

- Nucleosynthesis mechanisms require knowing the structure, reactions and decays, and reaction products for every nucleus in the nuclear chart
- Currently, each piece of nuclear data is described by a different theoretical model
  - Lack of consistency of the model most likely results in overfitting
  - Uncertainties from nuclear data cannot be properly calculated

**We need a consistent theory of nuclear structure, reactions and decay that can scale over the entire nuclear chart**

- Nuclear density functional theory is our best candidate for such a framework
  - Masses and Q-values: HFB theory (and/or refinements of it)
  - $\gamma$ -strength functions and  $\beta$ -decay rates: QRPA
  - Fission yields: time-dependent methods (TDDFT, TDGCM)
  - Level densities: combinatorial methods
- Progress requires
  - Work to incorporate theory of neutron capture / emission into DFT
  - Better computational tools for large-scale DFT calculations: hardware, software and expertise
  - Investments in the next generation of nuclear theorists