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Transitions of Two-body States in a Box.[1] FELIPE ORTEGA-GAMA, William & Mary, RAUL BRICENO, ANDREW JACKURA, Old Dominion University and Jefferson Lab, KEEGAN SHERMAN, Old Dominion University — The proton and neutron, along with their excitations, are some of the earliest known bound states of quarks that are described by the theory of quantum chromodynamics (QCD). Although their properties cannot be calculated using perturbative analytical tools, the determination of non-perturbative dynamics can be carried out with Lattice QCD (LQCD), a numeric implementation of QCD. LQCD relies on a discretization of a finite volume (FV) spacetime to regularize and calculate observables. Even when most of the uncertainties are systematically improvable, there are certain quantities that suffer from unavoidable substantial FV effects. In this talk I describe the development of a formalism that corrects the FV effects of transitions that involve states of two hadrons. After that, I will comment on the need to constrain the analytical form of the infinite volume amplitude which describes these two-hadron interactions to be able to correctly determine the response of the resonant excitations. These efforts seek to produce a quantitative description of the resonant nuclear spectrum, make definite statements about their structural origin, and resolve puzzles that obscure our current understanding of QCD.

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