Report on Canada's Participation in the 49th International Physics Olympiad in Lisbon, Portugal (December 3, 2018)

by Andrzej Kotlicki and Sepehr Ebadi

The 49th International Physics Olympiad (IPhO) was held from July 21st to 29th, 2018, in Lisbon. Portugal. Due to lack of funding, we were unable to organize the Canadian Olympiad Finals. The students scoring top in the Canadian Association of Physicists (CAP) High School exam were invited to represent Canada in IPhO. 778 students from 149 Canadian schools wrote the exam this year (about 80 less than last year).

Our students did not get any formal training to prepare them for IPhO. The four Toronto students had some training sessions organized at UoT by Dr. Natalia Krasnopolskaia with the help of Dr Brett Teeple. Two Ontario students got some preparation in afterhours Olympiads school. The BC student obtained some training at UBC from Andrzej Kotlicki and Pedram Amani (our last year's IPhO participant and UBC student).

It is worth mentioning that teams from other countries are given anywhere from 2 weeks to 2 years of additional training for this competition.

The members of the Canadian team this year were:

Manqiu Wu from A. Y. Jackson Secondary School (Ontario) the student of Gavin Kanowitz

Steven Mai from University of Toronto Schools (Ontario) the student of Marisca Vanderkamp

Alex You from Richmond Secondary (British Columbia) the student of Philip Freeman

Summary

The 49th International Physics Olympiad (IPhO) was held from July 21st to 29th, 2018 in Lisbon, Portugal. Organizers were able to provide minimal training due to lack of funding, putting Canadian participants at a significant disadvantage.

Tang David from University of Toronto Schools (Ontario) the student of Marisca Vanderkamp

Isaac Liao from Earl Haig Secondary School (Ontario) the student of Adam Morin

The team leaders were Dr. Andrzej Kotlicki (UBC), Director for the Canadian Physics Olympiad Program, and Sepehr Ebadi Harvard graduate student and past IPhO medalist.

The observer was:

Yadong Jiang from the Olympiads school in Toronto

This year we were able to pay for the trip to the IPhO for all of students and Sepehr while A. K. and the observer paid for their travel and the observer's fees.

This year's IPhO was hosted by the Ministry of Education of the Portuguese Republic and the Portuguese Physical Society. The opening ceremony took place at the University of Lisbon. There were the usual speeches by the organizers and the President of IPhO. There were some modern dance performances and all students were presented by spotlighting them and showing their image on the screen (Fig. 1).

Eighty-seven countries sent teams of students to this year's Olympiad. According to the IPhO's rules, roughly 67% of the participants were awarded Olympic medals or honorable mentions.

As usual, the competition had both theoretical and experimental parts that were meant to challenge students at a level more advanced than typical high school or even first year university physics exams. The competition consisted of 3 theoretical and 2 experimental problems.

The first experimental problem introduced students to the Junction Field Effect Transistors, in particular, thin film transistors. After the short introduction, describing this active electronic element the students were guided through the measurements of the characteristics of a thin film transistor printed on paper.

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and

Sepehr Ebadi, Harvard graduate student and past IphO medalist

Fig. 1. Canadian team being presented during the opening ceremony.

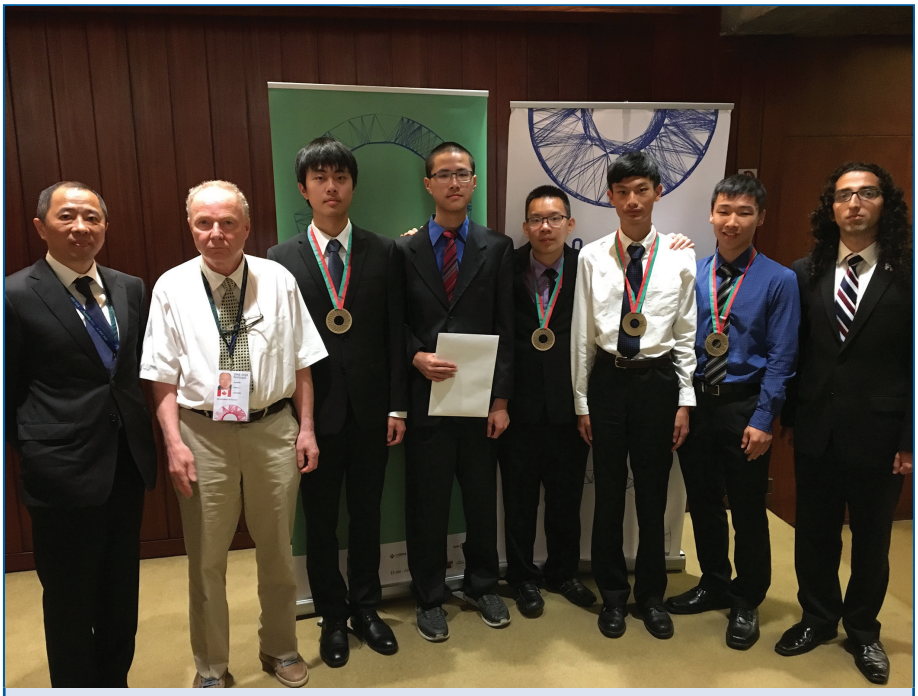

Fig. 2. The Canadian Team with awards after the Closing Ceremony. From the left: Yadong Jiang, Andrzej Kotlicki, Manqiu Wu, Isaac Liao, David Tang, Alex You, Steven Mai, and Sepehr Ebadi.

In the second experimental problem student were characterizing the viscoelasticity of a polymer thread. Both problems were educational for students, introduced new for them effects, and tested well the experimental skills.

First theoretical problem was related to the first observation of the passing of gravitational waves through Earth. It involved some simple Newtonian calculations and the relativistic energy dissipation as well as some measurements based on the original LEGO plot. David Tang got one of the best scores for this problem.

The second problem asked students to analyze the data of the two very high energy protons collision at the Large Hadron Collider.

The third problem involved the analysis of two simplified models of blood flow in vessels and a model of the tumor growth.

All the problems were very well prepared and written and required very small corrections from the International Board. Our students did reasonably well considering their very limited preparation: Manqiu Wu, David Tang, Alex You and Steven Mai got bronze medals and Isaac Liao got honorary mention (see Fig. 2).

In the free time both students and leaders enjoyed interesting excursions to the beautiful old Portuguese towns and tourist attractions: Castello de S. Jorge, Alfama, Palacio do Marques in Oeiras, old walled town of Obidos, Alcobaca and Nazare. In Lisbon students visited old Cassel, Oceanorium, National Coach and National Maritime museums and the Gulbenkian Planetarium There was also a lot of socializing and some sports activities.

After 10 years of leading the IPhO the President Prof Hans Jordan from Netherland retired. The International board thanked him for his hard work and leadership with a standing ovation. Prof. Rajdeep Singh Rawat from Singapore was elected as the new President.

Next year, Israel will host the IPhO in *Tel* Aviv from July 7th to July 15th.