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Inference of astrophysical parameters with a conditional Invertible Neural Network

Conditional Invertible Neural Networks (cINNs) provide a new technique for the inference of free model parameters by enabling the creation of posterior distributions. With these distributions, the parameter mean values, their uncertainties and the correlations between the parameters can be estimated. In this contribution we summarize the functionality of cINNs, which are based on normalizing flows, and present the application of this new method to a scenario from astroparticle physics. We show that it is possible to constrain properties of the currently unknown sources of ultra-high-energy cosmic rays and compare the posterior distributions obtained with the network to the ones acquired using the classic Markov Chain Monte Carlo method.

Significance

In this contribution a new technique, the conditional Invertible Neural Network, is applied to a scenario from astroparticle physics for the first time. We evaluate the performance and compare it to a classic analysis strategy. We conclude that it provides very similar results to the traditional method while being computationally much more effective.

References

<https://indico.cern.ch/event/980214/contributions/4413723/>

Speaker time zone

Compatible with Europe

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