

Parity-positive Baryon Spectra on Isotropic Lattice

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We present a calculation of the low-lying spectra for the positive-parity Delta and Nucleon using the distillation approach applied on an isotropic $32^3 \times 64$ lattice at a pion mass of around 360 MeV, using a non-relativistic basis of operators together with so-called hybrid-type operators. The spectra are extracted from two-point functions using variational analysis. The results are compared with lattice calculations at higher pion masses on an anisotropic lattice, and a similar pattern emerges, including in particular the presence of hybrid states in which gluonic degrees of freedom play a manifest role, confirming the robustness of their observation. The systematic uncertainties in the calculation are explored, including in particular the effect of varying the distillation space on the spectra and a minimal number of distillation vectors is identified. The effect of varying the distillation space on the calculation is explored and to obtain a spectra with acceptable statistical error, application of a minimum number of distillation vector is proposed.

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