



書報討論 Weekly Seminar

The Rise and Fall of Star Formation: Probing the Evolution of Nearby Galaxies

Dr. Eltha Yu-Hsuan Teng 鄧郁璇

Department of Astronomy,
University of Maryland, College Park

<https://elthateng.github.io/>

speaker's URL



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Star formation activities characterize the evolutionary stages of galaxies. As stars are born from the cold and dense molecular clouds, star formation is governed by the amount of molecular gas and how efficiently molecular gas is converted into stars (i.e., the star formation efficiency, SFE). However, the physical mechanisms that alter the level of star formation in galaxies are not well understood, due to a lack of precise knowledge in molecular gas mass and SFE variations across galaxies at different evolutionary stages. In this talk, I will present a series of work that tackle these challenges, using state-of-the-art telescopes including the Atacama Large Millimeter Array (ALMA), James Webb Space Telescope (JWST), and Green Bank Telescope (GBT). We started by establishing an accurate, physics-grounded prescription for the CO-to-H₂ conversion factor (α_{CO}) — a factor that has been causing major uncertainties in current molecular gas and SFE measurements. By re-evaluating molecular gas mass and SFE with our new prescription across ~ 150 galaxies ranging from active starbursts to quiescent galaxies, we have revealed systematic differences in SFE which were obscured in previous studies due to limited α_{CO} knowledge. Our results show evidence that SFE variation is a dominant factor driving both the enhancement and regulation of star formation in galaxies. I will also talk about my ALMA and JWST programs in progress, which aim to uncover the exact molecular gas conditions and feedback processes that lead to galaxy quenching.

future seminars

