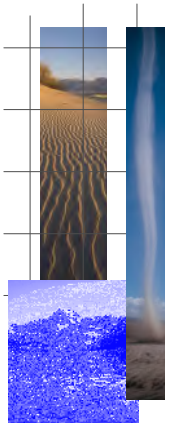


Schrödinger's Tiger

The Clemson University Physics and Astronomy Newsletter

Fall 2007 Volume 2, Issue 1

- Physics Shop Does Rocket Science
- Chairman's Message
- Department Fundraising Goals
- Clemson's Foucault Pendulum
- Charles E. Curry, a Super Clemson Donor!
- Alston Steiner's Continued Generosity
- Terry Tritt Addresses Energy Forum
- Terry's Other Job
- Godfrey Lecturer, Jeff Hester
- Leon Robinson Returns to Clemson for Talk

It Really Is Rocket Science...

Preparations for launches that were carried out at Kwajalein Atoll in the central Pacific.

The Clemson University Physics Department Shop has always been a major resource for research programs in the department. Over the last few decades, the Shop personnel have designed and built a large variety of complicated instruments for applications that cover the range from extremely low-temperature superconductivity research to instruments for biophysics.

In 1992 the Shop raised its work to an entirely new level, both literally and figuratively. One of the major research programs in the department has been, and continues to be, the atmospheric physics program that uses various types of instrumentation to study the upper atmosphere and ionosphere, including instruments flown on NASA rockets to make measurements in that critical part of the Earth's environment. In the late 1980s it was clear that a major problem had developed with the rocket instruments that were being flown as part of the Clemson research program. In particular, the instruments, which were being purchased from several different aerospace contractors, were failing frequently and compromising the experiments.

Continuing to fly suspect instruments was not an option. Something had to be done. The symptoms of the failures were known, but the contractors were not offering re-designs that were likely to improve the situation. After weighing all the information, the Shop technicians, James Mann and Lamar Durham, thought that they could design a more robust system that could survive and work well in the harsh near-space environment. The first Clemson-designed payloads were built and tested in 1992 and 1993 and were flown from the rocket range at Poker Flat, Alaska, in February 1994. All of the instruments functioned perfectly.

(Continued on page 3)

**Dr. Peter Barnes, Chairman,
Physics & Astronomy**

A Message From the Department Chair

This newsletter features our Instrument Shop and the invaluable contributions its technicians make to the success of our department's research programs, and I hope you will enjoy reading about them.

A major issue confronting the Department is our limited source of funds for special programs, and I am asking for your help. Some examples include the Society of Physics Students that has projects and travel opportunities in which we cannot participate because of a lack of funds. An improved reception area would also be beneficial for the Department. Scholarships funds need to be developed, as they are currently nonexistent. We lose very good students every year to institutions in bordering states and the University of South Carolina, all of which offer excellent student support. More funding is needed to attract these top students. We would like to establish a telescope in the South Carolina Botanical Garden for both instructional viewing for our students and outreach to the citizens of the state. The Garden will assist where possible, but we will need to prepare the site, purchase the instrument and a building to house it. Our planetarium is in need of a major overhaul and upgrade and can no longer compete with facilities at state institutions much smaller than Clemson. To replace the projector and upgrade the viewing area will be quite expensive. These and other areas need attention, and I am asking for your help to move the department forward. All donations are appreciated, large or small.

Finally, on behalf of the faculty, staff and students, let me wish all a very Merry Christmas and a joyous holiday season.

**Peter A. Barnes, Professor and Chair
Department of Physics and Astronomy
Clemson University, Clemson SC 29654-0978
Voice: (864)656-3416
peterb@clemson.edu**

Creating a Legacy… Giving to Clemson Physics & Astronomy

You can create a lasting legacy through your donation to the Clemson University Physics and Astronomy Department Foundation. The State of South Carolina can guarantee only that Clemson provides a basic level of education. Endowments to Clemson assure the best faculty, the brightest students and the most creative research projects. A substantial endowment can transform a good university into a great one.

The support of loyal Clemson friends has been instrumental in building a record of excellence in education, research and public service. Clemson's share of state funds supports less than 38 percent of the University's operating budget each year. Through gifts to the Clemson University Physics and Astronomy Department Foundation, donors share in a proud tradition of commitment that helps the department achieve greater distinction year by year.

As a non-profit organization, the Foundation is exempt from federal income tax under Section 501(c)(3) of the 1986 Internal Revenue Code, as amended. The Foundation has been classified by the IRS as a public charity operated for the benefit of a state university as defined in the Internal Revenue Code of 1986 Section 170(b)(1)(A)(iv). Contributions to the University through the Foundation by individuals, corporations, organizations and other foundations qualify as tax deductions. The Internal Revenue Service identification number assigned to the Clemson University Foundation is 57-0426335.

Since then, the Shop technicians have been involved in more than forty launches from diverse locations around the globe that include Brazil, Puerto Rico, Japan, Taiwan, and Kwajalein Atoll, as well as locations in Alaska, New Mexico, and Virginia. All of these flights have been successful.

The Shop personnel's work in developing a rocket instrumentation program has been a tremendous accomplishment. Part of their early effort required that a "fix" be developed for the problems that we experienced prior to 1992. In addition, hardware testing procedures had to be developed, along with procedures for handling hazardous materials used in the rocket systems. All of these efforts had to meet stringent NASA requirements. Starting with no experience in space-qualified systems in the early 1990s, the Clemson Physics Shop has developed the necessary expertise and is now recognized as one of two or three expert groups on rocket tracer release systems in the world. The Shop personnel's basic technical skill, innovativeness, and perseverance are responsible for the reputation that they now enjoy.

Shop technicians Jonathan Simpson and Brian Turpin prepare a recent payload for testing and launch.

Although James Mann retired as head of the Shop in the spring of 2006, Lamar Durham has brought continuity to the program as the new head. In addition, Brian Turpin and Jonathan Simpson were hired and have quickly become critical personnel in the rocket program, contributing both to the payload development process and to the launch operations support. Most of the Shop's efforts in the rocket program have involved work in the Shop facilities

Lamar Durham prepares a payload for vibration and sequence testing at the NASA Wallops Flight Facility in Virginia.

adjacent to Kinard Lab, but there have also been extended trips to the testing facilities at the NASA Wallops Flight Facility in Virginia and trips to remote launch sites. Besides the support for the rocket instruments, the Shop has developed systems used on the ground to track the rocket payloads and have operated the equipment at some very remote sites. Some of their assignments have been very pleasant, such as the trip to Kwajalein Atoll in the central Pacific in 2004, where the ocean water and the weather were both inviting. Other trips have been more demanding, both physically and mentally. The most extreme conditions have included temperatures of -55 degrees in central Alaska and a typhoon in Japan during launch operations.

The instrumentation that was developed for the experiments in 1994 have continued to be

in demand and will be used extensively in the future as well, but, as with any research program, techniques develop and evolve. The Shop personnel are currently working on a new rocket instrument that will provide more flexibility in the type and timing of the measurements that can be made. A test flight is planned for next year.

One characteristic of the Shop that makes the facility a special resource for the research programs in the department is the ability of the Shop technicians to work with faculty, graduate students, and undergraduates in developing equipment and instruments. There is a broad range of expertise from undergraduates to faculty members, but the technicians have always been exceptionally good at letting the students or faculty lead the design process while providing the input necessary to guide the design to a successful conclusion. In other words, the Shop personnel provides a teaching function, as well as a technical support service of the highest level. The Shop is therefore both a technical asset and a vital component of the overall educational program within the department.

The Shop technicians work with graduate and undergraduate students to set up ground-based imaging instruments designed and built at Clemson. Photos are from a recent rocket launch in Alaska in January 2007.

Drs. Miguel Larsen, Gerald Lehmacher, and John Meriwether have utilized Shop expertise in many aspects of their respective research. Dr. Meriwether notes that he has 7 Fabry-Perot observatories in operation in Alaska(3), Cape Verde (2), North Carolina (1), and Peru (1).

Loading TMA is one of the most hazardous duties that Shop workers must perform.

These instruments, designed by the Shop, are intended to measure the upper atmosphere winds and temperatures at altitudes of 175 miles and are the most effective means of measuring these winds. The analysis of these winds is important to the understanding of the physics of the auroral and equatorial regions.

According to Meriwether the Alaskan project and the Cape Verde project would not have happened had it not been for the Shop's modifications of existing Fabry-Perot instruments that allowed the photomultiplier detectors of years past to be replaced by high quality digital cameras.

This produced a big increase in instrumental sensitivity that improved the accuracy of wind and temperature measurements of the upper atmosphere thermosphere region. Not only have the Shop employees designed and fabricated parts for these Fabry-Perot observatories, they have provided great service in going into the field In Alaska and North Carolina to install the observatories. They have been very instrumental in providing advice concerning fabrication of FPI parts and the installation of these instruments at the several observatory sites. Dr. Meriwether added that he is certain that his research would not have progressed as well as it has over the past four years without the Shop's help.

Our Fundraising Goals for the Department

The generosity of our donors, no matter how large or small, is important to the success of the Physics & Astronomy program at Clemson University. There are several projects the Department would like to undertake in the immediate future. These are listed below, along with their anticipated costs for completion. If you are interested in helping the Department complete these goals, please see the giving instructions at the bottom of the page.

Planetarium Upgrade
Our 46-year-old planetarium has served us well, but has reached its life expectancy. Upgrades we are considering include: 1) refurbishing the star projector and replacing its analog electronics with digital controls; 2) installing a wide-field digital video projector to show simulations and animations (of all kinds, not only astronomical). In some new planetaria, a high-quality video projector replaces the star projector entirely; and, 3) completing the hemisphere of the dome by extending it into a second floor laboratory. The order of magnitude cost estimates is: 1)$100,000, 2)$100,000--400,000, and 3) $20,000.

Creation of a Discovery Center in the South Carolina Botanical Garden
Our goal is to provide regular astronomical observing opportunities beyond those for the laboratory students a few hours per week in the South Carolina Botanical Garden. We intend to purchase another reflecting telescope in the 11--15 inch class ($4,000--6,000) and permanently mount two telescopes in a protective structure (probably a roll-off shed, $5,000). An alternative is a more expensive modular or larger structure to accommodate a larger telescope in the future. Total project costs are approximately $11,000.

Refurbishing of the Foucault Pendulum
As discussed in the article on the following page, the Foucault Pendulum needs several repairs. The tower needs to be cleaned and the steel rungs repainted. The drive circuit, coils, and Formica table should all be replaced. Written and graphical explanations should be posted. We have considered adding a system to show the motion, such as pins that are pushed over and automatically reset, as well as a continuous data acquisition system that would record the pendulum motion over long periods for use in lab exercises. The estimated cost for these improvements is $5,000.

Creation of the "Science Café"
One project being planned by the Physics & Astronomy Department is to eventually convert the current library and mailroom into a visitors reception area, where a variety of refreshments could be served. This would provide an area where faculty, students and visitors could meet and greet. The department is currently going forward with these plans, and it is estimated that the cost of the renovation will be on the order of $20,000. This would include putting in new flooring, lighting, repainting and equipment.

Creation of an Endowment for the Society of Physics Students
The Society of Physics Students is a professional association designed for students interested in physics. Membership, through collegiate chapters, is open to anyone interested in the field. The SPS exists to help students transform themselves into contributing members of the professional community, by promoting and developing other skills critical to success, such as effective communication, leadership experience, networking, presenting scholarly work in professional meetings and journals, and outreach services to the campus and local communities. The Department would like to establish an endowment for Clemson's chapter of this society for furtherance of its activities. The projected start-up cost for the endowment would be approximately $25,000. Each $25,000 endowment would yield about $1,000 per year to help fund these items.

There are several ways to donate. You can send a personal check, made payable to Clemson University, to the following address: **Clemson University, Physics & Astronomy Dept., 118 Kinard Laboratory, P.O. Box 340978, Clemson, SC 29634-0978; Attn: Rise Moroney.** Please specify in the memo section of the check whether you wish the donation to be made to the Physics and Astronomy General Fund or if you would like it earmarked for one of the above-referenced projects. Alternately, you may visit the Clemson website **http://www.clemson.edu/alumni/giving/ways/index.html** and make a secure electronic donation. Again please specify that the donation go the Physics & Astronomy Department and which project to which you would like to donate.

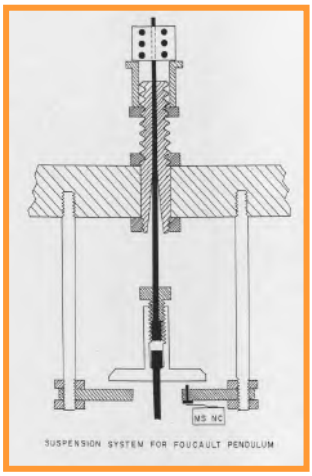
Clemson's Foucault Pendulum

By Dr. Mark Leising

Dr. Albert R. Reed, a Professor of Physics & Astronomy at Clemson from 1925 to 1968, was said to be passionate about using experiments and demonstrations to teach physics. Almost everyone who has taken or taught introductory physics courses at Clemson has seen or used demonstrations he designed and built in his lab and the machine shop. When Kinard Lab was constructed in 1961 with a four-story, glass-encased tower for a Foucault Pendulum (seen from below, right), Professor Reed took upon himself the task of constructing the ultimate mechanics demonstration.

The Foucault Pendulum Tower seen from below

He was not impressed with designs he saw elsewhere, so he studied the problems commonly encountered, developed original solutions, and ensured the pendulum bob was balanced by turning down a lead cylinder cast around a steel rod to a 9.5-inch diameter sphere. This was capped with two brass hemispheres, the lower of which held a permanent magnet. The magnet was a component of the kicker system designed to overcome the damping of the swing. When it passes over a small coil of wire at the center of the swing, the induced current (recall Faraday's Law!) is amplified and delivered, with a tunable delay, to a larger wire coil by a circuit designed by Professor Reed. The magnetic field of that coil exerts a slight outward force on the magnet in the bob. The 0.1 watts of power delivered over a fraction of a second is enough to overcome air resistance and other losses over the entire period. Professor Reed also built an elaborate support structure (left) for the steel cable designed to eliminate problems seen elsewhere with attachment at a point or to a swivel. When the pendulum was installed it still exhibited the problem of most others: the motion of the bob quickly began to trace out an ellipse as viewed from above, even when it started swinging along a line. It was bad enough that the magnet missed the small trigger coil and stopped. Through a series of experiments, Professor Reed traced the problem to asymmetries in the steel cable. He solved this with a cable made of seven twisted strands surrounded by twelve strands twisted in the opposite direction. After this the pendulum operated for many years without intervention, except for restarting after long power outages. Leon Foucault built his most famous pendulum in the Pantheon in Paris in 1851 to demonstrate that the rotation of the Earth is completely independent of astronomical observations. Of course, astronomers claimed the Sun and stars rose and set every day, but they were notoriously unreliable even then. The apparent clockwise (in the Northern Hemisphere) precession of the plane of the swing of the pendulum can be thought of as arising from the motion of the floor on the spinning Earth beneath the swinging bob. The precession rate can be calculated from apparent forces in the rotating frame on the surface of the Earth; the "Coriolis force" that deflects motion to the right in the North is responsible for the precession. The swing plane should make a complete rotation in 23.9/sin(latitude) hours. For Clemson's latitude of 34.7 degrees, this is 42 hours. The measured precession rate for our pendulum has varied somewhat over the years, but is typically around 36 hours. This is actually quite close to the expected rate for such a pendulum, and is

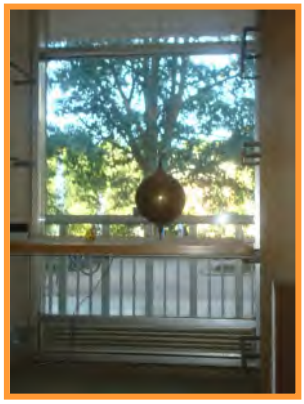


Support structure designed by Dr. Albert R. Reed

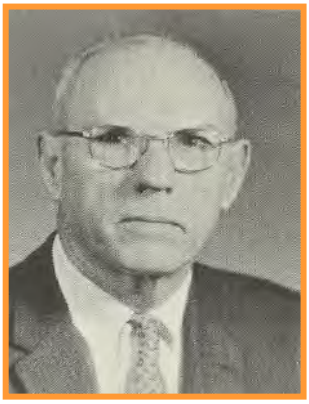
(Continued on next page)

probably off because the bob seen from above does not move in straight line, but traces out a narrow clockwise ellipse. This explanation is not completely clear, because the width of the ellipse appears to vary more than the precession period. At some point in the late 1980s or early 1990s some electronic components became erratic, and the drive circuit was rebuilt by the electronics shop then in the department. Again it operated for years with little intervention. For over three years beginning in 2001, the pendulum did not move, as the department conducted an extensive plumb bob experiment. There is no truth to the rumor that it began to tilt toward Columbia, South Carolina. Worried that the Earth's continuing spin might again be in doubt based only on astronomical evidence, a Clemson astronomer tinkered with the electronics and replaced some coil wires. The pendulum has operated continuously for over two years now, though not quite as intended. A much larger but imperfectly timed current pulse drives the pendulum.

We would like to clean and refurbish the Clemson Foucault pendulum to ensure its continued operation for many more years. The entire tower needs to be cleaned and the steel rungs repainted. The drive circuit, coils, and Formica table should all be replaced. We would like to improve the written information posted and include graphical explanations. We have considered adding a system to show the motion (besides the occasional plastic chicken getting knocked about) such as pins that are pushed over and automatically reset, as well as a continuous data acquisition system that would record the pendulum motion over long periods for use in lab exercises. If you are interested in helping, with expertise, labor, or funds, or if you have more information about Professor Reed, please contact the author. Please see page 5 of the newsletter for the estimated costs of repairing the pendulum and how to contribute to this project.



Clemson's Foucault Pendulum



Dr. Albert Reed

DID YOU KNOW????

In 1851 no one doubted that the Earth was spinning on its axis, but this first dynamical proof of the fact ended a quest that had begun two centuries earlier in Galileo's time. It established Foucault's fame then and subsequently. However, this was by no means his only significant contribution to 19th-century science. Others were:

- ***The naming of the gyroscope (from Greek "gyros" = turning + "skopeein" = to see) in 1852, which also demonstrated the terrestrial rotation.***
- ***A comparison of the speed of light in air and in water in 1850. The result that light traveled faster in air than in water showed that Newton's and Descartes' corpuscular theory of light could not be correct.***
- ***The invention of the reflecting telescope in essentially its modern form with metallized-glass mirrors figured to sub-wavelength surface accuracy (c.1857).***
- ***The first terrestrial measurement of the speed of light in absolute units (i.e. kilometers per second). The value obtained by Foucault in 1862 is in agreement with the modern value. It was also some 3 per cent smaller than the previously accepted value. This was in line with a prediction by Foucault's boss at the Paris Observatory, Verrier, that the then-accepted distance to the Sun was 3 per cent too big.***

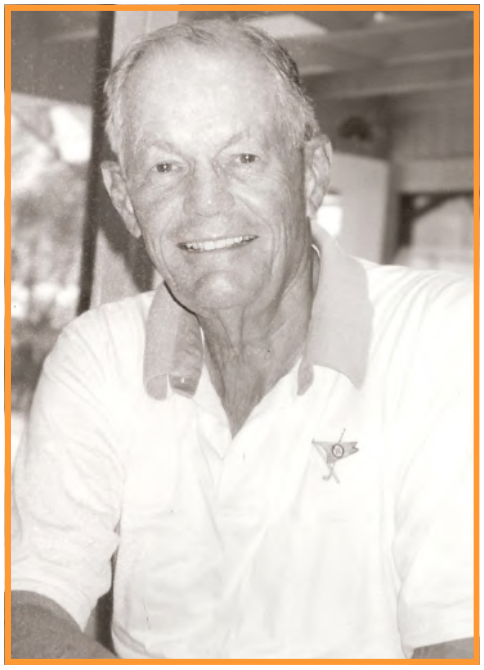
Charles Ewing Curry, a Super Clemson Donor!

Charles Ewing Curry was born in Kansas City, Missouri in 1918 to Charles F. Curry, a lieutenant serving in World War I and Janet Curry nee' Boone. On his mother's side he is a descendant of the frontier pioneer, Daniel Boone, a fact of which he's quite proud. Charles graduated Phi Beta Kappa from the University of Kansas in 1940. At the outbreak of hostilities in World War II he received his commission as an ensign in the U.S. Navy. Charles served in the Navy from 1942 to 1945, much of that time as captain of a sub chaser. Prior to the end of the war, he attended submarine school, becoming an officer on the Submarine "Macabi" until September 1945.

After the war he returned to Kansas City to a business career, taking over the position of head of the Home Federal Savings and Loan association from his father. He was later elected to local office as head of a civic reform group in Jackson County, Missouri (Kansas City), called the Committee for County Progress. It was a citizen effort to reform both city and county government, at that time plagued by internal problems. He served as the presiding judge of Jackson County government for eight years, the same position formerly held by Harry S. Truman before Truman assumed a position in the Senate. Charles later moved to Washington, D.C. and became an officer of the Democratic National Committee, holding the position of Treasurer during the Reagan administration. He has an always been an active participant in local and national Democratic Party politics and is married to the former Charlotte Rommel McCluney.

In 1987 he and Charlotte began spending summers in Cashiers, North Carolina. In the mid 1990s he became very interested in the topic of astrophysics, partly as a result of having met Dr. Jerry Fishman from the NASA facility at Huntsville Alabama. In order to be able to take classes on the subject, Charles and Charlotte decided to retire to Lake Keowee, because of its close proximity to Clemson University and its community.

In addition to his love of astronomy, Charles is an avid reader of politics and history, particularly military history.



Charles E. Curry

He has always loved boating and is a past Commodore of the Key Largo Anglers Club in Key Largo, Florida. In addition to reading and boating, over the years Charles has been a golfer and croquet player.

He has found his close association with Clemson University and friendships with many faculty members to be very worthwhile and stimulating over the past years.

In 1956 Charles started the Curry Foundation, which supports religious, educational, and charitable programs. Through the auspices of the Foundation, Charles has donated over $400,000 to the support and development of the astrophysics program at Clemson. Clemson University and the Physics & Astronomy Department are truly grateful to Charles and Charlotte.

Alston Steiner Continues a Dedication to Clemson Through His Generosity

During his career at Clemson University **Dr. P. Alston Steiner, III** did a yeoman's service for the Department of Physics and Astronomy. Among his duties as assistant to the department head, Alston had the difficult task of scheduling courses, keeping track of rules and timetables, and looking after boring minutia.

Retired faculty member **Dr. Will Graben** remembers that he enjoyed working closely with Alston each semester in setting up teaching assignments for faculty and graduate students. This they did by first surveying the faculty in an informal way before final assignments were ironed out at a faculty meeting. The faculty liked the system, and it worked surprisingly well. Alston was always diligent in his work and fully dedicated to the good of the department. Dr. Graben adds that he "valued his friendship and appreciated his many years of service. His generous gift to the department manifests his abiding loyalty to the Department of Physics and Astronomy."

Born and raised in Athens, Georgia, Alston received his B.S. in Physics in 1959 from the University of Georgia. After graduating from UGA, he attended Duke University, obtaining his Ph.D. in Spectroscopy in 1964. For postgraduate study, he spent two years in Copenhagen, Denmark, an experience he still relishes. Alston has always maintained a love of Denmark and travels there whenever the opportunity arises. While in Copenhagen on his "post doc", he continued his studies of spectroscopy that he had begun as a student at Duke. After returning from Denmark he was hired at Clemson in 1966, where he continued his ESR research, wrote labs, and helped instruct teachers in physical science. Later, he was made Associate Chair of the Department.

Alston retired from Clemson in 1998, after 32 years of service to the University. After retiring from Clemson, he returned to his hometown of Athens, where he lives with his new wife, the former Elaine Cummins. His current interests include travel, gardening and caring for the property handed down to him by his parents.

Dr. P. Alston Steiner, III & his wife, Elaine, toast aboard a recent cruise

He has two children, a son who teaches science on an island near Guam and a daughter who resides nearby in Athens. Alston fondly remembers the occasion when he was visiting his son that he bungee jumped in New Zealand. This past summer he and Elaine took a cruise to Stockholm, Copenhagen, Helsinki and St. Petersburg, Russia. They were particularly impressed by St. Petersburg, which both he and Elaine felt was the highlight of their trip.

Alston and Elaine have been very generous in their support of the department through financial giving. To date, they have contributed approximately $100,000 to Physics and Astronomy in support of undergraduate physics study.

The **Italian Study Abroad Program** is flourishing.

Six of the twelve students who attended in 2007 were from Clemson!

For more information on this program and enrollment for 2008, please visit :

http://physics.clemson.edu/italy_2008

Terry Tritt Addresses International Forum on Thermoelectric Energy

(Adapted from Clemson website)

Billions of dollars could be saved every year if energy lost from hot engines could be captured and converted into electricity via thermoelectric devices, Clemson University physicist **Dr. Terry Tritt** told scientists gathered in Dallas for the world-renowned NanoTX '07 conference. Tritt delivered an address at the Alan MacDairmid Memorial Nano Energy Summit on challenges in alternative energy, specifically thermoelectricity used to generate electrical energy from waste heat.

'Thermoelectric generators are currently used in NASA's deep-space probes to convert the heat of radioactive elements to electrical energy, powering these systems for over 30 years,' Tritt said. 'Thermoelectric energy conversion is a solid-state technology that is environmentally friendly. One of the more promising 'down-to-earth' applications lies in waste-heat recovery in cars.'

Tritt said more than 60 percent of the energy that goes into an automotive combustion cycle is lost, primarily to waste heat through the exhaust or radiator system. Even at the current efficiencies of thermoelectric devices, (7 to 8 percent), more than 1.5 billion gallons of diesel could be saved each year in the U.S. if thermoelectric generators were used on the exhaust of heavy trucks. That translates into billions of dollars saved,' Tritt said.

Clemson research focuses on developing higher-efficiency thermoelectric materials that could increase savings significantly. Research on the electrical and thermal properties of new materials could reduce the world's reliance on fossil fuels and has shown promise with two classes of materials: low-dimensional systems for enhanced electrical properties and increased phonon scattering that leads to inherently low thermal conductivity. Tritt heads up the Department of Energy's Center of Excellence in Thermoelectric Materials Research at Clemson, one of the leading laboratories for thermoelectric materials in the world. The center focuses on the next generation of thermoelectric materials for power conversion and refrigeration.

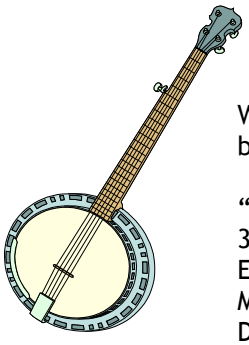
Dr. Terry Tritt

Researchers in physics, materials science and chemistry screen promising new classes of materials in order to achieve higher-performance thermoelectric materials. The Department of Energy recently renewed the program with more than $1 million a year in research funding for the next three years.

NanoTX, presented by Semiconductor Industry Association, highlights advances in nanoscience and explains how nanotechnology is being used today and how it will impact a broad range of industries tomorrow, including electronics, energy, aerospace, defense, biomedicine, robotics, chemicals and more.

Read on to the next page for more information about Terry, when he's not doing physics!

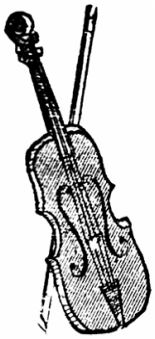
Terry Tritt's Other Job



When he's not doing top-notch physics, Terry Tritt's other great passion is bluegrass music and his band, The Grass Roots Revue".

"My instrument is guitar and mandolin, both of which I have played for over 30 years, but the guitar is my main instrument, a Clarence White Limited Edition D-28 Martin. We have opened for such bluegrass greats as "The Del McCoury Band" and traveled this past summer to play a private party in Denver, Colorado. We are regulars at Highlands Falls Country Club and Highlands Country Club, as well as local venues such as Just More BBQ", says Tritt.

Music is, indeed, in Terry's blood. He is a cousin to country music superstar, Travis Tritt. While Travis has made a name for himself in country music, Terry has remained true to his North Carolina roots, playing a very traditional strain of bluegrass music.



For more information on Dr. Tritt's music and the schedule for "The Grass Roots Revue", please visit their web page at:

http://www.myspace.com/grassrootsrevue

Dr. Jeff Hester of Arizona State University Visits Clemson as Distinguished Godfrey Lecturer

Famous shot of the Eagle Nebula taken by Dr. Jeff Hester of Arizona State University

Dr. Jeff Hester of Arizona State University visited Clemson as the 2007 Godfrey Distinguished Lecturer in Astrophysics. On November 27, he delivered the Godfrey Distinguished Lecture entitled "What It Means To Say 'I Know'", a stimulating analysis of the scientific method. In addition to this public lecture, he presented an Astrophysics seminar on "The Crab Nebula: The Gift that Keeps on Giving" the following day. He concluded his visit to Clemson by presenting a Physics and Astronomy colloquium entitled "Born Among Giants: The Solar System's Violent Origins" on Thursday November 29th in Daniel Auditorium. In addition to delivering his talks, Dr. Hester engaged in a number of exciting scientific discussions with Clemson faculty and students.

Dr. Hester is well known in the astronomical community for his work on star formation and supernovae. He is best known to the public for taking the famous image of the Eagle Nebula (left) with the Hubble Space Telescope. This image adorns countless posters, calendars, and T shirts throughout the country and was even made into a U. S. postage stamp.

The Godfrey Distinguished Lecture is made possible by the will of Mr. William C. Godfrey of Clemson.

Colloquium by Dr. Leon Robinson, "The Real Organics…"

On October 18, Dr. Leon Robinson, Clemson physics alumnus and retired Exxon researcher, gave a colloquium in Daniel Hall Auditorium, entitled "The Real Organics Aren't in the Grocery Store", in which he discussed basic physics principles applied to oil well drilling. After thirty-nine years in petroleum research and fifteen years of teaching classes and consulting with drillers about current problems, Dr. Robinson has a unique perspective about practical applications of physics to oil well drilling. His colloquium emphasized how a large amount of fundamental physics is necessary to economically deliver a useful well bore. Dr. Robinson's lecture described the drilling process and then discussed mechanical failure properties of sedimentary rock that must be drilled for oil and gas production.

Dr. Robinson, a graduate of the Class of 1949 was featured in last semester's newsletter after he submitted a letter to the Department Chair describing his experience as a Clemson physics student. Subsequently, an invitation was extended for him to come to campus to give a colloquium to current students. We thank Dr. Robinson for showing the students where a degree in physics can take you!

Dr. Leon H. Robinson

If you have any suggestions for this newsletter, or any other constructive input on its format, please email your thoughts to: rvogt@clemson.edu.

The Clemson University Physics and Astronomy Newsletter

118 Kinard Laboratory
Box 340978
Clemson, SC 29634-0978

Tel: (864) 636-3416
Fax: (864) 656-0805
E-mail: hdebra@clemson.edu

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physics.clemson.edu

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