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President:

B. Sinha
Variable Energy Cyclotron Centre
Bidhan Nagar
Calcutta 700 064 India

Secretariat:

R.H. Pratt
Dept. of Physics
Univ Pittsburgh, PA
15260 USA
Tel: (412) 624-9052
Fax: (412) 624-9163

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Main

FROM THE EDITOR

Dudley Creagh

In Australia the National Trust, a body devoted to the restoration and preservation of old buildings, townscapes, landscapes, and the like, has just produced a list of "Living National Treasures". It took a poll of 10,000 people to decide the top 100 Australians who could be regarded as National treasures. There were :

33 stars of stage, theatre and television

23 sporting identities

sundry politicians from all parties including two politician's wives.

But there were no scientists or engineers!!

As we live in a highly technological society it seems unbelievable that the average man in the streets had not heard, for example, of Professor Peter Doherty who had been awarded the Nobel Prize.

Which leads me to a question I keep asking myself. Why is it that scientists are held in such little esteem?

If you know the answer to this I would like to hear it. My own belief is that scientists are either unwilling or unable to communicate with others on the subject of their research. Whatever the explanation: if scientists are not seen to be important to society they will not receive rewards from society in the form of funding for their research.

So, with the NEW YEAR approaching, we must all resolve to make better contact with others about our research.

I wish you all the compliments of the season.

May 1998 be a year of peace and prosperity to you all.

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PRESIDENT'S COLUMN

Bikash Sinha

Perception of radiation for men and women across the world has gone through an evolution, if not revolution. The concept of radiation is essentially an anthema to most people, it is a sort of dirty, a nuisance that is best avoided, to be endured, at the worst. The Press ofcourse has fuelled a fair amount of hysteria, because "radiation" and its so called hazard sells copies. Inevitably of course, the Press, in general, by for and large never quotes the level of radiation. Too much of anything is bad, the Lord said. We all know in our society what exactly that implies.

Some of us, I presume, unfortunate creatures who have to travel extensively high up in the sky do not seem to be sensitive about radiation, for us it can easily be a case of "too much of radiation is no good".

Let me recall certain events to substantiate my point. Robert Oppenheimer, Neils Bohr, his son Aage Bohr, Geff Chew, Sir Denys Wilkinson et. al. worked on the Manhattan Project. Except R.O. & N.B. everybody is still alive and thriving. In Denys Wilkinson's case, of course, he was about to die of radiation and wrote the first paper of his life on bird (two legged) navigation and clearly went on to create milestones in Physical Sciences.

However, it is pertinent to point out (and this is well known) that the soldiers who tried and, one presume, succeeded to a great extent in preventing the extremely dangerous level of radiation from Chernobyl, were indeed victim of radiation, in a very much larger scale, so are the victims of Hirosima and Nagasaki; whereas after nearly fifty years one is not aware of any serious genetic hazards.

Not necessarily, a researcher in cosmic ray physics myself except one's obsession with the universe, when the poor thing was only a microsecond old one is keenly aware of recent discoveries of cosmic ray of energy to the tune of 1020ev or even more, possibly gamma radiation. The speculations are many; black holes, primordial in particular bursting, poppling of old starts, the last gasp of all the entropy, etc., etc.

The fact remains, despite the cosmos, and, ofcourse our (the earth that is) is rather a trivial planet full of vascittudes of the hyperbole of history, sun being rather a boring star, these extremely high energy gamma rays do come and shower on us, DO YOU MIND?

Now, when travelling up in the sky, as I am doing right now from Tokyo to London (what hell!) the probability of being hit by one of these ferocious (1020ev or even more) gamma ray is significant, because the time span of travel in this altitude is long, too long!

What does it imply? One protects oneself in this glorious world from radiation even for a much lower intensity than one gets exposed in 747 jet and still it is fashionable, if not social to scream about radiation.

Indeed one is keenly aware of the JACEE set of cosmic ray experiment, on the top of Air France Concorde, to measure cosmic particle multiplicity as a possible signature of phase transition from hadrons to Quark Gluon Plasma.

Green house effect, (essentially radiation) is the worst possible environmental signal to the world, and, that is precipitated by our fellow human beings driven by a desire for unlimited material pleasure.

Meanwhile, nuclear waste remains a substantial issue. As we discussed, my colleagues at Jaipur, the technology of the management of nuclear waste is only an incredible blotting paper of history of science, nothing substantial has happened since Mr. Enrico Fermi.

Why can we not join up with Mr. Carlo Rubbia for a global nuclear waste management and also create energy amplifier for energy but not for strategy.

Will it not be splendid to have an energy amplifier to reduce the half life of nuclear waste, in one hand, and safely, on the other hand, to produce, with a global effort, energy for energy starved nations, keeping in mind very carefully, a sensible balance for the strategic, economic and, social issues.

Your President has repeatedly confessed that he is rather fond of Kerala in India. The thorium deposit at Kerala beach, necessarily increases the radiation level of that area, above the permissible level.

I find, the ladies from kerala are one of the most attractive in the world, and, indeed the first Indian President of our society is from Kerala.

Thus, is the gospel :

(1) Burning Fossil Fuel as a source of energy has to come down, it creates havoc in the environment.

(2) Hydel Power is alright, as long as one takes care for the rehabilitation of dislodged people, especially in developing nations.

(3) Solar Power is a must for small scale requirements. You don't have to run your electricity and refrigerator at home with fossil fuel, please extremely relevant for developing nation such as India.

Nuclear reactors are good stuff if it is looked after, safest, cleanest. One must go for small reactors in a series; yes, it is expensive but, ultimately we can network it a straight parallel of computer network system. Big reactors, with big Megga watts is a disaster, if not taken care of.

In our society, time has come to take a quantum jump and make radiation a respectable world and try very modestly with the politicians, thinkers and so on to emphasize that science is advanced enough to annihilate the whole world in a couple of seconds; but no body will do it, let us have faith in fellow human beings and create harmony and equilibrium with our ethnic and traditional values. That exactly is the eight fold way as expounded of Lord Buddha.

NEWS ITEMS

Crystallographic and Magnetic Celebrations held at ILL

G.H. Lander, Karlsruhe, Germany
(From Neutron News, Vol. 8, No. 4, 1997, p6)

The year 1997 witnessed the 65th birthdays of the neutron, P. Jane Brown and J. Bruce Forsyth. To mark the occasion the ILL held a symposium on May 12 1997. The opening speaker was Marty Blume from Brookhaven who after admitting that he was also 1932 vintage, discussed the general features of the magnetic cross section for both the neutron and photon, and went on to give "homework" to Jane and Bruce in the form of complex correlations functions and their properties that could be the basis for future experi-ments. In their 25 years of working at the ILL (the fact that Bruce now just retired, was actually paid by Rutherford Laboratory for most of this time was a constant theme, especially at the dinner), much has been done.

Bruce and Jane wondering if they should be checking their experiments.

We heard talks on the CRYOPAD (a polarimeter for po-larization analysis) from F. Tasset (ILL), 3He filters from W. Heil (Mainz), instabilities and frustra-tion from J. Deportes (CNRS Grenoble) correlations in the para-magnetic state from H. Capellman (Aachen) and polarized neutrons as applied to f-electron magnetism from G. Lander (Karlsruhe). In the spirit of complementarity as emphasized by the opening talk of Marty Blume the afternoon ses-sion covered X-ray resonant scattering by E. Forgan (Birmingham) and W. Stirling (Liverpool) and magnetic reflectivity from thin films and multilayers by J. Bland (Cam-bridge). The day’s scientific sessions were rounded out by W. David (Rutherford Lab UK) telling us about the exciting possibilities provided by the Cambridge Crystallographic Subroutine Library (CCSL) especially in analyzing complex chemical structures and putting in important chemical constraints. This is used in many laboratories worldwide (it's free!), and was developed mainly by Jane, with help from the late Judy Matthewman and Bruce.

Marty Blune of Brookhaven ready to attack the neutron cross section

The day closed with a fine dinner and many impromptu speeches. The joy of such an occasion is that it does not signal the "end" of anything. Three days later Jane ex-pressed to me her relief that all the visitors had gone so that she could work properly again! Indeed.

New Routes to Fusion

(From : Physics World, Vol .10, No. 12, December 1997, p5)

Scientists in the US have devised a new way to achieve nuclear fusion, which they claim is superior to the tokamak approach favoured by the international fusion com-munity. They propose to confine beams of protons and boron-l I in a so-called configuration of magnetic fields. The team has designed a 100 MW reactor, which they believe would overcome the major problems associated with tokamaks (Science 1997 278 1419).

Hendrik Monkhorst of the University of Florida in Gainesville and colleagues at the University of California in Irvine suggest that their reactor would be smaller than a tokamak for the same power output It would also generate much less radioactivity, and would be easier and cheaper to build and maintain. "We have identified all of the engineering questions that need to be addressed," said Monkhorst. "We now need to build experiments to determine the pa-rameters of a prototype reactor."

The new reactor would rely on the fusion of hydrogen and boron nuclei, which are much more abundant than the deuterium and tritium generally used in tokamaks. Experiments at the Los Alamos National. Laboratory and the University of Washing-ton in Seattle also indicate that a plasma confined in a field-reversed configuration is more stable than in a tokamak design. Instabilities in tokamaks tend to transfer heat towards the walls of the reactor, ulti-mately losing the confinement that is es-sential for fusion. In the field-reversed configuration the charged particles follow betatron orbits, in which the particles oscil-late about a circular trajectory. Such orbits are familiar in accelerator physics, but are less well known in plasma physics.

The fusion of a proton and boron-11 nucleus yields three alpha-particles, which can be converted to electrical power with an efficiency approaching 90%. In contrast, the energetic neutrons produced in toka-maks lead to high radiation Levels and can damage the walls of the reactor. Moreover, the conversion efficiency is only about 40% .

Monkhorst and colleagues are now embarking on feasibility studies before a proto-type can be built. A key issue is to understand the injection of the particle beams. " Theory tells us what to do," said Monkhorst, "but we need to build the components to make sure they work as we expect."

Big Gains for Small Science as Research Council is Overhauled

Emma Sanders, Geneva
(From : Physics World, Vol .10, No. 12, December 1997, p9)

Modest reforms of the French scientific research council, the CNRS, were announced by its director, Catherine Bréchignac, last month. The CNRS will increase the core funding given to its laboratories in 1998 and introduce greater competition for research grants. The government team is also looking at whether the council's Institute for Nuclear and Particle Physics can be merged with the French Atomic Energy Commission.

The CNRS budget for 1998 is FFr 13.7 bn (about £1.36bn), an increase of 1.5% on this year. Bréchignac will increase the core funding given to the organization's l400 labs by around 7%. The bulk of this money will come from a cut to the FFr 434 m large facilities budget.

The first casualty will be the Saturne accelerator at Saclay, which will close at the end of the year. GANIL, the heavy ion accelerator at Caen, will also suffer a funding cut. Daniel Guérreau, director of GANIL, agrees "up to a certain point" that the day-to-day running of the labs needs to be given higher priority. But he warns that the policy of reducing the large facilities budget should not be taken too far. "Developing 'light' science can be justified in certain areas of research but not in others, such as astrophysics, particle physics and nuclear physics," he says.

In an effort to increase competition for research grants, Bréchignac has promised to stop funding laboratories in relation to their size and overall performance. She will instead introduce new criteria that take into account the quality and creativity of individual teams. Moreover she has stressed the importance of international input to the evaluation process and announced new procedures under which foreign scientists will contribute to review panels.

The CNRS is an ageing organization whose 25 000 scientists enjoy civil service status with jobs for life. Bréchignac hopes that 425 new posts, due to be created in 1998, will inject new blood and help revitalize the organisation.

In the longer term, more substantial reforms are expected. Vincent Courtillot, the government's chief scientific adviser, is leading a working group to re-evaluate the role of all French research organisations.

PECNO: A New Endeavour

Ewald Balcar, Atominstitut, Vienna
(From : Neutron News, Vol. 8, No. 4, 1997, pp3-4)

The EU has initiated a new coordi-nated scientific effort by supporting a European TMR-Network designed to address science related to perfect crystals and neutron optics.

PECNO—an acronym for PErfect Crystal Neutron Optics—will be active in the next three years. It has already boosted enthusiasm in the community of neutron scattering scientists and will—in accordance with the concept of a TMR-Network—create a number of opportunities for young scientists willing to work and be trained at the partnel institutions of the network.

A recent workshop held in Vienna from April 11th to 13th, 1997, marked the start of the PECNO-Network. Most of the 13 partners in the network took part and represented the width and depth of current interest in the subject, ranging from the application and investigation of crystal growing techniques all aspects of neutron preparation, storage, guidance scattering back-scattering and interference experiments all the way to the fundamentals of wave-particle dualism and the quantum measurement process

The presentations revealed a number of exciting options, and they reflected the beneficial effects unique to a meeting of scientists active in a common field and yet directing their efforts to various facets of the one subject. Highlighting a few of the key areas of this cooperative program, we may anticipate progress in the use and application of perfect and gradient crystals, thus leading to a more efficient use of existing neutron sources. Substantial improvements are expected for small-angle scattering cameras neutron storage devices, and multiple crystal arrangements Neutron interferometry another key area has enjoyed a substantial growth and diversification in recent years and is underpinned by a broad basis of knowhow for crystal cutting and the preparation of interferometer devices. In view of the availability and intensity of X-ray synchrotron sources, it will be a demanding and rewarding challenge to develop position-sensitive area detectors that have sufficient spatial resolution and are fast enough to allow time-resolved micro-tomography with neutrons. From the theoretical point of view, the partners will continue to investigate the fundamental quantum physical aspects of influencing the neutron wave function through partial measurement phase-space manipulations and post-selection experiments.

The partners of the network include an industrial partner, universities, national and international research institutions from the EU, and also three institutions from Eastern European countries. The coordination of the network rests with Prof. Dr. Helmut Rauch from the Atominstitut in Vienna (Stadionallee 2 A- 1020 Vienna Austria). In order to facilitate the distribution of announcements— especially with respect to research positions—an Internet web page has been created with the following address:

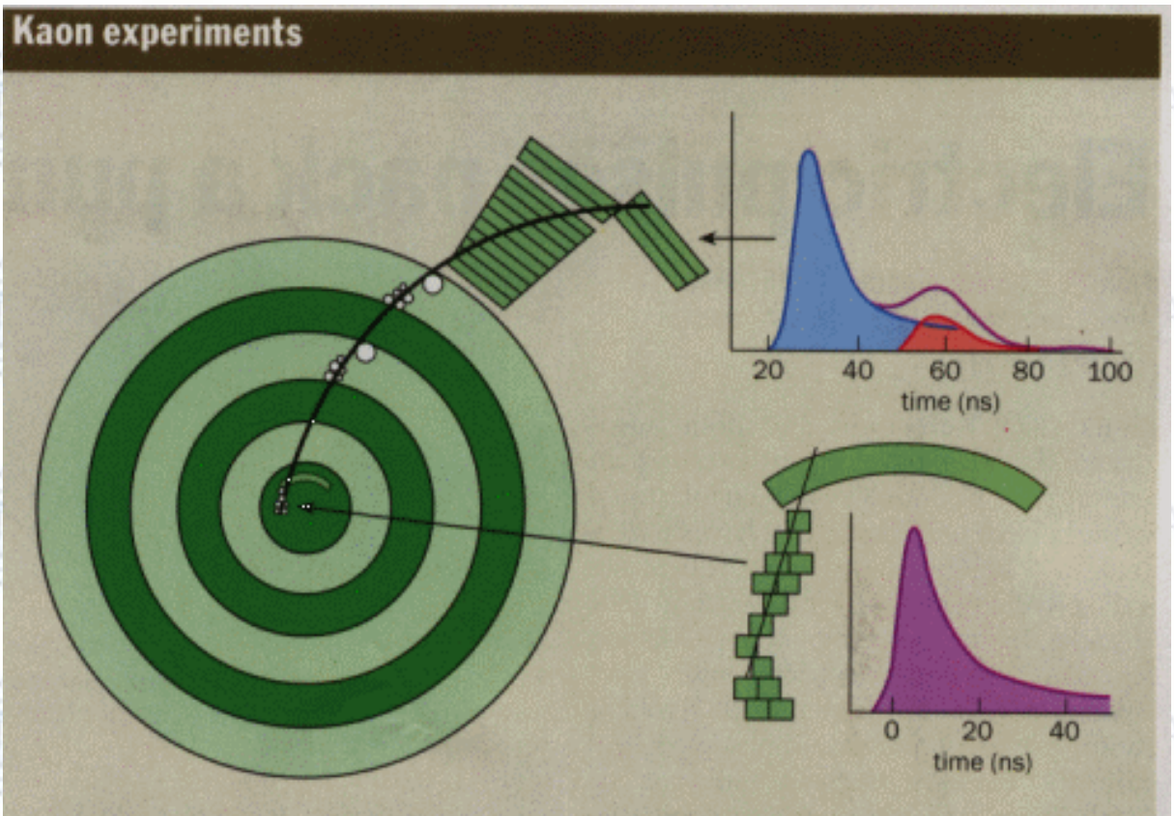
http://www.ati.ac.at/~neutrweb.pecno/pecno.html .

The participants of the PECNO workshop arranged on the famous "Strudlhofstiege"

Experiment Finds One in a Billion

Ken Peach at CERN in Geneva
(From : Physics World, Vol 10 No 12, December, 1997, p21)

A team of particle physicists has witnessed the rarest decay of a particle yet observed. Using the Alternating Gradient Synchrotron at the Brookhaven National Laboratory in the US, the E787 collaboration has detected a single event that could be caused by the decay of a positive K-meson to a positive p-meson, a neutrino and an antineutrino (*Phys.Rev.Lett*. 79 2204)



In the E787experiment, millions of energetic kaons were brought to rest in the target every second. The diagram shows the single event that indicates that a kaon has decayed to a charged pion and two neutrinos. The kaon stops in the target, shown in more detail on the right. Scintillation counters at the kaon stopping point measured the intensity of light at intervals of 2 ns (bottom graph). The curve shows the best fit to the data, assuming that the particle responsible was a stopping kaon. The kaon decays after 24 ns.

to a charged pion and a neutral pion is 205 MeV/c.

Finally, the pion reaches a series of scintillation counters. The pion decays after 27 ns to a muon, which in turn decays to an electron 3.2 μs later. The intensity of the light output from the final scintillation counter is shown in the upper inset, together with the fit to the stopping pion (blue shading), the decay to a muon (red) and the combined fit (purple solid curve). The decay of the muon is not shown.

The trajectory of the charged pion can be clearly seen. The times at which the pion passed through the outer chambers are indicated by the open circles, and a good track should pass each circle tangentially.

From the radius of curvature and the strength of the magnetic field, the momentum of the pion is estimated to be 219.1±2.9 MeV/c. The maximum possible momentum from the decay of a K-meson

The rest of the detector shows little signs of activity, apart from a small number of stray hits in the outer chamber. This rules out the possibility that the pion was accompanied by other neutral pions or gamma rays, so it is most likely that the remaining energy was carried away via an elusive neutrino–antineutrino pair.

- More information is available at http://www.phy.bnl.gov/e787/e787.html

CONFERENCES and NOTICES

AsCA'98

AsianCrystallographic Association
Professor Jim Simpson
President AsCA

reports that through the sponsorship of the Committee on Powder Diffraction of the International Union of Crystallography an

'International School on Powder Diffraction'
(ISPD-98)

is being organized at
Calcutta, India
7 - 10 October, 1998

just before the Asian crystallographic Association Meeting in Malaysia so that many participants from Asian Countries may be able to attend both.

Details are available from:

Prof. S. P. Sen Gupta
Dept. of Materials Science, I. A. C. S.,
Jadavpur, CALCUTTA - 700 032 INDIA
E-Mail : msspsg@iacs.ernet.in
Fax : +91-033-473 2805

Information regarding the School will be accessible on the AsCA'98 Homepage: http://gandalf.otago.ac.nz:800/rweavers/ASCA/asca98.htm

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The following is an article by Prof. Simpson concerning the above Conference :

Jim Simpson
Society of Crystallographers in Australia Inc Newsletter No. 36, Nov., 1997, p1

Plans for the forthcoming AsCA'98 meeting in Malaysia (13-15 October, 1998) are proceeding very well. The First Circular has been printed and sent to the various National representatives for distribution and will also be printed in the Journal of the Crystallographic Society of Japan. A copy of this circular, together with a form to register interest in the conference and a request for a copy of the Second Circular are also available on the AsCA'98 Homepage on the internet : http://gandalf.otago.ac.nz:800/ rweavers/ASSCA/asca98.htm which can also be reached by a link from the SCA Homepage : http://www.sca.asn.au.

Plans for a wide ranging scientific program are also well in hand and the meeting will feature a half day IUCr50 Symposium to celebrate the 50th Anniversary of the IUCr.

I have also heard from Professor Sen Gupta that he is organising an International School on Powder Diffraction (ISPD-98) in Calcutta, India from 7-10 October, 1998. Since this is jut before AsCA'98 it is hoped that many participants from Asian countries may like to attend both meetings. Further details will be available shortly.

XVIIIth IUCr CONGRESS and

GENERAL ASSEMBLY

to be held at

Scottish Exhibition and Conference Centre (SECC)

Glasgow, Scotland

4 - 13 August, 1999

Contact : J. Howard

Fax : +44 191 384 4737

e-mail : j.a.k.howard@durham.ac.uk

NEW MEMBERS, ADDRESS CHANGES

(The full list of Members (access from Welcome page) is updated regularly between issues. Address changes, and the following new members, have been added)

Welcome to New Members :

Dr Tatiana A. Angelescu
Physics Faculty
University of Bucharest
PO Box MG11R 76900
BUCHAREST ROMANIA

Dr. Amarjit Singh Dhaliwal
Department of Physics
Sant Longwal
Institute of Engineering and Technology
Longowal Sangrur
PUNJAB 148 106 INDIA

Dr Huaiqun Gun
Department of Radiation Oncology
St Jude Children's Research Hospital
332 North Lauderdale Street
MEMPHIS, TN 38105-2794 U.S.A

Dr Shyam L. Kalla
Department of Mathematics
Kuwait University
PO Box 5969
SAFAT 13060 KUWAIT

Dr Cecille Malgrange
Lab de Mineralogie-Cristallographie
Universite Paris
64 place Jussieu
F-75252 PARIS Cedex 5 FRANCE
Email: malgrang@lmcp.jussieu.fr

Dr Aurelian A. Radu
Institute of Space Science
PO Box MG36
RO 76900 BUCHAREST ROMANIA

Dr Biva Roy
Department of Physics
Bose Institute
CALCUTTA 700 009 INDIA

Dr Tomulescu Vlad-Costin
Institute of Public Health
1-3, Dr. Leonte Street
BUCHAREST 76256 ROMANIA.

Dr Nicholas Tssulfandis 12/99
Nuclear Engg. Department
University of Missouri-Rolla
ROLLA MO 65409-0170 U.S.A.

Dr Neslihan Ekinci
Atatuck Universitesi Fer-Edebiyai
Fakultesi Fizik
Bolurnu 25240 EZRURUM TURKEY

Dr Hem Prabha
Theoretical Physics Division
5th Floor, Central Complex
Bhabha Atomic Research Centre
Trombay
BOMBAY 400 085 INDIA

Dr Jan R. Pels
209 Academic Projects Building
UNIVERSITY PARK PA 16801 U.S.A.

Prof Carlos R Appoloni
Head, Applied Nuclear Physics Laboratory
Department of Physics - CCE
State University of Londrina
PO Box 6001
86051-970 LONDRINA PR BRAZIL

.. and apologies to Members who were omitted from our mailing list (now rectified!)

Dr Angela Vasilescu
Institute of Nuclear Physics and Engineering
"Horia Hulubei"
Radiation Metrology Department
PO Box MG-6 BUCHAREST ROMANIA

Dr. Paul S. Nizin
Baylor College of Medicine
Department of Radiology
One Baylor Plaza
HOUSTON, TEXAS 77030-3498 USA

Dr Christopher G. Jesudason
M003, Chemistry Department
Universiti Malaya
59100 KUALA LUMPUR MALAYSIA

REPORTS FROM VICE PRESIDENTS AND COUNCILLORS

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