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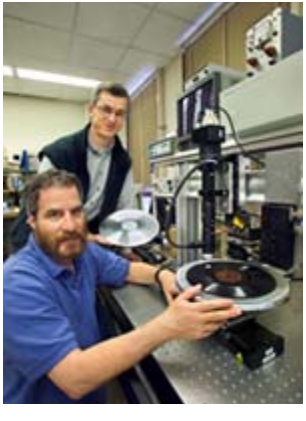
IMLS Press Contacts
202-653-4632
Jeannine Mjoseth, jmjoseth@imls.gov
Mamie Bittner, mbittner@imls.gov

Berkeley Lab Press Contact
510-486-4019
Dan Krotz, dakrotz@lbl.gov

3D Scanner May Save Vanishing Languages from Extinction

Washington, DC—Fragile field recordings of American Indian speech and song gathered in the early 1900s may be saved for future generations through breakthrough technology supported by the U.S. Institute of Museum and Library Services (IMLS). The Institute is funding the research and development of a 3D optical scanner through a $507,233 interagency agreement with the Department of Energy's Lawrence Berkeley National Laboratory (LBNL) announced Rep. Barbara Lee (D-CA) and IMLS Director Anne-Imelda Radice, Ph.D. Sept. 20.



Vitaliy Fadeyev (rear) and Carl Haber beside some of the

"This agreement underscores the federal commitment to making critical and irreplaceable collections held by

the Phoebe A. Hearst Museum of Anthropology – and thousands of museums, libraries, and archives around the country – available to the widest possible audience while and respecting the sensitive nature of the recordings," said Lee who represents Berkeley in the 9th Congressional District of California.

instrumentation at Berkeley Lab used in the optical scanning of cylinders and disc records. Click image for a larger view.

"The 2,700 wax cylinder recordings held by the Hearst museum are jewels in a treasure trove of early recordings that we hope will be rescued," Radice said. "Saving the delicate recordings, which literally may keep alive some of these Native American languages, fits squarely within the goals of IMLS's conservation initiative -- Connecting to Collections: A Call to Action." Nationwide, there are approximately 20,000 Native American fieldwork recordings on fragile wax cylinders, the earliest method of recording and reproducing sound.

Other rare recordings that would benefit from the technology include:

• Field recordings of linguistic, cultural, and anthropological materials, such as early 20th century Mexican-American folk recordings from Southern California and Hawaiian folk music recordings.

• Field recordings of American and European folk music, including those recorded and collected by John Lomax.

• Speeches of historical figures such as Thomas Edison, Theodore Roosevelt, William Jennings Bryan, Alfred Lord Tennyson, and P.T. Barnum.

The new 3D system builds on a 2D system also developed by the Berkeley Lab called IRENE (Image, Reconstruct, Erase Noise, Etc.), which gathers digital sound from grooved discs (flat recordings such as traditional 78 rpm shellac disc records) by illuminating the record surface with a narrow beam of light. The flat bottoms of the groove -- and the spaces between tracks -- appear white, while the sloped sides of the groove, scratches, and dirt appear black. The computer turns this information into a digital sound file and corrects areas where scratches, breaks or wear have made the groove wider or narrower than normal. IRENE then "plays" the file with a virtual needle without damaging or destroying the original media. The technology was adapted from methods used to build radiation detectors for high-energy physics experiments.

IMLS is funding the next stage of the project: development of the 3D imaging sound player that can read foil, wax, plastic cylinders (which preceded the development of flat records), plastic dictation belts, and discs. The 3D technology is required to read cylinders since the sound is held in vertical movements of the groove. The 3D device is based upon a type of confocal microscope. White light directed at the surface of a cylinder or disc passes through a special lens, creating a spectrum. Each color of the spectrum comes into focus at a different depth so the color of the reflected light reveals the height of the scanned point. A computer assembles these points into profiles for

each groove and translates the data into a sound file. The 3D scan would extract information based on 20-30 points – compared to IRENE's 2-4 points – also offering the possibility of higher quality sound files. Tinfoil and wax cylinders were developed in the late 1870s and 1880s, and cylinders remained in use until 1929, when commercial production for these music recordings ceased. However, cylinder technology continued to be used for dictation recordings for office use into the early 1950s.

"IRENE and its 3D offspring have the potential to recover great recorded sound collections in libraries, museums, and archives across the United States," said Carl Haber, a senior scientist in LBNL's Physics Division who developed the technology with fellow Physics Division scientist Vitaliy Fadeyev. "The project could revolutionize the preservation of early recordings because it will use digital imaging to recover sound from three-dimensional recordings without contact with the media."

IMLS is funding development of two 3D prototype machines: one will be evaluated at Berkeley, the other at the Library of Congress. Both systems could be available to the national community of museums and libraries. By the project's end, the path to reproduce the technology should be clear and the raw hardware costs should decrease significantly over time. The prototype's open design will enable improvements to the hardware and software as more experience is acquired.

In addition to potentially providing preservation-quality transfers of all mechanical formats, the project would provide a comprehensive assessment of the media's condition. The *Heritage Health Index*, a survey on the state of the nation's collections supported by IMLS, reported that American collections contain 46.4 million items of recorded sound, and 9.6 million (21 percent) are in grooved formats that could be affected by development of the prototype. A comprehensive assessment is needed because of the 9.6 million grooved carriers, 59 percent were in an unknown condition. With the new system, even cracked or scratched cylinders could be reproduced.

About the Institute of Museum and Library Services
The Institute of Museum and Library Services is the primary source of federal support for the nation's 122,000 libraries and 17,500 museums. The Institute's mission is to create strong libraries and museums that connect people to information and ideas. The Institute works at the national level and in coordination with state and local organizations to sustain heritage, culture, and knowledge; enhance learning and innovation; and support professional development. To learn more about the Institute, please visit www.imls.gov.

About the Berkeley National Laboratory
The Berkeley Lab is a U.S. Department of Energy national laboratory located in Berkeley, CA. It conducts unclassified scientific research and is managed by

the University of California. The Lab's website is at http://www.lbl.gov.

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