

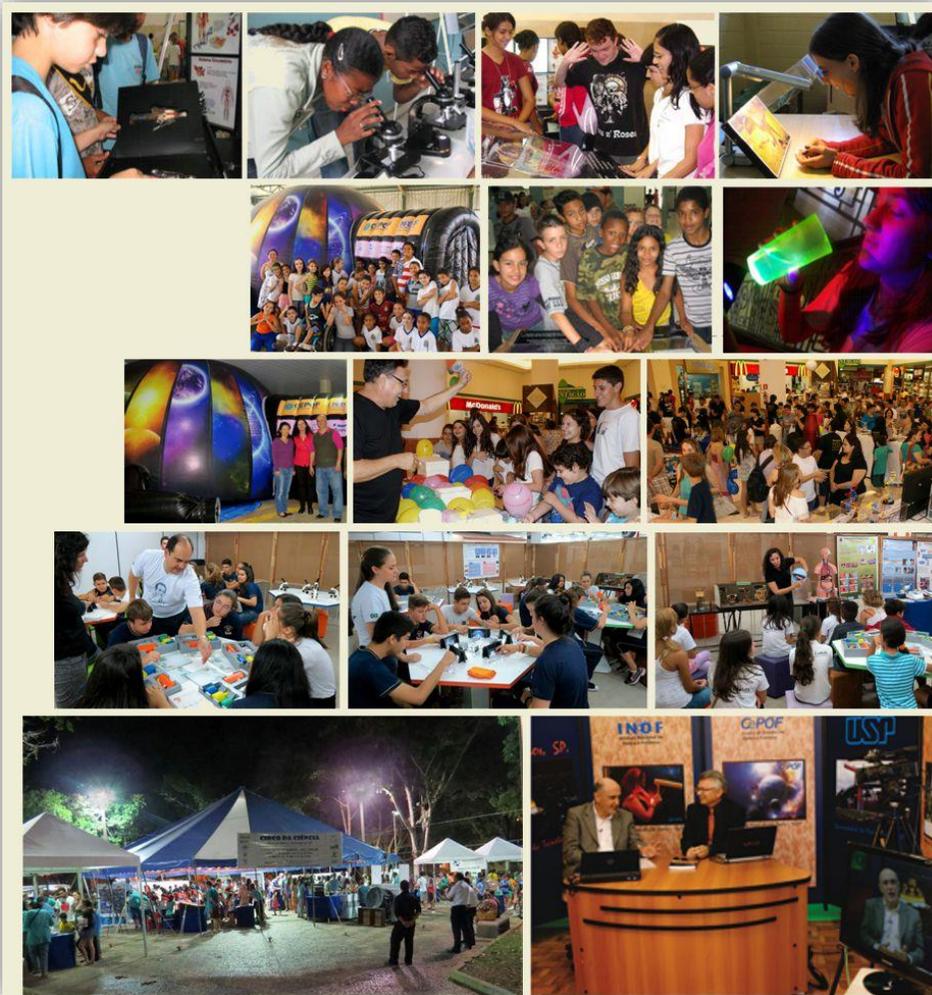
Technical Production

POPULARIZATION OF SCIENCE



Science Diffusion: how to disseminate university science and innovation to young students and general public.

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• CEPOF Science Dissemination



Brazil occupies one of the worst positions in educational ranks in the world: currently it is at the 88th position among 122 countries, based on the Human Capital Report from the World Economic Forum. As the major causes for that, one can highlight: (1) problems in management and adequate prioritization of resources for the basic education by the government; (2) lack of acknowledgement of the basic education professionals, mostly expressed by the low incomes, inefficient design of educational programs, and cumulative fails in the process of monitoring their basic training and capacitation; (3) lack of updated teaching laboratories and textbooks; (4) lack of innovation proposals for classroom application. Globalization made available continuous influx of information from the so-called XXI century through media; meanwhile, teachers have access to old-fashioned, sometimes archaic, learning/teaching resources and tools. During the last decades, a great deal of effort has been made to maximize academic teaching quality in Brazil. However, basic and secondary education lacked the same sort of attention. We currently have a large discrepancy between public and private schools and we need to improve our public fundamental education levels.

The Optics and Photonics Research Center – CEPOF is hosted by the University of São Paulo. The CEPOF coordinator, Professor Vanderlei Bagnato, and his team develop several Science Dissemination activities as part of its main work group. The actions include a TV Science, which is fully coordinated by the group for 24 hours a day. Besides the group activities include: (1) itinerant exhibitions at schools and in public spaces, (2) a itinerant planetarium, (3) production of interactive educational kits, (4) science fairs, (5) talks about innovation, (6) newspaper articles in addition to (6) Science classes broadcasted via the World Wide Web, with thousands of visualizations across the country. It also provides capacitating training to teachers by engaging them into the Science dissemination program “Science for All”.

In May of 2013 we traveled about 3,000 kilometers to bring our Roving Museum from the State of São Paulo to underserved populations in the Amazon.

• Science Dissemination: Science on TV, 24 hours a day

Brazilian students and public in general spend more than eight hours per week in front of a TV set. Even high school students in Brazil, spend more time watching TV than on the internet. In view of this situation, TV is an excellent mechanism to disseminate science in general. The goal of this project is to diffuse optical science and technology to the general public, including students, using the TV channel run by the CEPOF. We have three people fully dedicated to the activities of the TV. About thirty hours per week are being broadcast directly from our Center to the general public, including a diversity of titles that can please all the audiences.

According to the reports presented by NET, the audience of this channel corresponds to about 13% of all public receiving the cable channels. That means a daily number of persons receiving our programs is on the order of 6000, daily. We are now organizing a special transmission of the channel to all public schools where the students will be able to have lectures and special programs at different times.



E-classes: more than 200.000 views!

Internet: Professor Bagnato free brings e-classes, with a physics course to complete the High School. The YouTube already recorded more than 200,000 views! The Internet displays also: Online Museum, Science at 7 p.m., Genome classes, and several other classes from CEPOF team.

Reference: <https://www.youtube.com/watch?v=CUo7IV4TfLw>



Curso Básico de Física Aula 05 A Lei de Gauss - Vanderlei Bagnato IFSC/USP
Centro de Pesquisa em Óptica e Fátônica - CePOF

26.388 visualizações



Curso Básico de Física Aula D1 Introdução eletricidade e magnetismo - V. Bagnato
Centro de Pesquisa em Óptica e Fátônica - CePOF

45.045 visualizações

• Book and video production: “Tracks of Innovation”



The books and DVDs were produced by the Nucleus of Scientific Dissemination of CEPOF. Interviews were conducted with entrepreneurs, university professors and technical schools related to the theme of Innovation and representatives of support entities. The programs were transformed into kits containing lessons on Innovation and interviews. The DVDs are being distributed to companies, libraries of various public agencies, universities and technical schools of SESI and Paula Souza Center. In general, the DVDs will serve to improve corporate awareness and training of employees on the innovation theme; Encourage elementary and middle school students in relation to innovation; Stimulate actions within governments, awareness and training of employees in the innovation theme: e) instrumentalize NGOs, Service Clubs and other agents of the Social Network with tools to disseminate the benefits of technological innovation for the country's progress. Finally, all this effort to create facilitators for the diffusion of innovation will be made available to all interested national entities.

The GEPIT video, below, are a selection of 25 DVDs with lectures from reputed entrepreneurs to the Course named “Improvement Course in Management and Execution of Technological Innovation Projects”, produced by CEPOF and USP Agency of Innovation also coordinated by Prof Vanderlei Bagnato.



• » Young Speech: Tv Programs made by public school students



The transfer of knowledge is a focus of our Science Dissemination activities through the "Young Speech" project. We have been training students from basic public schools and also from public universities, especially from University of Sao Paulo-USP. During the project execution, the students produce documentaries and interviews on several scientific and technological topics. Such interviews receive the supervision of professionals and become television programs. Therefore these "learning reporters" become skilled at research techniques, and in editing and oral presentation, as well as in the disinhibition techniques necessary for the implementation of the reportages. Once completed and edited, the reports are showed on NET- 10 TV Channel – under our direction. Thus, there is the transfer of knowledge of the technical aspects regarding to the TV program productions. The acquisition of multiple skills and competences will likely broaden the scope of opportunities that these youngsters will be given in the market, and it will also grant them a more effective attitude towards a civil living.



• Science Diffusion: Public Exhibition in Shopping Centers



With a principal goal to reach the general public with respect to science and technology, the team of CePOF organizes frequently science exhibitions in public places. During these exhibitions students, researchers and faculty members prepare didactic material to explain their research as well as prepare general demonstrations in optics. The Shopping Center of the city of S. Carlos has hosted this exhibition since the beginning of our activities, and it is now considered as part of their calendar of activities for the public.

During these exhibitions schools, families, students, senior citizens as well as kid under school age, all enjoy the scientific curiosities while learning the importance of the research we are carrying out at the university in the field of optics. Besides the Shopping Center we have used the City Post-Office and other institutions. Recently we have organized an exhibition concerning the work of Leonardo da Vinci. During that week, many demonstrations about the machines created by him were shown to public with explanations of their operating principles, etc.



• The Circus of Science



The **Circus of Science**, held in public square, aims to awaken, especially in young people, the taste for science. The event, which attracted about 6000 people, was part of the Brazilian National Science and Technology Week. During the exhibition, the thousands of children and adults who visited the exhibition were able to interact with the various educational equipment and panels, as well as numerous experiments, which demonstrated the work that is carried out within the University to motivate children and adolescents. The exhibition is focused on aspects related to the new trends and applications mainly in the area of Optics, bringing science, technology and innovation, which are available to the public, so that they can understand how technological evolution has evolved to provide better health. Therefore, as researchers, we make available to Brazilian society what is of most modern in basic science, as well as in practical science related to population safety, as well as to the diagnosis and treatment of diseases. Still in the area of Optics, researchers the School of Engineering of São Carlos brought VANTs - unmanned aerial vehicles (or drones) developed by our group. In addition, the event was attended by companies, with whom we hold partnerships in the development of technological research, which bring solutions for its technological products and for society in general.



• Travelling Exhibitions

Travelling Exhibition "International Year of Light": It brings panels and experiments of the leading scientists involved in physics and optics throughout history. It was presented in Rio de Janeiro, in the Annual Meeting of the Brazilian Society for the Advancement of Science (SBPC) and in public schools.



Travelling Exhibition "Light in the range of the hands": exhibition for Physics Visually Impaired People ": brings panels, with light effects embossed so that the visually impaired can understand and learn how light behaves on their different characteristics and manifestations.



• Brazilian Olympiad of Physics brings 5 Nobel Prize winners!

Brazilian Olympiad of Physics of the Public Schools: students award. The awards event was attended with the presence of 5 Nobel prize winners.



Scholarships were offered to 63 students who won a gold medal at the Brazilian Olympiad of Physics of the Public Schools. During the course of the project, the students prepared scientific experiments in the area of physics and chemistry, oriented by a CEPOF supervisor. Students from all over the country received educational kits from the areas of physics and chemistry in their homes. Under pedagogical guidance, they replicated the experiments contained in the kits manuals, as well as elaborated new experiments. All the work was followed through the internet, in a system of Distance Education EAD, through a website created for this purpose. At the end, the 12 best performing students were selected along with their teachers who accompanied them in their experiments. The winners received a trip to the city of São Carlos, SP, in order to participate in several scientific activities of high expression in the scientific environment: (a) award ceremony of students and teachers who participated in the Brazilian Olympiad of Physics of the Public Schools. The ceremony was chaired by Minister José Aldo Rebelo Figueiredo (Ministry of Science, Technology and Innovation - MCTI); (B) participation in the 67th Annual Meeting of the Brazilian Society for the Advancement of Science - SBPC; (C) participation in the activities of the University of Sao Paulo-USP Itinerant Planetarium; (D) Filming on educational kits, which are being shown daily on USP TV Channel 10; (E) visit to laboratories of the University of São Paulo (USP).

• Diffusion: School Visitings



The program "USP goes your school" was conceived by the Centre for Research in Optics and Photonics-CEPOF and by the National Institute for Optics and Photonics-INOOF, both headquartered in Institute of Physics of São Carlos, IFSC. The project was developed in partnership with the Center for Human Genome Studies Biology Institute of USP in São Paulo.

In San Carlos, the Program Coordinator is Prof. Wilma Regina Barrionuevo. This program aims to contribute to the improvement of education and assist in the training of teachers at Carlos city and region. The project monitors take science to public schools through interactive educational kits and films. Such displays are considered very attractive by the students and professors.

The main areas addressed are the Physics, especially optics, and biology. The panels of optical include explanations and animations about colors, lasers, optical illusions, holograms, and 3D vision into the atomic world. The biology displays bring explanations about cells, genome, stem cells and body human physiology. The program monitors are students at USP and teachers and students of public schools themselves, who are trained at USP. The group is very committed with the ideal of assisting and improving the level of education, especially in public education. The project "The USP goes to your school" was initiated in August 2007, with the production of educational materials. A van Estate, acquired for this purpose is used for carrying the kits and monitors of the program.



• Roving Planetarium



A Planetarium is an equipment intended to artificially reproduce, by projection in an enclosed environment, starry sky, travel on the surface of the Earth and space travel or over time. In addition, auxiliary projectors can project diverse images, such as a cell, nanotechnology structures, alternative energy sources and other interesting science subjects. We emphasize Environmental Education so that the student understands the importance of preserving the third Planet of our system. In this way, students get a broader science teaching. During the fair in each place (2 to 3 days), we also give a series of lectures and video sessions, showing modern aspects of science and its social relevance to Brazil. In these videos, as we already do, we will give special emphasis to themes such as the creation of the universe, besides modern aspects of nanotechnology, laser, optics, stem cells, sciences in agriculture, health sciences, etc.



• Educational kits and The Clubs of Science



The Clubs of Science are composed of public school students and teachers groups. The program has about 300 participants, divided into 52 clubs. Next year, CEPOF provided 4 interactive educational kits for each school. The kits named "Adventures of Science" include the areas of Physics, Chemistry, Biology, Mathematics and Geology, which were designed by professors from renowned public universities (USP, UFRJ and UNESP) and aim to assist in the practical teaching of elementary and extend to arouse in young students the pleasure of science. The best students of the Club have received scholarships and are developing different research projects at the University of São Paulo and its schools.



• Conferences for Innovation and Entrepreneurship



In addition to spreading innovation, we seek to create innovation events to spark entrepreneurship in young students (to create the stimulus), as well as undergraduate and graduate students (to train new entrepreneurs) . Thereby, we invite companies, which are considered as a priority and universal locus of the most relevant innovations (which add a high economic value), governments (as creators of the infrastructure and environment suitable for innovations) and NGOs and other community entities that help and complete this system of actors of innovation. Through these actions we aim to create facilitators for the diffusion of innovation will be made available to all interested national entities and the modeling of actions (events, workshops, for example) which could serve as models for other entities and regions of the country.

• Training for Professors Capacitation



Each year, training courses are held for teachers and coordinators of 27 state schools in the city of São Carlos. The trainings are given by the physicist Vanderlei Salvador Bagnato (IFSC / USP) and Daniel Varela (EESC / USP), and the biologist Wilma Barrionuevo.

The training, conducted by the Center for Optics and Photonics Research (CEPOF), aims to teach teachers how to use the educational kits of the "Adventures of Science" project, designed by renowned public university professors (USP, UFRJ and Unesp). The event has the support of the Pedagogical Center of the Board of Education of São Carlos. All participants are committed and motivated to participate in various activities throughout the year, such as Science Fairs and Science Clubs.

• Earlier experience » Mobile Unit for Science Dissemination



For the purpose of promoting science in many different cities around São Carlos, we have established a partnership with a non-governmental association (NGA–Mother Nature). The activities in this cooperation consisted in creating a mobile unit (adapted bus) having special equipment inside to disseminate science. The bus was modified in such a way that students could get into the unit by the front door, walk inside see many different experiments and equipment on display, and leave by the back door. We have chosen the “WATER” as a theme for the exhibition. Using this theme, we show physics, chemistry, biology and mathematics to the visitors. A small hydroelectric plant, a collection of plants, fish, and water distribution on the planet comprise the exhibit. The unit can accommodate up to 15 students at a time and they can have a complete tour in about 20 min.

• Earlier experience » Entomoptic in elementary school



Created to promote science education in elementary school, the Entomoptic uses modern pedagogically correct methodology to show to young students under 6 years old the wonderful world of science. The program consists in using a kit containing microscopes, magnifiers and a good collection of insects to explain the world one can see and how it connects with the facts that we cannot see. During the program the students learn how a microscope works and why it is so important. A qualified person visits the schools enrolled in the project and presents to the teachers the methodology to be applied. The CEPOF equipment includes a kit containing microscopes, magnifiers, insect containers, videos, gluing materials, preservation solutions, songs, etc. The students are given questions to be answered related to their observations. The activities are part of a specific program that can be supplemented and enriched by the schoolteachers

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