

Invited: A high-resolution picture of fragmentation and accretion in the AFGL 4176 disk

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To date there have been few well-resolved observations of disks around forming massive stars, with almost all previous observations having fewer than 5 resolution elements across the disk. We have used the long-baseline capabilities of ALMA to observe, resolve and characterise the structure and fragmentation of the best example to date of a disk around a forming O-type star. Our earlier Cycle 1 observations of the AFGL4176 disk, also taken at 1.2mm, showed that it is in near-Keplerian rotation (Johnston et al. 2015), but the physical resolution in this case was limited to ~ 1250 AU. Now we have observed the K ladder of CH₃CN J=13-12 and 1.2mm continuum again at a resolution of $\sim 0.05''$ or 200AU, obtaining 20 resolution elements across this $r \sim 2000$ AU disk. With this resolution, we can determine the accretion kinematics in fine detail across the disk as well as how they are affected by fragmentation and the possible formation of proto-companions. In this talk, I will review our results from previous observations of AFGL 4176 as well as present our initial findings from the new observations, shedding some light on the processes which dominate disk accretion for high-mass stars.

Outflow Disks