JVLA detection of dramatic changes in the outbursting massive protostar NGC6334I-MM1B

- Todd Hunter

The evolutionary path that massive protostars follow in their youth presents many open questions. Though evidence for episodic accretion is now commonplace toward low mass protostars, the recent extraordinary outburst in the massive protostellar cluster NGC6334I marks only the second large episodic accretion event observed toward a deeply embedded massive protostar and casts new light on the tumultuous lives of these young objects. I will present results from high angular resolution ($0.2''$, 250 au) multi-epoch centimeter to submillimeter wavelength data that examine this outburst that began in 2015. In particular, I will describe the remarkable rise in dust emission from the dominant millimeter source and hot core MM1, which was identified by comparing 2008 Submillimeter Array (SMA) data with 2015 Atacama Large Millimeter/submillimeter Array (ALMA) data (Hunter et al. 2017). This outburst was accompanied by simultaneous flaring of 10 maser transitions detected in early 2015 thanks to the long-term bi-weekly maser monitoring program at the Hartebeesthoek Radio Astronomy Observatory (HartRAO) (MacLeod et al. 2018). I will then present results from multi-epoch 5.0, 1.3 and 0.7 cm observations in 2016-17 with the Karl G. Jansky Very Large Array (VLA), which document the emergence of strong 6.7 GHz methanol masers toward and surrounding MM1 (Hunter et al. 2018) and a dramatic dimming of the high-frequency free-free emission from the central hypercompact HII (HCHII) region MM1B. While the water maser emission toward MM1B has dramatically reduced, the water masers in other surrounding locations have flared. The pre-outburst luminosity and HCHII region are consistent with a deeply-embedded central object having a spectral type of B3 (ZAMS). The quenching of the HCHII region suggests a reduction in uv photons due to the rapid accretion of sufficient mass to cause the protostellar photosphere to expand and radiate at a much larger luminosity, but with a lower effective temperature.

Outflow Disks