PPPL
PRINCETON PLASMA PHYSICS LABORATORY
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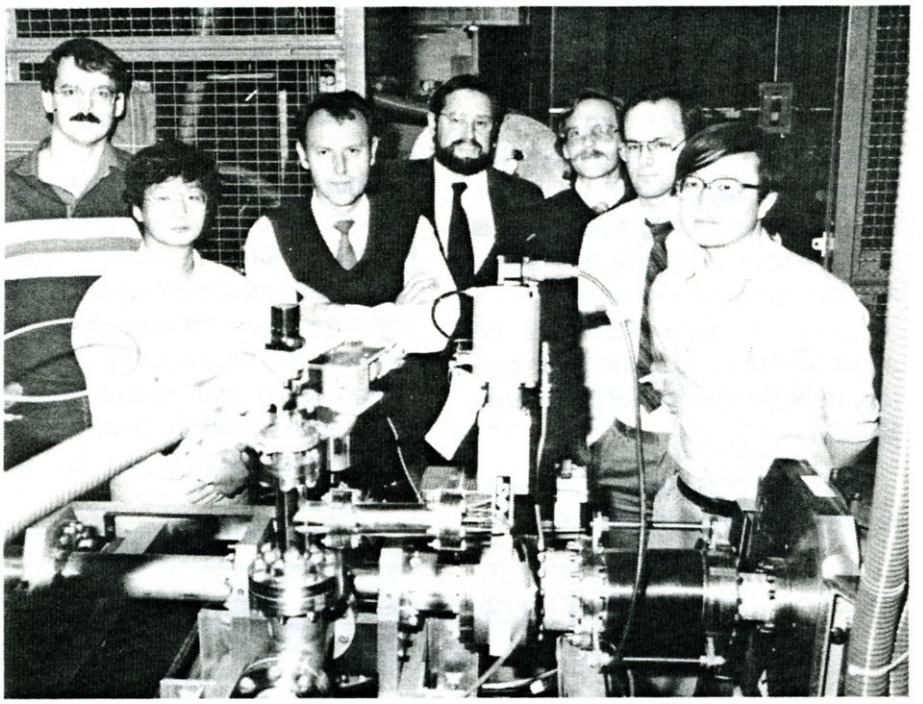
PICOSECOND LASER SYSTEM HAS 'FIRST PLASMA'



(Photo by John Peoples)

PPPL X-Ray Laser Team members who achieved so-called "first plasma" in its new picosecond laser system stand behind the vacuum chamber. The team includes (l to r): John Robinson, Dong Eon Kim, Dr. Szymon Suckewer, Lew Meixler, Dave Voorhees, Bill Tighe, and Chang Hee Nam.

by Phyllis Rieger

For most of us, Thursday, October 15th was just another day, but for the PPPL X-Ray Laser Team it signaled a major step.

After three years of preparation, the group, headed by Szymon Suckewer, produced so-called "first plasma" in its new picosecond laser system. At 11:45 p.m., a plasma column was formed and jubilant cries rang forth from weary team members Bill Tighe, Lew Meixler, Dave Voorhees, John Robinson, Alain Wouters, Dong Eon Kim, and Chang Hee Nam.

According to Dr. Suckewer, X-Ray Laser Team Group Leader, "For the first time we operated, simultaneously, the complex picosecond laser system, the 1.0 kilojoule CO_2 laser, a new magnet, and the vacuum and data acquisition systems. Eventually, the two laser systems will be fired consecutively in hopes to produce lasing action at wavelengths below ten nanometers, significantly shorter than past experiments on our older system. If we succeed, this will be a very important achievement because most applications envisioned for X-ray lasers require wavelengths at the short end of the spectrum."

In the new system, the CO_2 laser irradiates a carbon target to form a plasma. A 150-kG magnetic field confines the carbon plasma which is then irradiated by the picosecond laser pulse. By creating the plasma with the CO_2 laser and then irradiating it with the powerful (one trillion watts) picosecond laser, PPPL researchers hope to create higher electron energy transitions than previously available, and so provide higher energy (shorter wavelength) X-rays.

The picosecond laser system is composed of a chain of nine individual lasers which interact successively in stages to produce a one-trillionth-of-a-second pulse of ultraviolet light. "We revised the lasers' layout about 17 times before we were satisfied with the configuration," noted Senior Technician John Robinson. "Sometimes it can take almost an hour for one small adjustment which is done manually with the aid of diagnostics," he said.

October 15th proved to be a long but rewarding work day for the group.

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"For four weeks prior, we all spent a lot of extra hours on the project," noted Physicist Bill Tighe. "We were all concentrating very intensely that Thursday. Around 7:00 p.m. we experienced some problems but by 9 or 10:00 p.m. we took some serious shots. It all snowballed and just before midnight we succeeded in creating the first plasma. We did it! I felt relaxed and relieved. By 12:30 a.m. we were all celebrating."

Another team member is Associate Engineer Dave Voorhees who has been with the group for eight years. He designed most of the structures that support the optics, vacuum system, and lenses. According to Dr. Suckewer, "Dave's job is to make sure that everything fits securely against the stresses of the magnetic field." This required Dave to work closely with Engineer Lew Meixler who explained that the target area and vacuum system are supported by a nonmagnetic stainless steel structure.

"The magnet system is powered by a 345 kJ capacitor bank, located on the third floor of the RF Building," Lew said. "The X-ray laser team used the existing power source which was decommissioned from another project."

Lew explained, "To control the lasers precisely, synchronized timing is used. There are two types of timers—fast timers and master timers. The Fast Timer is digitally controlled with an analog vernier to allow selection of a precise delay in the picosecond range and is used to synchronize precise timing between the lasers and instruments."

Additionally, the Master Timer enables the selection time of delays from hundreds of seconds down to one microsecond steps for use in controlling the magnet valves in the vacuum system and diagnostics. Lew said, "Both timing systems, which the X-ray laser group designed and built, are modular and can be expanded as the system grows and more equipment is added. One 38-MHz reference clock, which is derived from the picosecond laser system, is used to time the entire experiment in order to maintain the overall synchronization."

Other members of Dr. Suckewer's experimental team include Dr. Alain Wouters who is responsible for spectroscopy which involves measuring the intensities of light. Graduate students Chang Hee Nam, who was instrumental in developing the picosecond laser, and Dong Eon Kim shared the satisfaction of accomplishment and Chang said, "This is just the start of bigger and better results." Early next year a new Nd (neodymium) glass laser will be added to the picosecond laser system under the direction of Dr. Charles Skinner.

This year has seen the group achieve two major goals—the firing of the picosecond laser and creating the "first plasma."

PBX-M UPDATE

In the fall, modifications to the Princeton Beta Experiment (PBX) had been completed. In October, PBX-M, as it's now called, began operating and on October 29th achieved first plasma. Since then the plasma has grown from a feeble pink glow to a real plasma carrying hundreds of kiloamps; now the PBX-M team is beginning to create truly bean-shaped plasmas.

After the holidays, PBX-M again will be opened up, inspected and prepared for neutral-beam injection. Some diagnostic work will also be completed. This will take several weeks. In February, the process starts again and serious experimentation will begin. Details on future developments will be announced.

SALUTING CANDELORI

by Phyllis Rieger

"I've always maintained a strong interest in and commitment to the military," said Angelo Candelori, PPPL's Assistant Department Head for Administration who's been an employee at Princeton for 23 years. Indeed, he attended Bordentown Military Institute and received a B.A. Degree from Pennsylvania Military College.

Angelo, who holds the rank of Colonel in the U.S. Marine Corps Reserve, is fortunate to be able to combine business with pleasure pursuing his military interests in his spare time. He truly believes in the Marine motto—Semper Fidelis (always faithful)—as he devotes his time and talents to the Corps in several capacities. Currently, he serves as Commanding Officer of the Marine Corps Mobilization Training Unit (PA-1) in Philadelphia. He's also Executive Vice President and Scholarship Chairman of the Marine Corps Scholarship Foundation, a nationwide organization of volunteers dedicated to providing financial assistance to needy and deserving sons and daughters of Marines and children of former Marines. "During our 25 years of existence, the Foundation has awarded in excess of $3,600,000 to more than 3,150 great young Americans. Additionally, last February, we selected another 393 students to receive $425,000 for the academic year 1987-88," said Angelo. "I find the Foundation work is particularly rewarding."

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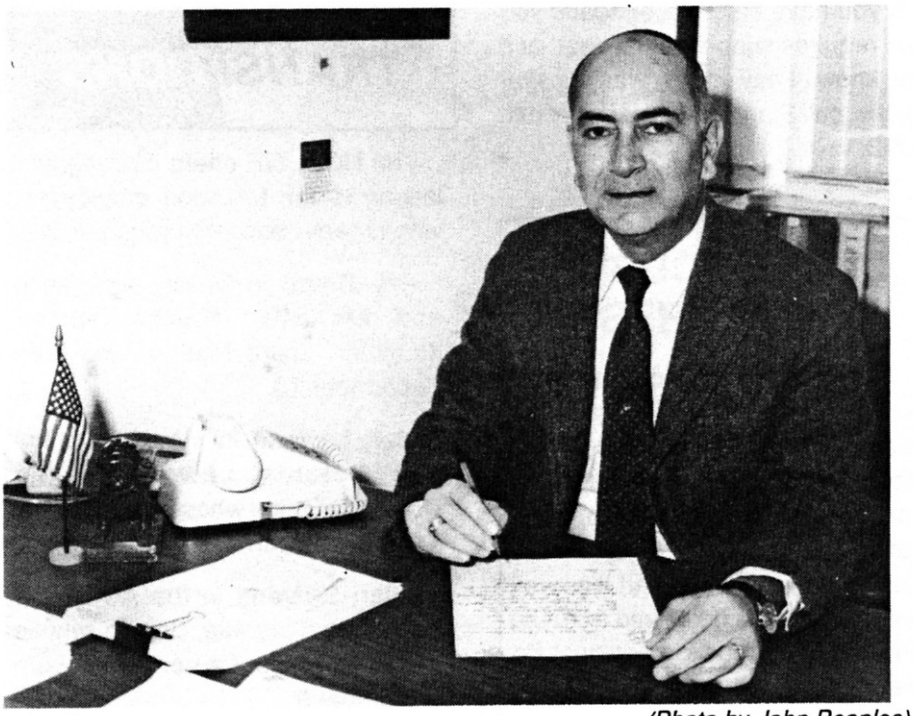


(Photo by John Peoples)

Angelo Candelori, Assistant Department Head for Administration.

Although a majority of his time is spent on these Marine-related activities, he still finds time to serve as Chairman of Congressman Chris Smith's U.S. Service Academies Screening Committee. For the last four years Angelo, with two other designees, has spent many hours reviewing 60-70 applications of young men and women vying to enter one of the four U.S. service academies including West Point, Annapolis, the Air Force Academy or the U.S. Merchant Marine Academy.

"We spend a full weekend, both Saturday and Sunday, interviewing applicants," said Angelo who explained the committee, "looks at the whole person. Does the student demonstrate leadership potential? Is the applicant active in school and in the community? What are his/her grades, class standing and Scholastic Aptitude Test (SAT) scores? We're looking for bright, articulate people with a strong will and ability to succeed.

"After the tedious review and personal interviews, the committee submits its recommendations to the Congressman. Following the review of the committee recommendations, Congressman Smith then formally nominates a number of students to academies. Each service academy will then make the final selections for admission," said Angelo. The Congressman has commended Colonel Candelori for "always being incisive, tough, and eminently fair to each candidate. His whole being speaks of commitment to excellence."

Obviously, Angelo's emphasis on excellence has been recognized by many since he is the receipt of the Fermi Federation Achievement Award in addition to the Marine Corps League's Distinguished Service Award. And how many people can say they have been knighted a Cavalieri in the Order of Solidarity by the government of Italy?

Practicing what he preaches, Angelo has contributed some of his time to his community of Hamilton Township. For 11 years, he served as a member of the Planning Board and the Development Review Advisory Board in addition to other organization involvement. Currently, he's a member of PPPL's Social Committee, among others.

TRITIUM COURSE

A Tritium Technology Course will be offered by the D-T Systems Division of the TFTR Tritium Branch. The course, which will be held at the Laboratory, will run from January 13 thru February 3. Topics to be covered include basic nuclear theory, tritium monitoring systems, tritium clean-up systems, automated tritium control systems, tritium handling techniques, radiological concepts of tritium dosimetry, and practical aspects of tritium handling. For further information or to register for the course, contact Ann McKee, ext. 2198.

FREE RIDES FOR SHOPPERS

On November 30th, the Princeton Forrestal Center/Village Mid-day Shuttle Service began operation. Free to anyone who wishes to use it, the service connects Forrestal Center with Forrestal Village. The shuttle runs from 11:00 a.m. to 2:00 p.m., Monday thru Friday.

Presently, the shuttle stops at 307 College Road every 20 minutes beginning at 11:04 a.m. The last stop is at about 1:44 p.m.

For more information or a copy of the schedule, call the Greater Princeton Transportation Management Association at 452-1491.

THANK YOU

Recently, this HOTLINE Editor received a telephone call from Sallie Young. Sallie wishes to thank everyone for the kind thoughts and concern expressed during her recent illness.

HEATING POLICY

The Laboratory is continuing the winter heating policy it followed last year. This policy has resulted in significant savings through conservation efforts by the Laboratory community, but with significantly fewer complaints than in former years.

The policy requires thermostats to be set to maintain a minimum temperature of 68 degrees Fahrenheit (rather then the 65 degrees of former years). Heat will also be turned off or cut back on weekends, weather permitting. Exceptions will be made for designated experimental areas.

Space heaters, which can only be purchased with the approval of Plant Engineering, or individual room controls should be set to maintain a maximum temperature of 70 degrees Fahrenheit. Unneeded lights should be turned off.

If you have an office or space you feel requires supplemental heat, or if you know of any energy wasting situations, call Plant Maintenance at ext. 3092.

IN FOCUS FEATURES

Segment II of "In Focus," PPPL's video magazine, shown last week, featured emergency services personnel, a look at the lab with volunteer tour guides, a news update, and holiday happenings with Santa. Videotapes of Part II as well as Part I can be borrowed from the Photo Lab. For copies, contact Ed Farris at ext. 2090.

Suggestions for future features are welcome and these should also be directed to Ed.

TRANSITIONS

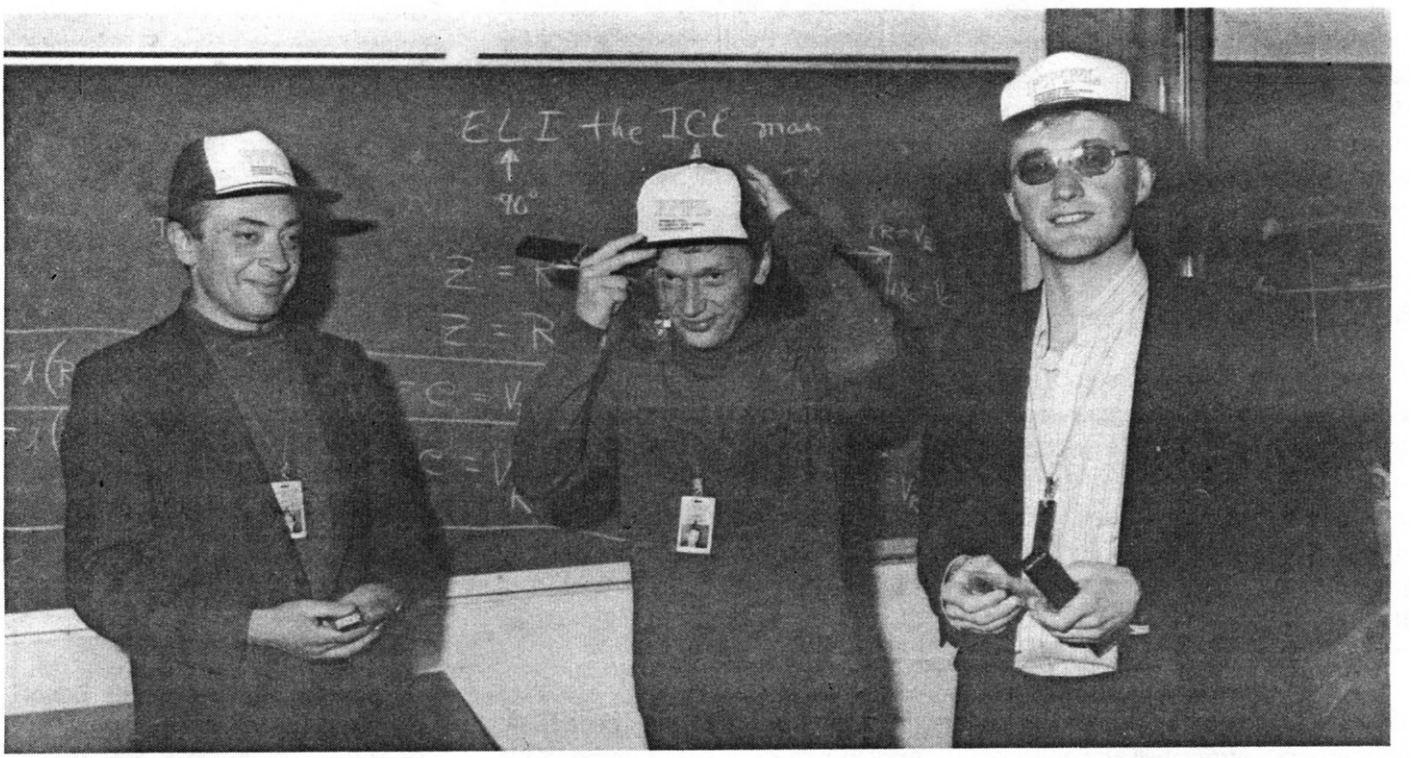
The HOTLINE offers its congratulations to the following employees, who recently became proud parents:

Ray Camp in Quality Assurance and his wife, Martha, whose daughter, Laura Marion, was born September 10.

Matt Lawson in Materiel Control and **Dolores Lawson** in the Director's Office whose son, Andrew James, was born September 30.

Allan Stevens in the AC Power Section and his wife, Bonnie, whose daughter, Julie Lauren, was born December 9.

FOR SALE: 1978 Peugeot. Four speed, air conditioning, tires in good shape. $800. Call David, ext. 3194.



Drs. Vasiliy Parail, Grigoriy Pereversev, and Sergei Medvedev (l to r) of the Soviet Union were recently presented with PPPL caps and other Laboratory momentos by Theory Division personnel. As official Soviet delegates in a continuing series of U.S.-U.S.S.R. scientific exchanges, they were involved in the study of tokamak stability and transport during their two week visit to the Laboratory. (Photo by John Peoples)

SAFETY TRAINING COURSES

The Occupational Safety Branch has scheduled the following safety training courses for January :

Course	Date/Time/Location
ASC Training/Meeting	12 January, 9:00-10:00 a.m. LOB Auditorium
	or
	18 January, 1:00-2:00 p.m. LOB Auditorium
PCB Handling/Spill Response	27 January, 9:00-10:30 a.m. Safety Training Trailer

Employees must obtained permission from their immediate supervisor to attend these classes. Supervisors should call Mary Ann McBride at ext. 3468 to enroll their employees.

Basic Safety for new employees is offered every Monday afternoon at 1:30 p.m. in the Safety Training Trailer.

CPR is offered every Tuesday at 9:00 a.m. in the Safety Training Trailer. Contact Mary Ann McBride, ext. 3468, to enroll.

(Photos by John Peoples)

Santa recently visited the Laboratory and talked with PPPL staff members about their holiday plans.

Best wishes for 1988! Have a restful and cheerful holiday.

The PPPL HOTLINE is issued by the Princeton University Plasma Physics Laboratory, a research facility supported by the United States Department of Energy. It is primarily an internal publication. Correspondence and requests to reprint material should be directed to PPPL Information Services, B366, C-Site, James Forrestal Campus, ext. 2754.