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Bridging the Gap in the New Era of Star Formation

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With the advent of JWST imaging in the Local Group, young stellar objects (YSOs) are being observed in a broader range of environments than ever before, which will revolutionize our understanding of star formation if their properties can be modelled accurately. We present a new approach to characterizing YSO populations by applying the technique of population synthesis originally developed for older stellar populations (Peltonen et al. 2026). Using the latest YSO radiation transfer and stellar evolution models, we have developed a population synthesis code that can generate YSO populations, accounting for details like binaries, clustering, extinction, and stochastic sampling. We used this new code to determine the properties of YSOs in the recent JWST images of NGC 604 within M33 and previous Spitzer studies of the LMC. This approach allows us to measure the star formation rate in extragalactic systems directly from YSOs instead of relying on tracers from massive stars (H α , photospheric emission). With this powerful technique, we can also turn to local clouds in the Spitzer Extended Solar Neighborhood Archive (SESNA). We present preliminary results to constrain the star formation histories in the SESNA molecular clouds. Ultimately, this population synthesis framework will allow us to evaluate the current star formation properties in any region with an observed YSO population and allow us to directly connect the Milky Way star formation properties to those of extragalactic systems.

Did you give a contributed talk at CASCA 2026?

No

If you are selected for a poster, would you be interested in giving a short flash talk on your work?

Yes

What is your career level?

PhD

Which keyword describes the area of focus of this talk?

Stars & stellar clusters

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