ID de Contribution: **34** Code de contribution: **Confirmed** Type: **Talk (submitted)**

Normalising Flows for data analysis of Laser Interferometer Space Antenna

mercredi 20 avril 2022 15:30 (15 minutes)

In the gravitational wave astronomy the main measure that we infer from the observation is the posterior distribution of the parameters that describe the model of the gravitational wave for a particular source.
The posterior distribution is estimated by utilising Bayes theorem and assuming that we know the model for the signal and that the noise is Gaussian with certain power spectral density.
The traditional way to perform this estimate is by applying sampling techniques such as MCMC or Nested Sampling. However this requires many evaluations of the likelihood and can take days or months to converge to a good solutions.
At the same time we expect that we are going to observe Electromagnetic counterparts for Massive Black Hole Binaries (MBHBs) during the inspiral and merger phases, which can be quasi-transient and happen very fast. Many MBHB signals will spend only couple of hours in the LISA sensitivity band.Therefore to inform electromagnetic observatories and do multimessenger observation it is particularly important to do very fast parameter estimation and predict the location of the source based on the knowledge from the gravitational wave.

I will present the way how we can do parameter estimation with normalising flows for signals such as MBHBs. Moreover I will describe what are the particular difficulties for our problem and what are the ways forward to resolve them.

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Classification de Session: Talks