Juliusz Aleksander Kruszelnicki

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EDUCATION

PhD in Nuclear Engineering and Scientific Computing, University of Michigan — **Current**
- Graduate Research Assistant, Computational Plasma Science and Engineering — **Ann Arbor, MI**
- **GPA:** 3.90/4.00

Bachelor of Science in Nuclear Engineering, University of Florida — **08.2010 – 05.2015**
- Honors Program Graduate — **Gainesville, FL**
- Cum Laude Honors
- **GPA:** 3.46/4.00

REASERCH EXPERIENCE

University of Michigan, Ann Arbor, MI — **Current**
***Academic Advisor**: Professor Mark Kushner* — *Graduate Research Assistant*

- Performed computational research of atmospheric pressure plasma interactions in plasma-chemical catalytic systems

University of Florida, Gainesville, FL — **08.2014 – 08.2015**
***Principal Investigator*: Professor James Tulenko** — *Undergraduate Research Assistant*

- Aided in development of innovative, accident tolerant, high thermal conductivity UO2 fuel
- Used Spark Plasma Sintering machine to fabricate 4.95% UO2-Diamond composite fuel pellets (17x17 and 15x15) for irradiation in the Advanced Test reactor
- Carried out pellet analysis via x-ray diffraction, Raman spectroscopy, and scanning electron microscopy
- Executed CASMO 4E and Simulate3K simulation runs and analysis of mixed component fuels' reactor performance
- Lead the initiative to quantify the thermal effects of several dopants on UO2
- Developed thermally/neutronically coupled modeling technique for doped, annular fission fuel

Tri Alpha Energy, Irvine, CA — **Summer of 2013**
***Supervisor**: Erik Trask, PhD* — *Corporate Internship Research Assistant*

- Modified implicit geometries and structures of the GENRAY.f plasma ray tracing code to allow open magnetic flux surface ray trajectories for Reverse Field Confinement device
- Found means of maximizing intra-separatrix power deposition via Electron Bernstein Wave coupling mechanisms
- Compiled and analyzed data pertaining to ray propagation in the electron cyclotron range of frequencies
- Designed, constructed and tested RFC DT reactor high vacuum chamber systems

Oculus Research, Gainesville, FL — **08.2012 – 04.2013**
***Supervisor**: Dan Dickrell, PhD* — *Research Assistant*

- Wrote MATLAB routines designed for retinal vascular structure analysis, as means of early illness detection and diagnosis
- Ported and scaled existing MATLAB codes to platform independent language (C++)

University of Florida, Gainesville, FL — **08.2012 – 04.2013**
***Principal Investigator**: Professor Yong Yang* — *Undergraduate Research Assistant*

- Assisted in design, construction, and implementation of a fluid-based pressurized piping system intended for simulated PWR-environment ZrC cladding corrosion investigation
- Performed microstructure analysis of 2 MeV proton irradiated, ultra-high purity ZrC, using transmission electron microscopy

Los Alamos National Laboratory, Los Alamos, NM — **Summer of 2012**
***Advisor**: Bruce Letellier, PhD* — *Summer Research Assistant*

- Researched and derived methods for risk analysis of South Texas Nuclear Plant's spray/sump filtration systems via micro and macro structure deposit and hydraulic interaction analysis
- Structured MATLAB hydraulic sequences for the plant's limiting conditions of the sump and spray system, the filtration system flow, and the spray system cooling capacities

Los Alamos National Laboratory, Los Alamos, NM — **Summer of 2011**
***Advisor**: Bruce Letellier, PhD* — *Summer Research Assistant*

- Researched means of kinematic characterization of explosives-propelled shrapnel via employment of self-developed computer-based synthetic radiography and analysis of experimental X-Ray imaging
- Created analytical means of 3-D object identification, elemental density assessment, and trajectory and kinetic energy calculation

LEADERSHIP

Treasurer, *IEEE Southeastern Michigan Nuclear Plasma Physics Section* **Current**

- Handled daily operations of IEEE section, including budgeting, event organization, and general body meetings

Session Chair, *University of Michigan Engineering Research Symposium* **2015**

- Recruited session judges, from amongst University faculty, alumni, and corporate affiliates
- Organized and presided over the Nuclear Sciences and Engineering presentation session

University Scholar, *University of Florida University Scholar Program* **2012-2015**

- Selected as an independent undergraduate research fund recipient for 2013 and 2014
- Leads research and construction of an innovative, pulsed DD fusion reactor which utilizes a hybrid Inertial Electrostatic/Magnetic, pulsed confinement system of own design
- Optimized Focus Electrode Concept geometrics and energetics via a Schwartz-Christoffel ionic pathway and electromagnetic field analysis
- Designed, simulated, constructed and tested high voltage/high current pulsed power systems

President & Founder, *Motorcycle Association of Students and Staff* **2011 - 2015**

- Organized nation's largest collegiate motorcycle riding group
- Lead riding skill development workshops, organized group events (up to 50 participants), set up a local network of vendor sponsors

PUBLICATIONS

- '*Propagation of negative electrical discharges through 2-dimensional packed bed reactors*', **Juliusz Kruszelnicki,** Kenneth Engeling, John Foster, Zhongmin Xiong, Mark J. Kushner, J. Phys. D: Appl. Phys. 50 (2017) 025203 (14pp); doi:10.1088/1361-6463/50/2/025203

PRESENTATIONS

**Award or recognition*

- *'Properties Influencing Plasma Discharges in Packed Bed Reactors', **Juliusz Kruszelnicki,** Kenneth W. Engeling, John E. Foster, Mark J. Kushner, 2016 APS Gaseous Electronics Conference, Bochum, Germany;
- '*Investigation of the Time Evolution of Micro-discharges in a 2-Dimensional Packed Bed Reactor*', Kenneth W. Engeling, **Juliusz Kruszelnicki,** John E. Foster, Mark J. Kushner, 2016 APS Gaseous Electronics Conference, Bochum, Germany;
- *'Confined Atmospheric Plasma Sources for Activating Gases, Liquids and Tissue',* Amanda M. Lietz, **Juliusz Kruszelnicki**, Mark J. Kushner, 2016 Hakone XV, Brno, Czech Republic;
- *'Geometry makes plasmas complex',* **Juliusz Kruszelnicki**, Amanda M. Lietz, Chenhui Qu, Peng Tian, Andy Xiong, Natalia Babaeva, Jerry Wang, Mark J. Kushner, 2016 Quo Vadis – Complex Plasmas, Hamburg, Germany;
- *'Properties of Atmospheric Pressure Plasmas in Packed Bed Reactors',* **Juliusz Kruszelnicki,** Kenneth W. Engeling, John E. Foster, Mark J. Kushner**,** 2016 International Conference On Plasma Science, Banff, Canada
- **'Property Analysis and Advanced Manufacturing Technique Development for Light Water Reactor Annular Composite Fuel',* **Juliusz Kruszelnicki**, Jhonathan Rosales, Patrick Moo, Ghatu Subhash, James Tulenko , 2015 American Nuclear Society Student Conference, College Station, TX;
- **'Inertial Electrostatic/Magnetic Confinement Hybrid Fusion Device', **Juliusz Kruszelnicki**, James Baciak, Joseph Mack, Hank Monkhorst, 2014 World Association of Science Engineering and Technology Conference, Stockholm, Sweden;

POSTERS

- **'Modeling plasma reactors for environmental pollution control', **Juliusz Kruszelnicki,** Kenneth W. Engeling, John E. Foster, Mark J. Kushner, 2016 University of Michigan Engineering Graduate Symposium, Ann Arbor, MI
- '*Effects of pulse-to-pulse Residual Species on Discharges in Repetitively Pulsed Discharges Through Packed Bed Reactors*', **Juliusz Kruszelnicki,** Kenneth W. Engeling, John E. Foster, Mark J. Kushner, 2016 APS Gaseous Electronics Conference, Bochum, Germany;
- *Discharge Morphology as a Function of Dialectic Constant in a 2-Dimensional Packed Bed Array',* Kenneth W. Engeling, **Juliusz Kruszelnicki,** John E. Foster, Mark J. Kushner**,,** 2016 International Conference On Plasma Science, Banff, Canada
- '*Properties Influencing Plasma Discharges in Packed Bed Reactors',* **Juliusz Kruszelnicki,** Kenneth W. Engeling, John E. Foster, Mark J. Kushner, 2016 Dept. of Energy Plasma Science Center Annual Meeting, University of Maryland, College Park, MD;
- **'Impact of Focusing Grid Electrodes and Pulsed Power on Modified IEC Fusion Device', **Juliusz Kruszelnicki**, James Baciak, Joseph Mack, Hank Monkhorst, 2014 American Nuclear Society Conference, Anaheim, CA;
- '*Ray Tracing of Electron Bernstein Waves in 2D for C-2 Equilibrium*', Eric Trask, **Juliusz Kruszelnicki**, 2013 American Physics Society Conference, Denver, CO;
- **'Kinematic Characterization of High-Velocity, Explosives-Propelled Objects via X-Ray Image Analysis', **Juliusz Kruszelnicki**, Bruce Letelier, 2011 Los Alamos National Laboratory Student Symposium, Los Alamos, NM;

HONORS & AWARDS

- 2016 University of Michigan Engineering Graduate Symposium Best in Nuclear Sciences
- 2016 American Physical Society Gaseous Electrons Conference Highlight Presentation
- 2016 Fellowship, Michigan Institute of Plasma Science and Engineering
- 2016 ANS Landis Scholarship
- 2015 ANS Student Conference: Best Undergraduate Paper Award
- 2015 University of Florida Nuclear Engineering Student of the Year

- 2015 National Science Foundation Graduate Fellowship Honorable Mention
- 2015 University of Florida Honors Program Graduate
- 2015 University of Florida: Pagano Scholarship
- 2015 University of Florida: Jacobs Scholarship
- 2014 University of Florida: University Scholar Award
- 2014 ANS Landis Scholarship
- 2014 University of Florida: Pagano Scholarship
- 2014 World Association of Science Engineering and Technology Conference: Best Student Presentation
- 2014 ANS Fusion Energy Division: Outstanding Student Paper Award
- 2013 University of Florida: University Scholar Award
- 2013 University of Florida: Pagano Scholarship
- 2011 Los Alamos National Laboratory Student Symposium Best in Engineering Presentation Award

CODING PROFICIENCY

- Mathematica, MCNP (X,5,6), MicroShield, MatLab, C++, Fortran, HTML, SIMULATE3, CASMO4e, SCALE, ABAQUS, AutoCAD, EES