

PROTON



PHYSICS REPORT ON THINGS OF NOTE

VOLUME 7 NUMBER 10

High Performance Computing @ UF

Contributed by
Erik Deumens

Four of the nine racks that hold the HPC cluster and storage systems in the computer room in NPB. All nodes are connected by GigE (orange cables) and InfiniBand (black cables.)

The University of Florida High Performance Computing center (HPC) operates a 1,600 core cluster with fast storage system for the researchers at UF. The computers are installed in two computer rooms in the New Physics Building (NPB). These rooms are connected to the Internet and a select number of other machine rooms on campus through the 20 Gbps Campus Research Network (CRN). The CRN connects



to the Florida Lambda Rail and through it to the National Lambda Rail. This allows physicists at UF who work on the CMS experiment at the Large Hadron Collider at CERN to get fast access to the large amounts of data generated by the experiment.

The CRN storage server uses the storage part of the 2004 NSF MRI award that funded the creation of the CRN, the HPC Center bought and installed a second storage server for the campus grid with a usable capacity of 80 TB. The first storage server is the HPC cluster storage server with 32 TB of usable capacity. Thus

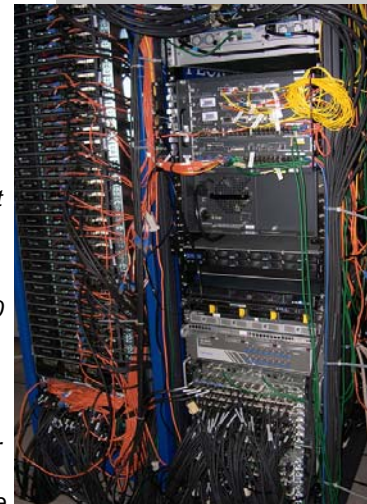
clusters will be able to mount the HPC cluster file system across the 20 Gbps Research Network. The CRN storage was built with RAID Inc hardware and a recent press release was issued about the exceptional performance obtained by the work of the HPC Center staff from which the following was taken:

The University of Florida's High-Performance Computing Center has chosen RAID Inc. for a large implementation of over 100TB of performance-intensive

4Gb Fibre to SATA-2 storage. The storage solution, which was designed in a clustered architecture, is networked in such a way to allow shared access not only between multiple research facilities across campus, but by scientific groups at various educational and government research facilities that span the state of Florida and the entire country. The University's HPC Center is linked to five satellite facilities on campus via its 20 Gb/s Ethernet CRN. "This novel approach to sharing scientific data will facilitate analysis and increase the likelihood of important discoveries. It raises the bar for storage innovation in the HPC arena," stated Bob Picardi, Chief Operating Officer at RAID, Incorporated. Research groups at other universities within the state will also be able to take advantage of this RAID Inc. storage solution. The University is one of ten academic institutions across the state to be a member of the Florida LambdaRail, Florida's research and education network. The FLR is complementary to the National LambdaRail initiative, a national high-speed research network for research universities and technology companies. The FLR provides opportunities for faculty, researchers, and students within the state of Florida to collaborate with colleagues around the world on leading edge research projects. The FLR also supports the State of Florida's economic development and high-tech aspirations.

"The High-Performance Computing Center at the University of Florida seeks best of breed providers that can push the technology envelope in support of our research projects," said Charlie Taylor, associate director of the University of Florida's HPC Center. "RAID Inc. was the ideal partner for our challenging storage needs, and their Falcon III product was a key component in the success of this project."

As part of the campus grid, the Quantum Theory Project (QTP) clusters were upgraded this summer with a new operating system. These clusters now share user ID with the HPC Center cluster and mount the Lustre parallel files system and use the Moab scheduler. This is the second cluster on campus to become interoperable with the HPC Center, the first one being the Tier2 cluster of the CMS/LHC collaboration.



The communications rack: central InfiniBand switches (bottom) connecting nodes and storage servers and the connections to the 20 Gbps CRN (top).



Erik Deumens stands next to the CMS/LHC Tier2 servers in the second computer room in NPB.



The CRN storage system provides 80 TB in a Lustre parallel file system.



My Thirty Years in Our Department by Henk Monkhorst



Now that I will retire as your regular faculty colleague, and enter the venerable rank of Professor Emeritus of Physics, I feel moved to make some reminiscing observations.

In 1968 I left the Netherlands, one of the flattest countries in the world, to take a job at the University of Utah's Physics and Astronomy Department in Salt Lake City. I fell, of course, thoroughly in love with the deserts and mountains surrounding me. Frank Harris, now a Courtesy Professor here, had invited me to Utah for a Postdoctoral Associate position. Because it was so good working with him, but also because the job market in science collapsed around 1970 at the end of the 'Race to the Moon', I ended up staying until 1978. It was a very productive and enjoyable period, but it could not last. Thus I had to look elsewhere for my professional future.

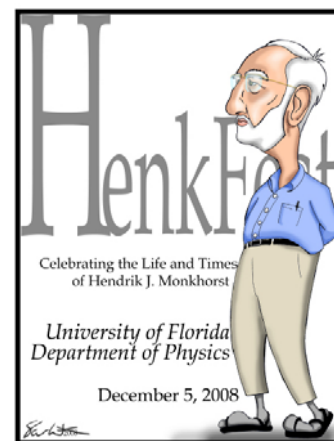
Thanks to my association with colleagues in the Quantum Theory Project (QTP), I became aware of a job opening in our Department. John Connolly, then a Professor of Physics here, had left for the National Science Foundation early in 1978. I was interviewed in April, just a week or two before a major tornado hit Gainesville, closing down UF for a week. I have always wondered about any omen, or was it just a coincidence?

Anyway, I was offered an Associate Professorship (for the grand nine-month salary of \$18,000), which I accepted. I arrived late December 1978, and, except for various sojourns elsewhere, I have stayed here ever since. I must admit to having had some adjustment problems: no mountains to climb, deserts to roam, too darned humid. But: lots of trees, spectacular thunderstorms, and a sure job with fine and supportive colleagues, lasting into today. In addition, I linked up with running buddies like Dwight Adams, pulling along many of my postdocs. Doing that midday, Florida humidity, took some getting used to, though.

I have greatly benefitted from a constant support by my QTP and other colleagues, and that is continuing. I have enjoyed the various research areas I have worked in, with excellent co-workers. These areas included many-body methods for crystals and molecules (especially the coupled-cluster method); precise calculations for the neutrino mass determination, muon catalyzed fusion and atomic energies; and nuclear, atomic and plasma physics connected with my current nuclear fusion research.

I have seen and experienced many changes in and outside this department: politics, finances, personnel turnovers, physics fads. Looking back over the past thirty years, one thing really stands out: the rising line of faculty and student quality, resources, collegiality and of course size. Upon my arrival we had a faculty of about 25, now, over 60 (including active Professors Emeriti).

Notwithstanding the current tight times, it feels that our department is heading for even better days. We have an excellent mix of older, middle-aged and young faculty. Major research breakthroughs can be expected to come out of our department. I am therefore delighted that I will be able to continue my association as a Professor Emeritus, which I hope to remain for a good while. Thank you all!!



Faculty News

Congratulations to New APS Fellows

Jaco Konigsberg and **Simon Phillpot** (UF Department of Materials Science and Engineering, UF Physics PhD 1985) have been elected as Fellows of the American Physical Society. Each new fellow is elected after careful and competitive review and recommendation by a fellowship committee on the unit level with additional review by the APS Fellowship Committee and final approval by the full APS Council. Only 0.5% of the total APS membership is selected for Fellowship in the Society each year. Their citations are as follows:

Jacobo Konigsberg (Division of Particles and Fields) Citation: For contributions to the discovery and studies of the Top quark, and for leadership in the CDF experiment.

Simon R. Phillpot (Division of Materials Research) Citation: For sustained contributions to developing microscopic mechanistic understanding of interfacial phenomena in materials using atomic-level simulations methods, in particular thermal transport behavior. Congratulations to Jaco and Simon!

CDF Collaboration Draws Attention

A recently published CDF collaboration article has drawn a lot of attention. The links below provide online stories related to the article and quotes from **Jaco Konigsberg** (from New Scientist, Discover, Nature and Symmetry).

<http://www.nature.com/news/2008/081103/full/news.2008.1203.html>

<http://www.newscientist.com/article/dn15115>

<http://blogs.discovermagazine.com/80beats/2008/11/05/ghost-in-the-machine-physicists-may-have-detected-a-new-particle-at-fermilab/>

<http://www.symmetrymagazine.org/breaking/2008/11/14/cdfs-ghosts-the-next-step-and-speculation/>



International REU in Gravitational-Wave Physics

Contributed by
Bernard Whiting

It all started with a talk given by **Beverly Berger** at the LIGO Science Collaboration (LSC) meeting in Hannover, Germany, in 2003. Beverly is the NSF program officer responsible for the Gravity program. She challenged the LSC to develop an international Research Experience for Undergraduates (REU) program for Gravitational-Wave Physics, to send US undergraduate students to our partner institutions in Europe, Australia, and Japan to do their summer research projects abroad. She envisioned that this would help the undergraduate students to gain a better international perspective on their research, attract highly talented undergraduate students to the field of GW research, and connect especially smaller US institutions within the LSC better with the institutions abroad.

Just by chance, a young scientist, originally from Hannover and familiar with our international partners, started the same week as a tenure-seeking Assistant Professor at UF. The young professor, **Guido Mueller**, received an early piece of advice (as young tenure-seeking professors receive from their senior mentors) to pay attention when your NSF (National Science Foundation) program officer talks. So he listened, and once Beverly was finished with her speech, he started talking to his old friends in Hannover and Glasgow. A couple of beers later, they agreed that this might be something worth a try (the young professor still tries to convince UF's purchasing department to pick up the tab).

"She envisioned that this would help the undergraduate students to gain a better international perspective on their research."

Already in 2004, Mueller started with the first introductory steps by sending two UF undergraduate students to Europe. **Amruta Deshpande** went to Glasgow where she worked on a new bonding technique for optical components, and **Joe Gleason** went to the Laser

Zentrum in Hannover (LZH). This exchange was very successful in many different ways. Amruta published a paper with the Glasgow folks and brought the technology to UF where it has been a key technology in two successful research proposals generating around \$400k additional funding over the last four years. Not bad for a little undergraduate research student visit. Joe Gleason's visit to the



LZH was equally successful. He was able to test our first prototype optical isolator for Advanced LIGO at their first prototype 200 W laser system. While probably not vital for the renewal of the UF-LIGO grants, this work was nevertheless an important step towards developing the Advanced LIGO input optics components. Far more important for the future REU program was how perfectly our European partners organized housing, supervised the students, and integrated them into their research groups. This was extremely encouraging.

In 2005 Mueller decided to test the hospitality of our Australian friends. UF undergraduate **Shannon Sankar** went to Australian National University (ANU) and UF undergrad **Ken West**, and Trinity College undergrad student **Robert McKinney**, went to the Gingin site, home of the Australian high power laser test facility, near Perth. The students had a blast and we were also very encouraged by the hospitality of our Australian partners. Already before the summer of 2005, Beverly Berger asked Mueller to expand the program and instead of funding it via supplemental funds to our research grants (which come out of her budget), we should propose a full international REU program (which would be mainly funded by NSF's REU program). This program should offer these international opportunities to students from smaller colleges and minority students. At that time Mueller knew already that this would require a lot of his time and decided to ask Professor **Bernard Whiting**

to help with the organization. In September 2005 both submitted their first proposal asking for funding to send 6 students each year to their partner institutions. Then we hit our first road-block: our proposal was declined because we didn't address the application procedure, project selection process, and evaluation procedure adequately. These were areas we had never dealt with in the test runs. Meanwhile, to keep things going we asked again for supplemental funding and sent UF undergraduate student **Mike Hartmann** (who is now a UF graduate student) to Birmingham and Steven Zech from Embry Riddle University to Glasgow. We then rewrote the proposal, addressed the above-mentioned issues, worked with outside evaluators on the evaluation process and resubmitted in September 2006.

The proposal was accepted and we selected five students from five different Universities, three of them female and one minority student, to go to Hannover, Canberra, and Gingin. We organized briefing meetings at UF where we discussed the projects and host institutions with the students; UF colleagues also gave short presentations on their research. The students then traveled to their host institutions, worked on their research project, and developed friendships with international

connections. They also spent time exploring their host country; an activity strongly encouraged by NSF. Ten weeks later the students reported back to Gainesville where they were interviewed and they tried to identify program areas which

might benefit from change. Do we believe that this was a successful year for our REU program? Take a look at <http://www.phys.ufl.edu/~bernard/IREU2007/> and judge for yourself. One of the students, **Danielle Wuchenich** is currently working for the LISA group at JPL and will start as a graduate student in Canberra in January 2009. **Lucienne Merrill** is again in Gingin and is likely to start as a graduate student at the University of Western Australia in Perth. **Luis Colon** is now a graduate student at UF.

Word has got out that our program is up and running strong. This caught the attention of our LIGO partners at the California Institute of Technology (CIT) who operated a similar exchange between LIGO and VIRGO, the French-Italian collaboration which operates the VIRGO detector in Cascina, Italy. For the past few years CIT had sent four students each year to the VIRGO site and hosted four VIRGO students either at CIT or the LIGO sites. This exchange had a few problems mainly due to the fact that the CIT international office has no experience dealing with undergraduate exchange programs while our international office is doing this on a daily base. Our friends from CIT asked us to take over one half of their program and organize the student selection, project selection, and travel for the four US students going to Italy. As a consequence, in 2008 we sent four students to Italy (Rome and Cascina), two students to Germany (Hannover), four students to the UK (Glasgow and Cardiff), and for the first time two students to Japan (Tokyo). The students came from 11 different universities ranging from small four-year colleges such as South-Eastern Louisiana University and Trinity College to large research universities such as Duke and Rice University. If you want to know if the students enjoyed it just look at our new website Bernard set up for our international REU program: <http://www.phys.ufl.edu/~bernard/IREU2008>.

It is still too early to judge if any long term relations between the students and the gravitational wave community will evolve, but several students expressed interest in applying to UF for graduate school or even going abroad for graduate school, as Danielle and Lucienne have done. If you want to know more about the program, please visit the website <http://www.phys.ufl.edu/ireu/> which Bernard developed.

Conclusion: Listen to your NSF program officer. It might actually lead to something.

**UPCOMING SEMINARS**

FOR TIMES PLEASE VISIT
<http://www.phys.ufl.edu/seminars>

ASTROPHYSICS

DEC 5, PENGJIE ZHANG,
 SHANGHAI ASTRONOMICAL
 OBSERVATORY

COLLOQUIUM

DEC 4, KATIA MATCHEVA
 UF PHYSICS

HIGH ENERGY

DEC 12, EDUARDO GUENDELMAN
 BEN GURION UNIVERSITY, ISRAEL

QTP

DEC 10, LASZLO FUSTI-MOLNAR,
 QTP

Department of Physics Recognized as Largest Producer of Hispanic American PhD students

The Department of Physics at UF was recently recognized by the American Institute of Physics Statistical Research Center as one of the largest producers of Hispanic American PhD students. According to the AIP SRC website, the following 12 universities awarded 50% of all physics PhDs to Hispanic Americans since 1998: MIT, New Mexico State University, Stanford, Stevens Institute of Technology, UC Berkeley, UC Davis, UCLA, UF, University of Minnesota, University of Nebraska, University of Pennsylvania, and UT Austin. The lists of "Universities that awarded the most degrees" can be viewed at:

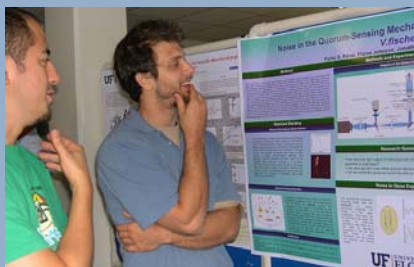
<http://www.aip.org/statistics/trends/minoritytrends.html>.

Thanks to all who have worked hard to ensure that we have a diverse and vibrant graduate program.

Student Awards

Nutter Dissertation Fellowship

Michael Ian Vega has been awarded a Nutter Dissertation Fellowship in the amount of \$5,000 to be used in the Spring 2009 term. This fellowship will also provide Ian with a tuition waiver and health insurance.



The Annual Students Meet the Faculty Event

The Physics Department's annual "Graduate Students Meet the Faculty" event will be held on Thursday, December 11th, from 4:30pm until about 6:30pm in room 2205 NPB. Refreshments will be provided as well as encouraging lively discussion between faculty and students. All graduate students and postdocs, including those from QTP, are welcome. Do not miss the presentation of awards to the graduate students! This is a particularly good opportunity for new students to meet some of the more obscure members of the faculty. (Webster's Dictionary: "Obscure," adj. Not clearly understood; vague; cryptic; difficult.)

Reflections ... By Physics Student **Deepak Kar** (graduating Fall 2008)



Time indeed flies fast. I still vividly remember that fall evening in 2003 when I landed in this little campus town. Fresh into an alien land, adjusting to a new culture, so far away from my friends and family, with my awkward accent, it was a challenge.

Physics was not the only thing I would learn over the next five or so years. Staying up late in the first few semesters, working on those lengthy homework assignments, taught me that that physics would be drudge

work, training for the future. Though the research has been fun, I realized it is almost impossible to make that ground breaking fundamental contribution, which we all dreamt about when we first decided to do physics, ignoring the temptation and allure of engineering and potentially big money. It has turned out that most of us are rather like cogs in a big wheel, making small (and hopefully somewhat significant) contributions to the big cluttered landscape. But I have also concluded that this is what I want to do, and by some fantastic coincidence, the next few years would be incredibly exciting time in our field.

Gainesville has definitely grown on me in all these years. People have been amazingly nice and kind. Once I left my passport in the department, the day before going on a month long India trip. **Darlene Latimer** and **Chris Scanlon** came all the way from their home on a Friday night to retrieve it, so that I did not have to miss the trip. I have lived through what probably has been the golden era of Gator sports. I have voted for the first time and actively participated in a landmark presidential election. I have traveled all across the country (35 states) and beyond, both for academic and pleasure trips. Now, driving up on I-75, and I see that little green sign saying Gainesville is near, it feels like I am coming home.



NanoJapan is a summer nanotechnology research internship program for freshman and sophomore undergraduate students. By involving and training students in cutting-edge research projects in nanoscale science and engineering this program aims to increase the numbers of US students who choose to pursue graduate study in this field while also cultivating a generation of globally competent engineers and scientists.

Japanese Research Institutions

- Kyoto University (Tokyo)
- RIKEN (Tokyo)
- Tokyo Institute of Technology
- University of Tokyo
- National Institute of Materials Science (NIMS)
- Osaka Institute of Technology
- Osaka University
- Shinshu University (Nagano)
- Hokkaido University (Sapporo)
- Tohoku University (Sendai)



Eligibility

- Degree-seeking undergraduate student at any US institution of higher education
- Freshman or Sophomore at the time of application
- Demonstrated interest in the field of nanotechnology as it relates to nanoscale semiconductor devices, nanophotonics, and carbon nanotubes.
- Demonstrated interest in study of Japanese language and/or culture through no prior language experience is required.

Tentative 2009 Schedule

- February 8: Application Deadline
- May 15: Pre-Departure Orientation
- May 16 - June 7: Language & Culture Orientation in Tokyo
- June 8 - July 9: Research Internship
- July 10 - 12: Kyoto Mid-Program Meeting & Traditional Culture Workshop
- July 13 - August 3: Research Internship Continues
- August 4 - 5: Return Flight to US
- August 6 - 7: Re-Entry Program & RQI Research Symposium
- Program Cost: \$2500
- Participants will receive a stipend of up to \$3,500 to be used towards international airfare & living costs during research internship in Japan.

RICE <http://nanojapan.rice.edu>

Summer Nanotechnology Study Program in Japan

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