

The Role of GIREP

The Groupe International de Recherche sur l'Enseignement de la Physique was created at the initiative of physics educators who had foreseen the utmost relevance of physics teaching in the approaching new era when the wealth and power of nations does not depend any more on size of bombs and armies but on the quick adaptation to changing conditions, on the development of high technology, and as a base for them: on the level of science education. Concepts like chips and DNS, ozone hole and AIDS, reactor safety and DDT, sky channel and E.T. have not been included in traditional school curricula. GIREP was born in the heroic era of PSSC and SCIS, Nuffield Physics and the first physics olympiads, the Bronx and Novosibirsk High Schools of Science. GIREP conferences discussed the emerging challenges of science education like teaching statistical physics and wave models, space exploration and chaotic phenomena, microcomputers and nuclear power, both at secondary and tertiary level.

GIREP is an international organization on education which has not been created by official bodies from above. Its members are not governments or academies, but common physics teachers who face their students in classrooms of universities and colleges, gymnasiums and lyceums day by day. This is the root of GIREP's weakness (in its financial possibilities) and its strength (in its fresh realism). At GIREP meetings school teachers have used to share benches with Nobel laureates, respecting the importance of new breakthroughs (in deep structure of matter or in the deep space outside) for the future of the students. And they have understood the importance of their everyday classes, which lay the foundation for survival and progress.

Nowadays we not only anticipate the Brave New World. We have entered it. Old schemes – elaborated by the teachers of the present teachers – do not work any longer. Information, material, safety, energy, risk, environment have obtained a new relevant meaning for citizens. The goal of education is not mere reproduction of society any more, but orientation in an unknown New World. We have to teach not only anticipating but shaping the future. This is why the role of GIREP is enhanced again. We have to count on the daring initiatives, on the pioneering experiences, on the realistic feedback of our individual members. Those who serve as officers of GIREP have got the duty to disseminate your contributions world-wide. We thank you for trusting us, and we wait for your personal initiatives.

George Marz, President of GIREP

The General Assembly of GIREP

Golub-Dobrzyn (Torun), 21 August 1991

The General Assembly of the members of GIREP met in a beautiful setting, the restored medieval castle of Golu-Dobrzyn near Torun on the third day of the GIREP '91 Conference "Teaching about Reference Frames: from Copernicus to Einstein".

1. Future Meetings

1. The planned GIREP '93 Meeting in Portugal with the (provisional) title "Teaching Modern Optics and Communications" is well on the way. Support for it has been offered by the Universities of Braga and Evora and by the Portuguese Physical Society, but the precise venue has not been established yet.

2. The Italian GIREP members propose to try to organize a Conference in Italy in 1995. The topic would be "Teaching about Transport Phenomena". The actual feasibility must be explored and it is hoped that in a couple of months a final decision can be taken.

3. Prof. M. G. Velarde asked GIREP to join the sponsors of the next ICPE-IUPAP Conference "TMP - Statistical Physics" (Bajadoz, Spain, July 1992). The Committee was favourable and asked for special conditions for school-teacher participants. It was also intends to negotiate the mailing of the Conference Proceedings to all GIREP members at an accessible cost. - The Assembly gave the Committee mandate to decide on this issue.

2. Secretary's Report

The last issue of the Newsletter (n° 26, July 1991) was sponsored by Piet Lijnse's Institution at University of Utrecht. A re-edition of the Network was mailed with it to (updated) members. The Secretary asked the Assembly to continue sponsoring the Newsletters and also for comments to both the Newsletter and the Network.

Some members promised that they would ask their Institutions to join the sponsorship scheme. The usefulness of the Network is debated at some length. Finally the Assembly has agreed by vote that the Network booklet should continue to be sent periodically to all members but: (i) it must be updated, (ii) it must report the E-mail addresses of the entries, when they exist.

3. Treasurer's Report

With respect to the Financial Report printed in the last Newsletter, GIREP was now able to add US\$ 500 to the US\$ 5000 it already gave to the Torun Conference and still has about US\$ 600 in its Bank Accounts. - The Treasurer offered actual examples of the problems that arose when people sent their fee without proper documentation, so that it could not be properly acknowledged (for example, cheques with an unreadable signature or payments not sent to the proper Bank, or if paid by GIRO, not followed by a note to the Treasurer). In these cases there is nothing the Treasurer can do, so members must be careful about the way they pay. - The Financial Report has been approved by the Assembly.

4. Other Organizations (ICPE, UNESCO)

E. Leonard Jossem illustrated the structure of IUPAP and the role of ICPE inside in it. In particular, ICPE acts as advisory Committee towards IUPAP's sponsoring conferences.

Rafael Ferreyra illustrated the mode of action of UNESCO, stressing the fact that the UNESCO budget was approved every 2 years (the next one will be approved in a couple

of months from now), so the sponsorship of Conferences such as this one was subject to heavy constraints. He stated that UNESCO's way of allocating resources depends on the interests expressed by the participating countries: so physicists must act at the local level if they wish UNESCO to be more active in relation to Education in Physics issues.

5. Elections

Paul Black has resigned so the post for President had become vacant. New elections were necessary. The only response to the call for designations came from Nahum Joel (France) who proposed George Marx of Hungary as future President. So George Marx has been elected new President of GIREP leaving his former post of Vice-President vacant (this possibility, mentioned in the last Newsletter, was recalled on the first day of the Conference). The one nomination for this post, proposed by Paul Black, endorsed by Giulio Calvelli (Italy), was Silvia Pugliese Jona of Italy, who left the post of Secretary vacant. The one candidate for this post was Esther Tóth of Hungary (proposed by George Marx, endorsed by Paul Black), who thus has become the new Secretary of GIREP.

The Committee's composition is given on the last page of this Newsletter. The Assembly has approved the new Committee.

Paul Black observed that it was in the tradition of GIREP that two members of the Committee (one of whom the President) lived in the same country. He asked the Assembly to allow the new Committee to take office from 1st September, in order to give the old one time to transfer the activities. The Assembly approved.

In reviewing the activity of the past and looking forward towards the future, Paul Black pointed out that many constraints weighed on the officers and suggested that an enlarged Committee, e.g. with three Vice-Presidents instead of two, would be able to work more effectively. This requires a revision of the Statutes and should be studied in time for the next General Assembly.

The future policy of GIREP was then discussed. It was agreed that it should aim towards larger involvement of school-teachers, especially young ones. In this respect the new Vice-President, who is a school teacher too, plans to get (and keep) in touch with Associations of Teachers in order to make GIREP more widely known among teachers themselves.

6. Other Business

a) Brian Davies thanked Paul Black for the work he had done as President of GIREP in all these years. Poul Thomsen proposed that Paul Black be awarded the honorary membership of GIREP. The Assembly applauded and approved.

b) Benito Laiz Castro would like GIREP Conferences to be equipped with simultaneous translation facilities, at least in the plenary lectures. This aroused a lively debate about costs, effective advantages for the participants etc. Arturo Loria thought that the Government of the host country would easily agree to provide simultaneous translation into the local language. Poul Thomsen remarked that in order to communicate effectively we must stick to one only language as we had done until now. So simultaneous translation has remained a recommendation the feasibility of which must be explored.

Silvia Pugliese Jona, Vice-President of GIREP

Reputation on Physics Olympiad

The International Commission of Physics Education of the International Union of Pure and Applied Physics gave its medal to the International Physics Olympiad in 1991. This medal has been created for teachers, professors, devoted workers of physics education whose outstanding achievements have a world-wide international impact on physics education. The former recipients were such famous personalities of physics education as Eric Rogers (1980), Pjotr Kapitza (1981), J.R. Zacharias (1983), Victor Weiskopf (1985) or John Lewis (1987).

The International Physics Olympiad was created by three institutions of three countries: the Institute of Physics of the Polish Academy of Science, the Hungarian Physical Society and the Katedra Fysika of Pedagogy Faculty of Nitra, Czecho-Slovakia. The Physics Olympiad was organized already at 22 occasions, the recent number of the participating countries is 33. The coming Olympiads will be held in Finland (1992), then in USA (1993), China (1994), Australia (1995), Norway (1996). The ICPE gave the Medal to the Olympiad, i.e. the Medal will be passed every year to the host country of the Olympiad. The citation of the Medal recalls the founders' names. The Bronze Medal was given to Jukka Ranta from Finland representing the hosts of the coming Olympiad. A tin copy of the Medal was handed to Rezső Kunfalvi (Hungary; the only founder who is alive) by the general secretary of IUPAP, Jan Nilsson in Budapest at the celebrations of the centenary of the Hungarian Physical Society.

As teachers we may be happy for this reputation of the Physics Olympiad. All of us know: to create five excellent competitors for the Olympiad is impossible without an appropriate background, without a good physics teaching in the whole country. On the other hand a well organized selection of the top five can be an excellent feedback to teachers and students. National competitions are the best driving force to create excellence.

E. T.

The Bronx High School of Science

(Exclusive interview with Milton Kopelman)

My name is Milton Kopelman. I am now retired from the educational world, but I was part of that world for 42 years. 39 of this 42 years I was affiliated with the Bronx High School. I was a young teacher of biology starting there 1949, and in 1977 I became the principal until I retired in 1990.

The Bronx High School of Science is a specialized public high school designed for bright students. Its curriculum puts emphasis in science and mathematics. We now have 2800 students in grades from 9 to 12. This school was founded in 1938. The founding principles Dr. Morris Meister was also a science teacher who believed that when bright students are gathered together in one educational institution they tend to stimulate, motivate one another, so that the total is greater than the sum of the parts. From the beginning science was the part of the school that was stressed. It was Dr. Meister's feeling along the idea of gifted children came together that not enough was being done in science education for young people. His understanding was that very often the future of a society depends upon not only bright able people, but bright able people who understand science, and can think along a line of problem solving.

The school in 1938 was set up in the part of New York city called the Bronx. At that time the Bronx had a population that was mainly people who had immigrated from Europe. Therefore the school at the beginning served mainly lower middle class, working class and poor families, many of whom were from Eastern Europe, many of whom were Jewish. The environment from a financial or material point of view was not rich. But from an intellectual point of view it was a very rich environment because these families although many of them were not educated themselves, believed in education and wanted their children educated. So as result the children who were selected to come to that school (because they had to be selected through an examination) wanted to learn, were motivated to learn and created an atmosphere where learning was the most important thing going on.

Again: the background was poor. But the belief in education and learning was rich.

The school is told successful today for many reasons. Although the school is only a few years more than 50 years old, in that time we have graduated four Nobel laureates in physics, besides many of our graduates have gone on to become university professors, teachers of science, researchers in science as well as leaders in many other areas beside science. For example we have graduates who are famous Purlitzer prize winners in literature like E.L. Doctoral.

Nobel laureates include people like Malvin Schwartz who received the prize not too long ago, Leon Cooper who had a class 1947 at the Bronx Science, and also Steve Weinberg and Sheldon Glashow, class of 1950.

N.L. *"What was your trick?"*

I strongly believe that children should be stimulated so far as possible to get involved in independent research, in selecting a problem of their own choosing, working with other children, but also working with experts and with teachers, and getting the feeling of what it means to identify a problem. What it means to gather information.

N.L. *"Please, speak about the level of the problems!"*

It should be problems they are appropriate at the level of the child. It does not have to be a high research problem because the whole point is the process. A child in the 9th grade who gets involved in a simple problem and learns a little bit about how to set up a hypothesis, how to gather information, how to design simple experiment, how to carry it out. That child may become a future Nobel laureate, maybe not. But that child has learnt something about the ways of science that will stand him or her for the rest of his life or her life.

When I talk about independent or individual research I do not mean the kind of laboratory work that often goes on in most schools in the world. The children are told what they are supposed to do today, what they are supposed to find today. And to fill out a book with blank lines, and answer questions. That is neither research nor is science nor is even education. And it is very uninteresting for children! I am talking more about discovery, I am talking more about giving children information so that they may find a problem or a question that they are interested in. That is what I am referring to. But even the laboratory teachers should not focus on what is called cook-book science, the kind of thing I described before. Rather they should design a laboratory work so that it grows out in the classroom. There may be discussions in classroom then a question comes up and

the idea emerges: Let's go into the lab and see what we can do!

N.L. *"Do you think the problems should be open-ended?"*

The best problem is open-ended. Is not that what scientists do? What is the point if you are doing something somebody did before? If you know what the answer is already? The problem is open-ended if it is all possible. And this should be done up and down the line with all children. So that it is an important approach that I tried to use in my school: to stimulate children, to get involved in independent research of the kind we have just been talking about.

N.L. *"How can you prepare teachers for this style of teaching?"*

There are couple of givens to make good teacher. There are two very very important things. One is intelligence. The other is a feeling for children, a belief in children, a likeing of children, a joy in watching children learn and discover.

If you give me a person who is intelligent and cares about children, I think, you can make him to be a good teacher. Of course, he has to know the scientific background, he has to have an academics. But that can always be learned. If you have a person who is brilliant, who has academic background but does not care about children that person, I do not think, would ever be a kind of creative teacher. What I am saying if you have got to have this feeling for children and this joy watching children learn, then you are on your way.

N.L. *"How about student competitions?"*

I strongly support student competitions, because they do a lot of very interesting things with children. I think the human spirit is one that thrives competition that is healthy. I have found in my school that the Westinghouse Science Talent Search is a competition of a good challenge. You may say: competition is a terrible business, the poor children are fighting against one another. But it is a matter of fact: the competition becomes the motivation you need, so the children get involved in all kinds of good science and research and problem solving. And if you do that kind of thing, I believe, you will stimulate more children to do science. I am approve the competitions.

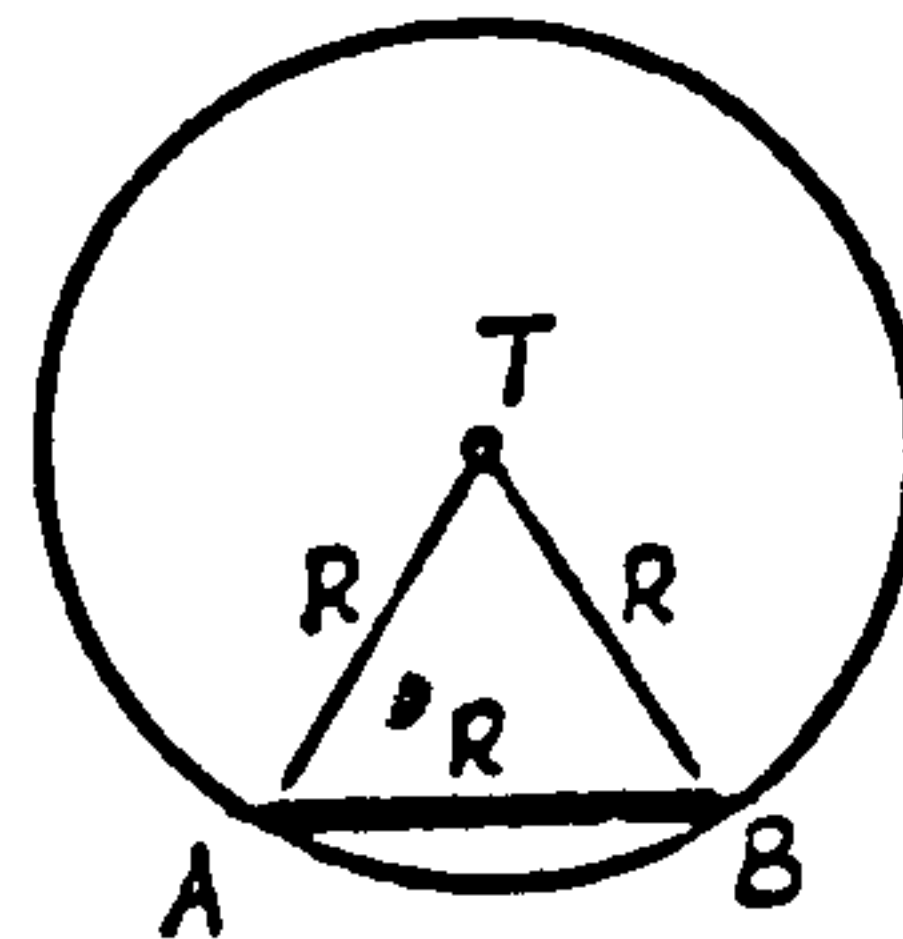
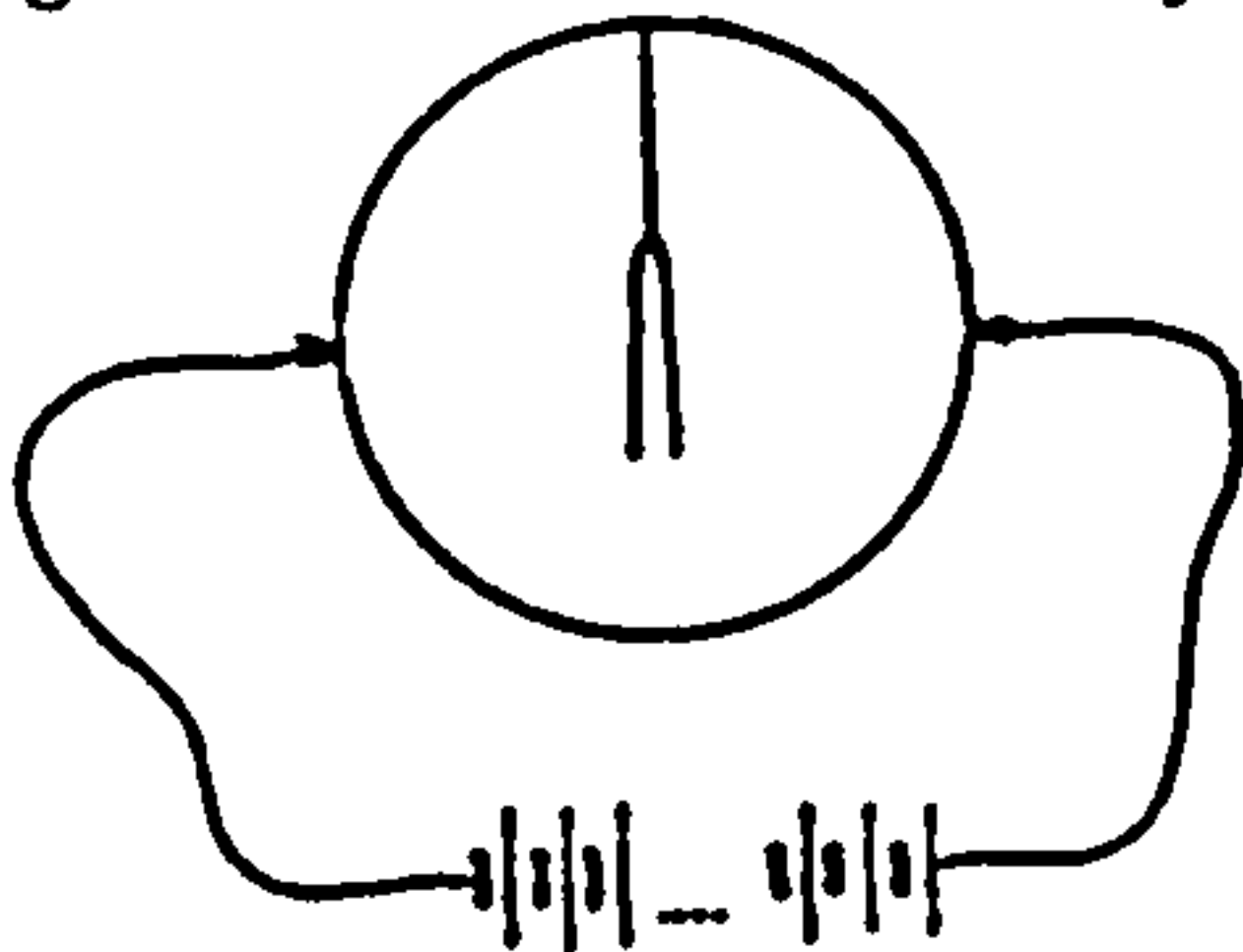
I think both kind of competitions – the Westinghouse type and the Physics Olympiad type – have a place. However I like the Westinghouse in particular. My feeling is: *anything* you do stimulate young people to get interested in science (I do not care what you call it) if it accomplishes that then it is worthwhile. The Westinghouse Science Talent Search is unique in a few ways but it is also a difficult competition to design and organize. Children submit two things to the competition. One is their research paper, that they have accomplished usually over a period of years or month. Another is a datablank which includes some information about the children with references. The interesting thing about Westinghouse that the children are evaluated by research scientists and as result their papers are looked at by people who practice science. As result of that they are selected in an objective but a very critical way. The Westinghouse Science Talent Search has recognized many children who have gone on to achieve a place in science, even Nobel laureates in America come out of the Westinghouse competitions. That was special about it. And that is why our school supported it strongly. We have had 160 winners in the 50 years of this competition, the second place school has less than a hundred, so we lead the nation by many. I believe: part of our success is being in the programme we have developed in the school.

Examples from National Competitions

At the Summer of 1990 an International Meeting was held in Hungary where we discussed how to deal with talented students in physics education. The participants expressed their interest how other countries offered problems for their talented students. With this issue of the GIREP Newsletter we start a series of examples from different countries. I ask our the readers (especially the contact persons from the countries) to send problems from their national competitions.

Problems at Eötvös Competition, 1991, Hungary

1. A squirrel's drum (cylindrical wiremesh drum) of radius R can revolve with negligible friction around the horizontal axis T . A ladder of length R is fixed inside the drum. In a moment when the drum is at rest and the ladder is horizontal, the squirrel starts moving from point A to point B so that the drum does not move. – How should the squirrel move? In how long time will it reach the end point?



2. A closed cylinder is divided into two parts by a piston moving practically without friction. On both sides of the piston there is air of the volume 1 liter, pressure 10^5 Pa and temperature 0°C . In addition in the left part there is a piece of ice of mass 2 g. – The system is heated up to 100°C . What is the final location of the piston?

3. A folded aluminium foil hangs on a thread inside a very thin-walled hollow metal sphere. A DC power supply is connected to two opposite points of the sphere as shown in the figure. – Will the aluminium foil strip move, and if so, in what way?

The Eötvös Competition is a national competition in Hungary initiated by Roland Eötvös in 1894. During the past 100 years you can find the names among the winners like Theodore von Kármán, Leo Szilárd, Edward Teller or László Tisza. The competitors can come from any secondary school beyond 18. Five hours is given to solve three problems.

Coming Events: See the ICPE Newsletter coming in the same envelope.

Articles, notes, information to the Newsletter: Please, send these things to the Secretary directly! Correct address is on the last page of this Newsletter.

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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 it is not possible, the equivalent of 10 £st indicating the 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'Università, via Campi 213/A, 41100 Modena, Italy.

APPLICATIONS OF NEW MEMBERS

Applicants for membership may 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 change of address to the Secretary.

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