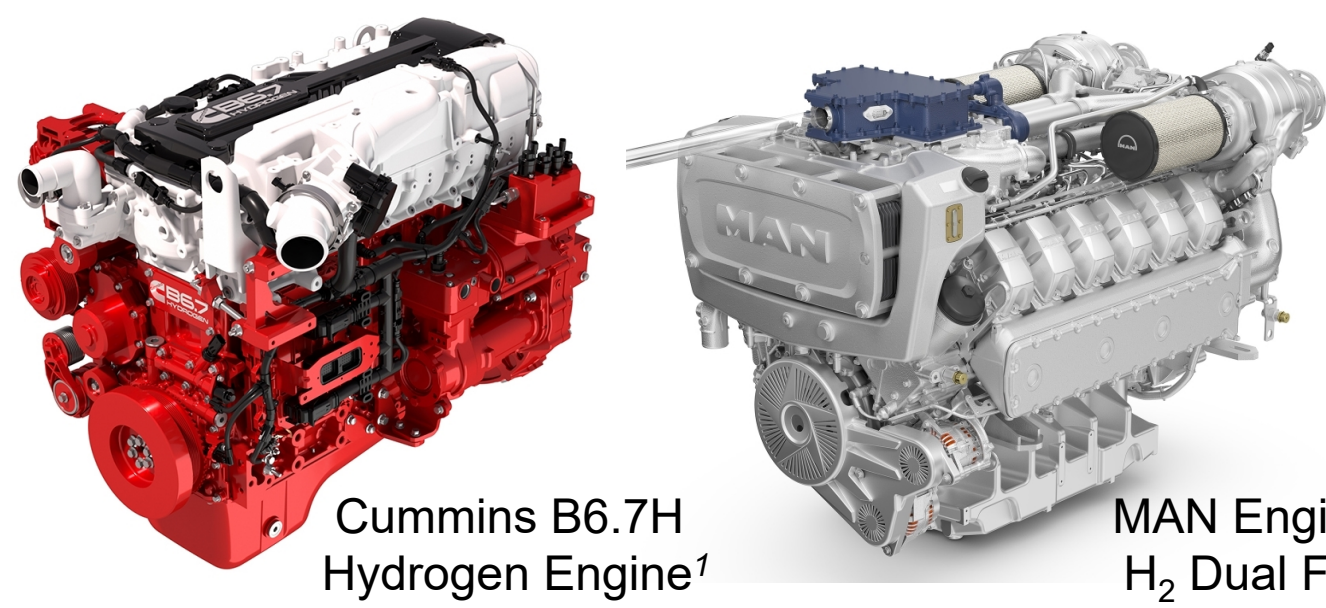
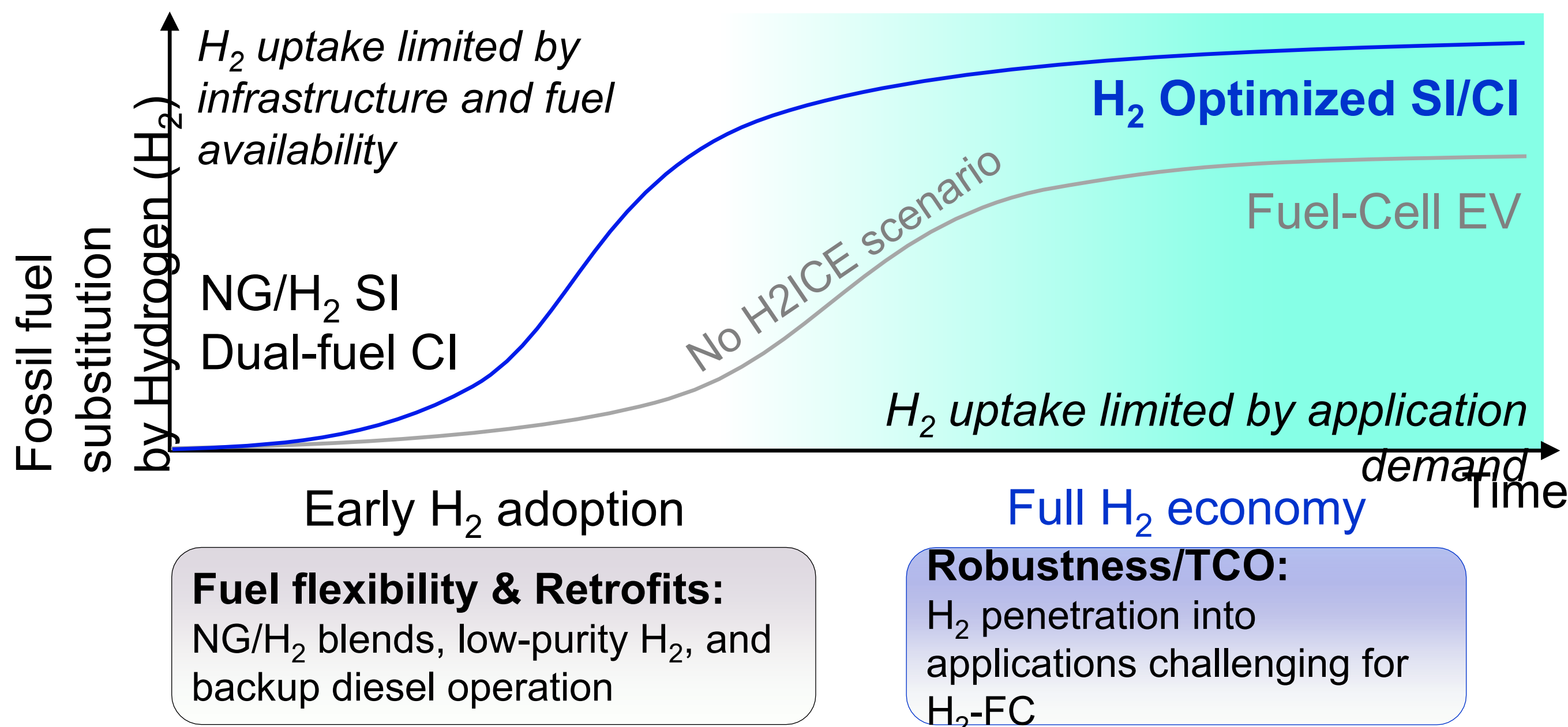


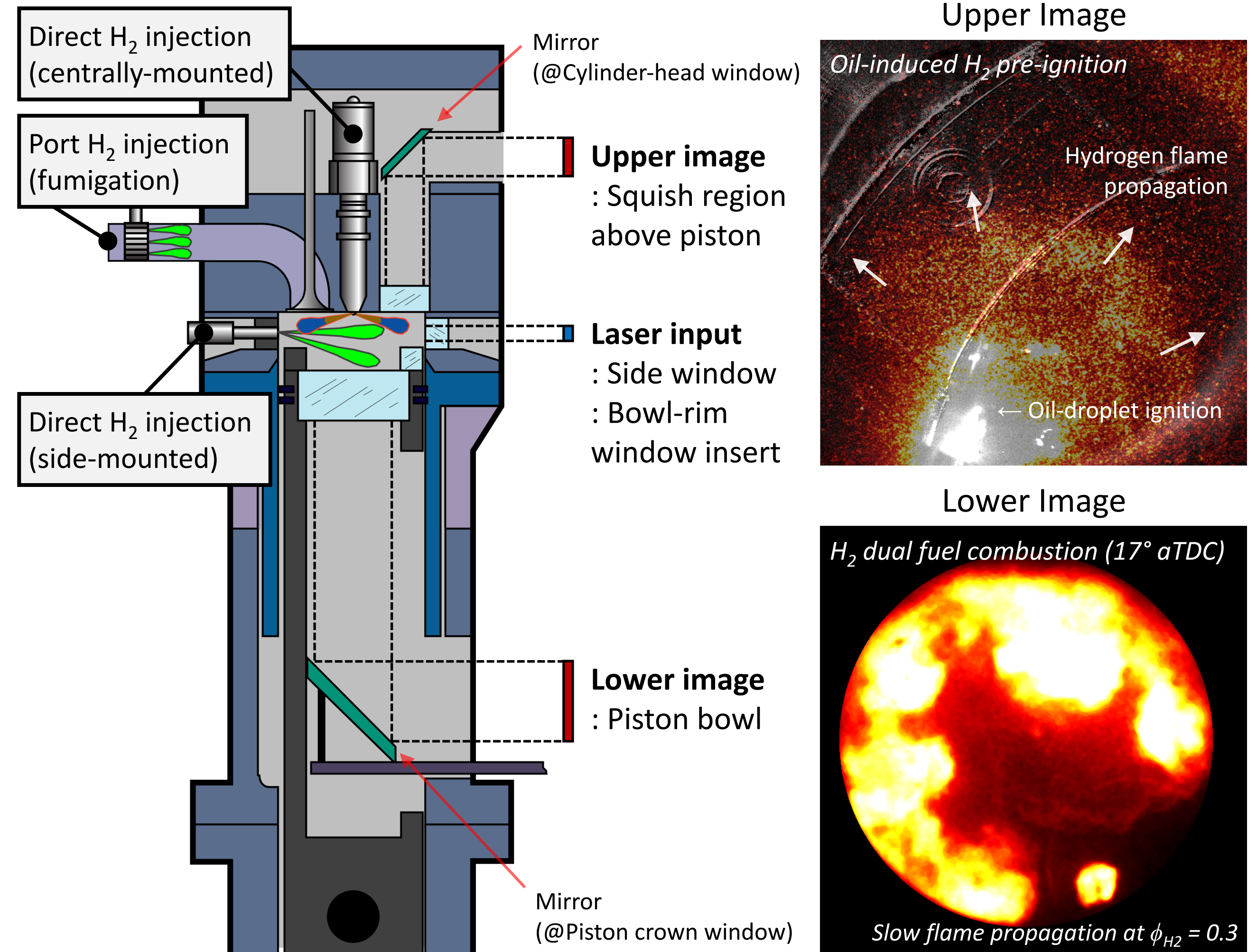
H2ICE: Driving towards 2050 Net Zero



"H2ICEs provide for a smooth, continuous transition as H₂ supply and infrastructure develops and the existing fleet turns over"

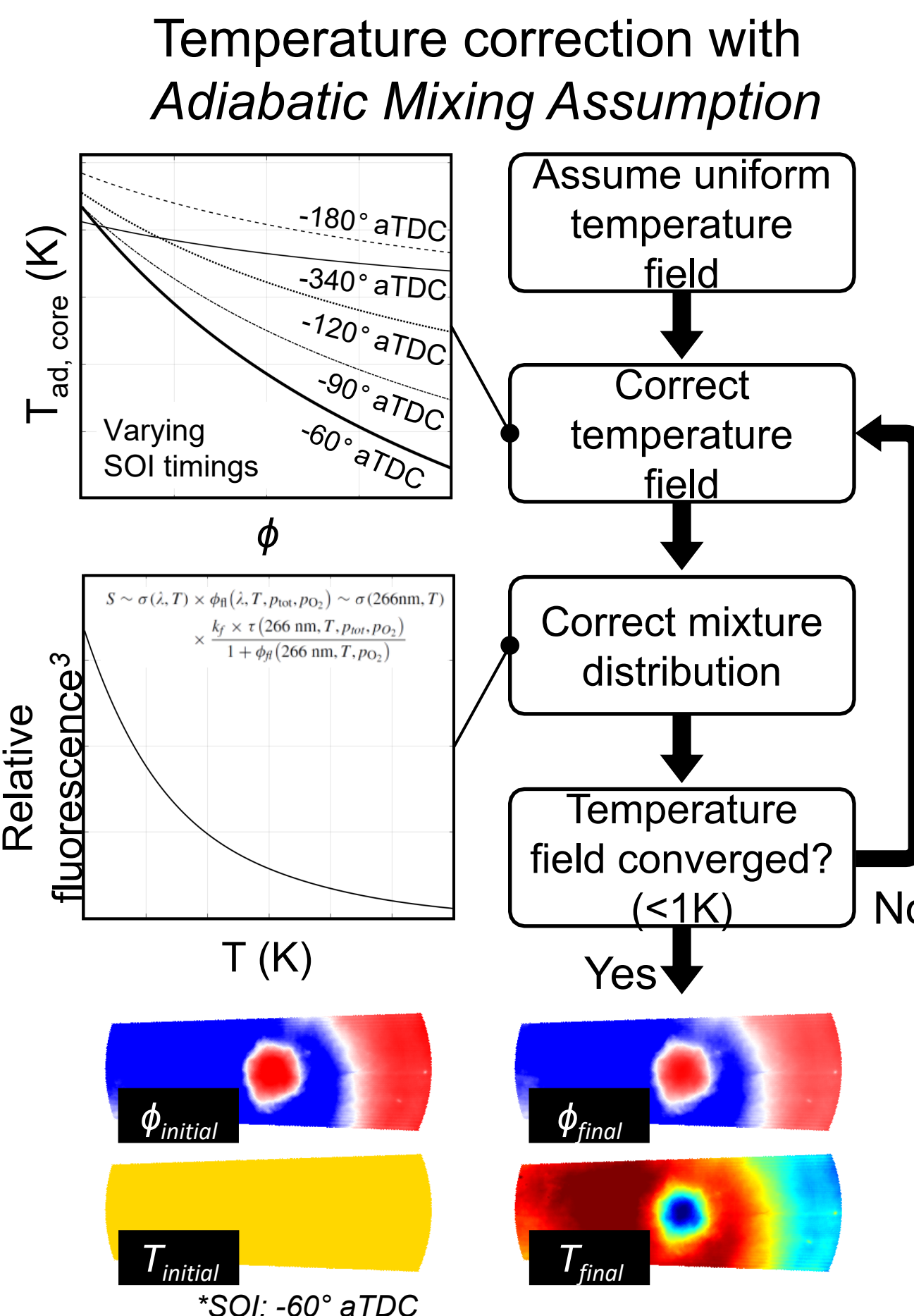
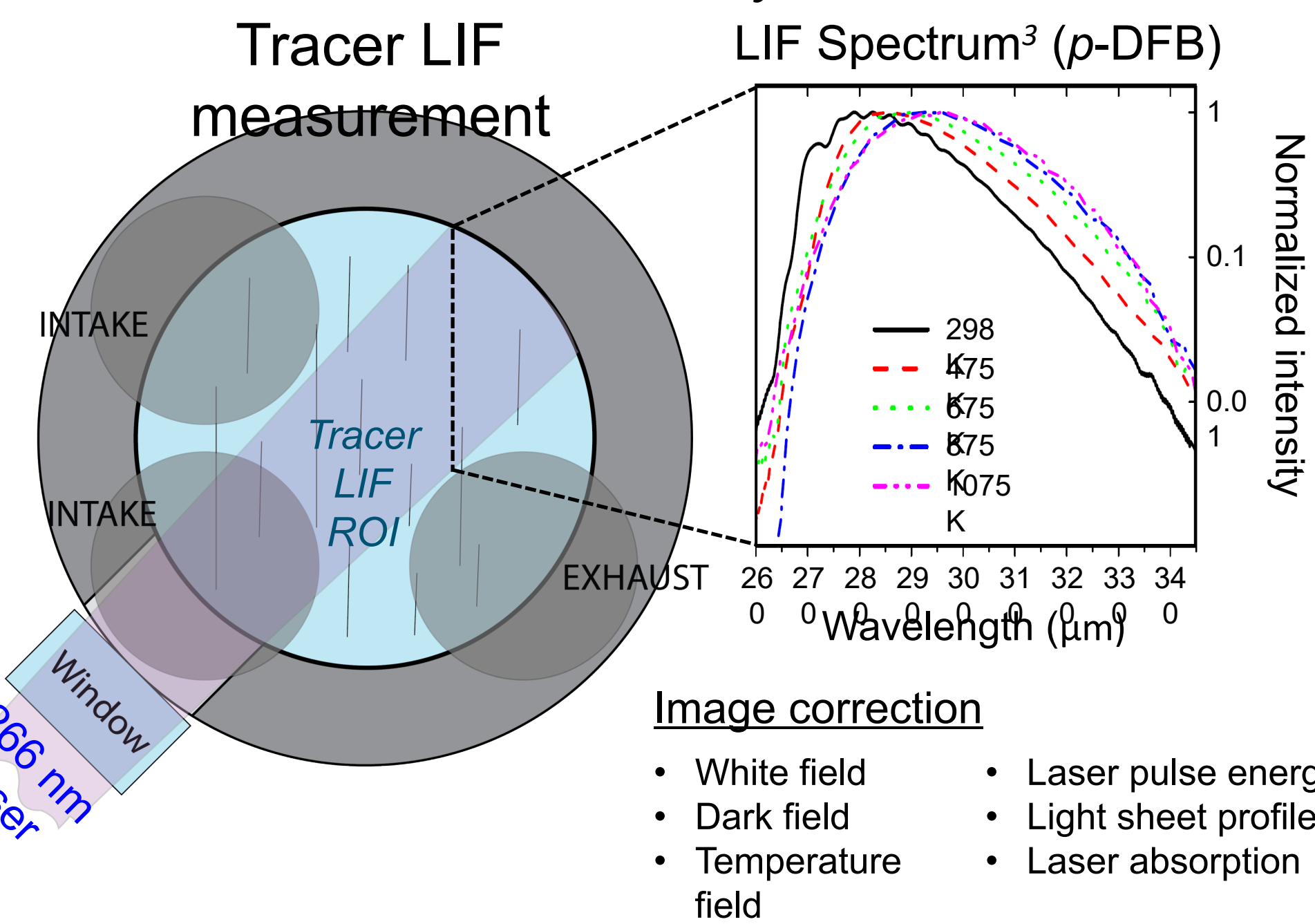


Sandia Heavy-Duty Optical Engine

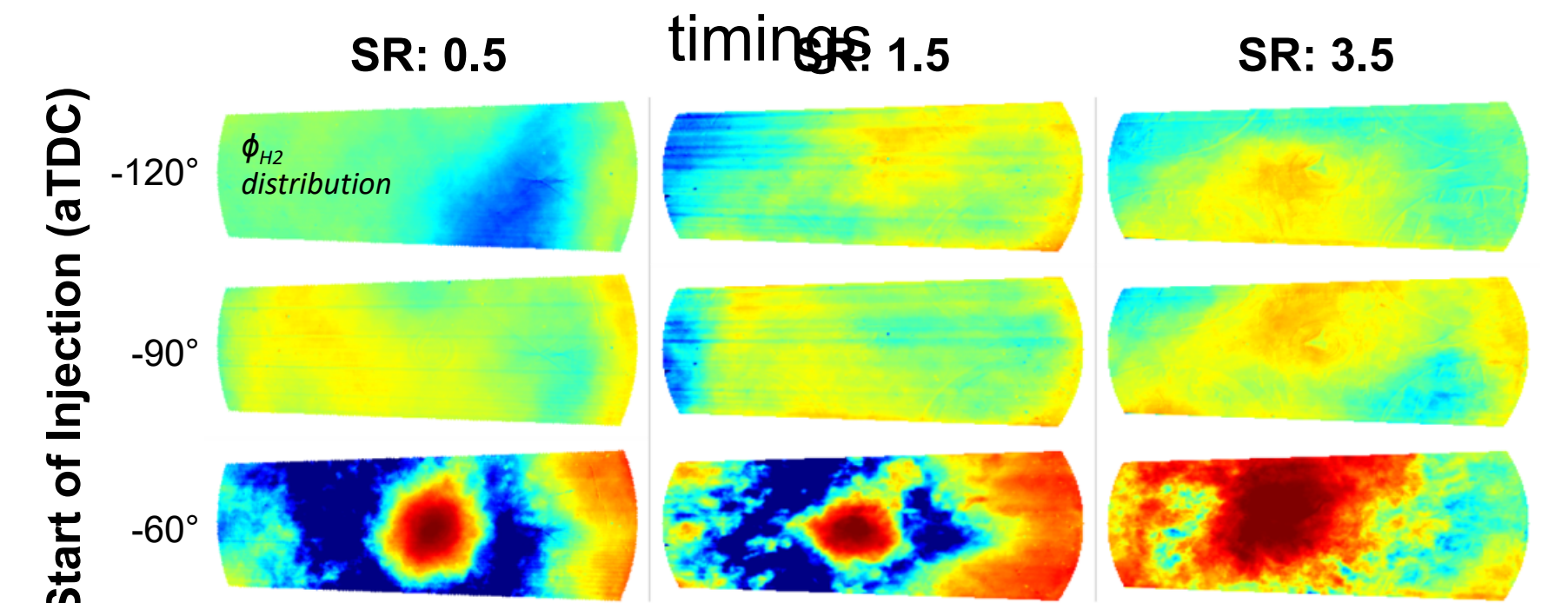


Hydrogen Mixing Dynamics

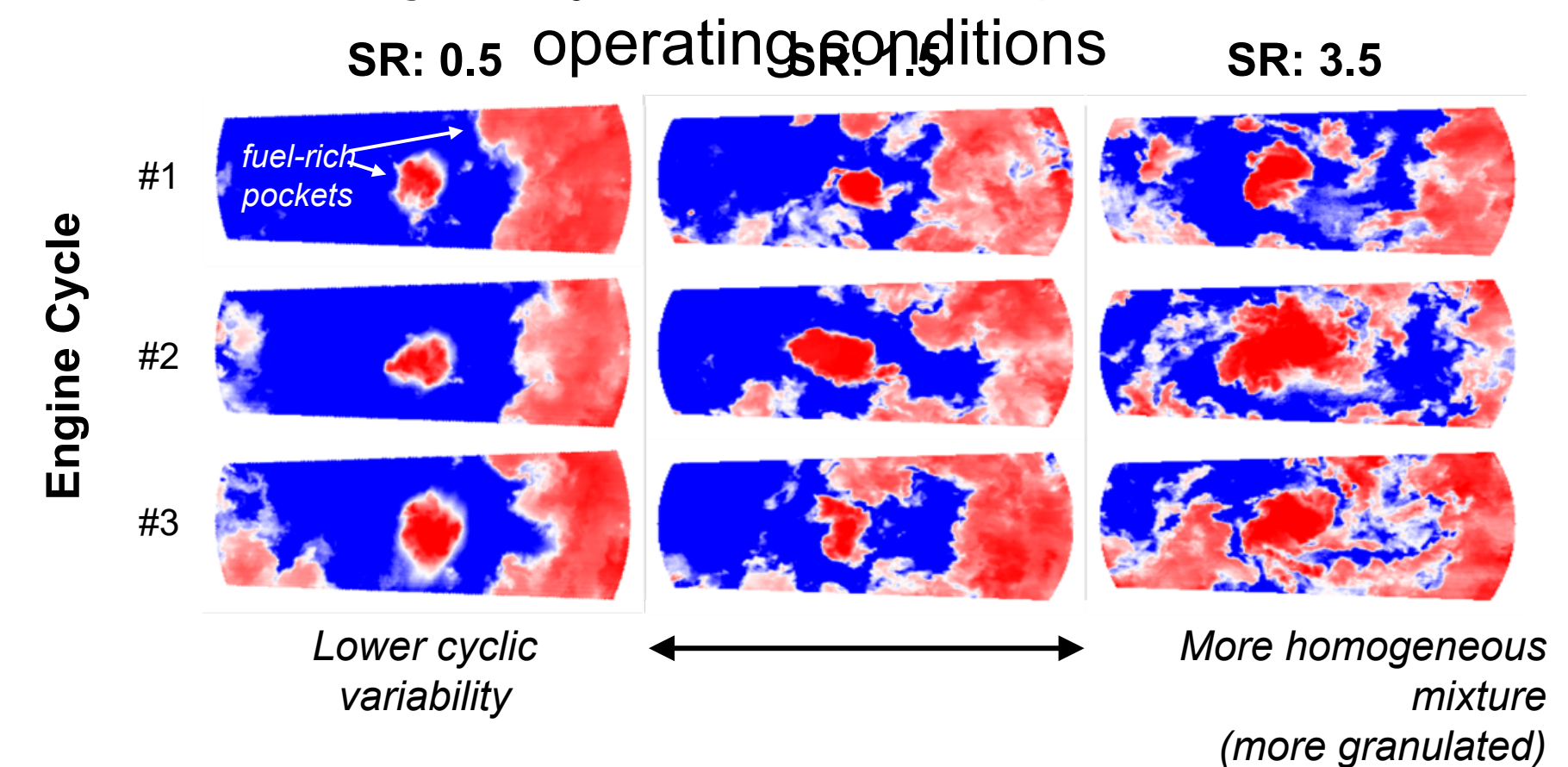
"Homogeneous mixture formation is essential for the robust operation of H₂-DI engine, significantly affecting cyclic variability, emission characteristics, and efficiency"



Engine swirl ratio (SR) significantly impacts H₂ mixing, particularly apparent at later injection

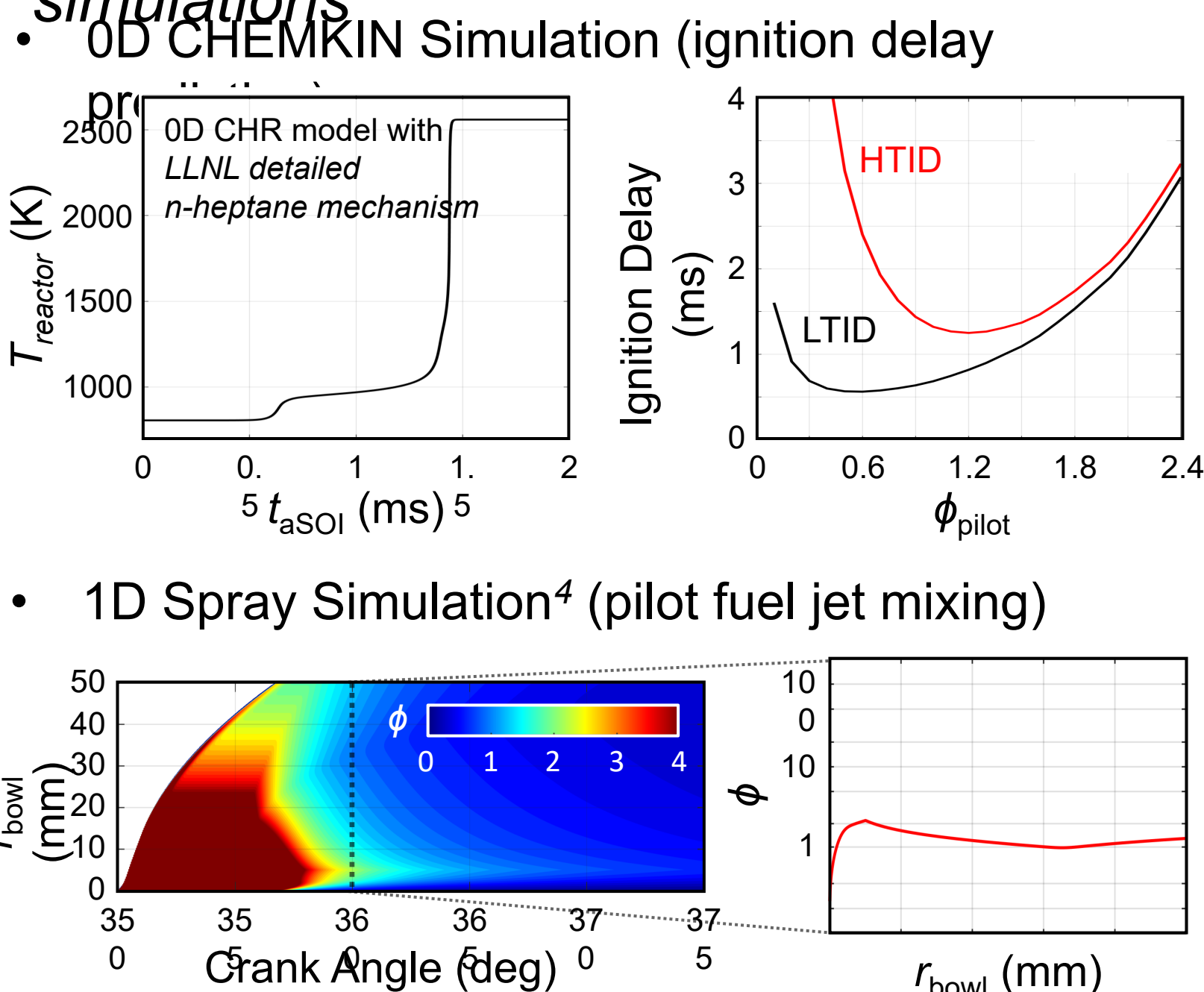


Trade-off between *Cyclic Variability* & *Mixture Homogeneity* necessitates optimization of

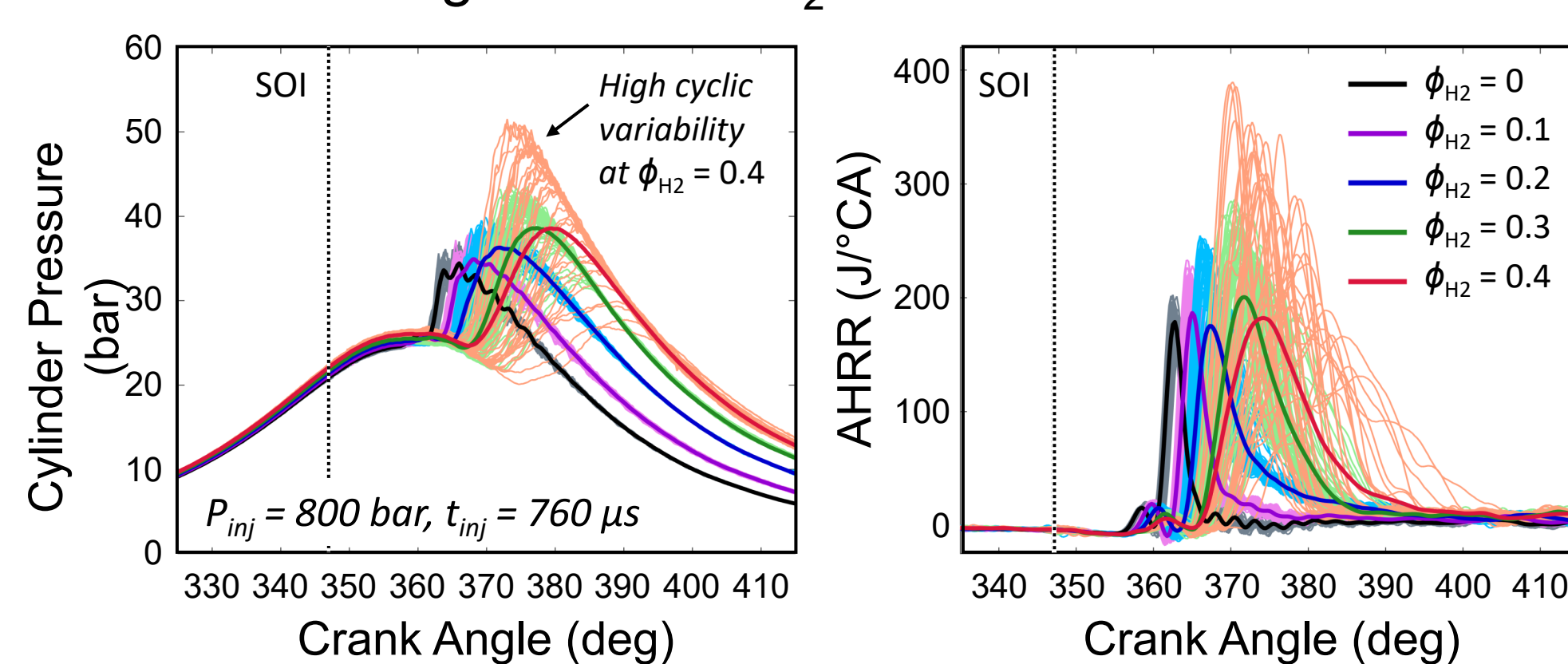


Hydrogen Dual Fuel Combustion

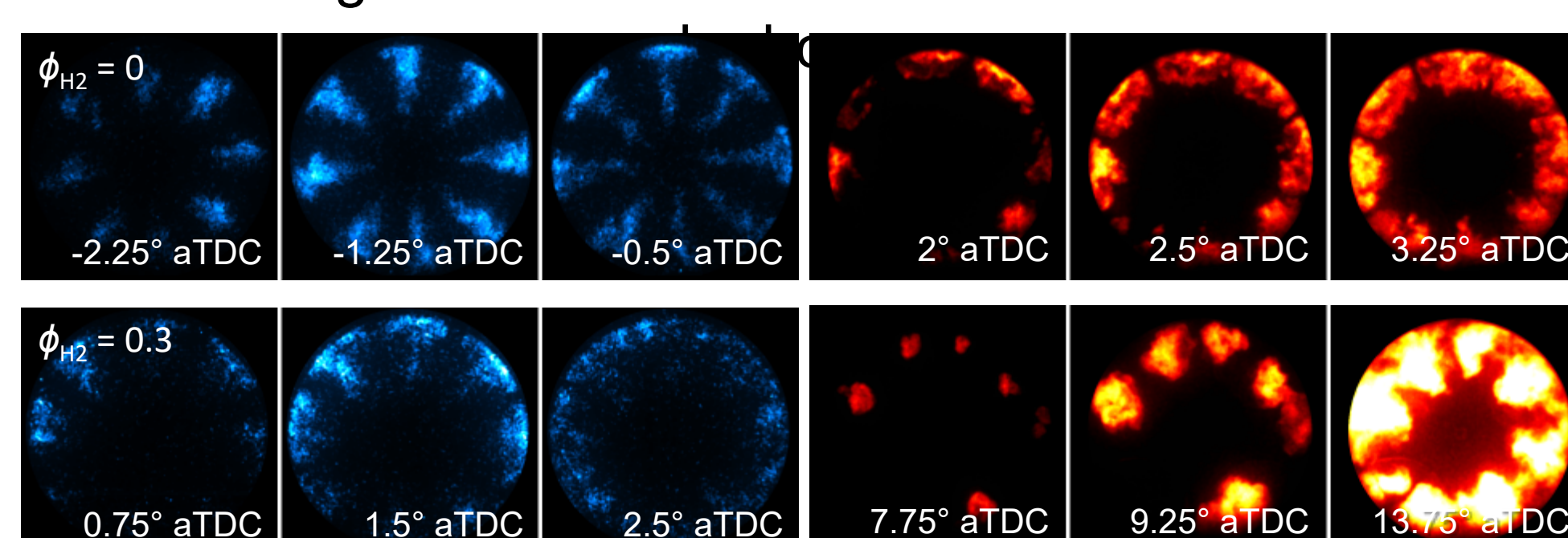
"Understanding the interplay between the physical and chemical processes governing pilot fuel jet ignition in a H₂ mixture, complemented with zero-dimensional chemical kinetics and one-dimensional spray dynamics simulations"



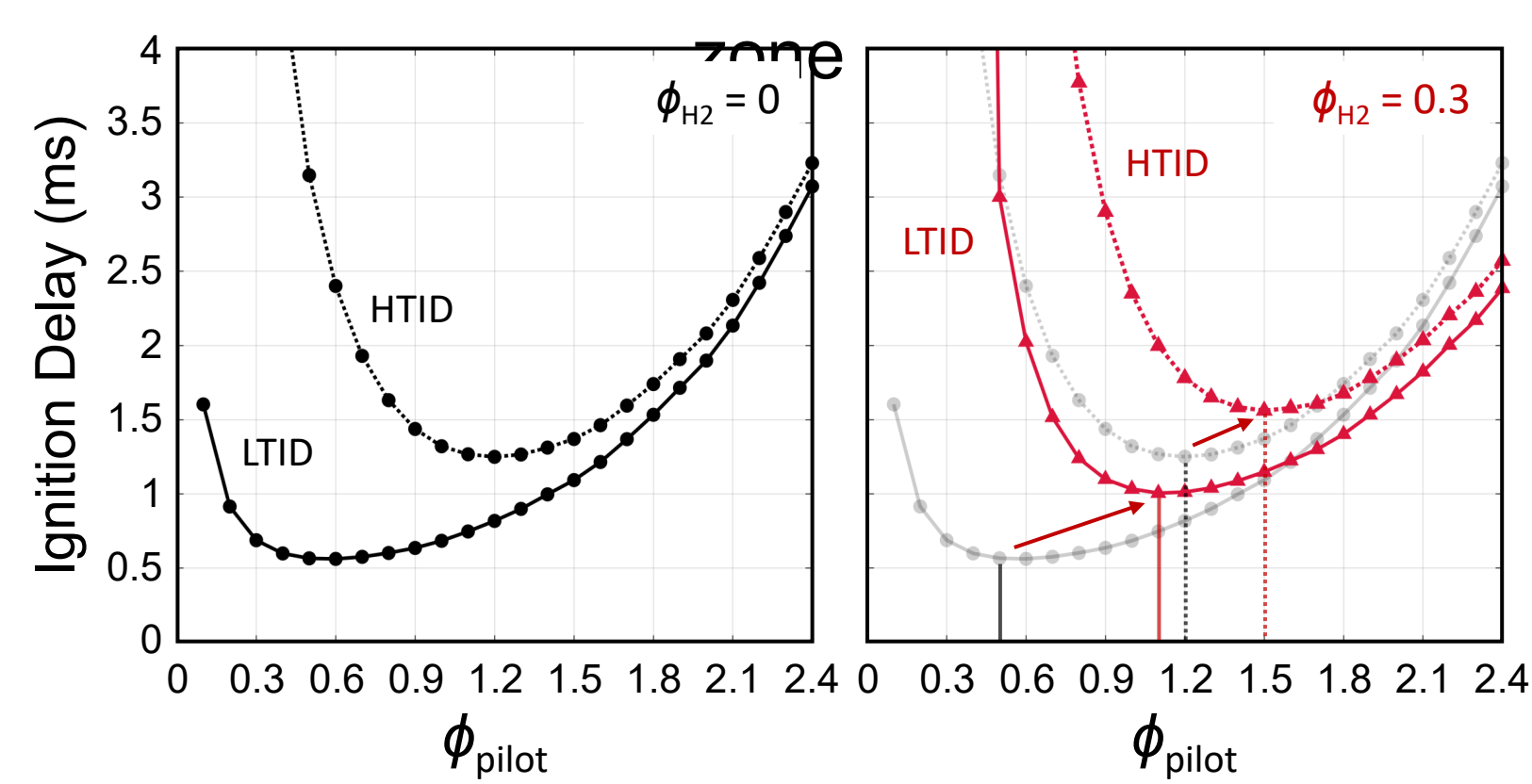
Prolonged ignition delay and higher cyclic variability become significant as H₂ concentration increases



Delayed onset of low- and high-temperature combustion and longer dwell time due to the inhibitive effect of



H₂ addition results in a pronounced shift of the most-reactive mixture fraction towards richer



H₂ prolongs mixing time, increasing misfire probability and limiting reactions to near fuel-rich

