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JEANS CRITERION IN A TURBULENT MEDIUM

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According to the classical Jeans analysis, all the molecular clouds of mass larger than a few $100 M_{\odot}$, size larger than about $1pc$ and kinetic temperature $T_k < 30K$ are gravitationally unstable.

We have shown that in clouds supported by internal supersonic motions, local gravitational instabilities may appear within molecular clouds which are globally stable.

The argument is threefold: *i*) when the turbulent kinetic energy is included into the internal energy term, the virial equilibrium condition shows that molecular clouds such as those observed, which are gravitationally unstable according to the Jeans criterion, are indeed globally stable if supported by a turbulent velocity field of power spectrum steeper than 3,

ii) $2D$ compressible hydrodynamical simulations show that a supersonic turbulent velocity field generates a turbulent pressure within clouds, the gradients of which stabilize the unstable scales (i.e. the largest scales and the cloud itself) against gravitational collapse,

iii) an analysis similar to the Jeans approach but including the turbulent pressure gradient term, gives basically the same results as those given in *i*).

Clouds of mean density lower than a critical value are found to be stable even though more massive than their Jeans mass. In clouds of mean density larger than that critical value, the gravitational instability appears only over a range of scales smaller than the cloud size, the largest scales being stable.

In practice, the observed mean densities are lower than this critical value: the observation of a small number of cores and stars of a few solar masses embedded in clouds of several hundred solar masses can only be understood in terms of small scale density fluctuations of large amplitude generated by the supersonic turbulence which would occasionally overtake the limit of gravitational stability.

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