

SOFIA

Science e-Newsletter



February 2018

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Reminder: Feb. 9 -- deadline to submit abstracts for Scientific Event E1.18 “Infrared Astronomy: Star Formation and Interstellar Processes Over Many Scales” at the COSPAR Assembly in Pasadena, California

The SOFIA Science Center will host “Infrared Astronomy: Star Formation and Interstellar Processes Over Many Scales” (E1.18) at the 42nd Committee on Space Research (COSPAR) Scientific Assembly in Pasadena (California, USA) on July 14-22, 2018. This event is a one-day workshop (the exact date has not been set by the conference organizers).

Please submit your abstracts on galactic and extra-galactic star formation and interstellar matter via the COSPAR web page: <https://www.cospar-assembly.org>.

The deadline for abstracts is February 9.

We look forward to seeing you and having an active discussion on infrared astronomy as well as current and future infrared observing facilities.

Scientific Description:

This is an opportunity to gather the infrared community to discuss the current status of our understanding of star formation and interstellar processes on galactic and extragalactic scales. This meeting will provide an overview of current research and will shape future observations with the Stratospheric Observatory for Infrared Astronomy (SOFIA).

Main topics include:

- Molecular cloud structures, dynamics, and evolution
- Star formation and feedback on cloud and galactic scales
- Dust origin, composition, and processing
- Chemical processes in the various phases of the ISM
- The roles of turbulence and magnetic fields for cloud dynamics and star formation
- Cooling and heating of the ISM and its energy budget
- ISM in extreme environments, e.g., star bursts and active galactic nuclei (AGNs)

- Impact and evolution of shocks in star formation and the ISM

The infrared Herschel and Spitzer Infrared Space Observatories have advanced our fundamental understanding of star formation and interstellar processes in the Milky Way and other galaxies. The images and spectra have revealed star bursts, turbulent clouds, intricate networks of filamentary structures, pre-stellar cores, and young stars. The archives of the Herschel and Spitzer Observatories are still treasure troves to be mined for new insights.

Today SOFIA continues the scientific exploration traditions of the Herschel and Spitzer Observatories, allowing researchers to make new observations of the interstellar medium (ISM) while offering state-of-the-art instrumentation. SOFIA provides the highest spectral resolution from mid-infrared wavelengths to terahertz frequencies, enabling, for example, detailed studies of gas dynamics. SOFIA's on-going instrumentation program will continue to add new capabilities, such as the High-resolution Airborne Wideband Camera-plus (HAWC+), a wide-field, far-infrared polarimeter to enable the investigation of magnetic fields and dust alignment on cloud scales, and the forthcoming High Resolution Mid-Infrared Spectrometer (HIRMES) covering the 25 – 122 μm spectral range that will enable detailed studies of the composition, thermal structure, and kinematics of protoplanetary disks, and will enable a wide range of Galactic studies.

Soon the James Webb Space Telescope (JWST) will deliver near and mid-infrared data at unprecedented spatial resolutions and sensitivities. Observations from the Atacama Large Millimeter/submillimeter Array (ALMA) and ground-based near-infrared and millimeter complete the multi-wavelength picture necessary to understand the matter cycle in galaxies.

This meeting will gather the infrared community to discuss the current status of our understanding of star-formation and interstellar processes on galactic and extragalactic scales, providing an overview of current research while shaping the direction of future SOFIA observations.

Confirmed Speakers:

Richard Klein (UC, Berkeley): Star Formation and Magnetic Fields

Darren Dowell (JPL): SOFIA HAWC+ Science Highlights

Kimberly Ennico Smith (SOFIA Project Scientist): SOFIA Instruments and Science

Meeting-In-Meeting of “Astrophysics in the SOFIA Era” at the 232nd AAS in Denver, Colorado

The SOFIA Science Center will host three, 90-minute special sessions at the 2018 Denver American Astronomical Society (AAS) conference, July 3-7, 2018, to address three themes in far-infrared astrophysics. You are invited to present your SOFIA results during these sessions.

The deadline for abstract submission to the AAS is March 5, 2018.

Meeting abstract for program:

Infrared astrophysics addresses a wide range of current problems including (1) The Birth of Planets and Stars, (2) The Path to Life, and (3) Extreme Environments, which comprise the sessions of this meeting-in-a-meeting.

The goals of the meeting are to present forward-looking prospects in each topic and to tie them to far-infrared capabilities. Multi-wavelength approaches, aligned with the three themes listed above, with sister observatories such as JWST and ALMA, or future concepts, are welcome. SOFIA has supported numerous Ph.D. theses and instrument

development, both of which will feature in the session.

Session 1: The Birth of Planets and Stars: Finally Charting the Infall

- Molecular clouds
- Cloud cores
- Filaments and magnetic fields in clouds
- Infall onto protostars
- Protostellar disks
- Resolving high-mass star forming regions
- Astrochemistry as a clock
- Stochastic accretion
- Feedback of stars into clouds
- Role of turbulence versus magnetic fields

Session 2: The Path to Life: Water, Organics, and Dust through Cosmic Time

- Formation of dust in the outflow of evolved stars, novae, and supernovae
- Spatial abundance gradients across the Galaxy
- Distribution of oxygen, water ice, and water vapor in protoplanetary disks
- First molecules: light hydrides
- Astrochemistry
- Far-infrared Polycyclic Aromatic Hydrocarbons (PAH) signatures
- Planetary atmospheres (including Titan, Europa)
- Cometary molecules and dust

Session 3: Extreme and Hostile Environments: Unveiling Starbursts and AGNs

- Flows and magnetic fields near the galactic center
- Local starbursts
- Galactic center as local truth to compare with high z
- Cold dust near supermassive black holes (AGNs)

Confirmed speakers:

Harold Yorke (USRA): Scientific promise of SOFIA

Giles Novak (Northwestern): Magnetic fields and star formation

Alberto Bolatto (U. Maryland): Interstellar medium in nearby galaxies

Edwin Bergin (U. Michigan): Organic astrochemistry

David Neufeld (Johns Hopkins): Light hydride astrochemistry

Mark Morris (UCLA): Galactic Center outstanding problems

Elizabeth Mills (Boston U.): Multiwavelength view of Galactic Center

Xander Tielens (U. Leiden): The C+ Universe

Invitation to participate in the ApJ Letters Focus Issue on SOFIA FIFI-LS and HAWC+ Results

The SOFIA Science Center has arranged an ApJ Letter Focus issue on SOFIA Field Imaging Far-Infrared Line Spectrometer (FIFI-LS) and High-resolution Airborne Wideband Camera-plus (HAWC+) science results. Publications with results from other SOFIA instruments will be linked to this focus issue. The target dates for submission and publication are July and November 2018, respectively. This ApJL Focus Issue is a golden opportunity for your paper to impact the astronomical community. We encourage SOFIA users (e.g., Guest Observers with SOFIA data) to present their science results at the SOFIA session of the COSPAR or the summer AAS meeting and to publish them in this SOFIA Focus Issue.

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

