# GIREP newsletter

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

No. 32 December 1994

## THE INTERNATIONAL PHYSICS STUDENT OLYMPIADS

The International Physics Student Olympiad emerged from the discussion of three physics teachers, Rotislav Kostial (Brno), Rudolf Kunfalvi (Budapest) and Czeslav Scislowski (Warszawa), in Prague in 1965, at the conference of the Czecko-Slovakian Physical Society. The first Physics Olympiad was organized in Warszawa in 1967, with Bulgaria, Czecko-Slovakia, Hungary, Poland and Romania participating.

I would say, the Olympiad is the continuation and extension to the international scale of the Students' Competitions in Central European countries, among them the Eötvös Competition in Mathematics and Physics in Hungary has the longest history: it celebrates its centenary just in 1994. With a few exceptions, the International Physics Student Olympiad has occured every year since its inception, growing up gradually from a small group of countries to its present status of genuine international scale. It was recognized by the international community of physicists in 1991, when the Physics Education Medal of the International Union for Pure and Applied Physics was given to the International Physics Student Olympiad. Thus the Olympiad has become one of the most challenging science competitions for high school students. Each country (independenly of its size and population) sends a team of 5 high school graduates (not yet in college or university) to the Olympiad (accompanied by two teachers), and the students solve theoretical and experimental problems individually in their mother tongue.

The 25th Physics Olympiad, with 229 students having participated from 46 countries, was held in July 1994 in Beijing. This was the first time of such an event held in Asia since its interception a quarter of a century ago. China is a country of long history and culture, but the history of science competitions is quite short. Physicics competitions were initiated in China only 10 years ago, thus they are by an order of magnitude younger than the Eötvös Competitions in Hungary. The Eötvös Competitions pose problems of high standard, and challenge the gifted creativity of the pupils rather than their knowledge. The International Physics Olympiads follow the same principle. A TV reporter asked me what kinds of knowledge are requested in the international contest. My answer was that not the knowledge itself is assessed, but the ability of applying the physics knowledge to solve the appropriate problems which might look infamiliar to the contestants in their physics lessons. We tried hard to offer such problems in Beijing, and several team leaders expressed their interest in the novel character of the problems given.

The participation history of the past 25 physics olympiads are given in Table 1 (page 2).

*Kai-Hua Zhao*
*Department of Physics, Peking University, China*

## Table 1. Participation History of Physics Olympiads

(H:Host, *:participant, O:observed)

| Year | 1969 | 1970 | 1971 | 1972 | 1974 | 1975 | 1976 | 1977 | 1979 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * |
| Australia | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * | * | * | * | * |
| Austria | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * | * | * | * | H | * | * | * | * | * | * |
| Belgium | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * | * | * | * |
| Belorus | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O |
| Bulgaria | * | * | * | * | H | * | * | * | * | * | * | H | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Canada | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * | * | * | * | * | * | * |
| China | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | O | * | * | * | * | * | * | * | * | H |
| Columbia | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * | * | * | * |
| Croatia | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * |
| Cuba | - | - | - | - | - | * | - | - | - | - | - | - | - | * | * | * | * | * | * | * | * | H | * | * | * |
| Cyprus | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * | * | * | * | * |
| Chech(S)Rep* | * | H | * | * | * | * | * | * | * | H | * | * | * | * | * | * | * | * | * | * | * | * | C | C | |
| Denmark | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | - | - | - | - | - | - |
| Estonia | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * |
| Finnland | - | - | - | - | - | - | - | - | O | * | * | * | * | * | * | * | * | * | * | * | * | H | * | * | |
| France | - | - | - | - | - | * | - | * | * | * | - | * | * | * | - | - | - | - | - | - | - | - | - | - | - |
| Germany | - | * | * | * | * | * | * | * | * | * | * | * | H | * | * | * | * | * | * | * | H | * | * | * | * |
| Gt Britain | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | H | * | * | * | * | * | * | * | * |
| Greece | - | - | - | - | - | - | - | - | - | - | - | - | * | - | - | - | - | O | - | O | - | * | * | * | * |
| Hungary | * | H | * | * | * | * | * | * | H | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Iceland | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * | * | * | * | * | * | * | * | * |
| Indonesia | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * |
| Iran | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * | U | * |
| Israel | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * |
| Italy | - | - | - | - | - | - | - | - | - | - | - | * | * | - | - | O | - | * | * | * | * | * | * | * | * |
| Kuvait | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * | - | * | * | * |
| Lithuania | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | U | O | - | * | * | * |
| Mexico | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * |
| Moldova | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O |
| Netherland | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * | * | * | * | * | * | H | * | * | * | * |
| New Zealand | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O |
| Norway | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * | * | * | * | * | * | * | * | * | * |
| Philippines | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * |
| Poland | H | * | * | * | * | * | H | * | * | * | * | * | * | * | * | * | * | * | * | H | * | * | * | * | * |
| Portugal | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * |
| Roman | * | * | * | * | * | H | * | * | * | * | * | * | * | H | * | * | * | * | * | * | * | * | * | * | * |
| Russia(SU) | - | * | * | H | * | * | * | * | * | * | H | * | * | * | * | * | * | * | * | * | * | * | R | R | R |
| Singapore | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | W | * | * | * | * | * | * |
| Slovakia | * | * | H | * | * | * | * | * | * | H | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * |
| Slovenia | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * |
| South Korea | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * |
| Spain | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | O | * | * | * | * | * |
| Suriname | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * |
| Sweden | - | - | - | - | - | O | - | - | * | * | * | * | * | * | H | * | * | * | * | * | * | * | * | * | * |
| Switzerland | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O |
| Taipei China | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | U |
| Tailand | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * | * |
| Turkey | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | * | * | * | - | * | * | * | * | * | * |
| Ukraine | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - | * | * | * |
| UAE | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | - | - | - | - | - |
| USA | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | O | * | * | * | * | * | * | * | H | * |
| Vietnam | - | - | - | - | - | - | - | - | - | - | - | * | * | * | * | * | - | * | * | - | * | - | * | * | * |
| Yugo(Serb) | - | * | * | * | - | - | - | - | * | * | * | * | * | * | * | * | * | * | H | * | * | * | S | S | S |

## Problems from 1925

Eötvös Competition, Budapest

1. The period of a simple pendulum on the equator of the Jupiter is 2 seconds. What is its length if Jupiter's mean radius is 11.14 times that of the Earth, it's mean density a quarter of the Earth's and the period of rotation is 9 hours 55 minutes 34 seconds? (The mean density of Earth is 5.5 g/cm$^3$, it's mean radius is 6375 km.)

2. Water and pieces of ice at temperature 0 °C are in a container. How will the height of the water level change after the ice melted?

3. The dimensions of a slide are 2cm x 3cm. It is desired to project an image of the slide, enlarged to 4cm x 6cm, on a screen at a distance 20 m. What should be the focal lenght of the projection lens?

(The winner of this competition was Edward Teller.) *Gy.J.R.*

## The World Around Us*

What I would like to do today is to chat with you briefly about various viewpoints on three subjects in which I believe we have a common interest, viz.: Physics, Physics Teaching, and Physics Teachers. There is an old song, "I get along with a little help from my friends." As you will see, much of what I have to say will be drawing on what I have learned from others, and I will be quoting from extensively.

Let me start with Physics. Niels Bohr once remarked that *"Physics concerns what we can say about nature."* The word "we" in that sentence remind us that physics is a human enterprise. Moreover, since what we *can* say is at any time a function of our knowledge, our understanding, and our imagination, physics is a dynamic enterprise, an enterprise in constant process of change. In the past few decades these changes have been extraordinarily rapid and significant. ...

Physics Teaching is an integral part of the physics community and it has not escaped the effects of the explosive increases in our detailed knowledge of the physical world, and the changes in the ways we interact with each other and with society. These changes have been both a challange and an opportunity. As Jerome Bruner put it in 1966:

*"I shall take it as self-evident that each generation must define afresh the nature, direction, and aims of education to assure such freedom and rationality as can be attained for a future generation. For there are changes both in circumstances and in knowledge that impose constraints on and give opportunities to the teacher in each succeeding generation. It is in this sense that education is in constant process of invention."* ...

Physics teaching is done by Physics Teachers. Physics teachers tend to teach the way they were taught.

*"Any instructions, or do I just wing it?"*

Congratulation ELJ!

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* a few paragraph form E. Leonard Jossem's acceptance speech for the 1994 Oersted Medal presented by American Association of Physics Teachers

## Message from the President of GIREP

The director-general of CERN has informed the president of GIREP and the chairman of ICPE, that they are unable to host the intended physics education conference at CERN. Therefore the Presiduum of GIREP and the International Commission on Physics Education of IUPAP asked the University of Udine and the International Centre for Theoretical Physics in Trieste, to host the 1995 conference in Udine (planned originally for 1996) that they cordially accepted.

Dr. Seta Oblak invited the International Conference on Physics Education for 1996 to Ljubljana, Slovenia, with the tentative topics NEW WAYS OF TEACHING PHYSICS (demonstrations, labs, computers, interfacing, networking). – For further information concerning the Ljubljana meeting contact Dr. Seta Oblak, Zavod Republike Slovenije za solstvo, Poljanska cesta 28, Ljubljana 61000, fax 386-61-310267.

**GIREP'95** **ICPE 95**

## TEACHING THE SCIENCE OF CONDENSED MATTER AND NEW MATERIALS

### international conference at the University of Udine, 24-30 August 1995

organized by the Groupe International de Recherche sur l'Enseigment de la Physique, the International Commission on Physics Education of the International Union for Pure and Applied Physics, the Office of External Activities at the International Centre for Theoretical Physics, and the University of Udine.

Our life, technology and comfort depend strongly on materials we use. Beside the "classical" materials – like ionic crystals, conducting metals, common fluids – we rely increasingly on "new" materials – man-designed semiconductors, superconductors, optical fibers, liquid crystals, smart materials. Devices commonly used by teenagers are based on the physical (structural, magnetic, electric, optical, thermal transport) properties of different types of condensed matter. Our duty is to bring this modern technological environment into the class room, without giving up the valuable aspects of physics teaching, based on direct experiences, rational reasoning, quantitative measurements, and predictions based upon calculations, which formed the scientific basis of the industrial revolution in the past and of the high tech revolution today. The conference will bring together scientists, researchers in education, teachers from schools and universities in a common effort to discuss the issues of introducing these topics in science teaching at different levels.

Udine (pronounced as "Oudeene') is a pleasant ancient city of 100 000 inhabitants at the feet of the Julian Alps, not far from the Adriatic Sea. It has a young and dynamic university which offers cordial hospitality. Udine is in the North-East corner of Italy and can be easily reached by train or plane. It is 60 km from Austria, 40 km from Slovenia, 70 km from Trieste, 125 km from Venice.

### Organizing Committee

Gallieno Denardo, International Centre for Theoretical Physics, Trieste
Marisa Michelini, University of Udine
Silvia Pugliese, GIREP

**Mailing address:** GIREP–ICPE–95, M. Michelini–S. Pugliese, Physics Department, University of Udine, via delle Scienze 208, I–33100 Udine, Italy. Phone 39–432–558208. Fax 39–432–558222. E–mails MICHELINI@FISICA.UNIUD.IT and MC5940@MCLINK.IT.



The conference will include

**a) invited talks** on scientific, technological and educational topics;
**b) panel session** with short contributions and discussion;
**c) workshops** on

macroscopic versus microscopic properties;
new methods to teach traditional properties of condensed matter;
the science of new materials;
implication for school curriculum;
demonstrations, experiments, laboratory work;
use of computers in teaching the topics;
science–technology–society aspects;
transport properties;
cognitive problems related to the topics;
problem-solving approach to the topics;
show & tell session.

The participants are invited to participate in the workshops, poster sessions, exhibits. An excursion is planned to Trieste (synchrotron, ICTP, Laboratorio Imaginario museum). The language of the conference is English. Participation fee is US$ 100. Bed and breakfast in student dormitory takes US$ 100 for the conference. Hotel rooms are available for US$ 50-100. Deadlines:

**pre-registration, call for papers:** 31 January
**second circular, provisional programme:** 31 March
**final registration, submission of abstracts:** 30 April.

## In Memoriam: Peter Kennedy (1925 – 1994)

With the death from cancer of Peter Kennedy on night of July 5, 1994, the world of international physics education lost one of its most dedicated and well-loved members. – Peter Kennedy first became involved with ICPE affairs in the planning for the general conference on physics education that took place in Edinburgh in 1975. As a member of the local committee, and as Treasurer for the conference, Peter played a key role in the planning and the whole conduct of the conference. The planning, of course, began well over a year in advance, and it was at this time that I first met Peter and began my long associaton with him. The conference itself was, in my opinion, the most exciting that the ICPE and GIREP has ever held. It was at this time that Peter Kennedy, with his imagination and his graphic talents, designed the emblem that has become the logo of the Commision in all its publications. Peter became an Associate member of the ICPE in 1975, in 1978 he was elected Secretary of the Commission, and later served as Editor of the ICPE Newsletter from 1985 to 1987. As Secretary he was centrally involved in organising several of the Commission's international conferences, beginning with the Postgraduate Education of Physicists held in Prague in 1980. In preparation for this conference, Peter Kennedy, in association with Maurice Ebison of the Institute of Physics in London, spent two years preparing a background report for the conference, based on information collected from around the world. The Prague conference was immediately followed by a conference in Trieste on Education for Physics Teaching. Peter was a co-editor of the Proceedings for both conferences. He also wrote a wise and witty retrospective commentary on the Trieste conference. It was, I believe, the experience of Trieste that cemented Peter's love of Italy and things Italian, a devotion that continued for the rest of his life. Peter's other major involvement so far as conferences were concerened was the conference on Using History of Physics on Innovatory Physics Education, held at Pavia in September 1983. Besides playing an important part in the planning of the conference, he served as co-editor in producing the conference Proceedings. Peter Kennedy was also associated with two significant books published by the ICPE. The first of these was Einstein: A Centenary Volume, published in 1979. Peter was a member of the four-person editorial committee for this book, which was extremely well received and gave a gratifying boost to the ICPE finances. A few years later, Peter and I served as co-editors of a similar book about Niels Bohr, published in 1985, which also did very well. In my close partnership with Peter Kennedy, I came to appreciate his very special qualities. He was, in the first place, a wonderful colleague; it was always a pleasure to work with him. In all our joint activities he was an inexhaustible source of wisdom and practical suggestions. He was a master in the art of promoting effective discussion in groups, and developing consensus from initially conflicting points of view. He would never let one get away with a half-baked plan; he would not let discussion of a proposal drop until he felt that its implications and feasibility had been fully understood. This was of particular importance in his role as ICPE Secretary and conference organiser. He retained a sense of humour in the face of trying circumstances – such as those that tend to crop up in connection with international conferences and their participants! He had a deep sense of commitment but an optimism and cheerfulness that made light of it. Above all, he had the kind of engaging and tolerant spirit that made for strong and lasting friendships. He will be widely and deeply missed. *A. P. French*

## We introduce the I.C.A.S.E.:
the International Council of Associations for Science Education

ICASE is a nongovernmental organisation connected with UNESCO (Intergovernmental organisation). It is an umbrella organisation heading a large number of associations of science teachers and of educational institutions distributed all over the world, all continents being represented.

Its aim is to improve the effectiveness of teaching science and technology at all levels of education (primary, secondary and tertiary) by making possible to exchange views and experiences between teachers. It covers all sciences, so its activities are a good forum for dealing with interdisciplinary aspects of education and with the teaching of integrated sciences and technology. This is done mainly through an international journal, other publications, by different kinds of meetings and international projects.

"Science Education International" – published quarterly, provides the member organisations all over the world with the kind of information and suggestions they may need. It is included in the annual fee of member organisations but individuals may also subscribe to it. This juornal also diffuses guidelines resulting from "Project 2000+: Scientific and Technological Literacy for All (STL for All)" supported by UNESCO.

Project 2000+ has been presented and discussed in depth during an International Forum held in Paris in July 1993. Besides typical problems traditionally discussed in the world of education, some specific new orientation were handled, namely STL for development, distance and adult education and relations between formal and non-formal education. After this Forum, attended by more than 80 countries, participants from all over the world are submitting concrete proposals for dealing with subjects. Some more specific activities may take place at a more regional level; interaction between regions are favoured. The creation of European section is being considered. This section is especially interested in co-ordinating activities resulting from the Forum in various European countries.

More detailad information are avaliable from the European representative:

*Alicja Wojtyna-Jodko*
*Skrytka pocztowa 93, PL-85-797*
*Bydgoszcz 92., Poland.*

## Meetings – for what?

*Many of the GIREP members in each second year travel to a GIREP Meeting, happy with other teachers sharing experiences, learning new methods or accepting new aspects in physics and physics teaching. It would be good to share with a wider community of physics teachers what would be the most effective way to organize our Meetings. Some people say: "Teachers should meet top researchers during these meetings and to feel the fresh idea in physics. It is the teachers job to interpret the new physics trends for students." Others opinion is to use these meetings to bring together educationalists and physics teachers, to learn from each other the new good physics teaching methods. It is also a question whether there is a claim to more traditional or to more modern parts of physics. – The next GIREP Newsletter intends to quote the opinion of GIREP members: please, write your opinion on our Meetings in a few sentences and send it to the Secretary. Thank you.* *(Esther Tóth)*

# 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 39–125-631-872)

**Secretary**: *Esther Tóth*, Logodi u. 48, 1012 Budapest, Hungary (tel 36–36-476-180, 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, Dipartimento di Fisica dell'Universita', via delle Scienze 208, 33100 Udine, Italy, fax: 39–432-558-222.

## 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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