

# Report on Canada's participation in the 48<sup>th</sup> International Physics Olympiad in Yogyakarta, Indonesia

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The 48th International Physics Olympiad (IPhO) was held from July 16<sup>th</sup> to 24<sup>th</sup>, 2017 in Yogyakarta, Indonesia. Again, this year due to the generosity of our sponsors we were able to organize the Canadian Olympiad Finals in Vancouver. The students who were invited to the finals at our cost were the top scorers of the Canadian Association of Physicists (CAP) High School Exam. 859 students from 162 Canadian schools wrote the exam this year (just few more compared to last year), and the top 12 students were invited to the National Finals in Vancouver. After 6 days of lectures, 3 theoretical exams, and 2 experimental exams, the Canadian Team for the International Physics Olympiad was selected. The National Final was organized with great help from UBC professor Joanna Karczmarek, the IPhO medalists: a UBC TA Koosha Rezaiezadeh and Sepehr Ebadi (who just graduated from UoT, and UBC COOP student Eric Neal).

The limited funding did not allow for any additional training for the full team before the trip to Indonesia, however, Koosha did some experimental training for Pedram, who started his preparation for Olympiad, while still in Iran at Atomic Energy High School. Three of our students (Henry Tang, Jerry Guo and Ming Yang Ye) got additional training at the York University and all Toronto students got great preparation in Toronto's after hours schools: Olympiads school and Ivy Path School.

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:

Ming Yang Ye a student of William Dykshoorn from Bayview Secondary

Pedram Amani student of Jeff Green from West Vancouver Secondary

Yuheng (Jack) Xu a student of Raymond Fung from Unionville High School

Henry Tang a student of Henri Van Bommel from Marc Garneau Collegiate

Guo Jerry Zheng student of Roy Karo from Richmond Hill High School

The team leaders were Dr. Andrzej Kotlicki (UBC), Director for the Canadian Physics Olympiad Program, and Koosha Rezaiezadeh, UBC engineering student and TA and past IPhO gold medalist from Iran.

The observers were:

Yadong Jiang and Ryan Lin from the Olympiads school in Toronto

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

This year's IPhO was hosted by Ministry of Education and Culture, Republic of Indonesia and Universitas Muhammadiyah Yogyakarta. The opening and closing ceremonies took place at the elegant Sahid Rich Jogja hotel, where all the students were housed. Both were enlivened by local traditional and modern music and dance performances.



**Figure 1. The Canadian Team with medals after the Closing Ceremony. From the left: Ryan Lin, Ming Yang Ye, Guo (Jerry) Zheng, Henry Tang, Andrzej Kotlicki, Yadong Jiang, Pedram Amani, Yuheng (Jack) Xu and Koosha Rezaiezadeh.**

Eighty-six 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.

One experimental problem was investigating the properties of the diamagnetic levitator based on the field from two cylindrical magnets. This question was very interesting, educational and well prepared. The other one was asking students to measure the refractive index gradient and a diffusion coefficient of the salt solution using the optical effects. This question was also interesting and educational but poorly written and needed a lot of corrections.

The final text was accepted by the International board very late and the translation to the various languages of the students was not finished until 6AM (not unusual in IPhO). Coping of the exam was not properly done and the exam, which should have started at 9 AM, was postponed until next day. It meant that there was no free day between the experimental and theoretical exam.

There were three theoretical problems prepared by the organizers. The first one dealing with the telescope had very little conceptual content and required very long purely trigonometrical calculations and was rejected by the International board. It was replaced with a very poorly prepared inflation of the Universe problem. Fixing it with the great help from the Hong Kong leader, who was an expert in this field took again a very long time. The second problem on Earthquakes, volcanos and tsunamis was very good and well written. The third one on Dark Matter needed more corrections. Again, the final text was accepted by the International board very late and the translation to the various languages of the students was not finished until 6AM. Unfortunately coping and distributing the problems to the students was very poorly organized and many students were supplied with wrong translations or none at all.

The marking by the organizers was very inconsistent and the differences between the organizers and leaders marking (including marking of our teams' papers) were unusually large. In this situation, the international board decided, on the suggestion of the president, that the medals will be awarded by the President and the Secretary of the IPhO based mainly on the leaders marking and taking into account the difficulties some non-English speaking students had working only from the English text. The International board did not consider or approve the choice on absolute winners and therefore these results, announced at the closing ceremony are not official.

To be fair, one should mention that Indonesian organizers had less time than most others, as Indonesia volunteered to organize the 2017 competition, when an other country withdrew in the last moment.

Our team did very well in the competition considering the limited training. Ming Yang Ye got a gold medal, Guo (Jerry) Zheng a silver and all the others bronze medals.

After the exams, the students enjoyed interesting excursions to the famous Borobudur temple, the Indonesian air force museum and to the center of town market. There was also a lot of socializing including a “midterm” party with a very good music. The local guide Ganis Agil Ramadhan took very good care of our students.

Next year, Portugal will host the IPhO in Lisbon. Canada looks forward to participating in 2018.