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FROM THE EDITOR

Paul Bergstrom

I offer my apologies to the membership for my delay in preparing this edition of the Bulletin. We can all thank the gentle prodding of Shirley McKeown that it appeared at all!

In this issue we have several excellent reports from the membership. These cover the SESAME facility in Jordan and a report on last November's National Symposium on Radiation Physics in India. While a recent Physics Today article presents a less optimistic outlook for SESAME, projects like these make Radiation Physics truly international. Reports from local conferences, such as the Indian symposium also serve this purpose.

I stress once again that these reports are the warp and woof of this Bulletin and encourage everyone to consider contributing. Our President realizes this and has contributed an article on some recent, interesting scattering studies in addition to his column.

More space than usual is taken up in these pages for Society business. The President's column covers the past council meeting. Leif Gerward's piece discusses the upcoming elections and Dan Jones has sent us the First Announcement for ISRP-9. Please post this announcement in a conspicuous place.

Hopefully we will see you on the ballot and in Cape Town!

Paul Bergstrom

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PRESIDENT'S COLUMN

Malcolm Cooper

Recently we took advantage of the overlap between the scientific interests of IRPS and the IRRMA group (Industrial Radiation and Radioisotopes Measurement Applications) to hold a Council meeting concurrently with their own conference in Bologna, Italy.

Several of their invited speakers were IRPS council members. The reverse is also true at our triennial ISRP meetings and we are now exploring the possibility of joint workshops on topics of common interest for future symposia.

One of the decisions we took in Bologna was to create a higher level of membership - FELLOW - to acknowledge members who have made internationally leading scientific, educational or administrative contributions to Radiation Physics. Applicants must have been paid up members of the Society for at least five years and will require three nominations, together with a brief curriculum vitae. The applications will be reviewed by an Awards Committee, which it is my task to create and the awards will be made at our triennial symposia. Further details will be announced in a future IRPS Bulletin.

Since I am also involved in the organisation of the Cape Town ISRP-9 (27-31 October 2003) and the preceding workshop on radiation-based analytical techniques (24-26 October 2003), perhaps I can use this column to whet your appetite to attend these events. Dudley Creagh is the other Scientific Organiser and the Local Organiser is Dan Jones.

Together we are planning a meeting featuring all the variety of Radiation Physics, which has traditionally characterised our meetings, through invited talks plus a significant number of oral presentations selected from those who offer contributed papers/posters. We shall also have a special competition for "young" radiation physicists who will be able to make brief oral presentations of the work that they have presented in the poster session in competition for a significant prize.

Further information about the symposium and the workshop can be accessed via our own web site

http:/www.ise.canberra.edu.au/IRPS/notices.html or directly from

http://www.medrad.tlabs.ac.za/isrp9.htm

This promises to be an exciting meeting and for many of us a wonderful opportunity to visit South Africa.

Malcolm Cooper

REPORTS FROM MEMBERS

* A German Synchrotron for the Middle East **_by Sameen Ahmed Khan_**

* A Ferromagnet Without a Moment? **_by Malcolm Cooper_**

* 14th National Symposium on Radiation Physics (NSRP-14) **_by Kulwant Singh Thind_**

A German Synchrotron for the Middle East

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Approximately two years ago, Germany decided to give the BESSY-I (Berliner Elektronen-Spiecherring für Synchrotronstrahlung), an 800 MeV synchrotron, fully functioning since 1982 in Berlin, to the region of Middle East. The Middle East Synchrotron now known by the acronym SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East) achieved a major milestone with the selection of a site in Jordan at a meeting of the SESAME Interim Council in Amman, Jordan during June 2000. SESAME will be the upgraded reincarnation of BESSY-I.

This will be the first synchrotron light source in the Middle East and should serve as a seed for a regional international research centre, open to scientists in the region and beyond. An account of events leading to these very significant developments is presented. Several other relocated synchrotrons are mentioned briefly along with some upcoming synchrotrons.

The need for creation of "Accelerator and Beam Physics Forums" is also dealt with briefly. A synchrotron source is an exceedingly powerful source of light based on the technology of particle accelerators. Bundles of charged-particles (usually electrons) circulate for several hours inside a ring-shaped, long tube under high vacuum. ***Synchrotron Radiation*** is the electromagnetic radiation emitted when charged-particles travel in curved paths. For high-energy electrons curving in the magnetic field of the storage rings, this radiation is extremely intense over a broad range of the electromagnetic spectrum. The high intensity over a very broad-spectrum range and certain other properties (including, collimation, polarization, pulsed-time structure, partial coherence, high-vacuum environment, etc.) make synchrotron radiation a very powerful tool for a variety of applications in basic and applied research and technology.

It is particularly important in those parts of the electromagnetic spectrum where laser sources are unavailable. The emitted radiation is collected by many different ***beam lines*** connected to the ring and conveyed to the experimental chambers. Thus, the facility is simultaneously exploited by dozens of user groups.

The applications of synchrotron radiation span a wide range of domains in fundamental science, applied research. and industrial technology. There are not very many synchrotron facilities to meet the demands of users. This is primarily due to the high costs and the required technological expertise. Around the world there are currently about fifty storage rings in operation as synchrotron radiation sources, located in twenty-three countries. About a dozen are under construction and another dozen or so are being planned.

This small list leaves not only many countries but whole regions (such as Middle East, Continents of Africa and Australia) without a single synchrotron facility. Jordan will join this elite group of countries possessing a synchrotron light source due to Germany's generous gift of BESSY-I. BESSY-I is to be replaced by the more powerful BESSY-II, a 1900 MeV synchrotron located in another part of Berlin.

Germans are well-known for their environmentally responsible attitude towards reusing and recycling, and now they have very successfully extended that attitude to the large-scale research facilities! The idea of donating the BESSY-I Synchrotron came from Herman Winick of the Stanford Linear Accelerator Center (SLAC) in California, a member of the Machine Advisory Committee of BESSY-II, and the fellow committee member Gustav-Adolf Voss, a former director of Deutsches Elektronen-Synchrotron (DESY) in Hamburg, Germany.

Now that the SESAME site has been selected, a controlled and documented dismantling of BESSY-I is now underway by a team of experts from Yerevan, Armenia and Russia. The required funds for the dismantling are coming from the SESAME Member Countries and UNESCO. It shall be shipped and upgraded to BESSY-Ia. The upcoming joint synchrotron radiation facility, which would be the first regional centre for cooperation in basic research in the Middle East, will also serve as a seed for an International Centre built around the facility.

SESAME will be located at the Al-Balqa' Applied University in Al-Salt and will be open to scientists from any country in the region or elsewhere. Because of this openness, organizers see its potential as not only a world-class research centre, but also as a politically important example of scientific cooperation in the region.

Such a centre has been long overdue and it shall be the first of its kind in the region.

The Centre will be operated and supported by its eleven member countries (Armenia, Cyprus, Egypt, Greece, Iran, Israel, Jordan, Morocco, Oman, Palestine and Turkey) with support from countries including, France, Germany, Italy, Japan, Russia, Sweden, Switzerland and the USA. Other countries which have expressed an interest to join this new fount of science and medium of international cooperation include Bahrain, Tunisia and Yemen.

It is hoped that the new centre will be able to mirror the CERN in stimulating regional research collaboration. Very much like CERN, SESAME is under the very valuable political umbrella of UNESCO and is expected to promote science and foster international cooperation. A broad-spectrum of planned research programmes include, structural molecular biology, molecular environmental science, surface and interface science, micro-electromechanical devices, X-ray imaging, archaeological microanalysis, materials characterization, and medical applications.

It took an effort of several years for the idea of donation to be set on course and to evolve from a ***vision to a system***. A considerably significant point to this state of progress was the "Sinai Physics Meeting" held at the Egyptian resort of Dahab, on the Gulf of Aqaba, in November 1995. This historic Meeting was conceived by the Italian physicist

Sergio Fubini from the University of Turin, which led directly to the formation of the Middle East Science Collaboration (MESC) in 1997. MESC constitutes a network of scientists promoting research cooperation between Europe, USA and the Middle East. The idea of relocating BESSY-I was further taken through the MESC in a series of meetings held under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO), European Laboratory for Particle Physics (CERN), Abdus Salam International Centre for Theoretical Physics (Abdus Salam ICTP) to name a few.

Herwig Schopper, former Director-General of CERN and an active member of MESC is the President of the SESAME Project's Interim Council. Koichiro Matsuura, soon after resuming the office of the Director-General of UNESCO, had very generously underwritten an additional amount of US $ 400,000 to expedite the project. Jordan's King Abdullah II has pledged US $ 1 million a year for five years and the member countries are expected to contribute US $ 50,000 per year for the three years of construction. The installation and upgrading of the synchrotron are estimated at about US $ 20 million. A similar amount is required over the next five years for installing and equipping ten beam lines. Annual operating costs are expected to be about US $ 3.5 million. SESAME is expected to come on-line by 2003.

This is not the first time that a synchrotron was donated and relocated, thanks to the generous support of those in charge of the original facilities. Recently the Japanese donated a 1000 MeV synchrotron to Thailand. Thus, the Asia-Pacific region became the birthplace for the ***Era of Relocated Synchrotrons***. Located 250 km northeast of Bangkok in the city of Nakhon Ratchasima, the Siam Photon Source is Thailand's first synchrotron light facility and is intended to serve scientists throughout Southeast Asia.

The original synchrotron light source, called SORTEC, was located in Tsukuba Science City, near KEK, Japan's High Energy Accelerator Research Organization. Thailand's Ministry of Science, Technology, and Environment got the machine ***gratis*** and is investing about US $ 15 million to move and upgrade it. This includes the doubling of the circumference to 81 m and tailoring the machine to produce narrow bright beams of soft X-rays and ultraviolet radiation. Scientists from the KEK have helped in the redesign and are training the scientists from Thailand to operate their new facility. Professor Tokehiko Ishii, the retired Director of the Synchrotron Radiation Laboratory at University of Tokyo was the key figure in orchestrating the donation. He is also overseeing the technical and scientific aspects of the transfer and upgrading of the synchrotron.

The plan is to use the Siam Photon Source for physics and chemistry research, with some industrial research in semiconductors, medicine, pharmaceuticals, and agriculture. The Siam Photon Source is scheduled to go on-line in 2002.

A Dutch accelerator and storage ring used for nuclear physics is being moved to Dubna, to add to Russia's Synchrotron capability. The original facility was located at Institute of Nuclear Physics and High Energy Physics (NIKHEF) in Amsterdam, The Netherlands. This will be dubbed the 1200 MeV ***"Dubna Synchrotron Radiation Source (DELSY)"***, located at the Joint Institute of Nuclear Research (JINR) in Dubna.

It is disheartening to note that many countries from the Middle East have yet to participate in the novel project of SESAME. These countries are missing an excellent opportunity in the arena of International Scientific Collaboration. Same is the sad/sorry state of affairs for countries in rest of Asia and the continent of Africa. Many of these countries have had very old ties with the countries of the Middle East since very ancient times. In recent decades, these ties have been further strengthened by their large presence in the region, leading to active economic collaboration. They could have taken a keen interest in the SESAME.

Nature, in one of its editorials, aptly advised, ***"... any potential funder is not to hold back, for this would be a worthwhile investment. Initiatives such as this do not come around often. When they do, they should be supported unhesitatingly" .***

Scientific cooperation across geographical and cultural borders helps stimulate not only the advancement of ideas in the professional field, but also the building of lasting bridges and the establishment of contacts on the personal and more importantly the international level. The costs involved for participation are not much, for any country.

Here, it would be worthwhile to recall earlier attempts (though unsuccessful and now almost forgotten) to build institutions (including, synchrotron radiation facilities) in the Middle East. The originator of these attempts was none other than Abdus Salam, a co-winner of the 1979 Nobel Prize in Physics, the founder and long-time director of ICTP (recently renamed in his honour as Abdus Salam ICTP) and a humanitarian who devoted much of his life to uplifting the status of science and technology in the third world. Salam dreamed of creating twenty international centres like the ICTP, spread throughout the world. ICTP attracts thousands of visitors every year, mostly from the developing countries for which it was created. For the period 1970-1998, Nationals from the Middle East have been benefitted by about 2,500 visits amounting to about 3,500 person-months.

As part of that vision, he actively promoted the idea of advancing the cause of science and technology in the Middle East, not only by having researchers from the region work with their colleagues in the developed world, but also by having the region develop its own facilities including a ***synchrotron laboratory!***

In May 1983, at the ***Symposium on the Future Outlook of the Arabian Gulf University***, held in Bahrain, Salam delivered a paper entitled ***The Gulf University and Science in the Arab-Islamic Commonwealth,*** in which he reminded his listeners that ***"we forget that an accelerator like the one at CERN develops sophisticated modern technology at its furthest limit. I am not advocating that we should build a CERN for Islamic countries. However, I cannot but feel envious that a relatively poor country like Greece has joined CERN, paying a subscription according to the standard GNP formula. I cannot rejoice that Turkey, or the Gulf countries, or Iran, or Pakistan seem to show no ambition to join this fount of science and get their men catapulted into the forefront of the latest technological expertise. Working with CERN Accelerators brings at the least this reward to a nation, as Greece has had the perception to realize".***

He then went on to make the following points: ***I have mentioned an international laboratory in materials sciences for Bahrain, with specialisation in microelectronics and modern electronic communications, including space satellite communication, to help also with the banking communications needed at Bahrain. Such a laboratory was in fact proposed for the University of Jeddah. The idea was to emphasise science transfer in addition to technology transfer and to create international laboratories in the fields of materials sciences, including surface physics and a laboratory with a synchrotron radiation light source. The facilities created would have been of the highest possible international order; the laboratories would have been opened to teams of international researchers, who would congregate and work at Jeddah, just as they congregate now at the great laboratories in Hamburg, Geneva or Paris.***

SESAME ***envisages a road map for science, technology and cooperation*** in the Middle East, but at the same time, SESAME does not totally fulfill the dreams of Salam for several reasons.

Many countries from the Middle East have yet to participate. The driving force is coming from outside of Middle East and not from within.

The SESAME Training Committee at ICTP is coordinating programmes, which will enable the trainees to join research groups and technical teams at several synchrotron laboratories. They will get training in research and experience to work on the current technical issues relevant to the maintenance, running and repairing of a synchrotron light source. The participating laboratories include Elettra (Trieste), Daresbury Synchrotron Radiation Source (Daresbury), EMBL-DESY (Hamburg) and LURE (Paris).

An important facet for SESAME would be the training of potential users. It would be worthwhile to start a series of "Schools" on synchrotron radiation and related fields. The SESAME site would provide a good venue for such schools. These would train the potential users and more importantly promote international collaboration. I would like to further add, that the ***Accelerator and Beam Physics and associated technologies are not yet*** part of the regular university curriculum in most parts of the world! The learning of such an important interdisciplinary science is done to a very large extent individually and through the very few Schools ***when*** and ***where*** available.

We need to include Accelerator and Beam Physics in University curricula. In passing, it is to be noted that there are not many Accelerator and Beam Physics Associations/Societies in most parts of the world. When created, such Associations/ Societies will provide the much-needed forums.

The Asian Committee for Future Accelerators (ACFA) actively encourages regional cooperation in accelerator science and technology. This organization was formed in 1996. The ***First*** Asian Particle Accelerator Conference (APAC-1998) was held at KEK under the auspices of the ACFA, stressing the importance of regional collaboration among Asian regions in the field of accelerator science and technology as well as accelerator-based science. The ***Second*** APAC was recently held in September 2001 in Beijing.

Globally speaking, the International Committee for Future Accelerators (ICFA), could provide an excellent framework for collaborations and forums. It is noteworthy to see how the ICFA Beam Dynamics Panel has contributed to the accelerator and beam physics. The well-attended and very regularly held ICFA Beam Dynamics Workshops are one of the proofs of its grand success.

It is to be noted that countries from the Middle East have yet to join the ICFA or/and ACFA. Several countries are in the process of building their own synchrotrons. Armenia is planning to build the 3.2 GeV CANDLE (Center for the Advancement of Natural Discoveries using Light Emission). There is the proposal to build the 3.0 GeV BOOMERANG under the Australian Synchrotron Research Programme (ASRP). Spain has a project for a 2.5 GeV National Synchrotron Laboratory (LLS) in Barcelona.

The upcoming synchrotron facilities at the dawn of the new millennium will be able to bridge the wide gap in several of the under-represented regions of the ***World Synchrotron Map***. These, when built, shall immensely benefit the scientific community in the concerned regions by enhancing international cooperation and providing them the latest technological expertise. Among the upcoming synchrotrons, SESAME is a most international project and offers an excellent opportunity for participation and active international collaboration.

A Ferromagnet Without a Moment?

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Long range interactions between the magnetic moments on different atomic sites lead to either ferromagnetic or antiferromagnetic order depending upon whether the moments align parallel or antiparallel, but could magnetic order persist if the net moment on each atomic site were zero? This question occurred to Adachi and Ino (***Nature*** 401,148, 1999) a couple of years ago when they found that the ferromagnetic compound $SmAl_2$, doped with a few atomic percent of gadolinium, had zero moment at a temperature close to 70K.

At that time they could not eliminate the possibility that magnetic order simply disappeared at that temperature; a method was needed to measure spin and orbital magnetisation separately. Recently Adachi et al (***Phys. Rev. Lett***. 87, 127202, 1-4, 2001) claimed to have confirmed the existence of long range order in a recent Compton scattering study working at the Photon Factory Advanced Source synchrotron in Japan. If circularly polarised x-rays are used in a Compton scattering experiment (i.e. the inelastic scattering of x-rays with energies typically above 100 keV), there is a contribution to the scattering from the electrons' spin moment. This manifests itself in a Doppler broadened signal whose shape is indicative of the momentum distribution of the unpaired-spin electrons and magnitude is the spin moment. In this study the Japanese group found a net spin moment at the temperature at which the total moment hit zero in their previous magnetisation measurement.

Further information on this exotic magnet comes from an even more recent, and as yet unpublished, x-ray diffraction experiment with circularly polarised synchrotron radiation. Duffy, Taylor and Bebb from Warwick University used the UK's highly versatile diffraction beamline "XMaS" at the European Synchrotron Radiation Facility (ESRF) in Grenoble. The acronym, XMaS, stands for X-ray

Magnetic Scattering, and the beamline was designed very much with studies of magnetic materials in mind. They measured the temperature variation of the orbital moment and then separately the total moment, in a single crystal of $Sm_{0.98}Gd_{0.02}Al_2$. Hund's rules predict that the orbital and spin moments on a samarium ion are opposed and that the former is a bit bigger than the latter.

Although Hund's rules usually work well in the rare earths, the thermal admixture of momentum states possible in samarium means that the ratio can vary with temperature. As well as the localised 4f moment there is an additional itinerant conduction electron moment. Doping the samarium site with a few percent of gadolinium is enough to make exact compensation a possibility. The Warwick group found that the spin moment becomes dominant below the compensation temperature and therefore in an applied field both spin and orbital moments swap directions as the sample cools through this temperature. These two experiments provide evidence for the persistence of ferromagnetic order. Duffy said 'It is now becoming clear from our XMaS experiment, exactly what happens at the compensation temperature. We will clarify this further with our temperature dependent magnetic Compton scattering data at ESRF.'

Adachi and collaborators have pointed out such materials have untapped potential in devices. It might be possible to manipulate the electron spin without changing the trajectory of the electron, because the internal magnetic field is zero. It is not difficult to imagine that the alloy's composition could be tuned so that the compensation temperature was at the boiling point of liquid nitrogen. Then these materials might make something out of nothing in spin electronics!

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14th National Symposium on Radiation Physics (NSRP-14)

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The 14th National Symposium on Radiation Physics (NSRP-14) was organized from November 1-3, 2001 at Guru Nanak Dev University, in Amritsar, Punjab, India. This symposium was organized by the Indian Society for Radiation Physics (ISRP) in collaboration with Department of Physics of Guru Nanak Dev University and was a sequel to previous symposia, the first was held in Mysore (NSRP-1, 1976). The next symposium (NSRP-15) is planned to be held at Mumbai.

About 200 delegates of universities, colleges and research institutes from all over the country participated in the symposium. The most striking feature of NSRP-14 was the participation of students in large number from universities and colleges. The symposium attracted more than 115 original research contributions in the areas of

(i) Fundamental Processes in Radiation Physics

(ii) Radiation Sources and Detectors

(iii) Applications of Radiation in Physical and Life Sciences

(iv) Radiation in Environmental Sciences

(v) Radiation Protection and Dosimetry and

(vi) Radiation Transport.

Twelve eminent scientists working in these areas delivered invited talks on wide ranging topics.

In the inaugural function held at Guru Nanak Bhawan Auditorium in the GNDU complex on November 1, 2001, Prof. Kulwant Singh Thind, Convener, Local Organizing Committee introduced the chief guest, Prof. Bikash Sinha, Director, Variable Cyclotron Centre (VECC) Kolkata, guest of honour Dr. S.K. Sikka, Director, Atomic and Condensed Matter Physics Group, BARC; and other dignitaries on the dais and thanked the ISRP for hosting its 14th session at Amritsar. Prof. T.S. Lobana, Dean Science Faculty, welcomed the delegates.

Prof. Bikash Sinha, Director, Variable Energy Cyclotron centre, Kolkata delivering the inaugural address, said with the depletion of fossil fuel sources like coal and oil, nuclear energy is bound to play a key role in the power sector. He suggested that scientists were working to educate the common people about the benefits and hazards of radiation. He opined that diagnosis of cancer cells using controlled radiation was the best example of radiation benefits. Use of large number of radioisotopes for diagnostic and therapeutic purposes, use of gamma radiations for preservation of food items and for sterilization of medical accessories and are among the ever-increasing list of uses of radiations. He said the Kerala beach with large thorium deposits, had a radiation level three to four times the normal level, but Keralites did not suffer from any health problem because of it. He remarked that the hazards from cosmic radiation received while flying have been overlooked. He stressed that this was an area, which should be looked at closely by radiation physicists. He also exhorted scientists working in the field to educate the common people about the benefits and hazards of radiation. He opined that the reactors in India were the safest in the world from the radiation hazard point of view. He also said that the 1998 nuclear explosions at Pokhran were textbook examples of controlled radiation.

Dr. A.R. Reddy, President, Indian Society for Radiation Physics, while thanking the Guru Nanak Dev University authorities, especially Vice-Chancellor Dr. S.P. Singh and local coordinator Dr. Kulwant Singh Thind for providing active cooperation for the success and excellent organization of this symposium, said the emphasis of the symposium was not on radiation, but on its interaction and physical aspects which is different from atomic and nuclear physics, as well as from radiation biology and medicine.

Dr. S.P. Singh, in his presidential remarks, said keeping in view the importance of the subject, the Department of Physics had introduced Radiation Physics as a special subject at the postgraduate level. He said the symposium would prove to be a forum for scientists, technologists and researchers engaged in this multi-discipline field to share their knowledge and lay down directions for appropriate application of radiation physics.

Director, Atomic and Condensed Matter Physics Group, BARC, Mumbai, Dr. S.K. Sikka, in his keynote address on "Radiation Aspects of the Pokhran Nuclear Explosions" summarized the results of the nuclear tests conducted at Pokhran (Rajasthan) in 1998. He said five explosions were carried out, which included a thermonuclear device or hydrogen bomb, fission device and small fission devices of sub-kilotons yields. He also explained the principles of these explosions with slides. Prof. Sikka detailed the various methods used to estimate the yield of these tests at Pokhran. He said the Department of Atomic Energy had carried out extensive drilling near the test areas. Samples recovered were analysed using standard gamma spectrometric and radiochemical techniques. The results clearly established the yields of different devices as predicted by analysing seismic data.

The three-day National Symposium was divided into eleven academic sessions including three poster sessions. There were twelve invited talks, fifteen oral and ninety six poster presentations.

In the first session, Prof. H.S. Virk, eminent scholar of the University, referred to the work carried out by the Department of Physics, which included both extensive and intensive environmental uranium and radon surveys in Punjab, Himachal Pradesh and Uttranchal during the previous two decades. He said it has been observed that Himalayan river system is conspicuous by its high dissolved uranium and radon concentration. The highest radon concentration has been found in thermal springs at Kasol in Parbati valley of Himachal Pradesh. Anomalous values of uranium and radon concentrations in underground potable water of Bathinda and Gurdaspur districts of Punjab have been observed. He suggested that there is a need to undertake epidemiological study correlating cancer risk and radon values in environment.

In another invited talk of the day, Prof. V. Jagannathan (BARC, Mumbai) spoke on 'Reactor Physics ideas for large-scale utilisation of thorium in India'. He said the new fissile nuclides like 239Pu or 233U produced in nuclear reactors from neutron capture in fertile nuclei were like man-made matchsticks to further ignite the rest of the fertile nuclides to prolong the extraction of fission energy in a closed fuel cycle option.

Dr. P. M. Ravi from the Environmental Survey Laboratory, Kaiga, in his talk on 'Environmental transportation of radioactivity-recent concept', presented the various monitoring activities being carried out by ESLs throughout India. He discussed a compartmental model for terrestrial transportation of radioactivity in the environment and the factors influencing this transportation.

In addition to a poster session, half-a-dozen papers were presented by distinguished scientists/ research scholars on various aspects of radiation physics such as study of radon concentration, its diffusion in building materials, radon exhalation rate in different types of flooring of houses, gamma radiation levels in the natural background environment and radiation dose due to radon -222 from ground waters.

On the second day of symposium, a special lecture was organized on the safety of nuclear reactors by Prof. L.V. Krishnan, former Director, Safety Research and Health Physics Group, DAE, Kalpakkam. The choice of energy resources to be tapped must be examined from four main angles: safety, cost, availability and need. Due to low per capita availability of energy in India, we should harness every possible source with an emphasis on self-reliance and safety (of humans and of the environment). Nuclear power fulfills all of the requirements mentioned above. Safety in nuclear reactors is addressed using 'defence in depth' philosophy that is based on a provision for redundancy for all the components needed to ensure safety and to conform to protection standards, which are uniform throughout the world. There are also multiple barriers to contain radioactive material within the reactor systems and a minimum distance is maintained between the station and the public residences through provision of an exclusion zone around the station.

The main cause for concern arises from apprehensions of radiation exposure. There is need for us to shed excessive fear, without abandoning necessary caution. While radiation is bound to cause harm at high levels of exposure, no adverse effects have been seen at the low levels to which all living beings are exposed. From advances in the science of genetics, we now know that nature has provided life with various types of protection against radiation. Moreover, living organisms have the ability to repair damage arising from low doses. Low doses of radiation may also lead to improved health status of the organism. It is clear that this kind of information has not yet reached the general public. Scientists in the respective fields have a duty to inform the general public of these recent findings and help them overcome a sense of unnecessary fear.

The second day included two invited talks in the session on 'Radiation Effects'. In the first talk on 'Low Dose Radiation Effects In The Immune System', Dr. K. B. Sainis of BARC discussed that, as opposed to high dose induced immunosuppression, current research demonstrates enhancement of certain immune responses or immunologically important parameters following exposure to low doses of radiation (<50 cGy). He presented a number of results of various experiments being conducted in laboratory on the subject to show that the effect of low dose radiation on the immune system appears to be a complex of molecular events related to cell cycle regulation and effector protein expression.

The second invited speaker in the session, Prof P. K. Goyal talked on 'Radiation Effects On Embryo And Fetus'. He said that, from the radiation effects point of view, the embryonic stage is the most radio responsive stage in life of any organism including mammals. He described various defects such as growth retardation; cytological, neurophysiological, behavioral, intellectual and hematological that can be caused due to exposure of an embryo to radiation at different stages of its development.

In the session on 'Fundamental Process In Radiation Physics',
Prof B.S. Ghumman of Patiala, presented 'Recent Trends In Studies Of Compton Scattering Of Photons'. He said that Compton scattering continues to provide considerable stimulus to theoreticians and experimentalists. In particular with the advent of massive computing power and development of synchrotron sources, new vistas have been opened up in explorations of atomic structure and solid-state environments.

In the afternoon session on 'Radiation Transport And Shielding', Dr. R. Indira (IGCAR) and Mr. H. K. Dravid of BARC presented the practical and theoretical aspects of the PFBR shielding experiments being conducted at the APSARA reactor in BARC in two invited talks. The talks included design aspects of the experiments, the results obtained and the validation of the computational models developed for the purpose. On the concluding day, invited and oral presentations were made by noted physicists on three important aspects namely 'Radiation Applications', 'Radiation Protection' and 'Radiation Detection and Measurements. Dr. Sunil Sabharwal (BARC, Mumbai) while presenting on 'Radiation Technology For Material Processing: Current Status And Challenges Ahead', described in detail the various applications of radiation in industry. In particular, he said that electron beams were being used for manufacturing of cross linked cables, which are high temperature resistant and have good insulation. Dr. Sabharwal highlighted that such cables were widely used in railways and aircrafts and that the country had electron beam accelerators, which were commercially producing such cables. Other electron beam applications included production of hydrogel for dressing of burn wounds, color enhancement of precious stones such as diamonds and treatment of sewage systems.

Dr. P.K. Sarkar, from Variable Energy Cyclotron Centre, Kolkata, presented on 'Radiation Protection In Intermediate Energy Particle Accelerators'. He pointed out that, although the current accelerators were operating safely, the accelerators of higher energies and currents in future would pose challenges for the radiation protection experts.

Dr. R. V. Srikantiah (BARC, Mumbai) made a presentation on 'Recent Development In Nuclear Detectors For Spectrometry'. He pointed out that the technology of detection and data processing was undergoing a tremendous changes. He said that the development of high-energy accelerators and the detectors are closely linked and the successful detector development programme can be realized only by a close interaction among the scientists, engineers, experimental physicists and technologists.

An innovation at NSRP-14 was a poster competition. Three posters were selected as the best poster by the panel constituted for the purpose keeping in view the scientific content and presentation. The prizes were distributed to the contributors of the three poster papers. The prizes included a photograph of the Golden Temple. The three posters were:

1. Emission of soil radon with rising helium emanations in Bakreswar geothermal area. ***Debasis Ghose, Kanchan Patra, Argha Deb and Deepak Ghose***

2. PIXE analysis of 10th - 14th century A.D. Indian coins ***N. K. Puri, M. L. Garg, S. Bedi, M. Hajivaliei, D. K. Handa, V. Vijayan, K. L. Govil,***

B. Rout, N.Singh and I.M. Govil

3. Criticality calculations of Dhruva reactor by Monte Carlo method
T .K. Basu and R. P. Anand

In addition to the technical cross-fertilization exchanges in the invited, oral and poster sessions, the face- to- face personal contacts and conversations during the tea breaks, social events were perhaps the most valuable outcome of the symposium.

Other major social events were the organisation of the cultural programme in the Dashmesh Auditorium, Guru Nanak Dev University, Amritsar and visits to Wagha Border and Golden Temple on Nov.1, 2 respectively. These activities were very much enjoyed and appreciated by the participants and accompanying persons. The conference sessions were fully covered with photographs and a combined photo of all the participants and the organizers was also arranged on November 2 in the lawns of the Guru Nanak Bhawan Auditorium (Venue of the symposium).

The NSRP-14 was sponsored by :

- Guru Nanak Dev University (GNDU) Amritsar
- Department of Atomic Energy (BRNS) Mumbai
- International Radiation Physics Society (IRPS)
- Atomic Energy Regulatory Board (AERB) Mumbai
- Variable Energy Cyclotron Centre (VECC) Kolkata
- Department of Science and Technology

(DST) New Delhi

- Council of Scientific and Industrial Research (CSIR) New Delhi
- Defence Research and Development Organization (DRDO) New Delhi

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9th INTERNATIONAL SYMPOSIUM ON RADIATION PHYSICS (ISRP-9)

WORKSHOP ON RADIATION BASED ANALYTICAL TECHNIQUES

Cape Town, South Africa

24 - 31 October 2003

www.medrad.tlabs.ac.za/isrp9.htm

FIRST ANNOUNCEMENT

GENERAL INFORMATION

The 9th International Symposium on Radiation Physics (ISRP-9) will be held in Cape Town, South Africa from 27-31 October 2003. This triennial event is being organised jointly by the International Radiation Physics Society (IRPS) and iThemba Laboratory for Accelerator Based Sciences (iThemba LABS) [formerly National Accelerator Centre].

The Symposium is the latest one in a series which began in Calcutta in 1974 and thereafter continued in Penang (1982), Ferrara (1985), São Paulo (1988), Dubrovnik (1991), Rabat (1994), Jaipur (1997) and Prague (2000). A 2½ day Workshop on Radiation Based Analytical Techniques (WoRBAT) will be held immediately prior to ISRP-9 (24-26 October 2003) with the emphasis being on x-ray fluorescence and diffraction (XRF, XRD) and particle-induced x-ray emission (PIXE).

INTERNATIONAL RADIATION PHYSICS SOCIETY

Radiation physics is the branch of science which deals with the production and nature of both ionizing and non-ionizing radiations and the physical aspects of their interactions with matter. It is an interdisciplinary science covering many areas of scientific endeavour.

The International Radiation Physics Society ***(IRPS)*** is a professional scientific organisation, which was formally founded in 1985 in Ferrara, Italy, at the 3rd International Symposium on Radiation Physics (ISRP-3)

The main objective of the IRPS is to promote the exchange of scientific information pertaining to radiation physics in both developed and developing countries, including the fostering of:

- theoretical and experimental research
- investigation of the physical aspects of the interactions of radiations with biological systems
- education and training
- utilisation of radiations for peaceful purposes

This is accomplished by arranging and supporting national, regional and international conferences and workshops, encouraging the establishment of co-ordinated international scientific research programmes and disseminating relevant information concerning radiation physics to both the scientific community and the general public.

In conjunction with local institutes IRPS also arranges major regular symposia, designated International Symposia on Radiation Physics (ISRP), in interesting locations. Proceedings of these Symposia, which are currently held every 3 years, are peer-reviewed and published in ***Radiation Physics and Chemistry***, which is the official journal of the Society. Two Nobel Prize winners for Physics, viz. Georges Charpak and Carlo Rubbia are members of the Society. The membership is currently drawn from 57 countries of whom about half are from developed and half are from developing countries.

iTHEMBA LABS

iThemba Laboratory for Accelerator Based Sciences ***(iThemba LABS)*** [formerly National Accelerator Centre] is a national research laboratory which provides facilities for:

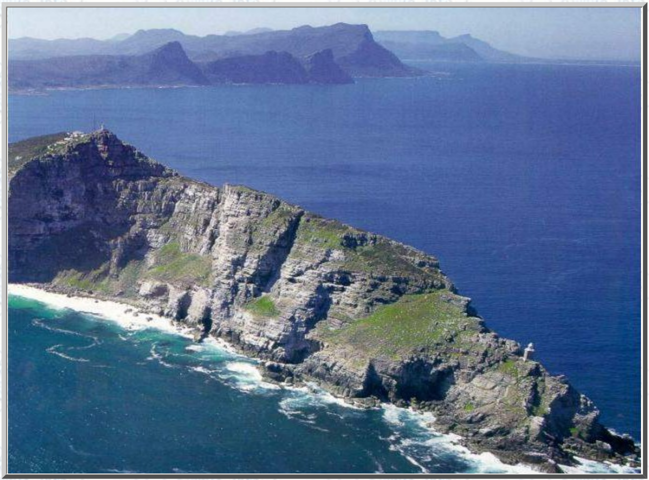
- basic and applied research
- radiation therapy
- radionuclide production
- advanced education and training

The laboratory is located about 35 km from downtown Cape Town and has a full-time staff complement of about 250. There are typically more than 100 post-graduates and other students undergoing training. The main facility is a separated sector cyclotron capable of accelerating protons to energies of 200 MeV and heavier ions to much higher energies. It is the largest accelerator in the Southern Hemisphere.

Two classical cyclotrons are used to inject light ions or heavy and polarised ions respectively into the main accelerator. Other accelerators on site are a 6 MV medical linear accelerator and a 6 MV CN Van der Graaff electrostatic generator. iThemba LABS operates the only proton (200 MeV) and fast neutron (66 MeV p + Be) therapy units in the Southern Hemisphere and is the only facility at which both modalities are available.

The main scientific activities are devoted to ***medical radiation***, ***radionuclide production*** for medical and industrial use, ***nuclear physics*** and ***materials science***. The major nuclear physics experimental facilities on the large cyclotron include a large gamma ray detector array for studying heavy ion interactions and a K-600 magnetic spectrometer for light ion studies. The Van der Graaff generator is utilised largely for studies in materials science, which includes an extensive programme in analytical research. Facilities include a nuclear microprobe and an x-ray diffractometer. The neutron physics research programme utilises both the separated sector cyclotron and the Van der Graaff generator.

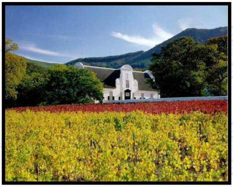
CAPE TOWN AND SOUTH AFRICA

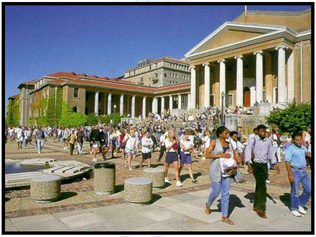


Where two oceans meet

Few countries rival South Africa's scenic beauty: from exquisite snow white beaches, rocky coves and charming fishing villages to majestic mountains, green forests, rolling farmlands and semi-desert plains.

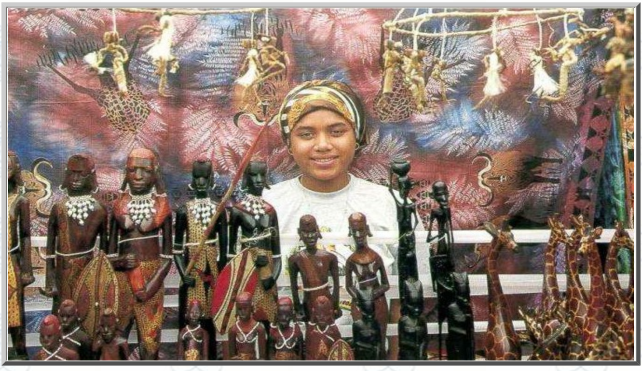
With its modern infrastructure and economy, pulsating cities, incomparable game reserves, varied recreational amenities, cultural diversity and pleasant climate, along with its hospitable people, South Africa, the Rainbow Nation, has much to offer visitors.





Cape Town is a spectacular, fascinating and cosmopolitan metropolis with a rich and varied heritage and boasts many natural splendours. It is dominated by the awesome crags of Table Mountain and encircled by the azure waters of the Atlantic Ocean and the emerald green vineyards of the ***Cape Winelands***.

The city is an eclectic conglomeration of striking architecture, sophisticated modern facilities, frenetic street markets, exciting entertainment venues, elegant restaurants and splendid shopping precincts.



The blend of African, Asian and European cultures contributes to Cape Town's unique, magnetic appeal. October is usually a very pleasant time of the year in Cape Town with average maximum and minimum temperatures of 21.3 °C and 10.4 °C respectively. On average it rains on 8 days with a total rainfall of 33 mm.

Information on South Africa and Cape Town is widely available on the internet. Helpful websites are:

www.southafrica.net

www.passportsa.co.za

www.gardenroute.co.za

www.cape-town.net

www.capeinfo.com

www.worldexecutive.com/cityguides/cape_town/index.html

TRAVEL

Cape Town is easily reached from all major cities using South African Airways ***(SAA)*** and other international carriers. International flights terminate in either Cape Town or Johannesburg (from which there is a
2-hour flight to Cape Town). Several carriers, including SAA, British Airways, Nationwide and Kulula.com operate on domestic routes.

Visas will be required for many delegates, who should contact the nearest South African consulate.

MEETING VENUES AND ACCOMMODATION

ISRP-9 scientific sessions and accommodations will be at the ***luxurious, but very affordable***, 4-star Protea Hotel President which is located on a spectacular seafront site in the suburb of Bantry Bay, about 5 km from the city centre. At the exchange rate of US$1.0=R10.0 (South African Rand) the room tariffs start from US$36 (per person sharing) and US$65 (single) per day.

More modest accommodations will also be provided nearby. The tariffs here start from US$14 (sharing) and US$27 (single).

The lodgings are within walking distance of beaches and numerous shops, bars and restaurants. The city centre and the magnificent Victoria and Alfred Waterfront shopping, hospitality and entertainment complex are easily accessible by bus or shuttle minibus taxi.

WoRBAT will be held at iThemba LABS which is about 40 km from the Protea Hotel President. Transport will be provided for delegates.

SCIENTIFIC PROGRAMME

The ISRP-9 programme will consist of both oral and poster sessions. The oral sessions will include invited and contributed papers. The latter will be selected by the Programme Committee from among the poster submissions whose main authors indicate their willingness to present the paper orally.

Young researchers are encouraged to do so as the best paper by a young scientist in this category will receive a substantial prize, providing that the paper is of sufficient scientific merit.

The presentations will cover all aspects of radiation physics (including non-ionizing radiation) encompassing, but not limited to:

- fundamental processes
- sources and detectors
- physical and material sciences
- medicine and biology
- space, earth and environmental sciences
- archaeology and art studies
- new technologies and industrial applications.

The full text of oral papers and refereed extended abstracts (2 pages) of poster presentations will be published in a special issue of ***Radiation Physics and Chemistry***.

Only English may be used for the presentations and publications.

The Workshop on Radiation Based Analytical Techniques will comprise an overview of the field, but with major emphasis on x-ray fluorescence, x-ray diffraction and particle-induced x-ray emission. The programme will serve as a refresher course for those working in the field and as an introduction to those young physicists who may be interested in entering it.

The lectures will be given by both local and international experts.

SOCIAL PROGRAMME

The social programme will include a cocktail function during the Workshop, a welcome party for Symposium delegates, a visit to iThemba LABS followed by a barbeque, the Symposium banquet and an excursion.

PROGRAMME COMMITTEE (Confirmed) :

M J Cooper (UK) [Co-Chair]
D C Creagh (Australia) [Co-Chair]
P Bergstrom (USA)
D A Bradley (UK)
R J Keddy (South Africa)
A Ljubicic (Croatia)
A S Paschoa (Brazil)
S C Roy (India)
C Theron (South Africa)

INTERNATIONAL ADVISORY BOARD (Confirmed) :

M J Cooper (UK) [Chair]
M Berrada (Austria)
M A Gomaa (Egypt)
J H Hubbell (USA)
G F Knoll (USA)
D McLean (Australia)
V K R Murty (Botswana)
L Musilek (Czech Republic)
A P de L Policarpo (Portugal)
B Sinha (India)
L Zheng-ming (China)

FURTHER INFORMATION :

ISRP-9/WoRBAT information is available on the ISRP-9 website:

www.medrad.tlabs.ac.za/isrp9.htm.

The website will be updated regularly with the latest information.

General enquiries should be addressed to the local organiser :

Dr D T L Jones
iThemba LABS
P O Box 722
Somerset West 7129 SOUTH AFRICA

Tel: +27 21 843 1336
Fax: +27 21 843 3382
E-mail: jones@tlabs.ac.za

Enquiries related to the scientific programmes of ISRP-9 and WoRBAT should be addressed to one of the Co-Chairpersons of the Programme Committee :

Prof M J Cooper ***e-mail :*** phsac@titanic.csv.warwick.ac.uk

Prof D C Creagh ***e-mail :*** dudleyc@ise.canberra.edu.au

Information on tours or local sightseeing excursions can be obtained from ***Springbok Atlas*** who are the official tour operators for ISRP-9/WoRBAT. For assistance or further tourist information please contact:

Marlese van Aswegen
Springbok Atlas
P O Box 819
Cape Town 8000 SOUTH AFRICA

Tel: +27 21 460 4783
Fax: +27 21 448 0003
E-mail: marlesev@springbokatlas.co.za

SECOND ANNOUNCEMENT :

The Second Announcement will be circulated during April 2003 and will include full registration, accommodation, paper submission, tourist and sightseeing information and the preliminary scientific programmes.

I R P S NON-MEMBERS WHO WISH TO BE PLACED ON THE MAILING LIST SHOULD SEND THEIR CONTACT INFORMATION TO THE ORGANISER

ISRP-8, 2000 with Malcolm Cooper, Bikash Sinha, Dan Jones, Don McLean

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Elections in 2003

According to the IRPS Constitution, election of Officers of the Society, including the President, the Secretary, the Treasurer and the Vice Presidents, will take place once every three years.

The terms of office for each of the eight Executive Councillors correspond to six years, the terms being so arranged that the terms of half of the councillors expire each three years.

A Nominations/Elections Committee has been designated in preparation for the next upcoming election in 2003. The members of the committee are

M.J. Farquharson (UK), L. Gerward (Denmark),

R.T. Mainardi (Argentina), D. McLean (Australia).

The result of the election will be announced at ISRP- 9
in Cape Town, South Africa, 27 - 31 October 2003.

We hope that many of the present Officers and Councillors will continue to serve the Society, but IRPS members should think of possible new names for the 2003 election. In particular the need for female representation has been noted. In conclusion, we need to identify suitable candidates, who are willing to become involved.

If you have any comments or suggestions, please contact your nearest member
of the Nominations/Elections Committee.

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NEW MEMBERS, ADDRESS CHANGES

Welcome to New Members :

Dr. Osama Fageeha, ***Saudi Arabia***

Dr Jillali Ghassoun, ***Morocco***

Dr. Ivana Jelovica, ***Croatia***

Dr. Luis C Longoria, ***Mexico***

Dr. Nada Orlic, ***Croatia***

Dr. Yoshitomo Uwamino, ***Japan***

New Members' addresses are listed in the Contact Members' Details
(click on country next to name)

Changes to Members' Addresses and Contact Information :

Address change :

Dr. Jae-Shik Jun ***Korea***

Email updates :

Dr Biva Roy, ***India***

Dr Kulwant Singh Thind, ***India.***

Dr T K Umesh, ***India***

Dr Teodoro Rivera Montalvo, ***Mexico***

Dr Dan Timus, ***Romania***

Prof R Keddy, ***South Africa***

Prof Malcolm Cooper, ***U.K.***

Members' new addresses and contact information are listed in the Contact Members' Details
(click on country next to name)

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