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Linking Multi-Scale Energetics with Fragmentation in Massive Star-Forming Clump SDC40.283

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The change in the relative importance of gravity, turbulence, and magnetic field affects the fragmentation of massive star-forming dark clouds. Using dust continuum and polarization data, as well as molecular transition lines from the JCMT, IRAM-30m and the SMA, we investigated the energetics of various star forming regions to understand the correlation between the three factors and fragmentation. In this work, we focused on SDC40.283-0.216, an infrared dark cloud that has one dense clump and shows no signs of fragmentation. SDC40 appears to be dominated by gravity at pc scale (~7 pc) and at sub-pc (~0.2 pc) scale. The change in energy ratio from clump scale (~0.7 pc) to core scale (~0.2 pc) is similar to the trend seen in MM1 in G34.43+00.24, another clump showing no fragmentation while being gravity-dominated. However, results from SDC18.624-0.070 suggest that a strong magnetic field can suppress fragmentation. While the clumps all show no fragmentation, the underlying mechanisms may be different.

Section

Star Formation

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