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Nucleon Physics with All HISQ Fermions

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A precise determination of the nucleon axial form factor will greatly reduce systematic errors for the upcoming neutrino scattering experiments. There are no foreseeable experiments to perform such measurement so lattice QCD is the best tool to accomplish the task. Such calculations are especially timely, because the uncertainty on the axial form factor is often underestimated in experimental analyses. In this talk, I will present our progress towards calculating nucleon axial form factor. Here, we use $2 + 1 + 1$ MILC HISQ action for both sea and valence quarks at the physical pion mass. First, preliminary results of the extraction of nucleon and delta masses from two-point correlators (using Bayesian fitting methodology) at three lattice spacing will be discussed. Then, I will present preliminary data of three-point correlators at both zero and non-zero momenta which will be used in the extraction of the nucleon axial charge and form factor once we have full statistics.

Primary authors: Dr MEYER, Aaron (Brookhaven National Laboratory); Dr STRELCHENKO, Alexei (Fermilab); Dr KRONFELD, Andreas (Fermilab); Dr HUGHES, Ciaran (Fermilab); Dr SIMONE, James (Fermilab); Mr LIN, Yin (University of Chicago)

Presenter: Mr LIN, Yin (University of Chicago)

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