

# LEAP

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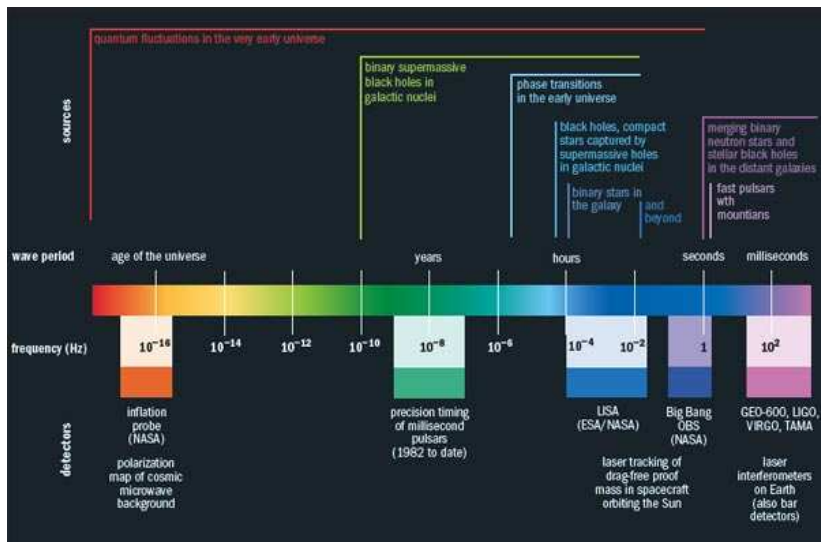
JBCA, University of Manchester / Astron

2009

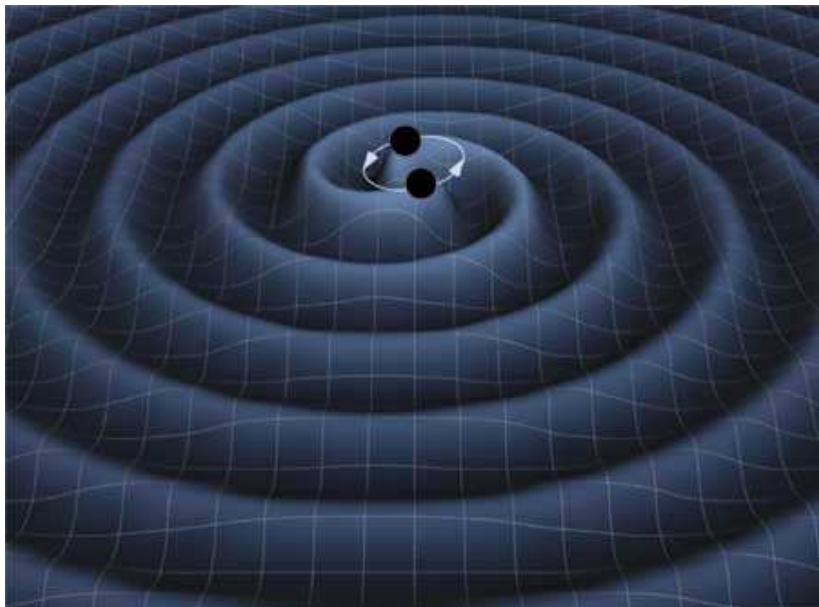
# Overview

- Detecting Gravitational waves.
- LEAP.
- What we exactly need to do.

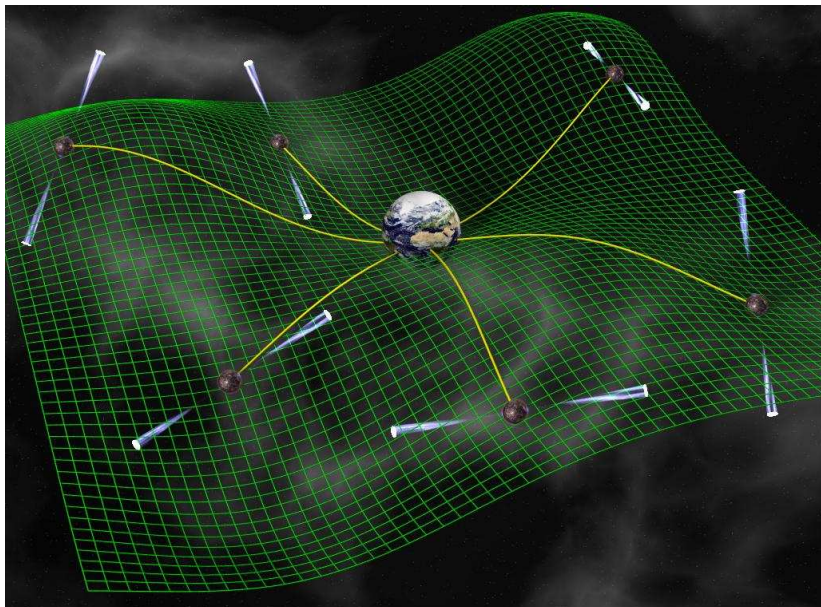
# Detecting gravitational waves (1/4)



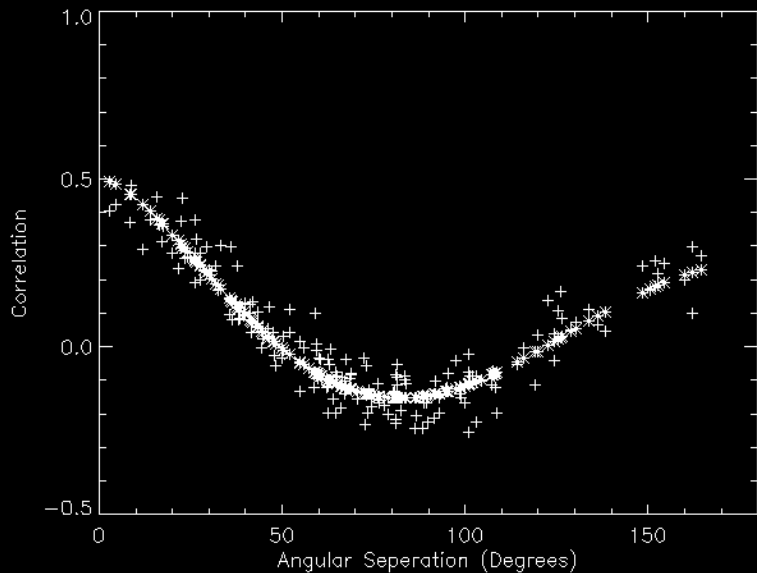
## Detecting gravitational waves (2/4)



## Detecting gravitational waves (3/4)



## Detecting gravitational waves (4/4)



# PTA's

- PPTA
- EPTA
- NanoGrav
- IPTA

## LEAP (1/2)

- Large European Array for Pulsars.
- Effort to detect gravitational waves by timing pulsars.
- Proposed by Michael Kramer and Ben Stappers.
- Part of EPTA.
- Giant 'leap' forward in sensitivity.



## LEAP (2/2)

- Coherently combining 5 telescopes:
  - WSRT (The Netherlands)
  - Effelsberg (Germany)
  - Lovell (UK)
  - Nancay (France)
  - Sardinia (Italy)
- To obtain steerable Arecibo sensitivity.
- Observing at 1.4 GHz.



# Making a phased array

- **Add signals from all telescopes with appropriate delays.**
- Delays are due to telescope position, instrumental delays, ionosphere, troposphere.
- Delays are found by fringe-finding.

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# What the correlator software needs to do

- **We have 5 ( $\times 2$ ) streams of base-band data from a MSP.**
- Correct all streams for geometric and instrumental delays.
- Cross-correlate streams.
- Find fringes, get phase-information.
- Apply phase-information and add streams coherently.
- We then have a data-stream from a super-telescope.

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