

# Preparing your SOFIA proposal

Science case / SOFIA motivation

Gather support documents/tools

Evaluate feasibility

Define observations in USPOT

Build / upload justification pdf

Submit! Deadline Sept 6<sup>th</sup>, 21h PDT



# Gather relevant documentation and tools: Call for Proposal

## What's offered - in short:

- All instruments
- 2 instruments deployed to NZ
- 'suitcase' deployments can be considered

## New:

- improved mapping modes on FORCAST (slit-scan) and HAWC+ (OTF polarimetry)
- new filter for FIFI-LS improving sensitivity at the [OIII] 52 $\mu$ m line
- new HAWC+ band B (63 $\mu$ m) available

The screenshot shows the SOFIA website's navigation menu at the top, with 'Proposing & Observing' selected. The main content area is titled 'Proposing & Observing' and includes a sidebar with links for 'Proposal Calls', 'Proposal Documents', 'Proposal Tools', and 'Quick Links'. The main content area features a 'Cycle 8' timeline diagram and a list of 'Important Documents'.

**Proposing & Observing**

- Proposal Calls
  - Cycle 8
    - Observer's Handbook
  - Cycle 7
  - Director's Discretionary Time
  - Past Proposal Calls
- Proposal Documents
- Proposal Tools
- Current Cycle Flight Plans
- Flying on SOFIA

**Quick Links**

- Quick Guide
- Proposal Documents
- Current Flight Plans

**Home » For Researchers » Proposing & Observing » Proposal Calls » Cycle 8**

### Cycle 8

Event	Date
Calls Issued (Phase I Begins)	31 May 2019
Update of Calls	20 July 2019
Proposals Due (Phase I Ends)	6 Sept. 2019 21:00 PDT 7 Sept. 2019 4:00 UTC
Selections Announced (Phase II Begins)	Dec. 2019
Proposal Updates Due (Phase II Ends)	Jan. 2020
Cycle 8 Begins	25 April 2020
Cycle 8 Ends	24 April 2021

### New for SOFIA in Cycle 8

- SOFIA Archival Research Program (SARP)

### Important Documents

- Call for Proposals (for regular proposals)
- Call for Proposals for the SOFIA Legacy Program (SLP) and the SOFIA Archival Research Program (SARP)
- Observer's Handbook for Cycle 8
- USPOT Manual

# Gather relevant documentation and tools: Call for Proposal

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## 3 different types of proposals

- **Regular:** up to 300h tot, includes surveys, ToO
- **Legacy:** 1-4 large proposals, up to 200h observations each, over 2 cycles. Up to 400 h total in C8. No proprietary period, team contributes enhanced products
- **Archival Research: new** (funding available, for US institutions only)

# Gather relevant documentation and tools: Call for Proposal

## Funding opportunities (for US-institutions only)

- Up to \$3M for Regular Proposals (~\$10k/ h)
- Up to \$2M / year for Legacy Proposals
- ~ \$300k for archival research proposals

	Regular Proposals	Legacy (SLP)	Archival (SARP)
Exclusive Use Period	yes	no	n/a
Observing Period	1 cycle	2 cycles	n/a
Total Program Budget	\$3M	\$2M/yr	\$300k
Proposals Selected	varies	1-4	10

- For proposals which are central to a PhD thesis, additional funding can be requested through the Thesis-enabling Program (up to two years of graduate student funding)
- Timing of funding depends on program priority ('rank'): must do (~25% of available time), should do (50%), do if time

# Gather relevant documentation and tools

The screenshot shows the SOFIA website's navigation menu at the top with links for 'SOFIA Overview', 'Proposing & Observing', 'Data', 'Instruments', 'Publications', 'Meetings and Events', and 'Announcements'. The left sidebar is titled 'Proposing & Observing' and includes links for 'Proposal Calls', 'Proposal Documents', 'Proposal Tools', 'Current Cycle Flight Plans', and 'Flying on SOFIA'. Below this is a 'Quick Links' section with 'Quick Guide', 'Proposal Documents', and 'Current Flight Plans'. The main content area shows a breadcrumb trail: 'Home » For Researchers » Proposing & Observing » Proposal Tools'. The 'Proposal Tools' section is titled 'Unified SOFIA Proposal and Observation Tool (USPOT)' and contains the text: 'All proposals are to be prepared and submitted using the Unified SOFIA Proposal and Observation Tool (USPOT). Download USPOT'. Below this is the 'Exposure Time Estimation' section, which states: 'Estimations of exposure times can be made using the SOFIA Instrument Time Estimator (SITE), a web-based tool that provides total integration time or S/N for a given instrument, filter(s), source type (point, extended, emission line), and water vapor overburden.'

Observers' Handbook

USPOT manual

Download USPOT

Open SITE (website)

Any missing information: Help Desk

## SOFIA Instrument Time Estimator (SITE)

Please Check 'Notes and Known Issues' Before Proceeding

### Spectroscopic Time Estimators and Tools

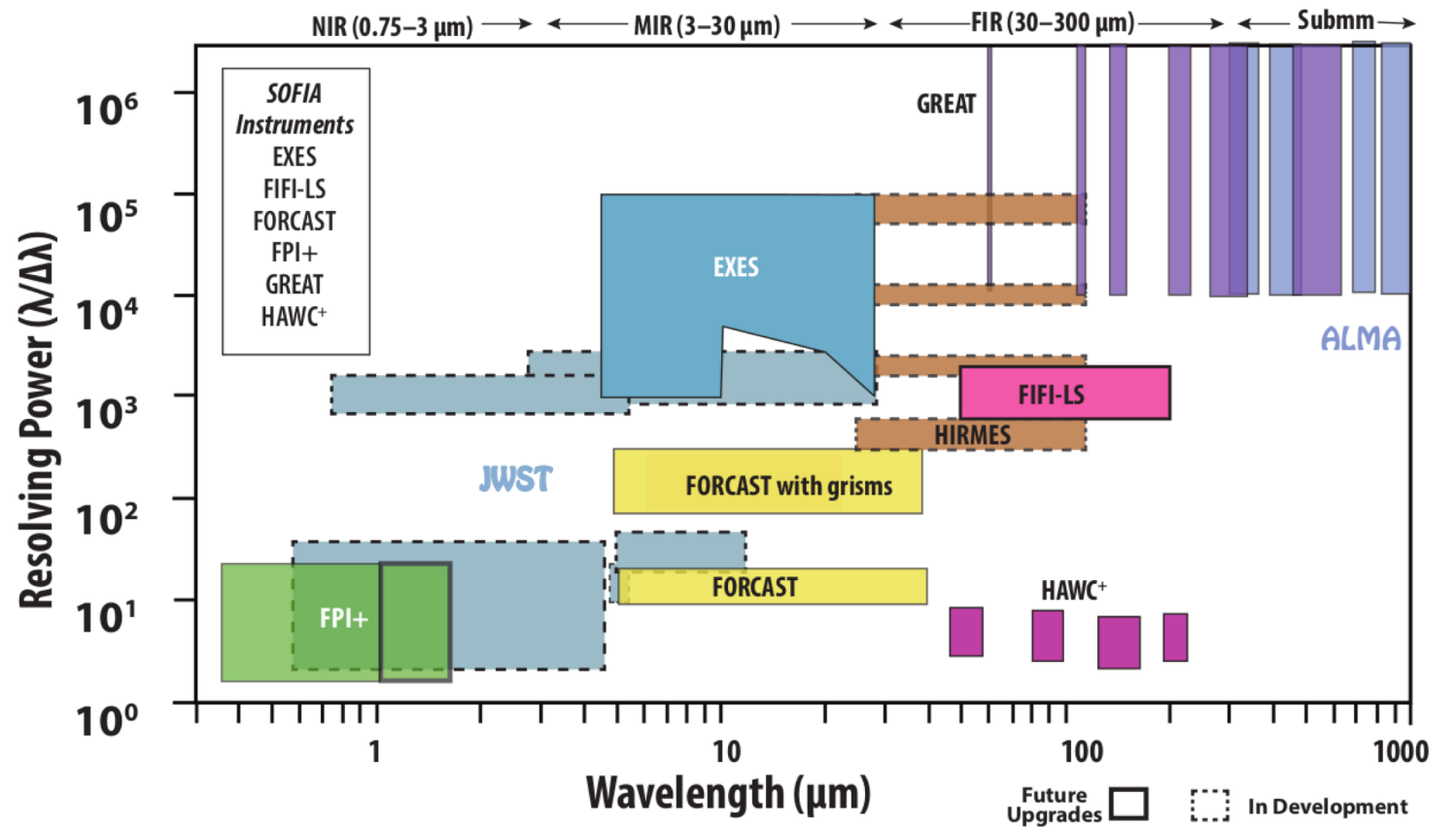
FIFI-LS      FORCAST GRISM      FLITECAM GRISM      GREAT      EXES

### Imaging Time Estimators

FORCAST      FLITECAM      FLITECAM\_HIPO      HAWC\_Plus      FPI\_Plus

# Feasibility

SOFIA currently covers most of the Mid and Far-IR spectrum (5-600  $\mu\text{m}$ ), at a variety of spectral resolutions



# Feasibility: Archival search and reserved observations catalogues

● <https://dcs.arc.nasa.gov/>

Reserved observations (GREAT and FIFI-LS):  
duplicates from Reserved Observations Catalog  
(ROC) lists not allowed, unless explicit permission  
from the instrument's PI (SMO should be notified  
prior to proposal submission)

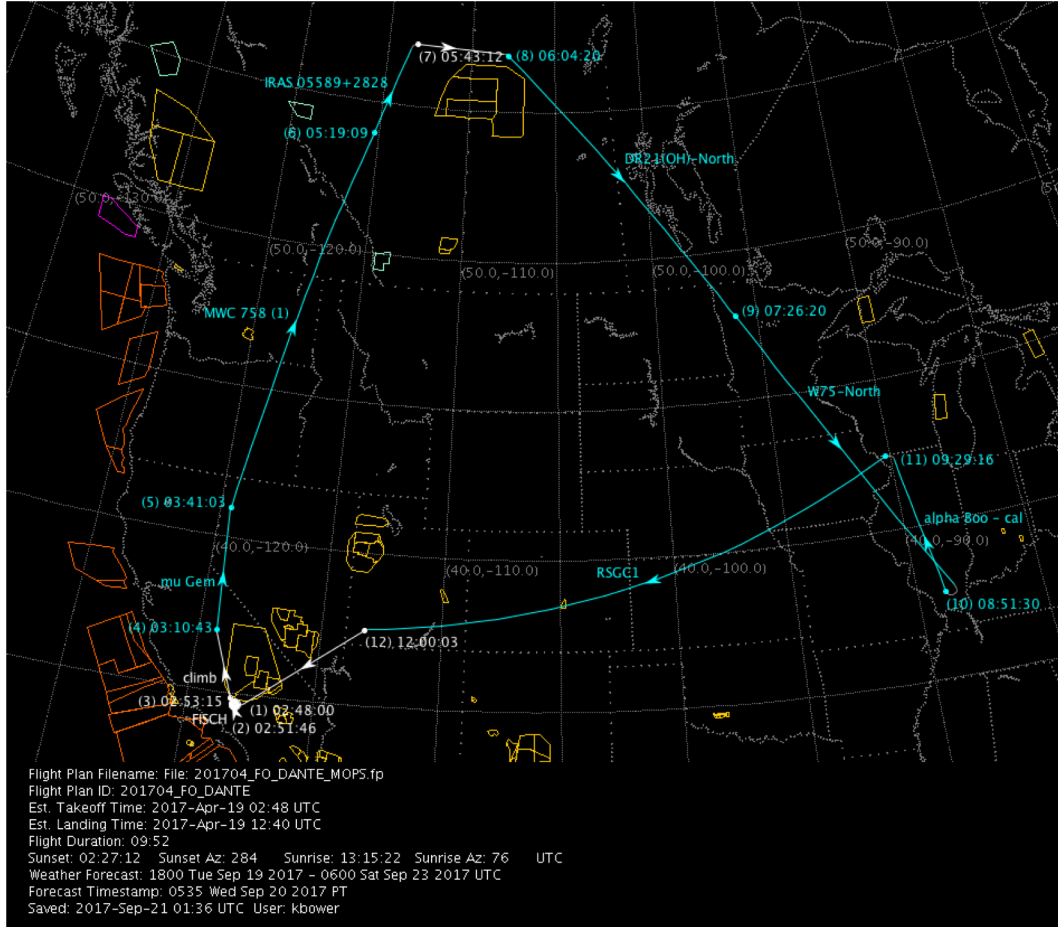
Duplication of observations:  
generally not allowed, and if proposed for must be  
identified and explicitly justified.  
Check the SOFIA archive (registration required)

The screenshot displays the 'Science Archive Search' interface. At the top, it says 'Get Observations For Matching Criteria'. Below this, there are several search criteria fields:

- Instrument:** FIFI-LS (dropdown)
- Detector Channel:** ALL (dropdown)
- Config:** ALL (dropdown)
- SpectE11/SpectE12:** ALL (dropdown)
- Frequency Range:** From (GHz) and To (GHz) (text input fields)
- Processing State:** LEVEL\_3 (dropdown)
- Target:** M51 (text input)
- Spatial Search:** Radius 600 (arcsec) (text input)
- Equatorial Coordinates:** RA(hh:mm:ss) 13:29:52.7, Dec(deg:mm:ss) +47:11:42.9, Equinox 2000 (text input fields)
- Galactic Coordinates:** Longitude and Latitude (text input fields)

Buttons for 'SIMBAD Position' and 'NED Position' are located near the target field. An 'Advanced Search' button is at the bottom left of the search area. Below the search area, there are options for 'Result Per Page' (50), 'Downloadable Only' (checkbox), and 'Result Organized By' (Data File, ObsPlan AOR). A 'Result Setting' section includes checkboxes for 'Optional Fields In Data File Table': PlanID, PI, AORID, Obs Type, Exposure Time, Obs Start/End, Product Type, Observer, Ingest Date, and Source. 'Submit' and 'Reset' buttons are at the bottom.

# Timing limitations considerations



Observing legs are limited (~ 2 hour max: hard to get long continuous observations)

Observations with an instrument limited to 1 / 2 obs. series per cycle

GC center observations in Northern early fall

Observations from NZ in Northern Summer



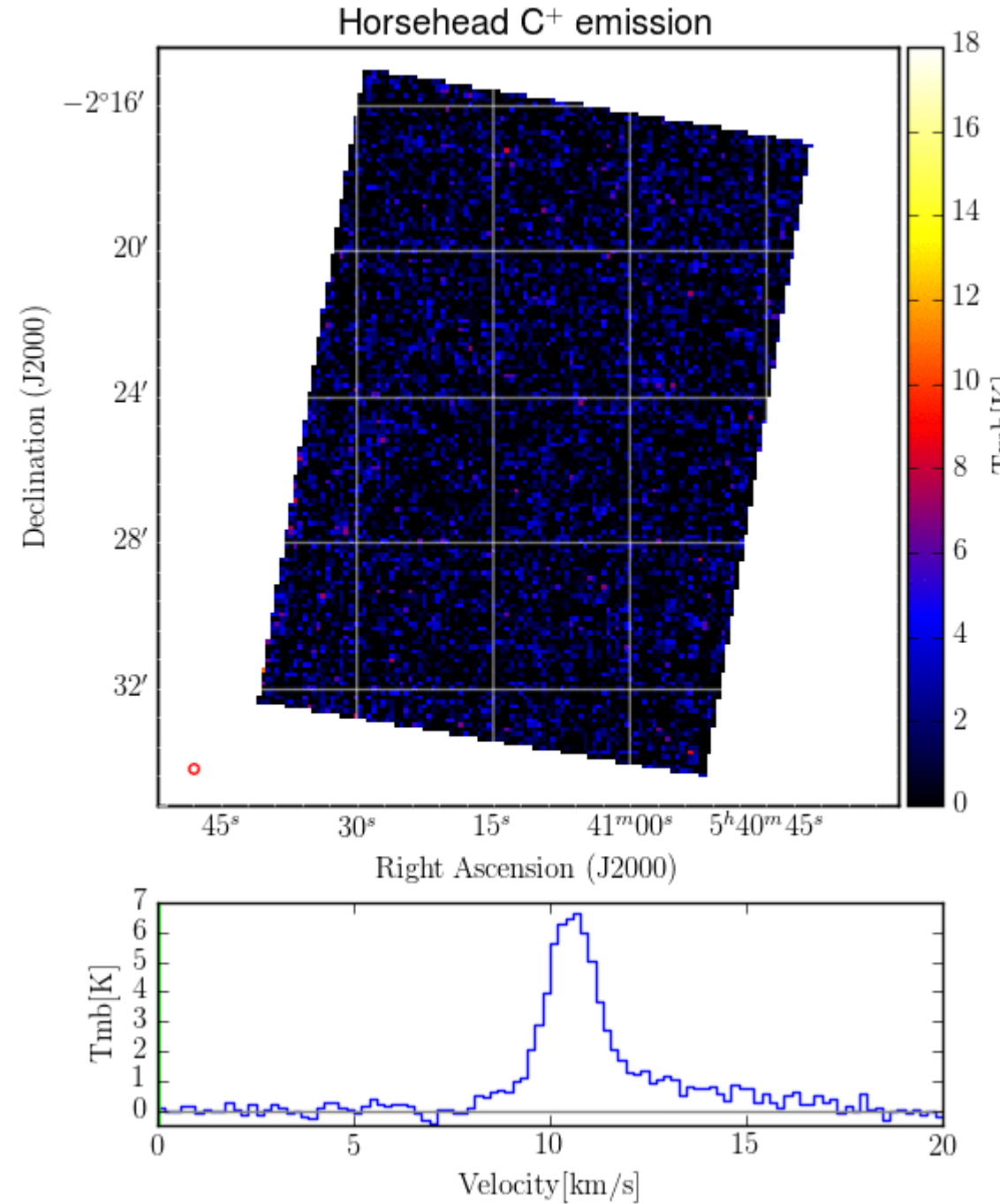
# Estimation of Signal and Signal to Noise

**Expected source signal:** needs to be soundly justified!

- archival data (possibly w. SED extrapolation)
- your own radiative transfer model (describe)
- classic models/ correlations: Hyperion (dust), Planetary Spectrum Calculator, Meudon PDR ...

Signal must be defined by element size / beam FWHM or surface brightness Units (depend on instruments)

- $\text{Jy}$  or  $\text{W.m}^{-2} \mu\text{m}^{-1}$  (flux density)
- $\text{Jy} / \text{arcsec}^2$  (surface brightness)
- $\text{W.m}^{-2}$  (flux density integrated on resolution unit)
- $T$  (brightness temperature)



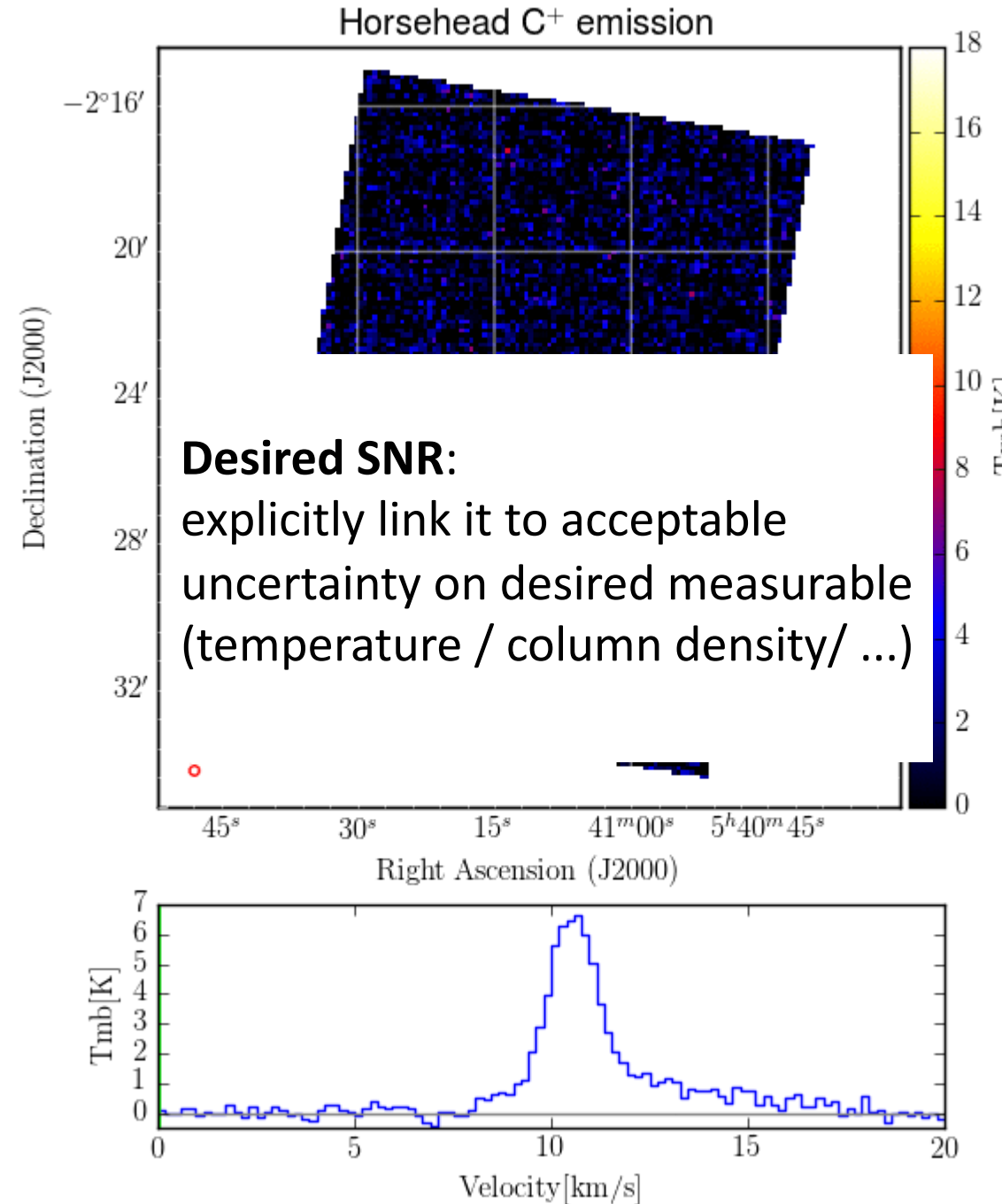
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- $W.m$  (flux density integrated on resolution unit)
- T (brightness temperature)



# SITE: estimating corresponding observing time

**SOFIA Instrument Time Estimator (SITE)**

Please Check 'Notes and Known Issues' Before Proceeding

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**Spectroscopic Time Estimators and Tools**

[FIFLS](#)   [FORCAST GRISM](#)   [FLITECAM GRISM](#)   [GREAT](#)   [EXES](#)   [ATRAN](#)

**Imaging Time Estimators**

[FORCAST](#)   [FLITECAM](#)   [FLITECAM\\_HIPO](#)   [HAWC\\_Plus](#)   [FPI\\_Plus](#)

The following four sections of this form are for imaging configurations: select the instrument, astronomical source, telescope, observing condition constraints and calculation method. Click on the  button to submit the parameters from all the sections to the server. The results are reported in a separate web page that can be resized and printed.

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**Instrument properties**  
*(more info, input parameter details)*

Instrument properties:

Wavelength:  microns (51 to 203)

Bandwidth:   km/s  microns

Observer Velocity (VLSR, km/s):  OR  Compute Velocity

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**Calculation Method**  
*(more info)*  
Select the calculation method

S/N ratio resulting from a Total Integration Time of  secs

Total Integration Time to achieve a S/N ratio of

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**Astronomical Source Definition**

Source Flux:   line (W/m<sup>2</sup>)  continuum (Jy)

Source Velocity:   LSR, km/s  redshift

<https://dcs.arc.nasa.gov/proposalDevelopment/SITE/index.jsp>

## Output Parameters

<b>V<sub>LSR</sub>:</b>	0.000 km/s
<b>Velocity corrected Wavelength:</b>	157.741 microns
<b>Plotted wavelength range:</b>	156.938 - 158.544 microns
<b>Interpolated values from data table:</b>	
Bandwidth =	0.803 microns
MDLF =	2.087e-17 W/m <sup>2</sup>
MDCF =	0.570 Jy
<b>Atmospheric Transmission:</b>	0.843      0.862
	(smoothed) (unsmoothed)
<b>Integration time (t<sub>on</sub>):</b>	<input type="text" value="0.107"/> 0.102 minutes
	(smoothed) (unsmoothed)

*On-source integration time **only**; overheads are calculated in USPOT.*

# USPOT: cover page

Unified SOFIA Planning Tool (USPOT)

File Edit Targets Observation Tools Images Overlays Options Window View Help

Proposal

\* Title

Proposal Info Investigators

\* TAC Queue

Category

Cycle ID

\* Science Keywords

\* Proposal PDF Attachment

\* Regular

\* Legacy

\* Target of Opportunity

\* Survey Program

\* Thesis

\* Waive Exclusive Use

EPO Program Participation

Archival Program

Re-submission of Program

\* Proposal Abstract

Related Proposals Status of Observations Special Instructions

\* Proposal Abstract

0/2000

Proposal Observations

Target: None Specified Total Duration: 0 min Awarded: 0 min

Proposal - <No File>

- Reset Close
- ABSORPTION LINES
  - ACCRETION DISKS
  - AGN PHYSICS
  - ASTEROIDS
  - ASTROMETRY
  - ATMOSPHERES AND CH
  - BAL QUASARS
  - BL LAC OBJECTS AND BL
  - BLACK HOLES
  - CALIBRATION
  - CENTRAL STARS OF PLA
  - CHEMICAL ABUNDANCES
  - CLUSTER BINARY STARS
  - CLUSTERS OF GALAXIES
  - COMETS
  - COOLING FLOWS
  - COSMOLOGICAL PARAM
  - DAMPED LYMAN-ALPHA
  - DARK MATTER
  - DETACHED BINARIES
  - DUST
  - DWARF GALAXIES
  - DYNAMICS
  - ECLIPSING BINARIES
  - ELLIPTICAL GALAXIES
  - EMISSION LINES
  - ERUPTIVE BINARY STARS
  - EVOLUTION
  - EXOSPHERIC ATMOSPHE
  - EXTRA-SOLAR PLANETS
  - FAST IMAGING
  - GALACTIC BULGE
  - GALACTIC CENTER
  - GALACTIC DISK

# USPOT: define targets

The image shows the Unified SOFIA Planning Tool (USPOT) interface. The 'Targets' menu is circled in red. A 'Target' dialog box is open, showing the 'Target Name (required):' dropdown set to 'SIMBAD'. The 'Resolve the Name' button is also circled in red. The dialog box includes fields for 'Coord Sys' (Equatorial J2000), 'RA', 'Dec', 'Epoch' (2000.00), and 'Proper Motion' (Use Proper Motion checked, PM RA and PM Dec both 0.000). The background shows the 'Proposal' form with fields for 'Title', 'TAC Queue' (US), 'Category' (None Selected), 'Cycle ID' (OPEN CYCLE), and various checkboxes for 'Regular', 'Legacy', 'Target of Opportunity', and 'Survey Program'.

# USPOT: define AORs

File Edit **Targets** **Observation** Tools Images Overlays Options Window

Proposal

\* Title

Proposal Info Investigators

\* TAC Queue US

Category None Selected

Cycle ID OPEN CYCLE

\* Science Keywords

\* Proposal PDF Attachment

\* Proposal Abstract Related Proposals Status of Observations Special

0/2000

Proposal Observations

Target: None Specified

Proposal - <No File>

FIFI-LS [AOR ID: N/A]

Unique AOR Label: FIFI\_LS-0000

Target: None Specified

New Target Modify Target Target List...

Observing Condition & Acquisition / Tracking

Observation Order 0

\* Rest Wavelength Blue (micron) 63.184

\* Width of Spectrum Blue (km/s OR micron) 0.000

Width of Spectral Feature Blue (km/s OR micron) 0.000

\* Rest Wavelength Red (micron) 157.741

\* Width of Spectrum Red (km/s OR micron) 0.000

Width of Spectral Feature Red (km/s OR micron) 0.000

Width Unit km/s

\* Source Velocity (km/s) 0.00000

Dichroic 105\_micron

Pointing Array Blue

Spectral 1 FIF\_BLUE

Spectral 2 FIF\_RED

On-source exp. time (sec) 60

\* On source exp. time per cycle (sec) 30.000

\* Cycles 1

Min Contiguous Exp Time (sec) 0.000

\* MapType Grid

\* Number of Points Along Lat (Grid Only) 1

\* Number of Points Along Lon (Grid Only) 1

Step Size Along Lat (arcsec) 30.000

Step Size Along Lon (arcsec) 30.000

Map Offset RA (arcsec) 0.000

Map Offset Dec (arcsec) 0.000

Map Priority Map order

FOV Angle (deg) 0.000

Custom Map Area (arcsec^2) 0.000

\* Instrument Mode Symmetric Chop

Chop Type Sym

Total Chop Throw (arcsec) 120.000

Chop Angle Coordinate J2000

Chop Pos Angle (deg) 90.000

Set Chop Angle Ranges

Reference Position

Ref Type

By Offset

By Position

Map Ref. Pos. false

Reference Name

RA Offset (arcsec) 600.000

Dec Offset (arcsec) 600.000

RA (deg) 0.000000

Dec (deg) 0.000000

Position: 0h00m00.0000s, +0d00m00.000s

Choose Position

(\* = Advanced) (\* = required for Phase I)

\*Import Map Offsets (Custom Only) Export Map Offsets Export Map Positions

Observation Est... Comments... Proposal Info...

OK Apply Cancel Help

- Context, aim, expected results (0.5p / 1p)
- Scientific justification (3p + references / 5 p)
- Feasibility + path to publication (3p)  
(instrument and modes, exposure time, time constraints)
- Budget (for Legacy only, 2p)
- Implementation (for Legacy only, 2p)
- Bio sketches
- Thesis enabling program (1 p)

Please note that for proposals longer than 9 (16) pages total, DCS will return a warning about a too long proposal document. If all individual section limits have been adhered to, this warning may be ignored.

# USPOT: building justification pdf

## Tips from Call from proposal:

- Preference given to substantial investigations that demonstrate significant scientific impact from SOFIA
- Programs using multi-wavelength data from major facilities (ALMA, HST, Spitzer, etc.) in conjunction with SOFIA are highly encouraged
- Programs that will inform future JWST observations are highly encouraged
- Criterion: degree to which the investigation uses SOFIA's Unique capabilities.
- Criterion: competence and relevant experience of the PI and any collaborators to carry the investigation to a successful conclusion.

## General tips:

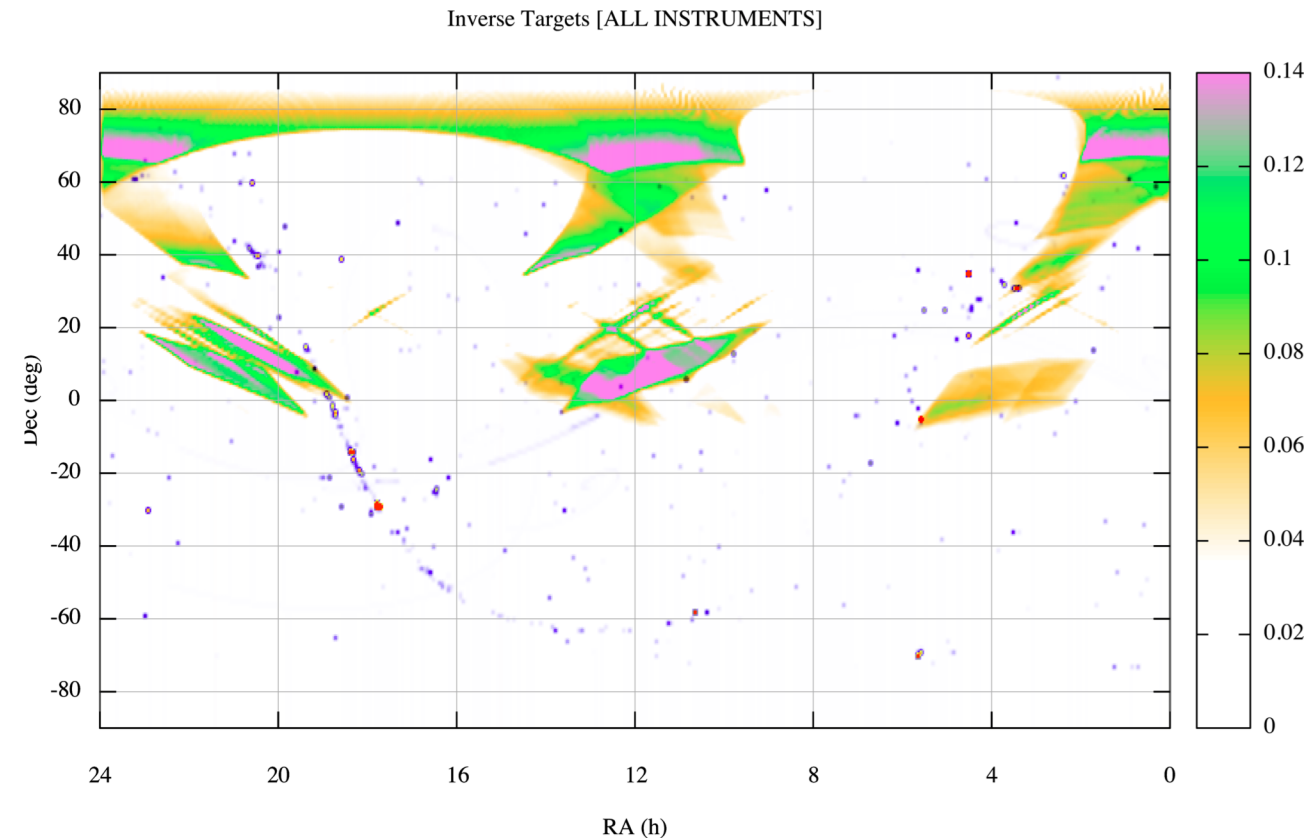
- do not forget instrument and data justification (as opposed to i.e., TEXES, archival data, ...)



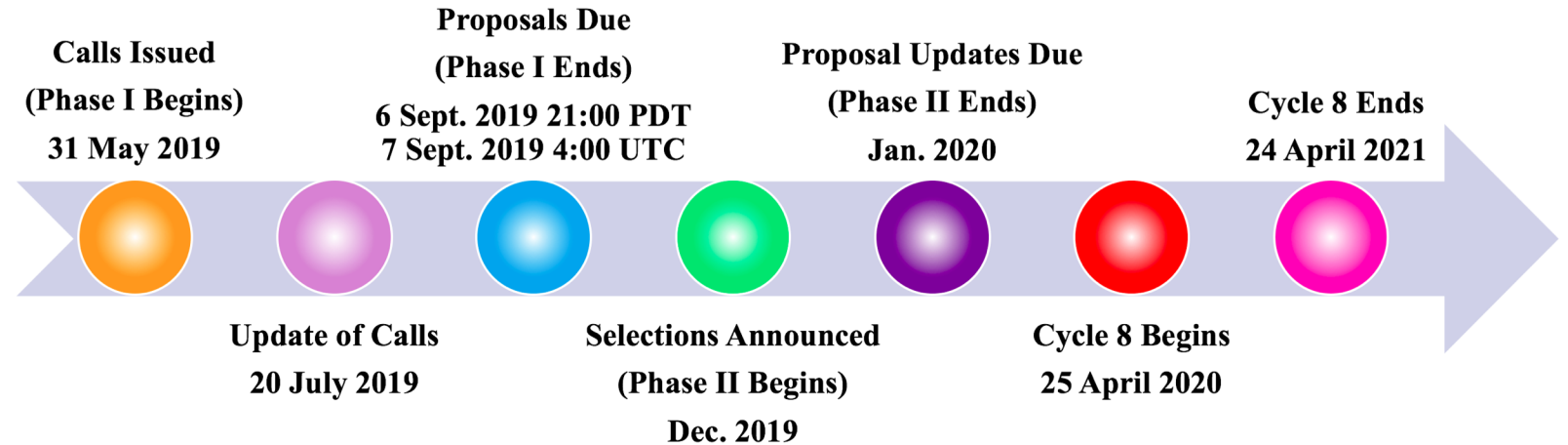
## Other strategic considerations

Even though bulk of targets are concentrated in the GP and ecliptic, you can only spend 1/2 of the time flying to view those directions and the other 1/2 on the return

Whenever possible (surveys), choose targets with distribution at all parts of the sky. More chances to win! High latitudes are desirable.



# Post deadline – what to expect



December 2019: results announced

Budget submission (US GOs)

Phase 2 – further definition of AORs, supported by instrument scientists

Observations: all GOs invited to their flights, receive flight summaries post-flight series

## Post deadline – what to expect

Processed data delivered and staged in archive ~ 1 month after observations  
- GOs notified by email

Note that the SOFIA archive is moving to **IRSA** at the end of 2019!

<https://irsa.ipac.caltech.edu/Missions/sofia.html>

Post-delivery: assistance available from science center / instrument scientists

Additional resources are available at the SOFIA website data section:

<https://www.sofia.usra.edu/science/data> - HelpDesk always open for questions:  
[sofia\\_help@sofia.usra.edu](mailto:sofia_help@sofia.usra.edu)

