



# Report from the event supported by RadioNet

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**TITLE** *9TH IRAM 30M SUMMER SCHOOL (2019)*

**DATE:** *6-13 SEPTEMBER 2019*

**LOCATION:** *PRADOLLANO, GRANADA, SPAIN*

**MEETING WEBPAGE:** <https://www.iram-institute.org/EN/content-page-402-7-67-402-0-0.html>

**HOST INSTITUTE:** *INSTITUT DE RADIOASTRONOMIE MILLIMÉTRIQUE*

**RADIONET  
BENEFICIARY / NO:** *IRAM /03*

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# Report:

## 1 SCIENTIFIC SUMMARY

### 1.1 SCIENTIFIC SUMMARY

The IRAM 30m Summer School is an already mature event organized every two years by the Institut de Radioastronomie Millimétrique (IRAM) in the ski resort of Pradollano, in Sierra Nevada (close to the observatory site), at some 40 km of the city of Granada (Spain). The ninth edition took place on 6-13 September 2019. This periodical event is aimed at attracting new astrophysicists to current and future single-dish millimeter and submillimeter facilities.

The 30m Summer School combined topics on (sub)millimeter astronomy with technical lectures on instrumentation, observing techniques, and data processing and, very importantly, with observations carried out at the 30m telescope.

Lectures were given by experienced scientists<sup>1</sup> and 30m observers, covering a range of topics. As usual, besides general areas of interest (e.g. interstellar medium) we added a special lecture in hot topic: this year the lecture was on VLBI and the Event Horizon Telescope. The detailed list of lectures follows:

#### A. Science lectures

- **Basics of radio–astronomy**, by Itziar de Gregorio (ESO Chile)
- **Chemistry of the Interstellar Medium**, by Asunción Fuente (OAN, Madrid)
- **Evolved Stars**, by Guillermo Quintana–Lacaci (IFF–CSIC, Madrid)
- **Nearby Galaxies**, by Dario Colombo (MPIfR, Bonn)
- **Distant Universe**, by Stefano Berta (IRAM, Grenoble)
- **Dust emission in the universe**, by Juan Macías–Pérez (LPSC, Grenoble)
- **The thermal and kinetic Sunyaev–Zel’dovich effects in high resolution millimetre cameras**, by Juan Macías–Pérez (LPSC, Grenoble)
- **Solar System**, by Nicolas Biver (OBSPM, Paris)
- **Debris discs**, by Jean–Francois Lestrade (LERMA, OBSPM, Paris)
- **VLBI science and EHT**, by José Luis Gómez (IAA–CSIC, Granada)

#### B. Technical lectures

- **Calibration of single–dish data in mm wavelengths**, by Carsten Kramer (IRAM, Grenoble)
- **Heterodyne detection, from the sky to your computer**, by Christophe Risacher (IRAM, Grenoble)
- **Continuum cameras: NIKA2**, by Alessia Ritacco and Bilal Ladjelate (IRAM, Granada)
- **Spectral line observing strategies**, by Jerome Pety (IRAM, Grenoble)
- **Basic concepts of GILDAS/CLASS**, by Sebastien Bardeau (IRAM, Grenoble)
- **Calibration of spectroscopic data at the 30m**, by Jerome Pety (IRAM, Grenoble)
- **Dealing with position–position–velocity cubes**, by Sebastiean Bardeau (IRAM, Grenoble)
- **The NIKA2 pipeline: PIIC**, by Stefano Berta (IRAM, Grenoble), Alessia Ritacco and Bilal Ladjelate (IRAM, Granada)

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<sup>1</sup> We attempted to apply gender balance also for lecturers, but due to agenda reasons several women eventually declined the invitation. Hence the unbalanced final list.

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A very important aspect was the practical work at the telescope. The students, lecturers and technical assistants formed small groups to develop one science topic, preparing the science case, planning and conducting the observations at the telescope to implement the case, reduced and analyzed the data gathered at the telescope and finally presented the results on the last day of the school.

The groups were organized as follows:

Group I: **Chemistry of the interstellar medium** with Asunción Fuente and Bilal Ladjelate

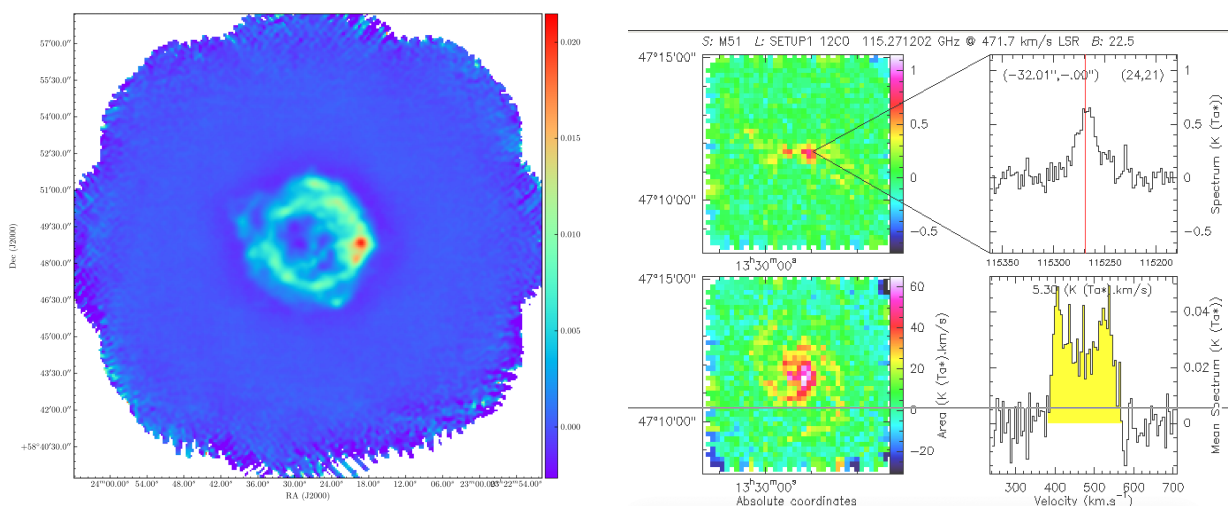
Group II: **Solar system** with Nicolas Biver and Gabriel Paubert

Group III: **Nearby galaxies** with Dario Colombo and Pablo Torné

Group IV: **Continuum observations** with Jean-Francois Lestrade and Alessia Ritacco

Group V: **Distant galaxies** with Stefano Berta and Miguel Sánchez-Portal

For the first time, the continuum camera NIKA2 was successfully used in the Summer School. The data was reduced with the IRAM-developed software suite PIIC (see Fig. 1 below).



**Figure 1:** **Left:** NIKA2 2mm image of the Cas A SN remnant processed by the Summer School students using PIIC. **Right:** M51  $^{12}\text{CO}(1-0)$  EMIR maps processed by the Summer School students using the GILDAS CLASS software.

Detailed information on the Summer School can be found at:

<https://www.iram-institute.org/EN/content-page-402-7-67-402-0-0.html>

The presentations can be found at:

[https://cloud.iram.es/apps/files/?dir=/Summer\\_School\\_2019&fileid=483994](https://cloud.iram.es/apps/files/?dir=/Summer_School_2019&fileid=483994)

## 1.2 RADIONET RELEVANCE

The connection of this event to RadioNet infrastructures is evident, since the course is geared towards preparing, carrying out and analyzing observations at the IRAM 30m telescope, one of the facilities within the RadioNet consortium.

## 1.3 IMPACT

This event plays a prominent role in the promotion of radioastronomy (specifically single dish millimeter astronomy), among new generations of scientists (mostly in European institutions – and many of them in RadioNet partner institutions). Therefore, not only IRAM, but the radioastronomy community at large, and specifically RadioNet institutions and facilities can benefit from the experience gathered by the students in this training event.

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The 30m Summer School has been often the seed of fruitful and successful careers. As an example, most of our research fellows passed by the School in their early careers.

The degree of satisfaction of the students with the School is very high, as demonstrated by the results of the “Satisfaction Survey” performed after the School (4.6/5, see below).

## 2 AGENDA OF THE EVENT

The detailed program of the event follows (can be also found at <https://www.iram-institute.org/EN/content-page-406-7-67-402-406-0.html> )

### Program of the 9th IRAM 30m Summer School

#### Friday September 6th

22:00 Reception and Dinner at the hotel Kenia

#### Saturday September 7th

08:00 Breakfast

09:00 Welcome and organization

09:30 **Concepts of mm-radioastronomy** by Itziar de Gregorio (1.5h) (chair: M. Sánchez)

11:00 Coffee Break

11:30 **Chemistry of the interstellar medium** by Asunción Fuente (2h)

13:30 Lunch

14:30–15:00 Working Groups: split-up

Working groups:

Group I: **Chemistry of the interstellar medium** with Asunción Fuente and Bilal Ladjelate

Group II: **Solar system** with Nicolas Biver and Gabriel Paubert

Group III: **Nearby galaxies** with Dario Colombo and Pablo Torné

Group IV: **Continuum observations** with Jean-Francois Lestrade and Alessia Ritacco

Group V: **Distant galaxies** with Stefano Berta and Miguel Sánchez-Portal

15:00–18:00 Working Groups

17:00 Coffee Break

20:30 Dinner

30m observations:

15:00–19:30 **Solar System group** with Nicolas Biver and Gabriel Paubert (bus leaves after the split-up, observations start at 15:00, return at ~19:45)

19:30–24:00 **Continuum observations group** with Jean-Francois Lestrade and Alessia Ritacco (bus leaves from hotel at 19:00, observations start at 19:30, return at ~00:15)

Each group has 4.5 hours of observing time. In addition, we reserved some backup time. For the 2nd group to leave for the observatory, the hotel is preparing a dinner box.

#### Sunday September 8th

08:00 Breakfast

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09:00 **Nearby galaxies** by Dario Colombo (Chair: P. Torné) (2h)

11:00 Coffee Break

11:30 **Heterodyne detection: from the sky to your computer**, by Christophe Risacher (1h)

12:30 **Continuum Cameras: NIKA2**, by Alessia Ritacco and Bilal Ladjelate (1h)

13:30 Lunch

15:00–18:00 Working Groups

17:00 Coffee Break

20:30 Dinner

30m observations:

15:00–19:30 **Nearby galaxies group** with Dario Colombo & Pablo Torné (bus leaves from the hotel at 14:30, observations start at 15:00, return at ~19:45)

19:30–24:00 **Distant galaxies group** with Stefano Berta & Miguel Sánchez (bus leaves from hotel at 19:00, observations start at 19:30, return at ~00:15)

## Monday September 9th

08:00 Breakfast

09:00 **Calibration of single dish data** by Carsten Kramer (1.25h) (Chair: A. Ritacco)

10:15 **The thermal and kinetic Sunyaev–Zel'dovich effects in high resolution millimetre cameras** by Juan Macías–Pérez (0.75h)

11:00 Coffee Break

11:30 **Spectral line Observing strategies** by Jerome Pety (1h)

12:30 **Basic concepts of GILDAS/CLASS** by Sebastien Bardeau (1h)

13:30 Lunch

15:00–18:00 Working Groups

17:00 Coffee Break

20:30 Dinner

30m observations (buses leave the hotel at 14:30 and 19:00):

15:00–19:30 **Chemistry group** with Asunción Fuente and Bilal Ladjelate

19:30–24:00 **Backup slot 1**

## Tuesday September 10th

08:00 Breakfast

09:00 **Distant Universe**, by Stefano Berta (2h) (chair: A. Bongiovanni)

11:00 Coffee Break

11:30 **Dust emission in the Universe**, by Juan Macías–Pérez (2h)

13:30 Lunch

15:00–18:00 Working Groups

17:00 Coffee Break

20:30 Dinner

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30m observations (busses leave at 14:30 and 19:00)

16:30–19:30 **Backup slot 2**

19:30–24:00 **Backup slot 3**

### Wednesday September 11th

08:00 Breakfast

09:00 **Evolved stars**, by Guillermo Quintana–Lacaci (1.5h) (chair: S. Berta)

10:30 Group Photo and Coffee Break

11:00 **Calibration of spectroscopic data at the 30m**, by Jerome Pety (1h)

12:00 **Solar System**, by Nicolas Biver (1.5h)

13:30 Lunch

14:30–24:00 Visit of Granada: Alhambra and more. At midnight the bus will leave Granada to return to Pradollano.

For those who do not wish to visit the Alhambra:

15:00–18:00 Working Groups

### Thursday September 12th

08:00 Breakfast

09:00 **Debris discs**, by Jean–Francois Lestrade (1h) (chair: M. Sánchez)

10:00 **Dealing with position–position–velocity cubes**, by Sebastien Bardeau (1h)

11:00 Coffee Break

11:30 **VLBI science and EHT**, by José Luis Gómez (1h)

12:30 **The NIKAZ pipeline: PIIC**, by Stefano Berta, Alessia Ritacco and Bilal Ladjelate (1h)

13:30 Lunch

15:00–18:00 Working Groups

17:00 Coffee Break

20:30 Aperitivo at the bar & Conference Dinner

### Friday September 13th

08:00 Breakfast

09:00 Work group presentations

12:00 Departure of Bus

## 3 PARTICIPANTS

The school was primarily meant for young scientists with little previous experience in mm-astronomy, although eventually no discrimination by age was applied. It was envisaged to limit the attendance to about 40 students, due to technical limitations. The selection was carried out by the SOC members, and the criteria took into consideration the applicants' scientific interests, experience, and references. Gender balance and other ethical issues were also carefully taken into account.

The event awoke interest among the community: we received 122 applications from 41 countries for 40 seats (i.e. an oversubscription factor of three!). Eventually we raised the accepted applicants' list to 42 students, from 24 countries (see table below; the largest number correspond to Spain – as

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expected since the largest number of applications came by far from the host country, followed by France and Italy). The age range of the accepted students was 24 – 42 yr, with a mean of 28.5yr and a median of 27. Regarding the gender, our final list included 25 women and 17 men (this somehow compensates the unbalanced lecturers' gender distribution).

**Distribution of nationalities of selected students**

Country	Number
Armenia	1
Belgium	1
Chile	2
China	1
Colombia	1
Denmark	1
France	3
Greece	1
India	2
Italy	3
Kazakhstan	1
Mexico	1
Morocco	1
Nepal	1
Nigeria	1
Poland	1
Portugal	1
Russia	2
Serbia	1
South Korea	1
Spain	11
United Kingdom	1
United States	1
Vietnam	1

**Distribution of nationalities of institutions of selected students**

Country	Number
Armenia	1
Brazil	2
China	1
Colombia	1
Denmark	1
France	7
Germany	8
Italy	2

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Kazakhstan	1
Mexico	1
Nigeria	1
Poland	2
Russia	2
Serbia	1
South Korea	1
Spain	11
United Kingdom	1
United States	1

### Results from the satisfaction survey

At the end of the 9th IRAM Summer School, we carried out a satisfaction survey among the participants. We got replies from 19 out of 42 students. Overall, we obtained a very positive feedback as the overall average score was **4.6 / 5** being 5 the highest mark available (ranging as usual from 1 = very dissatisfied to 5 = very satisfied).

The survey consisted of three blocks plus a free-input field. The three blocks and their average score were:

- 1.- General issues- Organization: information provided, communication with the organizers, general satisfaction, etc: **4.9 / 5**.
- 2.- Lectures and working groups: contents, program, computing, etc: **4.1 / 5**
- 3.- Logistics: transport, venue and meals: **4.9 / 5**

The outcome of the survey and the staff feedback show that the 9th IRAM Summer School was accomplished satisfactorily. The satisfaction survey provided useful information that will help the organizers to improve the futures IRAM Summer School editions.



Figure 2: official picture of the 9<sup>th</sup> IRAM Summer School. September, 2019. © Bilal Ladjelate

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#### **4 RADIO NET FINANCIAL CONTRIBUTION**

The RadioNet financial support of 1000€ was exclusively dedicated to supporting the attendance of 13 students.

Following the RadioNet rules, when assigning grants, we gave priority to applications from RadioNet partner institutions, followed by applications from institutions in developing countries.

#### **5 PUBLICATIONS**

No publication.

#### **6 CONFIRMATION:**

I hereby confirm authorization to publish this report incl. participants lists, statistic's details, pictures, etc.

Signed: Miguel Sánchez Portal  
Chair of the 9<sup>th</sup> IRAM 30m Summer School

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