



Contribution ID : 50

Type : **Contributed talk**

VLA 3 GHz Radio Continuum Mapping of Nearby PHANGS Galaxies: Tracing the Life Cycle of Star Formation

Wednesday, 28 October 2026 13:45 (10)

Massive stars strongly reshape their surroundings through radiation, stellar winds, and eventually supernova explosions, but when these different feedback mechanisms begin to dominate remains uncertain. We present VLA 3 GHz radio continuum observations of 13 nearby PHANGS galaxies to trace the evolution of star-forming regions during their first ~ 10 Myr. Combining these data with HST, JWST, VLT/MUSE, and AstroSat observations, we separate the radio emission into thermal free-free and non-thermal synchrotron components and connect their evolution to stellar age and other tracers of recent star formation. The radio observations also reveal a small population of 36 embedded, PAH- and dust-continuum-bright but optically faint star-forming regions, representing less than 10% of the radio sources and demonstrating the ability of radio emission to probe the earliest obscured phases of star formation. We find a clear evolution in radio properties with stellar age: from 1–3 to 6–10 Myr, the median thermal fraction decreases from $\sim 61\%$ to $\sim 33\%$, while the median radio spectral index steepens from -0.05 to -0.51 . The youngest regions already exhibit a non-thermal fraction of $\sim 28\%$ before the expected onset of core-collapse supernovae, suggesting that massive-star winds and associated shocks may contribute to early cosmic-ray acceleration. These results provide a resolved view of how radio emission evolves from the embedded phase through the emergence of synchrotron emission during the first ~ 10 Myr of stellar feedback.

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?

No

What is your career level?

PhD

Which keyword describes the area of focus of this talk?

Galaxies

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Session Classification : Galaxies