THE PULSE

For the Personnel of the Laboratory for Nuclear Science

Volume 3 Number 4 ********** June 1995

Design A T-Shirt Contest

How would you like to win 100 bucks?

Create a new T-Shirt design to celebrate LNS 50th anniversary and Bates 25th and win $100.

Here are the rules:

- *Contest entries must be submitted no later than Monday, July 24, 1995. All designs must be submitted on paper to Jean Flanagan, 26-540. Your name and extension should appear on a separate piece of paper.*
- *All personnel including graduate students of LNS may submit designs and you may submit more than one design.*
- *"LNS" and "Bates" must appear on the T-shirt.*

The judges for the contest are Bob Redwine, Stanley Kowalski, Anne Maloney, Heidi Stirling, and Leo McCue.

What's Inside

Bottom Line

by: Elsye Luc

A Crosswalk at 50 Vassar St. is needed

Have you ever tried to cross the street in front of 50 Vassar St. at 5:00 PM? Have you ever felt that one of these days you're not going to get to the other side in time? Do you find that you ask yourself every day why isn't there a crosswalk in front of 50 Vassar St? Well if you have, you're not alone.

How can this problem be resolved? How can Vassar St. become a safer street to cross? I have called the Safety Office and the Planning Office at MIT to find out what can be done about this problem. On May 11, Andrea Nichols, from the Planning Office told me that a request has been made to the City of Cambridge to have a crosswalk on Vassar St. The request was accepted and we can soon expect a safer street to cross.

Bottom Line *is an opportunity for you to share your issues, questions, points of view and opinions with the LNS community.* *Pulse reserves the right to edit articles and to refuse articles deemed inappropriate.*

Plans Begin for 1996 American Physical Society Division of Nuclear Physics Meeting

A Local Organizing Committee has been established by Lab Director Robert P. Redwine to begin planning for the 1996 American Physical Society -- Division of Nuclear Physics Meeting which will take place at MIT from October 2 - October 5, 1996. Members of the Local Organizing Committee are: William Bertozzi, Edward Booth from Boston University, Sheila Dodson, T. William Donnelly, Jean Flanagan, Jochen Heisenberg from the University of New Hampshire, Stanley Kowalski, June Matthews, Richard Milner, Rory Miskimen from the University of Massachusetts, John Negele, Craig Ogilvie, Robert Redwine, Stephan Steadman, and Heidi Stirling.

The Committee will be responsible for organizing the logistics of the meeting, two workshops, poster sessions and an invited session. A program for High School Teachers and a popular talk are in the planning. It is anticipated that there will be approximately 600 attendees.

O Say Can You See?

Independence Day is just around the corner. This year MIT will be closed on both Monday, July 3 and Tuesday, July 4.

Independence Day Trivia

* Which State had the most signers of the Declaration of Independence?

** Who was the oldest person to sign the Declaration of Independence?

*** How many signers of the Declaration of Independence were not born in America?

**** How many future presidents of the United States signed the Declaration of Independence?

***** Who served on the committee that wrote the Declaration of Independence?

Answers

* Pennsylvania (nine)

** Benjamin Franklin (70)

*** Eight

**** Two (John Adams & Thomas Jefferson)

***** Thomas Jefferson, Benjamin Franklin, John Adams, Roger Sherman and Robert Livingston

*****Happy 4th of July*****

List of LNS Publications

Center for Theoretical Physics

"Perfect Lattice Actions for the Gross-Neveu Model at Large N," W. Bietenholz, E. Focht and U-J. Wiese, LNS-95-104, CTP #2356

"Signatures of Confinement in Axial Gauge QCD," F. Lenz, E.J. Moniz and M. Thies, LNS-95-105, CTP #2390

"Infrared Renormalons and Power Corrections in Deep-Inelastic Sum Rules," Xiangdong Ji, LNS-95-106, CTP 2381

"Soffer's Inequality," Gary R. Goldstein, R. Jaffe & Xiangdong Ji, LNS-95-107, CTP 2402

"Dimensional Reduction at High Temperature for Fermions," Suzhou Huang and Marcello Lissia, LNS-95-108, CTP #2359

"Particle-In-Cell Simulations on Nonlinear Amplification Inverse Bremsstrahlung Electron ...," A.C. J. Paes, et al, LNS-95-109, CTP #2387

"Fusion of Halo Nuclei," M.S. Hussein, LNS-95-110, CTP #2389

"Analytical Treatment of Heavy Ion Elastic Scattering at Intermediate Energies," M.S. Hussein and M.P. Pato, LNS-95-111, CTP #2373

"Dipole Polarizability of Neutron-Rich Nuclei," L.F. Canto, M.S. Hussein, et al, LNS-95-112, CTP #2394

"The Relevant Scale Parameter in the High Temperature Phase of QCD," Suzhou Huang and Marcello Lissia, LNS-95-114, CTP 2360

"The Meaning of the Chaos Revolutio," Michel Baranger, LNS-95-115, CTP #2416

"Collective Periodic Orbits in a Model Nucleus," Michel Baranger, LNS-95-116, CTP 2408

"An Initiative of the International Committee for High Intensity Accelerators," Herman Feshbach, LNS-95-117, CTP #2364

"Closing Remarks Presented at "Nucleus-Nucleus Collisions," Herman Feshbach, LNS-95-118, CTP #2344

"Time Reversal Symmetry Breaking Effects in Resonant Nuclear Reaction," H. Feshbach, M.S. Hussein & A. K. Kerman, LNS-95-119, CTP #2310

"Symmetry Breaking Studied with Epithermal Neutrons," Herman Feshbach, LNS-95-120, CTP #2403

"Coupled-Channel Effects on Heavy-Ion Sub-Barrier Fusion Within the Doorway Expansion Method," A. M. Breitschaft, et al, LNS-95-121, CTP #2406

"Fine Structure Discussion of Parity-Nonconserving Neutron Scattering at Epithermal Energies," M.S. Hussein, A. K. Kerman and C-Y Lin, LNS-95-122, CTP #2296

"Optical Model Analysis of Parity-Nonconserving Neutron Scattering at Epithermal Energies," LNS-95-123, CTP #2372

"The Influence of Resonant Channels on Sub-Barrier Heavy-Ion Fusion," LNS-95-124, CTP #2338

"Computer Simulation on Nonlinear Amplification of Inverse Bremsstrahlung Electron Acceleration," A.C.J. Paes, et al LNS-95-125, CTP #2405

"Exact Sum Rules at Finite Temperature and Chemical Potential and Their Application to QCD," Suzhou Huang and Marcello Lissia, LNS-95-126, CTP #2298

"Fermi-Walker Gauge in 2+1 Dimensional Gravity," Pietro Menotti and Domenico Seminara, LNS-95-128, CTP #2400

"Exact Solutions for Correlation Functions in some 1+1 D Field Theories with Boundary," Denise Freed, LNS-95-129, CTP #2422

"Cosmic String Theory: The Current Status," Leandros Perivolaropoulos, LNS-95-130, CTP #2375

"Fermi-Walker Coordinates in 2+1 Dimensional Gravity," Pietro Menotti and Domenico Seminara, LNS-95-131, CTP #2362

"Parton-Hadron Duality: Resonances and Higher Twists," Xiangdong Ji and Peter Unrau, LNS-95-132, CTP #2348

"Hadron Substructure Probed with Hadron Beams," Xiangdong Ji, LNS-95-133, CTP #2410

"Constraining Spectral Functions at Finite Temperature and ...," Suzhou Huang and Marcello Lissia, LNS-95-134, CTP #2357

"Quantum Mechanics of the Vacuum State in Two-Dimensional... ," F. Lenz, et al, LNS-95-135, CTP #2391

"The Nucleon's Tensor Charge," Hanxin He and Xiangdong Ji, LNS-95-136, CTP #2380

"Physics of Q2-Dependence in the Nucleon's...," Xiangdong Ji, LNS-95-138, CTP #2411

"Constraining the Strongly-Coupled Standard Model...," Eric Sather and Witold Skiba, LNS-95-139, CTP #2409

"Black Hole Entropy and the Semiclassical...," Samir D. Mathur, LNS-95-140, CTP #2304

"Topological Effects on the Physics of the Standard Model," R. Jackiw, LNS-95-141, CTP #2349

"Parameterization Invariance and the Resolution of the Unitary Gauge Puzzle," P.F. Kelly, et al, LNS-95-142, CTP #2299

"Magnus Force Chern-Simons Vortices," Q. Liu and Ady Stern, LNS-95-143, CTP #2367

"Fermion Production in the Background of Minkowski Space Classical Solutions...," Edward Farhi and Jeffrey Goldstone, LNS-95-144, CTP #2370

"Naturalness and Superpartner Masses or When to give up on Weak Scale Supersymmetry," Greg W. Anderson, and Diego Castaño, LNS-95-145, CTP #2369

"Moduli Space Cohomology and Wavefunctional in 3D Quantum Gravity," Roger Brooks, LNS-95-146, CTP #2363

"Could the Supersymmetric Higgs Particles Naturally be Pseudo-Goldstone Bosons?," Zurab Berezhiani, et al, LNS-95-147, CTP #2404

"Yang-Mills Fields and Riemannian Geometry," Peter E. Haagensen and K. Johnson, LNS-95-148, CTP #2351

"Breakdown of the Semi-Classical Approximation at the Black Hole Horizon," Esko Keski-Vakkuri, et al, LNS-95-149, CTP #2341

"Measures of Fine Tuning," Greg W. Anderson, and Diego Castaño, LNS-95-150, CTP #2350

"The Monopole Equations in Topological Yang-Mills," Roger Brooks and Arthur Lue, LNS-95-151, CTP #2397

"Non-Perturbative Results for High-T QCD," R. Jackiw, LNS-95-152, CTP #2413

"Singularities in a Scalar Field Quantum Cosmology," Nivaldo A. Lemos, LNS-95-153, CTP #2378

"The Charge Response of a Meson-Correlated Relativistic Fermi Gas," M.B. Barbaro, et al, LNS-95-154, CTP #2399

Medium Energy Group, MEG

"Pion-Induced Single Charge Exchange in Deuterium," H.T. Park, et al, LNS-95-102

"Two-Nucleon Processes in Pion-Induced Double Charge Exchange in ^{4}He: A Coincidence...," S. F. Pate, et al, LNS-95-103

If you wish to request any of these articles, please call Elsye Luc at x3-2395.

Computer Security Update

PGP (Pretty Good Privacy)

Pretty Good Privacy (PGP) has been installed at the LNS Computer facility on the VMS, the RALPH1 Clusters, and it is available for Unix systems. The Unix tape archives (tar) file can be acquired through anonymous ftp to RALPH2.

PGP is a public key encryption package to protect e-mail and data files. It lets you communicate securely with people you've never met with no secure channels needed for prior exchange of keys. It supports 'digital signatures'. It's well featured and fast, with sophisticated key management, data compression, and good ergonomics design.

For information, enter $ HELP PGP. See especially $ HELP PGP GETTING_STARTED.

If you wish to generate a private/public key please do so just once on one system and copy it to the other computers on which you have an account.

Lexington Middle Schools Visit Bates

The DOE TRAC program provides follow-on grants to qualified teachers to continue efforts to have students participate in a program at a DOE facility. Last summer Shelley Chamberlain of Lexington, MA received this award. Funds were provided by DOE to transport Lexington Middle School students to Bates.

Bates is implementing a new format for tours, by student groups in grades 8-12. The largest groups to test the new format were from the Diamond Middle School in Lexington, which sent groups of 37 and 46 students, plus teachers, on May 25th and 26th.

The students saw several presentations and demonstrations on Bates research and technologies, ranging from measuring the size of nuclei to detectors, radiation, cryogenics and electron accelerators. The presentations on detectors and electron accelerators were both followed by short tours to related areas of the laboratory.

(continued on page 8)

An Initiative of the International Committee for High Intensity Accelerators (Reprinted with some changes)

Herman Feshbach
LNS-95-117

On December 8 and 9, 1994 in Amsterdam, a unique conference sponsored by ICHIA took place. Its purpose was to establish a framework for international cooperation in nuclear physics.

ICHIA is a committee of Commission C12 of IUPAP dedicated to nuclear science. As part of its charge ICHIA is asked to consider how the nuclear community can make the most effective use of the resources available to it world-wide.

Four years ago at a meeting of ICHIA it was decided to make international cooperation a principal focus of its activities. But with what aspect of international cooperation are we concerned? After all, science is international. Scientific truths do not recognize national boundaries. Scientific meetings and workshops are international. Experimental groups often involve scientists from several countries. In addition there are bilateral agreements at the national level. We have international organizations like IUPAP and UNESCO and a regional one, NuPeCC.

There is, however, a missing component. There are no examples of meetings between scientists and policymakers on a regular basis at the international level; meetings in which the policymakers can be involved in a dialogue with the scientists and with each other. Clearly if we are to make the most effective use of resources available to us, such dialogues are essential. Scientists must consist of international cooperation of the scientists and policymakers. The latter will of course turn to the scientists for advice, particularly with respect to scientific opportunities and the facilities, manpower, etc., necessary for their exploitation.

Most policies today are set nationally without much regard for the overall consequences to the subject. Our plan is to have systematic meetings in which scientists and policymakers participate to help to develop insights regarding the field as a whole. This will have an objective credibility. Secondly the interaction between the scientist and policymakers and among the policymakers themselves will provide an informed basis for cooperation on behalf of the health of the field.

There are several examples of cooperation between the scientist and policymakers. One is CERN, which has a council with two representatives from each country, one of which is a scientist. The other is NSAC (Nuclear Science Advisory Committee) which consists of nuclear physicists chosen by the National Science Foundation and the Department of Energy of the U.S.A. Its principal tasks are set by these agencies. Considerable interaction takes place between the scientists and the members of these agencies to their mutual benefit as I can testify, having served as chairman of NSAC during the period of time in which the first five year plan for nuclear science was formulated.

Both of these successful enterprises are existence proofs of the proposition that bringing policymakers and scientists together so that they can appreciate their mutual concerns is worthwhile and can be most constructive. The framework for international cooperation which we develop may differ from the previous models.

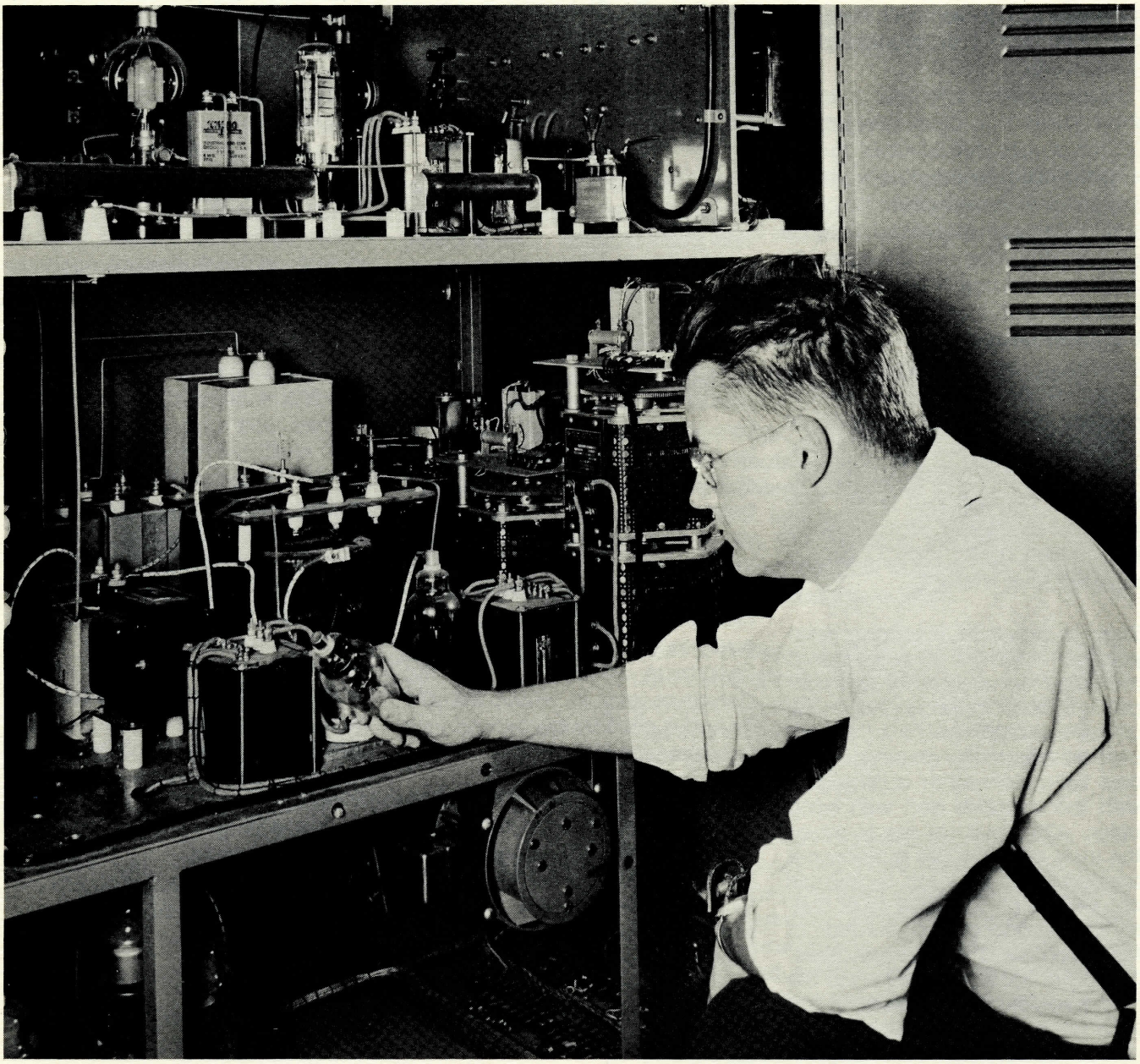
The International Conference to Promote International Cooperation in Nuclear Physics was convened in Amsterdam on December 8 and 9. Invitations to the policymakers who are in charge of the nuclear programs of 29 countries were made. A substantial number of acceptances were received. European examples include: France, Italy, Germany, the Netherlands and Portugal. Outside of Europe: The USA, Japan, India, the Republic of China, Mexico, and Australia. The scientific part of the program was arranged by Paul Kienle, President of NuPeCC and by Ernest Moniz, Chairman of NSAC. It was meant to emphasize the scientific promise of nuclear physics as well as the important applications of nuclear science. No attempt was made to "cover" all of nuclear science, but rather those aspects at the frontiers, ones which are important for nuclear physics and indeed are "universal," and give rise to general results which inform not only nuclear physics but also physics and science generally, was presented. The scientific program included the following topics; speakers were recruited, and they were reminded that their audience was not their fellow scientists-- but rather policymakers who most often are not nuclear physicists. Importantly, a keynote speech was given by V.F. Weisskopf, who has contributed importantly to nuclear physics and is well known for his strong support of international collaboration. Y. Yamaguchi, President of IUPAP, was asked to speak as well.

One important item was the presentation on applications of

nuclear physics. The unique aspect of nuclear science, in that while its scientists operate at the frontiers of science, its discoveries are converted continually and directly into uses of significant practical value. It was an important process in the early days of nuclear physics and continues to be at the present time.

Half of the meeting was devoted to policy issues-- in particular, how can international collaboration be expedited? What framework or protocol should be put into place? Some perspectives were introduced by Bernard Remaud, Deputy Director of IN2P3 in France, who presented a census of the facilities, manpower and budgets devoted to nuclear physics worldwide. The results of this part of the meeting were most important, for the meeting did make significant progress toward the goal of international cooperation. Note that no policy recommendations were made. The primary goal, was to develop a framework for international cooperation.

LNS Synchrotron Lab 24-036 Nov. 1948



When Feld Met Einstein

Extracted from the unpublished autobiography of Bernard T. Feld. Slight editorial changes have been made. Feld, who died in 1992, was one of the early directors of LNS. He came to MIT with Jerrold Zacharias, after World War II to start the Laboratory for Nuclear Science and Engineering.

One Saturday morning, Leo Szilard asked me if it would be possible to drive him down to Princeton. Fortunately, I was able to borrow my brother's car, and I drove Szilard to the Princeton Institute for Advanced Studies where Einstein had his office. Szilard went to confer with the great man, while I waited outside. When they were through, Einstein saw Szilard to the door. Since I was right there, Szilard had no choice but to introduce me to Einstein. When Einstein learned that I was working on a Ph.D. in physics, he wanted to know the subject.

"It won't be of interest to you," I said. "It's a rather dull problem in molecular spectroscopy."

"Oh, I used to know something about that subject," he said. Taking me by the arm, he said, "Come in and tell me about it."

He led me to the blackboard, and I proceeded to outline the work I was doing on the effect of nuclear electric quadrupole moments on the energy levels of diatonic molecules.

After a short time, Einstein interrupted to ask, "I wonder what would happen if you took this approach?" and he wrote a few equations on the board.

"Oh, Professor, I replied brashly, "I tried that approach, and it leads me to a dead end."

Einstein thought for a moment. "Of course, how stupid of me! But what would happen, I wonder, if you tried this variation?"

"I never thought of that," I said.

"Well, let's see," he said, and continued writing on the board.

At that moment the door opened and Leo Szilard, popped his head in, and cleared his throat, "Feld," he said, "I really must get back to New York."

And so I thanked Einstein and we left. I've often thought that if Leo had just given me ten more minutes, I would probably have turned in the most brilliant Ph.D. thesis of the decade.

Welcome to DOE Teacher Research Associates (TRAC)

Four teachers will be joining the Laboratory this summer to participate in the Department of Energy Teacher Research Associate Program (TRAC). The teachers were chosen from a nation-wide pool to receive a grant to pursue professional experience through summer research at one of the 27 participating DOE national laboratories, facilities, and energy technology centers. The program was established to promote the transfer of knowledge of research to the classroom.

The program is administered by the Associated Western University, Inc., Salt Lake City, Utah for DOE. Selection is based on the applicant's educational and professional qualifications, commitment to teaching, references, compatibility of scientific interests and proposed research with the needs the resources of the host facility, and expected benefit of the facility research experience to the applicant, the applicant's home institution, and the facility. The appointment is for eight weeks.

Please welcome:

Hope Howard of Fort Wayne, Indiana who will be joining the staff at the Bates Linear Accelerator Center. Hope will be working with Wade Sapp.

Paul Masi of Winchester, Mass will be joining the Electronics Facility and working under the leadership of Bernie Wadsworth. Paul teaches at the Edith C. Baker School in Brookline, Mass.

Gretchen M. Pasapane of Bear, Delaware. Gretchen will be working with Craig Ogilvie in the Relativistic Heavy Ion Group. Gretchen teaches at the Concord High School in Wilmington, Delaware. She has a BA in physics education from the University of Delaware.

Susan Rubini of Lexington, Mass. Susan will be working with Bob Bruen in the LNS Computer Facility. Susan teaches at Lexington High School and lives in Westford, Mass.

Lexington Middle Schools Visit Bates (continued from page 4)

The biggest crowd pleaser was the cryogenics presentation by Joe Dzengeleski whose demonstrations provoked spontaneous applause and the most questions. Other presenters were Gerry Fallon, Scott Ottaway, John Quattrochi, Wade Sapp and Chris Tschalaer. Tour guides were David Barkhuff (a graduate student at UVa), George Dodson, Lyman Stinson, Dan Tieger, Bill Turchinetz and Steve Wells.

Writing To A Member Of Congress

Limit your letter to one page, and to one subject. Type your letter whenever possible, and make sure it contains a legible name and address.

Organize your letter into three paragraphs:

• In the first paragraph, state your reason for writing and your credentials.

• In the second paragraph, state your position with supporting evidence. Include a relevant personal experience. Avoid emotionalism--stick to the facts. Offer an alternative approach where appropriate.

• In your third, and concluding paragraph, request (not demand) a specific action. Offer your assistance.

Below is a list of Senators and Representatives addresses in Washington:

The Honorable Edward M. Kennedy
United States Senate
Washington, DC 20510

The Honorable John F. Kerry
United States Senate
Washington, DC 20510

The Honorable Joseph Kennedy
U.S. House of Representatives
Washington, DC 20515

The Honorable Edward Markey
U.S. House of Representatives
Washington, DC 20515

The Honorable Peter Torkildsen
U.S. House of Representatives
Washington, DC 20515

Welcome

Mikhail Akopyan - Spon. Res. Tech. Staff, HBD/Chen

Paul L. Dozois - Rehire/Mach A, LNS Machine Shop

Evan A. Reidell - Rehire/Sr. Secretary Tech., CTP

Promotions

Philip Burrows - Principal Research Scientist, SLAC/PPC

Michael Fero - Principal Research Scientist, SLAC/LQS

Departures

Daniel W. Baker, Jr. - Retiring June 30, 1995

Douglas M. Nicoll - Retiring June 30, 1995

Lyman A. Stinson - Retiring June 30, 1995

THE PULSE is a publication of the Laboratory for Nuclear Science for the LNS Community.

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If you have any ideas and/or suggestions for new features in THE PULSE please let us know. PULSE 26-540.