

# CASPER NEWS

CENTER FOR ASTROPHYSICS, SPACE PHYSICS & ENGINEERING RESEARCH

ASTROPHYSICS & SPACE SCIENCE THEORY GROUP • HYPERVELOCITY IMPACTS & DUSTY PLASMAS LAB • SPACE SCIENCE LAB

Vol. I • No. I • Spring 99

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- Gear-Up, TexSpace
- NASA, NSF
- ~\$1,125,000.00

## ASSTG

### Goddard Summer School

Two of CASPER's theory group will be attending Goddard Space Flight Center's supercomputer school this summer. Bruce Lindsay and John Vasut's research proposals were selected as finalists allowing them to spend around a month (with all expenses paid under a NASA grant) at GSFC learning about the latest in supercomputer technology. Both John and Bruce will be working on original code they are developing as part of their dissertation research and will have access to full GSFC technical support to aid in optimizing it for massively, parallel systems. This makes the fourth year that the theory group has been represented at the school. Since less than twenty are selected nation wide (with the majority from either Ivy league or 'big name' west coast schools) it's apparent our reputation is growing!

### Recent Publications

The latest publications to come out of the theory group are "On the Lower Limit of Spoke Particle Radii," Laura A. Bringol-Barge and Truell W. Hyde, and "Numerical Simulation of Gravitoelectrodynamics in Dusty Plasmas," Lorin Swint Matthews and T. W. Hyde. Both papers can be found in the book *Strongly Coupled Coulomb Systems*, Edited by Kalman et al., Plenum Press, New York, 1998. (Reprints of the papers are available in the office as is our one copy of the book.) This book grew out of the Boston SCCS conference at which the group presented several papers. The above papers bring the theory group's number of publications during the past year to ten.

## HIDPL/SSL

### HIDPL Construction

Construction on the Baylor/TSTC lab has begun at long last! The inside of the building is currently undergoing a complete make-over in preparation for the installation this summer of the Van de Graaff accelerator and the various laser systems. Jerry Reay, Larry White, John Simcik, Wayne Blinky and Carliss Hyde have all been involved in the phenomenal amount of work that it takes to bring about a project of this magnitude. If you'd like more information (or would like to donate 'grunt labor') contact the office at once. We can use all the help we can get!

### Equipment

As soon as word about the HIDPL made it around the national lab circuit (with the aid of TSTC faculty and graduates) equipment started rolling in. Recent donations include the power supply used to power the LINAC at the SSC, the cooling system for the superconducting magnets at the SSC, all the stainless beam line we could ever use, vacuum pumps, cable, a complete Micro VAX system, two environmentally controlled target chambers, a stainless steel 'plasma' chamber and a Scanning Electron Microscope. All together, the above represents a sizeable investment in equipment!

### TSTC/Waco & TexSpace?

At the spring Texas Space Grant Consortium business meeting held at NASA/JSC, Dr. Hyde broached the possibility of the Center advancing a proposal to admit TSTC/Waco into the consortium as its first two year school member. We'll keep you posted as this opportunity develops.

## Personnel

### Graduates

Two of our members received their Ph.D.'s at the 1998 August commencement. Laura Bringol Barge and Lorin Swint Matthews both graduated with their Ph.D. in Physics with concentrations in Theoretical Astrophysics. Laura's dissertation was entitled, *Charging Processes and Effects in a Coupled Dusty Plasma* while Lorin's was *Numerical Modeling of the Gravitoelectrodynamics of Dusty Plasmas*. Laura is returning to Baylor from Houston Baptist to work in the newly formed HIDPL while Lorin is currently employed as a member of NASA's SOFIA project at Raytheon in Waco. (<http://sofia.arc.nasa.gov/>) Congratulations!

### TexSpace Fellowships

Cody Hamilton and Bernard Smith were both awarded TexSpace Graduate Fellowships while Galen Swint was awarded a TexSpace Undergraduate Fellowship for the 1999-2000 academic year. This represents \$11,000 dollars in fellowships next year (so far) for the Center. Congratulations guys!

### Dissertation Proposal

Ray Nazzario is narrowing in on his dissertation proposal and currently plans on defending it in August of this year. Let's all try to keep our computer and e-mail problems to a minimum so that he'll actually have the time to finish up.

### Prelims

Ke Qiao will be taking the Preliminary Exams in May for admission to the Ph.D. program in physics. Good luck Mike!

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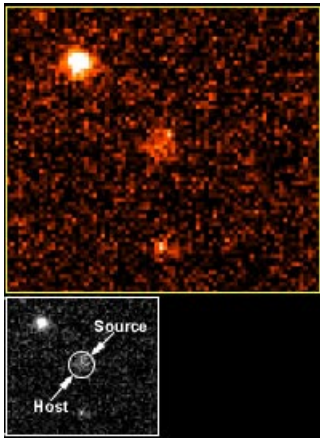
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## Profile

### Jerry Reay • HIDPL

Jerry Reay (TSTC/Waco) is the lead tech for Van de Graaff operations within the HIDPL. Jerry has a world of experience for such a job gained from previous positions at Los Alamos National Laboratory and Lawrence Livermore National Laboratory. His areas of expertise include high energy density plasmas, vacuum systems, and laser systems. While at the national labs, Jerry was responsible for everything from the alignment of the frequency conversion crystals to the preamps and main amps in the front end for both the Novette and Antares laser systems. We're happy to have Jerry as part of the team.

## Astrophysics



### Gamma Ray Bursters

The March 1998 gamma-ray burst has turned out to be a *very*, special event indeed. Although the visible component has faded to 1/500th its brightness (27.7 magnitude), Hubble continues to clearly see the fireball and discriminate a surrounding nebulosity (at 25th magnitude) which is considered a host galaxy. The continuing visibility of the burst (the above image is from Sept 5, 1998) support theories that the light is an expanding relativistic fireball, possibly produced by the collision of an orbiting pair of neutron stars. The energy released in such a burst is equal to all of the Sun's energy generated over its 10 billion year lifetime!

## Summer NSF Seminar Scheduled

### The Summer Lunch Bunch

This summer, the lunch bunch will be working its way through *Black Holes & Time Warps; Einstein's Outrageous Legacy* by Kip Thorne. This is a wonderful book for the lay person (and is available in paper at Barnes & Nobles) aimed squarely at the fascinating world of General Relativity. As always, everyone (faculty, graduate students, undergraduates, technical students, whoever!) is invited to attend. For those *really* interested folk who want to know more about the science *behind* the book, the seminars will be supplemented with tidbits of the 'real physics' delivered by members of the theory group. Please notify the office by Monday morning if you plan on attending so that we can be certain of having enough pizza. This has turned out to be one of the most popular of the Center's summer events. Don't miss it!

## Funded Grants/New Proposals

### Baylor/TSTC • HIDPL

The biggest thing to hit the Center recently is the establishment of the HIDPL as a partnership between Baylor and TSTC. Baylor's College of Arts and Sciences provided startup and annual operating funds while TSTC Waco provided a 5000 square foot building (appropriately remodeled) and ongoing full time technical support staff for the effort. The bids for the construction on the building are complete with the expectation that construction on the lab should start in June. The current timeline has the lab reaching at least minimal operating capability by the end of summer.

### 1999 NSF REU Program

CASPER's NSF REU program is underway! This year, the program will have at least twelve students involved in Center research activities. They will be working with physics research faculty, graduate students and TSTC faculty on various projects. As usual, we have NSF Fellows coming from all over the United States and England to be a part of the 1999 program. Several of these are our own. Mike Cook, a TSTC student and Garrison Benton and Ted Cook, both Baylor undergraduates will both be working in the HIDPL as NSF Fellows. Additionally, Kal Blackwell and Jared Fowler from TSTC along with John Perkins and Troy Henderson from Baylor will also be working in the lab part-time.

### Gear Up Waco

CASPER is a partner (with Dr. Hyde as Co-Investigator) in Baylor's recent pursuit of a Gear Up grant. Gear Up, tied to Waco's designation as an empowerment zone, will bring various Waco area organizations together to provide teacher in-service, summer training programs for kids, science and engineering curriculum, and other "goodies" for Waco Independent School District participants. The grant is being written by Rosemary Townsend and will allow teachers and students alike to enjoy hands-on experiences, a physics circus, and much more. Should the grant be funded, this will provide the Center with a large outreach program as well as fund two full time staff positions, two graduate student positions, two technical student positions and a few other goodies over a five year period.

### NASA

This summer, we'll be putting together a NASA proposal in response to an AO from the Planetary Instrument Definition and Development Program. The proposal will center on the development of an entirely new generation of flight sensor with (hopefully!) impressive new capabilities. Development and calibration of such an instrument is made possible solely due to the capabilities of the HIDPL. Stay tuned for more details.