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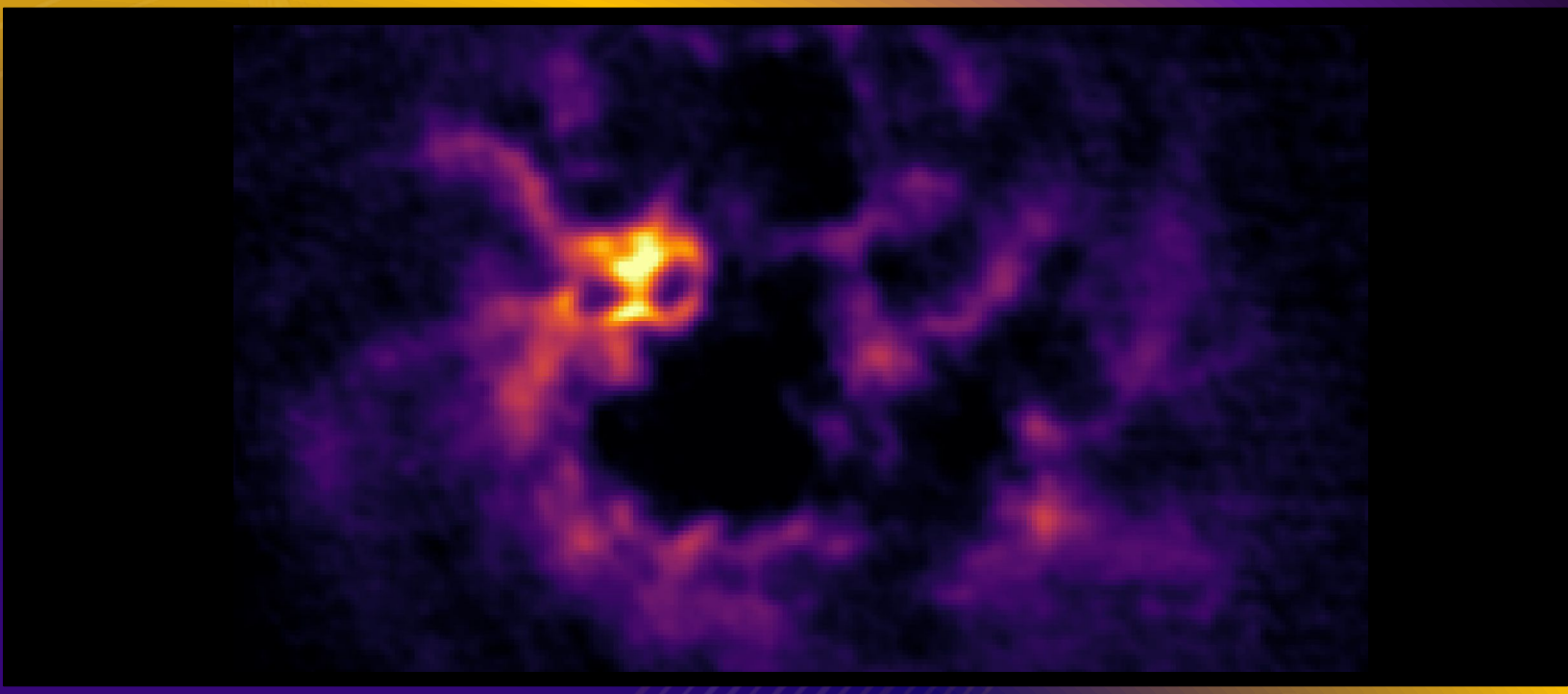

The atomic interstellar medium's role in the star formation lifecycle: a sharpened view of nearby galaxies from LGLBS and PHANGS-JWST

Eric Koch | *Center for Astrophysics (Harvard & Smithsonian)*

The atomic interstellar medium (ISM) encodes physics crucial to build a complete picture of the star formation lifecycle. The atomic ISM is what molecular clouds form from, thereby setting where new generations of stars form, and into which the newly-formed massive stars inject energy and momentum, creating a feedback loop that destroys the molecular cloud and reshapes the local galactic environment. Tests of molecular cloud formation and destruction remain difficult in observations, however, and fundamental questions remain before we can pinpoint the dominant processes. New instruments have enabled enormous strides in the past decade in understanding molecular clouds themselves and feedback from massive stars, and the long-standing gaps in the atomic ISM's role are increasingly the limiting factor in building a complete view of the star formation lifecycle.

I will present initial results from two ongoing surveys that can begin filling these gaps. First, I will introduce the Local Group L-band Survey (LGLBS), a VLA "extra"-large program to study the northern Local Group star-forming galaxies in the 21-cm HI line and the 1--2 GHz radio continuum in exquisite detail. Our pilot observations show complex HI spectra across both M31 and M33, and I will show early results of tracing the evolution of atomic gas around molecular clouds at different star-forming stages. Next, I will present the first results on the diffuse dust emission from the PHANGS-JWST Treasury, a Cycle 1 project using NIRCam and MIRI to map the inner portions of 19 nearby star-forming galaxies. We find that mid-IR emission from polycyclic aromatic hydrocarbons (PAHs) is potentially an accurate tracer of the total gas column density and that the incredible JWST sensitivity can directly trace the atomic ISM. JWST opens the door to resolving the atomic ISM structure across a representative sample of the local Universe star-forming galaxy population on scales that we will not match with the 21-cm HI line until the SKA and ngVLA era.

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