

Baryons as Solitons in the Meson Spectrum: A ML Perspective

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Inspired by Witten's idea that in the large N limit of QCD Baryons correspond to soliton states of mesons, we construct a model of hadronic masses using both Bayesian and non-Bayesian techniques in machine learning. From knowledge of the meson spectrum only, neural networks and Gaussian processes predict the masses of baryons with 90.3% and 96.6% accuracy, respectively. We also predict the masses of pentaquarks and other exotic hadrons and demonstrate that machine learning is an effective tool for testing composition hypotheses. Our results surpass the benchmark constituent quark model both in terms of accuracy of predictions and hypothesis testing across all sectors of hadrons. We anticipate that our methods could yield a mass formula for hadrons from quark composition and other quantum numbers.

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Session Classification: Short talks