THE LAST BEATS OF B1834+620

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Sant'Antioco 13/5/2015 MKSP meeting

overview

* Restarted AGNs

* B1834+620

* Observations and processing

* Results and future prospective

* Conclusions

AGN

The physical mechanism behind loud/quiet AGN dichotomy and AGN-galaxy feedback is still unknown (e.g. Di Matteo at al. 2005)

FRI/II dichotomy(Saripalli 2012)

AGN feedback in galaxy formation models of early type galaxies (McNamara & Nulsen 2007)

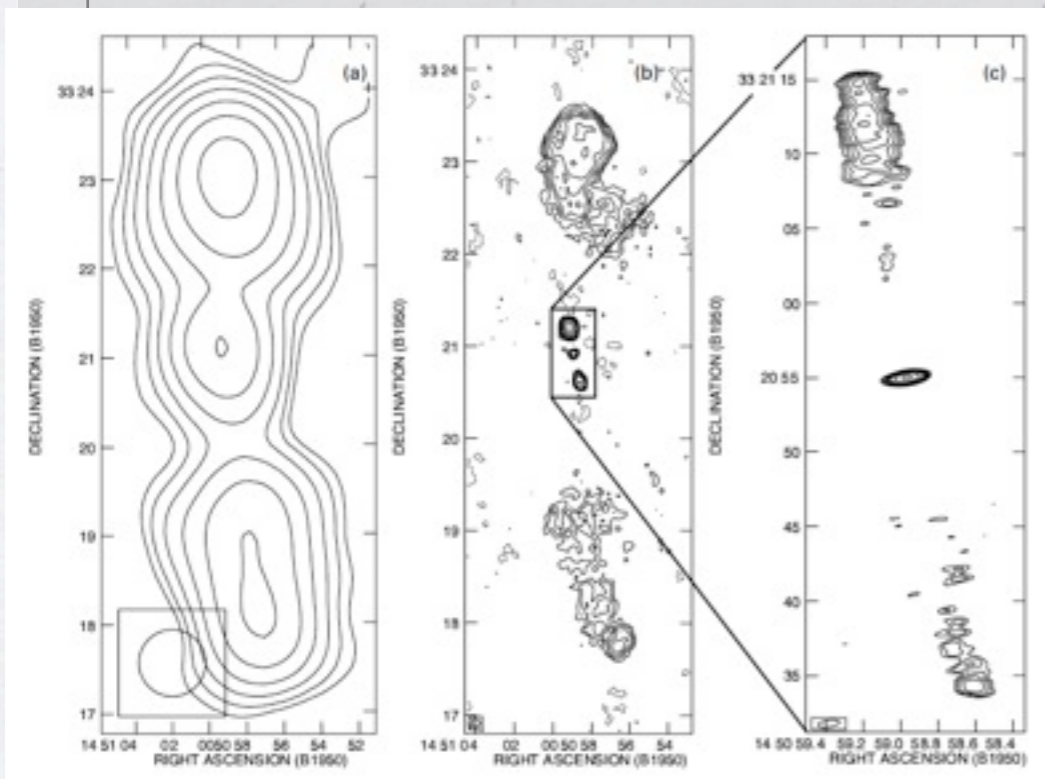Similarities with X-ray binaries accretion states: intermittent jets in AGN (Koerding et al 2008)

Restarted AGN

In the physics of AGN there are still many open questions:

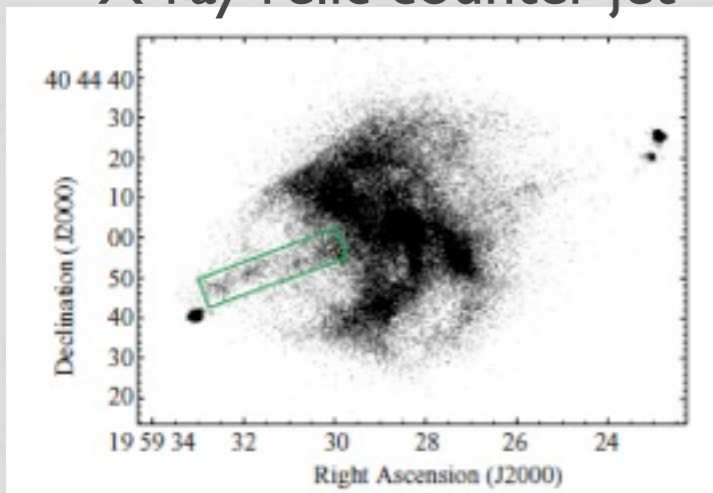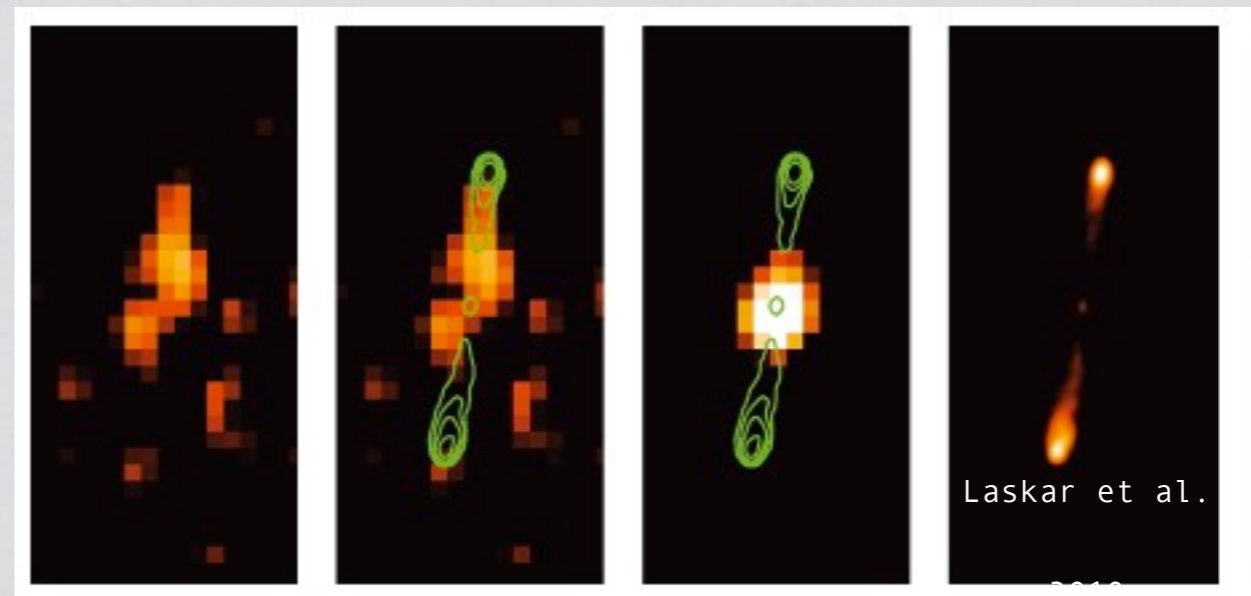How much do we know about AGN's duty cycles?

Restarted AGN

morphology

Shoenmakers et al. 2000

double-double radio/X-ray

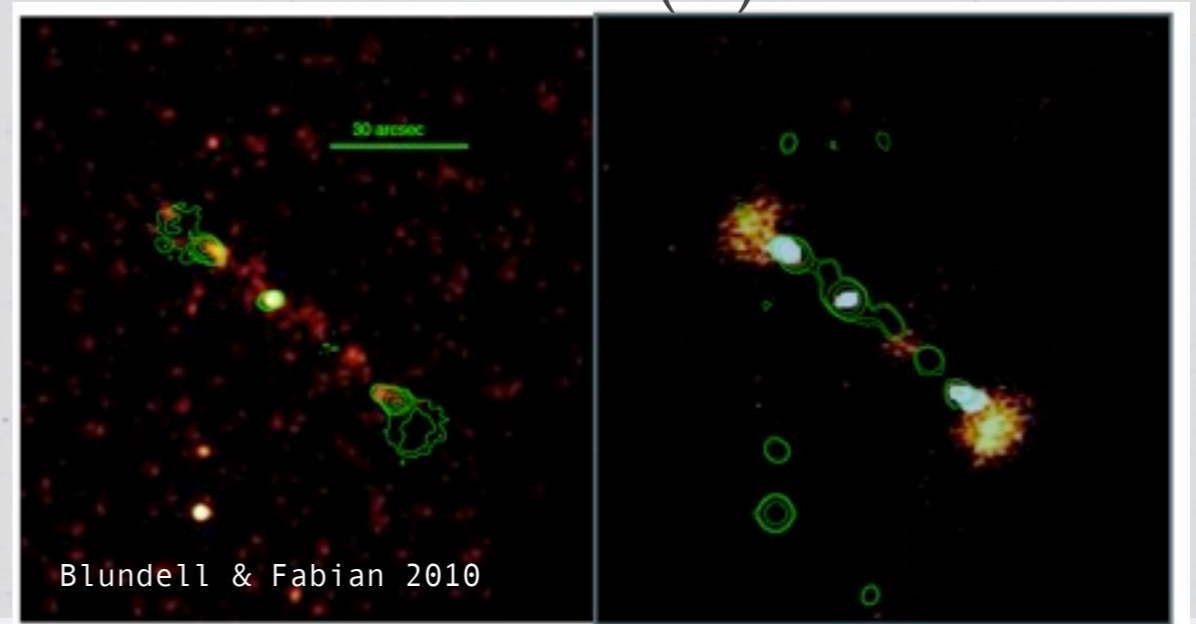Laskar et al.

radio offset w.r.t. (IC) emission

Blundell & Fabian 2010

X-ray relic counter-jet

Steenbrugge et al. 2008

Restarted AGN

morphology

Shoenmakers et al.

double-double radio/X-ray

Laskar et al.

X-ray re

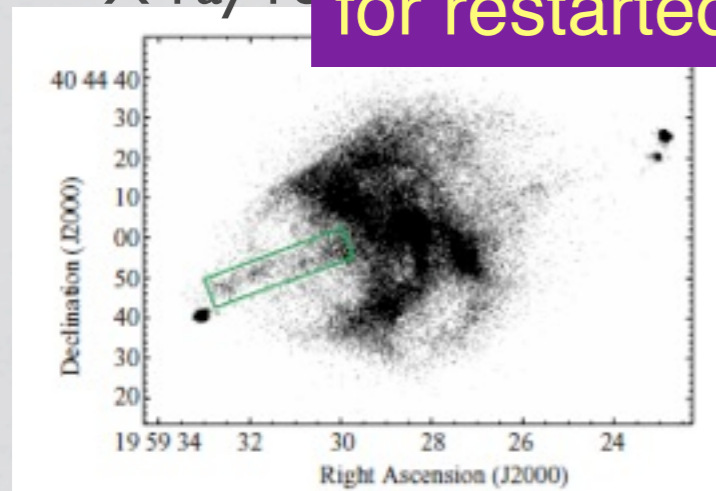Steenbrugge et al. 2008

C) emission

Blundell & Fabian 2010
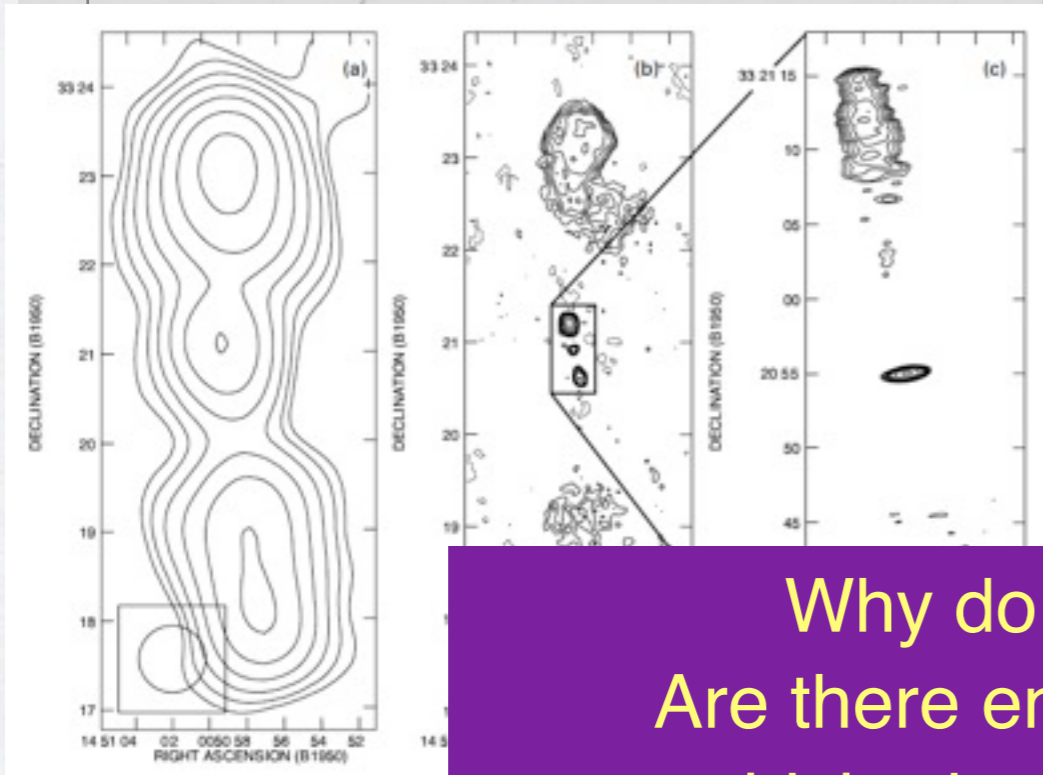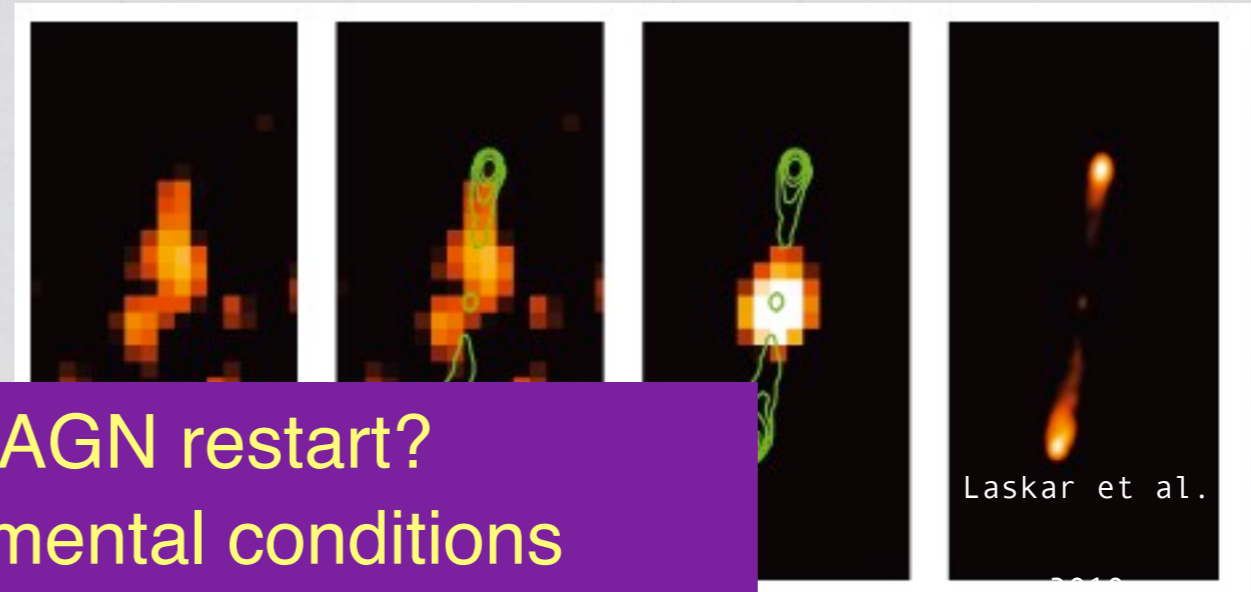
Why do radio AGN restart?
Are there environmental conditions
which trigger the AGN to restart?
Are the densities around the BH different
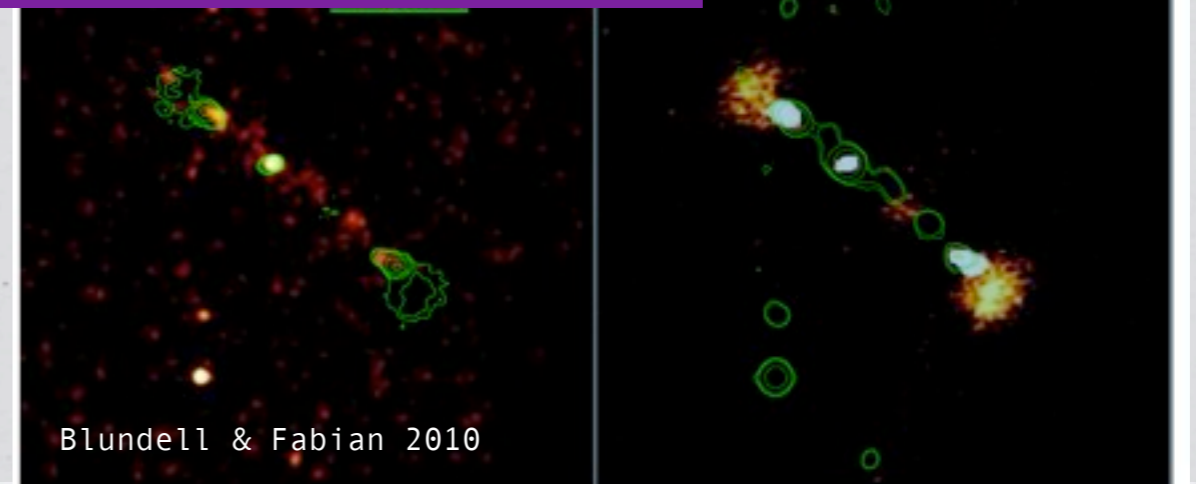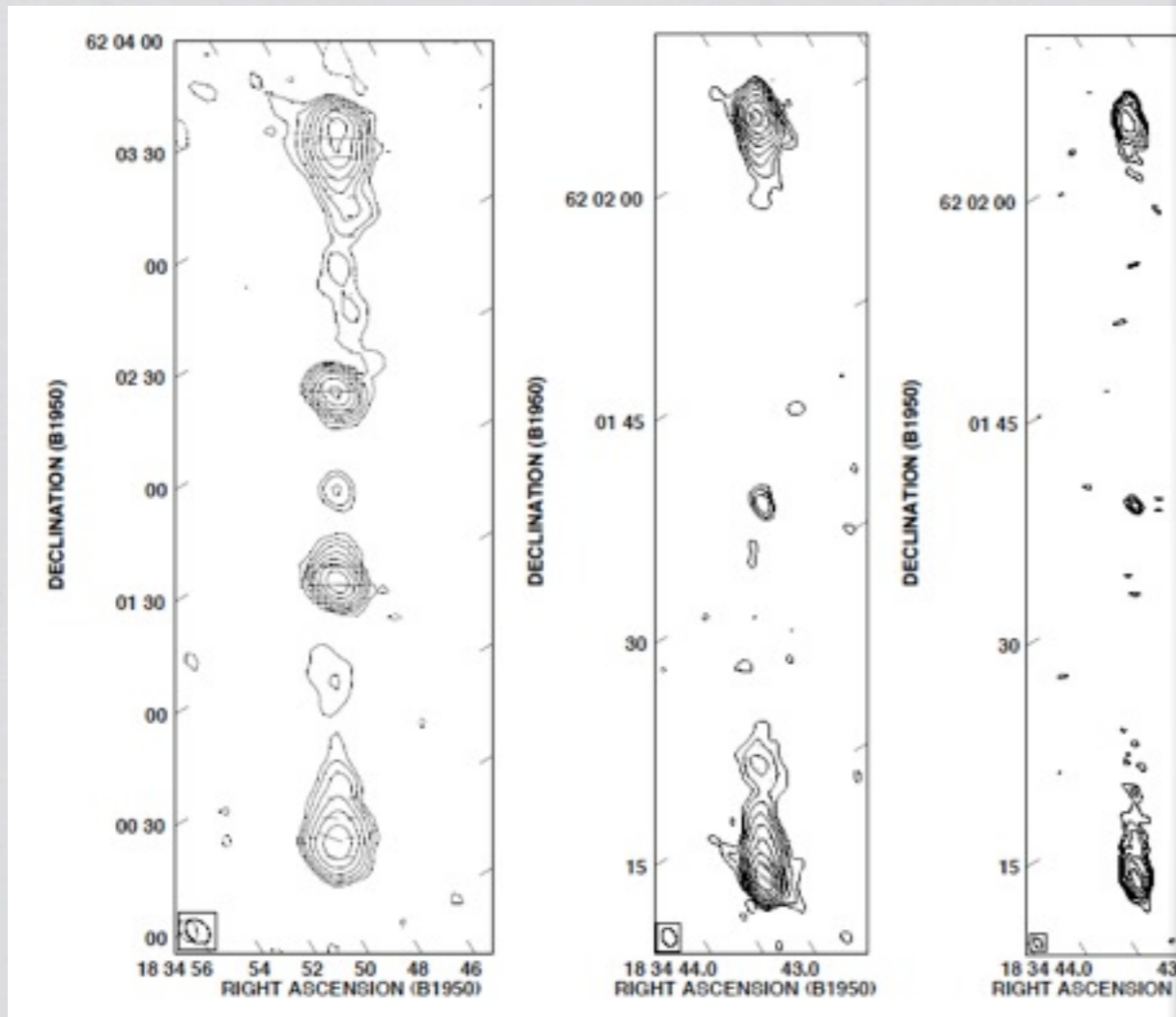**for restarted radio galaxies and normal AGN?**

Double-double Radio Galaxies

B1834+620

Flux @ 150 MHz = 5.6 Jy

Schoenmakers e

polarization fraction = 20%

RM from +55 to +60 rad m^2

MODELS:

•while the outer double can be explained with the standard model for FRII,theoreticians attempted to model the presence of the inner double..
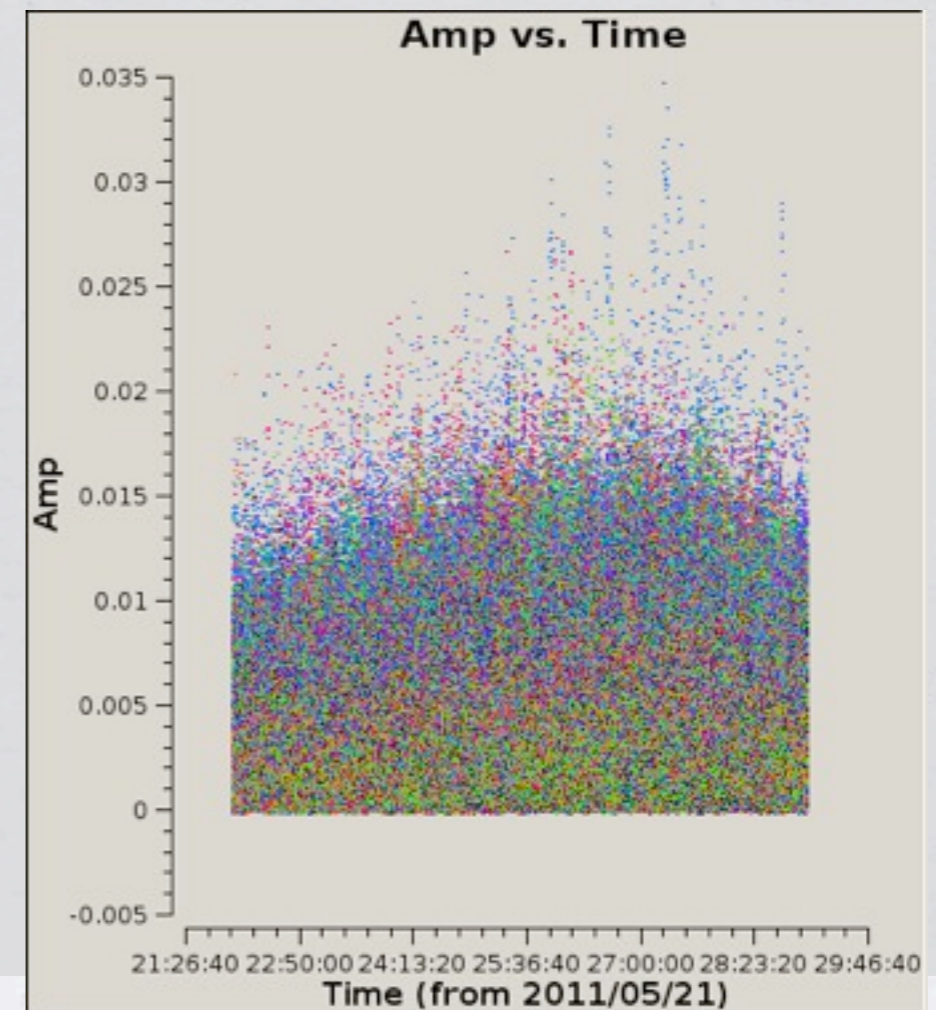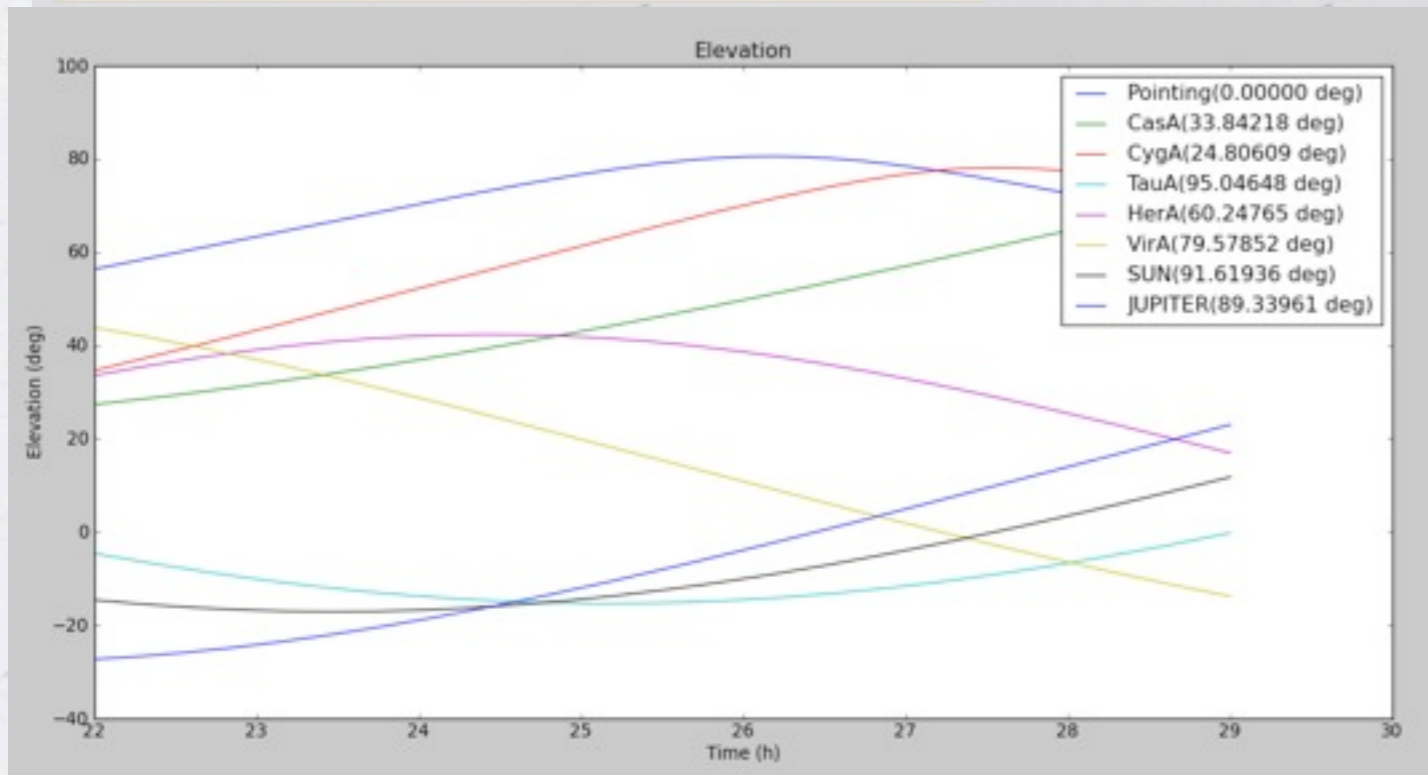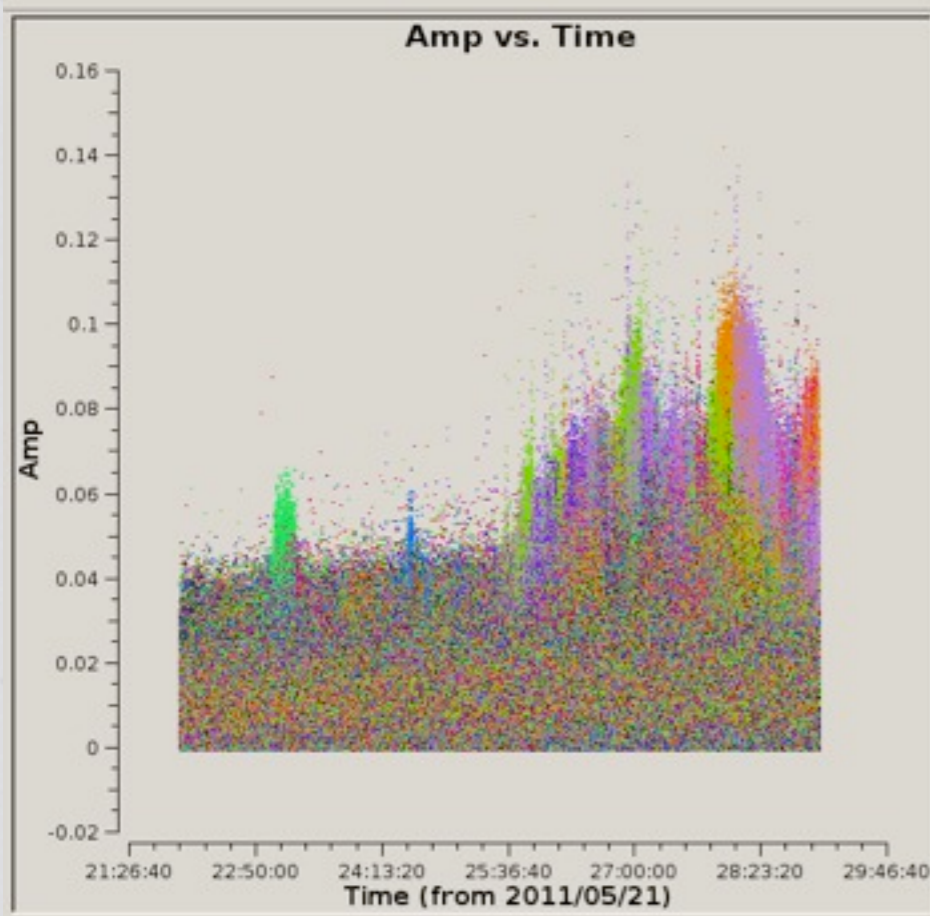MODELS:
• The inner lobes must be young,otherwise the emission from the outer lobes faded
•inner lobes are fully contained within the volumes of the outer lobes
☐standard model for FRIIs assuming higher mass densities within the outer lobes (entrainment) or assuming a significant drop of the power of the jet inflating the inner double wrt the jets relative to outer lobes (Kaiser et al. 2000).

☐bow shock model the inner lobes are arising from the emission of relativistic electrons within the outer lobes, which are compressed and re-accelerated by the bow-shock in front of the restarted jets and within the outer lobes.(Brocksopp at al. 2010). Hot-spots not expected.

B1834+620: LOFAR HBA

- 21-22 May-2011: 7h

- HBA freq. ~ 140 MHz

- 44 antennas --> 37 at the end
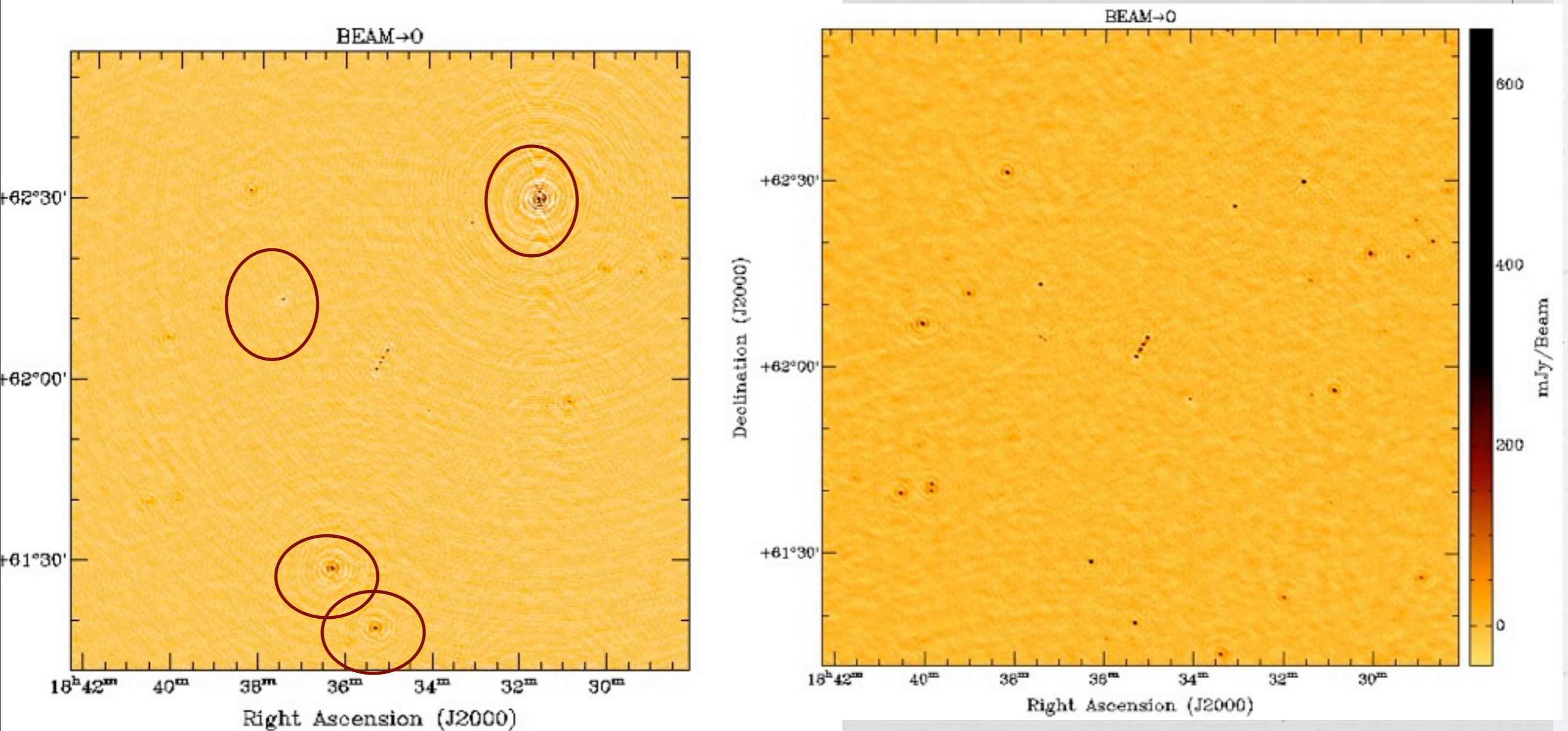
- 162 SB

Processing

demix: yes

flag (5ns delay)

BBS: full G matrix and
beam enabled

SAGECAL: self-
calibration with DDEs
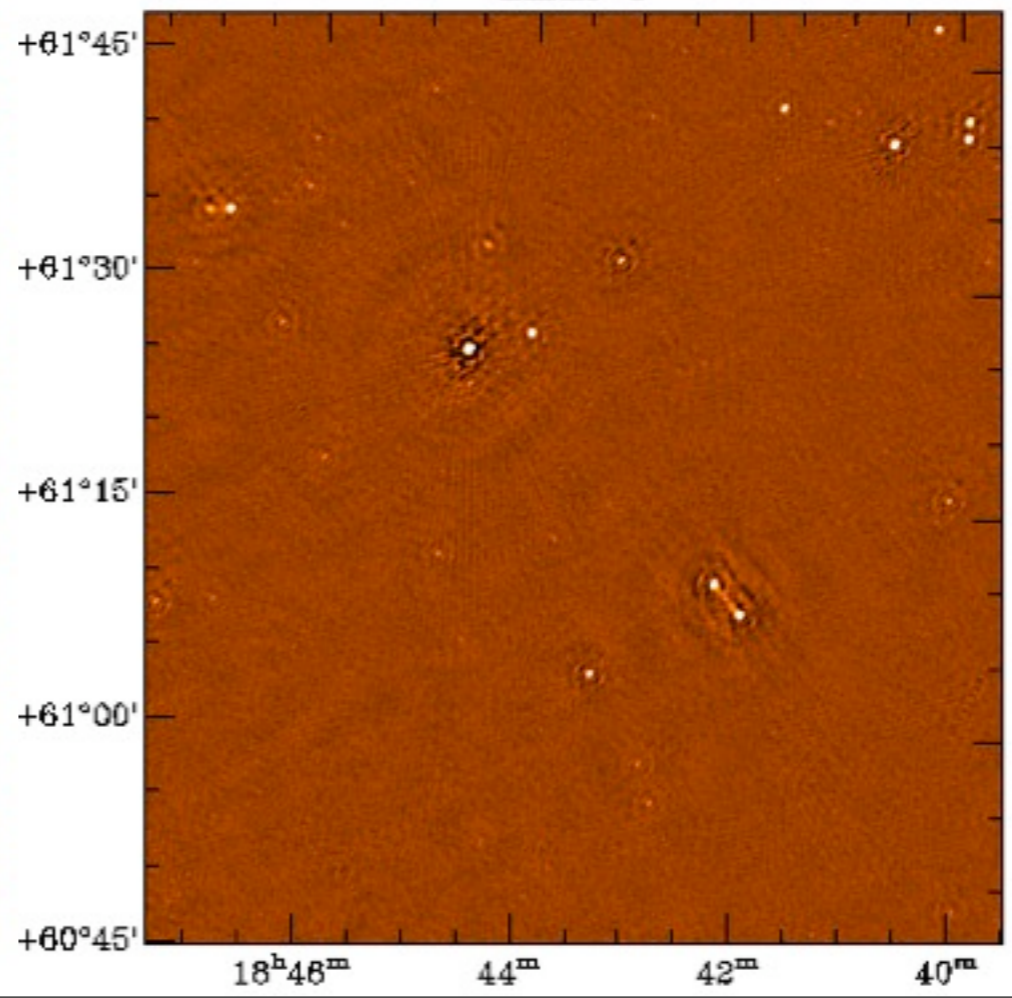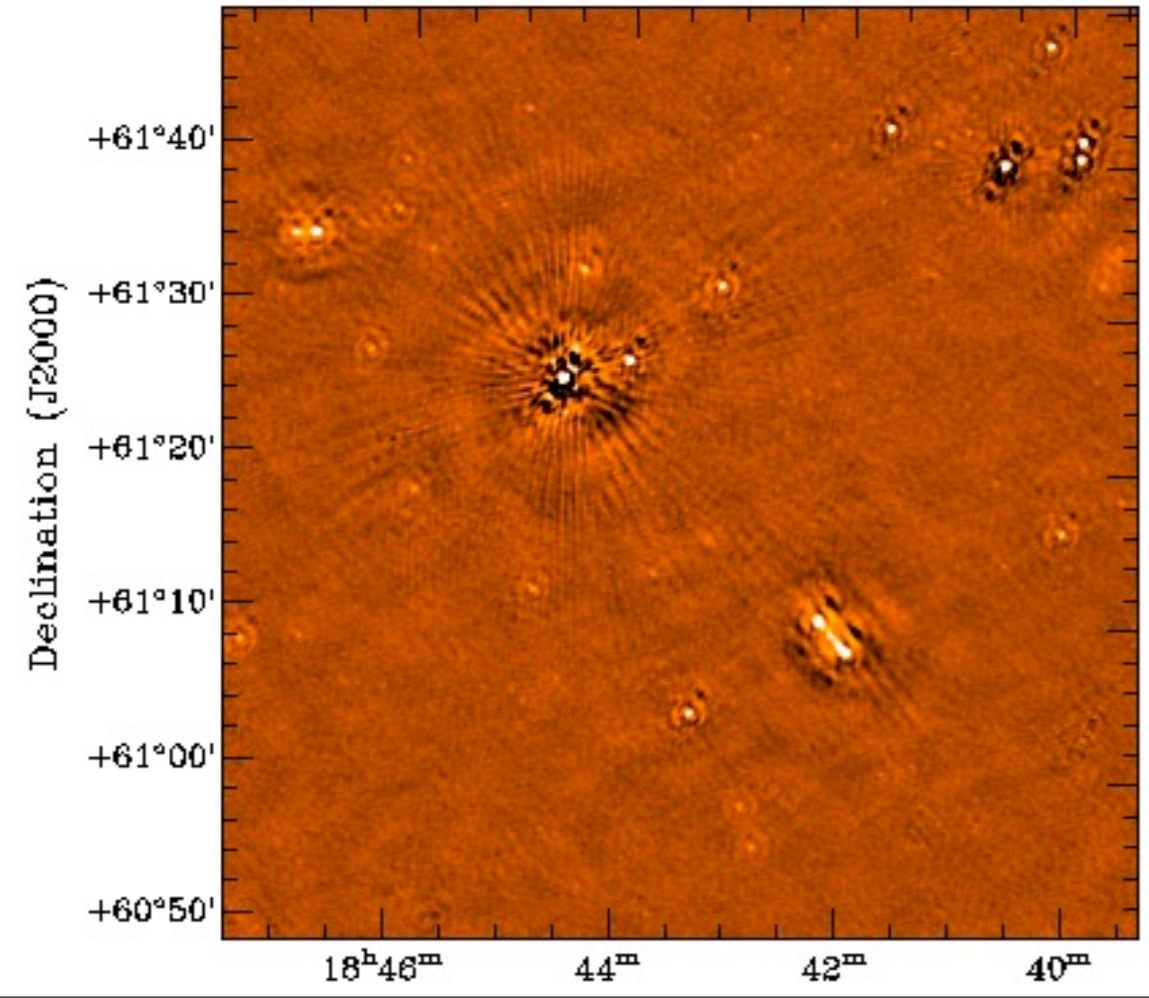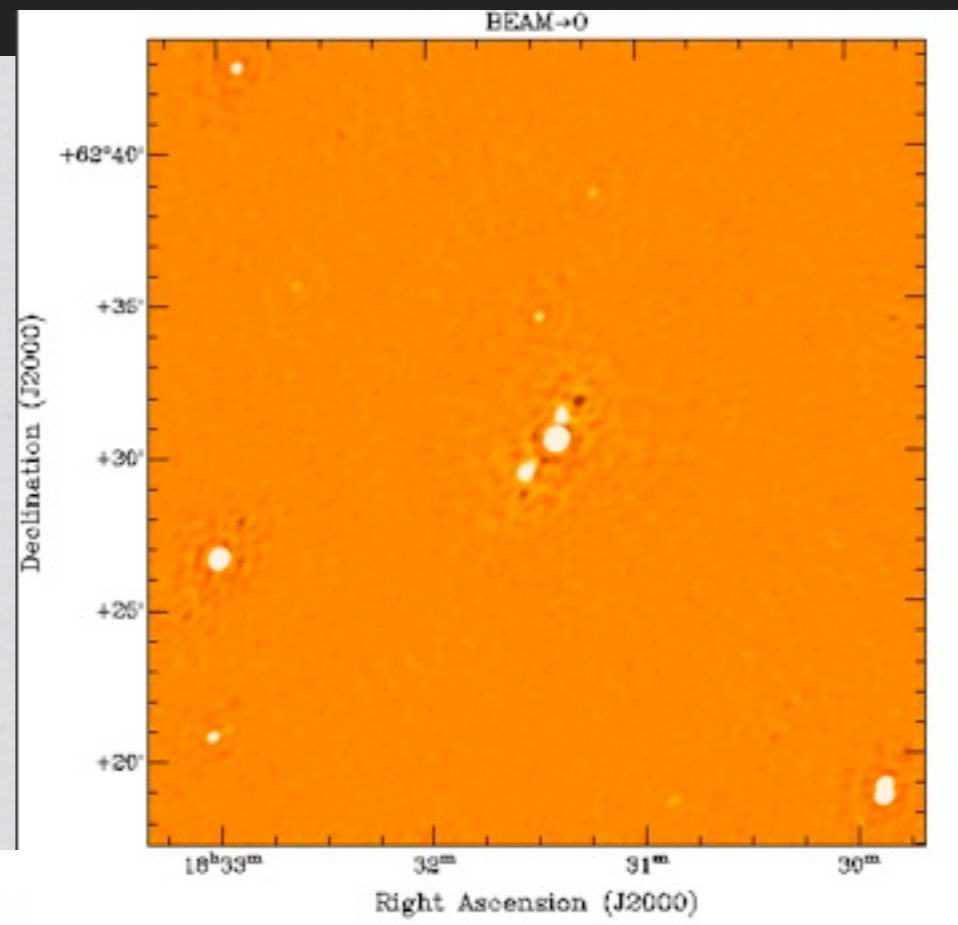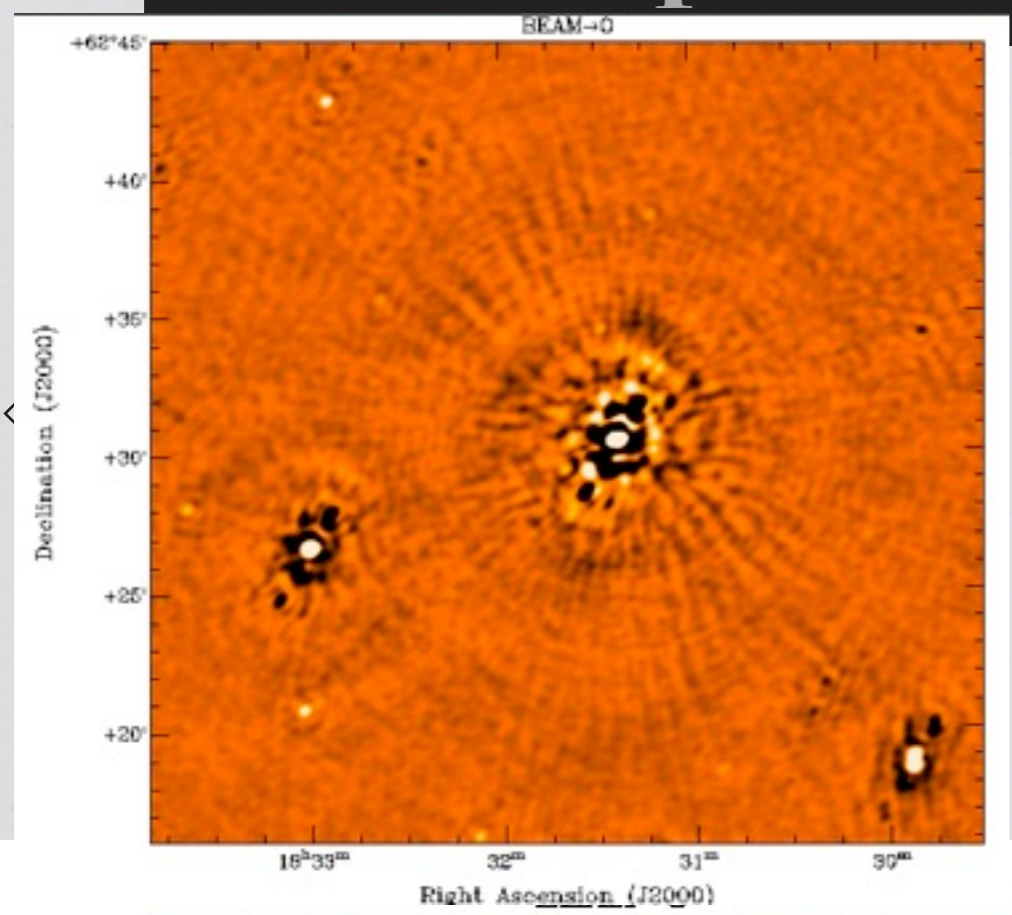
awimager: (old
version) total I

RMsynthesis: dirty
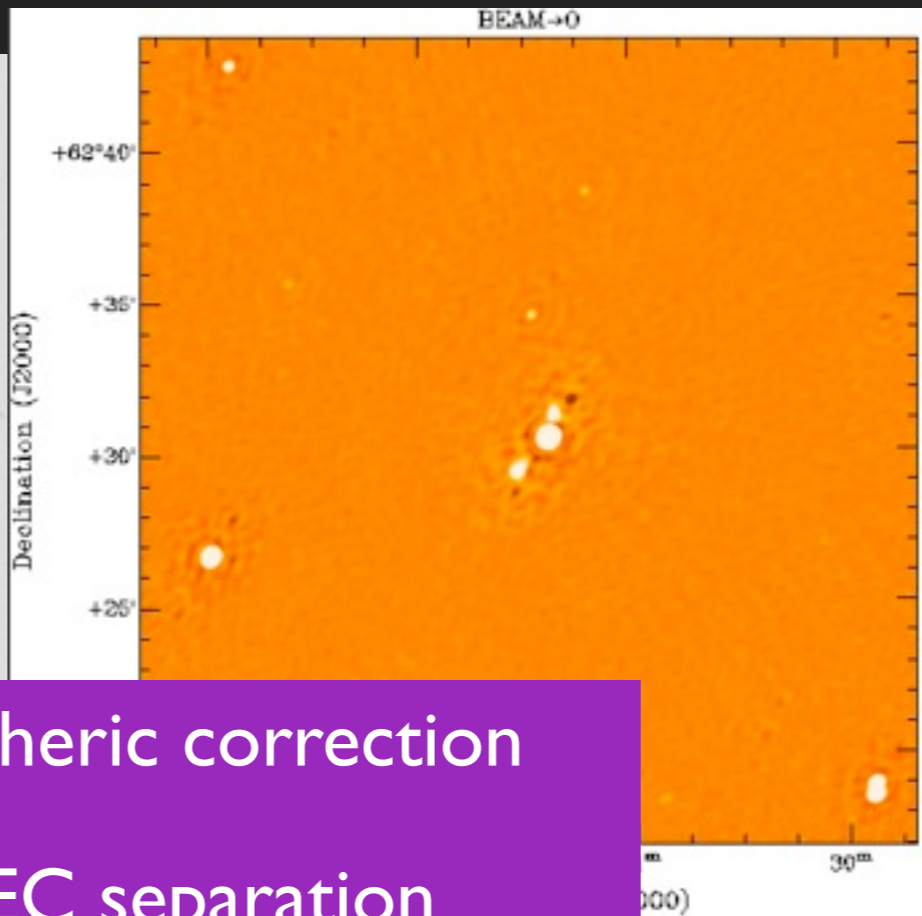images with casaclean
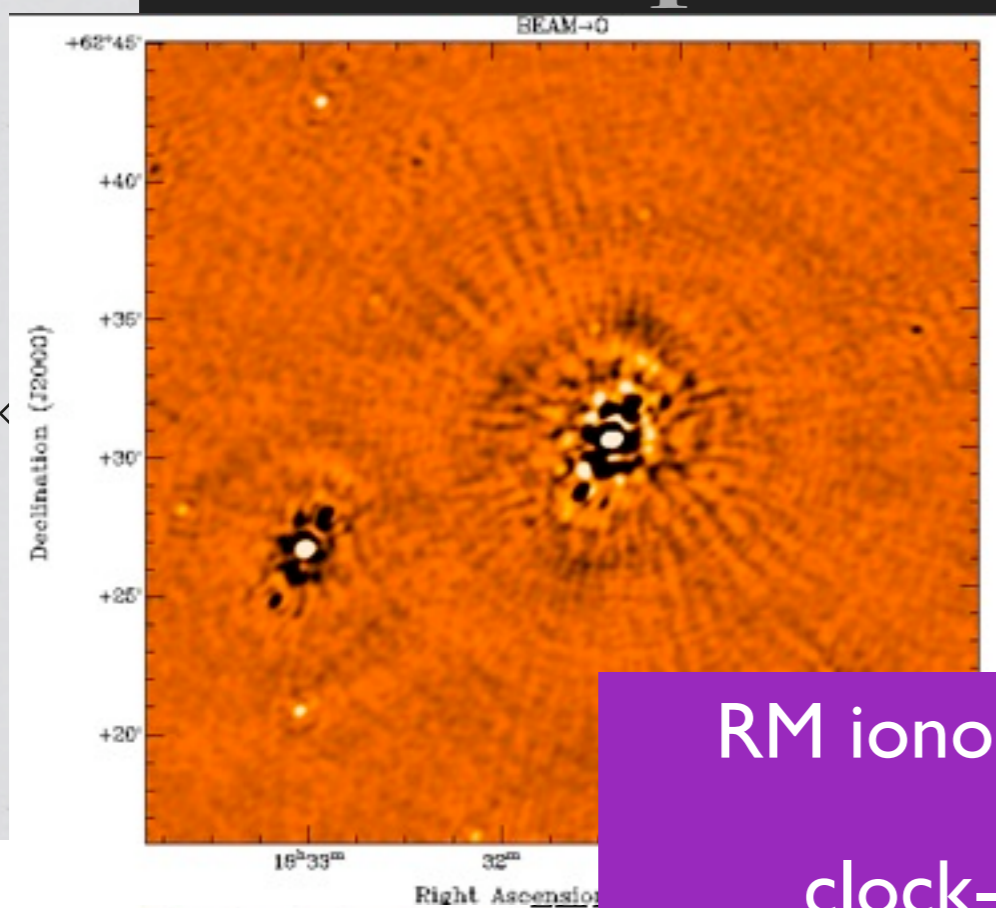
before and after sagecal

- sagecal.hd: Model from BBS calibrated image

- DDE corrections in 25 direction but Hybrid so 55 directions (CEP1/COMA RU Nijmegen)
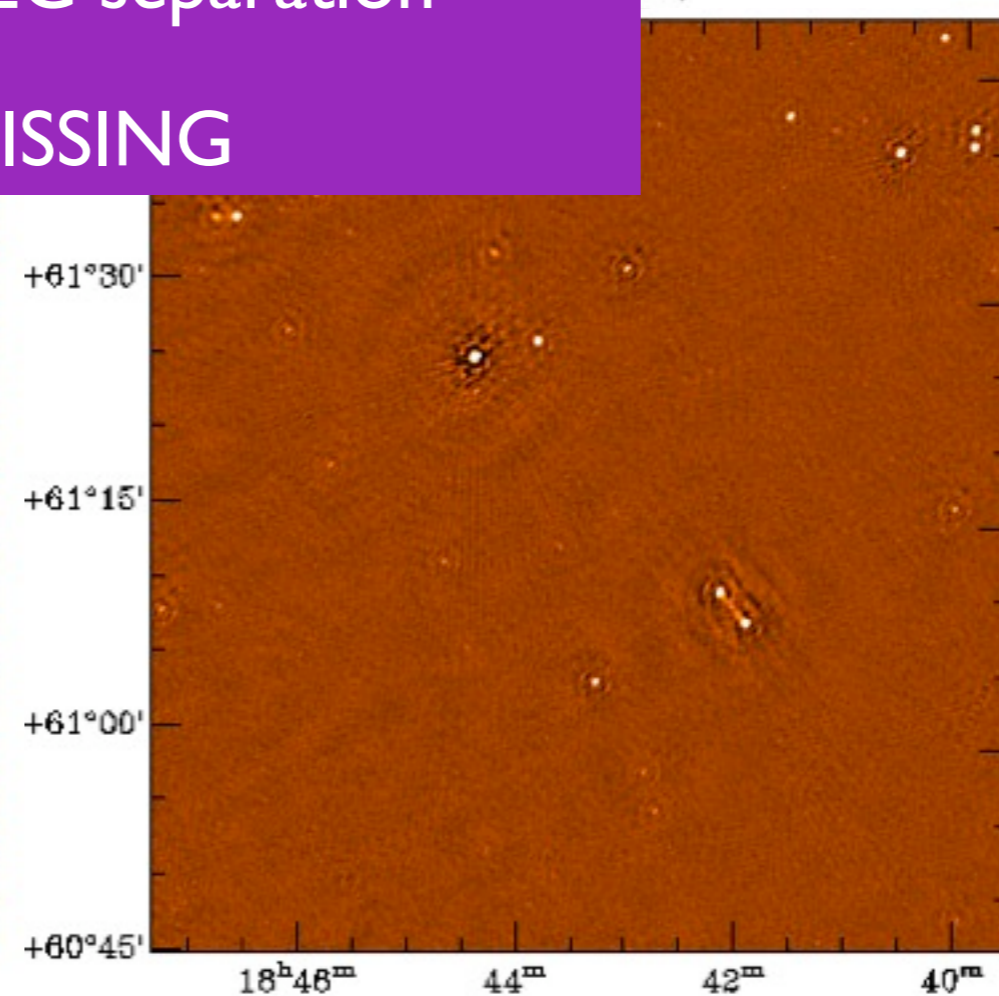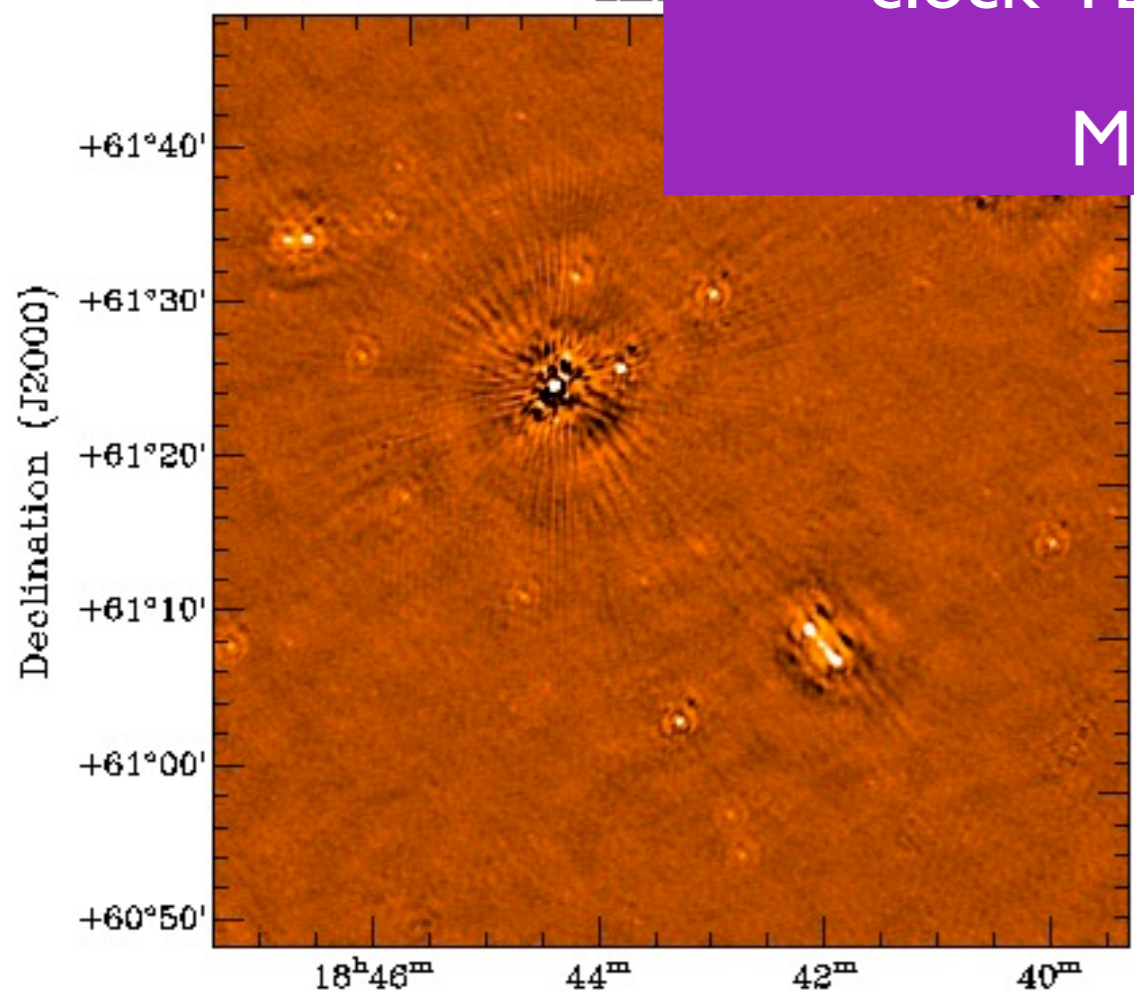
- 2 loops of sagecal

ionosphere+deconvolution errors

ionosphere+deconvolution errors

RM ionospheric correction

clock-TEC separation

MISSING

rms=0.6 mJy/beam

res= $24'' \times 21''$
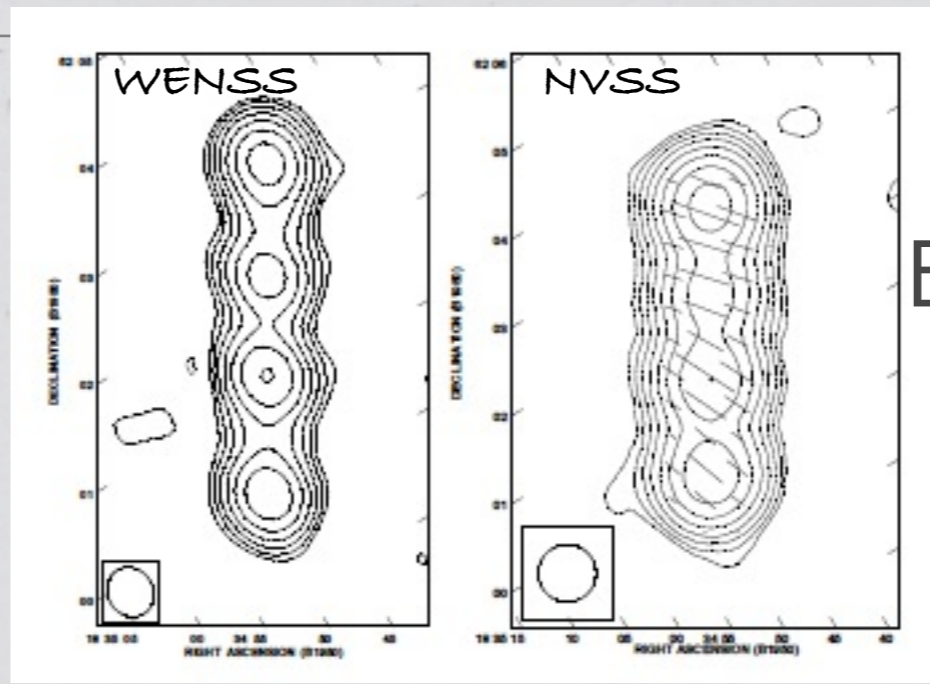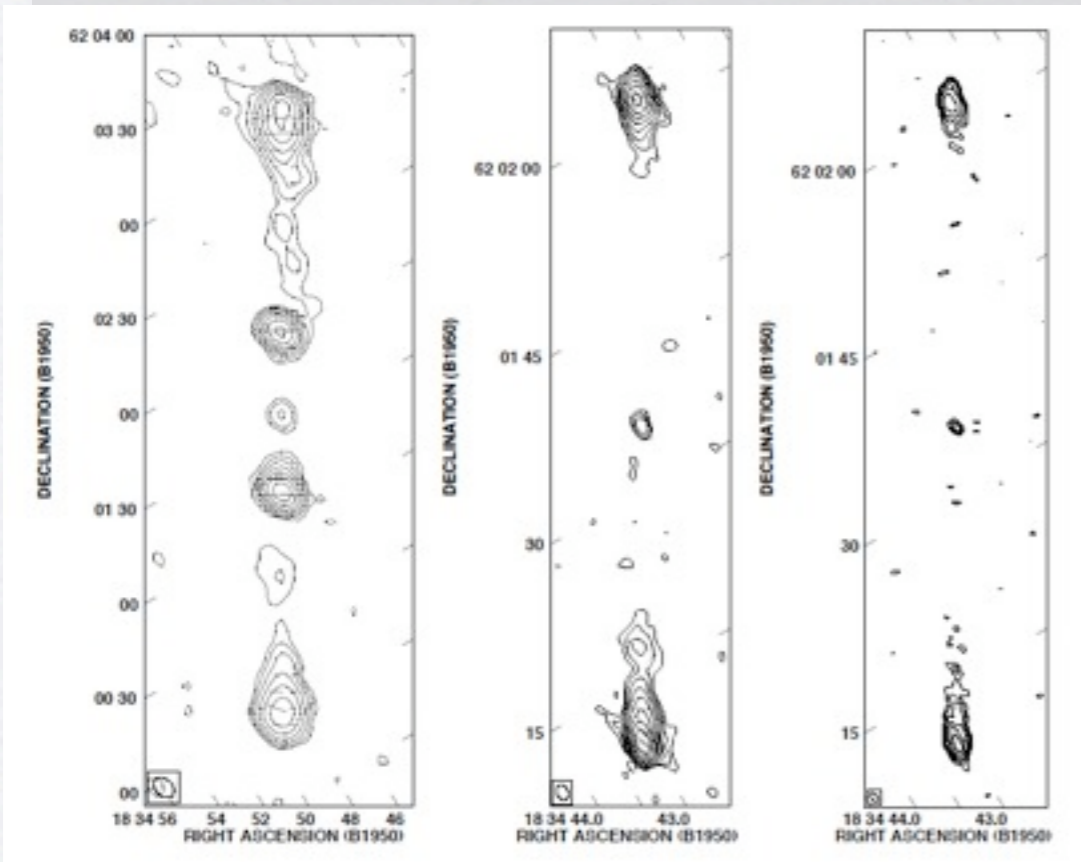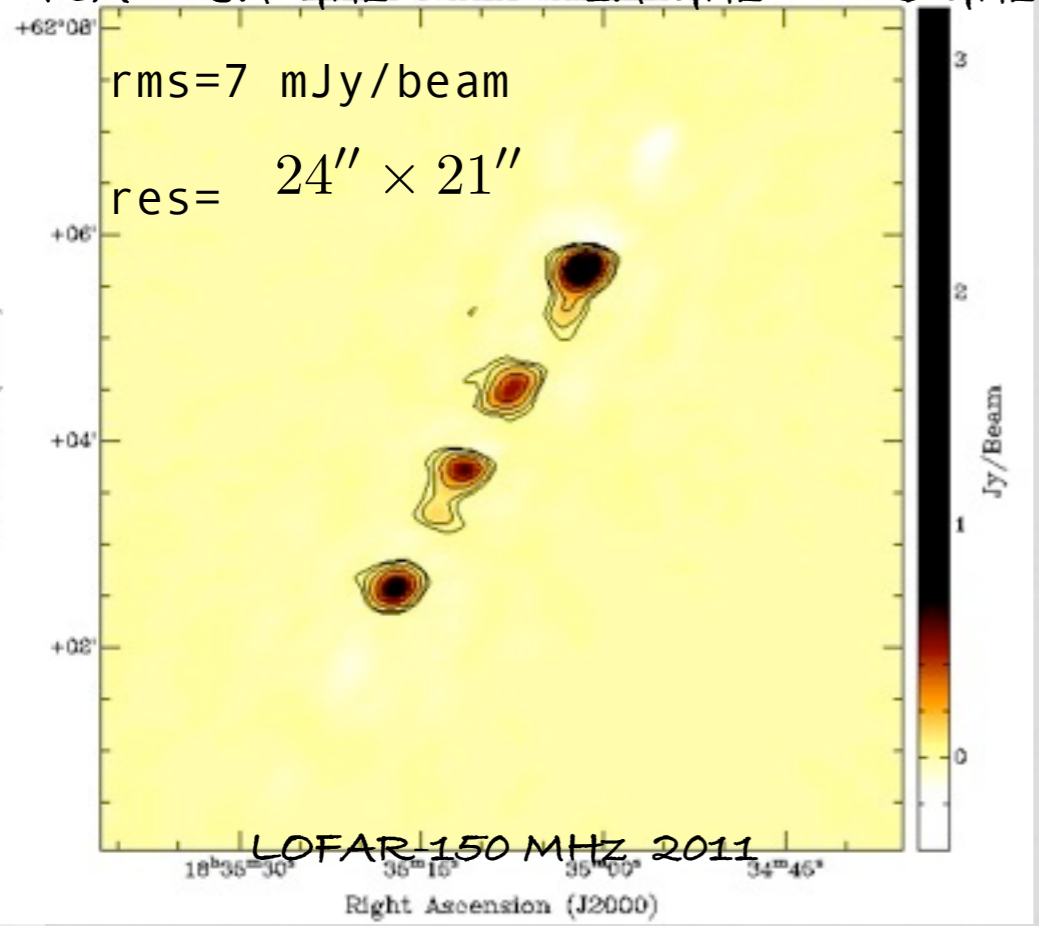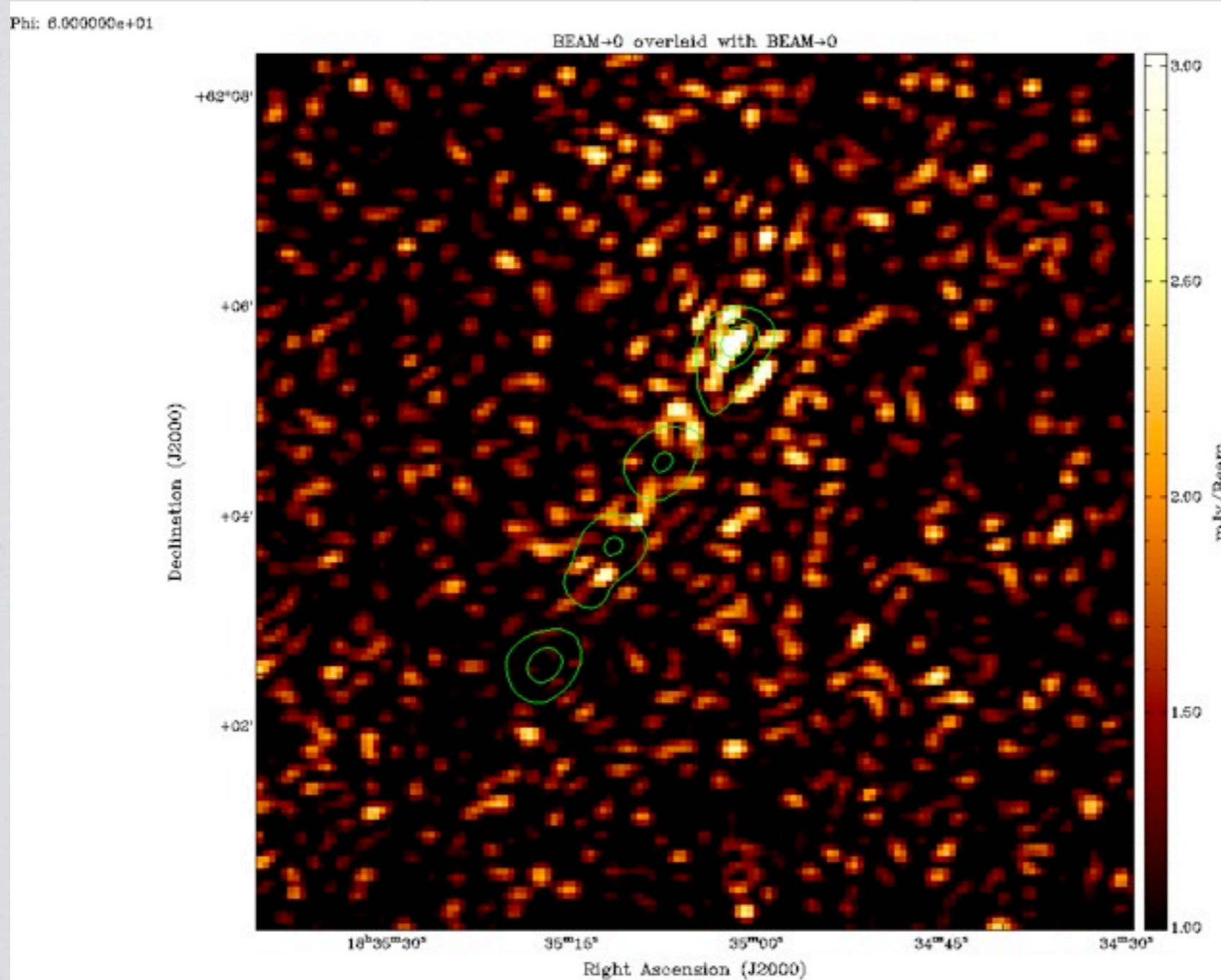
Declination (J2000)

64°

63°

62°

61°

60°

mJy/Beam

10

5

0

Tuesday, 28 May 13

B1834+620

WENSS

NVSS

VLA   8.4 GHz   1.4 GHz   5 GHz

rms=7 mJy/beam

res= $24'' \times 21''$

Jy/Beam

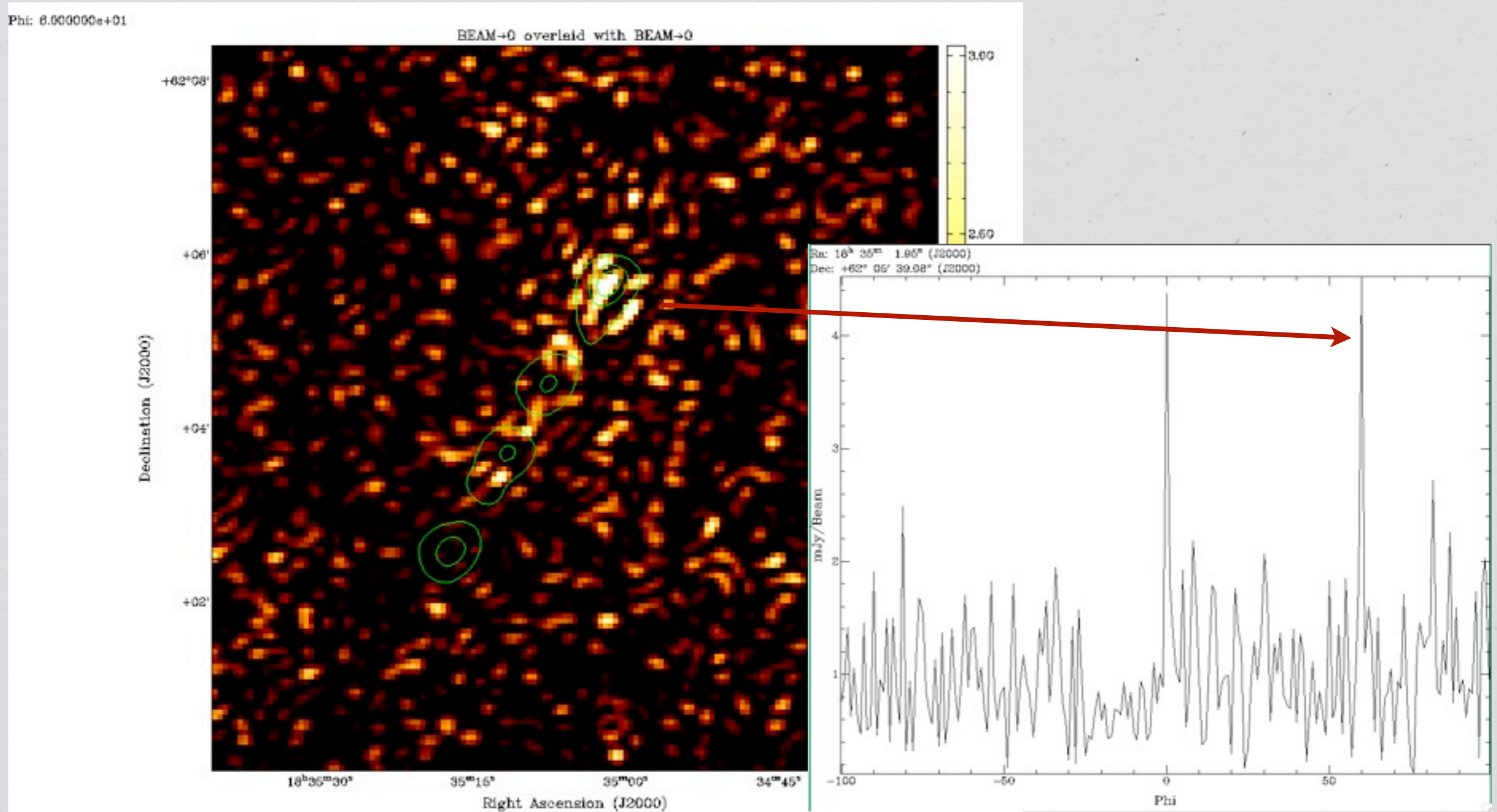Declination (J2000)

LOFAR 150 MHz 2011

Right Ascension (J2000)

Detected polarized emission at $\phi = +60\,rad\,m^{-2}$ as in Schoenmakers et al. 2000

another GRG polarized @ LOFAR freq. see Vibor Jelic's talk

Detected polarized emission at $\phi = +60\,rad\,m^{-2}$
as in Schoenmakers et al. 2000

another GRG polarized @ LOFAR freq. see Vibor Jelic's talk

work in progress

% polarized recored is low w.r.t WSRT

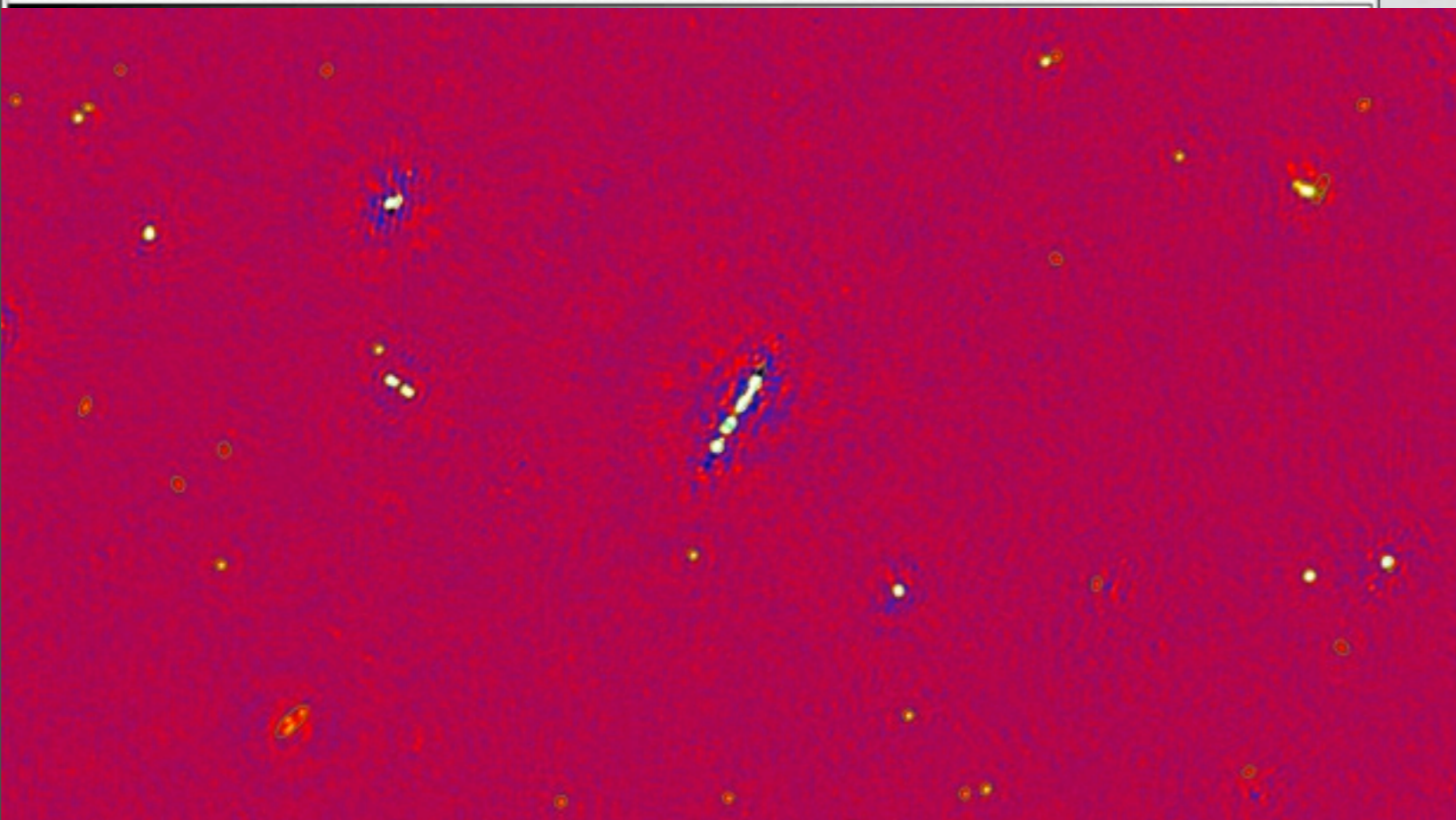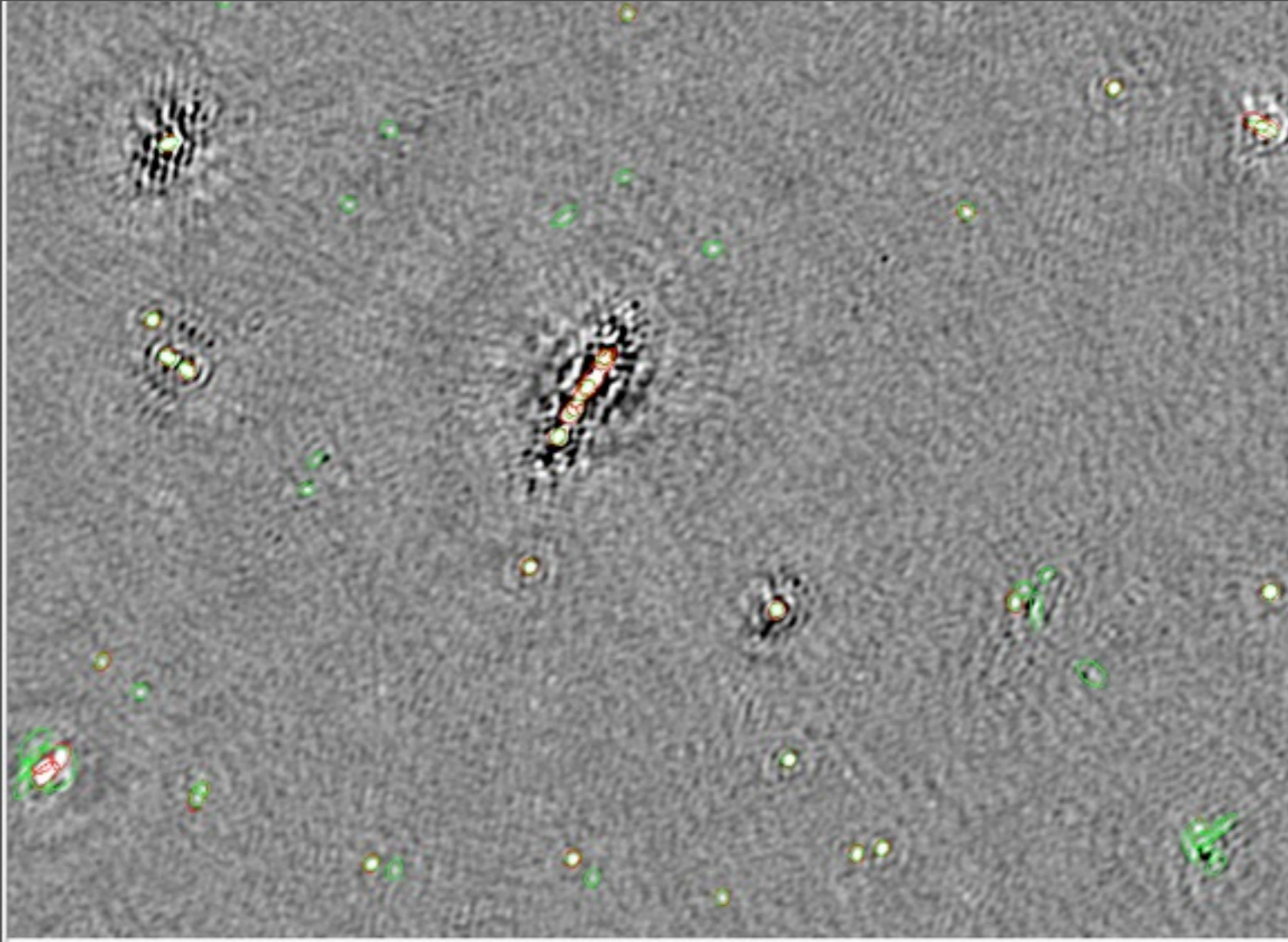TEST: run segecal subtracting all the model except the DDRG

Run awimager with element beam enabled

Run RMsynthesis

Question: self-cal models are not polarized, is there someone
that used polarized models in selfcal?

Do we still have the problem of extracting polarized models?

M. Bell proposed to build the models from the RMcubes

catalogues

- ☐ using two different rms boxes around the bright sources and for the rest of the field

- ☐ two catalogues with threshold 5σ (green) found 1300srcs and 8σ (red) found about 1000 srcs

- ☐ with 5 sigma all faint sources are detected but also artifacts "grapes"

- ☐ we could clean the catalogue by hand for a science field or use an high quality catalogue but for surveys if we want to have only real sources will not be complete
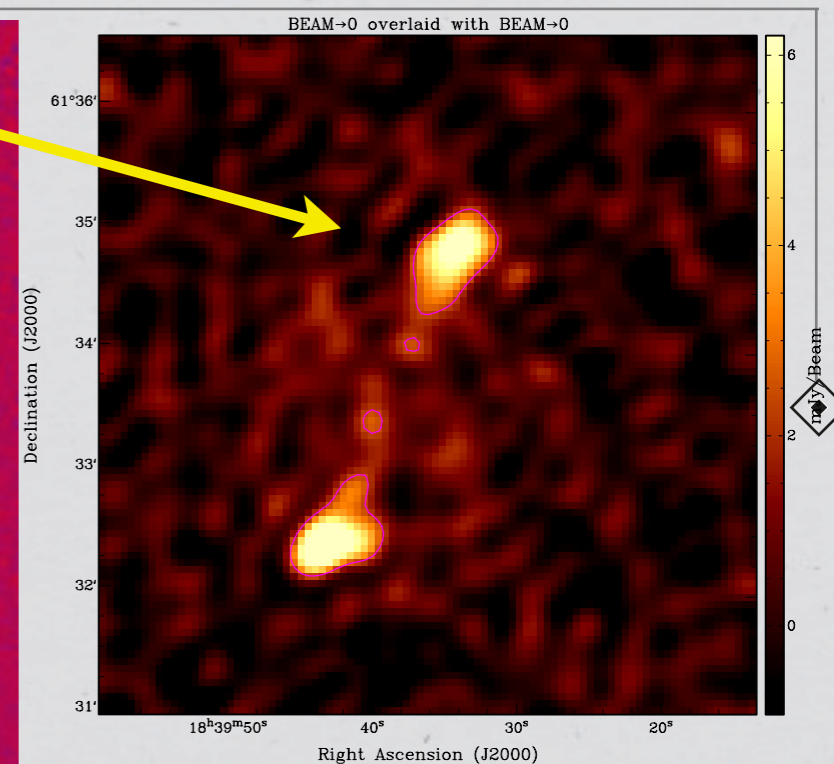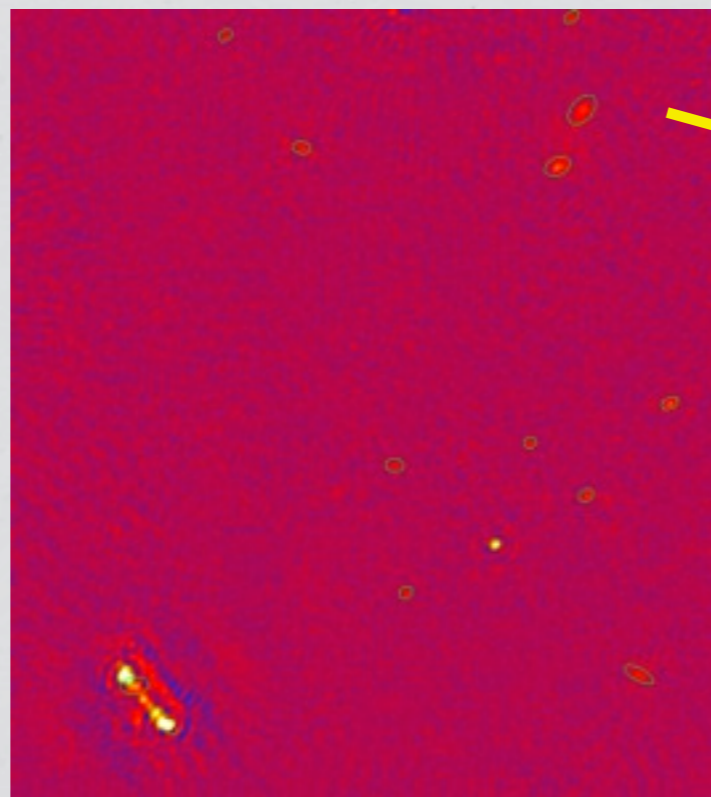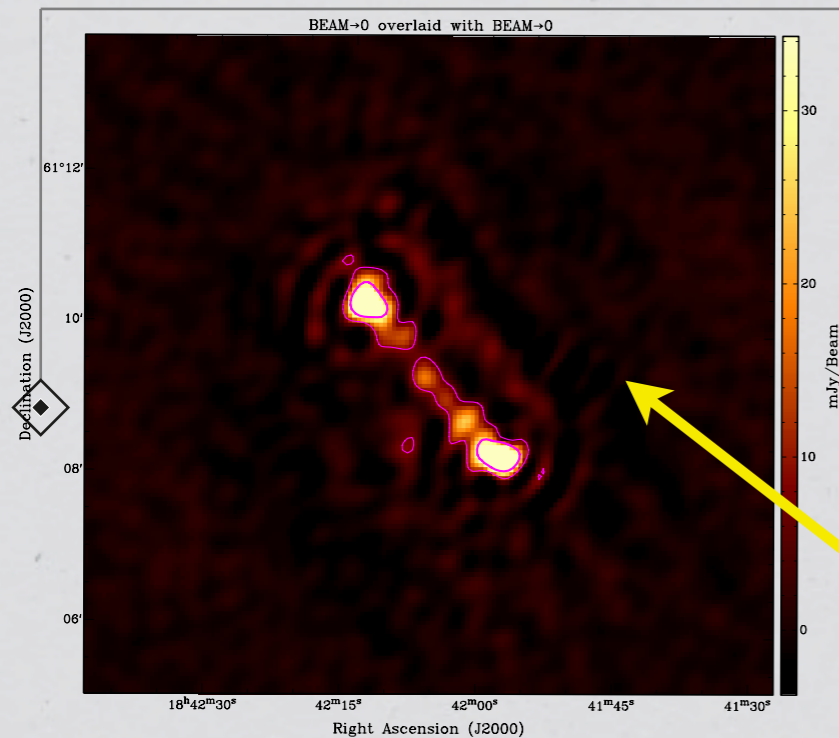
Doubletjes
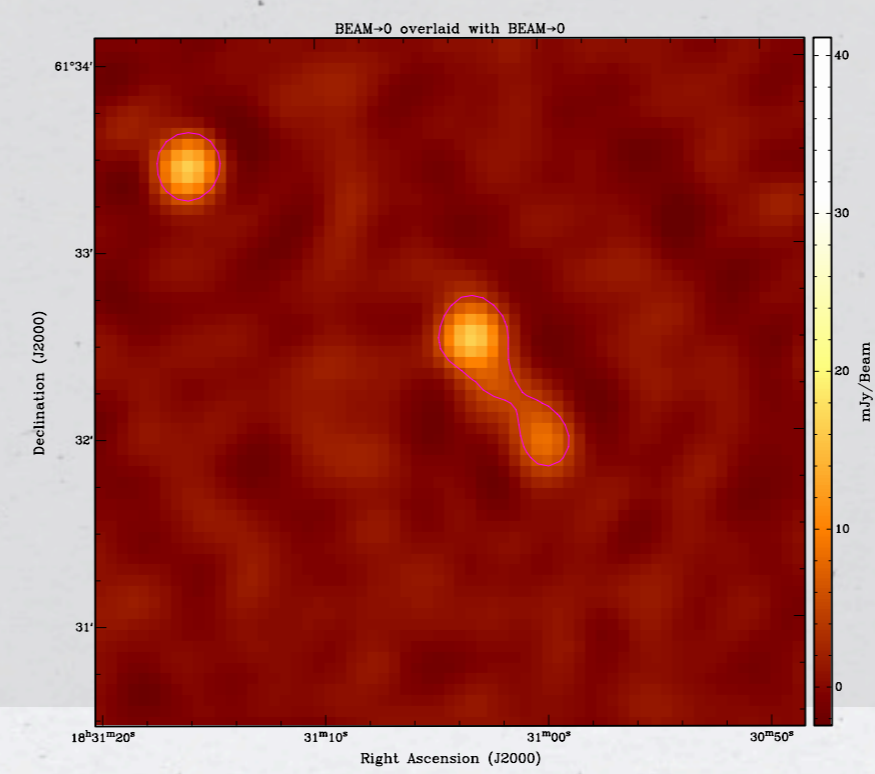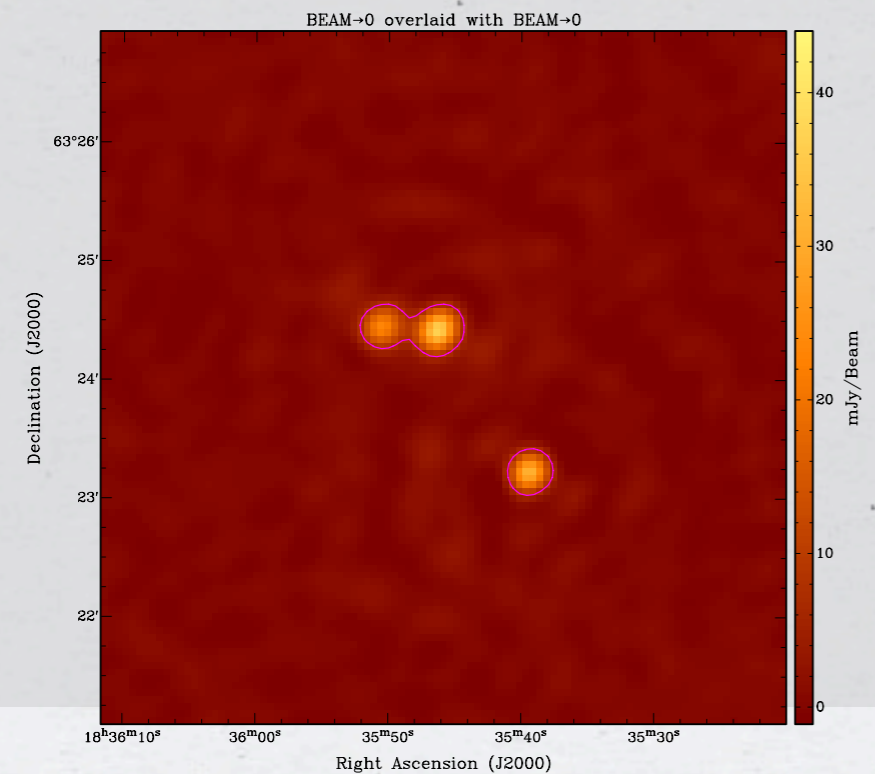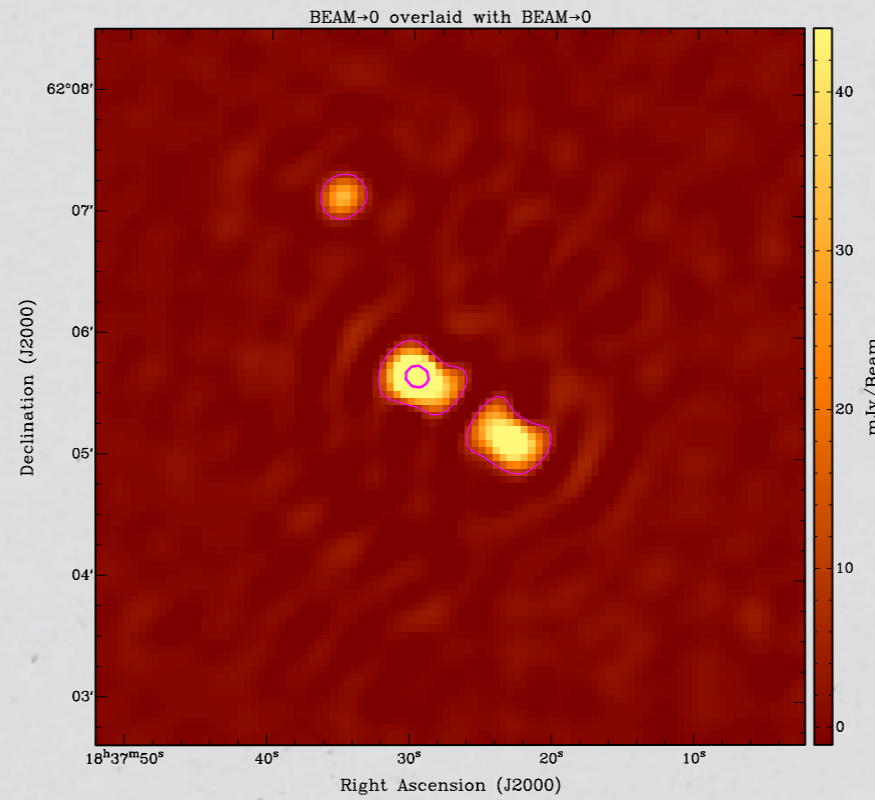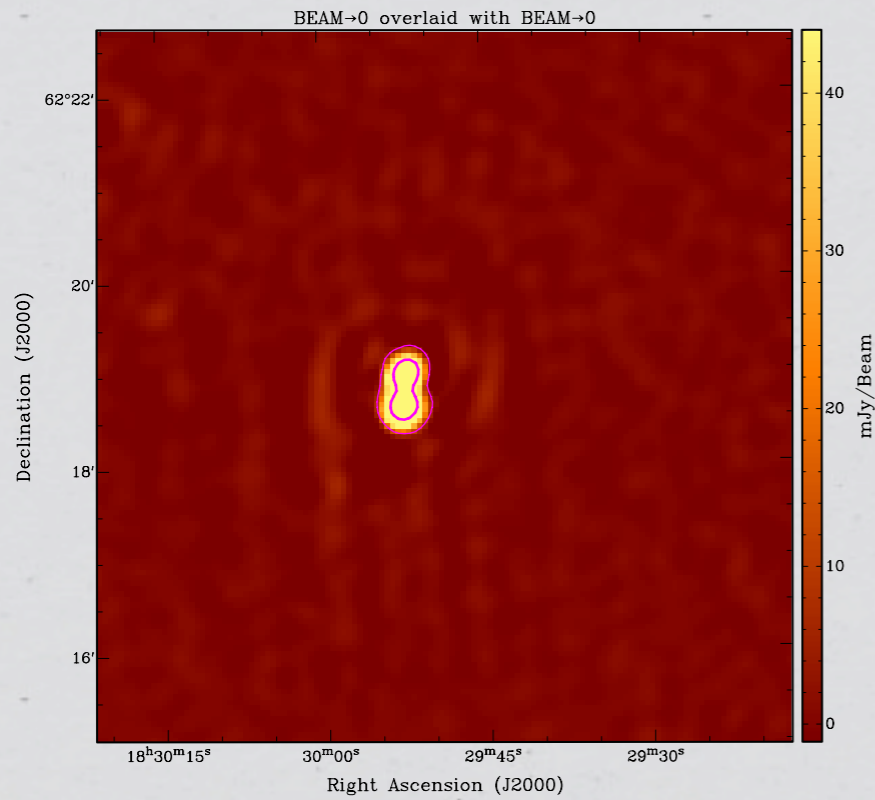
angular separation

$= 1'$

flux limit

$= 8$ mJy

At z=1,

1 arcmin = 700 kpc

10 mJy = L5e25 W/Hz

Giant Radio Galaxies

- selection criteria of doubletjes biased sizes and bright sources

- LOFAR surveys are the best tool for detecting GRG

- Unbiased catalogues to explore redshift

long BL
low energy electron

redshift now 0.3 but also
some z=1

conclusions

* High quality HBA LOFAR images obtained for the B1834+620 field detected polarization

* B1834+620 detection of relic lobe component. Does it follow bow shock model?

* open issues: flux calibration

future

- The field of B1834+620 top priority of the Nearby AGN WG (SKSP) and GRG WG (MKSP)

- paper in preparation