

Department of

PHYSICS

alumni
newsletter

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NDSU NORTH DAKOTA
STATE UNIVERSITY

OCTOBER 24, 2019

Greetings Alumni and Friends

Recently I read about a study that stated university faculty are among those with the highest level of job satisfaction. When I check for myself, I wholeheartedly agree. I have the best job I can imagine to have. Wait a moment. Am I fooling myself? In times of ever-increasing budget cuts (just google "NDSU" and "budget cuts"), overboarding bureaucracy (oh, I mean "compliance"), wide gaps between our strategic plan and the naked reality (fortunately, we always look forward), one digit funding rates for most of us at NSF (I envy you, Europa, mother of King Minos), and daily work until way after midnight — is my judgment completely out of focus?

You may now expect me to write (in all political correctness) it is the opportunity to work with students — a diverse body of curious and investigative learners — that is behind my high level of job satisfaction. And you know what, it actually is exactly that. Whether I have a hundred students in a big classroom think about why you can't actually observe someone fall into a black hole or discuss in one of my (almost) daily group meetings with just one or two students how to calculate the location of a tri-critical point in a three-dimensional phase diagram, and in a multitude of scenarios in between, I so often experience how we grow by learning from each other and I feel this incredible satisfaction when I can give back to others what my own teachers have passed onto me.

About two years ago, a bunch of people, mostly students, came into my office for some reason that I don't remember. Anyhow, I took that picture on the right. All those students (and many more) have entrusted some of their most important and productive years to our department. For me, this is an incredible responsibility and opportunity. Some of the students shown in the photograph are still in our department and will graduate soon. Others have graduated and are now employed in places like Rochester Institute of Technology or the State University of São Paulo. The person on the right was a visiting scholar in the math department; he is now at KTH Royal Institute of Technology in Stockholm.



Brianna Santangelo, Landon Johnson, Dejan Mihaylov, Guilherme Bossa, Alistair McInerny, Rachel Downing, Brian Farlow, and Bjorn Berntson (from left, Fall 2017)

Of those who have left physically, almost all remain connected to our department. We are keeping each other updated and often continue to do research together. The students that we work with are much more than a "job duty"; they are an investment into our and our society's future. They make my job the best one I can imagine to have.

*Sylvio May
Department Chair*

Advancing Inclusion Award

The NDSU Advancing Inclusion Award is presented annually to a department, committee, group or unit that has worked collaboratively to promote an inclusive culture by enhancing or contributing to the overall environment of the community or university. The 2019 honoree is the Department of Physics, which has made a commitment toward diversity through strategic actions and by advancing a culture of inclusion over the last several years. The award nomination was submitted by the department's graduate student organization Grad Phi.



The amazing cake that the department enjoyed after the award ceremony on May 02, 2019

"The physics department has gone beyond good intentions to commit to practices and allocations of funds which serve to remove barriers to inclusion," said Kevin Stockbridge, coordinator of Inclusion and KFASP Initiatives. "They have engaged in this work for several years, without seeking praise or acclaim, showing that their choice to prioritize diversity and inclusion is based solely on the merit of these values alone."

REU Program in Discipline-Based Education Research

By WARREN CHRISTENSEN

For the 7th consecutive summer, NDSU was host to a cohort of Undergraduate Researchers in STEM Education Research. Lead by PI Jennifer Momsen, Biological Sciences, and co-PI Warren Christensen, Physics, the Growing Up STEM REU Program is on its 3rd round of funding from NSF, surpassing one million dollars in total funding throughout the life of the program. This program has mentored 69 researchers from 37 states across the United States. They have engaged in research on the learning and teaching of science and mathematics at the university level. Each summer a cohort of 10 students come to Fargo for 10 weeks during the summer to work one-on-one with an NDSU STEM education researcher as a mentor conducting original research. Areas of research include the discipline of physics, biology, chemistry, psychology, mathematics and computer science, making it a truly interdisciplinary enterprise. Summer programs for undergraduate researchers include a variety of professional development workshops designed to further prepare our cohort for entrance into graduate and professional schools. The program has led to three graduate students from the program applying to and being accepted in our physics graduate program.

Sanibel Symposium Award

Sanibel symposium is a yearly meeting of computational chemistry and materials scientists which attracts about 200 scientists every year from over thirty different nations. The competitive awards to outstanding young researchers in the computational chemistry and materials are awarded by Professor Rod Bartlett, a leader in many body perturbation theory in chemistry. Sanibel has a long history of giving awards to deserving undergraduate, graduate, and postdoctoral students, and to a young investigator. Computational materials research groups of NDSU have regularly won awards in the past. Among the 2018 winners is physics undergraduate student Landon Johnson, who conducted his research "Modeling Charge Carrier Dynamics at Perovskite/Charge Transport Material Interface Using Density Functional Theory and Redfield Theory" with Dr. Dmitri Kilin from NDSU's Department of Chemistry and Biochemistry.



Landon Johnson, Aaron Forde, and Fatima Fatima (from left)

Hiring First Graduate Student through APS Bridge Program

Some years ago our Physics Department became a Partnership Site of the APS Bridge Program, which aims to increase the number of physics PhDs awarded to underrepresented minority (URM) students. Due to our severe budget cuts during the last years, we hesitated to attract APS Bridge students. However, in summer 2018 we decided to start materializing our commitment towards increasing diversity in physics graduate education. We made an offer to Kevin Gima, who decided to join our department and since Fall 2018 is one of our graduate students. Here is a brief personal introduction from Kevin:



Hello, my name is Kevin Gima. I earned my physics degree at University of Maryland, College Park, in May 2018 and subsequently moved to North Dakota State University to obtain my masters degree. Specifically, I was admitted through the APS Bridge Program, a program dedicated to increasing the number of underrepresented minorities in physics. After a semester of researching different advisers, I decided to go with Dr. Dmitri Kilin, a professor in the Department of Chemistry and Biochemistry. Dr. Kilin specifically conducts research in computational quantum chemistry. He uses computers to predict the quantum mechanical properties of nanomaterials. After taking a class in the subject matter with him, I learned new computational skills needed for my research project. I am currently investigating the properties of lead telluride (PbTe) nanowires to confirm their utility in semiconductors. In my spare time, I practice Nichiren Buddhism, exercise, and watch superhero movies and TV shows.

Peltier Award for Teaching Innovation

Our physics faculty member Dr. Mila Kryjevskaia is one of two recipients of the 2019 Peltier Award for Teaching Innovation.



Mila Kryjevskaia

Education Research and her inspiring passion for physics. We congratulate Mila for this highly-deserved recognition.

This award is given to an outstanding educator whose innovative teaching techniques have contributed to enhancing the educational experience of students at North Dakota State University. In our Physics Department we all already knew that Mila is an exceptional teacher who has the rare ability to combine rigorous evidence-based scientific approaches to teaching effectiveness with dedication, enthusiasm, and caring. Among the ingredients that enable her to do so is her expertise and leadership roles in Physics

NSF Graduate Research Fellowship

Brianna Santangelo is the recipient of a 2019 National Science Foundation Graduate Research Fellowship. This prestigious

award is a significant national accomplishment that our entire Physics Department is proud of. The funding will support Brianna on her path toward a PhD in physics; her field is Physics Education Research and her advisor Mila Kryjevskaia.

New Collaboration with Brazil

By ALEXANDER WAGNER

Last summer a new collaboration between Luben Cabezas Gomez of the Mechanical Engineering Department of São Paulo University (São Carlos Campus) in Brazil and Alexander Wagner from NDSU was initiated. Professor Gomez visited NDSU for one week in May 2019 to discuss a



Luben Cabezas Gomez

collaboration on developing effective lattice Boltzmann methods for the simulation of boiling for more effective heat transfer. This also gave him the opportunity to get to know the students in Dr. Wagner's group. As part of this new collaboration Prof. Gomez is participating in weekly group meetings remotely via Skype, and Dr. Wagner will visit his group in Brazil in December. PhD Students from Prof. Gomez' group will come to NDSU early in 2020 to spend a year at NDSU. We expect to add more about this exciting new collaboration in next year's newsletter.

Faculty Publishes in Nature Communications

The research group of our faculty member Dr. Andrew Croll has had a recent work, titled "The compressive strength of crumpled matter," published in the high-impact, open-access journal Nature Communications. The work is focused on understanding the strength of a crumpled ball – a rigid object created from a thin film (such as paper). Such an object is a complex collection of folds and verticies that somehow collectively give the system a significant resistance to compression. The system has potential for use as an engineering material akin to a foam, but one that is much more easily produced. Support from the Vice President for Research and Creative Activity and from the Deans of the College of Science and Mathematics and the Graduate School is acknowledged.

Fulbright Fellow from Argentina

By ELENA RUFEIL FIORI



My name is Elena Rufeil Fiori, I am an Assistant Professor at the Faculty of Mathematics, Astronomy, Physics and Computational Science of the National University of Cordoba, Argentina. I completed my PhD in Physics at that university, and I am currently conducting research in the field of biological soft matter. Through a Fulbright scholarship for visiting professors I came to the Physics Department at NDSU to work for three months with Dr. Sylvio May.

I became very interested in his publications because of their depth and clarity. I am very pleased to have started this collaboration because, in addition to being part of an exciting project, I have been able to engage in many fruitful discussions with Dr. May and his group members. I am grateful for this time commitment.

I would like to thank all the people in the Physics Department for being very friendly and kind, making me feel comfortable and part of the community, and for helping me settle in during my first weeks in Fargo. In the short time of two months since I arrived, we have started and almost finished an entire project, and we are discussing ideas for future extensions. Moreover, I was invited to give a talk and had great conversations about it, which I also deeply appreciate. My overall experience in the Physics Department has been excellent. I am very grateful for all the time and help received by all the people from the department, and I would love to return in the future and further develop this relationship.

University Physics Competition

Three groups of students from the Physics Department excelled during the 2018 University Physics Competition. One team earned a silver medal and two others received bronze medals in the contest held Nov. 9-11. One group – with Reed Petersen, Sean Gunderson, Jacob Abrams – solved Problem A “Sending a Light Sail Propelled Nanocraft to Alpha Centauri” and was ranked on the level of Silver Medal (185 teams participated). A second group – with Matthew Kurtti and Brandon Molina – also solved Problem A and was ranked on the level of Bronze Medal. Our third group – with Matthew Schoenecker and Noah Seekins – solved Problem B “Compost Pile Sizes” and was ranked on the level of Bronze Medal (96 teams participated).



The certificate for our silver medal winners, Reed Petersen, Sean Gunderson, and Jacob Abrams

2018-19 Awards, Graduates, Donors

Faculty Awards:

*Peltier Award for Teaching Innovation: Mila Kryjevskaia
NDSU Advancing Inclusion Award: Physics Department
CSM Ambassador Excellence Award: Sylvio May
NSF Graduate Research Fellowship: Brianna Santangelo*

Student Awards:

*Horvik Award: Eric Huus, Kirk Staiger
Sinha Scholarship: Jose Agudelo, Jens Johnson
Physics Achievement Award: John Spaight, Sean Gunderson
Darrell and Carol Strobel Awards:
– Graduate Research: Kyle Strand
– Graduate Excellence: Brianna Santangelo
– Undergraduate Excellence: Sean Gunderson
2019 Avenues of Discovery: 2nd place for Best Graduate Student Science Booth (Alistair McIntrye, Lina Alhalhooly, Tim Twohig, Jamie Froberg, Rachel Downing, Brian Farlow, Wathsala Jayawardana, and Deyan Mihaylov)*

Graduates:

Jacob Abrams (BS Physics, Fall 2018); Sean Gunderson, Brandon Molina, Landon Johnson, Daniel Becker, Reed Petersen, Matthew Kurtti (BS Physics, Spring 2019); Kristopher Heinle-Bodvig (BS Physics, Summer 2019); Jacob Connelly (BS Electrical Engineering and Physics, Spring 2019); Lina Alhalhooly, Mohammed Alziyadi, Mahmud Sefannaser (MS Physics, 2019); Cody Gette, Deyan Mihaylov (PhD Physics, 2019)

Donors:

Darrell Strobel, Harold Korb, Ping He, Mark Novotny, Marna and John Loucks, Cherish Bauer-Reich

The Department of Physics wishes to thank all donors who have contributed to our scholarship programs. You are making a significant difference in the lives of our students.

Your continued financial support is requested to keep the scholarship and awards programs growing.

Donations can also be made at www.ndsualumni.com/donate. Please select "Other" from the "Designation drop-down box and type "Physics Development Fund" or the name of a particular award (see below) in the box that appears.

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Thank you!

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