Ignition has been a long sought-after goal needed to make fusion energy a viable alternative energy source, but ignition has yet to be achieved. For an inertially confined fusion (ICF) plasma to ignite, the plasma must be very well confined and very hot, to generate extremely high pressures needed for self-heating – achieving this state is not easy!

In this talk, we will discuss the technology, science, and progress towards ignition on the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory (LLNL) in Northern California. We will cover the some of the setbacks encountered during the progress of the research at NIF, but also cover the great advances that have been made.

In particular, we will cover the recent work using the new “high-foot” pulse-shape implosion that presently holds the record for fusion performance. High-foot implosions are the first facility based fusion experiments to generate more energy from fusion than was invested in the fusion fuel. Yield amplifications from alpha-particle self-heating of 2.25x have also been demonstrated.