## Phenomenology 2016 Symposium



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## Hadron Resonances from Lattice QCD

Tuesday 10 May 2016 14:30 (15 minutes)

Our group studied the low-lying hadron spectrum of lattice QCD on a large  $32^3\times256$ anisotropic space-time lattice at a near-physical pion mass of 240 MeV. Quark fields were smeared using a Laplacian Heaviside kernel which is later exploited to estimate quark propagation with a novel method: the Dirac matrix-inverse is stochastically estimated by introducing noise vectors in the Laplacian Heaviside subspace. Interpolating operators expected to overlap with single- and two-particle meson and baryon states were used, staying below the three-particle energy threshold. Preliminary results for the  $I = 1, S = 0, T_{1u}^+$  channel will be shown, along with other channels. The Luescher method has been applied to the two-particle finite-volume spectrum to obtain results for the phase shift and width of the  $\rho$ . Future work will briefly be discussed, which includes an alternative to the Luescher method involving an effective finite-volume Hamiltonian to fit the spectrum, and the implementation of tetraquark operators with fundamental (and higher) gauge-links.

## Summary

This talk will be showing methods used by our group for studying hadron resonances with lattice QCD. Our preliminary results with a  $32^3 \times 256$  anisotropic lattice will be shown, which includes the finite-volume spectrum in multiple channels and the  $\rho$  scattering phase shift. Additionally, I will discuss future plans for alternatives to the Luescher method and for implementing tetraquarks.

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