

REPORT ON THE RADIONET3 NETWORKING ACTIVITY

TITLE: WORKSHOP ON MM-VLBI WITH ALMA

DATE: 22-23 JANUARY 2015 **TIME:** (WHOLE DAY)

LOCATION: BOLOGNA, ITALY

MEETING WEBPAGE http://www.alma.inaf.it/index.php/Workshop_on_mm-VLBI_with_ALMA

HOST INSTITUTE: INAF, Bologna

PARTICIPANTS NO: 73

MAIN LEADER: INAF

REPORT:

1. Agenda of the meeting

The 2-day workshop consisted of a public session on day 1 and a closed discussion session on day 2 (details below). The program for the open session is attached. There were 11 invited (“I”) presentations and 8 contributed (“C”) talks. In addition, there were 13 poster papers.

2. Scientific Summary

The motivation for organizing this workshop was the fact that soon ALMA will be included into a global network bringing unprecedented sensitivity to what are already observations of the highest achievable resolution. The Institute of Radio Astronomy, which hosts the Italian ARC node, has been a participant in EVN, the European (radio) VLBI network, since the beginning, contributing with two radio telescopes (at Medicina and Noto), and soon with a third antenna, the Sardinia Radio Telescope (SRT). The SRT is designed to go up to 100GHz and could therefore in principle also be a future element in the mm-VLBI network. Because of these roots, the Italian ARC node is interested in playing an active role in the mm- VLBI with ALMA project, as are several other nodes in the EU network. Indeed, other nodes are already involved in mm-VLBI.

The fact that an international consortium is presently constructing a beamformer for ALMA, the recent publication of two white papers (Fish et al., Tilanus et al.) presenting a wide range of science cases for mm-VLBI with ALMA, and knowing that it is suggested that mm-VLBI with ALMA might be operational from Cycle4 onwards (2016) made this a good moment to bring together the various interested groups to present the science that can be done and to discuss the strategies and the policies necessary to bring this about. In addition, the ARC-nodes wanted to discuss the role that the ARC nodes could (or would be required to) play, support-wise, in this.

We therefore invited people with a broad range of interests and responsibilities (representatives of the ALMA project, contributors to the white papers, representatives of the EU ARC-nodes, people involved in the science and the hardware of mm-VLBI) to participate in a 2-day workshop. The first day was dedicated to the science of mm-VLBI in the broadest sense and was open to all interested astronomers. The second day was by invitation only. About 30 people discussed the political, organizational, logistical and scientific aspects of the inclusion of ALMA in a global mm-VLBI array. The discussion was guided by a list of issues, arguments, questions and suggestions compiled by the SOC and distributed beforehand to the participants. A document, summarizing the outcome of the discussions, is being drafted and will be sent to the various committees involved in the decision-making chain.

There were 73 registered participants (54 men, 19 women), with the following distribution in country of origin: Italy (25), Germany (18), Netherlands (6), Spain and USA (4), UK and Sweden (3), France, Japan and Russia (2), Finland, Chile, Taiwan and South Korea (1).

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

The list of participants is attached.

4. Financial Report / RadioNet3 contribution

RadioNet3 sponsored this workshop up to a maximum of 2750 euro (WP3) and 1500 euro (WP5).

These funds were used for support on participants and for logistics.

The following participants have applied for and received financial support (with a maximum of 300 euro per person, WP3): Ivan Agudo (JIVE, NL); Taehyun Jung (Korea Astronomy & Space Science Institute, S. Korea).

5. Conference Proceedings and Web page

The presentations (pdf format) are made available on the workshop webpages:

http://www.alma.inaf.it/index.php/Workshop_on_mm-VLBI_with_ALMA

At the moment of writing we are still waiting for two of the speakers to grant permission to link their presentations on our website.

Thursday, 22 January 2015 - Open Sessions

08.30 - 09.15 *Registration*
09.15 - 09.30 *Welcome* -- J. Brand

09.30 - 11.00 First Session -- Chair: J. Brand

09.30 - 10.00 *The Event Horizon Telescope: Imaging and Time-Resolving a Black Hole* -- S. Doleman (I)
10.00 - 10.30 *European efforts towards the EHT* -- C. Goddi (I)
10.30 - 11.00 *The ALMA Phasing Project: Motivations and Status* -- V. Fish (I)

11.00 - 11.30 *Coffee Break - Posters*

11.30 - 12.45 Second Session-- Chair: G. Giovannini

11.30 - 12.00 *Review on BLAZARS Science with mm-VLBI* -- M. Giroletti (I)
12.00 - 12.15 *Probing the innermost regions of AGN jets with RadioAstron and mm-VLBI at tens of microarcsec resolution* -- J. Gomez (C)
12.15 - 12.30 *Resolving the Jet-Launching region in NGC1052* -- M. Kadler (C)
12.30 - 12.45 *Imaging AGN at highest frequencies and resolution* -- T. Krichbaum (C)

12.45 - 13.45 *Lunch - Posters*

13.45 - 15.50 Third Session-- Chair: L. Feretti

13.45 - 14.05 *Pulsars Science with a phased ALMA* -- M. Kramer (I)
14.05 - 14.35 *Maser Science with mm-VLBI* -- F. Colomer (I)
14.35 - 14.50 *Sub-mm maser VLBI: how do stellar winds break free from the star's gravity?* -- A. Richards (C)
14.50 - 15.05 *VLBA monitoring of SgrA* during the G2 encounter* -- A. Rushton (C)
15.05 - 15.20 *The ALMA 64-antenna correlator to phase up the ALMA array, status and perspective* -- A. Baudry (I)
15.20 - 15.35 *VLBI with IRAM/NOEMA* -- F. Gueth (I)
15.35 - 15.50 *Multi-frequency VLBI telescopes and synergy with ALMA* -- T. Jung (I)

15.50 - 16.20 *Coffee Break - Posters*

16.20 - 17.45 Fourth Session-- Chair: E. Liuzzo

16.20 - 16.35 *EHT-J Activities and new imaging technique with sparse modeling* -- F. Tazaki (C)
16.35 - 16.50 *Next generation mm-VLBI equipment* -- R. Tilanus (C)
16.50 - 17.05 *Solving the polarization problem in ALMA-VLBI observations* -- I. Marti-Vidal (C)
17.05 - 17.25 *Joint Observations of ALMA with GMVA* -- E. Ros (I)
17.25 - 17.45 *US perspective on mm-VLBI* -- C. Lonsdale (I)

17.45 - 18.05 Open discussion session-- Chair: E. Liuzzo

List of posters:

- I. Agudo - Changes in Sgr A*'s accretion flow through Faraday rotation measures at mm wavelengths: An update of mm-VLBI and single dish results.
- K. Asada - VLBI and mm/submm interferometric studies on M 87.
- S. Asadi - *Hunting for dark halo substructure using submilliarcsecond-scale observations of macrolensed radio jets.*
- T. Boller - Black hole imaging as GR tests in the GC.
- L. Humphreys- Extragalactic Water Masers and mmVLBI
- S. Koyama - Off-jet axis structure of blazars with mm/sub-mm VLBI.
- R. Lu - *Imaging an event horizon: mitigation of structure variability of Sgr A*.*
- D. Petry - FITS IDI for VLBI in CASA.
- V. Rivilla - *Constraining the non-thermal emission from young stars in Orion.*
- A. Rudnitskiy - "Millimetron" Project: *Space-VLBI Capabilities Overview.*
- K. Rygl - Gaia and VLBI: new possibilities for the celestial reference frame.
- R. Schulz - *Centaurus A: High-Resolution Imaging of the AGN in our Backyard.*
- I. van Bemmel - Data processing for mm-VLBI observations.

Participants "mm-VLBI with ALMA"

Alberdi	Antxon	(IAA-CSIC, Spain)
Agudo	Ivan	(JIVE, NL)
Andrianov	Andrey	(Astro Space Center, Ru)
Arcidiacono	Carmelo	(INAF-Osservatorio Astronomico di Bologna)
Asada	Keiichi	(ASIAA, Taiwan)
Asadi	Saghar	(Department of Astronomy, Stockholm University)
Baudry	Alain	(University of Bordeaux, OASU/LAB)
Biggs	Andy	(ESO)
Boller	Thomas	(MPE Garching)
Brand	Jan	(INAF/IRA,Bologna; Italian ARC)
Bruni	Gabriele	(MPIfR)
Carnerero Martin	Maria Isabel	(INAF-Osservatorio Astrofisico di Torino)
Casasola	Viviana	(INAF/IRA,Bologna; Italian ARC)
Colomer	Francisco	(Instituto Geografico Nacional (IGN-OAN), Spain)
Cox	Pierre	(JAO, Santiago Chile)
Dallacasa	Daniele	(DIFA - UniBO)
D'Ammando	Filippo	(INAF-IRA, Unibo)
de Graauw	Thijs	(ESO; LPI-ASC; USP-IAG)
Doeleman	Shep	(SAO/MIT, USA)
Feretti	Luigina	(INAF/IRA,Bologna)
Fish	Vincent	(MIT Haystack Observatory, USA)
Galluzzi	Vincenzo	(INAF Bologna)
Giovannini	Gabriele	(Bologna University & IRA/INAF)
Gioiretti	Marcello	(INAF Istituto di Radioastronomia)
Goddi	Ciriaco	(Radboud University Nijmegen, NL)
Gomez	Jose L.	(Instituto de Astrofisica de Andalucia - CSIC)
Gregorini	Loretta	(University of Bologna)
Gueth	Frederic	(IRAM)
Hughes	David	(Instituto Nacional de Astrofisica,Optica y Electronica)
Humphreys	Liz	(ESO)
Iono	Daisuke	(NAOJ, Japan)
Jung	Taehyun	(Korea Astronomy & Space Science Institute)
Kadler	Matthias	(Univ. Wuerzburg)
Koyama	Shoko	(MPIfR Bonn)
Kramer	Michael	(MPI fuer Radioastronomie)
Krichbaum	Thomas	(MPIfR)
Laing	Robert	(ESO)
Lico	Rocco	(Universita' di Bologna & IRA/INAF)
Liuzzo	Elisabetta	(INAF/IRA,Bologna; Italian ARC)
Lonsdale	Colin	(MIT Haystack Observatory)
Lu	Rusen	(MPIfR Bonn)
Mantovani	Franco	(Istituto di Radioastronomia, Bologna)
Marcelino	Nuria	(INAF/IRA,Bologna; Italian ARC)
Marti-Vidal	Ivan	(Onsala Space Observatory)
Massardi	Marcella	(INAF/IRA,Bologna; Italian ARC)
Moscadelli	Luca	(INAF - Osservatorio Astrofisico di Arcetri)
Muehle	Stefanie	(German ARC node, Argelander Institute for Astronomy)
Muxlow	Tom	(Jodrell Bank Centre for Astrophysics, UK)
Orienti	Monica	(INAF-IRA)
Paladino	Rosita	(Bologna University; INAF/IRA,Bologna; Italian ARC)
Pasqua	Antonio	(Universita' di Trieste)
Petry	Dirk	(ESO)
Prandoni	Isabella	(IRA - INAF)
Richards	Anita	(JBCA, Manchester UK)
Rivilla	Victor M.	(Osservatorio Astrofisico di Arcetri)
Ros	Eduardo	(MPIfR)
Rossi	Andrea	(INAF-IASFB0)
Rudnitskiy	Alexey	(Astro Space Center, Ru)
Rushton	Anthony	(Oxford University, UK)
Rygl	Kazi	(ESA-Estec, NL)
Savolainen	Tuomas	(Aalto University Metsahovi Radio Observatory, Fin)

Schulz	Robert	(Univ. Wuerzburg; Univ. Erlangen-Nuernberg)
Stanghellini	Carlo	(IRA-INAf)
Tazaki	Fumie	(NAOJ, Japan)
Testi	Leonardo	(ESO/Arcetri)
Tilanus	Remo	(Allegro, Leiden Observatory; IMAPP, Radboud University, NL)
van Bommel	Ilse	(JIVE, NL)
van Langevelde	Huib	(JIVE, NL)
Vlemmings	Wouter	(Chalmers / Onsala, Sweden)
Wootten	Al	(NRAO, USA)
Zanichelli	Alessandra	(INAF-IRA)
Zensus	Anton	(Max-Planck Institut für Radioastronomie)
Zwaan	Martin	(ESO)

J. Brand