SOFIA Proposal Development: Demonstration using SOFIA tools to make a SOFIA Proposal

Bill Reach

Chief Science Advisor

Sample Proposal Development

- This is a worked example illustrating usage of SOFIA proposal development tools
- Proposal concept: Measuring magnetic fields and [C II] structure of galaxies using HAWC+ and FIFI-LS

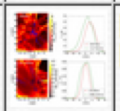
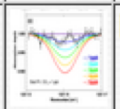
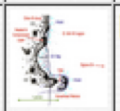
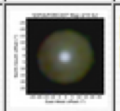
Practical steps to Prepare for Proposal

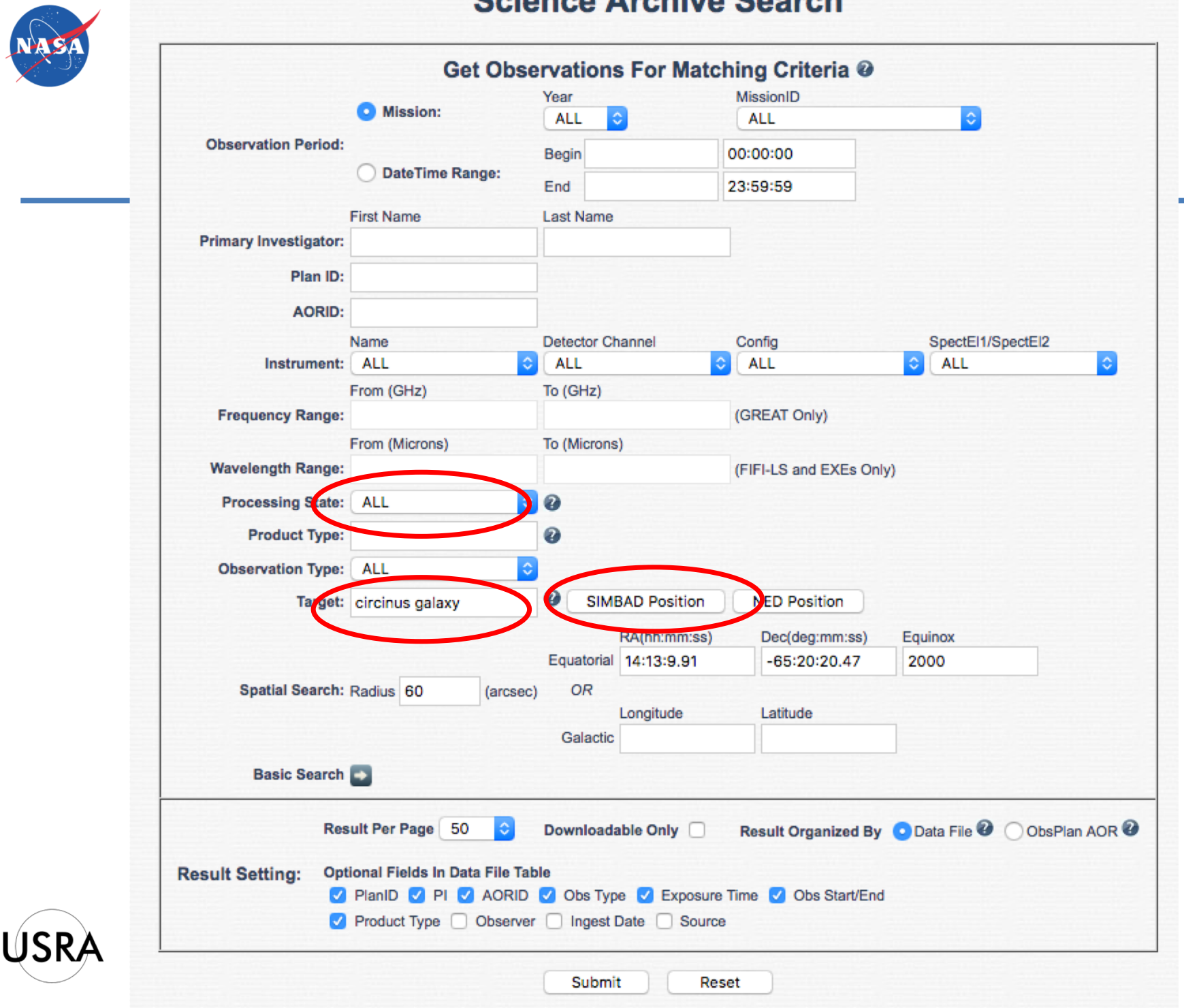
- Select concept and determine what has already been done to identify what could be new within SOFIA's general bounds
- Tools = ADS abstracts, astro-ph, SOFIA publications
- `https://dcs.sofia.usra.edu/dataRetrieval/SofiaPublications.jsp`
- SOFIA archive

SOFIA Publications

Total 139 Publications Found

Publication Number	Author	Title	Date	Publication	Science Topic	Keywords	Instruments	Program	Image	Links
9999	Matsuura, M	SOFIA observations of Supernova 1987A in 2016 ? possible dust re-formation after passage of shocks?	2018-03	submitted to MNRAS	Stars and stellar evolution		FORCAST	04_0016		
9999	Ma, J.	SOFIA/HAWC Detection of a Gravitationally Lensed Starburst Galaxy at Z=1.03	2018-01	submitted to ApJL	Extragalactic and galactic center		HAWC	05_0087		
9999	Bosh, A.	Haze in Pluto's atmosphere: Results from SOFIA and ground-based observationsof the 2015 June 29 Pluto occultation	2018-99	submitted to Icarus and under review	Solar System		FLITECAM, HIPO	03_0028		
9999	Langer, W.	The nature of molecular cloud boundary layers from SOFIA [OI] observations	2018-99	A&A	Interstellar medium		GREAT	05_0015		
9999	Iserlohe, C	FIFI-LS Observations of the Circumnuclear Ring: Probing the high-density phase of the PDR	2018-99	submitted to A&A	Extragalactic and galactic center		FIFI-LS	70_0408		
9999	Schneider, N	Anatomy of the massive star-forming region S106	2018-99	submitted to A&A	Star formation		GREAT	03_0095 83_0008		
9999	Sandell, G	Velocity resolved [OI] 63 microns emission in the HD 50138 circumstellar disk	2018-99	submitted to A&A	Interstellar medium		GREAT	83_0431		
9999	Xu, D	The distribution of carbon in rho ophiuchus A	2018-99	submitted to ApJ	Interstellar medium		GREAT			
9999	Perez-Beaupuits, JP	A Thorough view of the nuclear region of	2018-99	submitted	Extragalactic and galactic		GREAT	83_0008		

		Development of Dust Formation and Destruction in Nova Sagittarii 2015#2 (V5668 Sgr): A Panchromatic Study			stellar evolution					
106	Wiesemeyer, H	Unveiling the chemistry of interstellar CH: Spectroscopy of the 2 THz N=2-1 ground state line	2018-04	accepted to A&A [DOI]	Interstellar medium		GREAT	83_0435		[astro-ph]
105	Goldsmith, P	Velocity Resolved [C II] Emission from Cold Diffuse Clouds in the Interstellar Medium	2018-03	2018ApJ...856...96G [DOI]	Interstellar medium		GREAT	03_0012		[ADS]
104	Jameson, K	First Results from the Herschel and ALMA Spectroscopic Surveys of the SMC: The Relationship between [C ii]-bright Gas and CO-bright Gas at Low Metallicity	2018-03	2018ApJ...853..111J [DOI]	Extragalactic and galactic center		GREAT	03_0120		[ADS]
103	Rangwala, N	High Spectral Resolution SOFIA/EXES Observations of C2H2 Towards Orion Irc2	2018-03	2018ApJ...856....9R [DOI]	Interstellar medium		EXES	03_0126		[ADS] [astro-ph] [teletalk]
102	Bisbas, T.	The Inception of Star Cluster Formation Revealed by [CII] Emission Around an Infrared Dark Cloud	2018-03	2018MNRAS.tmpL..40B [DOI]	Star formation		GREAT	04_0169		[astro-ph] [ADS]
101	Aoki, S.	Stringent Upper Limit of CH4 on Mars Based on SOFIA/EXES Observations	2018-03	2018A&A...610A..78A [DOI]	Solar System		EXES	04_0087		[ADS]
100	Bally, J	Kinematics of the Horsehead Nebula and IC 434 Ionization Front in CO and C	2018-02	2018, AJ vol 155, No. 2 [DOI]	Interstellar medium		GREAT	75_0015		[ADS]
99	Hankins, M	An Infrared Study of the Circumstellar Material Associated with the Carbon Star R Sculptoris	2018-01	2018ApJ...852...27H [DOI]	Stars and stellar evolution		FORCAST	70_0400		[ADS] [teletalk]


Science Archive Search
Get Observations For Matching Criteria
Mission:
Year
ALL
MissionID
ALL
Observation Period:
DateTime Range:
Begin
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End
23:59:59
First Name
Last Name
Primary Investigator:
Plan ID:
AORID:
Name
Detector Channel
Config
SpectEl1/SpectEl2
Instrument:
ALL
ALL
ALL
ALL
From (GHz)
To (GHz)
Frequency Range:
(GREAT Only)
From (Microns)
To (Microns)
Wavelength Range:
(FIFI-LS and EXEs Only)
Processing State:
ALL
Product Type:
Observation Type:
ALL
Target:
circinus galaxy
SIMBAD Position
NED Position
RA(hh:mm:ss)
Dec(deg:mm:ss)
Equinox
Equatorial
14:13:9.91
-65:20:20.47
2000
Spatial Search:
Radius
60
(arcsec)
OR
Longitude
Latitude
Galactic
Basic Search
Result Per Page
50
Downloadable Only
Result Organized By
Data File
ObsPlan AOR
Result Setting:
Optional Fields In Data File Table
PlanID
PI
AORID
Obs Type
Exposure Time
Obs Start/End
Product Type
Observer
Ingest Date
Source
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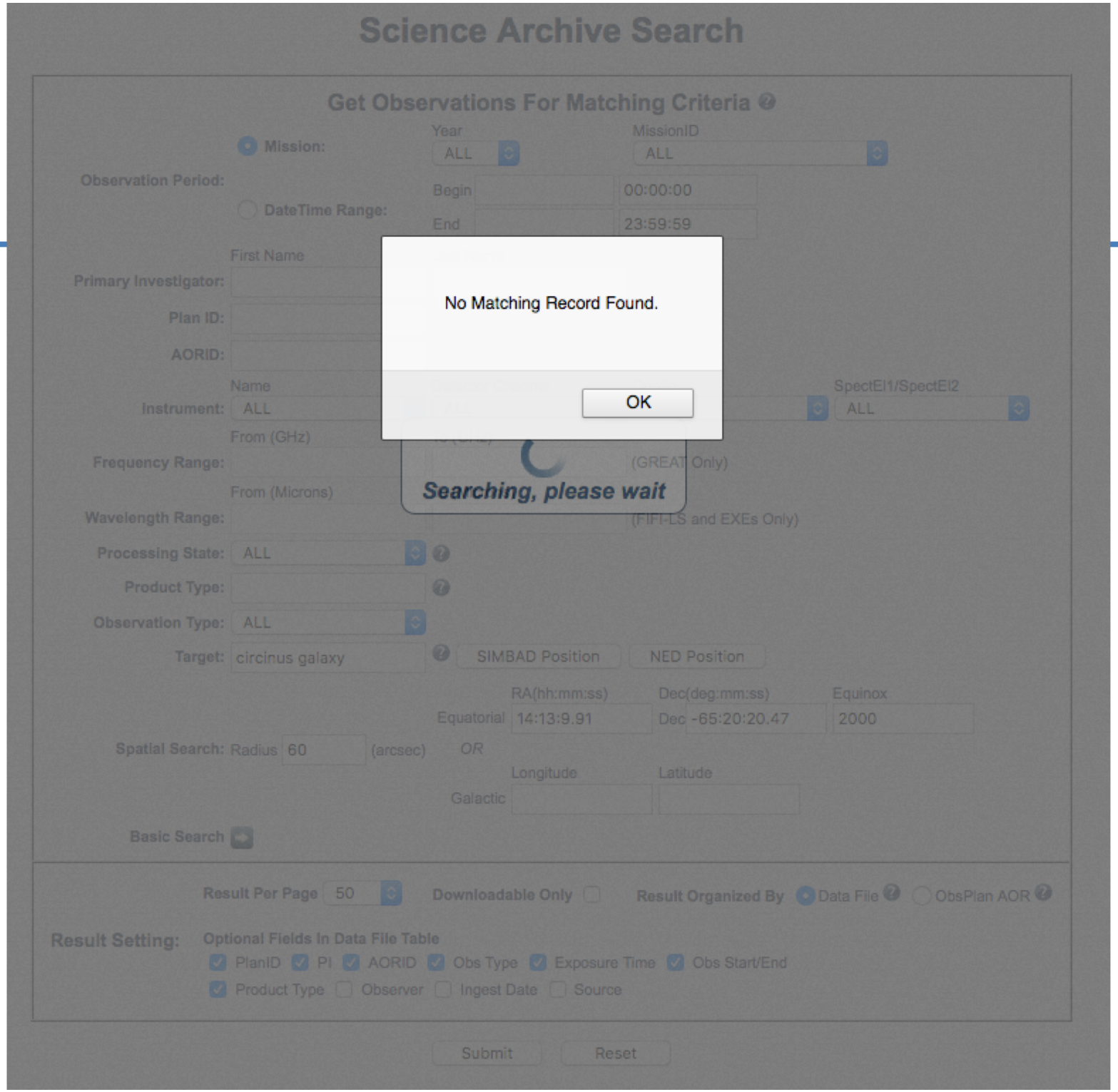
Reset


Science Archive Search
Get Observations For Matching Criteria
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Year
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MissionID
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Observation Period:
Begin
00:00:00
DateTime Range:
End
23:59:59
First Name
Primary Investigator:
Plan ID:
AORID:
Name
Instrument:
ALL
SpectEl1/SpectEl2
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From (GHz)
Frequency Range:
(GREAT Only)
From (Microns)
Wavelength Range:
(FIFI-LS and EXEs Only)
No Matching Record Found.
OK
Searching, please wait
Processing State:
ALL
Product Type:
Observation Type:
ALL
Target:
circinus galaxy
SIMBAD Position
NED Position
RA(hh:mm:ss)
Dec(deg:mm:ss)
Equinox
Equatorial
14:13:9.91
Dec
-65:20:20.47
2000
Spatial Search:
Radius
60
(arcsec)
OR
Longitude
Latitude
Galactic
Basic Search
Result Per Page
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Downloadable Only
Result Organized By
Data File
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Result Setting:
Optional Fields In Data File Table
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AORID
Obs Type
Exposure Time
Obs Start/End
Product Type
Observer
Ingest Date
Source
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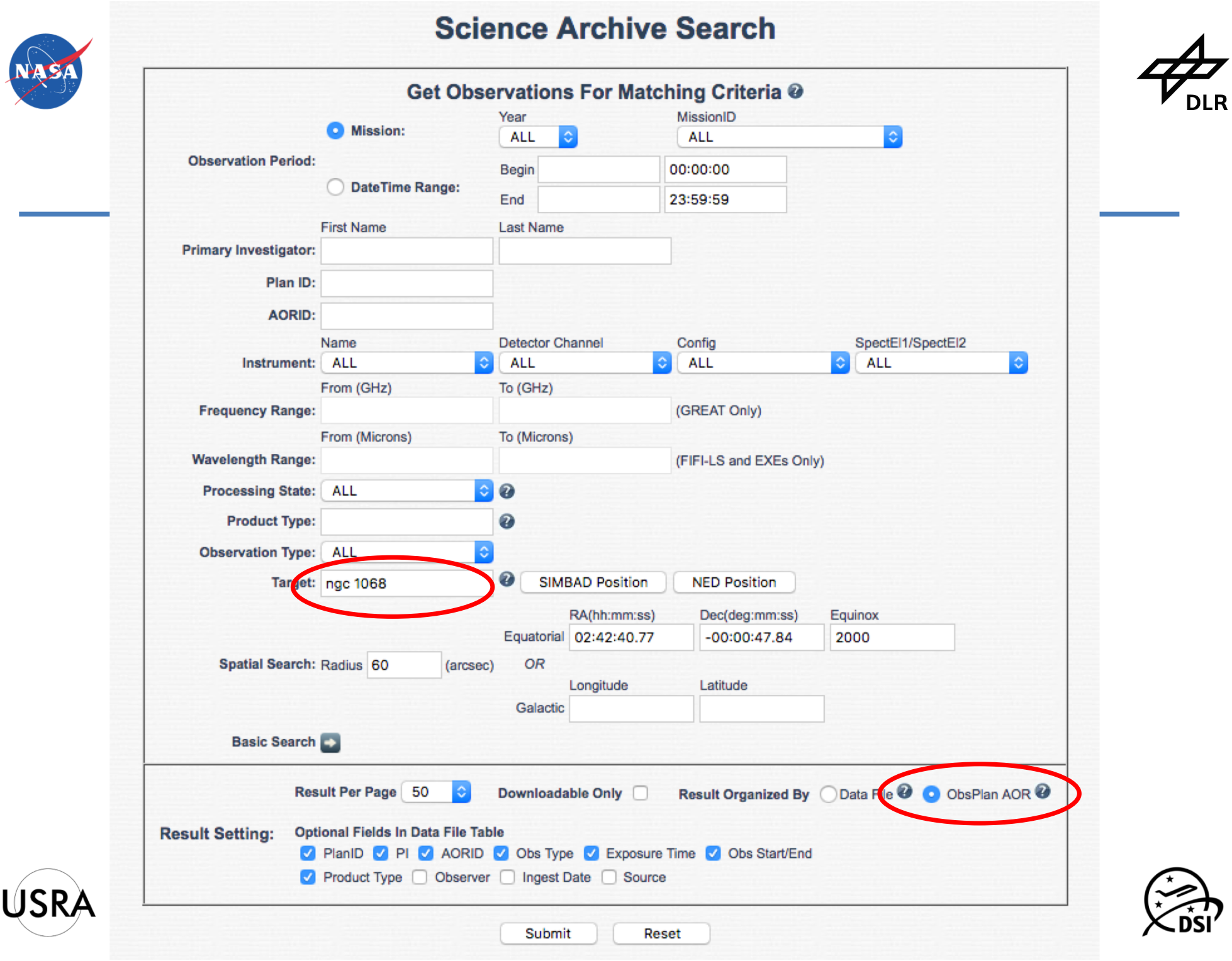
Reset


Science Archive Search
Get Observations For Matching Criteria
Mission:
Year
ALL
MissionID
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Observation Period:
DateTime Range:
Begin
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End
23:59:59
First Name
Last Name
Primary Investigator:
Plan ID:
AORID:
Name
Detector Channel
Config
SpectEl1/SpectEl2
Instrument:
ALL
ALL
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ALL
From (GHz)
To (GHz)
Frequency Range:
(GREAT Only)
From (Microns)
To (Microns)
Wavelength Range:
(FIFI-LS and EXEs Only)
Processing State:
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Product Type:
Observation Type:
ALL
Target:
ngc 1068
SIMBAD Position
NED Position
RA(hh:mm:ss)
Dec(deg:mm:ss)
Equinox
Equatorial
02:42:40.77
-00:00:47.84
2000
Spatial Search:
Radius
60
(arcsec)
OR
Longitude
Latitude
Galactic
Basic Search
Result Per Page
50
Downloadable Only
Result Organized By
Data File
ObsPlan AOR
Result Setting:
Optional Fields In Data File Table
PlanID
PI
AORID
Obs Type
Exposure Time
Obs Start/End
Product Type
Observer
Ingest Date
Source
Submit
Reset

Page 1 of 1 (1 - 7 of 7) Results Organized By ObsPlan AOR

Get Selected AORs Associated Data In Current Page | Get All AORs Associated Data In All Pages | There is a ***30GB*** download limit.

AORID	PlanID	LastName	FirstName	Instrument	InstConfig	InstMode	SpectEl1	SpectEl2	Slit	Target	NaifID	RAJ2000 Longitude (Galactic) (Ecliptic)	DecJ2000 Latitude (Galactic) (Ecliptic)	Exposure (Min)
03_0065_4	03_0065	Rangwala	Naseem	EXES	HIGH_MED	NOD_ON_SLIT	EXE_ELON	EXE_ECHL	EXE_S32	NGC1068	NA	02:42:40.77 172.104(G) 38.245(E)	-00:00:47.84 -51.934(G) -15.037(E)	132.3
03_0065_16	03_0065	Rangwala	Naseem	EXES	HIGH_MED	NOD_ON_SLIT	EXE_ELON	EXE_ECHL	EXE_S32	NGC1068	NA	02:42:40.77 172.104(G) 38.245(E)	-00:00:47.84 -51.934(G) -15.037(E)	160
70_0400_62	70_0400	Herter	Terry	FORCAST	IMAGING	C2N	FOR_F197	FOR_F315		NGC1068	NA	02:42:40.77 172.104(G) 38.245(E)	-00:00:47.8 -51.934(G) -15.037(E)	13.33
70_0400_63	70_0400	Herter	Terry	FORCAST	IMAGING	C2N	OPEN	FOR_F371		NGC1068	NA	02:42:40.77 172.104(G) 38.245(E)	-00:00:47.8 -51.934(G) -15.037(E)	10
70_0409_7	70_0409	Dowell	C. Darren	HAWC_PLUS	POLARIZATION	C2N	HAW_A	HAW_HWP_A		NGC1068	NA	02:42:40.77 172.104(G) 38.245(E)	-00:00:47.84 -51.934(G) -15.037(E)	10.67
70_0409_30	70_0409	Dowell	C. Darren	HAWC_PLUS	TOTAL_INTENSITY	OTFMAP	HAW_A	OPEN		NGC1068	NA	02:42:40.77 172.104(G) 38.245(E)	-00:00:47.84 -51.934(G) -15.037(E)	1
70_0509_20	70_0509	Dowell	Darren	HAWC_PLUS	POLARIZATION	C2N	HAW_C	HAW_HWP_C		NGC1068	NA	02:42:40.77 172.104(G) 38.245(E)	-00:00:47.84 -51.934(G) -15.037(E)	16

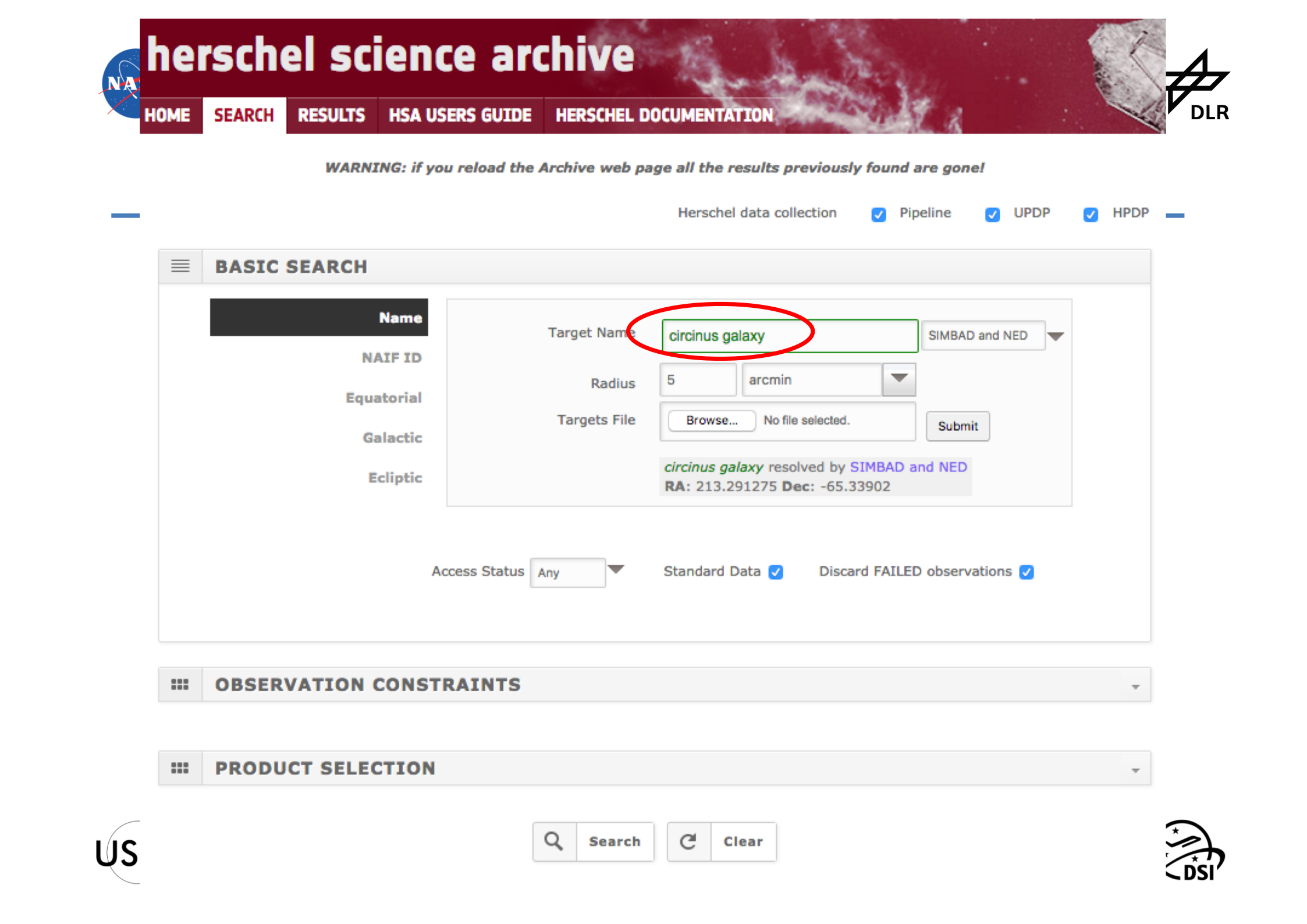
Page 1 of 1 (1 - 7 of 7)

Building the potential target list

- After checking ”obvious” targets and doing literature search, there appears to be remaining discovery space for the project
- Study the relevant Science Instrument website and scan Observers Handbook to get a better idea of what are the critical drivers of sensitivity
- Now, further elaborate a potential target list and begin numerical feasibility estimate based on the sensitivity metrics

Feasibility metric: far-IR polarization

- Signal-to-noise depends primarily on the surface brightness
- Herschel and Spitzer covered almost the exact same wavelengths
  - Herschel: get quick-look products, units Jy/pix, scale from Herschel to SOFIA pixel size
  - Spitzer: get PBCD products, units MJy/sr, multiply SOFIA pixel size


herschel science archive
HOME
SEARCH
RESULTS
HSA USERS GUIDE
HERSCHEL DOCUMENTATION
DLR
WARNING: if you reload the Archive web page all the results previously found are gone!
Herschel data collection
Pipeline
UPDP
HPDP
BASIC SEARCH
Name
NAIF ID
Equatorial
Galactic
Ecliptic
Target Name
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SIMBAD and NED
Radius
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Targets File
Browse...
No file selected.
Submit
circinus galaxy resolved by SIMBAD and NED
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Access Status
Any
Standard Data
Discard FAILED observations
OBSERVATION CONSTRAINTS
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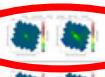
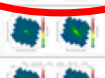
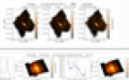
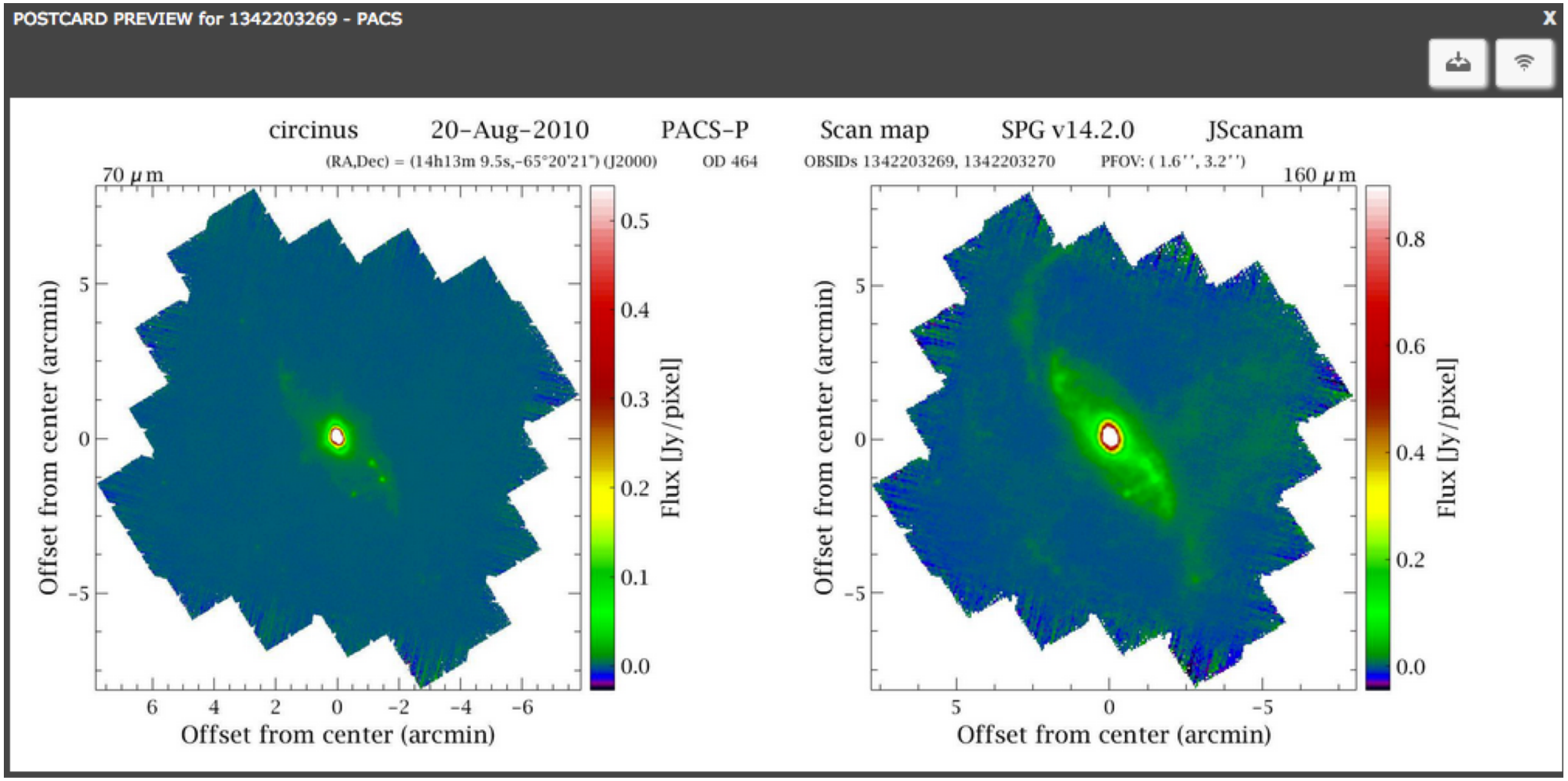
RESULTS #1

Pipeline (18) | UPDP (5) | HPDP (7) | Publications (8)

Observation ID				QCR	Target name	RA	Dec	Distance	Instrument	Observing Mode	OD
1342191297					Circinus Galaxy	14h 13m 09.73s	-65d 20' 20.17"	1.092	PACS	PacsLineSpec	289
1342191298					Circinus Galaxy	14h 13m 09.82s	-65d 20' 20.69"	0.548	PACS	PacsLineSpec	289
1342203269					circinus	14h 13m 08.80s	-65d 20' 20.71"	6.872	PACS	PacsPhoto	464
1342203270					circinus	14h 13m 08.80s	-65d 20' 20.71"	6.872	PACS	PacsPhoto	464
1342203271					circinus	14h 13m 09.23s	-65d 20' 20.73"	4.236	PACS	PacsPhoto	464
1342203272					circinus	14h 13m 09.23s	-65d 20' 20.73"	4.236	PACS	PacsPhoto	464
1342203638					circinus	14h 13m 08.37s	-65d 20' 30.93"	14.182	SPIRE	SpirePhotoLargeScan	467
1342225144					Circinus Galaxy	14h 13m 09.93s	-65d 20' 19.52"	0.962	PACS	PacsRangeSpec	810
1342225145					Circinus Galaxy	14h 13m 10.02s	-65d 20' 20.42"	0.747	PACS	PacsRangeSpec	810
1342225146					Circinus Galaxy	14h 13m 09.96s	-65d 20' 20.68"	0.407	PACS	PacsRangeSpec	810
1342225147					Circinus Galaxy	14h 13m 09.96s	-65d 20' 20.99"	0.635	PACS	PacsRangeSpec	810
1342225148					Circinus Galaxy	14h 13m 09.94s	-65d 20' 21.15"	0.728	PACS	PacsRangeSpec	810
1342228592					Circinus	14h 13m 10.03s	-65d 20' 20.97"	0.927	HIFI	HifiPointModeFastDBS	853
1342248904					Circinus_peak-SPIRE-1	14h 13m 09.84s	-65d 20' 18.76"	1.749	HIFI	HifiPointModeFastDBS	1174
1342251313					Circinus Galaxy	14h 13m 09.78s	-65d 20' 20.43"	0.748	SPIRE	SpireSpectroPoint	1229
1342251451					Circinus	14h 13m 09.90s	-65d 20' 20.96"	0.492	HIFI	HifiPointModeFastDBS	1231
1342251452					Circinus	14h 13m 09.92s	-65d 20' 20.95"	0.498	HIFI	HifiPointModeFastDBS	1231
1342251453					Circinus	14h 13m 09.92s	-65d 20' 20.90"	0.462	HIFI	HifiPointModeFastDBS	1231

USRA

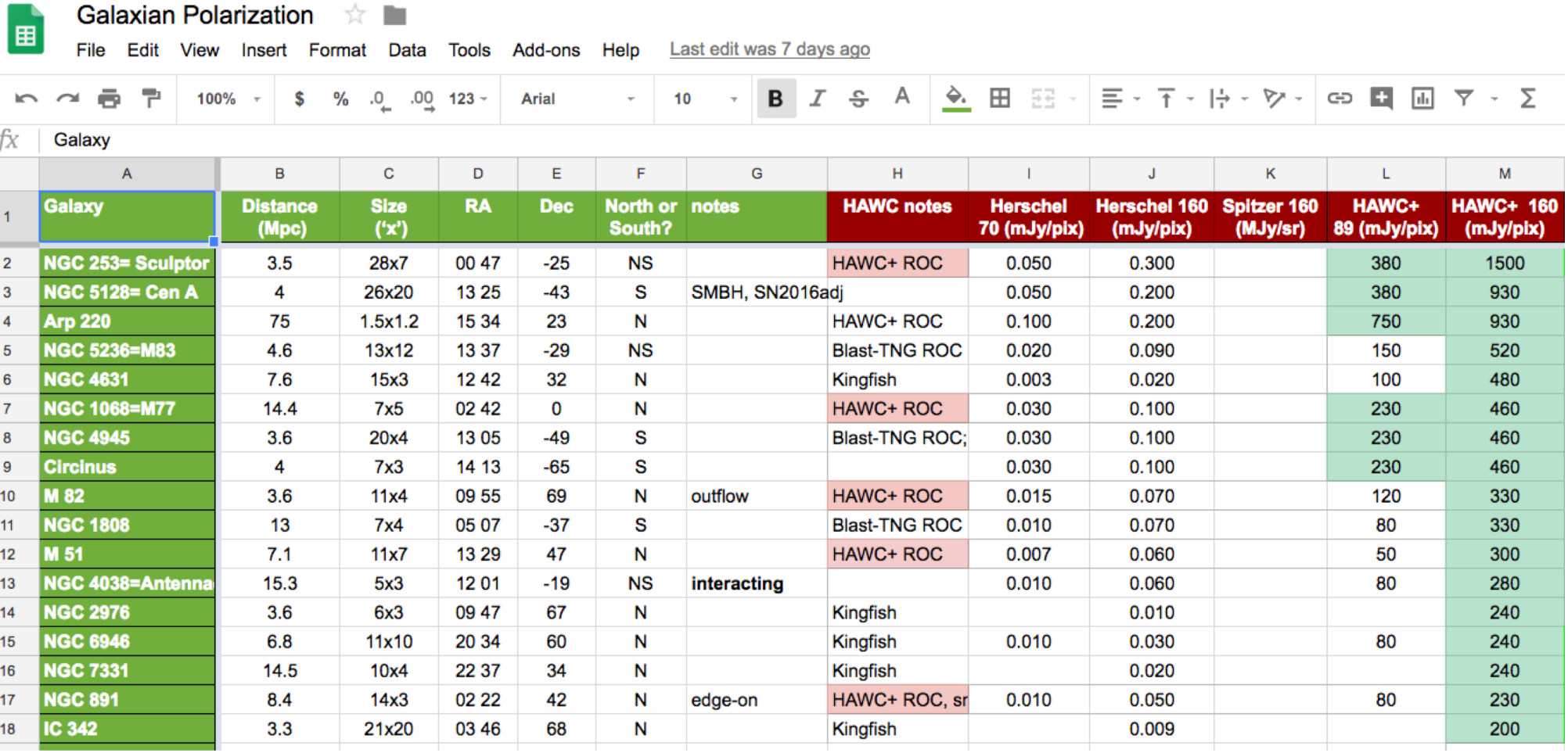
DSI



Read from plot or download FITS of “Postcard” to get approximate 0.03 Jy/pix at 70μm

Multiply by (PixSizeHAWC/PixSizeHerschel)^2 and interpolate to get 230 mJy/pix for HAWC, comp

Convert to 14 mJy/arcsec^2 for Integration Time estimator



Galaxian Polarization

File Edit View Insert Format Data Tools Add-ons Help Last edit was 7 days ago

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fx Galaxy

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Galaxy	Distance (Mpc)	Size ('x')	RA	Dec	North or South?	notes	HAWC notes	Herschel 70 (mJy/pix)	Herschel 160 (mJy/pix)	Spitzer 160 (MJy/sr)	HAWC+ 89 (mJy/pix)	HAWC+ 160 (mJy/pix)
2	NGC 253= Sculptor	3.5	28x7	00 47	-25	NS		HAWC+ ROC	0.050	0.300		380	1500
3	NGC 5128= Cen A	4	26x20	13 25	-43	S	SMBH, SN2016adj		0.050	0.200		380	930
4	Arp 220	75	1.5x1.2	15 34	23	N		HAWC+ ROC	0.100	0.200		750	930
5	NGC 5236=M83	4.6	13x12	13 37	-29	NS		Blast-TNG ROC	0.020	0.090		150	520
6	NGC 4631	7.6	15x3	12 42	32	N		Kingfish	0.003	0.020		100	480
7	NGC 1068=M77	14.4	7x5	02 42	0	N		HAWC+ ROC	0.030	0.100		230	460
8	NGC 4945	3.6	20x4	13 05	-49	S		Blast-TNG ROC;	0.030	0.100		230	460
9	Circinus	4	7x3	14 13	-65	S			0.030	0.100		230	460
10	M 82	3.6	11x4	09 55	69	N	outflow	HAWC+ ROC	0.015	0.070		120	330
11	NGC 1808	13	7x4	05 07	-37	S		Blast-TNG ROC	0.010	0.070		80	330
12	M 51	7.1	11x7	13 29	47	N		HAWC+ ROC	0.007	0.060		50	300
13	NGC 4038=Antenna	15.3	5x3	12 01	-19	NS	interacting		0.010	0.060		80	280
14	NGC 2976	3.6	6x3	09 47	67	N		Kingfish		0.010			240
15	NGC 6946	6.8	11x10	20 34	60	N		Kingfish	0.010	0.030		80	240
16	NGC 7331	14.5	10x4	22 37	34	N		Kingfish		0.020			240
17	NGC 891	8.4	14x3	02 22	42	N	edge-on	HAWC+ ROC, sr	0.010	0.050		80	230
18	IC 342	3.3	21x20	03 46	68	N		Kingfish		0.009			200

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 | 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 Calculate 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.

Instrument properties: *(more info)*

Filter: *more info* HAW_C

Calculation Method

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

- (•) S/N ratio resulting from a Total Integration Time of 900.0 secs
- ( ) Total Integration Time to achieve a S/N ratio of 4.0

Astronomical Source Definition

Spatial profile and continuum brightness: *(more info) Choose point or extended source.*

- ( ) **Point source** (spatial profile):
  Spatially integrated brightness 148.e-3 Jy
- (•) **Extended source**
  Uniform surface brightness 14e-3 Jy / sq arcsec

[ ] **Emission line:** *(more info)* in addition to the above continuum. The output SNR or observing time will be for the sum of continuum plus line.
Single emission line at wavelength 88.7 microns with line flux 0.0 W/m^2/sq arcsec

Observing Condition Constraints

Note: You can read the explanatory notes for more information on the water vapor overburden.

Elevation Angle:	( ) 20°	(•) 40°	( ) 60°								
Altitude in 1000's of feet:	( ) 35	( ) 36	( ) 37	( ) 38	( ) 39	( ) 40	(•) 41	( ) 42	( ) 43	( ) 44	( ) 45
Zenith Water Vapor Overburden (microns):	( ) 26.7	( ) 16.9	( ) 12.8	( ) 11.0	( ) 9.6	( ) 8.4	(•) 7.3	( ) 6.3	( ) 5.5	( ) 4.8	( ) 4.2

Calculate | Reset to Defaults

SOFIA Instrument Time Estimator (SITE)

HAWC_Plus

Outputs

Relative atmospheric transmission	0.99779
Signal to noise per pixel	26.3

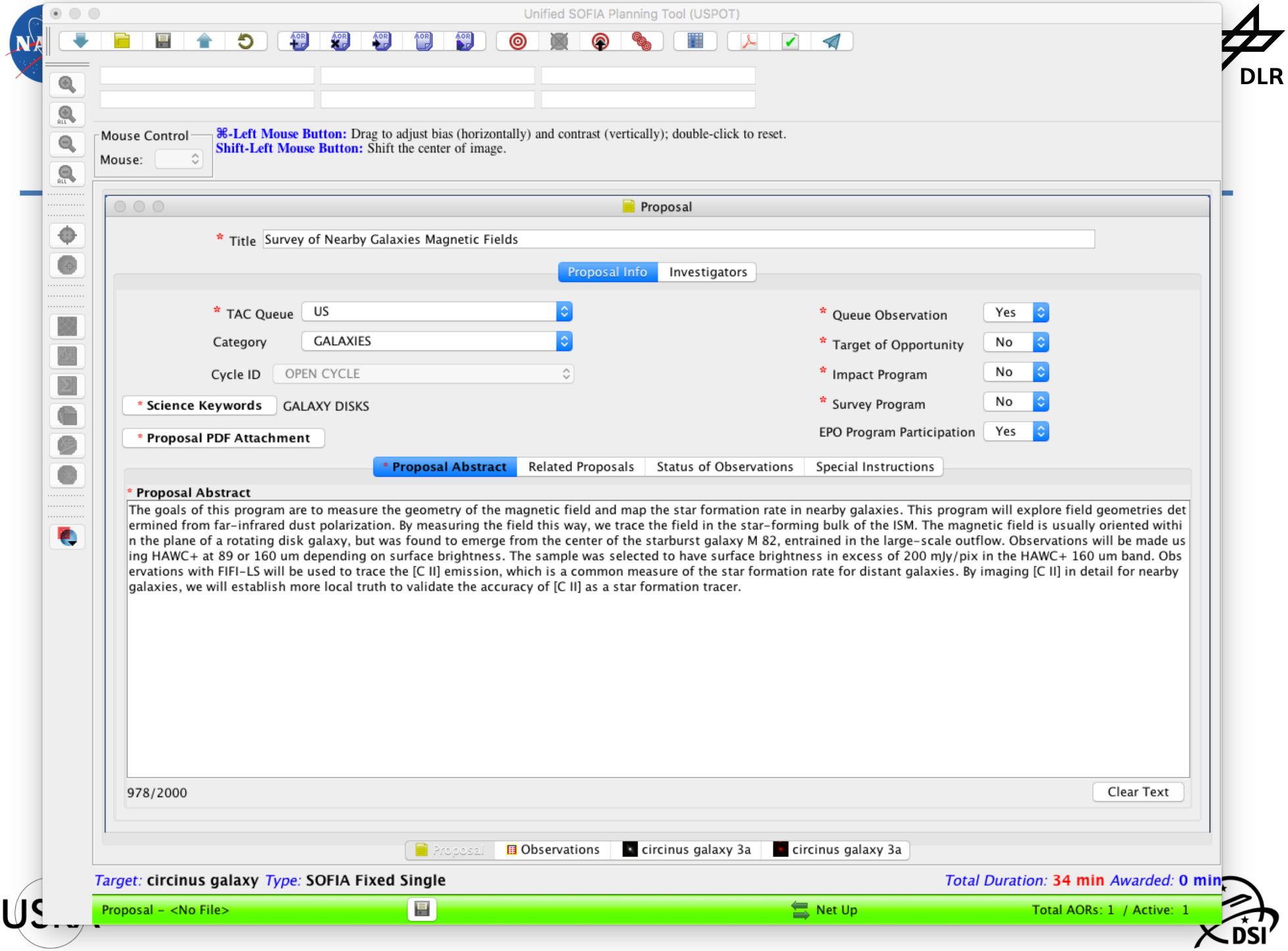
User Inputs

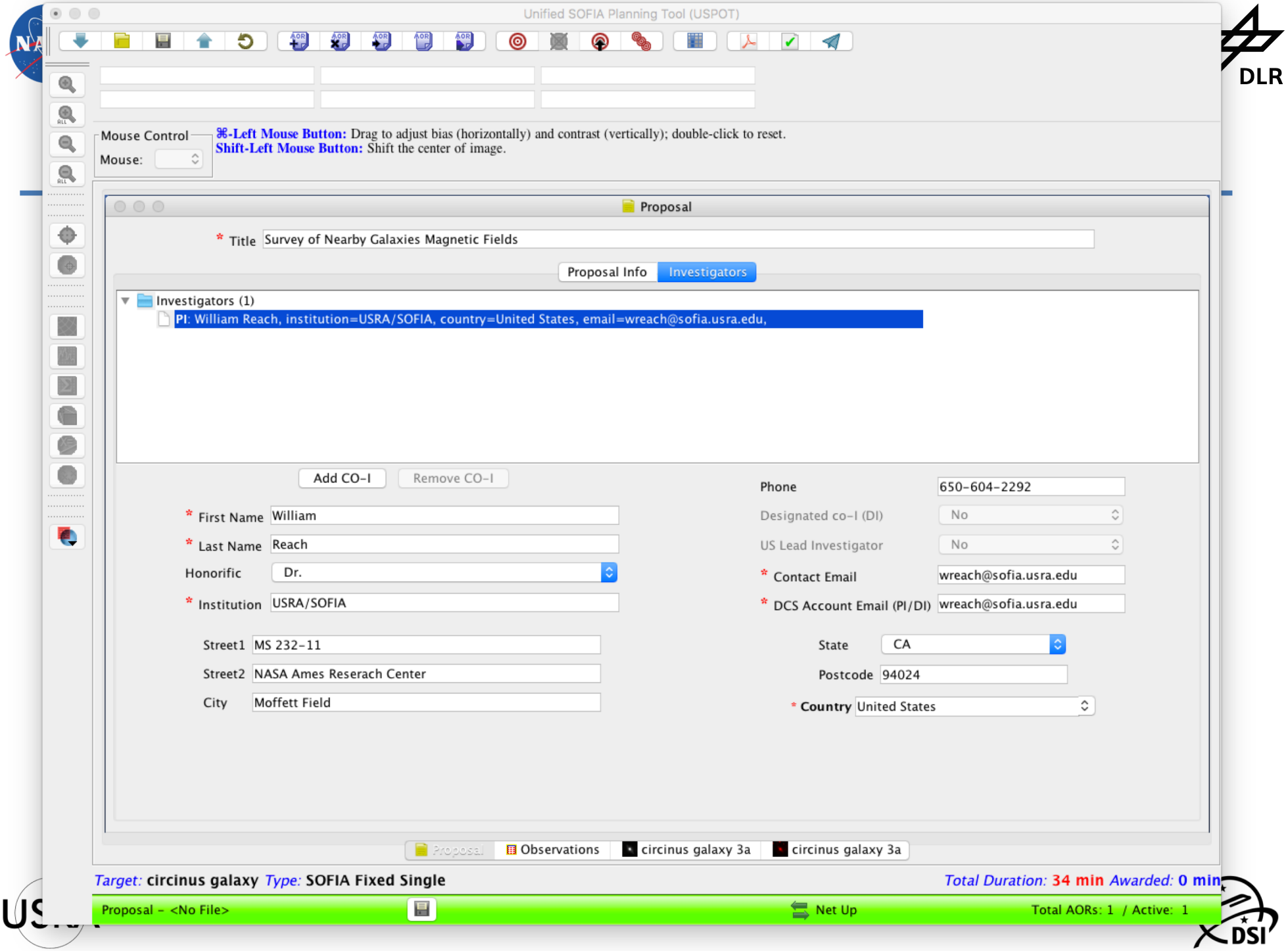
Filter name	HAW_C	
Band center	88.700	microns
Band width	17.200	microns
Source type	extended	
Total continuum flux	0.014	Janskys/sq arcsec
Elevation angle	40.0	degrees
Zenith water vapor	7.3	microns
Aircraft Altitude	41.0	microns
Total Integration Time	900	seconds

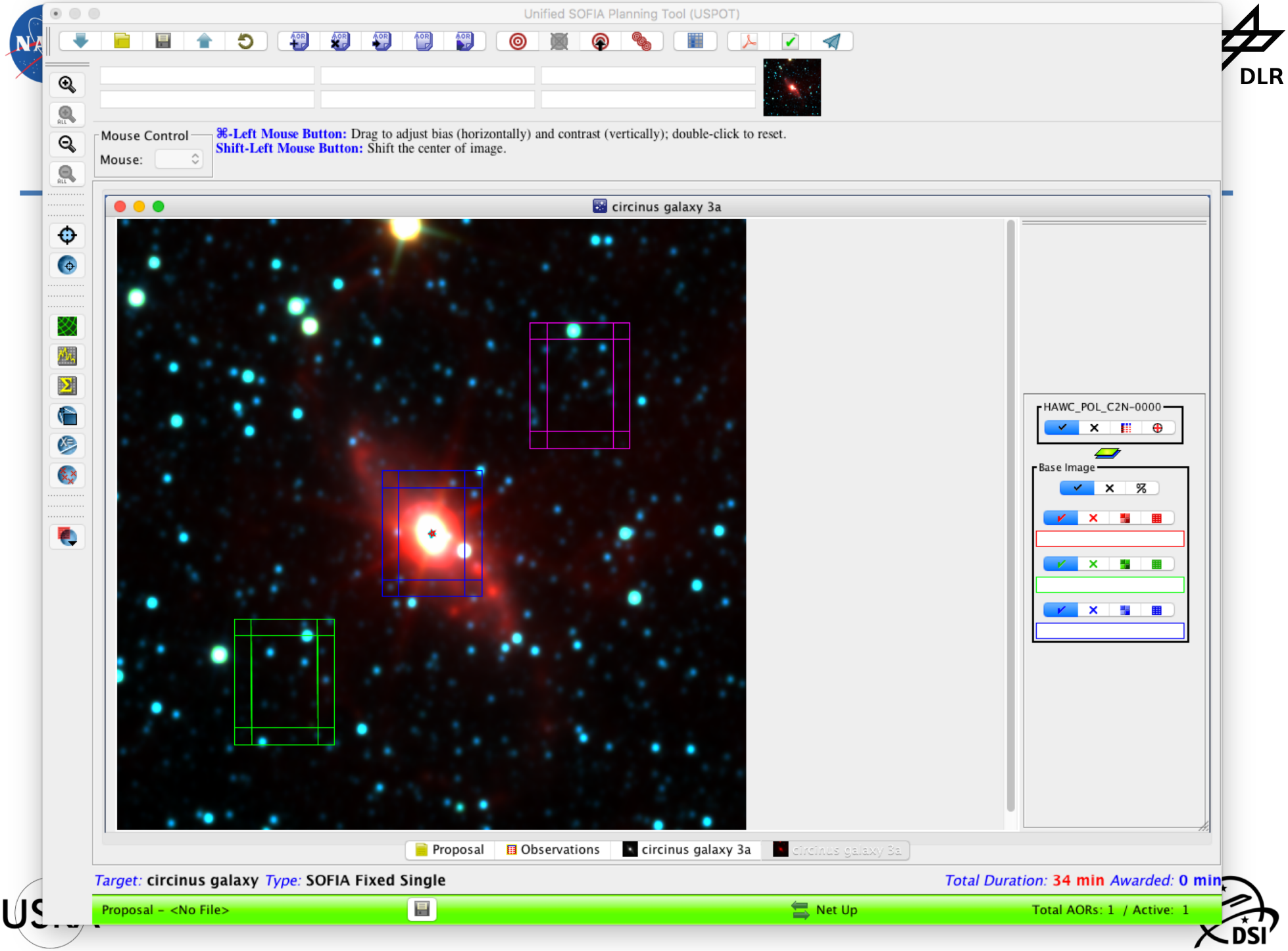
Instrument Parameters

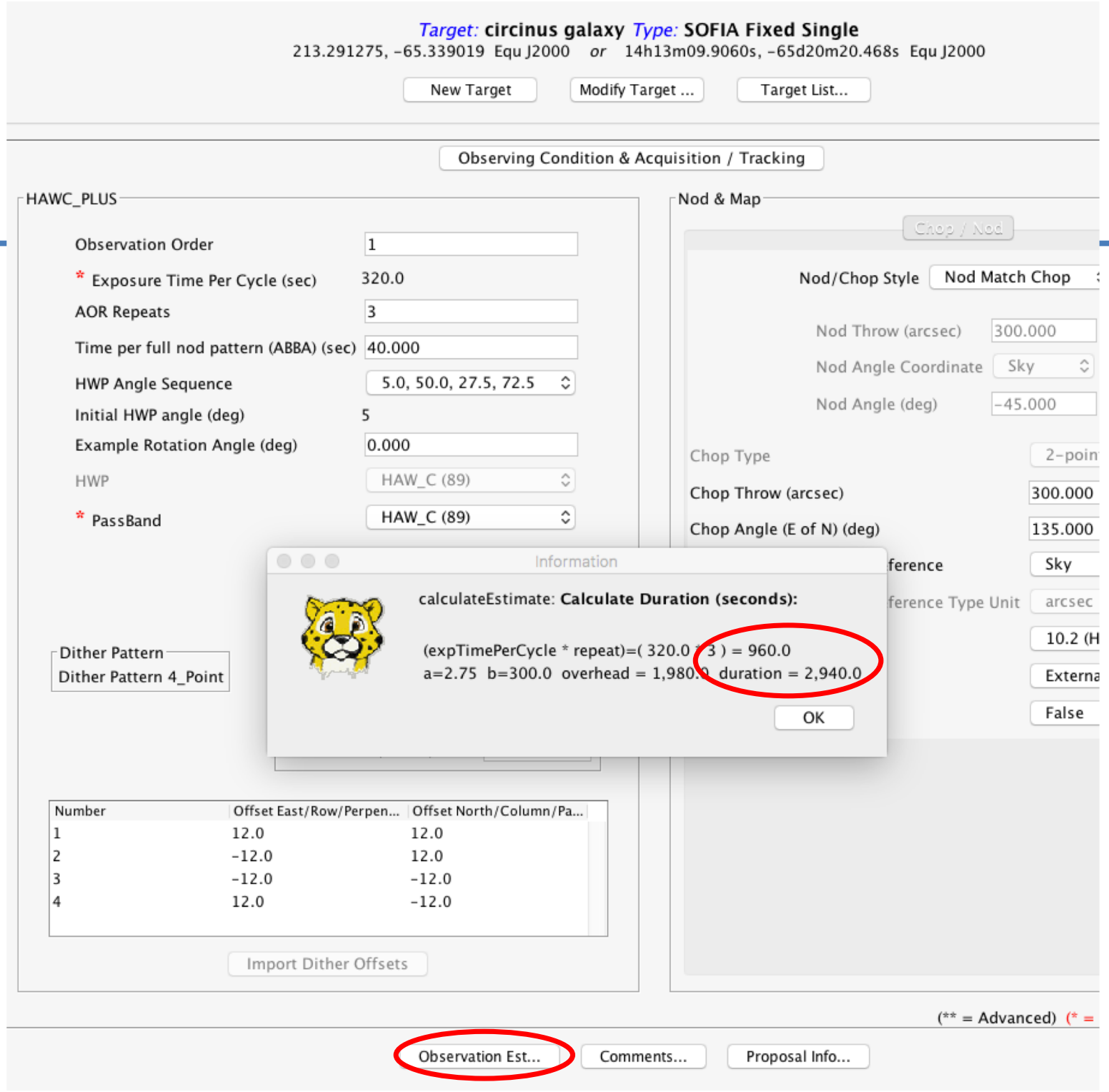
Instrument pixel size (X direction)	4.020	arcseconds
Instrument pixel size (Y direction)	4.020	arcseconds

Close Print Help


Unified SOFIA Planning Tool (USPOT)
Mouse Control
Mouse:
⌘-Left Mouse Button: Drag to adjust bias (horizontally) and contrast (vertically); double-click to reset.
Shift-Left Mouse Button: Shift the center of image.
Proposal
* Title Survey of Nearby Galaxies Magnetic Fields
Proposal Info
Investigators
* TAC Queue US
Category GALAXIES
Cycle ID OPEN CYCLE
* Science Keywords GALAXY DISKS
* Proposal PDF Attachment
* Queue Observation Yes
* Target of Opportunity No
* Impact Program No
* Survey Program No
EPO Program Participation Yes
* Proposal Abstract
Related Proposals
Status of Observations
Special Instructions
* Proposal Abstract
The goals of this program are to measure the geometry of the magnetic field and map the star formation rate in nearby galaxies. This program will explore field geometries determined from far-infrared dust polarization. By measuring the field this way, we trace the field in the star-forming bulk of the ISM. The magnetic field is usually oriented within the plane of a rotating disk galaxy, but was found to emerge from the center of the starburst galaxy M 82, entrained in the large-scale outflow. Observations will be made using HAWC+ at 89 or 160 um depending on surface brightness. The sample was selected to have surface brightness in excess of 200 mJy/pix in the HAWC+ 160 um band. Observations with FIFI-LS will be used to trace the [C II] emission, which is a common measure of the star formation rate for distant galaxies. By imaging [C II] in detail for nearby galaxies, we will establish more local truth to validate the accuracy of [C II] as a star formation tracer.
978/2000
Clear Text
Proposal
Observations
circinus galaxy 3a
circinus galaxy 3a
Target: circinus galaxy Type: SOFIA Fixed Single
Total Duration: 34 min Awarded: 0 min
Proposal - <No File>
Net Up
Total AORs: 1 / Active: 1


Unified SOFIA Planning Tool (USPOT)
Mouse Control
Mouse:
⌘-Left Mouse Button: Drag to adjust bias (horizontally) and contrast (vertically); double-click to reset.
Shift-Left Mouse Button: Shift the center of image.
Proposal
* Title Survey of Nearby Galaxies Magnetic Fields
Proposal Info
Investigators
Investigators (1)
PI: William Reach, institution=USRA/SOFIA, country=United States, email=wreach@sofia.usra.edu,
Add CO-I
Remove CO-I
* First Name William
* Last Name Reach
Honorific Dr.
* Institution USRA/SOFIA
Street1 MS 232-11
Street2 NASA Ames Reserach Center
City Moffett Field
Phone 650-604-2292
Designated co-I (DI) No
US Lead Investigator No
* Contact Email wreach@sofia.usra.edu
* DCS Account Email (PI/DI) wreach@sofia.usra.edu
State CA
Postcode 94024
* Country United States
Proposal
Observations
circinus galaxy 3a
circinus galaxy 3a
Target: circinus galaxy Type: SOFIA Fixed Single
Total Duration: 34 min Awarded: 0 min
Proposal - <No File>
Net Up
Total AORs: 1 / Active: 1


Unified SOFIA Planning Tool (USPOT)
Mouse Control
Mouse:
⌘-Left Mouse Button: Drag to adjust bias (horizontally) and contrast (vertically); double-click to reset.
Shift-Left Mouse Button: Shift the center of image.
circinus galaxy 3a
HAWC_POL_C2N-0000
Base Image
Proposal
Observations
circinus galaxy 3a
Target: circinus galaxy Type: SOFIA Fixed Single
Total Duration: 34 min Awarded: 0 min
Proposal - <No File>
Net Up
Total AORs: 1 / Active: 1


Target: circinus galaxy Type: SOFIA Fixed Single
213.291275, -65.339019 Equ J2000 or 14h13m09.9060s, -65d20m20.468s Equ J2000
New Target
Modify Target ...
Target List...
Observing Condition & Acquisition / Tracking
HAWC_PLUS
Observation Order
1
* Exposure Time Per Cycle (sec)
320.0
AOR Repeats
3
Time per full nod pattern (ABBA) (sec)
40.000
HWP Angle Sequence
5.0, 50.0, 27.5, 72.5
Initial HWP angle (deg)
5
Example Rotation Angle (deg)
0.000
HWP
HAW_C (89)
* PassBand
HAW_C (89)
Dither Pattern
Dither Pattern 4_Point
Nod & Map
Chop / Nod
Nod/Chop Style
Nod Match Chop
Nod Throw (arcsec)
300.000
Nod Angle Coordinate
Sky
Nod Angle (deg)
-45.000
Chop Type
Chop Throw (arcsec)
300.000
Chop Angle (E of N) (deg)
135.000
Sky
arcsec
False
Information
calculateEstimate: Calculate Duration (seconds):
(expTimePerCycle * repeat)=(320.0 * 3) = 960.0
a=2.75 b=300.0 overhead = 1,980.0 duration = 2,940.0
OK
Number
Offset East/Row/Perpen...
Offset North/Column/Pa...
1 12.0 12.0
2 -12.0 12.0
3 -12.0 -12.0
4 12.0 -12.0
Import Dither Offsets
(** = Advanced) (* =
Observation Est...
Comments...
Proposal Info...


NASA


DLR


USRA


DSI

CII spectroscopy with FIFI-LS

- Checking feasibility using source flux estimate
- For this proposal, we use a scaling between star formation rate surface density and CII: ***<CII/SFRSB>***
- Find the Star Formation Rate from Kingfish or other work: ***SFR*** = 5 Msun/yr for Circinus
- Divide SFR by square of galaxy size to get average ***<SFRSB>***= 0.18 Msun/yr/kpc^2
- Multiply ***<CII/SFRSB>*** and scale to FIFI-LS 12” pixels to find: ***<CII>***=7.8e-16 W/m2/pix

Web-based input form for FIFI-LS time estimator

This form can be used to estimate the integration time needed to reach a requested signal-to-noise for an input source flu

Submit Form

Input Parameters

Observatory Altitude (in feet; < 45000 ft): 41000 (•) ft ( ) m

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

Telescope elevation (between 20 and 60 deg): 40

Signal to Noise Ratio / Integration Time (minutes): 5 (•) SNR ( ) On-Source Int. Time

Wavelength (in microns, between 51 and 203): 157.741

Source Flux: 7.8e-16 (•) line (W/m^2) ( ) continuum (Jy)

Source Velocity (in km/s): 434

(•) **Input Observer Velocity** (VLSR in km/s): 0 - OR - ( ) **Enter UT Date:** 2016/07/08 **UT Time:** 12:00:0

Band width : 0 (•) km/s ( ) microns

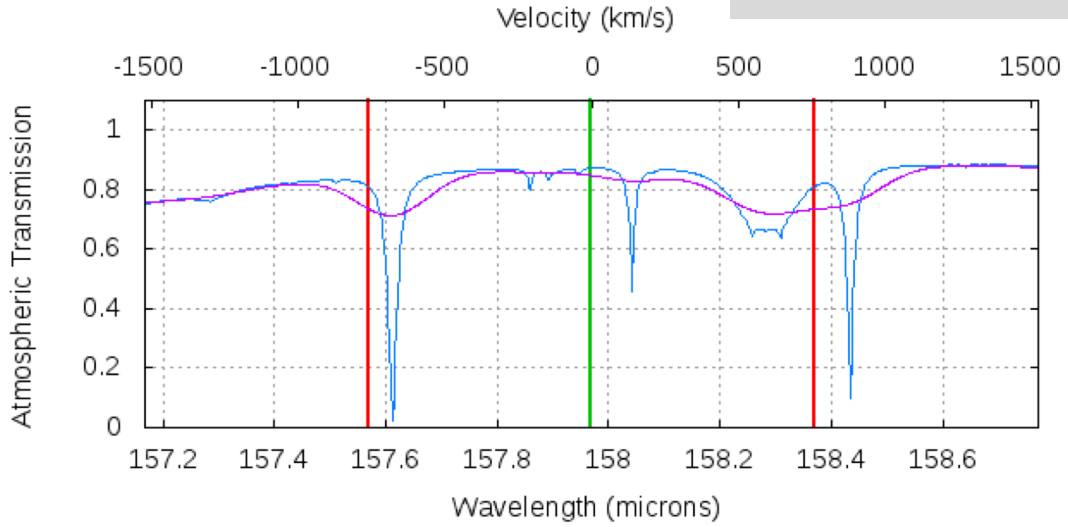
Comment :

Submit Form

V_LSR :		434 km/s
Velocity corrected wavelength :		157.969 microns
Plotted wavelength range :		157.167 - 158.771 microns
Interpolated values from data table:		
	Bandwidth =	0.802 microns
	MDLF =	2.084e-17 W/m^2
	MDCF =	0.571 Jy
Atmospheric Transmission :	0.848 (smoothed)	0.873 (unsmoothed)
Integration time (t_on):	0.023 (smoothed)	0.022 minutes (unsmoothed)

Look carefully to see what atmospheric lines are your target's predicted wavelength. It looks like we are clean for this one.

Plot of Atmospheric Transmi



The blue curve is the ATRAN model for the atmospheric transmission. Radiation from an astronomical source will be attenuated by the atmospheric transmission before detection by FIFI-LS.

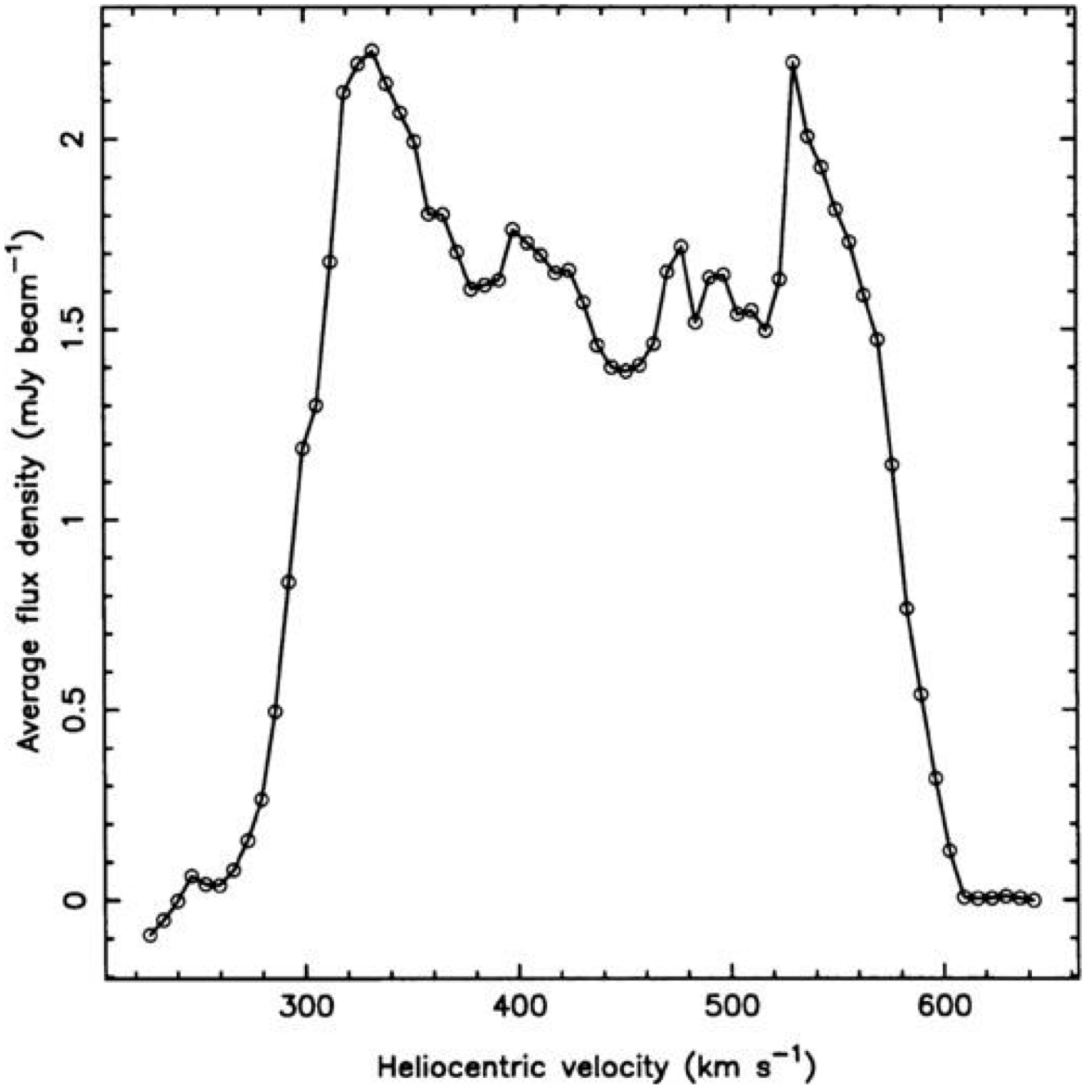
The purple curve is the transmission spectrum smoothed to the resolution of the instrument. The spectrum of a continuum source will appear similar to that of the purple curve.

The green line is the observing wavelength (rest wavelength plus Doppler correction).

The red lines depict the FIFI-LS instantaneous bandwidth or the user entered bandwidth, whichever is greater.

Software version 1.0.4 11 Aug 2017

21-cm line profile of Circinus

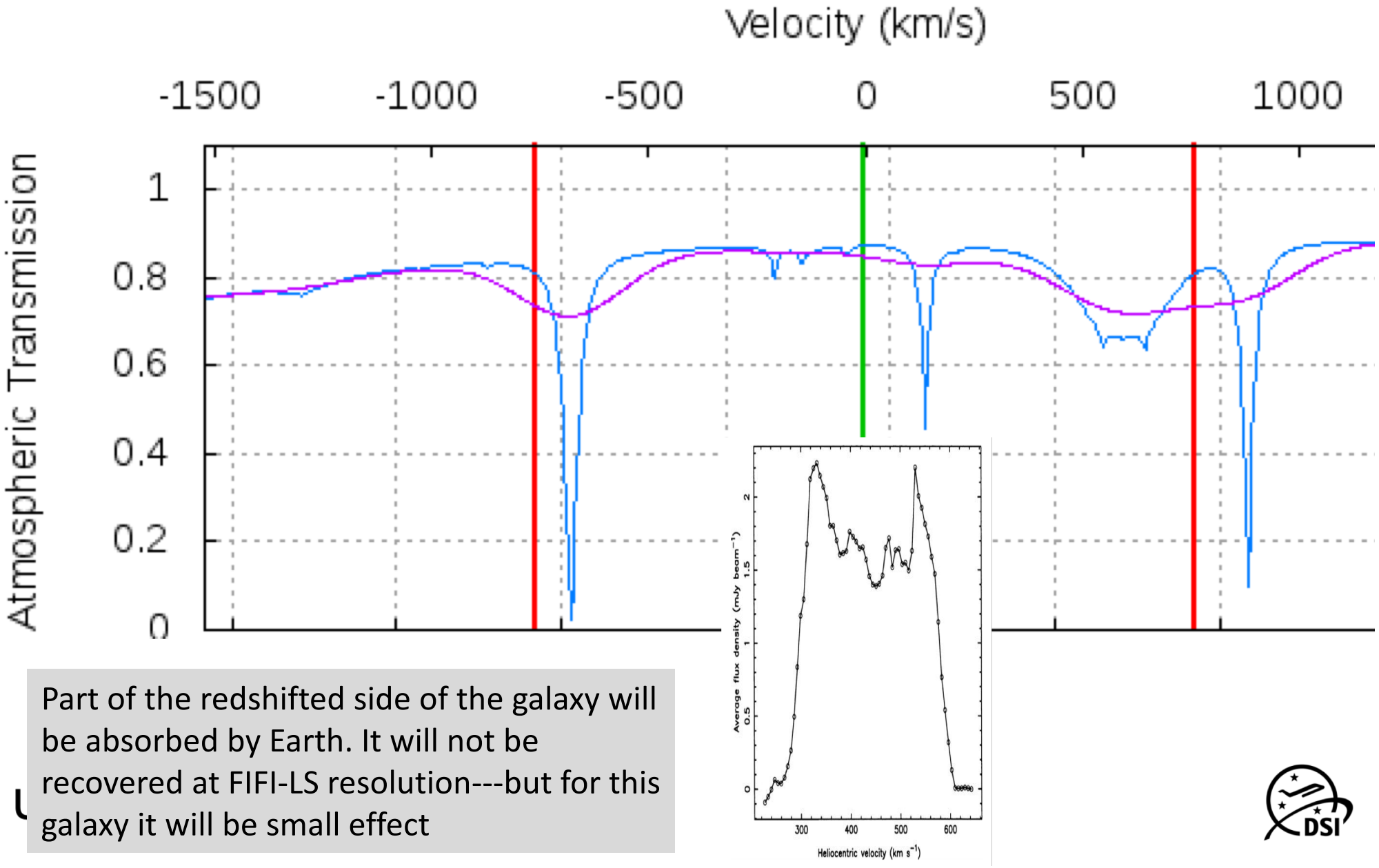


When possible, predict the line profile of your source and compare in detail to the telluric absorption

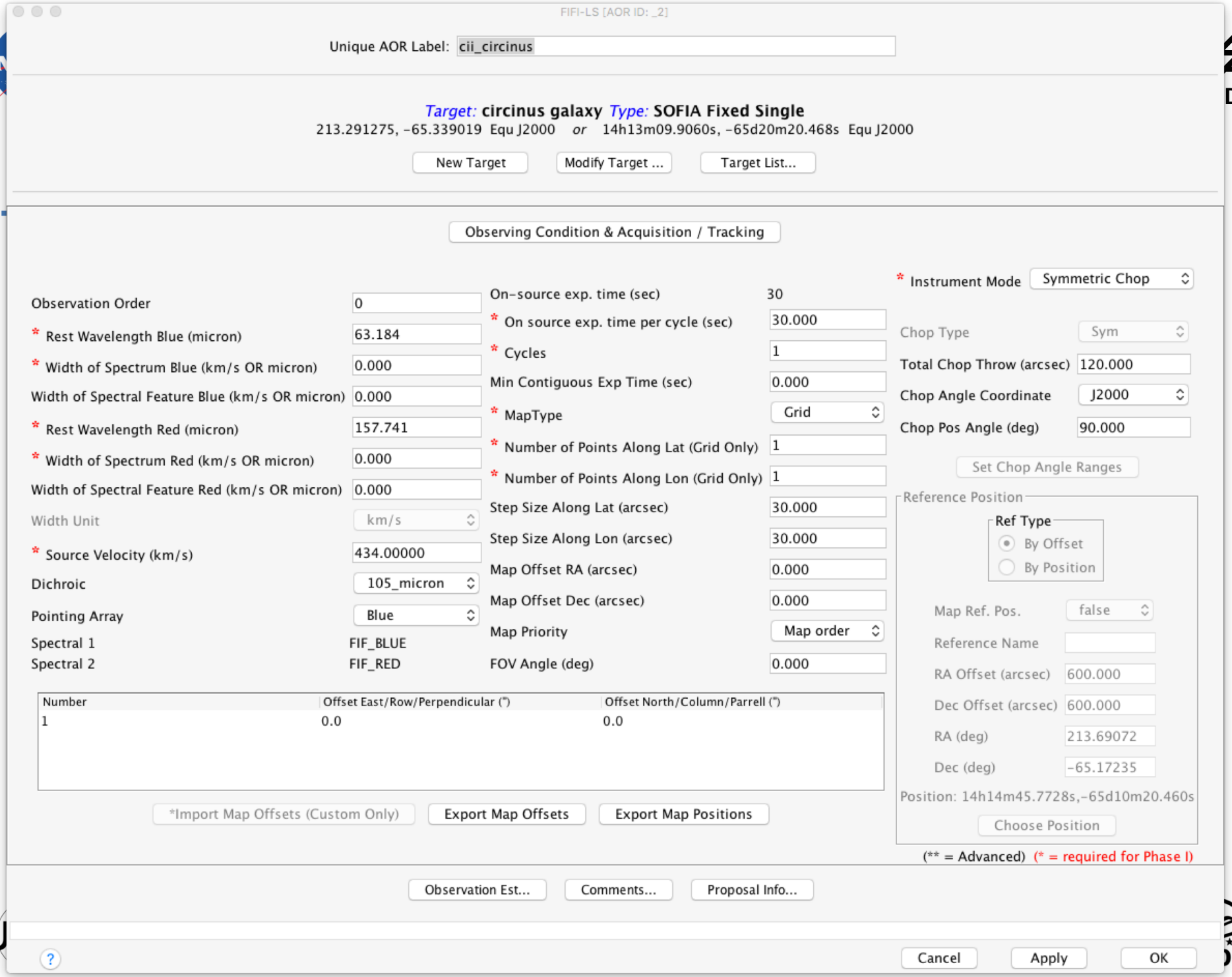
In this case, we assume the [C II] will be similar to HI 21-cm

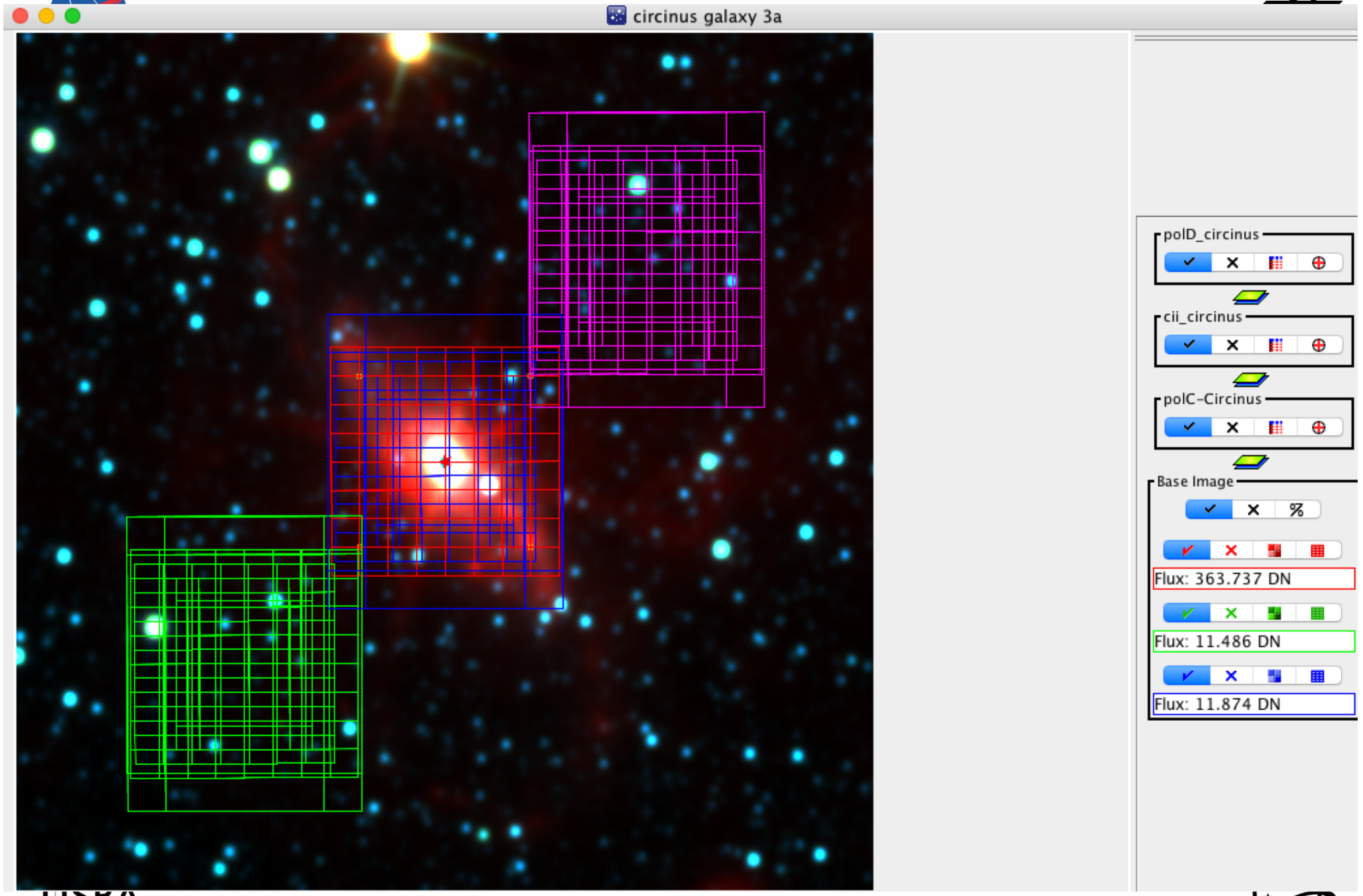
Jones et al 1999, MNRAS 302, 649

Compare Line Profile to Telluric

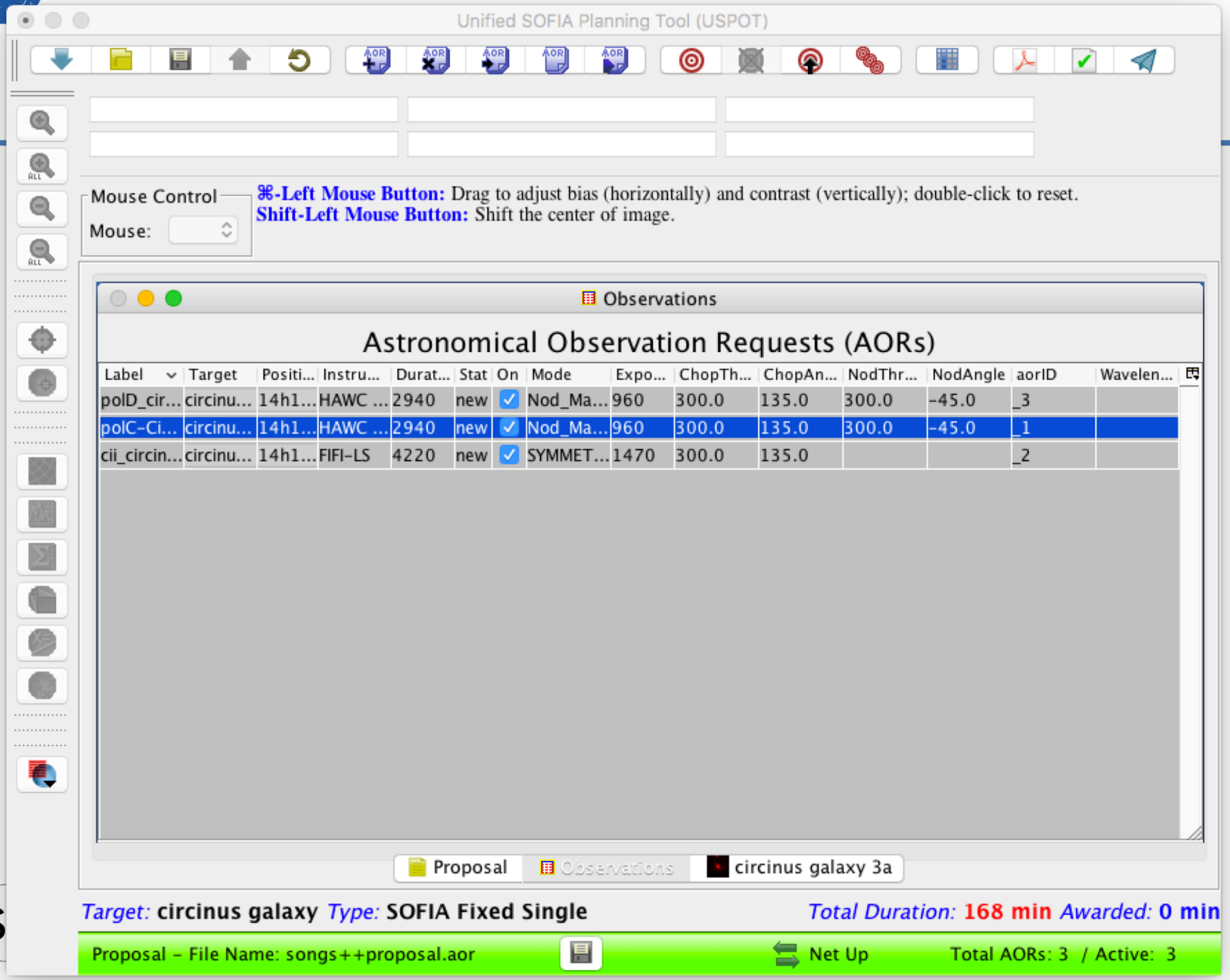


Part of the redshifted side of the galaxy will be absorbed by Earth. It will not be recovered at FIFI-LS resolution---but for this galaxy it will be small effect

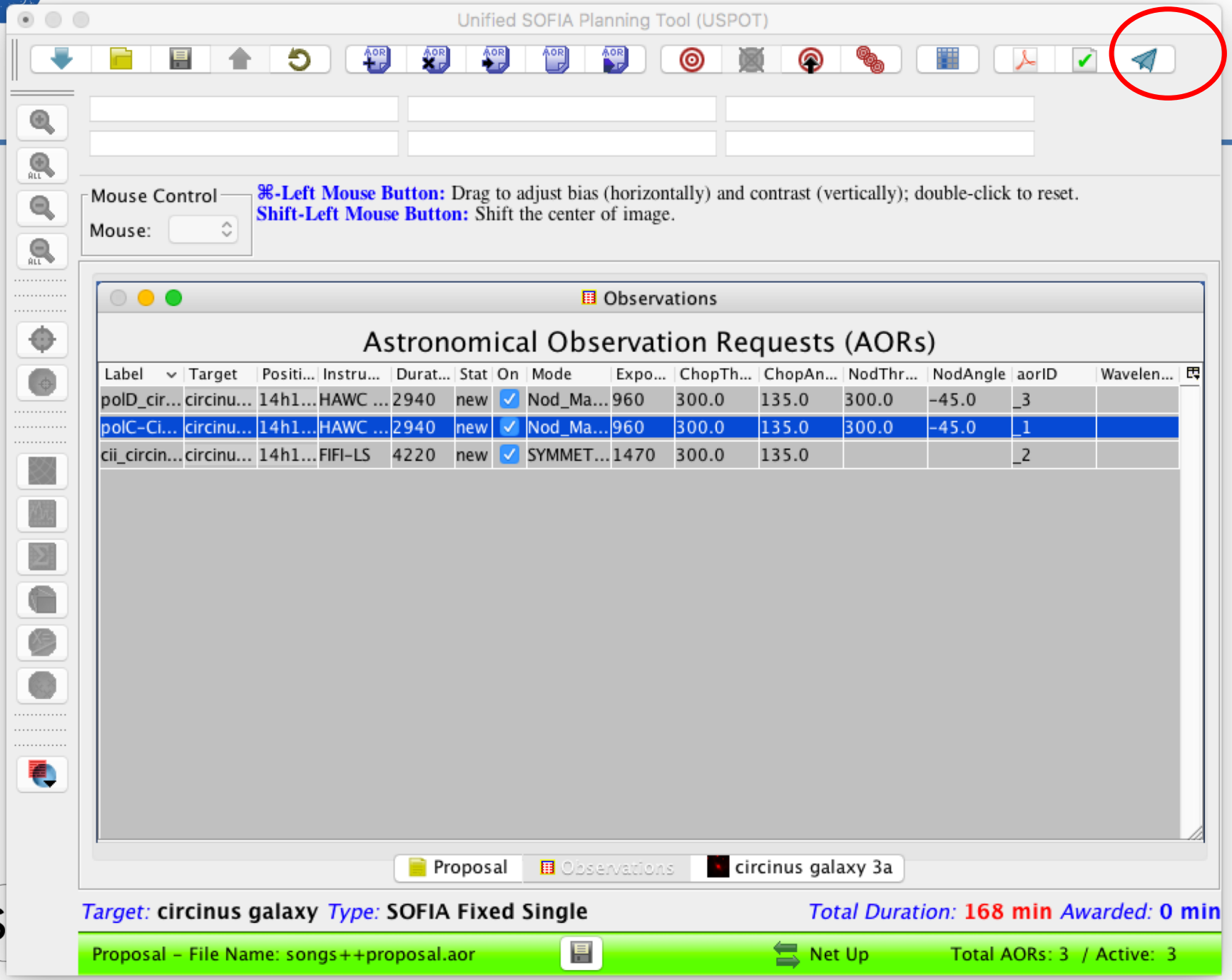

FIFI-LS [AOR ID: _2]
Unique AOR Label: cii_circinus
Target: circinus galaxy Type: SOFIA Fixed Single
213.291275, -65.339019 Equ J2000 or 14h13m09.9060s, -65d20m20.468s Equ J2000
New Target
Modify Target ...
Target List...
Observing Condition & Acquisition / Tracking
Observation Order 0
* Rest Wavelength 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) 434.00000
Dichroic 105_micron
Pointing Array Blue
Spectral 1 FIF_BLUE
Spectral 2 FIF_RED
On-source exp. time (sec) 30
* 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
Number
Offset East/Row/Perpendicular (")
Offset North/Column/Parrell (")
1 0.0 0.0
*Import Map Offsets (Custom Only)
Export Map Offsets
Export Map Positions
* 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) 213.69072
Dec (deg) -65.17235
Position: 14h14m45.7728s,-65d10m20.460s
Choose Position
(** = Advanced) (* = required for Phase I)
Observation Est...
Comments...
Proposal Info...
Cancel
Apply
OK


circinus galaxy 3a
polD_circinus
cii_circinus
polC-Circinus
Base Image
Flux: 363.737 DN
Flux: 11.486 DN
Flux: 11.874 DN

Final appearance of Uspot Observations



Submit the proposal and cross fingers



Updating your proposal

- Updating submissions is possible
  - In Uspot, File-> “Download from DCS”
  - Work on your Observations or the Scientific Justification
  - When you press “Submit” again, your proposal is resubmitted to the same PlanID (07_xxxx)
  - Saving your program to a file is recommended for safety

- After your proposal is accepted, update the AORs
  - Download the proposal using Uspot
  - Edit the AORs (work with your Support Scientist)
  - Upload the modified AORs (i.e. “Submit”)