AIP Library Matters
News for Librarians
AIP Publishing Fall 2012

FROM THE DIRECTOR'S DESK

Calculating from Memory

By H. Frederick Dylla, Executive Director & CEO, AIP

From our customers' standpoint, AIP's value stems from our ability to deliver information—from highly specialized journal articles written for the scientific community, to lay-language communications about this new science crafted for the public. On a long flight home after attending a recent publishing conference in the UK, I was struck by the overlap of several related impressions from my trip. My thoughts kept returning to "digital memory."

The potential value of this new tool for scholarship was made evident during a discussion session at the Association of Learned and Professional Society Publishers/ALPSP (www.alpsp.org/ebusiness/aic2012prog.aspx) conference on the prospects for data mining across the present online text inventory of scholarly journals. For the last 15 years, we have all become nearly dependent on search engines like Google to find very basic information: directions, a good place to eat, answers to the Sunday morning crossword puzzle, and so forth. The instant information is satisfying! But what happens when you attempt to Google a serious scientific topic and find hundreds of leads? One of a scientific publisher's most important tasks is to more effectively filter this ever-growing online inventory. We work closely with the information technology and library communities to evolve this capability.

Currently, most scholarly publishers contribute standard bibliographic data to the CrossRef database, which allows a collection of some 50 million articles to be interlinked and cross referenced. One proposal discussed at ALPSP posited that if the publishers who participate in CrossRef allowed the standard bibliographic data (title, authors, abstract, and references) to be accessible to data-mining tools, we could significantly advance "smart" searching. Similarly, one could easily imagine the advantages of opening up full text files to such search algorithms, especially text that had already been enriched with machine-

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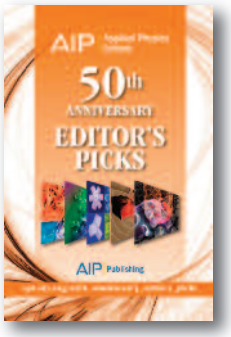
APL'S 50TH ANNIVERSARY EDITOR'S PICKS COLLECTION NOW AVAILABLE ONLINE

Applied Physics Letters (APL) turned 50 this year, and to celebrate the editor has highlighted some of the most recent influential papers published in APL. In January, APL released a collection (http://apl.aip.org/apl_50th_anniversary) of the 50 most highly cited papers ever published in the journal. But because newer papers did not have time to build up the number of citations necessary to make it into the top 50, APL's editor, Dr. Nghi Lam, has also selected an additional 50 notable articles, published from 2009 through 2012, to include in the Editor's Picks collection (http://apl.aip.org/50th_anniversary_editors_picks).

The collection, which was posted online in September, showcases ongoing innovative research activities and is representative of the broad cross section of topics that APL covers. The articles listed in this collection are freely available online until the end of September 2013. In an editorial written in honor of APL's golden anniversary, Lam writes, "As we celebrate the 50th anniversary of the journal, we look forward to many more years of cutting-edge research and technology, fascinating scientific discoveries, and innovative developments in scientific publishing. We believe that APL is well positioned to make an impact and to meet the needs of the applied physics community throughout the next 50 years and beyond."



This milestone will be commemorated at **APL's 50th Anniversary Celebration** on November 27 in conjunction with the MRS Fall Meeting. Chaired by David Long Price, *Applied Physics Letters*, invited talks on pioneering research and emerging topics in applied physics will be presented by the following distinguished speakers:

- Dr. Leigh T. Canham, *pSiMedica Ltd and University of Birmingham, UK*
- Prof. Federico Capasso, *Harvard University*
- Prof. Russell D. Dupuis, *Georgia Institute of Technology*
- Dr. Oleg Gang, *Brookhaven National Laboratory*
- Prof. William L. Johnson, *California Institute of Technology*
- Dr. Stuart S. P. Parkin, *IBM Almaden Research Center*
- Prof. Ching W. Tang, *University of Rochester*

readable tags for key information on methods, materials, and results of scientific experiments or simulations. To get there, we must first tackle numerous legal, security, and technical issues. But they are not insurmountable.

Take security, for example. Most scholarly publications still follow the subscription model, which limits full text mining to subscribing institutions. Publishers fear that opening up their full content for text mining would jeopardize their source of income required to maintain that content. Even if the text mining were done on the publisher's platform, there are questions of maintaining security over the platform's content. Both of these concerns might be addressed by having text mining authorized by certified tools on a third-party repository. In fact, CrossRef currently does this for the academic and publishing community with the operation of its CrossCheck service. CrossCheck ferrets out plagiarism by comparing suspected text in newly submitted articles with the full text content of the more than 50 million articles in the CrossRef database.

The prospects for enhancing discovery are enabled by the fact that almost all new publications are committed to digital memory in more than one place: the author's institution, the publisher's platform, and one of several digital archiving services. There has been significant effort expended in digitizing the back file of the pre-digital era. The cost of storing and retrieving this information has decreased faster than Moore's law—almost by a factor of 2 every year for the last decade. A modest-sized single hard drive can contain the entire CrossRef database (it requires about 5 terabytes—think of a 5,000 gigabyte jump drive). Cheap memory and computer power have enabled the fantastic power to enlighten through devices small enough to pick up.

The original Colossus computer, 1943. Using vacuum tube and punched-paper-tape technology, operatives decoded German military messages during World War II.

This artistic work created by the United Kingdom Government is in the public domain.

Five terabytes at our command—that was the first thread of my cross connect on digital memory. Two other historical events heightened my fascination with the power of cheap bits and bytes. I visited Bletchley Park just outside the city of Oxford. Bletchley Park was a sleepy old English estate in the late 1930s when the English government bought the manor house and surrounding land as a home for its code-breaking activities. Most of its fascinating history surrounded the successful cracking of the German Enigma codes during World War II. Bletchley Park was also home of the first digital computer, the first of 10 Colossus computers, built to automate the code-breaking process using a stored program algorithm developed by mathematician Alan Turing. Unfortunately, the original Colossus did not survive, but a faithful, working replica of the computer was built by dedicated amateurs who managed to find nearly all of the 70-year-old parts. This machine, with only 20 kilobytes of punched-paper-tape memory, saved thousands of lives in the last two years of the war.

A docent from Bletchy Park in front of the rebuilt Colossus.

Alan Turing's genius followed me across the Atlantic as I read George Dyson's recent account of Turing's legacy with John von Neumann at Princeton's Institute for Advanced Study. [The October 2012 issue of *Physics Today* contained a review of this book, *Turing's Cathedral*. (http://www.physicstoday.org/resource/1/phtoad/v65/i10/p56_s1?bypassSSO=1)] At Princeton, von Neumann constructed one of the first serious digital computers in the United States in 1953. This was a fateful year—with the first H-bomb blast at the Bikini Atoll and the publication of Watson and Crick's paper in *Nature* revealing that they had cracked the genetic code. Von Neumann's machine was important for both ventures: It was funded by the US military to perform the laborious calculations simulating thermonuclear blasts; it was also used by a Princeton biologist to simulate the evolution of life by the coding of proteins on DNA molecules. Dyson noted the strange juxtaposition of a single machine that was used to produce something that could both protect and destroy life. This machine had only 5 kilobytes of digital memory (using the persistence of phosphors on cathode ray tubes), and this single cache of memory represented a staggering 20% of the world's inventory of "fast" random access memory at the time. Just 20 kilobytes in Bletchley Park hastened the end of World War II; 5 kilobytes in Princeton helped keep the Cold War cold and launched a means of making biology and medicine quantitative.

What will scholars' unfettered access to 5 ***terabytes*** of stored information unleash?

AIP'S "WHAT DO PUBLISHERS DO?" WINS BEST STM PUBLISHER'S VIDEO AT FRANKFURT BOOK FAIR

October 20 marked the grand premiere of "What do Publishers do?" (http://www.stm-assoc.org/video-competition-results/), a 1940s-style spoof showing one researcher's quest to have her work published in a reputable AIP journal.

We invite you to view this entertaining, yet informative glimpse into the peer-review publishing process. The video was submitted to and won the STM Video Competition at the Frankfurt Book Fair.

AIP Congratulates the 2012 Nobel Laureates in Physics

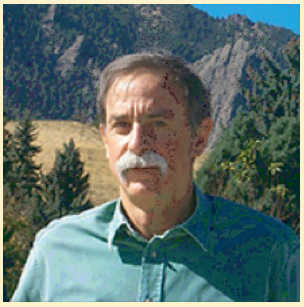
The 2012 Nobel Prize in Physics was awarded to Serge Haroche of Collège de France and Ecole Normale Supérieure in Paris, France, and David J. Wineland of the National Institute of Standards and Technology (NIST) and University of Colorado Boulder, Colo., USA "for groundbreaking experimental methods that enable measuring and manipulation of individual quantum systems."

Collège de France

Serge Haroche

In the quantum world, the general understanding is that to measure a single quantum particle will destroy that particle. These two researchers took different approaches to solve this unique quantum problem, and their efforts have resulted in direct observation of single quantum particles without destroying them.

Haroche's method required trapping photons—individual particles of light—and measuring their quantum properties by sending atoms through the trap. Wineland approached the problem from the other direction, trapping electrically charged atoms and measuring their properties with light particles. The results of their work have led to highly precise atomic clocks and provide a foundation that may one day make quantum computing a reality.



National Institute of Standards and Technology

David Wineland

"The works by Serge Haroche and David Wineland are among the most influential research endeavors of modern physics," commented John Haynes, Vice President, AIP Publishing. "Together they have provided new investigational tools for researchers and established a foundation to understand the relationships between matter and light at the smallest of scales. Quantum mechanics was once just theory and philosophy, but through this work and the ongoing research of others, we are now testing, manipulating, and building upon these scientific principles."

We have created the 2012 Physics Nobel Prize Resources (http://journals.aip.org/Nobel2012.html), to provide the physics community with background information, free access to every article that AIP has published by these Nobel Laureates, and much more!

Also visit Resources for the 2012 Nobel Prize in Chemistry (http://journals.aip.org/NobelChemistry2012.html)

AIP'S NIELS BOHR LIBRARY CELEBRATES ITS FIRST HALF CENTURY: 50 YEARS OF SHARING HISTORY

On the evening of September 26, 1962, an enthusiastic group met in AIP's building on 335 East 45th Street in Manhattan to hear the iconic physicist J. Robert Oppenheimer address the occasion of the dedication of AIP's Niels Bohr Library and its nascent historical efforts. Philanthropist and engineer Dannie N. Heineman generously provided the start-up funds. The attendees knew that something unique and valuable for the physical science community was in the making, but its importance to the community could not have been accurately predicted from its modest beginnings in 1962.

This September AIP held a half-century birthday party for the Center for History of Physics and what is now the Niels Bohr Library and Archives (NBL&A). The event was attended by more than 150 of the History Programs' supporters and researchers. By the party's end, it was clear to all that the promise of a unique and valuable resource for the community had been fulfilled. AIP's History Programs have joined the most valuable international resources for the history of physics and allied disciplines. AIP's collections house more than 18,000 book titles and hundreds of collections of manuscripts, about 1,500 oral interviews from many of the giants of the field in the 20th century, and more than 30,000 photographs. Many of the History Programs' pioneer research tools are now on the web, enhancing their value to historians, science writers, teachers and students everywhere. Our collections enable researchers to find information on neglected but important episodes in the history of science.

To find out more about the Niels Bohr Library and Archives we invite you to visit the event website (http://www.aip.org/history/events/anniversary) to listen to speakers' presentations and view the slideshow.

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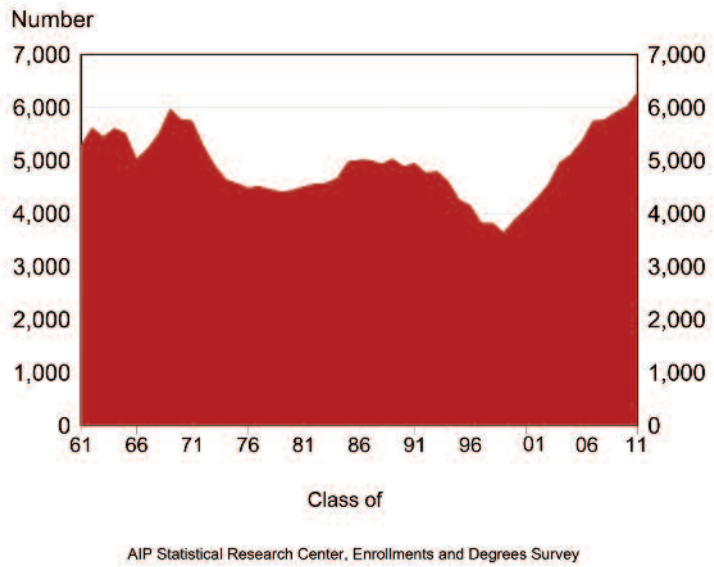
THREE ALL-TIME HIGHS FOR US PHYSICS AND ASTRONOMY DEPARTMENTS, REPORTS AIP STATISTICAL RESEARCH CENTER

The academic year 2010–11 produced more physics bachelor's and more physics PhDs than in any other year in US history—beating the record set just one year prior. The nearly 6,300 physics bachelor's degrees earned in the class of 2011 represent a 4.6% increase from the previous year and a 73% increase from a recent low in 1999. The almost 1,700 physics PhDs in the class of 2010 is up 8.3% from the previous year and 55% from a recent low seven years earlier.

Physics Bachelor's Produced in the US, 1961 through 2011



AIP Statistical Research Center, Enrollments and Degrees Survey

The academic year 2010–11 also produced more astronomy bachelor's than in any other time in US history. The just over 400 astronomy physics bachelor's degrees earned in the class of 2011 represent a 6.8% increase from the previous year and an increase of 102% from 11 years earlier.

The Statistical Research Center (SRC) has recently published two reports: Roster of Physics Departments with Enrollments and Degree Data, 2011 (www.aip.org/statistics/trends/reports/physrost.pdf) and Roster of Astronomy Departments with Enrollments and Degree Data, 2011 (www.aip.org/statistics/trends/reports/astrost.pdf). These reports provide a detailed, department-by-department listing of Fall 2011 enrollment and 2010–11 degree data for degree-granting physics and astronomy departments in the US. The data comes from an annual SRC survey of these departments.

AIP Statistical Research Center (www.aip.org/statistics) is your resource for relevant and reliable data on education and employment in physics, astronomy, and allied fields.

Other interesting reports:
Physics Doctorates Initial Employment (www.aip.org/statistics/trends/reports/phdinitial.pdf) July 2012

More than two-thirds of physics PhDs from the classes of 2009 and 2010 accepted a temporary position after earning their doctorate.

Physics Doctorates One Year Later (www.aip.org/statistics/trends/reports/phd1yrlater0910.pdf) July 2012
The proportion of new physics PhDs accepting a postdoc climbed in the aftermath of the recent recession.

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October is always an exciting month for the scientific community when the Nobel Prize winners are announced. In honor of this exciting time, we selected October to make AIP content freely available. We are proud to count many Nobel Laureates and their colleagues among our authors, editors, reviewers and readers, and we wish to celebrate all of the advancements that drive the physical sciences forward.

We encourage you to take full advantage of this free access offer! For more information and direct access to titles go to:
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2013 ALA Midwinter Meeting
January 25-29, 2013
Seattle, WA

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