Association of Korean Physicists in America

AKPA Newsletter

재미 한인 물리학자 협회

Volume 26, Number 13 June, 2006

The current and past AKPA newsletters are found in the AKPA website: http://www.akpa.org/.

1. Financial Report: May 2005-April 2006

Balance brought forward at the beginning of the fiscal year (5/1/2005):	$1,713.11
Total income:	$11,220.00
Subtotal:	$12,933.11
Total expenditure:	$6,722.89
Balance at the end of the fiscal year (4/30/2006):	$6,210.22

Details of the income and expenditure during the fiscal year are given below:

Name	Due	Contribution	Name	Due	Contribution	Expense Item	Expense
Saeyoung Ahn	$25	$200	Yoonseok Lee	$25	$75	SF lecture	$1,208.73
Taeil Bai	$25	$275	Sung Kwun Lyo	$25	$100	DC lecture	$1,359.60
William Chu	$25	$75	Ho Jung Paik	$25	$1,000	LA lecture	$1,592.82
Moo-Young Han	$25	$500	Byungwoo Park		$100	OYRA award	$1,500.00
Yung Huh	$25		Yoon Soo Park	$25	$200	OYRA expenses	$119.00
Namjung Hur	$25		Eun-Suk Seo	$25	$200	March Dinner	$500.00
Kyungsik Kang	$25	$300	Jin J. Song	$25	$500	(AKPA cont'n)	
Ki-Hyon Kim	$50	$250	Yung Kee Yeo	$25	$100	March Dinner	$400.00
Seong-Gon Kim	$25		Hoydoo You	$50		(Designated cont'n)	
Yeong E. Kim	$25	$100	Shun Y. Zinn	$25		Web registration	$34.99
Yong Jin Kim	$25		Collection in SF		$45	PayPal charges	$7.75
Yong W. Kim	$50	$1,000	SF Consulate		$400		
Nowhan Kwak	$25	$100	KUSCO		$5,000		
Do-Hyung Lee	$25						
Howard Lee	$25	$25	TOTAL INCOME	$675	$10,545	TOTAL EXPENSES	$6,722.89

Internal Audit Report

May 19, 2006

Association of Korean Physicists in America (AKPA)

Objective and Scope:

- This audit was conducted to examine and evaluate whether the organization exercises its financial and organizational processes adequately and effectively as required by the by-laws of the organization.
- We reviewed the following elements of the financial activity of the organization for fiscal year 2005-2006: accounting, reporting, purchasing, bank statements, copies of checks issued and received, and receipts.

Audit Opinion:

- Accounting is accurate and the organization maintains a healthy balance $6,210.22 as of April 30, 2006.
- All the records and receipts are well organized and preserved except one occasion for the APS March Meeting Dinner (see Corrective Action).

Suggestions for Improvements:

- For events involving a large number of people, the number of participants needs to be provided along with the receipts for the expenses.
- It is recommended to set up a budget as a guide for its fund-raising effort and projected expenditure.
- AKPA needs a plan to set up and maintain a rainy-day fund which is important for organization's sustainability.

Corrective Action:

- Receipts accounting the expenses for the APS March Meeting dinner in Baltimore, MD on March 15, 2006 are missing or in an inappropriate form, although all the expenses are justified. This event is an independent operation by some members of AKPA. However, all the records including receipts and the number of participants need to be provided to AKPA, since AKPA checks were issued to reimburse expenses for this event.

Auditor:

Yoonseok Lee
Department of Physics, University of Florida
yoonslee@phys.ufl.edu, 352-392-6689

Dues and Contributions:

Your continued support is important to be able to carry out AKPA's expanded activities. You can now pay your due ($25/year) or send your contribution *electronically*. Please go to www.akpa.org and follow the instruction there for electronic payment. Or you can mail your check to our Treasurer, Professor Eun-Suk Seo at IPST, University of Maryland, College Park, MD 20742.

2. Contest: AKPA's Logo

AKPA has not had its own logo, and it is a good time to come up with one. At this point, we would like to open a CONTEST, open to all those who receive our monthly newsletters.

Logo design:	**Must reflect Korean roots, represent physics and perhaps the universe. A compact and powerful design commensurable with the standings of our profession.**
Submission:	**Submit your design in JPEG to hpaik@umd.edu and myhan@phy.duke.edu by July 31, 2006. (The deadline has been extended from the original, May 31.)**
Selection:	**The selection will be made by five judges comprising of AKPA's President, Vice-President, and three Secretaries (General, Publicity & Editorial, E-link & Web).**
Award:	**The final selected design will be awarded a cash prize of $200.**

3. Amendment of the Bylaws

The need to make an amendment of AKPA's Bylaws in several areas was discussed at the General Meeting held on March 15, 2006 in Baltimore. A motion to make the following amendment was adopted by the members who attended the Meeting.

All members of AKPA: Please go to www.akpa.org, log in as a member, and cast your vote for this amendment by June 15, 2006. To be eligible to vote, you need to have paid your due at least once in the past two years.

1. Committee terms and appointment

According to Articles 19, 20, and 21, the members of the Award, Editorial, and E-link Committees serve *three-year* staggering terms while the elected officers (the President and the Auditor) serve *two-year* terms according to Article 10. To bring the terms of the committee members into phase with the two-year term of the President, we move to change the terms of the committee members to *four years*, with half of them appointed every two years by the President.

It has been difficult to find *six* active committee members for the Award, Editorial, and E-link Committees. Therefore, we move to reduce the membership of these committees to *four* each.

2. Category of membership and membership fees

According to Article 6, there are three kinds of membership: regular, associate (student), and corporate/honorary members. Presently, the dues are $25/year for regular members, $5/year for student members, and one-time contribution of $100 or more for supporting members. AKPA currently has only 24 regular members who have paid their dues. To increase the membership, we move to implement a *lifetime membership* option for regular members with a fee of $300. We also move to raise the eligibility of corporate/honorary members to a one-time contribution of $300 or more.

3. Making motion to amend the Bylaws

According to Chapter 7 of the Bylaws, a motion to amend the Bylaws requires the signatures of *twenty or more* regular members. This is very impractical when the total due-paying members are just over 20 as at present. We also feel that the President, as the elected officer, should be able to move to amend the Bylaws by getting it approved at the General Meeting. Therefore, we move to amend the number of signatures required to move an amendment of the Bylaws to *ten or more* and to make a provision for *the President* to make the motion *through the General Meeting*.

4. Calling for a special meeting

According to Article 25, calling for a special meeting requires the signatures of *twenty or more* regular members. This is impractical for the same reason as above. So we move to reduce the number of required signatures to *ten or more*.

If you have trouble with e-voting, you can email your vote to hpaik@umd.edu or snail mail it to Prof. Ho Jung Paik, Dept. of Physics, University of Maryland, College Park, MD 20742. (For your convenience, a cut-away ballot form is shown at the very end of this newsletter.)

4. Physics Today on Robert Laughlin

Korea sends Laughlin packing

Dr. Toni Feder, an Editor of PHYSICS TODAY

Robert Laughlin's stint as president of the Korea Advanced Institute of Science and Technology in Daejeon, South Korea, comes to an end next month. The Ministry of Science and Technology decided in April not to renew his two-year contract after some 90% of KAIST professors gave him a vote of no-confidence and nearly all deans and department chairs quit their administrative posts to protest his continuing in the job.

In naming the physics Nobel laureate president in 2004, the ministry apparently hoped to raise the international visibility and stature of KAIST. As a foreigner, Laughlin was at an advantage for introducing change, says KAIST vice president Sang Soo Kim.

Some of Laughlin's ideas were good, Kim says. "But he failed to build mutual trust between him and the professors." Also working against Laughlin, Kim adds, "were his lack of experience running a university and his confrontational style of management."

Others on the KAIST faculty are harsher in their criticism of Laughlin. "Professors are disappointed in him because of his lack of vision and lack of passion for KAIST," says Yong Hee Lee, chair of the physics department. "Also, in other places, he said KAIST is not up to par. As a president he was degrading his own institution."

For his part, Laughlin insists that the clash at KAIST was cultural and political and that his "personality and policies had nothing to do with it." To start with, he says, "I was hired by the ministry. I have legitimacy from the government, but no legitimacy from the troops." And he adds, "I got orders from the ministry not to build up mutual trust with the professors. I got orders from them to do stuff the professors would not accept."

Among his achievements at KAIST, Laughlin counts a $20 million a year hike in the institute's budget and, most important, he "managed to put the reform agenda in writing and get it into the public eye. That's 90% of the battle. Now the monkey is on the back of whoever takes the reins." The reform will include tying salaries to merit.

The faculty rebellion against Laughlin has brought unwanted attention to Korean science, which already had its tail between its legs in the wake of Hwang Woo Suk's fraudulent claims of cloning. Duke University physicist Moo Young Han, editor of the online newsletter *Korean–American Science and Technology News,* calls both affairs symptoms of "Nobel disease"—referring to the immense pressure in Korea to land a Nobel science prize. Laughlin's tenure at KAIST, Han adds, "was destined for failure, albeit not as spectacularly as happened."

In July, Laughlin heads back to Stanford University, where he plans to teach, research, and write "anything that brings income."

5. Obituary: Dr. Kyungsik Kang

Professor Kyungsik Kang, Professor Emeritus at Brown University, passed away on May 8, 2006 at Rhode Island Hospital after a long battle with lung disease. He was 69 years old. Born in Jochiwon, South Korea, on July 12, 1936, he was a son of the late Taeeui and Seokbun (Shin) Kang. He was the beloved husband of Hai-Lanne (Hahm) Kang.

Dr. Kang was a Professor of Physics at Brown University for 41 years, retiring in 2005. He graduated from Seoul National University in the class of 1959 where he received the SNU President's Award (Gold Medal), and received his PhD from Indiana University in 1964 and joined the faculty of Brown University immediately thereafter. He was a fellow of the American Physical Society, the Korea Academy of Science and Technology, the Korean Association for the Advancement of Sciences, and the Korean Physical Society. He had served as president of the Seoul National University Alumni Association in New England and the National Association of Korean Schools. He served on the board of directors for the R.I. Korean American Association, the Korea-U.S. Science Cooperation Center and was a council member of the Advisory Council for Democratic and Peaceful Re-Unification of Korea. Prof. Kang was awarded the Camelia Medal (Legion of Honor) from the Government of Korea, an Official Citation from the State of Rhode Island, and the Honorary Citizenship Award (as an Exceptional Overseas Korean) from the Metropolitan Government of Seoul, Korea.

He is survived by three sons, Peter Heeseok Kang of San Carlos, CA, Michael Heejin Kang of Los Angeles, CA, and David Heesung Kang of Providence; a daughter-in-law Eunjoo Kang of San Carlos, CA, two brothers Kwangsik Kang of Seoul, Korea and Paul Mansik Kang of Vienna, VA; a sister-in-law Sue Suhyoung Kang of Vienna, VA; and two grandsons, James Hyun-Gyu Kang and Lucas Jin-Gyu Kang.

His funeral was held Friday, May 12, 2006, at 10 a.m. in Zion Korean United Methodist Church, Kilvert Street in Warwick. Burial followed in Swan Point Cemetery, Providence.

Professor Kang is a founding member of the Korean-American Scientists and Engineers Association (KSEA) and served as the 11th President (1982-83). He also served as the 19th President of AKPA (1997-98) and as the current chair of the Outstanding Young Researcher Award committee. Widely known for his contributions not only to professional scientists and engineers but also to the well-being of the Korean-American communities at large, his passing is a great loss to all Korean-Americans.

A short report of the funeral service for Prof. Kyungsik Kang

By Professor Yong W. Kim, 12th President of AKPA (1990-1991)

I cut short by a day from an international conference I was attending in Williamsburg, Virginia, to attend the funeral service for Professor Kyungsik Kang in Providence, Rhode Island. It was a grueling drive all day, but my wife and I were able to attend the funeral service and burial in Providence in the next morning, May 12. We also spent some time with Mrs. Kang and her three surviving sons, Peter, Michael and David. I gave a eulogy representing the AKPA.

The funeral was well attended. There were four representatives from the KSEA and several of Brown University colleagues in particle physics theory; my wife and I were Korean-American physicists from the AKPA. The great majority was composed of long time friends in the Providence area.

The funeral was held in Zion Korean United Methodist Church. A Korean minister friend of Kyungsik Kang was the first to give a eulogy focused on Professor Kang's church-related activities and a year spent at Ewha Womans University (See the editor's note below), both in English and in Korean. Herbert Fried of Brown's particle physics theory group followed the minister, touching on Kyungsik's physics and faculty life at Brown. Following Fried, I talked about his beginning as a physicist, his interest in physics and physicists and the roles he played as a Korean-American physicist. Peter Kang then gave remembrance of his father regarding his father's upbringing and life as seen by him and his brothers. There was a reception at the Brown University faculty club after the burial.

I walked away with a feeling that the surviving family will manage well, and that Professor Kang's personal successes as well as his service to the KSEA, AKPA, universities in Korea and the Korean community in the U.S. will rise up to the consciousness of his friends and colleagues over the years to come.

[Editor's note: "Ewha Womans University" is the official name of the university and despite its wrong grammar, it is not a misspelling either by Professor Kim or by the AKPA editor. Although the name of the university may seem to contain two grammatical errors, the term woman's university is consistent with late 19th and early 20th century usage of American English, and was considered perfectly correct at the time the school was named. However, the absence of an apostrophe in the school's name is a grammatical error. Nevertheless, Ewha Womans University insists on using the original, wrong name.]

6. We Hear That

Dr. Dae-Il (Dale) Choi, Research Scientist II at the NASA Goddard Space Flight Center, will be visiting KISTI (Korea Institute of Science and Technology Information) supported by Brainpool fellowships administered by KOFST. He will be spending a year from October 16, 2006 to October 15, 2007 to work on the project titled "Investigations on Numerical Relativity for the Detection of Gravitational Waves in the National e-Science Project." Dr. Choi serves as a member of AKPA's Publicity and Editorial committee.

Numerical (analysis of general) Relativity (NR) is fairly new area to Korean physics community. Its main goals include simulations of binary black hole coalescence and calculations of gravitational waveforms that results. In North America, there have been amazing advances in the BBH (binary black hole) simulations recently. They provide crucial information for the gravitational detection efforts by gravitational-wave detectors such as LIGO and LISA.

But more theoretically oriented subjects (most famous example being critical phenomena in gravitational collapse discovered using numerical relativity in 93 --- work by Matt Choptuik now at UBC) are potential areas of research interests. Another example would be simulations of black string that recently received some attention by numerical relativists.

KISTI is acquiring 4th generation supercomputer (their goal is make it to top 4 in top 500 supercomputer life) and NR will be one of the major application areas for the new machine. Dr. Choi will be helping to establish research efforts in NR in Korea and put them on the right tract in this exciting area.

7. Fusion Power: Will It Ever Come?

Fusion Power: Will It Ever Come?

Prospects for practical application of fusion power to solve our energy problems appear dubious on engineering grounds.

By William E. Parkins

Science, March 10, 2006

In the early 1950s, the hydrogen bomb wakened public awareness to the explosive power of nuclear fusion and launched hope in the physics community to use fusion as a power source. Fission made the trip to utility reasonably quickly, and now, 14% of the world's electricity is produced in that way. But although practical, controlled energy release from fission followed the discovery of that process by only 3 years, fusion power is still a dream-in-waiting. The explanation has more to do with engineering than with physics.

Two achievements are essential to produce electricity from a primary fuel: attaining the temperature needed to convert the source into heat and extracting the heat from the reacting region. In a nuclear fission reactor, uranium-235 can undergo the chain reaction with neutrons of ordinary temperature, and heat can be extracted directly by coolant circulated through the reactor. The scheme is compact, and it is cheap enough to compete with combustion plants.

There is no shortage of pairs of isotopes of light elements that can be made to fuse, but a potential energy barrier must be exceeded by the energy of collision. The combination requiring the least energy is D-T (deuterium-tritium). It requires a stable, long-lived plasma of reasonably high density with a temperature of about 100,000,000 K, but many efforts have failed to reach these conditions for a net power-producing plasma. The other plausible candidate (D-D) requires a temperature five times as high with no feasible means of heat removal.

Heat removal is troublesome even with the D-T reaction. A large amount of energy (17.4 MeV) is released from each fusion. Although 14 MeV is carried away by a neutron—to be slowed and absorbed in a blanket containing lithium and thus "breed" more tritium—the energy released will make everything radioactive out to the radiation shield beyond the blanket. Worse, the material of the reactor vessel will undergo radiation damage, which alters its physical properties. Any material used for the reactor vacuum vessel will become increasingly brittle. Back in the 1970s, design studies indicated that the vessel would need periodic replacement *(1–3)*.

Another operational problem entails maintenance of vacuum integrity. The reactor vessel will have to approach as much as 20 m in its major dimension and would need many connections to heat transfer and auxiliary systems. It must operate at very high temperatures and undergo stresses from thermal cycling. Vacuum leaks would be inevitable and problem-solving would require remotely controlled equipment *(4)*.

During the 1970s, projects in the United States, the United Kingdom, and Japan worked on conceptual full-scale fusion plant designs. Cost for the UWMAK-III design from the University of Wisconsin was estimated by the Bechtel Corporation to be between four and six times those of coal-fueled and nuclear plants of the period *(5, 6)*.

Although the importance of reducing reactor dimensions was well recognized, recent work has focused on trying to achieve the necessary conditions in the plasma. In 1991, a team in California designed a plant with an output of 1000 megawatt-electric (MWe), comparable to modern nuclear power stations. The result, ARIES-I, was based partly on technologies yet to be developed *(7)*. The reactor vessel was 17 m in its major dimension, fabricated from a silicon carbide composite. It operated at 650°C and benefited from an imagined average heat transfer rate of 1.2 MW/m^2—six times the design rate for reactors that use helium coolants and twice that of pressurized water reactors.

Finally, the construction cost for any future fusion plant can be estimated by examining the blanket-shield component. Its area equals that of the vessel, so that its thickness is determined simply by choosing an average heat transfer rate. A 1000-MWe plant requires a thermal power of about 3000 MW, 20% of which must be absorbed by the vessel wall. If we assume an average heat transfer rate of 0.3 MW/m^2, the vessel wall and blanket-shield each must have an area of 2000 m^2. To absorb the 14-MeV neutrons and to shield against the radiation produced requires a blanket-shield thickness of ~1.7 m of expensive materials. This is a volume of 3400 m^3, which, at an average density of about 3 g/cm^3, would weigh 10,000 metric tons. A conservative cost would be ~$180/kg, for a total blanket-shield cost of $1.8 billion. This amounts to $1,800/kWe of rated capacity—more than nuclear fission reactor plants cost today *(8)*. This does not include the vacuum vessel, magnetic field windings with their associated cryogenic system, and other systems for vacuum pumping, plasma heating, fueling, "ash" removal, and hydrogen isotope separation. Helium compressors, primary heat exchangers, and power conversion components would have to be housed outside of the steel containment building— to prevent escape of radioactive tritium in the event of an accident. It will be at least twice the diameter of those common in nuclear plants because of the size of the fusion reactor.

Scaling of the construction costs from the Bechtel estimates suggests a total plant cost on the order of $15 billion, or $15,000/kWe of plant rating. At a plant factor of 0.8 and total annual charges of 17% against the capital investment, these capital charges alone would contribute 36 cents to the cost of generating each kilowatt hour. This is far outside the competitive price range.

The history of this dream is as expensive as it is discouraging. Over the past half century, fusion appropriations in the U.S. federal budget alone have run at about a quarter billion dollars a year. Lobbying by some members of the physics community has resulted in a concentration of work at a few major projects—the Tokamak Fusion Test Reactor at Princeton, the National Ignition Facility (NIF) at Lawrence Livermore National Laboratory, and the International Thermonuclear Experimental Reactor (ITER), the multinational facility now scheduled to be constructed in France after prolonged negotiation. NIF is years behind schedule and greatly over budget; it has poor political prospects, and the requirement for waiting between laser shots makes it a doubtful source for reliable power. ITER was born in 1987, but no dirt has been dug, and U.S. membership is temporarily in moratorium.

New physics knowledge will emerge from this work. But its appeal to the U.S. Congress and the public has been based largely on its potential as a carbon-sparing technology. Even if a practical means of generating a sustained, net power-producing fusion reaction were found, prospects of excessive plant cost per unit of electric output, requirement for reactor vessel replacement, and need for remote maintenance for ensuring vessel vacuum integrity lie ahead. What executive would invest in a fusion power plant if faced with any one of these obstacles? It's time to sell fusion for physics, not power.

1. W. D. Metz, *Science* 192, 1320 (1976).
2. W. D. Metz, *Science* 193, 38 (1976).
3. W. D. Metz, *Science* 193, 307 (1976).
4. W. E. Parkins *et al. Phys. Today* 1997, 15 (March 1997).
5. B. Badger *et al.,* Report UWFDM-150 (Fusion Technology Institute, University of Wisconsin, Madison, 1975).

6. W. E. Parkins, *Science* 199, 1403 (1978).
7. F. Najmabadi *et al.,* Report UCLA-PPG-1323 (University of California at Los Angeles, 1991).
8. J. A. Lake *et al., Sci. Am.* 2002, 73 (January 2002).

8. OYRA Recipients Series

In the past eight issues we featured the first eight winners of the Outstanding Young Researcher Award, from 1994 to 2001. Recent winners from 2002 have not had time to develop and settle their careers yet and we felt it might be better to pause the series at this point and restart it in a few years. (Editor-in-Chief)

AKPA Newsletter is published monthly online by the Association of Korean Physicists in America.
Publisher: Professor Ho Jung Paik, President
Editor: Professor Moo-Young Han, Editor-in-Chief

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E-Vote Ballot Form

Name:_____ Signature: _____

1. Motion to bring the committee terms to four years and to reduce the Award, Editorial, and E-link Committees to four members each.
   ( ) Agree ( ) Disagree
2. Motion to implement a lifetime membership with a fee of $300 and to increase the corporate/honorary membership fee to $300.
   ( ) Agree ( ) Disagree
3. Motion to change the number of members to move a Bylaw amendment from 20 to 10 and to allow the President to move an amendment through the General Meeting.
   ( ) Agree ( ) Disagree
4. Motion to change the number of members to call for a special meeting from 20 to 10.
   ( ) Agree ( ) Disagree

Optional: Dues and/or contributions for 2006-2007 Amount: _____

Copy, paste, and email to hpaik@umd.edu, or cut out and mail to Prof. Ho Jung Paik, Department of Physics, University of Maryland, College Park, MD 20742.
