



# Ian Faust

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## Education

- 2009–August 2016 **Doctorate in Nuclear Science and Engineering**, *Massachusetts Institute of Technology*, Cambridge, MA, USA.  
Dissertation - Quantification of Lower Hybrid wave absorption in the edge of the Alcator C-Mod tokamak
- 2005–2009 **B.S.E in Nuclear Engineering and Radiological Sciences**, *University of Michigan*, Ann Arbor, MI, USA.  
summa cum laude, minor in Mathematics

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## Work Experience

- 2016–Current **Postdoctoral Associate, ASDEX-Upgrade Tokamak**, *Max Planck Institute for Plasma Physics*, Garching bei München, DE.
- Experimental physicist focused on soft x-ray and Vacuum ultraviolet spectrometer systems (spectroscopy under vacuum). Work encompassed the repair, maintenance, design, development and analysis of these systems. Additional machine learning analysis and IoT-based hardware was developed to improve operational capabilities.
- Reverse engineering of a vacuum-ultraviolet spectrometer system
  - Rapid development/prototyping of a calibration system for the spectrometer, returning it to proper operation
  - Large data meta-analysis of  $\sim 3000$  experimental discharges using likelihood-based statistical and regularization-based machine learning methods for characterizing an unknown radiation line of tungsten
  - Installation and maintenance of Python and machine-learning related software (LAPACK, BLAS, Tensorflow and Scikit-learn for example) on various Solaris 10, 11 and Solaris Linux servers
  - Development of an IoT device for measurement monitoring using ESP8266-based hardware (full description available on [ianfaust.com](http://ianfaust.com))
  - Tensorflow RNN analysis of spectra for automated spectral identification

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2009–2016 **Graduate Student Researcher, Alcator C-Mod Tokamak, MIT Plasma Science and Fusion Center, Cambridge, MA, USA.**

Research has focused on the measurement of radiofrequency (LHRF) power and related attributes on a tokamak. This work spans from design, manufacture and data acquisition for several plasma measurement systems all of which operate in extreme thermal, radiation, vacuum, and electromagnetic environments. Thesis work focused on the analysis of multiple diagnostics with modulated RF power to synthesize an understanding its deposition. This work includes the following highlights:

- design and implementation of X-ray and vacuum ultraviolet radiometers
- meta-analysis of large datasets and formulation of advanced analysis codes for fusion science
- hands-on RF system work for high-power antenna operation
- rapid prototyping and implementation of several low cost visible and near-infrared camera systems

summer 2008,2009 **Summer Intern, Schlumberger - Princeton Technology Center, Princeton Junction, NJ, USA.**

Experimentalist in the neutron and X-ray generator group

- Worked on inductively coupled plasmas for use on neutron generators. This included the implementation of a wideband 1 kW RF source and a small high-vacuum system.
- Tested x-ray generators and detectors for future innovation for downhole X-ray use.
- Tested high voltage breakdown and tracking for oil exploration applications.

summer 2007 **SULi Intern, Los Alamos National Laboratory, Los Alamos, NM, USA.**

Student researcher on the FRX-L experiment (P-24 group)

- Helped build Marx banks for the integration of field reversed plasmas with the Shiva Star facility at the AFRL laboratory. This work was for magnetized target fusion research using reversed field plasmas and imploding metallic liners.
- Implemented shielded analog integrators for the FRX-L experiment

summer 2006 **Summer Intern, University of Missouri Research Reactor, Columbia, MO, USA.**

- Worked on lithium spinel growth for QCP testing on a triple axis neutron spectrometer (condensed matter physics).

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## Skills

Languages Native english speaker, B2 German (without qualification exam), I expect to test for B2 Zeugnis by Jan 2019

Codes Python (Scikit-learn, Tensorflow), MATLAB, IDL, C and SQL, LaTeX, and MDSplus

CAD Solid Edge and CATIAv5

Other Well-versed in unix and windows. Knowledge in vacuum system design and implementation. Experience with 3D printing and microcontrollers for prototyping. Courses on machine learning taken through Udacity and Coursera.

Extracurriculars running, travel, hobby projects and coding (see website), former residential advisor in undergraduate dormitory

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## Honors, Awards, and Professional Memberships

Memberships Tau Beta Pi, Alpha Nu Sigma, American Physical Society, Eagle Scout

Awards Doroghazi Eagle Scout award, NANT fellowship, 2nd year NERS fellowship (University of Michigan), Outstanding Student Service award (MIT, 2012)

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## Publications and Presentations

Refereed 2 first author papers, 2 first author contributed conference papers, 20 co-author papers, 7  
Journals co-author conference proceedings. 6 manuscripts in preparation (1 first author, 5 co-author)

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Conference 2 first author presentations (one invited talk at 2015 APS-DPP conference in Savannah,  
Presentations GA, USA)