Department of
PHYSICS alumni newsletter
www.ndsu.edu/physics
NDSU NORTH DAKOTA STATE UNIVERSITY

October 30, 2017

Greetings Alumni and Friends

Studies from the United States suggest that the quality of teachers is the single most important factor affecting student performance. When I talk to prospective students, they frequently tell me their desire to study physics originates in a specific high school teacher, often someone very enthusiastic and engaging. How does this emphasis on individual teachers – living people – fit into our age of digital transformation where online access to course offerings minimizes, or even eliminates, the need to physically be in school or on campus? After all, virtually all information is available to everyone at any time at every location, and high-quality lectures from top instructors at the finest educational institutions are readily available on YouTube. So, what is the role of analog (as opposed to digital) student-teacher interactions, and what do we want these interactions to look like in the future?

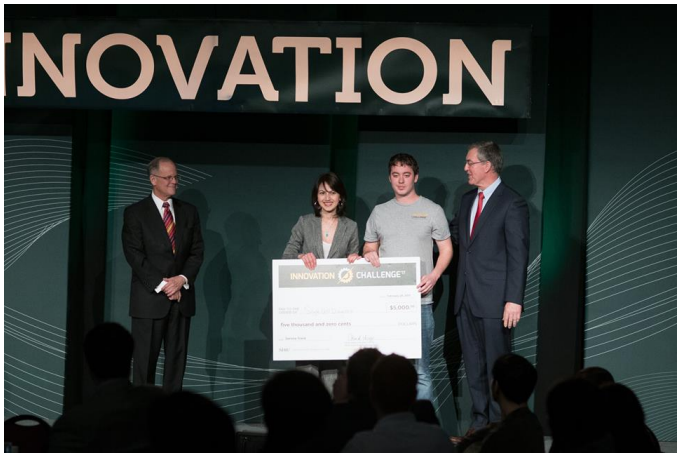
Fast forward 50 years. Our institution still exists (what a relief!), yet without offering anything that even remotely invokes the notion of "traditional instruction" or "large enrollment." Most technical skill-focused programs have vanished from campus or are replaced by virtual reality applications. Plain online instruction was never on a par with the classroom experience, but now, with AI having outgrown its infancy, it is so much more effective and cheaper to subscribe to the "acquire-the-skills-at-home" workforce development. Yet, Universities still exist. Not all survived, but those who did thrive again. Their "classes" (to use that outdated terminology) are physical meetings of professors with a small number of highly ambitious students, who jointly engage in the experience of human creativity. Sure, they make full use of AI, but not the other way around. The new university is a nursery of creativity and a renaissance of the human perception, where originality trumps repetition, and where inspiration shapes human personality.

Back to today's reality and our department. It is a small department. Small in size and thus vulnerable to cuts in budget and personnel. However, our classes have just the right size to truly engage every student, to enlighten their inspiration and ignite their creativity. All of our undergraduate students engage in original research: at least 20% of them will become authors on peer-reviewed publications before they graduate. They will form long-lasting relationships with professors and fellow students that will not only prepare their future careers but also develop their personality and shape the way to view our world. So, yes, we embrace the "analog" student-teacher interactions because we think they continue to play a key role in the future.

Sylvio May, Department Chair

Innovation Challenge

Science leads to global innovation and technological advancements. A pair of NDSU graduate students have developed an early detection method for pancreatic cancer that could have far-reaching effects for patients worldwide.



NDSU graduate students Fataneh Karandish and James Froberg earned first place in the Service category of Innovation Challenge '17.

James Froberg from the Department of Physics and Fataneh Karandish from the Department of Pharmaceutical Sciences proposed a detection process that uses a single drop of blood and a microchip. James' advisor is Dr. Yongki Choi, a faculty member from the Department of Physics.

The microchip responds to the presence of pancreatic cancer cells in the blood when exposed to an electric current. The current's intensity decreases with the presence of pancreatic cancer cells in the blood. The innovation could diagnose the disease long before any symptoms are present.

The project, titled "Single Cell Diagnosis", earned Fataneh and James first place in the Service category of NDSU's Innovation Challenge '17 for creating a novel way to test for cancer.

Quadrennial Physics Congress

By CLAY CARUFEL

The Quadrennial Physics Congress (PhysCon) brings together physics students, alumni, and faculty members for three days of frontier physics, interactive professional development workshops, and networking. It is the largest gathering of undergraduate physics students in the world! Hosted by Sigma Pi Sigma, the physics honor society, anyone interested in physics is invited to attend.

Our Physics Majors at the PhysCon. From left: Clay Carufel, Daron Dykes, Landon Johnson, Reed Petersen, Jacob Abrams, and Vijay Shah.

On November 2nd, 2016, seven of NDSU's Society of Physics Students traveled to San Francisco, CA for the Quadrennial Physics Congress. While there we attended events at the conference, toured national laboratories and museums, and explored the city.

Some of the events we took part in at the conference included plenary talks, breakout sessions, an event called Breakfast with the Scientists, and a dance party. Plenary talks were delivered by distinguished scientists including Nobel Laureate Eric Cornell and Jocelyn Bell Burnell. The breakout sessions were an excellent learning experience for us as they addressed topics including graduate school and careers for physics students.

PhysCon also gave members of our SPS chapter the opportunity to see some very cool national labs and museums. One group of our chapter toured the SLAC National Accelerator Laboratory and another group toured the California Academy of Sciences. A highlight of the SLAC tour included a visit of their dark matter detection lab. A highlight of the California Academy of Sciences tour was a journey through the cosmos in their planetarium.

During our time in San Francisco we also found time to explore the city. Some of the things we did included walking over the Golden Gate Bridge, touring famous neighborhoods, eating out, and strolling through Golden Gate Park. Our trip concluded on November 6th when we returned back to Fargo. SPS received partial funding for the trip through the NDSU Student Government. SPS wants to thank Warren Christensen for advising us on matters concerning the trip.

K-12 Students Visit Physics Department

On October 6, 2016, a group of 50 mostly home-schooled students, ages 5-18, visited and toured the physics department. We had a number of undergraduate and graduate students as well as faculty organize and support this event.

Physics major Sean Gunderson (left) working with elementary and middle school students during their visit of the Physics Department.

Graduate students, Guilherme Bossa and Brian Farlow, present physics experiments during a visit of K-12 students on 10/06/16.

NDSU hosts Upper-Midwest Computational Workshop

By ALEXANDER WAGNER

The NDSU Physics Department hosted a double-header meeting on Saturday, April 29, 2017. The morning consisted of a PICUP meeting and the afternoon of an American Association of Physics Teachers (AAPT) meeting. PICUP stands for Partnership for Integration of Computation into Undergraduate Physics: this is an NSF-funded effort to promote the use of computation in the undergraduate curriculum. The organizers have developed a set of helpful tools that introduce students to computational methods on a fundamental level, suitable for inclusion in introductory physics classes. During the morning, organizers demonstrated some of these useful tools in hands-on demonstrations where we examined the effect of air-resistance on falling objects.

In the afternoon, a regular AAPT meeting was held in the same room in South Engineering and much of the same crowd attended: we were able to hear about teaching experiences with novel approaches, both successes and promising ideas that did not pan out in practice as well as expected.

It was a unique opportunity for about 30 local physicists from an area roughly demarcated from Bismarck to Sioux Falls to Minneapolis to Grand Forks to come together at NDSU and meet. We provided a lunch and a coffee break featuring homemade bread, cheese, meat, vegetables and other healthy nourishment, which is unlike much of the catered conference "refreshments," and several attendees commented that this was very much appreciated. We enjoyed seeing many familiar and unfamiliar faces in South Engineering.

2017 Distinguished Alumni Award Recipients: Harold Korb and Darrell Strobel

By ANDREW CROLL

The College of Science and Mathematics has awarded the 2017 Distinguished Alumni award to the entire physics class of 1964! The year, of course, had only two graduates. Nevertheless, both went on to have remarkable careers after finishing their degrees at NDSU. Harold Korb specialized in solid state physics while working in industry (receiving a Ph.D. as well) and contributed significant technological advances to the generation of high purity single crystal silicon. Harold's work has lead to the creation of pure single-crystal silicon wafers that serve as the foundation for the countless integrated circuits of the modern world.

The Dean of the College of Science and Mathematics, Dr. Scott Wood, has just presented the Distinguished Alumni award to Darrell Strobel (left) and Harold Korb (right).

The work continues, with new techniques increasing purity and allowing the continued shrinking of circuit feature sizes.

Harold's classmate Darrell Strobel stayed in the academic world, choosing to specialize in planetary physics. Darrell has lead a distinguished career contributing to our understanding of the atmospheric physics of many planets and moons in our solar system. Notably, Darrell played a significant role in the Voyager Mission and more recently in the New Horizons mission to Pluto. Congratulations to Harold and Darrell on the well-deserved award!

Attending the Conference for Undergraduate Women in Physics at University of Wisconsin-Madison

By MARTHA SLOAN

The Conference for Undergraduate Women in Physics, which took place January 13-15 at the University of Wisconsin-Madison, was a very inspirational and educational conference. The speakers talked about their journey to get to where they are now, the hardships they had to face, and the research that they completed. Some undergraduates also discussed what they had or are currently researching and there were quite a few interesting topics. I was able to talk to many female researchers and other undergraduates, and I even made friends! The small group parallel sessions on Saturday provided me with tips for furthering myself in not just physics, but in all other aspects of life as well.

There was a career panel at the conference where each person explained what their job entails. There was one lady on that panel who is a physicist in industry, one who is a librarian, two who are teachers, one who works at a national laboratory (and was promoted to head of her division the day before this panel took place), and one who works at a museum. Each of those ladies had a Bachelor's in Physics but their resulting careers were very different.

One of the main ideas of the conference was that physicists are exceptionally good problem solvers and can therefore be anything they want to be. Another was that just because you're different from other people in your field, doesn't mean you're any worse than them. You are as great as you make yourself to be. Don't be afraid to ask questions just because you think it'll make you look stupid.

The conference helped boost my confidence, gave me inspiration, and provided me with skills and tips that will help me throughout the rest of my life. I encourage other gender minorities in physics to attend this conference in the future.

I am very thankful to Dr. Darrell Strobel for his support in allowing me to attend the CUWiP conference! It was a very insightful, inspiring, and empowering conference, and I'm extremely grateful I had the opportunity to attend.

Carly Snell receives Astronaut Scholarship

Carly Snell, an NDSU senior majoring in physics, has been selected to receive the prestigious Astronaut Scholarship Foundation scholarship for the 2017-18 academic year. She is one of 45 students from across the country to be selected for the $10,000 scholarship. Here is what Carly said about her selection: "I was honored to be chosen as a recipient of the Astronaut Scholarship. Not only does this award support me financially, it also provides mentoring and networking opportunities now and for years to come. In September, I had the opportunity to travel to Washington D.C., where I toured facilities such as Lockheed Martin, the National Geospatial-Intelligence Agency headquarters, and NASA's Goddard Space Flight Center. I also had the chance to meet and network with executives from NASA and various aerospace companies, and I met NASA astronauts like Al Worden, Cady Coleman, and several others. The scholarship and these experiences have reinvigorated my passion for physics and astrophysics, and I am working with even greater focus toward a future career in this field."

Astronaut Scholarship awardee, Carly Snell (middle), with NASA astronauts Alfred Worden and Catherine Coleman.

Former Physics Chairman David G. Worden

David G. Worden, 93, a former chairperson of NDSU's Physics Department, passed away at his home on Friday, April 21, 2017.

David pursued his interest in physics, graduating with a bachelors degree from Earlham College in 1950, then earning his Ph.D. in physics from Iowa State University in 1956. After completing his doctorate, David and Elizabeth moved themselves and their now two young children to Schenectady, NY where David was a research physicist at the General Electric Research and Development Center. David left GE in 1961 and moved to Pasadena, CA where he served as manager of the Electron and Image Device Department of Electro-Optical Systems, Inc. a subsidiary of Xerox Corporation. In 1967 David accepted the position of chairman of the physics department at North Dakota State University in Fargo, ND. Eighteen months later, he was promoted to the position of vice president of academic affairs at NDSU. David and Elizabeth were avid sailors, and in 1979, the pull of living closer to the ocean led them back to Schenectady, NY where David worked again at the GE Research and Development Center as the director of university relations. David was most at peace when sailing. Upon retirement from GE he and Elizabeth committed to live on their 31-foot sailboat. They spent four delightful years sailing from Nova Scotia to the Bahamas before settling back in the Capital Region. During his life, David was active in the community. He served on the board of directors for the Fargo-Moorhead Symphony and the Fargo Moorhead Community Theater in ND and the Guilderland Public Library Board in NY from 1991 to 2000. In addition to his family and sailing, he loved music, books, the study of philosophy, fishing with his son David, and a good party.

Permission to reprint the obituary was received from Christine Worden through New Comer Cremations & Funerals.

Research Experience for Undergraduates at UC Davis

By THOMAS BLOMMEL

This summer, I took part in a Research Experience for Undergraduates (REU) at UC Davis. Working under Dr. Richard Scalettar, my project focused on the Holstein model, a numerical model meant to analyze the interactions of phonons with electrons in a solid. Surprisingly, the critical temperatures of the Holstein model have not been well understood at all, in fact, the values given in the literature vary largely.

What I did was to carefully analyze the critical temperature of the model and its dependence on parameters such as phonon frequency and the strength of the electron-phonon coupling. Over the course of the program, I learned a lot about hard condensed matter and their simulation methods. Hard condensed matter deals with systems in which quantum mechanics becomes very important, and so Quantum Monte Carlo methods must be used. This project was a great fit for me as I already have had a lot of experience writing Monte Carlo code and using bash commands. I learned how to code in Python, became more proficient with writing and generating bash scripts and introduced myself to more numerical methods. The summer was a great success and my work is planned to be included in two publications that the research group are working on currently.

40 Years of Service

By SYLVIO MAY

Patty Hartsoch, our Department's Academic Assistant, has been serving NDSU for 40 years. Patty's contributions were recognized in the Physics Department on May 1 and at NDSU's Staff Recognition Social on April 20, 2017. Patty is an outstanding person who has helped our department for many years – virtually all the time since I joined NDSU in 2005 – to be stable and thrive. Other physics faculty – especially our former Department Head, Daniel Kroll – share this view. Since summer 2017, Patty is splitting her work with two departments: Physics in the morning and Geosciences in the afternoon. This is part of a recent staff restructuring in the College of Science and Mathematics. Nevertheless, Patty continues to be a central element in the workings of our Department: her knowledge and experience are indispensable. Congratulations to Patty! She has done a great service to our Department and to the University community.

2016 – 2017 Awards, Graduates, and Donors

Faculty Awards:

CSM Award for Excellence in Mentoring: Alan Denton

Student Awards:

Horvik Award: Anna Renner, Luke Stevens, Erin Richards
Sinha Scholarship: Vijay Shah, Martha Sloan
Physics Achievement Award: Vijay Shah, Thomas Blommel,
Physics Achievement Award: Carly Snell
Graduate Student Research Award: Guilherme Bossa
Undergraduate Student Travel Award: Martha Sloan
AAPT outstanding Teaching Assistant Award: Kyle Strand
AAPT outstanding Learning Assistant Award: Scott Jezusko
Astronaut Scholarship: Carly Snell

Graduates:

Martha Sloan, Clay Carufel, Vijay Shah, Jacob Schulze (BS Physics, Spring 2017); Alistair McInerny, Abu Taufique (MS Physics, Spring 2017); Brian Farlow, Kyle Strand (MS Physics, Summer 2017);

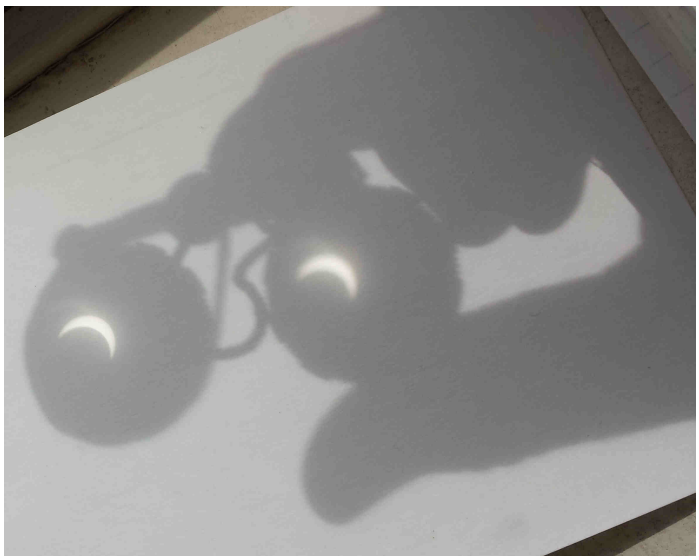
Donors:

Harold and Anne Korb
Scott Fricke
Scott and Carol Strand
Orven and Deborah Swenson
John Loucks
Dan Chen

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.

August 21, 2017 Partial Solar Eclipse in Fargo

A partial solar eclipse on August 21, 2017, kept us all at awe. Although Fargo was not in the path of a total eclipse (and will not be until 2099), about 400 students, staff, faculty, and community members gathered in front of South Engineering to observe the event through safety glasses that the Physics Department had acquired prior to the event. The image below shows faculty member Andrew Croll using a pair of binoculars as eclipse projection device.



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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☐ Darrell and Karen Strobel Endowment Fund

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Thank you!

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We are eager to hear from our alumni. Please send an email or note to update us on what's happening in your world.

Email updates to:
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