New Components of YSO Outflows Revealed through High-Resolution

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We show how new millimeter observations with higher spatial and velocity resolution reveal new components of molecular outflows from young stellar objects. Small scale, high-velocity components in the outflow, discovered with the IRAM 30-m telescope, were detected not only due to high velocity resolution spectra which enable one to distinguish the high-velocity components from the parent cloud emission, but also due to the 30-m's high spatial resolution. Telescopes with large beams can dilute the small scale spatial and kinematical components, making them impossible to detect.

We also present new ^{13}CO FCRAO maps of dense star-forming cores known to harbor outflow sources. The observations have higher velocity resolution than previous observations of these cores. We find two very distinct populations of spectra in each of the ^{13}CO core maps. One group of spectra shows a clear increase of line width with antenna temperature, while the other group is clustered in a "blob" with mean line width substantially below the first group's and showing no line width-antenna temperature trend. Remarkably, the component whose line width is anti-correlated with antenna temperature is coincident with the outflow. We show how the outflow spectra's dependence of width on antenna temperature can be explained by assuming a momentum-conserving outflow.

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