PHYSICS COLLOQUIUM:
The PHANGS HST & JWST Surveys: A Census of Star Clusters and Multi-Scale Stellar Associations in Nearby Spiral Galaxies

Janice C. Lee
Chief Scientist, Gemini Observatories
NOIRLab

Date:
9/24/2021

Time:
10:30 AM - 11:50 AM

Link:
Please contact snsgradstaff@ucmerced.edu for the Zoom infromation.

Abstract:

The PHANGS program is building the first dataset to enable the multi-phase, multi-scale study of star formation across the nearby spiral galaxy population. This effort is enabled by large Treasury programs with ALMA, VLT/MUSE, and HST, with which we have obtained CO(2--1) imaging, optical spectroscopic mapping, and high resolution UV-optical imaging, respectively.

Here, I discuss PHANGS-HST, which is obtaining five band NUV-U-B-V-I imaging of the disks of 38 spiral galaxies at distances of 4--23 Mpc, and parallel V and I band imaging of their halos, to provide a census of tens of thousands of compact star clusters and associations. The combination of HST, ALMA, and VLT/MUSE observations will yield the first joint catalog of the observed and physical properties of ~100,000 star clusters, associations, HII regions, and molecular clouds. With these basic units of star formation, PHANGS will systematically chart the evolutionary cycling between gas and stars, across a diversity of galactic environments found in nearby galaxies. I discuss the design of the PHANGS-HST survey, and highlight new methods for selecting star cluster candidates, morphological classification of candidates with convolutional neural networks, and identification of stellar associations over a range of physical scales with a watershed algorithm. I describe the cross-observatory imaging, catalogs, and software products to be released, which will seed a broad range of community science, in particular, a recently approved JWST Cy1 study of dust embedded star formation and ISM physics for 19 of the galaxies.

About the Speaker:

J.C. Lee began her career in STEM education and policy, with focus on increasing equity for minoritized and under-served student populations. She subsequently pursued academic research in observational astronomy, and is an expert on star formation in nearby galaxies.

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About the Speaker (cont.):

J.C. Lee graduated from Cornell University with a BA in Mathematics and a MA in Teaching. She then obtained a Masters in Astronomy from Wesleyan University, and a PhD in Astronomy from the University of Arizona (2006). She held Hubble and Carnegie postdoctoral research fellowships at NOAO and Carnegie Observatories.

In 2011, she became a member of the scientific staff at the Space Telescope Science Institute, where she continued her research and supported the scientific community through her work to enable the Early Release Science program with the James Webb Space Telescope. In 2017, she joined the scientific staff at Caltech/IPAC as Deputy Lead for Communications and Education. In 2021, she began serving as Chief Scientist for Gemini Observatory at NSF's NOIRLab.

J.C. Lee has authored over 100 publications on star formation and galaxy evolution, and has been an editor of 3 books. Her research aims to constrain the physics that drive, regulate, and extinguish massive star formation across different galactic environments. She has been particularly interested in using the extreme environments of low mass dwarf galaxies, galaxy outskirts, and starbursts as observational laboratories. The majority of her work is based on large, multi-wavelength imaging surveys of nearby galaxies that she has led or co-led over the past 15 years: Spitzer Local Volume Legacy Survey (LVL); HST Legacy ExtraGalactic Ultraviolet Survey (LEGUS); and most recently, PHANGS-HST/JWST.

J.C. Lee engages in a broad range of service to the astronomical research community, with participation on national and international scientific advisory, review, and organizing committees. In particular, she currently serves as Chair-Elect for the NASA Cosmic Origins Program Analysis Group (COPAG) Executive Committee.

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