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Bar-spiral interaction produces star formatin bursts

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Central bars and spirals are known to strongly impact the evolution of their host galaxies, both in terms of dynamics and star formation. Their typically different pattern speeds cause them to regularly overlap, which induces fluctuations in bar parameters. I will show, using both numerical simulations and observations, how bar-spiral physical overlap produces both migration and star formation boosts on the timescale of their beat-frequency. On the one hand, this mechanism can send stars from the bar radius out to the solar neighborhood on cold orbits. On the other end, it can enhance star formation by a factor of up to 4 when the bar and the spiral are connected, depending on the strength of the spiral structure. This is in agreement with observational studies seeing a revival of star formation rates at the end of the bar, compared to its decrease along the bar major axis. The bursts do not always happen simultaneously at the two sides of the bar, hinting at the importance of odd spiral modes. Various pieces of evidence seem to show the relevance of non-bisymmetric spiral structure in the MW. Such a phenomenon could be investigated thanks to resolved observations of nearby face-on galaxies, by comparing star formation rates from the two sides of the bar.

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