Abstract CDD : Mikel FALXA – Detecting low frequency gravitational waves (PTA)

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Pulsars are very dense and rapidly rotating neutron stars. They emit light on concentrated beams making them appear as series of pulses. They are extremely stable objects and monitoring these series of pulses allows us to use them as clocks. A gravitational wave passing through would disturb the time of arrivals of pulses and provide us information on the local space-time curvature. The Pulsar Timing Array (PTA) collaboration is currently monitoring many pulsars in the galaxy using radio telescopes with the aim to detect gravitational wave signals. It is now composed of a total of 65 pulsars that are constantly observed by many different branches of the collaboration throughout the world. The targeted signals can be separated in two categories : the stochastic Gravitational Wave Background (GWB) which is a low frequency noise resulting from the sum of all supermassive black hole binaries gravitational emissions in the universe and the Continuous Wave (CW) signals which come from stable individual binaries well resolved at one specific frequency. These signals are expected at frequencies around 10nHz which lies in the range of sensitivity of PTA. My PhD concentrates on the CW and individual sources. I will have to develop a statistical analysis pipeline using bayesian inference for gravitational wave detection based on already existing tools to ultimately improve them.