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Nucleon excited states from lattice QCD

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The spectrum from lattice QCD is one of the important tools to understand the properties of hadron. By using the Hamiltonian effective field theory (HEFT) method, we develop an approach for relating the nucleon excited states extracted from lattice QCD and the nucleon resonances of experimental data. The approach opens a new window for the study of experimentally-observed resonances from the
first principles of lattice QCD calculations. With this pproach, one not only describes the spectra of lattice-QCD eigenstates through the eigenvalues of the finite-volume Hamiltonian matrix, but one also learns the composition of the lattice-QCD eigenstates via the eigenvectors of the Hamiltonian matrix. Therefore, the approach reveals the composition of the resonances observed in Nature. In this
presentation, I will focus on recent breakthroughs in our
understanding of the structure of the N*(1535)*, *N*(1440) and
Lambda(1405) resonances using this method.

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