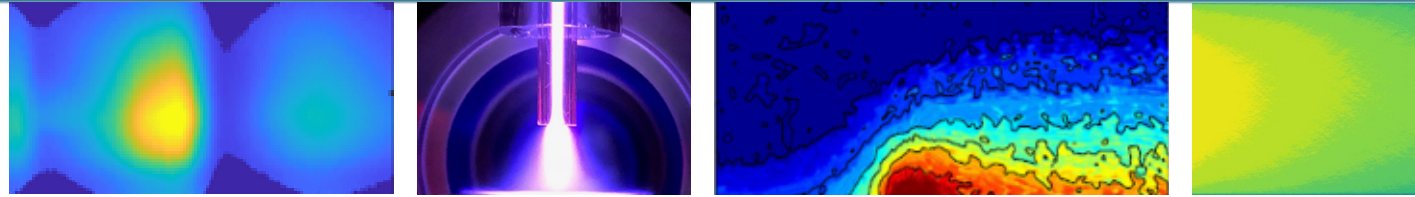




SNL Plasma Research Facility (PRF)



Shane Sickafoose, Brian Bentz, Jonathan Frank,
Nils Hansen, Matthew Hopkins, Christopher Klierer,
Amanda Lietz, Dirk van den Bekerom

7 October 2021

74th Gaseous Electronics Conference

Huntsville, Alabama



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Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

Sandia PRF Differentiating Capabilities



Multiple femtosecond, picosecond, nanosecond and CW lasers for interrogating dynamic plasma and reactive environments

- Neutral species density – LIF, PF-LIF
- Electric Fields (LIF-Dip, EFISH)
- Electron Densities - LCIF
- Multidimensional CARS for gas and surface phase interrogation

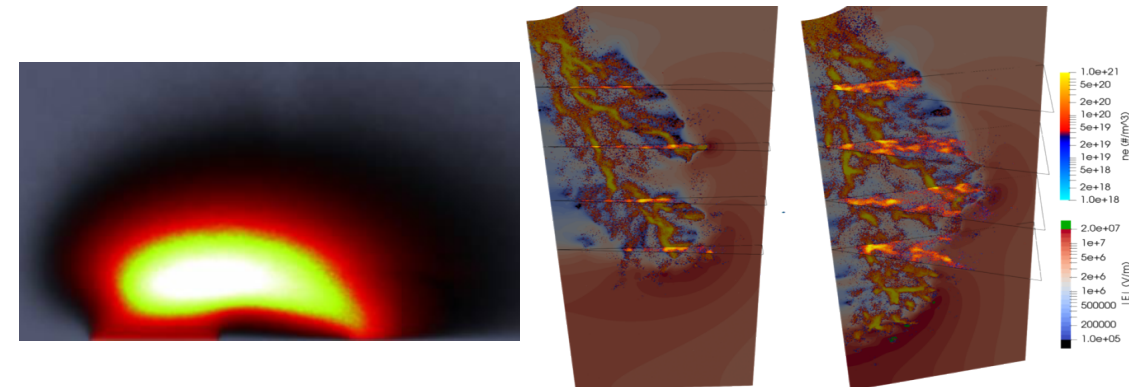
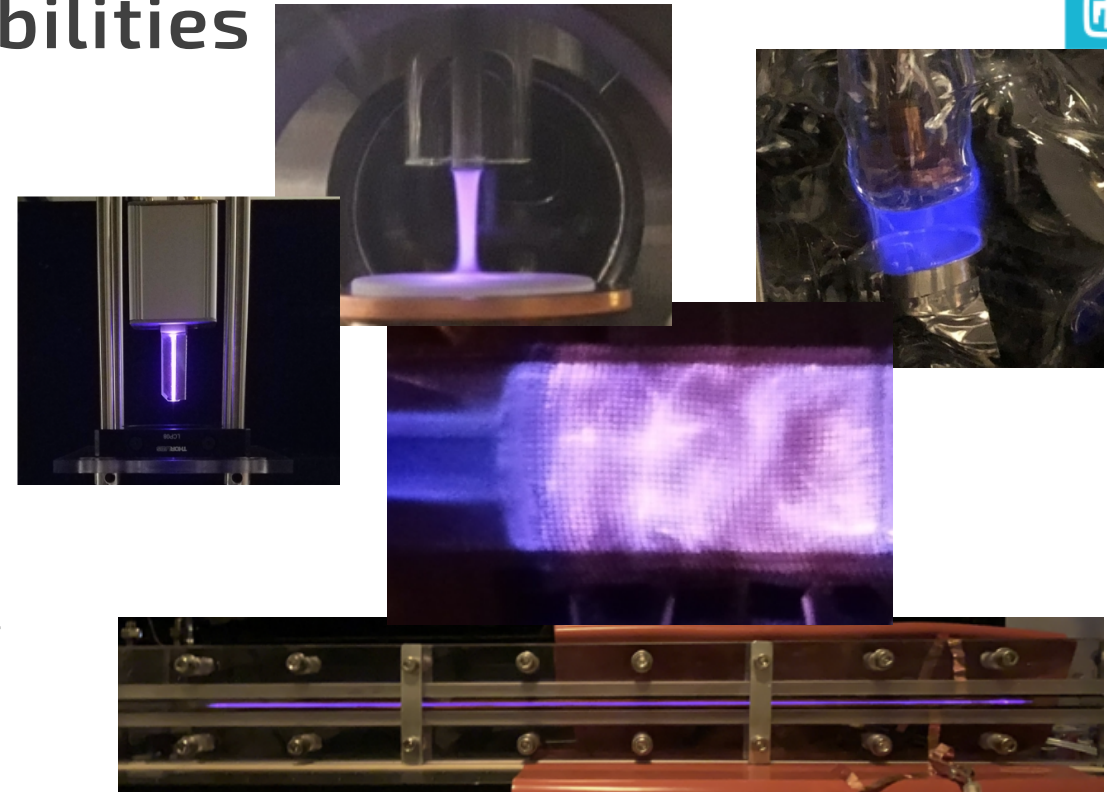
High speed imaging and detectors capabilities

- <200 ps gated cameras, multi-frame framing cameras and high-speed CMOS cameras, streak camera
- VUV to Visible to IR spectrometers

High resolution tandem and molecular beam mass spectroscopy for interrogating gas phase chemistries occurring in multi-atmosphere environments.

Theoretical/Computational LTP Capabilities

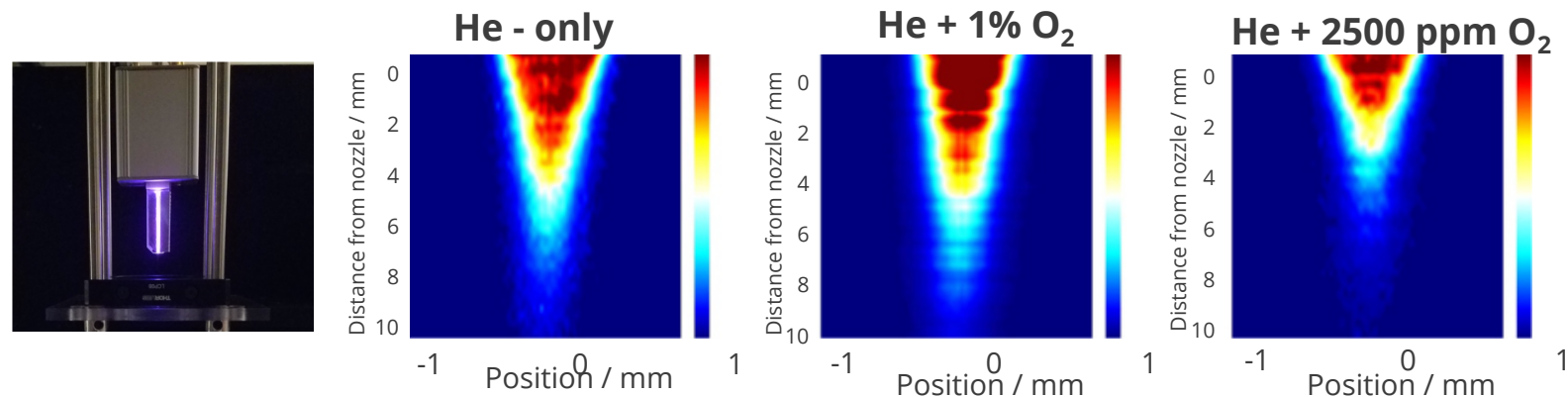
- Aleph and EMPIRE: Massively parallel PIC-DSMC, extensive chemistry and photonic processes
- Aria: multiphase fluid simulation capability being extended to highly collisional plasmas
- 0D Global Modeling



Propose a collaboration at: www.sandia.gov/prf

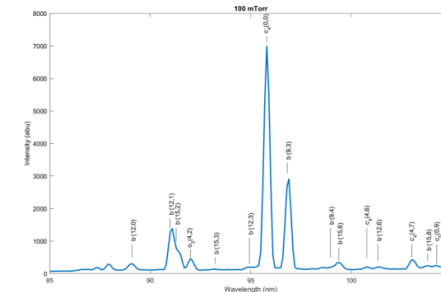
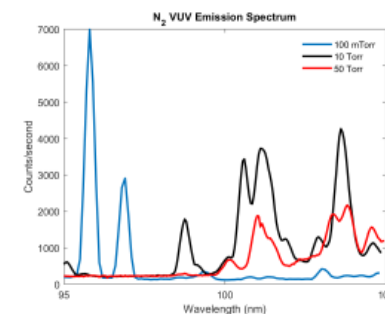
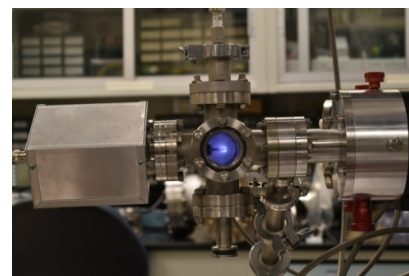
ps-TALIF atomic Oxygen

NCSU – Stapelmann, Myers, Barnat



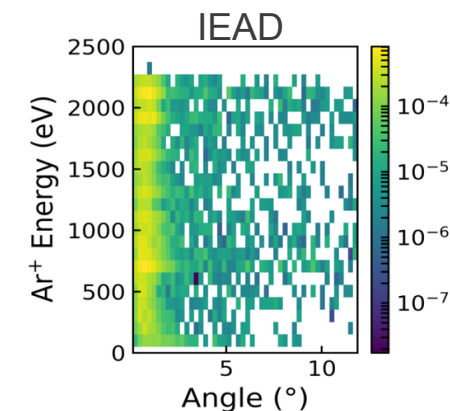
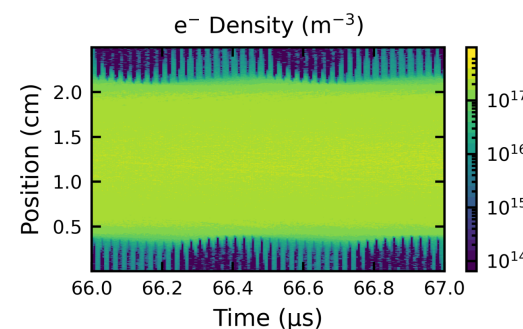
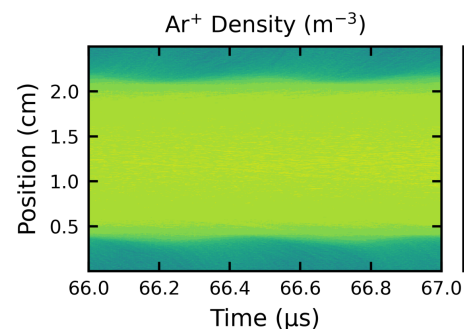
VUV N₂ spectrometry –

UNM – Lehr, Fierro, Smith, Yee



PIC-DSMC dual freq. CCP

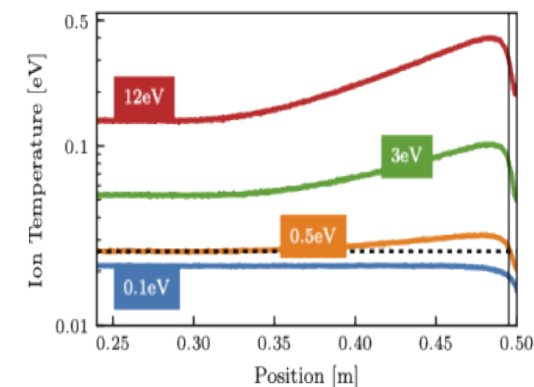
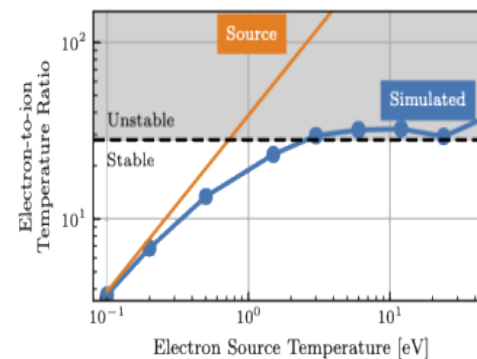
Applied Materials – Rauf, Kenney, Lietz, Hopkins



Sandia PRF Project Examples (cont.)

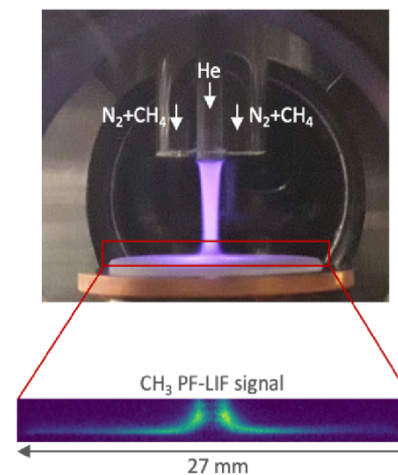
PIC-DSMC Sheath Instability

U of Michigan – Baalrud, Beving, Hopkins



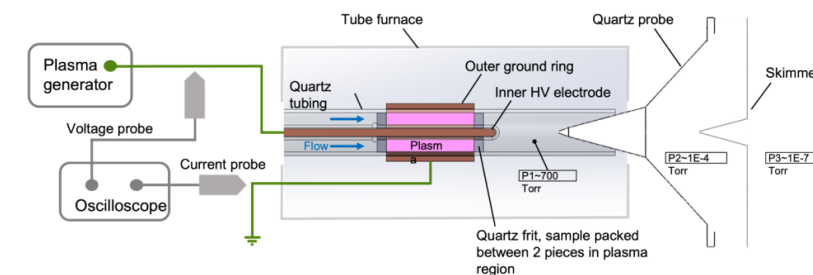
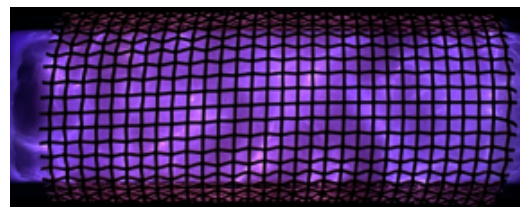
CH₃ PF-LIF imaging in ns pulsed plasma discharges

OSU – Adamovich, Richards, Frank, van den Bekerom



Molecular Beam Mass Spectrometry

Princeton University – Ju, Burger, Hansen



Work with us: 3rd Facility Proposal Call



Propose a collaboration at: www.sandia.gov/prf

Open of PRF Proposal Call	October 12, 2021
Close of PRF proposal Call	December 17, 2021
External Reviews	~ 1 month
Notification of Principal Investigators	February 4, 2022

Call timing is aligned with PPPL PCRF

Contact us to ensure projects are well-aligned with our capabilities:

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- Jonathan Frank (jhfrank@sandia.gov)
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- Christopher Kliwer (cjkliew@sandia.gov)
- Shane Sickafoose (smsicka@sandia.gov)

Acknowledgements



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