The Abdus Salam
International Centre for Theoretical Physics

United Nations Educational, Scientific and Cultural Organization

IAEA International Atomic Energy Agency

NEWS from ICTP

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#119

APR seeks to increase interaction between African physicists and the global physics community.

ICTP Launches Physics Journal for Africa

As part of ICTP's larger effort to build scientific capacity in Africa and to promote international scientific exchange, the Centre has launched *The African Physical Review (APR)*, an on-line peer-reviewed international journal featuring articles in all branches of theoretical and experimental physics. In addition to high-quality research articles, the journal will include "literature reviews" and "brief communications" on a broad range of topics of interest to the physics community. *APR* is being cosponsored by the African Academy of Sciences in Nairobi, Kenya.

"*APR*," says ICTP director, K.R. Sreenivasan, "will publish articles by physicists not only from Africa but from around the world." A unique feature of the journal will be the publication of invited articles on the growing interdisciplinary nature of physics research. There will also be special editions dedicated to a single topic and sections devoted to conference proceedings, particularly conferences that take place in Africa. "The goal," notes Sreenivasan, "is to create a first-class journal of value to African physicists and physicists worldwide."

An internationally renowned board of editors, representing more than 15 countries and including Nobel Laureate Sir Anthony Leggett, has been formed. K. Tahir Shah, who has been a frequent visiting/guest scientist at ICTP since 1965, and a former professor of theoretical computer science at Trieste University, will serve as the journal's managing editor. Zohra Ben Lakhdar (see "Profile", *News from ICTP*, Winter 2005-2006), director of the Laboratory of Atomic-Molecular Spectroscopy and Applications at the University of Tunis and winner of the prestigious L'Oréal-UNESCO Award for Women in Science in 2005, has been appointed editor. Associate editors include: A.I. Arbab (see "Profile", *News from ICTP*, Summer 2001), Comboni College for Computer Science, Khartoum, Sudan; M.A. Bouchene, *Université Paul Sabatier*, Toulouse, France; M. Chergui, *Ecole Polytechnique Fédérale (EPF),* Lausanne, Switzerland; and M.E. Elzain and H.M. Widatallah, Sultan Qaboos University, Oman.

"Two major factors led ICTP to sponsor this journal," says Shah. "First, low-cost and easily accessible electronic publishing is rapidly replacing traditional high-cost print journal publishing. This trend is altering the entire field of peer-reviewed scientific publishing, removing the stigma of inferior quality from electronic publications. And, second, poor nations do not subscribe to conventional print publications simply because they are too expensive. Limited access to the most recent publications have put scientists in Africa and other developing countries at a distinct disadvantage, especially in the many fields of physics where new information and discoveries are taking place at an unprecedented pace. *APS* is designed to address this problem."

"A vast majority of physicists in Africa," says Sreenivasan, "have had some affiliation with ICTP—a fact that was noted a few years ago in an article published in *Physics Today* (January 2004). *APR* not only reflects the Centre's ongoing commitment to the African physics community but also represents an effort to create new and innovative channels for fostering both greater interaction and integration between African physicists and their colleagues from around the world."

APR is now accepting submissions for its first issue that is scheduled to be published later this year. Scientists interested in submitting manuscripts should browse the website at www.aphysrev.org or email K. Tahir Shah at shah@ictp.it.□

COMMENTARY

Filippo Giorgi, head of ICTP's Earth System Physics section, examines the potential impact of climate change on the Mediterranean.

Mediterranean: Hotbed of Climate Change

On 2 February, the Intergovernmental Panel on Climate Change (IPCC), the world's most authoritative source of information on this critical global issue, released a "summary for policy makers," the first of a series of publications associated with the panel's *Fourth Assessment Report*. Filippo Giorgi, head of ICTP's Earth Physics section and one of three vice chairs of IPCC's working group 1 (focusing on the scientific aspects of the climate system and climate change), was among those participating in the event, held at the headquarters of the United Nations Educational, Scientific and Cultural Organization (UNESCO) in Paris.

The IPCC assessment report is the result of six years of work by hundreds of scientists from around the world. More than 90 per cent of all climate scientists now firmly believe that human activities are causing significant changes in the Earth's climate. The work by IPCC provides discernable evidence in support of this consensus.

Giorgi, a pioneer in regional climate modeling, has recently turned his attention to examining climate change projections in the Mediterranean. His goal is to estimate the possible effects of global climate change in this century due to increased concentrations of greenhouse gases, mainly carbon dioxide and methane.

"Our regional model simulations," says Giorgi, "indicate that by the end of the 21st century the entire Mediterranean region may undergo a substantial extension of dry and arid lands." Such trends are likely to be particularly noticeable in the central and southern portions of the Iberian, Italian, Hellenic and Turkish peninsulas, southeastern Europe (Romania and Bulgaria), the Middle East, northern Africa and on the islands of Corsica, Sardinia and Sicily.

Giorgi says the models show that the "average temperatures and precipitation levels will decrease substantially, especially during spring and summer. The region's mountainous topography and large, jagged coastlines, moreover, will likely amplify the trend towards greater aridity." For these reasons, Giorgi identifies the southern Mediterranean as a region especially vulnerable to water stress and desertification spurred by conditions caused by climate change.

Giorgi and an international team of researchers previously pointed to the Mediterranean's vulnerability to climate change in an article published in the international peer-reviewed journal, *Geophysical Research Letters*, in April 2006. In the article, the authors say that the Mediterranean would likely be among the regions most affected by year-to-year changes in precipitation and temperature due to global climate change.

Filippo Giorgi

"The Mediterranean," Giorgi observes, "lies in a transition zone between northern Africa's arid climate and central Europe's temperate and wet climate." As a result—Giorgi concludes in a paper not yet published—even minor shifts in climatic conditions could have large impacts on the climatic regime of different Mediterranean areas. In particular, spring and summer warming and drying will likely extend northward across the region. Furthermore, the complex coastline topography that marks the Mediterranean will likely modulate climate change signals from place to place. Consequently, shifts in climatic regimes "may display substantial fine-scale variability," according to Giorgi.

Such climatic changes will have a dramatic impact on the millions of people living on the Mediterranean coastal region, especially in southern Europe and northern Africa. "We found that fine-scale physiographic effects, surface moisture feedbacks, and horizontal moisture gradients intensify heat stress in coastal areas," notes Giorgi. "And because many of the region's population centres are also located in these areas, the impact of global warming on human health, energy demand, and biodiversity may be keenly felt by large portions of population, including people living in Trieste, the home of ICTP."

Giorgi concludes that only "a dramatic decrease in greenhouse gas emissions, taking place on a global scale, can reduce the risk of increased heat stress and aridity in the Mediterranean region."□

Can physicists become entrepreneurs? An ICTP workshop shows how.

Profiting from Physics

Can physicists also be entrepreneurs? What additional skills are required to fulfil this unusual marriage of scientific insight and investment savvy? And how can enterprising physicists in developing countries fully participate in efforts to utilize their difficult-to-acquire knowledge and expertise not only for personal financial gain but also to advance sustainable economic growth? After all, their colleagues in developed countries have largely dominated such efforts, which began in earnest some two decades ago in the United States.

These were some of the key questions posed at an ICTP-hosted Workshop on Economic Development for Physicists from Developing Countries held at the Centre from 27 November to 1 December. The workshop, which drew more than 70 participants from around the world, including 45 from developing countries and countries with economies in transition, was organized in collaboration with the Institute of Physics, the International Union of Pure and Applied Physics, and the European Physical Society.

Workshop on Economic Development for Physicists from Developing Countries

"This week-long event was a follow-up activity to the World Conference on Physics and Sustainable Development (WCPSD), held in Durban, South Africa, in autumn 2005," says Peter Melville, president and institutional director of the Institute of Physics. "One of the major themes of the Durban conference was to examine the 'role of physics in economic development.' Participants there agreed to organize subsequent meetings focusing on the measures that could be taken, particularly in education and training, to nurture a sense of entrepreneurship among physicists."

"The workshop," says Claudio Tuniz, ICTP assistant director and local organizer for the event, "was intended, in part, to provide participants with an 'entrepreneurial toolkit' designed to help them build strategies for transforming their ideas into marketable goods and services in their home countries."

The organizers attempted to achieve this goal through several means: by describing, for example, the general aspects of commercialization and the obstacles that stand in the way of success, especially in universities and publicly-financed research centres; by outlining the steps that are required to create 'spin-out' companies and small- and medium-sized enterprises; by exploring the complex legal and regulatory environment that surrounds issues related to intellectual property rights, licenses and patents; and by discussing the challenges posed by such critical activities as market research and technology transfer.

The workshop included presentations by noted experts and practitioners in the broad-ranging multi-disciplinary fields of technology transfer, innovation and entrepreneurship. Lecturers included Peter Dobson, director, Begbroke Science Park, UK; David Fernandez, director, TechnoCore, Mexico; Gerry Fitzsimons, chief executive officer, TTP Venture Managers Ltd., UK; and Surya Raghu, president, Advanced Fluidics, USA. In addition, representatives from Trieste's and the region's international research and economic development communities chaired many of the discussion sessions.

As David Secher, chief executive officer and director of N8, a consortium of research-intensive universities, and founder of Praxis, a successful not-for-profit technology transfer training company, noted in the opening talk at the workshop: "Today's knowledge economy is a global economy."

If scientists and economic development specialists from developing countries are to fully participate in this economy, he went on to say, they must have both the scientific knowledge and access to entrepreneurial know-how to do so. He also noted that global investment in research and development is increasing at an annual rate of 3.5 percent a year and that China now ranks third behind only the United States and Japan in total research and development expenditures. The developing world, as Secher noted, is no longer completely on the sidelines when it comes to such endeavors.

However, Secher also observed that the number of patents worldwide had doubled between 1992 and 2002, and that just five developed countries—the United States, Japan, the United Kingdom, France and Germany—accounted for nearly 85 percent of all the international patents that were approved. "Global knowledge may be easily transportable thanks largely to the internet and other means of electronic information," Secher said. Nevertheless the products and services derived from such knowledge are indeed too valuable to be given away freely and therefore are usually protected by a variety of means, including patents.

It is not surprising, he added, that universities (and publicly funded research centres), which are the primary places of employment for physicists, have begun to engage in entrepreneurial activities only in the past few decades, and that this transformation has largely been confined to the United States and, more recently, the United Kingdom.

Universities, after all, are knowledge, not innovation, centres. Perhaps even more importantly, they are slow to change. The long-standing mandate of universities has centered on two pillars of responsibility: teaching and research. Only recently have universities been encouraged, both by

governmental officials who authorize their funding and institutional administrators who oversee their work, to reach out to industry and seek to profit from their knowledge by licensing and patenting unique ideas and discoveries that take place in their classrooms and laboratories.

What does all of this mean for scientists working in universities in the developing world? Simply put, that there is a track record of both success and failure among universities in the North that can help guide universities in the South as they formulate their own strategies for the promotion of entrepreneurship and innovation.

According to Secher, this is what the track shows. First, that it takes time—often quite a bit of time—to change the culture of a university and to nurture an entrepreneurial spirit within the halls of academia. In the United States, for example, policies designed to promote innovation and technology transfer within universities date back to 1980 when the US Congress passed the Bayh-Dole Act.

Yet, even today, after more than 25 years of activity, only a few universities in the United States profit from such initiatives and those that do usually have a large world-renowned faculty, excellent facilities and ample resources. For every Stanford University, which receives substantial royalties from Google and Yahoo, both of which were created by enterprising students who were enrolled in Stanford at the time that these electronic portals (and now multi-billion companies) were created, there are many small two- and four-year colleges with one-person technology transfer offices operating on a budget of less than US$100,000. The Massachusetts Institute of Technology (MIT), in contrast, spends US$1 billion a year on efforts to commercialize its research, which generates an annual return of just around US$50 million. All told, US universities have obtained some 21,000 licenses to commercialize technological products and services created by faculty and students working in their institutions. Yet, only 125 of these licenses have generated revenues exceeding US$1 million.

Which brings Secher to his second point. Universities, especially universities in the developing world, are unlikely to reap a financial windfall from their efforts. Therefore, he noted, it is important for universities in the developing world to define the success of their innovation and technology transfer initiatives in nonmonetary ways—for example, by the number of students who are trained and who subsequently apply their skills in private companies or as independent entrepreneurs; by the individual and institutional networks for innovation and technology transfer that are created largely as a consequence of university efforts; and by the interactions and synergies that take place both within the university and through conferences and workshops that professors and teachers organize and attend."

"University efforts to promote innovation and technology transfer," Secher notes, "are here to stay." What physics professors and physics students alike from developing countries should recognize is that building an institutional infrastructure for success takes time and that a return on the investment will only occur if a university has both the intellectual capacity and marketplace savvy to engage in such activities.

He is quick to add that money isn't everything, especially in a university, which can contribute to society in many different ways—most notably, by educating and training students who in turn use the knowledge and know-how that they acquire not only to earn money but to solve critical social and economic problems.

Such capacity-building contributions take place within universities whether the subject is physics, technology, innovation or economic and social development. By creating synergistic opportunities for students to learn and apply their knowledge in all of these fields of study, the ultimate goal is to create wealth and solve problems—in others words, to enable students and faculty alike to do 'well' by doing 'good.'□

PARTICIPANTS PROFILES

"This workshop will help me improve my entrepreneurial skills and obtain a better understanding of intellectual property rights."

Iwan Yahya

Faculty of Mathematics and Natural Sciences
Sebelas Maret University
Solo, Indonesia
Research interests: acoustics, new building materials, digital signal processing.

"This workshop will help me to continue to crystallize and implement programmes intended to relate physics to economic development. I find this of paramount importance to my work as a teacher, researcher and writer."

Sameen Ahmed Khan

Salalah College of Technology
Engineering Department
Salalah, Oman
Research interests: accelerator physics, light beam optics, light beam polarization.

"This workshop will me help my students learn about a world beyond the university and make it more likely that they will be able to develop joint projects with colleagues in both academia and industry."

Ranasinghe P.K.C. Malmini

University of Sri Jayewardenepura
Department of Mathematics
Nugegoda, Sri Lanka
Research interests: statistical mechanics, econophysics, physics and mathematics education.

"As the deputy dean of the faculty of science and technology, this workshop will help me acquire the necessary skills for raising capital and devising successful marketing strategies that are likely to prove vitally important to the future success of our faculty."

Spirit B. Tlali

National University of Lesotho
Department of Physics and Electronics
Roma, Lesotho
Research interests: physics, electronic engineering, college administration and technology transfer.

John Ellis
Advisor to CERN Director General

One of CERN's most eminent scientists describes his organization's increasing efforts to reach out to the developing world.

FEATURES

CERN and the South

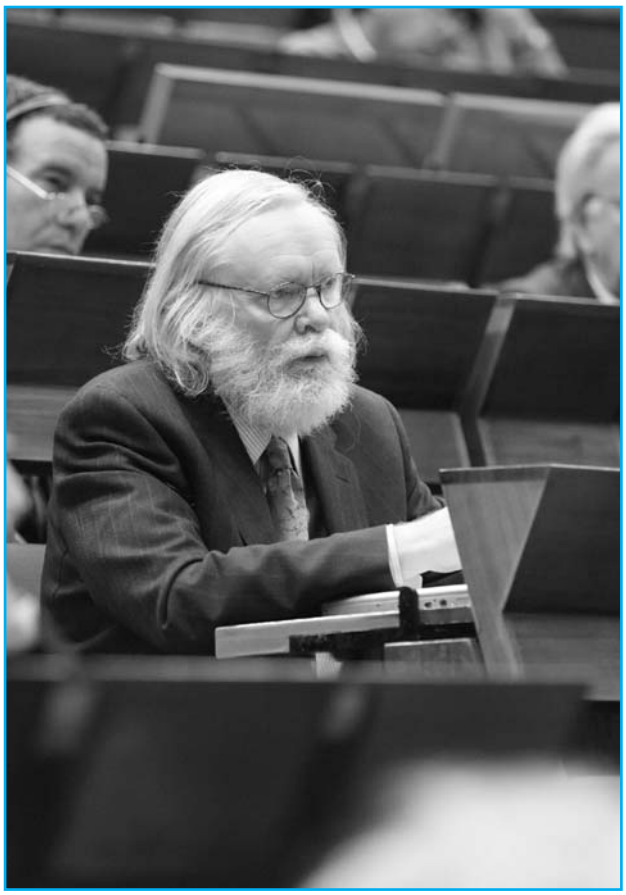
CERN (the European Organization for Nuclear Research), the world's largest particle physics centre, has four basic missions.

First and foremost, CERN stands for scientific research and discovery, which have earned the institution broad international acclaim over the past half-century.

This, however, was not the only reason for the founding of CERN. And it is not the only reason why CERN continues to attract support from European and other governments. In fact, another key mission of CERN is technological innovation, which creates spin-offs and the potential for fruitful collaboration with industry.

Then there's advanced training. CERN is a centre for many aspects of human resource development, ranging from training schools that take place at its facilities to postdoctoral fellowships that enable young scientists to work on CERN experiments.

Last but not least, CERN has many decades of experience in international collaboration. Partnerships are not just restricted to member states, but have increasingly been extended to countries outside Europe, including the developing world.



John Ellis

All these basic missions enable CERN to serve as a potential source of benefits for developing countries and carry with it the potential to strengthen its collaboration with ICTP.

The next major step in particle physics will take place at the Large Hadron Collider (LHC), an accelerator under construction at CERN that will drive protons, each with an energy 7000 times the proton mass, into one another to create a billion collisions per second. The high energy and collision rate will enable researchers at the LHC to explore a new range of small distances within matter. The LHC will recreate conditions that existed in the Universe during the first millionth of a second of its existence, and will address such fundamental cosmological questions as the origin of matter, the nature of dark matter, and the possible existence of extra dimensions of space.

These fundamental objectives are of equal interest to physicists in the North and in the South, and CERN has always opened its doors to interested and qualified scientists from anywhere in the world.

The LHC accelerator is being financed mainly by CERN's 20 European member states. But non-member states, including Canada, India, Japan and the United States, have also made important contributions. Argentina and Pakistan have provided support for the development of the LHC as well.

The LHC will have four large experimental detectors. The two largest—ATLAS (A Toroidal Lhc ApparatuS) and CMS (Compact Muon Solenoid)—are being designed to search for Higgs bosons and dark matter. Each of these detectors is being constructed through a collaborative effort comprising about 2000 scientists and engineers from some 150 institutions in more than 30 countries.

CERN's particle accelerators and experiments have led to many technical innovations. The most prominent is the world wide web, which was developed in the 1990s to enable the large number of scientists working with CERN across the globe to share information. CERN decided not to patent the world wide web. Instead, CERN released it for open public use—hardly imagining the global communications revolution that it would trigger, both in the North and the South.

Working with ICTP and other international scientific organizations, CERN is now spearheading the next step in the integration of worldwide computer resources: the Grid (see "Grid Near You," *News from ICTP*, Spring 2006, p. 2). This will enable the creation, on demand, of powerful virtual computing systems, via the global sharing of stored computer files, central processing units and software. The Grid will be essential for handling and analyzing the data produced by

the LHC, which, when fully operational, will require computing power equivalent to about 100,000 of today's personal computers.

The Grid will also be invaluable for many other applications, both scientific and non-scientific. These include medicine and healthcare (for imaging, diagnosis and treatment), bioinformatics (for the study of the human genome and proteome), and natural resources and the environment (for weather forecasting, Earth observation, and the modeling of natural disasters such as earthquakes and tsunamis).

Many of these applications have potential benefits for developing countries, and CERN is already sharing Grid technology with some 35 non-member states, including China, India and many Latin-American countries, through the European Union's EGEE (Enabling Grids for E-sciencE) project.

Information technology is just one of the many areas where innovations at CERN have found interesting and valuable applications. Take, for example, medical physics. CERN was a pioneer of positron-emission tomography (PET). Several detector technologies developed at CERN have subsequently been used in various medical fields, including cardiology, neurology, oncology and pharmacology.

CERN sponsors a large number of programmes, ranging from school visits and courses for high-school teachers, to apprenticeships and internships for undergraduate students, to training for technical and doctoral students and the awarding of fellowships for postdoctoral researchers. CERN encourages students and scientists from developing countries to participate in these activities. For example, teachers from Mexico and South Africa took part in CERN's programme for high-school teachers and CERN's summer internship programme for undergraduates has included students from developing countries, most recently from Madagascar, Sri Lanka and Thailand.

In addition, the European Union provides funding for a network called HELEN that links high-energy physicists in Latin America to CERN. HELEN has extended many training opportunities to students from the region and has enabled professors from Europe to lecture at universities and research centres in Latin America.

Each year, CERN organizes schools in computing, accelerator physics and particle physics. Every other year, CERN jointly sponsors a physics school with the Latin American Centre of Physics (CLAF - see "Fostering Physics in Latin America," *News from ICTP*, Summer 1999, p. 6-7, and "A Helping Hand," *News from ICTP*, Autumn 2002, p. 2). Such schools have been held in Brazil, Mexico and Argentina. The next school will take place in Chile in 2007. This year, CERN will also hold a school in accelerator physics in India.

Full membership in CERN, which now stands at 20, is open to European countries. Several countries, including India, Israel, Japan, Russia, Turkey and the United States, enjoy 'observer' status, with rights to attend meetings of the CERN Council and participate in its discussions—as do UNESCO and the European Commission. In addition, CERN has cooperative agreements with governments in 35 countries around the world. These include many countries in Africa, Asia, Latin America and the Middle East. Contacts have also been made with scientists in about 20 additional countries, many of whom participate in physics experiments at CERN.

In total, about 8000 scientists collaborate actively with CERN. About one-third come from non-member states, including several hundred from developing countries. These scientists remain based at their home universities and research institutes, where they build hardware, create software and analyze data. They come to CERN for varying periods to assemble data, train students and meet scientists from other countries.

CERN does not expect developing countries to contribute financially to the construction of its accelerators, although, as stated above, some do. However, CERN does expect scientists from developing countries to contribute to the construction and operation of the experiments they participate in.

In a real sense, particle accelerators are both telescopes and microscopes. Laboratories such as CERN, moreover, are a microcosm of the macrocosm (that is, a confined space that reflects the endless wonders of the Universe). CERN's research objectives address basic scientific issues of interest to all humanity, and the organization, not surprisingly, is open to scientists from all countries. Research at CERN provides access to many technologies of broad and enduring value to scientists everywhere. And many research and training opportunities at CERN lay a strong foundation for nurturing knowledge and building scientific capacity on a global scale.

For all of these reasons, officials at CERN envision unlimited opportunities to cooperate with researchers in the developing world. Our work, together, will prove mutually beneficial to both science and society.□

ICTP AND CERN

ICTP and CERN enjoy a long and fruitful relationship that promises to set the groundwork for even closer collaboration in the future. In the global scientific community, the institutions are forever linked by science's most prestigious award: the Nobel Prize. It was Carlo Rubbia's experiments at CERN in the early 1980s that confirmed Abdus Salam's theory of the unification of the weak and electromagnetic forces. Salam, founding director of ICTP, won the Nobel Prize in Physics in 1979 for his work, and Rubbia, who subsequently became director general of CERN, received the Nobel Prize in physics in 1984. What is less well known is that two CERN theorists, Jacques Prentki and Léon Van Hove, were part of an influential panel of experts that in the early 1960s called for the creation of ICTP, and that several directors general of CERN, including Van Hove, Victor Weisskopf and Herwig Schopper, have served on the ICTP Scientific Council. Joint activities between ICTP and CERN date back to the early 1970s when the two institutions began collaborating in the organization of training courses in Trieste. ICTP staff have worked on CERN's COMPASS experiment by developing a data readout system. More recently, ICTP has forged an agreement with the Italian National Institute of Nuclear Physics (INFN) and CERN that will enable ICTP staff and visiting scientists to participate in experiments at the Large Hadron Collider (LHC), which is scheduled to begin operations later this year.

DATELINE

Mori Fellow Article Draws Attention

Mori Fellow **Ali Bashir** and ICTP staff scientist **Charles Chidume** co-authored an article in the *Journal of Mathematical Analysis and Applications* that has been heralded as one of the 25 top in its field for April-June. The announcement was made by *Science Direct*, which lists the most popular scientific articles based on downloads on the internet. The article, "Approximation of Common Fixed Points for Finite Families on Nonself Asymptotically Nonexpansive Mappings in Banach Spaces", which was published online, subsequently appeared in print in the February 2007 edition of the journal. Mori Fellowships—a programme sponsored by the Japanese government and administered by ICTP—are granted to doctoral and post-doctoral students from sub-Saharan Africa (see *News from ICTP*, Winter 2005-2006, p. 4).

Bandwidth Management in Print

ICTP staff consultants **Enrique Canessa**, **Carlo Fonda** and **Marco Zennaro** were part of a team of information experts who recently published *How To Accelerate You Internet: A Practical Guide to Bandwidth Management and Optimization Using Open Source Software*. The book, which includes an introduction by ICTP director **K.R. Sreenivasan**, can be accessed free-of-charge on the internet. It is designed to help network specialists, especially those working in developing countries, learn effective technical and management techniques for maximizing the use of the internet. Issues discussed include reducing viruses and spam, prioritizing network traffic, and providing local content caching. The book, released under a Creative Commons license, was written by the BMO Book Spring Team and sponsored by the International Network for the Availability of Scientific Publications (INASP). Other organizations contributing to the effort include Aidworld and Hacker Friendly LLC. The text is available in both PDF and HTML formats at http://bwmo.net.

Furlan, Sreenivasan Honoured

The Science Academy of Turin, Italy, has awarded **Giuseppe Furlan**, long-time head of ICTP's Training and Research in Italian Laboratories (TRIL), the Ravani-Pellati Prize for his outstanding contributions to scientific research and international cooperation. ICTP director **K.R. Sreenivasan** has received the academy's Panetti-Ferrari Prize for Applied Mechanics for his important contributions to experimental and theoretical studies of turbulence. The awards ceremony took place on 20 November.

Giuseppe Furlan

Centre Links

ICTP director **K.R. Sreenivasan** has proposed the creation of a centre in India designed to link universities across the country. The centre, which would be created with assistance from the University of Hyderabad and the B.M. Birla Science Centre, would seek to improve teaching and research capabilities nationwide. Sreenivasan made his remarks in Hyderabad. He was there as part of a week-long visit to India designed to increase cooperation between ICTP and India's universities and research institutes. The trip took place in October.

Nature on Science in Trieste

Nature Materials (November 2006) has published an article, "Nurturing Science in Developing Countries," that examines the state of research and training in physics in Trieste. The article is based on interviews with ICTP director **K.R. Sreenivasan**, former ICTP acting director **Erio Tosatti**, and **Mohamed H.A. Hassan**, executive director of the Academy of Sciences for the Developing World (TWAS). For copies of the article, contact sci_info@ictp.it.

Computational GRIDs

Scientists from Europe and India met at ICTP in October to discuss how the GRID, a computational network designed to facilitate the exchange of large amounts of information, could be used to promote cooperation between European scientists and their colleagues in India. For additional information on the GRID, see "CERN and the South," p. 6-7 of this edition of the newsletter, and "Grid Near You," *News from ICTP*, Spring 2006, p. 2.

Sharing Knowledge

Abdulsalam El-Qallali

Adnan Shihab El-Din

ICTP hosted a three-day advanced research workshop entitled "Sharing Knowledge Across the Mediterranean" in early November. The workshop is the third in a series of workshops organized by the North Atlantic Treaty Organization (NATO). Previous workshops were held in Geneva (2004) and Casablanca (2005). This year's event, which was dedicated to the memory of ICTP's founding director Abdus Salam on the occasion of the 10th anniversary of his death, featured an opening talk by **Carlo Rubbia** (Nobel Laureate in Physics 1984). **Abdulsalam El-Qallali**, Libyan Ambassador to the United National Educational, Scientific and Cultural Organization (UNESCO) and a former ICTP Associate (1986-1991), also spoke at the opening session. Other presenters included **Adnan Shihab El-Din**, former secretary general of OPEC, who examined the prospects for adequate fossil fuel supplies in the 21st century, and **Herwig Schopper**, former director of CERN, the European Organization for Nuclear Research, who described the current state of the SESAME project, which has brought a synchrotron light facility to the Middle East.

Telemedicine in Malawi

In collaboration with ICTP's Aeronomy and Radiopropagation Laboratory (ARPL), the Department of Electrical Engineering at the Malawi Polytechnic is developing a pilot project to establish a wireless network for telemedicine. The project will involve four institutions in Malawi: the Malawi Polytechnic, Queen Elizabeth Central Hospital, and the Ndirande and Limbe health dispensaries. *Regione Friuli Venezia Giulia* has generously donated the equipment. Technical experts from Malawi were trained at ICTP's Advanced Training on Wireless Networking in June 2006.

Malawi newly-installed WiFi system

Elettra Users' Meeting

The 14th *Elettra* Users' Convention took place at ICTP on 20-22 November. The meeting was accompanied by two satellite workshops on "New Frontiers in Insertion Devices" and "Science at High Pressures" and the announcement of a prize in memory of Luciano Fonda and Paolo Maria Fasella—two of the driving forces behind the creation of *Elettra*—for young researchers in the field of synchrotron radiation who have made outstanding scientific contributions while working at *Elettra*.

ICTP Diploma in Basic Physics

ICTP has announced a new one-year ICTP Diploma Course in basic physics (DBP). The programme is designed to assist young physicists and mathematicians from sub-Saharan Africa who have recently received undergraduate degrees and are interested in pursuing their studies at the graduate level. The programme will be launched in September 2007. For additional information, see users.ictp.it/~diploma.

Public Lecture

"Arithmetic of Electoral Reforms" was the subject of the third public lecture in the series *Frontiere* jointly organized by ICTP, *Immaginario Scientifico* and the Department of Mathematics and Informatics at the University of Trieste. Marco Li Calzi, professor of mathematics at Ca' Foscari University in Venice, spoke on the crucial role played by mathematics in determining the number of seats that would likely be available for representatives of congress and parliament based on population projections and the way in which a government chooses to subdivide its political districts. Li Calzi focused on the situation in both the United States and Italy. The lecture took place at the University of Trieste.

NEWS FROM ASSOCIATES

Mohamed Abdalla Darwish, ICTP Regular Associate 2003-2008, associate professor of mathematics and head of the Department of Mathematics, Alexandria University (Damanhour Branch), Egypt, has won the Alexandria University Scientific Prize 2006. The prize is given to the University's outstanding scientists and scholars.

ACTIVITIES

INTERNATIONAL SCHOOL AND WORKSHOP ON POLYNOMIAL AUTOMORPHISMS AND RELATED TOPICS, Hanoi, Viet Nam

9 - 20 October

Organizers: A. Van den Essen (Radboud University, Nijmegen, The Netherlands), Nguyen Van Chau (Institute of Mathematics, Hanoi, Viet Nam), Le Tuan Hoa (Institute of Mathematics, Hanoi, Viet Nam) and D. Wright (Washington University in St. Louis, MO, USA).

WORKSHOP ON OPTIMIZATION TECHNOLOGIES FOR LOW-BANDWIDTH NETWORKS

9 - 20 October

Cosponsor: International Network for the Availability of Scientific Publications (INASP, Oxford, UK).
Organizers: E. Canessa (ICTP), C. Fonda (ICTP) and M. Zennaro (ICTP).

SCHOOL ON NONLINEAR DIFFERENTIAL EQUATIONS

9 - 27 October

Organizers: A. Ambrosetti (International School for Advanced Studies, SISSA, Trieste, Italy), C.E. Chidume (ICTP) and D. De Figueiredo (*Universidade Estadual de Campinas*, Brazil).

CLIMATE CHANGE MITIGATION MEASURES IN THE AGRO-FORESTRY SECTOR AND BIODIVERSITY FUTURES

16 - 17 October

Organizers: C. Carraro (University of Venice and *Fondazione Eni Enrico Mattei*, Italy) and P. Dogse (UNESCO, Division of Ecological and Earth Sciences, Paris, France).
Local Organizer: M. Marsili (ICTP).

EU-INDIA GRID KICK-OFF MEETING

18 - 20 October

Organizers: S. Cozzini (Italian National Institute for the Physics of Matter, INFM, at the International School for Advanced Studies, SISSA; and ICTP), A. Masoni (Italian National Institute for Nuclear Physics, INFN, Cagliari, Italy) and A. Nobile (ICTP).

INTERNATIONAL WORKSHOP ON SCIENCE FOR CULTURAL HERITAGE

23 - 28 October

Organizers: J.-L. Boutaine (*Centre de Recherche et de Restauration des Musées de France*, Paris, France), G. Furlan (University of Trieste and ICTP), M. Martini (University of Milan, Italy) and C. Tuniz (ICTP).

Chris Stringer

FOURTH WORKSHOP ON DISTRIBUTED LABORATORY INSTRUMENTATION SYSTEMS

30 October - 24 November

Organizers: A. Induruwa (Canterbury Christ Church University, UK), C. Kavka (*Universidad Nacional de San Luis*, Argentina) and U. Raich (CERN, Geneva, Switzerland).
Local Organizer: A. Cicuttin (ICTP).

ACTIVITIES

INTERNATIONAL CONFERENCE ON MICRO - AND NANOTECHNOLOGIES ICMNT2006, Tizi-Ouzou, Algeria

19 - 23 November

Organizers: *Université Mouloud Mammeri de Tizi Ouzou* UMMTO, Faculty of Electrical Engineering and Computer Sciences, Tizi Ouzou, in collaboration with ICTP and *Institut Méditerranéen d'Ecologie et de Paléoécologie du Centre National de la Recherche Scientifique* (IMEP-CNRS, Grenoble, France).

TOPICAL CONSULTANCY ON THE EFFECTS OF CLIMATE CHANGE ON THE OCCURRENCE, FREQUENCY AND INTENSITY OF EXTREME METEOROLOGICAL AND HYDROLOGICAL EVENTS

20 - 24 November

Organizers: A. Gürpinar (International Atomic Energy Agency, IAEA, Vienna, Austria) and A.R. Godoy (IAEA).
Local Organizers: G. Panza (University of Trieste and ICTP) and J. Pal (ICTP).

WORKSHOP ON ROLE OF PARTITIONING AND TRANSMUTATION IN THE MITIGATION OF THE POTENTIAL ENVIRONMENTAL IMPACTS OF NUCLEAR FUEL CYCLE

20 - 24 November

Organizers: H.P. Nawada (International Atomic Energy Agency, IAEA, Vienna, Austria) and C. Ganguly (IAEA).
Local Organizer: C. Tuniz (IAEA).

ECONOMIC DEVELOPMENT FOR PHYSICISTS FROM DEVELOPING COUNTRIES

27 November - 1 December

Organizers: D.D. Chauhan (The Institute of Physics, IOP, London, UK), P. Melville (IOP), K.R. Sreenivasan (ICTP) and C. Tuniz (ICTP). See p. 4-5.

ICTP-INFN ADVANCED TRAINING COURSE ON FPGA DESIGN AND VHDL FOR HARDWARE SIMULATION AND SYNTHESIS

27 November - 22 December

Cosponsor: Actel Corp. (Mountain View, CA, USA).
Organizers: N. Abdallah (Actel Corp.), A. Cicuttin (ICTP) and A. Vacchi (Italian National Institute for Nuclear Physics, INFN, Trieste, Italy).

SEISMIC HAZARD IN ASIA

4 - 8 December

Organizer: I. Parvez (Centre for Mathematical Modelling and Computer Simulation, Bangalore, India).
Local Organizer: G.F. Panza (University of Trieste and ICTP).

WORKSHOP ON THE FUTURE OF IONOSPHERIC RESEARCH FOR SATELLITE NAVIGATION AND POSITIONING: ITS RELEVANCE FOR DEVELOPING COUNTRIES

4 - 15 December

Cosponsor: International Union of Radio Science (URSI, Ghent, Belgium).
Organizers: R. Leitinger (University of Graz, Austria) and S. Radicella (ICTP).

WORKSHOP ON PORTING APPLICATIONS ON COMPUTATIONAL GRIDS, Colombo, Sri Lanka

11 - 13 December

Cosponsors: SPIDER (Swedish Program for ICT in Developing and Emerging Regions), National Science Foundation (NSF, Sri Lanka) and Sri Lanka Chapter of the Institute of Electrical and Electronics Engineers (IEEE).
Organizers: A.S. Induruwa (Canterbury Christ Church University, UK), S. Cozzini (Italian National Institute for the Physics of Matter, INFM, at the International School for Advanced Studies, SISSA; and ICTP) and R. Wait (Uppsala University, Sweden).
Local Organizer: D.N. Ranasinghe (University of Colombo, Sri Lanka).

MONITOR

In Memory of Abdus Salam

21 November marked the 10th anniversary of **Abdus Salam**'s death. Salam, who won the Nobel Prize in physics in 1979, founded ICTP in 1964 and then led the institution for the next 30 years. An article recalling the illustrious life of Abdus Salam and featuring reminiscences from his student and long-time collaborator, **Seifallah Randjbar-Daemi**, currently ICTP assistant director, was published in the local newspaper *Il Piccolo*. Also see "Commentary," *News from ICTP*, Autumn 2006, p. 3.

2006 Ramanujan Prize Winner

The 2006 Ramanujan Prize for Young Mathematicians from Developing Countries has been awarded to **Ramdorai Sujatha** of the Tata Institute of Fundamental Research (TIFR) in Mumbai. Sujatha, who received her university education in India, has been with TIFR since 1985, where she is currently associate professor in the School of Mathematics. The prize was awarded in recognition of her work on the arithmetic of algebraic varieties and her contributions to non-commutative Iwasawa theory. Together with John Coates, Takako Fukaya, Kazuya Kato and Otmar Venjakob, Sujatha formulated a non-commutative version of the main conjecture of the Iwasawa theory, which now drives much of the work in this important subject. **Lennart Carleson**, winner of the Abel Prize 2006, also spoke at the awards ceremony.

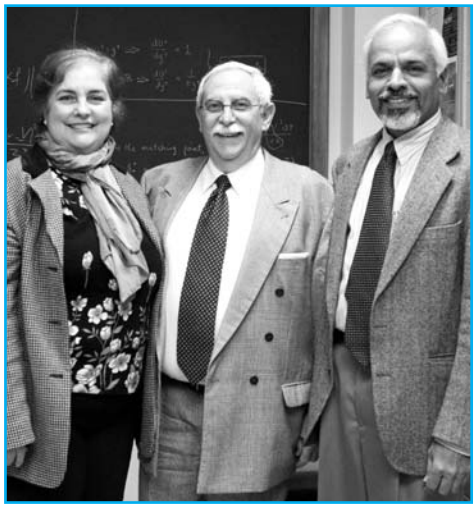
The Ramanujan Prize, funded by the Norwegian Academy of Sciences and Letters through the Abel Fund in cooperation with the International Mathematical Union (IMU), is given annually by ICTP to a mathematician under 45 from a developing country. It is named after the great Indian mathematician Srinivasa Ramanujan.

Ramdorai Sujatha receiving the Ramanujan Prize from Lennart Carleson

ICTP Visitors

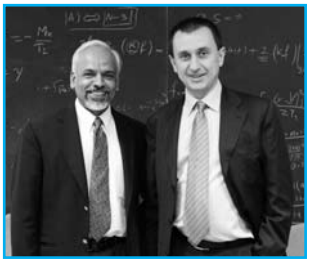
A number of public officials and scientists have recently visited ICTP to discuss potential avenues of future cooperation. These visitors included:

• The Cuban Ambassador to Italy, **Rodney Lopez Clemente**, and **Lourdes Alicia Diaz**, Science and Technology Counsellor, who came on 22 November.



• Senator **Milos Budin**, Undersecretary, Italian Ministry of International Commerce, who arrived on 11 December.

• The Italian Deputy Home Minister **Ettore Rosato** who came on 18 December.



• A delegation from the Kuwait Foundation for the Advancement of Sciences who visited on 18 December. The delegation included **Khalid S. Al-Muhailan**, director of the Office of International Programs, **Almansour Mohammed** and **Adnan Hamoui** (left). Hamoui has come to the Centre regularly both as a scientist and science administrator since the 1980s.

ICTP NUMBERS

VISITORS FROM MEDITERRANEAN COUNTRIES

COUNTRIES	VISITORS 1970-2006		COUNTRIES	VISITORS 1970-2006	
Albania	129		Macedonia (TFYR)	40	since 1993
Algeria	884		Malta	15	
Bosnia and Herzegovina	28	since 1992	Montenegro	2	since 2006
Croatia	448	since 1992	Morocco	841	
Cyprus	9		Occupied Palestine Territory	86	
Egypt	1911		Serbia	14	since 2006
France	3739		Serbia and Montenegro	59	from 2003 to 2005
Greece	641		Slovenia	390	since 1992
Israel	700		Spain	1243	
Italy	12960		Syria	405	
Jordan	278		Tunisia	357	
Lebanon	151		Turkey	1714	
Libya	215		former Yugoslavia	1733	until 2002
			TOTAL	28992	

PROFILE

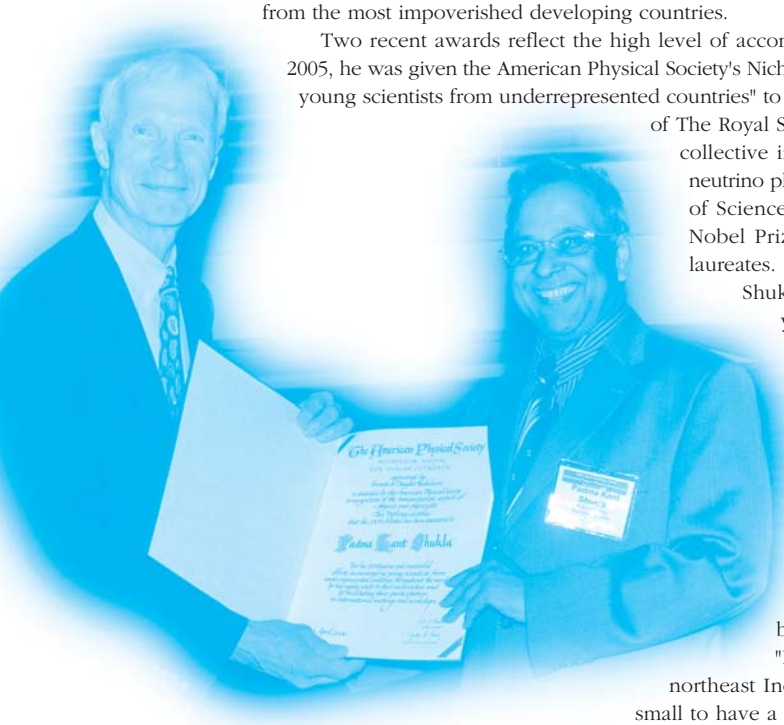
Padma Kant Shukla's eminent career in the world of physics began modestly in a small remote village in India.

In the Footsteps of Salam

Indian-born Padma Kant Shukla, a professor of physics at *Ruhr-Universität Bochum*, Germany, and a frequent visitor to ICTP, considers himself a protégé of the Centre's founding director Abdus Salam, whom he met on several occasions while studying in Europe during the 1970s and 1980s.

Like Salam, Shukla has enjoyed an exemplary career both as an internationally renowned physicist and as one of the most effective advocates for the need to provide world-class research and training opportunities to young scientists from developing countries, especially from the most impoverished developing countries.

Two recent awards reflect the high level of accomplishment that has accompanied Shukla's pursuit of both goals. In late 2005, he was given the American Physical Society's Nicholson Medal for Human Outreach for "his prodigious efforts in encouraging young scientists from underrepresented countries" to study physics. And this past November, he was elected a foreign member of The Royal Swedish Academy of Sciences for his outstanding research in the areas of collective interactions in complex plasmas and fluids as well as for his studies in neutrino plasmas and quantum systems. As a member of The Royal Swedish Academy of Sciences, he is now one of just 18 eminent scientists worldwide advising the Nobel Prize committee in physics during its annual selection process of Nobel laureates.



Padma Kant Shukla receiving the Nicholson Medal from president of American Physical Society John Hopfield

Shukla, who is a German citizen, arrived in his adopted country nearly 34 years ago. Although a young and gifted student in physics, he had never before journeyed beyond his homeland. "I was just 22 years old when I enrolled in the doctorate programme at Umeå University in Sweden in 1972 to study under Lennart Stenflo, another eminent physicist and frequent visitor to ICTP (see "Plasma Memories," *News from ICTP*, Winter 2004-2005, p. 14). My wife Ranjana, who had remained in India, joined me one year later when I was appointed to the faculty of physics and astronomy at *Ruhr-Universität Bochum*."

Shukla's grandfather, a teacher and religious leader, recognized his grandson's talent at an early age. He not only inspired Shukla to learn science but also opened up opportunities for schooling that could only be found at other places.

"I was born in Tulapur, a village of just 50 families in Uttar Pradesh in northeast India," Shukla explains. "While Tulapur is a Hindu holy place, it was too small to have a school." So, Shukla's grandfather arranged for him to go to school some five kilometres from his home. Shukla began his formal studies at five, graduated primary school at eight, finished high school at 13, and received a bachelor of science degree at 17 and a master's degree at 19, both from Agra University in his native state of Uttar Pradesh. From there, he went on to earn a doctorate in physics from Banaras Hindu University at 22. Three years later, he received a second doctorate in theoretical plasma physics from Umeå University in Sweden while continuing to do research and to teach in Germany.

Shukla's research spans a wide range of subfields making him by some measure a 'polymath' in physics. He began his career working closely with John Dawson, a distinguished physicist at the University of California at Los Angeles, studying the physical forces that may be responsible for supernovae explosions. Devising theoretical and computer simulation models, he and his colleagues hypothesized that the most powerful explosions known to humans may be due to neutrinos—wispy nearly-weightless particles—interacting with plasma in such numbers and intensity that they trigger the massive explosion of a star.

Shukla has also made fundamental contributions to dusty plasma physics, the study of highly-charged micron-sized dust particles that could have important implications in condensed matter physics and new materials. More recently, he has lent his considerable analytical skills to the study of the structure and behaviour of quantum matters related to the emerging field of nanotechnology. He and his collaborators have even provided an explanation for the rise of unexpected 10- to 30-metre ocean waves that sometimes cause shipwrecks and serious shoreline damage. Their explanation: mild surface winds create tiny ocean ripples that slowly build upon themselves, ultimately leading to destructive waves.

"While my research focuses on a number of different fields," Shukla notes, "what ties my studies together is an abiding interest in nonlinear wave-wave and wave-particle interactions. This kind of analysis," he observes, "can be applied to the behaviour of heavenly stars as well as to ocean waves. That's because regardless of the physical phenomena we are exploring, it's wave and particle interactions that we are trying to identify and understand—and that's precisely where the study of nonlinear physics can play a unique role."□

11 - 13 January

13th International Workshop on Computational Physics and Materials Science: Total Energy and Force Methods

15 - 18 January

Meeting on Renewable Energies

15 - 19 January

Advanced Workshop on Nanomaterials: A Partnership between ICTP, ICMR and TWAS

5 - 9 February

Preparatory School to the Winter College on Fibre Optics, Fibre Lasers and Sensors

5 - 23 February

ICTP-ITU-URSI School on Wireless Networking for Scientific Applications in Developing Countries, including Environmental Monitoring

12 - 16 February

Workshop on Biomedical Applications of High Energy Ion Beams

12 - 23 February

Winter College on Fibre Optics, Fibre Lasers and Sensors

5 - 16 March

Advanced School in High Performance Computing Tools for e-Science

22 - 24 March

Conference on Milankovitch Cycles over the Past 5 Million Years

22 - 30 March

Spring School on Superstring Theory and Related Topics

Throughout the year, the most up-to-date information on ICTP activities may be found on the World Wide Web and via e-mail. Here's how to find out what's going on.

ON THE WORLD WIDE WEB (WWW)
Our address is `http://www.ictp.it/`
The site includes detailed information on our research groups and activities, and a listing of our preprints, awards and job opportunities.

ON E-MAIL
(1) For Scientific Calendar of Activities
Create a new e-mail message and type
To: `smr@ictp.it`
Subject: `get calendar 2007`
Leave the body of the message blank. Send it.
Your e-mail will generate an automatic reply from the ICTP server containing the most updated version of the Calendar.

(2) For Information on a Specific ICTP Activity
Each activity in the Calendar has its own 'smr' code number, which is located on the last line of each activity description. The 'smr' number will enable you to obtain more information—if available—on those activities you are interested in. To receive this more detailed information, create a new e-mail message and type the smr code number that you found on the Calendar:
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You will receive automatic reply messages containing all documentation available on that particular activity.

(3) For Information on All ICTP Activities
A free online service for the dissemination of information on all ICTP activities, programmes and related announcements is available via e-mail. To subscribe, create a new e-mail message and type:
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Any comments or suggestions on this service are most welcome. Please address them to `pub_off@ictp.it`.

NEWS from ICTP

The Abdus Salam International Centre for Theoretical Physics (ICTP) is administered by two United Nations Agencies—the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Atomic Energy Agency (IAEA)—under an agreement with the Government of Italy. Katepalli R. Sreenivasan serves as the Centre's director.

News from ICTP is a quarterly publication designed to keep scientists and staff informed on past and future activities at ICTP and initiatives in their home countries. The text may be reproduced freely with due credit to the source.

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