

How to search for continuous gravitational waves while allowing the frequency to wander: selected results using O3 LIGO data

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Rotating neutron stars offer great potential as targets for continuous gravitational wave (CW) searches. However their spin frequency may display stochastic fluctuations over time, due to X-ray flux (and hence accretion torque) variability or timing noise. It is crucial to accommodate for this “spin-wandering” in (at least some) CW search algorithms. One approach is to deploy a hidden Markov model (HMM) which postulates that the CW frequency executes a random walk. In this presentation, I will provide an introduction to the HMM search method, and the outcome of three CW searches employing said method using data from LIGO’s third observing run O3. These searches targeted the low-mass X-ray binary Scorpius X-1, 20 accreting millisecond X-ray pulsars, and the millisecond pulsar J0437–4715.

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