

## **Iterative adaptive learning for parameter and population inference**

Richard O'Shaughnessy, Rochester Institute of Technology

Many areas of multimessenger astronomy require applying Bayes theorem to a set of costly forward models, to draw inferences about properties of individual events or the universe. Due to high computational cost, these simulations usually only sparsely cover the full parameter space. Generalizing techniques applied to gravitational wave parameter estimation, we outline some techniques for adaptive learning with gaussian processes that seem fruitful for many common challenges in multimessenger astrophysics. We illustrate our methods with three concrete applications: gravitational wave parameter estimation; adaptive learning for surrogate light curves for kilonovae; and source population modeling for multimessenger astrophysics. We discuss some strategies that could be applied for more robust adaptive learning going forward.