

Report on Canada's participation in the 46th International Physics Olympiad in Mumbai, India

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The 46th International Physics Olympiad (IPhO) was held from July 5th to 12th, 2015 in Mumbai, India. Members of the Canadian Physics Olympiad team were selected based on the results of the Canadian Association of Physicists (CAP) High School Exam. 799 students from 159 Canadian schools wrote the exam, and the top students were invited to form the Canadian Team. 6 students among the top scorers in the CAP exam, including the winner, were not able to join the team, two because they were not eligible (not Canadian citizens or landed immigrants), two because they had chosen the Mathematics Olympiad, and two for financial reasons. For the second year because of lack of funding, no National Camp or extended team training was organized – this is in stark contrast to teams from other countries, which went through training for anything from 2 weeks to 2 years. The only training our students got was a practical training session kindly organized by Dr Natalia Krasnopolskaia from UoT with the help of an ex Olympiad medalist Sepehr Ebadi, and a few theoretical sessions for the four students who lived in Toronto, organized by team co-leader Run Ze Cao.

The students and two leaders had to pay their own way to India (about \$2000 per person). As far as I know, we were the only country that requested students to do so, when less fortunate countries were able to support the participation of their students financially. The Canadian Physics Olympiad (CPO) Program paid the IPhO participation fee (3000US\$). The CPO contribution was made possible by the kind donation from Triumpf.

The members of the Canadian team this year were:

Qingyue Wu, from University of Toronto (extra students), student of April Seeley

Stephen Liu, from Bayview Secondary School, student of Bogdan Brkic

Andrew Jinwook Kim, from University of Toronto Schools, student of Shawn Brooks

Wilson Wu, from Pierre Elliott Trudeau High School, student of Graham Baker

Oliver Jin Wang, from St Robert Catholic Secondary School, student of Benoit Leduc

The team leaders were Dr. Andrzej Kotlicki (UBC), Director for the Canadian Physics Olympiad Program and, ex-participant of Canadian Physics Olympiad, at present student at the University of Pennsylvania, Run Ze Cao, who kindly volunteered his time and funds to help with the program.

This year's IPhO was hosted by the Homi Bhabha Centre for Science Education, a national center of the Tata Institute of Fundamental Research, Mumbai (an autonomous institution under the umbrella of the Department of Atomic Energy) and Deemed University. The opening and closing ceremonies were held in the Tata Institute of Fundamental Research and Indian Institute of Technology respectively, with wonderful traditional dance and music performances.

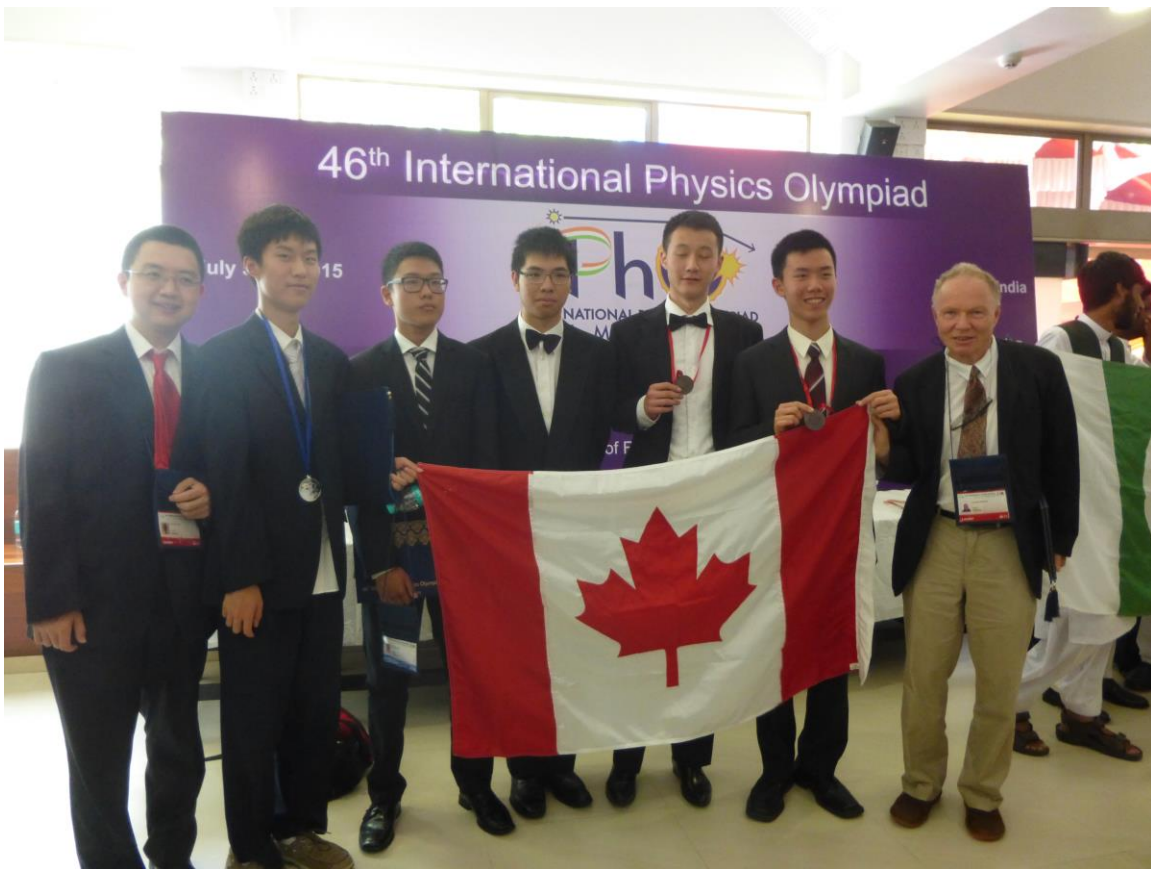


Figure 1. The Canadian Team with medals after the Closing Ceremony. From the left: Run Ze Cao, Qingyue Wu, Andrew Jinwook Kim, Wilson Wu, Oliver Wang, Steven Liu, Dr Andrzej Kotlicki.

Eighty-five countries participated from all continents except Antarctica in this year's Olympiad. According to the IPhO's statistics, 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 exams. The competition consisted of 3 theoretical and 2 closely related experimental problems. All

the problems were excellent, at a very appropriate level and not only interesting to solve but also very educational for the students.

The first theoretical problem was about solar cells and flux of radiation from the Sun including the flux of neutrinos. The second problem was about the Extremum Principle in Mechanics and optics as well as de Broglie waves. The third problem required students to do some modeling of the core of a nuclear reactor.



Fig.2. Qingyue Wu on the stage among other silver medalists.

Experimental problem 1 was an optical measurement of an object simulating a double helix. It was a very interesting problem forcing students to do an analysis of the optical patterns resembling the x-ray patterns obtained in the famous experiments leading to the discovery of DNA structure and function. The second experiment, using mainly the same equipment, expected students to investigate the waves on the surface of water in the very short wave regime. Both tested very well the students' experimental skills and evaluated for a good understanding of optical effects. Qingyue Wu obtained an excellent result in the experiments at 90% of the possible marks.

To ensure the fairness and consistency of the marking, grading was done separately by organizers and team leaders and then moderated. Overall, marking was excellent. There was almost nothing to discuss during the moderation for our students.

Our team did reasonably well in the competition even though there was almost a complete lack of training due to funding reasons. Everyone on the team received a prize: Qingyue Wu won a silver medal, Stephen Liu and Oliver Jin Wang got bronze and Andrew Jinwook Kim and Wilson Fan Wu won honorable mentions.



Figure 3. The team just before the opening ceremony. From the left: Qingyue Wu, Run Ze Cao, Wilson Wu, Dr Andrezj Kotlicki, Oliver Wang, Andrew Jinwook Kim, Stephen Liu.

When the students were not busy with exams, they spent time experiencing the rich cultural, social and scientific programs. They also took the opportunity to admire Mumbai's architecture and interacted with their peers from other countries.

Next year, Switzerland will host the next Olympiad in Zurich. At the official closing ceremony of this year's Olympiad, the Swiss leaders showed a movie, distributed some chocolates and invited all the countries to the next International Physics Olympiad. Canada looks forward to participating in 2016.