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A holographic bottom-up description of light nuclide spectroscopy and stability

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This work explores a holographic proposal to describe light nuclide spectroscopy by considering extensions to the well-known bottom-up AdS/QCD proposals, the hardwall and softwall models. We also propose an alternative description inspired by the Woods-Saxon potential. We find the static dilaton associated with this potential in this Wood-Saxon-like model. We compute the nuclide spectra finding that, despite their pure AdS/QCD origin, hardwall and softwall, as monoparametric models, have good accuracy and precision since the RMS error is near 11% and 4 % respectively. In the case of the Wood-Saxon model, the RMS was around 1%. We also discuss configurational entropy as a tool to categorize which model is suitable to describe nuclides in terms of stability. We found that configurational entropy resembles a stability line, independent from nuclear spin, for symmetric light nuclides when considering softwall and Wood-Saxon-like models. For the hardwall case, configurational entropy, despite increasing with the constituent number, depends on the nuclear spin. Thus, the Woods-Saxon-like model emerges as the best choice to describe light nuclide spectroscopy in the bottom-up scenario.

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