# Characterisation of the best high-mass prestellar core candidate found so far and of the hot cores in W43-MM1

Molet, J.[1], Brouillet, N.[1], Despois, D.[1], Nony, T.[2], Gusdorf, A.[3], Motte, F.[2], Louvet, F.[2], Bontemps, S.[1] and Herpin, F.[1]

[1] *LAB, Univ. Bordeaux, CNRS, allée Geoffroy Saint-Hilaire, 33615 Pessac – France*
[2] *Univ. Grenoble Alpes, CNRS, IPAG, 38000 Grenoble – France*
[3] *Laboratoire de Physique ENS, PSL, CNRS, Sorbonne, Univ. Paris, Paris – France*

Despite considerable observational efforts over the past 10 years, the very existence of high-mass pre-stellar cores remains a matter of debate. We recall that while high-mass pre-stellar cores are the starting point of the 'turbulent core model' that forms high-mass stars, more dynamical models including the 'competitive accretion model' can skip such a phase. It is just as topical as ever with large interferometers like NOEMA and ALMA which allow now to achieve the spatial resolution necessary to characterise the cores in the high-mass star forming regions further-away. Very few pre-stellar candidates have been reported and their status is often unclear (see Motte et al. 2018). We recently have identified a new, excellent high-mass prestellar core candidate in the W43-MM1 hyper-massive filament, located at a distance of 5.5 kpc (Nony et al. 2018). The region contains numerous 2000 AU massive cores with up to ~100 $M_\odot$ among which one high-mass (60 $M_\odot$) core that does not drive any outflow nor other typical signatures of star formation.

For this study we needed to develop new tools. A first step was to subtract the continuum. Because of the sensitivity of the instruments, it is now difficult to find channels with no emission line over all the map in a data cube, we thus developed a method similar to the one presented in Jørgensen et al. (2016), using the density distribution of the channel intensities on each pixel, and which allowed us to obtain automatically a continuum map free of emission lines contamination. With the high number of identified cores, we also developed an automatic technique based on the contribution of the lines in the total flux, in order to detect the hot cores. We could then identify 7 massive and 1 less massive hot cores.

I will present the detailed analysis of the molecular content of all these cores we made using ALMA data covering a total bandwidth of 5 GHz with a 0.5'' (~2400 AU) spatial resolution. We find that the molecular content of the hot cores appears to be the same within a factor 2-3 (Brouillet et al., in prep) and our results tend to confirm that the high-mass 60 $M_\odot$ core is prestellar in nature and thus a very unique object (Molet et al. 2019). However very few lines are present and the broad NOEMA spectral bandwidth will be a main feature to characterise such objects in the future.

**References**

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