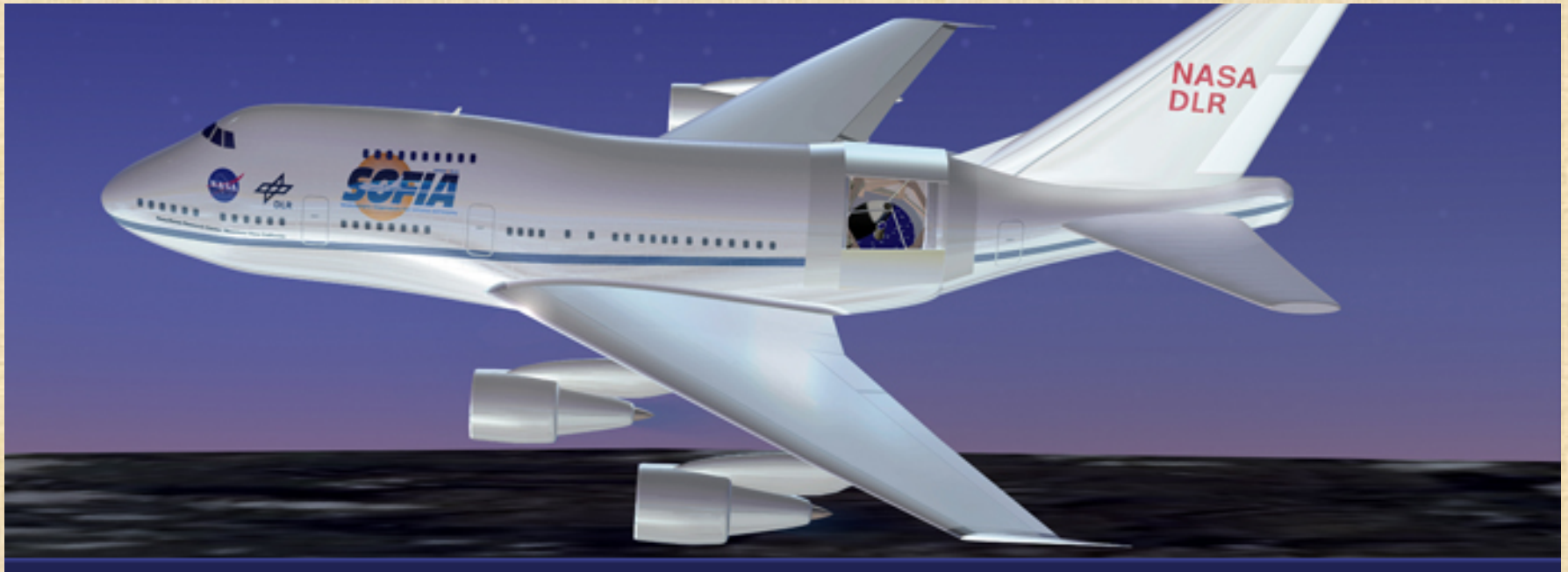


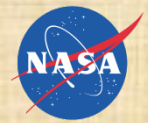
# Examples

Dario Fadda - USRA  
Associate Scientist



SOFIA Observers Workshop 10 May 2016



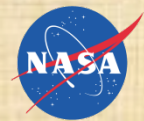


# Outline



- Herschel archive
- FIFI-LS example





# Herschel archive



The Herschel Science Archive can be accessed directly through:

<http://www.cosmos.esa.int/web/herschel/science-archive>

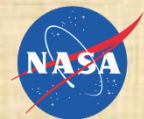
or via the IRSA pages:

<http://irsa.ipac.caltech.edu/applications/Herschel/>

The HSA offers the most updated reductions, while IRSA archives older products.

However, the IRSA portal has a simpler interface.





# HSA



JAVA application  
to access archival  
data

HSA Science Archive v7.5

File View Windows Account Tools Help

HERSCHEL ESA

Search

Query Cancel Clear

Query Panels

Main Query Panel

Observation Id  Obs. List  Choose

Proprietary Status

Geometry Panel

Target \ Multiple Target \ NAIF ID \ Multiple NAIF IDs

Shape

Circle  Box

Resolve Name  Equatorial  Galactic  Ecliptic

Centre Coordinates

Target   Radius

Instruments Query Panel

Instrument  Obs. Type:   Standard Data

All HIFI PACS SPIRE SPIREPACS

HIFI: Single Point Mapping Spectral Scan

PACS: Pacs Photometer Range Spectroscopy Line Spectroscopy

SPIRE: Photometer Spectrometer

SPIREPACS: Parallel Mode

Instruments Advanced Query Panel

User Provided Data Products Panel (UPDP)

Proposal Query Panel

Pipeline Processing Query Panel

Timing Constraints Query Panel

Query Cancel Clear

Log Console

Not Logged In  ESA



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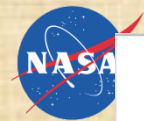
irsa.ipac.caltech.edu/applications/Herschel/

The metadata used by this tool was updated to HSA7.0 in December 2015

This web interface allows users to find data in the *Herschel Science Archive (HSA)* maintained by ESA at the European Space Astronomy Centre, and provides links to the data retrieval through the HSA's Virtual Observatory interface. The archive can also be accessed from ESA's [Herschel Science Archive interface](#). An [observation log](#) of all Herschel science observations is also available. Additional information about the mission and the instruments can be found on the [NASA Herschel Science Center](#) webpages and on ESA's [Herschel Science Centre](#) webpages.

Cone Search    Box Search    Multi-Position Search    All Sky

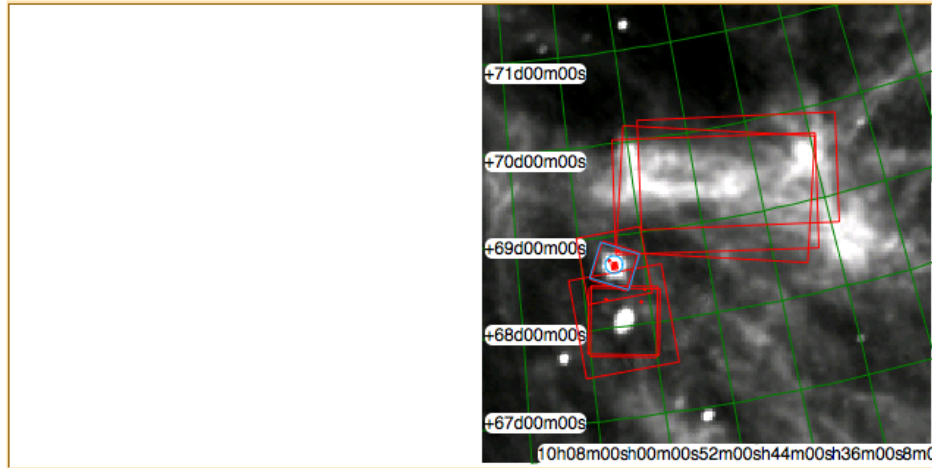
<b>Coordinate/Object</b> <input type="text" value="M 82"/> <input type="checkbox"/> <small>Examples: 0 0 gal   M42</small>	<b>Radius</b> <input type="text" value="30"/> <input type="text" value="arcmin"/> <small>radius <math>\leq</math> 5.0 deg</small>
<b>Instrument &amp; Observation Mode</b> <input checked="" type="checkbox"/>	
<input type="checkbox"/> <b>HIFI</b> <input type="checkbox"/> Single Point <input type="checkbox"/> Mapping	<input type="checkbox"/> Spectral Scan
<input checked="" type="checkbox"/> <b>PACS</b> <input checked="" type="checkbox"/> Photometry <input checked="" type="checkbox"/> Line Spectroscopy	<input checked="" type="checkbox"/> Range Spectroscopy <input checked="" type="checkbox"/> SPIRE PACS Parallel
<input type="checkbox"/> <b>SPIRE</b> <input type="checkbox"/> Photometry <input type="checkbox"/> Spectroscopy	<input type="checkbox"/> SPIRE PACS Parallel
<b>Proposer (case sensitive)</b> <input type="text"/>	<b>Proposal ID (case sensitive)</b> <input type="text"/>
<input type="button" value="Submit"/>	



IRAS:IRIS 100 1.6x

IRAS:IRIS 100  
 Eq-J2000: 9h58m16.22s, +69d44m13.0s  
 Gal: 141.187462, 40.701403

Lock By Click



o -- search center    box -- coverage of the retrieved observations

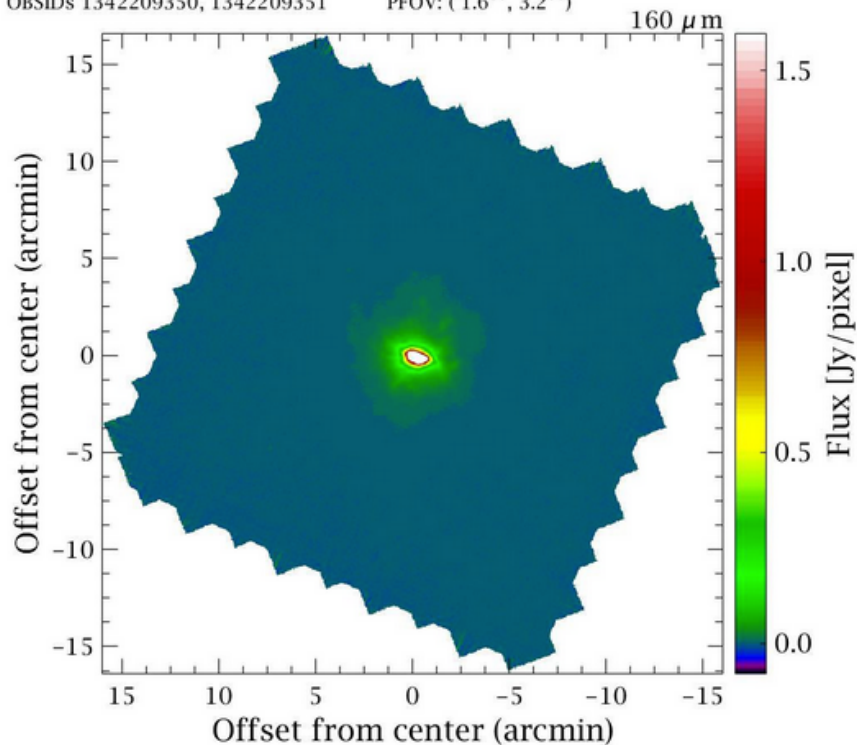
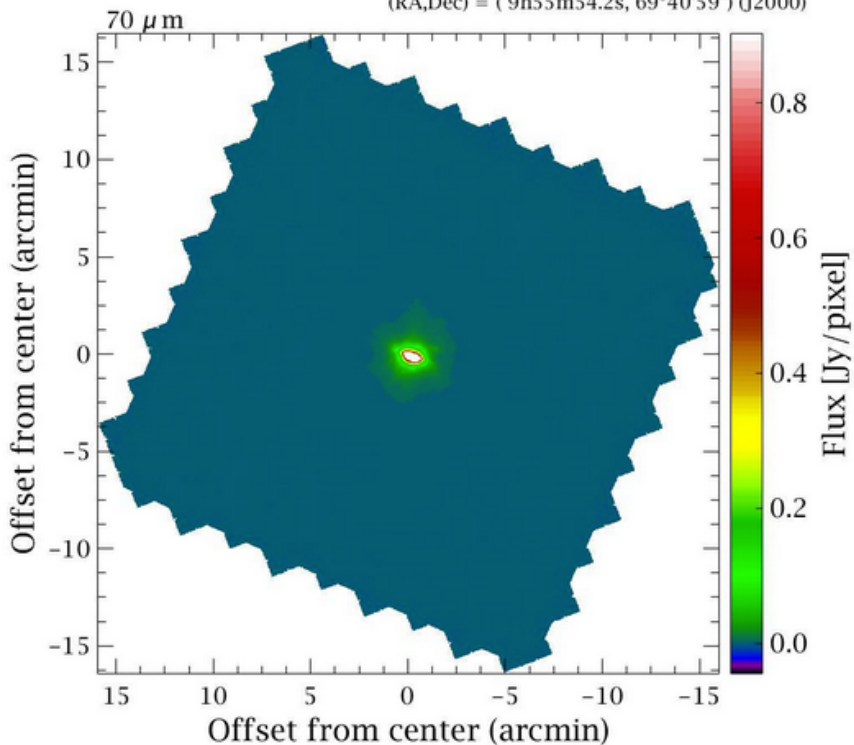
1 of 2 (1 - 100 of 129)

Observation ID	Thumbnail	Target	RA (degree)	DEC (degree)	Instrument	Observation Mode	Ops
<a href="#">1342208389</a>		m82	148.965361	69.680051	SPIRE	SpireSpectroPoint	543
<a href="#">1342208545</a>		M82-SW	148.953018	69.678283	HIFI	HifiPointModeFastDBS	534
<a href="#">1342208584</a>		M82-SW	148.953530	69.678600	HIFI	HifiPointModeFastDBS	534
<a href="#">1342208945</a>		M82-outflow-south	148.982044	69.667767	PACS	PacsLineSpec	550
<a href="#">1342208946</a>		M82-outflow-north	148.949485	69.687719	PACS	PacsLineSpec	550
<a href="#">1342209351</a>		m82	148.965910	69.679964	PACS	PacsPhoto	546
<a href="#">1342210062</a>		M82-SW	148.953092	69.678565	HIFI	HifiPointModeFastDBS	560
<a href="#">1342210065</a>		M82-NE	148.975756	69.681345	HIFI	HifiPointModeFastDBS	560
<a href="#">1342210066</a>		M82-SW	148.953155	69.678399	HIFI	HifiPointModeFastDBS	560
<a href="#">1342230364</a>		M82	148.966342	69.680351	HIFI	HifiPointModeFastDBS	878



m82 10-Nov-2010 PACS-P  
(RA,Dec) = (9h55m54.2s, 69°40'59") (J2000) OD 546

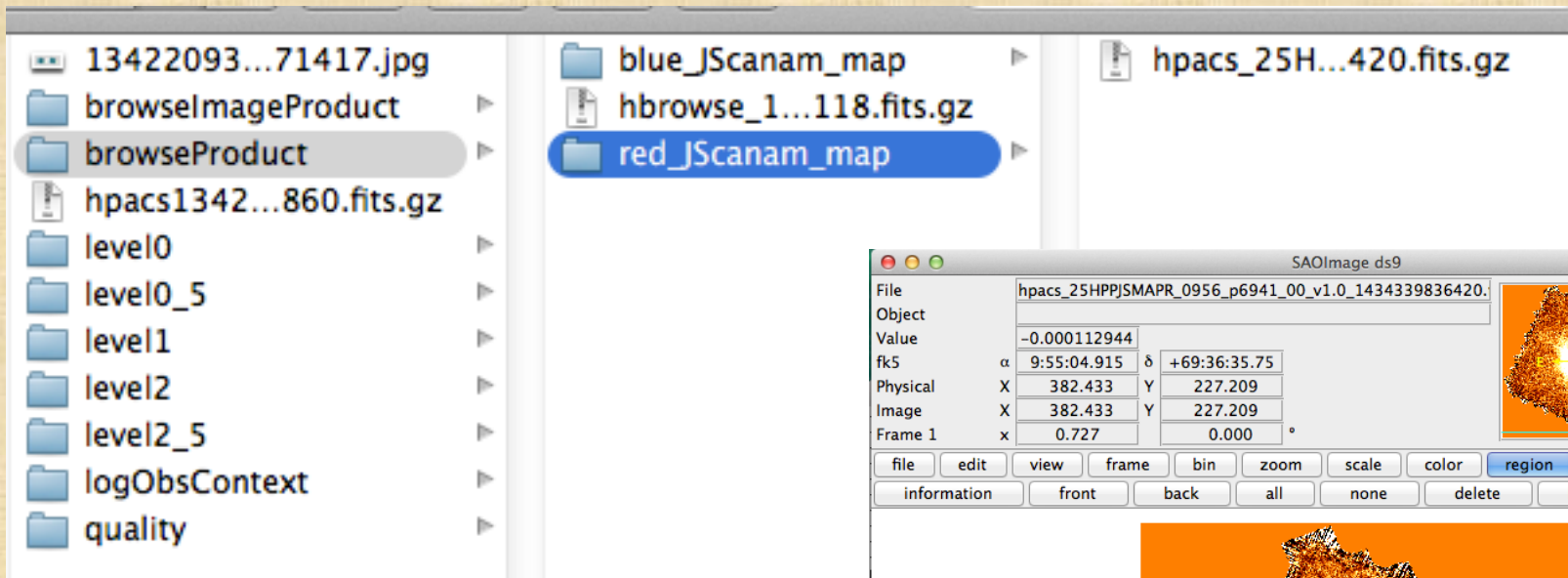
Scan map SPG v13.0.0 JScanam  
OBSIDs 1342209350, 1342209351 PFOV: (1.6'', 3.2'')



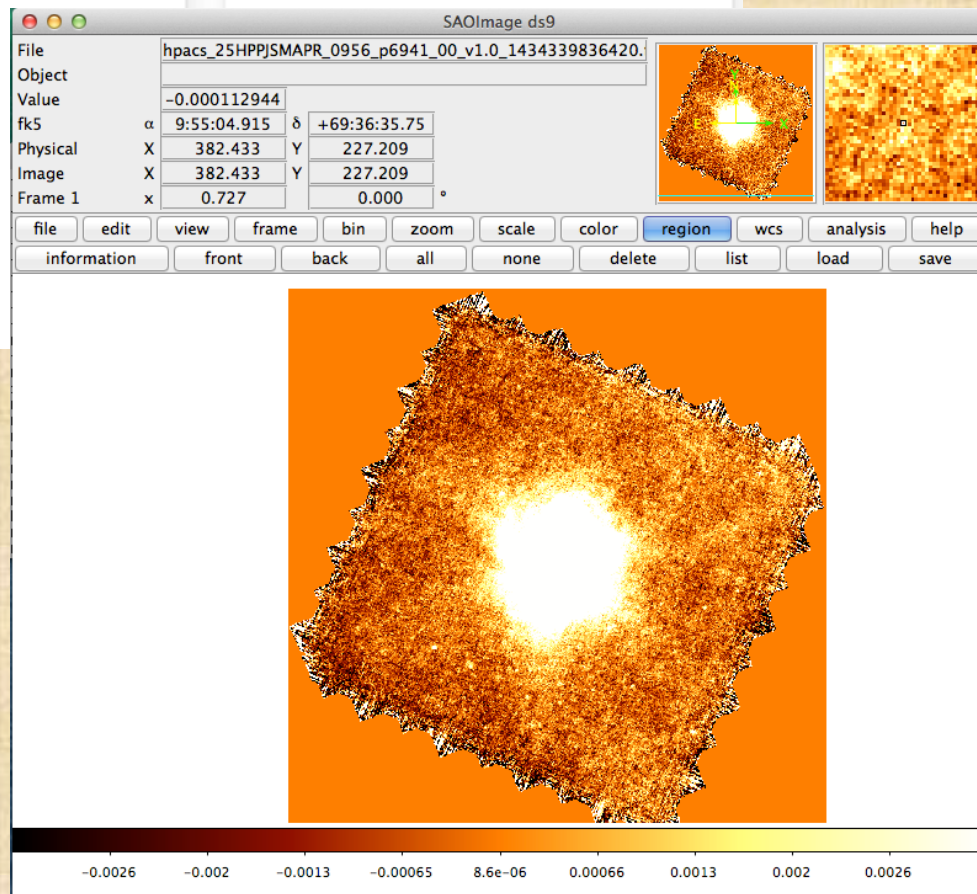
## Thumbnail pictures



# Browse products



You can download the archival data (tarball) and display the browse products

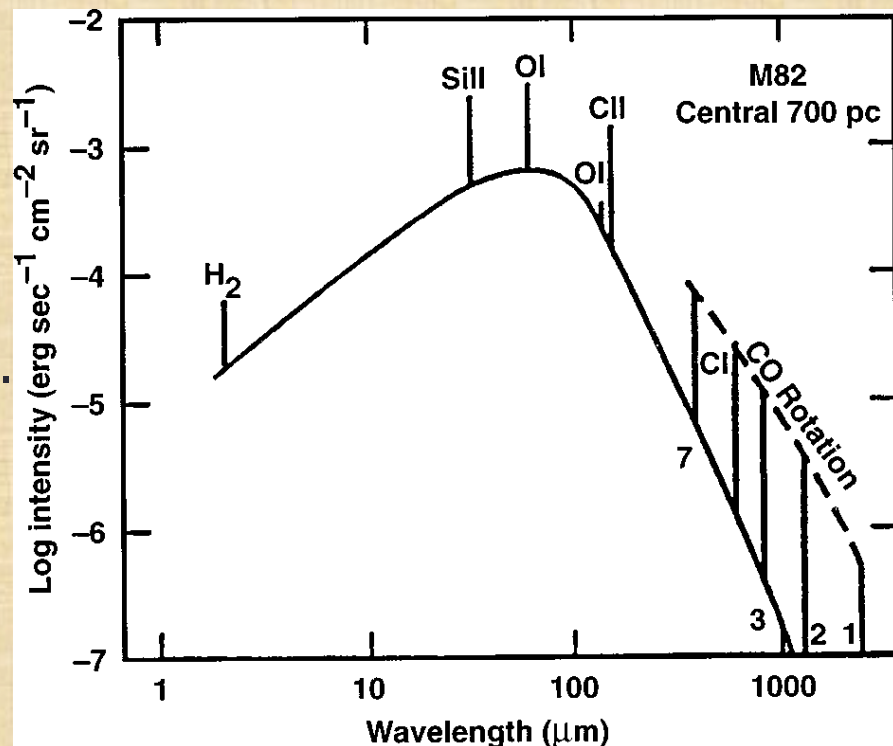


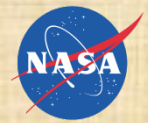


Mapping of FIR fine structure lines in galactic and extra galactic sources.

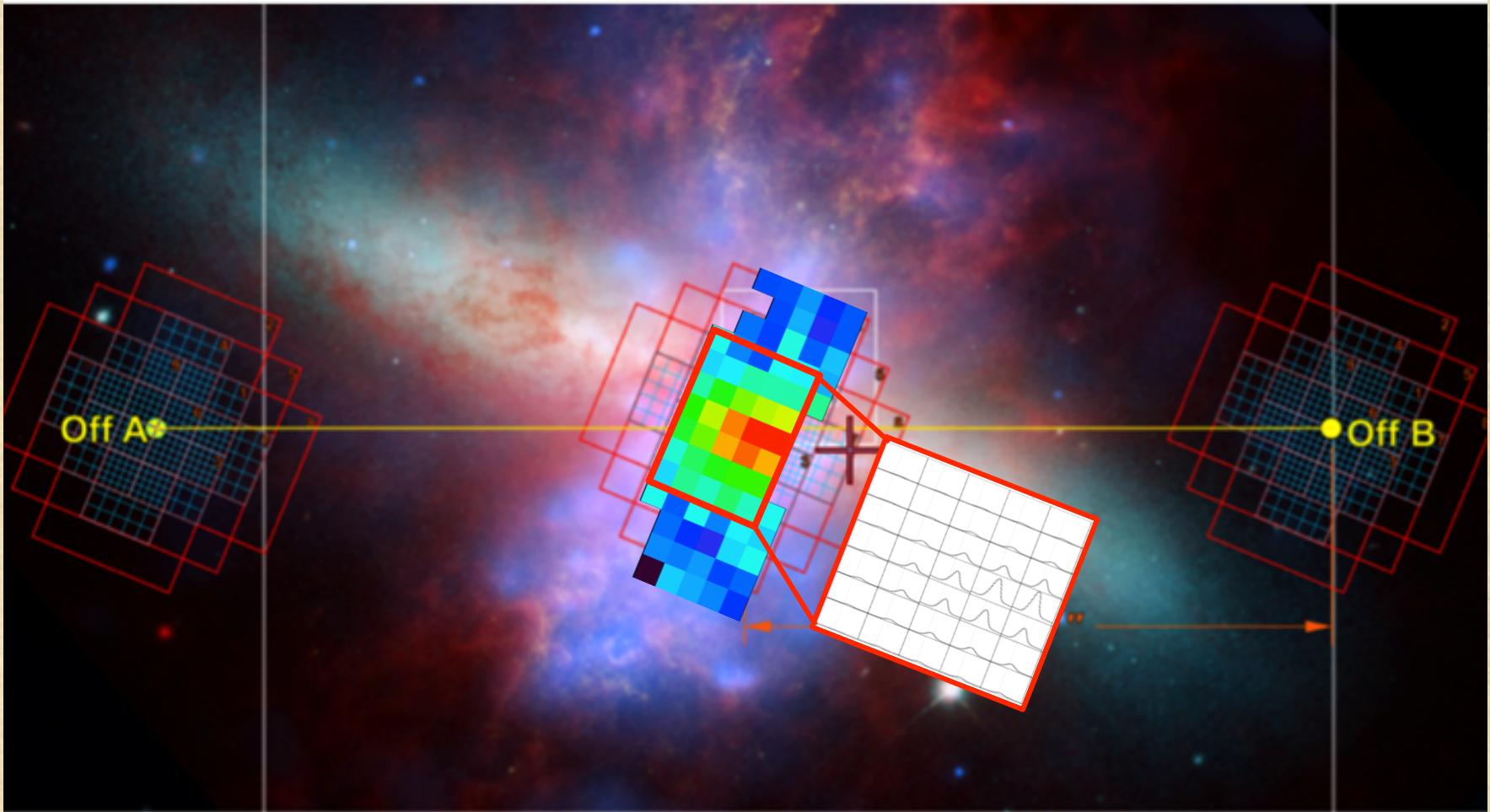
Main cooling lines of the interstellar gas in the FIFI-LS range:

- [CII] 158 $\mu\text{m}$
- [OI] 63.18 $\mu\text{m}$ , 145.4 $\mu\text{m}$
- In ionized regions:
- [OIII] 51.81 $\mu\text{m}$ , 88.36 $\mu\text{m}$
- But also high-J CO lines, OH-lines etc.

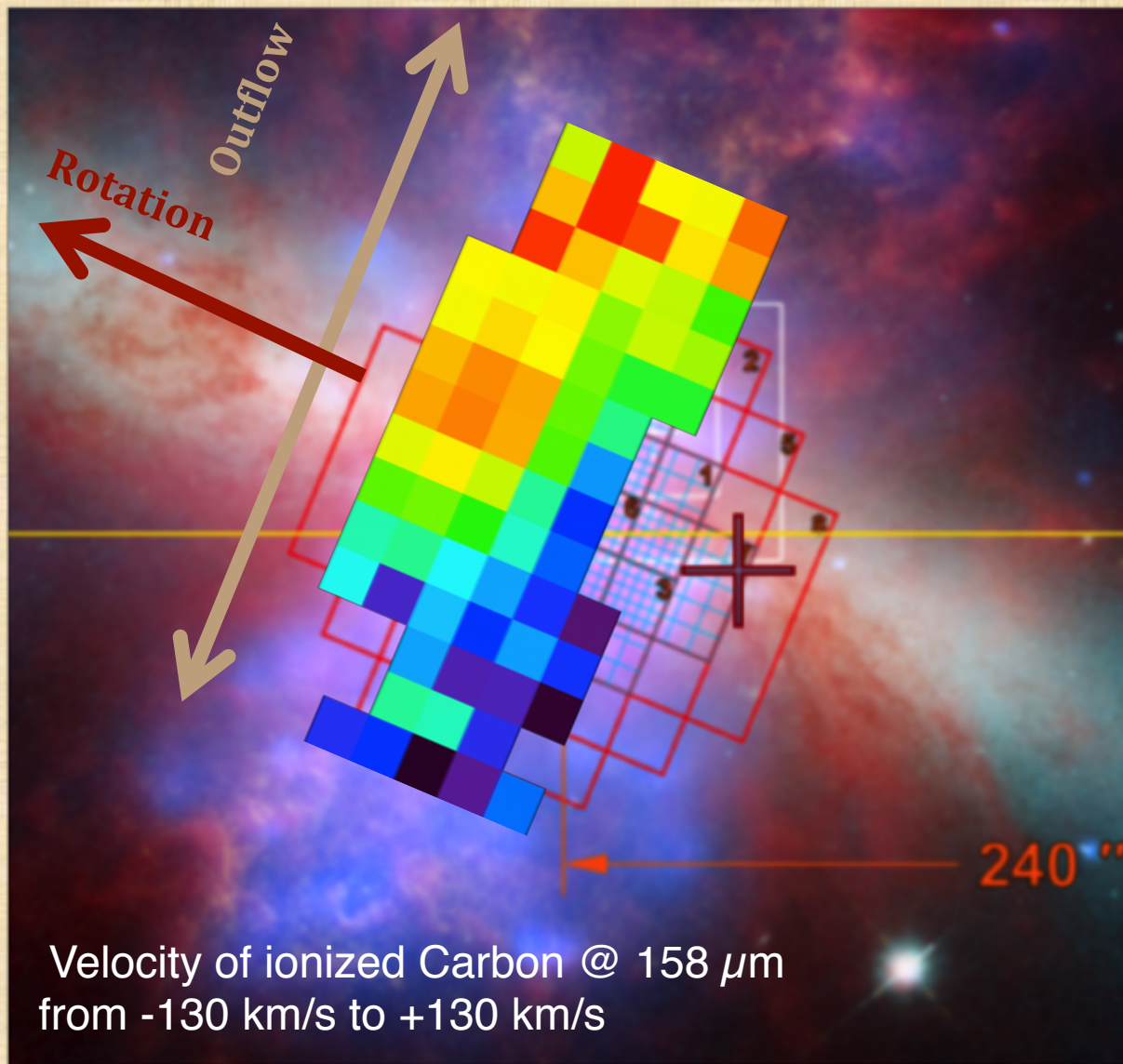




# M82 [CII] 158 $\mu\text{m}$

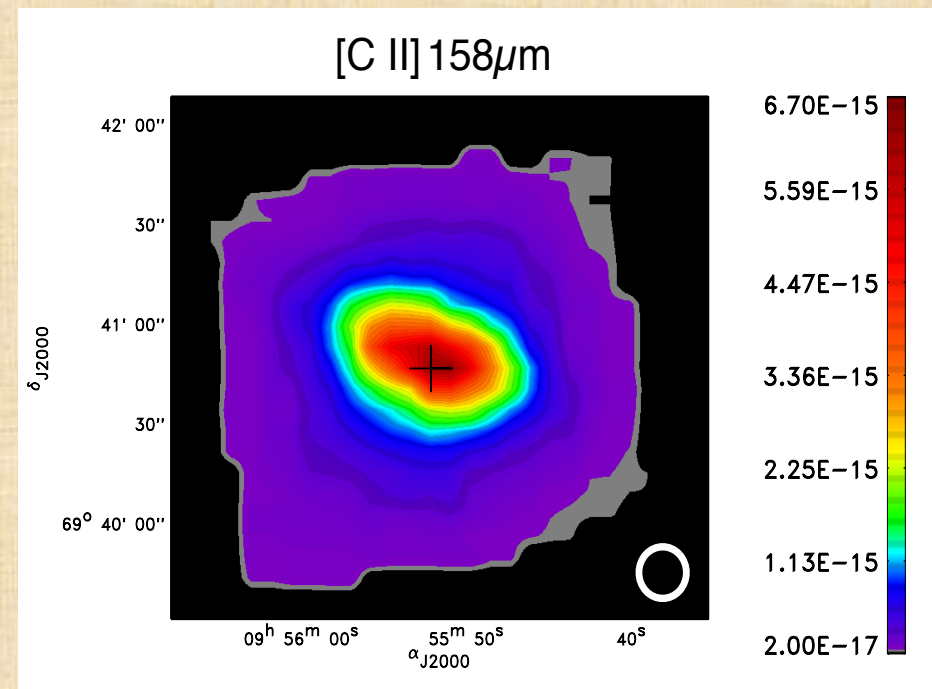


# M82

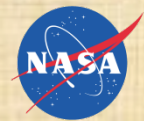




- Expected flux eg. from KOA, ISO, or Herschel observations
- From Herschel PACS-S: Central 2'x2' with PACS-S  
Contursi et al. A&A 549, A118 (2013)
- Expected integrated line flux for [CII]:  
 $\sim 2 \times 10^{-17} \text{ W/m}^2$  per PACS-S  
spaxel in outer regions
- PACS-S spaxel is 9.7"x9.7"
- FIFI-LS red spaxel:  
12"x12" -> 1.5 times larger
- Expected flux per FIFI-LS  
spaxel:  $3 \times 10^{-17} \text{ W/m}^2$







# FIFI-LS time estimator



## Input Parameters

Observatory Altitude (in feet; < 60000 ft):

ft  m

Water Vapor Overburden (in microns; 0 if unknown):

Telescope elevation (between 20 and 60 deg):

Signal to Noise Ratio / Integration Time (minutes):

SNR  Total Int. Time

Wavelength (in microns, between 51 and 203):

Source :

line (in W/m<sup>2</sup>)  continuum (in Jy)

Velocity correction (source VLSR, in km/s):

Band width :

km/s  microns

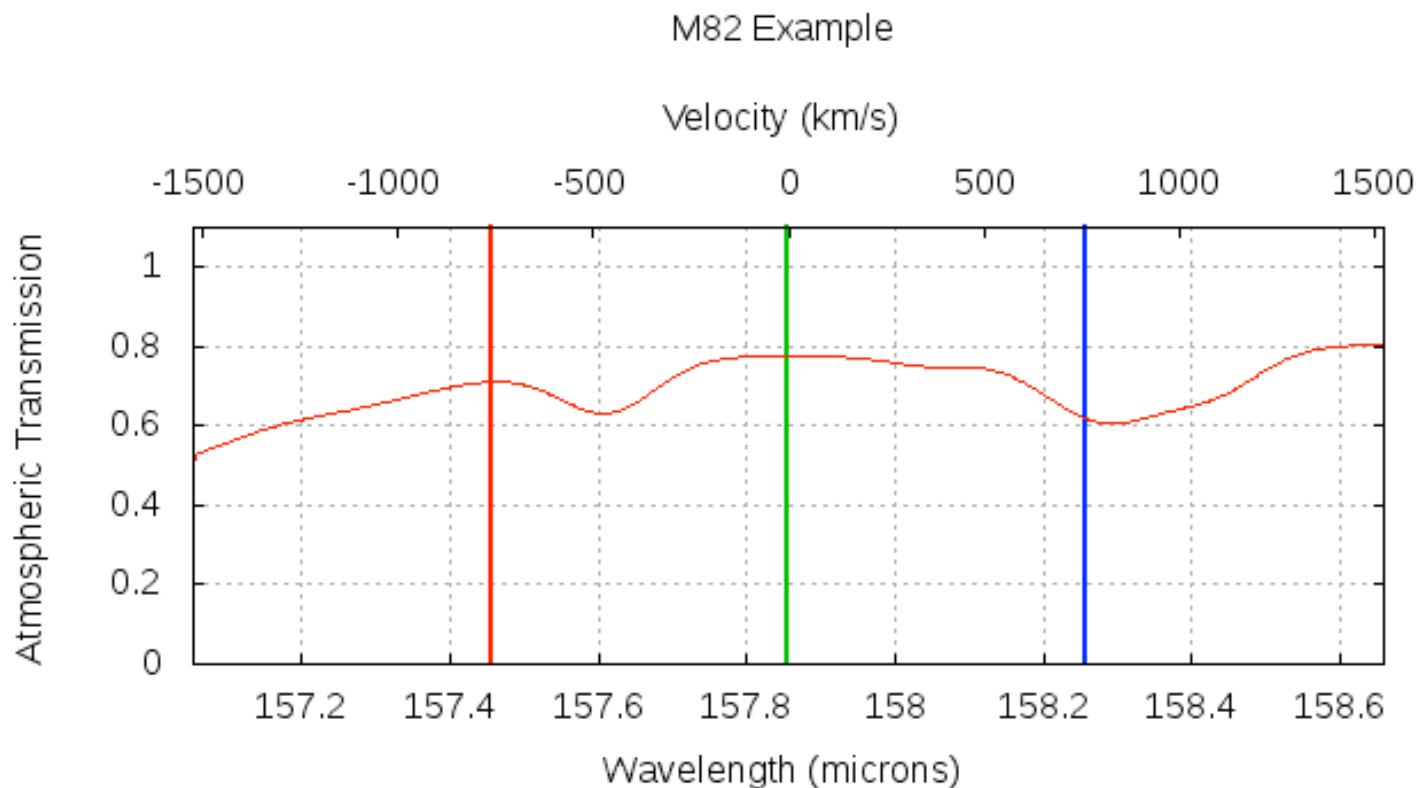
Comment :

*Conservative default values*

*Required user input*

<https://atran.arc.nasa.gov/cgi-bin/fifi-ls/fifi.cgi>

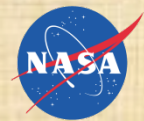




Green line: observing wavelength/frequency

FIFI-LS: Red and blue lines denote width of spectrum

GREAT: they mean LSB/USB with respect to obs. wavelength.



# Time estimator



List of parameters inserted:

<b>Observatory Altitude</b> (in feet; < 60000 ft):	38000 ft
<b>Water Vapor Overburden</b> (in microns; 0 if unknown):	0
<b>Telescope elevation</b> (between 20 and 60 deg):	40
<b>Signal to Noise Ratio / Integration Time</b> (s):	5 SNR
<b>Wavelength</b> (in microns, between 40 and 200):	157.741
<b>Source :</b>	3e-17 line (in W/m <sup>2</sup> )
<b>Velocity correction</b> (source VLSR, in km/s):	219
<b>Band width :</b>	1500 km/s

List of parameters derived:

<b>Velocity corrected wavelength</b> (in microns):	157.856
<b>Plot wavelength range</b> (in microns):	157.054 - 158.659
<b>Interpolated values from data table :</b>	MDLF = 2.085e-17 (W/m <sup>2</sup> ); MDCF = 0.570 (Jy); bandwidth = 0.802 (microns); l = 1.000
<b>Atmospheric transparency :</b>	alpha = 0.775
<b>Integration time :</b>	t <sub>on</sub> = 18.870 minutes

Inter-  
mediate  
results

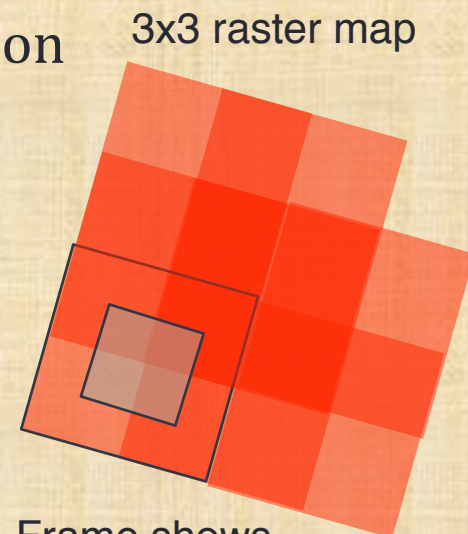
Result

MDL/CF: minimum detectable line/continuum flux ( $4\sigma$  in  $15 t_{on}$ )



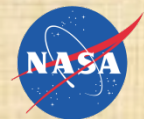


- $t_{\text{on}} = 19\text{min}$
- Overlap: 3x3 map positions, spacing of  $\frac{1}{2}$  a red array or 30" or 2.5 pixels (super-resolution) -> Map size 2'x2' in red
  - Corners covered once -> SNR: 2.9
  - Sides covered 3x -> SNR: 5
  - Center covered 9x -> SNR: 8.7
- $t_{\text{on}} = 19\text{min}$  coverage, i.e. SNR of 5, in sides.  
Therefore  $19/3 = 6.3\text{min}$  on-source time, per position  
->  $9 \times 6.3 = 57\text{min}$  or **3420s** total on-source time.
- Symmetric Chop -> overhead: approximately x 1.7  
Total time: 9192s (SPT)
- Blue map full coverage, no overlap  
Let's assume that 6.3 min per position is sufficient for a blue pointing.



Frame shows  
single blue &  
red FOV





# Sofia Proposal Tool



## Observation 2: M 82 of Unsubmitted Phase I Proposal (Unsaved)

Instrument:

Target Name:

Source Type:

SIMBAD

NED

NAIF ID:

NAIF ID Selection List

Coordinates (J2000):

Galactic

RA/GalLong:

DEC/GalLat:

Proper Motion ("/yr):

RA:

DEC:

Instrument Mode:

Overheads - Constant (secs):

+ Factor:

Wavelengths ( microns ):

Blue Channel:

Red Channel:

Width of Spectrum ( km/s ):

Blue Channel:

Red Channel:

*t<sub>on</sub>* Integration Time (secs):

Alternate Overhead:

Default Overhead:

Duration:

arcmin

arcmin

Map Area:

X

Order of Observation:

Priority:

Time Critical Observation:

First Critical Time, From :

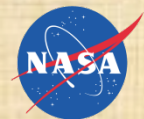
To:

Second Critical Time, From :

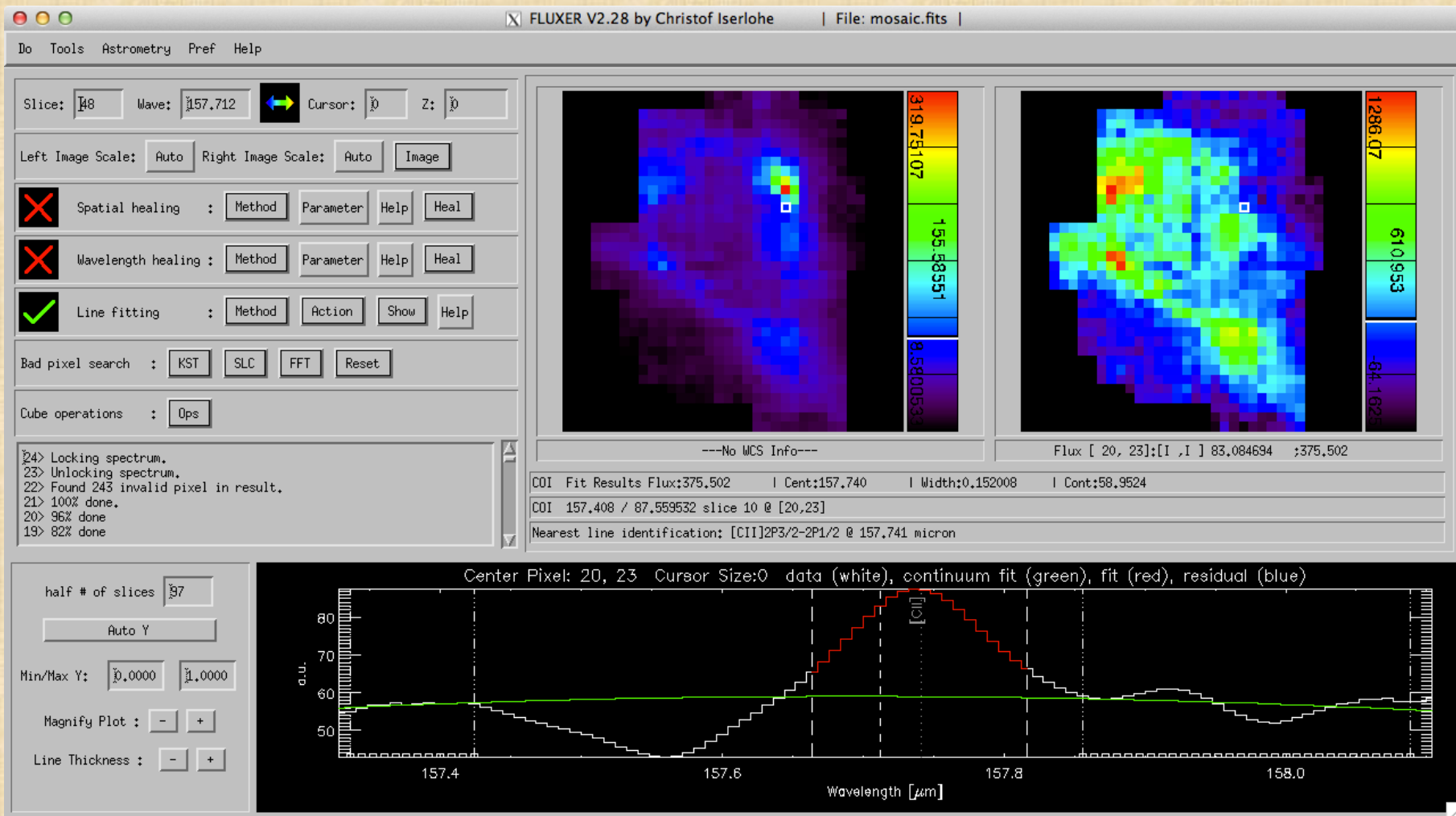
To:

*t<sub>total</sub>*





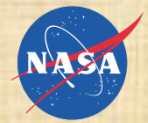
# FIFI-LS data visualizer



<http://www.ciserlohe.de/fluxer/fluxer.html>

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# Other time estimators



All the time estimators are accessible at the page:

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

