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Presentation Requested: oral

Category: Role of AGN in Galaxy Evolution in the ALMA Era

Question: Is AGN feedback more, less or equally important as stellar feedback? Is this dependent on the galaxy types and how? What is the role that ALMA and other new facilities like NuStarr play in addressing this question?

Suppressing star formation the AGN s unlikely role in maintaining nuclear gas

Feedback on the interstellar medium of galaxies by outflows driven by Active Galactic Nuclei is an essential component of many models of galaxy formation, but an example of an AGN outflow directly affecting the star formation (SF) efficiency in the resident molecular gas has not been observed. Here we present millimeter-wave observations from ALMA and CARMA of the gas and dust continuum of NGC 1266, which hosts an AGN-driven outflow, finding that SF is very suppressed in the nuclear region. Our observations reach spatial resolutions of $\approx 60\text{pc}$, separating the continuum emission due to SF from that due to the AGN, and resolving the CS line emission from high density molecular gas. The ratio of the SF rate surface density (Σ_{SFR}) to the gas surface density (Σ_{H_2}) reveals that SF is suppressed by a factor of ≈ 70 in the molecular gas compared to normal star-forming galaxies. The AGN-driven outflow can account for this extreme suppression by injecting turbulence into the molecular gas, regulating SF while simultaneously hindering black hole growth, providing an example of regulation that can the M- σ relation at intermediate scales.