James **Kapaldo**

Ph.D. Physics · Scientific Researcher · Data Analyst · Prototyper

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Education

University of Notre Dame — *Notre Dame, IN, USA*

Ph.D. in Physics — *2015 - May 2018*

Dissertation title: The spatial dependent interaction of environment controlled atmospheric pressure plasma jets with cultured cells
Advisor: Prof. Sylwia Ptasinska

- Built a controllable cold plasma jet for plasma medicine applications. Created hardware & software for experimental analysis of the jet's 2D species distributions.
- Conceived and developed a method for locating the center of overlapping convex objects and applied it to partitioning overlapping cell nuclei and unsupervised data clustering.
- Created image processing tools for analyzing large fluorescence images of cultured cells and extracting the cell reproductive phase using both supervised and unsupervised machine learning.

M.S. in Physics (*Arther J. Schmitt fellow*) — *2011 - 2015*

Advisors: Prof. Alexander Mintairov & Prof. Jacek Furdyna

- Measured exciton life-times in quantum dots and explained shifts in emission wavelength from InP/GaInP quantum dots by modeling with COMSOL & Matlab.
- Used near-field scanning optical microscopy to study the spatial light emission from single, large InP/GaInP quantum dots.

Illinois Institute of Technology — *Chicago, IL, USA*

B.S. in Physics (*summa cum laude*) — *2007 - 2011*

Professional certificates

Self-Driving Car Nanodegree, Udacity — *Feb. 2017 - Feb. 2018*

- Design and train fully convolution neural networks for scene understanding and behavioral cloning.
- Use measurement estimation techniques (extended and unscented Kalman filters) for sensor fusion.
- Build and use both PID and model predictive controllers for trajectory following.
- Utilize optimal trajectory generation for car path planning.

Machine Learning (*Stanford University: Andrew Ng*), Coursera — *2016 - 2017*

- Machine learning fundamentals: regression, regularization, classification, neural networks, model bias and variance, gradient descent.

Machine Learning Specialization (*University of Washington: Carlos Guestrin & Emily Fox*), Coursera — *2016 - Ongoing*

- 4 courses: foundations, regression, classification, clustering & retrieval.

Experience

University of Notre Dame — *Notre Dame,IN, US*

Teaching Assistant — *Jan. 2018 — May 2018*

- Fostered students physical understanding through critical thinking and problem solving.

Rockwell Collins — *Sterling,VA, US*

Technical Intern — *Sum. 2011*

- Designed and developed an algorithm to initialize a Kalman filter used for geolocating objects of interest photographed by UAVs.

Max-Planck Institute for Quantum Optics — *Garching,Bavaria, DE*

Research Intern (*Advisor: Dr. Matthias Kling*) — *Sum. 2009 & Sum. 2010*

- Designed ultra-high vacuum experimental chambers and parts in MicroStudio CAD software. Cleaned and constructed an ultra-high vacuum experimental setup. Assisted in first experiments detecting photoelectrons from nanostructured surfaces with a photoelectron emission microscope. Assisted in experiments observing high harmonic generation from nanostructures.

Illinois Institute of Technology *Chicago,IL, US*

Resident Advisor *Aug. 2009 — May 2011*

- Resolved issues and conflicts among students. Planned programs with the goal empowering students and building a stronger community.
  Senior resident advisor (2010/2011) : Managed resident advisor schedules and resident advisor planned events for the student body.

Systems Planning and Analysis, Inc. *Alexandria,VA, US*

Software Intern *Sum. 2008*

- Designed a new method of data management and representation for use in a modified internal version of the Single Integrated Air Picture. Started using Matlab.

Peer-reviewed Journal Articles

Excitonic lasing of strain-free InP(As) quantum dots in AlInAs microdisk

D. V. Lebedev, M. M. Kulagina, S. I. Troshkov, A. S. Vlasov, V. Y. Davydov, A. N. Smirnov, A. A. Bogdanov, J. L. Merz, J. Kapaldo, A. Gocalinska, G. Juska, S. T. Moroni, E. Pelucchi, D. Barettin, S. Rouvimov, A. M. Mintairov

Applied Physics Letters, *110*, *121101 (2017)*

Wigner molecules and charged excitons in near-field magnetophotoluminescence spectra of self-organized InP/GaInP quantum dots

A. M. Mintairov, J. Kapaldo, J. L. Merz, A. S. Vlasov, S. A. Blundell

Physical Review B, *95*, *1–10 (2017)*

Ga–In intermixing, intrinsic doping, and Wigner localization in the emission spectra of self-organized InP/GaInP quantum dots

J. Kapaldo, S. Rouvimov, J. L. Merz, S. Oktyabrsky, S. A. Blundell, N. Bert, P. Brunkov, N. A. Kalyuzhnyy, S. A. Mintairov, S. Nekrasov, R. Saly, A. S. Vlasov, A. M. Mintairov

Journal of Physics D: Applied Physics, *49*, *475301 (2016)*

Mechanochemical synthesis of methylammonium lead iodide perovskite

K. V. Manukyan, A. V. Yeghishyan, D. O. Moskovskikh, J. Kapaldo, A. Mintairov, A. S. Mukasyan

Journal of Materials Science, *51*, *9123–9130 (2016)*

Time-of-flight-photoelectron emission microscopy on plasmonic structures using attosecond extreme ultraviolet pulses

S. H. Chew, F. Süßmann, C. Späth, A. Wirth, J. Schmidt, S. Zherebtsov, A. Guggenmos, A. Oelsner, N. Weber, J. Kapaldo, A. Gliserin, M. I. Stockman, M. F. Kling, U. Kleineberg

Applied Physics Letters, *100*, *051904 (2012)*

Peer-reviewed Conferences/Proceedings

Near-field scanning magneto-optical spectroscopy of Wigner molecules

A. M. Mintairov, J. Kapaldo, J. L. Merz, S. Rouvimov, N. Kalyygniy, S. A. Mintairov, S. Nekrasov, R. Saly, A. S. Vlasov, S. Blundell

State-of-the-art Trends of Scientific Research of Artificial and Natural Nanoobjects (STRANN), St. Petersburg, Russia, April 2016, *AIP Conference Proceedings*, *1748*, *020001 (2016)*

Manuscripts in Submission

Seed-Point Detection of Clumped Convex Objects by Short-Range Attractive Long-Range Repulsive Particle Clustering

J. Kapaldo, X. Han, D. Mery

IEEE Transactions on Pattern Analysis and Machine Intelligence (Submitted Aug. 26, 2017)

Conference Talks

Characterization of large self-organized In(Ga)P/GaInP quantum dots (QDs) grown by metal organic vapor-phase epitaxy — *St. Petersburg, RU*, *June 2015*

Nanostructures: Physics and Technology (NANO2015), 23rd International Symposium
J. Kapaldo, A. M. Mintairov, S. Rouvimov, J. L. Merz, N. A. Kalyuzhnyy, S. A. Mintairov, A. S. Vlasov

On Wigner molecules and their observation in self-assembled InP/GaInP quantum dots — *Notre Dame, IN, US*, *Apr. 2015*

Graduate Student Union and Office for Postdoctoral Scholars Research Symposium, 7th Annual
J. Kapaldo, A. Mintairov, J. Merz

Conference Posters

High throughput imaging for studying the spatial effect of cold atmospheric plasma jets on cell cultures — *Notre Dame, IN, US*, *Nov. 2016*

Graduate Physics Students Annual Conference
J. Kapaldo, X. Han, S. Ptasinska

High throughput imaging for studying the spatial effect of cold atmospheric plasma jets on cell cultures — *Belgrade, RS*, *Aug. 2016*

Physics of Ionized Gases (SPIG 2016), 28th Summer School and International Symposium
J. Kapaldo, X. Han, S. Ptasinska

High throughput imaging for studying the spatial effect of cold atmospheric plasma jets on cell cultures — *Anodver, NH, US*, *July 2016*

Gordon Research Conference: Plasma Processing Science, Plasmas with Complex Interactions - Exploiting the Non-Equilibrium
J. Kapaldo, X. Han, S. Ptasinska

A characterization of atmospheric pressure plasma jets through a spatio-temporal mapping of the optical emission spectra — *Notre Dame, IN, US*, *Dec. 2015*

Graduate Physics Students Annual Conference
J. Kapaldo, X. Han, S. Ptasinska

A characterization of atmospheric pressure plasma jets through a spatio-temporal mapping of the optical emission spectra — *South Bend, IN, US*, *Nov. 2015*

American Physical Society, Prairie Section, 2015 Annual Fall Meeting
J. Kapaldo, X. Han, S. Ptasinska

A characterization of atmospheric pressure plasma jets through a spatio-temporal mapping of the optical emission spectra — *Honolulu, HI, US*, *Oct. 2015*

Gaseous Electronics Conference, 68th Annual
J. Kapaldo, X. Han, S. Ptasinska

Electrostatic Control of Wigner Molecule Emission in Self-Organized InP/GaInP Quantum Dots — *Hersonissos, Crete, GR*, *May 2013*

Physics of Light-Matter Coupling in Nanostructures (PLMCN14), 14th Conference
J. Kapaldo, J. L. Merz, A. M. Mintairov

Observation of Wigner molecule emission spectra using micro-photoluminescence techniques — *Notre Dame, IN, US*, *Apr. 2013*

Schmitt Fellows Poster Presentation
J. Kapaldo, J. Furdyna, S. Blundell, A. Mintairov

Viewing ultrafast nanolocalized plasmonic fields using attosecond optical field microscopy — *Chicago, IL, US*, *Feb. 2010*

IIT Undergraduate Research Day
J. Kapaldo, A. Wirth, S. Watson, S. H. Chew, T. Uphues, S. Zherebtsov, J. Lin, M. Stockman, U. Kleineberg, M. Kling, F. Krausz

Other Conference Contributions

Atmospheric pressure plasma jet: its characterization and equivalent dose in aqueous solutions — *Upton, NY, US*, *Oct. 2016*
International Conference on Ionizing Processes
E. R. Adhikari, X. Han, J. Kapaldo, V. Samara, I. Janik, S. Ptasinska

Interactions of atmospheric pressure plasma jet with liquid surfaces — *Belgrade, RS*, *Aug. 2016*
Physics of Ionized Gases (SPIG 2016), 28th Summer School and International Symposium
X. Han, J. Kapaldo, I. Janik, S. Ptasinska

DNA damage in oral cancer cells induced by nitrogen atmospheric pressure plasma jets — *Anodver, NH, US*, *July 2016*
Gordon Research Conference: Plasma Processing Science, Plasmas with Complex Interactions - Exploiting the Non-Equilibrium
X. Han, J. Kapaldo, Y. Liu, M. S. Stack, S. Ptasinska

DNA damage in oral cancer cells induced by nitrogen atmospheric pressure plasma jets — *Anodver, NH, US*, *July 2016*
Gordon Research Seminar: New Challenges of Plasma Science and Cutting Edge Plasma Applications
X. Han, J. Kapaldo, Y. Liu, M. S. Stack, S. Ptasinska

Cold atmospheric plasma jets as novel tool for cancer treatment — *Notre Dame, IN, US*, *Apr. 2016*
Harper Cancer Research Institute Research Day, 5th Annual
X. Han, J. Kapaldo, Y. Liu, M. S. Stack, S. Ptasinska

Cold atmospheric plasma jets as novel tool for cancer treatment — *Notre Dame, IN, US*, *Dec. 2015*
Graduate Physics Students Annual Conference
X. Han, J. Kapaldo, Y. Liu, M. S. Stack, S. Ptasinska

Cold atmospheric plasma jets as novel tool for cancer treatment — *South Bend, IN, US*, *Nov. 2015*
American Physical Society, Prairie Section, 2015 Annual Fall Meeting
X. Han, J. Kapaldo, Y. Liu, M. S. Stack, S. Ptasinska

DNA damage in oral cancer cells induced by nitrogen atmospheric pressure plasma jets — *Honolulu, HI, US*, *Oct. 2015*
Gaseous Electronics Conference, 68th Annual
X. Han, J. Kapaldo, Y. Liu, M. S. Stack, S. Ptasinska

Cold atmospheric plasma jets as novel tool for cancer treatment — *Notre Dame, IN, US*, *Apr. 2015*
Harper Cancer Research Institute Research Day, 4th Annual
X. Han, J. Kapaldo, Y. Liu, M. S. Stack, S. Ptasinska

Awards & Fellowships

Arthur J. Schmitt Fellow — *University of Notre Dame, US*, *2011 — 2016*
One of the Presidential fellowships offered to graduate students at University of Notre Dame.

2nd place poster presentation — *University of Notre Dame, US*, *Nov. 2016*
Graduate Physics Students Annual Conference
High throughput imaging for studying the spatial effect of cold atmospheric plasma jets on cell cultures

3rd place poster presentation — *University of Notre Dame, US*, *Dec. 2015*
Graduate Physics Students Annual Conference
A characterization of atmospheric pressure plasma jets through a spatio-temporal mapping of the optical emission spectra

Notebaert Professional Development Award — *University of Notre Dame, US*, *June 2015*
Received $1000 to attend NANO2015 in St. Petersburg, Russia.

Notebaert Professional Development Award — *University of Notre Dame, US*, *June 2013*
Received $1744 to attend PLMCN14 in Crete, Greece.

1st place poster presentation *Illinois Institute of Technology, US*

IIT Undergraduate Research Day: College of Science of Letters *Feb. 2009*

Viewing ultrafast nanolocalized plasmonic fields using attosecond optical field microscopy

Rise DAAD Scholarship *DE*

Received scholarship to intern at Max-Planck Institute for Quantum Optics in Garching bei München, Germany *Mar. 2009*