

SOFIA

Science Newsletter



March 2021

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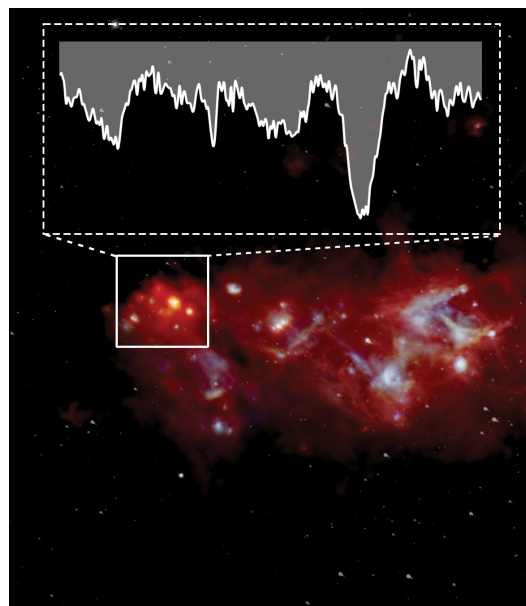
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Science Spotlight

First Detection of ^{13}CH in the Interstellar Medium

The $^{12}\text{C}/^{13}\text{C}$ isotopic ratio has been investigated extensively because it is an important diagnostic tool for probing the nuclear history of our galaxy. Chemical evolution models predict that the ratio will increase with distance from the galactic center and decrease with time. These predictions have been confirmed by observational measurements of rotational transitions of several simple species like CO, CN, and H_2CO , amongst others. However, the trends found using different molecules show systemic variations, often related to isotope-selective chemical processes.

CH on the other hand, which produces absorption lines in diffuse clouds in front of high-mass star-forming regions, should be relatively unaffected by such fractionation effects. The team lead by A. Jacob (MPIfR) used SOFIA/GREAT to observe the ^{12}CH and ^{13}CH rotational transitions at 2 THz towards four high-mass star-forming regions, SgrB2(M), G34.26+0.15, W51e, and W49(N). By combining the $^{12}\text{C}/^{13}\text{C}$ values derived using CH with previous measurements from different chemical species, a revised galactic gradient was determined. [Read more.](#)



The first detection of ^{13}CH in the interstellar medium. SOFIA absorption spectrum of ^{13}CH corresponding the rotational transition near 2 THz in the direction of SgrB2(M) superposed over a composite infrared image of the Sgr B complex. Data from SOFIA /FORCAST taken at 25 and 37 μm , shown in blue and green, is combined with data from the Herschel Space Observatory, shown in red (70 μm), and the Spitzer Space Telescope, shown in white (8 μm). Credit: Jacob et al., 2020; NASA/SOFIA/JPL-Caltech/ESA/Herschel

Upcoming Events

Southern Sources with EXES/SOFIA: A Community Chat -- March 30, 2021

The SOFIA Science Center is **soliciting input from the astrophysics community at large** to evaluate the potential scientific impact unlocked by Southern Hemisphere observations with EXES. The [EXES instrument](#) (4.5 – 28.3 μm , R=5000-100000) typically operates during ~ 20 flights per observing cycle, all departing from Palmdale, California. Observing regions with declinations below -36 degrees (and in practice, below -24 degrees for faint sources) require flights departing from a Southern Hemisphere base.

In particular, we want to understand which EXES data from Southern sources could leverage the interpretation of MIRI/Webb observations (which cover the same wavelength range with lower spectral resolution), and complement atmosphere-impacted TEXES and CRIRES observations. This 1.5 h webinar is an opportunity for anyone to present ideas about high-impact EXES observations of Southern sources, which will be used as inputs to the development of a long-term Southern deployment strategy, supporting Cycle 10 and beyond.

[Registration](#) is free but necessary in order to join the webinar. To help us prepare for a productive workshop, please consider sharing your suggestions on this [collaborative document](#) before the meeting -- please send a request for editing permissions. If you would prefer to share your input outside of a public forum, we encourage you to contact the [EXES team](#).

New Publications

Instrument Roadmap

The Instrument Roadmap, a community- and science-driven plan for SOFIA's instrument suite, is now available to view. The Roadmap is focused on prioritized science cases and the technology needed to enable them. It is built on input from a large scientific community, including more than 300 participants across more than 100 institutions attending dedicated [virtual workshops](#) last summer. [Read the full Instrument Roadmap report on the Science Center website.](#)



Making the Magnetic Field Visible

HAWC+ is rapidly expanding the study of magnetic fields, from protostars to nearby galaxies. To highlight the contributions of HAWC+, a special edition of the SOFIA newsletter is available, featuring recent polarimetric observations of sources such as galaxies M82 and NGC 1068, the Milky Way's center, galactic filaments and the Orion nebula. [Read the newsletter here.](#)

Community Survey

We are soliciting feedback from our community to help improve the [SOFIA Science Center website](#) and invite you to take a survey about your experience with the website. The survey should take about five minutes to complete and will close on April 5. All responses are anonymous. [Take the survey here.](#)

Good to Know

How are Instrument Series Scheduled?

Before the start of each observing cycle, how is the instrument schedule determined so as to maximize the execution of requested observations? This is a question relevant to all multi-configuration telescopes; for SOFIA, the additional positioning flexibility needs to be balanced by a thoughtful flight leg design to maximize observation time on scheduled sources.

After the Time Allocation Committee's scientific recommendations are made, the first step in the process consists in selecting the highest ranked proposals and finding the optimal instrument cadence, given a set of technical constraints. To determine the most efficient instrument schedule, a series of cycle-long simulated solutions are computed and compared. Then a second tool is applied to automatically plan all the flights in the cycle. This allows SOFIA's scheduling team to identify additional programs whose targets fill in the flight plans, and which can hence be included as Priority 3 programs. [Read more.](#)

Virtual Talks

Join Science Talks Remotely: Colloquia, Tele-Talks & Workshops

SOFIA colloquia are held via WebEx on Wednesdays at 3:30 pm Pacific. [See the complete schedule and connection information.](#)

Upcoming Colloquia

- March 24: Viviana Guzman (UPC)
- March 31: Tjitske Starkenburg (Northwestern University)
- April 7: Melodie Kao (University of Arizona)
- April 14: Natalia Lewandowska (Haverford)
- April 21: Mark Morris (UCLA)
- May 5: Laura Perez (Universidad de Chile)

[See full list of Spring Colloquia series.](#)

Tele-Talks are scientific presentations given via phone, with slides distributed ahead of time. The talks are held approximately twice a month on Wednesdays at 9:00 a.m. Pacific, noon Eastern. For information on how to participate, check the [SOFIA Tele-Talk webpage.](#)

Upcoming Tele-Talks

- March 24: Enrique López-Rodríguez (KIPAC/Stanford); The Structure and Strength of the Magnetic Field in the Galactic Outflow of M82
- March 31: Casey Honniball (NASA GSFC); Molecular Water on the Sunlit Moon
- April 7: Bo Peng (Cornell University); N/O Abundance Estimates for Dusty Galaxies
- April 14: Sarah Nickerson (NASA ARC, BAERI); HNC towards the Orion Hot Core

- April 28: Bringfried Stecklum (Thueringer Landessternwarte - TLS); IR Observations of a Flaring Maser Source
- May 5: Jordan Guerra (Villanova University); Magnetic Field Map of OMC-1

[See full list of tele-talks.](#)

The **SOFIA Science series** is SOFIA's year-round program of virtual multi-day workshops. The first series event will take place on **March 23-26, 2021** (8-11 am Pacific Time), and will address the topic of '[Rock, Dust and Ice: Interpreting Planetary Data](#)'. Observers, modelers and laboratory astronomers will discuss the interpretation of observations of rocks, ices and dust on and around Solar System objects. A large variety of complementary observational techniques will be featured, via invited and contributed presentations, as well as different methods to constrain solids' fundamental properties such as composition, porosity, thermal inertia and grain size distribution. The fourth day will be dedicated to a moderated discussion on databases, archives and public codes.

See the program [here](#).

[Registration](#) is free but necessary to attend. **Registration deadline is March 22 at 9pm Pacific.**

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Please direct questions and comments to the SOFIA Science Center help desk:
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