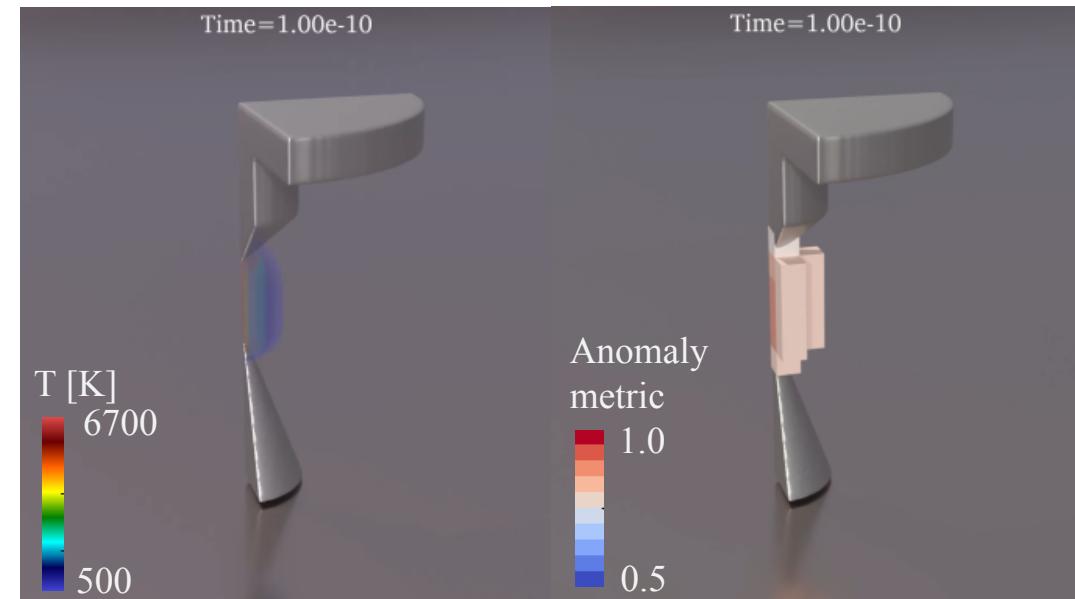


Crosscut ECP Integration (Pele, ExaLearn, ALPINE)

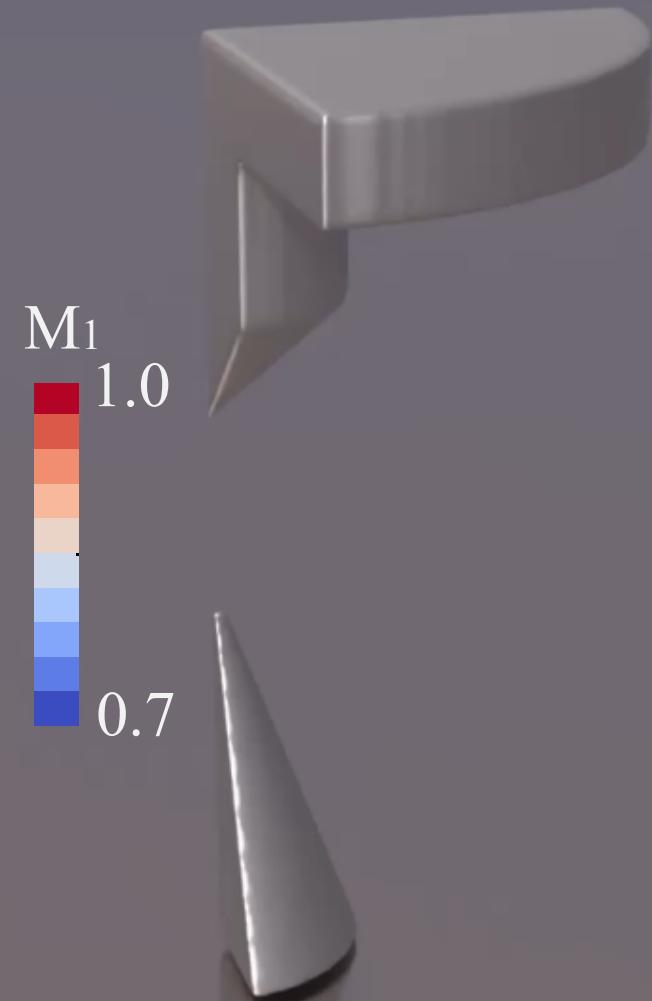
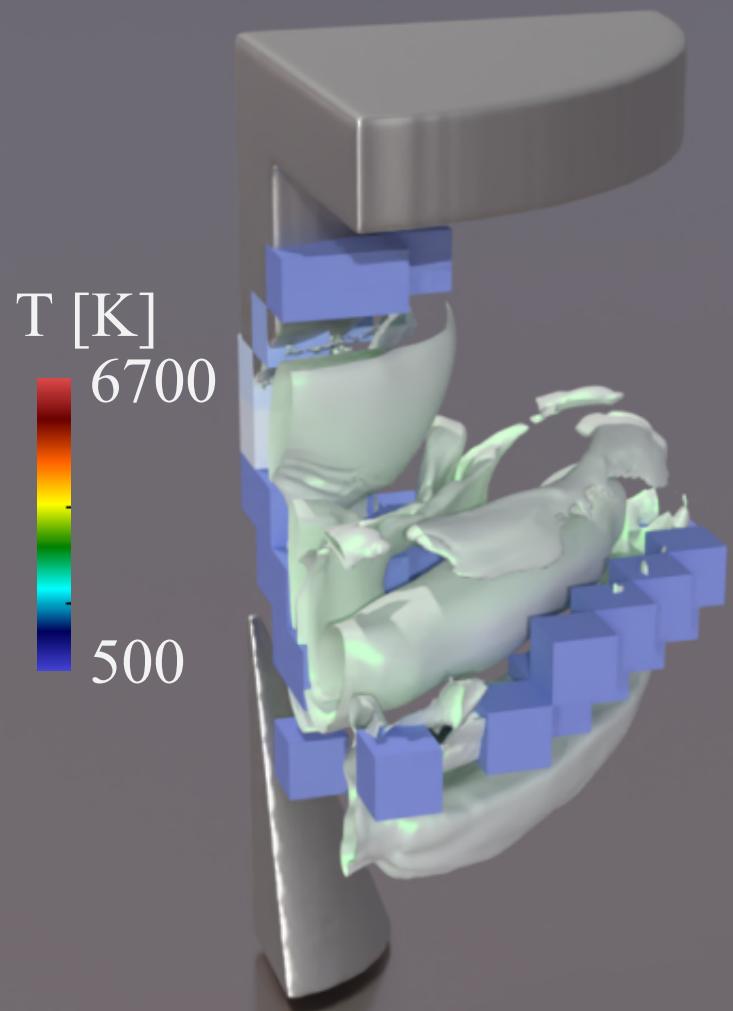
- Part of a sustained integration effort through 2023 to explore *spark-ignition and extinction*
 - **KPP-2** stretch goal for **Pele** team: leverage advances in AI/ML to reframe the role of high-fidelity simulations in enabling progress in combustion research and engineering design
 - **KPP-3** goal for **ALPINE** team:
 - Functionality = in situ anomaly detection as a trigger for further analysis
 - Applications = PeleC/LM + Higher-order moment tensor analyses
 - Platform = Summit
- Demonstration: GPU-scalable in-situ detection of spark-ignition regions using co-kurtosis tensor-based anomaly detection.
- Next steps:
 - Continued maturation of Pele, ALPINE, and ExaLearn capabilities towards FY23 Science + KPP targets
 - GPU-enabled PeleC/LM coupling with the Ascent library for on-the-fly demonstration on Summit



Simulation of spark-ignition of methane in air. Volume render of temperature field (left) with AMR boxes flagged by the anomaly detection algorithm (right)

Contributors: Jorge Salinas, Bruno Souza Soriano, Martin Rieth, Jackie Chen (Pele), Hemanth Kolla (ExaLearn), Marco Arienti, Janine Bennett (ALPINE)

Time=2.93e-04



Simulation of spark-ignition of methane in air. Volume render of temperature field, together with iso-surface of Q-criterion to visualize turbulent structures (in light green). Also shown are AMR boxes flagged by the anomaly detection algorithm