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Star Formation on the Outer Edge of the Milky Way

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The Outer Scutum-Centaurus spiral arm (OSC) is the outermost molecular spiral arm in the Galaxy and contains the most distant known high-mass star formation regions in the Milky Way. HII regions are the archetypical tracers of high-mass star formation, and because of their high luminosities, they can be seen across the entire Galactic disk from mid-infrared to radio wavelengths. We have detected HII regions at nearly 20 locations in the OSC, as far as 23.5 kpc from the Sun and 15 kpc from the Galactic center on the far side of the Galactic center.

The far outer Galaxy has lower metallicity than the more inner regions of the Milky Way, with $12 + \log(\text{O}/\text{H}) = 8.29$ at the OSC versus 8.9 and 8.54 at the Galactic Center and the Solar neighborhood, respectively. Coupled with lower gas densities, star formation in the OSC could be similar to that of a much younger Milky Way or galaxies like the Large Magellanic Cloud.

We find large reservoirs of diffuse and dense molecular gas (^{13}CO , HCO^+ , HCN) in the OSC with the Argus array on the Green Bank Telescope (up to 10^5 Solar masses). We are also able to estimate the central ionizing sources from Very Large Array continuum observations, showing central stellar types as early as O4. Combined, these observations allow us to study chemical abundances and star formation efficiencies on the outer edge of the Milky Way, putting constraints on star formation properties towards the edge of the Galaxy's molecular disk.