February 2020

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Selected Cycle 8 Observing Proposals

The Cycle 8 Call for Proposals had an outstanding response. For the U.S. and German queue combined, the SOFIA Science Center received 238 observing proposals. Of these, 47 proposals were accepted as Legacy, Priority 1, and Priority 2 programs, with an additional 44 proposals accepted as Priority 3 and Survey programs (see entire list). Furthermore, five archival research proposals were received and one was accepted. The selected Legacy Program (PI Neufeld) will span two observing cycles; two additional Legacy proposals were selected as pilot programs for Cycle 8 (PIs Lopez-Rodriguez and Stephens). The data will have no exclusive-use period, and hence the community will have immediate access to these high-impact datasets.

Legacy Program - HyGAL: Characterizing the Galactic Interstellar Medium with Hydrides
PI: David Neufeld (Johns Hopkins University)
Proposal ID 08_0038
Abstract (Excerpts): By means of absorption-line spectroscopy towards 22 background Terahertz continuum sources widely distributed within the Galactic plane, we will obtain robust measurements of the column densities of six hydride molecules (OH^+, H_2O^+, ArH^+, SH, OH, and CH) and two key atomic constituents (C^+ and O) within the diffuse ISM. These observations will allow us to address several related questions: (1) What is the distribution function of H2 fraction in the ISM? (2) How does the density of low-energy cosmic-rays vary within the Galaxy? (3) What is the nature of interstellar turbulence (e.g. typical shear or shock velocities), and what mechanisms lead to its dissipation?
The anticipated results are (1) a determination of the distribution function for the H2 fraction in the Galaxy, and how it varies; (2) a determination of the cosmic-ray ionization rate and how it varies; (3) an improved characterization of turbulence in the diffuse ISM, and its dissipation; (4) the provision of enhanced data products that will serve as a legacy for future ISM studies.

Pilot Legacy Program - SOFIA Heralds a New Era of Measuring the Magnetic Fields of Galaxies
PI: Enrique Lopez-Rodriguez (SOFIA Science Center)
Proposal ID 08_0012

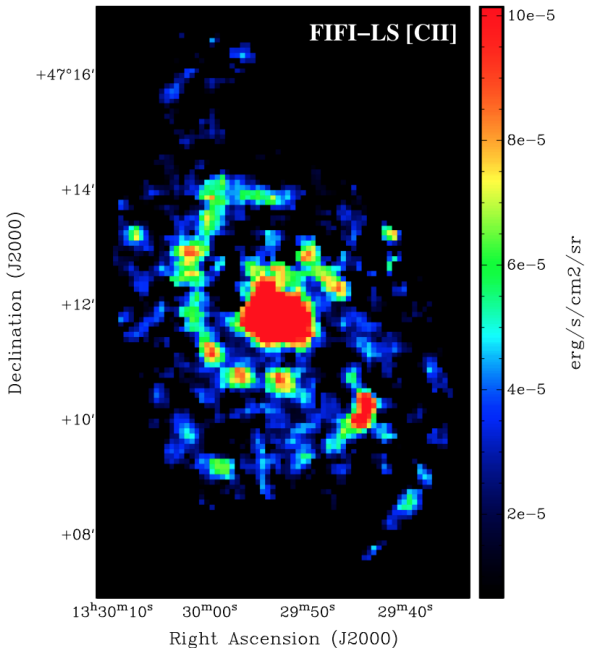
Abstract (Excerpts): Our team has made important and unexpected discoveries about the role of the magnetic fields in nearby galaxies. We have found a) that galaxies typically host large-scale and coherent magnetic fields along the spiral arms, b) magnetic field strengths of ~uG with similar contributions from the random and ordered field components, and c) magnetic fields oriented along galactic outflows that are likely responsible for magnetizing the IGM. To date, these results have mostly emerged from single wavelength regimes: radio synchrotron polarization tracing the large-scale field structure in the ionized gas, and optical studies to investigate the effect of scattering and/or extinction by the ISM. These studies access the field on vastly different spatial scales and within different ISM phases. However, the effect of magnetic fields in dense regions of the ISM, outflows, and the ISM of merging galaxies are still poorly described. SOFIA/HAWC+ is key to provide a complete picture using far-infrared (FIR) polarimetric observations. This Joint Legacy Program aims to construct a comprehensive empirical picture of the magnetic field strength and structure in multiphase ISM of galaxies. Using HAWC+, we will conduct a FIR polarimetric survey covering the full disk of nearby galaxies.

Pilot Legacy Program - FIELDMAPS: Filaments Extremely Long and Dark: A Magnetic Polarization Survey
PI: Ian Stephens (Harvard & Smithsonian Center for Astrophysics)
Proposal ID 08_0186
Abstract (Excerpts): Molecular gas in a galaxy generally follows the spiral arms. In the Milky Way, the densest of this molecular gas can form long, velocity-coherent filaments parallel and in close proximity to the Galactic plane. These dense filaments make up the 'skeleton' of molecular gas of the Milky Way - akin to the dark dust lanes seen in nearby spiral galaxies - and thus have been called 'bones.' For the early stages of star formation, these bones represent the largest star-forming structures in the Galaxy, and previous studies suggest that magnetic fields are critical to their formation. Our pilot survey of 2 bones show that HAWC+ can detect polarization over large angular extents with modest integration time. To understand how gas collects in the magnetized spiral potential, we propose a legacy survey to probe the magnetic fields across the entire extent of 8 additional bones (for a total of 10). We will use these observations in combination with new magnetohydrodynamical simulations of galactic formation of bones to investigate (1) the role of magnetic fields in the formation of bones, (2) how the field varies between arm and inter-arm bones, and (3) whether or not fields bend into filaments to build gas flows to the largest gravitational potential well.

Featured Public Archival Dataset: Survey of [CII] in M51

Proposal ID: 04_0116
Co-PIs: J. Pineda (NASA JPL) and J. Stützki (University of Cologne)

The [C II] 158-micron emission line is an important tracer of star formation and provides critical diagnostics of the interstellar medium by revealing the distribution of gas transitioning between the atomic and molecular phases. SOFIA mapped the entire spiral galaxy M51 in the [C II] line using its FIFI-LS and GREAT instruments, providing the first full velocity-resolved [C II] map of a nearby galaxy.



View and download the FIFI-LS data.
View and download the GREAT data.

Co-Principal Investigator Jorge Pineda presented the findings of the survey in a SOFIA Tele-talk. The talk focused on star formation activity in the disk and the overall spatial and spectral relationship of the interstellar medium tracers used to characterize the spiral arms of M51, including far ultraviolet, H-alpha, CO, and HI in addition to [CII]. (View the presentation and audio files.)

In addition to the talk, Pineda published a paper comparing these high-sensitivity FIFI-LS [C II] maps with other star formation tracers. (Read the paper.)

The high velocity resolution of the GREAT maps provide further detailed kinematic information, and are available for download on the SOFIA Data Archive at IRSA.

We're Hiring!

Current job vacancies include:

- Visiting Associate Scientist Astronomy
- Mission Director
- Instrument Scientist

To learn more about SOFIA jobs, visit the USRA Careers website.
In "Filter by Business Unit," select "SOFIA."

Join the SOFIA Tele-Talks

Tele-Talks are scientific presentations given via phone, with slides distributed ahead of time. The talks are targeted broadly towards members of the astronomy community who are interested in SOFIA science and in the current and potential scientific capabilities of the observatory. The talks are held approximately twice a month on Wednesdays at 9:00 a.m. Pacific, noon Eastern.

Upcoming Schedule

- March 4: Carbon Lines Towards Orion; Pedro Salas (Leiden Observatory)
- March 18: FIR polarimetry of 30 Dor; Michael Gordon (SOFIA/USRA)
- April 1: Polarimetry of Protostellar Core IRAS 15398-3359; Elena Redaelli (MPE)
- April 15: IRSA Archiving of SOFIA Data; Luisa Rebull (IPAC)
- May 27: Dust Production in Carbon Stars; Kathleen Kraemer (Boston College)

For information on how to participate in the Tele-Talks, please check the SOFIA Tele-Talk webpage.

e-Newsletter Writer: Raquel Destefano

Please direct questions and comments to the SOFIA Science Center help desk:
sofia_help@sofia.usra.edu.