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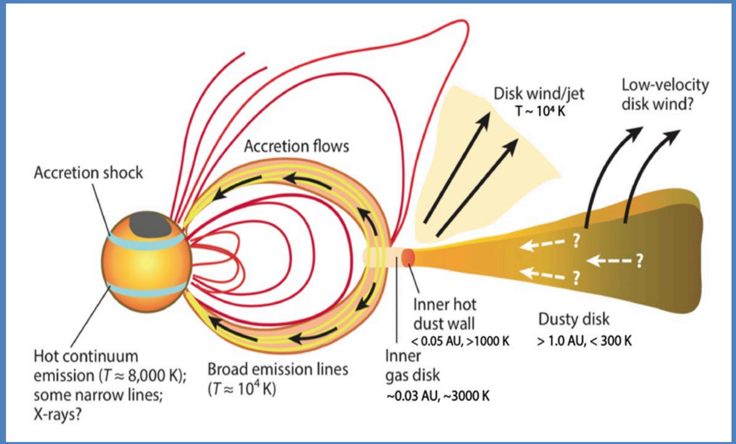
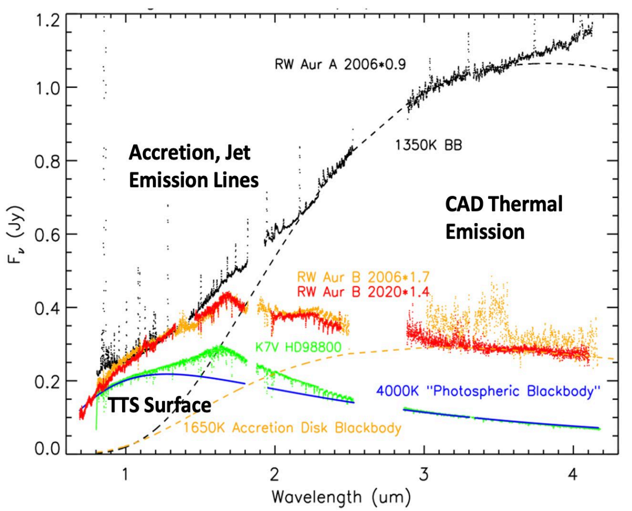
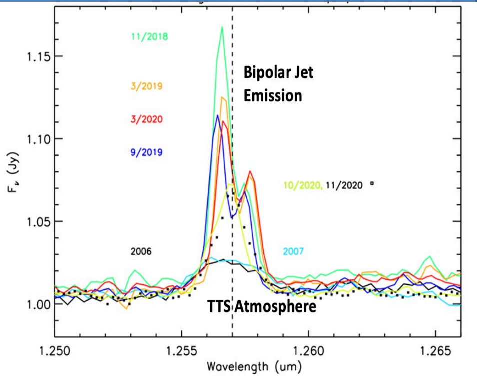
RW Aur A : A Growing Infant Sun Caught Eating a Differentiated Planetesimal at ~3 Myr by NASA/IRTF



Sun-sized infant T Tauri stars grow in their first few Myr via accretion from a circumstellar disk (CAD) focused by magnetic fields onto its surface.





IRTF/SpeX 0.7 – 5.0 μm spectroscopic monitoring not only saw a TTS that is highly spun up and energized (black) vs. its binary partner ***(red/yellow; left)****, but also found a huge increase in jet Fe II in 2018 which decayed back to near-normal by late 2020* ***(right)****.*

The very young RW Aur T Tauri star (TTS) system (~3 Myr) is similar to our solar system during the formation of our Sun, giant planets & iron meteorites.

- The energetic TTS system consists of a central protostar growing via accretion from a surrounding cold accretion disk (300K surface; 1650K inner wall). Accretion also drives focused high-speed outflow jets moving away at 100 – 200 km/s. The hot (T~20,000K) jets are surrounded by a diffuse stellar atmosphere, producing strong atomic emission lines.
- A huge drop in RW Aur A's normal soft XUV emission was reported by Chandra in 2014–2016, coupled with a large increase in Fe X-rays in 2017, suggesting huge amounts of newly accreting Fe onto the TTS. Our 2006 – 2020 SpeX monitoring not only found a highly energized system, but also confirms Vesta-sized amounts of hot Fe blowing out of the systems jets. However no rocky gaseous material was seen, explainable by catastrophic disruption of a differentiated planetesimal core formed delivered from outer parts of the cold accretion disk.

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