

# Casey Icenhour

## Contact Information

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## Research Interests

Computational Physics, High-Performance Computing, Radio-Frequency Plasma Sheaths, Plasma Material Interactions, Plasma Neutron Sources, Industrial Applications of Plasma Physics, Nuclear Security, Nuclear Policy

## Education

- PhD **North Carolina State University (NCSU)**, Nuclear Engineering **2012 - Dec 2019 (expected)**
- Concentration in Plasma Physics and Nuclear Fusion
  - Research Topic Area: Simulation of electromagnetic field structure and wave propagation in inhomogeneous media
  - Advisor: Dr. Steven C. Shannon
- BS **Western Carolina University (WCU)**, Electrical Engineering **2008 - 2012**
- GPA: 4.0
  - Honors College
  - Concentration in Optics and Communications
  - Minors: Mathematics, Physics

## Honors and Awards

|  |                    |
|--|--------------------|
| Idaho National Laboratory Graduate Fellowship  | <b>2018 - 2020</b> |
| DOE Office of Science Graduate Student Research Program, Oak Ridge National Laboratory | <b>2016 - 2017</b> |
| NCSU College of Engineering Dean's Doctoral Fellowship                                 | <b>2012 - 2013</b> |
| T. Ray and Frances Louise Gibbs Endowed Scholarship, WCU                               | <b>2008 - 2012</b> |
| Most Outstanding Upperclassman, WCU Electrical Engineering                             | <b>2011</b>        |

## Research and Professional Experience

**Idaho National Laboratory (INL)**, Idaho Falls, ID **Jan 2018 - present**  
*INL Graduate Fellow, Nuclear Science & Technology, Modeling and Simulation*  
Developing an INL-sponsored MOOSE Framework (see <https://mooseframework.org>)  
App for general electromagnetic simulation, in direct collaboration with the INL MOOSE Development Team

**Oak Ridge National Laboratory (ORNL)**, Oak Ridge, TN **Jul 2016 - Dec 2017**  
*Graduate Student Intern, Fusion and Materials for Nuclear Systems Division*  
Developed EELS, a MOOSE Framework App for basic vacuum radio-frequency electromagnetic simulation (see <https://github.com/cticenhour/EELS>) and Matlab codes for self-education in finite-element methods (see <https://github.com/cticenhour/matlab-fem>)

**North Carolina State University, Nuclear Engineering Dept.**, Raleigh, NC **Jul 2013 - Jun 2016**  
*Graduate Research Assistant, 4th State Applications Research Group*  
Utilized particle-in-cell codes to study capacitively-coupled RF plasma discharges

**Dean's Doctoral Fellow, NCSU College of Engineering** **Aug 2012 - Jun 2013**  
Modeled proof-of-concept Z-pinch plasma neutron source for concrete interrogation

## Professional Society Affiliations & Memberships

American Physical Society (APS)  
Institute for Electrical and Electronics Engineers (IEEE)  
Society for Industrial and Applied Mathematics (SIAM)

## Scientific Computing Skills

|                                     |  |
|-------------------------------------|--|
| Languages                           | C++, bash, Python                      |
| Operating Systems                   | Windows, MacOS, Linux (Ubuntu, Fedora) |
| Mathematical Computing Environments | Matlab, Mathematica, Mathcad           |
| Multiphysics Code Frameworks        | MOOSE Framework                        |
| Plasma Physics Codes                | VSIm, XPDP1                            |
| Version Control                     | git                                    |
| Data Visualization                  | Paraview, Matplotlib                   |
| Mesh Generation Tools               | Gmsh                                   |
| Other Tools                         | L <sup>A</sup> T <sub>E</sub> X        |

## Presentations

- (1) **C. Icenhour**, A. Lindsay, R. Martineau, S. Shannon, “Electromagnetics Simulations with Vector-Valued Finite Elements in MOOSE”, 2019 SIAM Conference on Computational Science and Engineering, [http://meetings.siam.org/sess/dsp\\_talk.cfm?p=96892](http://meetings.siam.org/sess/dsp_talk.cfm?p=96892)
- (2) **C. Icenhour**, S. Keniley, C. DeChant, C. Permann, A. Lindsay, R. Martineau, D. Curreli, S. Shannon, “Multi-Physics Object Oriented Simulation Environment (MOOSE)”, Invited workshop, APS Gaseous Electronics Conference 2018, <http://meetings.aps.org/Meeting/GEC18/Session/AS2.1>
- (3) **C. Icenhour**, A. Lindsay, D. Green, R. Martineau, S. Shannon, “Elk: A New MOOSE Framework Application for Radio-Frequency Electromagnetics”, APS Gaseous Electronics Conference 2018, <http://meetings.aps.org/Meeting/GEC18/Session/ET1.2>
- (4) S. Shannon, A. Lindsay, D. Graves, **C. Icenhour**, D. Peterson, S. White, “Plasma Simulation in the Multiphysics Object Oriented Simulation Environment MOOSE”, APS Gaseous Electronics Conference 2016, <http://meetings.aps.org/link/BAPS.2016.GEC.QR2.2>
- (5) **C. Icenhour**, A. Exum, E. Martin, D. Green, D. Smithe, S. Shannon, “PIC Simulation of RF Plasma Sheath Formation and Initial Validation of Optical Diagnostics using HPC Resources”, Poster, APS Division of Plasma Physics Meeting 2014, <http://meetings.aps.org/link/BAPS.2014.DPP.NP8.88>
- (6) **C. Icenhour**, T. Kummerer, D. Green, D. Smithe, S. Shannon, “Validation of RF CCP Discharge Model Against Experimental Data using PIC Method”, Poster, APS Gaseous Electronics Conference 2014, <http://meetings.aps.org/link/BAPS.2014.GEC.GT1.67>