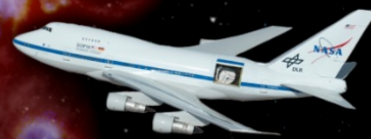


# SOFIA

## Science Newsletter



May 2021

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## Science Spotlight

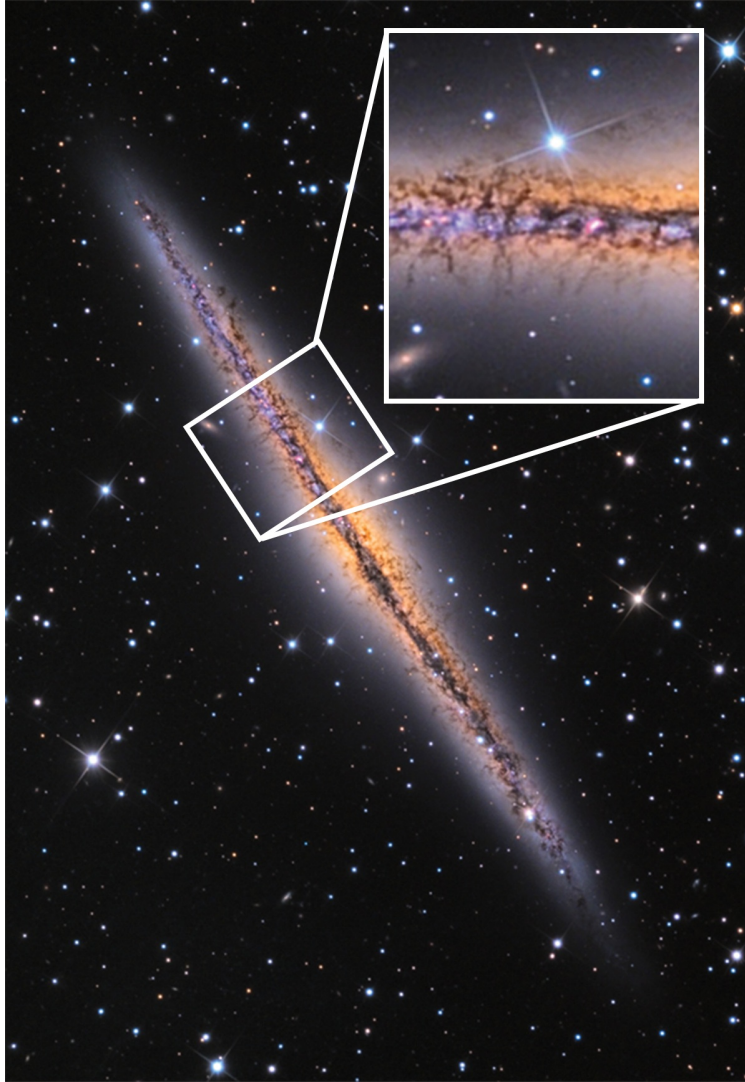


### Galactic Chimneys: An Unseen Component of the Disk-Halo Interaction

Spiral galaxies are relatively thin, but when viewed edge-on, observers can discern emission extending above and below their midplanes. In particular, vertical protrusions called chimneys can be produced by powerful winds from supernovae or intense star formation in star clusters.

Researchers used the FIFI-LS instrument on SOFIA to study the extra-planar distribution of [C II] in the two edge-on spiral galaxies, NGC 891 and NGC 5775. The [C II] line at  $157.7 \mu\text{m}$  appears to trace molecular gas that has been elevated from the midplane and which comprises the inner walls of chimneys that are illuminated by the remaining young stars in the cluster.

Both galaxies have a thinner disk with a scale-height of about 3 kpc, while the central and active star-forming regions are supplemented by a thicker disk with a scale height of about 2 kpc. The extra-planar [C II] may arise in walls of chimneys that connect the disk to the halo, where material is driven upward by stellar winds and supernovae. [Read more.](#)



Optical image of the edge-on galaxy NGC 891, showing dark, thread-like extinction features — walls of the chimneys — extending above and below the midplane. SOFIA [C II] observations reveal a significant mass gas in the chimney walls. *Credit: Adam Block/Mount Lemmon SkyCenter/University of Arizona*

## Director's Discretionary Time

### New Process for DDT

As of May 2021, the process for submitting SOFIA Director's Discretionary Time (DDT) proposals has changed. DDT proposals should now be submitted using the [USPOT software](#), similarly to regular proposals. Detailed instructions can be found [here](#).

We continue to encourage proposals for DDT observing projects at any time. Usages for DDT may include the following: newly discovered celestial phenomena, time-critical observations, experimental techniques for which pilot observations are needed, observations that fill gaps in flight plans, and short observations that are necessary to complete a publication or PhD dissertation. [Read more here](#).

Please look at the [schedule of upcoming series here](#). The schedule is under development and the order and timing of flight series may change. Note that this Fall, two observing series with HAWC+ are planned (including a Southern Hemisphere series), followed by a series with FIFI-LS or GREAT in mid-November.

# Upcoming Events

## SOFIA at the 238th AAS Meeting June 7-9, 2021



We are looking forward to catching up with you at the [238th AAS meeting!](#) SOFIA science results and SOFIA staff can be found at the meeting during [sessions and events](#), on the Slack channels, and at our virtual booth.

On **Monday June 7th at 11 am ET**, Enrique Lopez-Rodriguez (Stanford/KIPAC) will be giving the Fred Kavli Plenary Lecture titled: "A New Era of Measuring Magnetic Fields in Galaxies", featuring SOFIA/HAWC+ observations from their [Legacy program](#).

On **Wednesday June 9th at 12 pm ET**, Margaret Meixner (SOFIA Mission Operations Director) will address the community with a webinar titled "Science from the Stratosphere: What's New with SOFIA", with Q&A afterwards.

SOFIA staff will also be available at the virtual exhibit booth during exhibit hours. Please stop by to download our latest science newsletters and other materials, and chat with us about our latest scientific results and opportunities, and your own projects.

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## SOFIA/ALMA Summer Series Thursdays June 10-July 22, 2021



The SOFIA Science Center and the [North American ALMA Science Center](#) are excited to present their [joint Summer seminar series](#), exploring synergies between radio/millimeter and infrared observations, spanning a large range of astrophysical topics.

The six-week online series will feature a 40 to 45-minute talk on Zoom each **Thursday at 3:30 pm EDT/12:30 pm PDT**, starting June 10 and concluding on July 22, 2021. A Q&A/discussion session will follow each talk.

The scheduled invited speakers are Enrique Lopez-Rodriguez (Stanford/KIPAC), Alberto Bolatto (UMD), Todd Hunter (NRAO), Allison Kirkpatrick (Kansas University), Kate Su (University of Arizona) and Katherine de Kleer (Caltech).

[Registration is free but necessary to attend.](#)

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## Magnetic Fields and the Structure of the Filamentary Interstellar Medium June 22-25, 2021



How do magnetic fields affect the evolution of the interstellar medium (ISM), and in particular star formation? This [4-day online workshop](#) on **June 22-25, 2021 (7-11 am Pacific Time)**, part of the SOFIA Science series ([S3](#)), is organized in partnership with the [James Clerk Maxwell Telescope \(EAO\)](#).

This workshop will provide a forum to exchange insights and views on recent polarimetric observations, numerical simulations and advances in theoretical understanding, in an attempt to identify observable markers of the impact of magnetic fields. We are also dedicating a day to the question of turning polarimetric observations into magnetic field

measurements, including the use and limitations of the Davis-Chandrasekhar-Fermi method.

The schedule includes [16 invited talks](#), including keynote talks by Mordecai-Mark Mac Low (AMNH), Thushara Pillai (BU), Christoph Federrath (ANU) and Terry Jones (UMinn).

We solicit contributions for short talks ([abstract submission deadline: Friday June 4, 2021 at 9 pm Pacific Time](#)), and we welcome attendance from scientists at any career level, especially early career scientists. [Registration](#) is free but necessary to attend.

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## The Future of Airborne Infrared/Submm Astronomy: Prospects and Opportunities July 26-28, 2021

This online workshop organized and hosted by DSI (Deutsche SOFIA Institut) is the first of two, intended for all those concerned about the short-term and mid-term future of Infrared and Submm astronomy. This first workshop aims to identify the main scientific interests in this field, in preparation for a second workshop that will focus specifically on supporting instrumental solutions that can be contributed from the European side. The organizers are interested in new ideas and intend to leave ample room for contributed talks. Meeting times will be suitable for both European and American audiences.

More details are available at the [workshop homepage](#).



# Featured Public Archival Data

## Characterizing the Dust and PAH of Ultracompact HII Regions

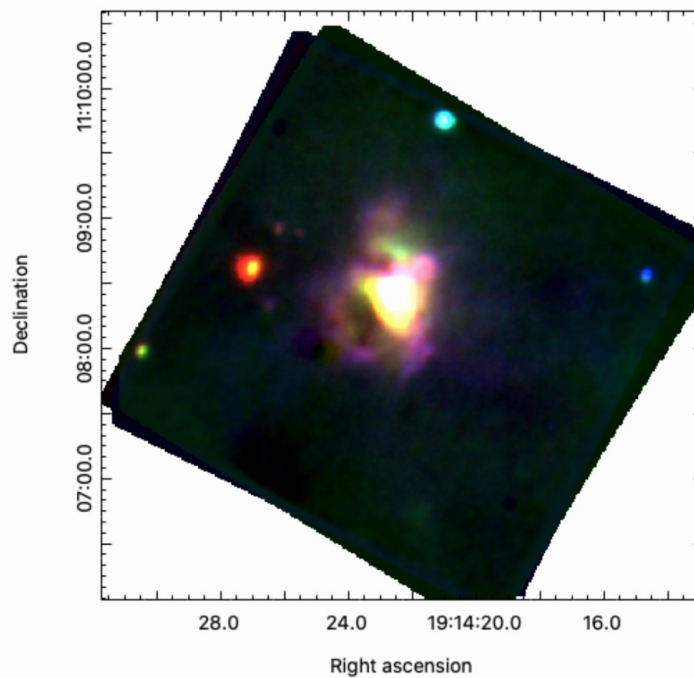
Compact HII regions allow us to investigate the early phases of the interaction between young massive stars and their environment. Both polycyclic aromatic hydrocarbon (PAH) molecules and dust play an important role in the evolution of the properties of these HII regions.

SOFIA/FORCAST can cover the thermal emissions of the different dust components, from PAH to big grains, allowing the study of the properties of each dust component and their distribution within the gas phases. Combining the properties of the different dust components with the properties of the ionizing source and the gas phases, one can investigate the interplay with the different components of the compact HII region and link their co-evolution at their early stage ([Salgado et al., 2012](#)).

Several FORCAST images of ultracompact HII regions are publicly available from the [IRSA SOFIA Archive](#):

- Images of sources G45.45+0.06 and G23.96+0.15 at 6.4, 6.6, 7.7, 19.7, 24.2, 31.5, and 37.1  $\mu\text{m}$  (project 01\_0034).
- Images of NGC 7538 at 7.7, 19.7, 24.2, 31.5, and 37.1  $\mu\text{m}$ , already published by [Sandell et al., 2020](#) (project 01\_0034).

The images effectively spectrally cover the emission of the PAHs, small grains, and big grains, for optimized SED modeling.



Three-color image of G45.45+0.06 with FORCAST images at 7.7  $\mu\text{m}$  (blue), 19.7  $\mu\text{m}$  (green) and 37.1  $\mu\text{m}$  (red).

## Good to Know

### SOFIA as an Earth Observatory

Flying at up to 45,000 feet allows SOFIA to observe above more than 99% of the atmospheric column, avoiding the strong atmospheric absorption of mid- and far-infrared light which prevents such observations from the ground. Yet the residual amount of atmosphere above the plane still absorbs incoming light, following a complex spectrum pattern controlled by the content in water and other components in the mesosphere and above, along with their vertical thermal structure. This terrestrial absorption spectrum, usually a challenge to the study of celestial sources, can in turn become a wealth of information for the study of the upper terrestrial atmosphere.

The team led by H. Richter (DLR) demonstrated how [GREAT observations of the atomic oxygen](#) fine-structure transition at 4.7448 THz allowed for the first time to directly measure the oxygen's mesospheric concentration in the direction of SOFIA's line of sight. The team is now in the process of obtaining more data and analyzing a large amount of archival data and to establish this technique for upper atmosphere oxygen monitoring as a strong alternative to indirect methods based on photochemical models.

## Virtual Talks

### Join Science Talks Remotely: Tele-Talks

**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 am Pacific, noon Eastern. For information on how to participate, check the [SOFIA Tele-Talk webpage](#).

#### Upcoming Tele-Talks

- June 2: Jim Jackson (SOFIA Science Center); [CII] in Massive Star-forming Clumps
- June 9: Maitraiye Tiwari (University of Maryland); SOFIA Legacy Survey, Stellar Wind Driven Shell of RCW 49

- July 7: José Pablo Fonfría (IFF/CSIC); CO2 Fluorescence in R Leo
- July 21: Enrique López-Rodríguez (KAVLI/Stanford); Warped Magnetic Field in CenA
- August 11: Matteo Luisi (West Virginia University); Stellar Feedback in RCW 120

[See full list of Tele-Talks.](#)

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

