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### Towards GPU-accelerated multimessenger inference of neutron star mergers and dense matter physics

Mergers of neutron stars offer a unique probe of ultra-dense nuclear matter, far beyond the reach of terrestrial experiments. However, fully exploiting the multimessenger nature of these events, combining gravitational waves, electromagnetic counterparts, and dense matter physics, poses a major computational challenge. This burden will become even more pressing with next-generation observatories such as the Einstein Telescope, which are expected to deliver high-precision data at unprecedented rates. In this talk, we present our ongoing efforts in accelerating the likelihood-based parameter estimation of these events by using normalizing flows, differentiable programming, and GPU hardware accelerators. Beyond speed, these methods enable a deeper exploration of systematic uncertainties arising from modeling choices, paving the way to more robust and comprehensive constraints on neutron star physics.

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