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On the shoulders of giants: searching for individual supermassive blackhole binaries in the presence of a background

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Pulsar Timing Array (PTA) experiments use well-timed pulsars to probe the gravitational universe at frequencies down to a few nanohertz. This band is populated by gravitational waves emitted by binary systems of supermassive black holes (SMBHBs). The most common signal sought by PTA experiments is a stochastic gravitational wave background, generated by the superposition of hundreds of thousands of these waves arriving from a large population of SMBHBs. However, it is very likely, especially at higher frequencies (>10 - 8 Hz) where the background amplitude decreases, that there will be one or more singularly resolvable signals. Since the SKA will have a much higher sensitivity than current PTAs, especially at high frequencies, it will significantly increase our probability of observing such resolvable sources.

I will present the first results of realistic simulations of PTA data sets in the presence of a single resolvable source. All simulations are based on the second European PTA data release and the analyses focus on the accuracy and precision achieved in parameter estimation and on the subtleties of disentangling a single gravitational wave signal from the stochastic background.

Research area

Gravitational Waves

Primary author: Ms FERRANTI, Irene ('G. Occhialini' Dipartimento di Fisica, Università degli Studi di Milano-Bicocca)

Presenter: Ms FERRANTI, Irene ('G. Occhialini' Dipartimento di Fisica, Università degli Studi di Milano-Bicocca)

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