Interferometría...
¿Magia o Ciencia?

Rubén Herrero-Illana

Introduction

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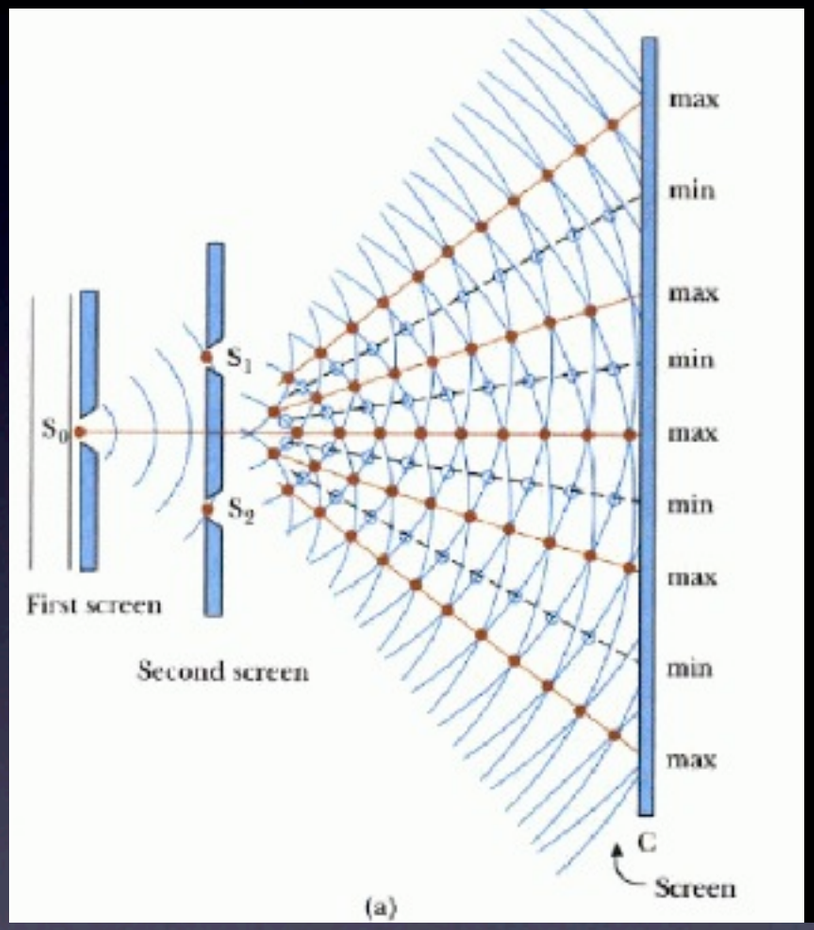
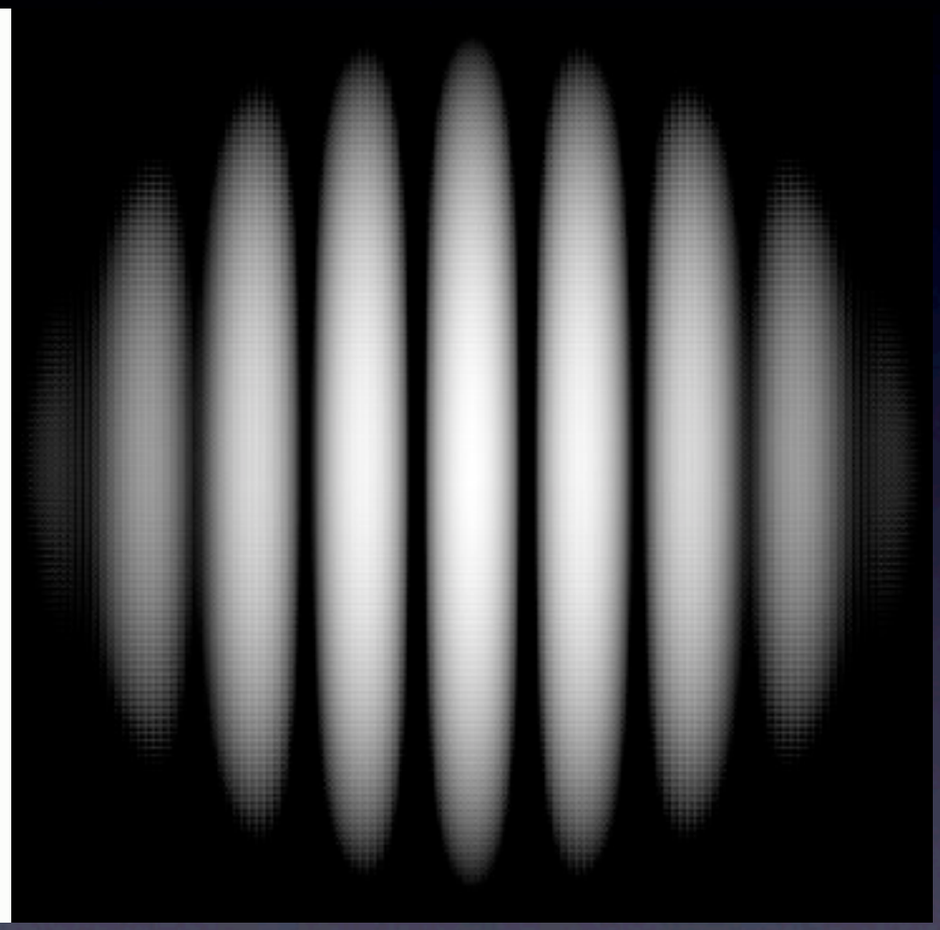
Basics

Double slit experiment





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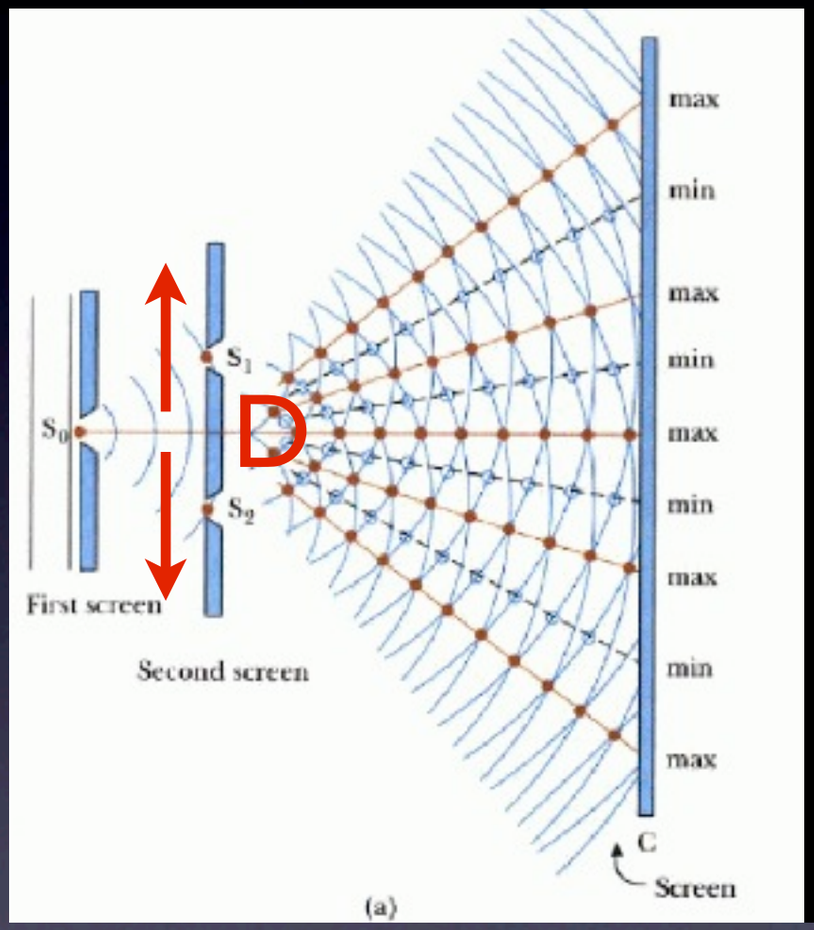

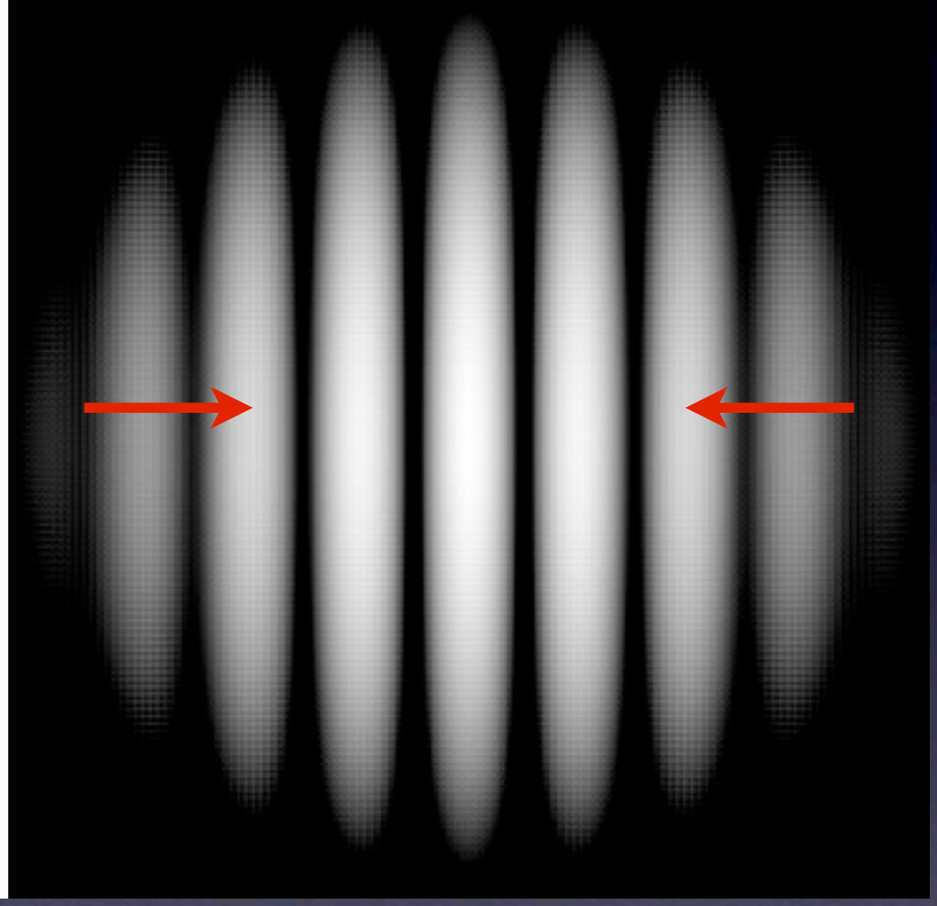

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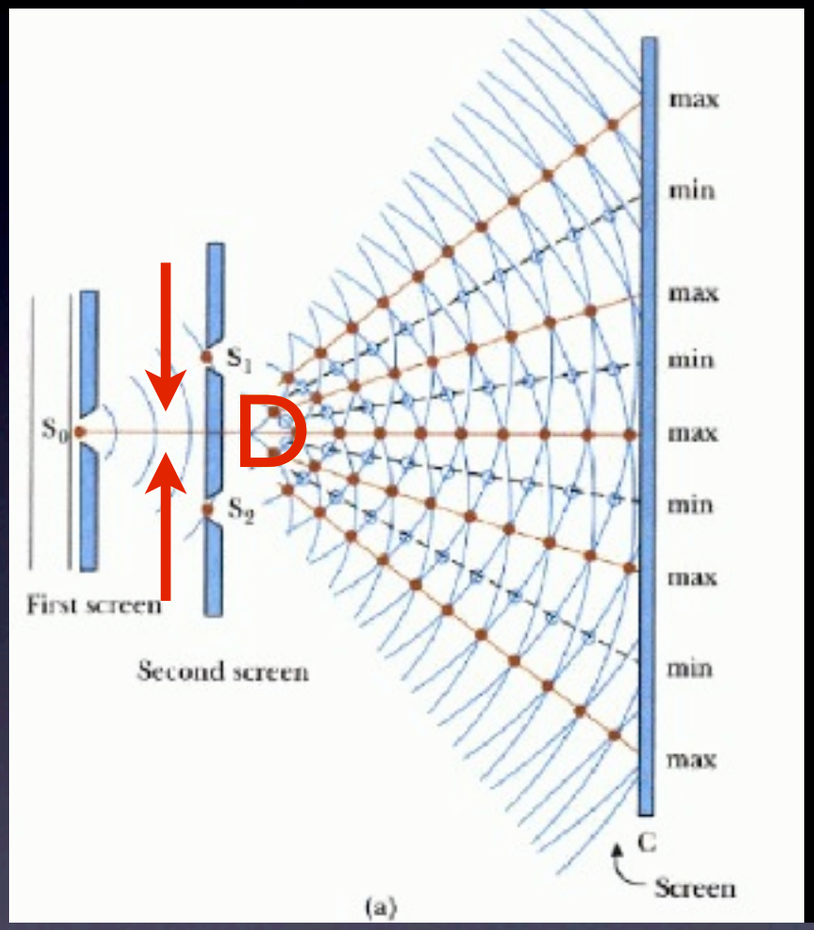

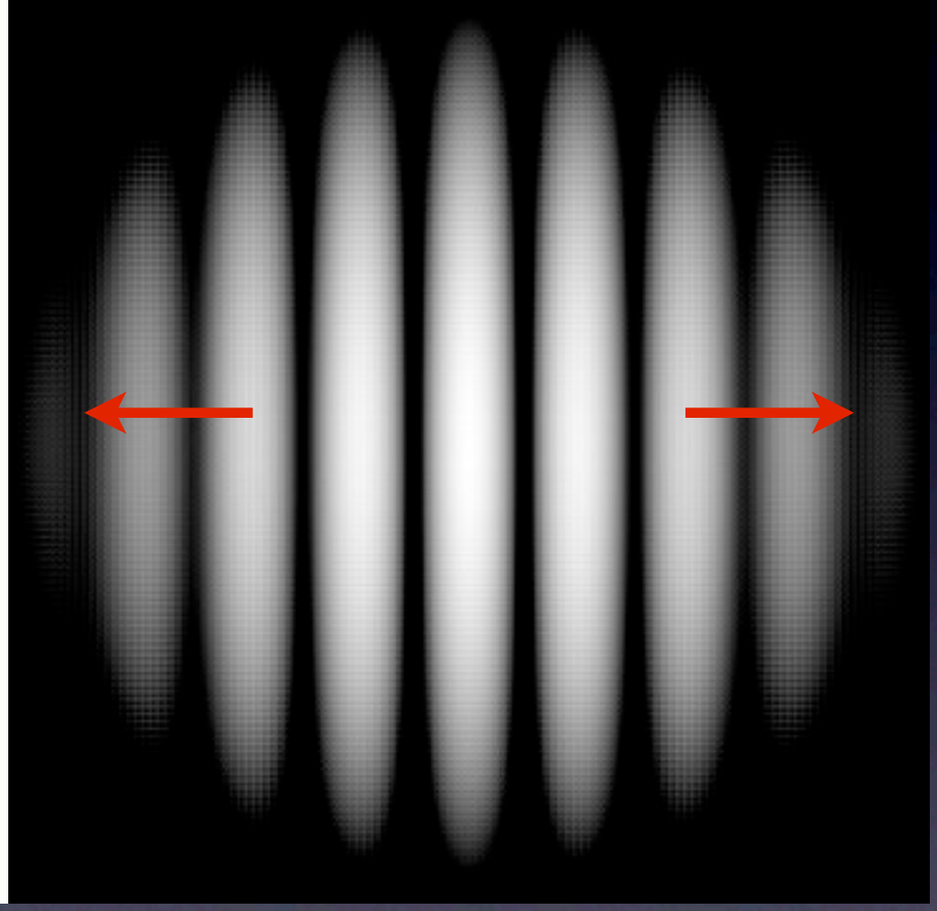

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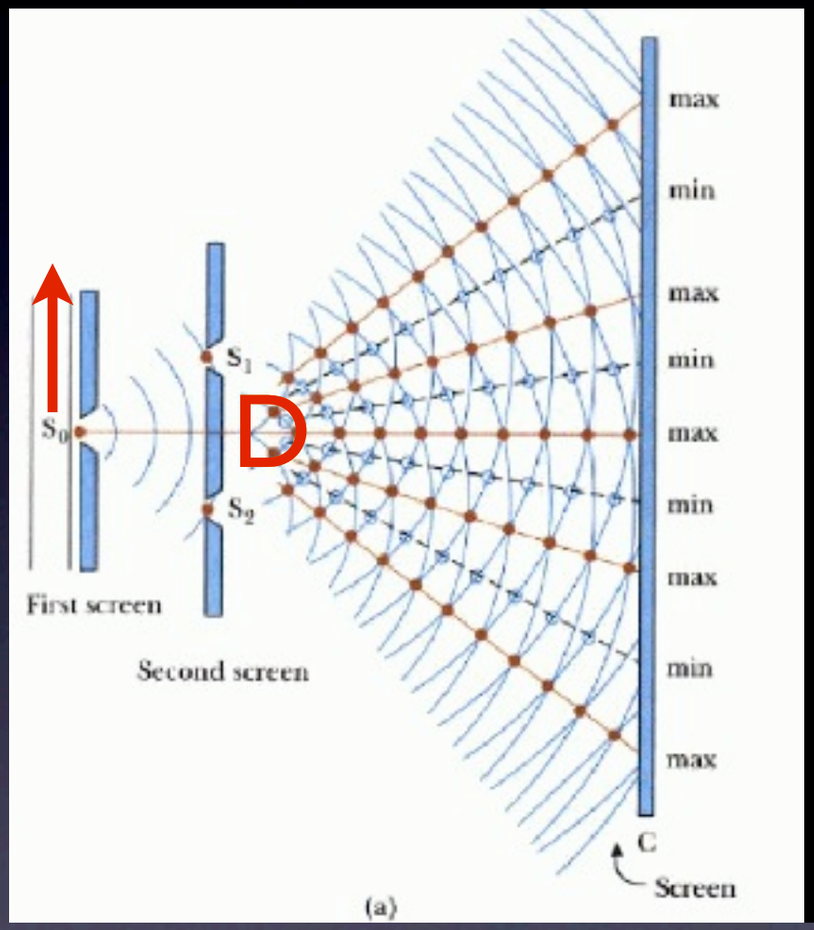

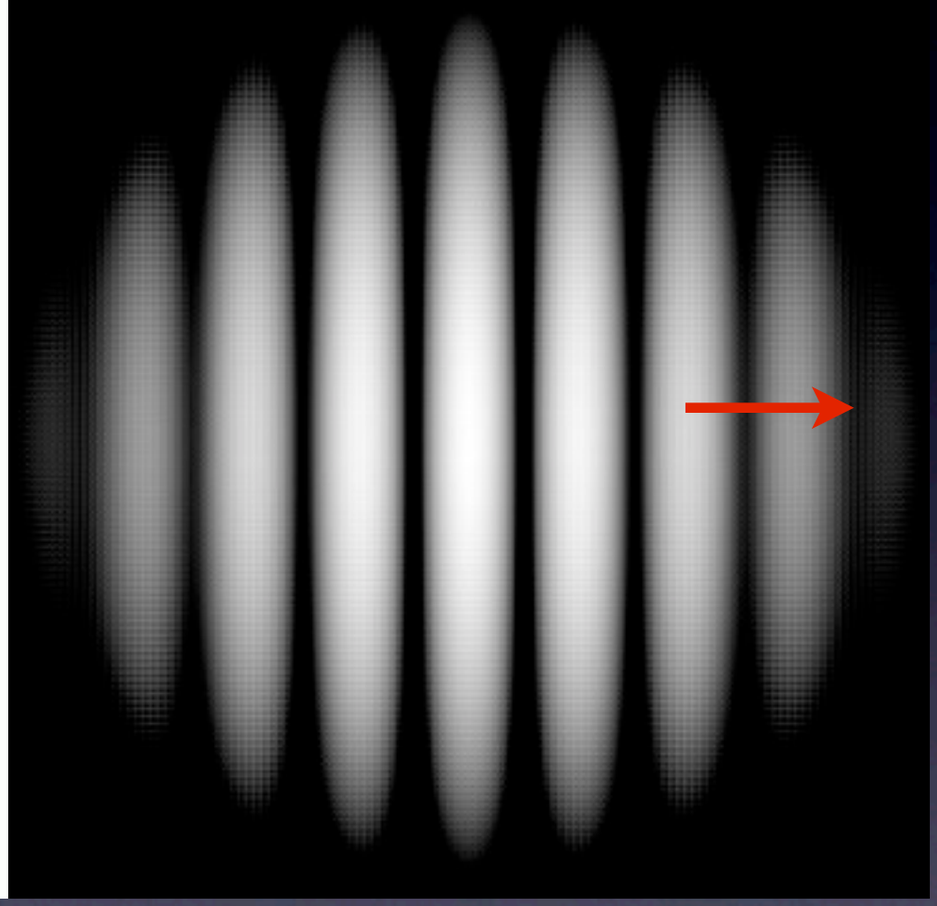

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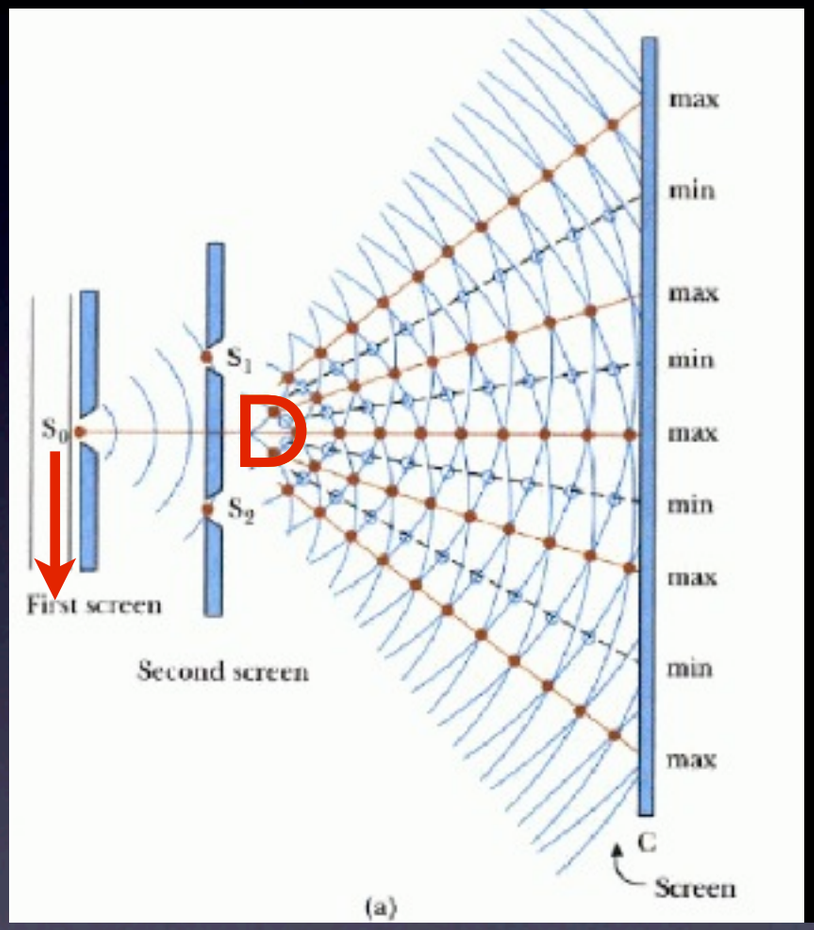

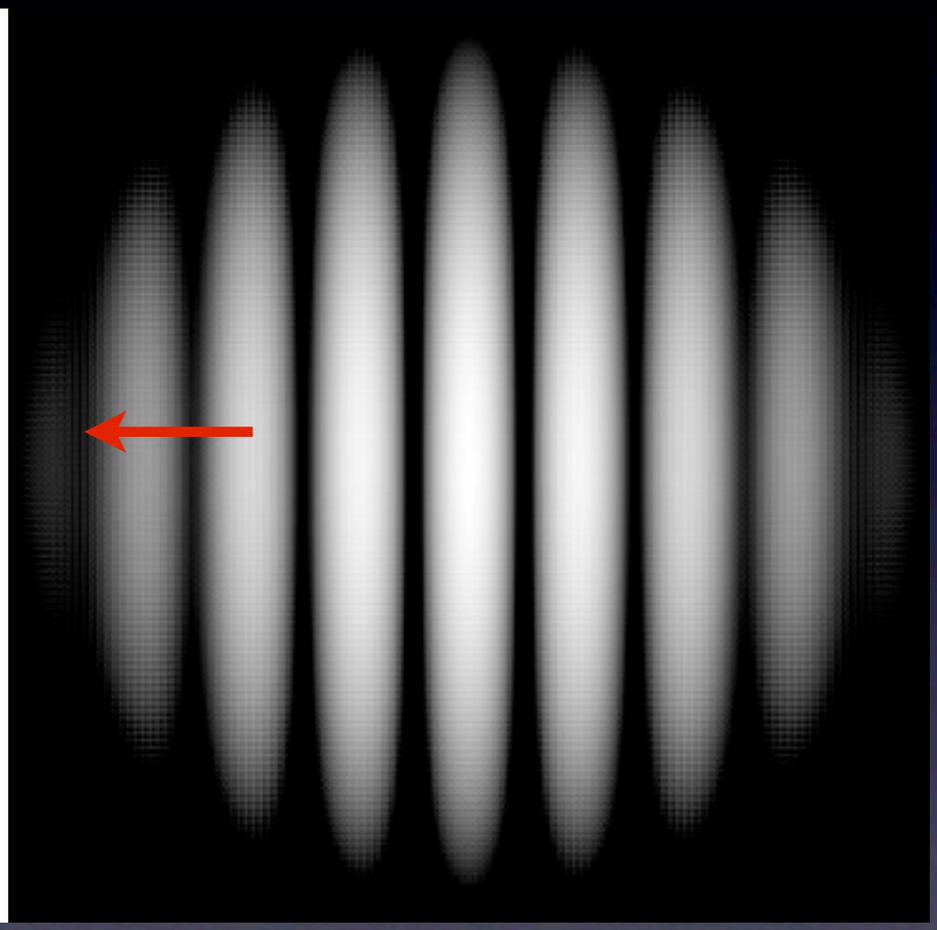

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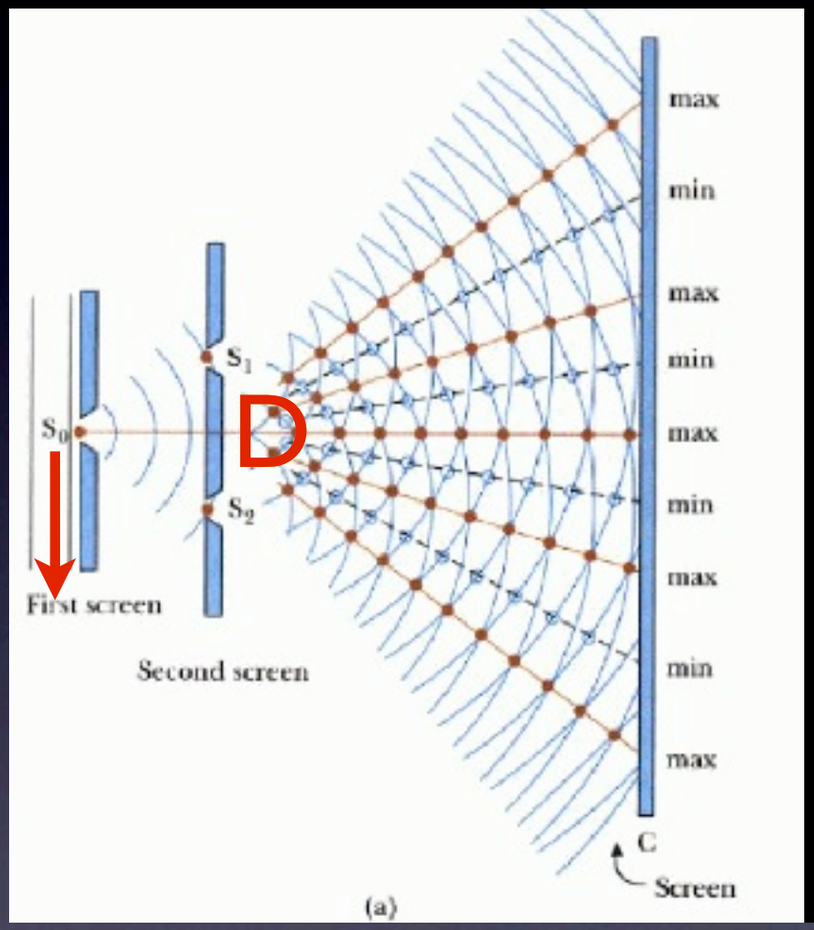
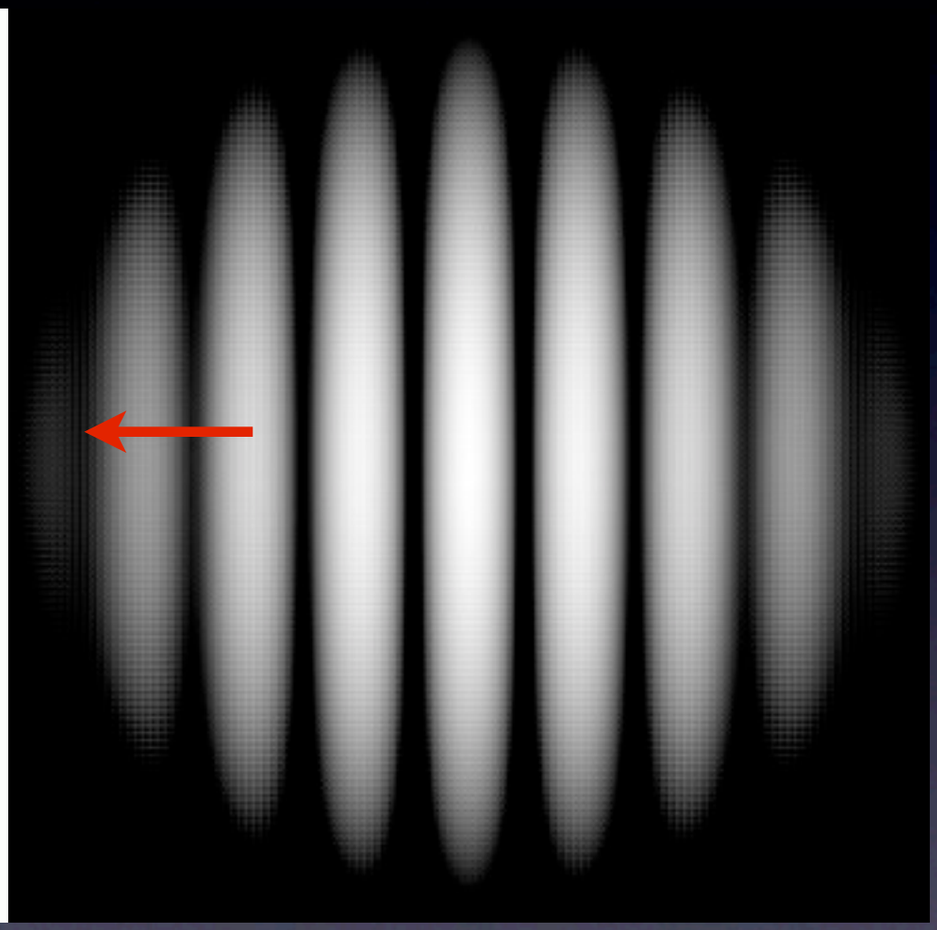
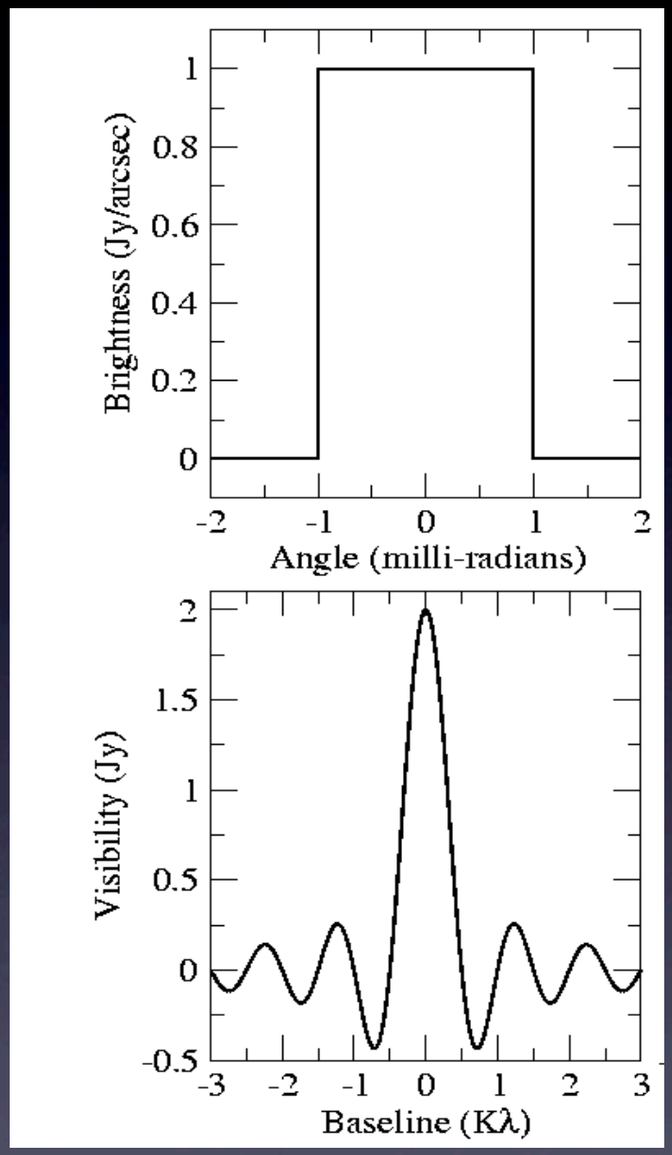




$$V = |V|e^{i\phi} \qquad |V| = \frac{I_{max} - I_{min}}{I_{max} + I_{min}}$$

Double slit experiment



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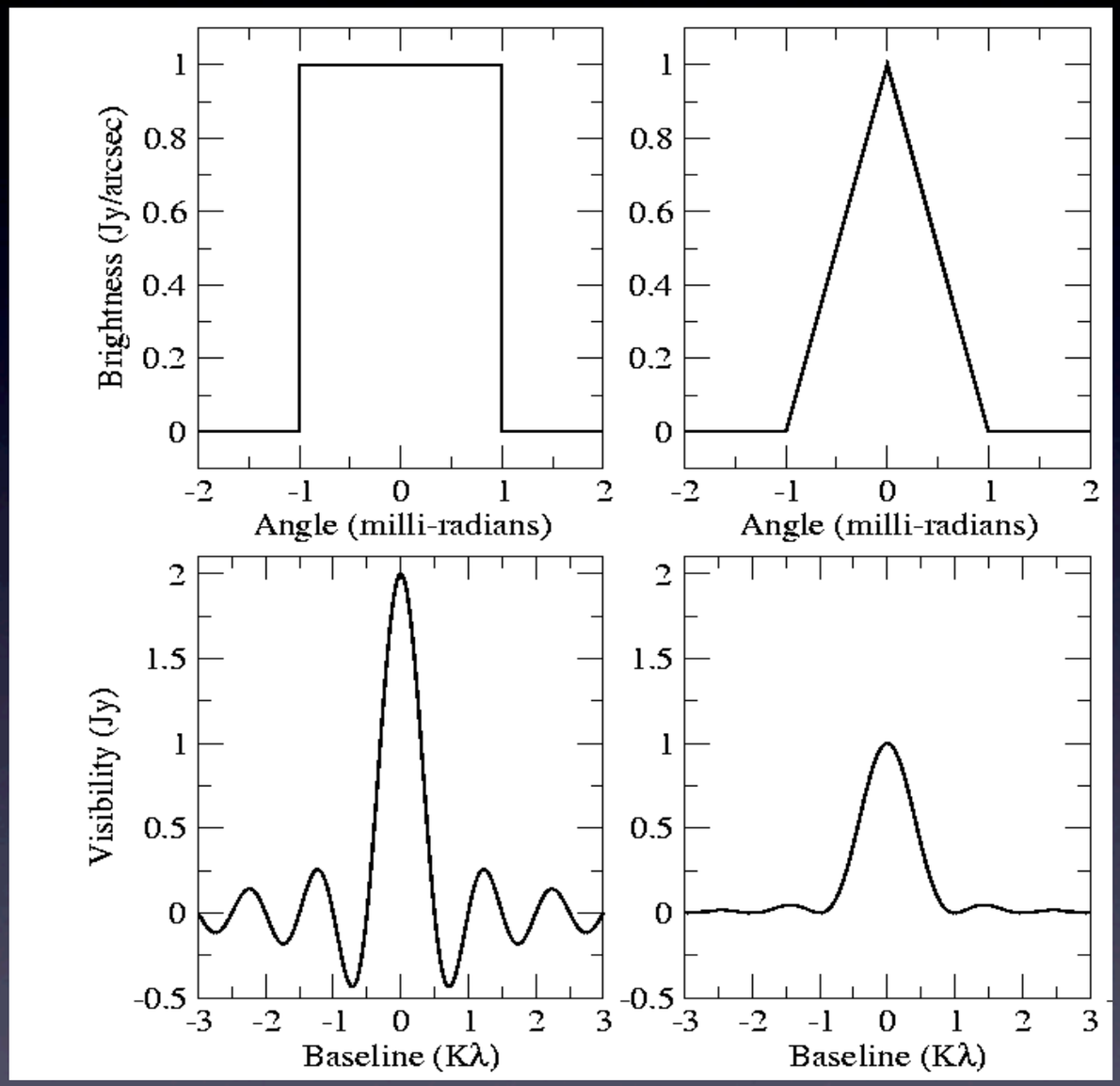

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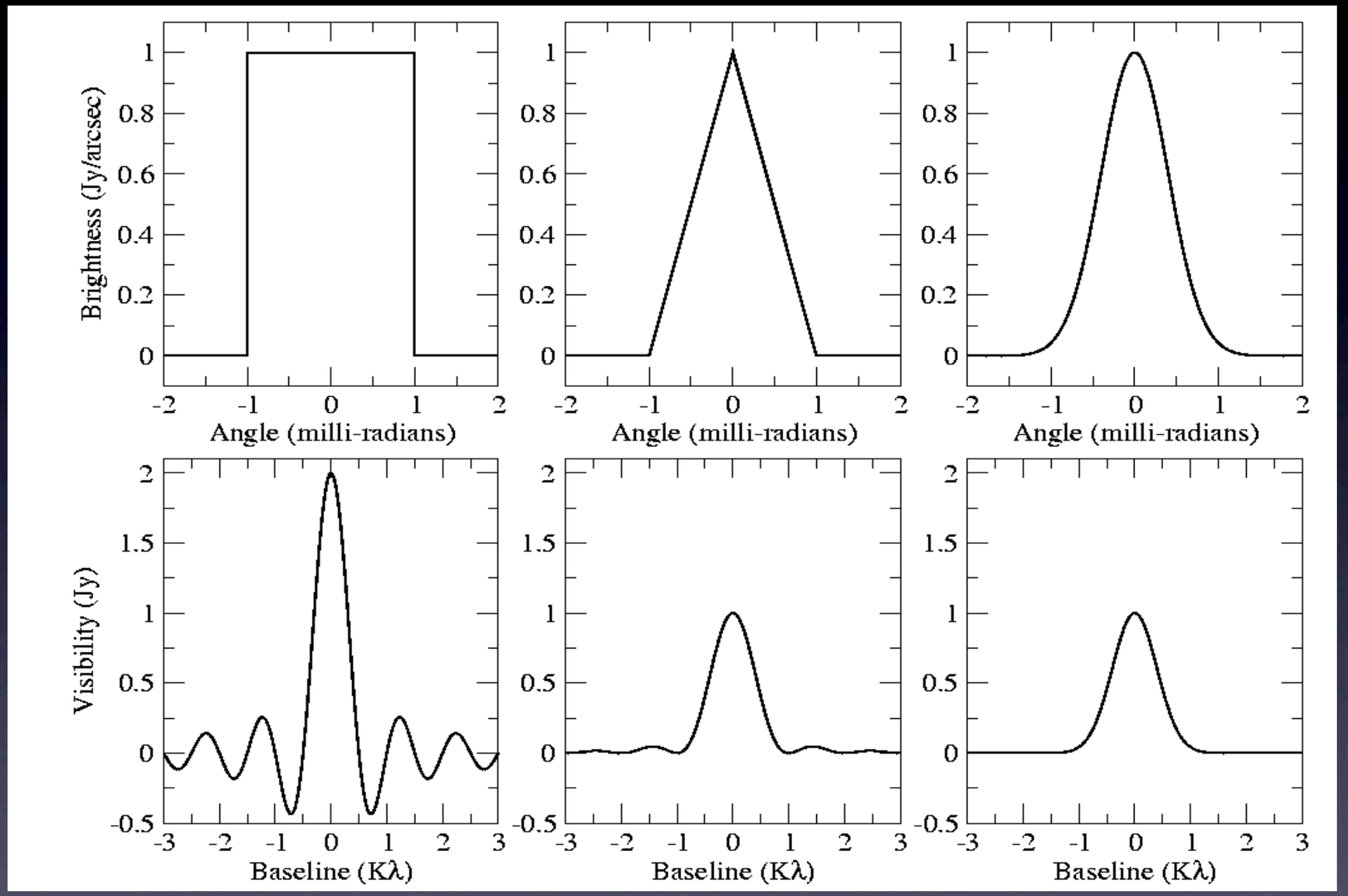

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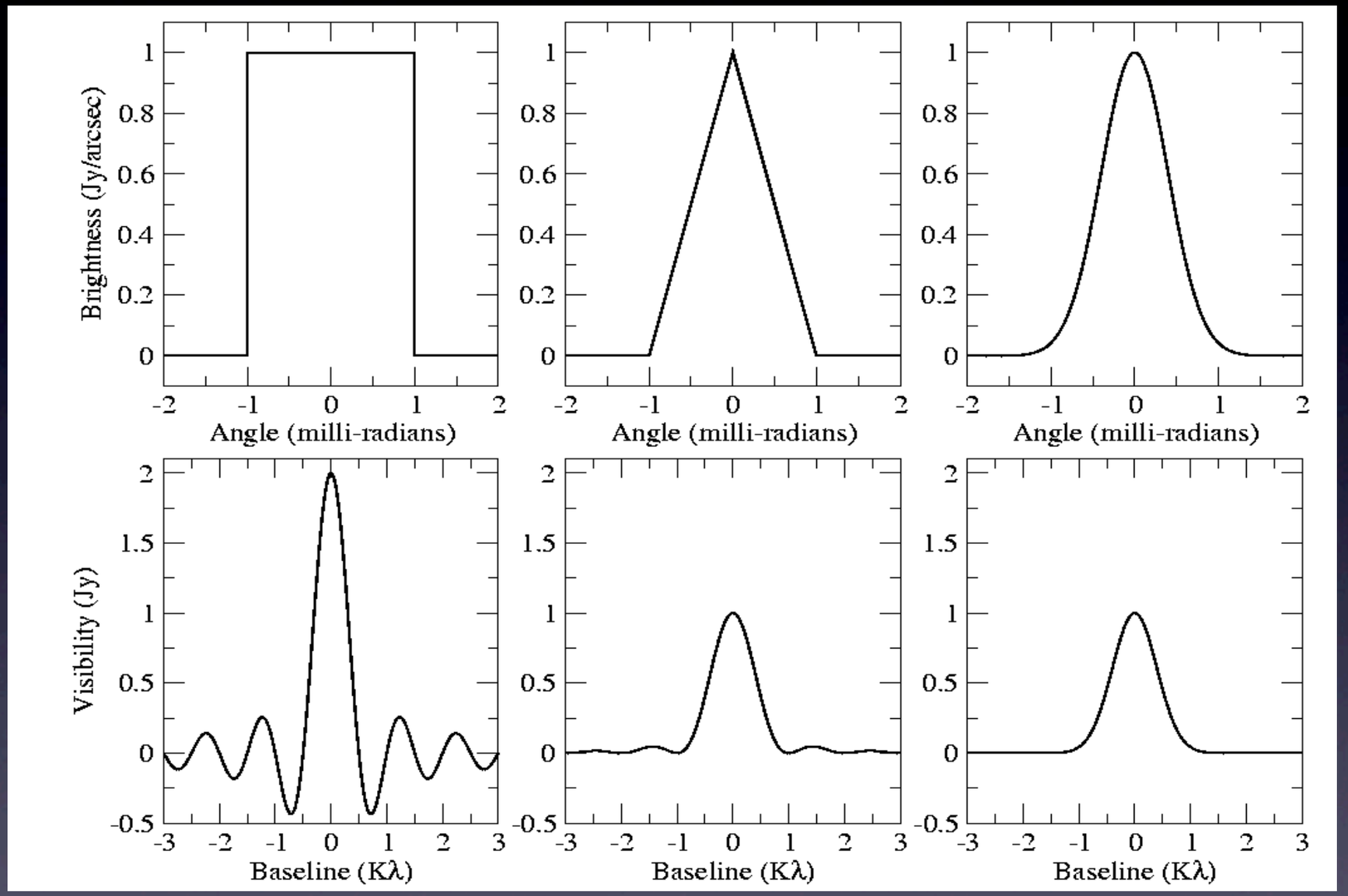

FT!!

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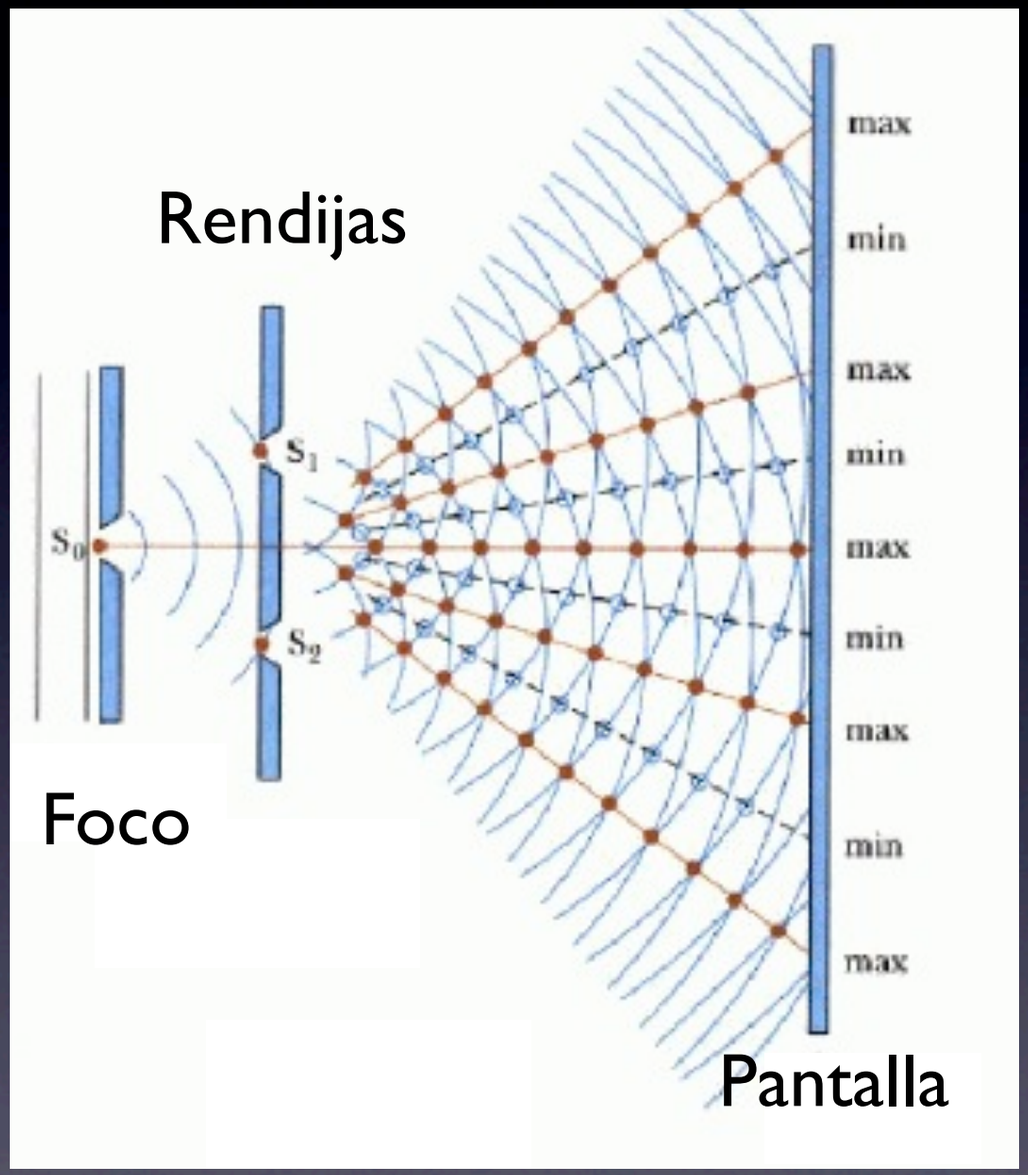

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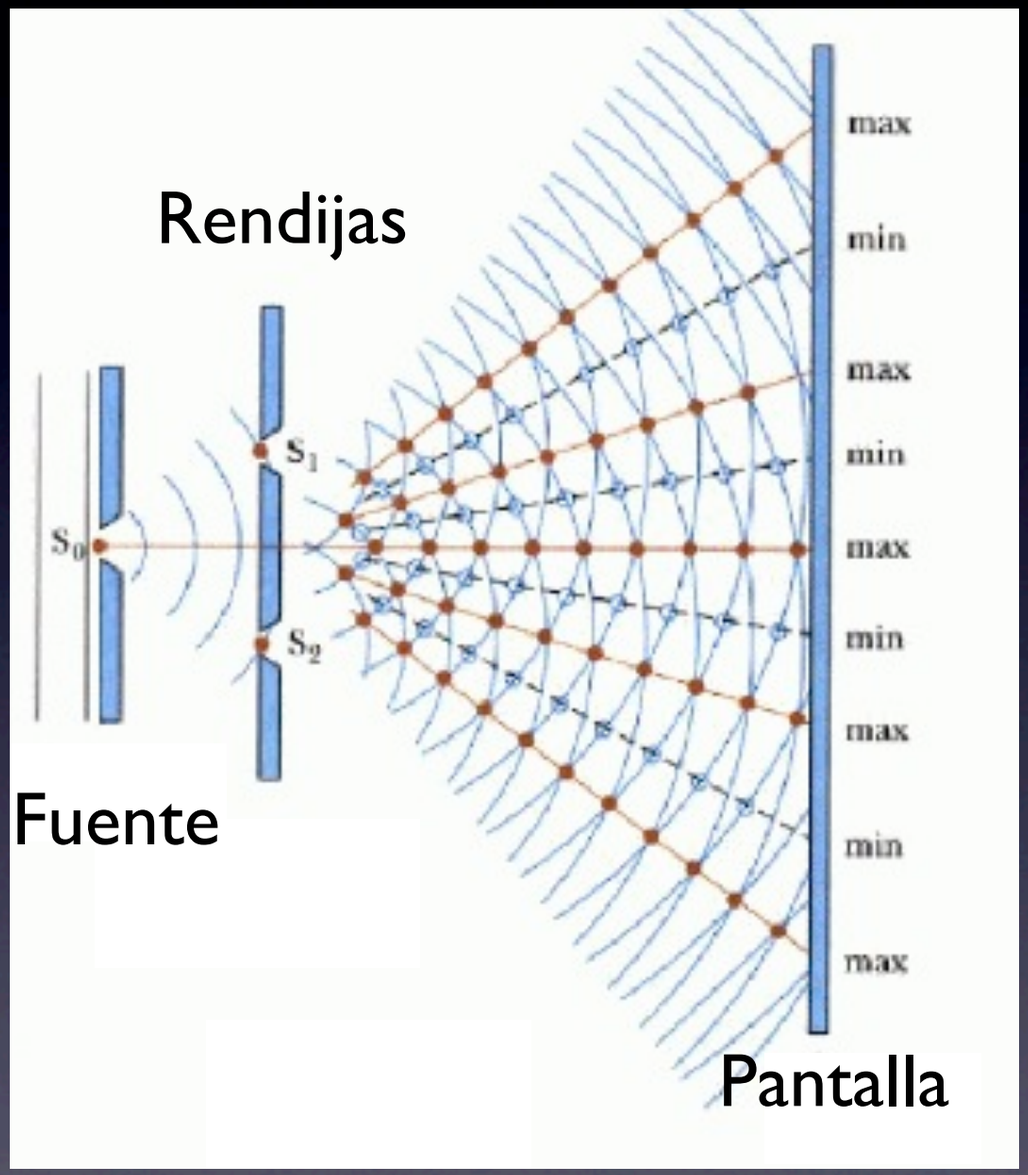

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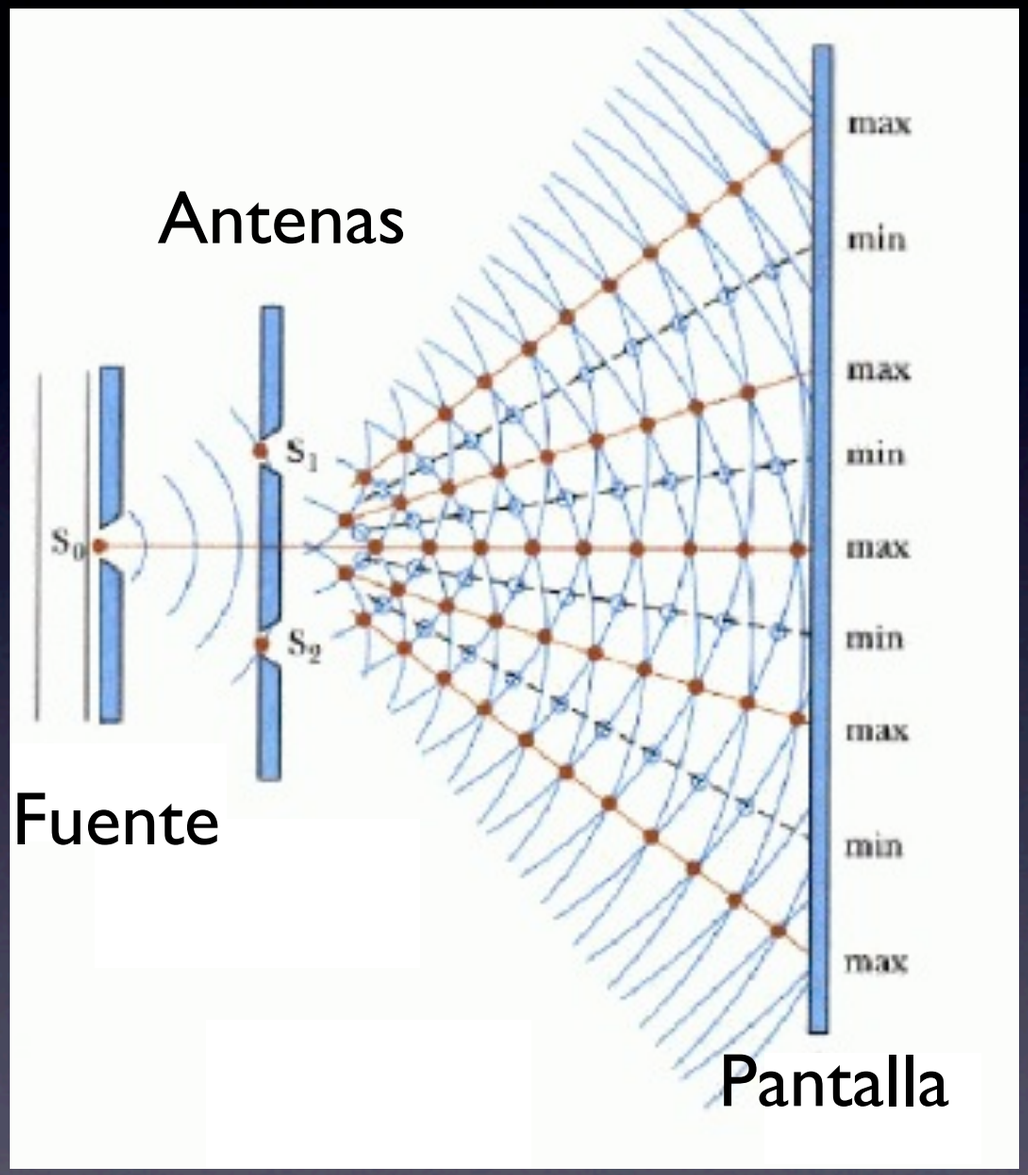

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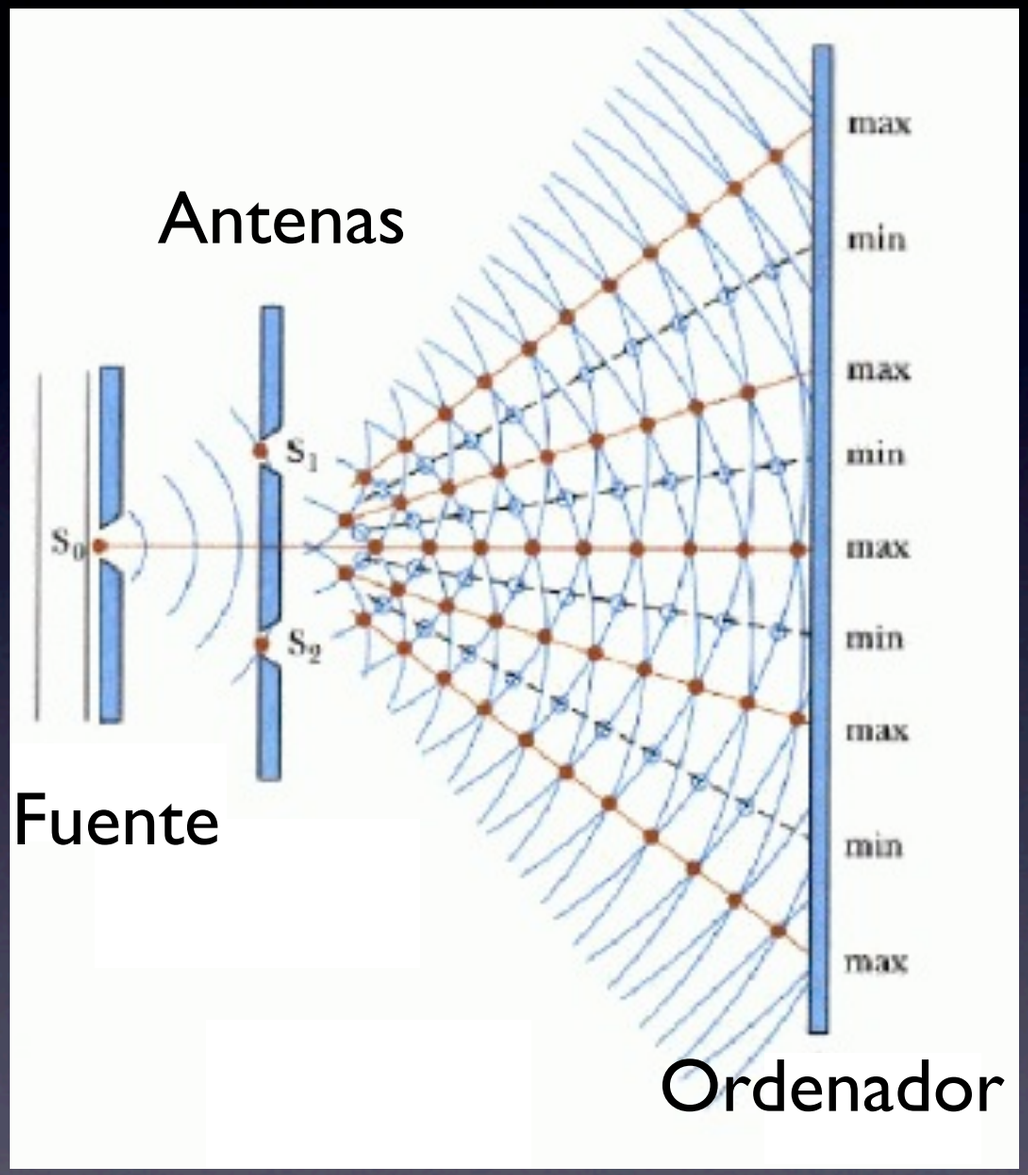

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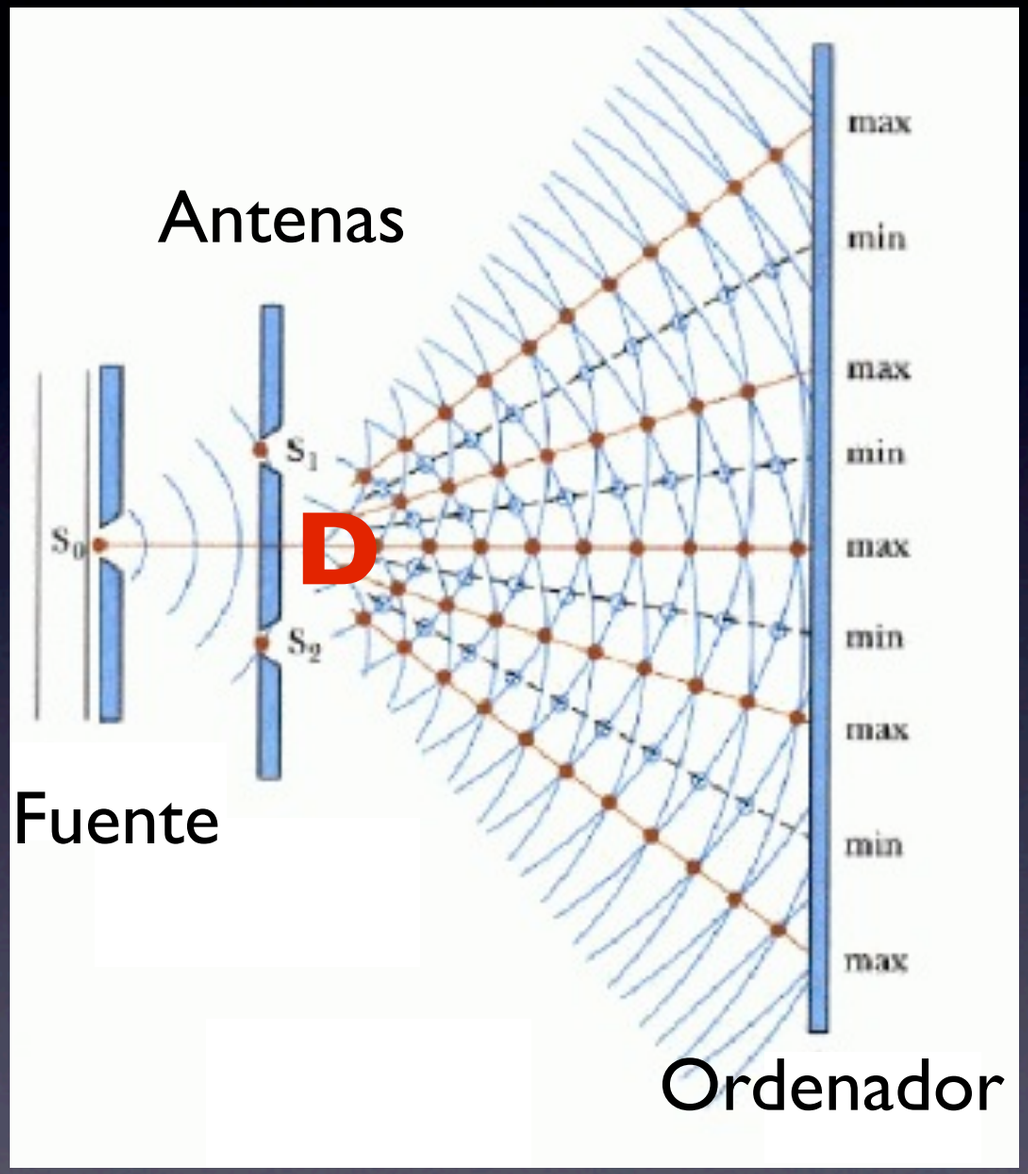
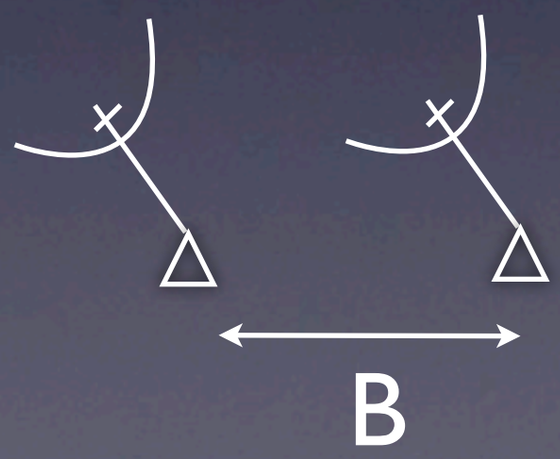


u-v plane



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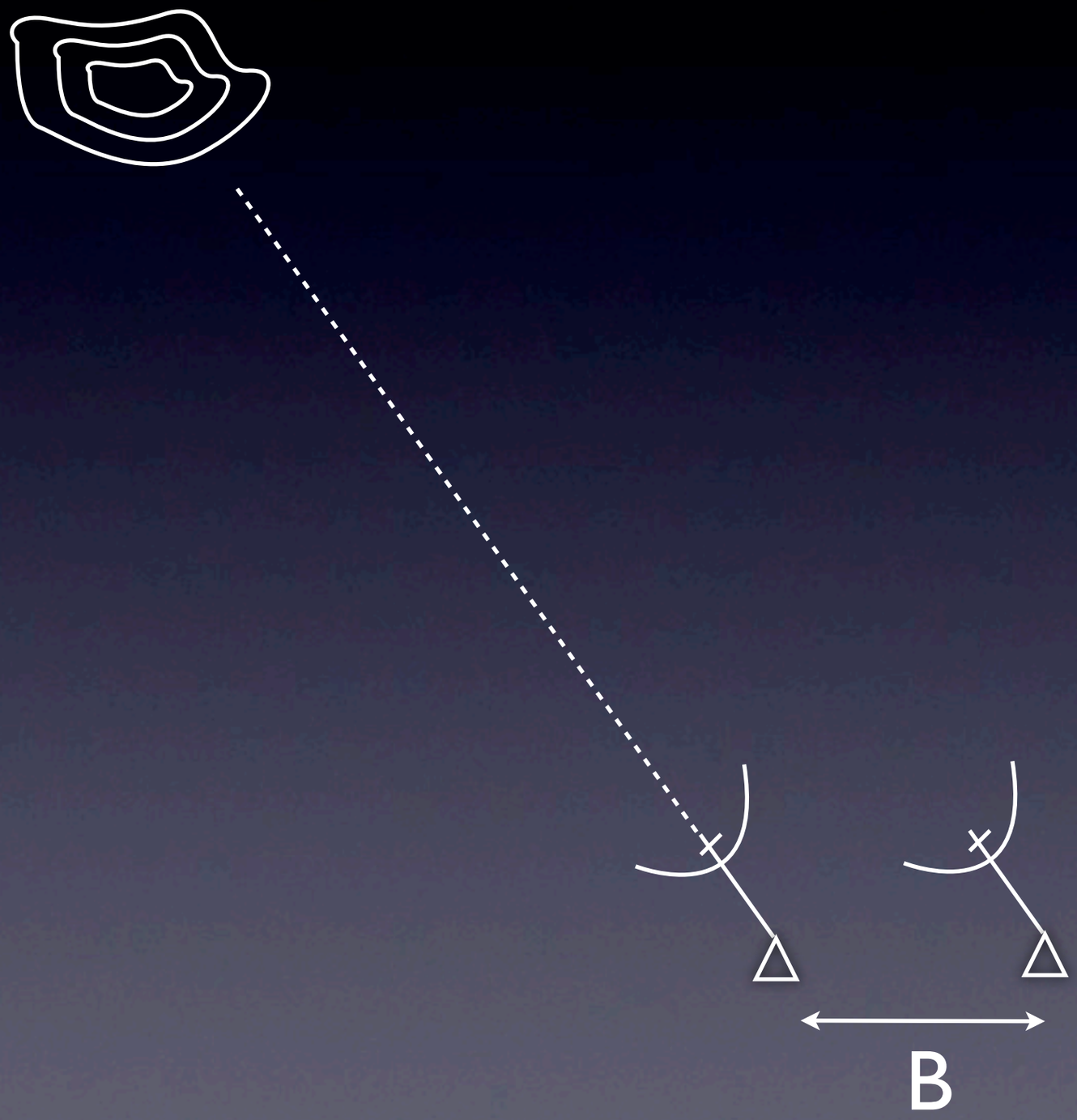

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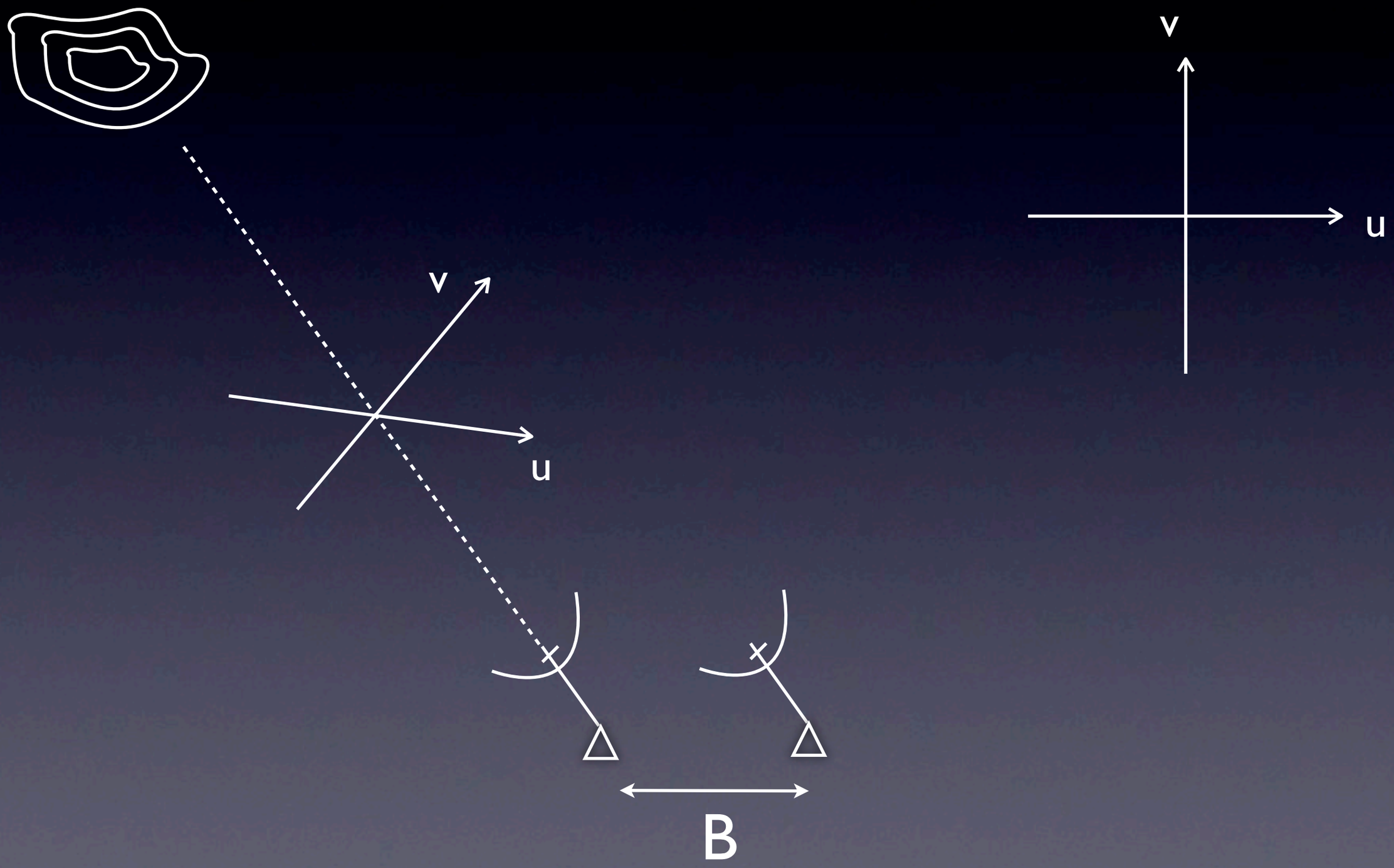

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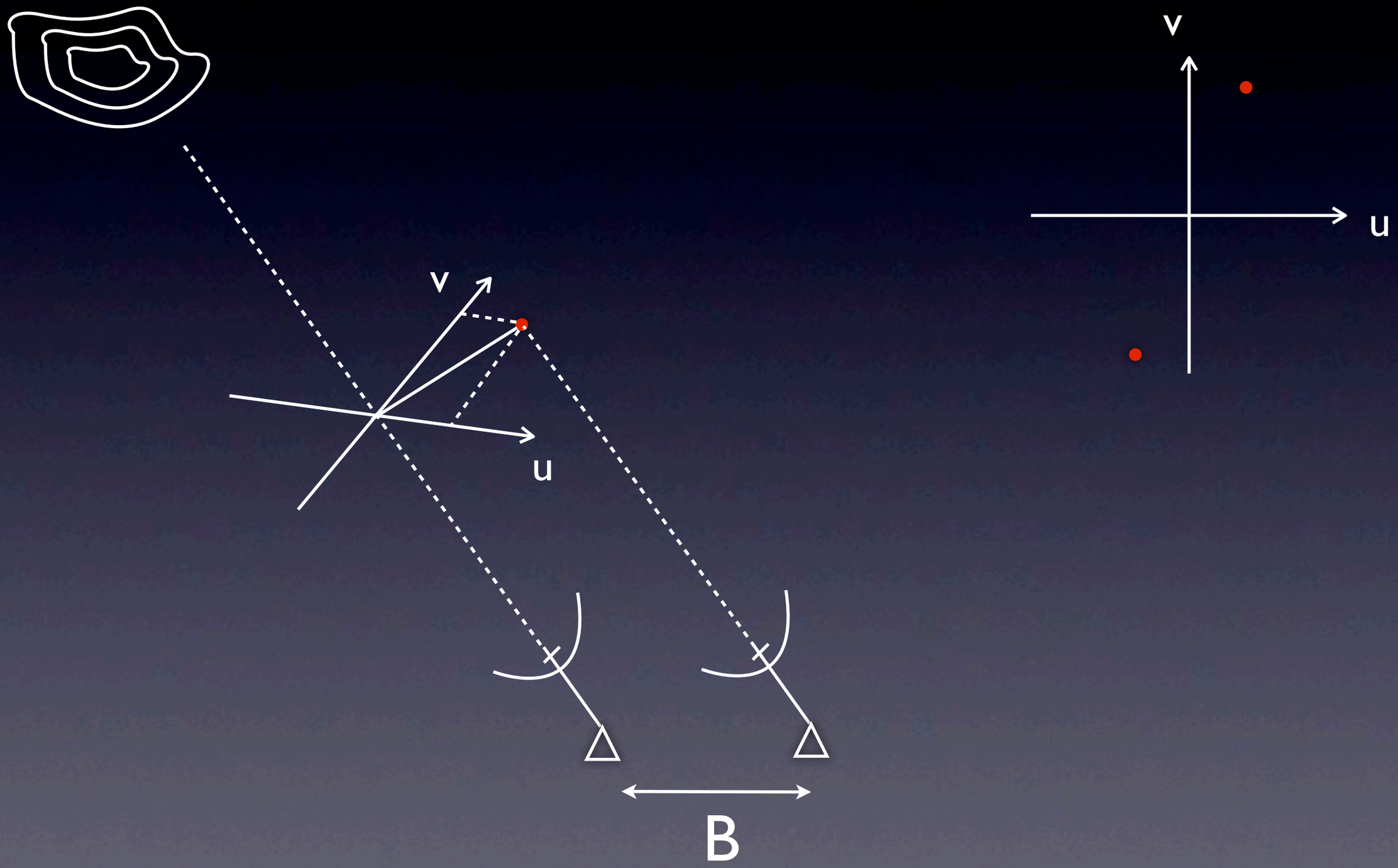

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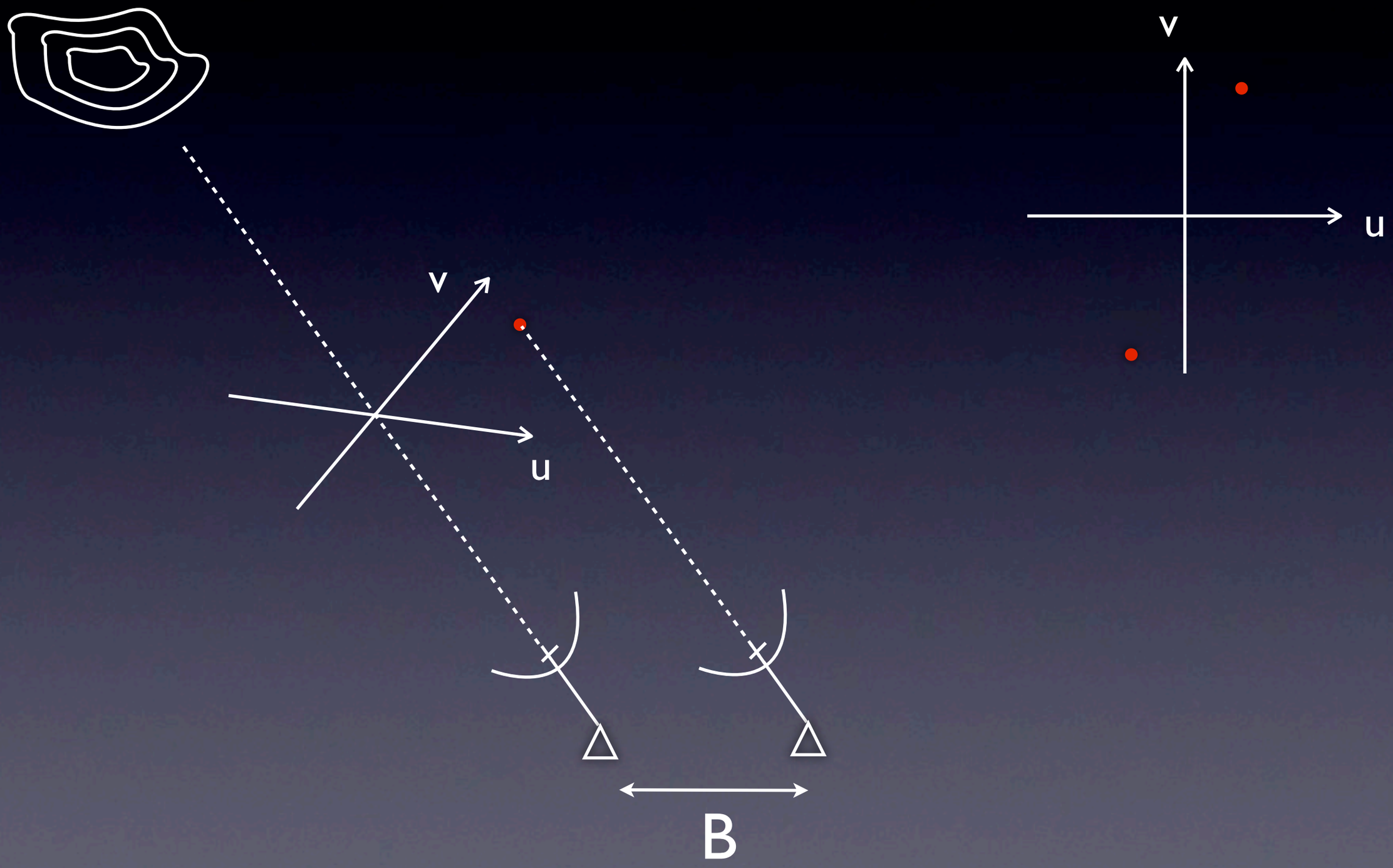

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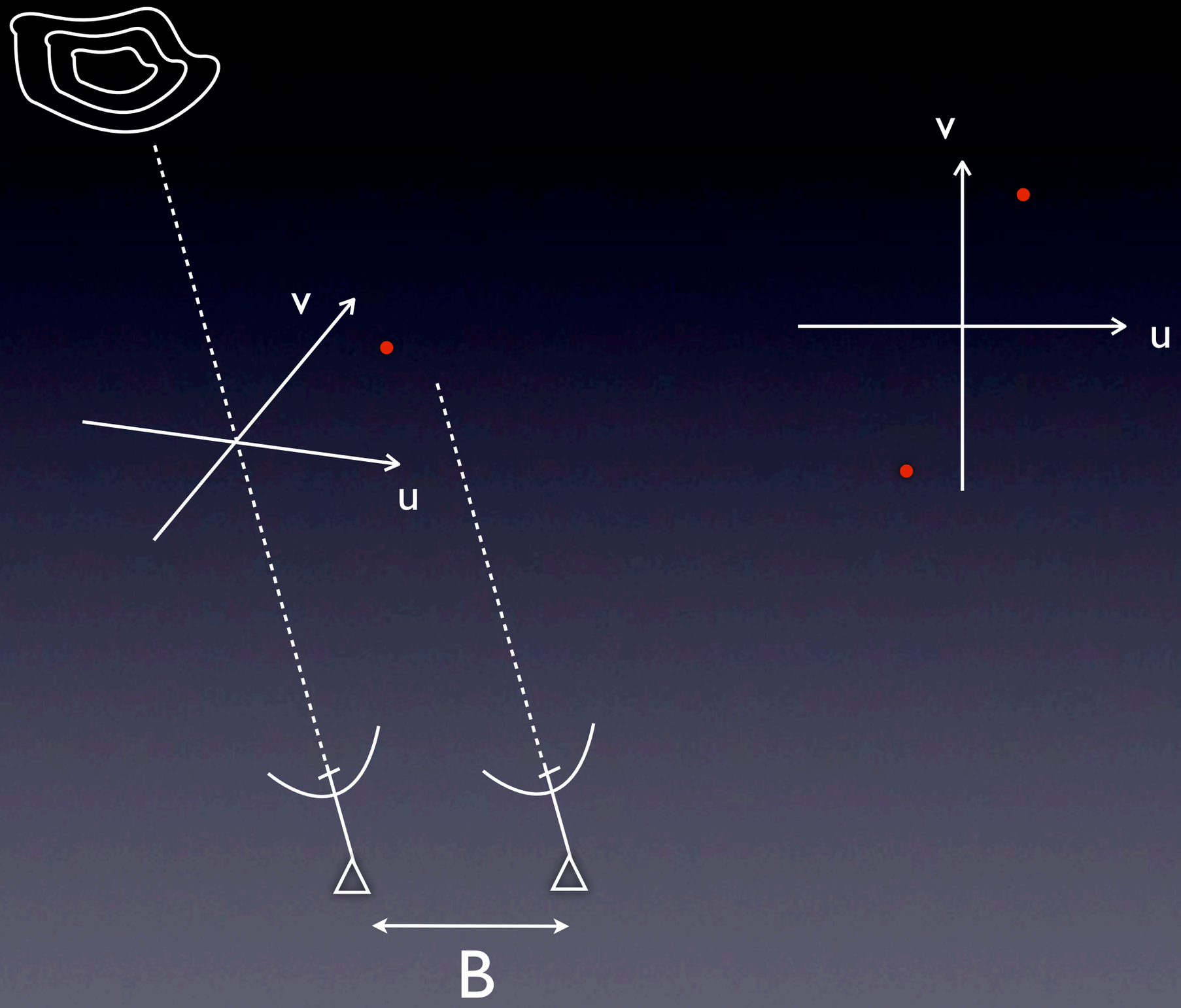

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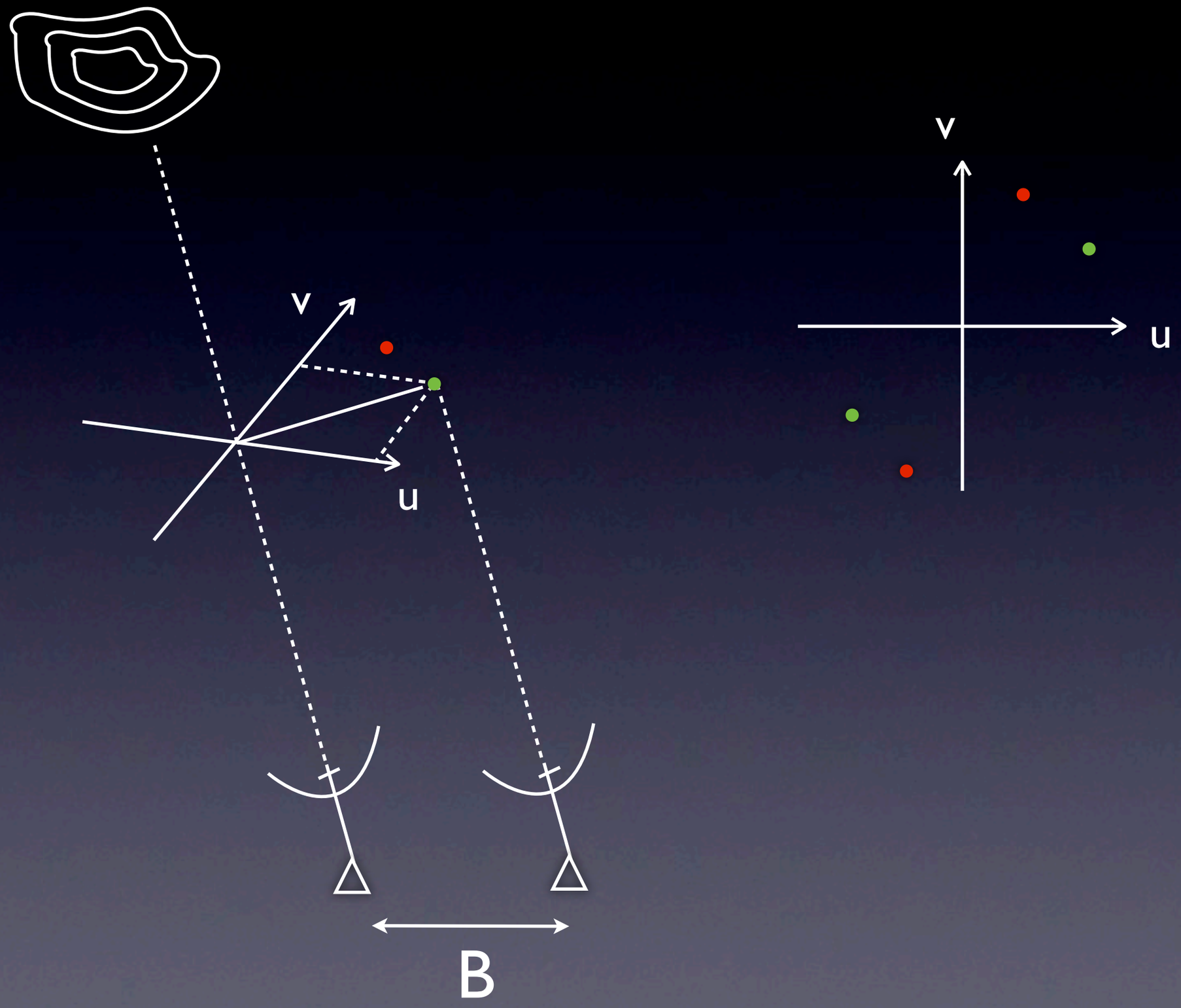
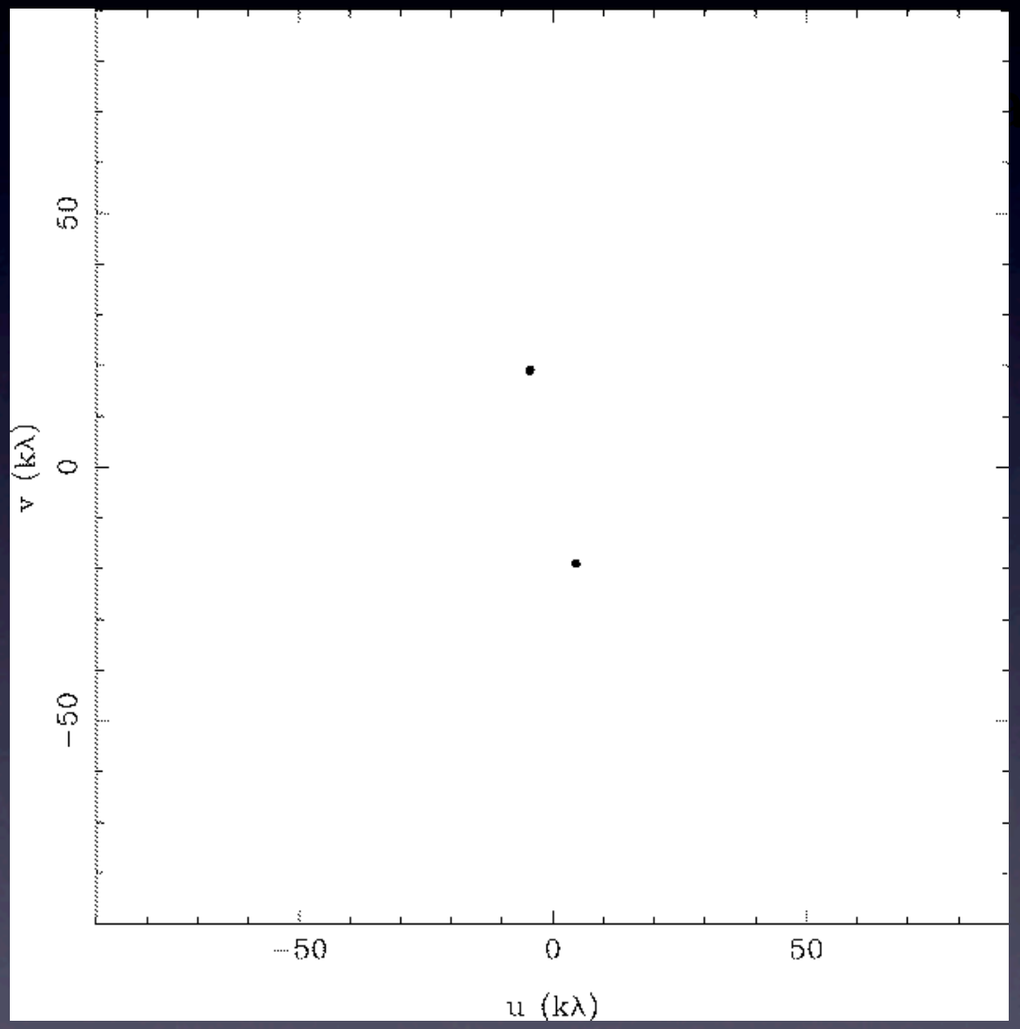
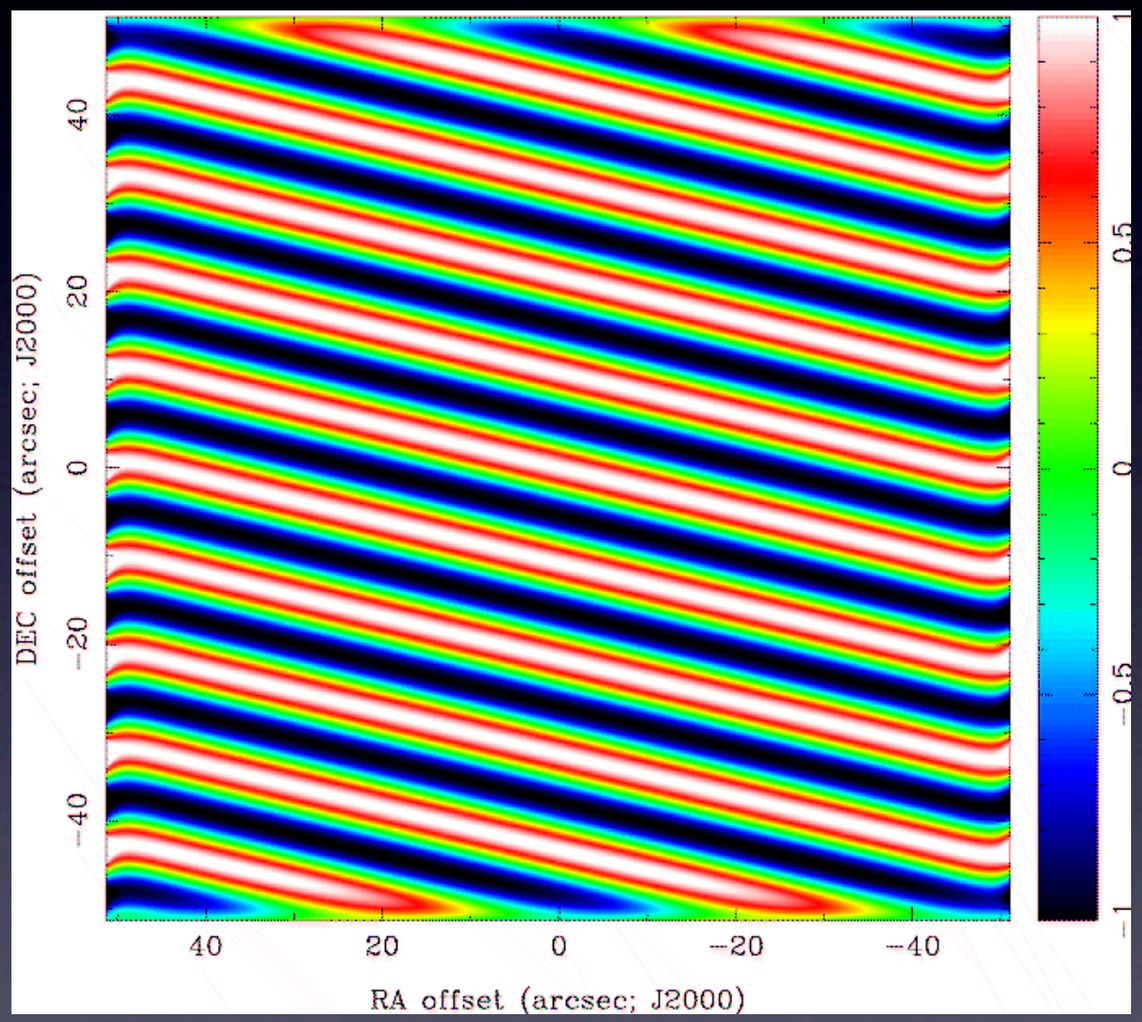


u-v coverage: Dirty beam

2 antennas





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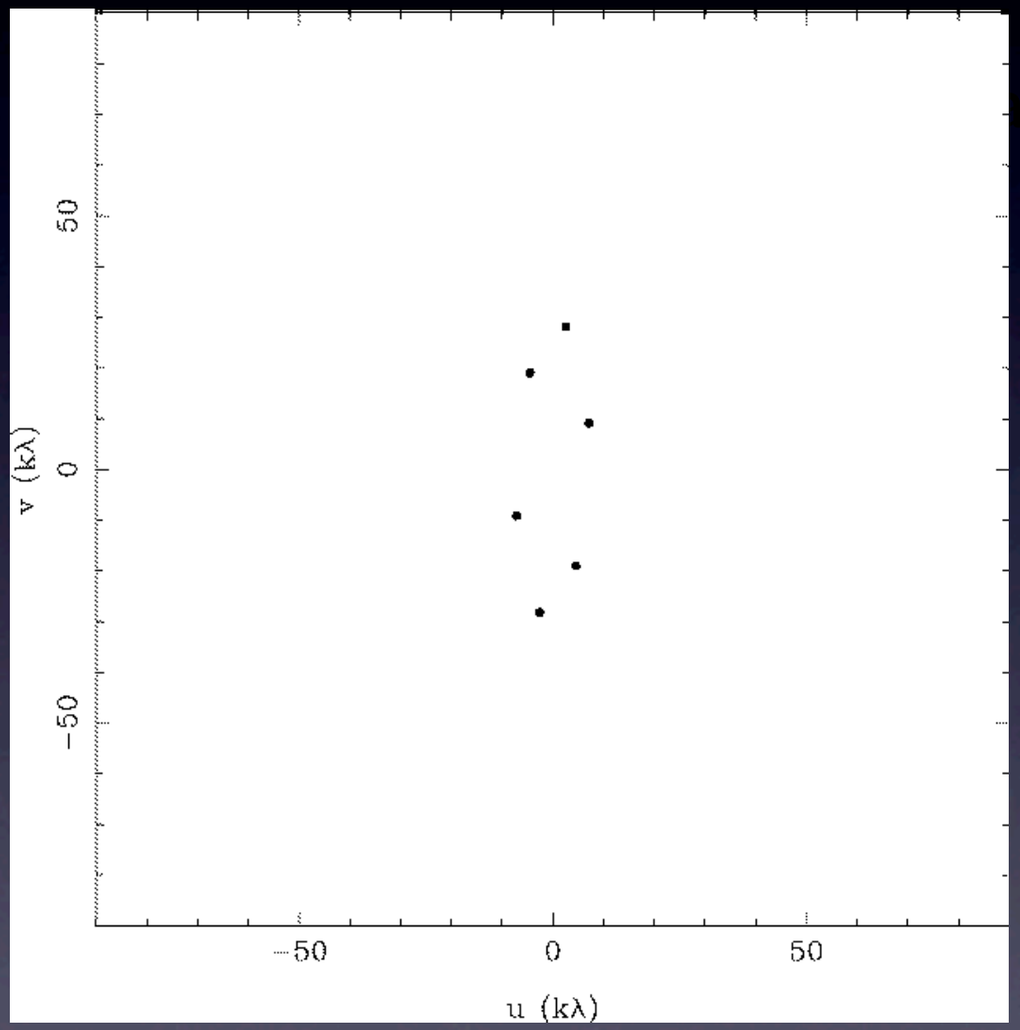
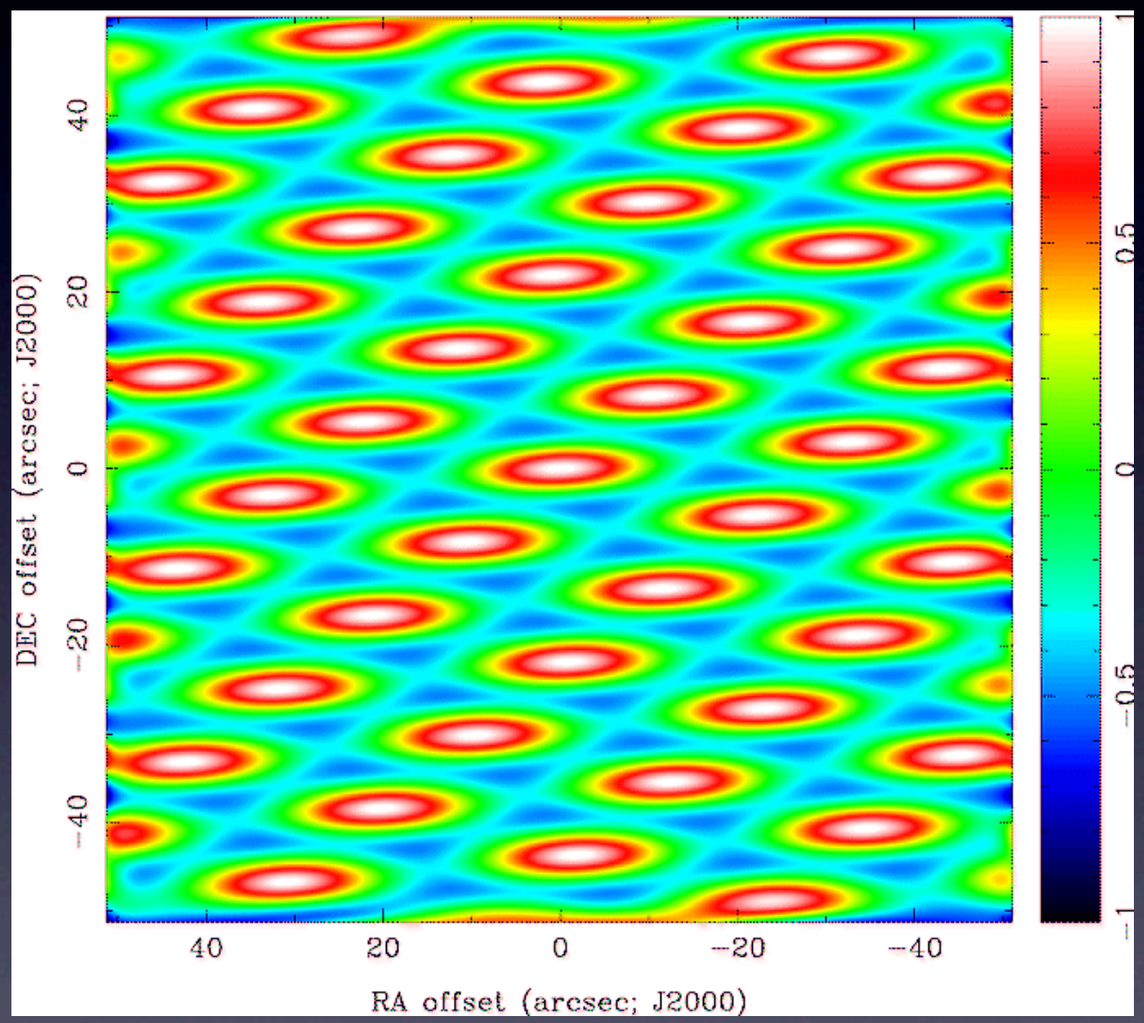
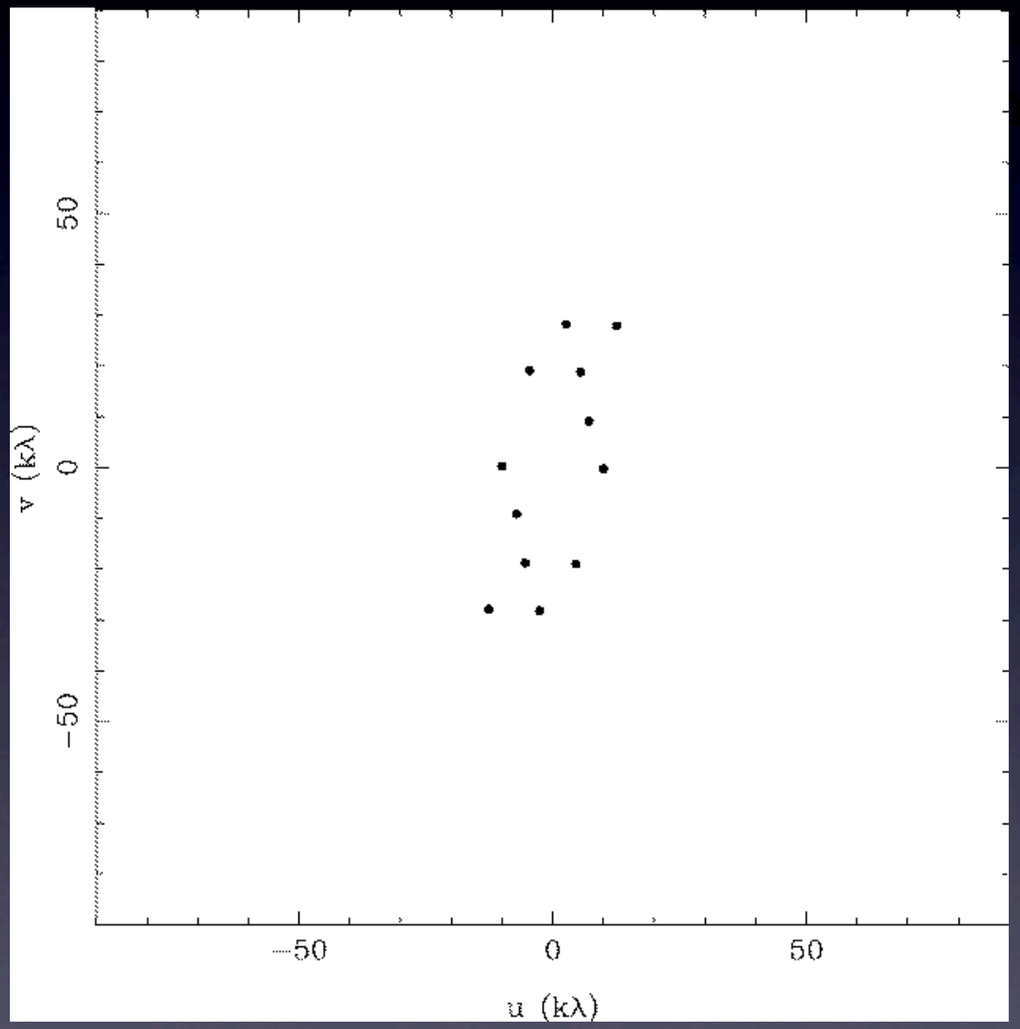
3 antennas

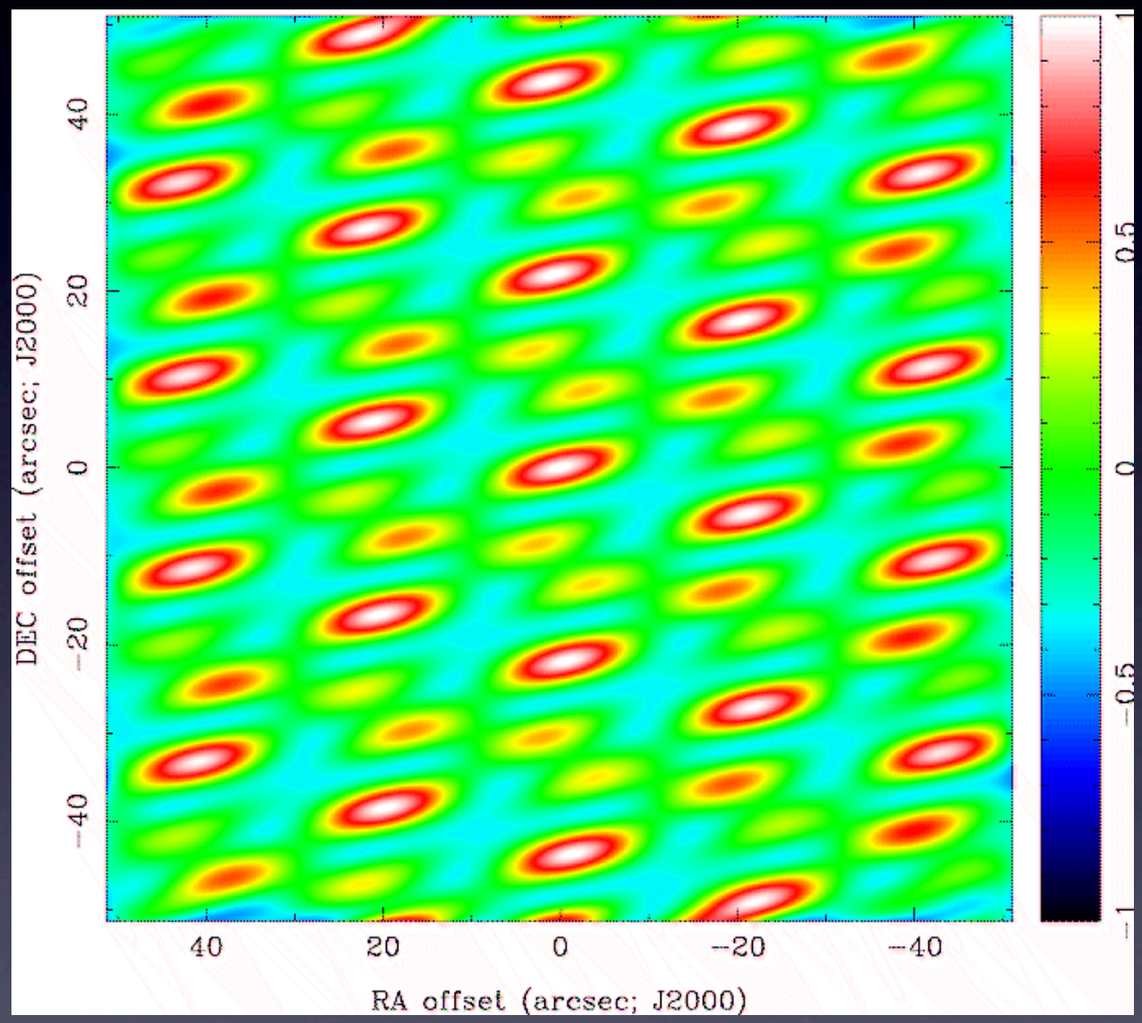




u-v coverage: Dirty beam

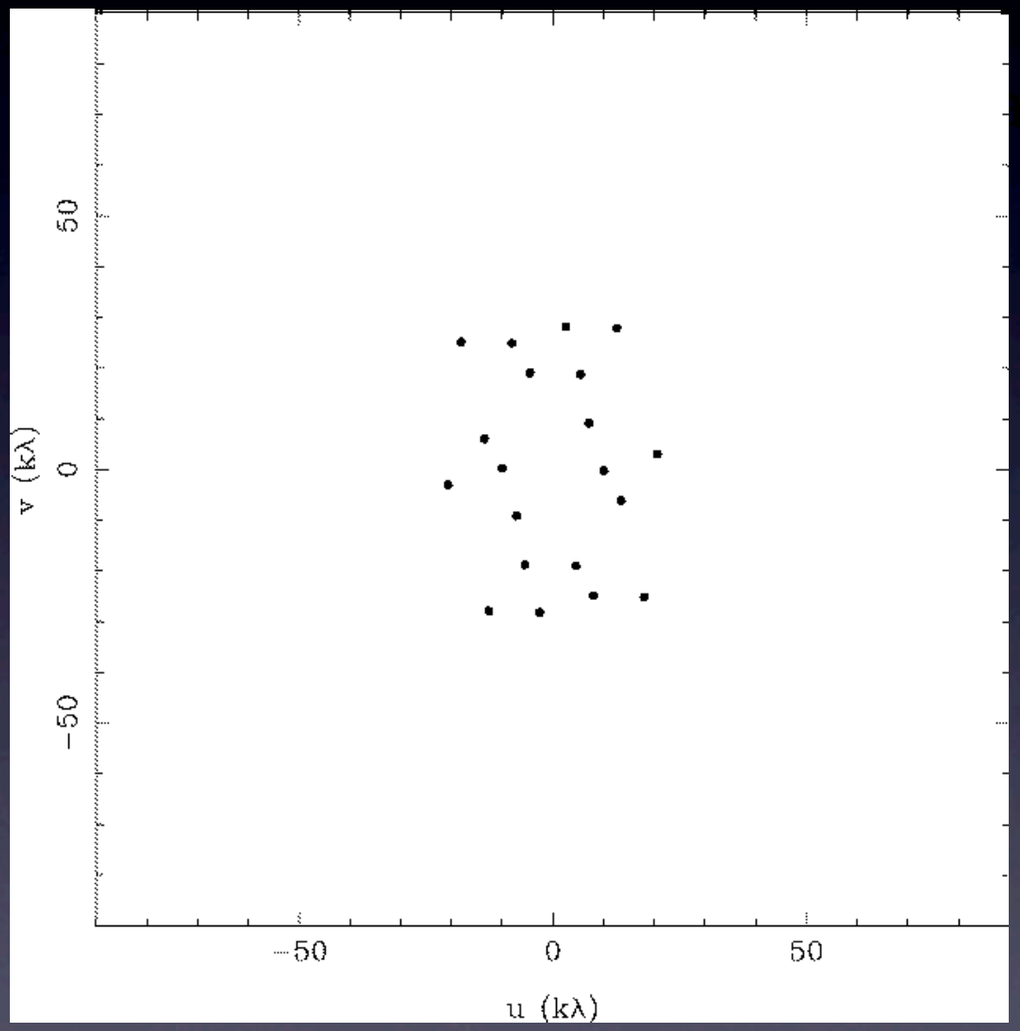
4 antennas

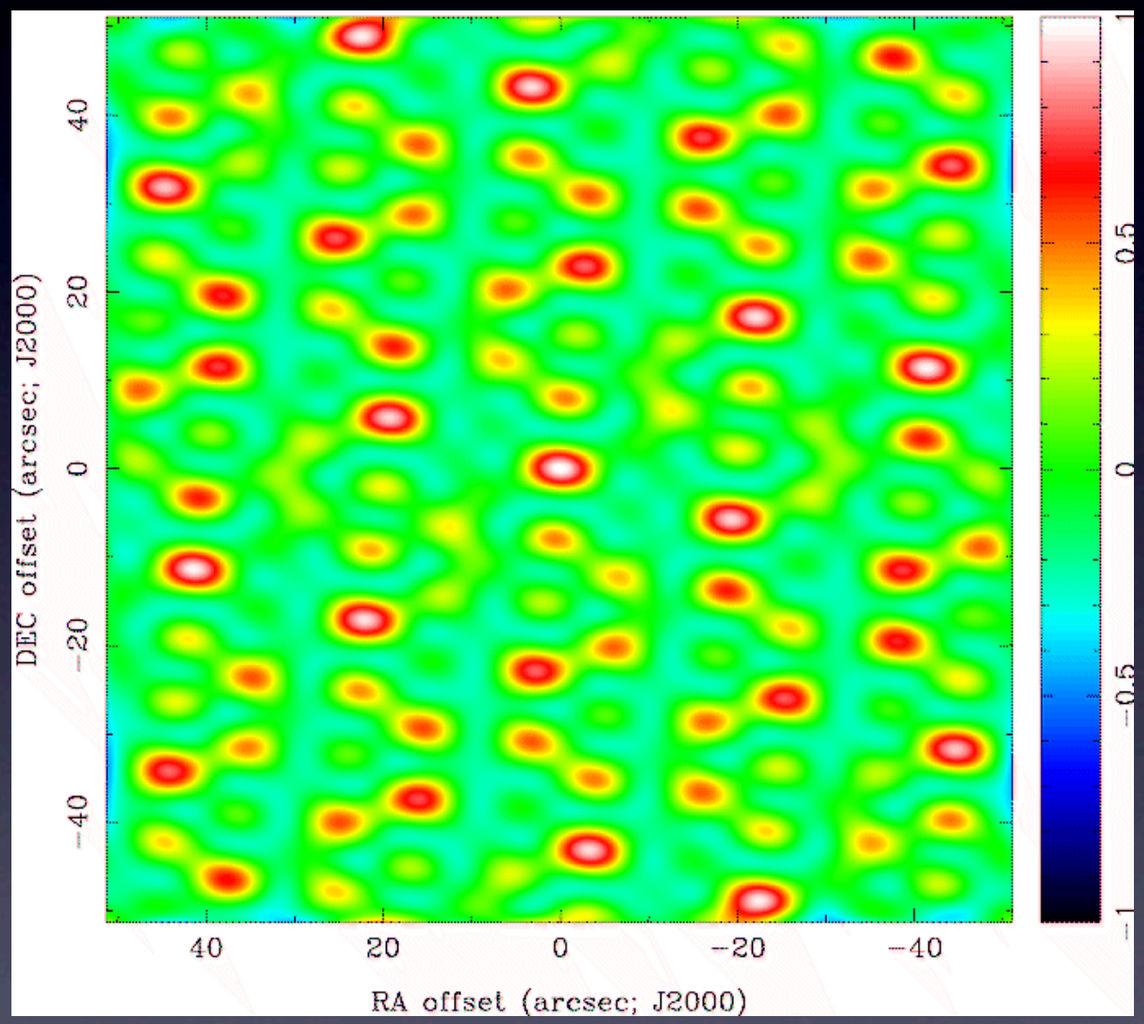




u-v coverage: Dirty beam

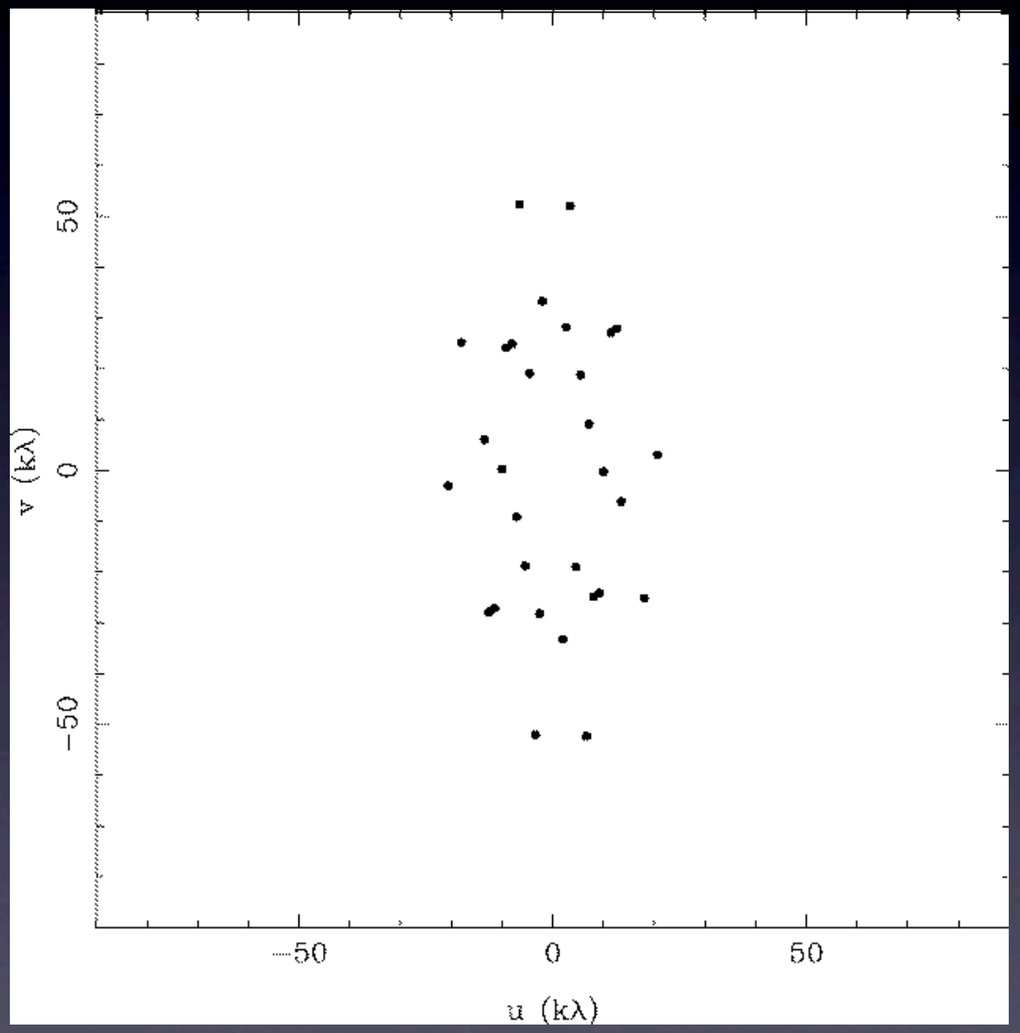
5 antennas

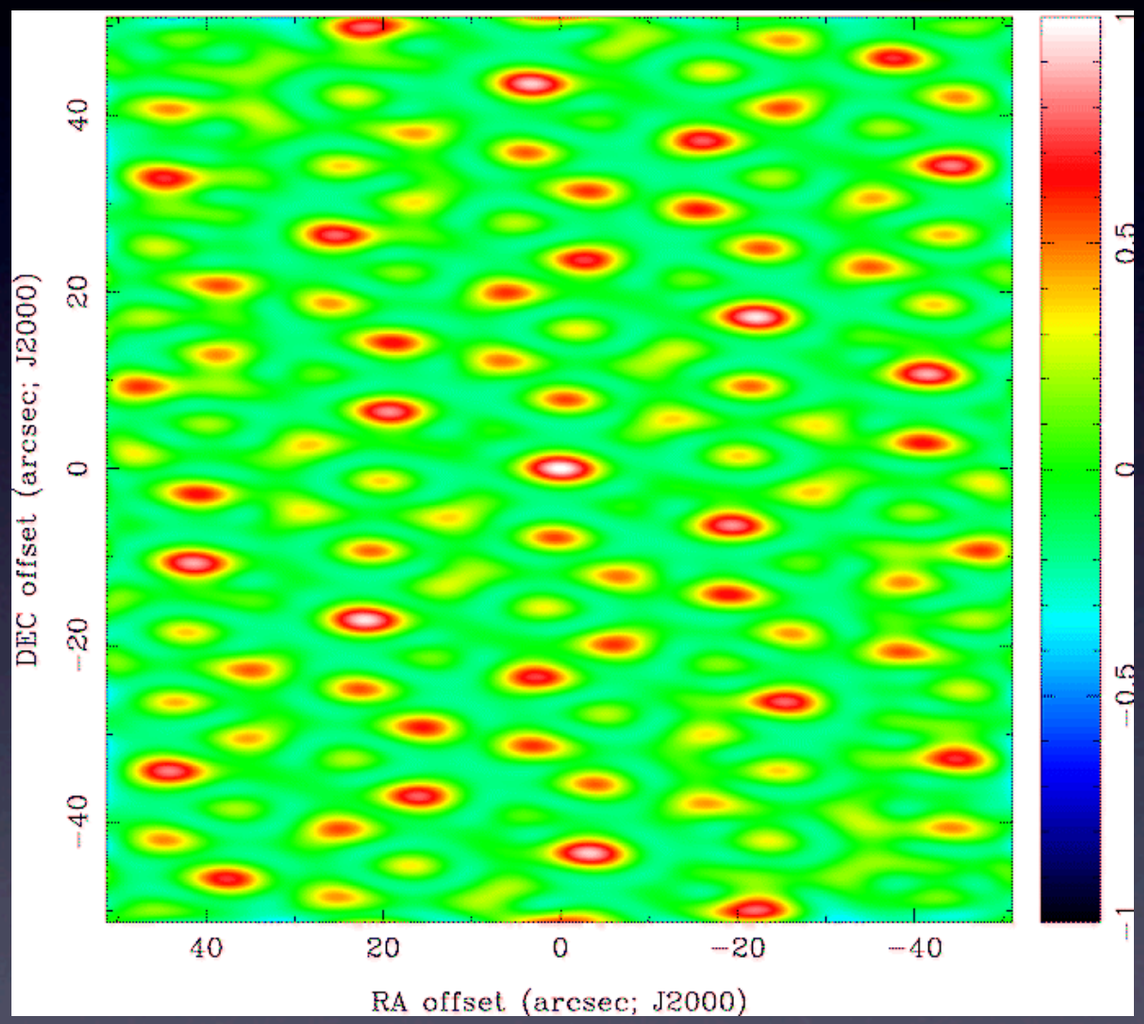




u-v coverage: Dirty beam

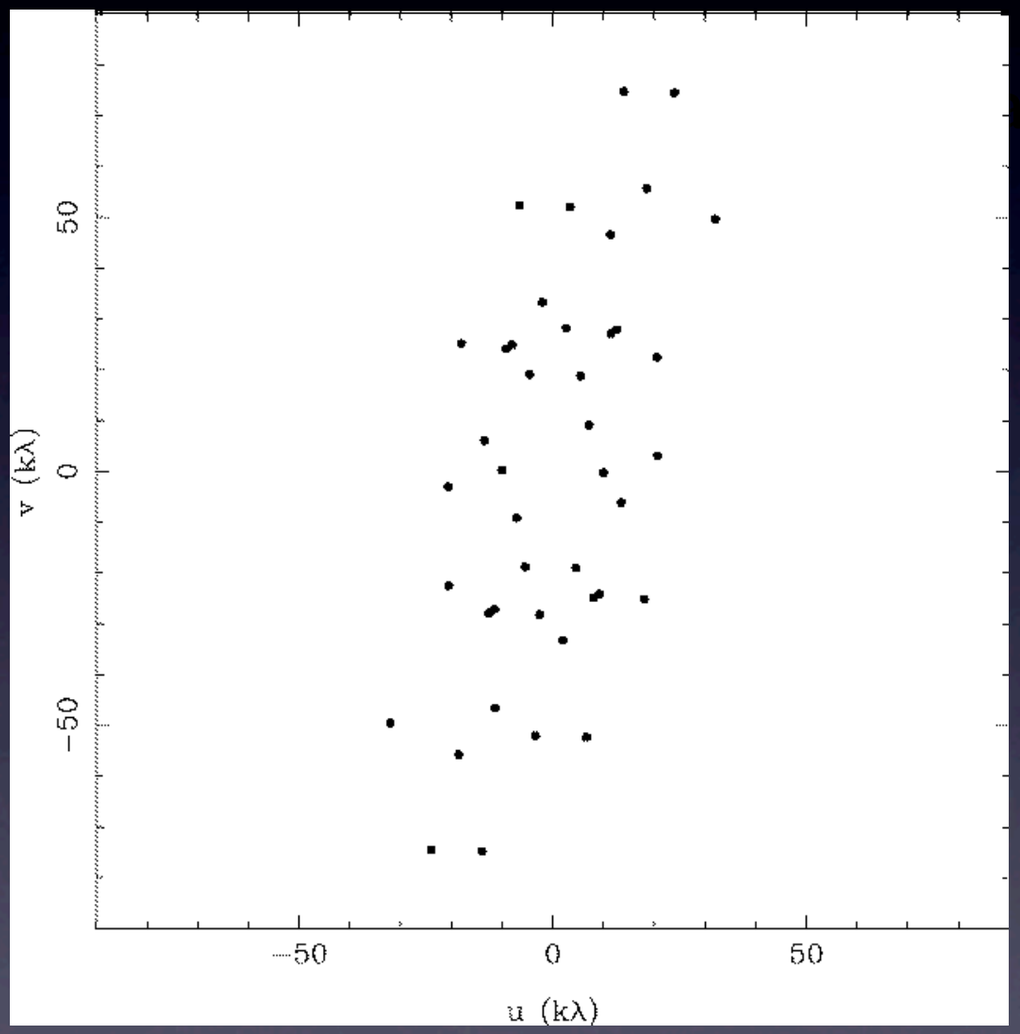
6 antennas

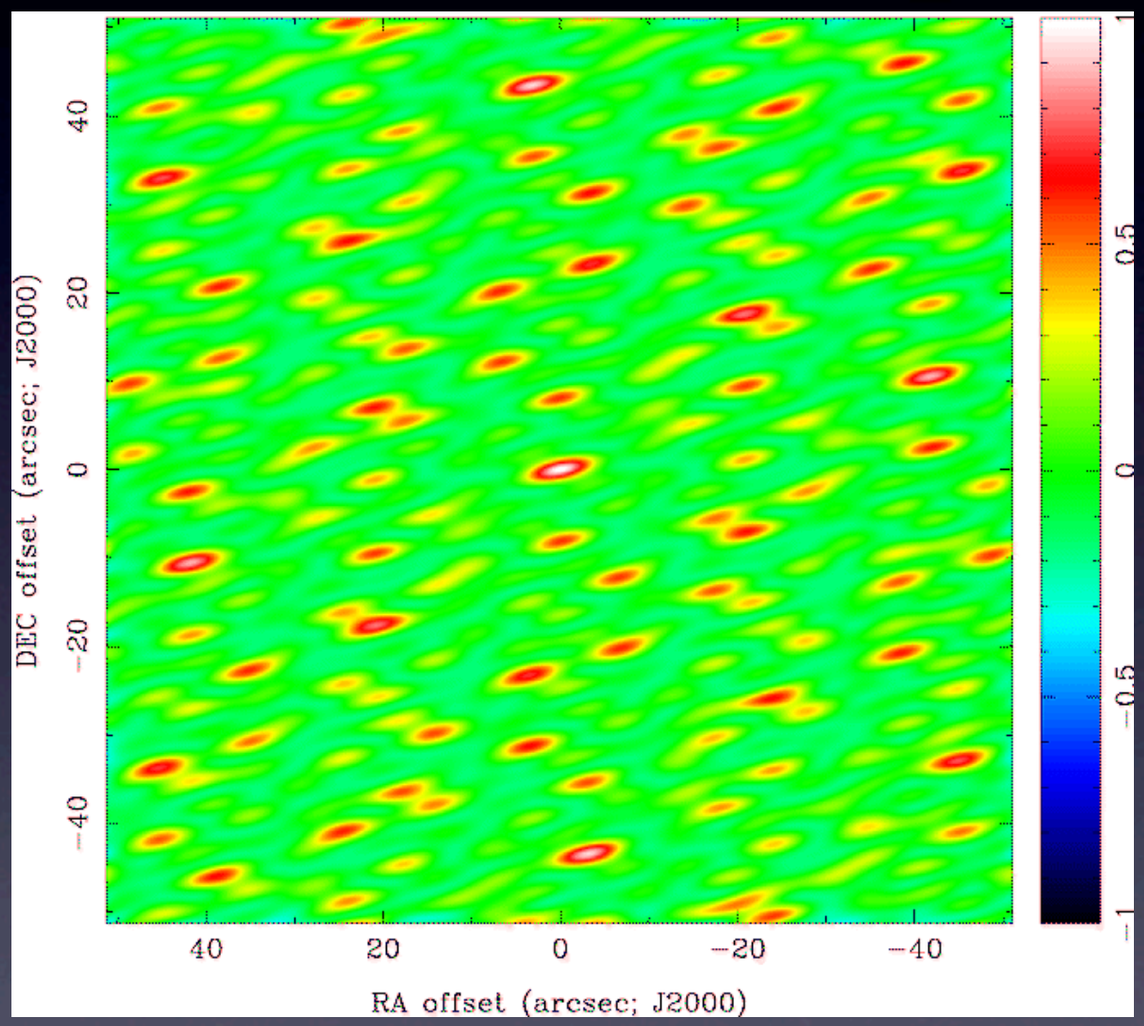




u-v coverage: Dirty beam

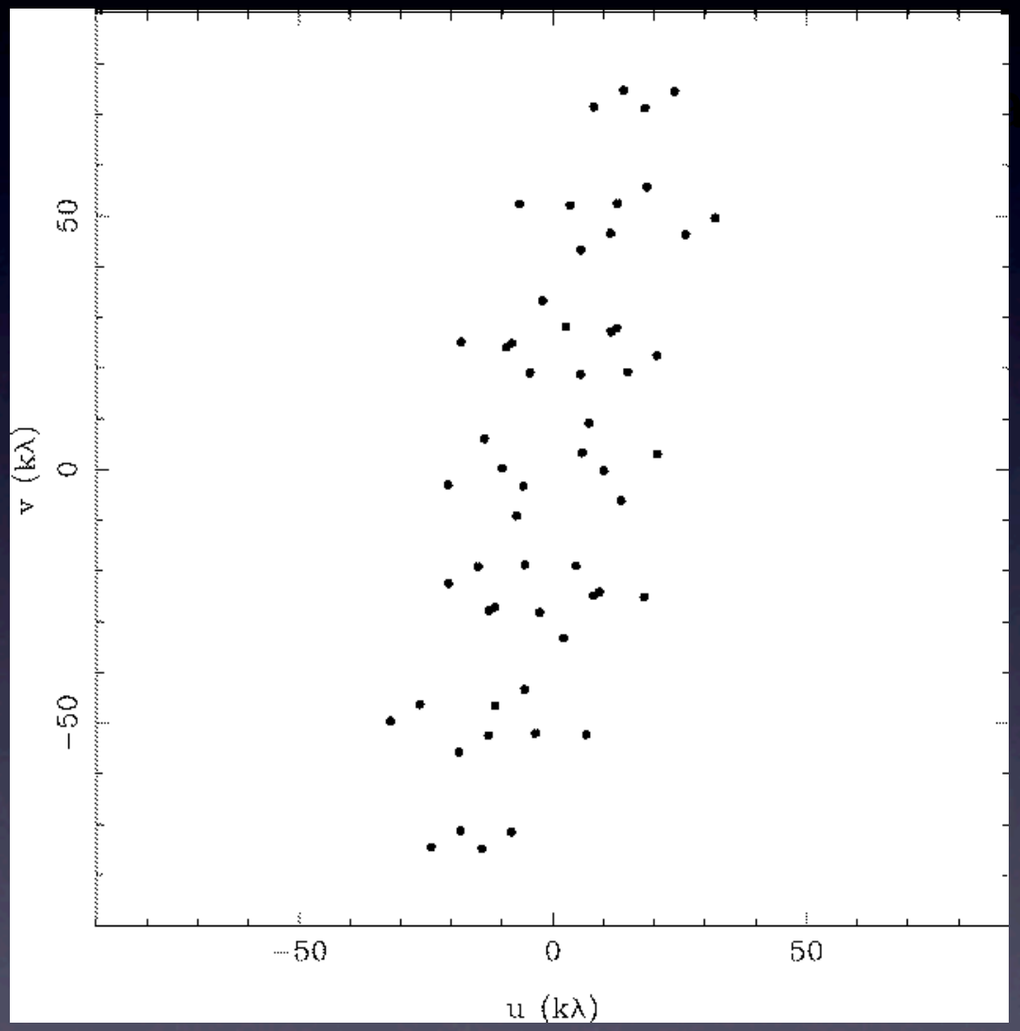
7 antennas

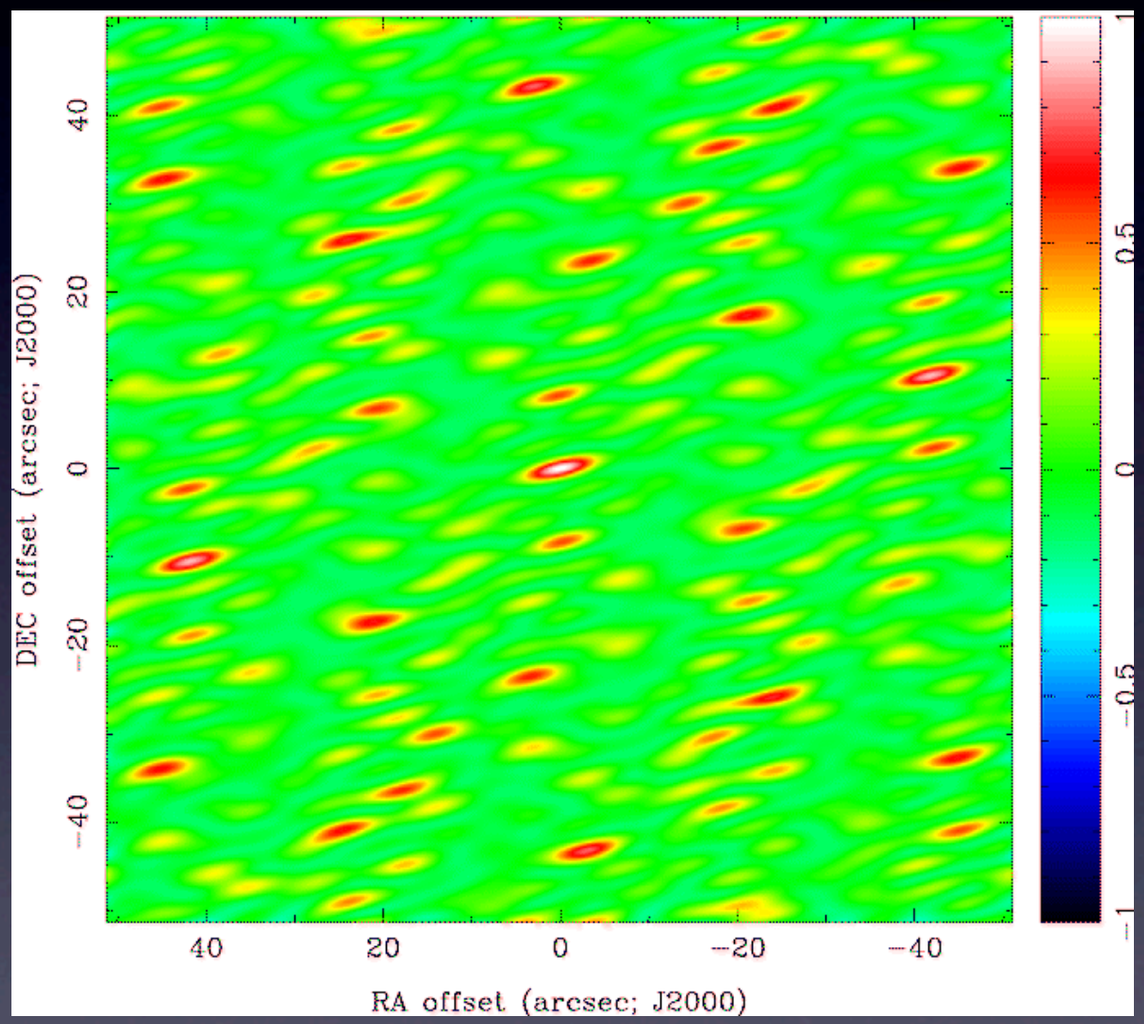




u-v coverage: Dirty beam

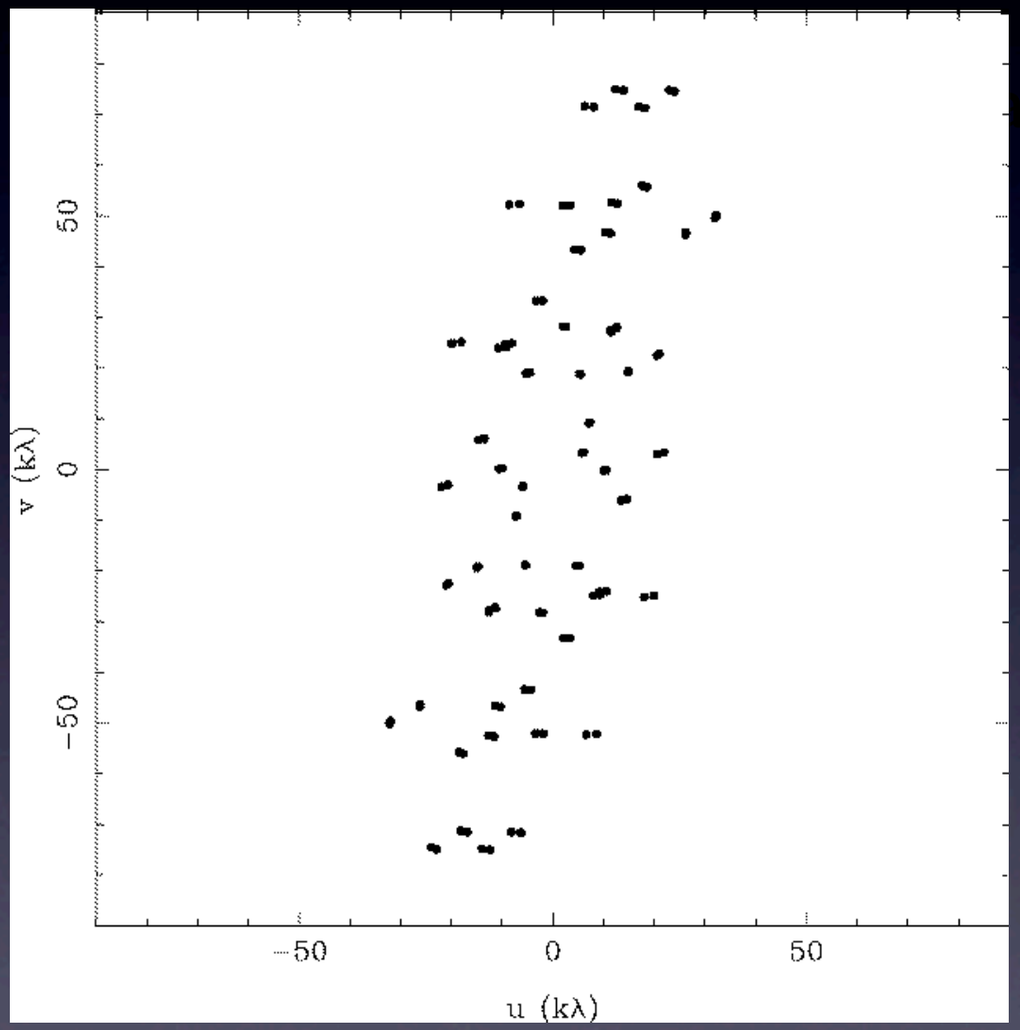
8 antennas

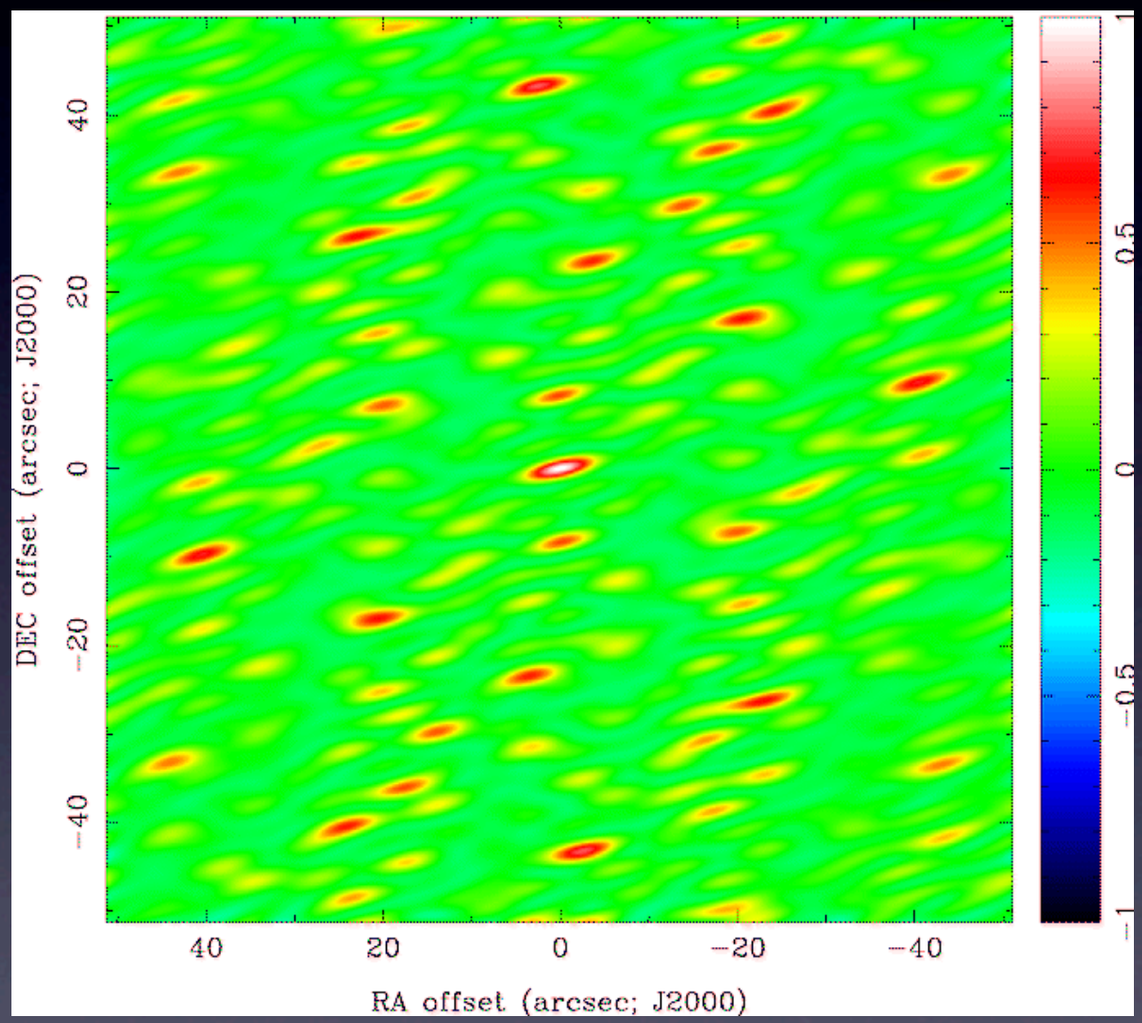




u-v coverage: Dirty beam

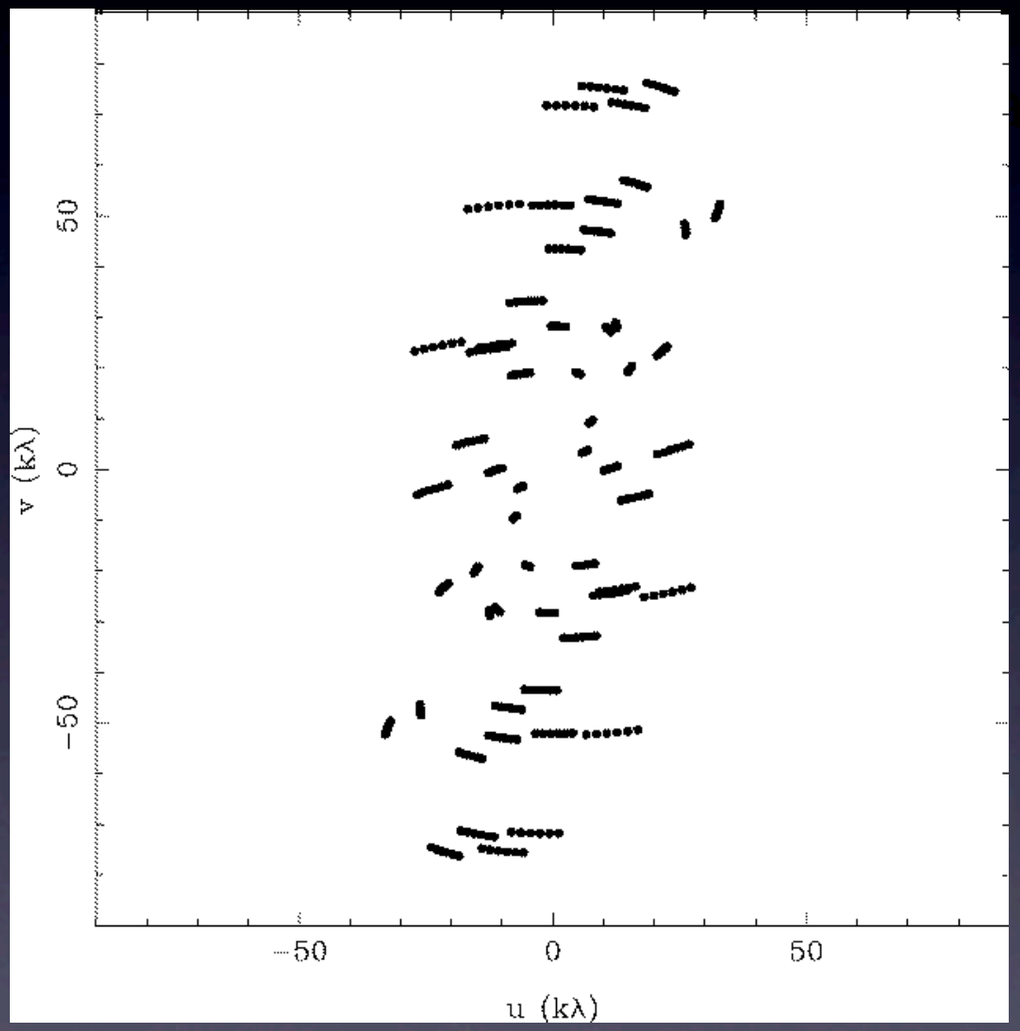
8 antennas x 2 samples

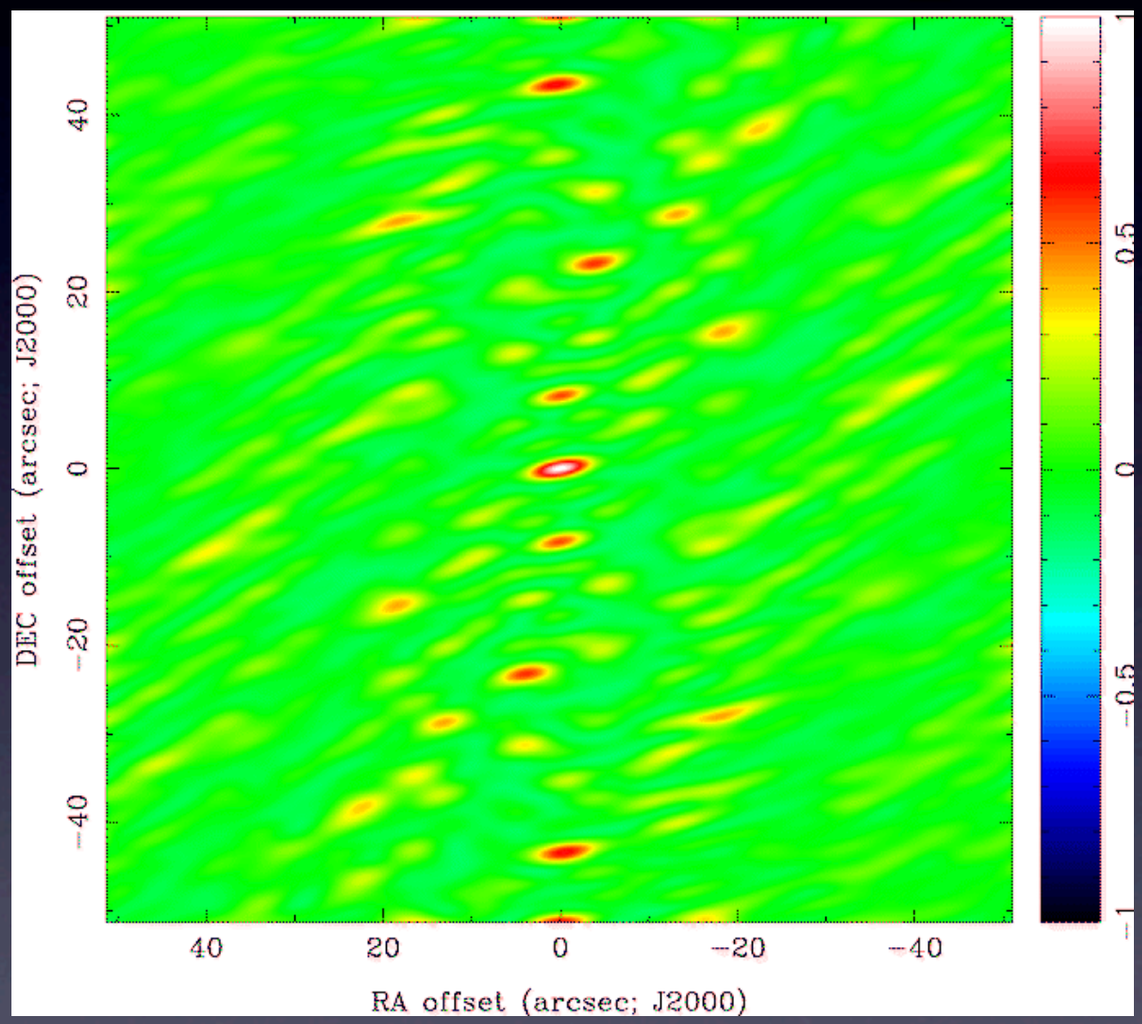




u-v coverage: Dirty beam

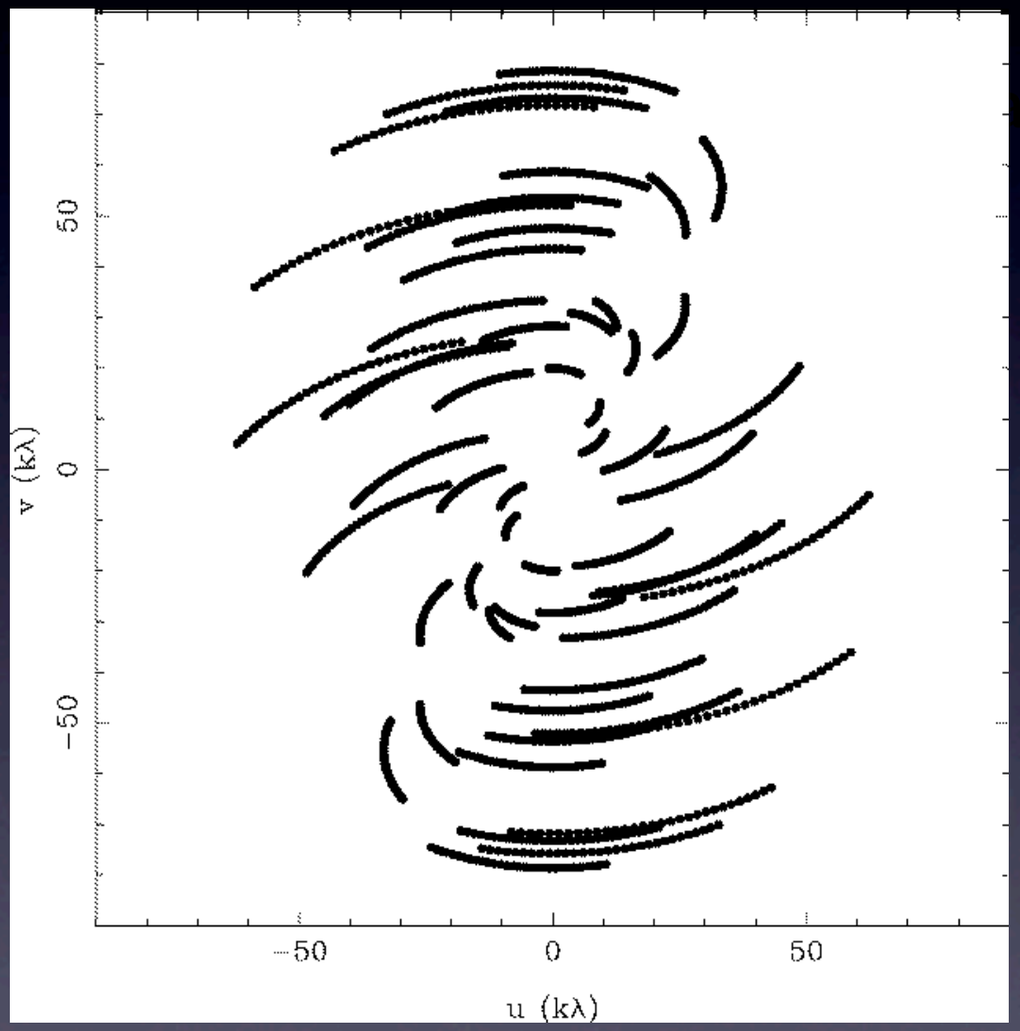
8 antennas x 6 samples

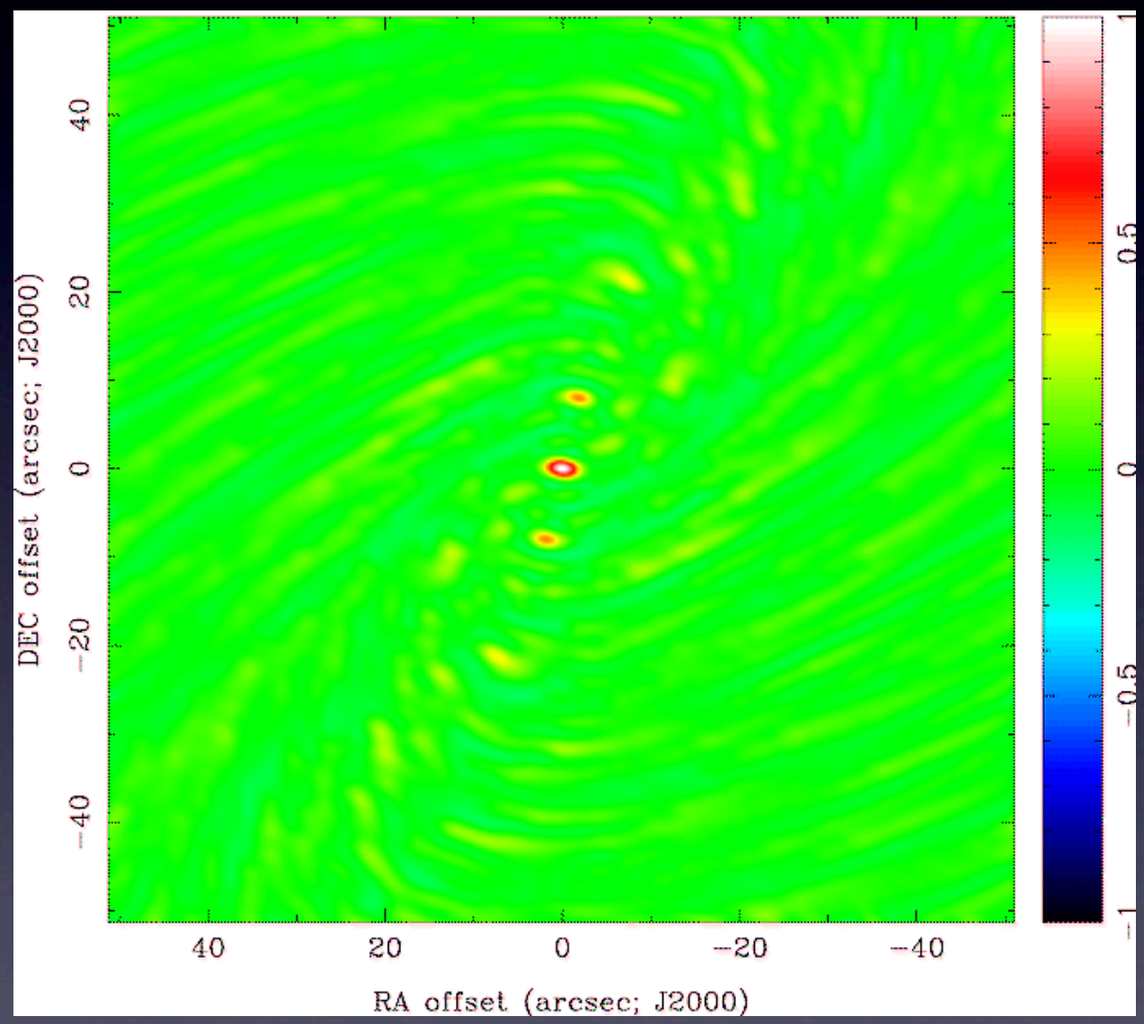




u-v coverage: Dirty beam

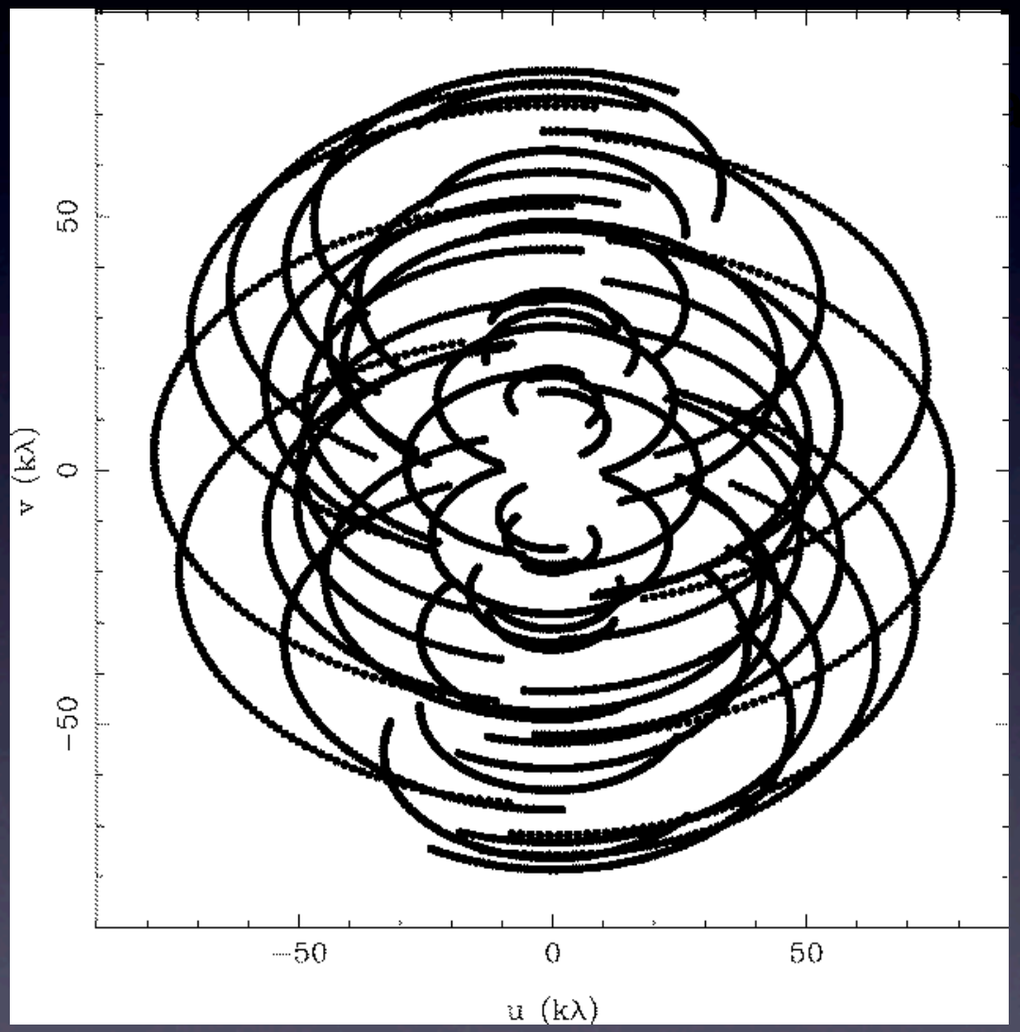
8 antennas x 30 samples

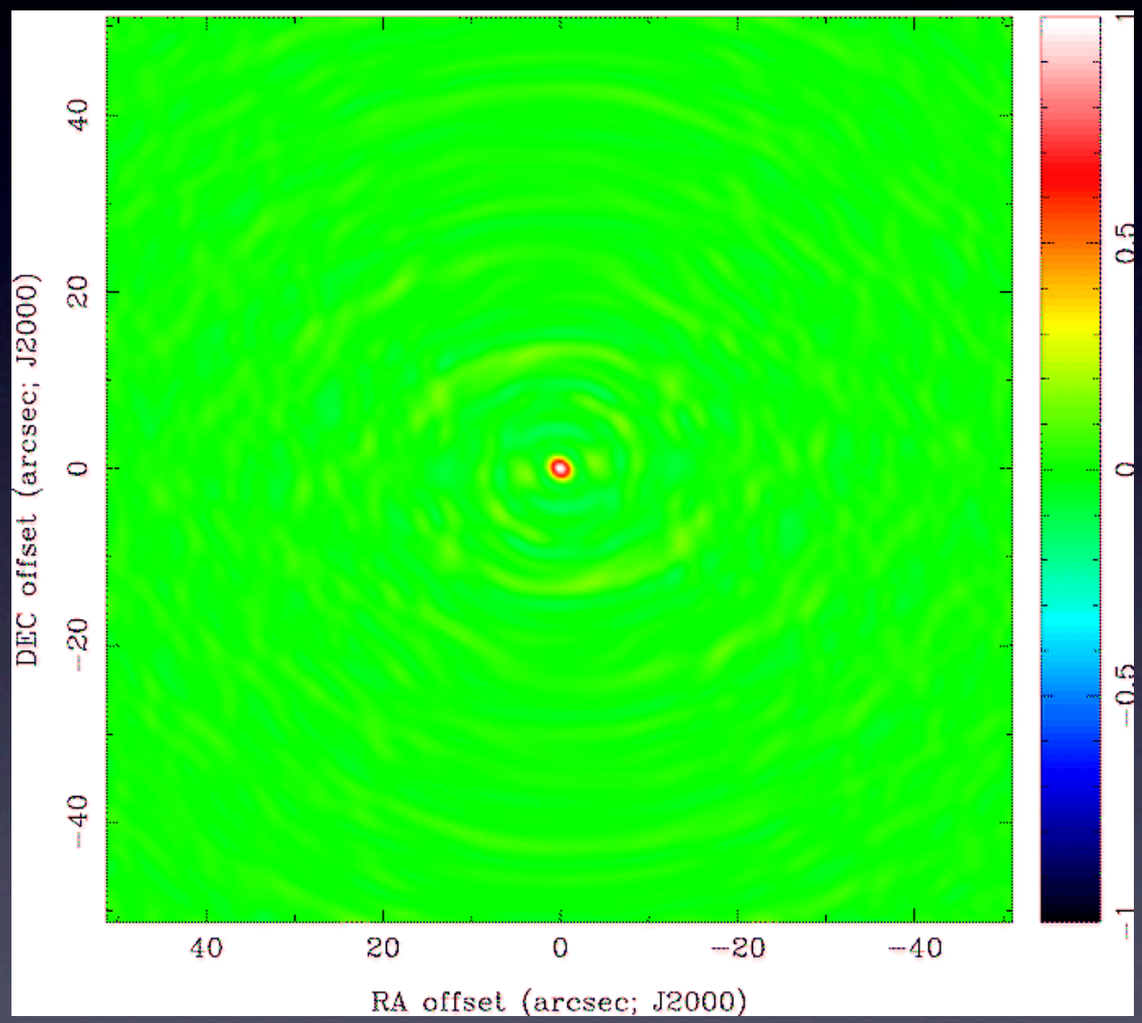




u-v coverage: Dirty beam

8 antennas x 107 samples





Observations

Main ideas

- Flux calibrator.
- Phase calibrators.
- Best u-v coverage.
- Real time VS Tapes.

Interferometers

Interferometers

EVLA

Interferometers

EVLA

eMERLIN

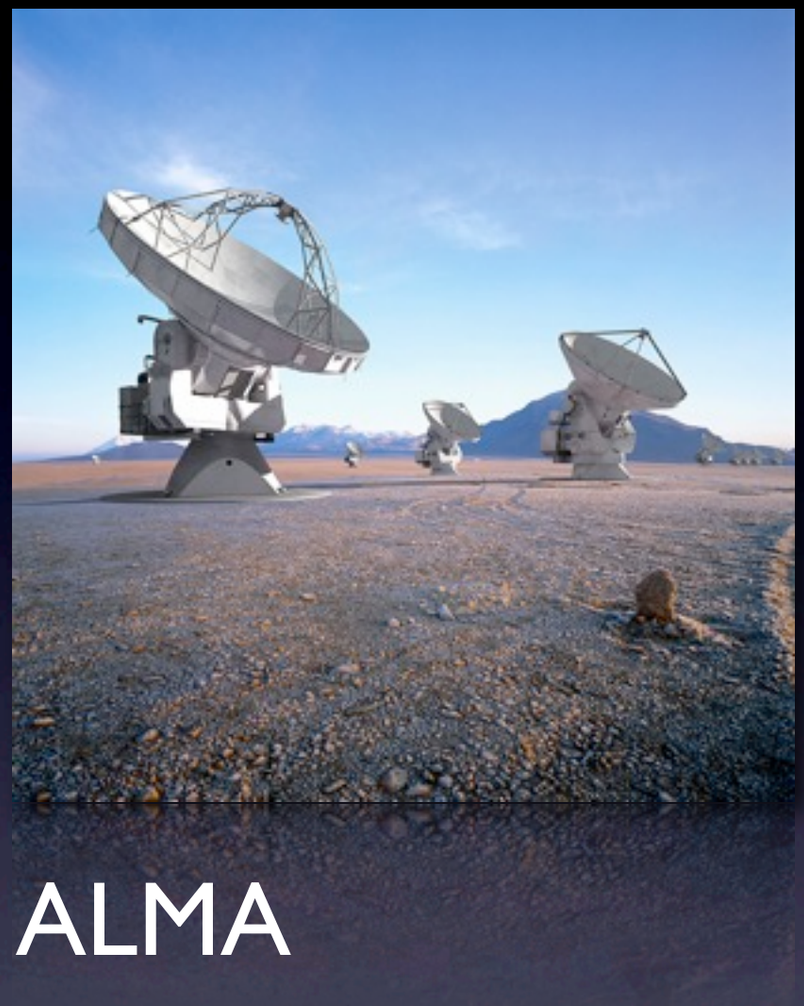
Interferometers

EVLA

eMERLIN

Plateau de Bure

Interferometers



ALMA

Interferometers

ALMA

LOFAR

Interferometers

ALMA

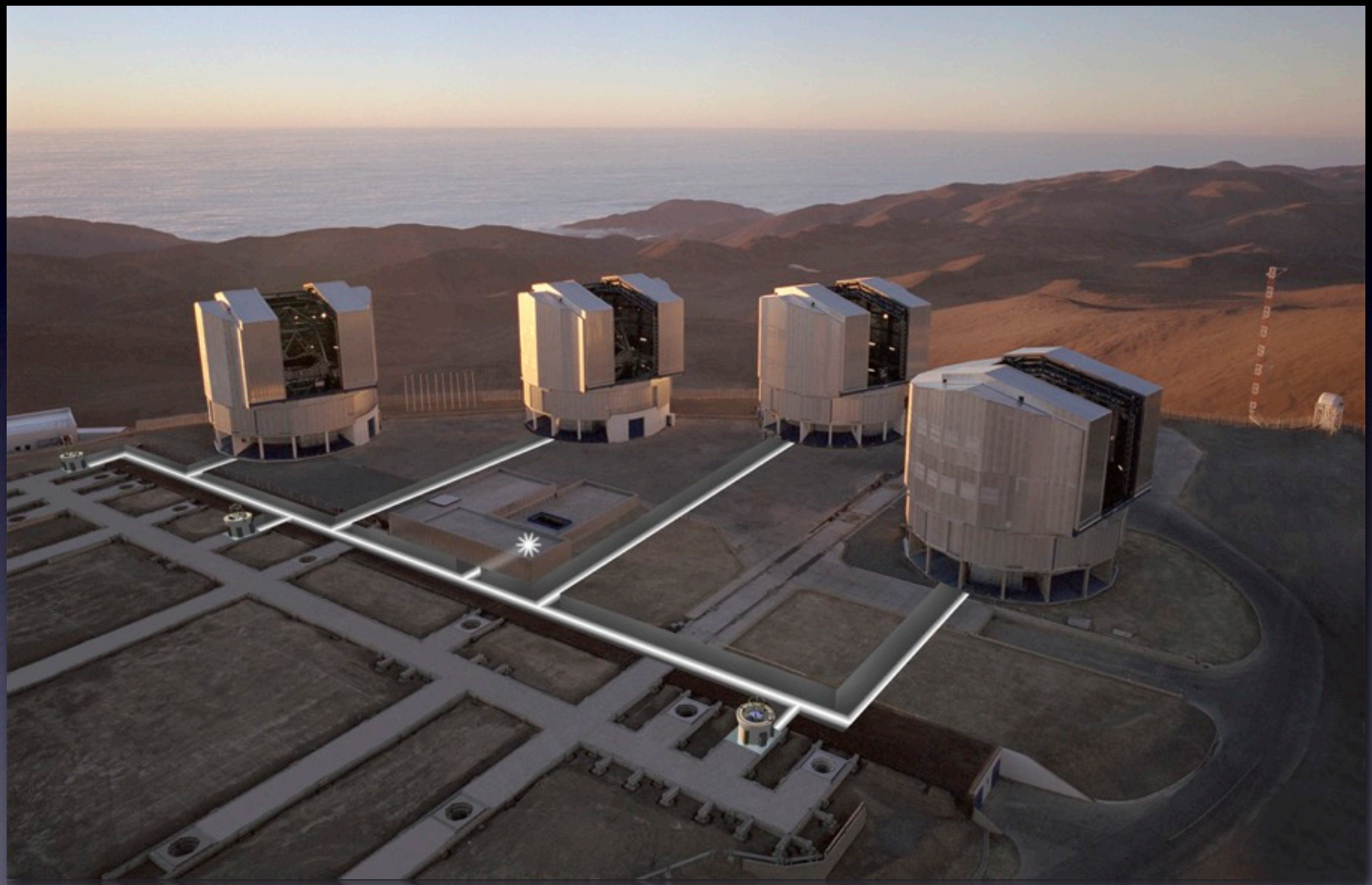
SKA

LOFAR

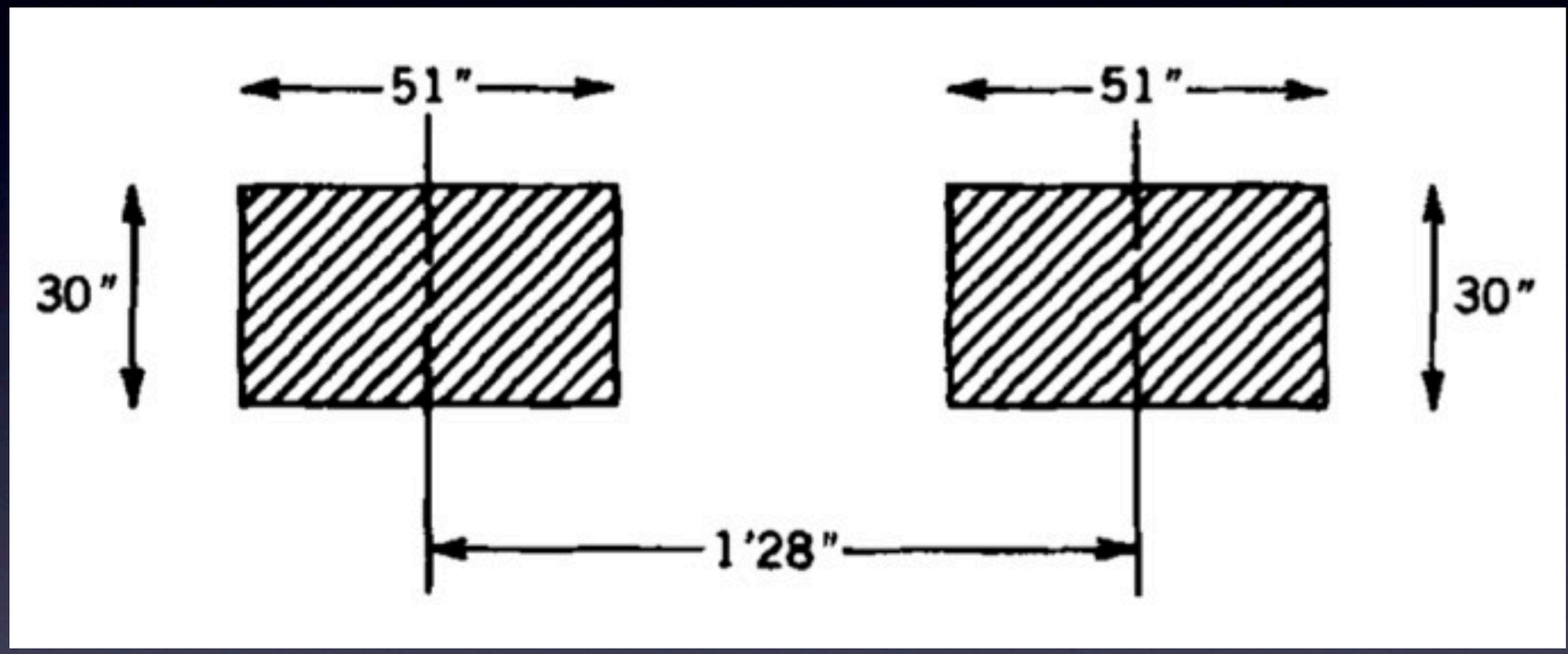
VLBI

Space - VLBI

IR and beyond...

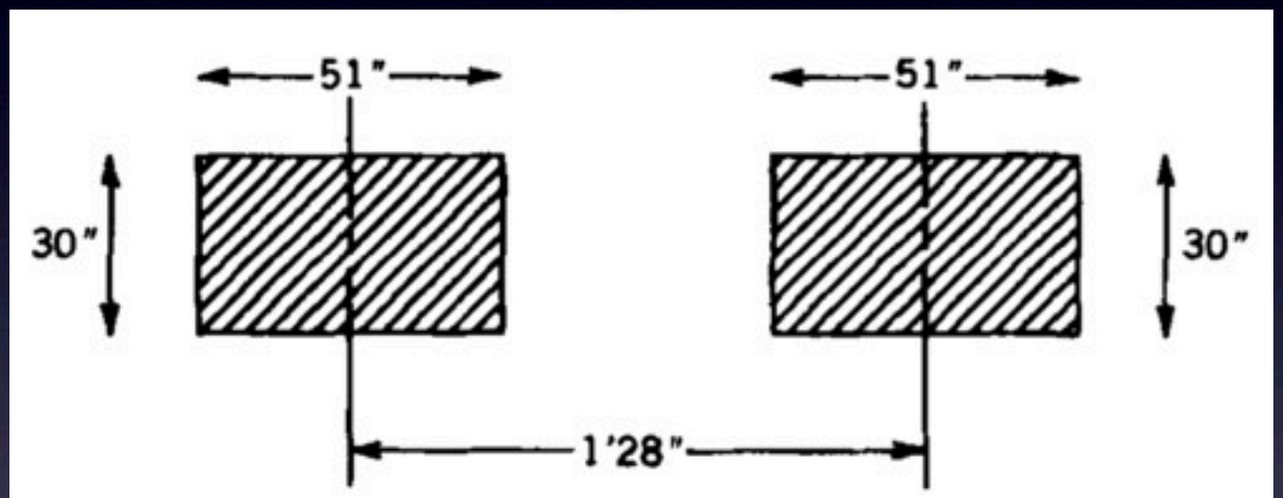


Cygnus A

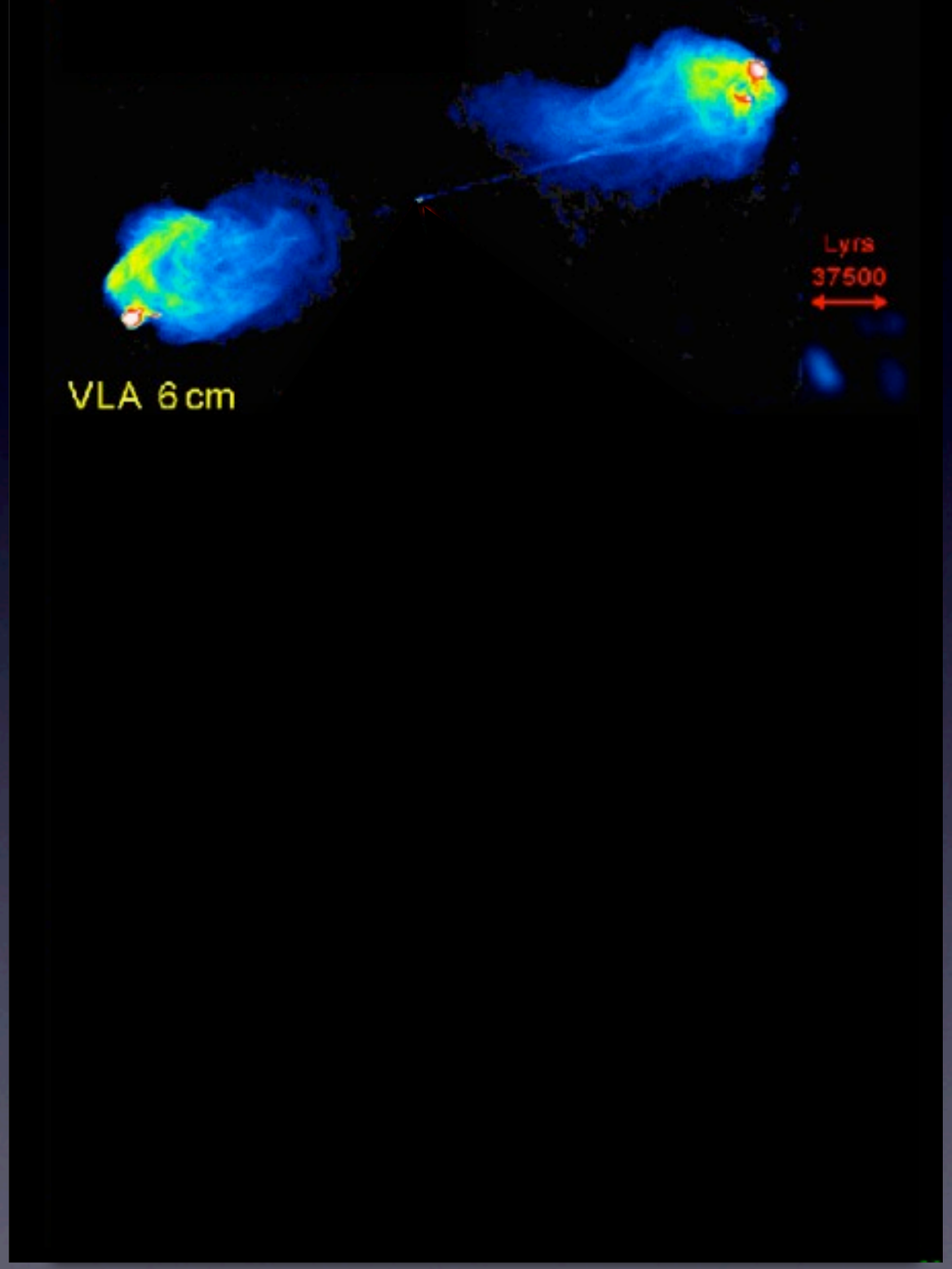


Jennison & Das Gupta (1953)

Cygnus A



Jennison & Das Gupta (1953)



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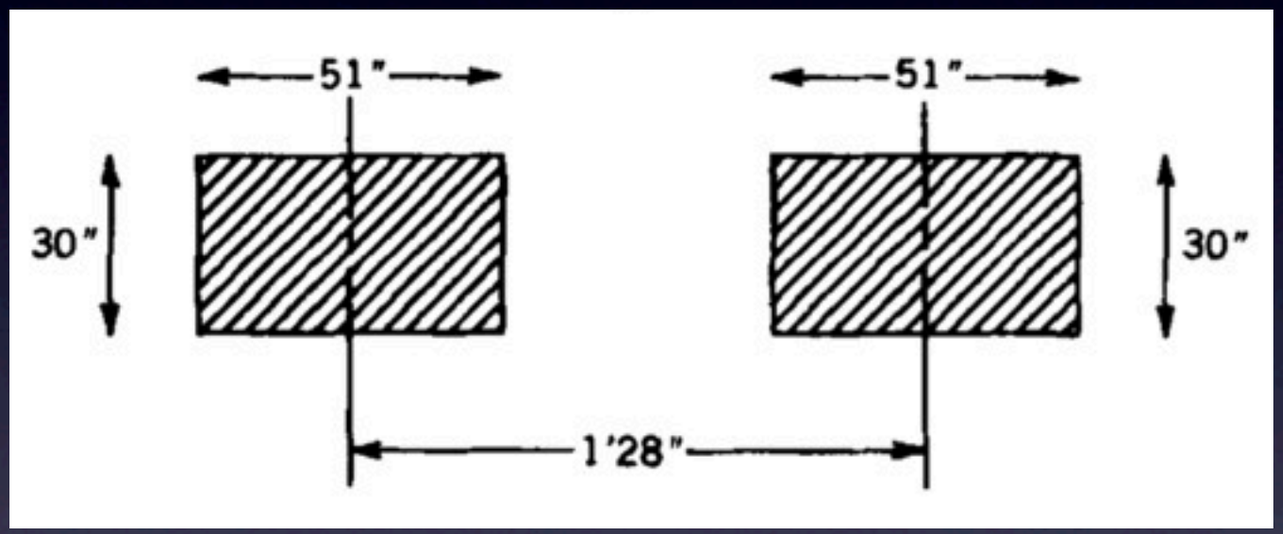
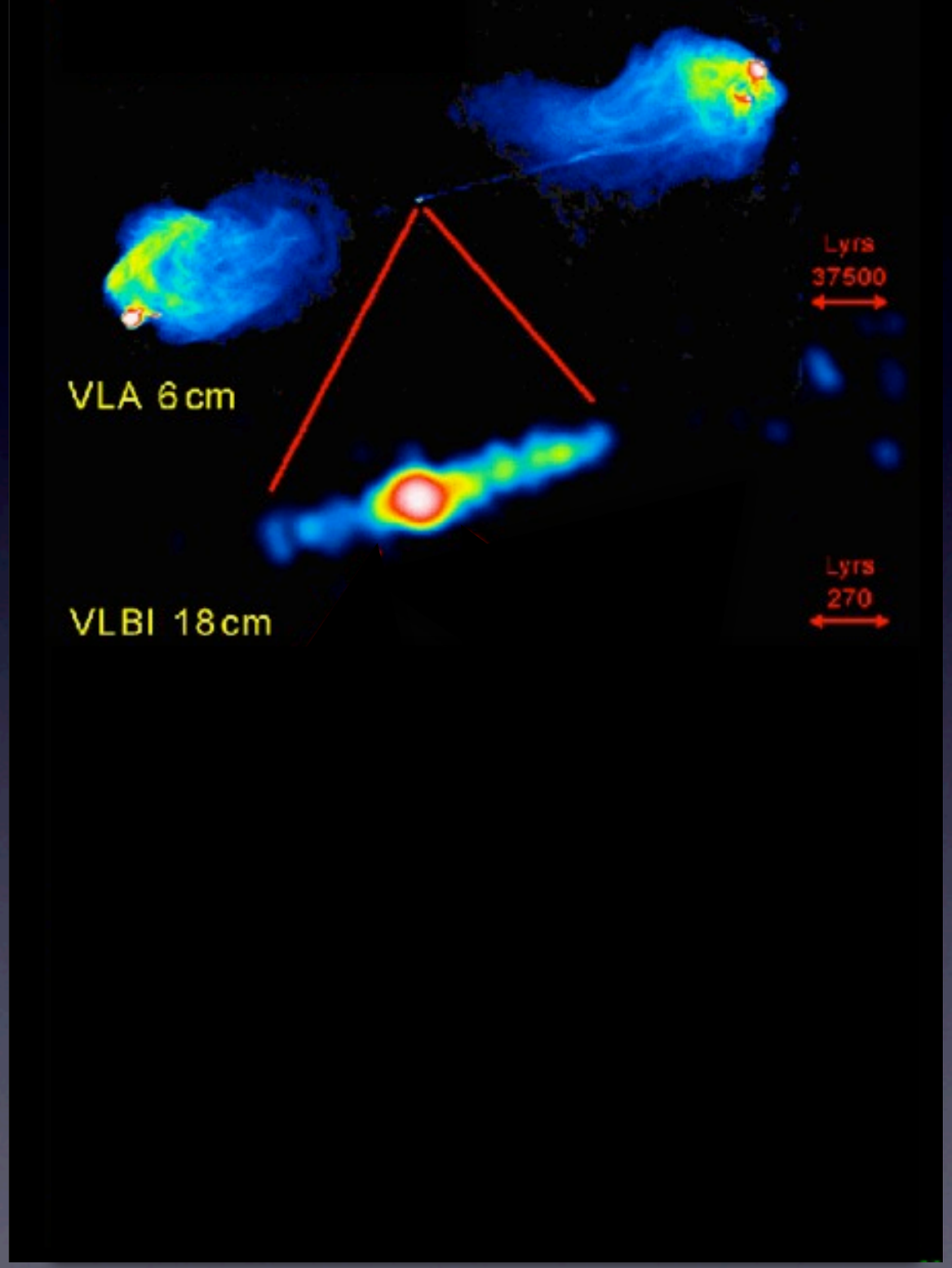


Jennison & Das Gupta (1953)



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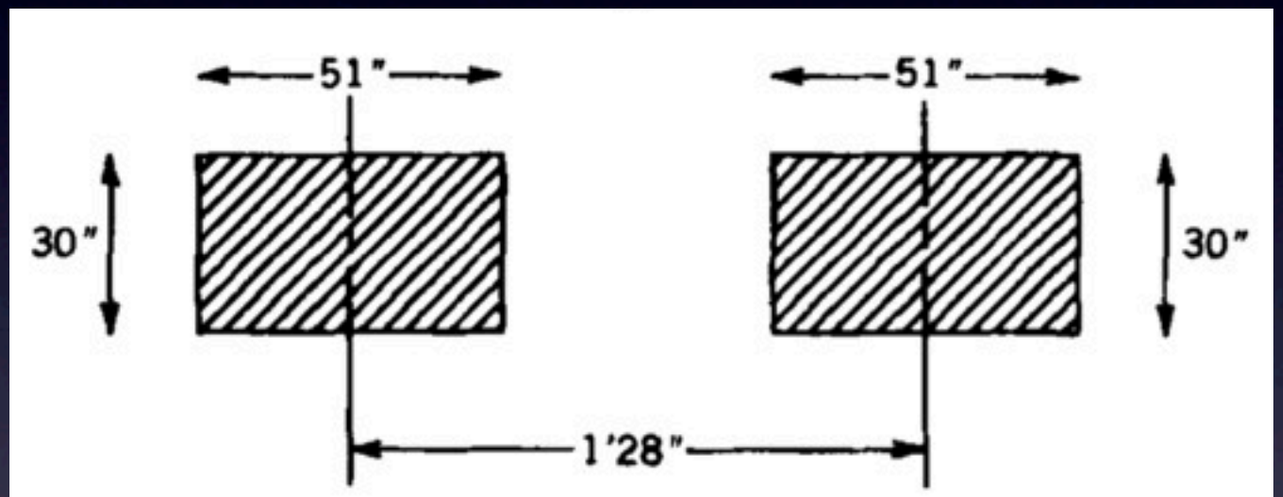
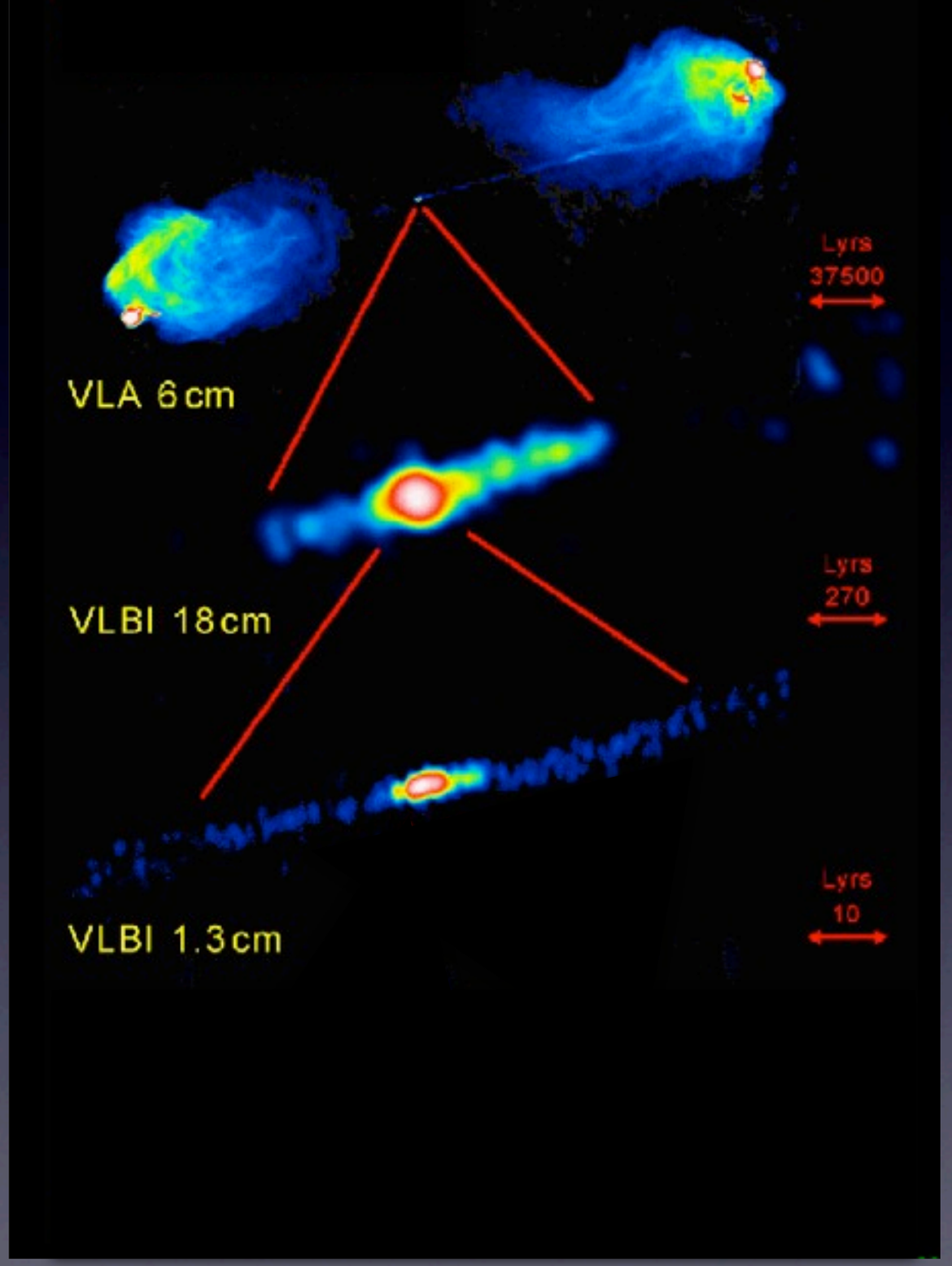
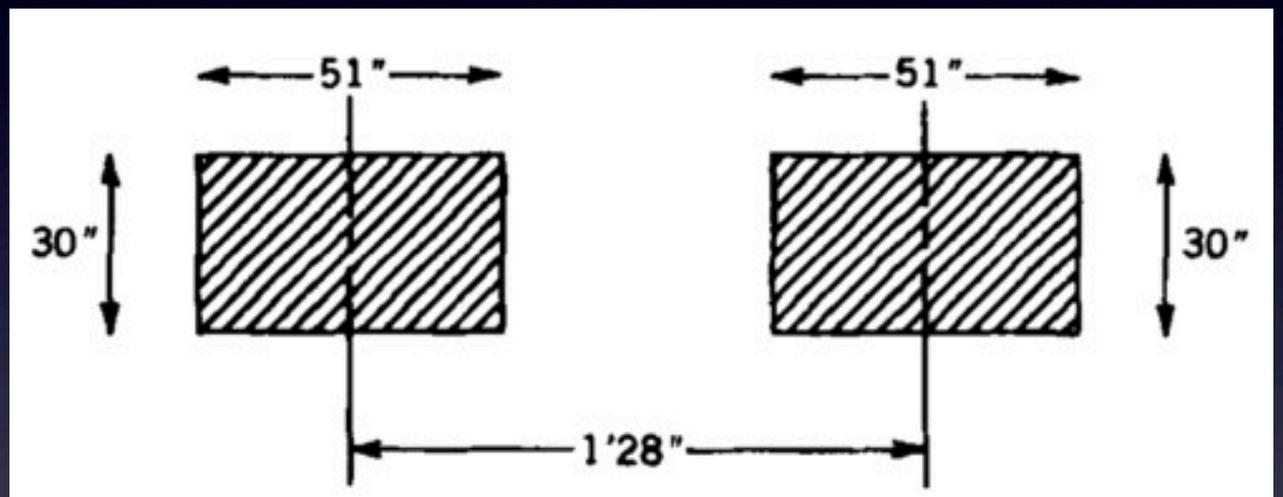


Jennison & Das Gupta (1953)



Cygnus A



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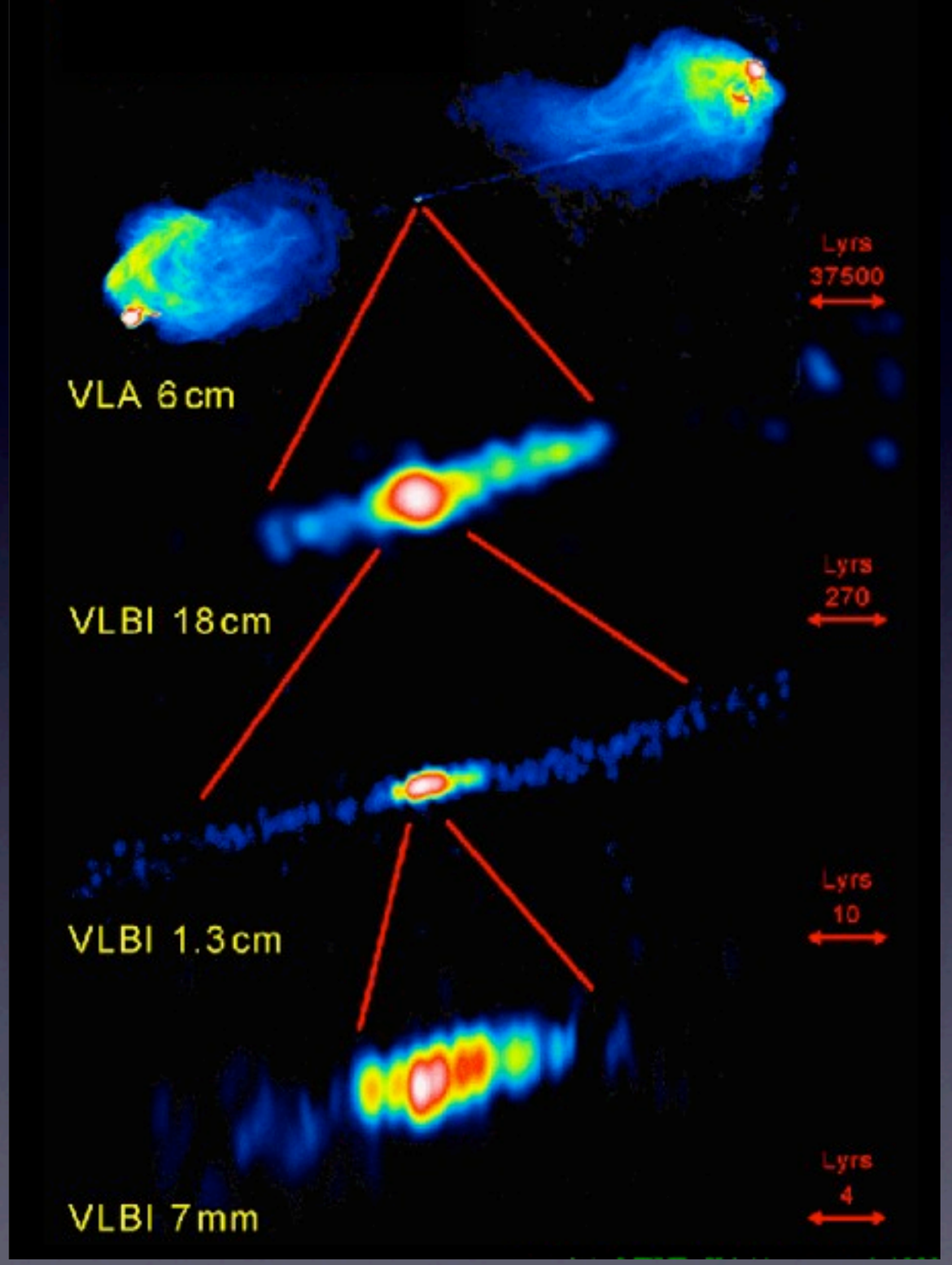


Krichbaum et al. (1998)

Data reduction

Software

AIPS

Most powerful software.

IRAF ‘like’.

Created in 1970s (ancient FORTRAN).

Software

AIPS

Most powerful software.

IRAF 'like'.

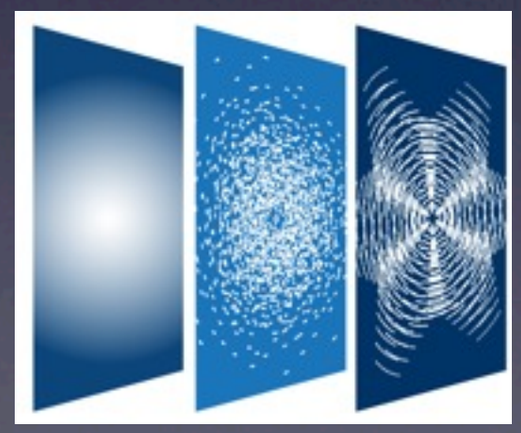
Created in 1970s (ancient FORTRAN).

CASA

Developed for ALMA.

C/C++ kernel / Python interface.

Nearly completed.



Step by step

- Data examination.
- Amplitude calibration.
- Phase calibration.
- Imaging.

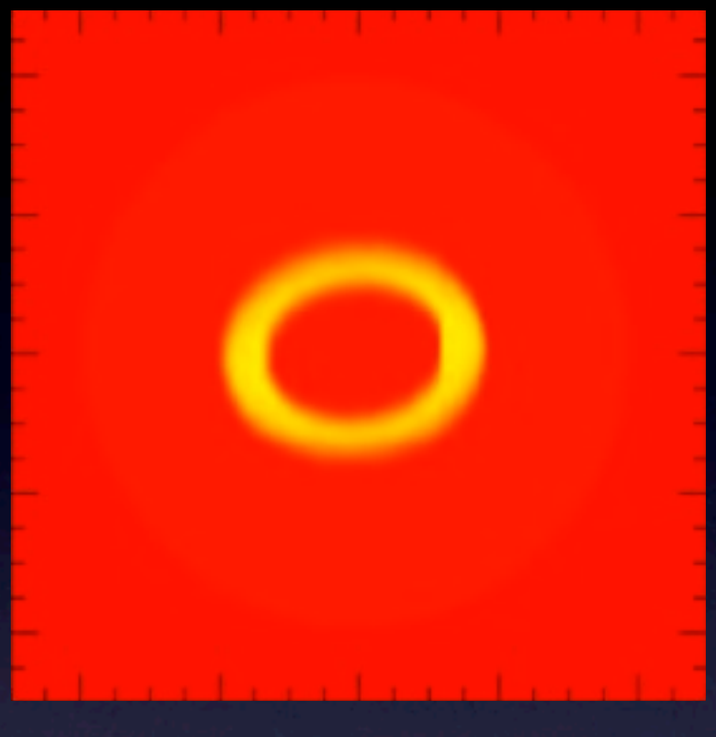
Step by step

- Data examination.
- Amplitude calibration.
- Phase calibration.
- Imaging.

Imaging

(J. Pety)

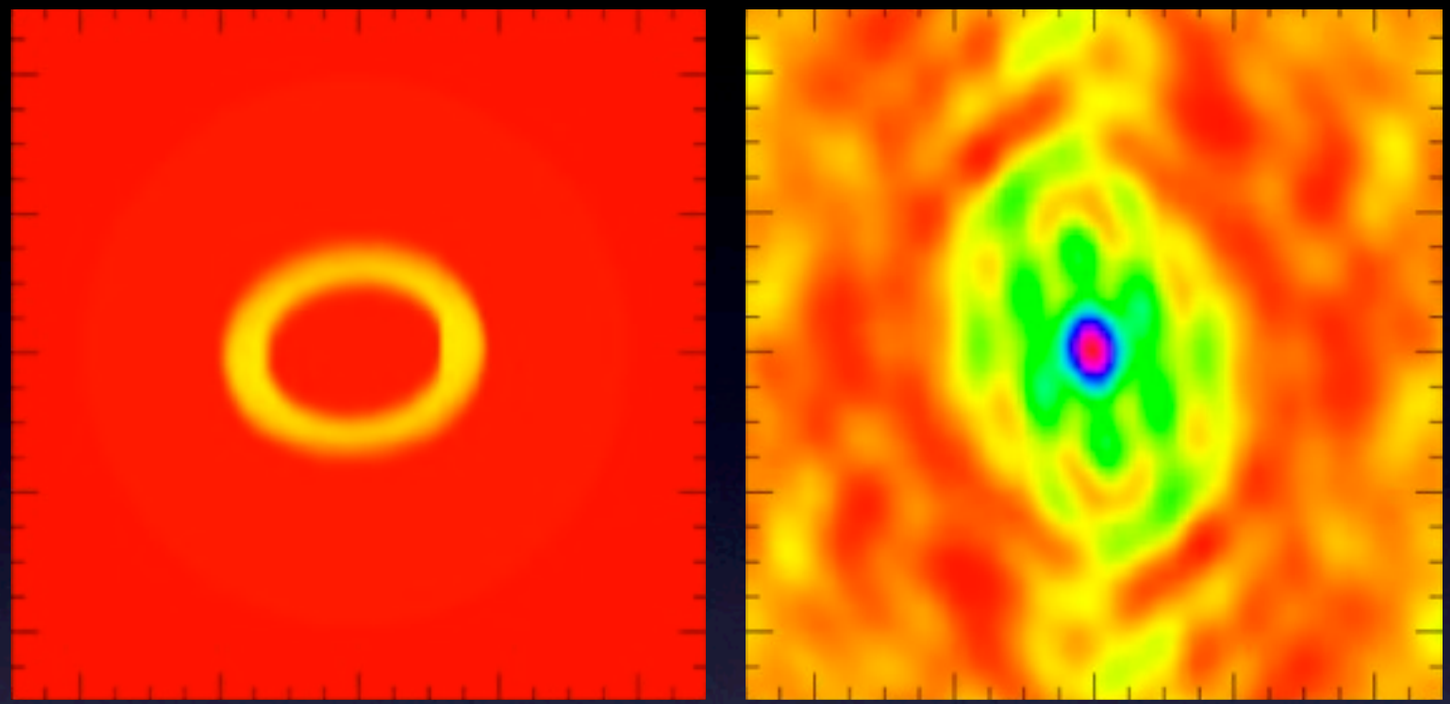
Source



Imaging

(J. Pety)

Source

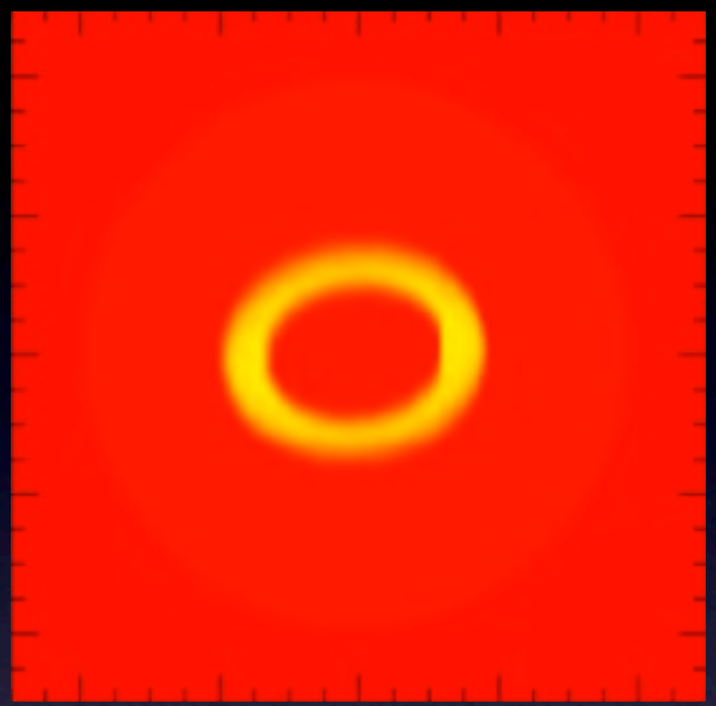


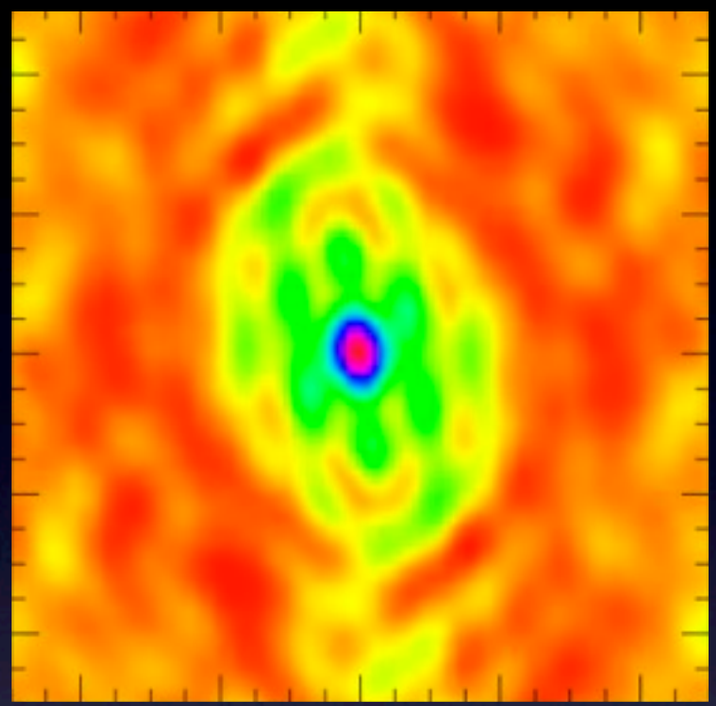
Dirty beam (PSF)

Imaging

(J. Pety)

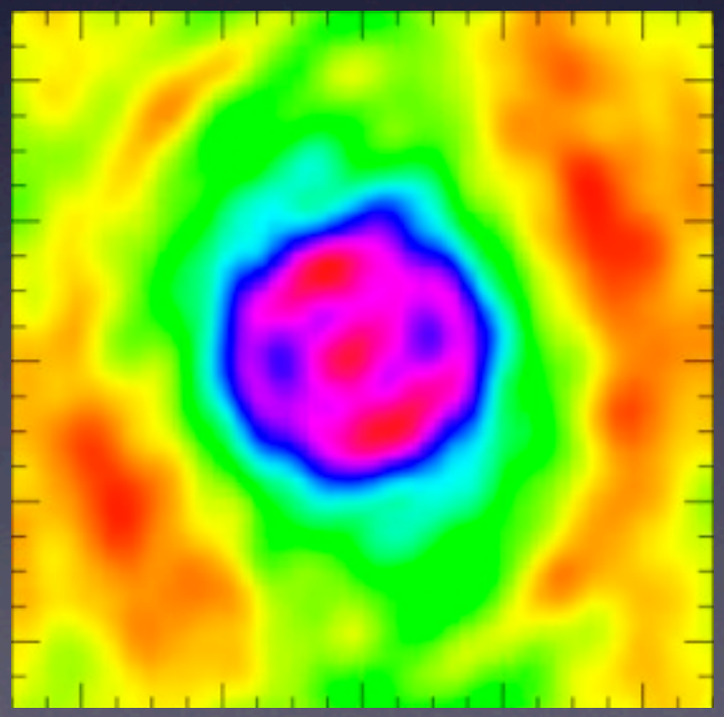
Source





Dirty beam (PSF)

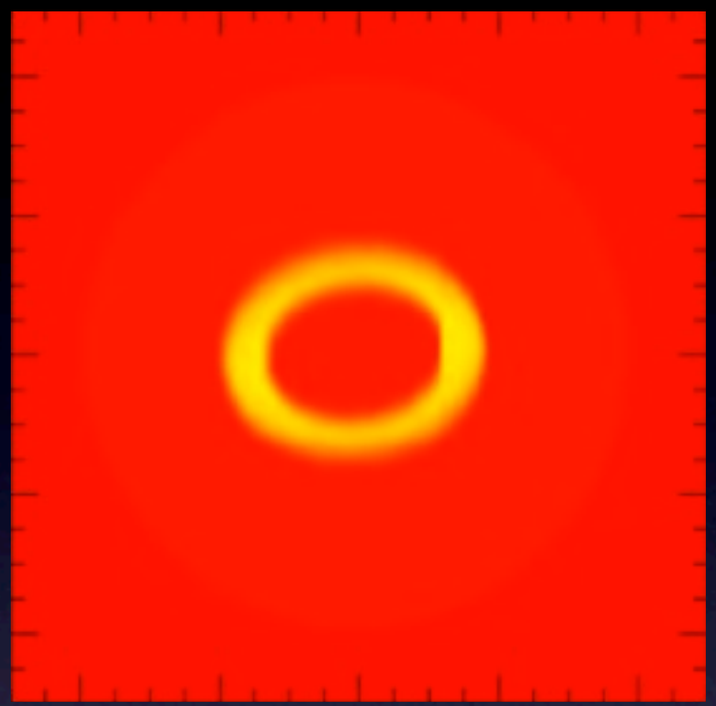
Dirty image

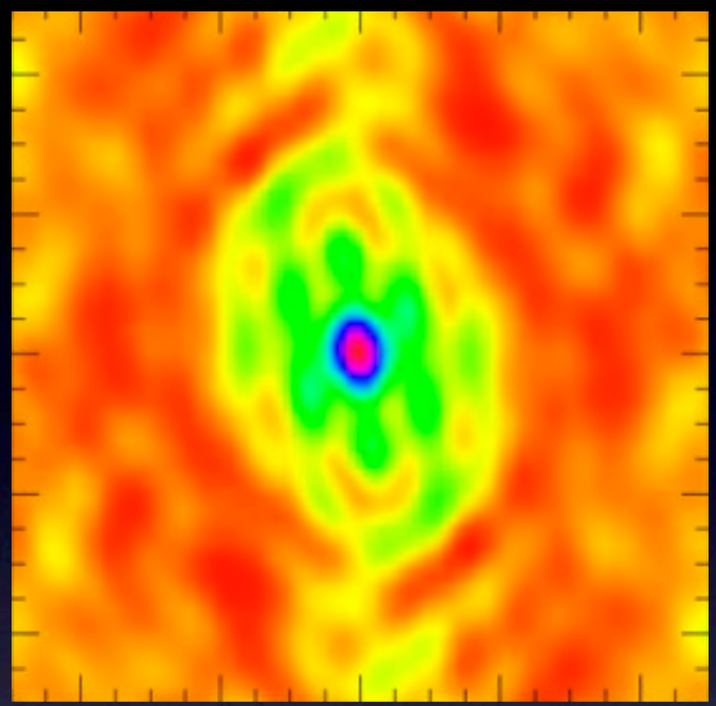


Imaging

(J. Pety)

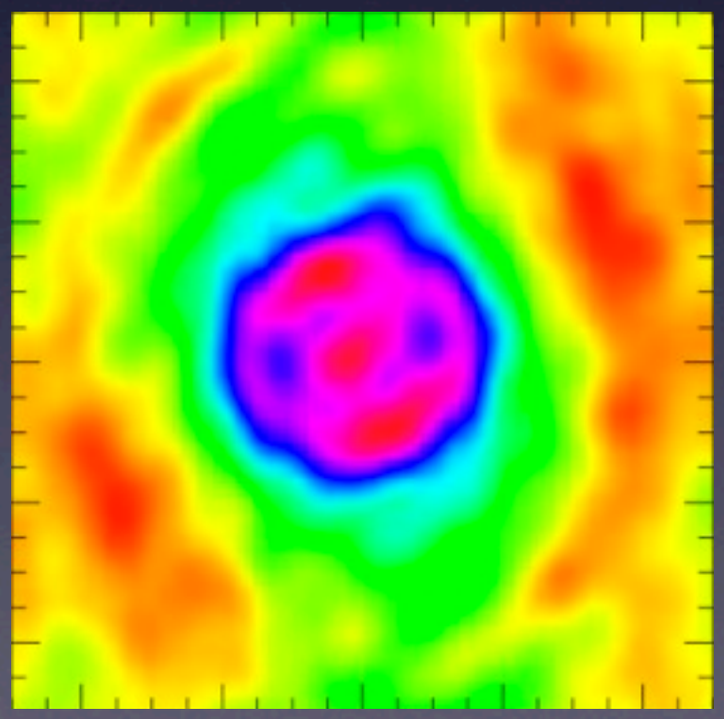
Source

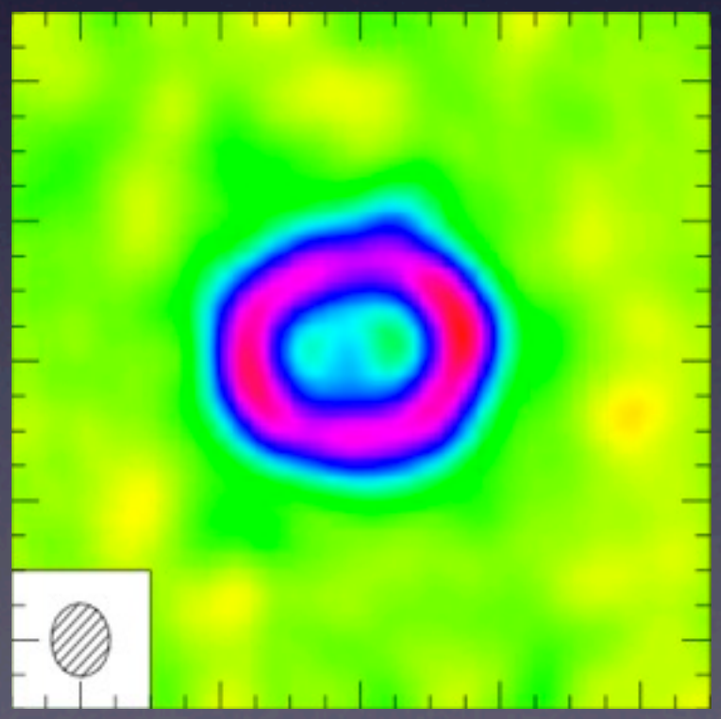




Dirty beam (PSF)

Dirty image

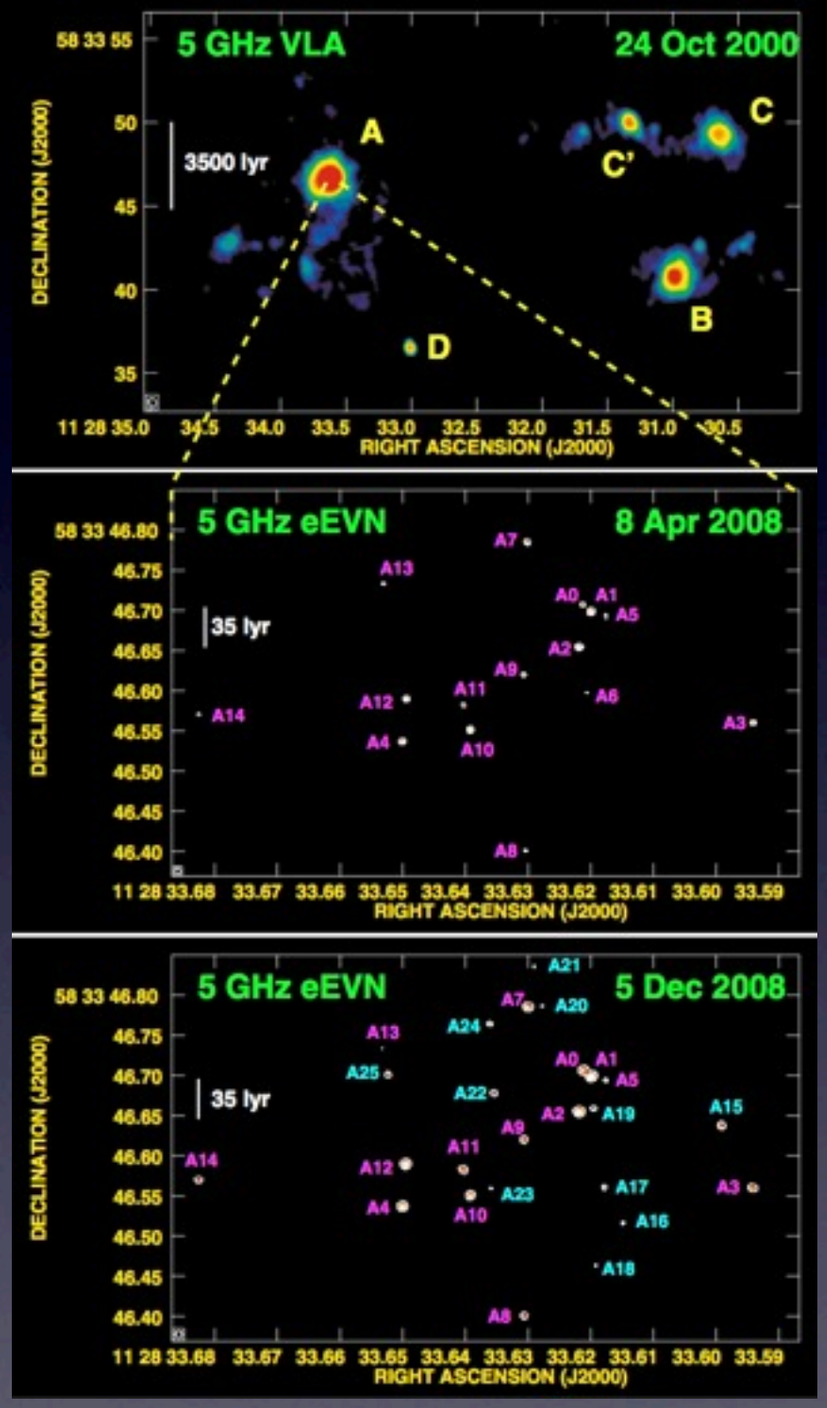


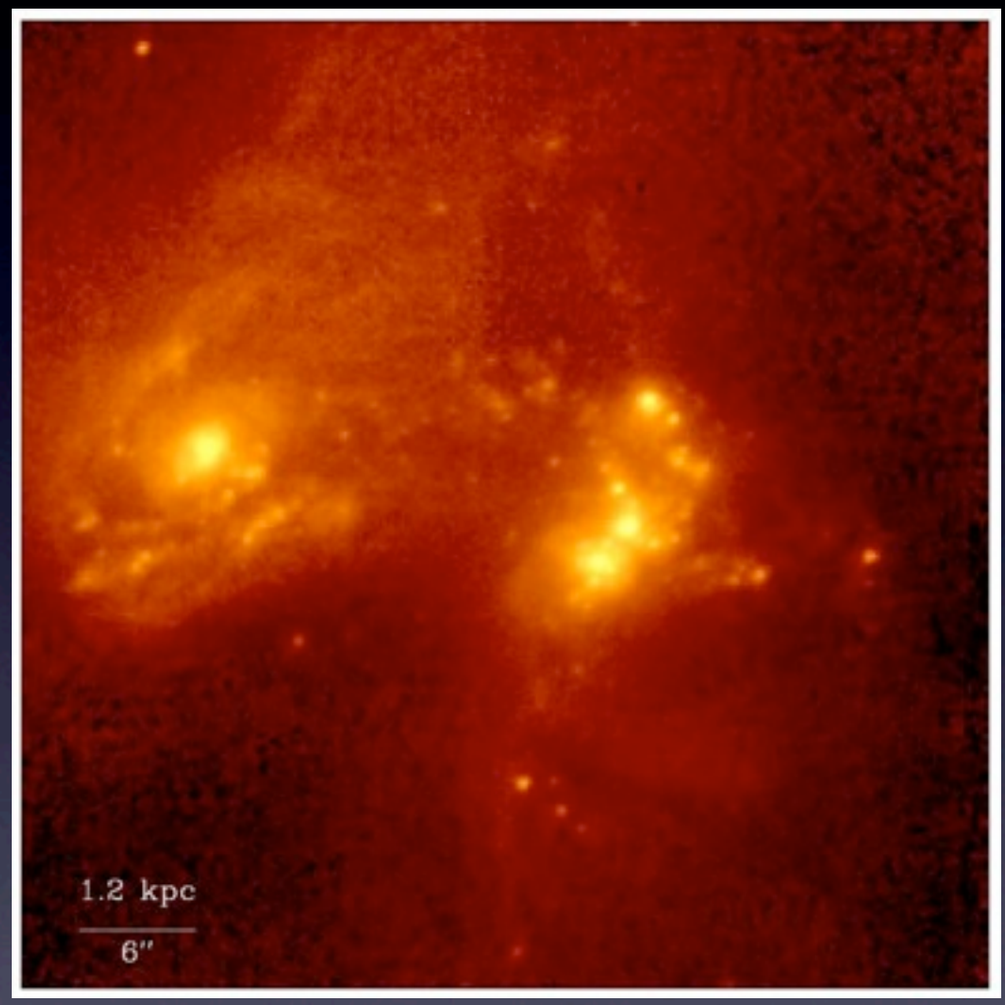


Clean image

Some examples (LIRG biased!)

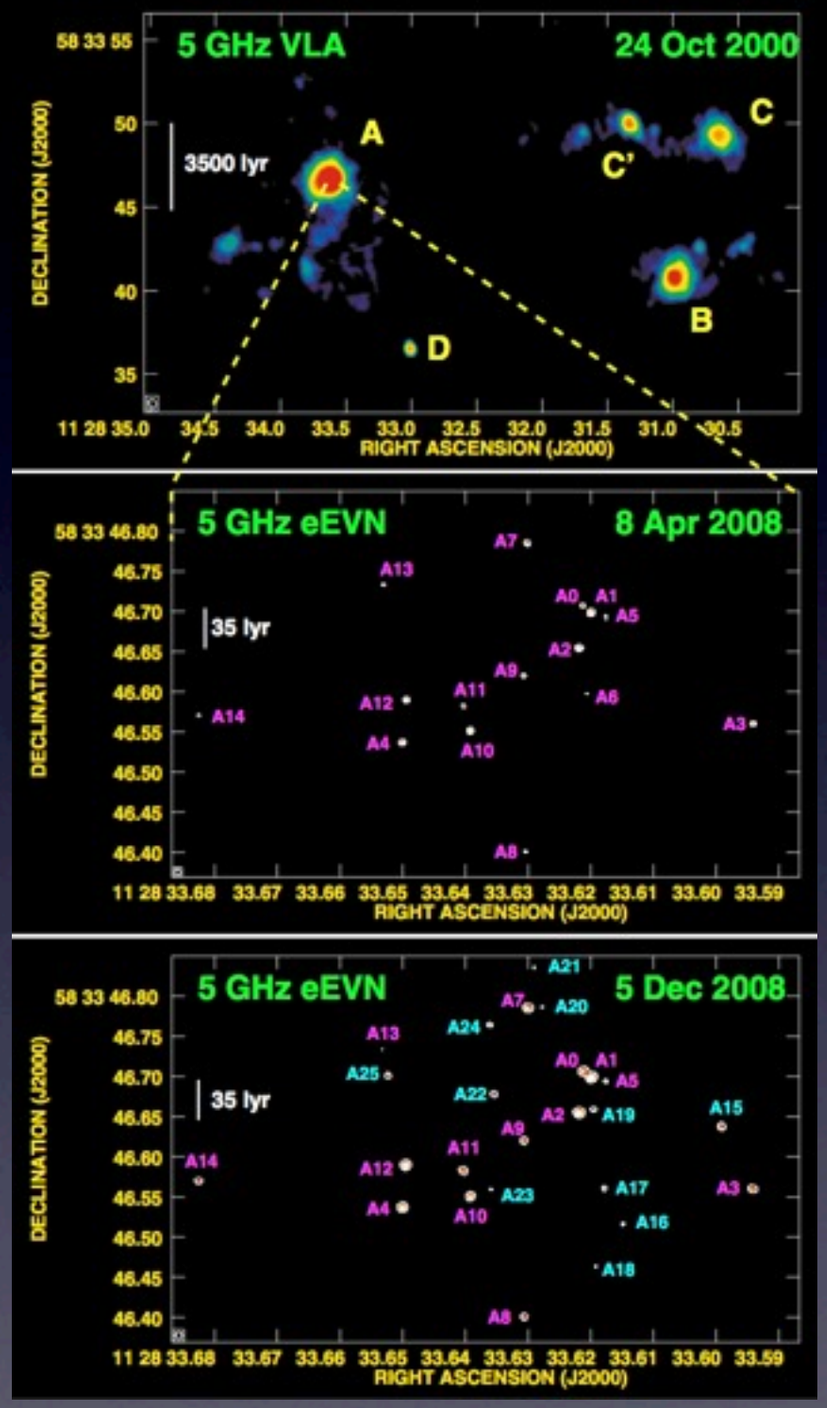
Arp 299: Hunting SNe & AGN



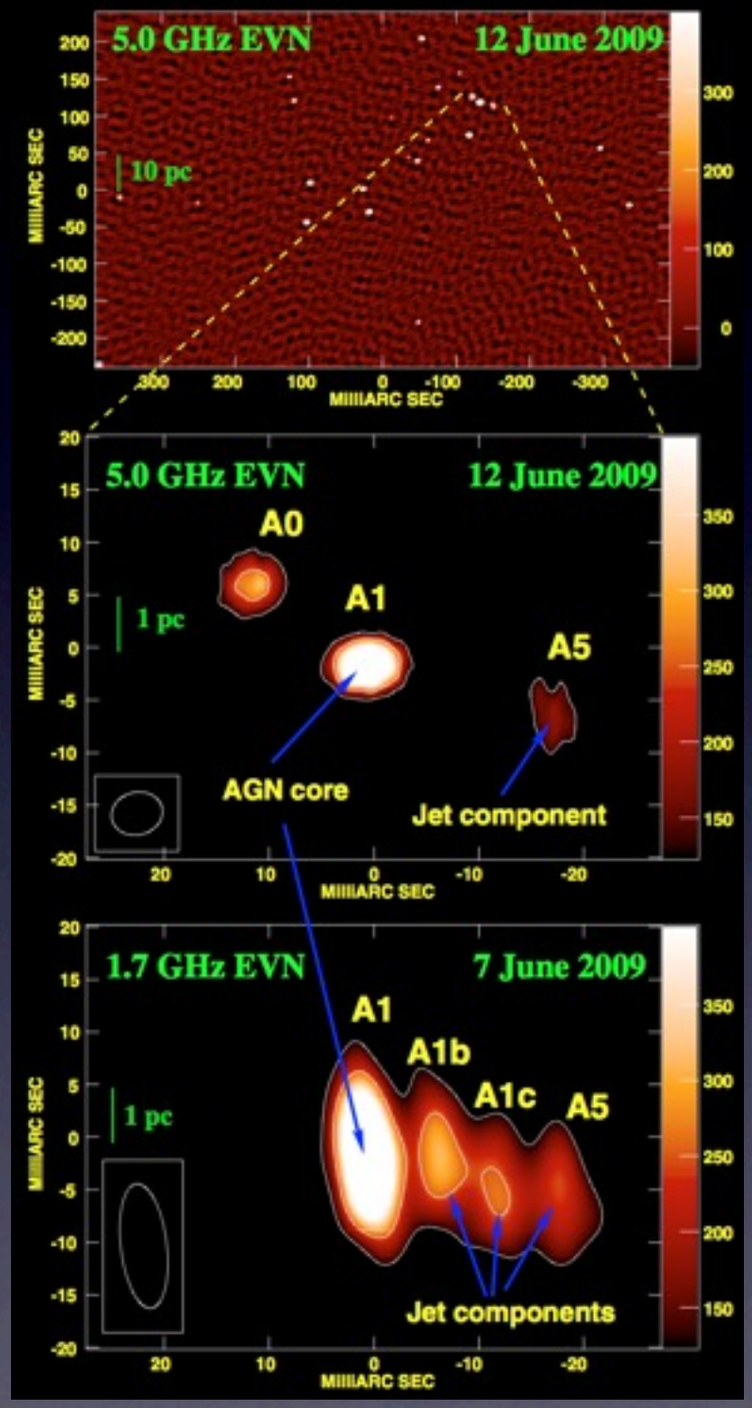


Pérez-Torres et al. 2009

Arp 299: Hunting SNe & AGN

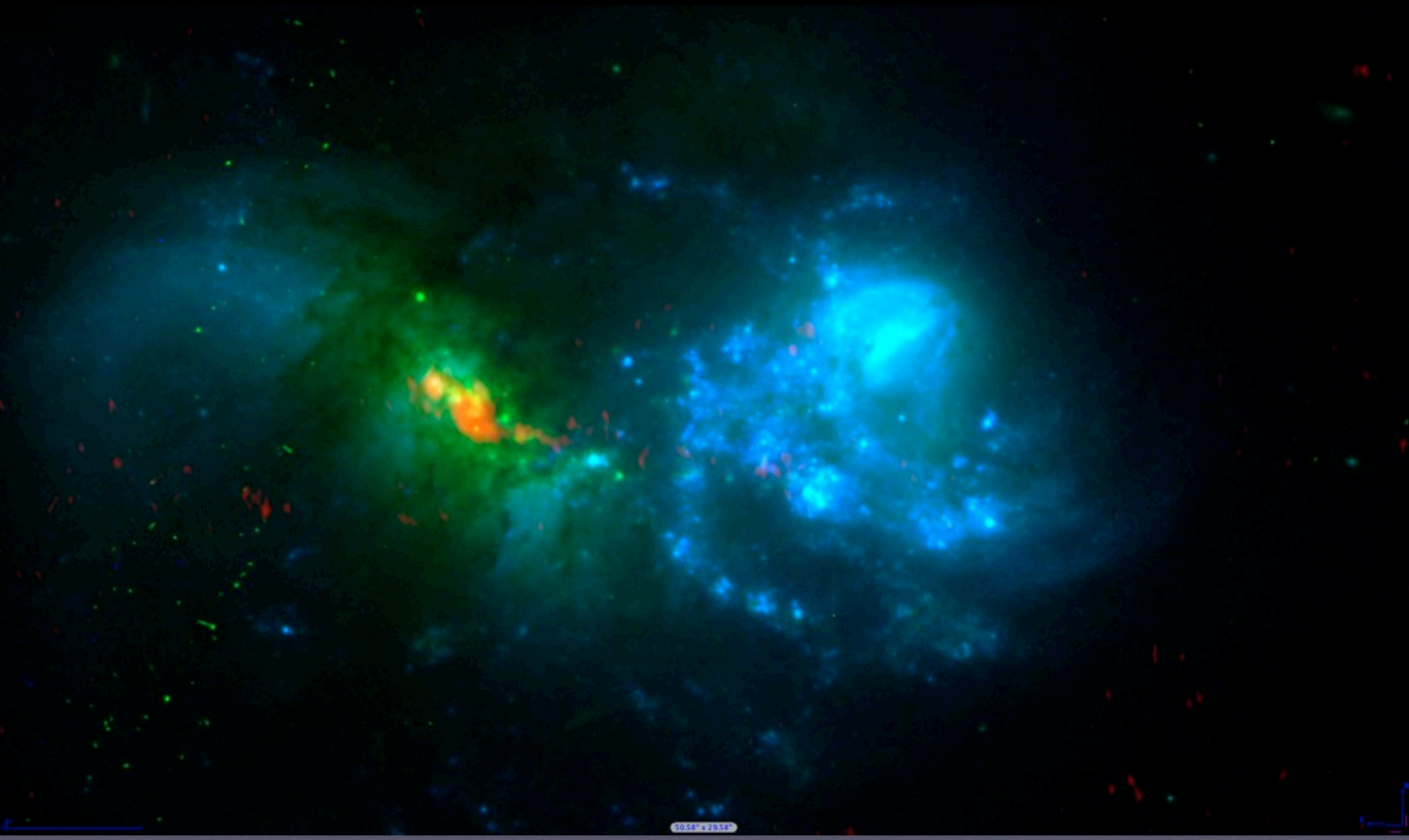


Pérez-Torres et al. 2009



Pérez-Torres et al. 2010

IC 1623



3.6cm 814nm 435nm

¡Muchas gracias!