



ID de Contribution: 122

Type: Non spécifié

Advances and challenges for ab initio calculations of medium-mass to heavy nuclei

mercredi 6 novembre 2024 08:45 (20 minutes)

The ab initio description of nuclei has seen major advances combining innovative many-body developments with nuclear forces and currents based on chiral effective field theory. This has led to ab initio calculations up to heavy nuclei, and highlighted the importance of uncertainty quantification as well as the development of accurate interactions for medium-mass to heavy nuclei. This talk will discuss novel chiral low-resolution interactions that accurately describe bulk properties from oxygen to lead, including uncertainty estimates from the effective field theory truncation. Moreover, we will discuss the role of two-body currents for electroweak properties of nuclei and present applications of ab initio calculations to tests of the standard model and beyond.

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