# Multi-tracer Observations for Multi-scale Accretion Structures in Massive Star Formation

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How massive forming stars accrete material from their surrounding dense clouds are still unclear. Growing observational evidences have shown disk-mediated accretion is a viable mechanism to form massive stars. However, disks in massive star formation, as it contains material in drastically different physical and chemical conditions, cannot be effectively traced by any single type of tracers.

Our recent high-resolution ALMA observations have shown that, in addition to typical hot-core molecular lines, a group of “hot-disk” line can exclusively trace the disks around massive forming stars, including gaseous refractory molecules such as SiO, NaCl, and high upper state energy transitions of a few simple molecules such as H2O [1,2]. Furthermore, recombination lines are important in tracing the innermost disk which has been ionized by the forming massive star, supplementary to the molecular tracers for the neutral disk [3,4].

Here we report another case study using ALMA observations to reveal the complex multi-scale accretion structures around massive young star G35.20-0.74 (Zhang et al. in prep.). The molecular line emissions such as SO2, H2CO, and CH3OH show rotational structures around the main sources, with SO2 emission further traces two spiral arm structures in the fragmented disk perturbed by a forming binary system, as well as the inner and faster-rotating materials around the primary. The innermost region is photoionized with its kinematics revealed by the hydrogen recombination lines. This study agains shows the importance of using different molecular lines and recombination lines to trace different components of the accretion structures, in order to obtain the full picture of the accretion process in massive star formation.

## References

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