Triggered Star Formation in a Turbulent ISM
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Quiescent high mass cores in Orion region

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Our goal is to study relatively quiescent dense gas cores, isolated from disruptive stars, to understand the initial conditions of massive star formation. Determining their mass, size, dynamical status, and core mass distribution is a starting point to understand the mechanisms for formation, collapse, and the origin of their IMF. We obtained CSO 350 μm images of quiescent regions in Orion and detected 51 resolved or nearly resolved molecular cores with masses ranging from 0.1 $M_\odot$ to 46 $M_\odot$ (Li *et al.* 2006). The mean mass is 9.8 $M_\odot$, which is one order of magnitude higher than that of the resolved cores in low mass star forming regions, such as Taurus. Our sample includes largely thermally unstable cores, which implies that the cores are supported neither by thermal pressure nor by turbulence, and are probably supercritical. They are likely precursors of protostars. Fig. 1 shows the cores in our sample have a power law core mass function with an index α = -0.85±0.21. This mass function does not resemble the stellar IMF or turbulence cascade structure function, and it is also in contrast with core surveys done in the Ophiuchus region (Motte *et al.* 1998) and the Serpens region (Testi *et al.* 1998). We find that the differential mass function approach, while requiring more cores due to the necessity of binning, is more robust and has better defined statistical uncertainties than the cumulative mass function. Use of the cumulative mass function can erroneously suggest multiple power law indices, particularly if the core mass distribution is characterized by a power law index close to ~ -1. Our results for the quiescent cores in the Orion show that the core mass function is flatter in an environment affected by ongoing high mass star formation. Thus, environmental processes likely play a role in the evolution of dense cores and the formation of stars in such regions.

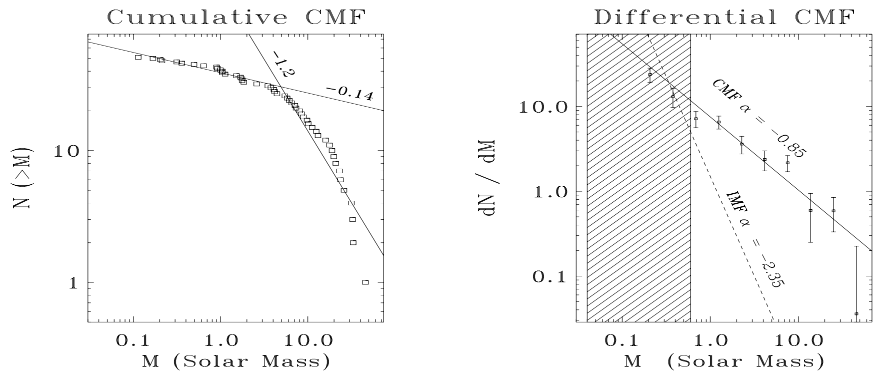

Figure 1. *(Left)* Cumulative Core Mass Function with two power laws. *(Right)* Differential Core Mass function with single power law fit. The lines represent stellar IMF (broken) and best fit to the cores (solid). The shaded area represents incomplete core sample.

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References

Li, D., Velusamy, T., Goldsmith, P.F., & Langer, W.D. 2006, *ApJ* (in press)
Motte, F., Andre, P. & Neri, R. 1998, *A&A* 336, 150
Testi, L. & Sargent, A.I. 1998, *ApJ* 508, L91