

Machine Learning Gravitational Waveforms for Binary Neutron Star mergers

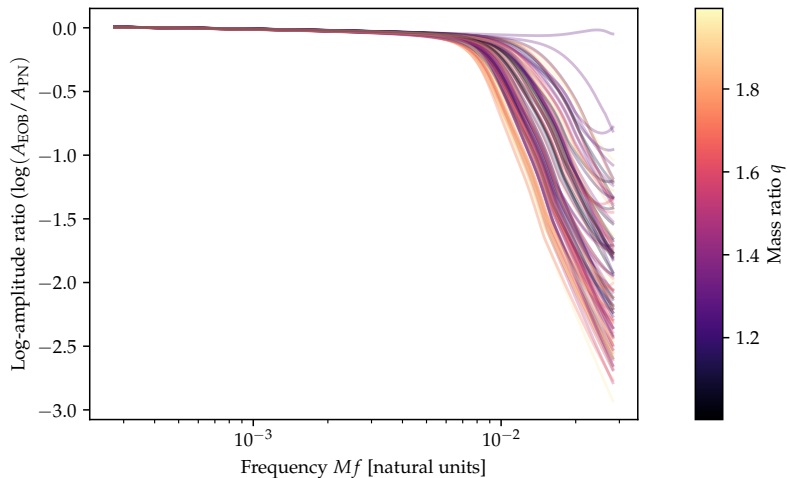
Jacopo Tissino

2021-09-10

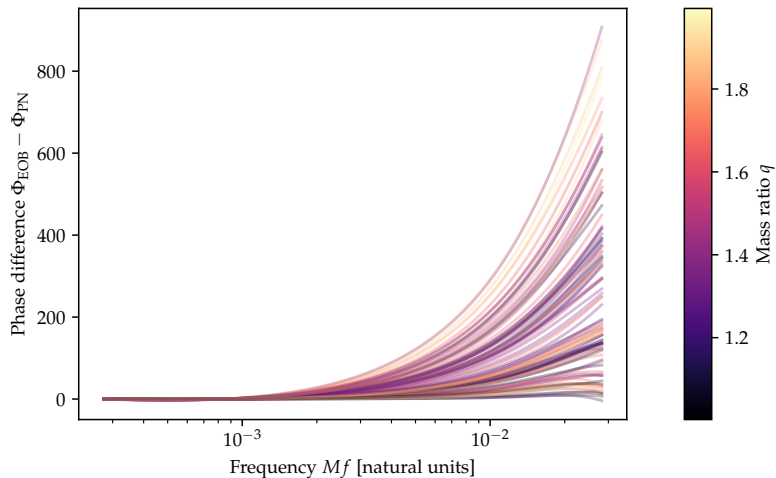
MLGW_BNS structure: training dataset generation

- Greedy adaptive downsampling fit;
- EOB waveform generation and downsampling;
- residuals from PN waveforms: $\Delta A = \log(A_{\text{EOB}}/A_{\text{PN}})$ and $\Delta\Phi = \Phi_{\text{EOB}} - \Phi_{\text{PN}}$;
- PCA on the combined, downsampled residuals;
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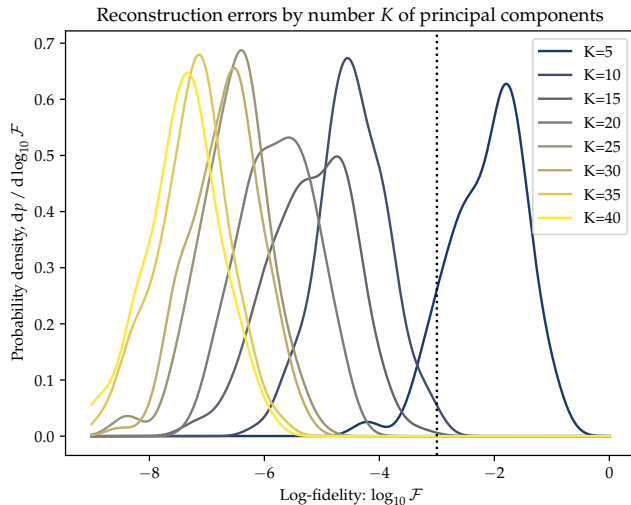
Residuals: amplitude



Residuals: phase

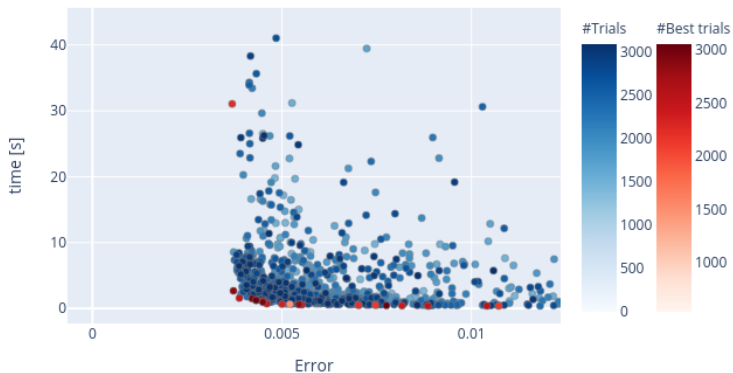


PCA mismatches

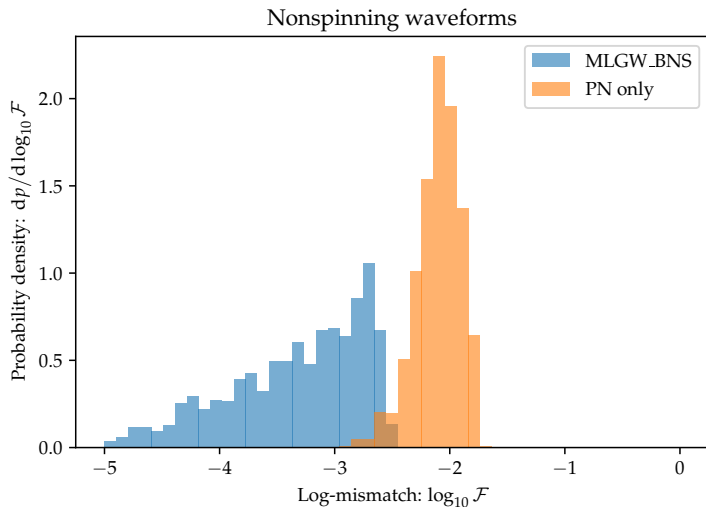


Hyperparameter optimization

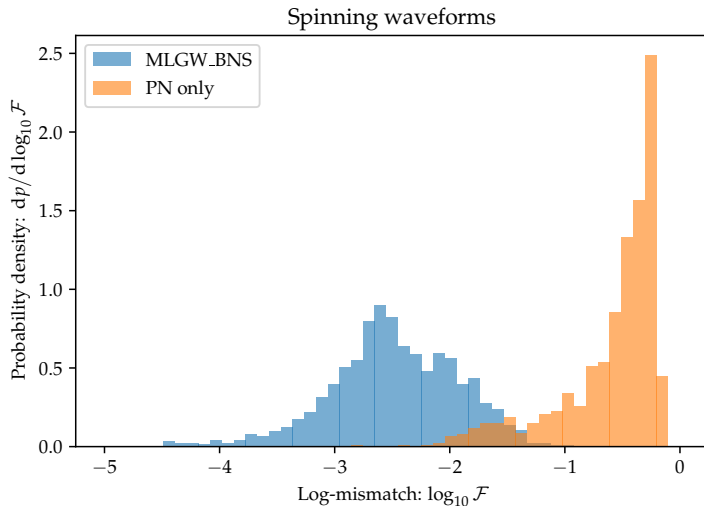
Pareto-front Plot



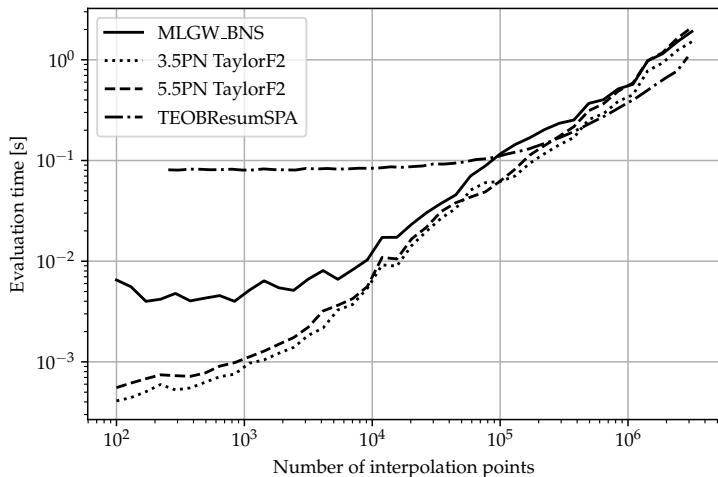
Fidelity: nonspinning case



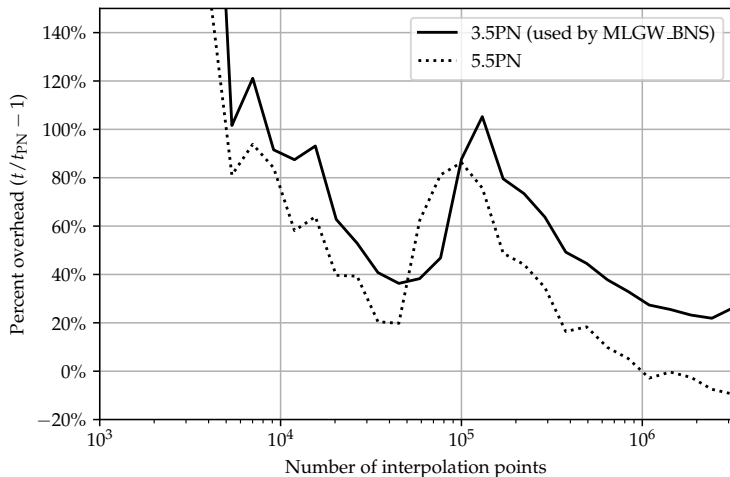
Fidelity: spinning case



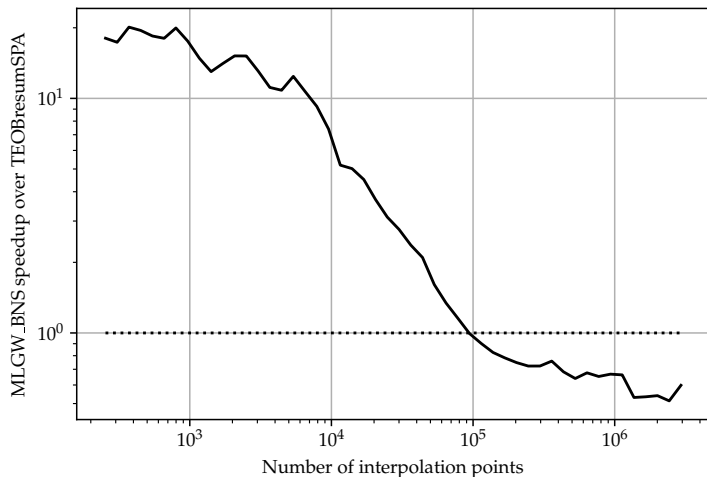
Evaluation time



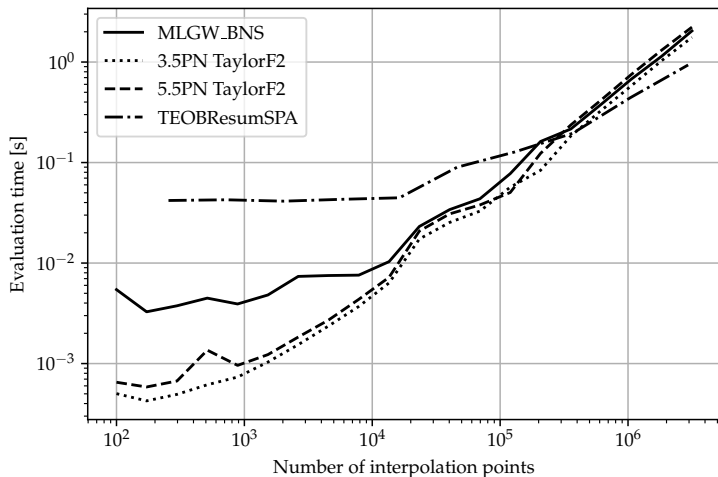
Evaluation time: $f_0 = 20$ Hz



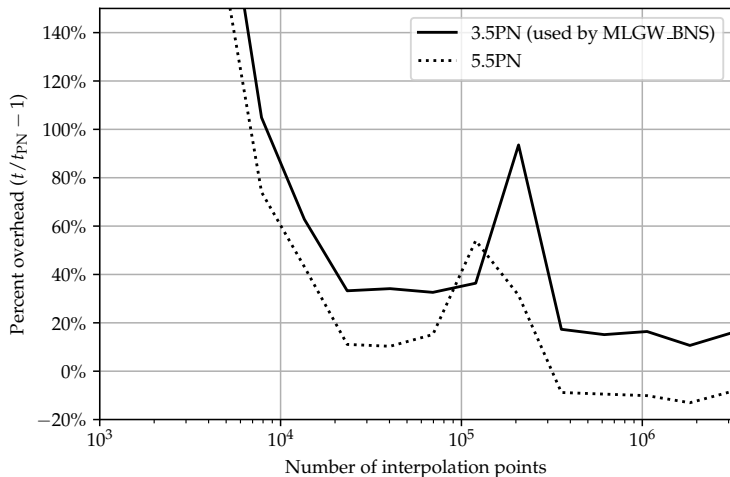
Evaluation time: $f_0 = 20$ Hz



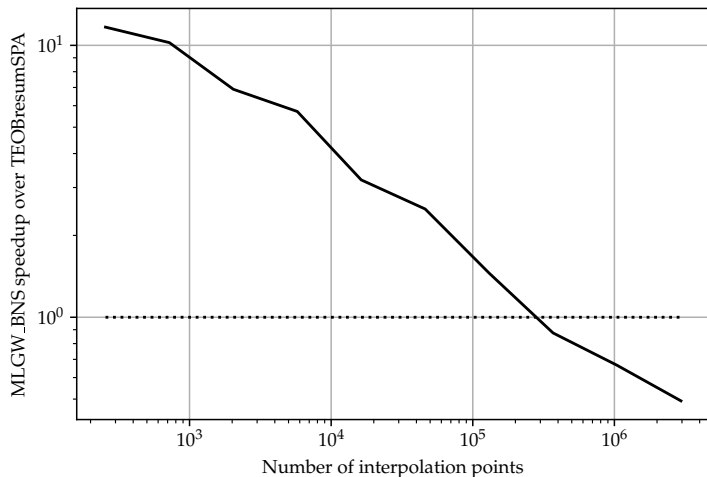
Evaluation time: $f_0 = 10$ Hz



Evaluation time: $f_0 = 10$ Hz



Evaluation time: $f_0 = 10$ Hz



Bibliography