



# **Searching for phase transitions in neutron stars with modified Gaussian processes**

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Functional forms of the neutron star Equation of State (EoS) are required to extract the viable EoS band from neutron star observations. Typically, one of three methods are used—spectral functions, piecewise polytropes, or Gaussian processes. However, realistic nuclear EoS, containing deconfined quarks or hyperons, present nontrivial features in the speed of sound such as bumps, kinks, and plateaus, which can be difficult to capture using previous methods. We modify Gaussian processes by introducing spikes and plateaus in the speed of sound and check how those features impact the posterior distribution obtained using constraints from X-ray and gravitational-wave observations, and perturbative QCD. We find that introducing modifications to the EoS plays a role in understanding the possible phase structure of neutron stars at densities around twice nuclear saturation density.

**Tuesday, February 21st, 2023**

**4:00 pm**

**Lindley Hall room 321**