

Abstract Submitted  
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**NTCL: The Nuclear Tensor Contraction Library** JUSTIN LIETZ, GUSTAV JANSEN, XINGZE MAO, Oak Ridge National Lab — Tensor contractions are a ubiquitous mathematical operation in theoretical physics and are frequently the dominant computational cost in codes that implement these theories. Additionally, scientists use a diverse range of computational hardware to perform these calculations: from humble laptops to leadership class supercomputing facilities. Writing an application which can perform well on a variety of computational platforms is time consuming for scientists, and frequently impossible if a large amount of legacy code is being used. The Nuclear Tensor Contraction Library (NTCL) is a library that solves these challenges by providing a single tensor contraction interface which implements the actual tensor contraction via plugins, where plugins for many popular existing libraries like cuTensor (for Nvidia GPUs) and Tencile (for AMD GPUs) have been included. Here we present benchmarks for some tensor contractions typical in nuclear physics, using a variety of hardware, a variety of algorithms, and a variety of asynchronous data management schemes, all of which are accessed through a single NTCL interface.

Justin Lietz  
Oak Ridge National Lab

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