Contribution ID: **208** Type: **not specified**

Controlling Excited-State Contributions to Nucleon Isovector Charges using Distillation

Wednesday, 25 July 2018 14:40 (20 minutes)

As all lattice calculations are subject to a trade-off between excited-state contamination at short Euclidean times and an increased signal-to-noise ratio at large Euclidean times, the need for reduced or removed excited-state effects is paramount. Perhaps the most notable in lattice calculations is that of the axial charge of the nucleon, wherein calculations have historically differed from the world average by roughly 10%. Widely used methods to tame the impact of excited states on lattice n-point functions include the Jacobi and Wuppertal smearing techniques, and the variational method. An alternative smearing algorithm called Distillation has garnered much attention in spectroscopy calculations for its utility in efficiently identifying a plethora of hadronic states across a wide range of quantum numbers, including some of hybrid nature. Distillation provides several advantages including explicit momentum projection at source and sink, and the correlation of arbitrarily complicated interpolators once a single set of modified quark propagators have been computed. That said, Distillation has as of yet seen little use in structure calculations. In this presentation we discuss the implementation of Distillation in the calculation of the nucleon isovector charges g_A, g_S and g_T. Rather than seek precise determinations of said charges, we instead highlight the demonstrable improvements achieved in calculated matrix elements by combining Distillation with the variational method. By employing a basis of several Distilled interpolators, including some of hybrid character, we demonstrate an earlier onset of a plateau region in calculated nucleon matrix elements and stability of said plateaus under variations of the source/sink interpolator separation. When compared to Jacobi smeared interpolators used in previous variational analyses, Distillation appears to afford greater statistical precision in extracted matrix elements as reliable estimates are attainable at much shorter Euclidean times. Comparisons are also made to other recent strategies seeking to control excited-state effects, and prospects are sketched for the potential efficacy of Distillation in future structure calculations, such as the many works seeking to calculate parton distribution functions.

Primary author: Mr EGERER, Colin (William and Mary)

Co-authors: Dr RICHARDS, David (Jefferson Laboratory); Dr WINTER, Frank (Jefferson Lab)

Presenter: Mr EGERER, Colin (William and Mary)

Session Classification: Hadron Spectroscopy and Interactions

Track Classification: Hadron Spectroscopy and Interactions