

» INTERVIEW



L'ORÉAL-UNESCO GRANT GOES TO ACCELERATOR PHYSICS

Interview with Valentina Mariani: winner of the For Women in Science Award 2020

In Italy, women represent almost half of research workers. This piece of data alone would be enough to prove their decisive and essential contribution to the scientific enterprise and production of new knowledge. Despite this, a gap generally persists, especially at higher levels, between the professional careers of female and male researchers. Thus, in recent years, there have been many initiatives and campaigns that, drawing attention to the problem of gender inequality in science, are engaged in highlighting the results obtained by women researchers, on the one hand to inspire new generations of women to undertake scientific careers and, on the other hand, to raise awareness regarding these issues. One of the most famous and enduring initiatives is "For Women in Science", an international award promoted by the L'Oréal foundation in collaboration with UNESCO. Every year, the award offers grants to benefit young scientists who come from STEM (Science, Technology, Engineering, and Mathematics) disciplines and who therefore cover a wide range of research fields with their projects: from those relating to biological sciences, to research in the field of high-energy physics. The women researchers that win in the Italian section are awarded for the quality of their projects and for continuing to undertake their work in Italy. The 2020 national edition of the competition concluded at the end of September with the announcement of the names of six winners. Valentina Mariani, a researcher with the INFN division of Perugia who is part of the CMS experiment's international scientific collaboration at CERN's LHC accelerator, was awarded a prize for her project that looks to the future of the LHC and is dedicated to improving the capacity of detectors for investigating rare phenomena that can provide us with clues regarding the new physics.

What is the "L'Oréal For Women in Science" award?

It is an international initiative that is held at the national level, and which involves awarding prizes in the form of grants for scientific research, which are financed by L'Oréal and UNESCO. In Italy, in the last 18



NOVEMBER 2020

» INTERVIEW

years, six grants have been awarded to as many scientists. The prize is aimed at young researchers under 35, who are encouraged to pursue their research activity in STEM fields in an Italian research centre or university. Each grant covers a period of ten months, for which 20,000 Euros are allocated, which, thus, allows researchers to keep working in Italy.

What does your winning project focus on?

My project, which was selected by the award committee, is focused on the field of high energy physics and accelerator research. In detail, my proposal concerns CMS, the LHC experiment on which I collaborate, and the Hi-Lumi LHC project (the high-luminosity phase of the CERN accelerator), which involves upgrading the machine to look for new physics. In fact, beginning in 2027, for the following 10 years, LHC will make protons collide with a greater intensity than today, and this will translate into a greater number of collisions and, therefore, into a greater quantity of data to analyse. It's a prospect that will allow us to open a window onto rare phenomena that are currently inaccessible for statistical reasons.

What, specifically, does your proposal entail?

The high-luminosity LHC entails a technological effort in terms of its update. This is very significant for the experiments located along the accelerator. These wouldn't be able to work in their current configuration because they would be "blinded" and they would be damaged quickly by the radiation emitted in the collisions. So, we need to update the experiments and adapt them to high-luminosity data acquisition. My research project is, thus, divided into two parts, which are different but complementary. On the one hand, there is the development and update of a new, main component of the CMS experiment, called "tracer", which will be bigger, more resistant, and it will be moved forward. This latter improvement will enable us to reduce the blind spot of the experiment. On the other hand, there is the design of silicon detectors that can also support an increase in radiation.

What are the scientific objectives of the project?

Thanks to the new capacity that the experiment will acquire in observing regions that, today, are precluded from investigation, we could identify rare phenomena like vector boson scattering, which is the collision between two vector bosons, W and Z. This is an event predicted by the Standard Model that could be particularly sensitive to some new physics phenomena that can interfere indirectly with this process. By measuring the impact cross-section of the collision in an extremely sensitive manner, we could, thus, detect how much it deviates from the Standard Model prediction.



NOVEMBER 2020

» INTERVIEW

What did you feel after being awarded the prize?

I was very happy to be awarded the prize, also because I wasn't expecting that my research field would be of interest to a foundation like L'Oréal. The awarding of the grant showed me, in contrast, that the competition was actually aimed at truly heterogenous scientific sectors, as the CVs of the members of the Italian committee, charged with evaluating the proposals, also show. It is chaired by Lucia Votano, former research director of INFN and director of the INFN Gran Sasso National Laboratories. On the other hand, the fact that gender initiatives are still necessary shows how the scarce representation of women within research and science is still a problem. It's a lack that is even more evident if you consider more prestigious positions, the managerial roles, which still reflect the gender disparity that has distinguished the recent past. Fortunately, over the last few years, I've noticed that this inequality is slowly flattening out. Today, the number of men and women researchers is already almost equal. The real challenge is trying to keep this number constant, because the great precariousness that characterises all scientists' careers in Italy disincentivizes and penalises women most.

Can you tell us about your education?

I completed my undergraduate degree and Masters in Perugia, where I also stayed for my PhD, during which I spent one year at CERN thanks to a simil-fellow scholarship provided, in the context of an agreement with INFN, to doctoral students and post-docs working on experiments in Geneva. It was a very formative experience because it allowed me to live for one year in contact with the tools on which my research is based and to understand how they function. After this, I got my research fellowship with the university and the INFN Division of Perugia, thanks to which I'm continuing my professional path.

What would you suggest to a young woman who wanted to embark on a journey in the field of high energy physics?

The only thing that I would advise is to not let yourself get scared by the difficulties. Remembering the moment when I decided to undertake the physics route at the end of high school, I remember in fact being torn between my passion for this world and the fear of not being able to make it. Today, I'm extremely happy that I didn't let these fears stop me.

Valentina Mariani completed her degree in physics at the University of Perugia with an experimental thesis in High Energy Physics. In 2016, she obtained her PhD on the first measurement of the impact crosssection produced by "charmed" mesons from proton-proton collisions at CERN's Large Hadron Collider. Her research activity is undertaken in a very important field for understanding the Standard Model of



NOVEMBER 2020

» INTERVIEW

Fundamental Interactions and fits into a wide international context: the CMS experimental collaboration, which involves approximately 4,000 researchers from more than 40 countries throughout the world. During her PhD, in 2017, she won an important external fellowship at CERN that allowed her to develop her research in the best context possible, getting to the heart of the experiment, with significant responsibilities too. She is the author and co-author of more than 300 articles published in the most prestigious journals in the sector, such as the Physical Review Letters and the Journal of High Energy Physics. She has also participated in numerous international conferences and meetings, reporting on the results obtained on behalf of the CMS collaboration.