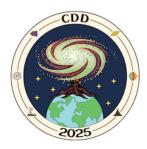ID de Contribution: **112**   Type: **Talk**

How to measure ripples in the fabric of space time ?

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The Laser Interferometer Space Antenna (LISA) space based gravitational wave detector is set to be launched in the mid 2035's to be placed 66 000 000 km away from Earth and act as a low frequency GW observatory in space.

LISA will measure gravitational waves in the low frequency regime, ripples in the fabric of space time that are caused by the acceleration of massive objects in space and time. LISA will be measuring the low frequency part of these emissions meaning that it will probe much heavier objects than ground based detector such as LIGO and VIRGO can detect.

This observatory will take the form of a constellation of three satellites that fly in a triangular configuration with a length baseline of around 2 500 000 km. A distance measurement will be done using heterodyne interferometry that will track movements between the satellites up to a precision of 10 picometers (achieving a relative measurement of 10^{-21}).

Such an instrument must be thouroughly tested before being sent to orbit, but with such a complexe measurement scheme one cannot just turn on the instrument to check if it works and meets the required specifications. For this reason, France is developing a complex test system to check that the instrument can meet the required sensitivity.

For my contribution, I will first explain the basic functioning of this future observatory and how we manage to perform this highly challenging measurement. For the second part of this contribution, I will give an overview of how we are going to be testing the instrument before sending it to space.

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