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## Thesis subject

Name of the laboratory: LAM

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Subject's title: Dynamics and star formation in the Galaxy: an extragalactic perspective

### Subject description:

Star formation is a highly dynamical process on all spatial scales, strongly impacted by the environment (Zhang et al. 2020a,b). Recent studies in external galaxies (Schruba et al. 2019, Schinnerer et al. 2019, Gomez-Lopez et al. 2019) indicate that the dynamical environment plays a key role in the star formation process. However, the lack of resolution renders difficult the interpretation of the results.

In our Galaxy, star formation is resolved on all spatial scales from molecular clouds (hundreds of pc, Veneziani et al. 2017) down to individual cores (at the milli-parsec scale, Figueira et al. 2018, Zhang et al. 2020b). Star Formation Rate (SFR) and Star Formation Efficiency (SFE) maps can be derived and compared with the local dynamical conditions, such as the level of turbulence. The comparison of these resolved quantities in the Galaxy and their understanding as a function of the environment (dynamical state, location in the Galaxy, density, evolution stage) can shed light on the dynamical processes governing star formation in external galaxies.

We propose to use available data on the Galaxy to derive the star formation laws on different spatial scales, as a function of the dynamical environment. These laws will be compared with state-of-the-art models of Galactic star formation. Results of observations will then be compared with recently obtained high-resolution data in nearby galaxies (such as the PHANGS survey, Schinnerer et al. 2019) in order to bridging the gap between our knowledge of the star formation process in the Galaxy and the one proposed in external galaxies.

The PhD will be realized in collaboration with researchers at LAM including A. Zavagno, P. Amram and B. Epinat.

### Bibliography:

Figueira, M. et al. 2018, A&A, 616, L10      Gomez-Lopez, J. et al. 2019, A&A, 631, A71  
Schinnerer, E. et al. 2019, Msngr, 177, 36      Schruba, A. et al. 2019, ApJ, 883, 2  
Veneziani et al. 2017, A&A, 599, A7      Zhang, S. et al. 2020a, A&A, 637, A40  
Zhang, S. et al. 2020b, A&A, in press (ArXiv <https://arxiv.org/abs/2012.07738>)