GIREP newsletter

Groupe international de recherche sur l'enseignement de la physique
International Research Group on Physics Teaching
Internationaler Arbeitskreis zur Förderung des Physikunterrichts

No. 29 February 1993

ICPE Medal 1993

Nahum Joel (born in Chile in 1924) a personality who has contributed to the international respect, cohesion and development of physics education for the past 30 years in a most decisive way. Beside educating prominent experts like Ana Csilag and Rafael Ferreyra, he played an active role in research and educational development of modern optics, from crystallography to holography; in this way he changed the face of optics in physics education. The books he wrote, edited and launched, among other the important TRENDS series, reached every country which pays real attention to education. But the far greatest achievement of Nahum Joel has been to bring together the teachers of physics from the West, from the Spanish speaking world, from Eastern Europe, from the globe to one creative community where citizens of industrialized superpowers and small developing countries, highly respected university professors and enthusiastic school teachers have got a chance to improve the level and actuality of teaching physics. In 1963 he joined the UNESCO headquarter offices in Paris and till his retirement in 1985 he served in the Sector of Science and Technology Education. Being a leader himself, Nahum Joel has been instrumental in the detection and promotion of local and regional leaders in physics education, by providing good opportunities for them to act and to grow. Despite the fact that very often the name of Nahum Joel does not appear in the front page, several books, articles or thesis are dedicated to him as public recognition of his contributions. Great teachers always behave in that friendly and humble way: they live to dissolve in the works of their students. The students may overtake their master, making progress possible, giving the beauty of physics teaching. Nahum Joel loves all of us and we love him with the deepest respect. Even in the tiny far–away Hungary several of us feel to be his students, we know that he has taken care of us.

(E.T.)

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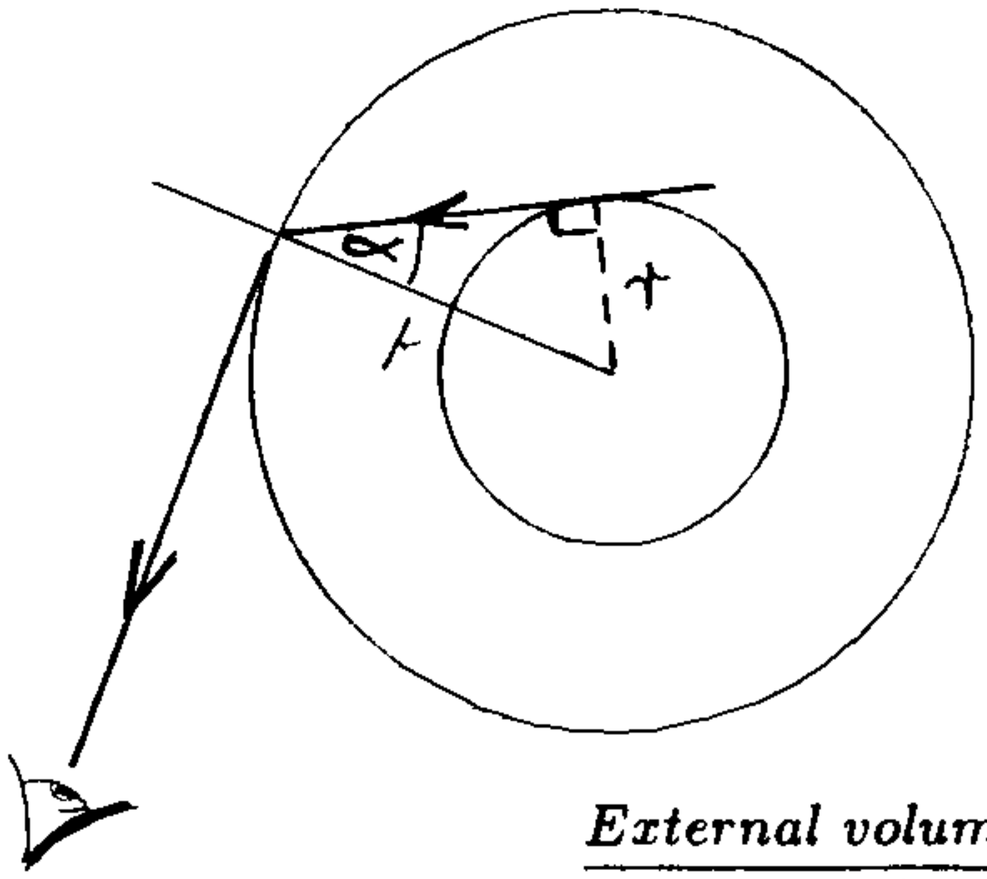
Nahum Joel's Favorite Problem

When you look at a bottle of eau de cologne, of a soft drink, of wine, etc, you may have the impression that it is made of infinitely thin glass. The liquid seems to fill the bottle right up to its external wall. Why this is so?



Look at the figure! The light beam coming from the liquid to your eyes is shown for the case when you see the side of the glass. Because of the refraction $sin\alpha = \frac{1}{n}$ and because of the geometry $sin\alpha = \frac{r}{R}$, thus $R = nr$. (Here n is the index of refraction for the glass.)

For a cylindrical bottle:

$$\frac{External\ volume(bottle)}{Internal\ volume(liquid)} = \frac{R^2}{r^2} = n^2.$$

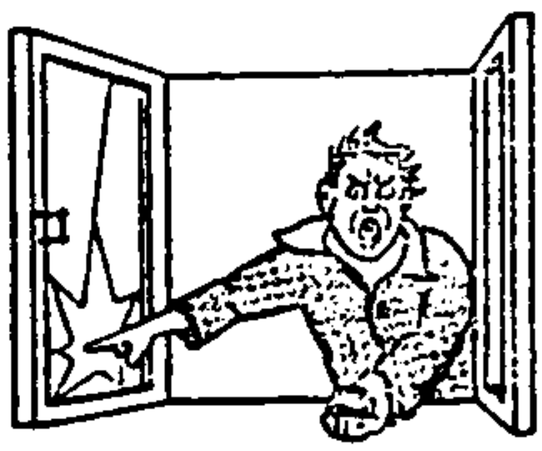
If $n = 1.5$ then $n^2 = 2.25$. So, the bottle may in fact contain (less than) half the liquid it seems to contain. (With a spherical bottle, the ratio would be $n^3 = 3.375$, and the liquid contained may be less than 1/3 of what it seems.)

Selections from a List of 100 Problems
by Peter Leonidovich Kapitza

These problems had been sent by Kapitza (with kind wishes) to R.V. Pound of Harvard University in about 1966. Xerox copy sent to H.R. Crane by Edward Purcell of Harvard. Translated from Russian in 1969 by John Pearl, student at the University of Michigan. Here are only problems reproduced which were illustrated by cartoons. Artist of the cartoons is unknown, may have been Kapitza.

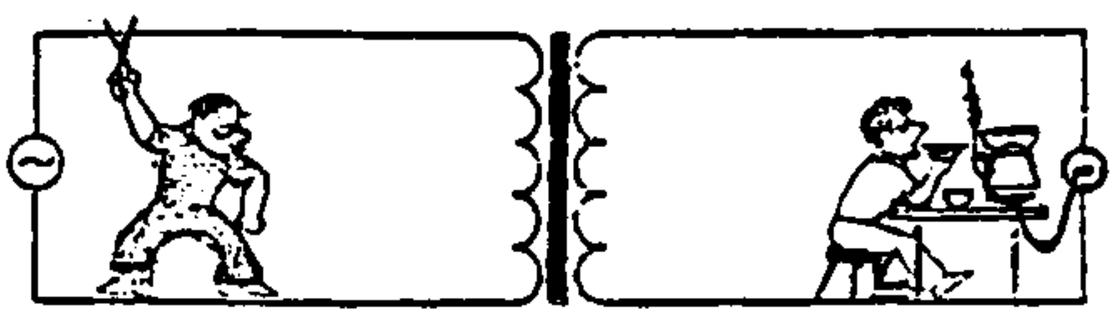
After earning his doctorate in Russia in 1919 Kapitza went to work in Rutherford's Laboratory in Cambridge University in England, where he pioneered in production of high magnetic fields: 500 000 Gauss, far the highest known. In 1934 on a holiday in Russia, his passport was seized and he was forced to stay. There he invented a helium liquifier, and discovered superfluid HeII. Later he became chief of satellite development, and desereved a great part of the credit for the success of the Sputnik. After that he worked on ionized gas plasmas, trying to explain ball lightning. He received the Nobel prize in 1978 for his work on strong magnetic fields and the discovery of superfluid Helium. He received the medal of the International Commission of Physics Education in 1982.

a) With what speed must a tennis ball fly in order that it will break a glass?



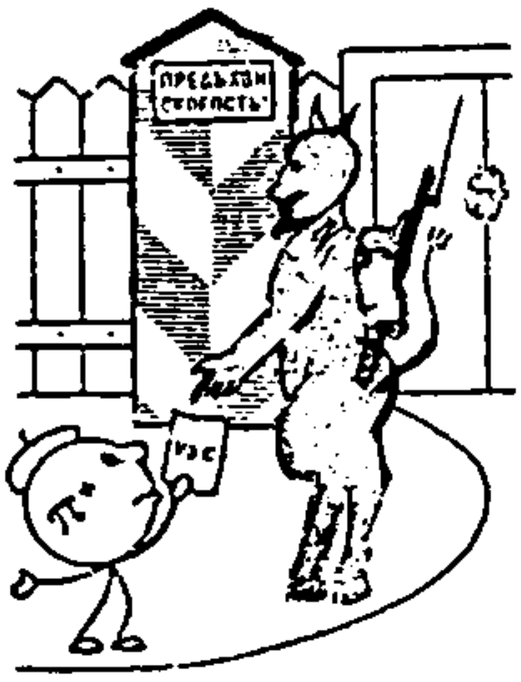
b) The Coffin of Mohammed. How is it possible, by electric, magnetic and other forces, to realize a freely suspended body which would be in a stable equilibrium with gravity?

c) Why doesn't an overvoltage occur in the secondary of a transformer when the current in the primary is interrupted, while overvoltage does occur in an induction coil when the current is interrupted?



d) Estimate the order of the speed at which a person must run on the water in order not to sink.

e) Why is it possible to pour liquid nitrogen on the hand without the fear of "burn"?



f) A molecular beam is passed through a selector consisting of two discs which rotate on a common axis, and in which there are radial slits that on one disc are displaced relative to those on the other. As is well known, only molecules of one specific velocity will pass through both discs. Therefore it is a "Maxwell's Demon". How is it consistent with the second law of thermodynamics?

PROJECT 2000+
an International Project on Scientific and Technological Literacy for All
Preparing for the Year 2000 and beyond

A dimension of the EDUCATION FOR ALL initiative needed to empower ALL PEOPLES to:

– help themselves and each other to live a better life through the sharing and proper application of scientific and technological knowledge

– forge a new culture of care, concern and competence for dealing with human problems in harmony with the environment

– share responsibility for present and future of humanity and for the life of each individual, paricularly those who have been less privileged

– understand the needs and aspirations of others; promoting equity and fairness in social, eonomic, cultural, scientific and technological development.

Why is this project necessary?

Social issues of the modern world need an increasing degree of scientific and technological literacy on the part of the populace for both the understanding and the decision-making involved to simulate necessary action. The 1990 World Conference on *Education For All* (WCEFA) recognized the need for a world community of scientifically and technologically literate citizens. However it did not have the opportunity to consider in depth science and technology education in schools and in communities. Project 2000+ is an initiative of UNESCO and the International Council of Associations for Science Education (ICASE) supported by other sponsors of WCEFA to meet this need.

What can be done?

Explore the meaning of scientific and technological literacy. Raise awareness of goverments at policy levels of the need for science and technology education for all. Provide a framework for major programmes of action in science and technology involving governments, Intergovermental and Non Governmental Organizations. Provide guidelines for professional development of science and technology teachers. Support the development of a wide range of regional and national projects including evaluation studies, teacher education programmes and resource development.

Worldwide Expectations

* A world community of citizens who are literate in science and technology

* Increased interation between scientists and their communities

* National policies, curricula and teacher education to meet the needs of the 21st Century.

How Project 2000+ will Make All These Happen?

Phase I: Preparatory work is under way:

– information and research on projects, curricula, teacher education and experiences are being collected worldwide, will be organized in databases, analyzed and published;

– networks for information exchange, institutions and specialists who can provide technical support are being identified;

– potential sponsors and donor agencies and organizations are being invited to join the project;

– guidelines for national action are being prepared to facilitate programme design, funding and implementation;

– 'feeder' meetings and workshops are being supported and organized.

Phase II: An International Forum, to be held in Paris from 5 to 10 July 1993 is being planned to permit worldwide exchange of knowledge and ideas and create a firm commitment towards scientific and technological literacy for all. Discussions and contributions relating to scientific and technological literacy will focus on: the need, development, teaching and learning environments, teacher education and leadership, assessment and evaluation, non-formal and informal development.

Phase III: National Programmes will be designed and implemented in and each country. An international task force will be support the more critical tasks as needed.

Project 2000+ belongs to the people. Everybody has the right and the moral obligation to participate. How to participate?

During Phase I, those persons and organizations having information on research findings, experiences or projects related to scientific and technological literacy, and particularly to the 6 focus areas already mentioned are encouraged to send their articles or communications to: John E. Penick, Science Education Center, Van Allen Hall, University of Iowa, Iowa City, Iowa 52242, U.S.A. Tel: +1-319-335-1168, fax:+1-319-335-1188, BitNet:CEDPENWY@UIAMVS. For further information please contact: Project 2000+ Secretaiat (ED/STE),UNESCO, Place de Fontenoy, 75700 Paris, FRANCE; Fax: 33-1-40.65.94.05, telephone: 33-1-45.68.08.37, BitNet: EDAPE@FRUNES21

"Labs on Wheels" – an Aid to Schools

Science instruction for elementary students (grades 1–6) is improved by the use of demonstrations that allow students to see physical principles in action. Participation by a student in making physical observations, such as laboratory experimentation, is an ever better method of learning science. However, many schools have no equipment or materials for doing demonstrations or laboratory exercises for their students. It would be extremly expensive to provide every school with the equipment and materials to properly teach science. A new program "Laboratories on Wheels" is helping to solve this problem in our geographic area.

With money from Michigan Department of Education, SVSU has bought a large quantity of laboratory and demonstration equipment suitable for elementary schools science instruction. This equipment is loaned to nearby schools. By loaning the equipment for 4–6 week periods, several schools can use the same equipment in the same academic year. Just as it is cheaper to buy books for a central library system and loan the books to interested readers than it would be for each reader to buy every book for

themselves, it is cheaper to have the university buy science equipment and loan it to schools rather than have each school buy all the equipment it needs.

The equipment is packaged into modules with several interrelated demonstration and laboratory exercises on a common topic. A module provides enough material for about one month instruction in elementary schools in the U.S. Each module comes with a complete set of instructions on how to use equipment and suggestions about how to teach the basic concept. A van bought with state funds delivers the modules to the school and picks them up when the teachers have finished with them. This is the origin of the name "Labs on Wheels".

Since this program started two years ago, it has become popular with local teachers. The biggest problem with this program has been the inability to provide adequate training to the teachers so that they can use the modules with the greatest benefit to the students. It seems to us that the "Labs on Wheels" concept is a useful technique to achieve maximum benefit from limited resouces for science equipment in schools.

Albert Menard
Saginaw Valley State University, U.S.A.

'93 Guilin Multi–national Physics Teachers Meeting

August 3–4, 1993 at Guanxi Normal University, Guilin, PR China

For many years, physics teachers have been confronted with serious problems which were often called "crisis of physics education". Many teachers were in fact defeated by the crisis. Their ignoring and despair only made the things worse. On the contrary, there are teachers who always keep in mind their responsibities as teachers and never gave up their effort to improve their teaching. Their unusual enthusiasm and persistent devotion to education attract more students and encourage their collegues. It is because the efforts of these outstanding teachers in U.S.A., Japan, China, ... that we can optimize about the future of physics education.

The aim of this meeting is to bring together physics teachers from different countries active in improving the current situation in physics education at both high school and college/university levels in order to exchange ideas, knowledge and experiences of how to effectively stimulate students' interest in learning physics, promote genuine understanding in physics conceptions and cultivate thinking and creation. Besides, we expect this meeting to act as a bridge of mutual understanding, friendship and co-operation among physics teachers of various part of the world.

Programme: Guilin Multi-national Physics Teachers Meeting August 3 – 4, 1993. (2 days and 2 nights, US Dollar 90 includes all accomodation in a three star hotel, transportations and cultural events.) Excursion in Guilin and Yangshuo July 31 – August 2, or August 5 – 7, 1993. (3 days, 3 nights, US Dollar 275 includes full accomodation in a three-star hotel, transportations, excursions.)

Correspondence: Foreign Affairs office, Guanxi Normal University, Guilin, 541001, P.R.C.; Telephone 773-225850; Fax: 773-512383.

Light and Information
GIREP '93, 16–21 July

The conference deals with light in interaction with matter and its use for the transport and processing of information. It will be specially addressed to physics teachers, physics teachers' trainers and specialists in physics education. – It will be held in Braga, one of the most dynamic Portuguese cities, with over 100 000 inhabitants and situated 50 km northeast from Porto. Known as "the city of the archbishops", Braga is one of the oldest Christian towns, founded by the Romans, with the name of "Bracara Augusta", around the year of 27 B.C. It is well known for its 11th century cathedral, its sanctuaries of Bom Jesus, Sameiro and Falperra, and also for various splendid XVII century monuments, in Baroque style. – Plenary speakers and topics:

- A. Moreno Gonzalez (Spain): History of Optics
- A. Rocha Trindade (Portugal): Simulation, Exp't and Reality in Optics Teaching
- C. Taylor (United Kingdom): Optical Images and Education
- F. Carvalho Rodrigues (Portugal): Light, Communication and Information
- F. Kaczmarek (Poland): Micro–amplifiers and Micro–lasers
- Gallieno Denardo (Italy): Optical Transmission of Information
- George Marx (Hungary): Light, the Sky and Us
- Keith Hodgkinson (United Kingdom): Title to be confirmed
- Richard Fork (USA): Ultrashort Light Pulses
- Silvia Costa (Portugal): Primary Events in Photosynthesis

Open Lecture by Brian Davis (UK): Light and Colour: Physics of Fine Art
(other invited speakers are to be confirmed)

Workshops will be held in the following areas: Models of Light in School Education; Teaching Light, Colour and Vision; Light Studies with Simple Materials; Vision and Optometry; Light Scattering; Optical Experiments and Computer Modelling; Teaching Geometrical Optics; Holography. – Short communications (15 min) within the general topics of the Workshops and posters in the field of the Conference are welcome.

The Final Registration Form together with the conference fees should arrive to Braga before 30th of May 1993. (Copies of the bank receipt should be sent to the Organization Secreteriat, to arrive not later than 10^{th} of June. – Conference fees include Conference Abstracts and general documentation, Proceedings, coffees and light refreshments, and social programme:

Active participants: twenty thousand PTE, accompanying person: six thousand PTE, members of SPF: thirteen thousand PTE, GIREP, EPS members: thirteen thousand PTE, undergraduate students: six thousand PTE. (One US Dollars is about 140 PTE.)

A final registration form together with the 2nd Circular containing more details may be asked from the Conference Secreteriat:

Conference GIREP'93, Dr. Helena Lopes, Physics Department, Campus de Gualtar, University of Minho, 4719 Braga Codex, Portugal, fax 351-53-604339 or 351-53-604392, telephone 351-53-604331.

GENERAL INFORMATION

GIREP COMMITTEE

President: *George Marx*, Dept. Atomic Physics, Eötvös University, Puskin u. 5., 1088, Budapest, Hungary (telex 225459, tel 361-266-79-02, fax 361-266-02-06)

Vice-presidents: *Joseph Depireux*, Institute de Physique, 4000 Sart-Tilman (Liege 1), Belgium (tel 3241-563-612, fax 3241-562-355) *Silvia Pugliese Jona*, via San Nazario 22, 10015, Ivrea (Torino), Italy (tel 39-125-436-37, fax 39-125-621-872)

Secretary: *Esther Tóth*, Logodi u. 48, 1012 Budapest, Hungary (tel 361-175-29-43, fax 361-266-02-06)

Treasurer: *Brian Davies*, The Institute of Physics, 47 Belgrave Sq, London SW1X 8QX, UK (tel 44-71-235-6111, fax 44-71-259-6002)

FEES

The accounting year runs from January 1 to January 1, Fees paid after September in any year will be credited on the following year, unless the applicant specifies otherwise. – The current fee (1992) is 10 £st, **preferably paid into one of the two London accounts** or, if that is not possible, the equivalent of 10 £st in the currencies and into the accounts indicated application for (or renewal of) membership, with members paying their own bank charges and mailing costs. It is possible and advisable, in order to reduce bank expenses, to pay several years together in advance. – In cases of real difficulty of payment, please contact the Secretary who is ready to advise whether special arrangements can be made.

London accounts:

a) GIRO: Fees in £st should be made out to "Brian Davies re GIREP" GIRO Account n° 53 889 4806. This number must be quoted and the money sent to GIROBANK, c/o The Post Office, Eccleston Street BO LONDON SW11 9LS, UK. At the same time, please send a note to the Treasurer confirming how much money you sent and when and for what years. b) Non GIRO: made out to "GIREP ACCOUNT N° 90301248" and sent to the Treasurer.

Italian Account: Equivalent of 10 £st can be paid, in Italian Lire only, made out to "Marisa Michelini" and sent to: Dr Marisa Michelini, Istituto di Fisica dell'Universitá, via Campi 213/A, 41100 Modena, Italy.

APPLICATIONS AND NEW MEMBERS

Applicants for membership should, please require the Application Form from the Treasurer

INQUIRIES – CHANGES OF ADDRESS

Please, address inquiries concerning fees to the Treasurer. Other inquiries may be addressed to the Secretary or to any other member of the Committee. Please, send notice of changes of address to the Secretary.

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