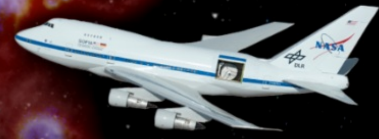


SOFIA

Science Newsletter



April 2022

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Science Spotlight



SOFIA Legacy Results: Mapping the Magnetic Fields of Galactic Bones

Most stars in spiral galaxies form within the galaxy's arms. Building the "skeletons" of these galaxies are galactic bones, long filaments that outline the densest parts of the arms. At the largest scales, the magnetic fields of a galaxy follow its spiral arms. Fields in the bones were accordingly believed to be aligned with respect to the bone, but the first results from from the FIELDMAPS SOFIA Legacy Program hint that this is generally not the case.

The Filaments Extremely Long and Dark: a MAgnetic Polarization Survey (FIELDMAPS) project, led by Ian Stephens (Worcester State University), is the first attempt to map the magnetic field of any galactic bone in its entirety. In G47, a giant filamentary bone within the Milky Way, Stephen's team was able to determine that the magnetic fields are strong enough to prevent gas in many areas from succumbing to gravitational collapse to form stars. [Read more.](#)

Science-ready data is already publicly available on 6 of the ten bones that the group plans to map (under Plan ID 08_0186 in the [IRSA Archive](#)). Advanced data products and data analysis codes will eventually be available on the [FIELDMAPS website](#).



A map shows the direction of magnetic fields in the G47 bone overlain atop an image of the G47 filament as seen by the Herschel Space Observatory. The red and yellow areas are high-density regions of dust and gas. Credit: G47: ESA/Herschel/PACS/SPIRE/Ke Wang et al. 2015; Polarization map: Stephens et al., 2021

Upcoming Events

Pipeline Week: April 26-29

As a follow-up to the [SOFIA School](#) earlier this year, the SOFIA science center is hosting a series of short webinars to demonstrate the use of SOFIA's [public pipeline](#) for data processing and calibration. Over the course of four webinars, users will be introduced to the pipeline functionalities and practical reprocessing use cases for several instruments and modes. Each webinar of the 'pipeline week' is broadcast on WebEx and can be accessed through this [link](#) - no registration needed. The schedule of 'pipeline week' is as follows:

- Tuesday April 26, 9am PDT: Introduction - installation and visualization tools
- Wednesday April 27, 9am PDT: FORCAST Grism
- Thursday April 28, 9am PDT: HAWC+
- Friday April 28, 9am PDT: FIFI-LS

SOFIA Conference

Summary of the 'Our Galactic Ecosystem: Opportunities and Diagnostics in the Infrared and Beyond' Conference at Lake Arrowhead, Feb 28-Mar 4

More than 60 participants gathered at the Lake Arrowhead facility for a [week of talks and discussions](#), which were also made available to the limited number of remote participants.

This was one of the first in-person astronomy events since March 2020.

The premise of the meeting was to explore observational diagnostics of ISM structure and chemistry on galactic scales, which helps to better understand the lifecycle of dust and gas in galaxies and the drivers of ISM evolution (stellar feedback, star formation, magnetic fields, supernovae). The scheduled talks spanned an array of sources and scales: comets, YSOs and stellar environments, molecular clouds, and nearby galaxies (including high-z analogues). Several presentations showcased the latest results from multi-wavelength surveys of stellar cores, star forming regions and extragalactic ISM, including a number of magnetic fields maps from far-IR polarimetry (SOMA, FEEDBACK, HYGAL, PHANGS, GALFA, GALMAG, SIMPLIFI).

The discussion of these data was enhanced by presentations of state of the art advances in modeling approaches and theoretical frameworks. Ample time was dedicated to discussions on the role of SOFIA and far-IR observations in the current and future landscape of astronomy facilities. In addition, the participants were encouraged to present the link between the far-IR observations and the mm/submm observations with ALMA and other millimeter/submillimeter wave observations. The SOFIA and ALMA Science Centers plan to continue to collaborate on meetings and workshops highlighting the synergies between these two facilities.

Text provided by A. Moullet (SOFIA) and A. Remijan (ALMA).

Good to Know

Recorded Talks on Website

Missed one of our virtual events? The SOFIA Science Center website now features a page with recordings of science talks from SOFIA-related events such as workshops, webinars, and tutorials. [Browse the webpage](#) to find a topic of interest and watch whenever you want!

Data Analysis FAQ

Based on the frequently asked questions received through the SOFIA HelpDesk, a compilation of common questions and answers on data analysis and quality assessment is now available [here](#). The list currently focuses on FIFI-LS and FORCAST for instrument-specific questions, but will soon be expanded to other instruments. We encourage you to keep soliciting the [SOFIA HelpDesk](#) for any of your questions related to data analysis.

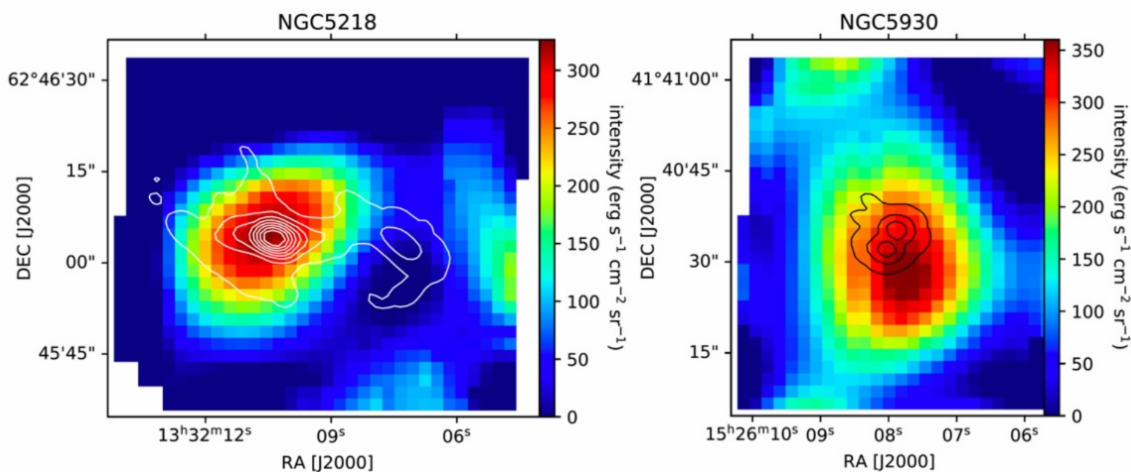
Featured Public Archival Data

[CII] Line Emission Towards a Sample of Galaxies

[CII] is the main coolant over a wide density range in the interstellar medium. As a result it is expected that the total [CII] emission is correlated to the local star formation activity which was confirmed for a relatively large sample of galaxies. However, starburst galaxies show a lower [CII] emission than expected. It is thus important to understand the relation of [CII] emission with the SFR, cooling, extinction and molecular gas.

The DDT program [76_0007](#) observed 11 galaxies with FIFI-LS from the EDGE-CALIFA survey which provides complementary optical IFU spectroscopy and high-resolution CO data from CARMA for a large sample of nearby galaxies ([Bolatto et al. 2017](#)). The FIFI-LS observations aimed to make galaxy maps at the transition range from 'normal' disk galaxies to 'starburst' galaxies, which is still relatively poorly studied, in order to examine the [CII] relations and [OI] emission.

The full dataset of the 11 galaxies (NGC 5218, NGC 5908, NGC 5930, NGC 5980, NGC 6155, NGC 6168, NGC 6361, NGC 6478, UGC 05108, UGC 05111 and UGC 10205) can be found at the [SOFIA science archive](#) under Plan ID '76_0007'.



The [CII] integrated intensity, observed with FIFI-LS, overlaid with contours indicating the integrated CO emission, observed with CARMA, towards NGC 5218 (left) and NGC 5930 (right).

Call for Proposals

ALMA Call for Proposals

The ALMA Cycle 9 Call for Proposals closes on Thursday April 21, 2022 at 15:00 UT, for scientific observations to be scheduled from October 2022 to September 2023. 4300 hours of approved science time are anticipated on each of the 12-m, 7-m, and the Total Power arrays. Projects with observations in the highest-frequency Bands 8, 9, and 10 (wavelengths of about 0.65, 0.45 and 0.35 mm respectively) are strongly encouraged. For further information about ALMA and the North American ALMA Science Center, visit the [ALMA Science Portal at NRAO](#).

ALMA and SOFIA are complementary facilities which offer strong scientific synergies, many of which were highlighted during the [ALMA SOFIA Summer Series](#) in 2021. See also this [list of sources already observed](#) by both SOFIA and ALMA. Please expect a funding call for archival SOFIA research to be issued later in Spring 2022.

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

- April 20: Nima Chartab (University of California Irvine); Gas Phase Metallicities in Local ULIRGs
- May 11: Arshia Jacob (Johns Hopkins University); HyGal Program on Small Molecules in the ISM
- May 25: Niko Zielinski (University of Kiel); Magnetic Field Structure in OMC-3
- June 1: Ian Stephens (Worcester State University and Harvard CfA); Magnetic Field in the Filamentary Bone G47

- June 8: Slawa Kabanovic (University of Cologne); [CII] Self-Absorption in RCW120

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

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

