

UNK PHYSICS & ASTRONOMY NEWSLETTER

2022-2023 Academic Year

STUDENT WATER ROCKET COMPETITION



Sponsored by Royal Engineered Composites, our 2022-2023 student Water Rocket Competition was a blast for all six competing teams. Held the Wednesday after Spring Break, winners competed to see who could have the longest flight time. Competition was fierce but fun. Team Lifty walked away with first prize; second and third went to the Rocketeers and The Pirates respectively. Students are looking forward to using the prize money to buy books for the upcoming school year.

For more, go to <http://go.unk.edu/rocket>

WEST CAMPUS STEM LEARNING COMMUNITY

The results are in for West Campus STEM's 2022-2023 End-of-Year survey! Here are a few fun facts about our learning community:

West Campus STEM is for majors in either the Physics Department or the Math Department. ALL students who were departmental majors indicated that West Campus STEM has helped them form friendships during their first year with other students who share similar interests.

One hundred percent of students who participated in the West Campus STEM study sessions believe that the study sessions improved their overall success as college students and positively impacted their grades.

All departmental majors who participated in this survey stated that they feel better connected to their future careers and career goals because of their participation in West Campus STEM.

According to one West Campus STEM student: "Getting help from teachers at the study sessions helped me out more than words can express at the beginning of college. I also appreciate the break in my week to have fun with stuff I'm interested in."

For more information go to www.unk.edu/wcs

STUDENT NEWS

OUTSTANDING SENIOR BROOKE CARLSON

Brooke Carlson was selected to receive one of four UNK outstanding senior awards. This honor recognizes seniors for excellence in scholarship and leadership, involvement and dedication



to UNK and the Kearney community. Brooke Carlson (Elkhorn, NE) graduated in May with dual degrees in physics (emphasis in pre-mechanical engineering) and mathematics. She will attend UNL to pursue a master's degree in mechanical engineering and serve as a graduate teaching assistant. During her time at UNK, Brooke participated in multiple engineering internships with Baldwin Filters and was a rockstar on the UNK Women's Basketball team. Congratulations, Brooke!

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UNK SCIENCE DAY

UNK Science Day is for high school juniors and seniors interested in the sciences. This year we were excited to offer three sessions for UNK Science Day; these sessions were in the fields of physics, engineering, and astronomy (planetarium). Other sessions for that day included biology, chemistry, health sciences, mathematics, and wildlife. Our first science day on November 22 filled to capacity, so a repeat overflow session was hosted on January 27 (also filled). As one attending high school student said of the event, "I really loved it and it gave me more of an inside view on college and made me feel more comfortable with my thoughts about attending a university."

For more, go to <http://go.unk.edu/scienceday>

CAREER INFORMATION EVENT

Geared for high school and undergraduate students interested in Astronomy, Engineering, Physics and Mathematics, our Career Information Events occurred on October 12 and November 16 in Discovery Hall.

For more, go to <http://go.unk.edu/careerdiscovery>



EMPOWER CAMP

In May, our department participated in the EmPOWER Girls Science Camp for 7th and 8th Grade Girls, sponsored by UNK Women's, Gender, and Ethnic Studies, and held in Discovery Hall. The day camp was free to campers and helped encourage girls in their scientific interests. UNK Physics was able to support the hosting of individual sessions in engineering, physics, and astronomy, as well as provide a planetarium show to campers and their families.

For more, go to <http://go.unk.edu/empowercamp>

APES CAMP

In May, we hosted our second annual Astronomy, Physics & Engineering Summer Camp ("APES" Camp). Twenty-three incoming high school sophomores, juniors and seniors registered; 13 were independent registrations and 10 came from a grant-funded shuttle that we were able to provide to Grand Island Senior High. Water rockets were one of the most popular activities, but students also enjoyed making pan pipes, doing engine design with CAD, and conducting solar observations (among other activities). According to one student, "I had a lot of fun. I learned a lot and found out more about what I want to do, thank you so much!"

For more, go to <http://go.unk.edu/apes>



"I had a lot of fun. I learned a lot and found out more about what I want to do, thank you so much!" -APES Camper 2023

OUTREACH HIGHLIGHTS

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ALUMNI SPOTLIGHT ADAM SCHLOTTHAUER

3+2 DUAL DEGREE PHYSICS & ENGINEERING

DEGREES BS in Comprehensive Physics (UNK), BS in Electrical Engineering (UNL), Masters of Engineering Management (UNL)

EMPLOYER University of Nebraska, Department of Facilities, Planning, and Capital Programs

ADVICE FOR STUDENTS Be prepared to get frustrated. A big part of this work is going to be dealing with situations in which you don't have the answers but people think you do. Don't be afraid to tell them you don't currently know but will find out. As engineers, we may not have the answers right away, but we have the capability of finding out what we need to know and applying them wherever needed. Just don't give up!

INSPIRATION After a few semesters, I wasn't sure I was cut out for electrical engineering. The math and concepts were tough and it wasn't sticking nearly as easily as things came in high school. However, my girlfriend (now wife) Hannah was always in my corner and supported me the whole way through. She encouraged me to get help often and I became very familiar with looking to find resources to get what I needed instead of trying to do it all on my own.

LIFE ADVICE Take time to enjoy college. Try new things and meet people. Many of them (including professors and mentors) will enjoy talking with you in the future. When you are out into the working world, work hard but play harder. It is so very important to live life and not live to work. Obviously, if you love what you do, that is great. But you also need to take time for family and friends. Focusing solely on work is a surefire way to get burnt out no matter what you do. Take breaks, take vacations, join clubs, build a family, and never stop trying to have fun.



ROAD TRIP TO UNL ENGINEERING'S LABS AND SENIOR DESIGN SHOWCASE

The Friday before finals, UNK Physics & Astronomy and the Engineering Foundation program provided a shuttle to UNL where our students had a fantastic visit with UNL's College of Engineering. Dr. Yayu Peng drove the shuttle, and Dr. Ken Trantham joined to attend the showcase.



UNK Engineering students toured lab spaces, checked out UNL Engineering's school culture, and finished their trip by visiting the senior design projects at the UNL College of Engineering Senior Design Showcase. If you're an engineering student, it's always a good day when you get to see a bit of what your (bright!) future looks like!

For information about engineering at UNK go to: www.unk.edu/engineer

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NEW FACULTY SPOTLIGHT ALEKSANDER WYSOCKI

Dr. Aleksander Wysocki completed his undergraduate studies at Adam Mickiewicz University in Poland and obtained his PhD degree in Physics from the University of Nebraska-Lincoln in 2009. Before joining



UNK, he worked as a researcher at Cornell University, Ames Laboratory and Virginia Tech. Dr. Wysocki's research interests are in computational materials science and focus on magnetic materials and their applications in spintronics, energy science, and quantum information technologies. Within EQUATE Dr. Wysocki investigates new qubit materials – discrete two-level quantum systems with controlled mutual interactions that can be externally manipulated and measured with high fidelity, but at the same time are well-isolated from the environment such that they preserve quantum coherence for a sufficiently long time.



Armstrong and Dr. Aleksander Wysocki; two post-doctoral fellows, Dr. Neelam Shukla and Dr. Monirul Shaikh; and undergraduate student researcher Douglas Davidchik. The EQUATE grant's stated goal is to "bring Nebraska to the forefront of scientific discoveries and innovation in the design, synthesis, growth, and use of materials and hybrid systems with large-scale quantum properties for applications in sensing, metrology, communication, and information processing." Currently, Dr. Armstrong is studying two and three dimensionally trapped gases which are dipolar in nature. These gases have a preferred direction of symmetry and having them interact with impurities with different orientations holds promise for future application.

NEW EQUIPMENT BRINGS NEW RESEARCH POSSIBILITIES

Dr. Diganta Dutta's research aims to characterize the cells and tissues in nano and atomic scale and measure the mechanical properties of these cells, which have tremendous applications in disease states such as cancer. His team is working on imaging normal, early, and late-stage breast cancer cells, using nano and atomic scale imaging in physiological conditions and Nano mechanical analysis of these cells with high and low glucose treatments in different time intervals using the department's new NanoWizard® Sense+ Atomic Force Microscope (AFM). AFM is a versatile tool with the ability to characterize surfaces and analyze mechanical, chemical, electrical, and thermal properties of samples. Using this tool, the team will map the surface charge density between probe and samples in chemical solution. AFM supports interdisciplinary research tracks: biomechanical, Nanoscale heat transfer measurements and Colloidal Transport Phenomena.



The EQUATE (Emergent QuAntum Materials and Technology) grant was awarded in April 2021 and started June 2021. This grant includes 20 PI's from four Nebraska Institutions (UNK, UNL, UNO, and Creighton University), led by Dr. Christian Binek at UNL and including two faculty in the UNK Physics & Astronomy Department, Dr. Jeremy