

NRAO



National Radio Astronomy Observatory



Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array



Preparing for ALMA

<http://science.nrao.edu/alma>



National Radio Astronomy Observatory

North America ALMA Science Center

Charlottesville, Virginia U.S.

Atacama Large Millimeter/submillimeter Array

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Preparing for ALMA: User Tools



Anthony J. Remijan

North America ALMA Science Center



Atacama Large Millimeter/submillimeter Array
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Points to Take Home:

User tools include:

- User Portal
- ALMA Observing Tool
- Project Tracker
- Helpdesk
- Common Astronomical Software Applications (CASA)
 - ALMA simulator
- Splatalogue

The ARCs will provide full support for all user tools through an integrated helpdesk.

I'm already lost...where do I start???



Start with the User Portal:

- Register with User Portal (single sign-on):
 - Helpdesk, Project Tracker, ALMA Science Archive

The screenshot shows the ALMA User Portal website. The top navigation bar includes links for Home, About NRAO, Science, Research Facilities (highlighted), Observing, and Opportunities. Below this is a secondary bar with links for ALMA/NAASC, EVLA, GB, VLBA, and NTC. The main content area is titled 'Research Facilities > ALMA/NAASC > About ALMA/NAASC'. On the left is a sidebar menu with links: About ALMA, Early Science, HelpDesk, Proposal Preparation (Phase I), Observing Preparation (Phase II), Post-Observation: Data Processing, Schedules, Software & Tools, Data Archive, Financial Support, Scientific Visitor Info, People, Publications, and ALMA Project Status. The main content area features a section titled 'ALMA: An Overview' with a large image of the ALMA antennas. Below the image is a paragraph describing the ALMA site and its capabilities. On the right side of the main content area, there are two boxes: 'Events' with links for 'Preparing for ALMA' and 'NRAO Proposal Deadline', and 'Latest News' with links for 'ALMA Attains Phase Closure', 'ALMA Construction Update', and 'New Astrochemistry Center'.

Home About NRAO Science **Research Facilities** Observing Opportunities


ALMA/NAASC EVLA GB VLBA NTC

Research Facilities > ALMA/NAASC > About ALMA/NAASC

About ALMA

- Early Science
- HelpDesk
- Proposal Preparation (Phase I)
- Observing Preparation (Phase II)
- Post-Observation: Data Processing
- Schedules
- Software & Tools
- Data Archive
- Financial Support
- Scientific Visitor Info
- People
- Publications
- ALMA Project Status

ALMA: An Overview



The Atacama Large Millimeter Array (ALMA) is comprised of 66 high-precision antennae, and is located on the Chajnantor plain of the Chilean Andes. The ALMA site offers the exceptionally dry and clear sky required to operate at millimeter and submillimeter wavelength. The quality of the observing site, combined with the unprecedented combination of sensitivity, angular resolution, spectral resolution and image fidelity made possible with ALMA, will enable astronomers to carry out transformational research in a wide variety of astronomical areas. The wavelengths covered by ALMA range from 0.3 mm to 3.6 mm (frequency coverage of 84 GHz to 950 GHz) - this range is essential for probing the first stars and galaxies, directly imaging the disks in which planets are formed, and probing the energy output from active supermassive black holes in extremely luminous starburst galaxies. The specific **level one science goals** are:

- The ability to detect spectral line emission from CO or C₂ in a normal

Events

- Preparing for ALMA**
May 24, 2010 | 6:00 PM
AAS in Miami, FL
- NRAO Proposal Deadline**
Jun 1, 2010 | 5:00 PM

Latest News

- ALMA Attains Phase Closure**
- ALMA Construction Update
- New Astrochemistry Center

So far so good...now I want to write a proposal...?

Download the ALMA Observing tool:

ALMA



REAL - High Resolution Astrochemistry in the Hot Corino IRAS 16293-2422 (0) - Observing Tool for Chajnantor, version [UT7.1p3]

File Edit Tool Search Options Help Perspective 1

Project Structure

- REAL - High Resolution Astrochemistry in the Hot Corino IRAS
 - Proposal
 - Planned Observing
 - Science Goal ()
 - Description
 - Field Setup
 - Calibration Setup Parameters
 - Spectral Setup**
 - Control and Performance Parameters

Editors

You can setup spectral elements (windows) to be observed.
Up to 4 can be observed at the highest frequency resolution depending on the bandwidths you specify.
If you want to setup more than 4, you need to arrange them into 4 or fewer sets of spectral elements/windows.
Those sets are called "Basebands", and the width of a baseband is 2GHz.

Spectral Type

☒ Up to 4 spectral elements/windows
☐ More than 4 spectral elements/windows
☐ Single continuum (average frequency)
☐ Spectral scan

Spectral Type: Choose the type of spectral observation you wish to make

Polarization Products desired

☐ SINGLE_X ☐ SINGLE_Y ☒ DOUBLE ☐ FULL

Up to 4 spectral elements/windows

Center Freq Rest	Center Freq Sky	Transition	Bandwidth, Resolution	Continuum
248.00000 GHz	247.99669 GHz		2000MHz, 488.28KHz (0.591 km/s)	<input type="checkbox"/>
249.80000 GHz	249.79667 GHz		2000MHz, 488.28KHz (0.586 km/s)	<input type="checkbox"/>
232.00000 GHz	231.99690 GHz		2000MHz, 488.28KHz (0.631 km/s)	<input type="checkbox"/>
233.80000 GHz	233.79688 GHz		2000MHz, 488.28KHz (0.627 km/s)	<input type="checkbox"/>

Select Lines Add Delete

Spectral Spatial Forms Catalog

Feedback

Description	Suggestion	Resource
-------------	------------	----------

Problems Information Log

Overview

Contextual Help

- Please ensure you and your co-Is are registered with the [ALMA user portal](#)
- Create a new proposal by
 - Selecting **File > New Proposal**
 - Click on the icon in the toolbar
 - Or click on this [link](#)
- Click on the proposal tree node and

Phase I: Science Proposal

New Science Proposal → Create Science Goals → Validate Science Proposal → Submit Science Proposal

Phase II: Observing Program

Retrieve Science Proposal → Configure System Setup → Validate Observing Program → Submit Observing Program

Click on the overview steps to view the contextual help

Importing And Need More

ALMA Observing Tool:



Editors

Target: M81

Source Name: M81 [Resolve]

Choose a Solar System Object? ☐ Name of object: Mercury

Source Coordinates: System: J2000 Sexagesimal display? ☒
RA: 09:55:33.173
Dec: 69:03:55.061

Proper Motion RA: 0.00000 mas/yr
Proper Motion Dec: 0.00000 mas/yr

Source Velocity: -42.0 km/s hel OPTICAL z (optical) -0.000140

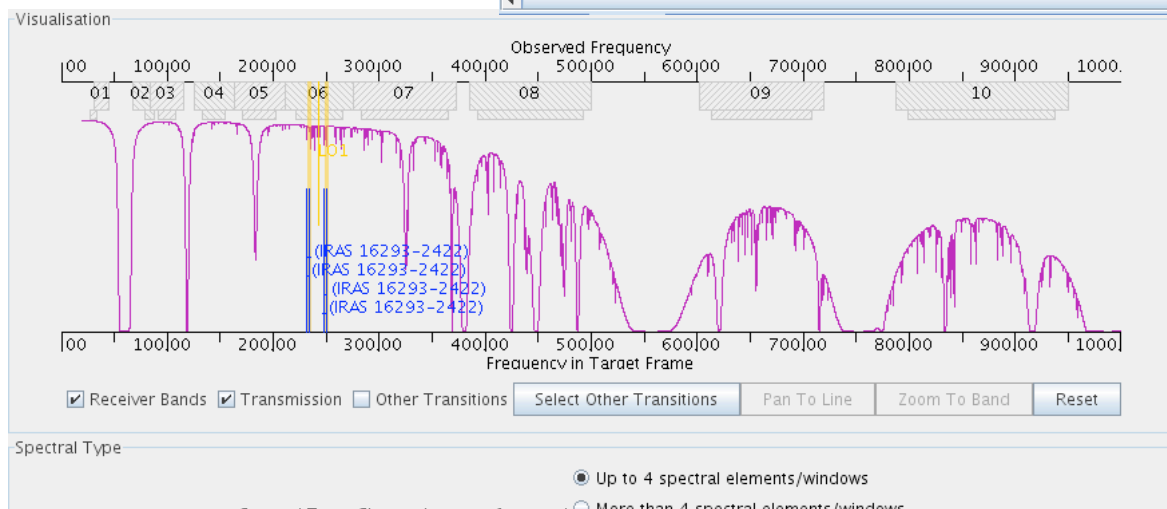
Parallax: 0.00000 mas

Target Type: ☐ Single Point Field ☒ 1 rectangular field

Field Center Coordinates: Coords Type: ☐ ABSOLUTE ☒ RELATIVE
Offset[RA]: 0.00000 arcsec
Offset[Dec]: 0.00000 arcsec

Rectangle:

Frequency used: 80.00000 GHz [Refresh]



First “public preview” will be available July 20th

What's happening with my project?



The ALMA Project Tracker:

ALMA Project Tracker

Project search | Sched Block search

Project search

PI Name
Project Name
Project ID
Percent completed

Project state history

☐ Approved
☐ Broken
☐ Canceled
☐ FullyObserved
☐ ObservingTimedOut
☐ PartiallyObserved
☐ Phase2Submitted
☐ Processed
☐ Ready
☐ Repaired
☐ Verified

In the last
From time
To time
Predefined queries

Results per page 10 Search Reset

ALMA Project Tracker

Project search | Sched Block search

Project Code	PI Name	Name	Progress	State	Priority	Time of Creation	Timed Out
uid://X58/X134/X27	Thomas Powers I	OPT 1 - 6 bright polar stars		Phase2Submitted 1		2008-03-07 15:43:18	
uid://X58/X68/X263	Thomas Powers II	OPT 2 - 6 bright polar stars		Phase2Submitted 2		2008-03-07 15:43:18	
uid://X58/X268/X291	Thomas Powers III	OPT 3 - 6 bright polar stars		Phase2Submitted 3		2008-03-07 15:43:18	
uid://X58/Xef/X99	R Kurowski	Galaxies Test project		Phase2Submitted 0			
uid://X58/X17a/X2e5	Wikland T., Combes F.	Spectral line survey in high-z molecular absorption systems		Phase2Submitted 0			

Refresh

Spectral line survey in high-z molecular absorption systems

Observing Program

- 1325-43-SFI
 - 1325-43-B6/1
 - 1325-43-B6/2
 - 1325-43-B3/1
 - 1325-43-B3/2
 - 1325-43-B7/1
 - 1325-43-B9/1
- PKS1830-211-SFI
 - PKS1830-211 - B6/1
 - PKS1830-211 - B6/2
 - PKS1830-211 - B3/1
 - PKS1830-211 - B3/2
 - PKS1830-211 - B7/1
 - PKS1830-211 - B9/1
- PKS1413+135-SFI
 - PKS1413+135 - B6/1
 - PKS1413+135 - B6/2

Project

Name: Spectral line survey in high-z molecular absorption systems

Code

PI name: Wikland T., Combes F.

Creation date

Priority: 0

Id: uid://X58/X17a/X2e5

Project status

State: Phase2Submitted

Status Entity Id: uid://X302/X323/X0

Ready time

Start time

End time

Last update time

Program status

Seconds observed	Unit sets completed	Unit sets failed	SBs completed	SBs failed

1 / 2 [1 - 20 / 22]



Great...where do I get the data?

ALMA



ASA Portal Project Overview

ALMA SCIENCE ARCHIVE

site map accessibility contact us

015750AA000
122000111F3
55001100100

Search Site search Andreas Wicenc log out

- Home
- Science Archive
- Science data query
- Project Overview**
- Sourcecatalogue
- Spectral Lines
- USNO-A2 Catalog
- UCAC2 Catalog
- DSS query
- DRSP query form
- Project Tracker
- XML Store
- Bulk Store
- Monitor/Logging Store
- News
- Events
- Users
- Services
- Archive admin

Project Overview

Project overview form

The project overview form allows retrieval of a table of project related information based on a few simple query parameters. All parameters are case in-sensitive and treated substring searches. That means that if you enter a string like 'Bill' in the PI Name field the query will actually search for '%BILL%' in the database. The same holds also for the creation date field. Entering '2009-12' will show all projects created during December 2009. Leaving all fields empty will show a summary table of all projects.

PI Name	<input type="text"/>	Enter the PI name or a substring.
Date-time of Creation	<input type="text"/>	Format: YYYY-MM-DDThh24:MI:SS Substrings are allowed
Project Name	<input type="text"/>	Enter the project name or a substring
Manual Mode	<input type="text" value="Both"/>	Select constraint

submit

All content copyright © ALMA observatory. Feb 26, 2010 01:24 PM

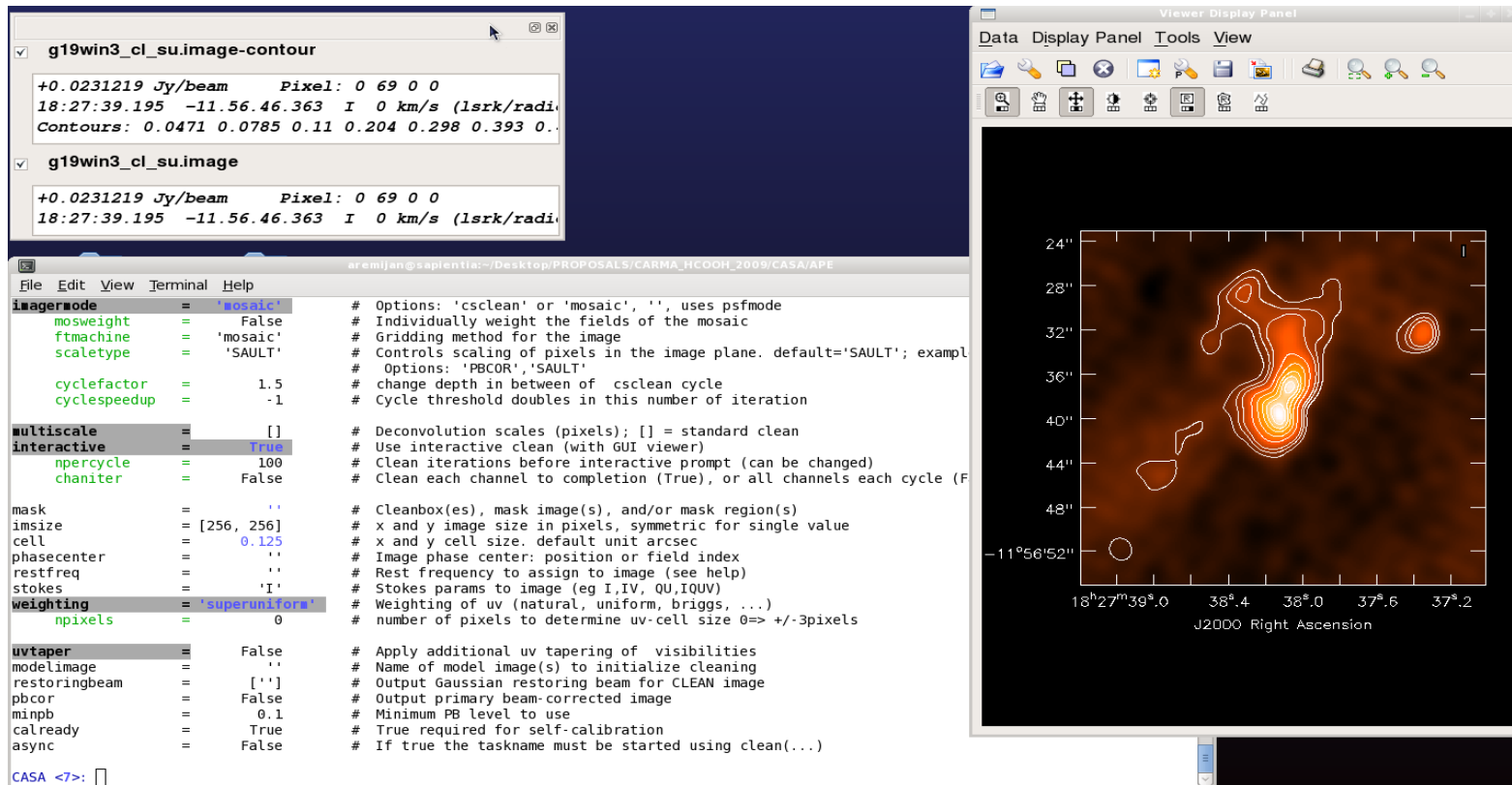


I got my data...now what?

What is CASA?



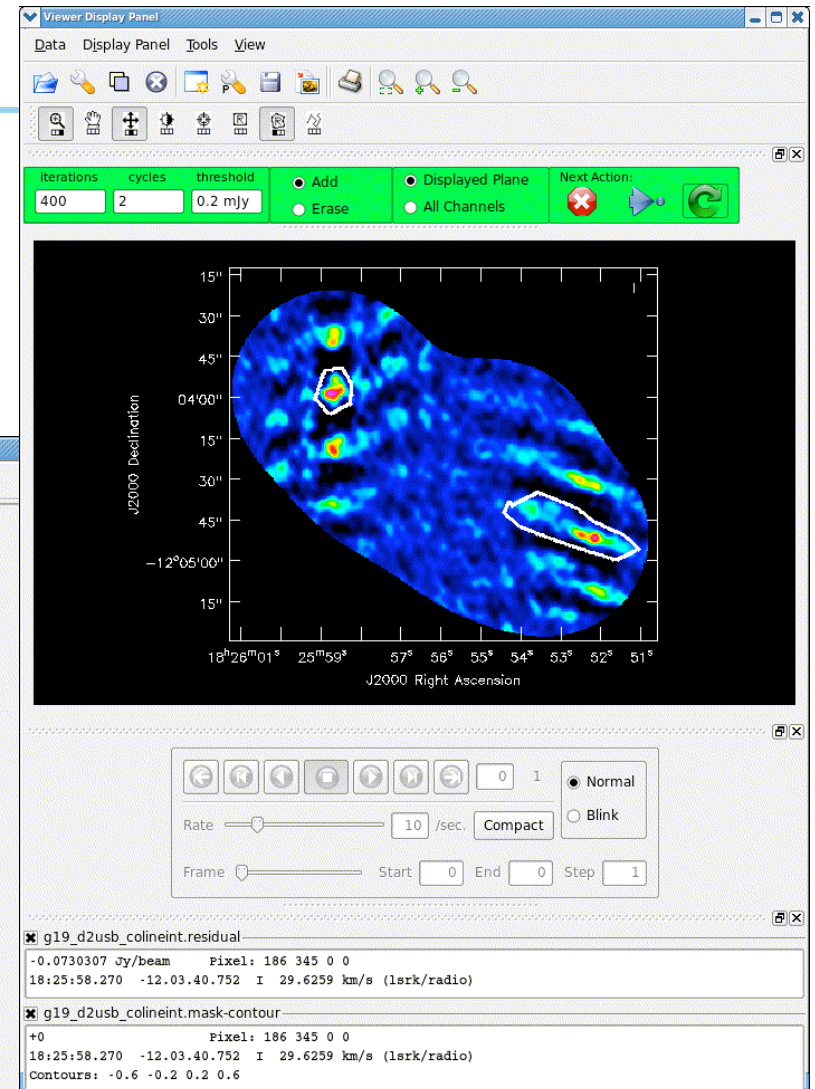
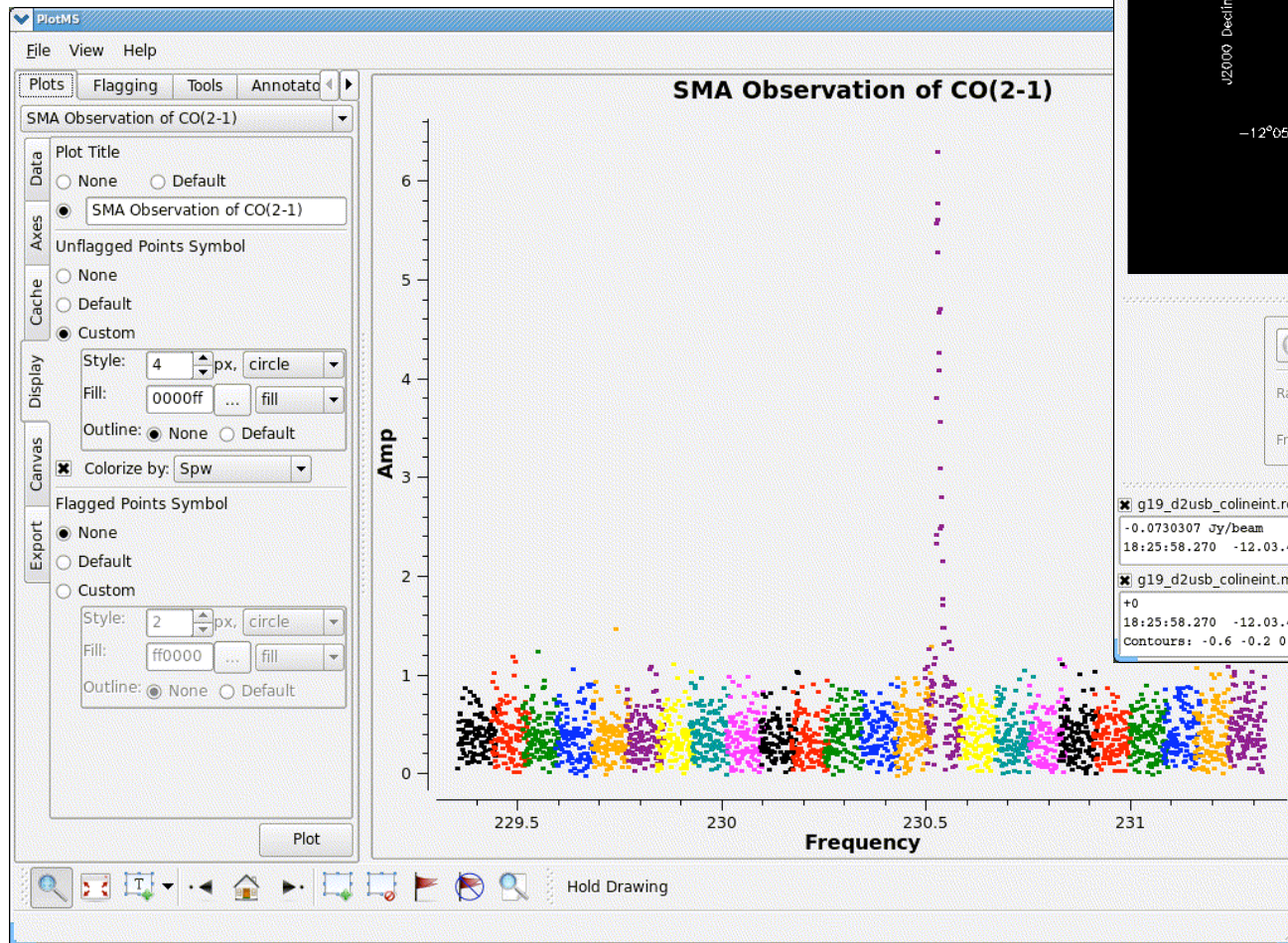
- CASA is the post-processing package for ALMA and EVLA (interferometric and single dish)



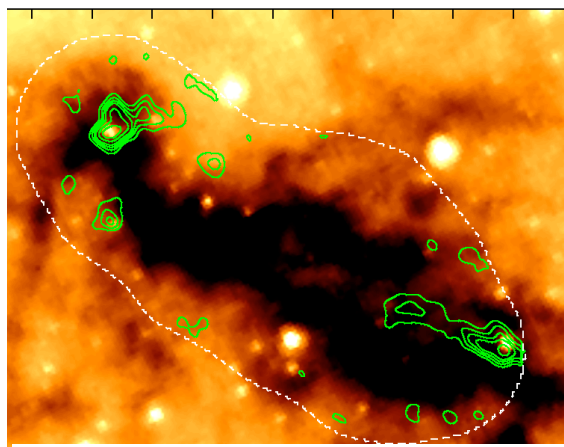
Available at: casa.nrao.edu

Interactive cleaning and flagging

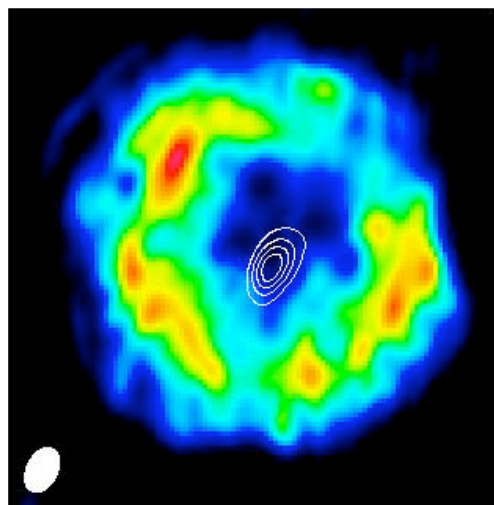
UV-spectrum in plotms, colored by spectral window



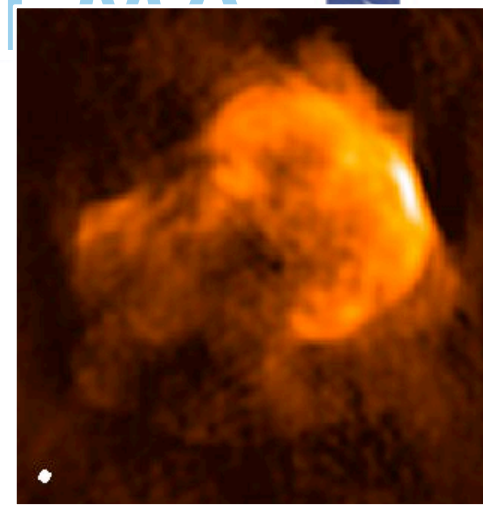
Diverse Data Reduced & Imaged in CASA...



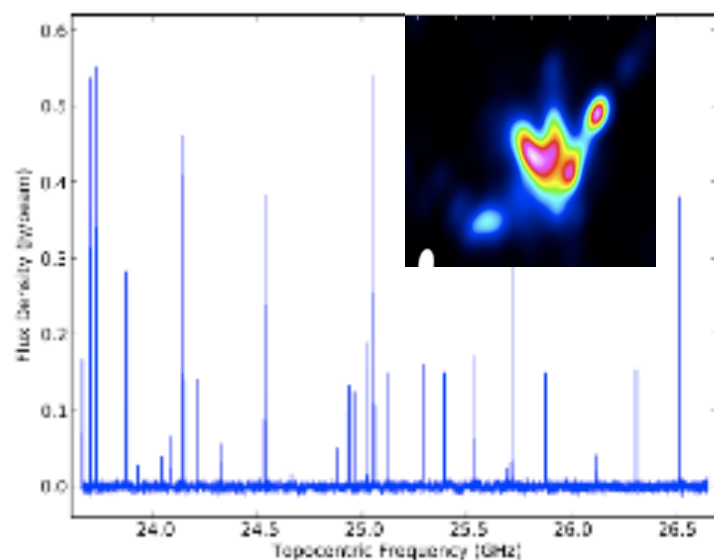
SMA ^{12}CO (2-1) mosaic
toward IRDC G19.3+0.07



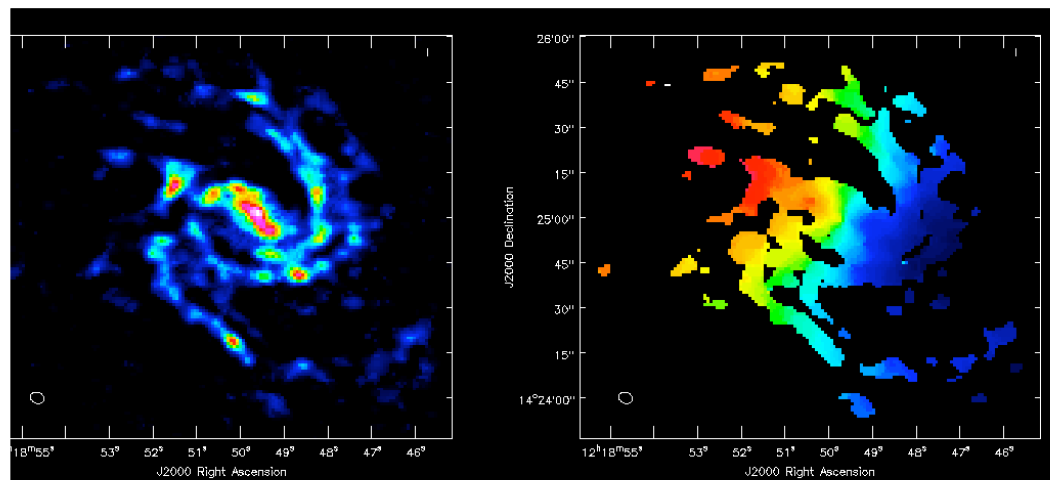
EVLA Ka-band of HC_3N in
AGB star IRC+10216



EVLA 6cm mosaic of
SNR: 3C391



EVLA demo science: Orion Hot Core
this spectrum has 24k channels!



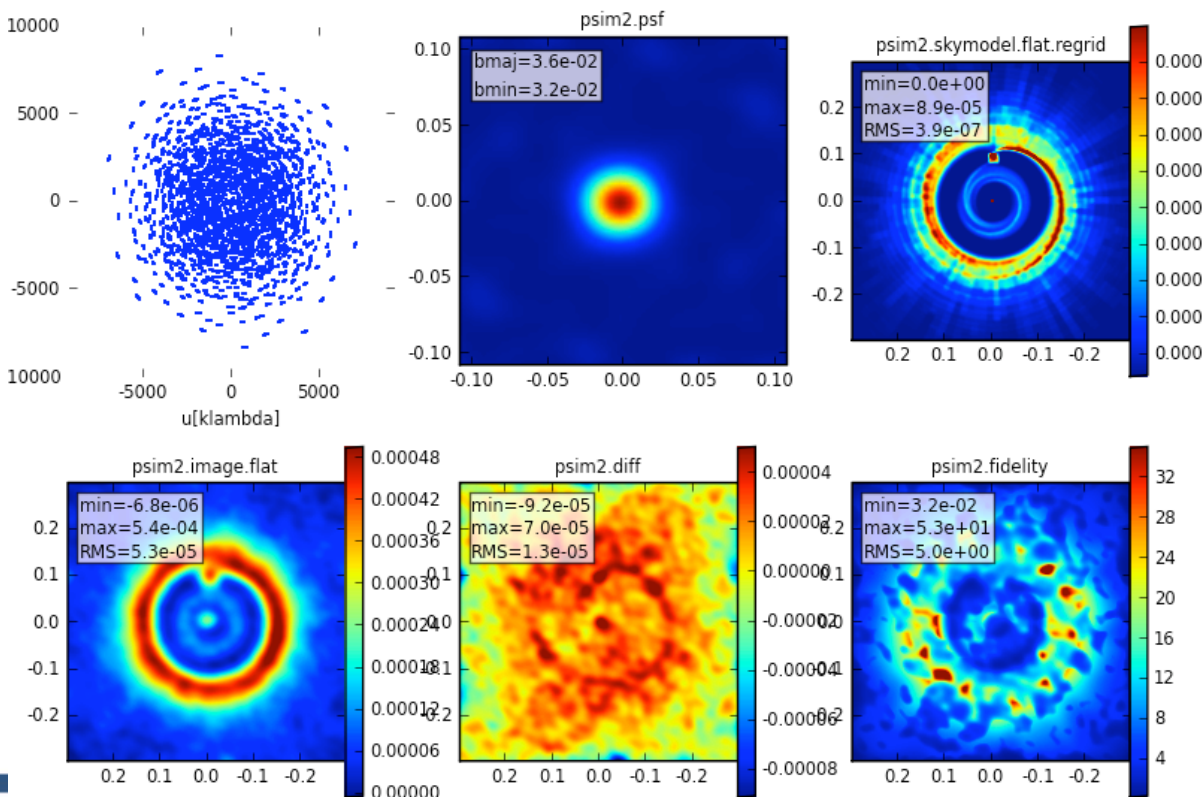
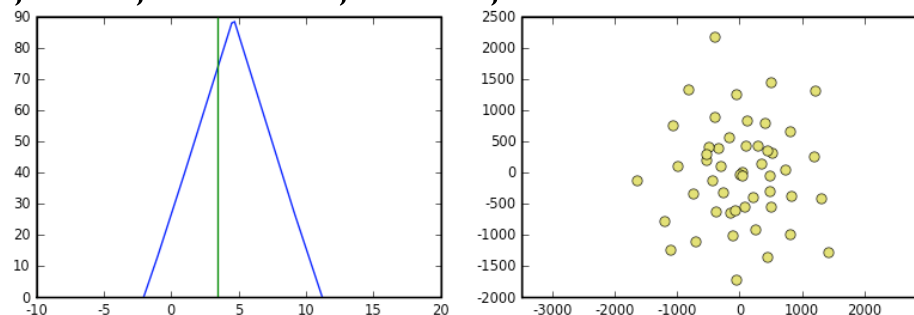
CARMA CO(1-0) mosaic of M99
(data courtesy STINGS team)

CASA Simulator: “simdata”



○ I-stop task to simulate ALMA, EVLA, SMA, CARMA, ATCA, SKA

- Simulate continuum, simple cubes
- Create coordinate system for model images
- Automatically calculate mosaic pointings or manually
- Optionally interleave a calibrator
- Simulate total power observations
- Add thermal noise and linear cross-polarization
- Re-image the data, interferometric + total power
- Analyze the difference in output and input images



CASAguides

- Uses mediawiki to enable fully annotated scripts
- Additional “guides” continue to be added
- NRAO Synthesis Imaging summer school tutorials will be delivered this way



<http://casaguides.nrao.edu>

A screenshot of the CASAguides website. The browser address bar shows the URL http://casaguides.nrao.edu. The page has a sidebar on the left with a navigation menu (Main Page, Community portal, Current events, Recent changes, Random page, Help), a search box, and a toolbox (What links here, Related changes, Special pages, Printable version, Permanent link). The main content area is titled "Main Page" and includes a "Welcome to CASA Guides" section with a description of CASA (Common Astronomy Software Applications) and a photo of radio telescopes. Below this are sections for "CASA Events" (listing workshops and sessions), "CASA News" (listing software releases), and a "Featured article" about calibrating a CARMA dataset. A "Contents" section follows, listing various guides and tools categorized under "Using CASA", "Interactive Tools in CASA", "Data Reduction Guides", and "Simulations".

I really need help!

ALMA



Atacama Large Millimeter/submillimeter Array

Observer Support

Logged In: Carol | [Support Center](#) | [Admin CP](#) | [Logout](#)

[Home](#) | **[Tickets](#)** | [Teamwork](#) | [Knowledgebase](#) | [Downloads](#) | [News](#) | [Users](#)

Manage Tickets | Search | New Ticket | Predefined Replies | Alerts | Filters | Reports

>> Ticket Options

- Flag Ticket
- SLA Plan
- Mark Due
- Options
- Export

>> Filter Tickets

- View All
- Filters
- Labels
- General Queries (NAASC)
- Observation Simulation - CASA (NAASC)
- Scheduling Block Generation (NAASC)
- Data Retrieval (NAASC)
- Data Reduction - CASA (NAASC)
- Proposal Submission (NAASC)
- Pipeline (NAASC)
- Data Reduction - Other (NAASC)
- Documentation/Web (NAASC)
- Visits (NAASC)
- Splatalogue (NAASC)
- Transfer to EU
- Transfer to NAASC
- Transfer to NAOJ
- Return to Triage (NAASC)

>> Online Staff

- Carol

Manage > General Queries (NAASC) > Open > What do you do when you're on triage and there isn't anything to triage? (TBC-762551)

General | Post Reply | Forward | Follow-Up | Billing | Add Notes | Release | History (9) | Chats (0)

Audit Log | Edit

Ticket ID	Department	Assigned Staff	Status	Priority	Due	Labels
TBC-762551	General Queries (NAASC)	Tony	Open	Default		-- Unassigned --

Note by John Hibbard - 17 May 2010 2:34 PM (6h42m59s)
Nope, I neglected my triage duties on Sunday. But I did assign it to Tony bright and early on Monday morning.

Page 1 of 1 | View All

Template Group: almana | < Previous Ticket | Next Ticket >

Author	Contents
Gerald Schieven	Posted on: 16 May 2010 2:48 PM
USER	Just thought I'd give you something to do, John...
Gerald Schieven	Posted on: 17 May 2010 2:18 PM
USER	Checking something out. Guess nobody was checking triage on Sunday!
Gerald Schieven	Posted on: 17 May 2010 2:18 PM
USER	Checking something out. Guess nobody was checking triage on Sunday!

Page 1 of 1 | View All

Template Group: almana | < Previous Ticket | Next Ticket >

[Back](#)



Splatalogue was created to satisfy ALMA's need to have an up-to-date and complete spectral line database

Until now most observatory software included only a single catalog or ad hoc line list into their:

- Observing tool
- Proposal tool
- Data reduction tool(s)

This is problematic because there are pros and cons associated with each individual list and moreover, these observatory line lists were almost never updated (e.g. BIMA) – a situation that ALMA cannot afford to follow

Our goal is to include all of the standard catalogs (i.e. JPL, CDMS) plus others from around the world (i.e. ToyaMA, SLAIM, OSU), and also recombination and atomic lines

What else you got for us?



SPLATALOGUE - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.cv.nrao.edu/php/aremijan/splat_beta/

CDMS JPL Molecular Sp... Toyama Microw... SPLATALOG newsq.cv.nrao.e... SAO/NASA ADS C... NRAO Library National Radio A... http://www.nra... NRAO Webmail ... NRAO WebVPN S...

Navigate

- Splatalogue Home
- What's New (Updates)
- Motivation
- Notes on Observing Frequencies
- Notes on Quantum Numbers
- ALMA Working Group on Spectral Line Frequencies
- Applications (SLAP Interface)

Search Parameters

Select Species

Select Species - Ordered by Mass

- All
- 00101 H-atom - Atomic Hydrogen
- 00102 H α - Hydrogen Recombination Line
- 00103 H β - Hydrogen Recombination Line
- 00104 H γ - Hydrogen Recombination Line
- 00105 H δ - Hydrogen Recombination Line
- 00106 H ϵ - Hydrogen Recombination Line
- 00107 H ζ - Hydrogen Recombination Line
- 00201 D-atom - Atomic Deuterium
- 00202 He α - Helium Recombination Line

Mass calculator...

Specify Ranges

Specify a Frequency Range:

From to

☒ MHz ☐ GHz

Specify an Energy Range:

From to

☐ EL (cm⁻¹) ☐ EJ (cm⁻¹)

☐ EL (K) ☐ EJ (K)

Line Intensity Lower Limits

Select Criteria and Specify Lower Limit:

☒ None

☐ CDMS/JPL (log)

☐ Sij μ^2

☐ Aij (log)

Specify a Transition

(e.g. 1-0)

Search Results

WELCOME TO SPLATALOGUE!!

The Splatalogue is an attempt to collate, rationalize and extend existing spectroscopic resources for use by the astronomical community. Currently, Splatalogue is a transition-resolved compilation of the [JPL](#), [CDMS](#), [Lovas/NIST](#), and Frank Lovas' own Spectral Line Atlas of Interstellar Molecules (SLAIM). Currently, Splatalogue contains over 3.9 million lines in 720 unique chemical species. Open access starts with splatalogue v.1.0 at www.splatalogue.net.

The Splatalogue effort would not be possible without the efforts of laboratories all over the world. Specifically, you will notice in the last column of any search with Splatalogue, the "LineList" where the data originated. For these data, you will need to reference the following:

- CDMS: H. S. P. Müller, F. Schlöder, J. Stutzki, and G. Winnewisser, *J. Mol. Struct.* **742**, 215-227 (2005)
- JPL: H. M. Pickett, R. L. Poynter, E. A. Cohen, M. L. Delitsky, J. C. Pearson, and H. S. P. Muller, "Submillimeter, Millimeter, and Microwave Spectral Line Catalog," *J. Quant. Spectrosc. & Rad. Transfer* **60**, 883-890 (1998).
- Lovas/NIST: F.J. Lovas and R.A. Dragoset (2004), *NIST Recommended Rest Frequencies for Observed Interstellar Molecular Microwave Transitions - 2002 Revision*, (version 2.0.1). [Online] Available: <http://physics.nist.gov/restfreq> [2009, February 4]. National Institute of Standards and Technology, Gaithersburg, MD. **Optional addition:** Also published as *J. Phys. Chem. Ref. Data* **33**(1), 177-355 (2004).
- SLAIM: In referencing SLAIM, use the following "All spectral line data were taken from the Spectral Line Atlas of Interstellar Molecules (SLAIM) (Available at <http://www.splatalogue.net>). (F. J. Lovas, private communication, Remijan et al. 2007)

Specifically, we would like to give special thanks to H. S. P. Müller, Brian Drouin, John Pearson, Frank Lovas and Floris van der Tak for their continued help and support of this effort. Without their efforts and their input, Splatalogue would not be possible.

Below are listed other sources that may be useful in both obtaining spectral line data as well as collisional cross sections, fitting programs for spectral line data and radiative transfer analysis tools. Use wisely and let us know if you ever find a "broken link" at splatalogue@nrao.edu.

Other Resources for Molecular Spectroscopy

Applet.org oak.astro.slise.applet.Splatalogue started

aremijan@sapientia... aremijan@sapientia:~ aremijan@sapientia:~ Windows XP Professio... SPLATALOGUE - ...

Search Parameters

Select Species

Select Species - Ordered by Mass

05230 CH ₃ 37Cl - Methyl chloride
05231 CH ₂ F ₂ v=0 - Difluoromethane
05232 CH ₂ F ₂ v ₄ =1 - Difluoromethane
05233 KCH - Potassium methylidyne
05234 CaC - Calcium carbide
05235 HOCl - Hypochlorous acid
05236 26MgNC - Magnesium Isocyanide
05301 H ₁₃ C ₁₃ CCN - Cyanoacetylene
05302 H ₁₃ CC ₁₃ CN - Cyanoacetylene
05303 HC ₁₃ C ₁₃ CN - Cyanoacetylene

Enter Molecular Formula (Case sensitive)

BLUE
(atmospheric)

RED
(possible)

WHITE
(known)

GREEN
(probable)



Applications Places System 2 GHz Tue Oct 6, 4:07 PM

SPLATALOGUE - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.cv.nrao.edu/php/aremijan/splat_beta/

CDMS JPL Molecular Sp... Toyama Microw... SPLATALOGUE newsq1.cv.nrao.e... SAO/NASA ADS C... NRAO Library National Radio A... http://www.cv.nra... NRAO Webmail ... NRAO WebVPN S...

Navigate

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☐ $S_{ij} \mu^2$

☐ $A_{ij} (\log)$

Specify a Transition

(e.g. 1-0)

Search

Search Filter

- ☒ Exclude atmospheric species
- ☒ Exclude potential interstellar species
- ☒ Exclude probable interstellar species
- ☐ Include known AST species
- ☒ Display NRAO Recommended Frequencies

Line List Display

- ☒ Lovas/NIST ☒ SLAIM ☒ JPL
- ☒ CDMS ☒ Recombination Lines

Line Strength Display

- ☐ CDMS/JPL Intensity ☒ $S_{ij} \mu^2$ ☐ S_{ij}
- ☐ A_{ij} ☐ Lovas/AST

Energy Levels

- ☐ Lower (cm^{-1}) ☐ Lower (K)
- ☐ Upper (cm^{-1}) ☒ Upper (K)

Frequency Error Limit

☐ No Frequency Displayed w/ Error > 50 MHz

Miscellaneous

Done

splatalogue

database for astronomical spectroscopy

Search Results

Found 2338 lines, showing 1 - 500 Next >
Click on the chemical formula below for more information about that species.

	Species	NRAO Recommend	Chemical Name	Freq (Err)	Meas Freq (Err)	Resolved QNs	Unresolved Quantum Numbers	$S_{ij} \mu^2 (D^2)$	$E_u (K)$	LineList
1	CCCN v=0		Cyanoethynyl	9884.28800 (0.04)		N=1-0, J=3/2-1/2, F=3/2-1/2	1.5, 1 - .5, 0 1.5 - 0.5	0.00000	0.47437	SLAIM
2	CCCN v=0		Cyanoethynyl	9884.29000 (0.0178)		N=1-0, J=3/2-1/2, F=3/2-1/2	1 2 2 0 1 1	3.36029	0.47437	JPL
3	CCCN v=0	*	Cyanoethynyl	9884.29320 (0.016)		N=1-0, J=3/2-1/2, F=3/2-1/2	1 2 2 0 1 1	5.63998	0.47437	CDMS
4	CCCN v=0	*	Cyanoethynyl		9885.89000 (0.01)	N=1-0, J=3/2-1/2, F=5/2-3/2	1 2 3 0 1 2	16.24567	0.47445	CDMS
5	CCCN v=0		Cyanoethynyl		9885.89000 (0.01)	N=1-0, J=3/2-1/2, F=5/2-3/2	1 2 3 0 1 2	9.67913	0.47445	JPL
6	CCCN v=0		Cyanoethynyl	9885.89000 (1)		N=1-0, J=3/2-1/2, F=5/2-3/2	1-0 J=3/2-1/2 F=5/2-3/2	0.00000	0.00000	Lovas
7	CCCN v=0		Cyanoethynyl	9885.89300 (0.008)	9885.89000 (0.01)	N=1-0, J=3/2-1/2, F=5/2-3/2	1.5, 1 - .5, 0 2.5 - 1.5	0.00000	0.47445	SLAIM
8	CCCN v=0	*	Cyanoethynyl	9886.09420 (0.027)		N=1-0, J=3/2-1/2, F=3/2-3/2	1 2 2 0 1 2	5.19063	0.47445	CDMS
9	CCCN v=0		Cyanoethynyl	9886.09550 (0.0271)		N=1-0, J=3/2-1/2, F=3/2-3/2	1 2 2 0 1 2	3.09398	0.47446	JPL
10	CCCN v=0		Cyanoethynyl	9886.09700 (0.032)		N=1-0, J=3/2-1/2, F=3/2-3/2	1.5, 1 - .5, 0 1.5 - 1.5	0.00000	0.47446	SLAIM
11	CCCN v=0	*	Cyanoethynyl	9886.99370 (0.0297)		N=1-0, J=3/2-1/2, F=1/2-1/2	1 2 1 0 1 1	4.96868	0.47450	CDMS
12	CCCN v=0		Cyanoethynyl	9886.99710 (0.0307)		N=1-0, J=3/2-1/2, F=1/2-1/2	1 2 1 0 1 1	2.96100	0.47450	JPL
13	CCCN v=0		Cyanoethynyl	9887.00400 (0.025)		N=1-0, J=3/2-1/2, F=1/2-1/2	1.5, 1 - .5, 0 0.5 - 0.5	0.00000	0.47450	SLAIM
14	CCCN v=0	*	Cyanoethynyl	9888.79480 (0.035)		N=1-0, J=3/2-1/2, F=1/2-3/2	1 2 1 0 1 2	0.44615	0.47458	CDMS
15	CCCN v=0		Cyanoethynyl	9888.80250 (0.04)		N=1-0, J=3/2-1/2, F=1/2-3/2	1 2 1 0 1 2	0.26557	0.47458	JPL

Note how Splatalogue reports the quantum numbers

“Click on” the chemical formula

Found 2217 lines, showing 1 - 500 Next >
Click on the chemical formula below for more information about that species.

Species	Chemical Name	Freq (Err)	Meas Freq (Err)	Resolved QNs	Unresolved Quantum Numbers	$S_{ij}\mu^2$ (D ²)	E_U (cm ⁻¹)	LineList
CCCN v=0	Cyanoethynyl	9884.29000 (0.0178)		N=1-0,J=3/2-1/2,F=3/2-1/2	1 2 2 0 1 1	3.36029	0.32970	JPL
CCCN v=0	Cyanoethynyl	9884.29320 (0.016)		N=1-0,J=3/2-1/2,F=3/2-1/2	1 2 2 0 1 1	5.63998	0.32970	CDMS
CCCN v=0	Cyanoethynyl		9885.89000 (0.01)	N=1-0,J=3/2-1/2,F=5/2-3/2	1 2 3 0 1 2	16.24567	0.32976	CDMS
CCCN v=0	Cyanoethynyl		9885.89000 (0.01)	N=1-0,J=3/2-1/2,F=5/2-3/2	1 2 3 0 1 2	9.67913	0.32976	JPL
CCCN v=0	Cyanoethynyl	9886.09420 (0.027)		N=1-0,J=3/2-1/2,F=3/2-3/2	1 2 2 0 1 2	5.19063	0.32976	CDMS
CCCN v=0	Cyanoethynyl	9886.09550 (0.0271)		N=1-0,J=3/2-1/2,F=3/2-3/2	1 2 2 0 1 2	3.09398	0.32976	JPL
CCCN v=0	Cyanoethynyl	9886.99370 (0.0297)		N=1-0,J=3/2-1/2,F=1/2-1/2	1 2 1 0 1 1	4.96868	0.32979	CDMS
CCCN v=0	Cyanoethynyl	9886.99710 (0.0297)		N=1-0,J=3/2-1/2,F=1/2-1/2	1 2 1 0 1 1	2.96100	0.32979	JPL

SLAP example with PHP

- A Simple Line Access Protocol (SLAP) client written in PHP was created to test the new SLAP server at NCSA.
- The class contains methods to query the SLAP service and return an XML file – readable by variety of VO programs and web services.
- The class can be easily implemented in a web page or form.
- It requires Chris Miller's IDL library, which is also included in the directory:
 - <ftp://ftp.cv.nrao.edu/NRAO-staff/bkent/slap/idl/>

Constructor (SLAPClient)

```
$slap = new SLAPClient ($slapurl);
```

Method (getRaw)

```
$xmlstr=$slap->getRaw ('queryData', $minwave, $maxwave);
```

Method (buildQuery)

```
$query = $this->buildQuery ($request, $wavelengthlower,  
$wavelengthupper, $verb, $keys);
```

XML



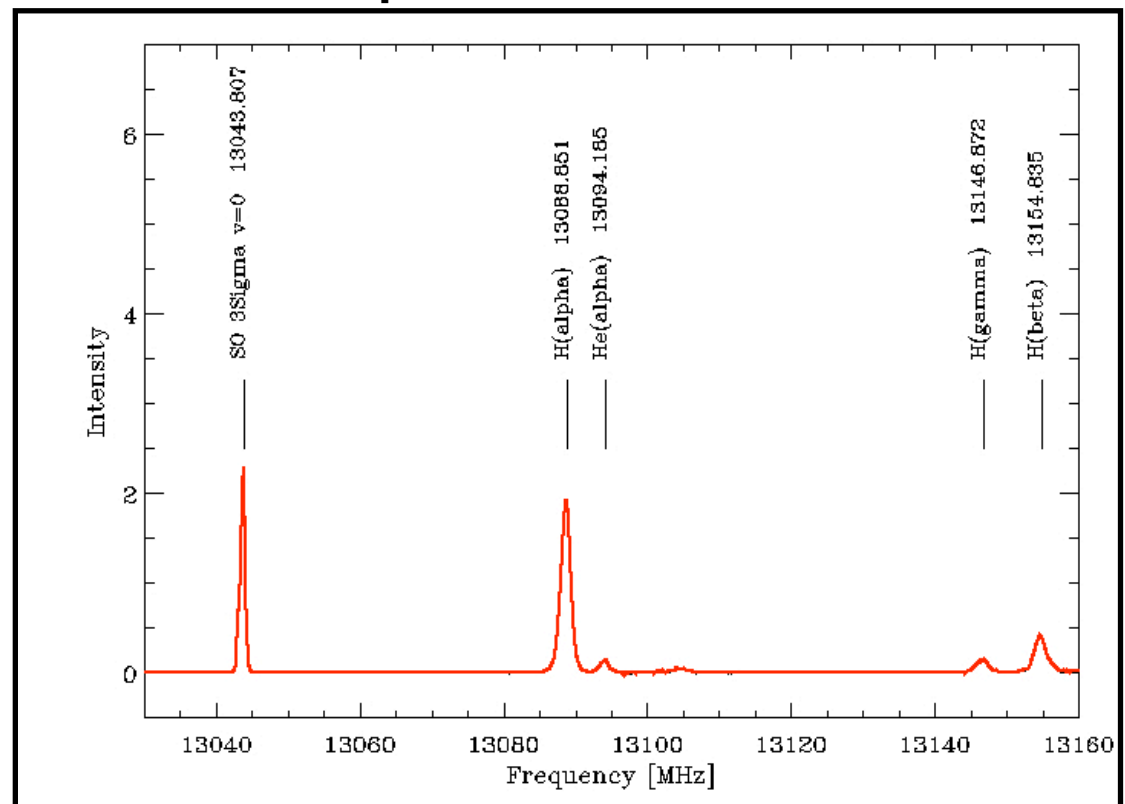
SLAP example with IDL

- The SLAP service can be also used within a scripting or programmatic interface.
- Using IDL:

```
xrange=[13030.0,13160.0] ;MHz  
  
minwave=c/(xrange[1]*1.0e6) ;meters  
  
maxwave=c/(xrange[0]*1.0e6) ;meters  
  
url='http://voera.ncsa.uiuc.edu:8080/  
splat-slap/slap'  
  
slapsearch, url, minwave, maxwave, slap
```

```
IDL> help, slap, /st  
** Structure <a9c2054>, 9 tags,  
    length=84, data length=84, refs=1:  
  
CREATED      STRING  '2010-03-09'  
TITLE        STRING  Array[1]  
CATALOGNAME  STRING  Array[1]  
WAVELENGTH   DOUBLE  0.023060131  
FREQUENCY    DOUBLE  13000.466  
MOLECULARFORMULA STRING  Array[1]  
MOLECULETYPE LONG     0  
FREQUENCYRECOMMENDED LONG  -999  
QUANTUMNUMBERS STRING  Array[1]
```

GBT Ku-band spectrum





A stable version of Splatalogue (v1.0)

<http://www.splatalogue.net>

And if you are not convinced yet...you may want to

[Watch this](#)

***Demos of Splatatalogue, CASA and the OT will
be available tomorrow from 2-4PM at the
NRAO Booth***

THANK YOU !!!

ALMA



www.almaobservatory.org

The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership among Europe, Japan and North America, in cooperation with the Republic of Chile. ALMA is funded in Europe by the European Organization for Astronomical Research in the Southern Hemisphere, in Japan by the National Institutes of Natural Sciences (NINS) in cooperation with the Academia Sinica in Taiwan and in North America by the U.S. National Science Foundation (NSF) in cooperation with the National Research Council of Canada (NRC). ALMA construction and operations are led on behalf of Europe by ESO, on behalf of Japan by the National Astronomical Observatory of Japan (NAOJ) and on behalf of North America by the National Radio Astronomy Observatory (NRAO), which is managed by Associated Universities, Inc. (AUI).



PREPARING FOR ALMA

<http://science.nrao.edu/alma>



National Radio Astronomy Observatory
North America ALMA Science Center
Charlottesville, Virginia U.S.

Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array

