JCMT Proposal Preparation

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Atmospheric Transparency and Instrument Coverages

` demáseao 
277 — 370 GHz

`ũũ
215 — 270.6 GHz
HARP
325 — 375 GHz
SCUBA-2 & POL-2 850 μm

SCUBA-2
450 μm
~660GHz

\[ \text{Tau 225} = 0.04 \text{PWV + 0.017} \]

http://www.submm.caltech.edu/cso/weather/atplot.shtml
Sky Opacity (\(\bar{\text{Åweoweo}} / \text{HARP}\))

- Band 5
- Bands 2–4
- Band 1

Compare \(^{12}\text{CO}\) to \(^{13}\text{CO}\)
Sky Opacity (‘Ū‘ū)

Then, how to apply for telescope time?
Overview

- **A good proposal:**
  What to consider scientifically & technically

- **Search archives** for existing data

- proposal submission: **Hedwig**

- Time needed for Proposal: **Integration Time Calculator (ITC)**

- Target Tools: **Clash Tool & Target Availability Tool**
Generate an Idea... 

Start early!

▸ Ideas may follow from current research, or detailed discussions with collaborators. This works best if one starts early.

▸ Search archives and literature for existing data that can address the scientific question partially or completely, or can complement the requested data. start early.

▸ Iteration between scientific goals and telescope capabilities will gradually improve the idea. Again, start early!
CADC - JCMT Archive

Project ID

Target

Frequency

1 year after the end of the semester data are taken in, they become publically available at CADC. (e.g., *20B* data are available as of ~ Feb 2022)
A Quick Query and Data Reduction Are Helpful for Your Proposal

Links:

› A guide to the JCMT Science Archive
› Full list of columns

Tips:

› Search: filter `update & sequence_no.` to find unique data scans
› Download: get raw data (to get more accurate info)
› Reduce: Use script to quickly reduce data (see Tutorials)

A script example:

```bash
#!/bin/bash
ls a*0001.sdf >> list.lis
mkdir reduced
oracdr_acsis
export ORAC_DATA_IN=$(pwd)
export ORAC_DATA_OUT=$(pwd)/reduced
oracdr -loop file -file $ORAC_DATA_IN/list.lis -nodisplay -log sf -verbose
```
Outline of a Proposal

A straightforward title
abstract

Scientific Justification

1. **Context** – why is this subject important or interesting
2. **Question** – The specific problem you are addressing
3. **Research** – How will you address the problem with these observations
4. **Details** – Sources, observing plan, data reduction plan etc.

Technical Justification – simple and concise
TIPS (1)

- **TAC** (Time Allocation Committee):
  1. not all experts in all fields
  2. ~15 minutes for each proposal
  3. they are looking for reasons to reject your proposal

- Get an colleague/friend to read your draft

- 1 publication for every ~15 hours of observing time
TIPS (2)

▶ Be specific (use numbers instead of vague statements)
▶ Avoid too much information
▶ Figures that clearly reveal the underlying concepts
▶ Use Itemized lists and **boldface** to emphasize your key statements

focus on your **SCIENCE** & avoid small mistakes!
TECHNICAL DETAILS & REFERENCES

We request the same observational setup as for our previous data, namely jiggle mapping of a source less than 2.3' in diameter (see Fig. 1) at 450 µm and 850 µm simultaneously. This requires a 64-point jiggle pattern. Based on extrapolations of thermal flux to these two wavelengths (see Gear 1988), we were granted 3 hours of observing time during semester 96B in order to detect the thermal continuum emission in NGC 1275. Note that by thermal, we mean the emission which is spatially extended beyond the central pixel in which the variable AGN supplies a contribution to the total flux. Although we were awarded 3 hours, only 0.7 hours were actually carried out. Nevertheless we clearly detected emission at both wavelengths, as Figures 2 and 3 show (note that the data in Figures 2 and 3 have been calibrated to Jy/beam, although the headers say ‘Volts’!). As we are particularly interested in the extended emission and spatial correlations of the extended emission with other tracers, the S/N away from the central peak is relevant. Here we see structure at the 3 - 4 σ level, where σ_{850} ~ 8 mJy/beam and σ_{450} ~ 100 mJy/beam. These may be real detections, but the SCUBA beam itself may have structure at this level. Thus, longer integrations with higher S/N are required to determine structure in the extended emission. Independent observations will also help, since non-real structure should rotate with respect to the sky and real structure should remain.

We would like to obtain a minimum S/N of ~ 7/1. Based on our existing data of 0.7 hour integration, this would require a total on-source integration of 2.8 hours. A similar integration time is given by the SCUBA WWW-based Integration Time Calculator, to reach an rms of 20 mJy at 450 µm. With overheads of 80% (30% for mapping overheads, and 50% for calibration overheads, as suggested on the SCUBA WWW page), our total time request is 5 hours. This is longer than the 3 hours which we were originally allotted, but is now based on real data at the observing frequencies, rather than extrapolations.
TOOLS

- Proposal submission: Hedwig
- Time needed for Proposal: Integration Time Calculator (ITC)
- Target Tools: Clash Tool & Target Availability Tool

The Hedwig Proposal Management System was created by Dr. Graham Bell, EAO / JCMT.

https://proposals.eaobservatory.org/
Hedwig - JCMT Proposal Preparation

Calls for Proposals

The following regular calls for proposals are open:

- 22B
- 22A
  - Independently Funded Programs

Other calls for proposals
Previous calls for proposals

Calculators

- SCUBA-2 ITC
  - Time required for target RMS
  - RMS expected in given time
- Heterodyne ITC
  - Time required for target RMS
  - RMS expected in elapsed time
  - RMS for integration time per point

Target Tools

- Clash Tool
- Target Availability

Access Open Calls for Proposals here
Access ITCs for SCUBA-2 & heterodyne instruments
Access Clash & Target Availability Tools

Every page has a manual!
JCMT Proposal Queues

- **PI queue**
  every 6 months for “normal sized” projects
  \( \leq 200 \) h, but typically \(~ 3 - 50\) hours
  deadline of **A** semester: mid-Sep;  (observing 02/03 – 08/01)
  deadline of **B** semester: mid-Mar;  (observing 08/02 – 02/02)

- **Large Program Queue**
  \( > 200 \) h, multiple semesters
  Open Enrollment - any JCMT astronomer may join any *new* program

- **Urgent queue**
  always open for submissions
  Typically \(~ 2 - 12\) hours
Access ITCs for SCUBA-2 & heterodyne instruments

https://proposals.eaobservatory.org/
ITC has built-in weather / instrument information

### Heterodyne ITC

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elapsed time</td>
<td>2.423 hours (2:25:21)</td>
</tr>
<tr>
<td>Integration time</td>
<td>565.737 seconds per point</td>
</tr>
<tr>
<td>Receiver temperature</td>
<td>59.959 K</td>
</tr>
<tr>
<td>System temperature</td>
<td>141.208 K</td>
</tr>
<tr>
<td>Opacity</td>
<td>0.101</td>
</tr>
<tr>
<td>Zenith angle</td>
<td>32.353 degrees</td>
</tr>
<tr>
<td>IF frequency</td>
<td>6.000 GHz</td>
</tr>
<tr>
<td>LO frequency</td>
<td>236.538 GHz (LSB)</td>
</tr>
<tr>
<td>Rest frequency</td>
<td>230.538 GHz</td>
</tr>
<tr>
<td>Rest frequency resolution</td>
<td>0.384 MHz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Band</th>
<th>Representative</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.648 hours</td>
<td>1.710 – 2.118</td>
</tr>
<tr>
<td>2</td>
<td>1.907 hours</td>
<td>2.118 – 2.757</td>
</tr>
<tr>
<td>3</td>
<td>2.423 hours</td>
<td>2.757 – 4.422</td>
</tr>
<tr>
<td>4</td>
<td>3.520 hours</td>
<td>4,422 …</td>
</tr>
<tr>
<td>5</td>
<td>5.772 hours</td>
<td></td>
</tr>
</tbody>
</table>

### SCUBA-2 ITC

<table>
<thead>
<tr>
<th>Parameter</th>
<th>850 μm</th>
<th>450 μm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observing time</td>
<td>1.265 hours (1:15:54)</td>
<td></td>
</tr>
<tr>
<td>Time on source</td>
<td>1.215 hours (1:12:54)</td>
<td></td>
</tr>
<tr>
<td>Sensitivity at 450 μm</td>
<td>25.757 mJy/beam</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>850 μm</td>
<td>450 μm</td>
</tr>
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<thead>
<tr>
<th>Band</th>
<th>Representative</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.978 hours</td>
<td>1.043 – 1.556</td>
</tr>
<tr>
<td>2</td>
<td>1.265 hours</td>
<td>1.043 – 1.556</td>
</tr>
<tr>
<td>3</td>
<td>1.995 hours</td>
<td>1.556 – 2.575</td>
</tr>
<tr>
<td>4</td>
<td>4.239 hours</td>
<td>2.575 – 6.837</td>
</tr>
<tr>
<td>5</td>
<td>12.329 hours</td>
<td>6.837 …</td>
</tr>
</tbody>
</table>

Link to this calculation

same sensitivity!
Weather is varying year-to-year!
Hedwig – JCMT Proposal Preparation

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Target Tools

- Clash Tool
- Target Availability

Access Clash & Target Availability Tools

https://proposals.eaobservatory.org/
Clash Tool

Input

Target name: Optional
RA / Longitude: 00:00:00
Dec / Latitude: 00:00:00
System: ICRS
Search radius: 30

Upload a target list
View all defined areas of sky coverage

Output

Matches

Matches were found for the following targets.

Please investigate each match and add a note to your proposal to explain why you still wish to observe a target. Each match is linked to the name of a match for more information on how the corresponding coverage area is defined.

- m31

Matches were found in the following defined areas of sky coverage:

- Existing HARP observations
- Existing SCUBA-2 observations
- Large Program M17BL005: HASHTAG

Search archive at 00:42:44.35 +41:16:08.6

Link to this query

Input

Target name: m31
RA / Longitude: 00:42:44.35
Dec / Latitude: 41:16:08.6
System: ICRS
Search radius: 30

Upload a target list
View all defined areas of sky coverage

https://proposals.eaobservatory.org/jcmt/tool/clash
Target Availability

PI proposals

A semester: 02/01 – 07/31
proposal deadline: mid September

B semester: 08/02 – 01/31
proposal deadline: mid March
Tips on using Hedwig

▸ Prepare in advance!

▸ Follow proposal format rules

▸ Proposals can be repeatedly submitted up to the deadline – No need to leave proposal submission until last few minutes!

▸ Read the manuals

Questions are welcome on Helpdesk or Slack!

(helpdesk@eaobservatory.org)
Further Reading

- The Beginners Guide To JCMT Projects
- Writing a Good Proposal (Ciska Kemper)
- How to Write a Good Proposal (Geoffrey Bower)
- “Do’s & Don’ts” for JCMT Users

Questions are welcome on Helpdesk or Slack!
helpdesk@eaobservatory.org