The role of ridges in high mass star formation: super filaments hosting protostars

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High mass star formation and evolution is still a process that is not well understood, which is largely attributed to the clustered and embedded nature in which high-mass stars form. The Herschel Imaging Survey of OB Young Stellar Objects (HOBYS; Motte, Bontemps and Zavagno), aims to study the earliest stages of high-mass star formation and evolution as well as the environments in which they form.

High mass stars require a greater reservoir of material than their (better studied) lower mass equivalents. We have identified the best locations from which high-mass stars can form - super filaments which we called ridges. Ridges are supercritical high-column density (>10^23 cm^-2) filaments which dominate their environment and serve as the preferential sites of high-mass star formation. For the first time, ridges provide an excellent mechanism through which high mass stars can form. We have identified a number of ridges in high-mass star forming complexes from HOBYS. Our earlier work suggested that ridges form through dynamical means such as converging flows and turbulence (e.g. Hill et al., 2011, Nguyen Luong et al., 2011) or through mergers of smaller filaments (e.g. Hennemann at al., 2012).

Understanding how a ridge forms may allow prediction of how, where, and under what conditions high-mass stars form. It may be that high-mass stars are born as a result of the formation of the ridge itself, or that other factors, such as a bipolar nebula - as proposed by us (Minier et al. 2013) acts upon the ridge to trigger high-mass star formation. We present here the results of a census of ridges in HOBYS regions, which had the objective of identifying how a ridge forms from its natal molecular cloud and ultimately how they form young massive stars.