The role of interstellar filaments in regulating the star formation efficiency on GMC scales

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Recent surveys at infrared and submillimeter wavelengths with *Spitzer* and *Herschel* suggest that 1) star formation becomes much more efficient above a "threshold" gas surface density corresponding to $A_V \sim 8$, and 2) star formation in dense molecular gas is governed by essentially the same "law' in nearby Galactic clouds and distant external galaxies. The latter raises the possibility of a unified picture for star formation in the Universe from individual-cloud scales to galaxy-wide scales. I will describe the star formation scenario favored by *Herschel* studies of the nearest molecular clouds of the Galaxy which point to the key role of the quasi-universal filamentary structure pervading the cold ISM. A large fraction of the dense gas is found to be in the form of filaments and most prestellar cores are located within dense, "supercritical" filaments. Altogether, the *Herschel* results support a picture in which star formation occurs in two main steps: first, the dissipation of kinetic energy in large-scale MHD flows (turbulent or not) generates ~ 0.1 pc-wide filaments in the cold ISM; second, the densest filaments grow and fragment into prestellar cores (and ultimately protostars) by gravitational instability above a critical threshold $\sim 16\,M_\odot$/pc in mass per unit length or $\sim 160\,M_\odot/\mathrm{pc}^2$ in gas surface density ($A_V \sim 8$). This picture provides new insight into the inefficiency of star formation and the origin of the initial mass function.