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The Standard Model of Nuclear Physics

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At its core, nuclear physics, which describes the properties and interactions of hadrons, such as protons and neutrons, and atomic nuclei, arises from the Standard Model of particle physics. However, the complexities of nuclei result in severe computational difficulties that have historically prevented the calculation of central quantities in nuclear physics directly from this underlying theory. The availability of petascale (and prospect of exascale) high performance computing is changing this situation by enabling us to extend the numerical techniques of lattice Quantum Chromodynamics (LQCD), applied successfully in particle physics, to the more intricate dynamics of nuclear physics. In this talk, I will discuss this revolution and the emerging understanding of hadrons and nuclei within the Standard Model.