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Forging a Path for Understanding Nuclear Structure from Strong QCD

The focus of our program –and hence this contribution –is to recast lessons learned over the last half of the 20th Century regarding the structure of atomic nuclei (primarily a particle-based picture) into a forward leaning 21st Century (field-theory-based framework) in anticipation that this will encourage the establishment of a natural bridge between the low-energy and medium-to-high energy nuclear physics communities. This has been and continues to be enabled by two major developments, the first technical (high-end computational facilities of the 90s) and the other analytical (underpinned by the so-called no-core ab initio –from first principles –shell-model theories). Early successes of the latter rest upon a realization that special symmetries and the associated algebraic methods that this enables are far better than previously anticipated. Consequently, this presentation includes a shallow dive into some key group theoretical concepts, and also shows some published results that exposes "simplicity within complexity" in atomic nuclei that has, until now, been under appreciated!

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Track Classification: Theory for strong QCD