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SEVENTH FRAMEWORK PROGRAMME

1. Document information

Document name: Report on the single dish mm-wave school

Type Other

WP 4 (New Skills)

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1.1 Dissemination Level

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

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2. Report

The 8th IRAM 30m summer school was held in the week September 11-18, 2015, in Pradollano in the Spanish Sierra Nevada. The school combined lectures on millimetre astronomy with observations using the 30m telescope. Lectures were given by experienced scientists and 30m observers, covering a range of topics, from comets and planetary atmospheres in the solar system to the study of the chemistry of interstellar clouds, low and high mass star formation, in the Milky Way, in nearby galaxies, and in ultra-luminous objects at high-redshifts. Lectures were complemented by shorter lectures on instrumentation, observing techniques, and data processing.

In addition to the lectures, the students, lecturers and technical assistants formed small groups of about 10 students each, to work on one topic, preparing a science case, conducting the observations with the 30m telescope, reduce the data, and present first results on the last day of the school.

The school has been aimed at attracting new astrophysicists to current and future single-dish millimetre and submillimetre facilities. And, the school was primarily meant for young scientists with little previous experience in mm-astronomy. It has been limited to 40 students who were selected on the basis of their interests, experience, and references. Due to one last-minute cancellation, 39 students participated in 2015, who were supported by a total of 13 lecturers and assistants.

The school ran over one week from Friday to Friday, with six days of about 4 hours of lectures per day, leaving ample time for the observations and for the group work. Both Fridays were arrival and departure days.

All information is given at the school webpage:

http://www.iram-institute.org/EN/content-page-308-7-67-308-0-0.html

2.1 Meeting programme

Friday September 11th
22:00 Reception and Dinner at the hotel Kenia

Saturday September 12th

08:00 Breakfast
09:00 Welcome and organization
09:10 **Chemistry of the Interstellar Medium** by Javier Goicoechea
11:00 Coffee Break
11:30 **Calibration of single dish data** by Carsten Kramer
13:30 Lunch
14:30-15:00 Working Groups: split-up

Group I: **Chemistry of the interstellar medium** with Javier Goicoechea and Sandra Trevino

Group II: **Solar system** with Nicolas Biver with Pierre Gratier

Group III: **Nearby galaxies** with Frank Bigiel with Claudia Marka

Group IV: **Distant galaxies:** Spectroscopy with Axel Weiss with Albrecht Sievers

15:00-18:00 Working Groups

30m observations:
15:00-19:30 **Chemistry group** with J.Goicoechea & S.Trevino
17:00 Coffee Break

19:30-24:00 **Solar System group** with N.Biver & P.Gratier

20:30 Dinner

Sunday September 13th
08:00 Breakfast
09:00 **Nearby galaxies** by Frank Bigiel (Chair: Claudia Marka)
11:00 Coffee Break
11:30 **Data processing with GILDAS** by Jerome Pety and Sebastien Bardeau
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 F.Bigiel & C.Marka
19:30-24:00 **Distant galaxies group** with A.Sievers

Monday September 14th
08:00 Breakfast
09:00 **Nearby galaxies** by Frank Bigiel (Chair: Israel Hermelo)
10:00 **Data processing with GILDAS II** by J. Pety, S. Bardeau, and P. Gratier
11:00 Coffee Break
11:30 **Continuum cameras** by Alexandre Beelen
13:00 **GILDAS updates** by Sebastien Bardeau
13:30 Lunch
15:00-18:00 Working Groups
17:00 Coffee Break
19:30 **GILDAS for experts** by Jerome Pety
20:30 Dinner

30m observations (buses leave the hotel at 14:30 and 19:00):
15:00-19:30 **Chemistry group** with J.Goicoechea & S.Trevino
19:30-24:00 **Distant galaxies group** with A.Weiss & A.Sievers

Tuesday September 15th

08:00 Breakfast
09:00 **Distant galaxies** by Axel Weiss (Chair: Albrecht Sievers)
11:00 Coffee Break
11:30 **Dust emission in the universe** by Alexandre Beelen
13:30 Lunch
15:00-18:00 Working Groups
17:00 Coffee Break
20:30 Dinner

30m observations (busses leave at 14:30 and 19:00)
16:30-19:30 **Nearby galaxies** with Frank Bigiel and Claudia Marka
19:30-24:00 **Solar system** with Nicolas Biver and Pierre Gratier

Wednesday September 16th
08:00 Breakfast
09:00 **Distant galaxies II** by Axel Weiss (Chair: Pierre Gratier)
11:00 Group Photo and Coffee Break
11:30 **Solar system by Nicolas Biver**
13:30 Lunch
14:30-24:00 Visit of Granada: Alhambra and more.

Thursday September 17th

08:00 Breakfast
09:00 **Prototypical regions: SgrB2 and OrionKL** by J. Goicoechea (Chair: S. Bardeau)
11:00 Coffee Break
11:30 **Comet 67P/Churyumov-Gerasimenko: The Rosetta mission** by Nicolas Biver
12:30 **NOEMA - The Northern Extended Millimeter Array** by Jerome Pety
13:30 Lunch
15:00-18:00 Working Groups
17:00 Coffee Break
20:30 Aperitivo at the bar & Conference Dinner

Friday September 18th
08:00 Breakfast
09:00 Work group presentations (Chair: Carsten Kramer)
12:00 Departure of Bus

2.2 Meeting Photo

2.3 Participants list

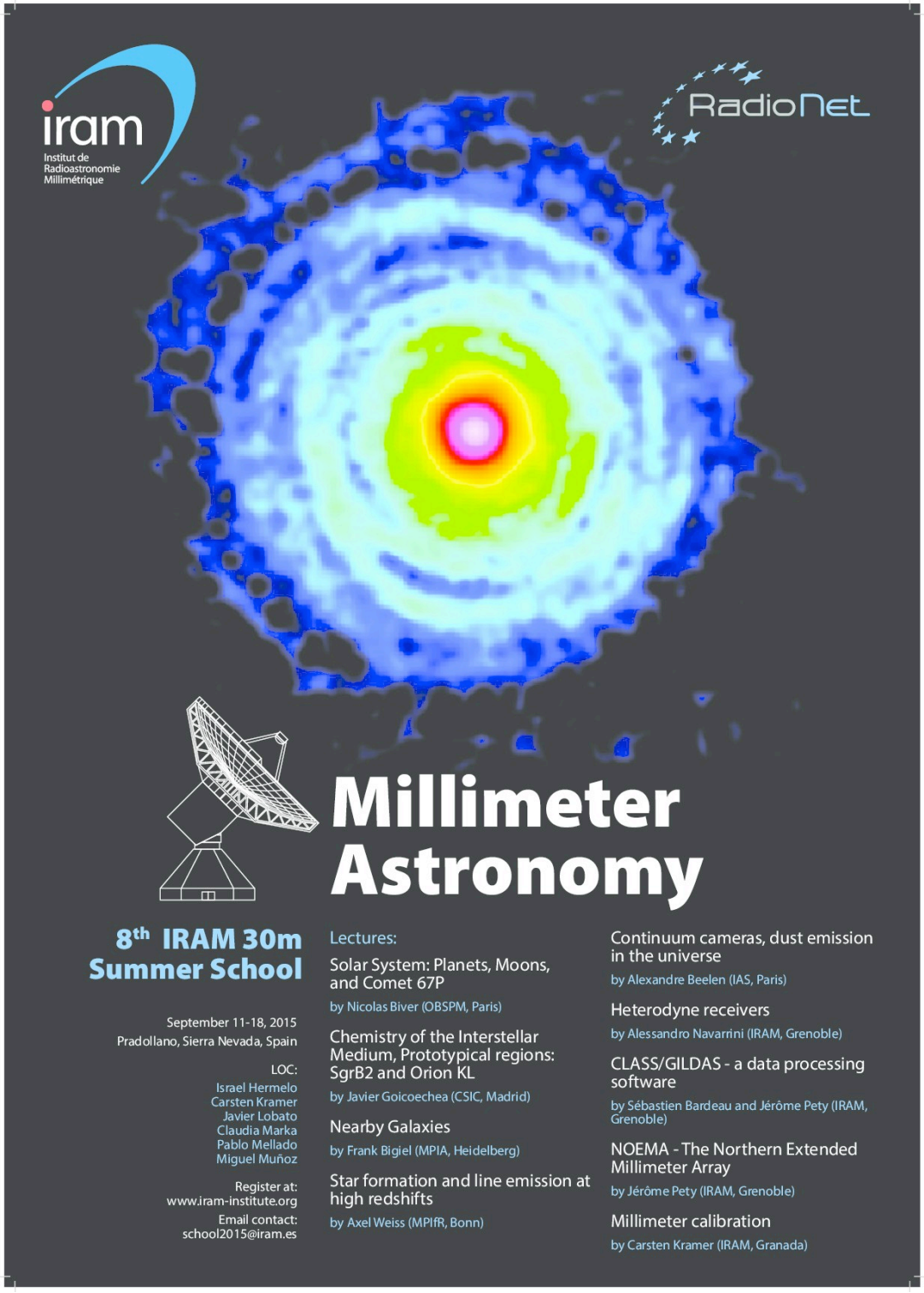
Students:

1. Katherine Alatalo (Caltech, USA)
2. Eleonora Bianchi (Observatorio Astrofisico di Arcetri, Italy)
3. Alejandro Borlaff (Instituto de Astrofisica de Canarias, Spain)
4. Ana Chacon-Tanarro (MPE, Garching, Germany)
5. Jennifer Cooper (Cornell University, USA)
6. Kerem Osman Cubuk (Erciyes University, Kayseri, Turkey)
7. Mario Dapra (VU Amsterdam, Netherlands)
8. Julie Djordjevic (University of Herfordshire, United Kingdom)
9. Alizee Duthu (LAB, Bordeaux, France)
10. Ozlem Erginoz (Istanbul University, Turkey)
11. Miguel Figueira (Laboratoire d'Astrophysique de Marseille, France)
12. Seiji Fujimoto (University of Tokyo, Japan)
13. Enrique Garcia Garcia (IPAG, Grenoble, France)
14. Maria Jesus Jimenez (Universitaet Heidelberg, Germany)
15. Camilo Jimenez (Universidad de la Laguna, Spain)
16. Umit Kavak (Universitaet zu Koeln, Germany)
17. Fridtjof Kerker (Gymnasium Aurich, Germany)
18. Won-Ju Kim (MPIfR, Bonn, Germany)
19. Andrey Khudchenko (SRON Groningen, Netherlands)
20. Iryna Kushniruk (Taras Shevchenko National University of Kyiv, Ucraine)
21. Bilal Ladjelate (CEA Saclay, France)
22. Liton Majumdar (LAB, Bordeaux, France)
23. Javier Alvarez Marquez (LAM, Marseille, France)
24. Tomonari Michiyama (NAOJ, Tokyo, Japan)
25. Naim Ramirez Olivencia (IAA-CSIC, Granada, Spain)
26. Jan Orkisz (ENS, Meudon, France)
27. Alberto Petriella (IAFE, Argentina)
28. Anastasiia Pienkina (LERMA, Observatoire de Paris, France)
29. Anna Punanova (MPE, Garching, Germany)
30. Johannes Puschnig (Stockholm University, Sweden)
31. Guido Roberts-Borsani (University College London, United Kindom)
32. Florian Ruppin (LPSC, Grenoble, France)
33. Isabel Santos Santos (Universidad Autonoma de Madrid, Spain)
34. Yuval Shoham (Technion, Israel)
35. Vlas Sokolov (MPE, Garching, Germany)
36. Vivien Thiel (MPIfR, Bonn, Germany)
37. Pablo Torne (MPIfR, Bonn, Germany)
38. Paulina Venegas (APEX, ESO, Chile)
39. Petr Zemlianukha (Institute of Applied Physics, Nizhny Novgorod, Russia)

Lecturers and technical assistants:

1. Javier Goicoechea (CSIC/Madrid, Spain)
2. Frank Bigiel (Univ. Heidelberg, Germany)
3. Alexandre Beelen (IAS/Paris, France)
4. Nicolas Biver (OBSPM/Paris, France)
5. Axel Weiss (MPIfR/Bonn, Germany)
6. Pierre Gratier (Observatoire de Bordeaux, France)
7. Jerome Pety (IRAM/Grenoble)
8. Sebastien Bardeau (IRAM/Grenoble)
9. Carsten Kramer (IRAM/Granada)
10. Sandra Trevino (IRAM/Granada)
11. Claudia Marka (IRAM/Granada)
12. Albrecht Sievers (IRAM/Granada)
13. Israel Hermelo (IRAM/Granada)

2.4 Scientific summary of the school



In preparation of the 8th IRAM 30m summer school 2015, we advertised the school at the IRAM homepage and had distributed the school poster (see above) to about 100 institutes around the world. We received about 91 applications, out of which we had to select 40 students. While the bulk of students came from the European Union, we had also several strongly motivated students from the Ukraine, Russia, Turkey, Israel, Japan, USA, Argentina, and Chile. For eleven of the students, we have applied for financial support by RadioNet3.

As usual, we offered a series of lectures on topical science topics, which have been addressed during the last few years at the 30m telescope, from distant galaxies, star forming clouds in the Milky Way, to comets in the solar system. In addition, we had a highlight lecture on very recent, highly complementary results obtained with the Rosetta mission to comet 67P. And, we had a presentation on the latest results obtained with the Northern Extended Millimetre Array NOEMA, showing also the latest on the ongoing installation of new antennas and receivers at the Plateau de Bure. All presentations were given by ten experienced 30m observers and recognized expert scientists in the field. And all presentations have been put online.

At the beginning of the week of school, we split-up into four groups of 8 to14 students. Each group prepared a science case, observed about 8 hours with the 30m telescope during two shifts, reduced and interpreted the data, and, at the last day of the school, presented their science case, and a first analysis of the data they took. Weather conditions were in general good. The students managed to produce very nice results including a map of a nearby star forming galaxy at only 11 Mpc distance. Each group was guided by one of the lecturers aided by one of the participating IRAM PhD students and postdocs.

At the pre-last day of the school, we distributed a one-sheet questionnaire to the students asking for anonymous feedback and their opinion and any recommendations for the future. More than half of the students filled-in this questionnaire, providing us at IRAM very useful information for future schools. On a scale of 1 (poor) to 10 (excellent), the average ratings for the lectures was 8.2, for the group work 8.0, for the program 8.5, for the general atmosphere 9.4, and the general organization 8.7. The especially high rating of the general atmosphere was also reflected in the many positive comments we received, on the questionnaire, but also during and after the school. Among the aspects we could improve on, several students mentioned that an interactive tutorial on the GILDAS data reduction software would be very useful, especially for newcomers.

2.5 Information of the EC financial contribution

RadioNet3 supported was the accommodation of 11 students and their school fee (see below), Additionally it has been used to cover the costs for renting of lecture hall, the salon for the group work, and the internet connections. The following 11 students received the support:

- Alejandro Serrano Borlaff (Spain)
- Angel Camilo Eduardo Jimenez (Spain)
- Karem Osman Cubuk (Turkey)
- Ozlem Erginoz (Turkey)
- Florian Bernard Ruppin (France)
- Iryna Kushniruk (Ukraine)
- Petr Zemlianukha (Russia)
- Seiji Fujimoto (Japan)
- Tomonari Michiyama (Japan)
- Naim Ramirez Olivencia (Spain)
- Isabel Maria Eugenia Santos Santos (Spain)

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