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on behalf of the GILDAS developers  

6th IRAM 30m Summer School  
Sep. 23 - Sep. 30 2011, Pradollano
Many different kinds of softwares at IRAM:

1. Proposal and scheduling (statistics, dynamic scheduling, pool observing).
2. Preparation of observations, *e.g.* setups.
3. Data acquisition:
   3.1 Low level, *e.g.* hardware control (antennae, receivers, correlators, etc...)
   3.2 High level, *e.g.* operator and observer interface.
4. Data archiving.
5. Data reduction and analysis (single dish + interferometry).

**GILDAS** deals only with a subset. **Points: 2, 3.2, 5 and 6.**
Scope: II. 30m time/sensitivity estimators

30m EMIR Time/Sensitivity Estimator for March 17th, 2011 deadline

Parameters

- Typical source elevation: 45.0 degrees
- Observing frequency: 110.0 GHz
- Spectrometer resolution value: 0.25 km/s
- Telescope time: 1.0 hr
- Map area: 0.0 (sensitivity estimation)
- RMS sensitivity: 4.0 (time estimation)
- OTF observation: 0.0

Important comments:

After estimating the number of tunings needed to complete the project, the user has to add to the telescope time 30 minutes per tuning (this includes the observation of a line calibrator).

To take into account pointing, focus, calibration and instrumental deadtimes, we assume an overall efficiency of 50% between the total telescope elapsed time and the integration time (on-off).

The two polarizations of the EMIR receivers can only be tuned at the same frequency. This time/sensitivity estimator gives results derived from averaging the two polarizations.

Press Help button for additional help.
Scope: III. GILDAS at IRAM
425,000 executable lines

• Common facilities
  – Command line interpreter: SIC;
  – Graphical possibilities: GREG
    (1D: curves, 2D: images, 3D: spectra cubes).
  – Preparation of observations: ASTRO, MOPSIC.

• 30m
  – Bolometer + Monitoring: MOPSIC;
  – Spectroscopy: TELCAL + MIRA + CLASS.

• PdBI
  – Calibration: CLIC;
  – Imaging + Deconvolution: MAPPING.

• ALMA
  – Simulator: MAPPING @ alma.map;
  – Holographies of ALMA antennae are done in CLIC at San Pedro.
GILDAS Strengths

- Large range of supported systems: Linux, Mac/OSX, Windows.
- Light weight: Data reduction and analysis possible on laptops.
- 28 years of history
  ⇒ Accumulated expertise.
- Powerful advanced tools, e.g.
  - Easy OTF processing;
  - Easy interferometric mosaicing;
  - General fitting routines.
GILDAS users

- IRAM AODs: Instrument monitoring, data pipelining.
- IRAM users: Data reduction.
- Others:
  - CLASS is used in many facilities (e.g. APEX, CSO, NANTEN2, GBT, HHT, Effelsberg, Kosma, ...); CLASS is considered for use by Herschel/HIFI, SOFIA, 45m.
  - ALMA: (Single Dish characterization in San Pedro).

⇒ GILDAS evolutions must be thought with all users in mind.
People

- People participating in one way or another
  
  
  **IRAM/Granada**  H. Ungerechts, A. Sievers.
  
  **LAOG/Grenoble**  P. Hily-Blant, S. Maret.
  
  **L3AB/Bordeaux**  S. Guilloteau.
  
  **ALMA/JAO**  R. Lucas.

- Large code contributors:  ~ 5.0 FTE/yr
  
  R. Zylka  MOPSIC.
  
  H. Ungerechts  PAKO.
  
  A. Sievers  MIRA.
  
  E. Reynier  kernel + OMS.
  
  V. Pietu  CLIC + RDI.
  
  J. Pety  kernel + TELCAL + CLASS + MAPPING.
  
  F. Gueth  CLIC + ASTRO.
  
  A. Castro-Carrizo  CLIC pipeline.
  
  S. Bardeau  kernel (including the python binding) + CLASS.
  
  P. Hily-Blant + S. Maret  CLASS.
  
  S. Guilloteau  Kernel + MAPPING.

- Research & Development:  1 FTE/yr.
  
  N. Rodriguez-Fernandez  PdBI OTF.
An example of the GILDAS daily life: CLASS

- The LMV command which read a spectra cube (FITS or GDF in whichever order, ie LMV, VLM,...) is now operational.
- First release of WEEDS (an interface to line databases and line modelling). It is automatically loaded into CLASS, if a recent version of PYTHON (>= 2.6) and the associated NUMPY are available.
- SET UNIT IMAGE is now fixed (the plot axis was wrong).
- Fixed the sign of the correction on the image frequency axis in the MODIFY VELOCITY command. This is very useful for DSB spectra (e.g., some of the HIFI receivers).
- FIND /FREQUENCY Freq1|* [Freq2|*] [SIGNAL|IMAGE]
- FIND /LINE and FIND /SOURCE (respectively SET LINE and SET SOURCE) now accept the "*" wildcard anywhere in the input pattern.
- SET CURSOR ON|OFF is now obsolete.
- In interactive cursor mode, the commands SET WINDOW and SET MASK now display in real time the selected values. A warning is raised if a window is only half-defined.
- The maximum number of masks, defined through the SET MASK command and used by the MINIMIZE command, was increased from 5 to 100. SET MASK now also accepts the /VAR option to read the mask boundaries from an input array.
- Introduced the SET%LAS SIC structure, which stores (most of) the global control values of CLASS, i.e. the one showed by the SHOW command.
- The R%HEAD SIC structure now matches the header of the spectrum in the R buffer. SET VAR Section now creates SIC aliases to the SIC variables in R%HEAD%Section%.
- Introduction of a user section.
User support:

I. Documentation

Web page http://www.iram.fr/IRAMFR/GILDAS.
Memos at http://www.iram-institute.org/EN/content-page-161-7-66-161-0-0.html.
Mail to gildas@iram.fr.

IRAM Memo 2005-1

CLASS evolution: I. Improved OTF support

P. Hily-Blant1, J. Pety1,2, S. Guilloteau3

1. IRAM (Grenoble)
2. LERMA, Observatoire de Paris
3. LAA, Observatoire de Bordeaux

Dec. 29th 2005
Version 1.0

IRAM Memo 2009-4

Averaging spectra with CLASS

S. Bardou1, J. Pety1,2

1. IRAM (Grenoble)
2. LERMA, Observatoire de Paris

July 20th 2009
Version 1.0

Abstract

CLASS0 (formerly CLASS) provides a set of commands capable to process two or more spectra. They provide easy averaging modes, presented elsewhere in this document. The different modes often imply to perform internally and identify some important computations, namely resampling and weighted average. Combining these operations at the same time may imply some non-trivial effects described here.

On October 2005 it appeared that some particular combinations of the resample modes were not behaving as expected (either in CLASS00 and in CLASS01). A complete cleaning and factorization of the algorithm was performed, associated to exhaustive tests of all combinations. A test suite was also provided to check the output of each commands and modes.

Reducing this maintenance of the code, and the use of these capabilities to concentrate the new feedback spectra, it was decided to write this document in order to keep a trace of all the methods applied. This was also the occasion to investigate deeply in the code and to examine the effects which can occur during all the possible processing.

Keywords: DIFFRAC, AUTOCORRELATE, resampling, weighting, concatenation

Related documents: IRAM memo 2005-1 CLASS evolution: I. Improved OTF support

J. Pety, 2011
User support:

II. Web page http://www.iram.fr/IRAMFR/GILDAS

INTRODUCTION

GILDAS is a collection of state-of-the-art softwares oriented toward (sub-)millimeter radioastronomical applications (either single-dish or interferometer). It is daily used to reduce all data acquired with the IRAM 30M telescope and Plateau de Bure Interferometer PdBI (except VLBI observations). GILDAS is easily extensible. GILDAS is written in Fortran-90, with a few parts in C/C++ (mainly keyboard interaction, plotting, widgets).

ACKNOWLEDGMENT IN PUBLICATIONS

The GILDAS team welcomes an acknowledgment in publications using GILDAS software to reduce and/or analyze data.

Please use the following reference in your publications: http://www.iram.fr/IRAMFR/GILDAS

RECENT MILESTONES

(detailed news here)

oct-09
ASTRO is now able to setup observations for the next PdBI correlator, which should arrive at Bure end of 2009, beginning of 2010.

sep-09
MIRA now fully support EMIR (standard and polarimetry modes).

aug-09
A memo describing the detailed behavior of the CLASS AVERAGE command (including the recent bug fixes) is available here: http://www.iram-institute.org/medias/uploads/class-
User support:

III. answers to gildas@iram.fr

- Total number of threads: 398.
- Median time to
  - First answer: 11h;
  - Final answer: 32h.
Hi,

I have just stumbled on an obnoxious bug which prevents me from making the discovery of the century. I will defend my PhD thesis tomorrow. Fix this bug in the coming minutes.

Toto.
Dear Gildas team,

Your software is great. For the first time in my life, I encountered a segmentation fault using it. I succeeded to reproduce the bug with a simple list of commands. I attach the following information: version of gildas I am currently using, list of commands and the data set to reproduce the bug. I hope this will help you solve the bug in the coming months. Continue the great work.

Best regards, Toto.

***************************************************************************
gildas version: dev (07oct08 13:45) (x86_64-fedora6-ifort) source tree

List of commands:
LAS90> file in test
LAS90> find
Blablablabla...
Segmentation fault

Data set attached: test.30m

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No software is the answer to all these:

- Best \textit{(i.e. most recent) computing technology}.
- Best \textit{portability}.
- Best \textit{speed}.
- Best \textit{ease of use (CLI and GUI)}.
- Best \textit{(i.e. shortest) learning curve}.
- Best \textit{functionalities}.
  - Best \textit{data calibration methods}.
  - Best \textit{data mapping methods}.
  - Best \textit{(i.e. most complete) analysis methods}.
  - Best \textit{graphical possibilities}.
- Best \textit{cost}.
Strategy

- Maintain high-quality software for IRAM instruments while staying open to outside world.
  - Focused but generic developments;
  - In/out fillers;
  - Python binding.