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Computing the Bayes factor in favor of the ringdown overtone using normalizing flows

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I introduce $floZ$, an improved method based on normalizing flows, for estimating the Bayesian evidence (and its numerical uncertainty) from a set of samples drawn from the unnormalized posterior distribution. I validate it on distributions whose evidence is known analytically, up to 15 parameter space dimensions and I demonstrate its accuracy for up to 200 dimensions with 10^5 posterior samples. I show its comparison with nested sampling (which computes the evidence as its main target). Provided representative samples from the target posterior are available, this method is more robust to posterior distributions with sharp features, especially in higher dimensions. I apply $floZ$ to compute the Bayes factor for the presence of the first overtone in the ringdown signal of the gravitational wave data of GW150914, finding good agreement with nested sampling.

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