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ECHOES

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ASA/EAA to meet in Paris

Bill Hartmann

The 155th meeting of the Acoustical Society of America (ASA) will be held in Paris, France, starting Monday June 30 and ending on Friday July 4. The meeting is joint with the European Acoustics Association (EAA) and is managed by the Societé Française d'Acoustique (SFA). This meeting will be the second joint meeting of the ASA and the EAA, the first being held in Berlin in March 1999. In Paris, the technical committees on Underwater Acoustics and Acoustical Oceanography will meet together with the European Conference on Underwater Acoustics (ECUA). The sessions sponsored by the ASA Technical Committee on Noise will be integrated with the European Conference on Noise Control (Euronoise).

The Paris meeting will be, by far, the largest ASA meeting in history, with over 3500 papers in 265 sessions. The previous record was actually set at the Berlin meeting, where 1955 papers were presented. Fortunately, the city of Paris is well equipped to handle a meeting of this size. The venue will be the Palais des Congrès, near the center of Paris, a modern conference center with high-quality lecture halls for oral presentations and abundant space for posters. The center also includes shops, cafes, and space to just hang out. The Palais des Congrès is just a few blocks from Étoile (Place Charles-de-Gaulle) the amazing conjunction of twelve major avenues at Napoleon's Arch of Triumph.

Palais des Congrès

The Pompidou Center is the home of the Museum of Modern Art. It is next door to IRCAM, the Institut de Recherche et Coordination Acoustique/Musique, a conference tour site.

Technical Program Organizing Meeting, Acoustics'08 Paris, Front Row (L to R): Yves Berthelot, Philippe Blanc-Benon, Pierre Badin, Jean Pierre Hermand, Yann Stephan, Patrizio Faustio; Second Row: Walter Lauriks, Paul Iverson, Armin Kohlrausch, Brigitte Schulte-Fortkamp, Alain de Cheveigne, Michael Vorländer, Dan Warren; Third Row: Antoine Chaigne, Bill Hartmann, Murray Campbell, Peter Rogers, Dave Adams; Fourth Row: Neil Owen, Emmanuel Bossy, Michel Berengier; Fifth Row: Keith Attenborough, Andone Lavery, Kevin LePage, Betrand Dubus (Photo by Charles Schmid)

To cope with a meeting of this size required the cooperation of many people at many different levels of the ASA and EAA. For its part, the SFA invented a computer program that brought unprecedented control and sophistication to the process of sorting papers and scheduling sessions. As papers were sorted and sessions were placed in the calendar, the computer kept a watchful eye on potential conflicts for each individual. Although the occasional participant may still find it necessary to be in two places at once, such conflicts are likely to be at a minimum.

At the outset, three sponsoring organizers were committed to encouraging the participation of students. Given travel costs and the costs of accommodation in a major European city, the challenge was considerable. The challenge was met thanks to contributions from ASA, EAA, SFA and from sponsors, and 138 grants were awarded. Low cost accommodations were arranged, and there is now an EAA acoustics student network established

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We hear that . . .

Alice Suter

• **Alice Suter**, ASA Fellow and former editor of *ECHOES*, received the Lifetime Achievement Award from the National Hearing Conservation Association at their annual conference in Portland in February. It is only the second time that the award has been presented.

• ASA Fellow **Peter N. Mikhalevsky** has been elected a Fellow of IEEE. He is senior vice president of Science Applications International Corporation.

• Among comments from the **Technical Committee meetings** at New Orleans reported to the Technical Council: ASA should increase its coordination with other societies, including AAPT (American Association of Physics Teachers) and OSA (Optical Society of America); ASA should lower registration fees for meetings; ASA should improve relations with industry; more sessions on nanotechnology and infrasound.

L to R: Philippe Blanc-Benon, Manell Zakharia, Pascal Laugier. Zakharia is meeting co-chair; Blanc-Benon and Laugier are technical program co-chairs.

Cathédrale Notre Dame de Paris

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 Rossing
ASA Editor-in-Chief . . . . . .Allan Pierce
Advisors . . . . . .Elaine Moran, Charles Schmid

Phone inquiries: 516-576-2360. Contributions, including Letters to the Editor, should be sent to Thomas Rossing, Stanford University, CCRMA Department of Music, Stanford, CA 94305 <rossing@ccrma.stanford.edu>

To the editor:

Variation in pronunciation

The variation in the pronunciation of vowels is one of the strongest markers of the different accents in English. We write to ask whether readers of *ECHOES* might help us document the rich diversity of the language. We are doing this with a web-based investigation that uses subjects' perception, rather than production, to map vowels onto the vocal plane. Current results for the United States reflect only a small number of regions, and are dominated by California.

The experiment and its current results are at http://project.phys.unsw.edu.au/swe

Sincerely,
Ahmed Ghonim, John Smith and Joe Wolfe
University of New South Wales, Australia

ASA/EAA to meet in Paris, *continued from page 1*

online through Facebook.

Contributors to the meeting have the option of submitting their paper to the conference proceedings which will be distributed at the meeting on CD ROM. The deadline for these submissions is May 7, and the required format is described at the conference web site. Submitting for the proceedings is entirely optional.

Before attending the meeting, participants should do two important things. The first is to become familiar with the conference schedule and other features. These are laid out on the conference web site, www.acoustics08-Paris.org.

The other important thing is to learn a little about the Paris subway (the Métro). The Métro is the key to going places and doing things in Paris.

The Métro is a vast network of subway lines with many interconnections for transfers among lines. Participants should get a Métro map and bring it to Paris. A good map is available at http://www.Paris.org/Metro/gifs/metro.pdf. Compared to the subways in other cities, the Paris Métro is easy. You buy a ticket to enter (you can buy a book of ten tickets — a "carnet" — at a discount), and once in the system you will not pay again no matter how many transfers you make. If you make a mistake — go the wrong direction or miss your stop — the error is easily corrected with only the loss of a little time. Métro lines are labelled both by number and by the terminus stations. For instance the Palais des Congrès is at the station called Porte Maillot, and this station is on Line 1, La Défense - Château de Vincennes.

Armed with the conference information and a Métro map, the participant in Acoustics'08 Paris should have a wonderful time in Paris. *Bienvenue à Paris*!

Bill Hartmann, Professor of Physics at Michigan State University and past president of ASA, has lived and worked in Paris and knows the city well. He is widely known for his work in psychoacoustics and musical acoustics.

Making Spatial Music Accessible: Investigating elementary spatial movements

Georgios Marentakis, Nils Peters and Stephen McAdams

Significant research has been performed for the creation of auditory virtual environments where the goal is to reproduce spatial qualities of sound, such as direction, distance and properties of the space, such as reverberation time and listener envelopment. Such systems are used much in the entertainment industry, but also in music. For their successful deployment it is important to ascertain concise perception of spatial manipulations for listeners in large spaces such as concert halls. This can be a difficult task since most techniques for simulating space in audition are optimized for listeners in the center of circular or spherical loudspeaker arrays (i.e., the sweet spot) with reference to a dry, reflection-free environment. In practice however, there is substantial variation in concert hall acoustics, the spatial distribution of the audience, and practical limitations in loudspeaker placement.

Spatial events cannot be perceived consistently in an absolute manner due to the differences in the location of the listeners in the space. Even with a perfect spatial audio system, an event appearing in front for a listener seated in the middle of the hall, will be perceived as originating from the front right direction for a listener at the left end of the hall. What could be perceived consistently, however, are discrete or continuous changes in location of sounds and the spatial interrelations among the elements of the spatial scene. From a psychoacoustics point of view, this idea is related to the minimum audible angle (MAA), i.e., the angular displacement of a sound that is perceivable with a probability of 75%. It depends on the sound used (in particular the spectral content of the sound), the direction from which the sound is emitted, the plane in which the movement is taking place (i.e., horizontal, vertical or diagonal) and to a smaller extent on the duration of the sound. Typical values for MAAs are about 1 degree for a sound directly in front of a person, 1.5 degrees for a sound at 60 degrees and 5 degrees for a sound at the side of the listener, (estimations done with broadband noise stimulus and real sounds, after Saberi *et al.,* 1991 and Chandler & Graham, 1991).

Perception of sound displacement for virtual systems in reverberant spaces has been little studied. Studies focus mostly in absolute localization judgments, the majority being in anechoic conditions. In addition, they are mostly concerned with listeners in the center of the loudspeaker deployment. The effect of the room is important in sound localization, especially when sounds with regular temporal variation are considered, sounds that often occur in music. Reflections, especially side ones, are known to affect localization. Furthermore, the location of a listener relative to the loudspeaker array distorts the localization image. This is because the time of arrival and levels of the signals emitted by the loudspeakers vary as a function of the location of a listener in the concert hall. For virtual audio systems designed with the sweet spot in mind, listeners at different locations experience a mixture of lead and lag signals and levels. The result of this phenomenon is hard to predict in an analytical way. Depending on time and level differences of the lead and lag signals, a variation of phenomena such as summing localization, the precedence effect or in the extreme case,

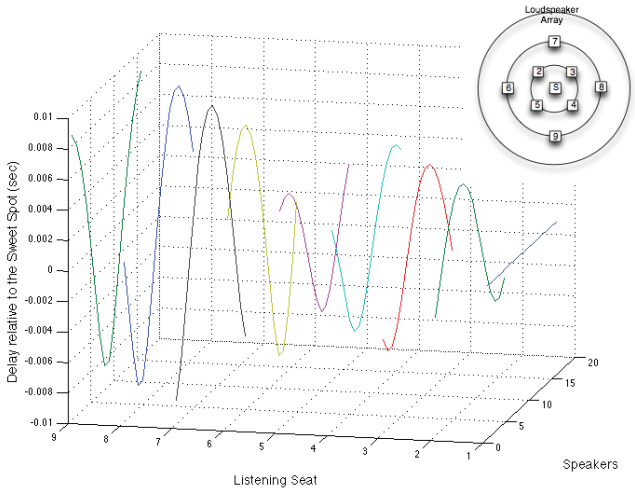

Figure 1. Variation in the time of arrival of the sound of each speaker to each of the listening seats in the test relative to the sweet spot. Level differences are aligned with the time differences therefore furthermore blurring the localization process. Estimation is for 16 speakers equally spaced on the array with an offset of 11.25 degrees.

echoes, will essentially reduce the spatial resolution delivered to the audience as a whole. It is important therefore to establish empirical laws with respect to loudspeaker placement that take into account the psychoacoustics of auditory space perception.

The aforementioned problems can be approached by way of evaluation experiments. As a departure point, we focused on the perception of sound displacement and movement and examined how this varies for measurements in a studio set-up and in a large area similar to that of a concert hall for the case of amplitude panning.

Identification performance was estimated for four angular displacements and three nominal directions of incidence in nine seats in the concert hall for amplitude panning with 8 and 16 speakers. The same experiment was performed in the studio for a person in the sweet spot with an 8- and 4-speaker system. Identification rates were then used to estimate MAAs. The results show that increasing the number of speakers improved localization performance for VBAP. For four speakers results were disappointing even for a studio setup. With eight speakers, MAAs were comparable for frontal incidence but deteriorated more than expected for sounds emitting from the sides of listeners. In addition, we found that these values deteriorate significantly for sounds originating from locations on or close to a loudspeaker. In the concert hall, for frontal incidence, the best performance was found for listeners aligned with the source. Performance deteriorated as the angle between the seat of the listeners and the sound increased, as would be expected. Localization using the 8-speaker system was in general less accurate than in the studio, implying that the room had a significant effect. Overall it improved when 16 speakers were used and became comparable to the studio for frontal incidence. Performance for sounds at oblique incidence was however sig-

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Echoes from New Orleans

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Figure 2. Measurement process in a big space

nificantly degraded and the effect of the room became more pronounced. For listeners away from the centre of the array, identification performance was confounded with the difference between the nominal and the apparent angle of incidence and angular separation and the distortion to the localization image due to violation of the symmetry with respect to the time of arrival of the speakers. In addition, considerable variation is observed in the measurements for sounds on the sides of the listeners, which can either be attributed to unfamiliarity with spatial sound experiences, but also to individual differences.

It appears therefore feasible to create a uniform experience of sound displacement both in the studio and in the concert hall; however in the latter case a specialized measurement procedure is necessary to compensate for the effect of the room and the variability in listener positioning. Composers, performers and practitioners should be particularly careful for sounds at the sides of listeners where the expectations of algorithm designers are not met especially in room conditions. We are currently extending our research to accommodate sound movement and a variety of spatialization algorithms.

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Georgios Marentakis

Nils Peters

Stephen McAdams

Georgios Marentakis is a post-doctoral researcher and Nils Peters a PhD candidate at the Centre of Interdisciplinary Research in Music Media and Technology. Stephen McAdams is Professor and Canada Research Chair in Music Perception and Cognition at the Schulich School of Music of McGill University and the director of the Centre for Interdisciplinary Research in Music, Media and Technology (CIRMMT). This article is based on paper 4aMU2 at the ASA meeting in New Orleans.

Best student paper/young presenter awards (New Orleans)

Architectural Acoustics
First: Samantha B. Rawlings and Joshua A. Magee (University of Hartford)
Second: Gordon Rubin (Rensselaer Polytechnic Institute)

Animal Bioacoustics
Joy Smith (Coastal Carolina University)

Acoustical Oceanography
First: David R. Barclay (University of California, San Diego)
Second: Megan S. Ballard (Penn State University)

Engineering Acoustics
Tim Marston (Penn State University)

Musical Acoustics
First: Rohan Krishnamurthy (Kalamazoo College)
Second: Edward L. Toussaint (Lawrence University)

Rohan Krishnamurthy (Musical Acoustics) presented a mini-concert on the mridangam.

Noise (young presenters)
Yun Jin (Rensselaer Polytechnic Institute)
Cole V. Duke (Brigham Young University)

Signal Processing in Acoustics (young presenter)
Joris Vanherzeele (Vrije Universiteit Brussel)

Speech Communication
First: Youngsok Jung (Harvard-MIT Div. of Health Science and Technology)
Second: Melissa Baese (Northwestern University)

Structural Acoustics and Vibration
First: Kyungmin Baik (Washington State University)
Second: R. Benjamin Davis (Duke University)

Underwater Acoustics
First: Yaniv Brick (Tel Aviv University)
Second: Shawn F. Johnson (Penn State University)

Scanning the Journals

Thomas D. Rossing

• Using computer simulations, researchers have determined that it is possible to build objects that will allow sound waves to slip past undisturbed, according to a paper in the 11 January issue of *Physical Review Letters*. Acoustic scattering theory is used to predict the mass density and bulk modulus of a "**3D acoustic cloaking shell**." Calculations confirm that the pressure and velocity fields are smoothly bent and excluded from the interior of the shell. The shell requires an anisotropic mass density with principal axes in the spherical coordinate directions and a radially dependent bulk modulus. Such a cloak might hide submarines in the ocean from detection from sonar. A similar "microwave cloak" was predicted in 2006. As in the case of the microwave cloak, the properties required for a sound cloak are not found among materials in nature and would require the development of artificial, composite metamaterials.

• Seismologists have learned that **low-frequency seismic waves**, the so-called W phases, with periods of 100 to 1000 seconds, accurately reflect an earthquake's tsunami-generating power. But W-phases are very difficult to extract from an ordinary seismic record. According to a note in 11 January issue of *Science*, however, using enough seismometers allows W-phases to identify quakes with tsunami generating power in 15 to 20 minutes.

• The November issue of *Acoustics Science and Technology* has an invited review on "Recent developments in **noise legislation and prediction methodologies for railways in Europe**." The European Commission has recently instigated a set of legislative initiatives in order to prevent increases in noise exposure for the population. This review focuses on railway-specific issues, with detail of the railway noise prediction technology developed within projects relating to the Noise Directive of 2002. Also described are noise elements of the Technical Specifications for Interoperability.

• A very interesting paper by Neville Fletcher in the December issue of *Acoustics Australia* discusses the familiar **sound of a spinning disc** (such as a coin or a saucepan lid dropped obliquely on a table). If the supporting plane is large so that reflections from the edges can be neglected, the sound comes simply from the vibrational waves propagating away from the rotating source. The oscillating disc itself acts as a set of multipole sources which are correlated at the contact point. The lower side of the disc, however, is shielded by the supporting plane and its oscillations are imposed upon the wedge of air between the disc and the plane. This imposes a rapid fluctuation on the sound in any given direction. The author also discusses the sound of bouncing balls and rocking beams as they settle on a supporting plane.

• The National Science Foundation has acknowledged that data on certain aspects of the **state of the country's S&E** (science and engineering) enterprise are missing from their publication indicators, according to a note in the 25 January issue of *Science*. Topics for which data are lacking include: informal learning experiences, how math and science teachers are trained, the global flow of S&E workers, lifelong learning, R&D trends, the outsourcing and offshoring of S&E jobs and others.

• Shallower regions in the oceans can act as lenses, **focusing the energy of tsunamis** into cusp points where two caustic lines meet, according to a paper in the 8 November issue of *Proceedings of the Royal Society A*. The wave elevation depends on position, time, and two parameters: the distance of the cusp from the lens divided by the local wavelength, and the spatial extent of the initial disturbance. Focusing amplifies the wave and can potentially multiply tsunami energy 10-fold over a transverse range of tens of kilometers.

• The November/December issue of *Acta Acustica/Acustica* includes a set of papers from the Greek-French workshop on **Statistical Aspects of Acoustic Propagation** held in Heraklion, Greece in September 2006. Of particular interest at the workshop was the presentation of computational methods applied in acoustic propagation problems derived from seismic and electromagnetic wave propagation. The papers cover a wide range of applications involving both forward and inverse acoustic propagation in water and the atmosphere. Finite differences in space and time are among the most frequently used computational schemes.

• In the February issue of *The Science Teacher* the "Career of the Month" column features "**Musical acoustics scientist**." James Beauchamp, chair of ASA's Technical Committee on Musical Acoustics, explains how he became a musical acoustics scientist, and how musical scientists contribute to science and music. "Most musical acoustics scientists," he explains, "are familiar with making physical measurements, writing computer programs, conducting perceptual studies, and critically listening to music."

• The whistling **noise made by male hummingbirds** is not vocal but created by the birds' tail feathers, according to research published in the 30 January issue of *Proceedings of the Royal Society B: Biological Sciences*. The chirp sound he makes during his dive happens at the same time as his tail feathers spread. High-speed videos show that fluttering of the trailing vane of the outermost tail feathers produces the sound. Subtle changes in feather shape tune the frequency of the sound. The results of the research by two scientists at the University of California has been written up in the 5 February issue of *The New York Times* and the 8 February issue of the *San Francisco Chronicle*. A short video appears at sfgate.com.

• Termites are blind and thus they **use vibrations to communicate** for a number of purposes. According to a paper in the December issue of *Acoustics Australia*, they also use vibrations for assessment of food structures. Some species prefer larger, some species prefer smaller blocks of wood. Recording foraging signals in large blocks and playing them back in the smaller blocks were found to reverse their preferences. Given that the cost of structural damage by termites in the USA alone amounts to some $11 billion annually, understanding the termite preferences for food could be of economic value.

• The February issue of *IEEE Spectrum* features 10 engineers with "dream jobs." One of them is the world's leading design-

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Scanning the Journals

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er of class-D **amplifiers used in high-end audio components**. One of his amplifiers is claimed to have 0.0003 percent harmonic distortion at full power amplifying a 20-kHz signal.

• Although the **human vocal instrument** is small, it is capable of producing remarkable sounds, and an article by Ingo Titze in the January issue of *Scientific American* explains how. Researchers have now learned that nonlinear interactions in which source and resonator feed off each other play a crucial role in generating human sound (see cover story in the Summer 2007 issue of *ECHOES*). In a nonlinear feedback system, small changes can result in disproportionately large effects. Singers use a nonlinear energy-feedback process (inertive reactance) in the laryngeal vestibule to resonate or amplify sounds created by the vocal folds. A singer's task is to adjust the shape of the vocal tract so that inertive reactance is experienced over most of the pitch range—no easy task.

• **Hearing music in the early stages after a stroke** can improve patients' recovery, according to preliminary research published online 20 February in the medical journal *Brain*. If patients listened to music for two hours a day, their verbal memory and focused attention recovered better—the first time such an effect has been shown in humans.

• The January issue of *Acoustical Science and Technology* is a special issue on the **ASA-ASJ joint meeting** in Honolulu in 2006. The issue includes 12 peer reviewed papers and 6 acoustical letters based on papers given in Honolulu by Japanese authors. The papers cover structural acoustics, ultrasound and underwater acoustics, noise, physiological acoustics, musical acoustics, speech communication, and signal processing.

• "**Bird song and the Problem of Honest Communication**" is the title of a feature article in the March-April issue of *American Scientist*. Male song sparrows each possess a repertoire of different versions of their species' songs, and the quality of the acoustic elements or "notes" are unique. Females appear to prefer males with larger song repertoires, so what is to keep males from exaggerating this talent in order to appear more attractive? Game theory suggests that individuals are less likely to bluff or deceive if deception comes at some cost. It is argued that soft singing is an aggressive signal because it is a costly signal of attention. Some sparrows may have a larger song repertoire than they "ought" to have given their quality or employ soft songs when they are unwilling to attack. Distinguishing cases of deceit from common error, however, is not a simple matter.

• A "**smart" material that can vary its Young's modulus**, and therefore its resonant frequency to damp vibrations in airframes, is described in *Smart Materials and Structures* vol. 17, p. 7). The material is a reinforced carbon composite material reinforced with Kevlar fibers plus a carpet of hair-thin wires made from a shape-memory alloy (SMA) of nickel, titanium, and copper. Sending a current through the SMA wires heats them to their switching temperature of 65° C. Although only 7% of the composite is SMA, the stiffness can be changed by a factor of three, not only reducing vibration but likely reducing aircraft noise as well.

• The momentum and temperature dependence of **acoustic phonons in the elemental superconductors** lead and niobium, determined by resonant spin-echo spectroscopy with neutrons, still have puzzling features, according to a paper in the 14 March issue of *Science*. In both elements the superconducting energy gap extracted from these measurements was found to converge with sharp anomalies originating from so-called Kohn anomalies at low temperature. Experiments on the two different elemental superconductors demonstrate that the low-temperature limit of the superconducting energy gap coincides with low-lying Kohn anomalies in transverse acoustic phonons. Because both superconductors exhibit different lattice structures, phonon spectra, Fermi surfaces, and superconducting gaps, this coincidence cannot be accidental, it is argued.

• The fly *Ormia ochracea* can **pinpoint a sound source** far more accurately than a human even though its eardrums are much closer together according to a report in the 22 March issue of *New Scientist*. The secret is a chitin bridge that links the fly's eardrums. As one drum moves forwards the other moves backwards in a see-saw motion, amplifying tiny differences in the sound wave arriving at each eardrum. Now Miao Yu, an engineer at the University of Maryland, has created a prototype "fly mike" that can pinpoint a sound source accurately. The bridge in her microphone is a wafer of silicon dioxide. The prototype also has an air-filled cavity that helps to transmit sound waves from one diaphragm to the other. The device could be useful in hearing aids or in robotic vehicles.

• A letter to the editor in the 22 March issue of *New Scientist* comments on the **musical preferences of monkeys** (see "Acoustics in the News" in the Fall 2007 issue of *ECHOES*). The writer argues that just as teenagers dislike whatever music their parents like and people prefer the music that was in fashion when they were teens, monkeys might be expected to prefer the music they hear in their "formative" years. "We need to get groups of 'teenage' monkeys to listen to different styles of music, with father monkey coming in periodically to turn the volume down, to convince them that this is the 'in generation' sound. Ten years later test them to find out whether they still like the music they thus learned to enjoy."

• A **surface acoustic wave (SAW)** mass sensor plays a key role in a new method for storing hydrogen, according to a paper in *Physical Review Letters* **100**, 105505. Titanium-ethylene complexes have been found to store up to14 wt% of hydrogen. They are constructed by vaporizing Ti atoms in an ethylene atmosphere. The Ti atoms are thought to bond with the ethylene before being deposited on SAW mass sensors. Once the deposition is complete, excess ethylene is evacuated from the chamber and hydrogen is introduced. The amount of hydrogen is measured by noting the frequency shift in the SAW device.

Acoustics in the News

• A federal judge severely limited the Navy's ability to use mid-frequency sonar on a training range off the Southern California coast, according to a story in the 4 January *Washington Post*, ruling that the loud sounds would harm whales and other marine mammals if not tightly controlled. The court banned the use of the sonar within 12 nautical miles of the California coast, expanded from 1100 to 2200 yards the Navy's proposed "shut down" zone in which sonar must be turned off whenever a marine mammal is spotted, required monitoring for the presence of animals for one hour before exercises involving sonar begin, and required that two National Marine Fisheries Service-trained lookouts be posted for monitor during exercises. According to a story in the 11 January issue of *Science*, the federal judge visited the sonar-equipped USS *Milius* before issuing her ruling.

• The White House has exempted the Navy from two major environmental laws in an effort to free the service from a federal court's decision limiting the Navy's use of sonar in training exercises, according to a story in the 17 January *Washington Post*. While traveling in the Middle East, President Bush signed an exemption from provisions of the Coastal Zone Management Act, and the White House Council on Environmental Quality granted the Navy a waiver from the National Environmental Protection Act. According to a story in the 17 January issue of the *San Francisco Chronicle*, the action by itself won't allow the anti-submarine warfare training to go forward because an injunction is in place, but the Navy believes it will significantly strengthen its argument in court. An appeals court in San Francisco had been expected to make a determination about the future of the Navy's exercises off Southern California, but after the White House action, the appeals court remanded the issue back to the U.S. District Court in Los Angeles. The exemption drew swift criticism from environmentalists, needless to say.

• According to a story in the 5 February *Washington Post*, the White House went too far when it sought to limit the Navy's obligation under national environmental laws related to sonar training exercises off California, a federal judge ruled. District Judge Florence-Marie Cooper wrote that the Navy and the administration had improperly declared that an emergency would be created if they had to accept court-mandated steps to minimize risk to whales and other sea mammals. Because no real emergency exists, she said, the White House cannot override her decisions and those of the U.S. Court of Appeals.

• "Hurricanes make themselves heard, even under water. So why not use the sound to safely gauge how destructive a storm will be before it makes landfall?" ask hurricane scientists according to the 5 April issue of *New Scientist*. Hydrophone recordings made during hurricane Gert in 1999 showed that the frequency of the noise peaked twice, corresponding to the strong winds on either side of the storm's eye. Planting hydrophones in hurricane-prone regions would be cheaper and safer than using aircraft to gauge their intensity.

• A German law designed to prevent people from impersonating physicians and police officers has gotten some U.S.-educated scientist in hot water for unauthorized use of the title "Dr." according to a story in the 14 March issue of *Science*. In Germany, only those who receive their doctorates in the E.U. are allowed to use Dr., which is considered a legal part of a name. Maximum penalty is a year in jail. On March 6, authorities announced that holders of U. S. PhDs will now be allowed to use the title.

• Marine biologists are testing a plan to train fish to catch themselves, according to a story in the 26 March issue of the *San Francisco Examiner*. Fish would be trained to swim into a net when they hear a tone that signals feeding time. If it works, the system could eventually allow black sea bass to be released into the open ocean, where they would grow to market size, then swim into an underwater cage to be harvested when they hear the signal. Farmed fish might become better acclimated to the wild if they can be called back for food every few days.

• Concern is growing that silent hybrid cars are a hazard to 1.3 million blind Americans according to a story in the 30 March issue of the *Oakland Tribune*. Although Federal safety authorities say that no fatalities have been reported, several blind pedestrians have been struck by hybrid cars backing out of parking spaces. At least one Silicon Valley firm is said to be developing a warning device for backing hybrid cars. One problem is that warning sounds such as chimes or whistles are not associated with automobiles to the same degree as engine noises.

• The earliest audio recording ever made, according to a story in the 29 March issue of the *San Francisco Chronicle*, was a tracing on lampblack-covered paper that requires an optical reader to be heard. The recording of the French folk song "Au clair de la lune," created in 1860 by a French typesetter, Édouard-Léon Scott, was heard at a meeting of the Association for Recorded Sound Collections at Stanford University. The method used by physicists at the Lawrence Berkeley Laboratory for reading old recordings optically was described at the ASA meeting in New York (see http://www.acoustics.org/press/147th/haber.html) and summarized in the Fall 2004 issue of *ECHOES*.

• Wireless microphones, which have begun to appear in hundreds of Washington area classrooms, "might herald the most significant change in classroom technology since the computer," according to a story in the 31 March issue of *The Washington Post*. They are "designed to raise the volume and clarity of teachers' voices above the distracting buzz of competing noises—the hum of fluorescent lights, the rattle of air conditioning, the whispers of children and the reverberation of those sounds bouncing off concrete walls and uncarpeted floors." The audio systems "not only make it easier for teachers to speak and students to hear but also add excitement in classroom participation, teachers say." One teacher commented that the "only annoyance she has encountered is occasional static or a loud squeal when she is standing under a ceiling speaker. That just drives the kids crazy, but it is easy to overcome."

• The most promising therapies for tinnitus are based on discoveries in the past five years about brain activity of sufferers, according to a story in the 1 April issue of *The New York Times*.

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Acoustics in the News

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With brain-scanning equipment and functional magnetic resonance imaging, researchers have discovered that the brain areas responsible for interpreting sound and producing fearful emotions are exceptionally active in people who complain of tinnitus. "We've discovered that tinnitus is not so much ringing in the ears as ringing in the brain," commented one researcher. Tinnitus can be intense in people whose auditory nerves have been completely severed. In the absence of normal auditory stimulation, the brain is like a driver tying to tune in to a radio station that is out of range who turns up the volume but gets only static. Some sufferers have gained relief from a device that delivers broadband sound embedded in soothing music to mask the tinnitus. Others have found that drugs intended to treat alcoholism, epilepsy, Alzheimer's and depression have quieted tinnitus.

- The "audio spotlight" and its commercial applications is the subject of a story in the 19 February issue of the *San Francisco Chronicle*. In New York they have been used in talking billboards. In supermarkets they have been used to beam audio to customers in checkout lines. In museums they have been used to direct sound toward people standing in front of an exhibit or display without disturbing those around them. Directed sound devices, available from two different companies, use narrow beams of modulated ultrasound to distort air as it passes through, generating sound that people can hear along its length, the story explains. One of the inventors, Joseph Pompei, is quoted as saying, "The people who benefit most from the audio spotlight are the ones not hearing it."
- Mice can whistle and chirp like birds, and they usually do so during pleasant brain stimulation such as when having sex, according to a story in the 3 April issue of *Science Now*. When researchers let a male mouse into a female's cage, he approaches her with a series of whistle calls and during intercourse he makes more complex chirps. Females sing during social reunion with other females but only squeak uncomfortably during sex. Recordings of the mouse songs, pitch-shifted into human audible range, as well as sonograms are available at http://biology.plosjournals.org/perlserv/?request=get-document&doi=10.1371/journal.pbio.0030386.
- The speed of sound might have been quicker just after the big bang according to a story in the 5 April issue of *New Scientist*. If it were, it would provide an alternative solution to the "horizon problem:" No matter where you look in the universe, the background temperature is pretty much the same even though not enough time has elapsed since the big bang for radiation to zip across the universe exchanging temperature information. So far only cosmic inflation theories have offered an explanation for the horizon problem.

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Suite 1NO1
2 Huntington Quadrangle
Melville, New York 11747-4502

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