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Calculation of the Compton Amplitude at High Momentum using Momentum Smearing

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The Compton amplitude is of significant phenomenological interest, particularly at higher momenta, where numerical approaches such as Lattice QCD are required to calculate the Compton amplitude. There are, however, significant challenges to using Lattice QCD at non-zero momentum, not least of which is the reduction in signal to noise ratio. Traditionally, signal to noise ratios are improved by exploiting freedom in interpolator construction, however, at non-zero momenta these methods become less effective. Hence, other methods to reduce noise are needed such as the recently developed Momentum Smearing which modifies traditional quark smearing by including an extra momentum dependent phase factor to the smearing kernel. Here, we use this method to calculate the Compton amplitude for nucleons at high momenta, and further extend the method using variational techniques.

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