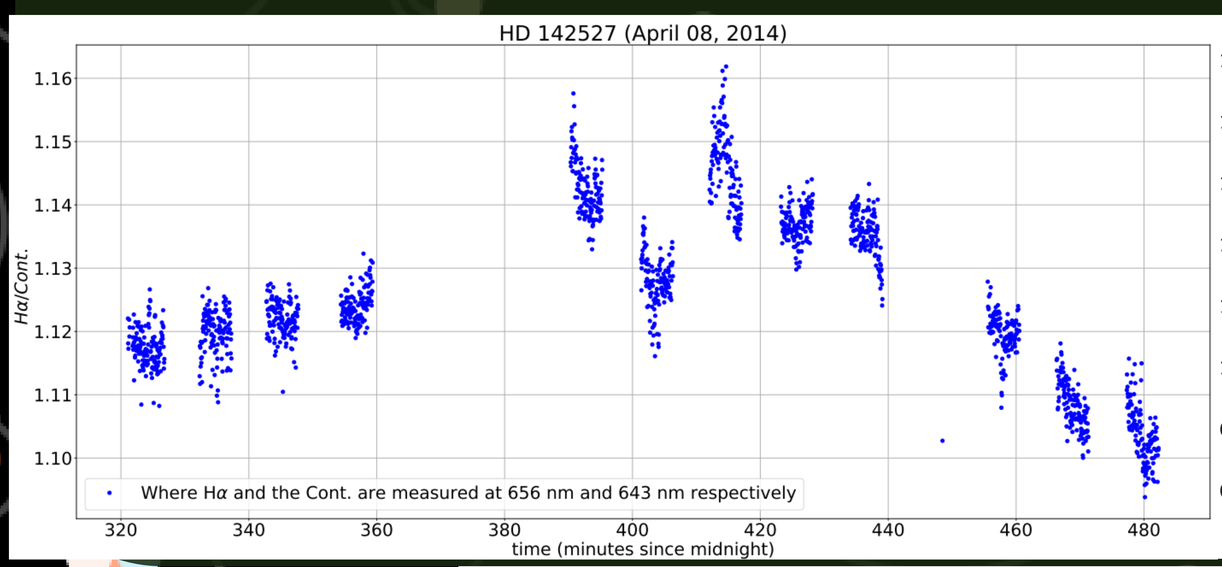
A subset of disks with gaps 10's of AU in diameter are thought to form from a mixture of accretion, radiative winds, and planet formation. We know accretion of the outer disk on to the central star must occur in transitional disks, but exactly how is not understood well.

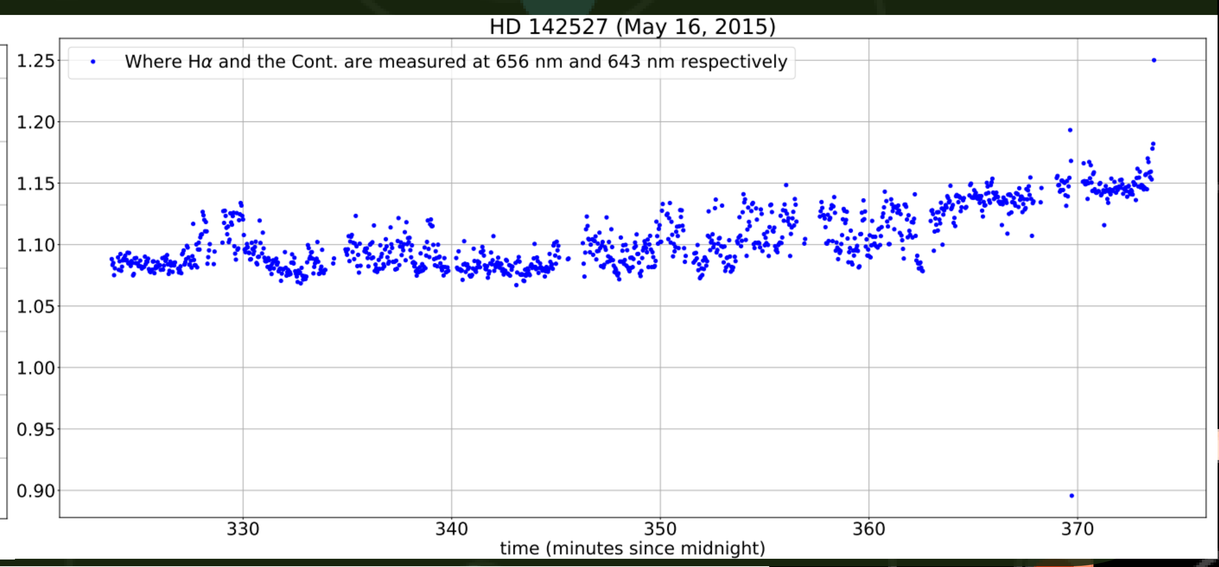
Objective

Use raw images to produce light-curves of 14 transitional-disk-bearing T-Tauri stars, by plotting Hα/Continuum vs. time. We want to begin an investigation on the timescales of accretion variability for T-Tauri stars with transitional disks

Aperture Photometry

Retrieve timestamps → Identify sources in raw images → Count flux from source + local noise → Count local noise → Subtract noise from source → Plot ratio of Hα line to continuum

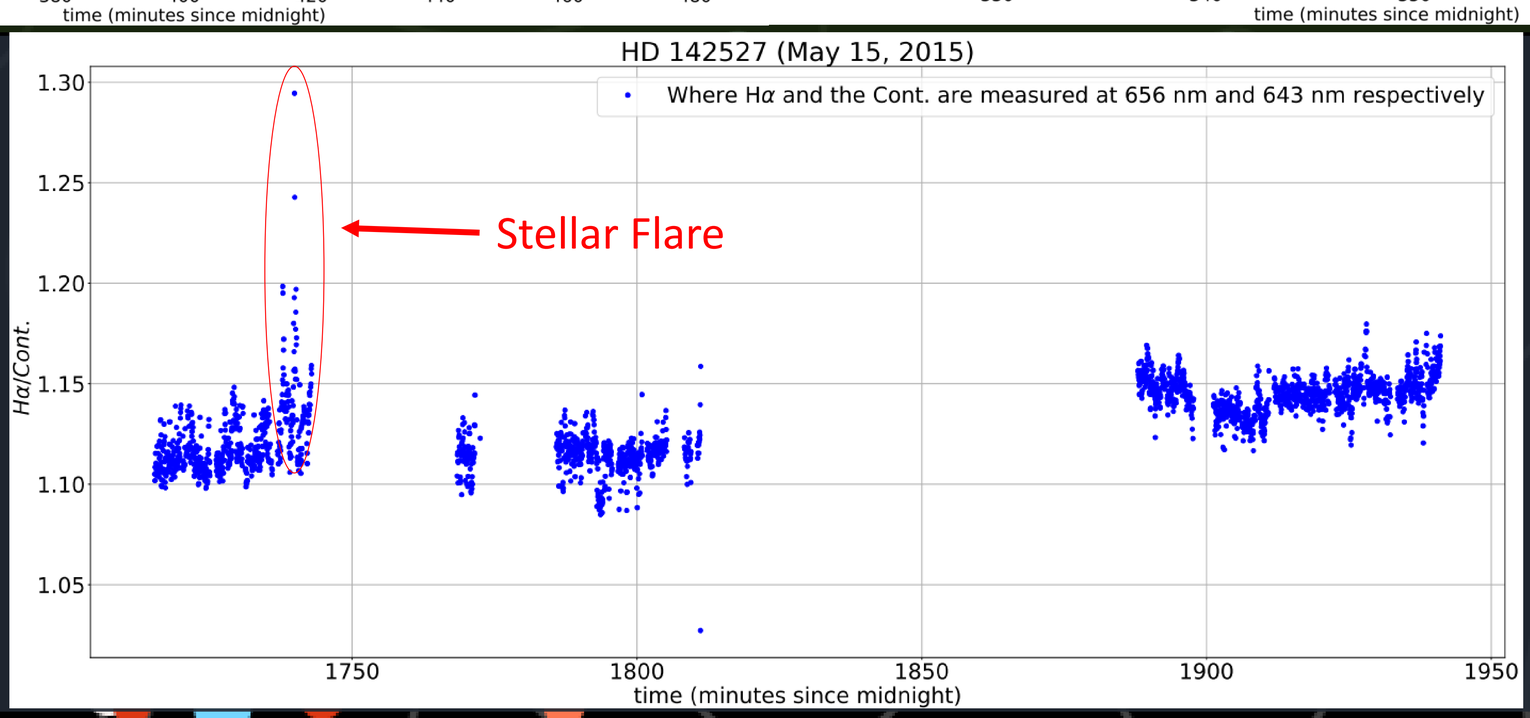




Constraining $\dot{M}$

Next Steps

I'll be comparing the timescales of multiple sources of variability for these objects in my thesis! The goal is to isolate variability purely due to accretion



Sources of Variability

- Rotation?
- Starspots?
- Disk Warps?
- Stellar flares?
- **Accretion?**