



The 44th International Physics Olympiad, IPhO 2013

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President of the IPhO-2013

The 44th International Physics Olympiad was held in Denmark this year hosted by Technical University of Denmark (DTU) and Niels Bohr Institute, University of Copenhagen. As reflected in the logo, IPhO 2013 was part of the centennial celebration of the Niels Bohr's quantum model of the hydrogen atom.

Delegations from most of the 81 participating countries arrived on Sunday July 7. Each delegation typically consisted of 5 students and 2-3 leaders and observers. Next day the opening ceremony with entertainment and speeches took place at DTU. Each of the 81 participating teams was presented one by one by standing up to receive applause. The ceremony can be seen on the web site www.ipho2013.dk. After the opening ceremony the leaders and students were separated. The leaders stayed at DTU where they began to negotiate the theoretical problems. The students enjoyed themselves in a nature park nearby.

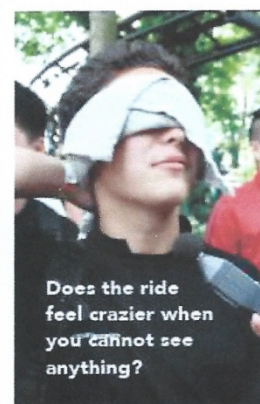
The theoretical problems comprised: (1) Meteorites, especially the so-called Maribo meteorite, which fell close to the Danish town Maribo in 2009. (2) A so-called plasmonic steam generator, based on local heating of an aqueous suspension of nanoparticles when exposed to a focused light source. (3) Modeling of the Greenland ice sheet, including a newly found and surprising effect of gravitation, namely that the sea level around Denmark will be *lowered* if the ice sheet melts completely. The experimental problems, presented two days later, dealt with: (4) A determination of the refractive index in water using a laser range finder and (5) an investigation of solar cells. The Danish IPhO committee had aimed at constructing problems inspired by actual physical phenomena and having fairly straightforward introductions that most students could handle, followed by increasingly difficult parts. The proposed problems were met with general acceptance; the only minor gripe was that the problems might be a little too long. The problems turned out to work very well in the test context, in fact some of the students managed to answer nearly all questions.

After the presentation of each problem, the hard part began: The debates among leaders from 81 countries about details. On the one hand, everybody should be allowed to have their say, and on the other hand one has to prevent the negotiations from dragging on indefinitely.

After final adoption of the wording and point-values of the problems, the translation into many different languages began. For some nations it lasted the whole night, so the two nights of the problem presentations were tough for both leaders and organizers.

The final version of all problems and the associated solutions, as well as the presentation slides for each of them, are available for download at www.ipho2013.dk.

For students, the academic part of IPhO 2013 was "just" the two five-hour examinations. The rest of the time there was plenty of opportunity for socializing and shared experiences: Swimming, excursions, among other things visits to Niels Bohr Institute, Tivoli amusement park (including physics experiments on the rides), Copenhagen Experimentarium, historic viking sites, and a harbour cruise. The excursions and a party mid-week, where leaders also attended, were successful.



The visit of the IPhO students to Tivoli amusement park in Copenhagen

The leaders had much more to do than the students. In addition to negotiating and translating problems, they also took part in marking the papers. Moreover they had to attend meetings where decisions about future IPhO work were made. But the leaders had also time for excursions including Niels Bohr Institute, harbour cruise, Carlsberg Museum, Louisiana Museum of Modern Art, Hamlet's castle Kronborg and, together with the students, the City Hall of Copenhagen. On the latter occasion Copenhagen was named "World Capital of Physics 2013", following up on the tradition inaugurated at IPhO 2012 in Estonia.

On Sunday afternoon July 14, all winners were presented on stage at the grand closing ceremony at DTU, followed by dinner and closing party. So, how were the medals distributed? One might say, as usual. Students from the East Asia, led by China and South Korea, from Eastern Europe and from the very large countries won a large part of the gold and silver medals. Students from small western European countries as Denmark typically got one or two bronze medals. Detailed lists of the winners of gold, silver, bronze and honorable mention are presented at the web site www.ipho2013.dk.



All answers from the students at IPhO 2013 under close guard of Professor Henrik Bruus

An arrangement of this type is a very big task - almost three conferences to be organized in parallel. After the intense preparation stretching over 2-3 years, we are very pleased to say that everything went very well. We have received very positive feed-back from students, leaders, and the

educational institutions in Denmark, a result of the great effort of many dedicated people. In addition, we were lucky enough to avoid any serious incidents such as illness, assaults or accidents. Finally the Danish summer weather showed itself from an unusually pleasant side: Throughout the Physics Olympiad we enjoyed sunny dry weather and comfortable temperatures.

More details about IPhO 2013 can be found on www.ipho2013.dk including the daily IPhO Newsletter "Hafnium" as well as several photos and videos of the week.

Now we are looking forward to the next International Physics Olympiad, which takes place in Astana, Kazakhstan, in July 2014, where we do not have any organizational responsibilities.



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