Star Formation and Disk Evolution in NGC 2068/2071

James Muzerolle

NGC 2068/2071

- embedded star formation region in L1630, Orion B molecular cloud
- t ~ 1 Myr
- hundreds of PMS stars, most massive members ~B1-2
- excellent laboratory for studying early protostellar and disk evolution
- IRAC/MIPS maps cover ~1 sq. degree
embedded star formation revealed...  

SDSS $gri$ mosaic  

$\text{MIPS } 70 \mu m$  

mid-infrared colors  

- disk, envelope sources occupy distinct loci  
- contamination from AGB, AGN, only few %
YSO spatial distribution

- ~50 Class I, 200 Class II
- Protostars arranged in linear structures
- Class II more widely distributed

Embedded protostars: HH 24 region

IRAC 3.6, 4.5, 8 microns
MIPS 70 microns
SCUBA 850 microns
V1647 Ori (McNeil's nebula)

- $L_{\text{bol}}$ increased from $3 - 44 \, L_{\odot}$
- accretion disk + envelope
- EXor??

Disk evolution at 1 Myr: dust settling?

"normal" disk

flat disk: $F \sim \lambda^{-4/3}$
disk evolution at 1 Myr: inner disk holes

as in CoKu Tau/4, TW Hya
~5% of all disks
grain growth? planet formation?

usual accretion criterion at K7:
EW(Hα) > 10 Å
some exhibit strong IR excess
Summary

- full range of protostellar and circumstellar disk behavior on display in NGC 2068/2071, often within < 1 pc
- Class I objects associated with dense gas, mostly distributed in linear structures
- at t~1 Myr, Class II objects show a surprisingly wide range of properties, including dust settling and inner disk clearing

– age not the only factor in disk evolution!
  initial conditions more important??

NGC 2068/2071

- etc