The naïve computational cost required to calculate the correlation functions of nuclei in lattice QCD grows factorially in the number of quarks, making large nuclei inaccessible to ab initio study. An extensive programme of work [1, 2, 3] has explored techniques to reduce this scaling dependence.

Equality graphs (e-graphs) have emerged in a number of fields such as automated theorem proving [4], program optimisation [5], and deep learning [6] as a tool that efficiently computes all possible ‘rewrites’ of a given expression and further extracts the ‘most optimal’ rewrite according to a given criterion.

Tensor e-graphs are an e-graph variant that optimise the numerical evaluation of a set of tensor expressions. Tensor e-graph optimisation is applied to the tensor expressions of a selection of lattice QCD interpolating operators for nuclei, and benchmarks of numerical performance are presented.