A rotating molecular disk toward IRAS 18162-2048, the exciting source of HH 80-81

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We present several molecular line emission arcsec and subarcsec observations obtained with the Submillimeter Array (SMA) in the direction of the massive protostar IRAS 18162-2048, the exciting source of HH 80-81.

The data clearly indicates the presence of a compact (radius~425-850 AU) SO2 structure, enveloping the more compact (radius~150 AU) 1.4 millimeter dust emission (reported in a previous paper). The emission spatially coincides with the position of the prominent thermal radio jet which terminates at the HH 80-81 and HH 80N Herbig-Haro objects. Furthermore, the molecular emission is elongated in the direction perpendicular to the axis of the thermal radio jet, suggesting a disk-like structure. We derive a total dynamic mass (disk-like structure and protostar) of 11-15 msun. The SO2 spectral line data also allow us to constrain the structure temperature between 120-160 K and the volume density > 2x10^9 cm-3. We also find that such a rotating flattened system could be unstable due to gravitational disturbances.

The data from C17O line emission show a dense core within this star-forming region. Additionally, the H2CO and the SO emissions appear clumpy and trace the disk-like structure, a possible interaction between a molecular core and the outflows, and in part, the cavity walls excavated by the thermal radio jet.

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