

AKPA Newsletter

재미 한인 물리학자 협회

Volume 26, Number 3

August, 2005

1. [Letters to the Editor](#)
2. [10 Physics Questions for the Millennium](#)
3. [We Hear That](#)
4. [Audit Report](#)
5. [AKPA at 27: A Very Brief Capsule History](#)
6. [Websites of the Month](#)

The current and past AKPA news will be found in the AKPA website: <http://www.akpa.org/>. The website is temporarily down for an upgrade.

1. Letters to the Editor

[1] *James Delaney*

Institute for Defense Analyses, Washington, D.C.

It will come as no surprise to you that I am intrigued and encouraged by what the AKPA newsletter might do to encourage physicists and other scientists to take ownership from bureaucrats and politicians of public policy issues to include international security challenges. Such a trend could become a lightning rod to the best and the brightest of the younger generation to study and use science as a platform for improving the world.

[ED. At the Institute for Defense Analyses, Mr. Delaney specializes in homeland security science and technology cooperation with Japan. After having served in paramilitary operations during the Korean War (1950-53), he spent 20 plus years with US CIA in Korea, Japan, Taipei, Saigon, and Bangkok. During this period, he served as CIA station chief in Seoul and CIA station chief in Tokyo. He has long advocated the unrealized power of the international community of scientists to influence the nuclear policies of nations.]

[2] *Yanglai Cho*

18th President of AKPA (1996-97)

I like the new AKPA newsletters very much. Done in the PDF format, the newsletter really looks great. Keep up the good work and keep on trucking!

[ED. Dr. Yanglai Cho is currently working in Darmstadt, Germany, advising in the design and construction phase of an international anti-proton producing facility. More on this in the "We Hear That" section of this issue.]

2. 10 Physics Questions for the Millennium

[ED. The following article originally appeared in the August 15, 2000 issue of the New York Times.]

Ten Physics Questions to Ponder for a Millennium or Two

By George Johnson

The New York Times, August 15, 2000

One hundred years ago, with those inviting thoughts, the German mathematician David Hilbert opened his landmark address to the International Congress of Mathematicians in Paris, laying out 23 of the great unsolved problems of the day. "For the close of a great epoch," Hilbert declared, "not only invites us to look back into the past but also directs our thoughts to the unknown future."

With another century ending -- a whole millennium in fact -- the pressure is all the greater to tabulate human ignorance with lists of the most enticing cosmic mysteries.

In May, the Clay Mathematics Institute of Cambridge, Mass., emulated Hilbert, announcing (in Paris, for full effect) seven "Millennium Prize Problems," each with a bounty of \$1 million. The list is at: www.claymath.org/prize_problems/.

And last month physicists, with a typically lighter touch, ended a conference on superstring theory at the University of Michigan with a session called "Millennium Madness," choosing 10 of the most perplexing problems in their field. It was like a desert island game, involving some of science's smartest people.

"The way I thought about this challenge was to imagine what question I would ask if I woke up from a coma 100 years from now," said Dr. David Gross, a theoretical physicist at the University of California at Santa Barbara, as he unveiled the winners. He and the other judges made the selection, he noted, "in the middle and after this party in which we were sufficiently drunk."

After weeding out unanswerable questions (like "How do you get tenure?"), the judges came up with enough puzzles to occupy physicists for the next century or so. There are no monetary prizes, though solving any one of these would almost guarantee a trip to Stockholm.

1. Are all the (measurable) dimensionless parameters that characterize the physical universe calculable in principle or are some merely determined by historical or quantum mechanical accident and uncalculable? Einstein put it more crisply: did God have a choice in creating the universe?

Imagine the Old One sitting at his control console, preparing to set off the Big Bang. "How fast should I set the speed of light?" "How much charge should I give this little speck called an electron?" "What value should I give to Planck's constant, the parameter that determines the size of the tiny packets -- the quanta -- in which energy shall be parceled?" Was he randomly dashing off numbers to meet a deadline? Or do the values have to be what they are because of a deep, hidden logic?

2. How can quantum gravity help explain the origin of the universe?

Two of the great theories of modern physics are the standard model, which uses quantum mechanics to describe the subatomic particles and the forces they obey, and general relativity, the theory of gravity. Physicists have long hoped that merging the two into a “theory of everything” -- quantum gravity -- would yield a deeper understanding of the universe, including how it spontaneously popped into existence with the Big Bang. The leading candidate for this merger is superstring theory, or M theory, as the latest, souped-up version is called (with the M standing for “magic,” “mystery,” or “mother of all theories”).

3. What is the lifetime of the proton and how do we understand it?

It used to be considered gospel that protons, unlike, say, neutrons, live forever, never decaying into smaller pieces. Then in the 1970's, theorists realized that their candidates for a grand unified theory, merging all the forces except gravity, implied that protons must be unstable. Wait long enough and, very occasionally, one should break down.

4. Is nature supersymmetric, and if so, how is supersymmetry broken?

Many physicists believe that unifying all the forces, including gravity, into a single theory would require showing that two very different kinds of particles are actually intimately related, a phenomenon called supersymmetry.

5. Why does the universe appear to have one time and three space dimensions?

“Just because” is not considered an acceptable answer. And just because people can't imagine moving in extra directions, beyond up-and-down, left-and-right, and back-and-forth, doesn't mean that the universe had to be designed that way. According to superstring theory, in fact, there must be six more spatial dimensions, each one curled up too tiny to detect. If the theory is right, then why did only three of them unfurl, leaving us with this comparatively claustrophobic dominion?

6. Why does the cosmological constant have the value that it has? Is it zero and is it really constant?

Until recently cosmologists thought the universe was expanding at a steady clip. But recent observations indicate that the expansion may be getting faster and faster. This slight acceleration is described by a number called the cosmological constant. Whether the constant turns out to be zero, as earlier believed, or some very tiny number, physicists are at a loss to explain why.

7. What are the fundamental degrees of freedom of M-theory (the theory whose low-energy limit is eleven-dimensional supergravity and that subsumes the five consistent superstring theories) and does the theory describe nature?

For years, one big strike against superstring theory was that there were five versions. Which, if any, described the universe? The rivals have been recently reconciled into an overarching 11-dimensional framework called M theory, but only by introducing complications.

8. What is the resolution of the black hole information paradox?

According to quantum theory, information -- whether it describes the velocity of a particle or the precise manner in which ink marks or pixels are arranged on a document -- cannot disappear from the universe.

9. What physics explains the enormous disparity between the gravitational scale and the typical mass scale of the elementary particles? In other words, why is gravity so much weaker than the other forces, like electromagnetism?

A magnet can pick up a paper clip even though the gravity of the whole earth is pulling back on the other end.

10. Can we quantitatively understand quark and gluon confinement in quantum chromodynamics and the existence of a mass gap?

Quantum chromodynamics, or QCD, is the theory describing the strong nuclear force. Carried by gluons, it binds quarks into particles like protons and neutrons. According to the theory, the tiny subparticles are permanently confined. You can't pull a quark or a gluon from a proton because the strong force gets stronger with distance and snaps them right back inside. But physicists have yet to prove conclusively that quarks and gluons can never escape.

3. We Hear That

YOUNG-KEE KIM



Dr. Young-Kee Kim (b. 1962) received the Samsung Foundation's 2005 Ho Am Science Prize. She received her B.S. and M.S. (1984 and 1986) from Korea University and her doctorate in physics from the University of Rochester in 1990. Since 2003, she is a professor of physics at the University of Chicago and since 2004 she serves as a co-spokesperson for the CDF International Collaboration at the Fermi National Accelerator Laboratory, IL, USA. Her citation reads, in part:

Dr. Young-Kee Kim has made significant contributions to the understanding of fundamental particles and their interactions while playing a central role in the CDF Collaboration at Fermi National Accelerator Laboratory in the United States.

Dr. Kim has developed an analysis tool for distinguishing gluon and quark jets. She has also made important contributions to the discovery of top quarks and subsequent measurement of their masses. In particular, she has played a crucial role in estimating the mass of the Higgs particle through precision measurement of the top quark mass and weakly interacting W boson mass. In the standard theoretical model, the Higgs particle is widely believed to provide the key to the question of the origin of mass, but has not yet been discovered.

Dr. Kim, while leading the CDF Collaboration at Fermi National Accelerator Laboratory, is currently pouring her efforts into research in the area of Higgs particles. The international community has great expectations that Dr. Kim will continue to play a leading role in making new contributions to the field of physics.

YANGLAI CHO

The German federal government plans to build a 1 billion Euro nuclear physics facility in GSI, Darmstadt. The project is approved with a condition that 25% of 1 billion has to come from foreign sources to make it an international facility. The facility is called FAIR (Facility for Antiproton and Ion Research) to produce copious amount of antiprotons and radioactive ion beams.

Potential member states are all of western EU countries plus China, India, Russia and Hungary. These countries have signed an MOU to make an international treaty within two years. I have tried to encourage people from Seoul to become a member state with very little contributions, but no success. They would rather build their own machine than joining this kind of collaboration.

At present, the project is managed out of the Bonn government (not all moved to Berlin) by International Steering Committee (ISC) headed by a vice minister level person. The ISC is assisted by two working groups: Scientific and Technical Issues (STI) and Administration and Finance Issue (AFI). Then there is Technical Advisory Committee (TAC). TAC reports to the STI on all technical matters, cost and schedule for the project.

I chair the Technical Advisory Committee, and spend a lot of time to oversee design of accelerators and buildings as well as costing of these. The scope includes one lineac, two synchrotrons and six storage rings. A unique possibility is generating polarized antiprotons.

4. Audit Report

By Young Hoon Kim, Auditor of AKPA

June 28, 2005

The financial record of AKPA for the period of May 1, 2003 through April 30, 2005 has been audited.

Transaction summary:

Funds transferred from Dr. Kwang-Je Kim, 24 th President	\$4,015.77
Membership fees and donations received	<u>\$1,055.00</u>
Subtotal	\$5,070.77
Total expenses	<u>\$3,357.66</u>
Balance transferred to Prof. Ho Jung Paik, 26 th President	\$1,713.11



Fees and donations received from:

Taeil Bai, Dae-II Choi, William T. Chu,	
Seok Hwan Chung, Ki-Hyon Kim, Quiesup Kim,	
M. Howard Lee, Sungkwun Lyo, Ho Jung Paik,	
Jin-Joo Song, Yungkee Yeo	<u> </u>
Total from 11	\$1,055.00

Expense details:

Checkbook order	\$ 22.86
Website domain fee (2)	\$ 334.80
OYRA Awards (2)	\$2,000.00
Donations for APS dinner (2)	<u>\$1,000.00</u>
Total expenses	\$3,357.66

Based on the provided records, the account has been properly kept and the balance is accurate.

5. AKPA at 27: A Very Brief Capsule History

Year 1. 79-80: Tong Nyung Lee (b. 1927)

Retired from Pohang University; now lives in Los Angeles, CA

<http://sol.potech.ac.kr/prof/tnlee.html>

AKPA was launched in the spring, 1979. The inaugural dinner meeting was held at a banquet room at the Holiday Inn in Rosslyn, Virginia. It was during the annual Spring Meeting of APS-AAPT joint meeting, which in those days was one of the two largest APS meetings, the Winter Meeting in New York City and the Spring Meeting in Washington, DC. Dr. Tong Nyung Lee, then at the Naval Research Lab, was elected the first inaugural president. For more than a decade since 1979, AKPA meetings were held during the APS Spring Meeting in Woo Lai Oak restaurant in Crystal City, Virginia.

Year 2. 80-81: Ja Hyun Lee (b. 1925)

Retired from NASA

Year 3. 81-82: Yung Keun Lee (b. 1929)

Professor of Physics, Johns Hopkins University

<http://www.pha.jhu.edu/people/faculty/ykl.html>

Year 4. 82-83: Yoon-Soo Park (b. 1929)

Retired from the Office of Naval Research

Visiting Professor of Physics, Seoul National University

<http://www.phy.duke.edu/~myhan/ONR.html>

Year 5. 83-84: Won Yong Lee (b. 1930)

Retired from Columbia University

http://columbia-physics.net/faculty/leew_main.html

Year 6. 84-85: Ki-Hyon Kim (b. 1933)

Professor of Physics, North Carolina Central University

<http://ariel.acc.nccu.edu/artsci/physics/kim.htm>

Year 7. 85-86: Moo Young Han (b. 1934)

Professor of Physics, Duke University

<http://www.duke.edu/~myhan/introp.html>

Year 8. 86-87: William Tong-II Chu (b. 1934)

Participating Scientist, Lawrence Berkeley Lab (retired as Senior Scientist)

http://www.lbl.gov/lifesciences/labs/chu_lab.html

Year 9. 87-88: Kong Ki Min (b. 1931)

Retired from Rensselaer Polytechnic Institute

<http://www.rpi.edu/dept/phys/faculty/profiles/min.html>

Year 10. 88-89: Yeong Ell Kim (b. 1933)

Professor of Physics, Purdue University

<http://www.physics.purdue.edu/people/faculty/yekim.shtml>

<http://www.physics.purdue.edu/csst>

<http://www.2kcorporation.com>

Year 11. 89-90: Chung-Wook Kim (b. 1934)

Retired from Johns Hopkins University and Korea Institute of Advanced Studies

Now lives in Baltimore

http://www.kias.re.kr/en/programs/physics_mypage_home.jsp?empid=50001

Year 12. 90-91: Yong Wook Kim (b. 1938)

Professor of Physics, Lehigh University

<http://www.lehigh.edu/~ywk0/ywk0.html>

Year 13. 91-92: Suk Koo Yun (b. 1930 - d. 1994)

Deceased

Professor Suk Koo Yun, then at the Saginaw Valley State University, was the person to have translated the AKPA Bylaws into English. He also initiated the publication of the AKPA newsletter and the membership directory for the first time; it was published semi-annually in hard copies and mailed to all members. Professor Yun passed away in the early 1994 after a long illness. His legacy, as far as AKPA is concerned, is the genesis of the AKPA newsletters and the membership directory. The English version of the AKPA Bylaws has disappeared from the AKPA website some years ago.

Year 14. 92-93: Hyo Gun Kim (b. 1936)

Gwangju Institute of Science and Technology

Year 15. 93-94: Nowhan Kwak (b. 1928)

Retired from University of Kansas

<http://www.phy.duke.edu/~myhan/kwak.html>

Professor Nowhan Kwak launched the Outstanding Young Researcher Award (OYRA). The very first OYRA was awarded to Dr. Byungwoo Park, then at Georgia Tech, who is now a Professor at the College of Engineering [Materials Science] of Seoul National University. The first OYRA committee was chaired by Dr. Moo-Young Han.

Year 16. 94-95: Young Soo Oh (b. 1936)

Retired from Penn State

Professor Benedict Young Soo Oh started the first E-link activity of AKPA. The AKPA directory of today had been carefully nurtured by Professor Oh for several years.

Year 17. 95-96: Saeyoung Ahn (b. 1943)

Retired from NRL; Visiting Professor at Seoul National University

Year 18. 96-97: Yanglai Cho (b. 1932)

Retired from Argonne National Lab; Chair, Technical Advisory Committee for FAIR
(Facility for Antiproton and Ion Research), Darmstadt, Germany

Year 19. 97-98: Kyungsik Kang (b. 1936)

Professor of Physics, Brown University

<http://www.het.brown.edu/people/kang/>

Year 20. 98-99: Yung Kee Yeo (b. 1938)

Professor of Physics, Air Force Institute of Technology

<http://en.afit.edu/enp/Faculty/yeo/yeo.htm>

Year 21. 99-00: Jin Joo Song (b. 19??)

Adjunct Professor of ECE, UC San Diego

Year 22. 00-01: Zang-Hee Cho (b. 1936)

Professor of Radiological Science, UC Irvine

<http://www.ucihs.uci.edu/com/radiosci/>

Year 23. 01-02: Sungkwun Lyo (b. 1941)

Sandia National Lab

Year 24. 02-03: Kwangje Kim (b. 1944)

Professor of Physics, University of Chicago

<http://efi.uchicago.edu/Home Page of Kwang-Je Kim.htm>

Year 25-26*. 03-05: Quiesup Kim (b. 1939)

Retired from JPL

* Terms of Presidency extended from one to two years beginning from 2003.

Year 27-28. 05-07: Ho Jung Paik (b. 1944)

Professor of Physics, University of Maryland

<http://www.physics.umd.edu/GRE/>

Dues and Contributions

As of July 27, 2005

Running total: \$2,600.00

Largest: \$1,025, \$1,000, \$525

A complete list will be published
after October 31, 2005.

Current members: Please send your membership fee (\$25/year) and donation to Professor Eun-Suk Seo at the Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742.

New members: While our website is down, you can send your personal information (name, highest degree, field of specialization, current position, address, phone number, and email address), along with your membership fee and donation, to the above address.

6. Websites of the Month

1. Overseas Chinese Physics Association (OCPA)

The Overseas Chinese Physics Association was chartered in the State of New York in 1990. It covers all ethnic Chinese physicists all over the world outside China and Taiwan – North America, South America, Europe, Africa and Asia. Although OCPA came into being 11 years after AKPA, it is much larger organization and with more clout than AKPA, with several Nobel laureates.

OCPA initiated the OYRA Award in 1991 with the first award given out in 1992. Our own OYRA followed that of OCPA by two years.

OCPA's website is at www.ocpaweb.org

2. ITER Korea

A group called TFT (Task Force Team) has been formed in Korea to oversee the Korea's participation in the ITER program (International Thermonuclear Experimental Reactor) of nuclear fusion. Named ITER Korea, the program is new and distinct from KSTAR, the ongoing fusion research program. ITER Korea has its website at (for now it is in Korean only) www.iterkorea.org

Editor's Corner



“Ten Physics Questions to Ponder for a Millennium or Two” is truly a thought-provoking article. It is a humbling experience to come to terms with the fundamental ignorance on our part. As the article says, “There are no monetary prizes, though solving any one of these would almost guarantee a trip to Stockholm.” Well, here is your chance!! If any of you should have the inspiration to see a solution to any of the ten questions, be sure to let us know so we can announce it in the next issue of the AKPA newsletter! A few semi-permanent departments of the newsletter are emerging. They include: Letters to the Editor, We Hear That, Dues and Contributions, and Websites of the Month. We welcome all communications of import from all members, as well as any and all non-members who read this newsletter.

Moo-Young Han, Editor-in-Chief