The Italy-Japan bi-lateral collaboration

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Outline

1) Italian radio telescopes

2) Italy-Japan collaboration

3) First scientific results

Medicina Northern Cross

50 years ago, opening of radio astronomy in Italy

640 m N-S
564 m E-W
Area: 30000 m^2

Currently used as a test ground for SKA and LOFAR technologies.

Involved in the ASI program for searching and monitoring space debris.

B2 and B3 catalogues of radio sources

Medicina 32-m antenna

- Frequency agility (<4min)
- Receivers: 1.4 – 22 GHz (K-band dual feed)
- Remote control
- Optical fiber link (10 Gbps)
- VLBI Network
- Mark5-C recorder, FILA10G board, DBBC transition completed
- Mark5-A+analog backend “legacy” configuration

Noto 32-m antenna

- Frequency agility will come soon
- Receivers: 0.3 – 43 GHz
- Active surface up to 86 GHz
- Optical fiber link (10 Gbps)
- VLBI Network
- Mark5-B recorder, FILA10G board, DBBC transition completed

Sardinia 64-m antenna

2013 September: inauguration of the Sardinia Radio Telescope

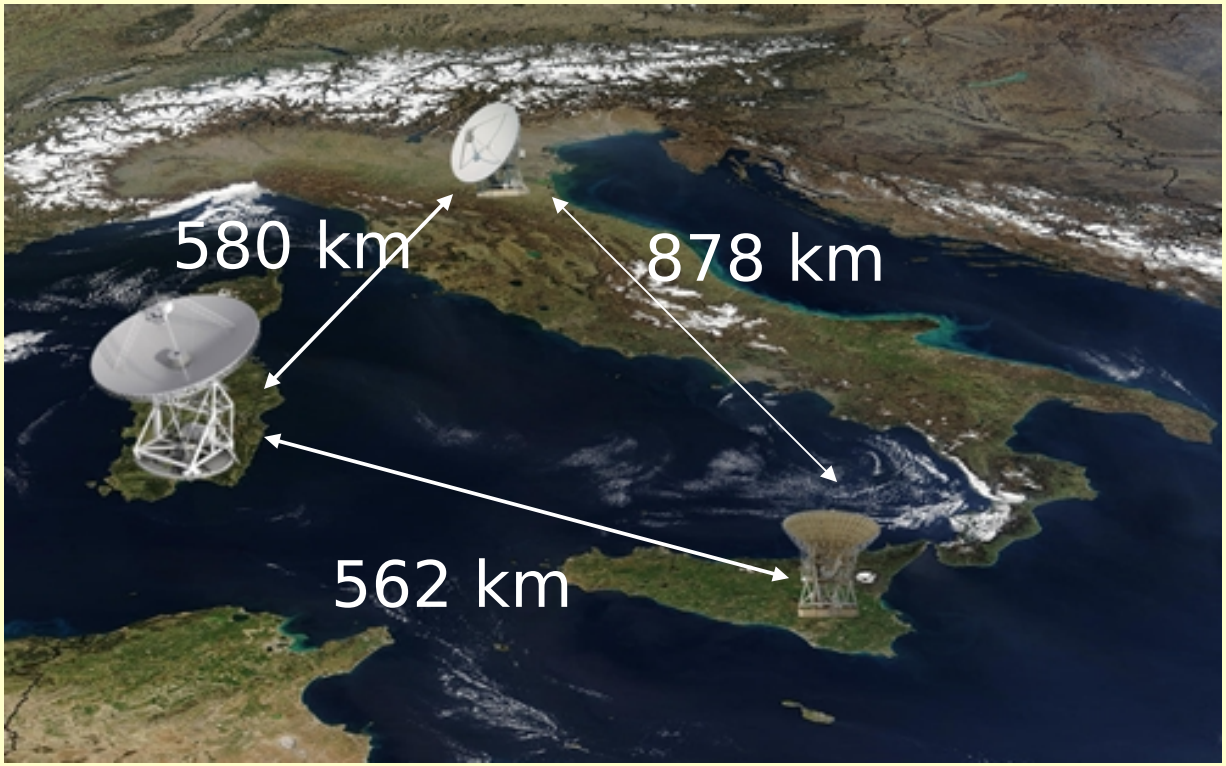
- Frequency agility
- Receivers: 0.3/1.4, 6.7, 22 GHz (K-band multi feed)
- 43 GHz planned
- Designed for up to 13 total receivers (three focal positions), up to 100 GHz
- Optical fiber link planned
- VLBI Network
- DBBC backend, FILA10G, Mark5-C recorder
- Mark5-B recorder being installed

Italian VLBI

Beam:
20 mas @1.6 GHz
2 mas @ 22 GHz

Max ang scale:
30 mas @1.6 GHz
3 mas @ 22 GHz

Sensitivity:
0.4 mJy @1.6 GHz
1.0 mJy @ 22 GHz



Medicina-Noto-SRT

What achieved so far

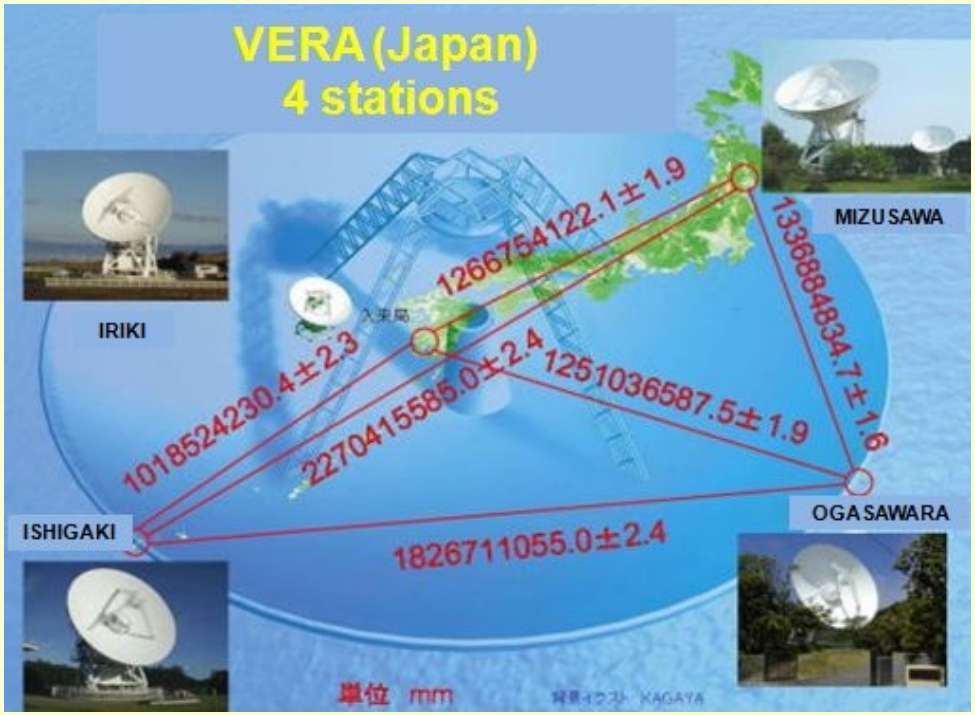
2013: software DIFX correlator in Bologna

2013: Mc – Nt fringes found in Bologna and Mitaka

2014: Sr – Nt and Sr – Md fringes found in Bologna

		Mc	Nt	Sr
RXs	1.4-1.6	✓	✓	✓
	5	✓	✓	✗
	6.7	✓	✓	✓
	8	✓	✓	✗
	22	✓	✓	✓
	43	✗	✓	✗
backend		DBBC	DBBC	DBBC
recorder		Mark5-C	Mark5-B	Mark5-B&C
e-VLBI		10 Gbps	10 Gbps	✗

Italy-Japan Network



A network of Japanese and Italian antennas will provide a sensitivity of 0.16 mJy/beam at 22 GHz, and a resolution of 0.4x0.2 mas, i.e. about one order of magnitude better.

Italy-Japan collaboration

2010-2012: “Radio Astronomy from Space”

PI: Prof G. Giovannini, Prof. Y. Murata

Aim: Study of the nuclear region of radio-loud AGN

2013-2015: “Italy-Japan joint observations to understand black hole properties”

PI: Prof G. Giovannini, Prof. M. Honma

Aim: Study of the SMBH by high resolution VLBI observations

Italy-Japan collaboration

Since 2010:

About 5 visitors from Japan to Bologna per year

About 3 visitors from Italy to NAOJ per year

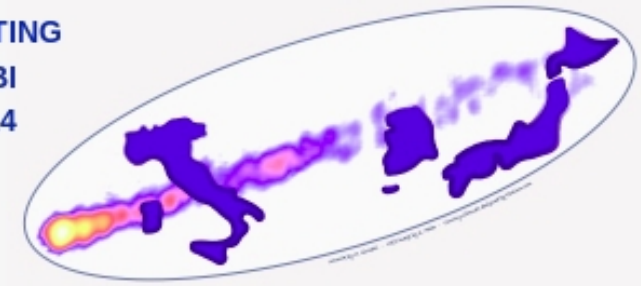
>15 papers published on peer-reviewed journals

2 Conferences “East Asia to Italy: Nearly Global VLBI – Eating VLBI” held in Bologna in 2012 and 2014

More than 40 participants from Japan, Korea, Italy

Eating VLBI

EATING VLBI 2014



East Asia To Italy: Nearly Global VLBI
CNR Research Area, Bologna, 13-14 October 2014
organized by INAF Istituto di Radioastronomia

We are organizing a series of meetings to develop the collaboration between Italy, Japan, and Korea in the field of VLBI. After the successful event in 2012, a new meeting took place at the **CNR research area in Bologna on the 13-14 October 2014**.

The meeting is organized by INAF/IRA (Istituto di Radioastronomia, Bologna), with generous support from the Italian Ministry for Foreign Affairs, the Department of Physics and Astronomy of the University of Bologna, and RadioNet3.

Latest news (27 Oct):
we started uploading presentation files
the conference picture is online!

The Scientific Organizing Committee is composed by:

K. Hada - IRA/INAF & NAOJ
Y. Hagiwara - NAOJ
M. Honma - NAOJ
G. Giovannini - DIFA/UniBO & IRA/INAF
M. Giroletti - IRA/INAF
M. Orienti - IRA/INAF
B. W. Sohn - KASI

Day 1 - Monday, October 13th

Morning - chair M. Cappi

9:30 Vettolani Welcome speech

Session 1 - National reviews

9:35 Giroletti Status of VLBI in Italy - pdf
10:00 Hagiwara Status of VLBI in Japan and East Asia - pdf
10:25 Sohn Status of VLBI in Korea - pdf

10:50 COFFE BREAK

Session 2 - Results from ongoing collaboration (first part)

11:20 Hada M87 - pdf
11:40 NIINUMA Imaging capability of KVN and VERA Array (KaVA) - pdf
12:00 Kino Key science observations of AGNs with KaVA array - pdf
12:20 Orienti 1510-08, 3c454.3 - pdf
12:40 Sasada Optical Photopolarimetric Study of Blazar Outbursts - pdf

13:00 LUNCH

Afternoon - chair L. Foschini

Session 3 - Presentations from junior researchers

14:15 Casadio Fermi gamma-ray detection of the radiogalaxy 3C120 and its connection with the VLBI jet - pdf
14:30 Chida Probing very Early Stage of Radio Source Evolution in NGC 1275 with VERA - pdf
14:45 Fujinaga The survey for new AGN candidates within the field of Fermi unassociated gamma-ray sources - pdf
15:00 Kim Investigating plasma-physical properties of jets in nearby radio-bright AGN with KVN and KaVA - pdf
15:15 Lico Very Long Baseline Polarimetry and the Gamma-ray connection in Markarian 421 during the broadband campaign in 2011 - pdf
15:30 Nakahara Multi-epoch, quasi-simultaneous 22/43GHz observations of the M84 nucleus with VERA - pdf
15:45 Sakai Absolute proper motions measurement of Sgr D HII region with VERA - pdf

16:00 COFFE BREAK

Session 4 - Results from ongoing collaboration (second part)

16:30 D'Ammando Narrow Line Seyfert 1s - pdf
16:50 Koyama Detection of new component perpendicular to the jet axis in Mrk 501 - pdf
17:10 Sawada-Satoh VERA/GENJI Monitoring of OJ 287 in 2010-2013 - pdf
17:30 Zhao KaVA K and Q band observations of Sgr A* - pdf

20:00 DINNER (main menu; veg. menu)

Day 2 - Tuesday, October 14th

Morning - Chair G. Tucari

Session 5 - Joint observations: status and plans

9:30 Jung Recent Activities of KVN and Multi-Frequency AGN Survey project - pdf
9:50 Orfei Using multifeed systems for simultaneous multifrequency mm-VLBI observations from 18 to 100GHz and above - pdf
10:10 Stagni VLBI-IT - towards the Italian VLBI network - pdf
10:30 Oyama The development and performance of OCTAVE-DAS and Correlator System - ppt
10:50 Hagiwara Planning Italy-Japan observations (10min talk) - pdf

11:00 COFFE BREAK

Session 6 - Science results of mutual interests

11:30 Ambrosini Prospects in Time and Frequency observables from VLBI (5 min flask talk)
11:35 Rioja Astrometric Continuum Observations with KVN - pdf
11:55 Dodson Non-Integer Spectral line Source Frequency Phase Referencing - pdf
12:15 Mantovani Faint blazars potential target for KVN observations - ppt
12:35 Hirota Observational study of star-forming regions with VERA and beyond - pdf
12:55 Moscadelli Outflow Structure on small scales in high-mass protostars - odp

13:15 LUNCH

Afternoon - Chair T. Venturi

Session 7 - Towards the future

14:30 Giovannini SKA - ppt
14:50 Gomez Probing the innermost regions of AGN jets and their magnetic fields with RadioAstron - pdf
15:10 Nagai Detection of Kpc-scale Jet Emission with ALMA - pdf
15:30 Casasola AGN fueling with ALMA: from Cycle 0 results to Cycle 2 incoming data - pdf
15:50 Honma Super resolution imaging - pdf
16:00 Honma Summary and Conclusions - pdf

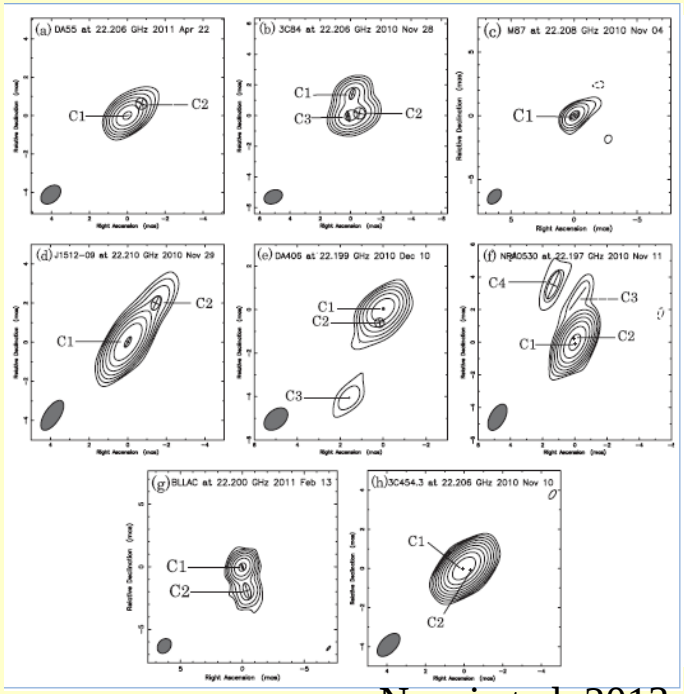
16:30 COFFE BREAK – END OF MEETING

- 9 talks on ongoing projects
- 5 talks on plans for joint observations
- 11 talks on topics of mutual interest
- 7 talks from junior researchers

Scientific results

Connection between radio and γ-ray emission in AGN

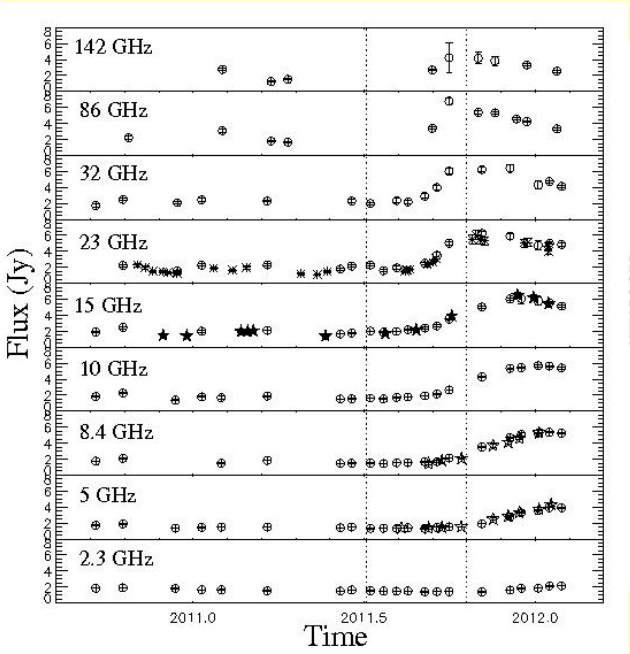
Pc-scale images



Nagai et al. 2013

Genji programme

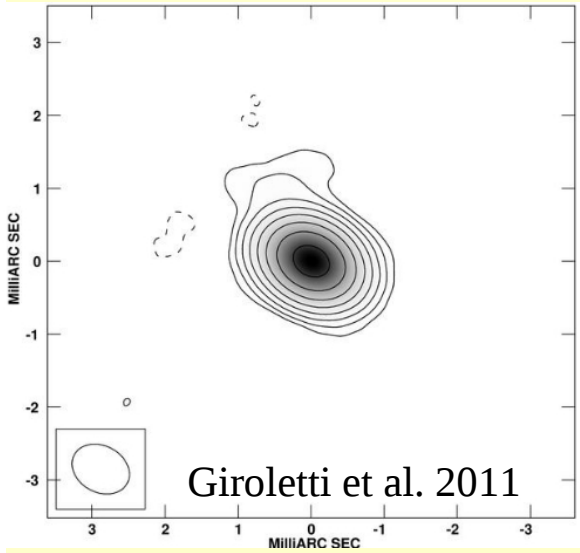
Multi-band light curves



Orienti et al. 2013

VERA+Medicina+ FGAMMA

Emission from NLSy1



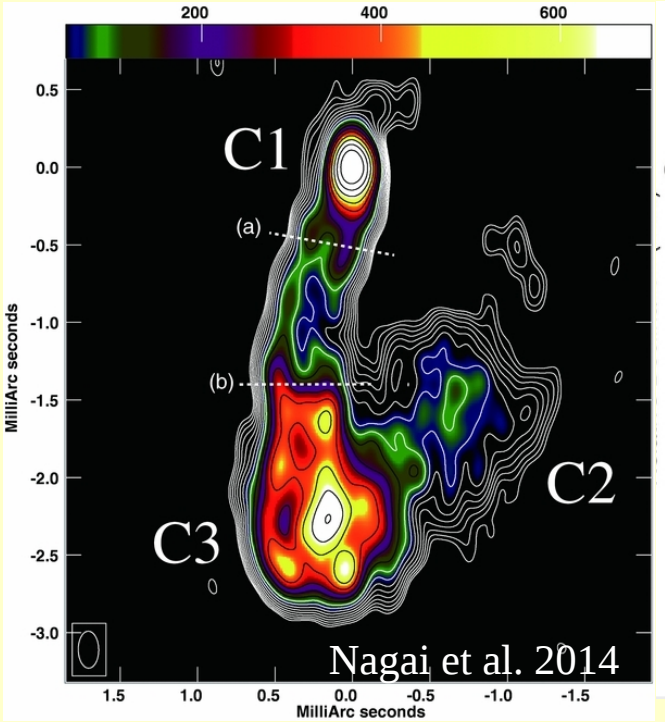
Global e-VLBI

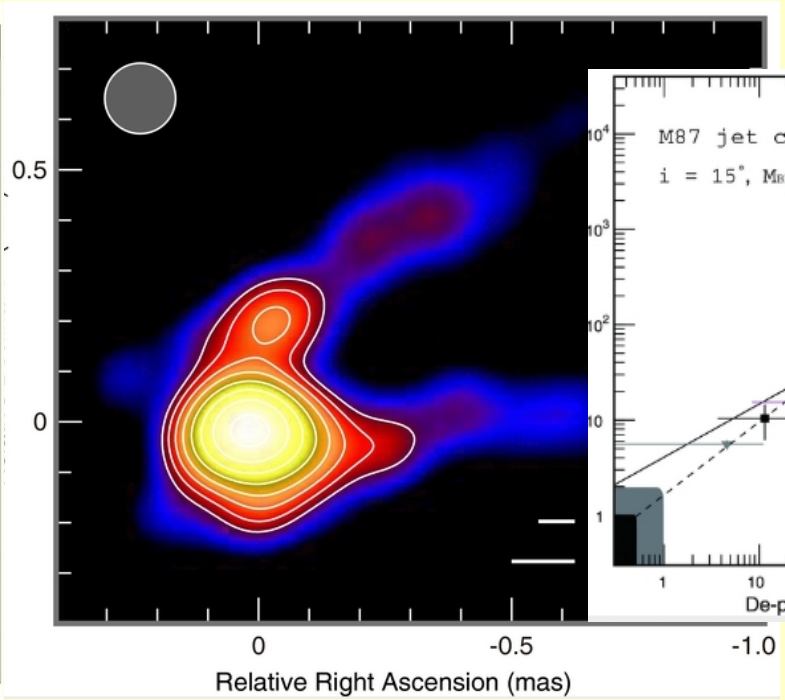
EVN+LBA+Kashima

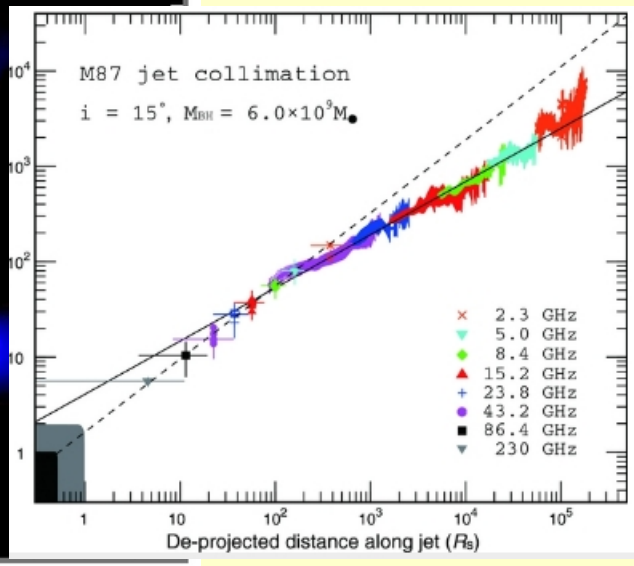
Scientific results

The jet structure in radio-loud AGN

3C 84 **M 87**







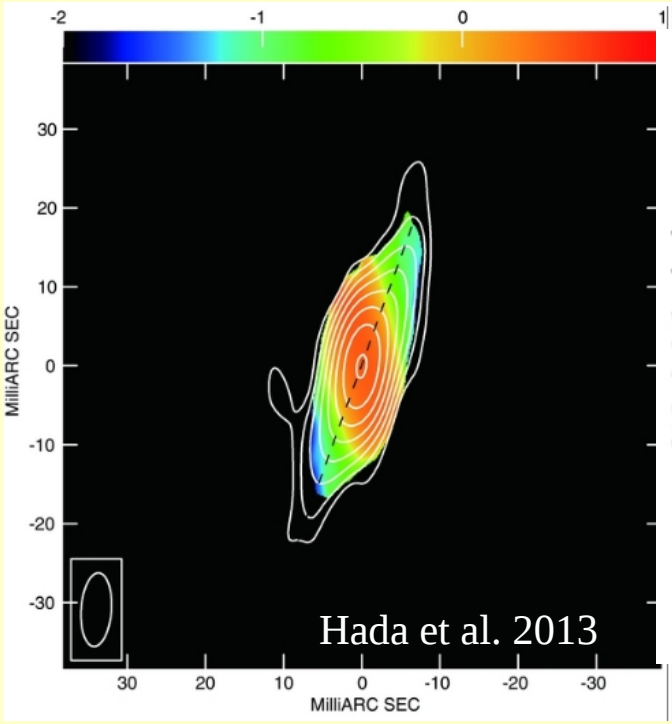
Hada et al. 2013

Limb-brightened structure and jet collimation in nearby radio galaxies

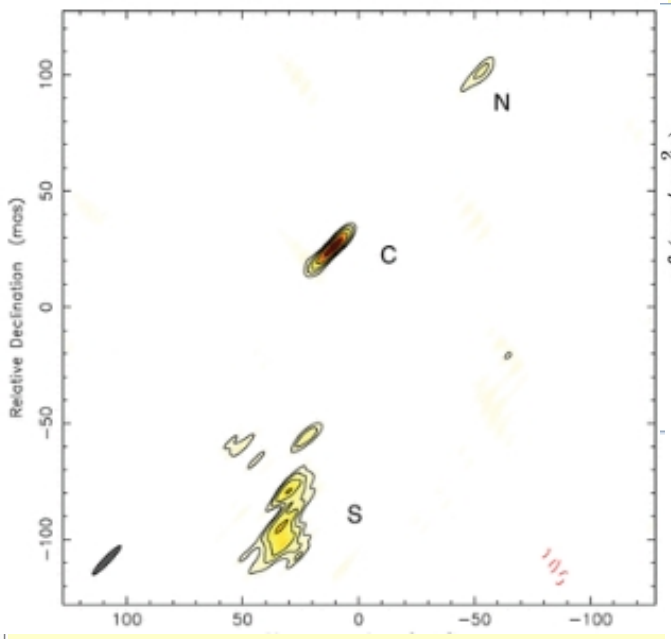
Scientific results

The jet structure in radio-quiet AGN and more..

Sombrero

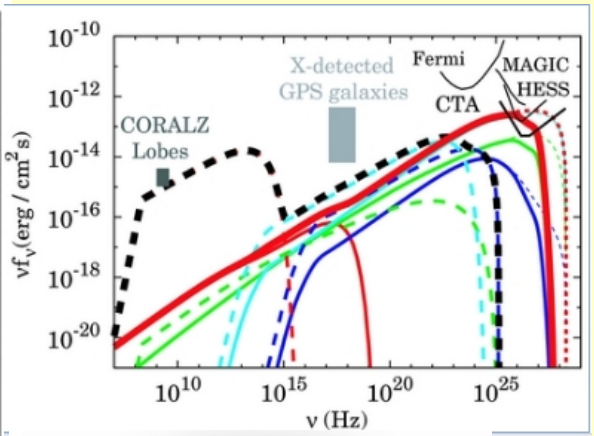


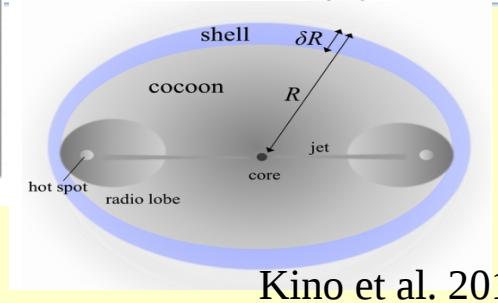
Seyfert



Bontempi et al. 2012

Theoretical works





Kino et al. 2013

Jets in radio-quiet AGN and theoretical prediction for the next generation of telescopes like CTA, SKA...

Future plans

End 2014 – 2015:

First three-station Mc-Nt-Sr fringes

Near real time Mc-Nt-(Sr)-VERA fringes at 22 GHz

Mid 2015:

Full track Mc-Nt-(Sr)-VERA observations at 22 GHz

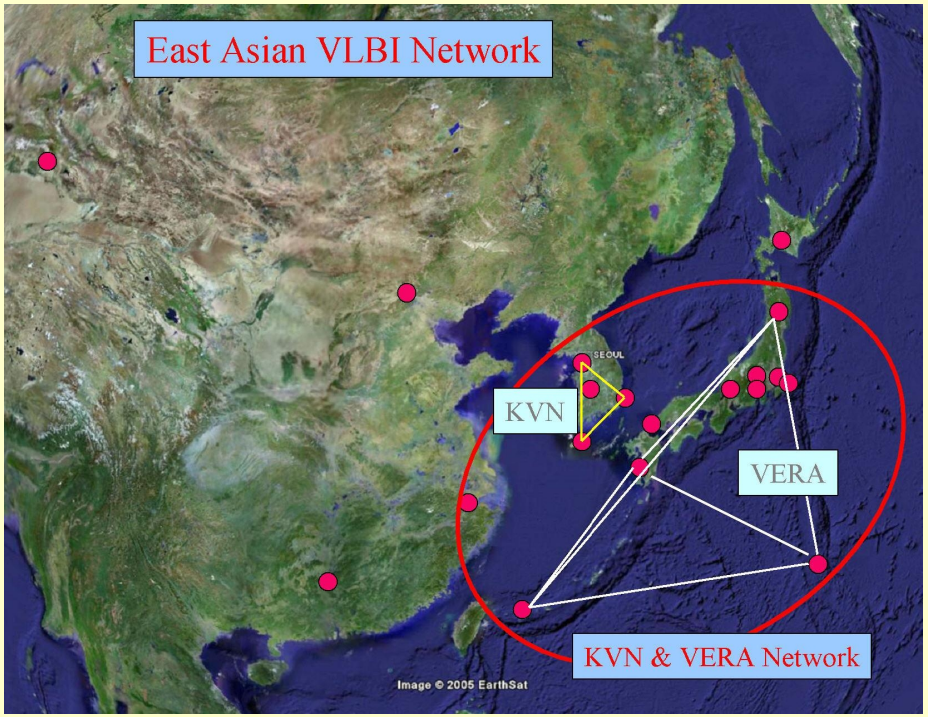
Second attempt at detecting Nt-VERA fringes at 43 GHz

MoU for a common use of Italian and VERA antennas

Future:

East Asia to Italy VLBI: I-VLBI+VERA+KVN

Future plans



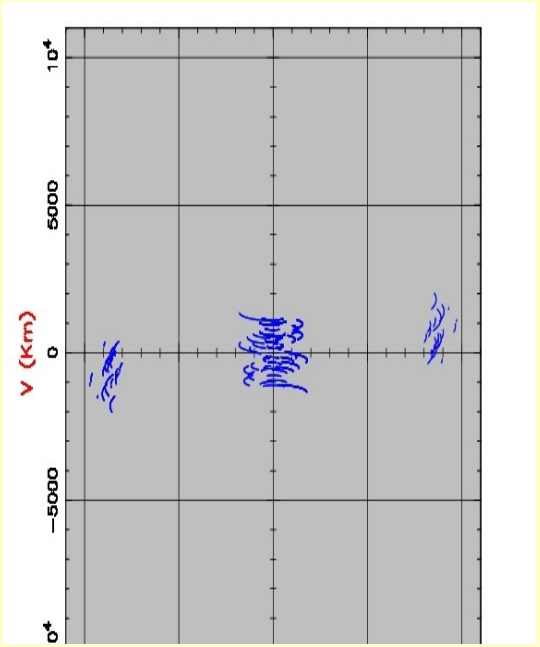
KVN provides short baselines → Sensitive to larger angular scales

Italy+Japan provides very long baselines → Angular resolution improvement of ~ an order of magnitude

Future plans

KVN+VERA+Italy: improvement of the *uv-coverage*

Dec= -10



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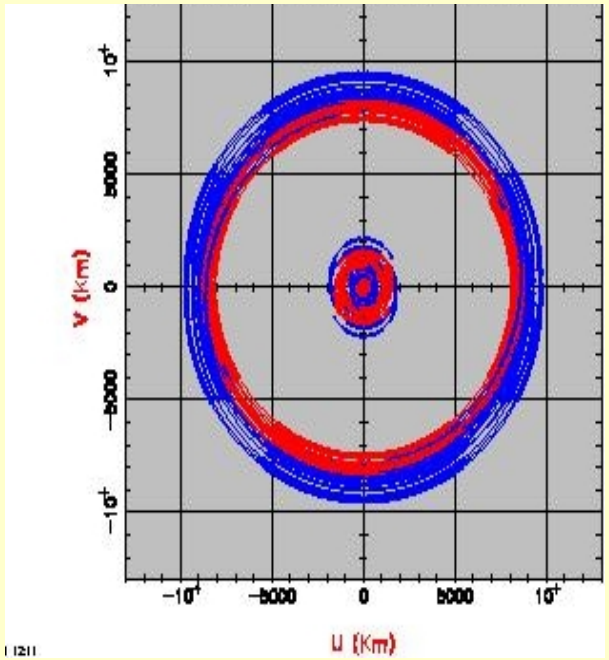

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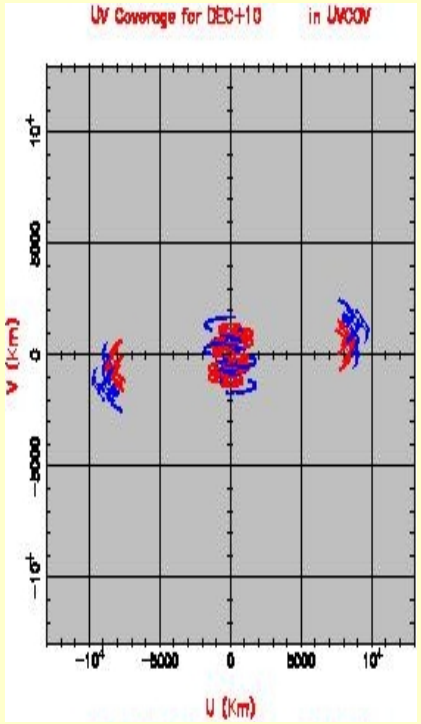

New outstanding scientific results!!