Ab initio nuclear theory -- recent progress and future prospects"

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The vision of solving the nuclear many-body problem with fundamental interactions tied to QCD appears to approach reality. The goals are to preserve the predictive power of the underlying theory, to test fundamental symmetries with the nucleus as laboratory and to develop new understandings of the full range of complex nuclear phenomena.Recent progress includes the derivation, within chiral perturbation theory (ChPT), of the leading terms of the nucleon-nucleon (NN), three-nucleon (3N) and four-nucleon (4N) potentials.Additional substantial progress includes solving nuclear structure and reactions in nuclei up to mass 16 and selected heavier nuclei around closed shells using these ChPT interactions.Advances in theoretical frameworks (renormalization and many-body methods) as well as in computational resources (new algorithms and leadership-class parallel computers) signal a new generation of theory simulations that will yield valuable insights into origins of nuclear shell structure, collective phenomena and complex reaction dynamics.I will outline recent achievements and present ambitious consensus plans for a coming decade of research that will strengthen the links between nuclear theory and nuclear experiment, between nuclear physics and astrophysics, and between nuclear physics and nuclear energy applications.