



Seminaire PRISME

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Polytech Orléans

**Recent progress in transient plasma ignition and ozone-enhanced
compression ignition research at Sandia National Laboratories**

Transient plasma ignition (TPI) can enable multiple EGR-diluted and lean combustion modes that are expected to improve gasoline engine fuel economy by more than 12% relative to current high-efficiency Atkinson cycle engines. For example, late-cycle TPI can promote robust flame kernel development beneficial for both lean/dilute and boosted stoichiometric SI, while early-cycle TPI can produce ignition-enhancing species such as ozone (O_3) that allow for control of low-load CI. When coupled with other technologies, such as hybridization or cylinder deactivation, the combined efficiency gains make improved internal combustion engines one of the most promising pathways for reducing light-duty fleet petroleum consumption and the associated environmental impacts through mid-century. However, development and deployment of TPI is limited by poorly understood operating principles and inadequate modeling and igniter design tools. To address these concerns, our project leverages unique facilities and a range of optical diagnostics to explore fundamental ignition and combustion processes related to TPI. Sandia generated experimental data are used by Argonne National Laboratory modelers to develop, refine, and validate high-fidelity ignition modeling capabilities. My seminar will highlight recent TPI research performed at Sandia, and outline a roadmap for future research directions.