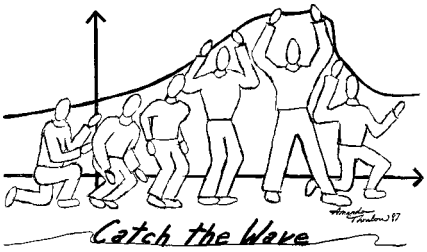

The Wave Packet

The UMD Physics Newsletter

Issue No. 6 ***Spring 2001*** ***http://www.d.umn.edu/physics/newslett/newslett.htm*** ***Editor: J.R. Hiller***

Neu(trino) Hire: Alec Habig

The department has expanded temporarily, with the arrival of a new faculty member last Fall semester as a pre-replacement for Tom Jordan. Alec Habig joined the department then, coming from a post-doctoral research position at Boston University, where he worked on the Super-Kamiokande and MACRO neutrino and cosmic-ray experiments.

The proximity of Duluth to the Soudan Mine in Tower, MN allows Habig to join in the new MINOS experiment. MINOS stands for Main Injector Neutrino Oscillation Search, and upon becoming operational in early 2004 will send a beam of neutrinos created by the Main Injector at Fermilab National Accelerator Lab (near Chicago) 735 km to the north to a 5 kiloton steel and scintillator detector in the Soudan Mine. Habig is building part of the experimental control system, in order to monitor the status of the experiment and the electronics acquiring the neutrino data.

This experiment will allow a detailed study of the neutrino flavor oscillations previously observed by the Super-Kamiokande experiment, using neutrinos coming from cosmic-ray interactions with the Earth's atmosphere. Super-K is a 50 kiloton water Cherenkov detector in a zinc

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Jordan Set to Retire

This May Professor Thomas Jordan will retire after 31 years as a faculty member at UMD. He joined the UMD Physics faculty in 1970, became Head of the Department in 1984, and served in that capacity until 1995. He contributed to and oversaw substantial growth in the research activity of the department and in the size of the graduate program. He has been a major contributor to the liberal education program of UMD, both in Physics, with special courses in Newtonian mechanics, quantum mechanics, relativity, and cosmology and in the co-taught "core curriculum" project.

Many years prior Jordan was a student at UMD, graduating with a B.A. in 1958 as a double major in Physics and Mathematics. He then went to the University of Rochester for a Ph.D. in Physics, remaining an extra year as Instructor. After postdoctoral work at the University of Bern in Switzerland, he became a Physics faculty member at the University of Pittsburgh and was an Alfred P. Sloan Research Fellow. He left that faculty position to return to UMD. During his years at Pittsburgh and UMD he spent many summers and quarter leaves visiting other institutions, including the International Centre for Theoretical Physics in Trieste and the Centre for European Nuclear Research (CERN) in Geneva, and held a Fulbright Fellowship at the University of Gottingen.

Although retired, Professor Jordan will continue his research and continue teaching on a voluntary basis. Next year he will be delivering the graduate mechanics course. He can still be reached at his regular office phone number and e-mail address.

Inside this issue

Hanson Scholarship

Through the good graces of alum Roger Pilon (BA, '63), the Department has established a new scholarship in honor of its first department head, Howard Hanson. The scholarship will be awarded to support students doing research, just as the Olson Scholarship has been used, but with a focus on advanced undergraduates rather than those just beginning. The first award is expected to be announced in May 2001, as this newsletter goes to press.

Professor Hanson came to UMD in 1947 as an assistant professor in a new 4-member department. He had graduated from St. Cloud State with a B.S. and the University of Wisconsin-Madison with a Ph.D. in Physics. He became Department Head in 1951, when the position was created, and remained Head until 1984, just prior to retirement. Thomas Jordan took over as Head and John Hiller was hired to fill the faculty position.

While a faculty member, Professor Hanson was active in both the American and the Minnesota Area Associations of Physics Teachers. He spent several summers at various research labs, including Oak Ridge, Holloman Air Force Base, and what was then the Lawrence Radiation Lab. In 1963 he held an NSF faculty fellowship in Sweden. As Department Head he was instrumental in leading the department to its present size, including the addition of the graduate program and increased emphasis on research, without taking away from the undergraduate teaching mission. The importance of research as a contributor to that teaching mission is reflected in the structure of the scholarship.

The Howard Hanson Scholarship Fund is open to additional contributions. Simply send a check designated for this fund to the Development Office at 315 Darland Administration Building, UMD, 10 University Drive, Duluth, MN 55812.

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mine under the Japanese Alps, which observes not only these atmospheric neutrinos, but neutrinos from the fusion in the core of the sun, perhaps proton decay (if it happens!), and neutrinos from supernovae - when the next one happens in the Milky Way or a nearby smaller galaxy. Neutrino oscillations provide evidence of a nonzero neutrino mass. This is something not predicted by the Standard Model of particle physics, and which also provides an additional piece to the puzzle of the "missing mass" in the universe.

In addition to MINOS, Habig continues to work on the Super-K experiment where he analyzes the high-energy end of the atmospheric neutrino spectrum and helps to coordinate the SNEWS SuperNova Early Warning system. SNEWS is a global network of neutrino experiments which hopes to provide advance notice of a nearby supernova, as the neutrinos escape from the exploding star several hours before the photons. Habig enjoys being involved with this astronomical research topic, having started out his career as an astronomer before becoming more involved with the properties of the cosmic ray particles themselves than the study of their astrophysical sources.

The MACRO (Monopoles, Astrophysics, and Cosmic Ray Observatory) experiment concluded last December, after more than ten years of observing neutrinos and cosmic rays (but unfortunately, no magnetic monopoles) from a highway tunnel underneath the Apennine Mountains in central Italy. Habig did his thesis work on MACRO, while a student in the Astronomy Department at Indiana University, graduating with a Ph.D. in Astrophysics in 1996. The thesis tried to verify earlier reports of possible point sources of cosmic rays. Cosmic rays, being charged particles, should get good and scrambled up by the galactic magnetic field, so if true these reports would have been quite puzzling. However, no such signals were found by MACRO, although the shadow cast by the moon in the cosmic rays was seen, as were the seasonal variations in the underground muon flux caused by the changing conditions in the upper atmosphere where the cosmic rays interact. Italy, it turns out, is also a pretty fun place in which to work on an experiment while in graduate school!

Joining Alec in Duluth are his wife Kim and son Karl. Alec is originally from Cincinnati, and while Kim is from Maine, she is a Carleton grad, so the family is enjoying being back in the Midwest and looks forward to raising Karl to also enjoy such activities as camping and canoeing. They got their first taste of cross-country skiing this winter, and look forward to plenty of practice at it in future Duluth winters. Indoors, Alec likes to mess around with computers and is a history and science fiction buff.

Gift Funds

Gifts to the Physics Development Fund, the Donald Olson Memorial Scholarship Fund, and the Howard Hanson Scholarship Fund may be sent to the Development Office, 315 Darland Administration Building, UMD, 10 University Drive, Duluth, MN 55812. The University is currently engaged in its "Campaign Minnesota" to improve the financial base from which it serves the state. If you have questions or would like further information regarding a gift of any type to the Physics Department, including estate planning, please call us or the Development Office at 218-726-6186.

In Memory of...

Todd O'Bey, who lost his battle with ALS on August 29, 2000, and Ronald Ylatupa (BA '60), who passed away on June 29, 1999.

New CSE Dean

The College of Science and Engineering has a new Dean! Sabra Anderson retired as Dean at the end of June 2000 and James Riehl was hired to replace her later that summer. He comes from Michigan Tech, where he was Chair of the Chemistry Department. Prior to Michigan Tech, he was on the faculty of the University of Missouri at St. Louis. He completed a Ph.D. in Physical Chemistry at Purdue and did postdoctoral work at the University of Virginia. He has continued an active research program in spectroscopy of optically active molecules and of lanthanides. His most sweeping innovation in this first year is to move the College toward wireless networking with handheld PCs, the Compaq iPAQ Pocket PC systems. Engineering and Computer Science freshman and faculty will have them for this Fall, and the rest will follow in the years to come.

The Water Column

by Elise Ralph

The Large Lakes Observatory members of the Physics Department have had a busy and productive year characterizing the fluid dynamical processes in lakes and the oceans on scales ranging from millimeters to hundreds of kilometers. These physical processes are important because they transport heat, momentum, nutrients, dissolved and particulate organic matter, sediments and contaminants through lakes and the ocean and thus play an important role in the water quality and biological productivity of the lake. Our research groups span the processes that govern the cascade of energy from large scales (where energy enters the system) to small scales (where energy is ultimately dissipated).

At the largest scale, the water in large lakes is thought to circulate along the shoreline in a counterclockwise circulation; however, surprisingly little work has been done to measure the strength, structure and variability of this flow. As part of an NSF-sponsored interdisciplinary project on examining how water, heat, momentum and biogeochemically important materials are transported across coastal margins, Elise Ralph has been measuring currents along Lake Superior's Keweenaw peninsula using moored instruments which have measured horizontal currents throughout the water column every hour for the past three years. After spending approximately 50 days during the summer of 2000 on Lake Superior and a short research trip on Lake Issyk Kul in Kyrgyzstan, Ralph spent much of this year at the University of Washington analyzing the data as part of her McKnight Land-Grant professorship.

Mesoscale eddies and jets in large lakes and oceans are like windstorms, which, superimposed on large-scale circulation, sweep sediments, chemicals and biota from one place to another and pump nutrients from deep water to the surface, thereby enhancing primary productivity. The interdisciplinary study group led by Meng Zhou extends their research on mesoscale nonlinear dynamics and ecosystem responses from Lake Superior to oceans around the world using both numerical modeling and field observational methods. In 2000, this group led one 4-day cruise in the western arm of Lake Superior and two 21-day cruises in the Barents Sea, Arctic onboard R/V Johan Ruud, and took part in two 19-day cruises off Oregon on R/V Wecoma. In 2001, this

group will take part in 2 cruises down to Marguerite Bay, Antarctic onboard of R/V Palmer and R/V Gould. The project in Lake Superior is funded by the University of Minnesota Grant-in-Aid Program and Sea Grant Program, and others are funded by the National Science Foundation.

Turbulence is the random motion of fluid at the smallest scales of fluid flow. Turbulence is caused by a variety of processes including wind stresses and buoyancy fluxes at the air-water interface, breaking internal waves in the interior, and drag at the water-sediment boundary. Studies of turbulence at the LLO are being conducted by Brian May and focus on direct measurements of mixing using a micro-structure turbulence profiler. The Self-Contained Autonomous Microstructure Profiler (SCAMP) measures millimeter-scale fluctuations of temperature in the water column. From these measurements, key turbulent parameters (vertical eddy diffusivity K) are inferred. In its first year of operation, SCAMP has been deployed a number of times from the R/V Blue Heron and R/B Noodin. Preliminary studies in western Lake Superior indicate varying levels of turbulence that depend on wind-forcing, stratification and proximity to boundaries. Measurements of turbulent mixing in Lake Superior will continue with goals of characterizing the spatial and temporal distribution in the lake and determining the effects of mixing on things such as the thermal structure, nutrient supply and transport of pollutants.

Being Who I Am

My name is Denise Ann Osterholm, but what may be somewhat confusing is that, in the fall of 1998, I was hired by the Physics Department as Don, to be the Lab Services Coordinator. I am actually transsexual, but please understand what that means. First of all, it has nothing to do with sex. What it does mean is that I was born with a brain that had developed to be female, but my chromosome structure developed my body as male. This condition is actually quite rare, occurring approximately once in every 10,000 births. There is no psychotherapeutic cure for transsexualism, because the only thing that's wrong is a mismatch of brain and body. Neither a healthy brain nor healthy body can be fixed, whether matched or unmatched. I grew up in a time when such things were not understood and were viewed as unacceptable. So for the better part of my life, I had to live as somebody I wasn't. I finally reached a point where I could not do that anymore.

In all other respects, I'm still very much the same person that I always was. In fact, to me very little has actually changed. Only now I can tell people who I am, instead of living in fear that someone may find out. The change is apparently more abrupt to other people, but being able to be who I am is a freedom of monumental proportion. The Physics Department and UMD have been extremely gracious to me. I've asked a lot, of a lot of people, but everyone has been absolutely great.

Alumni Visits

Several alumni have stopped by, including Ron Boe (BS '94), Richard Dumas (BA '62), and Roger Pilon (BA '63). Al Friebe, who did a research project some years back, also visited. A couple of us again met up with Allen Anway (BA '63) at the judging for the Northeastern MN Regional H.S. Science Fair. John Sorensen (BS '72) now spends much of his time in 395 MWAH, to where the equipment for trace analysis of mercury was moved with the closing of Rip Rapp's Archeometry Lab.

If you're ever in the area, please stop in. With some advance planning, we can arrange a chance for you to speak about your work, or other topic of interest.

Honors and Awards

The **Outstanding Graduate Teaching Assistant** for 1999-2000 was **Ryan Dorland**. He joined the graduate program after completing a BS in Physics at Mankato State. His MS is nearly complete, under the supervision of Professor Zhou.

Shawn Putnam received the **Outstanding Research Project Award** for 1999-2000, for his design and construction, with Professor Zhou, of a towed vehicle for physical and biological measurements in Lake Superior [Wave Pack. **5**, 3 (2000)]. Shawn will finish his B.S. this spring and begin graduate work at the University of Illinois-Urbana in the fall.

Catch Up with Past Grads

Brian Kohn, BA '66

The year I graduated from UMD in Physics was 1966. There were 4 physics majors that year, Prof. Hanson was the Department Head, and a diverse group of unique personalities made up the cast of physics professors.

It began with Prof. Likely whose dynamic presentations produced stories across generations of students. I know this to be true because I have traded stories about his classroom antics with my nieces and nephews who, 20 years later, were heir to his legacy. Prof. Olson's laboratories introduced me to a new and exciting world of experimental physics, and I'm sure Prof. Sydor was convinced that none of us physics majors quite got the picture, at least when it came to theoretical physics. Somehow, even through the struggles, I have always had a love for physics and am thankful for my many life experiences that have resulted from choosing physics as a career field.

Upon graduation two things happened that set the direction for my Life. One was meeting and marrying Barbara Lilleberg, a Minnesota farm girl who is to this day my sweetheart, and the other had to do with the military. In 1966, the Vietnam War was building, the military draft was in effect, and student deferments were only guaranteed until graduation. After that, all bets were off. Barb convinced me that it would be better to enlist than to be drafted, so I signed up with the Air Force hoping for leniency. That decision would lead us to experiences beyond my imagination. Life lesson: You never know what's around the corner.

Instead of being shipped off to Vietnam, the Air Force wanted to use my physics degree and sent me to work at the Air Force Weapons Laboratory in Albuquerque, New Mexico. It was the backyard of where the Atomic Bomb was developed, and it was the middle of the cold war with the Soviets. My first assignment had to do with investigating nuclear weapons effects. It included my first experience with supercomputers (actually, my first experience with computers of any kind), experimental studies of high pressure shock waves using gas gun im-

pacts, and actual down-hole experiments fielded at the Nevada underground nuclear test site. Amazingly, I went from trying to stay out of the military to a 20-year career in research and development. I even got a graduate degree in physics from the University of New Mexico, paid for by Uncle Sam.

Over the next twenty years I worked on development of technologies for conventional (nonnuclear) weaponry, taught physics at the Air Force Academy, and spent my final years in the military studying applications in plasma physics and high power microwaves. Upon leaving the military in 1987 I went to work with private industry, continuing my R&D activities as a member of the military industrial complex for another ten years.

Now I have come full circle. In 1997 Barb and I returned to Minnesota where I am teaching physics and engineering at Central Lakes College in Brainerd and have a farmstead to satisfy our needs for woods and wildlife. I am content. Thirty-five years ago I had no idea of what to do with a physics degree. It was just what I wanted to do. Looking back, I would not choose differently. I still enjoy the challenge of discovery and learning and remember those good old days at UMD like it was home.

P.S.: Barb and I love receiving visitors. Call, write, or stop by. 320-745-2300 16808 273rd St Ft Ripley, MN 56449, bkohn@gwmail.clc.mnscu.edu.

Tim Perala, BS '83, MS '85

When I was finishing up my undergraduate studies at UMD, the specter of having to face a job and the real world was not at all comforting. I was already married to Kathy (in 1982) and neither of us thought too much of moving away from our native Duluth. What does one do with a bachelor's degree in Physics if one of the requirements is living near Duluth? Well, one option was to stay in school at UMD. So I did, and entered the master's program with a teaching assistantship, and later a research assistantship.

As fate would have it, my first year as a graduate was Dr. John Hiller's first year at UMD. He must have drawn the short straw, teaching graduate Quantum Mechanics to me and a small but surly crew. We did our best to wear him down, but in the end he prevailed. The crew was mostly humbled.

Besides making my brain hurt, all that thinking led me to consider the prospects for a career as a physicist in the Northwoods. It didn't appear promising. Fishing guide was high on my list of alternative vocations. How does one leverage all of this hard-earned knowledge to find a life's-work around Duluth? Learning computer science might increase my options for employment, and with that thought I began taking CS classes along with my graduate work in physics. My physics concentrated on computer analysis and modeling. I also designed, coded and eventually installed a electric-field monitor and warning system. That system was based on a small network of PCs connected to some homegrown sensing equipment, including Don Olson's famed field-mills.

My first job after getting my MS in Physics was teaching at Mesabi Community College in Virginia, MN. I was commuting daily from Duluth, which was a drag, but the work was fun. I taught computer programming and electronics.

After a year at Mesabi, I took a job back at UMD in the Computer Science department as an instructor. I began taking graduate courses in CS between the classes and labs I was teaching. This stuff was easy compared to doing QM and ED. The CS department at UMD was gearing up to start their own master's program. When that happened I knew my job duties would largely be taken over by graduate teaching assistants. I figured I better keep my eyes open for a job with a bit more of a future. I didn't need to look too far afield.

A job opened up for a Systems Programmer in the UMD Computer Services department (later renamed Information Services, and most recently renamed Information Technology Systems and Services). I got that job and found myself right back in the UMD Physics building, MWAH. The job was really that of a computer systems administrator. I took care of a VMS/VAX system, and a few fledging Unix systems. Computer networking was just coming into its own, and our department was building out the campus ethernet network to all parts of the campus. We also had a relatively high-speed connection to the ARPA-Net, which was to become the now ubiquitous Internet. This was fun!

Over the years we saw the computer systems and network move from a tool for scientists and mathematicians, to a resource used by virtually every faculty and student on campus. Email was the big draw early on, then the world-wide-web happened, and soon the network and systems became an indispensable infrastructure for the institution. All the while the equipment and software supporting this infrastructure were expanding, and being replaced with newer technology. This was still fun!

In 1997 I moved on to a job at Minnesota Power as a Computer Network Analyst. It was hard to leave UMD after all those years, both as a student and as an employee, but it was time. Minnesota Power (since renamed Allete) is more than just the regional electric utility, it is a corporation that owns diverse companies across the country. I've been fortunate enough to be involved in information technology projects for several of these companies, although my main focus is with the local electric company. Right now I am doing systems and database administration for the electric company in Duluth. Basically, I care for large Unix systems running Oracle databases and associated software in support of both financial and operational functions. And yes, it's still fun.

I'm asked occasionally if I regret investing so much of my energy in studying Physics. "Wouldn't it have been better to get a degree in engineering or computer science, if you could do it over again?", I'm asked. Considering what my career has become, I suppose it would have been easier. But the answer is "No". Even if I had known then what I know now, I'd still choose Physics. Foremost, my studies in Physics at UMD has provided me with a vantage point to view the world in a way few people do. I guess only physicists can appreciate that view. I earned confidence (tempered with humility), tenacity, resourcefulness, and great problem-solving skills. I can't think of a better traits than those for success in life. I'm sure it will make me a better fishing guide, if I ever get that chance.

Do you remember me? Drop me a note at tperala@mnpower.com.

John Swenson, BS '93

After receiving B.S. degrees in Physics and Mathematics from UMD, I entered the Ph.D. program in Geology and Geophysics at the Twin Cities Campus, eager to study the subsurface hydrodynamics of sedimentary basins under the supervision of Mark Person. During my first year of graduate studies, I developed a strong interest in basin-scale sediment transport and basin-filling processes, i.e. the physics behind the formation of sedimentary basins, and added Chris Paola as a co-advisor. I was fortunate to secure funding from the National Science Foundation, in the form of a four-year fellowship, which afforded me tremendous freedom to work on a variety of research projects in pursuit of the Ph.D. Overall, my graduate experience was very enjoyable. I had numerous opportunities to interact with superb faculty, visiting researchers, and seminar speakers. My advisors were very generous with their time and money and encouraged me to broaden as a researcher and teacher. Consequently, I attended many research meetings and short courses and, most importantly, spent a year teaching at the University of Wyoming.

While in Wyoming, I learned that UMD was advertising a tenure-track position in surface processes and hydrogeology in the Department of Geological Sciences-what luck! Although I had not completed my thesis, I applied for the position and was fortunate to receive an offer. In addition, my partner, Christina Gallup, secured an equivalent, tenure-track position in the Department. Christina is a geochemist with degrees from the University of Chicago, Caltech, and the University of Minnesota (Ph.D.), where we met. Prior to arriving at UMD in the spring of 2000, she spent two years in a tenure-track position at the University of Maryland (College Park). We are very happy to live in this beautiful place and have the opportunity to continue our academic careers on an equal footing.

I started teaching at UMD in the fall of 2000 and am nearing the end of my first academic year. My courses include Hydrogeology, Geomorphology, Stratigraphy and Basin Analysis, and Physics of the Earth's Interior. I have been very busy developing and teaching courses, renovating my laboratory, writing proposals, recruiting graduate and undergraduate students for research, and maintaining an active research program. I just returned from co-leading a spring-break field trip to Death Valley and the Mojave Desert and soon will be departing for a research-related field trip to Utah. Despite the crazy schedule, I am thoroughly enjoying my new position.

My research program, which builds on my thesis work, is devoted largely to the study of basin-scale sediment transport, particularly on continental margins. The sedimentary rocks of continental margins provide the longest record of tectonics and climate; for example, on the Atlantic margin of North America, a 15-km-thick package of sedimentary rocks preserves 250 million years of Earth's history. The overarching objective of my science is to infer from patterns in the rocks the history of climate and tectonics, which together control sediment supply, subsidence of the crust, and sea level. The large uncertainties associated with observing and dating these rocks renders this a formidable inverse problem. My contribution to solving the problem focuses on developing theoretical descriptions of sediment dynamics on large spatial and temporal scales. Currently, I am developing a theoretical framework that allows the various "pieces" of continental margins, e.g. the coastal plain and the continental shelf, to communicate across dynamic internal boundaries, the positions of which are unknown a priori, on geological time scales. Internal boundaries, e.g. the shoreline, are important stratigraphic observables. Hopefully, my framework will provide a better understanding - in a forward-modeling sense - of how continental margins preserve a history of climate and tectonics.

A Sampling of Student Research Projects

Amanda Thralow, BS '97, MS '01

Professor Sydor has been working on the problem of light scattering from micron sized particulates for the last 17 years. This is an effort to decipher remote sensing data which includes light scattered from micron sized particulates in water. For example, the south shore of Lake Superior is eroding. The clay particulates entering Lake Superior can be seen in satellite images because they scatter light differently than water alone. Prof. Sydor wants to be able to determine more precisely the sizes of particles and their distribution in Lake Superior using satellite data. This requires knowledge of the angular and the spectral properties of scattering by the suspended particles. To gain this knowledge, Prof. Sydor has headed many physical experiments and theoretical calculations of light scattering by particulates. (Many of the recent physical experiments have been performed by Bill Wolz, MS '01.) My part in this project was to determine what is expected theoretically for light scattering by perfectly conducting spherical particles using Mie theory (developed by Gustav Mie in 1908).

There already exists a program called Mietab, created by August Miller of New Mexico State University and W. J. Lentz of the Naval Postgraduate School, that calculates several Mie theory scattering quantities. I wrote a postprocessing program that uses the results produced by Mietab to do further calculations. In particular we wanted to know how the ratio of back scattered reflected light to the total light scattered varied with the wavelength. If the back scattered light and total scattered light vary similarly, then the reflectance can be expressed in terms of total scattering, an easily measured quantity, rather than back scattering that is usually on the order of ~2% and is very difficult to measure. Using Mietab and my postprocessor, we were able to determine that they do indeed vary similarly with wavelength. This result was confirmed experimentally for coastal waters. The proportionality constant for red clay turns out to be 2.1%. Mietab and my postprocessor can be used to do many other calculations to answer future theoretical and experimental questions.

Ryan Dorland, MS '01

Before arriving at UMD, I had never heard of limnology. In two short years, I've developed an interest not only in the physical processes driving Lake Superior, but also in the variability and abundance of life within the lake. This past year I have been working with Prof. Meng Zhou on examining geostrophic circulation, circulation due to the earth's rotation and density differences within the lake, and studying spatial distributions of phytoplankton and zooplankton (fish food) in western Lake Superior. With two more cruises planned for this summer, we will examine temporal correlations between temperature, circulation and plankton fields and estimate zooplankton productivity. I count myself as fortunate to be participating in the U.S. GLOBEC WinDSSOcK (Winter Distribution and Success of Southern Ocean Krill) Antarctic cruise this May; I tend to have an affinity towards colder climates - Duluth is just too mild sometimes.

I continually tell students in lab that an understanding of physics and mathematics is essential in any field they pursue. Following my own advice, I plan to pursue my limnological interests by continuing on in Water Resources Sciences and applying the many lessons learned during my tenure as a physics graduate student here at UMD.

Chris Lavelle, BS '01

During my time at UMD, I have been fortunate enough to work on many research projects, including spectrophotometry and remote sensing, under the generous advising of Professor Sydor. I began research with a UROP grant for spectrophotometry in the fall of 1998 as a Junior. Spectrophotometry is an optical technique for determining the wavelength dependence for the coefficient of absorption in gases and liquids. I was able to differentiate the absorption coefficients of small (> .7 micron) particles and large particles, producing a series of graphs relating the wavelength of visible light (400 nm - 800 nm) to the absorption coefficient. Bill Wolz provided the water samples, and we ran the experiment on North Shore, South Shore, and Nemadji River water. My results were very consistent and reproducible, and they were later cited in Xiaoyun Fei's M.S. thesis. I also took several measurements of particle distributions using a Spectrix laser particle counter. I was very pleased to learn that the measurement I took was later used by Amanda Thralow when she needed a naturally occurring particle distribution for her numerical modeling of light scattering due to particulates.

In the summer of 1999 I was accepted to a National Science Foundation Research Experiences for Undergraduates Program. I spent ten weeks at the University of Indiana, Bloomington Cyclotron Facility (IUCF). While I was there, I joined 12 other students from around the country to participate in the nuclear physics research being conducted at the Lab. We received special topics lectures twice a week and gave presentations on our own work at the lab every two weeks. I developed a statistical analysis code to increase the effectiveness of the proton beam profile scanner in regions where the scanner's signal was almost buried in the background noise. As a result of this program, I gained a working knowledge of physics which has helped my studies tremendously.

My latest research has been in remote sensing. Using NASA SeaWiFS, a 412 nm - 865 nm, 1 km pixel resolution digital satellite camera, and the Internet, I am able to display images from around the world. Much of the project thus far has been devoted to the coding procedures necessary to store and work with the very large (>15 megabyte) individual image data files in the UNIX environment. I have recently developed an algorithm which will detect the presence of red clay and dissolved organic materials in Lake Superior from orbit. While this is not a new algorithm, it is important because we are now able to calibrate this algorithm in light of Bill Wolz's experiments on light scattering from natural water and Amanda Thralow's modeling of Lake Superior water. We expect to be able to determine the quantitative amount of red clay in the water using SeaWiFS. This quantification would represent a substantial improvement in the SeaWiFS program because the satellite was originally intended for ocean viewing and vegetation tracking. NASA's algorithms fail to characterize coastal water regions like Lake Superior, but our work will help the development of better coastal water algorithms for the next generation of Earth observing satellites.

One of the greatest joys I have been able to take from university research has been the collaboration with so many brilliant and wonderful people. It has been a truly rewarding experience to be able to share a meaningful part of a larger quest for knowledge. Next fall I intend to pursue graduate study in physics.

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Spring 2001 UMD Physics Newsletter Response Form

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Do you wish to be added to the alumni web directory?_____

(The URL is http://www.d.umn.edu/physics/contact/alumni.htm.)

Are you willing to serve as a career information resource for physics students?_____

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Send your reply by one of the following means:

- mail to University of Minnesota Duluth, Department of Physics, 371 MWAH, 10 University Drive, Duluth, MN 55812.
- fax to 218-726-6942.
- e-mail to jhiller@d.umn.edu.
- web page form at the URL http://www.d.umn.edu/physics/response.html.

Thanks!! We'll enjoy hearing from you!

Lost Addresses

If anyone knows a current address for someone on the list below, please send it in or have the person get in touch. Thanks!

James C. Anderson, BA '50
Wai Ang Chan, BS '75
Charles W. Hill, BA '55
Lloyd L. Horton, BA '51
Yongxin Jia, MS '94
James D. Johnson, BA '54
Wallace E. Johnson, BA '50
Michael R. Jones, BA '69
Kambiz Khosroshahroudi, BS '85
Nagi Keung Lee, BA '71
John A. Miller, BA '59
Mohd I. Mohdyusof, BS '86
William M. Mularie, BA '61
Yaseen S. Murayed, BS '85
Charles C. Nelson, BA '58
Gerald D. Nelson, BA '60
Wesley J. O'Brien, BA '56
Timothy S. Olson, MS '87
Lawrence W. Pirila, BA '66
Anthony K. Quick, BS '92
Mylan Radulovich, BA '60
Michael J. Schmidt, BS '71
Frederick C. Stewart, Jr., BA '59
Haichuan Tan, MS '96
Charles A. Turcotte, BA '50
Dale O. Wick, BA '59
Stephen Wong, Jr., BA '50
Yong Zhou, MS '98