

## ***REPORT ON THE RADIONET3 NETWORKING ACTIVITY***

**TITLE: POLARIZATION WITH ALMA (SCHOOL/WORKSHOP)**

**DATE:** *25-28 JUNE 2013*                      **TIME:** (WHOLE DAY)

**LOCATION:** *BOLOGNA, ITALY*

**MEETING WEBPAGE** *<http://www.alma.inaf.it> and follow link in 'meetings & talks'*

**HOST INSTITUTE:** *ITALIAN ALMA REGIONAL CENTRE, INAF-ISTITUTO DI RADIOASTRONOMIA*

**PARTICIPANTS NO:** *24*

## REPORT:

### 1. Agenda of the meeting

See Appendix 1.

### 2. Scientific Summary

The Atacama millimeter and sub-millimeter array (ALMA) is presently under construction. Even though the number of antennas, receivers, and available array configurations have not yet reached their final range, ALMA is already much more powerful than any other existing instrument operating at these wavelengths. Therefore, so-called Early Science (ES) operations have started in September 2011. Starting with Cycle 2 of ES (June 2014) the possibility to carry out polarimetric observations is likely to be available, and the phase of commissioning and science verification (CSV) for this type of observations has started. We therefore considered it was time to bring together those people in the ALMA Regional Centre (ARC) network who are interested in such observations, and to interact with people who know the instrumental properties and with those who are working on the data reduction tasks. The result was a four-day meeting, organized by the Italian ARC and held at the ARC's home institute (INAF-Istituto di Radioastronomia) in Bologna. Several experts were invited, to wit: Fomalont, Moellenbrock, Nagai, and Vlemmings (see App. 2); all accepted.

The meeting consisted of two parts: a two-day "School" to review the main issues of millimeter-band polarization, the ALMA properties and the CASA (the software of choice to reduce ALMA data) algorithms to address data reduction in polarization. The "School"-part included a hands-on tutorial on ALMA polarization data reduction, in which the participants worked with actual ALMA CSV data. The last two days were taken up by a dedicated "Workshop", to discuss which activities could be and/or are already being undertaken by the European ARC-nodes, how we could better coordinate them, and how we can make relevant contributions to the activities in this area of the ALMA Observatory. This part consisted of several presentations by the experts working on ALMA polarization CSV tasks, followed by discussion sessions, co-chaired by one of the topical experts present. At the end we reached consensus on a list of 'to do' action items, with priorities, for the near future (the next 6 months), and a set of objectives for the development of polarimetric observations with ALMA on the long term (ES Cycle 3). The meeting was generally seen by all participants as timely, stimulating and very useful.

The geographical distribution of the 24 participants was as follows:

France: 5; Germany: 4; Italy: 9; Japan: 1; Sweden: 1; UK: 2; USA: 2

Fourteen (58%) participants could be classified as 'young researchers or students'; ten (42%) participants were women.

### 3. Attendance list (incl. participant names, affiliation and country) signed by the participants and confirmed by the organizer

See Appendix 2.

### 4. Financial Report / RadioNet3 contribution

Maximum total contribution of 1600 euro (WP4), divided as follows:

Dr. Wouter Vlemmings (Invited speaker; Onsala Space Observatory, Chalmers Univ. of Technology, Sweden): a maximum of 1000 euro for expenses (transport, accommodation, meals);

Dr. Gaelle Dumas (IRAM, Grenoble, France): 300 euro towards expenses made;

Marta Alves (Institut d'Astrophysique Spatiale, Paris, France): 300 euro towards expenses made.

The actual amount spent by RadioNet can only be determined after all recipients have sent in their claim forms.

### 5. Conference Proceedings and Web page

The talks presented at the School and Workshop are available on the meeting's webpage (<http://www.alma.inaf.it>, and follow the link in 'Meetings & Talks'). The sessions during the first day of the School have been recorded (video & audio) and will be made available on the website after editing.

## Appendix 1

### Polarization with ALMA School & Workshop – 25-28 June 2013, Bologna Programme of the meeting

#### School part:

Tuesday, 25/6

10:00 - 10:05 Introduction [Brand]

10:05 - 11:25 [ALMA polarimetry - from astronomical sources to correlated data](#) [Fomalont]

11:35 - 12:00 Coffee/Tea break

12:00 - 13:20 [Synthesis polarimetry fundamentals for ALMA](#) [Moellenbrock]

13:30 *Lunch*

14:30 - 16:00 ALMA polarimetry calibration in CASA [Moellenbrock]

Wednesday, 26/6

10:00 - 13:20 Hands-on practical tutorial using ALMA data [Fomalont, Moellenbrock, Nagai].  
Coffee/Tea break at about 11:15 (ca. 20 min)

13:30 *Lunch*

#### Workshop part:

Thursday, 27/6

10:00 - 10:10 Introduction [Massardi]

10:00 - 13:30 Science session (chair: Brand), with

10:10 - 11:00 [Polarization science with ALMA](#) [Vlemmings]

11:00 - 11:20 *Coffee/Tea break*

11:20 - 11:50 [Synchrotron polarization with ALMA](#) [Laing]

11:50 - 12:20 [Extended extragalactic source polarization with ATCA and perspectives for ALMA](#) [Massardi]

12:20 - 12:50 [Recent ALMA polarization commissioning results and remaining questions](#) [Nagai]

12:50 - 13:20 Discussion session (co-chair: Vlemmings) on polarization science topics and proposal preparations: collection of polarization-related science cases that will be of general interest, what is needed for them in ALMA/AOT/CASA? Ideas/Caveats for proposal submission for polarization (i.e. what to know to give useful support in phase 1).

13:30 *Lunch*

14:30 - 18:00 Commissioning activities session (chair: Mignano), with:

14:30 - 15:00 [Anticipated ALMA polarization commissioning activities leading to the already defined Cycle-2 polarization observing limitations](#) [Fomalont]

15:00 - 15:30 [A search for a line polarization calibration catalogue for ALMA](#) [F.Alves]

15:30 - 16:00 [Ancillary databases in polarization of extragalactic sources](#) [M. Massardi]

16:00 - 16:20 *Coffee/Tea break*

16:20 - 18:00 Discussion session (co-chair: Richards) on polarization commissioning activities/status with particular emphasis on calibration issues. Finding suitable polarization calibrators. Collaboration on observations activities also with other telescopes. Collection of suggestions for science verification science cases.

20:00 *Social dinner at the "Trattoria Belle Arti"*

Friday, 28/6

10:00 - 13:30 CASA and organizative future plans session (chair: Boissier), with:

10:00 - 10:30 [Summary talk on status & plans for polarization in CASA \[Moellenbrock\]](#)

10:30 - 13:20 Continuing Discussion session (co-chair: Laing) on polarization commissioning activities/status with emphasis on organizational issues in the next months and beyond. Discussion session on polarization algorithms, reduction strategies; looking beyond Cycle-2 pol. observations. Discussion to motivate a collaboration on algorithm/reduction activities over the next 9 months and beyond, as the relatively conservative Cycle-2 capabilities are expanded, and reduction strategies and methods are refined. Coffee/Tea break at about 11:00 (ca. 20min)

13:30            *Lunch*

14:30 - 17:00 Summing-up and future plans session (chair: Massardi), with:

14:30 - 17:00 Discussion session (co-chair: Andreani) about what has to be done on short term and polarization-related efforts and assignment for short term activities. Interaction between ARCs/JAO/CSV. General ideas on long-term program. Coffee/Tea break at about 15:45 (ca. 20min).

Note: the affiliations of the speakers can be found in Appendix 2 (list of participants)

## Appendix 2

### Polarization with ALMA School & Workshop – 25-28 June 2013, Bologna

#### Attendance list

Ed Fomalont	NRAO	Charlottesville (VA)	USA
George Moellenbrock	NRAO	Charlottesville (VA)	USA
Hiroshi Nagai	NAOJ	Mitaka	Japan
Andy Biggs	ESO	Garching	Germany
Paola Andreani	ESO	Garching	Germany
Robert Laing	ESO	Garching	Germany
Felipe Alves	Argelander-Institut für Astronomie	Bonn	Germany
Gaelle Dumas	IRAM	Grenoble	France
Doris Arzoumanian	Institut d'Astrophysique	Paris	France
Andrea Bracco	Institut d'Astrophysique	Paris	France
Marta Alves	Institut d'Astrophysique	Paris	France
Lapo Fanciullo	Institut d'Astrophysique	Paris	France
Anita Richards	Jodrell Bank Centre for Astrophysics	Manchester	UK
Tom Muxlow	Jodrell Bank Centre for Astrophysics	Manchester	UK
Wouter Vlemmings	Onsala Space Station	Göteborg	Sweden
Jeremie Boissier	Istituto di Radioastronomia	Bologna	Italy
Jan Brand	Istituto di Radioastronomia	Bologna	Italy
Marisa Brienza	Istituto di Radioastronomia	Bologna	Italy
Viviana Casasola	Istituto di Radioastronomia	Bologna	Italy
Andrea Giannetti	Istituto di Radioastronomia	Bologna	Italy
Elisabetta Liuzzo	Istituto di Radioastronomia	Bologna	Italy
Marcella Massardi	Istituto di Radioastronomia	Bologna	Italy
Arturo Mignano	Istituto di Radioastronomia	Bologna	Italy
Rosita Paladino	Istituto di Radioastronomia	Bologna	Italy

List confirmed by the organizers.