JSA/JLab Graduate Fellowship Report

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My research interest focus on the description of the rich internal structure of hadronic states that arises from the strong coupling regime of Quantum Chromodynamics (QCD). With this in mind I have been carrying out numerical calculations in the framework of Lattice QCD, which up to date is the only tool that offers first-principle results from the QCD Lagrangian. Secondly, I have also worked in collaboration with others \[1\] on the analytical description of amplitudes that describe the interaction of multi-particle hadrons and external probes, i.e. currents, from a rigorous quantum field theory formalism. The latter are necessary to analyze the data obtained from the Lattice, specially when attempting to describe unstable hadrons. These manifest as poles in the complex energy plane of the amplitudes describing the multi-hadron processes of the daughter hadrons.

The main accomplishments during the academic year 2020-2021 made possible thanks to the JSA/JLab Graduate fellowship were:

- Calculation of the Lattice correlation functions at the JLab computational cluster, the analysis of which is undergoing.
- Published paper on the analytic behavior of the amplitude \(2 + J \to 2\), where 2 represents the number of external hadrons, and \(J\) is a generic external current \[1\].
- Derivation of the analytic behavior of other amplitudes in a soon-to-appear publication.
- Talk at the SESAPS conference \[2\] regarding the analytical work on amplitudes.
- Talk at the HadSpec collaboration meeting \[3\] on the progress of the numerical calculation on the Lattice.

No travel was undertaken during this period due to the COVID-19 pandemic.

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REFERENCES

