

IMPROVED HADRONIC MATRIX ELEMENT DETERMINATION USING THE VARIATIONAL METHOD

Jack Dragos, Ross Young, James Zanotti, and Waseem Kamleh

Special Research Centre for the Subatomic Structure of Matter,
School of Physical Science University of Adelaide, South Australia, 5005,
Australia

Calculating hadronic matrix elements in Lattice QCD that are relevant for e.g. Form Factors and Parton Distribution Functions, provides important insights into the structure of hadrons. However standard 3-point function methods have their limitations. One of the most commonly studied sources of systematic error is excited state contamination, which occurs when correlators are contaminated with results from higher energy excitations. This investigation uses configurations generated by the QCDSF/UKQCD/CSSM collaborations at the SU(3)-symmetric point ($m_\pi \approx 460 MeV$) a lattice spacing of 0.074 fm with a volume of $32^3 \times 64$. We apply the variational method to calculate a range of quantities and compare the results to the more commonly used summation and two-state fit methods. The results of this analysis demonstrate that the variational approach offers a more efficient and robust method for the determination of nucleon matrix elements.