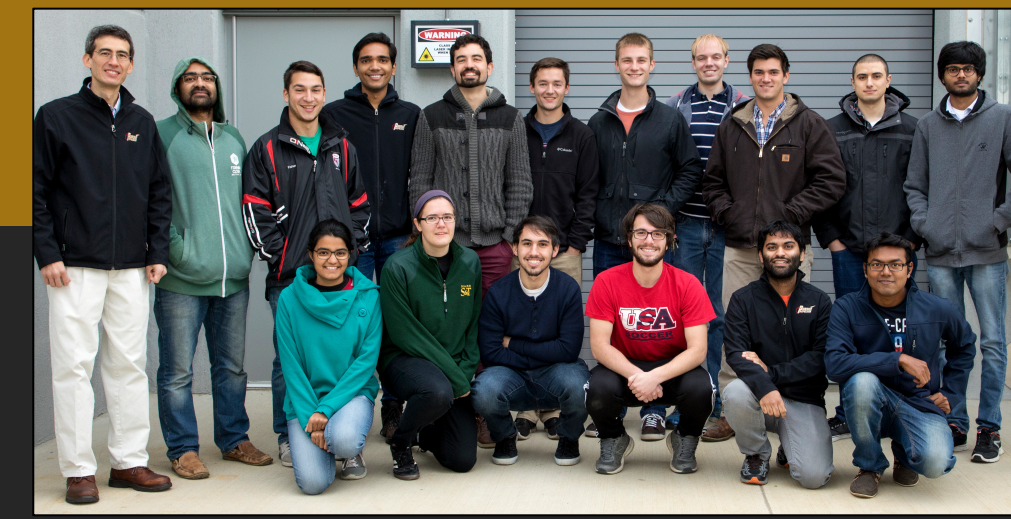


Towards a Detailed Understanding of Extreme Thermal-Fluid Behavior in Propulsion, Power, Energetic, and Hypersonic Systems

PURDUE
UNIVERSITY

Prof. Terrence Meyer
School of Mechanical Engineering



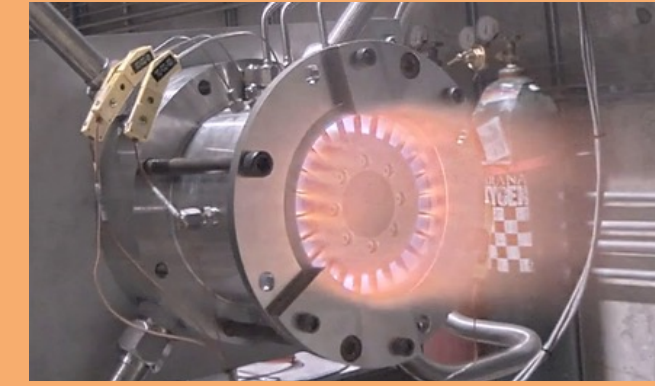
Motivation

Advanced laser spectroscopy, optical imaging, and X-ray diagnostics provide detailed insight into the physics and thermal-fluid mechanisms that enable clean and efficient operation of various propulsion, power, and energetic systems. Technical areas include:

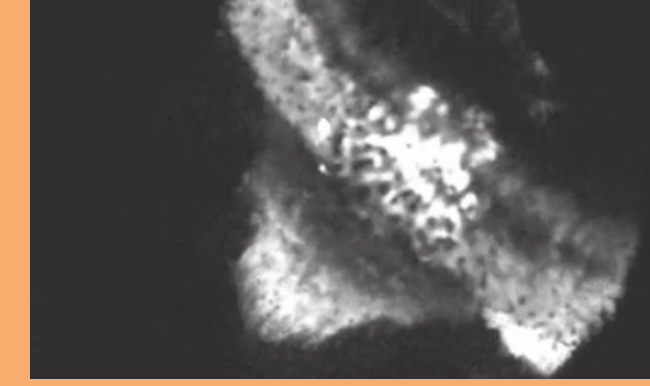
- Combustion, detonations, pollutant emissions
- Turbulence, supersonic flows, and hypersonics
- Multiphase flows, solid-liquid-gas systems
- Energetics and propellants

Applications

Detonation Engines



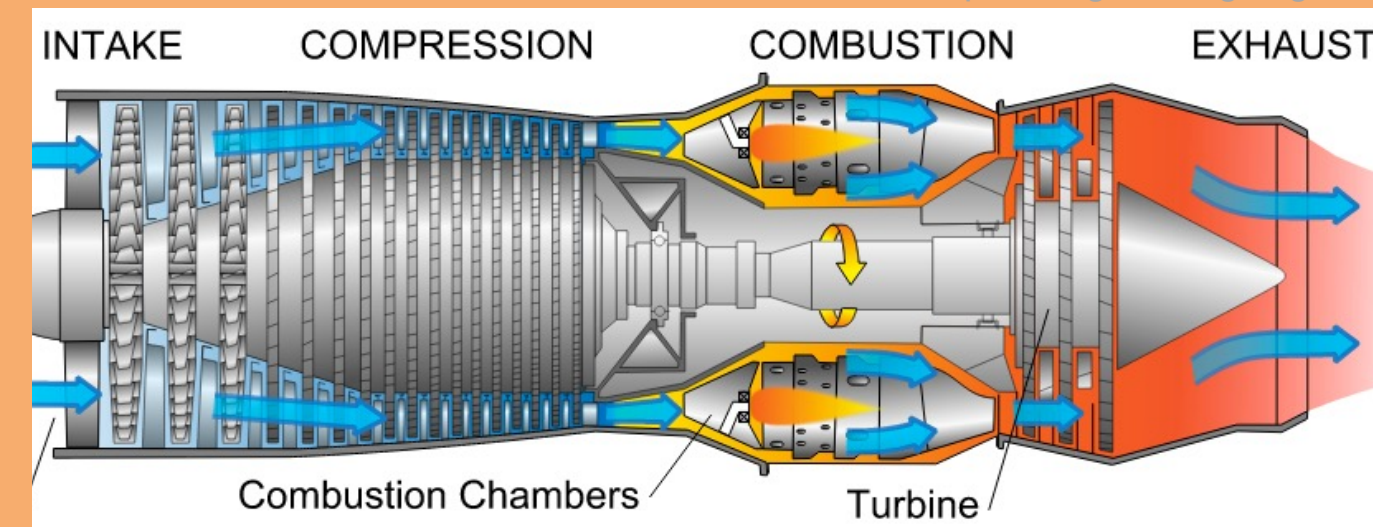
Energetics



Rockets

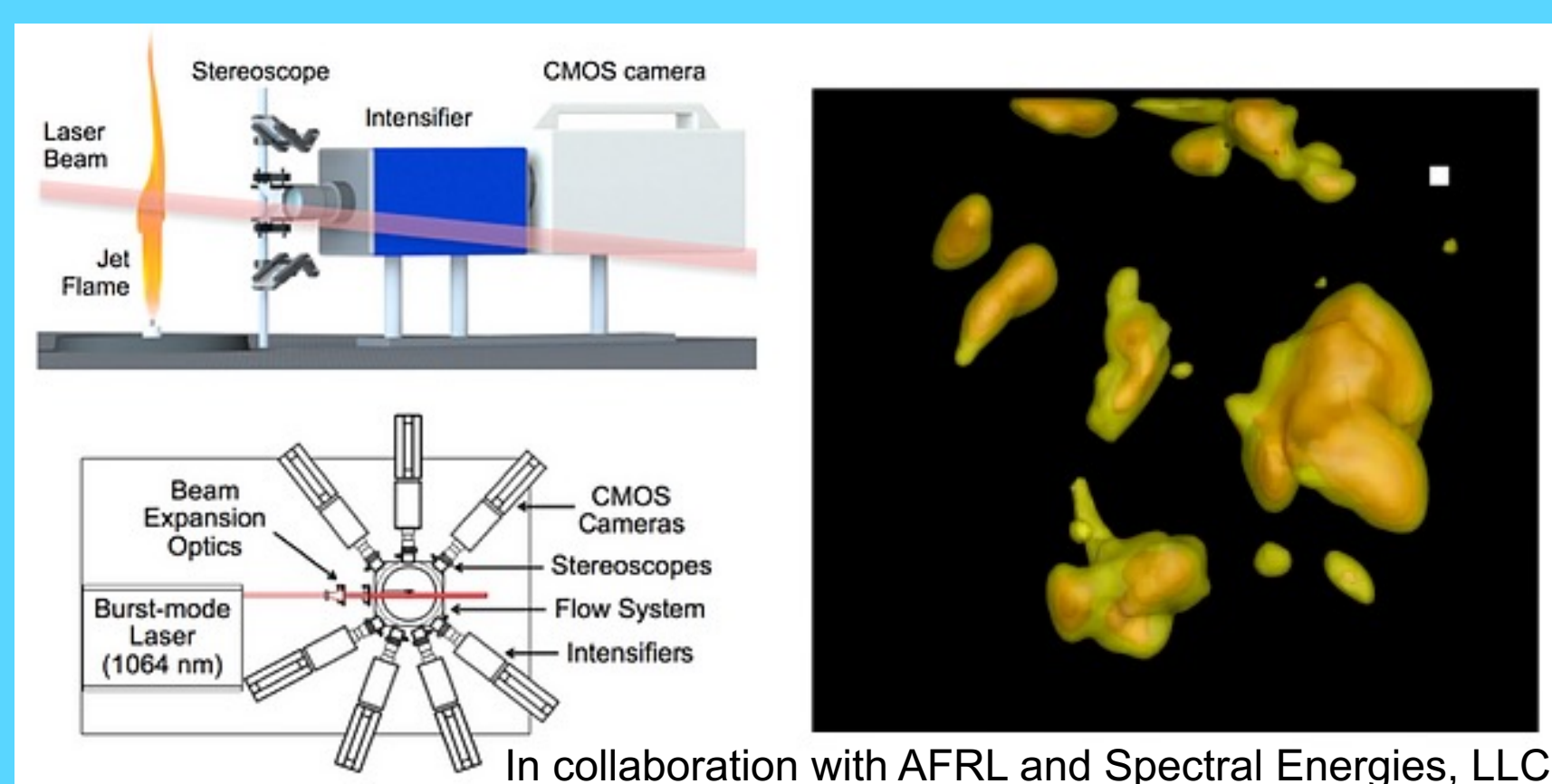


Gas-Turbines

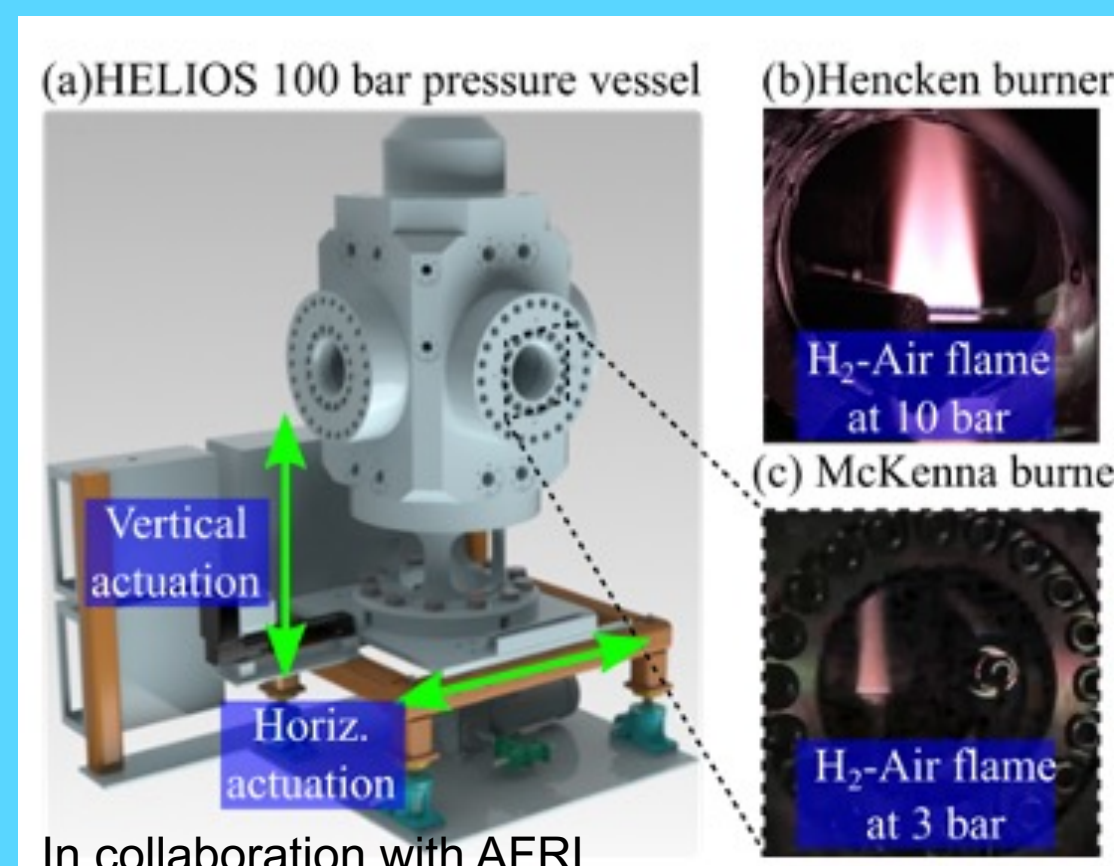


Imaging and Spectroscopy in Turbulent, Energetic, and High-Pressure Flames

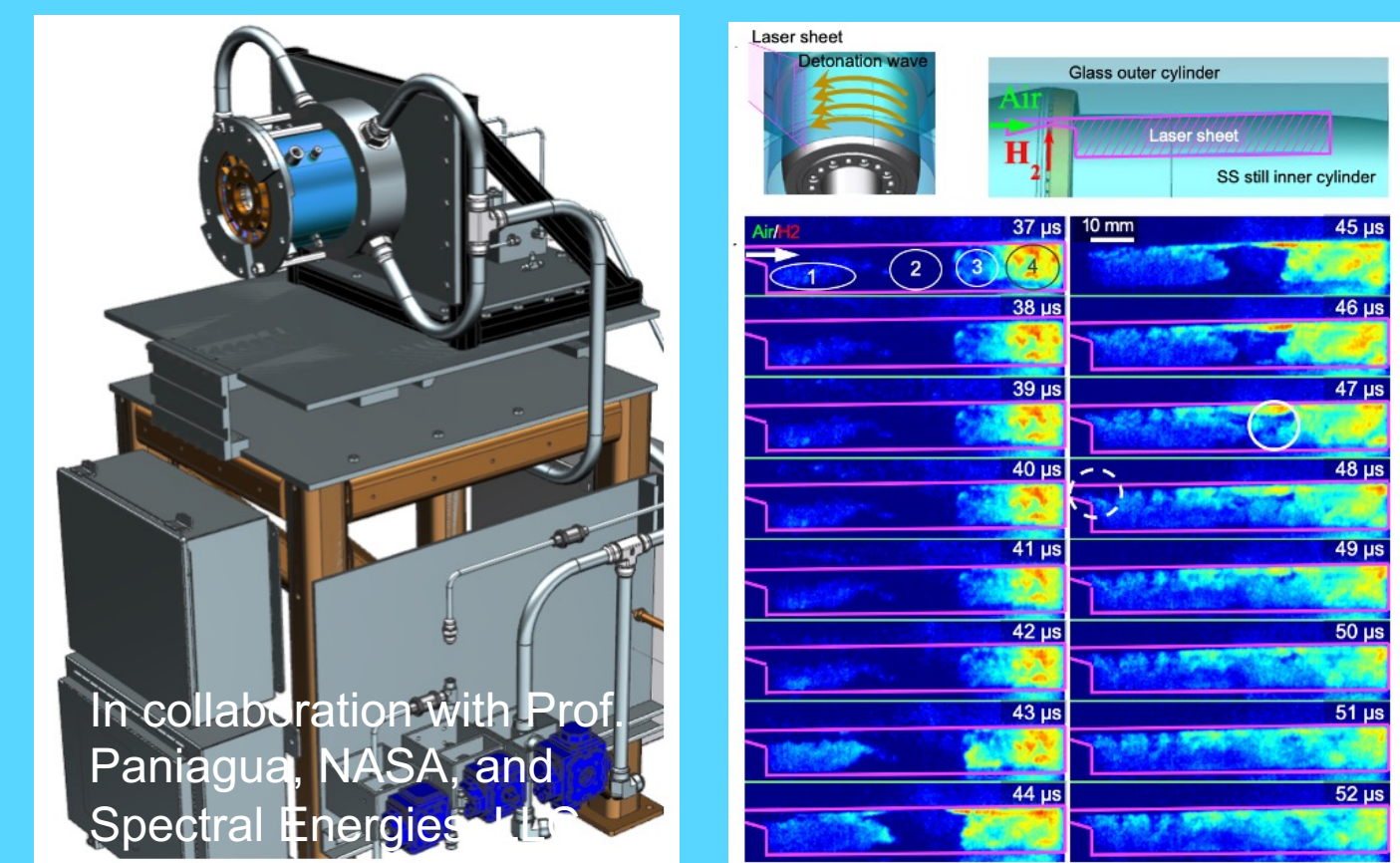
3D Imaging in Turbulent Flames



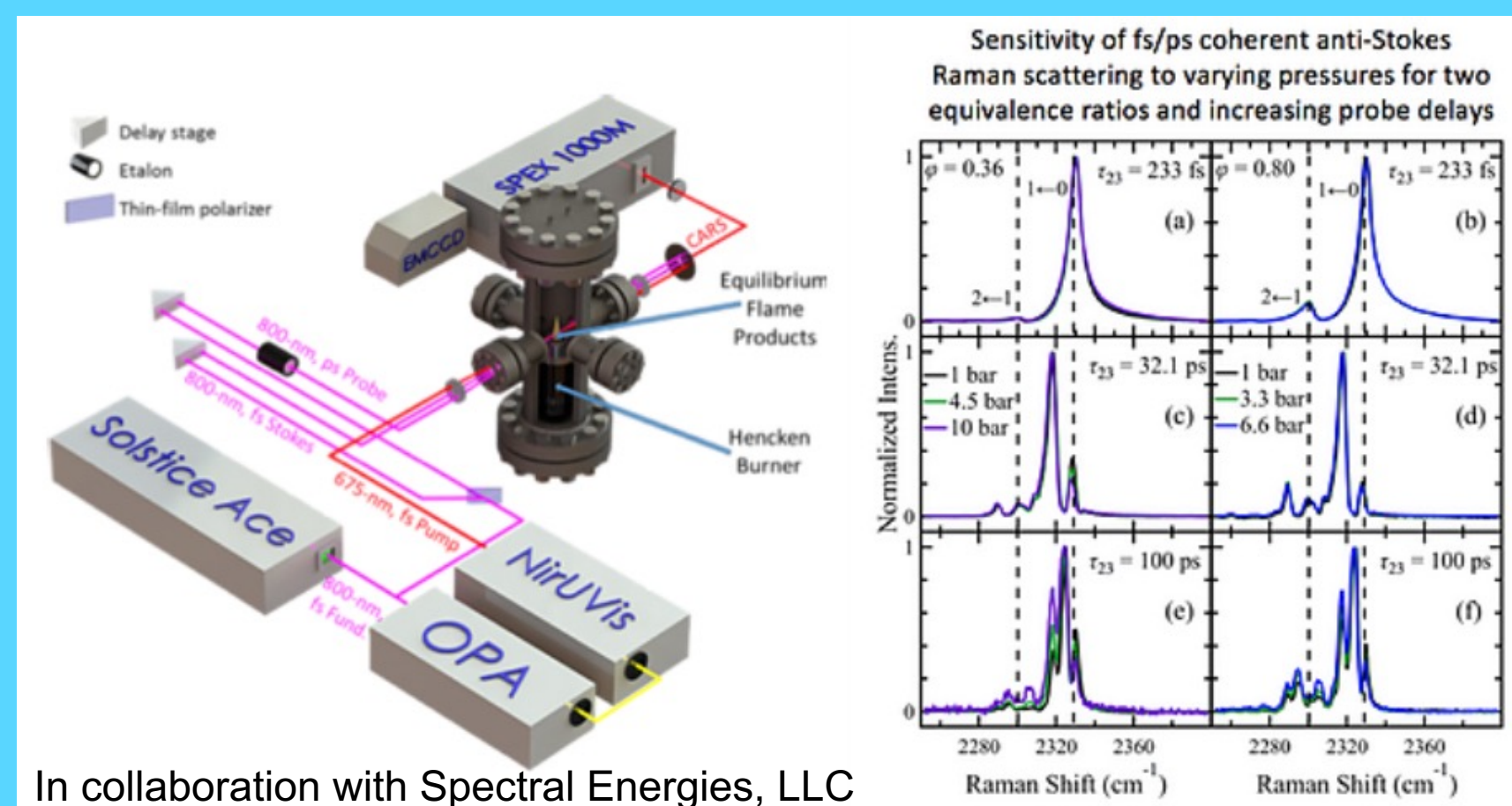
HELIOS Test Rig (100 bar)



THOR Optical RDE Test Rig



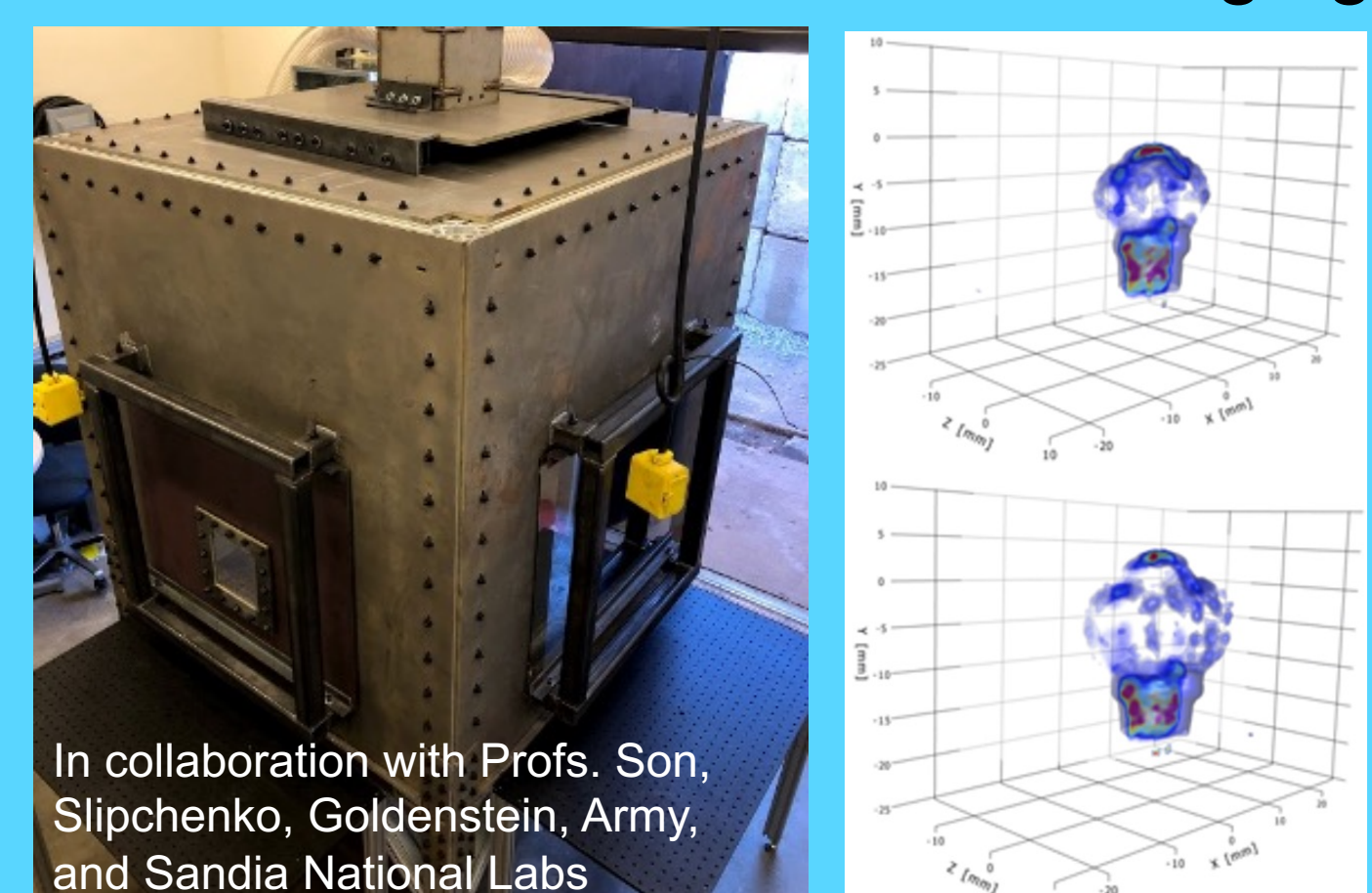
Laser Spectroscopy in High-Pressure Flames



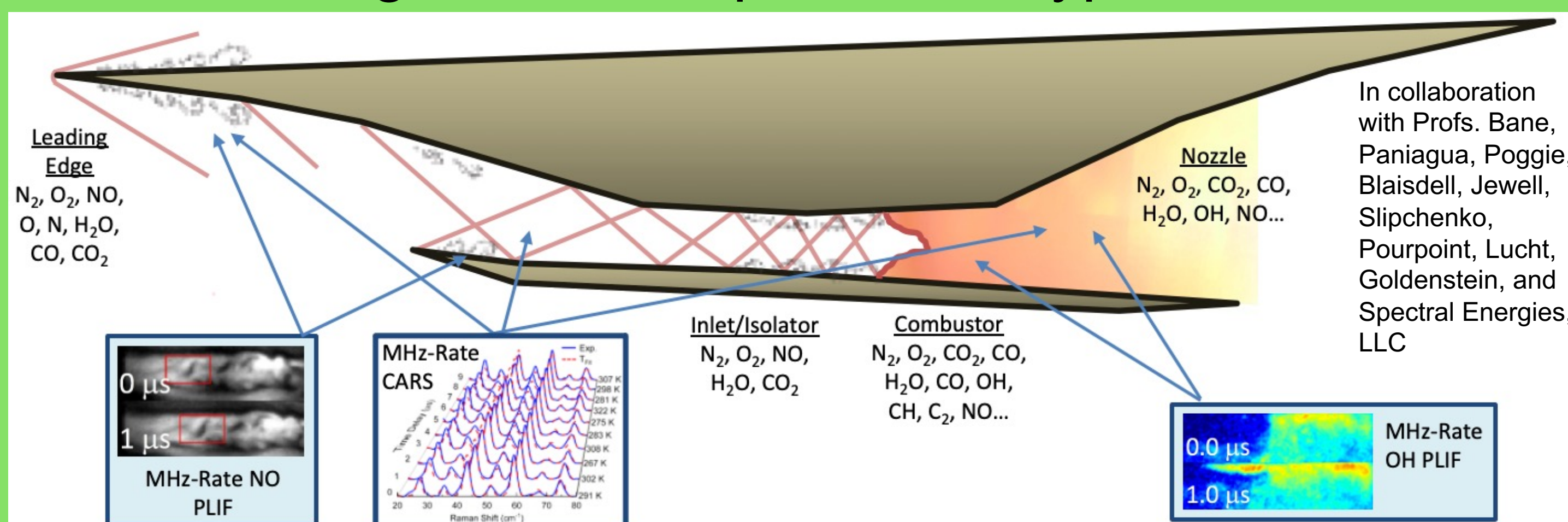
HEAT Test Rig (24 bar)



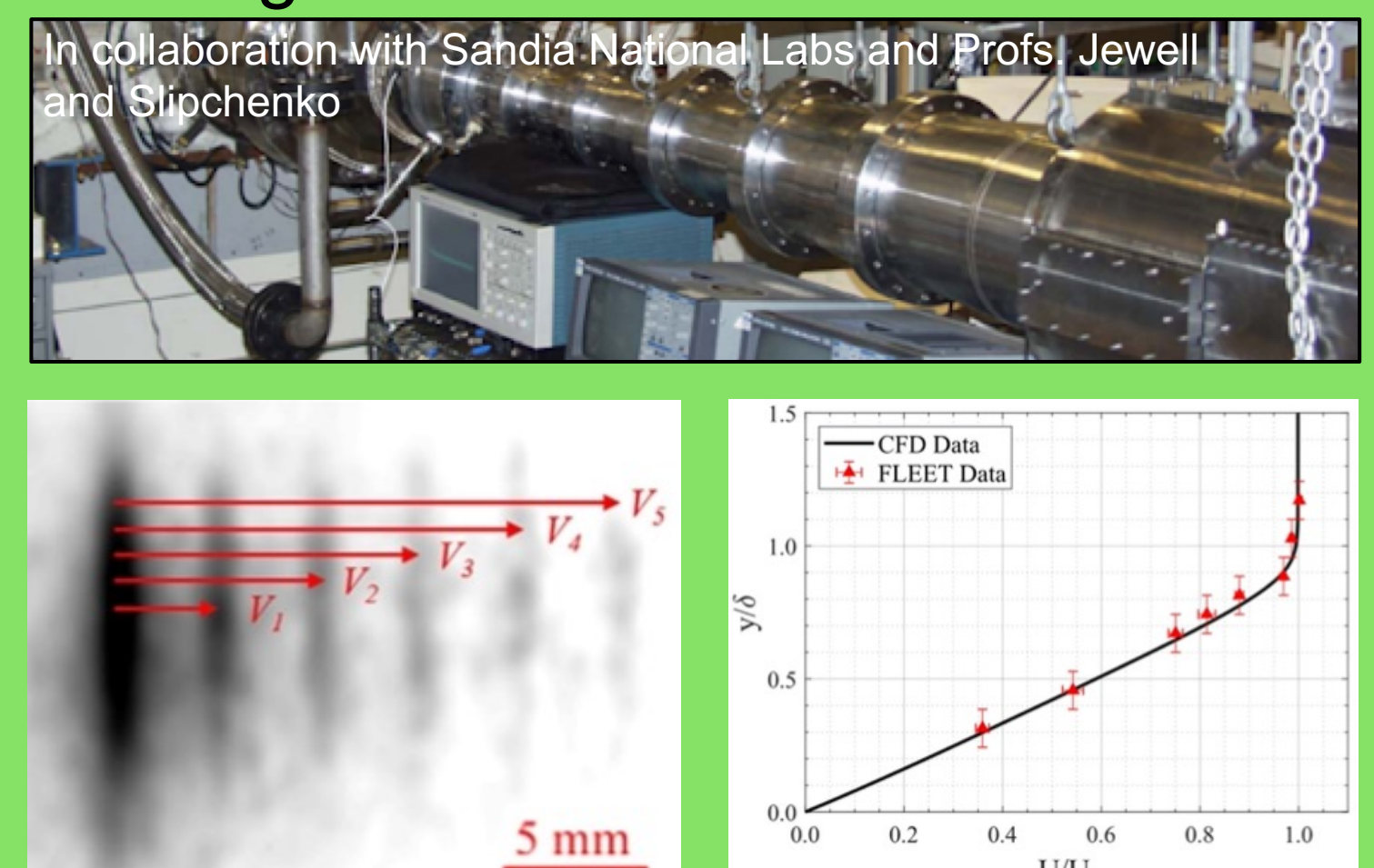
Blast Chambers for MHz 3D Imaging



Measuring V, T, and Species in Hypersonic Flows

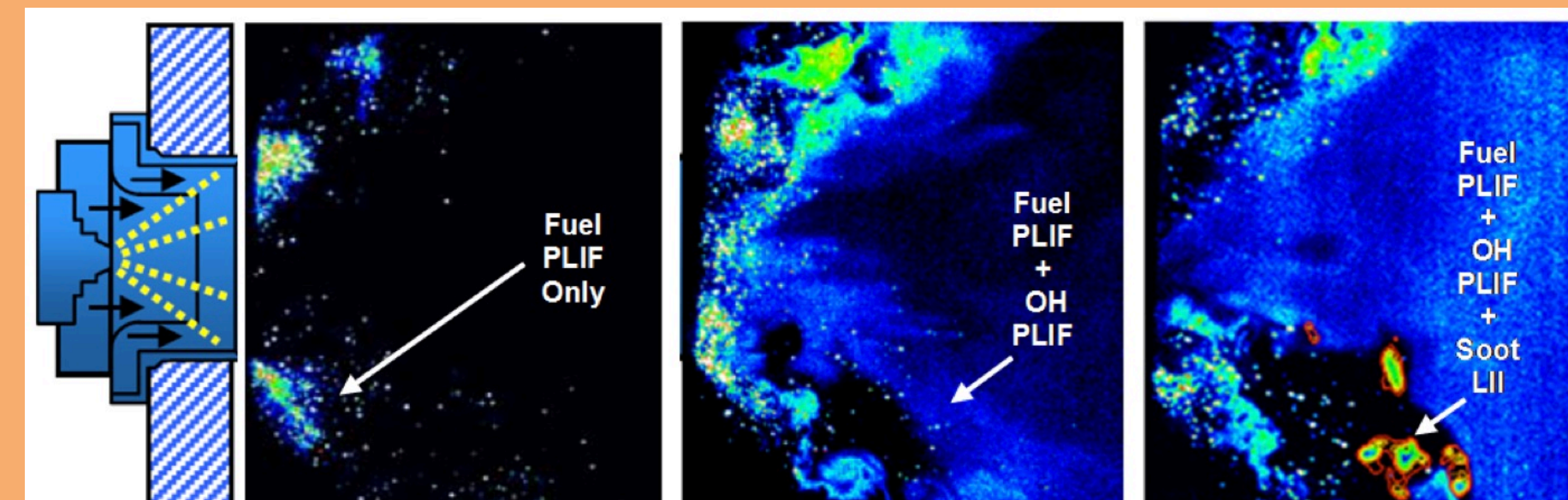


Boeing/AFOSR Mach 6 Quiet Tunnel



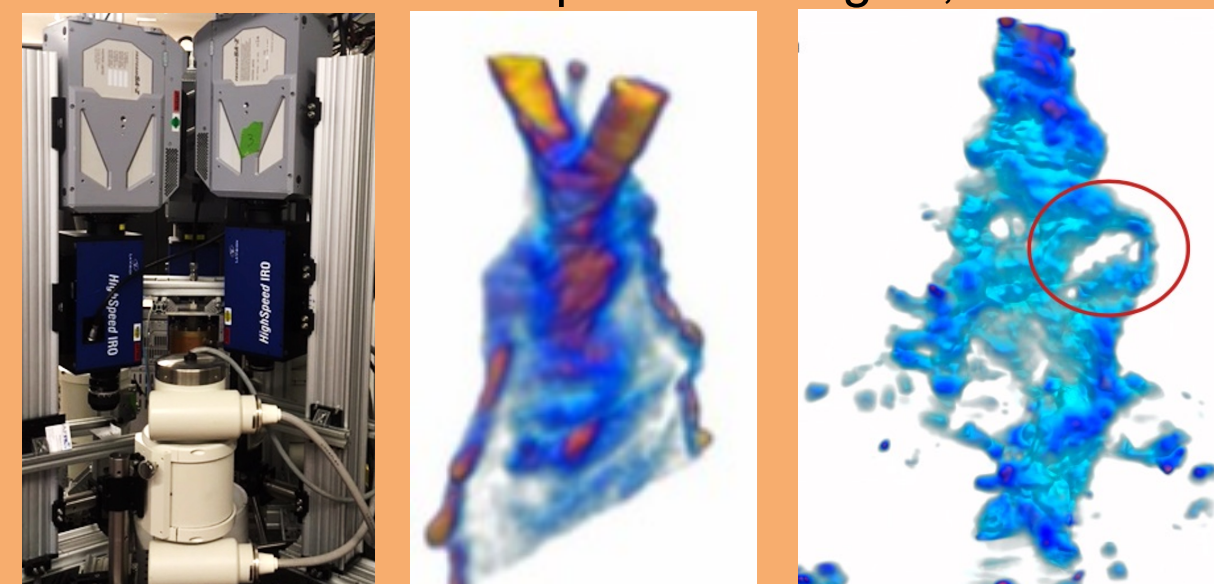
Gas Turbine Spray Combustion

In collaboration with AFRL



X-ray of Rocket Sprays

In collaboration with Spectral Energies, LLC



IC Engine Sprays

In collaboration with Iowa State University

