December 1998

CLAS notes

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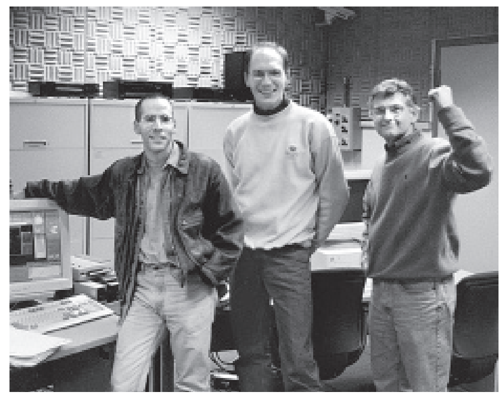
Written in the Stars

An Interview with CLAS Astronomer Charles Telesco

Cn: Last March, you and your team (Scott Fisher, Robert Piña and [from Harvard] Ray Jayawardhana) discovered what appears to be the birth of a solar system like ours, using a sophisticated infrared camera (OSCIR) you designed, built and mounted on the largest telescope at the Cerro Tololo Observatory in Chile. The reaction in the popular press has been amazing. All the major newspapers and radios have carried the story, and your discovery made the cover of* Newsweek. *How has all the coverage affected your work?



Robert Piña, Scott Fisher and Charles Telesco at the international observatory in Mauna Kea, Hawaii.

CT: I think that the press and PR that we got about our discovery has actually helped us quite a bit because it's really let people know that we're doing interesting work. It's a little hard to get that information out to the broader public and the people who really support your research when the primary way that you advertise, as it were, is through scientific journals.

The main thing was that a lot of people were exposed to our department. Our department has been remade in the last few years [Telesco came in 1995], and even though the "old department" had a lot of really top-notch scientists in it, this new department is taking advantage of all kinds of recent technology, and we have new young faculty members…so this was kind of our coming out party. This publicity helped us advertise ourselves at a very critical time. We're hiring new faculty now, too. We've just made a job offer that was accepted by a scientist from Cal Tech, and we're going to make two additional offers. Those interested in applying could see that we are on the move and that we are going to be part of some major discoveries.

Because of the discovery and publicity, we think we're on the verge of getting involved in a big way in a really big class of telescopes. Once we cross that line…once our university is part of a big telescope project like that—we're talking major telescopes, the biggest in the world at 8-10 meters—we'll very quickly, coupled with the new faculty that we're bringing in, be in the top class of astronomy departments, which is a pretty amazing accomplishment.

Cn: Describe the planet formation process.

CT: What we were looking at indeed seems to be the whole birth process....the creation process. Swirling dust clouds in space contain enormous filaments of material, and for some reason that we don't fully understand, the denser parts of the filaments start to collapse in on themselves. Little knots eventually form, and then the knots may fragment and form a lot of smaller knots which can actually begin to collapse. They are already rotating a bit, just a random rotation, and as they collapse more they start to rotate faster, you know, like a spinning ice-skater who pulls in her arms. Eventually, they start to flatten out to form a little disk…sort of—as the *Newsweek* science editor said—like when you take a ball of dough and toss it, it stretches out into a pizza.

Initially you get this bright, central core that will become the star [the star they worked with in Chile is called HR 4796A],

See Astronomy, page 8

The Dean's Musings

And to Round Out the Year

Readers of this column may recall that I have been on record in recent months about the many good things happening in CLAS this year. In addition to accomplishments triggered by CLAS, we have also enjoyed the gracious benevolence of Tally, Tigert, and our alumni/friends. No question, it has been a fine year.

But in order to maintain good standing in the International Deans Union, I must cite here our catchy slogan, "What have you done for me lately (as in, this week)?" In spite of its substantial gains, CLAS has yet many quite real needs.

And it is December, after all, when gifts are expected, so I ask Chancellor Herbert, President Lombardi, Provost Capaldi, and CLAS alumni fundraising czar, Al O'Neill, to keep in mind some of the modest presents listed below that would look good under the CLAS holiday tree.

• *Funding for the Women's Gym*—A great opportunity to house one of the finest Women's Studies programs in the country and to name the building. I have only a few of these naming opportunities left, so don't wait too long. Note also that not only does this fund a great program, but another UF historic building becomes renovated. A real win-win.

• *Enhanced Faculty/Staff Salary Package*—Progress has been made, but the UF salary structure is still much below where it should be for an AAU institution.

• *Term Professorships*—Our alumni and friends have already funded several of these, and we have need for more (the target is 20) to recognize and reward the best faculty in CLAS.

• *Ethics Professorship*—The need exists for an interdepartmental effort to integrate ethical considerations more broadly in our curriculum. We seek an endowed senior

See Musings, page 12

This month's focus: Astronomy

DEPARTMENTS

BOTANY

Stephen Mulkey and **Kaoru Kitajima** co-chaired an invited paper session at the "Second International Canopy Biology Conference: Global Perspectives" held at the Selby Botanical Gardens, Sarasota, Florida, November 4-8. The meeting was attended by tree canopy biologists from Europe, Asia, Australia and the Americas. Kitajima presented her collaborative work with Mulkey and S. J. Wright (Smithsonian Institution) conducted from the two canopy cranes at the Smithsonian in Panama.

CHEMISTRY

Michael Zerner has been awarded an honorary PhD from Tartu University in Estonia. Tartu was founded in 1623 by Gustavus II Adolphus and is one of Europe's oldest institutes of higher learning. Cooperative agreements between UF and Tartu were among the few that existed between Universities in the US and the former Soviet States.

ENGLISH

James Haskins' book, *I Am Rosa Parks,* written with Rosa Parks, has been named a Carter G. Woodson Award Honor Book. *Moaning Bones: African-American Ghost Stories,* has been published by Lothrop, Lee & Shepard Co.

Andrew Gordon chaired a panel on the fiction of Bellow and Roth at the American Literature Association Conference on Jewish-American literature, held in Delray Beach October 24. He also read a paper on "The Return of the Repressed in the Bellarosa Connection." He will organize this conference in 2000.

Brandon Kershner has been nominated to the Board of Directors of the International James Joyce Foundation. The Board consists of eighteen internationally recognized scholars, nine of them from North America. His former doctoral student at UF, **Garry Leonard** (University of Toronto), has also been nominated.

UNIVERSITY OF FLORIDA

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Keene Faculty Center Dedicated

The New Keene Faculty Center in Dauer Hall was dedicated on Thursday, November 12. **Alistair Duckworth** (ENG) addressed the Keenes on behalf of the faculty (left). **President Lombardi** and **Ken and Janet Keene** cut the ribbon (right).

Geology Celebrates 50 Years at UF

President Lombardi (center), Geology chair **Paul Mueller** (left) and Geology alumnus **Jon Thompson** spoke at the Williamson Hall rededication ceremony.

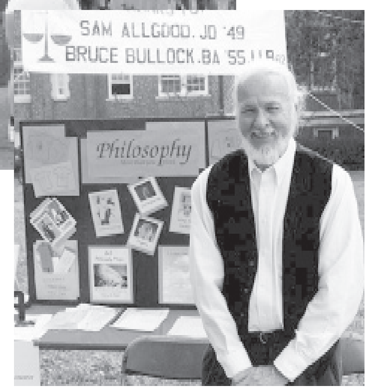
The Geology Department celebrated its 50th anniversary during the weekend of November 6. Activities included a professional development symposium on Friday, where several UF Geology alumni made presentations about their career experiences to the student body.

On Saturday, a large group convened outside Williamson Hall for a rededication ceremony. In his remarks, President Lombardi recognized that the Department has become a comprehensive educational and research organization with an internationally acclaimed faculty. He set forth a challenge that Williamson will become a globally recognized center for research education and service in the earth sciences.

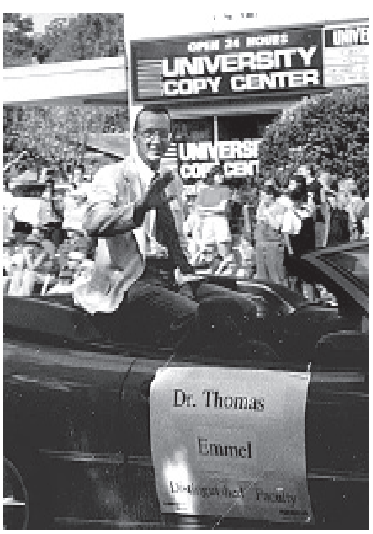
Other speakers included CLAS Associate Dean Jim Dufty, Geology chair, Paul Mueller, and one of the Department's distinguished alumni, Jon Thompson, president of Exxon Exploration Company. A tour of the building immediately followed the rededication ceremony. The National Science Foundation and the State of Florida have provided funds for Williamson's upcoming renovation.

Around the College

Homecoming 1998



Clockwise from top left: CWOC's **Kellie Roberts** (fourth from left), the **UF Speech and Debate Team** and the **Law School's Moot Court Team** served barbecue; the CLAS/Law Homecoming tent, sponsored by **Sam Allgood, Jr.** (JD '49) and **Bruce Bullock** (LS '55, LLB '62); **Richard Haynes** offered information at the Philosophy Department's display; **The Marine Biology Club**, headed up by Zoology lab technician **Jonathan Wheeler** (kneeling with cap in foreground) treated parade watchers to a hands-on aquatic life display; **Dean Harrison** and anthropology grad student **Heather McIlvaine-Newsad** admired the department's Potlatch t-shirts; Chemistry professor **Gardiner Myers** performed magic for a crowd in the Chemistry Lab Building; Blue Key Distinguished Faculty designee **Thomas Emmel** (ZOO) rode in the parade; Physics technical assistant **Eric Berry** conducted experiments for spectators; **Paula Palmer** held down the fort at the Center for Women's Studies and Gender Research table.

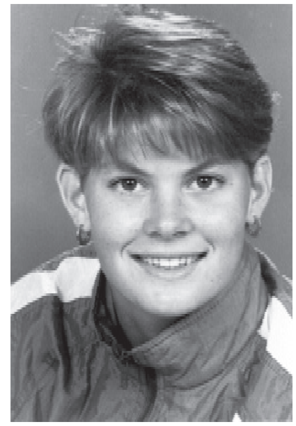


Preserving the Past (Part III)

Conversations with a UF Olympian

*What follows is the third and final installment of our series on The Samuel Proctor Oral History Program. The Oral History Program, directed by **Julian Pleasants** (History), houses over 3,200 interviews (more than 80,000 pages of transcribed material) which are available for use by research scholars, students, journalists, genealogists, etc.*

As with the other Oral History installments we've included in CLAS notes*, the following short excerpts represent a very small portion of the much lengthier original interview.*



Nicole Haislett

Interviewer: Julian Pleasants
Interviewee: Nicole Haislett
Date: 1997

UF graduate Nicole Haislett (Journalism, '97) won three gold medals (the most of any US competitor and tied for the most golds of any female athlete) in the 1992 Olympics in Barcelona, Spain. Haislett's titles came in the 200 free, the 400 medley (prelims) and the 400 free relay (her team broke the world record). Since 1968, Gator swimmers have won 46 Olympic medals.

P: I know for a fact that you are an outstanding student and that you made All Academic SEC….[to win] gold medals and [to maintain] a high academic standard is very, very difficult. How do you explain that level of accomplishment?

H: I think it all stems back to what I learned through swimming. Starting at such an early age, I learned a lot about myself and about the sport. It is not just swimming; it is any sport. It teaches you about goals, hard work, giving things up, and those are all things that can be carried over into any aspect of your life [including] academics.

P: If you look back, this is the twenty-fifth year of women's athletics at the University of Florida, things have changed rather dramatically. I think we would see in the last four or five years that women's sports have become much more equal to men's sports. Did you find that, for example, on the swim team?

H: Yes. While I was here, I never felt that the men's swim team had anymore than we did or had more privileges. I never saw that anywhere, except for football. They have more scholarships because they have more players. They get bigger prizes if they win the SEC and so on. [But] it was not like it was an unfair thing, because they are the ones who are bringing in all of the money for us….I always felt that I was treated fairly and equally here.

P: Right before you swim, what do you do? What do you do in the ready room, for example?

H: If I remembered, I would tell you. Everything is such a blur. I really do not remember things very well. I remember warming up real quickly before I went to the ready room and I was in the warm-up pool and the men's 100 fly was right before my event. Pablo Morales [U.S. Gold Medalist, 1996 Olympics] was in it and you know that was a big story. My coach at the Olympics came running in with this huge smile on his face and I was like, did he win? I could tell [that he did]. I was really pumped up about that, so I had some big adrenaline going. I warmed up, got my stuff on, and went down to the ready room. All I can remember is being so nervous….They put you in a line according to your lanes and you march out….I just remember hearing these people yelling, "Go Nicole, go Nicole." For a second I thought, wow, that really sounds like my family. I lost all concentration and I looked up and [saw that] it was [them]. They were just behind my lane. I almost stopped the lineup because I was staring at them wondering how on earth they got those tickets.

P: Did that help, the fact that they were there?

H: Probably. One of the fondest memories that I have from the Olympics is finishing the race and being able to see them right away. The first thing I did was look at the clock and then I looked at them.

P: Some people in the ready room stare down opponents. Do you get into these mind games at all?

H: No. I was real quiet; I did not talk a lot. I just did my own thing. If it was intimidating, then it was, but I did not do anything purposely. I did not spit on anybody or make faces or anything like that.

P: When did you know you won? Do you know when you hit the wall?

H: I did not know. I think I felt pretty good about it, but I did not know. I touched the wall and I looked back and it seemed like an eternity before the places went down by the lanes. Then I saw the one.

P: You were swimming next to this girl.

H: Yes. I was right next to her.

P: And you did not see who touched first?

H: I breath hold the finish, so I do not breathe from five, six, seven meters out. You cannot see the side of you and you are concentrating on your finish, so you cannot really tell. You know if you are ahead of somebody, but I was not ahead of her. We were even.

P: It was that close?

H: The difference was .1 seconds exactly.

P: How did you feel when you got up on the stand to get your first gold medal?

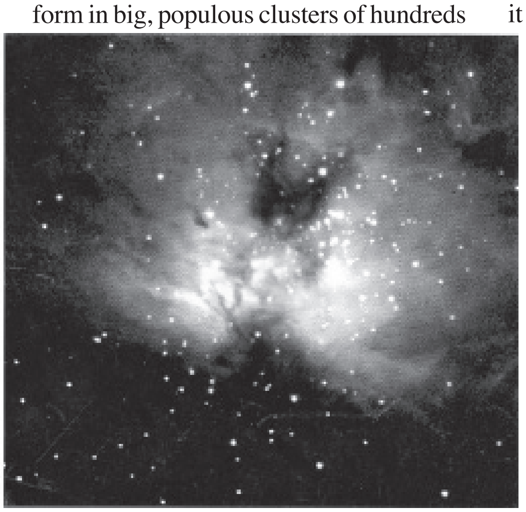
H: To me it was like deja vu because I had visualized it and pictured it happening so many times that it felt like I had already done it….It was pretty neat. It was funny because you watch it at home and you watch them on the award stands, you watch them raising the flag, and [you hear] the national anthem. So as I was standing there I was thinking, wow, people at home are watching me right now getting my medal.✎

How Stars are Born

Elizabeth Lada's discovery paves way for new research on star and planet formation.

Elizabeth Lada in her office (note: Orion on wall in background).

While working on her dissertation at The University of Texas at Austin in the late 1980s, Elizabeth Lada's goals were modest. By surveying the giant dust cloud inside her favorite constellation, Orion, Lada hoped to understand more about the general formation process of stars. "We knew that stars form in very cold, very large, massive clouds of gas and dust. They're the largest things in the universe and they're the coldest things in the universe," she says. "I was really fascinated by how the gas and dust collects, eventually getting dense enough to collapse and form stars." But what she discovered changed the entire premise of star formation theory. Up until then, astronomers had assumed that our sun and stars like it formed relatively alone, from tiny cores. "In conducting these surveys," explains Lada, "we learned that typical stars like the sun don't form in isolation; in fact, most of them form in big, populous clusters of hundreds of stars very densely packed together. This was a total surprise."



A near-infrared image of a cluster (NGC 2024) which contains more than 300 "infant" stars (only around one million years old). Lada discovered that most stars are born in clusters.

Her findings have raised many important research questions, most notably: if stars usually form in clusters, why do so many "lone" stars exist? Part of the answer is that star formation is, as Lada terms it, "an inefficient process." While the clouds of gas from which stars form are huge—tens of thousands of times the mass of the sun—only a small fraction of this gas actually ends up creating stars. But far from waste, this unusually large quantity of leftover gas may actually act as a binder, keeping the young stars together as they form. "What we think happens, and we don't understand the entire mechanism, is that at a certain stage in this formation process, the gas is disrupted and shoots out of the cluster. We know that in these kinds of regions you have very powerful outflows that drive gas out and you have radiation pressure from the new stars that push the gas away." Once the "glue" is gone, Lada theorizes, there is not enough material between the stars to hold them together, and since the galaxy and everything in it is constantly moving, the stars end up gradually drifting away from each other.

So it's highly possible that our sun may have hundreds of brothers and sisters out there, stars of similar age and chemical composition. Unfortunately, this would be difficult to prove. "Because our star, the sun, is so old," Lada says, "if it did form in a cluster, by now its brother and sister stars would be spread all over the galaxy."

Since clusters produce stars of all types and sizes, Lada also hopes to understand more about the distribution of masses of stars within each cluster. "We'd like to know if star formation is so robust and fundamental that no matter where you go in the galaxy, clusters are always going to produce the same number of stars or the same distribution of stars," she says. "Looking at really young things will help us out; we're not studying fossil records of stars, we're looking at things that have just been born." In recognition of Lada's pioneering work in star formation, the National Science Foundation awarded her a $390,000 Faculty Early Career Development Program (CAREER) grant last summer.

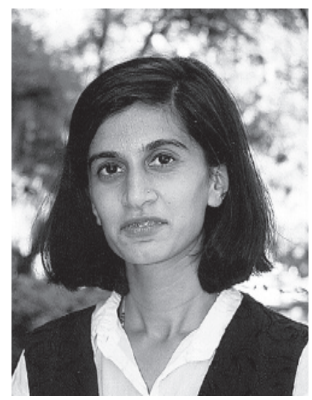
Lada's work has also dramatically impacted research on planet formation. Pictures from the Hubble Space Telescope provided proof that disks of interstellar dust (the type of disks now thought to indicate the birth of planets—see Telesco interview in this issue) exist around approximately 50% of recently formed stars in the nearby Trapezium cluster. "One of the things we want to try to figure out is how cluster density [the degree to which these groups of young stars are closely packed] affects disk formation. How long do disks live in stellar clusters? Long enough to produce planets? Does radiation emitted from large, bright stars in a cluster disrupt the environment for planet formation?"

She is currently using both mid-infrared technology (Telesco's OSCIR) and radio millimeter telescopes to try to answer these questions. FLAMINGOS, Richard Elston's new spectrometer (see article, page 9), will eventually be helpful in answering other questions about star formation and stellar clusters. "With FLAMINGOS, we'll be able to study a whole cluster of new stars in a single night—a powerful breakthrough—so I'm really excited about that." ✎

New Faculty

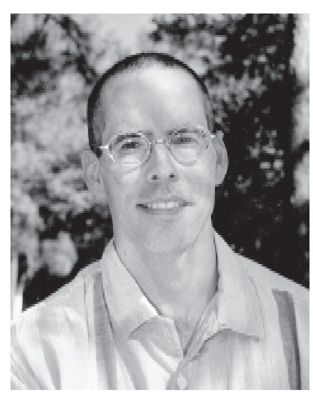
Assistant professor of psychology **Darragh Devine** completed his PhD in psychology at Concordia University's Center for Studies in Behavioral Neurobiology in Montreal. He came to UF from the University of Michigan School of Medicine, where he was a post-doctoral researcher in the Department of Psychiatry. He is currently examining the molecular neurobiology of stress and its relationship to disorders such as self-injurious behavior. He is also examining the behavioral and physiological functions of the neurotransmitter orphanin FQ. He teaches courses in physiological psychology and the neurobiology of stress. His pastimes include playing guitar, cooking, windsurfing and playing soccer.

Shari Moskow, an assistant professor of mathematics, came to UF from the University of Minnesota, where she was a postdoctoral associate. She earned her PhD from Rutgers University in 1996. Her research interests include applied mathematics, partial differential equations and numerical analysis. Shari collaborates with industry studying problems that arise in material science, electromagnetics and other areas of science. She is currently teaching classes in numerical analysis and calculus. Her pastimes include watching movies, dancing, reading mystery novels and traveling.



Ranjini Natarajan, an assistant professor of statistics, earned her PhD in statistics from Cornell University. She came to UF from Brown University, where she was an assistant professor of biostatistics. She is interested in the issue of modeling heterogeneity among experimental units through the use of random effects. Currently, she is investigating the consequences of ignoring heterogeneity, and developing a procedure for testing its presence within a Bayesian statistical paradigm. In her spare time, she enjoys cooking, watching movies, hanging out with her friends and playing bridge.

Assistant professor of sociology **Chuck W. Peek** earned his PhD in 1995 from the University of Michigan in Ann Arbor. He has held postdoctoral fellowships in the UF College of Medicine and most recently in the UF College of Dentistry. His research focuses on health and long-term care among older adults. Chuck is currently working on a project that examines race and ethnic differences in the physical and contextual aspects of disability and the consequences of declining health. He will teach courses in medical sociology and methods of social research. Spare time permitting, he enjoys playing tennis, cooking, and reading mystery novels.



Robert Piña, an assistant professor of astronomy, earned his PhD in 1994 from the University of California, San Diego. He was most recently a postdoctoral research associate at UF. His principle expertise is in astronomical infrared cameras, which use a special kind of detector developed by the defense industry. Currently, he is studying massive stars and "active galaxies" and developing new numerical techniques to "enhance" astronomical images. He is teaching his first graduate class entitled, "Data Analysis with Application to Astronomy." He enjoys swimming, hiking, biking and reading.

Closing the Gap

by Bo Gustafson (Astronomy)

Gustafson holds a scaled model of a dust particle. An actual interplanetary dust partcle (upper right), magnified by more than 6000. The microwave facility Gustafson designed and built to study scaled particles is visible in the background.

Dust particles are the starting point of planet formation, the remnants from planet formation, and probably the “cradle” from which life developed and spread in the universe. Theoretical modeling and observations of cosmic dust is a well-established research focus in the Department of Astronomy and has been for decades. In the Laboratory for Astrophysics we are developing unique theoretical and experimental methods that can be used on “real” problems facing astronomy and other fields of research in the natural sciences, in medical sciences, and in engineering. We apply these techniques in the development of innovative space instrumentation that enables missions that are truly “faster, cheaper, and better.”

In general, there is a big gap between the idealized conditions that theoreticians can solve for and the real world that we observe. Almost all natural and man-made particles are found to be complex structures and are usually aggregates of multiple particles less than a micrometer (one thousandth of a millimeter) across. Most theoretical calculations of how these particles interact with light are, despite this, still based on idealized homogeneous and perfect spherical particles that are also assumed to act independently of one another. This may be a good approximation for explaining the rainbow since it arises from a cloud of finely dispersed liquid drops pulled spherical by surface tension, but it is not a good approximation for most other real conditions. Far from spherical, cirrus cloud particles, for example, are actually intricate angular ice crystals that can be assembled in snowflake-like complex geometries. Volcanic dust, car exhaust, man-made smog and other types of dust are examples of irregular, complex aggregate structures. Real applications involving such intricately shaped or closely spaced particles include a range of remote sensing applications, blood analysis and other medical analyses, pollution monitoring, and the sensing and manipulation of small particles in the food industry and manufacturing as well as in our primary interest: cosmic dust. Maybe the common view that most theoretical work is “academic” and almost unrelated to reality has some truth to it.

(from left) Bo Gustafson, Ludmilla Kolokolova, Thomas Waldemarsson, Yu-lin Xu and Frank Giovane stand in front of instrumentation similar to equipment they designed and built for the “John Glenn” Space Shuttle mission.

When I formed the Laboratory for Astrophysics in 1994 to study the physics of dust particles and other small bodies, there was a great need for closing the gap between modeling, both theoretical and experimental, on the one side, and real particles on the other. The foundation for our success is an accurate and fully automated microwave facility that allows us to study light interactions in which a particle’s dimensions and the light’s wavelength are scaled up by a factor of 6000. Affording great control and accuracy through the scaling (we build models of particles that are micrometers across scaled up to the size of grapes), ours is the first and only facility capable of measuring all aspects of the interaction of light with an arbitrary particle. Its first use was to test and confirm a rigorous theoretical solution to the scattering of light by arbitrary aggregates of fully interacting spheres developed in the Laboratory for Astrophysics by Dr. Yu-lin Xu. This long sought-after theoretical development is a big step that has allowed theoretical modeling of more realistic dust structures. Dr. Ludmilla Kolokolova, also at the Laboratory for Astrophysics, uncovered evidence for organic compounds sublimating away from dust particles as they leave a comet, an interpretation that catches the imagination since cometary organics may have “sparked” life on this planet. The interpretation would have been impossible to make without the laboratory data.

These successes have not gone unnoticed, and NASA has repeatedly approached our group to apply our results to instrumentation for the analysis of dust particles in planetary atmospheres, the outflow from icy satellites and comets, and in space. We therefore formed an alliance for space instrumentation with collaborators worldwide including Dr. Frank Giovane at the Naval Research Laboratory. As a result, the Laboratory for Astrophysics was funded to develop the next generation space instrumentation that is small and technically simple—with no moving parts—but that is “smart” because it uses knowledge about real particles, not before available, to analyze individual micrometer-sized specks of dust that may be suspended in thick atmospheres or could be traveling through virtually empty space at velocities measured in km/s. NASA designated our Planetary Aerosol Monitor / Cometary Dust Analyzer (PAM/IDA) one of their sixteen “standard instruments for planetary exploration in the new millennium.”

As part of the effort, we developed test and calibration facilities as well as both a means of handling small particles and the guns to shoot these particles. A plasma gun of our design uses a hypodermic needle for a barrel and may be the smallest hypervelocity gun in the world. This gun launches tiny dust particles to velocities exceeding 7 km/s, the speed of the space shuttle. The whole setup including the gun and flight path is designed to fit inside our 25-foot

See Gustafson, page 8

Astronomy

Telesco, continued from page 1

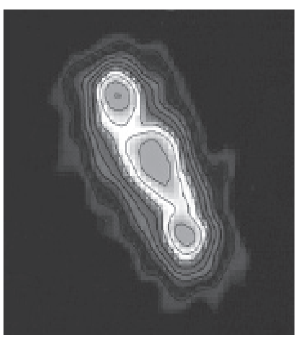
and over time the dust and gas in the disk slowly coagulate and form bigger and bigger chunks of material that eventually form planetesimals [a few kilometers and bigger], and over time those coagulate and form planets, and all the dust and gas in the disk either dissipates or is captured into one of the forming planets. We think planets usually form in the interior of the disk [which begins to look like a ring with a central cleared zone…they saw this clearing in the disk around HR 4796A].

Cn: Do you hope to eventually identify and image an actual planet in a new system like HR4796?

CT: The planets are going to be very hard to see because they are very small and the star light is very bright…a planet like the earth at the same distance from a star that earth is from the sun is like a million or hundreds of thousands of times fainter than the star.

So it's going to be a long time before we can actually see a planet like earth which is quite small. But we may be able to see big planets like Jupiter in the next few years—see them directly. We're going to have to be very clever [laughs]…you're just not going to go and take a picture of it.

The key for us is that we'll be working in the mid-infrared with the biggest telescopes possible to get the highest contrast between the planets and the star so we can keep the stellar image overflow, if you want to call it that, down to a minimum. But even doing that is not enough. There is an interesting technique—called interferometry—in which you use the interference effects of light to actually cancel out the starlight. That's the state-of-the-art, where researchers are struggling to learn how to use the telescopes in the most effective way, so it's not *just* having a big telescope. You can actually combine the radiation from several telescopes to cancel radiation you don't want so you can see radiation that you do want. A pretty interesting technique…but you just don't get simple pictures… you have to process the images before you can translate them into a form in which the planets are visible.



A computer-enhanced version of an image Telesco's group made using OSCIR on the Keck II in Hawaii. The central circle is the star (HR 4796A); the circles above and below are a cross-section of the kind of circumstellar disk (imagine looking at half of a doughnut edge-on) in which astronomers think planets are born.

Cn: What's your next step?

CT: We haven't discovered very many of these disks. This one is only the second one discovered for which we see a lot of the details. What we'd like to see is a whole sequence of them—of different ages. If you were a Martian and came to earth to find out how a single person ages…if you only had 10 minutes on earth, how would you do it? You could take a lot of pictures of different people and compare them…you'd realize there were some small ones, big ones, etc…and you'd find that there is an evolution from children all the way through to adulthood. That's exactly what we want to do with solar systems.

Cn: So it's important to find more disks to examine.

CT: We have to find a lot of them. You want to see an evolutionary sequence, so you look at a lot of different systems of a lot of different ages. It's a harder problem than one thinks because we have to use a variety of techniques to determine the age of a star, so there's always uncertainty. We have to build up statistics and look at a large number (ideally hundreds and hundreds of disks of all shapes and sizes)…and then we can piece together the scenario and really describe the evolution of solar systems.

The Keck II telescope in Hawaii, where, in May, Telesco's group was able to gather more detailed images of their March discovery.

Cn: A group working at the Keck II telescope in Hawaii made the same discovery (HR 4796A) at almost the same time you did last March. Is there a lot of competition out there?

CT: Yes. Over the last couple of years, we've been racing to hunt down stars we can confirm as having disks around them. Right now we're just sort of taking pot shots trying to accumulate data so that we can actually begin to organize it—it's pretty exciting. And we need the big telescopes and we need the good detectors. NASA thinks this is important, and we enthusiastically agree. We're just like kids in a candy shop.✎

Gustafson, continued from page 7

space simulation chamber. Detecting, let alone analyzing, particles on this scale as they speed by is a truly mind boggling feat and our way to "reach for the stars."

In just a few years since its formation, our group not only built the ground facilities and developed the PAM/IDA instrument, it has also built and flown a simplified version of the instrument on the "John Glenn" space shuttle this fall. Our unit monitored the growth of dust grains in a simulated planet forming region as part of a German microgravity experiment that is intended to eventually be a long term project on the International Space Station. We also designed part of the dust instrument on Rosetta, the European mission to a comet, and are now negotiating to fly our PAM/IDA instrument on NASA's DS4 comet mission.

Given the esoteric reputation of our field, it may be ironic that, as astrophysicists, our primary activity is to close the gap between theoretical and experimental modeling with applications to a broad and well established research field that touches nearly all the sciences and to bring modeling "down to Earth." Through establishing applications for our work in the space program and potentially in industry, we feel that we are also closing the gap between "academic work" and the "real world."✎

The Future of the Universe

Richard Elston's new design will allow astronomers to work 100 times faster.

Astronomers like Richard Elston have to possess quite a bit of patience. "When you're trying to figure out how all the galaxies in the universe have changed and evolved over time," Elston explains, "you need to collect data on hundreds of galaxies." And that takes time. Lots and lots of it. In order to collect data Elston first has to apply for time on major telescopes at the big observatories around the world. He might get three or four nights several times a year. But because distant galaxies are faint even on the biggest telescopes, it takes Elston most of each night observing to collect data on a single galaxy. And that's only if the weather is good. At the Cerro Tololo Inter-American Observatory in Chile recently, for example, weather permitted Elston only two productive nights. "I was pretty happy with that," he admits, "but it would have been nice if all four nights would have been clear and I could have observed four galaxies."

"Right now," admits Elston of the painstaking process of accruing data on hundreds of galaxies, "we're merely scratching the surface." Not for long. Thanks to a new near infrared spectrometer that Elston himself designed, astronomers will soon be able to study up to one hundred galaxies in a single night. "A factor of 100 is a big gain," Elston says proudly of his creation, the Florida Array Multi-object Imaging Grism Spectrometer, or FLAMINGOS for short. "In one night we can do what would have taken a hundred nights to do traditionally. FLAMINGOS will give us this huge boost in the speed at which we can do these kinds of projects."

FLAMINGOS will be used in two ways. First, the instruments can act as a camera, taking pictures of the sky at infrared wavelengths (several times longer than what can be seen by the human eye). Secondly, FLAMINGOS can be used as a multiple object spectrometer. A spectrometer breaks up all the wavelengths of the infrared and spreads them out on the infrared array which detects the light, allowing astronomers to conduct various analyses. "We can measure the distances to the objects, we can measure their chemical compositions, we can learn things about the type of stars that they're made of, how old they are and a whole range of things," says Elston. And although infrared spectrometers have been built before, FLAMINGOS is the first multi-object spectrograph, allowing users to take spectra of about one hundred objects simultaneously.

What technology has allowed this giant leap forward? Several things. Using lasers, astronomers can punch holes into a small metal plate that fits inside Elston's spectrometer. The holes, precisely mapped to correlate with the location of targeted objects, tell FLAMINGOS exactly which galaxies to observe, and the instrument can carry many of these perforated plates at one time.

Another major factor aiding FLAMINGOS' leap forward is improved infrared array technology. "Right now most infrared cameras have about 256 by 256 pixels," explains Elston, "but FLAMINGOS is going to have 2,048 by 2,048." Advanced technology comes at a price, however. The infrared array or "detector" alone costs a quarter of a million dollars.

FLAMINGOS, currently under construction here at UF, should be finished in one year. "We just signed an agreement with the US National Observatory to take it and put it on their telescope for part of the year, and we're now talking to other major observatories like the International Gemini 8-m telescope and the Harvard-Smithsonian MMT 6.5-m telescope about getting it on their telescopes for a substantial amount of time." His agreement with the US National Observatory guarantees Elston (and his UF colleagues and graduate students) 40 observation nights a year, and they will let outside groups use it for a total of 80 additional nights.

Elston's long-term goal is to make headway into the mysteries of galaxy formation and galaxy clustering effects. "Right now there are two very different models of how galaxies formed," he says. "They either formed all at once in the collapse of a big gas cloud, or they could have formed from pieces of little clouds coming together slowly over time. These are two very different pictures, and we hope to be able to determine which is actually correct."

Richard Elston stands beside FLAMINGOS, his new spectrometer currently under construction at UF.

Since Elston studies galaxies that are 10 or 15 billion light years away, he is actually looking at light that left these galaxies and traveled for 10 or 15 billion years to get to us. "Essentially, studying these distant galaxies allows us to see the universe as it appeared when it was very young," he says. "With FLAMINGOS, we want to look for clusters of galaxies back in the distant universe to see how these clusters have grown with time. Gravity pulls more and more galaxies into these clusters, so clusters are continually growing as time passes. Thus, the overall amount of matter in the universe will determine how clusters of galaxies will grow. The question then becomes, Is there enough gravity in the universe to pull it back together or will it go on expanding forever?" Elston laughs and adds without a touch of irony, "It's a big question."

"With the help of FLAMINGOS," he continues, "we hope to learn something more global about what the whole future of the universe is."✎

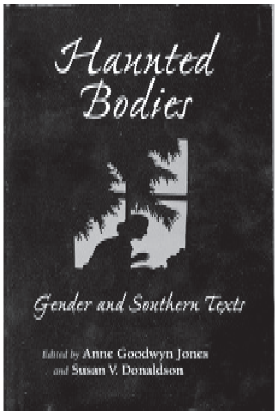
Grants (through Division of Sponsored Research)

October 1998 Total $ 1,930,417

Investigator	Dept.	Agency	Award	Title
Corporate...$ 318,669				
Abboud, K.	CHE	Dow	9,000	Crystal structure determination.
Boncella, J.	CHE	Mobil	30,000	Bimetalic group 4 metallocene complexes for the polymerization of alpha-olefins.
Hudlicky, T.	CHE	Procter & Gamble	42,000	Organic synthetic methods and services.
Katritzky, A.	CHE	Glaxo	1,000	Compounds for biological screening.
Katritzky, A.	CHE	Hoechst Schering	112,170	Agrevo compound agreement.
Katritzky, A.	CHE	Mult Companies	10,000	Miles compound contract.
Richardson, D.	CHE	Amoco	39,000	Metal-oxo catalysts for hydrocarbon activation by oxygen.
Winefordner, J.	CHE	Texaco	16,000	Texaco fellowship.
Thomas, C.	CRI	Mult Sources	8,500	Private corrections project.
Golant, S.	GEO	Mult Sources	40,349	The Casera project.
Federal...$ 1,131,343				
Ciardi, D.				
Lada, E.	AST	NASA	10,000	Understanding the accretion geometry and energetics in polars.
Dermott, S.	AST	NASA	15,442	Calibration and astrophysics with the infrared space observatory.
Elston, R.	AST	NASA	22,728	Calibration and astrophysics with the infrared space observatory.
Gustafson, B.	AST	NASA	61,228	Planetary aerosol monitor/integrated dust analyzer.
Lada, E.	AST	NASA	21,181	Calibration and astrophysics with the infrared space observatory.
Mukherjee, J.				
Dermott, S.	AST	NASA	2,700	Student experimenters in motion.
Telesco, C.	AST	NASA	102,155	Calibration and astrophysics with the infrared space observatory.
Bowes, G.	BOT	DOA	120,000	Characterization of NADP-MALIC enzyme in a unique Kranz-less C4 system.
Jones, D.				
Gordon, D.	BOT	DOT	137,707	Native sandhill species revegetation techniques.
Kennedy, R.	CHE	US Army	184,003	Role of glutamate release ABD metabotropic autoreceptors.
Richardson, D.	CHE	NSF	50,000	Gas-phase chemistry and spectroscopy of metal complex ions.
Stewart, J.	CHE	NSF	337,500	New reagents for asymmetric organic synthesis from engineered baker's yeast.
Winefordner, J.	CHE	NSF	68,261	Advanced measurements and characterization.
Smith, N.	GEO	NSF	6,140	Market impacts on agrobiodiversity among smallholders in Eastern Amazonia.
Konigsberg, J.				
Mitselmakher	PHY	DOE	64,848	Luminosity monitor detector development for the CDF experiment.
Korytov, A.	PHY	DOE	43,800	Task G CMS: Research on elementary particle physics.
Scicchitano, M.	POL	NRTWLD	8,470	A study of attitudes regarding union membership.
Bradley, M.	PSY	NIMH	39,894	Project 4: Center for the study of emotion and attention.
Fischler, I.	PSY	NIMH	36,952	Project 3: Center for the study of emotion and attention.
Natarajan, R.	STA	NSF	10,000	Bayesian analysis of generalized linear mixed models using non-informative priors.
Shuster, J.	STA	NIH	50,359	Pediatric oncology group—Phase I Clinical Trials in Children.
Bjorndal, K.				
Bolten, A.	ZOO	DOC	5,693	Sea turtles and longline fisheries in the Eastern Atlantic.
Bjorndal, K.				
Bolten, A.	ZOO	DOC	6,215	International sea turtle flipper tag distribution and tag recapture dissemination.
Foundation ...$ 83,471				
Katritzky, A.	CHE	USCR&D	3,000	Novel methodology for pyridine ring synthesis.
Malecki, E., Jr.	GEO	UK Research	19,968	Telecommunications infrastructure in the Southeastern United States.
Chapman, L.				
Chapman, C.	ZOO	Beinecke	11,500	Ugandan student support.
Other...$ 6,250				
Brown, W., Jr.	CSD	Misc Donors	6,250	Miscellaneous donors.
State...$ 2,225				
Mossa, J.	GEO	SJRWMD	2,225	Spatial and relational database services for water use and supply.
University...$ 163,529				
Bowers, C.				
Blackband, S.	CHE	FSU	75,990	A proposal to establish an optically polarized noble gas NMR and MRI program.
Boyland, P.	MAT	U of Illinois	28,374	Subcontract between the University of Illinois and the University of Florida.
Adams, E.				
Xia, J.	PHY	FSU	59,165	Experimental investigation of states at half-filled Landau levels.

Bookbeat

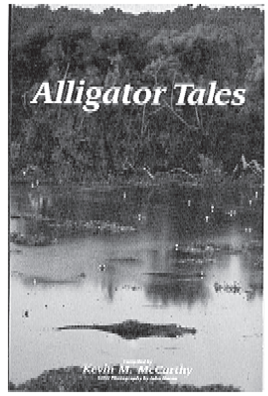
Haunted Bodies: Gender and Southern Texts
Edited by Anne Goodwyn Jones (English) and Susan V. Donaldson
University Press of Virginia



(review from book jacket)
In *Haunted Bodies*, Anne Goodwyn Jones and Susan V. Donaldson have brought together some of our most highly regarded southern historians and literary critics to consider race, gender, and texts through three centuries and from a wealth of vantage points. Works as diverse as eighteenth-century court petitions and lyrics of 1970s rock music demonstrate how definitions of southern masculinity and femininity have been subject to bewildering shifts and disabling contradictions for centuries.

(excerpt)
Analyses of gender in American studies have tended to assume that the contours of gender that developed in the first half of the nineteenth century in the American North can be successfully generalized elsewhere....Yet a moment's thought will make it clear that such gender assumptions could not work so smoothly for people in the American South, white or black, rich or poor, slave or free. For manhood, the notion of "the free play of individual interests" in a rigidly hierarchical and paternalistic society or of gaining social status through achievement rather than birth in a culture based on family lineage had to remain only a gleam in the eye for the Southerner born with the wrong blood or condition of servitude and without a silver spoon in his mouth. Most southern men, that is to say, would not have had access to Rotundo's "American" manhood. And even those most likely to—the men of the master class—argued quite explicitly against such ideas, for example in the proslavery speeches, sermons, and essays.

Alligator Tales
Compiled by Kevin McCarthy (English)
Pineapple Press



(review taken from book jacket)
Collected here are true (and tongue-in-cheek) accounts of alligators and the people who have hunted them, been attacked by them, and tried to save them from extinction. Journey through the Everglades with 1800s Seminoles, experts at stalking and killing gators. Go along with a "Northern girl" as she shoots "my first alligator in my gloves and veil." And learn how modern alligator hunters go about their business, which hasn't changed much in the last hundred years or so.

This book is filled with amusing black-and-white photos and is punctuated by a full-color section of photographs by John Moran, who has managed to capture the true essence of alligators in their natural habitat.

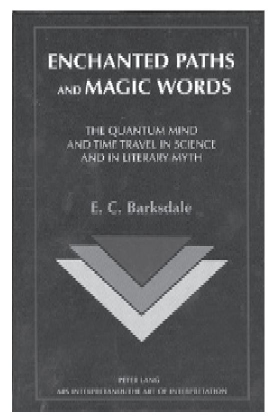
(excerpt)
The University of Florida began using a gator for its mascot back in 1907. At that time, Philip Miller, who owned a stationery store in Gainesville, Florida, was visiting his son at the University of Virginia in Charlottesville. When he tried to order some University of Florida pennants there to sell in Gainesville, Miller suggested the alligator for two reasons: First, no other school at that time had an alligator for a mascot; and second, the reptile was native to Florida.

When the pennant maker admitted that he had never seen an alligator and could therefore not design one for the pennants, Miller's son went to the local library, found a picture of a gator in a book, and presented a copy to the pennant maker. When the pennants arrived in Gainesville in time for the 1908 football season, the blue banners had on them a large orange alligator—and a mascot was born.

Enchanted Paths and Magic Words: The Quantum Mind and Time Travel in Science and in Literary Myth
E.C. Barksdale (Germanic and Slavic Studies)
Peter Lang

(review taken from book jacket)
Dreams of time travel have long haunted the human imagination. Many physicists and philosophers think that time travel is impossible; others, such as Stephen Hawking, ponder whether perhaps it could be done. Part One of this book offers a nontechnical account of some of the major current theories concerned with time travel and with the quantum mind. The mind already makes imaginary journeys in time. The mind may some day, through a special process of information transfer, make real ones. In Part Two, the reader goes on several trial-run trips in time with great writers and filmmakers as guides.

(excerpt)



We cannot really see time as a fourth dimension. Instead we perceive it as a one-directional dimension separate from the three dimensions of space; and we "crawl" along that dimension in one direction going from the past to the present and on to the future. We shall see later in this book that certain famous physicists, including Sir Isaac Newton, have proposed that there is no reason why we cannot in theory" crawl" back in the other direction; from future to the present and on into the past. So we perceive time as a one-dimensional entity because we can imagine time as a straight line and often we draw time on graphs as a straight line....we always conceive of three dimensions of space as utterly separate from the extra dimension of time.

Musings, continued from page 1

position, the occupant of which will provide leadership in this area.

• *Continued Upgrade of Rolfs Hall* — We are gradually modernizing this 1927 building for critical CLAS teaching needs, although painfully slowly. Much work remains to be done. The provost is providing 5th floor renovations this year, for which I am grateful. [Betty, did I mention the critical needs on the 4th floor, too?]

• *Residential College*—An unfulfilled dream is the conversion of a campus dormitory into a site for faculty-student social and intellectual interaction. A small Residential College within UF could have a catalytic effect far beyond its size, and our students (and faculty) would be the better for it.

• *More Infrastructure*—We always need more talented staff to make this far-flung College function properly. New positions for secretaries, engineers, computer managers, and lab technicians would be appreciated.

• *Increased TA Stipends*—To be successful in the graduate growth initiative, we need to be competitive with our peer institutions in attracting the best graduate students. Given the financial straits of most graduate students, stipend level takes on undue significance.

• *Additional Graduate Fellowships*—Similar purpose and needs as described above under TA Stipends.

• *Naming of the College*—A defining mark for CLAS would take the form of a large gift to endow and name the College (i.e., the Gates College of Liberal Arts and Sciences).

I will stop here to avoid the slightest appearance of unreasonableness, but a more complete list is available upon request. And remember, CLAS is always a good investment.

A joyous holiday season to all.

Will Harrison, Dean
<harrison@chem.ufl.edu>

A Note from the Chair

Stan Dermott, Chair
Department of Astronomy

One measure of the success of a research program is its level of external funding. In FY95-96, the total external funding of the Astronomy Department was $637,884. In FY96-97, we brought in $1,478,558, an increase of 230%. In FY97-98, that figure increased to $3,636,290, representing a further increase of 250%. There must, of course, be a limit to this process, but all the indications point to a level of funding that may be close to the highest in the college, at least on a funds per faculty member basis. At present, the department has 17 faculty.

This success has been achieved by a new strategy. Time on space-based telescopes—for example, the technically brilliant Hubble Space Telescope operated by NASA—is available through open competition and our faculty have been very successful in gaining time on those facilities. However, most of the new, large and sophisticated telescopes are ground-based and sited in the deserts of Arizona, Chile and Hawaii. The new strategy that the department is pursuing is the development of instruments that are unique and of such high quality that the major observatories will welcome the opportunity of using them on their telescopes. Thus, in exchange for an investment in instrumentation, UF astronomers now gain some access to the world's best observatories.

***The birth of a department: CLAS astronomers made the cover of* Newsweek *last May*.**

OSCIR, the infrared camera designed and built by Charlie Telesco and his team, was used by UF and Harvard astronomers to discover a disk of dust around a young, nearby star in which planets may now be forming. This discovery made the cover of *Newsweek* in May 1998 and was the first big payoff of the new strategy. Other major new instruments are now under development with funds provided by NSF.

Our graduate program is small, but comparable in size to those of most other major astronomy departments. We only have 28 students in our PhD program, but with one exception, all of these students are fully funded, and 40% hold competitive, external fellowships. With the expansion of our research program, we expect our graduate program to continue to grow. At the undergraduate level, we teach mostly 1000 and 2000 level general education courses to non-scientists. We find that the presentation of the latest discoveries on the frontiers of astronomy, sometimes by the astronomers who are making those discoveries, can be an exciting and intellectually challenging experience for these young students.

We are now in the process of hiring three new faculty to strengthen our research on the origin of the universe and all that it contains: that is, galaxies, stars, planets and even life itself. We are confident both of making further important discoveries in that area and of communicating the new results to our students.✎

Astronomy Staff

The Astronomy Department's office staff includes (from left) office manager **Deborah Hunter**, senior secretary **Ann Elton**, and program assistant **Glenda Smith.**