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50 ways to build a deuteron: a variational calculation of two-nucleon systems

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Multi-baryon systems are challenging to study with lattice QCD in particular because of small gaps between the ground state and excited states for large lattice volumes. Variational methods have long been known to be useful for disentangling closely spaced energy levels but require approximations to all-to-all quark propagators that are computationally prohibitive to compute exactly. In this talk, I will discuss a new method for computing multi-nucleon correlation-function matrices using sparsened all-to-all quark propagators and results for a variational calculation of the two-nucleon spectrum at $m_{\pi} \sim 800$ MeV using a large interpolating operator set including local hexaquark operators, nonlocal two-nucleon operators with plane-wave wavefunctions, and exponentially localized two-nucleon operators.

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