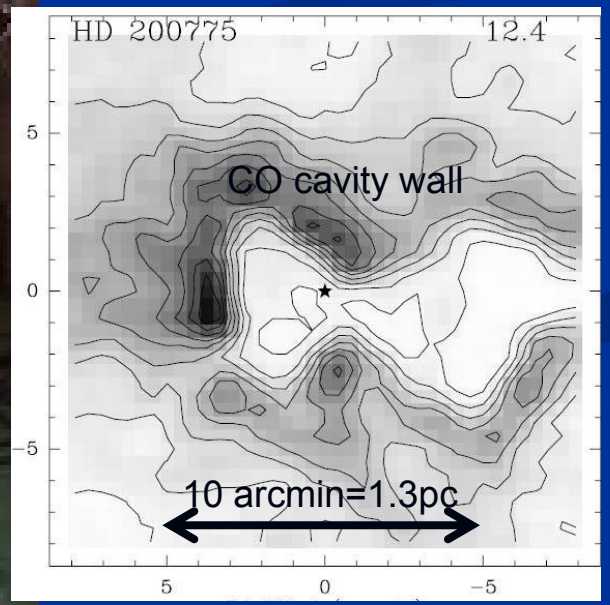
Discovery of a disk around a young massive star HD200775/Okamoto et al.

- Massive star ($\geq 8M_\odot$) formation is much less understood than the formation of lower mass stars
  - Radiation pressure problem & rapid evolution/formation in cluster
  - Formed by disk accretion or merging of lower-mass stars?
    - ←→ there were little well-resolved disk images in IR/optical.

- COMICS observations of HD200775
  - N&Q imaging/spectroscopy
  - Herbig B3(±1)e
  - $d=430^{+160}_{-90}$ pc (Hipparcos)
  - E-W extending outflow cavities (CO & FIR)
  - Closed binary
    - a=6.5AU, M1>~$8M_\odot$

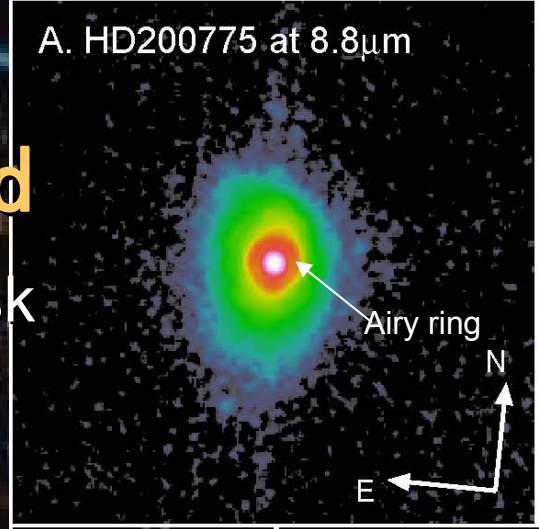


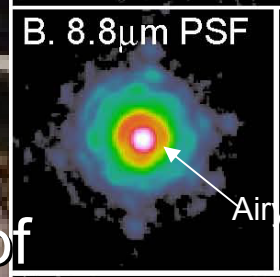
Extended Disk Emission Detected

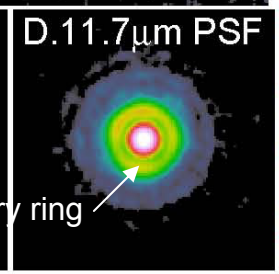
- Inclined circumbinary disk
  - Unresolved peak + diffuse
  - Perpendicular to the outflow cavity
  - Parallel to the projected major axis of the binary orbit
  - 750~1000AU in radius

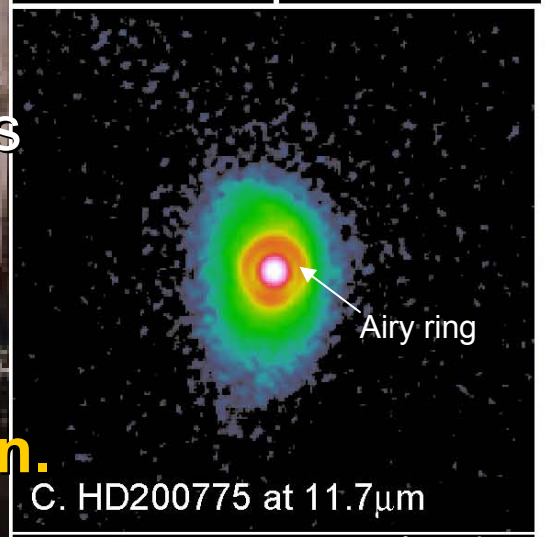
1st detailed IR disk image around ~10$M_\odot$ star

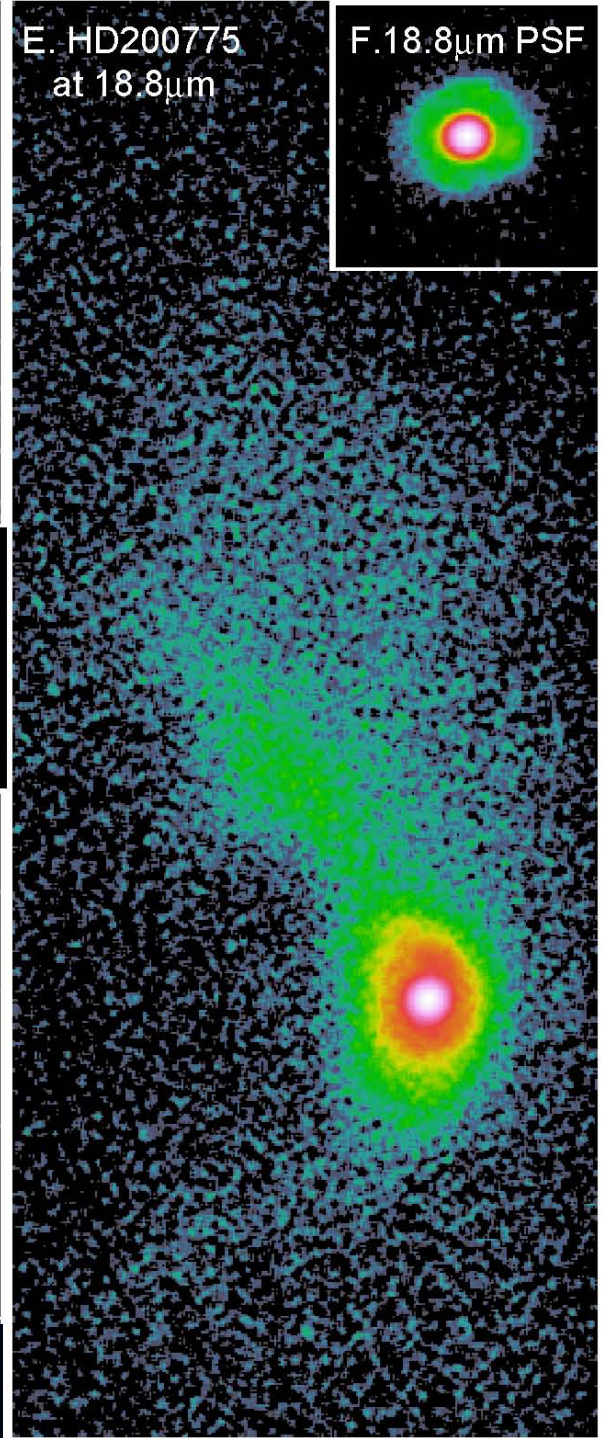
→ HD200775 has formed through the disk accretion.





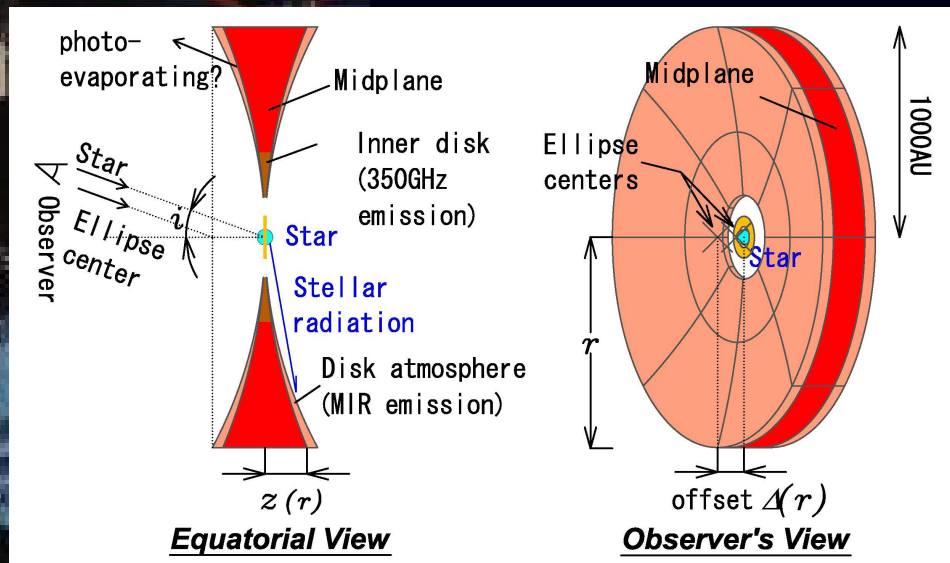


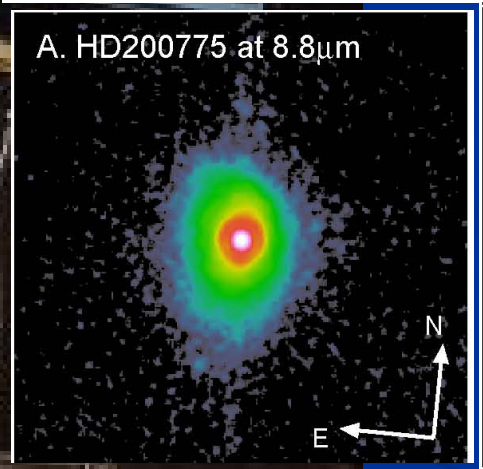


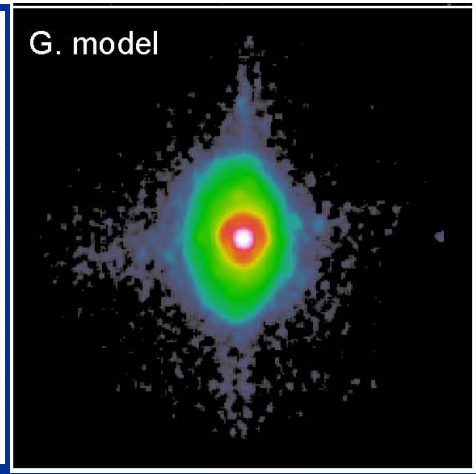


Disk properties

- The disk is flared.
  - r_{out}=680±50AU
  - *Surface Brightness*
    $\propto r^{-1.8\pm0.3}$
    ~ observed brightness profile
  - i=54.5±1.2deg
    ~ inclinations of the binary orbit and of the stellar rotation
  - z(r)[AU]=(20±17)×(r[AU]/280)$^{2.1\pm1.1}$

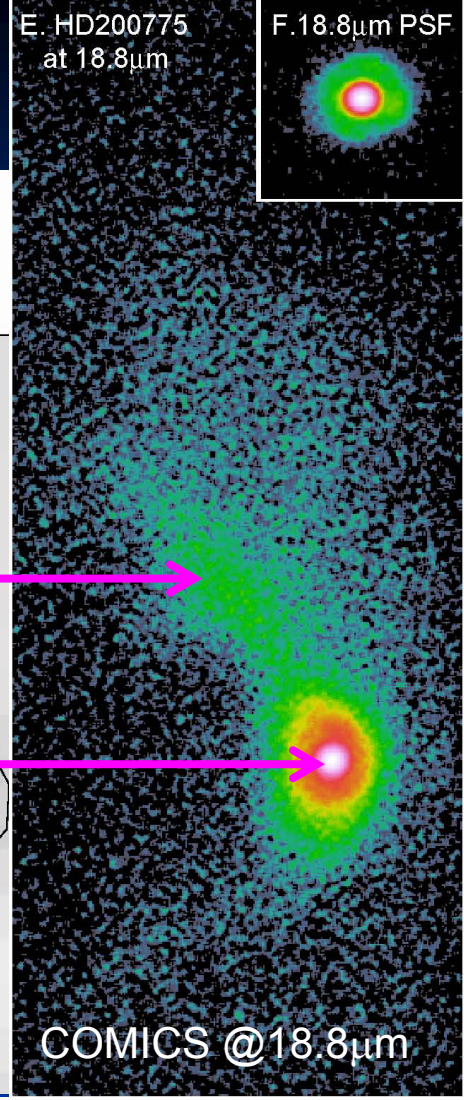






Disk properties: Photoevaporation

- Photoevaporation from the disk surface
  - 3.4mm free-free emission ~ MIR disk and tail emission
  - Short-timescale phenomenon
  - Disk evolution characteristic to massive stars



Hollenbach+1994

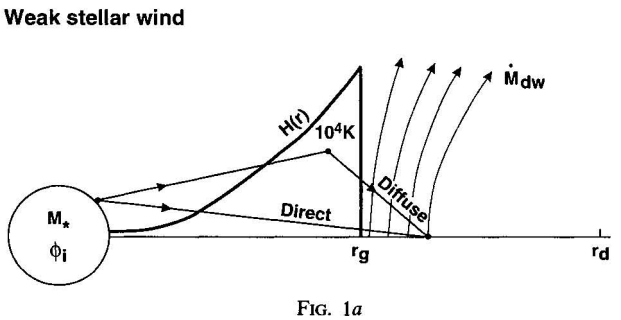
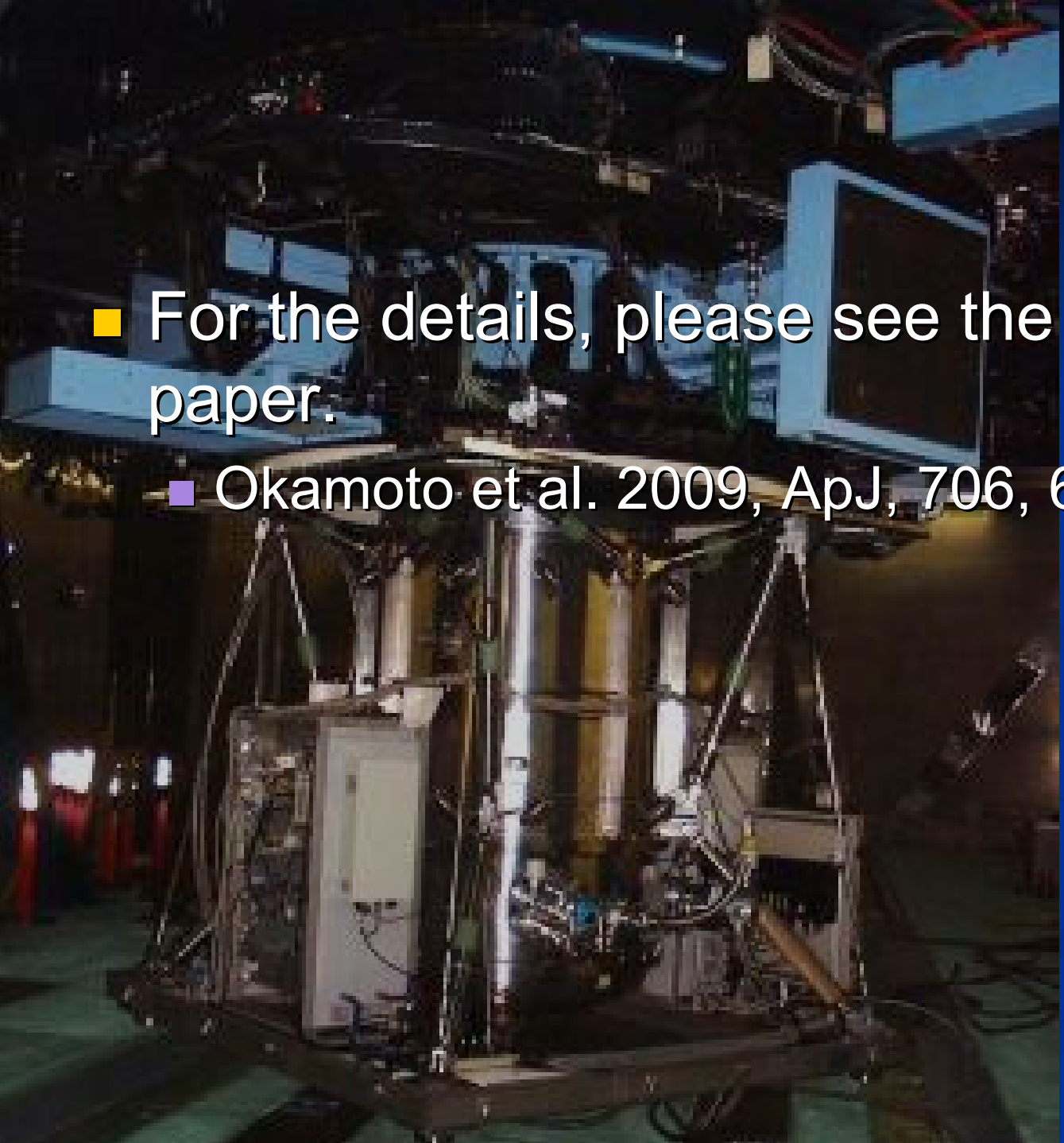


FIG. 1a



- For the details, please see the following paper.
  - Okamoto et al. 2009, ApJ, 706, 665