The newsletter of
The Acoustical Society of America

ECHOES

Volume 7, Number 3
Summer 1997

Born to Learn Language!

"Born to Learn: Language and the Brain of the Baby" was the title of a paper ASA Vice-President Patricia Kuhl presented at the White House Conference on Early Childhood Development and Learning on April 17. President and Mrs. Clinton, as well as thousands of listeners at 100 sites across the country, listened attentively as six leading experts reported how recent scientific research has revealed that vital brain synapses are formed before age 3.

Pat Kuhl is greeted by President Clinton at the White House

According to Kuhl, who is the William P. and Ruth Gerberding University Professor, and chairs the Department of Speech and Hearing Sciences at the University of Washington, new studies on infants show two things: first, infants are born to learn. "One of the most striking characteristics of human beings is their passion for learning. Signs of language learning occur in the first months while the infant is still in the crib," she pointed out. Second, the first sign of language learning that occurs does not involve words or grammar, but the phonetic units of language, the consonants and vowels that make up words. "We think the process uncovered at this level may mirror learning at higher levels of language."

The importance of early brain development in setting the foundations for language is apparent in babies younger than 6 months. Infants are born with the ability to distinguish all the subtle acoustic differences that occur in language. Newborns are ready to acquire any of the world's languages; they don't know what culture they will be born into. In order for a specific language to develop, however, this "citizen of the world" has to become a "culture-bound language specialist," Kuhl explained. "The young child's extraordinary response to language input puts some responsibility on us; we are the speakers that infants are listening to."

The White House conference focussed media attention not only on early childhood learning of language but on our own Pat Kuhl. Her work was featured in *Newsweek, Time,* and most of the major newspapers in the country. Pat appeared with Hillary Clinton as a guest on the "Today" show as well as on "Good Morning America." She has brought much-deserved recognition not only to her and her colleagues but to speech research and the whole field of acoustics.

"Up until a couple of weeks ago, Pat kept busy with a bushel-basket full of roles that would have taxed the equanimity of any normal brilliant person," wrote columnist Terry McDermott in the *Seattle Times*. "She was, depending on the time of day, chairwoman of the University of Washington's Department of Speech and Hearing Sciences, board member at the prestigious Neuroscience Research group in California, car-pool driver for daughter Katherine, wife to brilliant husband Andy Meltzoff, invited lecturer at distinguished conferences in exotic locales from Tokyo to Oslo, Starbucks habitué and sometimes sensationally dressed dinner party host."

Pat is well known in the Acoustical Society of America. She first joined the Society as a student member in 1972

(Continued on page 6)

We hear that...

Jim West was awarded an honorary Doctor of Science degree by New Jersey Institute of Technology at its commencement ceremony on May 23, 1997. The award was offered in recognition of his distinguished career at Bell Laboratories, which has included not only research leading to more than 200 patents and 100 publications, but also his "encouragement and support for future scientists, particularly among underrepresented populations." Jim helped to design the Bell Labs Summer Research Program for Minorities and Women, and he has also mentored NJIT students in their Educational Opportunity Program. Jim received the Silver Medal in Engineering Acoustics from ASA in 1995.

We congratulate you for yet another honor, Jim!

Jim West and his family at Penn State

Timothy Lancey, was named a Fellow of ASME International (the American Society of Mechanical Engineers). Lancey is a professor of mechanical engineering at California State University, Fullerton.

Elaine Moran has completed 30 years of service for ASA and AIP in Woodbury. She has worked for AIP for 3 years before she came to ASA in 1970. Congratulations, Elaine!

ECHOES ECHOES

Newsletter of the Acoustical Society of America

Provided as a benefit of membership to ASA members

The Acoustical Society of America was organized in 1929 to increase and diffuse the knowledge of acoustics and to promote its practical applications.

Echoes Editor ..... Thomas D. Rossing
Graphic Design ..... Jim Nelson
Printing ..... Klocker Printing
ASA Editor-in-Chief ..... Daniel Martin

Phone inquiries: 516-576-2360. Article submissions and correspondence should be directed to Echoes Editor, Acoustical Society of America, 500 Sunnyside Blvd., Woodbury, NY 11797.

New Editor of *Echoes*

I have agreed to serve as editor of *Echoes*. This is my first issue as editor.

Echoes is now six years old, going on seven. The request for an ASA newsletter originally came from the Public Relations Committee. The first 3 issues of *Echoes* were co-edited by Charles Schmid and Alice Suter, after which Alice became the editor. She defined the mission of *Echoes* as being twofold: to present brief technical articles that will be interesting and understandable to all ASA members; and to provide readers with news and other current information. A look at the 25 issues published these past 6½ years will convince you that *Echoes*, under Alice's guiding hands, has fulfilled this mission very well.

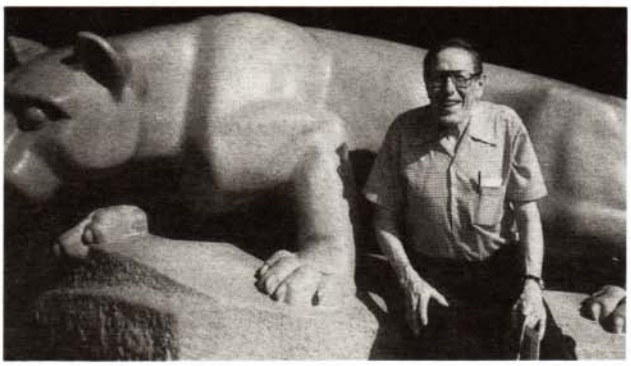
Echoes has no staff of reporters. In a sense, however, it has thousands of reporters: the members and friends of ASA. I will try to keep my eyes and ears open for acoustics news, but we continue to depend mainly on contributions from readers. "The better the input, the better the output," Alice used to write, "so keep those letters and postcards coming!"

One thing I can't help noticing, as an avid reader of *Echoes* these past years, is the rather small number of Letters to the Editor. As a newsletter, *Echoes* should also serve as a forum for readers. Since people tend to write letters to the newspapers when they are unhappy, perhaps the relatively small number of letters indicates that ASA folks are basically happy folks. But even happy folks have thoughts to share with others.

I should tell you a little about myself. After completing my PhD in physics in 1954, I worked in industrial research (UNIVAC division of Sperry Rand, now Unisys) for a few years, but I have been a physics professor for the past 40 years. My interest in musical acoustics was what first brought me into the Acoustical Society, but I have since become interested in all areas of acoustics. I have written or edited 10 books on acoustics. I enjoy writing, both for scientific audiences and for the general public. In addition to ASA, I am active in AAPT (president in 1991), APS, AAAS, and Sigma Xi (national lecturer for several years). During summers and sabbatical leaves, I have lectured and done research in England, France, Sweden, Germany, Australia, and China. I am the same age as ASA.

One more thing: I thrive on feedback (don't we all?). In addition to yours Letters to the Editor meant for publication, send me your informal comments on *Echoes*. My email address is Rossing@physics.niu.edu; telephone number is 815-753-6493 and FAX number is 815-753-8565.

–Tom Rossing



Tom Rossing meets the Nittany Lion at Penn State

Echoes From Penn State

● **Acoustic time reversal**--Two experiments conducted in the Mediterranean Sea in April 1996 and May 1997, demonstrating that an acoustic time reversal mirror (TRM) can be implemented to spatially and temporally refocus an incident acoustic field back to its origin in an inhomogeneous ocean, were discussed by William Kuperman and his associates at Scripps Institute of Oceanography. The TRM was implemented with a vertical line array of 24 underwater loudspeakers and 24 hydrophones. The incident sound field was from a 445-Hz sound source emitting 50-ms pulses from as far away as 30 km. The sound field was refocused to the position of the source with a spot size much smaller than the free field Rayleigh resolution cell. This "superfocussing" is caused by the waveguide nature of the ocean.

"Time-reversal invariance is a very powerful concept in classical and quantum mechanics," Mathias Fink (University Denis Diderot, Paris) pointed out in his distinguished lecture. However, simple experimental evidence of this concept is difficult to obtain. Not so in acoustics. "Time-reversal experiments may be achieved rather simply with large ultrasonic piezoelectric transducer arrays." The Mediterranean Sea experiments demonstrated, for the first time, that time reversal can be accomplished in the oceans.

Jim Cottingham demonstrates an historic reed organ in a session on musical instruments

● **Take-fives--**A new innovation was an informal session entitled "Take Fives—Sharing Ideas for Teaching Acoustics" sponsored by the Committee on Education in Acoustics. Presentations were limited to five minutes each (in fact, there were 20 presentations during the 90-minute session), although presenters were invited to take the stage more than once. "Star" of the show, if there was one, was Ron Edge from the University of South Carolina (currently president of AAPT), who did four short presentations in the spirit of his popular column "String and Sticky Tape Experiments" in *The Physics Teacher*. Ron demonstrated soliton behavior, Bessel function waves on a string of paper clips, binaural pitch, and the sounds of open and closed conch shells. Bob Celmer did a very active and graphic experiment to plot forced vibration amplitude as a function of frequency.

Uwe Hansen and Tom Rossing have agreed to organize similar "take-five" sessions on teaching acoustics at the San Diego and Berlin ASA meetings, so start thinking about what tricks of the teaching trade you would like to share with your colleagues at these meetings.

● **"Auralization"** is how Richard Campbell (Worcester Polytechnic Institute) refers to the use of high-speed computers and digital signal processing to simulate the acoustic environment of an auditorium. One needs a computer model of the acoustic space, including placement of sources and receivers, an appropriate source signal, a binaural spatial transfer function from free-field pressure to eardrum pressure, and a headset with a known equalization function. Campbell demonstrated auralization to a large audience during an interdisciplinary "Hot Topics in Acoustics" session, as well as to interested individuals in the exhibits area using headsets and a computer.

An example of how auralization can be applied to auditorium design is the Portland City Hall Auditorium. A model of the hall, converted by staff at Kirkegaard and Associates, was imported to CATT-Acoustic from an Autocad file, at which time Campbell and David Griesinger repaired the geometry and "plugged leaks," according to Campbell. The hall has now reopened to favorable reviews by patrons, critics, and orchestral musicians.

● **The King Song-Dok and other Bells**--The 20-ton King Song-Dok bell, cast in 771 during the Silla dynasty, is one of the treasures of the Eastern world. Realizing that a state-of-the-art scientific investigation would provide information needed to protect the bell, the Korean government sponsored a study of the acoustics of this bell. Professor Yang-Hann Kim and his colleagues at the Korean Advanced Institute of Science and Technology (KAIST) carried out experimental modal testing to determine the modes of vibration of the bell and used cylindrical acoustical holography to study its acoustic radiation field. A vertical array of 32 microphones, separated by 15 cm, sampled the near field sound every 30 degrees. Attendees at the Honolulu meeting, who enjoyed Professor Kim's photographs and video in the Gallery of Acoustics (it won second prize), learned more about the bell as well as how these images were created from the data.

Also featured at the special session on bells were talks about carillons, early American bell founders, change ringing, and handbells. Kathleen Ebling-Thorne made use of the Westminster Concert Bell Choir to illustrate some of the techniques used by today's handbell choirs, including martellato, plucking, thumb damping, four-in-hand ringing, echo and gyro. The session concluded with a concert by the Westminster Choir to an appreciative, standing-room only audience.

The Westminster bell choir in performance

● **Musical instrument identification**--Experiments comparing the abilities of human listeners and computers to distinguish between oboe sounds and saxophone sounds were described by Judith Brown (Wellesley College and MIT). Since the most successful work on speaker identification has involved identifying the formant structure of the speech sounds by a particular speaker and using this information to features for computer identification through pattern recognition, this same procedure was followed for the oboe and sax. Her results indicated that a computer can do very well in distinguishing the sounds of these instruments. In fact, it scored considerably better than human listeners in identifying oboe sounds; in the case of saxophones, there was little difference.

President's Message

It's a pleasure to serve as President of the ASA for the coming year; I look forward to working with Vice President Ilene Busch-Vishniac and the other Officers and Managers of the Society–I'm sure we'll have a busy and productive year. Permit me to take this opportunity to inform you of some recent developments in the Society and of our priorities for the coming year.

First of all, I welcome our new Editor of Echoes, Tom Rossing, who brings a special expertise to this position, having established a worldwide reputation for his contributions to acoustics education. I'm sure Tom will bring the same unbridled enthusiasm to this job a he has to other activities within our Society over the many years. I want also to acknowledge the outstanding contributions of Alice Suter, who was our first Editor of Echoes, and who made Echoes into one of our most widely read publications. I am especially pleased that the Medals and Awards Committee has singled her out for a Distinguished Service Award for her dedicated service to the Society.

As our Society evolves, we must face the changes that inevitably occur. Some of these changes are significant enough that the Executive Council of the ASA has felt a need to react in a proactive manner. For example, the principal source of income for our Society is our Library subscriptions from around the world. The number of these subscriptions has steadily dropped over the last several years, so that we have lost a significant percentage of our former subscribers. Although we have increased our subscription rate, it is obvious that continued decline would seriously effect our financial health. Accordingly, we have undertaken an effort to identify those libraries that have dropped their JASA subscriptions and we are actively encouraging them to renew. You can help us by ensuring that your library has not dropped its subscription, and if it has, by requesting them to renew as soon as possible.

I am continually amazed at the overwhelming amount of information that is available over the internet; perhaps libraries and books and printed journals will be a thing of the past someday! Because our publishing activities are such an important part of the ASA, continued success in this area is essential for our own existence as a Society. Thus, we have organized an active effort to examine the role of electronic publishing in our Journal and in our Society. I assure you that we will stay current on this issue and do our best to ensure that we don't move too slow or too fast.

Our overall mission encompasses a great deal of what we could call "Service"; We maintain one of the most active Standards activities of any professional Society; we publish a number of books on acoustics that are out-of-print or no longer generally available; we have an active Committee on Education that regularly organizes activities involving high school teachers and students, and lectures at AAAS and similar meetings; we have an active group of Regional Chapters that are involved in a number of educational and community activities; and some of our Technical Committees sponsor such events as Hearing Awareness Days in the various cities in which we hold our meetings. I could go on and on...we as a Society are very active in a number of such ways, which, although principally staffed by volunteers, inevitably costs money. Thus, our increasingly active, and costly, service and outreach programs have been one of the motivations for starting the Acoustical Society Foundation.

Beginning this year, our dues bill will now have a check-off box for contributing to the Foundation. Members of our Society have been very generous in the past. For several years we have had a check-off for student travel–this fund has accumulated over $250,000 and we can now use the income from this fund to support student travel in perpetuity. We have similar goals for the Foundation. Our current service and outreach activities cost our Society over $300,000 per year; thus we have set a goal of raising $5 million over the next few years to ensure that our Society and its mission will be active and viable for many years to come. We already have a challenge grant of $50,000 from Leo and Gabriella Beranek. I urge you to continue your active volunteerism, but also help us by contributing to this important goal.

Finally, our membership has shown only modest growth over the past few years, and indeed, the membership of those from North America has shown a significant decline. It is only through an increasing number of international members that we have maintained our level without decline. Our international membership now exceeds 25%; Journal authorship from outside North America has exceeded 40% in recent volumes. Thus, the Acoustical Society of America is increasingly becoming "The Acoustical Society (of the world)". Accordingly, I hope you will support our efforts to address the needs of **all** our members and attend our upcoming joint meetings with the International Congress on Acoustics in Seattle in June of 1998, and with the European Acoustics Association in Berlin in March of 1999. And, if you know someone who is active in acoustics and is not a member of the ASA invite them to join...tell them about the best Scientific Society in the world!

Lawrence A. Crum
Applied Physics Laboratory
University of Washington
Seattle, WA 98105

lac@apl.washington.edu

Star in a Jar: A New Model for Single-Bubble Sonoluminescence

by William C. Moss, Douglas B. Clarke, and David A. Young

This is based on paper 2aPA10 at the 133rd ASA meeting at Penn State. For further information, see Science ***276****, 1398 (1997) as well as the article in Echoes* ***3****(1) (Spring 1993)*

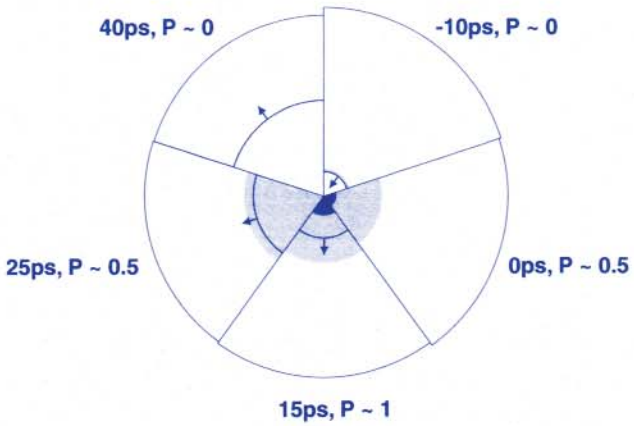
Sonoluminescence (SL) is a mysterious process in which sound waves aimed at a container of water nucleate, grow, and collapse many gas-filled bubbles to create ultrashort light flashes representing a trillionfold focusing of the initial sound. SL was discovered in 1933, but the phenomenon could not be studied in detail until 1990, when Felipe Gaitan at the National center for Physical Acoustics in Mississippi successfully obtained SL from a single air bubble.

We have developed a new theoretical model for single bubble sonoluminescence (SBSL) that is consistent with experimental results and makes predictions about the sensitivity of SBSL to various parameters. This model provides an explanation for the ultrashort light flashes, predicts that the duration and spectrum of the light flashes may be very sensitive to the maximum radius of the bubble, and supports a theoretical prediction that the gas inside a sonoluminescing air bubble may be comprised solely of argon.

In single bubble sonoluminescence, sound waves levitate and trap a single micron-sized gas-filled bubble while forcing it to undergo SL repetitively. A bubble of air undergoing SL appears electric blue in color to the naked eye. Experimental measurements at UCLA [*Nature* **352**, 318 (1991)] showed that single-bubble sonoluminescence from an air bubble produces light flashes that are synchronized with the periodically expanding and compressing sound field. In addition, each flash had a measured duration of less than 50 picoseconds. In addition, the light flashes produce a spectrum of colors consistent with the idea that the sonoluminescing bubble has a temperature of at least 23,000 kelvins. These results created a scientific stampede in which experimentalists obtained more data and theorists tried to explain the data, especially the mechanisms underlying the ultrashort flashes and high temperatures of the bubble. Scientists proposed exotic mechanisms such as quantum vacuum fluctuations, fractoluminescence, and charged liquid jet collisions. Nevertheless, what remains perhaps the most popular hypothesis for sonoluminescence was first made in Peter Jarman of Imperial College in London, who proposed that the collapsing bubble generates an imploding shock wave that compresses and heats the gas in the bubble.

Our model, which supports Jarman's hypothesis, makes two basic assumptions: first, that as the bubble collapses, the gas inside is compressed and heated; and secondly, that the hot gas emits light. Using the computer code LASNEX, we performed fluid dynamics simulations of the growth and collapse of a gas-filled bubble and the liquid surrounding it [*Science* **276**, 1398 (1997)]. (LASNEX is also used for calculations in inertial confinement fusion, in which lasers compress a pellet to such high temperatures and densities that thermonuclear fusion occurs).

Our calculations show that during the collapse of the bubble, a shock wave is generated that compresses and heats the contents of the bubble. More heating occurs at the center of the bubble than at its boundary because the shock wave's strength increases as it approaches the center. In the hotter regions, the gas molecules and atoms trapped inside the bubble begin to ionize. What results is a partially ionized plasma which emits light by a rapid (on the order of femtoseconds) cascade of energy from the ions in the plasma to electrons to the photons that make up the light pulses. The figure below shows our calculated results for a collapsing argon bubble. Five snapshots of the final 50 ps of the collapse are shown, during which the radius of the bubble decreases from 0.45 to 0.43 microns. Time is referenced to the instant when the shock wave reaches the center of the bubble.



The final 50 ps of the calculated collapse of an argon bubble. The bubble radius (outermost curve), shock wave location (inner curve), optically thin emitting regions (shaded), and optically thick emitting regions (solid) are shown. P is the relative emitted power of visible light.

At -10 ps, the shock wave (solid curve) is near the center of the bubble, and light begins to be emitted (lightly shaded region) just behind the shock wave. At t=0, the shock wave reaches the center of the bubble. At this point, the power emitted in the visible spectrum is one-half its eventual peak value. The emitting regions of the bubble are very much like those in a miniature star: Visible light from the sun appears yellow, which is indicative of a temperature of approximately 6000 K. However, the center of the sun is much hotter, nearly 107 K. This temperature can't be "seen," however, because the light that is emitted from the deeper regions is absorbed before it reaches the surface. This deeper absorbing region is

(Continued on page 7)

Born to Learn Language

("Born to Learn..", continued from page 1)

and became a Fellow in 1989. She has served the Society in many official roles, including terms on the Executive Council, the Speech Communication Technical Committee, the Medals and Awards Committee (Chair, 1993), and the Women in Acoustics Committee. She has served as Associate Editor of the Journal, and as vice-president of the Society. She is co-chair for the 1998 joint ASA/ICA meeting in Seattle.

Besides her many invited papers at ASA meetings and her publications in JASA, Pat has published four papers in *Science*, the most recent of which was published August 1, 1997. She has authored over 80 papers and book chapters. The Acoustical Society will recognize her work in December by awarding her the Silver Medal in Speech Communication at the 134th ASA meeting in San Diego.

When Pat completed her presentation at the White House conference, President Clinton asked the first question, about how much parent-child interaction is necessary, a question that researchers are still studying. "We don't know if it takes 10 minutes or 2 hours a day of conversational interaction to produce the effects I've described," she warned. "We would not advise parents to try and accelerate the normal pattern of development (by flash cards for word learning, for example). Natural language input to children in normal social environments causes language growth, and infants like the interaction."

Other panelists at the conference urged the adoption of several programs to help young children, including those that would emphasize higher wages and better training for day care workers, better parenting education, better training for pediatricians to help parents, more pre-natal care and expanded health coverage. Pediatrician Barry Brazelton said that 40 percent of the nation's children are not getting effective preventive health care and called for universal coverage for children and pregnant women. Dr. Carla Shatz, a professor of neurobiology at the University of California, pointed out that the "use it or lose it" phenomenon in brain development has been confirmed by studies of children who suffered from cataracts. Even when the cataracts were removed, the children remained blind because the brain pathways necessary to see were never developed in these children.

In her summary remarks, Hillary Clinton commented that some of her best memories were of reading to Chelsea as a young child. "Reading to her when she was young was a joy for Bill and me. But we had no idea 15, 16, 17 years ago that what we were doing was literally turning on the power in her brain, firing up the connections that would enable her to speak and read at as high a level as she possibly could reach."

Hillary Clinton and Pat Kuhl

You never know whom you'll meet...

Thrilling moments from Pat Kuhl's career, as related to the Editor

"When I think about it, the two most thrilling moments in my career were meeting Bill Gates and giving the presentation to the President and Mrs. Clinton at the White House. The White House was very special because it provided the opportunity to talk about the implications for children of the research that many of us do. As scientists largely funded by taxpayer monies, we owe that to the nation, and the Clintons reminded us that it is our responsibility to communicate our findings to the public even though it is difficult to do. Meeting the President, Mrs. Clinton, and Vice-President Gore, and giving a talk at the White House will surely be one of the events I will never forget.

"The second most interesting thing was meeting Bill Gates and talking to him about speech. The funny thing is that I met him on an airplane on the way home from the Houston meeting of the ASA (1991)! I was exhausted and heading home Friday night. I was late (EC didn't end on time) and because of that was bumped up to First Class. I planned to sleep, read the NY Times for the first time in a week, and ordered a glass of wine. The next thing I knew, a pair of tennis shoes was crawling over me without a word. This kid (he looked very young) had stacks and stacks of papers, ordered 3 cokes, and started to speed read the papers. I buried myself in the newspaper (couldn't see very well because I had taken my glasses off) and hoped he didn't want to talk. Out the corner of my eye I looked at what he was reading and make out "M"s all over the page. I glanced at his face and thought, "Oh my god...I'm sitting next to Bill Gates...and only have 4 hours to talk to him!"

"I put away the paper, canceled the drink, put my glasses back on, took a deep breath, and said, 'Hi. I'm Pat Kuhl and I study speech. I want to know if Microsoft is interested in cracking the speech code.'

"That proved to be a good opener! We started talking and by the time we reached Seattle I had explained 40 years of research on speech, promised a full stack of reprints and a video of the auditory-visual illusion that I was studying, and agreed to keep in touch. That began what's turned into a long and interesting interaction. Many ASA members know that since that time, Microsoft has launched a full scale attack on the problem of computer speech recognition. Bill now tells audiences that Microsoft's computer recognition system still confuses 'recognize speech' with 'wreck a nice beach,' but that speech recognition is one of their number one priorities and they fully expect to crack the speech code at some point in the future.

"The moral of this story, of course, is that students should regularly attend ASA meetings because they never know whom they might ride home with!"

(Star in a Jar... continued from page 5)

described as being "optically thick." The solid black region in the figure shows where the bubble is optically thick. Only the light emission from the "halo" (lightly shaded region) and from the surface of the optically thick region can be seen.

At 25 ps, the light emitting halo is even larger, but the bubble has collapsed, so that the emitted visible optical power has decreased to one-half its peak value. At 40 ps, the bubble is too cool to emit light. The bubble temperature decreases for two reasons. First, the gas behind the outgoing shock wave expands and cools. Second, electrons carry away some of the heat that was created during the compression of the bubble. By comparing the times at which one-half peak power occurs, a 25-ps pulse width can be deduced from the figure, and this is consistent with the experimentally measured value.

The physics of matter under SL conditions is not yet understood completely. Our results suggest that our basic theoretical and computational strategy is valid, and that semiquantitative predictions are possible. For example, if the collapse of the bubble can be enhanced, thereby raising the bubble temperature even higher, than it may be possible to obtain a small amount of thermonuclear fusion from a micron-sized sonoluminescing bubble filled with heavy isotopes of hydrogen (deuterium or tritium). Although it remains to be confirmed experimentally that shock waves or plasmas are present in a bubble undergoing SL, no other model of which we are aware has been able to explain such a broad array of experimental data.

This work was performed under the auspices of the U. S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. W-7405-Eng-48.

Notes from the Executive Council

The Executive Director reported that membership had increased by 1.8% and that non-member subscriptions to JASA had decreased by 4.1%. The Acoustical Society plans to participate in a number of satellite meetings and seminars including: Power Plant Noise Seminar (at Penn State); Measuring and Evaluating Benefits of Hearing Aids; International Symposium on Musical Acoustics (Leavenworth, WA); Classroom Acoustics; Product Sound Quality; and a Session on Meeting Room Acoustics at Council of Engineering and Scientific Society Executives.

The ASA Home Page and List Server continue to continue to grow in use by members and by the public. The World Wide Press Room for the Penn State meeting included 17 lay-language papers; several of these included sounds, color pictures, and animated images to demonstrate sound and vibration.

The Executive Council approved sending the "offprint" or front part of the Journal to all members in 1998. Also, it was the sense of the Council that all members should receive *Echoes*. It was decided that the Journal should go on-line in 1998.

The appointments of Associate Editors Robert V. Shannon (Psychological Acoustics) and D. Wesley Grantham (Psychological Acoustics) and the reappointment of Anders Lofqvist were approved.

The ASA agreed to cosponsor the Third International Conference on Electronic Engineering and Oceanography, an International Conference on Spoken Language Processing (1998 in Australia), and the AGU Ocean Sciences meeting.

The past vice president will continue serving as a non-voting member of the Executive Council and the Technical Council for the next three years.

Acoustics in the News

● Talking to plants seems reasonable, but listening to them? According to the June 1997 issue of *Scientific American*, physicists at the University of Bonn are doing just that to find out why so many geranium seedlings die in transit from the Mediterranean to Germany every year. They use a sensitive hearing aid: a laser excites ethylene molecules—gas that plants release when exposed to drought, cold or other forms of stress—and a resonance tube amplifies the ensuing shock waves. Higher ethylene emissions make for louder sounds.

● Near absolute zero, sodium atoms collectively enter the same quantum state and act as a coherent unit, producing a Bose-Einstein condensate. Researchers have now measured the speed of sound in a cloud of sodium atoms cooled near absolute zero, according to a note in *Science News*, May 3, 1997. A Bose-Einstein condensate is "a fascinating kind of matter," says Wolfgang Ketterle of MIT, and one way to study its characteristics is to disturb the atomic cloud, making it ring like a bell (*Science News*, May 25, 1996). Ketterle's team has now gone a step further, measuring the speed of a sound pulse through the cloud.

● The two-fluid nature of superfluid ^{4}He can lead to interesting behavior when it is used in a Helmholtz oscillator, according to Scott Backhaus (paper 1aPA2, Penn State ASA meeting). If the oscillator's constriction is narrow enough, the normal fluid can be locked by its own viscosity, leaving only the superfluid component to flow in and out of the oscillator volume. Hoping to exploit this "weird phenomenon," Backhaus and Richard Packard (U.California, Berkeley) engraved a millimeter-wide channel in a silicon wafer for the helium to flow through, according to *Science Now* (online magazine of AAAS) 18 June 1997. When tuned to the proper frequency (a few thousand hertz), the pipe acts as a resonating cavity and seems to pick up the sound, making "music" from quantum vortices. The researchers generated exactly the same tone every time they forced the helium through the bottleneck under the same pressure, suggesting that the device could form the basis of a pressure standard. A pressure standard set by superfluid helium would be analogous to the voltage standard based on a quantum-mechanical circuit called a Josephson junction.

Earlier, Packard, along with Keith Schwab and Niels Bruckner, had used a similar technique to determine the earth's rotational rate to a precision of 0.5% (*Nature*, April 10, 1997). A small aperture (190 nm x 1000 nm) was placed in a torus filled with superfluid liquid. Small changes in the frequency of the resulting Helmholtz oscillator around a nominal 66 Hz indicate changes in the earth's rate of rotation.

● When American bullfrogs sing (in beer commercials or otherwise), the sound appears to come from a large vocal sac bulging from under the frog's chin. Now, according to a story in *Academic Press Daily*, July 11, 1997, scientists have found that these bass notes are amplified by an unusual set of loudspeakers, the frog's ears. Alejandro Burgue, a bioacoustician at UCLA, designed a sound-generating device and placed it inside the bullfrog's mouth. As this device made a tone, Purgue found strong vibrations of the eardrum, according to a paper to appear in the the *Journal of Comparative Physiology*.

● Despite its prevalence in prenatal care, ultrasound screening remains a subject of considerable debate among experts. Many see it as an indispensable tool for detecting problems in a pregnancy, others emphasize its shortcomings and overuse. Organizations such as the American College of Obstetricians and Gynecologists do not recommend its use unless there is a reason , like unexplained bleeding or uncertainty about the date of conception. In Europe, there is more of a consensus that obstetrical ultrasound, properly done, is desirable, according to a story in the *New York Times*, July 21, 1997. Sixty hospitals participated in the Eurofetus Project, in which about 200,000 women were given routine scans about midway through their pregnancies. The results of this study were described at a conference sponsored by the New York Academy of Sciences. Sonograms detected 61% of the major or minor structural abnormalities of the heart, kidneys, limbs, brain, or other organ.

ACOUSTICAL·SOCIETY·OF·AMERICA
500 Sunnyside Blvd.
Woodbury, New York 11797

Non-Profit Org.
U.S. POSTAGE
PAID
Medford, OR
Permit No.143