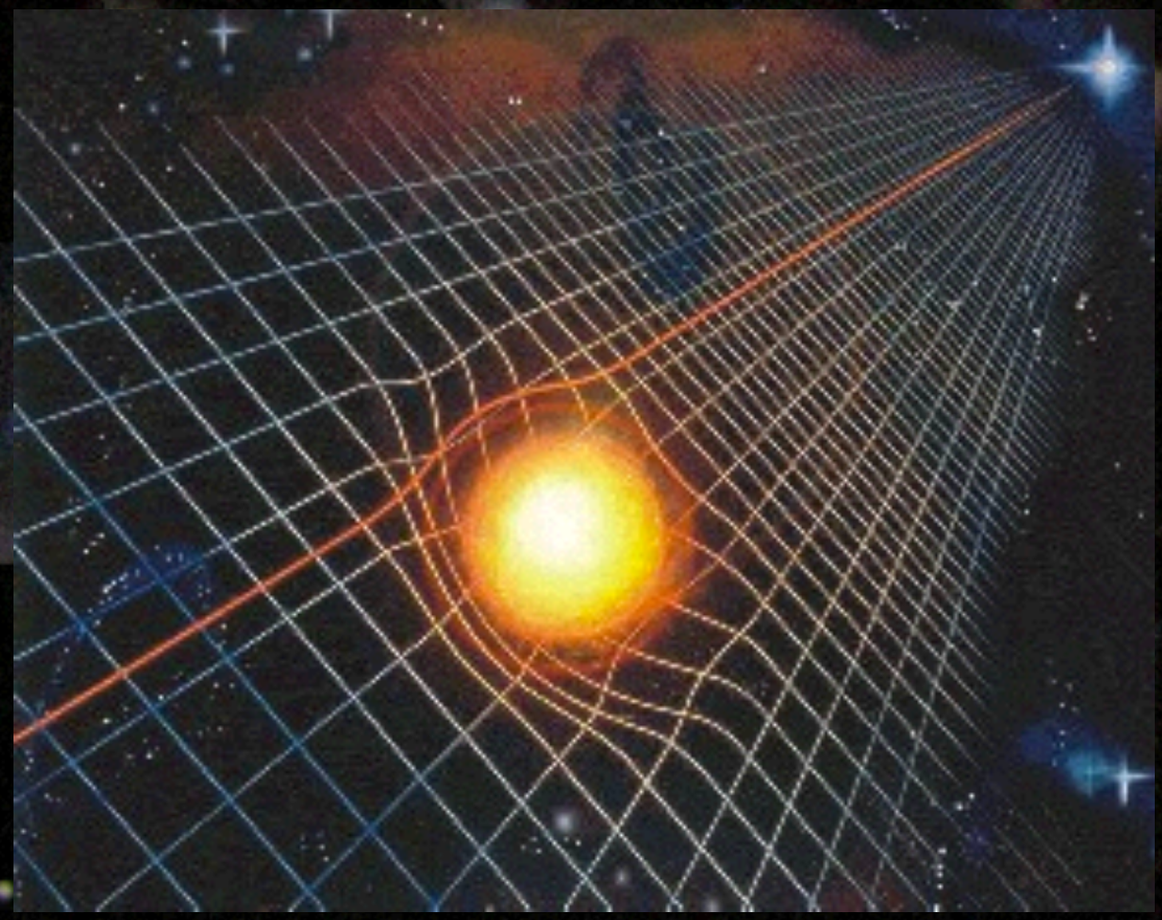

Gravitational Wave Detection with LISA

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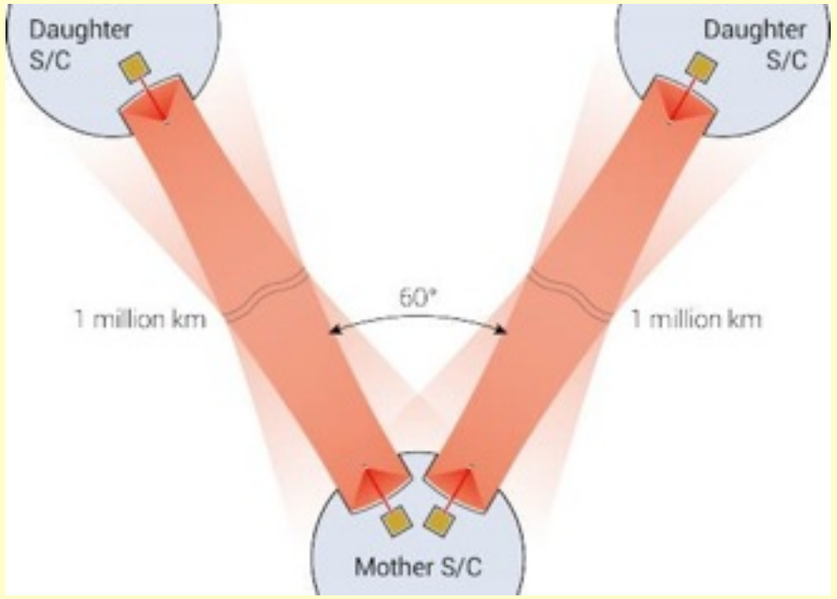
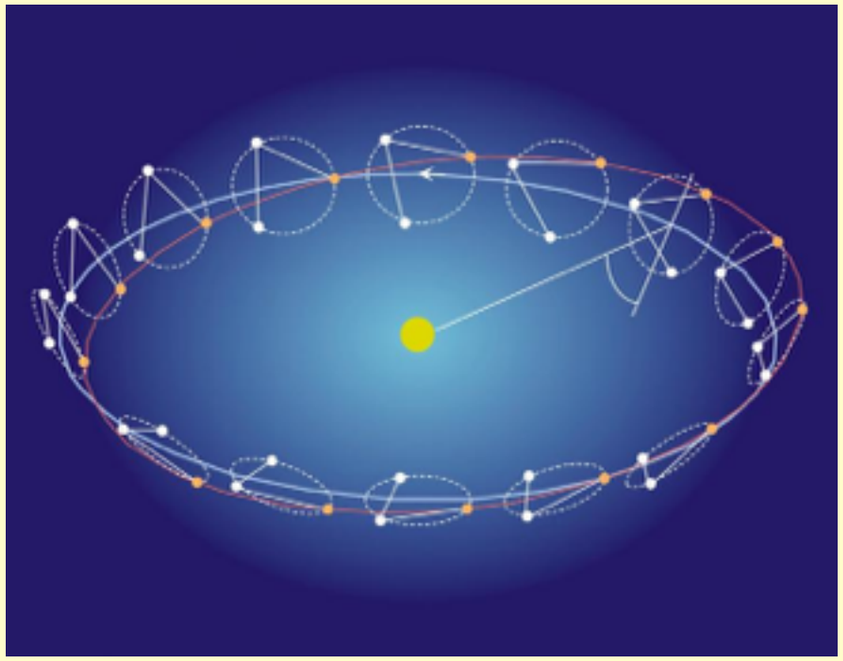
Presented by Hubert Halloin
APC/Paris

Gravitational Wave Detection with LISA

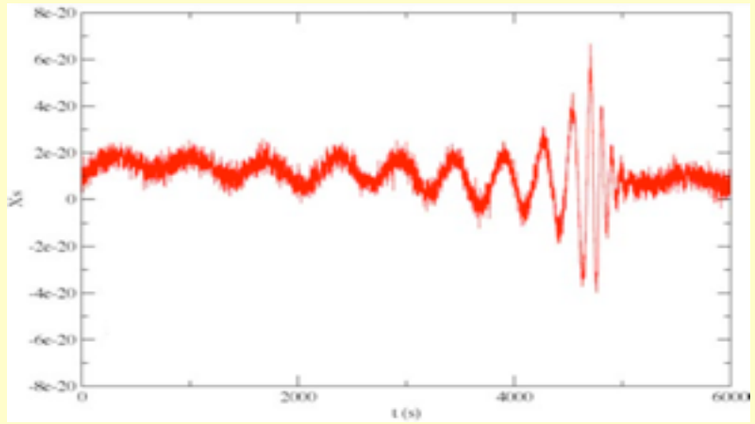
- Lisa is a space based detector whose aim is to detect Gravitational Waves (GW) in the mHz frequency range
- LISA is made of 3 satellites in a triangular configuration that orbits around the Sun, following the Earth with a delay f 1 month
- The distance between each satellite is of the order of 10^6 km
- When a GW reaches LISA, the distance between the satellites will oscillate at the frequency of the GW.
- The expected oscillation is very small, of the order of a few picometers
- In order to achieve this, the LISA detector performs like a 2 arm Michelson Interferometer based on the exchange of laser beams between the satellites.
- Typical sources that LISA will detect are:
  - Massive Black Hole Binaries
  - Extreem Mass Ratio Inspiral
  - Galactic binaries
  - Cosmological stochastic sources





The "lab" : Determination of source parameters using Markov Chain Methods

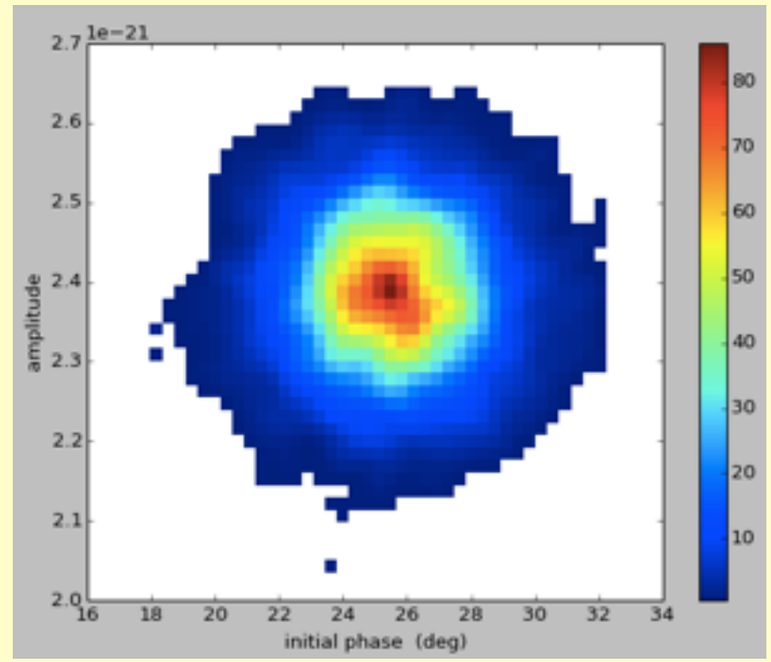
- General Relativity gives us a very precise model of what the effect of the passage of a GW should be.



- Most sources that will be observed by LISA are described by 7-20 parameters

- This relatively large number of parameters have led the LISA community to develop data analysis method based on Markov Chain algorithms.

- The "lab" will focus on the detection of Galactic Binaries and the determination of the 7 parameters that describe such sources.



- After an extended introduction to the physics and detection of GW by LISA, the activity will be based on the analysis of "simplified version" of a MCMC code (Python) and its application to parameter estimation.