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Revisiting the Milky Way's Star Formation Rate: A New and Improved Estimate

Thursday 8 May 2025 09:50 (20 minutes)

This presentation explores three methods for estimating the total star formation rate (SFR) of the Milky Way, two of which leverage Herschel far-infrared imaging observations. The first method derives SFRs by positioning Hi-GAL star-forming clumps on the luminosity–mass diagram, incorporating a variable gas-to-dust ratio that varies with Galactocentric distance. The second method, inspired by extragalactic studies, introduces a novel approach that estimates SFRs based on the total 70 μm emission in Hi-GAL maps. The third method examines molecular clouds identified through CO emission lines, adjusting masses and SFRs according to Galactocentric radius and applying a star formation efficiency per free-fall time that depends on the cloud's virial parameter.

All three approaches yield not only a global SFR estimate for the Milky Way but also its Galactocentric profile and a detailed 2D face-on projection. While the methods show overall consistency, some intercalibration differences and localised discrepancies persist, which will be discussed. Additionally, the presentation includes a test of the Kennicutt-Schmidt relation using Milky Way regions, providing a valuable link to extragalactic studies.

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