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Abstract for an Invited Paper  
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**Nuclear structure and reactions from ab initio calculations<sup>1</sup>**

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An overarching goal of nuclear physics is to arrive at the comprehensive understanding in terms of the laws of quantum mechanics and the underlying theory of the strong force (quantum chromodynamics) of atomic nuclei and their interactions, and to use this understanding to accurately predict nuclear properties that are difficult to measure or simply inaccessible to experiment, but play a fundamental role in explaining the inner workings of the Universe or are critical to the national security. I will present first-principles calculations of nuclear structural and reaction properties to reveal the imprints of the strong nuclear force in rare isotopes with large proton-neutron asymmetry located at the edges of nuclear stability (the drip-lines) and to predict thermonuclear reaction rates of interest for stellar nucleosynthesis and fusion energy technology.

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