Department of Chemistry & Physics ✦ 100 Campus Drive ✦ Weatherford, OK 73096-3089

PHYSICS ALUMNI NEWSLETTER

Spring 2005

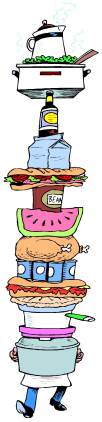
http://www.swosu.edu/academics/physics ✦ physics@swosu.edu ✦ Terry Goforth, Editor

A Night Among the Stars

The 24th Annual Spring Physics Banquet will be held on Saturday, April 9, 2005, at 7:00 p.m. in the SWOSU Student Union Ballroom. Tickets are $12 per person. You may send your money in advance or pay at the door. We do need a head count by April 6, so please let us know in advance if you plan to attend and how many will be in your party.

Dr. Stanley Robertson, retired Professor of Physics, will speak about his work on (against!?!) black holes. We have followed Dr. Robertson's contributions to this very active field of study in previous editions of the newsletter, and this edition is no exception. Read on below for his latest contributions.

Beef on the Barbie



This year's edition of the Physics Shish-ke-bab is gearing up to be a belly-buster. There'll be food enough for an army (beef and chicken shish-ke-bab with all the veggies, salads, sides, and desserts to make your mouth water), and the usual Honor (Not!) Awards will be presented for your entertainment. You don't want to miss this. Don't bother eating ahead of time; you will not go away hungry! Mark your calendar for Saturday, April 30. The dinner bell rings at 6 p.m. (Note: The location for this yum-scrumptious event has now been set. We'll convene at Dr. Jones' Estate southwest of town. Call or e-mail for directions.)

My goal is simple. It is complete understanding of the universe, why it is as it is and why it exists at all. – Stephen Hawking

Physics Club Officers

Pres: Casey Wells
VP: Moin Khan
Sec: Santosh Bhatt
Treas: Micah Perkins
Publ Rel: Ashis Shrestha
Historian: Bhaskar Basnet
Spn: Dr. Tony Stein

100 Years On - A New Test For Einstein in 2005

by Dr. Stanley Robertson

The aim of science is not to open the door to everlasting wisdom, but to set to a limit on everlasting error. Bertholt Brecht (1898-1956), in "Life of Galileo"

In 1905, Albert Einstein shook the world of physics with three remarkable papers on the photoelectric effect, Brownian motion, and the theory known as Special Relativity. He was awarded the 1921 Nobel Prize for physics for the first of these. Special Relativity, the subject of an excellent series of lectures last year by our own **Dr. Ray Jones**, considers the comparisons of measurements between reference frames in uniform relative motion. Between 1907 and 1915 Einstein worked out the theory of General Relativity, which extends to the effects of accelerated frames of reference. The apparent fact that one cannot tell the difference between an accelerated reference frame and a uniform gravitational field makes the theory of accelerated frames equivalent to a theory of gravity. As a gravity theory, General

Relativity reduces to Newton's law of gravity in the weak field, slow velocity limit, but conceptually it is very, very different. Newton's law envisions an instantaneous interaction of objects separated by some distance. After Maxwell's synthesis of electromagnetic theory in the 1860s it was known that Newtonian gravity needed modification to encompass a finite propagation speed for gravity fields. But even this correction would be inadequate, for Einstein showed that there were previously unknown small effects that did not fit in a Newtonian framework. Special Relativity showed that moving clocks run slow and moving meter sticks shrink. In reference frames in relative acceleration, there would be progressive slowing and shrinking as speed increased. Equivalently, the same must happen in gravitational fields.

In a simplified, but reasonably fair, rendition of General Relativity, at a distance R from a gravitating mass, M, a clock will run slower than it would in a distant, field free space by the factor (1-2U), where $U=GM/(c^2R)$ and is dimensionless. Here G is Newton's gravitational constant and c is the speed of light. This slowing has been directly measured with precise atomic clocks. Measuring sticks contract by the same factor. If the slow clocks and contracted meter sticks are used to measure the speed of light at R, one still obtains c as a result. But to a distant observer, the speed of light has slowed by $(1-2U)^2$. The slowing of light has been experimentally demonstrated by the slowing of radar waves passing the limb of the sun on trips to Venus and back to earth. The effect is small! If we take M as the mass of the sun and R as its radius, where the greatest amount of slowdown would occur, we find 2U = 0.0000042. At a typical neutron star surface, 2U= 0.4. And finally, if 2U=1, a clock at R would slow to zero tick rate and stop. This is the condition that is supposed to occur at the location known as the "event horizon" of a black hole.

Although there are viable alternatives to the theory of General Relativity that do not possess event horizons, they necessarily must accommodate the slowing of clocks, shrinking of meter sticks and slowing of light speed. For example in the Yilmaz theory (and many others) clocks slow by the factor $e^{-2U} = 1-2U+2U^2+$ ..... In the solar system, it is apparent that the terms beyond 2U can only contribute at most $2U^2 \sim 9x10^{-12}$, which is usually negligible (but see below).

General Relativity conceives of space (or more accurately, the combination of space and time, called "spacetime") as "curved". And in a sense, it is curved. If one were to measure the ratio of circumference of a circle, centered on a gravitating mass, to the diameter of a circle, the ratio would not be pi, because the parts of the diameter near the center would be measured by a shrunken measuring stick. The basic idea of General Relativity is that the presence of a gravitating mass warps space and time in its vicinity. The motion of small "test particles", such as planets orbiting a massive sun are affected by their passage in the warped space. Indeed, they can be considered as following orbits whose shapes are dictated solely by the shape of the warped space. The idea is that massive matter gravitationally warps space and then things move as though in ruts following the warp.

In General Relativity, the idea of massive matter warping space extends to the view that rotating masses not only warp space and time, but literally drag it around with their rotation. It is almost as if space and time were like viscous fluids that could be set in motion by rotating an embedded object. This aspect of the theory will be tested by the Gravity Probe B experiment, which is in progress after a rocket launch in April 2004. Results will be revealed this year or next. (See http://einstein.stanford.edu/ for weekly progress reports.) The experiment tracks the orientations of the rotation axes of four small gyroscopes in a satellite in polar orbit. If spacetime is dragged with the rotation of the earth, the gyroscope axes should remain aligned with their local spacetime and be "dragged" along with its rotation. One might

guess how much of an effect to expect. If the earth alone controlled the properties of nearby spacetime, the gyroscopes could be expected to rotate with the earth by 360 degrees per day. But if the relativistic correction is proportional to 2U, then perhaps we should expect only something like 360x(2U) degrees/day. But U for the mass of the earth and at a satellite altitude of 650 km is $U=6.3x10^{-10}$, so 360(2U) is only ~0.141 arcsec per year. A rigorous calculation of the expected effect from General Relativity gives a result nearly 1/4 as large, primarily due to averaging over the satellite orbit. Some positions in an orbit are less favorable for dragging the gyroscope axes. The predicted cumulative gyroscope axis shift is 0.042 arcsec/yr. Gravity Probe B was designed to measure this gyroscope axis deflection to 1% accuracy! In addition, a larger shift of about 6.6 arc/sec/yr parallel to the orbit plane will be measured. Remarkably, this shift, known as the "geodetic effect" is sensitive to the second order term, $2U^2$.

There are very few other theories of gravity that pass all of the weak field tests (where terms of $2U^2$ and beyond are usually negligible)[1]. Those that are ten sor theories, like General Relativity, all predict the same frame dragging effects for Gravity Probe B. It is little known and surprising, however, that the only thing needed to pass all of the weak field tests to date is to encompass the slow clocks, warped meter sticks and slowing of the speed of light in gravitational fields. Kris Krogh (see the Los Alamos arXiv:astro-ph/9910325) has used the refraction of deBroglie waves in gravitational fields to correctly describe weak field gravity. He predicts the same geodetic shift, but no rotational frame dragging effect at all! Another rival theory is a vector theory that I have worked out just for fun. It is so simple that anyone with an introduction to special relativity and a course in electricity and magnetism can understand it. (See http://xxx.lanl.gov/abs/gr-qc/0502088) I assumed that the particles comprising the gyroscopes of Gravity Probe B would be attracted toward earth's center according to Newton's law of gravity, if both were motionless, and then transformed the force for a frame rotating with the earth, according to the rules of Special Relativity. Then the gyroscopes are found to be subject to a "gravitomagnetic" torque (analogous to a spinning magnet in a larger external magnetic field) that will cause them to precess. Their rotation axes would shift by 0.01 arcsec/yr, which is 1/4 as much and in the same direction as predicted by General Relativity. So this gives us three predictions to add a little spice to our wait for results from Gravity Probe B. Additionally, correcting the Newton force law to make its gravity forces propagate with finite speed, the predicted geodetic effect turns out to be the same as that of General Relativity. It only depends on the clock slowing factor being equal to $1-2U+2U^2+.....$ to terms of second order, independent of the rotation of the earth.

It has been claimed that the rotational frame dragging effect has been measured in other ways by precise tracking of the LAGEOS earth satellites, (google this!) But this seems unlikely because it requires using calculated corrections that are 10^7 times larger than the expected effect. The expense of Gravity Probe B, which has so far cost well over one billion dollars, has also been used as an argument against doing the experiment. So why are we going to such trouble to measure an effect so small and so little in doubt by most physicists? Because it tests the foundations

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[1] If one chooses coordinates that would let us describe a satellite in earth orbit, as observed from earth, the clock slowing factor of General Relativity theory would be $[(1-U/2)/(1+U/2)]^2 = 1-2U+2U^2+....$ So even to second order terms, there would be no differences from Yilmaz' theory. The event horizon for these coordinates would occur for U=2. The fact that the event horizon can be moved around (to a different radius for a given mass) by choosing different coordinates suggests that it might not be physically real.

of our accepted theory of gravity in one of the few ways now possible. If the warping of space and time does not extend to rotational frame dragging, then an unexpected result from Gravity Probe B can save us from a very long term, if not everlasting, error. It may be centuries before there are other tests of General Relativity to second order. On the other hand, if General Relativity passes the Gravity Probe B test, it may be centuries before there is any motivation to test again.

It is better to know some of the questions than all of the answers. – James Thurber

Things are Bigger and Better in Texas

Bigger wafers, that is; and not the edible variety. These critters were 300 mm silicon wafers on which the latest digital signal processors were being built, layer by layer by Texas Instruments Corp (TI). Eleven members of the Physics and Engineering Club and Dr. Robertson, erstwhile sponsor, were treated to a tour of the TI chip fabrication plants in Dallas, Texas on March 26, 2004. Appropriately, we began our tour in the Kilby Center, named after Jack Kilby, the inventor of the integrated circuit chip and winner of the Nobel Prize for Physics in 2000. We spent our first hour getting an overview of the chip manufacturing processes, the roles of engineers and a look at possibilities for employment in the industry. We extend a special "Thank You!" to SWOSU grads Thomas Weichel ('90) and Russell Fields ('95) for their arrangements for our visit and for their excellent presentations, morning and afternoon. Later in the morning we were taken through the clean room of KFAB for a first hand look at the many processing steps involved in building integrated circuits, layer by carefully indexed layer. [Editor's note: We hear that Dr. Robertson looks 'smashing' in a bunny suit.] In the afternoon, we spent some time looking over some of the ICs from old (10 years = eternity in this industry) to new. Later we toured DMOS6, the facility built to handle the larger new wafers. (If peering out at the universe at night makes you feel small and insignificant, you can get much the same feeling standing in a room with $1.5 billion worth of $4 million machines humming quietly.)

In addition to our TI tour, we spent some time savoring night life in Dallas' West End, parted with some of our hard-earned cash in the Galleria and had a sumptuous meal at the India Palace. After first hand experience with kamikaze drivers in Dallas, Russell Fields' tale of meeting a TI old-timer who remembers driving out to TI on a dirt road seems apocryphal. Nevertheless, the colossus that is now TI was once small and the invention that has reshaped modern life on this planet started with an idea of Jack Kilby, a young man from Great Bend, Kansas. It reminds us to remind our students to dream big.

Do or do not. There is no try. – Yoda

A Night to Remember

Last April 17, a dozen alumni, a score of students, plus faculty, administrators, family, and friends assembled to enjoy each others company and to catch up on old times at the 2004 Annual Spring Physics Banquet. The highlight of the evening was a presentation by alumnus and retired faculty member **Dr. Benny J. Hill** (class of '57, faculty and chair until '90). Dr. Hill shared his many experiences on his road

from western Oklahoma farm boy to a teaching and research physicist. Along the way, he emphasized the ingredients for success–hard work, selling yourself, looking for and pursuing opportunities wherever they may present themselves (and creating a few if necessary). He also stressed that it's not where you start that counts, it's where your headed. This very important message was well-received by all in attendance. The end of the planned activities was by no means the end of the evening. Many folks lingered long after enjoying each other's company, reminiscing about times past, and getting updated on times more current. It's no cliche to say "a good time was had by all!"

And the Honor Goes To...

Of course, the Annual Physics Banquet also marks the presentation of many awards for past success and scholarships to insure future success. The 2004 Banquet was no exception. Four inductees joined the ranks of SWOSU's Sigma Pi Sigma Honor Society: **Micah Perkins** (Jr, Ponca City), **Terry D. Cox** ('86 alumnus), **Lee McClune** ('69 alumnus), and **Karl Warkentin** ('58 alumnus). **Ross Giblet** (Sr, Rocky) was named the J.R. Pratt Outstanding Student in Physics. Physics and Engineering club President **Casey Wells** (Sr, Ninnekah) received the Leadership Award, and **Lucas Weber** (Sr, Weatherford) received the Distinguished Service Award. Selection of the Outstanding Midclassman in Physics Award resulted in a tie, going to **Santosh Bhatt** (Soph, Kathmandu, Nepal) and **Moin Khan** (Jr, Karachi, Pakistan). This year's Outstanding New Physics Club Member was **Derrick Daugherty** (Fr, Chester). Of course, both of our graduates, **Lucas Weber** and **Ross Giblet** (Sr, Rocky) were recognized for graduating with honors and received medallions indicative of this achievement to wear during commencement ceremonies.

If we knew what it was we were doing, it would not be called research, would it?

– Albert Einstein

Here's Looking at You, Kid!

Through the generosity of our alumni and friends, we were able to hand out over $4,000 in assistance to nine very deserving students. Recipients of scholarships at the 2004 Banquet were **Santosh Bhatt**, $500 J.R. Pratt Scholarship, **Micah Perkins**, $500 Benny J. Hill Scholarship, and **Moin Khan**,$500 Arthur McClelland Memorial Scholarship. Receiving $500 Physics Alumni Scholarships were **Bhaskar Singh Basnet** (Fr–Kantifajpath, Hetauda, Nepal), **Vishnu Pokhrel** (Fr–Chhetrapur, Narayangarb Nepal), **Ashis Shrestha** (Fr–New Banesware, Kathmandu, Nepal), and **Parasthiti Shrestha** (Fr–Sallaghari, Nepal). Two soon-to-be fifth-year seniors, **Ross Giblet** and **Chris Robertson** (Sr, Meeker), were awarded with $300 Physics Alumni Scholarships. With tuition rising as much as ten percent each year, these scholarships are much needed (and much deserved). Many of our students are working both on and off campus, some as much as 30 to 40 hours a week, to help pay educational and living expenses. These financial awards, made possible by our generous donors, are greatly appreciated.

And If You'd Like to Help...

We welcome contributions of all sizes. Twenty here and fifty there, and pretty soon we've got enough for an extra scholarship award. Of course, all donations are tax-deductible. Just make your check out to the SWOSU Foundation. Be sure to indicate which fund

you'd like to contribute to. The choices are the endowed funds (J.R. Pratt Scholarship or Arthur McClelland Memorial Scholarship) which allow us to spend only the interest earned or the more immediately usable Physics Unrestricted Fund which can be used for scholarships, recruitment, and other activities to enhance the education of SWOSU Engineering and Physics majors. If you choose to donate to the Physics Unrestricted Fund, you may specify how you want the funds used and we'll be sure to honor your request. You can send your checks to the Foundation Office on campus or directly to us (Attn: Terry Goforth, Dept of Chemistry and Physics). Either way, your gift will be deposited and used to continue our work of producing graduates well-prepared for the careers and/or graduate programs that lie in their futures. Thank you so much for your support!

640K ought to be enough for anybody. – Bill Gates

Old Dogs, New Tricks

In the fall of 2003 Dr. Ray Jones presented a series of eight seminars for the SWOSU faculty and students at large and the general public. Eighty-five people attended the seminars. This series of seminars was based on a similar series done in 1984, but was enlarged and improved. A 50-page handout was given to the participants. While some people did drop by the wayside, the effort was considered a success. Some attendees suggested turning the series into a book, so last April Dr. Jones began work his latest project.

There are many published books about relativity, and these typically fall into one of two categories: 1) Physics books that rely heavily on mathematics, even calculus. Often, the overuse of math results in little intuition being developed by the reader. 2) Books with essentially no math; these are merely descriptive. Such approaches leave the reader with the feeling that relativity is weird and not understandable by non-specialists. Dr. Jones' manuscript,titled "Relativity Revealed - A Concrete Approach," is intended to fill this gap. It does use elementary algebra (not a terrorist organization) to keep up with the quantitative aspects. However, only the relativity logic is presented in the text, while the algebraic manipulations are shown, step-by-step, in appendices. The appendices contain math lessons so a reader can either learn some basic algebra, or can use this book as an excuse to brush up on a rusty skill.

In "Relativity Revealed" the subject of relativity is actually derived from three simple postulates using gedanken experiments (thought experiments). As you probably know, these consists of an imagined situation with a drawing. The book then presents equations that describe the figures. Most of the equations are simply "Distance equals rate times time," or "this length plus that length equals a third length," but the distances and times might be contracted.

Subtle humor is used in the text to provide some comic relief. A number of Limericks that relate to the subject just considered are also used.

Much of the time spent developing the manuscript involved inventing new and simple ways of presenting the material. What work remains, besides a little more polishing, is the attempt to get the book published. While this most unpleasant task is being done, Dr. Jones plans to post Chapter 1, the appendices which support Chapter 1, the table of contents, and the preface on the web. Because of concerns with terrorism, publishers will no longer accept an unsolicited manuscript. (Book manuscripts are heavy, and might be a bomb.) Posting a sample chapter allows publishers to safely see what the book is like. In the very near future, you should be able to find it on the SWOSU website (www.swosu.edu) by searching for "Ray Jones." We'll keep you updated on the publication status of Dr. Jones' book in a future editions of the newsletter.

New Alumni

We bid congratulations and fond farewells to two graduates this year. **Lucas Weber** (Weatherford) graduated in May. Lucas has since been accepted to the Navy Nuclear Submarine program. Salute! In December, **Ross Giblet** (Rocky) completed his degree and headed out for the "real world." At last we heard, Ross had some leads on a couple of jobs. Hey, Ross, if you're reading this, let us know what's up! Congratulations to both of our grads!

Way to Go, Gang!

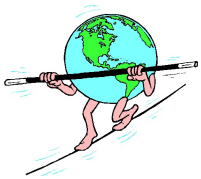
Congratulations to Dr. Stanley Robertson and the Physics and Engineering Club for once again being named as an Outstanding Chapter of the Society of Physics Students, this time for the 2003-2004 academic year. This was fitting finale to Dr. Robertson's tenure.

"I did not think: I investigated." – Wilhem Roentgen, when asked what he thought upon discovering x-rays.

Getting by with a Little Help from our Friends

Following Dr. Robertson's retirement last spring, we found ourselves needing a little help to make sure SWOSU students could take all the physics courses they wanted. Answering the call was Dr. Wayne Trail, who agreed to take on a full-time load as an adjunct faculty member this year. Dr. Trail taught many of our support courses, including the pharmacy majors' General Physics, Astronomy, Concepts of Physical Science, and some introductory labs. His enthusiastic approach to developing, modifying, and using demonstrations to illustrate basic principles in class has served as an inspiration to all of us.

Quantum Mechanics: the dreams stuff is made of.



Edmond Halley and His Golden Newton

Except for John Flamsteed, the Astronomer Royal, Edmond Halley was the greatest astronomer of his day. He was a member of the Royal Society [scientific] of London, and following one of the Society's meetings in January, 1684, he met with two other members at a coffee house to continue a discussion. The other two were Christopher Wren, another astronomer, who also became a very successful architect, and Robert Hooke, a creative experimental physicist. Their discussion may have gone something like this:

Wren: Let me summarize the discussion so far. According to Copernicus, gravity acts to assemble the parts of the Earth at its appointed place, parts of the Moon at its appointed place, and so on. Kepler introduced the notion that the reason the planets go around the Sun is because there is an attractive force between the planets and the Sun. He supposed that it was a magnetic force, but no one could explain exactly how that would work.

Hooke: I think this might be another aspect of the gravitational force.

Halley: Yes, we all agree on that, but what is the mathematical expression for this force?

Hooke: Clearly it gets weaker with distance since the more distant a planet is from the Sun, the slower it moves in its orbit. I think that it falls off as the reciprocal of the square of the distance.

Wren: Why? Is that in analogy to the decrease in the intensity of light from a point source?

Hooke: Yes, that seems reasonable.

Halley: Has anyone shown what the orbits of planets would be in an inverse square force?

Hooke: Why they would be ellipses, of course. After all, that is what the are: ellipses.

Halley: Certainly they are ellipses, but can you prove that follows from an inverse square force?

Hooke: Of course I can!

Halley: Well how does the proof go? Don't leave us in suspense.

Hooke: I believe that is exactly what I will do–leave you in suspense for a while. You try to solve it, and when you see how difficult the problem is, you will appreciate it all the more when I show you my proof.

Halley (speaking to Wren while Hooke has gone to the privy): I think Robert is bluffing again. I doubt that he really has it worked out.

Wren: Well, if he is bluffing, I'll call his bluff.

Wren (after Hooke has returned): I think hard work should be rewarded. You produce your proof, and I'll buy you any science book you like up to a cost of, let's say, forty shillings.

Hooke: Well, I still need to polish my proof a bit before its ready to present.

Halley: Can I get in on this? Suppose I come up with a proof?

Wren: All right, I will buy a book for anyone who is the first to come up with the proof within the next two months. How does that sound?

Halley: Suits me.

Hooke: Good, but to a more important matter, it's your turn to buy a round, Chris.

More than two months passed without any proof being presented. In August, Halley went to Cambridge to see his friend, Isaac Newton, believing that if anyone could solve the problem, Newton could. When Halley put the problem to him, Newton replied much the same as Hooke had, that the orbits would be ellipses for he had worked out the problem years ago. He rummaged around, but couldn't find his proof. But, no problem, he would simply write it out again and mail it to Halley. And he did.

Halley was so impressed with the elegance of Newton's proof that he encouraged Newton to make it part of a more comprehensive work. With Halley's continuous encouragement and editing, Newton wrote one of the greatest scientific books of all time, *The Mathematical Principles of Natural Philosophy* (generally referred to by the first word of its Latin title, *Principia)*. Published in 1687*,* it included Newton's laws of motion along with his law of gravitation. He had to invent calculus in order to do some of the proofs, but then redid them as geometrical proofs, since that is what others would accept.

The book was published in sections, and included in the last section were applications, such as Newton's collected observations of the Comet of 1680 and his discussion that it might be in a parabolic orbit about the Sun. As this last section neared publication, Hooke demanded that it include a preface acknowledging Hooke's priority in formulating the law of gravitation. The prickly Newton was so incensed he vowed to withhold publication of the last section. With great diplomacy, the genial Halley convinced Newton to proceed with publication. Since the Royal Society lacked the funds, the *Principia* was published at Halley's expense. Without Halley, the *Principia* would not have been written, edited, or published.

Using methods described in the *Principia*, Halley calculated the orbital elements of 24 comets and published the list in 1705. He found that the orbits of the comets of August 1531, October 1607, and September 1682 were so similar that they probably were the same comet. Its orbit was a highly elongated ellipse, which meant that it orbited the Sun and should return 53 years later, near the end of the year

1758. He hoped that if it did return at the predicted time, the world would recall that this had first been predicted by an Englishman. Its return was first seen on Christmas evening by Johann Georg Palitzsch, a young German astronomer. Now called Halley's Comet (or Comet Halley), it became the first comet named for a person. The successful prediction of the comet's return provided spectacular confirmation of Newton's laws, and it brought foretelling the future into the domain of physics. Halley had turned Newton golden.

It's kind of fun to do the impossible. – Walt Disney

New and Familiar Faces and Places

With Dr. Robertson's retirement and the graduation of two of our officers, the Physics and Engineering Club starts with almost a completely new slate of officers. Dr. Tony Stein has taken the reins as the new club sponsor. To help him out, we were able to twist Casey Wells' arm to stay as president.

Physics Day saw 130 high school students descend on SWOSU for three hours of physics fun and mayhem. Amongst other things, our students demonstrated that angular momentum truly is conserved for high school students in a freely rotating chair while bringing two 10 pound weights from fully outstretched position inward. We had no SERIOUS injuries this year! We were happy that Dr. Jones was able to join us for this event.

The club also held a number of social activities including the annual Halloween Party, a trip to the bowling lanes, and the now-traditional paint ball battles. Casey Wells won a free T-shirt for his bowling expertise. Psycho wasn't available for the Halloween party (for some reason it was all rented out!?) so we watched a slightly disturbing movie called The Butterfly Effect instead.

We have received funding from the Student Association to offset costs for our annual spring trip. This year will find us in Colorado Springs on Tuesday, April 5th for the Space Career Fair. This is part of the 21st National Space Symposium held at The Broadmoor on April 4-7. We'd love to connect with any of our alumni in the area. If you can join us for a meal or just to visit, contact Dr. Stein to work out the details.

Well done is better than well said. – Benjamin Franklin

Pass It On…

Brandon Hale ('83) visited the department in November. He is self-employed as a certified flight instructor and a private jet pilot.

Joanna Blevins ('01) visited the department in January. She is continuing her work at the VA Rehabilitation R&D Center in Seattle, WA, studying limb-loss prevention by creating a finite element model of the human foot, validating automatic meshing software, and dissection and mechanical testing of the soft tissue that covers the bottom of the foot.

Dean Chapman ('75) is now a full Professor of Anatomy & Cell Biology (!) at the University of Saskatchewan in Saskatoon, Saskatchewan, Canada. He is the scientific lead and principle investigator for the biomedical imaging and therapy beamline at the Canadian Light Source (CLS) synchrotron research facility. He has also been granted a

Tier I Canada Research Chair which includes a support faculty researcher, a post-doc, and money for graduate students and equipment. Wow!

Christian Stillings ('97) is now at Wright-Patterson Air Force Base in Ohio.

Jami Ward ('01) was in her final semester for a master's degree at the University of Central Florida last fall. Her thesis was on the cancellations of vortex-induced instabilities in sold rocket motors. (A rocket scientist!) Jami is president of the Amateur Radio Club and vice-president of the SEDS (Students for the Exploration and Development of Space) organization there. She has also spent some time in Africa taking food, clothes, toys, money, and educational supplies to Mufulira in Zambia, and she managed to squeeze in a little sightseeing along the way.

Lee McClune ('69) is involved with a project to develop Sorganol (a fermented by-product of sorghum) as a renewable, non-fossil fuel (*i.e.*, ethanol). He is partnered with some folks from Oklahoma State University in this project which hopes to allow farmers to produce ethanol right on their farms. Check out Lee's article in TechnologyReview.com at www.technologyreview.com/forums/forum.asp?forumid=600.

Scott Taylor ('97) is back from Saudi Arabia and now working with Halliburton in Kilgore, TX. Welcome home, Scott.

We should be careful to get out of an experience only the wisdom that is in it–and stop there; lest we be like the cat that sits down on a hot stove lid. She will never sit down on a hot stove lid again, and that is well; but also she will never sit down on a cold one anymore. (Mark Twain)

Sad News

Anita Perkins (Secretary, 1982-1996) passed away on Christmas Day, 2004. Anita served the department for nearly two decades and watched many, many new freshmen arrive, grow, and eventually graduate and move on to "the real world" out there. She served many of us–students and faculty alike–as a mother, sister, confidant, advisor, and conscience.

Computers make it easier to do a lot of things, but most of the things they make it easier to do don't need to be done. – Andy Rooney

New Leadership

The Department of Chemistry and Physics is currently in the hunt for a new Chair. **Dr. Blake Sonobe**, who has so aptly served as our Chair since 1999, will begin his new duties as SWOSU's Provost on June 1. Internal applicants for the vacant position are currently being screened. We'll likely have the name of our new fearless leader by the time of the banquet. We offer heartfelt congratulations to Dr. Sonobe.

Human beings, who are almost unique in having the ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so. – Douglas Adams, Last Chance to See

My grandfather once told me that there were two kinds of people: those who do the work and those who take the credit. He told me to try to be in the first group. There is much less competition. – Indira Ghandi

KEEPIN' IN TOUCH

We hope you enjoy reading the newsletter even half as much as we enjoy putting it together for you. But to send you one, we have to know where you are. Please keep us up on your current address. It's easy, just mail it (snail or e-), call us, or fax us. We also appreciate information like who you work for, your job title, promotions, or anything else you'd like to share with us. But CAUTION: If you send an update to the SWOSU Alumni Association, we DO NOT automatically receive that information. (Hey, we didn't make the rules!) So, send us a copy, or email us so we know to ask them for the update.

WE'RE WAITING TO HEAR FROM YOU!!!

Drop us a line at 100 Campus Drive, Weatherford, OK 73096-3098, or e-mail or call us at

Dr. Terry Goforth	(580) 774-3109	terry.goforth@swosu.edu
Dr. Charles Rogers	(580) 774-3108	charles.rogers@swosu.edu
Dr. Tony Stein	(580) 774-3107	tony.stein@swosu.edu
Dr. Wayne Trail	(580) 774-3124	wayne.trail@swosu.edu
Mary Lou Scouten (Secretary, Department of Chemistry & Physics)	(580) 774-3266	marylou.scouten@swosu.edu

Don't want to keep track of all that? Just send your email to physics@swosu.edu and we'll see that it gets to the right person(s).

CHECK US OUT ON THE WEB!

Information about the physics programs and how to contact us can be found on the web at www.swosu.edu/academics/physics You can also find this newsletter as well as newsletters dating back to spring 2001.

ALUMNI EMAIL ADDRESSES*

*If you are a SWOSU Physics Alumnus, drop us an e-mail at physics@swosu.edu and we'll send you the complete list of alumni e-mail addresses that we have on file.

PHYSICS ALUMNI BANQUET 2005

Saturday, April 9, 2005 7:00 p.m. SWOSU Student Union Ballroom $12/person

Name_____ No. Persons Attending_____

Address_____ Phone_____

_____ Email_____

Please return to: Dr. Tony Stein ✧ 100 Campus Drive ✧ Weatherford, OK 73096

SHISH KEBAB 2005

Saturday, April 30, 2005 6:00 p.m. $5/person

Dr. Jones' Estate
SW of Weatherford

Name_____ No. Persons Attending_____

Address_____ Phone_____

_____ Email_____

Please return to: Dr. Tony Stein ✧ 100 Campus Drive ✧ Weatherford, OK 73096

Or... just give us a call or e-mail us to confirm for either/both event(s).