1. INTRODUCTION

We present preliminary results of Herschel PACS range spectroscopy data toward 10 high mass young stellar objects (YSOs), taken as part of the key program Water in Star-forming Regions with Herschel (WISH, van Dishoeck et al. 2011). We attempt to find evolutionary trends of physical/chemical properties in high mass star formation.

High mass YSOs are expected to have a high accretion rate (~10^{-3} M_\odot/yr) or small cores merged. They become a main sequence star as still embedded in a cloud, which results in a HII region developed around (e.g., Zinnecker & Yorke 2007, Beuther et al. 2006).

2. OBJECTS/OBSERVATIONS

- Herschel Space Observatory (2009-2013)
- 3.5 m primary; PACS, HIFI, SPIRE
- Photodetector Array Camera & Spectrometer (PACS)
- Spectrometer
- Red 57-105 μm and blue 105-210 μm cameras
- 5x5 spaxels (9.4 arcsec x 9.4 arcsec spatial pixels)
- R = λ/Δλ = 1000-5000

3. CONTINUUM

- Spectral energy distributions (SEDs) over 60-200 μm
- Radial distributions
- Targets different in fluxes and angular sizes
- Normalized by total fluxes
- Concentration ratios e.g., C_{[Si]/CO}, where C = (peak flux) / (total flux)

4. MOLECULAR/ATOMIC LINES

- Water lines in absorption and emission
- CO lines all in emission
- OH lines in absorption/emission
- CH lines in absorption
- [OII], [CII], [NII], [OIII] lines: absorption/emission but not fully checked for off-position contamination

5. CONCLUSIONS

Based on the concentration ratios between MIR and FIR and between continuum and CO, HMCs appear to have higher extinction. It suggests that HMCs could be the earlier stage than MIRQ/B objects, rather than between MIRQ/B and UCHII. Further investigations with more molecular lines and modeling will be carried out.

REFERENCES

- Beuther, H., Churchwell, E., McKee, C. et al. 2006, PPV
- Zinnecker, H. & Yorke, H.W. 2007, ARAA, 45, 481

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