



Report from the event supported by RadioNet

TITLE IV Workshop on millimetre and sub-millimetre astronomy in Italy

DATE: 7-10 November 2017

LOCATION: Bologna, Italy

**MEETING
WEBPAGE:** <https://indico.ira.inaf.it/event/3/>

HOST INSTITUTE: INAF – Istituto di Radioastronomia (Italian node of the European ALMA Regional Centre)

**RADIONET
BENEFICIARY / NO:** INAF / 4

Report:

1. SCIENTIFIC SUMMARY

This workshop intended to bring together the Italian astronomical community interested in the field of (sub)millimetre research. The aim was to discuss scientific projects, carried out or to be carried out with ALMA or other instruments operating in the mm-band, and the interplay with instrumentation in other bands of the electromagnetic spectrum. Technical and instrumental developments were also an integral part of the meeting.

The meeting covered research from the nearby solar system to the distant universe, through 13 invited and 35 contributed talks. Participants also presented (32) posters.

The format of this workshop was different from that of the previous editions, in that much time was given to discussions on key scientific issues relevant to the astronomical community (astrophysical jets and outflows, star formation laws, instrumentation). At the initiative of the moderators, these took place not in parallel sessions as originally planned, but in plenary meetings, where phenomena in common to galactic and extra-galactic research were presented, confronted and discussed. This format worked particularly well and there was active participation in lively discussions. On two afternoons participants were offered the possibility to partake in a guided tour of the cryogenic laboratory at IASF, where they are working on the development of a receiver for ALMA Band 2+3.

One of the tasks set by the European ALMA Regional Centre (ARC) Network is the training of the next generation of mm-astronomers (and potential ALMA users) in the community “served” by each node in the network. Young post-docs and students (PhD and Masters) were therefore especially encouraged to attend; this was reflected in the choice of invited speakers (and to some extent also in the composition of the SOC). Many young astronomers did in fact participate.

Being organized by the Italian ARC-node, the Workshop was aimed at the Italian astronomical community working in (or interested in working in) the field of mm-astronomy. This includes non-Italians working at Italian institutes as well as Italians working abroad (PhD students, post-docs); see Sect. 3 for details.

Although the prime argument of the Workshop was to present and discuss research with ALMA and/or related radio- and (sub)mm facilities, one of the explicitly stated aims of this Workshop was to explore the synergy with facilities in other regions of the electromagnetic spectrum. Likewise we had a special session on technical and instrumental developments. We reserved much space for discussion on important issues that were in part defined by the participants themselves. These discussion sessions were intended not only to encourage the exchange of ideas, but also to stimulate collaboration.

The impact of this Workshop on the RadioNet community (or the radio astronomical community in general, for that matter) can of course be appreciated only in the fullness of time. Nevertheless, I believe it is safe to say that the exposure to such a large number of high-quality talks and posters, expounding beautiful and exciting new results from ALMA and related instruments, has planted a seed in the brains of the participants, that will grow with time and lead to a surge of collaborations, new projects, and new insights – especially, though not exclusively, for the younger among the participants. It is therefore with great anticipation that we may look forward the next edition in this series of Workshops, and discover what rich fruit will have spawned from these seeds of knowledge.

The web address of the workshop is <https://indico.ira.inaf.it/event/3/>

2. AGENDA OF THE EVENT

Tuesday 7.11.2017

- 13:40 Welcome
- 13:50 The Italian ARC
- 14:00 Session 1: ISM physics and chemistry in our Galaxy and in nearby galaxies. - Chairs: Kazi Rygl, Sandra Burkutean, Rosita Paladino**
- 14:00 Review on Galactic science -- invited
- 14:30 Revealing the magnetic fields in massive protostars
- 14:50 Large-scale flows in a cluster forming filament: the case of G351.77-0.51
- 15:10 Linear filaments in the Galaxy and star formation
- 15:30 Galactocentric variation of the gas-to-dust ratio and its relation with metallicity
- 15:50 coffee break + poster session 20m
- 16:10 Prebiotic molecules in interstellar space: rotational spectroscopy and quantum chemistry
- 16:30 Phosphorus in the interstellar medium: the missing prebiotic element
- 16:50 Review on extragalactic science -- invited
- 17:20 DustPedia: Dust and gas distribution in the galaxies of the Local Universe
- 17:40 Unveiling the inner morphology and gas kinematics of NGC 5135 with ALMA
- 18:00 APEX detection of molecular gas in ram-pressure stripped galaxies
- 18:20 ALMA observations of AGN fuelling. The case of PKS B1718-649¶

Wednesday 8.11.2017

- 09:00 **Session 1: ISM physics and chemistry in our Galaxy and in nearby galaxies. - Chairs: Kazi Rygl, Sandra Burkutean, Rosita Paladino**
- 09:30 The synergy between the near-IR and the millimeter to finally see the planet formation
- 09:50 A multi-wavelength view of planet forming regions: unleashing the full power of ALMA
- 10:10 Lupus disks with faint CO isotopologues: low gas/dust or high carbon depletion?
- 10:30 ALMA observations of pulsars
- 10:50 coffee break + poster session
- 11:10 Session 2: Evolution of galaxies and of their ISM. - Chairs: Giulia Rodighiero, Roberto Gilli**
- 11:10 Review on high-z science - invited
- 11:40 Review on high-z quasars - invited
- 12:10 The lensed galaxies SDP9 and SDP11
- 12:30 The impact of chemistry on internal structure of high-redshift galaxies
- 12:50 The ISM of the first galaxies as probed by [CII], [OIII], and CO line emission
- 13:10 Lunch + poster session
- 14:10 Review on star-forming galaxies - invited
- 14:40 The limits of sub-mm surveys as SFRH tracers
- 15:00 Rapidly-rotating molecular gas in a compact AGN-host galaxy at $z=2.226$ revealed by ALMA
- 15:20 Herschel-ATLAS: a reassessment of the size and magnification of a sample of 500 micrometer-selected strongly lensed galaxies
- 15:40 Multi-frequency polarimetry of a complete sample of PACO radio sources
- 16:00 Dust evolution within simulated galaxy clusters and panchromatic SEDs
- 16:20 coffee break + poster session
- 16:40 Discussion on session 1 (Chairs: Sergio Molinari and Leslie Hunt) and on session 2 (Chair: Marcella Brusa)

Thursday 9.11.2017

- 09:00 Session 3: Astrophysical jets and outflows. - Chairs: Andrea Giannetti, Marcello Giroletti, Elisabetta Liuzzo**
- 09:00 Review on galactic jets - invited
- 09:30 Protostars as cosmic-ray factories
- 09:50 Dischi e jet nelle stelle massicce giovani
- 10:10 ALMA resolves a disk-jet system around an O-type young star
- 10:30 The chemistry of protostellar jet-disk systems
- 10:50 Coffee Break + Poster session
- 11:10 Review on extragalactic jets - invited
- 11:40 Review on jets observed with mmVLBI - invited
- 12:10 3mm GMVA observations of total and polarised emission from blazar and radiogalaxy core regions
- 12:30 Molecular outflow and feedback in an obscured Quasar at $z \sim 1.5$ revealed by ALMA ¶ 20m
- 12:50 The AGN fueling/feedback cycle in Radio Galaxies observed with ALMA: the role of the molecular gas.
- 13:10 Fast outflow of molecular gas in the Seyfert galaxy IC 5063
- 13:30 Lunch + Poster session
- 14:30 Session 4: Italian instruments. - Chairs: Jan Brand, Marcella Massardi**
- 14:30 Review on "Receivers for Radio Astronomy" report -- invited
- 15:00 Review on the Sardinia Radio Telescope -- invited
- 15:30 ALMA Band 2+3 receiver -- invited
- 16:00 Sviluppo di ricevitori e componentistica millimetrica ad INAF-Osservatorio Astronomico di Cagliari
- 16:20 Super-Resolving Toraldo Pupils for Radio Astronomical Applications: current status and future prospects
- 16:40 Coffee Break + Poster session
- 17:00 Discussion on session 4 (Chair: Alessandra Zanichelli)
- 18:30 Visita laboratorio "cryowaves"
- 20.30 Social Dinner

Friday 10.11.2017

- 09:00 Session 3: Astrophysical jets and outflows. - Chairs: Andrea Giannetti, Marcello Giroletti, Elisabetta Liuzzo: Session 3: Astrophysical jets and outflows ¶**
- 09:00 Review on Event Horizon Telescope ¶ 30m
- 09:30 Simulations of instrumental effects for mm-VLBI observations ¶ 20m
- 09:50 Mapping black hole winds, from the event horizon up to galaxy scales ¶ 20m
- 10:10 Photoevaporation of molecular clumps in quasar outflows ¶ 20m
- 10:30 Coffee Break + Poster session 30m
- 11:00 Discussion on session 3 (Chair: Raffaella Morganti e Francesca Bacciotti) and Concluding remarks (Federica Govoni e Leonardo Testi) ¶ 2h
- 13:00 Lunch + Poster session 1h
- 14:00 Visita laboratorio "cryowaves" ¶

3. PARTICIPANTS

There were 116 participants at the workshop, 68 (58.6%) men and 48 (41.4%) women. Fifteen (12.9%) of the participants are employed outside Italy; these 9 men and 6 women came from 12 different institutes in 8 countries (6 from Germany, 2 from the Netherlands, 2 from Sweden, and 1 each from France, Spain, UK, USA, and Australia). From the remaining 101 participants, the majority (49) were affiliated with institutes in Bologna (including the University's Dept. of Chemistry); the others came from Florence (20), Rome (11), Padova (6), Cagliari (5), Pisa (4), Trieste (3), and Milan, Turin and Teramo (1).

The list of participants is Appendix 1.



4. RADIONET FINANCIAL CONTRIBUTION

The RadioNet support of €1750 was used as follows:

Daria Dall'Olio (female; Italian; Onsala, Sweden): max. €400

Eleonora Fiorellino (female; Italian; Rome): max. €250

Domenico Romano (male; Italian; Rome/Sydney): max. €150

Alessandro Navarrini (male; Italian; Cagliari): max. €75

Organizing Institute (Italian ALMA Regional Centre/INAF-Istituto di Radioastronomia; contribution catering costs): max. €875

5. PUBLICATIONS

All contributions, including the Posters, will appear on-line at

<https://zenodo.org/communities/itmmws-iv/>

where the proper RadioNet acknowledgements are included.

Appendix 1: The list of participants.

Sincerely,

Dr. Jan Brand
INAF-Istituto di Radioastronomia
Italian ALMA Regional Centre
(Local Organizing Committee)
Bologna, Italy

List of participants

Last_name	First_name	Institution
Antonietti	Nicolò	Adicomgroup, Torino
Bacciotti	Francesca	INAF-Oss. Astrof. di Arcetri Italy
Ballotta	Bernardo	Univ. di Bologna, Dipartimento di Chimica "G. Ciamician"
Balmaverde	Barbara	SNS-Scuola Normale di Pisa
Beltran	Maite	INAF-Oss. Astrof. di Arcetri
Bernardi	Gianni	INAF-IRA
Bianchi	Eleonora	INAF-Oss. Astrof. di Arcetri; Univ. di Firenze
Bianchi	Simone	INAF-Oss. Astrof. di Arcetri
Boccardi	Bia	Max-Planck-Institut fuer Radioastronomie, Bonn (D)
Bolli	Pietro	INAF-Oss. Astrof. di Arcetri
Bonato	Matteo	INAF-IRA & Italian ARC
Bragaglia	Angela	INAF-Oss. Astron. Bologna
Brand	Jan	INAF-IRA & Italian ARC
Bruni	Gabriele	INAF-IAPS
Brusa	Marcella	DIFA-Univ. di Bologna
Burigana	Carlo	INAF-IRA
Burkutean	Sandra	INAF-IRA & Italian ARC
Cane'	Elisabetta	Univ. di Bologna, Dip. di Chimica Industriale "Toso Montanari"
Casadio	Carolina	Max-Planck-Institut fuer Radioastronomie, Bonn (D)
Casasola	Viviana	INAF-Oss. Astrof. di Arcetri
Cazzoletti	Paolo	Max-Planck-Institute for Extraterrestrial Physics, Munich (D)
Cesaroni	Riccardo	INAF-Oss. Astrof. di Arcetri
Codella	Claudio	INAF-Oss. Astrof. di Arcetri
Colzi	Laura	Univ. di Firenze & INAF-Oss. Astrof. di Arcetri
Comastri	Andrea	INAF-Oss. Astron. di Bologna
Cresci	Giovanni	INAF-Arcetri
Cristallo	Sergio	INAF-Oss. Astron. d'Abruzzo
Cuttaia	Francesco	INAF-IASF-Bologna
D'Amato	Quirino	Univ. di Bologna
Daddi	Emanuele	CEA Univ. of Paris-Saclay (F)
Dall'Olio	Daria	Chalmers University - Onsala Space Observatory, Onsala (S)
Decarli	Roberto	INAF-Oss. Astron. Bologna
Decataldo	Davide	Scuola Normale Superiore
Di Lonardo	Gianfranco	Dipartimento di Chimica, Bologna
Elia	Davide	INAF-IAPS
Enia	Andrea	Univ. di Padova
Fedele	Davide	INAF-Oss. Astrof. di Arcetri
Fiorellino	Eleonora	INAF-IAPS
Fragnito	Francesco	INAF-IRA
Gallerani	Simona	Scuola Normale Superiore
Galluzzi	Vincenzo	DIFA, Univ. di Bologna & INAF-IRA
Garufi	Antonio	Universidad Autonoma de Madrid, Madrid (E)
Giannetti	Andrea	INAF-IRA & Italian ARC
Gilli	Roberto	INAF-Oss. Astron. di Bologna
Giovannini	Gabriele	DIFA-Univ. di Bologna
Giroletti	Marcello	INAF-IRA

Gitti	Myriam	DIFA, Univ. di Bologna
Gjergo	Eda	Univ. di Trieste, Department of Physics & INAF-OATS
Goddi	Ciriaco	Radboud Univ. Nijmegen & Leiden Observatory, Univ. Leiden (NL)
Govoni	Federica	INAF-Oss. Astron. di Cagliari
Gregorini	Loretta	INAF-IRA
Gruppioni	Carlotta	INAF-Oss. Astron. Bologna
Guidi	Greta	INAF Oss. Astrof. di Arcetri & Univ. di Firenze
Hunt	Leslie	INAF-Oss. Astrof. di Arcetri
Leurini	Silvia	INAF-Oss. Astron. di Cagliari
Liuzzo	Elisabetta	INAF-IRA & Italian ARC
Loiacono	Federica	Univ. di Bologna
Maccagni	Filippo	INAF-Oss. Astron. di Cagliari
Mancuso	Claudia	INAF-IRA & Italian ARC
Marchili	Nicola	INAF-IAPS
Maris	Assimo	Univ. di Bologna, Dip. di Chimica "Giacomo Ciamician"
Maris	Michele	INAF-Oss. Astron. di Trieste
Massardi	Marcella	INAF-IRA & Italian ARC
Massi	Fabrizio	INAF-Oss. Astrof. di Arcetri
Melloso	Mattia	Univ. di Bologna, Dip. di Chimica "Giacomo Ciamician"
Mignani	Roberto	INAF-IASF Milano
Miotello	Anna	ESO (European Southern Observatory; Munich, D)
Molinari	Sergio	INAF-IAPS
Moretti	Alessia	INAF-Oss. Astron. Padova
Morgante	Gianluca	INAF-IASF Bologna
Morganti	Raffaella	ASTRON and Kapteyn Inst., Groningen (NL)
Moscadelli	Luca	INAF-Oss. Astrof. di Arcetri
Nanni	Riccardo	INAF-Oss. Astron. di Bologna
Navarrini	Alessandro	INAF-Oss. Astron. di Cagliari
Nisini	Brunella	INAF-Oss. Astron. Roma
Olmi	Luca	INAF-Oss. Astrof. di Arcetri
Orfei	Alessandro	INAF-IRA
Orienti	Monica	INAF-IRA
Orlati	Andrea	INAF-IRA
Padovani	Marco	INAF-Oss. Astrof. di Arcetri
Paiella	Alessandro	Univ. Sapienza di Roma & INFN-Roma1
Paladino	Rosita	INAF-IRA & Italian ARC
Pallottini	Andrea	Centro Fermi, Roma
Pezzuto	Stefano	INAF-IAPS
Podio	Linda	INAF-Oss. Astrof. di Arcetri
Puzzarini	Cristina	Univ. di Bologna
Renzini	Alvio	INAF-Oss. Astron. di Padova
Ricciardi	Sara	INAF-IASF Bologna
Rivilla	Victor M.	INAF-Oss. Astrof. di Arcetri
Rodighiero	Giulia	Univ. di Padova
Rodriguez-Muñoz	Lucia	Univ. di Padova
Romano	Domenico	Univ. of New South Wales (Sydney) / INAF-Tor Vergata (Roma)
Ruffa	Ilaria	Univ. of Bologna & INAF-IRA
Rygl	Kazi	INAF-IRA
Sabatini	Giovanni	Univ. di Bologna & Italian ARC

Salvestrini	Francesco	Univ. di Bologna
Sandri	Maura	INAF-IASF Bologna
Sanna	Alberto	Max-Planck-Institut fuer Radioastronomie, Bonn (D)
Saro	Alex	INAF-Oss. Astron. Trieste
Schisano	Eugenio	INAF-IAPS
Sciarratta	Mauro	Dip. Fisica e Astronomia, Univ. di Padova
Serra	Paolo	INAF-Oss. Astron. di Cagliari
Spada	Lorenzo	Scuola Normale Superiore - Pisa
Talia	Margherita	DIFA, Univ. di Bologna
Tamassia	Filippo	Univ. di Bologna, Dip. di Chimica Industriale "Toso Montanari"
Tazzari	Marco	Institute of Astronomy, University of Cambridge, Cambridge (UK)
Terenzi	Luca	INAF-IASF Bologna
Testi	Leonardo	INAF-Oss. Astrof. di Arcetri & ESO (Munich, D)
Toci	Claudia	INAF-Oss. Astrof. di Arcetri & Univ. di Firenze
Tombesi	Francesco	Univ. di Roma, Tor Vergata, NASA/GSFC, Univ. of Maryland (USA)
Trafficante	Alessio	INAF-IAPS
Trombetti	Tiziana	INAF-IRA
Vallini	Livia	NORDITA (KTH & Stockholm University) (S)
Vergani	Daniela	INAF-IASF Bologna
Villa	Fabrizio	INAF-IASF Bologna
Zanichelli	Alessandra	INAF-IRA

Dr. Jan Brand,
 Coordinator of the Italian ALMA Regional Centre
 and member of the organizing committee
*IVth Workshop on millimetre and sub-millimetre
 astronomy in Italy*