CORIA
UMR 6614

Séminaire

Vendredi 12 Juillet à 10h30 – Salle de conférences

Applications of Femtosecond Coherent Anti-Stokes Raman Scattering Thermometry in Challenging Environments

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Laser-based measurement techniques can provide non-intrusive experimental data in challenging environments where other measurements fail. In this talk, we will focus on the application of Coherent Anti-Stokes Raman Scattering (CARS) instruments with ultra-short pulse laser systems. Such CARS instruments can provide highly accurate gas-phase temperature data in multi-phase reacting flows and challenging ground-test facilities. The broadband ultra-short pulse lasers are used to excite many ro-vibrational Raman transitions which are subsequently probed by a narrowband probe pulse. The resulting CARS spectra carries information about the underlying Boltzmann distribution among quantum states and thus temperature. Measurements from three different experiments will be presented: fireball temperatures after a detonation, plume temperatures above metalized solid rocket propellant combustion, and gas-phase temperatures across various flow features in a Mach 8 hypersonic wind tunnel.

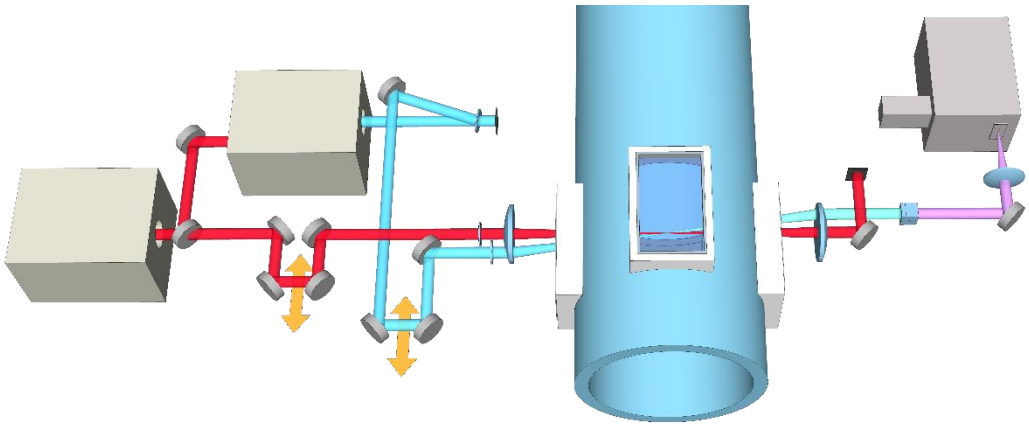

Diagram of femtosecond CARS instrument for measurements in a hypersonic wind tunnel.

Short Biography: Dr. Daniel Richardson is a research engineer at Sandia National Laboratories working in the field of laser diagnostics. His work has focused on the development and application of advanced optical measurement techniques in challenging environments including high-pressure turbulent combustion, hypersonic wind tunnels, and detonation fireballs. He has experience with many measurement techniques including PLIF, LII, PIV, FLEET, structured illumination, and particularly short-pulse CARS. He received his PhD from Purdue University in 2012.