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The nucleon-pion scattering lengths on a single CLS ensemble with $m_{\pi} = 200\text{MeV}$

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The $I=1/2$ and $I=3/2$ nucleon-pion scattering lengths are determined from a high-statistics computation on a single ensemble of gauge field configurations from the CLS consortium with dynamical up, down, and strange quarks and a pion mass $m_{\pi} = 200\text{MeV}$. The stochastic-LapH approach to quark propagation enables the efficient computation of all required correlation functions, and a statistical precision is achieved which suggests that controlled computations at the physical point are possible. The $I=3/2$ p-wave scattering amplitude is also precisely determined, and is consistent with the presence of the narrow $\Delta(1232)$ resonance. Systematic errors due to excited states and the reduced symmetry of the finite volume are addressed, but the extrapolation to the continuum and physical quark masses is left to future work.

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