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# **CERN and Perimeter Institute Professional Development Programmes Impacts on Brazilian High School Physics Teachers**

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CERN and Perimeter Institute are two notable institutions for their international teacher programmes in Switzerland and Canada, respectively. CERN has started its HST (High School Teachers at CERN) programme in 1998. Even though the first edition of this programme only had European teachers, it became transcontinental the following year. From 2006 on, CERN has expanded its programmes to different countries, each of them on its national language, while HST remained as an international teacher programme administrated in English.

The Portuguese Teacher Programme was inaugurated on 2007 and was soon expanded to a Portuguese Language Teacher Programme from 2009 on, when Brazil and Mozambique were invited to join (and later joined by other Portuguese-speaking countries), becoming one of CERN's first international teacher programmes in a different language than English. Through this programme, 244 Brazilian teachers had the opportunity to visit CERN from 2009 to 2019, not to mention those who were selected to attend HST or CERN's newer international programme: International Teacher Weeks (ITW).

Through a different perspective, Perimeter Institute also created on the early 2000's an international programme for teachers around the world called Einsteinplus. While CERN's programmes were mostly designed around lectures and visits to CERN's installations, Perimeter Institute's programme was designed around teacher resources to incorporate Modern Physics on the High-School curriculum. Although the resources were originally written in English, Perimeter Institute established a partnership with International Centre for Theoretical Physics –South American Institute for Fundamental Research (ICTP-SAIFR), which is based in São Paulo –Brazil, on which the resources were translated to Portuguese.

ICTP-SAIFR also promoted weekend hands-on workshops for teachers in different Brazilian towns from 2018 to 2020. With the covid-19 pandemic, those hands-on workshops had to adapted to an online format in 2020 and 2021. Even though online activities have some limitations comparing to the hands-on format, this made it possible to reach farther locations on Brazil. In 2021, the resources were also translated to Spanish, so ICTP-SAIFR could reach not only Brazil and other Portuguese-speaking countries around the world, but also the Spanish-speaking countries, which comprehend most of Latin America.

This research was designated to evaluate the impact of CERN and Perimeter Institute's programmes on Brazilian teachers. The theoretical framework used to evaluate this impact was Thomas Guskey's Evaluating Professional Development [1], in which the impact is measured around five different levels: participants' reactions, participants' learning, organization support and change, participants' use of new knowledge and skills and student learning outcomes.

In order to evaluate all these five levels, a group of 30 Brazilians teachers from different parts of the country was selected and those teachers were submitted to a semi-structured interview, in which they could be asked some questions about their academical background and their work. Also, five schools in which some of these 30 worked (each in one of Brazil's five main geographical regions) were selected to investigate in a deeper way the teachers worked. So, some of the students and coordinators were also interviewed.

The results of this research showed mainly four distinct types of teachers with different demands. Those from state public schools represent the teachers with higher demands, since those schools are normally located on farther areas and with a poorer structure, while the teachers from private international schools face a totally different reality. Federal public schools have an intermediate situation and some of the teachers work on more than one school, so they had to be put on a separate group.

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