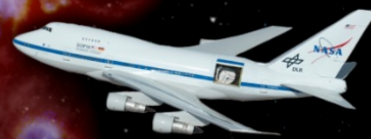


# SOFIA

## Science Newsletter



June 2022

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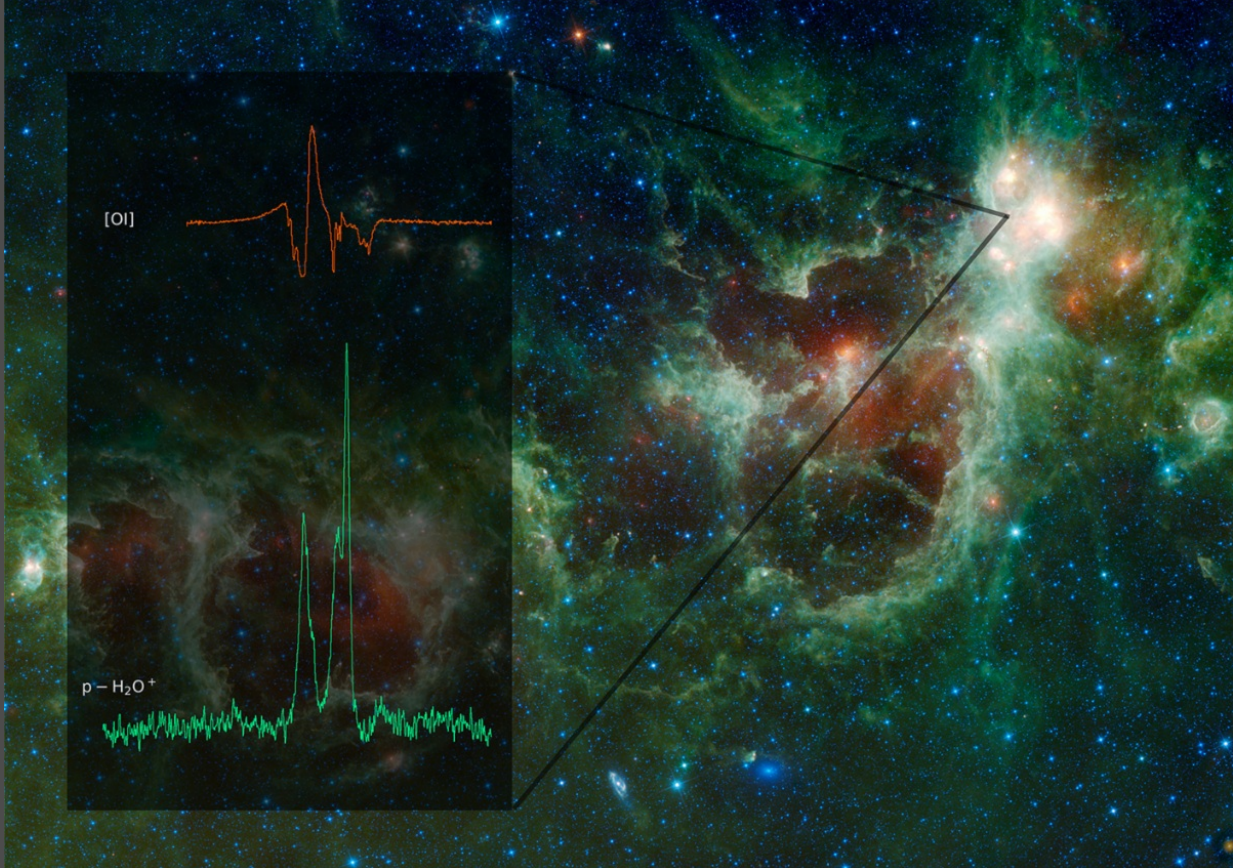
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## Science Spotlight



### Small Molecules Have Big Impacts in Interstellar Clouds

Hydrides are very sensitive tracers of different phases of the interstellar medium, and their chemistry is relatively straightforward. The SOFIA legacy program Hydrides in the Galaxy (HyGAL) targets a diverse selection of hydride molecules, allowing different processes to be monitored while complementing other observations. For example, one of the hydrides studied, argonium, can only form in regions that are almost purely atomic gas, so detecting argonium is indicative of a low molecular content in its surrounding environment. Other hydride molecules can indicate the presence of dense gas, intense cosmic radiation, turbulence, and more. In [its first publication](#), the legacy team compared the hydride abundances in three regions of the Milky Way: two star-forming regions, W3(OH) and W3 IRS5, and a young stellar object, NGC 7538 IRS1. [Read more.](#)



W3, one of the 25 Milky Way regions the HyGAL project will study, is seen as the glowing white area in the upper right of this image of the Heart and Soul Nebulae, taken by NASA's Wide-field Infrared Survey Explorer (WISE). SOFIA looked at the abundances of six hydride molecules in W3, the spectra of two of which are shown in the box at left. Image credit: Nebulae: NASA/JPL-Caltech/UCLA; Spectra: Jacob et al. (2022)

## Upcoming Events

### **SOFIA at the AAS Meeting in Pasadena, June 2022**

SOFIA science will be all over the [240th AAS Meeting](#), next week June 12-16, 2022 in Pasadena, CA. Be sure to visit our exhibit booth to chat with our staff! We will also host the following events:

- **Monday, June 13, 9:00-9:30 am PT, Hall A/B**

#### **Exhibit Theater Presentation: "SOFIA Legacy data: The ISM at high spectral resolution with GREAT"**

This summer, new SOFIA observations will provide the final data to Legacy Programs using the GREAT heterodyne instrument for ISM exploration: HyGAL (PIs Neufeld and Schilke) and FEEDBACK (PIs Tielens and Schneider). This presentation will introduce the publicly available datasets and relevant analysis tools.

- **Monday June 13, 10:00-11:30 am PT, Conference Room 204**

#### **Splinter Session: "Mid and Far-IR Observations: Leveraging Science across the Spectrum"**

This session will highlight the scientific synergies available from multi-wavelength, multi-observatory datasets including mid and far-IR data, as well as observational constraints and considerations. A panel and open community discussion will address how in practice such synergetic approaches can be best supported. With E. Schinnerer (MPIA), M. MacGregor (U Colorado Boulder), N. Karnath (SOFIA/USRA), J. Jackson (GBO), M. Zemcov (RIT), M. Bradford (JPL), J. Pineda (JPL).

- **Wednesday June 15, 11:30 am-12 pm PT, Hall A/B**

#### **Exhibit Theater Presentation: "SOFIA Archival Research Program - what you need**

to know"

We will present the policies and mechanics of the open SOFIA Archival Research Program (SARP), and highlight a selection of public datasets.

- **Wednesday, June 15, 6:30-7:30pm PT, Ballroom C**

#### **SOFIA Town Hall**

The SOFIA SMO Director will report on the status of the observatory, the ongoing Cycle 9 observations including Legacy Programs and Southern deployments, and open archival science research opportunities. This Town Hall will also be an opportunity for direct feedback from the SOFIA user community regarding current science operations and future plans. Light dinner and refreshments will be served. **We encourage you to [submit anonymous questions here](#). SOFIA leadership will address questions during the Town Hall. Questions may be submitted until Wednesday, June 15, at 10:00am Pacific time.**

- **Thursday, June 16, 9:22-9:32 am PT, NASA Booth**

#### **Hyperwall Talk: Exploring the Galactic Center with SOFIA**

by M. Hankins (Arkansas Tech), lead of the Galactic Center FORCAST legacy program

- **Thursday June 16, 11:00-11:30 am PT, Hall A/B**

#### **Exhibit Theater Presentation: "SOFIA Legacy datasets: Polarimetric observations with HAWC+"**

The HAWC+ instrument aboard SOFIA has opened the way to the exploration of magnetic fields on dusty sources, through polarization measurements at mid- and far-IR wavelengths. We will describe the data from the ongoing HAWC+ Legacy programs.

[More information and full list of events on the Science Center website.](#)

## Featured Legacy Dataset

### **Legacy Program: Hydrides in the Galaxy**

The SOFIA legacy program Hydrides in the Galaxy - HyGAL (PI: D. Neufeld & P. Schilke) - focuses on the detection of spectral signatures of six hydride molecules in the galactic diffuse ISM:  $\text{OH}^+$ ,  $\text{H}_2\text{O}^+$ ,  $\text{ArH}^+$ , SH, OH, and CH. Eventually, the program is expected to observe up to 25 galactic regions with the GREAT instrument, using absorption-line spectroscopy of foreground interstellar gas in front of bright background continuum sources. This technique offers a robust tool for measuring column densities. Selected sources span regions from the inner galaxy all the way to outer regions, including different spiral and inter-arm regions, representing different environments and stages of chemical enrichment.

The spectra from 13 sources are currently available, and additional data will be obtained during the upcoming Southern deployment. All calibrated data are available from the [IRSA SOFIA Archive](#), under Proposal ID 08\_0038.

## Call for Proposals

### **SOFIA Archival Research Program Call for Proposals**

SOFIA is pleased to invite proposals for the [SOFIA Archival Research Program](#) (SARP), aimed at encouraging the use of SOFIA archival observations for impactful science.

This program will fund archival research projects primarily using SOFIA data to encourage the use of available SOFIA archival data. Two distinct types of proposals for the archival research program are solicited in this round:

- Regular Proposals - Large programs requesting up to \$175,000 per year, or more in exceptional cases, and lasting up to two years
- Small Proposals - Targeted programs requesting up to \$50,000 - \$75,000 and lasting for one year

This call is open to all qualified astronomers affiliated with a U.S. institution, and complements the Astrophysics Data Analysis Program (ADAP) under the NASA Research Opportunities in Space and Earth Sciences (ROSES) solicitation.

Early career researchers, including graduate students and postdocs, are encouraged to apply to the small proposals category.

**Proposals are due July 8, 2022.** [Learn more about the Archival Research Program on the science center website.](#)

To help users navigate the SOFIA archive, the [SOFIA Synergies with JWST and ALMA page](#) lists the references to sources available in the SOFIA archive which have also been observed by ALMA programs and are included in Webb early observations plans. The website also provides [selected highlights of the data archive](#), a collection of high-potential datasets.

As a NASA sponsored funding call, the SARP is open only to U.S. institutions. Access to the SOFIA Science Archive is freely available and not limited to those eligible to apply for this funding.

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## DDT Observing Proposals

Proposals for [Director's Discretionary Time](#) (DDT) for observing projects continue to be welcome at any time. Note that new DDT programs will need to be scheduled during the [programmed series for Cycle 9](#). To request a DDT observation on SOFIA, therefore please simply generate and submit a proposal via the [USPOT tool](#) (as for regular Cycle proposals). Because DDT projects usually address time-critical phenomena that are of high interest to the community, there will generally not be any exclusive use period where the data can only be accessed by the proposing team. Note that funding is not granted for most DDT programs. Eligible PIs of DDT programs that receive data can apply to the [archival research program](#).

# Good to Know



## Enhanced SOFIA and Finder Chart Tool

The [SOFIA](#) and [Finder Chart](#) data exploration tools have been upgraded to include the same features recently released for [ZTF](#) and [IRSA Viewer](#). In addition to optimizations in the button layouts, the new features include "drill-down" extractions of spectra from data cubes, plots of data values along a line, and scatter plots of user-selected points.

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## New Cookbook: GREAT Data with jdaviz Tools

This [new SOFIA cookbook recipe](#) is a beginner's introduction to visualizing and analyzing GREAT datacubes using the jdaviz tool Cubeviz. This is one of several tools in the STScI data analysis tool ecosystem, which is optimized for Webb data analysis but can be used for .fits datacubes from a variety of instruments. You can find the whole suite of SOFIA cookbooks [here](#).

## Join Science Talks Remotely: Summer Series 2022 and Tele-Talks

The [SOFIA summer seminar series 'Synergies within the Infrared Archive'](#), supporting the latest SARP Call (deadline July 8th, 2022), consists of online talks by members of the community, spanning a large range of astrophysical topics and highlighting how infrared archival data from different instruments can be used together to leverage scientific information. The five-week series features a 45-minute talk, followed by Q&A, on Fridays at 12:00pm EDT/9:00am PDT, starting 13 May and concluding on 10 June 2022.

### Upcoming Summer Series Talks

- [June 10: Fiorella Polles \(SOFIA/USRA\); Synergies within the infrared archive: Investigating the electron density distribution in low metallicity environment](#)

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 [SOFIA Tele-Talk webpage](#).

### Upcoming Tele-Talks

- June 22: Slawa Kabanovic (University of Cologne); [CII] Self-Absorption in RCW120
- July 6: José Pablo Fonfría (Instituto de Física Fundamental, CSIC); S(1) Line of H<sub>2</sub> in AGB Stars
- July 20: Ümit Kavak (SOFIA Science Center); Protostellar Feedback in Orion's Veil

Please direct questions and comments to the SOFIA Science Center help desk:  
[sofia\\_help@sofia.usra.edu](mailto:sofia_help@sofia.usra.edu).

