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Simulation-based inference for stochastic gravitational wave background data analysis

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The next generation of space- and ground-based facilities promise to reveal an entirely new picture of the gravitational wave sky: thousands of galactic and extragalactic binary signals, as well as stochastic gravitational wave backgrounds (SGWBs) of unresolved astrophysical and possibly cosmological signals. Here, I will focus on one particular analysis challenge: reconstructing an SGWB from mock LISA data. I demonstrate that simulation-based inference (SBI) is a promising avenue to overcome some of the technical difficulties and compromises necessary when applying more traditional methods like MCMC. As a demonstration of the rich potential of SBI, I consider the injection of a population of low signal-to-noise ratio supermassive black hole transient signals into the data, which SBI automatically marginalises over. I will close with an outlook on the general potential of SBI for gravitational wave science.

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