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Seminar of the theory group of APC

Mardi 23 Fevrier 2021, 14 :00
APC, https ://u-paris.zoom.us/j/87016236807?pwd=SkJNU0Q1d1lYU1BxZzlvZXpKblkzQT09
Domaines : gr-qc

Titre : *From pulsars to supermassive black holes and gravitational waves in between*

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Résumé : *Pulsar Timing Arrays (PTAs) aim to detect nHz gravitational waves (GWs) from supermassive black hole binaries (SMBHBs). This is done by looking for correlated variations of the Time of Arrivals (TOA) across an array of ultra-stable millisecond pulsars. Comparing the predicted TOAs from our timing model against the measured TOAs gives us the residuals. These contain the imprint of GWs, but also other effects and sources of noise processes. A gravitational wave background (GWB) from a population of merging SMBHBs manifests as a common spatially correlated process across all pulsars, with the characteristic signature being the Hellings-Downs curve. This correlation is the smoking gun of a detection of GWs. Three established PTA collaborations : the North American Nanohertz Gravitational Wave Observatory (NANOGrav), the Australian Parkes PTA (PPTA) and the European PTA (EPTA), as well as emerging PTA collaborations from India, China and South Africa all work together in the International PTA consortium towards the common goal of detecting low frequency GWs.*

The EPTA can build on the history of European pulsar observations and has therefore a long timespan of PTA observations of up to 25 years. There are 5 major European telescopes : Effelsberg in Germany, Lovell in UK, Westerbork in the Netherlands, Sardinia in Italy and the Nancay Radio Telescope (NRT). The NRT is a vital part of the EPTA providing a large fraction of the European data. In this talk, I will present some of the most recent results of GW searches from PTA collaborations with a focus on the results from the 25 years of EPTA data. I will also discuss the astrophysical interpretation of a prospective GWB detection.