// IRAM Newsletter

Number 52 May 27, 2002

IRAM Newsletter

Contents

Third IRAM Millimeter Interferometry School: 2nd Announcement

IRAM organizes this year its Third Millimeter Interferometry School. The school, which is part of the Euro Lab Course "Millimeter Observing School", will be co-sponsored by IRAM and the European Commission. The school will take place at the IRAM headquarters in Grenoble from September 30 to October 5, 2002.

The school is intended for PhD students, post-docs and scientists who want to acquire a good knowledge of interferometry techniques at mm wavelengths. In the same spirit as the previous two interferometry schools, the courses will be focused on the Plateau de Bure interferometer, with an outlook to the next generation interferometer ALMA. Demonstration sessions will help the participants to become familiar with the reduction and imaging of Plateau de Bure data and the related technology. We would like to encourage participants to present posters related to their own scientific interests.

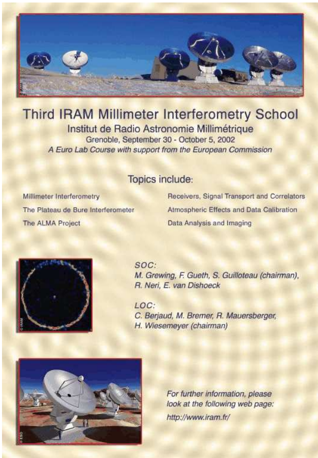
If you would like to get a first idea what the courses may contain, you can consult the proceedings of the first and second IRAM interferometry schools over the links on the page `http://www.iram.fr/IRAMFR/IS/`). The page also contains a link to a high resolution jpeg file of the poster below.

The number of participants will be limited to 60 persons. On the basis of their CV and references, young researchers are granted a financial support for travel and lodging expenses, if they are nationals or long term residents of the European Union or an associated state . Only low-fare flight tickets (i.e. including a week-end), respectively train tickets (for shorter distances) can be reimbursed.

In case you are interested (and if you have not already registered), please fill out the registration form at the end of this Newsletter and send it to us before July 31, or ask H. Wiesemeyer for further information.

Wednesday, July 31, 2002:
Deadline for registration. Late registrations will be handled on a best-effort basis, without any guarantee.
Sunday, Sept. 29, 2002:
Arrival of participants and welcome reception.
Monday, Sept. 30 - Saturday, Oct. 5, 2002:
Lectures and practical exercises at the IRAM headquarters.
Sunday, Oct. 6: Departure date.

Scientific Organizing Committee:
S. Guilloteau (chair), E. van Dishoeck, M. Grewing, F. Gueth, R. Neri
Local Organizing Committee:
H. Wiesemeyer (chair), C. Berjaud, M. Bremer, R. Mauersberger



Helmut WIESEMEYER and Michael BREMER

Calendar

May 30th – 31st, 2002:
Meeting of the IRAM Advisory Council

June 27th – 28th, 2002:
Meeting of the IRAM Executive Council

July 31st:
Deadline for registration to the third IRAM interferometry school

September 30th – October 5th, 2002
Third IRAM Millimeter Interferometry School in Grenoble

Personnel Changes

IRAM Administration

Since the departure of Christelle MESUREUR at the end of December 2001, the post of Head of Administration at IRAM had been vacant. Following a proposal from the IRAM direction, the IRAM council has appointed Gilbert KLEIN as the new Head of Administration. He has joined IRAM on April 22nd. Gilbert KLEIN has previously been working at the Institut Laue-Langevin (ILL) in Grenoble.

Michael GREWING

IRAM Granada

Axel WEISS started work as an IRAM astronomer on April 2nd 2002. His main task will be the organisation of the service- and pool observations, and the development and maintainance of a database for their support.

Our receiver engineer Hauke HEIN retired on April 30th 2002. He has been at the 30-m telescope since its beginning. He played a key role in pushing the performance of the 30-m telescope and its receivers to its very high level. In addition, he was for many years responsible for the safety at the site. He also spent several years in helping to commission the Heinrich-Hertz-Telescope in Arizona. We wish Hauke many active years of retirement.

Rainer MAUERSBERGER

IRAM Grenoble

At the beginning of April, Bertrand GAUTIER has started his assignment as station manager on the Plateau de Bure, and Lilian MASNADA has joined the group of Bure interferometer operators on March 18th. In the SIS group Grenoble, Sandra DEVOLUY will take over the tasks of Dominique BILLON-PIERRON for the next months.

Michael BREMER

News from the 30m Telescope

Astronomer on Duty

The pooled bolometer and heterodyne observing sessions during the winter 2001/2002 have significantly increased the observing efficiency of the 30-m telescope. It meant, however, also an increased load on our astronomy staff who had to organize and supervise the pool projects, perform some of the observations, and to assist in the case of technical problems. The plan is to offer the same observing mode during the winter period 2002/2003.

Unfortunately, the scheme of "cooperants" has been discontinued in France. As a consequence, we may run into manpower limitations because we always had one or two cooperants helping with the astronomer on duty services. By carefully planning the presence of astronomers on the mountain, and also by involving some of the operators, we hope to maintain the same level of support to visiting astronomers that we have been able to provide in the past.

If you plan to come to the telescope and have particular questions on observing strategy and data reduction or have special requests, or need an introduction to the telescope, please contact the AoD (`http://www.iram.es/IRAMES/groups/-astronomy/aodsched.html`) before you travel.

Rainer MAUERSBERGER

Monitoring of atmospheric opacity

In order to assess the atmospheric conditions, in particular during pooled and remote observations, a tau-meter was designed and built by the receiver group of IRAM Granada. It is installed on top of the control building. It consists of a 1.3 mm uncooled Schottky receiver which is continuously scanning in elevation toward a norther direction (in order to avoid the sun). Results obtained so far are consistent with bolometer and heterodyne calibrations from the 30-m telescope.

The display of the actual tau values is on a monitor near the control room. We are planning to display the results, the history and statistics of tau values on our web pages.

Rainer MAUERSBERGER

Calibration under Unix

Starting in June 2002, we will offer online data calibration under Unix (Linux). In the first release, we will automatically calibrate data of the following observing procedures: PSWITCH, FSWITCH, WSWITCH, RASTER, OTFMAP. Data from all backends (including 4MHz, excluding continuum) will be calibrated using the last CALIBRAT observation.

The calibrated data will be written into two files:

- /mrt/data/project/spectraOdp.30m : this file will contain "final" data similar to the spectra.30m file produced by RED
- /mrt/data/projectspectra.Plot.30m : this file will contain "intermediate" data used to plot (quick view)

The data files can be read from the project accounts but not be modified. We will also provide the following utilities:

- a program to plot calibrated data (intermediate and final) and
- a program to monitor online data processing (odp) activities

Details are described in the project documentation: `http://www.iram.es/IRAMES/documents/-projectOnlineDataProcessing`

Walter BRUNSWIG, Albrecht SIEVERS and Hans UNGERECHTS

IRAM Program Committee Recommendations

The IRAM program committee convened in Grenoble on March 25 and 26 to discuss the proposals submitted for the summer 2002 scheduling period. The committee was chaired by Linda Tacconi (MPE, Munich).

Plateau de Bure Interferometer Proposals

In total 33 proposals were received for the interferometer and evaluated by the Program Committee. The principal investigators of each proposal are informed by letter about the outcome, which will include comments issued by the committee if there were any.

For the interferometer, the programs were classified A (accepted), B (backup) and C (rejected). Programs rated A will be scheduled in priority. Further time, if it becomes available, will go to the B programs, taking into account scientific merit, crowding in certain right ascension ranges and general aspects of balance. For projects rated A and B, check the list of the local contacts.

Project	Rate	Project	Rate	Project	Rate
M001	C	M002	B	M003	A
M004	B[†]	M005	B	M006	B
M007	A	M008	B	M009	B
M00A	B	M00B	A	M00C	A
M00D	B	M00E	B[†]	M00F	A
M010	B	M011	B	M012	C
M013	B	M014	C	M015	B
M016	C	M017	B	M018	A
M019	A	M01A	C	M01B	A
M01C	C	M01D	B	M01E	A
M01F	A	M020	C	M021	A

[†] *some parts of the program - others rated C*

30m Proposals

In total 85 proposals were received for the 30m telescope, requesting 4152 hours of telescope time. The highest rating "A" was given to 27 proposals; 31 proposals were rated "B", i.e. were given backup status. The remaining proposals, although scientifically valuable in most cases, were rated "C". The individual ratings are listed in the attached table. All A-rated proposals will be scheduled on the telescope, although some with less time than requested. We expect that about half of the B-rated programs will actually be scheduled. The selection will take into account scientific merit, crowding in certain right ascension ranges, and general aspects of balance. Proposals rated "C" will not get telescope time.

The principal investigators of each proposal are also informed by letter about the outcome of the evaluation process. Comments issues by the committee - if there were any - will be included.

A		B		C	
010-02	050-02	001-02	041-02	002-02	060-02
014-02	051-02	004-02	042-02	003-02	065-02
015-02	055-02	007-02	048-02	005-02	067-02
018-02	057-02	011-02	049-02	006-02	070-02
019-02	061-02	013-02	054-02	008-02	076-02
020-02	062-02	016-02	056-02	009-02	078-02
022-02	064-02	023-02	063-02	012-02	079-02
027-02	069-02	024-02	066-02	017-02	080-02
028-02	071-02	025-02	068-02	032-02	081-02
029-02	074-02	026-02	072-02	033-02	084-02
037-02	077-02	030-02	073-02	034-02	
040-02		031-02	075-02	047-02	
043-02		035-02	082-02	052-02	
044-02		036-02	083-02	053-02	
045-02		038-02	085-02	058-02	
046-02		039-02		059-02	

Roberto NERI and Clemens THUM

Scientific Results in Press

High-Mass Proto-Stellar Candidates - I : The Sample and Initial Results

T.K.Sridharan(1), H. Beuther(2), P. Schilke(2), K.M. Menten(2) and F. Wyrowski(3)
(1)Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, MS 78, Cambridge, MA 02138, USA, (2)Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany, (3)Department of Astronomy, University of Maryland, College Park, USA

Abstract:
We describe a systematic program aimed at identifying and characterizing candidate high-mass protostellar objects (HMPOs). Our candidate sample consists of 69 objects selected by criteria based on those established by Ramesh & Sridharan (1997) using far-infrared, radio-continuum and molecular line data. Infrared-Astronomical-Satellite (*IRAS*) and Midcourse-Space-Experiment (MSX) data were used to study the larger scale environments of the candidate sources and to determine their total luminosities and dust temperatures.

To derive the physical and chemical properties of our target regions, we observed continuum and spectral line radiation at millimeter and radio wavelengths. We imaged the free-free and dust continuum emission at wavelengths of 3.6 cm and 1.2 mm, respectively, searched for H_2O and CH_3OH maser emission and observed the CO $J = 2 - -1$ and several NH_3 lines toward all sources in our sample. Other molecular tracers were observed in a subsample.

While dust continuum emission was detected in all sources, most of them show only weak or no emission at 3.6 cm. Where detected, the cm emission is frequently found to be offset from the mm emission, indicating that the free-free and dust emissions arise from different subsources possibly belonging to the same (proto)cluster. A comparison of the luminosities derived from the cm emission with bolometric luminosities calculated from the *IRAS* far-infrared fluxes shows that the cm emission very likely traces the most massive source, whereas the whole cluster contributes to the far-infrared luminosity. Estimates of the accretion luminosity indicate that a significant fraction of the bolometric luminosity is still due to accretion processes. The earliest stages of HMPO evolution we seek to identify are represented by dust cores without radio emission.

Line wings due to outflow activity are nearly omnipresent in the CO observations, and the molecular line data indicate the presence of hot cores for several sources, where the abundances of various molecular species are elevated due to evaporation of icy grain mantles. Kinetic gas temperatures of 40 sources are derived from NH_3 (1,1) and (2,2) data, and we compare the results with the dust temperatures obtained from the *IRAS* data.

Comparing the amount of dust, and hence the gas, associated with the HMPOs and with ultracompact HII regions (UCHIIs) we find that the two types of sources are clearly separated in mass-luminosity diagrams: for the same dust masses the UCHII regions have higher bolometric luminosities than HMPOs. We suggest that this is an evolutionary trend with the HMPOs being younger and reprocessing less (stellar) radiation in the IR than the more evolved UCHIIs regions.

These results indicate that a substantial fraction of our sample harbors HMPOs in a pre-UCHII region phase, the earliest known stage in the high-mass star formation process.

Published in ApJ **566**, *931*

High-Mass Proto-Stellar Candidates - II: Density structure from dust continuum and CS emission

H. Beuther(1), P. Schilke(1), K.M. Menten(1), F. Motte(2), T.K.Sridharan(3) and F. Wyrowski(4)
(1)Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, 53121, Germany, (2)California Institute of Technology, MS 320-47, Pasadena, CA 91125, USA, (3)Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, MS 78, Cambridge, MA 02138, USA, (4)Department of Astronomy, University of Maryland, College Park, USA

Abstract:
We present a detailed 1.2 mm continuum and CS spectral line study of a large sample of 69 massive star forming regions in very early stages of evolution, most of them prior to building up an ultracompact HII region. The continuum data show a zoo of different morphologies and give detailed information on the spatial distributions, the masses, column densities and average densities of the whole sample.

Fitting the radial intensity profiles shows that three parameters are needed to describe the spatial distribution of the sources: constant emission from the center out to a few arcsec radius followed by a first power law intensity distribution which steepens further outside into a second power law distribution. The inner flat region is possibly caused by fragmentation of the large scale cores into smaller sub-sources, whereas the steeper outer power law distributions indicate finite sizes of the cores.

Separating the sources into sub-samples suggests that in the earliest stages prior to the onset of massive star formation the intensity radial distributions are rather flat resembling the structure of intensity peaks in more quiescent molecular clouds. Then in the subsequent collapse and accretion phase the intensity distributions become centrally peaked with steep power law indices. In this evolutionary stage the sources show also the broadest $C^{34}S$ linewidth. During the following phase, when ultracompact

HII regions evolve, the intensity power law radial distributions flatten out again. This is probably caused by the ignited massive stars in the center which disrupt the surrounding cores.

The mean inner power law intensity index m_i ($I \propto r^{-m_i}$) is 1.2 corresponding to density indices p ($n \propto r^{-p}$) of the density indices of 1.6. In total the density distribution of our massive star formations sites seem to be not too different from their low-mass counterparts, but we show that setting tight constrains on the density indices is very difficult and subject to many possible errors.

The local densities we derive from CS calculations are higher (up to one order of magnitude) than the mean densities we find via the mm-continuum. Such inhomogeneous density distribution reflects most likely the ubiquitous phenomenon of clumping and fragmentation in molecular clouds. Linewidth-mass relations show a departure from virial equilibrium in the stages of strongly collapsing cores.

Published in ApJ, **566**, *945*

Massive molecular outflows

H. Beuther(1) P. Schilke(1) T.K. Sridharan(3) K.M. Menten(1) C.M. Walmsley(3) F. Wyrowski(1,4)
(1)Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany, (2)Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, MS 78, Cambridge, MA 02138, USA, (3)Osservatorio Astrofisico di Arcetri, Largo E. Fermi, 50125 Firenze, Italy, (4)Department of Astronomy, University of Maryland, College Park, USA

Abstract:
With the aim of understanding the role of massive outflows in high-mass star formation, we mapped in the ^{12}CO ($J = 2 - 1$) transition 26 high-mass star-forming regions at very early stages of their evolution. At a spatial resolution of 11″ bipolar molecular outflows were found in 21 of them. The other five sources show confusing morphology but strong line wings. This high detection rate of bipolar structure proves that outflows common in low-mass sources are also ubiquitous phenomena in the formation process of massive stars. The flows are large, very massive and energetic, and the data indicate stronger collimation than previously thought. The dynamical timescales of the flows correspond well to the free-fall timescales of the associated cores. Comparing with correlations known for low-mass flows, we find continuity up to the high-mass regime suggesting similar flow-formation scenarios for all masses and luminosities. Accretion rate estimates in the $10^4 L_\odot$ range are around $10^{-4} M_\odot yr^{-1}$, higher than required for low-mass star formation, but consistent with high-mass star formation scenarios. Additionally, we find a tight correlation between the outflow mass and the core mass over many orders of magnitude. The strong correlation between those two quantities implies that the product of the accretion efficiency $f_{acc} = \dot{M}_{acc}/(M_{core}/t_{ff})$ and f_r (the ratio between jet mass loss rate and accretion rate), which equals the ratio between jet and core mass ($f_{acc} f_r = M_{jet}/M_{core}$), is roughly constant for all core masses. This again indicates that the flow-formation processes are similar over a large range of masses. Additionally, we estimate median f_r and f_{acc} values of approximately 0.2 and 0.01, respectively, which is consistent with current jet-entrainment models. To summarize, the analysis of the bipolar outflow data strongly supports current theories which explain massive star formation by scaled up, but otherwise similar physical processes – mainly accretion – to their low-mass counterparts.

Published in A&A, **383**, *892*

Design and characterization of 225-370 GHz DSB and 250-360 GHz SSB full height waveguide SIS mixers

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(1)Institut de Radio Astronomie Millimétrique, 300 rue de la Piscine, Domaine Universitaire de Grenoble, 38406 Saint-Martin d'Hères, France

Abstract:
We describe the design, construction, and characterization of two SIS mixers: a DSB mixer for the band 275−370 GHz, intended for band 7 of the ALMA frontend, and a SSB mixer, backshort tuned, intended for IRAM's Plateau de Bure interferometer, and covering the band $260 - 360$ GHz. These two mixers share various common design features, such as a wideband single ended probe transition from full height waveguide to microstrip, and they use the same mixer chip. A significant challenge, especially for the SSB mixer, has been to achieve not only low noise, but also stable operation over the design band. The receiver noise for the DSB mixer is found to be below 50 K over 100 GHz of RF bandwidth, with a minimum as low as 27 K (uncorrected) at 336 GHz. The SSB receiver has a measured image rejection of order −14 dB over the design band, and its noise remains below 80 K (effectively a SSB receiver noise value).

Appeared in the Proceedings of the Thirteenth International Symposium on Space Terahertz Technology, March 26-28, 2002, Cambridge, MA, USA.

FE model based interpretation of telescope temperature variations

Michael Bremer(1) and Juan Peñalver(2)
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Milimétrica (IRAM Granada), Avenida Divina Pastora 7, Núcleo Central E-18012 Granada, Spain

Abstract:
At the IRAM 30m telescope on Pico Veleta, Spain, an extended net of temperature sensors has been installed in 1996 and their data recorded since. A finite element (FE) model of the antenna has been used to analyse these measurements and to refine the sensor network. Details on the optimum choice of sensor locations will be presented, and how their readings are interpolated onto the model grid. From the model, structural deformations are obtained and converted into observable telescope parameters. These parameters, like focus, pointing and large-scale surface deformations, will be used to upgrade the real-time instrumental performance and to provide the astronomer with data for an eventual correction of observations.

Accepted for the Proceedings of the Workshop on Integrated Modeling of Telescopes, 5-7 February 2002, Lund, Sweden. Preprints: bremer@iram.fr

The Crab Nebula at 1.3 mm. Evidence for a new synchrotron component

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Abstract:
We present the results of 1.3 mm observations of the Crab Nebula, performed with the MPIfR bolometer arrays at the IRAM 30-m telescope. The maps obtained, of unprecedented quality at these wavelengths, allow a direct comparison with high-resolution radio maps. Although the spatial structure of the Crab Nebula does not change much from radio to millimetre wavelengths, we have detected significant spatial variations of the spectral index between 20 cm and 1.3 mm. The main effect is a spectral flattening in the inner region, which can be hardly explained just in terms of the evolution of a single population of synchrotron emitting electrons. We propose instead that this is the result of the emergence of a second synchrotron component, that we have tried to extract from the data. Shape and size of this component resemble those of the Crab Nebula in X-rays. However, while the more compact structure of the Crab Nebula in X-rays is commonly regarded as an effect of synchrotron downgrading, it cannot be explained why a similar structure is present also at millimetre wavelengths, where the electron lifetimes far exceed the nebular age. Our data, combined with published upper limits on spatial variations of the radio spectral index, also imply a low-energy cutoff for the distribution of electrons responsible for this additional synchrotron component. Although no model has been developed so far to explain the details of this component, one may verify that the total number of the electrons responsible for it is in agreement with what predicted by the classical pulsar-wind models, which otherwise are known to fail in accounting for the number of radio emitting electrons. This numerical coincidence can give indications about the origin of this component. We have also detected a spectral steepening at millimetre wavelengths in some elongated regions, whose positions match those of radio synchrotron filaments. The steepening is taken as the indication that magnetic fields in synchrotron filaments are stronger than the average nebular field.

Appeared in A&A **386**, *1044*

The structure and dynamics of the molecular envelope of M 2–56

Castro-Carrizo, A.([1]); Bujarrabal, V.([1]); Sànchez Contreras, C.([1]); Alcolea([1]), J.; Neri, R.([2])
([1])Observatorio Astronomico Nacional (IGN), Apdo. 1143, 28800 Alcala de Henares, Spain, ([2])IRAM, 300 rue de la Piscine, 38406, St-Martin-d'Hères, France

Abstract:
M 2–56 is a protoplanetary nebula (PPN) in which strong shocks are taking place, therefore, useful to study the post-AGB wind interaction. It is well known that molecular observations allow studying the mass distribution of PPNe, even in those regions that have been recently shocked. We present high-resolution maps of the emission of ^{12}CO J=2–1 and J=1–0 in M 2–56. Such maps show a bipolar, molecular nebula that extends $\sim 28''$ along the symmetry axis. The nebula is composed of two contiguous, incomplete shells located along the symmetry axis, which has an inclination of $\sim 17°$ with respect to the plane of the sky. Those empty lobes intersect in the center of the nebula, where there is a small and dense ring perpendicular to the axis. This central ring expands radially at about 8 km/s and seems to be the remnant of the circumstellar envelope of the AGB star, that has not been accelerated by the interaction with the fast post-AGB jets. The radius of the central ring is of $\sim 4\,10^{16}$ cm, for a distance of 2.1 kpc (deduced from an analysis of the main properties of the object). At $\sim 4\,10^{17}$ cm from the nebular center, the tips of the lobes reach axial expansion velocities of $\sim$ 200 km/s. We have developed a model for the spatio-kinematical distribution and the excitation conditions of the molecular gas in M 2–56. From the best fitting of the observations with the predictions of the model for both lines, we have estimated the physical conditions of the molecular nebula. It is found that the density varies from $5\,10^3$ to $0.6\,10^3$ cm^{-3} from the nebular center to the lobe tips, and that the part of the lobes that has not been detected is probably composed of photodissociated gas, due to the effect of interstellar photons on low-density regions. The rotational temperature is estimated to be approximately constant, $\sim 13-16$ K. For the assumed geometry, a velocity field composed by a

dominant radial component plus an axial contribution has been deduced. The emission of both lines is found to be optically thin, and therefore probes the whole molecular gas, which has a mass of ~ 0.05 $M_{\odot}$. The "scalar" momentum and the kinetic energy of the different regions of the molecular nebula have been calculated, finding that the high momentum won by the gas in the post-AGB phase cannot have been supplied by the radiation pressure mechanism. Although the central star of M 2–56 is not very hot yet ($\sim$ 20000 K), this PPN has a large kinematical age, between 1000 yr and 1700 yr, in comparison with other PPNe that have hotter central stars. M 2–56 may not be a typical PPN, but an intermediate object between the known low-mass post-AGB nebulae and the standard PPNe.

Appeared in: A&A **386**, *633*

New Preprints

566. SO AND SiO EMISSION AROUND THE YOUNG CLUSTER IN THE CB34 GLOBULE
C. Codella, F. Scappini, R. Bachiller, M. Benedettini
2002, *Mon. Not. R. Astron. Soc.*

567. THE STELLAR MASS TO LIGHT RATIO IN THE ISOLATED SPIRAL NGC 4414
O. Vallejo, J. Braine, A. Baudry
2002, *Astronomy and Astrophysics*

Appendix: Registration Form for the IRAM Interferometry School

(Grenoble area, September 30th to October 5th, 2002)

Interested scientists should complete the registration form (*if they have not already pre-registerd*) and send it to:

Mrs. Cathy Berjaud
Scientific Secretariat
IRAM
300, rue de la Piscine
F-38406 Saint Martin d'Hères
France
FAX: +33 476 51 59 38

You may also register by E-Mail to `berjaud@iram.fr`.
Please specify "Interferometry School 2002" in the subject field.

Name:
Institute:
E-Mail:

- I am interested in the IRAM Interferometry School 2002 and wish to receive further information: YES ○ NO ○
- I would like to present a poster: YES ○ NO ○
- I need financial support and add a CV and a reference: YES ○ NO ○
- Lodging preferences:
  Single room (might include a personal financial contribution) ○
  or a shared double room ○

If you would like to present a poster, please fill in the part below:

Poster Title:
Author(s):
Abstract (not more than 10 lines, please):

The IRAM Newsletter is edited by Michael Bremer at IRAM-Grenoble (e-mail address: `bremer@iram.fr`). In order to reduce costs we are now sending paper copies of this Newsletter to astronomical libraries only. The IRAM Newsletter is available in electronic form:

- by using the World Wide Web: from the IRAM home page (`http://iram.fr/`), click on item "Newsletter" and follow the links...
- by means of an anonymous `ftp` account, opened at IRAM for Internet users. To access those files, please connect through `ftp` to `iram.fr` (or `193.48.252.22`) and read the `README` file. Several subdirectories are available:

Directory	Contents
`/dist/newsletter`	Recent issues of this Newsletter (one subdirectory per issue)
e.g. `/dist/newsletter/jul95`	jul95.ps is the Postscript file for the July 1995 issue.
`/dist/doc`	Documentation on IRAM telescopes and software
`/dist/proposal`	Proposal forms and Latex files to aid proposal preparation
`/dist/soft`	distribution files for reduction software

- by means of an electronic mail file server installed at IRAM (on iraux2). This file server is a file distribution service that uses electronic mail facilities to deliver files. To communicate with it you should send a message to the electronic address:
  `listserv@iram.fr`
  On the first time you should send a message: `SUBSCRIBE IRAMNEWS` *your name*
  in order to subscribe to the mailing list IRAMNEWS. You will then receive an acknowledgement from the server. Then, for instance, to obtain a copy of the January 1999 issue, just send the one line message:
  `GET IRAMNEWS JAN99.PS`
  to the above electronic address. You will receive later a mail message containing the IRAM Newsletter in Postscript code. Please discard all the e-mail header information with a text editor, and send the file to a Postscript printer. More information may be obtained by sending the one line message:
  `HELP`
  Note that this file server also contains the proposal forms.

The e-mail list IRAMNEWS is used to send warning messages when the Newsletter is available, but also to provide fast information, if needed.
Please keep M. Bremer informed of any problem you may encounter.

IRAM Addresses:

	Address:		Telephone:	Fax:
Grenoble	Institut de Radioastronomie Millimétrique, 300 rue de la Piscine, Domaine Universitaire, 38406 St Martin d'Hères Cedex, France			
		from abroad:	(33) 476 82 49 00	(33) 476 51 59 38
		from France:	0 476 82 49 00	0 476 51 59 38
Plateau de Bure	Institut de Radioastronomie Millimétrique, Observatoire du Plateau de Bure, 05250 St Etienne en Dévoluy, France			
		from abroad:	(33) 492 52 53 60	(33) 492 52 53 61
		from France:	0 492 52 53 60	0 492 52 53 61
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