Kindergarten of Physics – where science meets youth

Dagmara Sokołowska
Marian Smoluchowski Institute of Physics
Jagellonian University, Cracow, Poland

The idea of inviting young high school students to join the Cracow School of Theoretical Physics in Zakopane, a prestigious annual international conference, was born in the early eighties. From the very beginning it was a very good idea and a few years later it was formalized into the so called "Kindergarten of Physics".

At the beginning the participants came only from the university classes of Cracow's high schools, where physics and mathematics were taught by university scientists. Nowadays, some students apply by themselves, some are the winners of a *Physics Olympiad* and other competitions e.g. *First Step to the Nobel Prize*, *Physics Tournament* and *Lion Cub*. Many students come from small provincial towns and villages.

The idea of the "Kindergarten" is to invoke the old traditional method of teaching based on a close relationship between the master and his disciple. Close personal contact of young students with top physicists is unique and it proves to be the best educational method of all. It is the role of the master to stimulate an intellectual activity of his disciple who must then think, understand and discover for himself.

High school students can participate in the ordinary school lectures, if they wish to do so, but they also have a program prepared especially for them. It consists of lectures, seminars, workshops, individual discussions with physicists during joint meals and problem-solving competitions. Students are encouraged to present (usually for the first time in their life) their own seminars on subjects in physics they are interested in.

Anyone attending the conference can participate in the scientific activities of the "Kindergarten" and many scientists do. The idea has been appreciated by the participants of the school and described as refreshing.

In June 2005 the XLV Cracow School of Theoretical Physics was organized by the Institute of Physics, Jagellonian University in collaboration with the Institute of Nuclear Physics, AGH University of Science and Technology and the Polish Academy of Arts and Sciences. Twenty-two high school students accompanied by two physics teachers were invited to the "Kindergarten of Physics 2005" – a special workshop prepared in the Year of Physics. Over five days the students had the following lectures and workshops:

"Asymptotic freedom – what it is and why it is important"
"Elementary presentation of Einstein's treatment of Brownian motion and its impact on our way of thinking"
"Introduction to differential equations – workshop" (in Polish)
"Solitons" (in Polish)
"Searching for life in the Universe" (in Polish)
"Astrophysics" (in Polish)
"RHIC program and some early results"
"Einstein's contacts with Polish Scientists" (in Polish)
"Neutrinos – in the past and today" (in Polish)
"Superposition in Classical and Quantum Physics" (in Polish)
"Short History of Black Holes" (in Polish)
"About the Scientific World"
"Supersymmetry and Asymptotic Freedom"
"Wounded nucleons in D-Au collisions under 200 GeV" (in Polish)

During the seminars young participants presented (in Polish) the following topics chosen by themselves:
"Polish Project of an Artificial Heart"
"A new telescope in Niepołomice"
"Einstein – de Hass experiment"
"Planetary Systems"
"The ideas for time traveling"
"Quantum Computers"
"Theories of the Origin of the Universe"

After a successful seminar during the "Kindergarten of Physics" the lecture entitled "Quantum Computers" was presented by our high school student Izabela Balwierz during the International Summer School for Young Physicists organized by Perimeter Institute for Theoretical Physics in Waterloo, Ontario, Canada.

Zakopane – where the "Kindergarten" takes place – is a well known Polish mountain resort (Tatra Mountains). One hundred years ago it became the winter capital of Poland. During the summer it is also full of tourists and scientists. In view of the landscape it is the best place to show a refreshing view on physics.

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