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Gravity-driven formation of star clusters in a turbulent background

Stars in Milky Way form in a clustered fashion. The underlying gas dynamics that governs star cluster formation in not well-understood. We propose a picture where the cluster-forming gas clumps are gravitationally bound entities, surrounded by a diffuse turbulent medium, and analytically study evolution of such a medium. We found that structures that can dynamically detach from the ambient medium and collapse gravitationally should obey the scaling m ~ r^{5/3} (m = mass, r= size). The normalisation of the scaling is determined by the level of the ambient turbulence. Our results agrees with existing observations to a good accuracy. Finally, we will briefly discuss how our results can be used to understand the formation of star clusters in different galaxies.