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Nucleon electric polarizabilities and nucleon-pion scattering from lattice QCD

Tuesday 20 August 2024 17:00 (30 minutes)

I will discuss a lattice QCD calculation of the nucleon electric polarizabilities at the physical pion mass. Our findings reveal the substantial contributions of the Nπ states to these polarizabilities. Without considering these contributions, the lattice results fall significantly below the experimental values, consistent with previous lattice studies. This observation has motivated us to compute both the parity-negative Nπ scattering up to a nucleon momentum of ~ 0.5 GeV in the center-of-mass frame and corresponding $N\gamma^* \longrightarrow N\pi$ matrix elements using lattice QCD. Our results confirm that incorporating dynamic Nπ contributions is crucial for a reliable determination of the polarizabilities from lattice QCD. This methodology lays the groundwork for future lattice QCD investigations into various other polarizabilities.

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