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Modeling Vector and Axial Nucleon Form Factors with Bayesian Neural Networks

Friday, 19 June 2020 10:30 (15 minutes)

The vector and axial form factors describe the electroweak structure of the nucleon. They are obtained from the analysis of the electron and neutrino scattering data.

Accurate predictions of the nucleon form factors are important for the proper modeling of the neutrino-nucleon and neutrino-nucleus cross-sections. I will review the Bayesian neural network approach, which allows us to obtain unbiased parametrization of the nucleon form factors. The idea of the approach is to use the adaptive abilities of the neural networks as well as Bayesian statistics philosophy. The 'best fit' is chosen from the ensemble of the neural network models ranked by the evidence (probabilistic measure). I will discuss the bias-variance trade-off dilemma (overfitting problem). The talk is based on the papers: Phys.Rev.C 99 (2019) 2, 025204; Phys.Rev.C 91 (2015) 4, 045205; J.Phys.G 42 (2015) 3, 034019; Phys.Rev.C 90 (2014) 054334; Phys.Rev.C 88 (2013) 065205; Phys.Rev.C 84 (2011) 034314; and JHEP 09 (2010) 053.

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