

Newsletter Interview

INTERNATIONAL DAY OF WOMEN AND GIRLS IN SCIENCE: WHY WE STILL NEED IT | Interview with Luci Votano

Interview with Lucia Votano, research director emerita of INFN, from 2009 to 2012 director of the INFN Gran Sasso National Laboratories and member of the JUNO collaboration for the construction of an underground neutrino observatory in southern China.



“I Science, She Science, We Science, be Innovative, Be Creative, Be a Leader, for the People, for the Planet” is the motto of the 2022 edition of the International Day of Women and Girls in Science, celebrated on last February the 11th and established seven years ago by the UN with the aim of facilitating closing the gap that still exists in the world of research, where men are still in a clear majority and have even greater access to the most leadership positions. To date, the UN notes, women account for 33.3% of researchers and have a presence of only 12% in Science Academies.

Although the number of female researchers is gradually increasing, in the absence of an incisive change in trend, this disparity will persist for a long time, also considering how little women are represented in emerging fields, such as artificial intelligence, where only one in five (22%) professionals are women, and there are still few women graduating with degrees in engineering (28%) and computer science (40%). The problem is also widespread in Italy, where only 16% of girls graduate from science schools compared to 37% of boys.

On the occasion of the Day, on last February the 11th, dozens of initiatives were also proposed in Italy by institutions and research centres, such as INFN, with events organised in many of its local divisions and national laboratories, the University of L'Aquila, the Gran Sasso Science Institute (GSSI), the European Gravitational Observatory (EGO), the Bruno Kessler Foundation with the University of Trento and INFN TIFPA, the National Institute of Geophysics and Volcanology (INGV), the Institute for Environmental Protection and Research (ISPRA) and the National Research Council (CNR), as well as many others organised by associations, with meetings and online discussions on inequality issues. INFN has also joined the social media campaign *#WomenInScience* with the participation of major international laboratories such as CERN.

We asked Lucia Votano, INFN research director, who directed the Gran Sasso National Laboratories for three

years, to discuss with us the current situation on the issue of gender equality in science.

Lucia Votano, what are the gender stereotypes that still affect women's access to scientific careers and recognition of their merits?

Observing the Italian society focusing on the combination of the two words "science" and "women", I am convinced that the list of stereotypes is quite long, and that trained eye and mind are required to recognise them. We can divide them into several categories that sometimes are even combined with humorous effects.

I would start by listing the prejudices against science in a hierarchical order. First of all, culture and science are normally mentioned separately, and even the Constitution distinguishes between culture and scientific research. Secondly, science, especially fundamental science, is considered a niche field, valuable but reserved for people with brains other than normal, and having little impact on the economic and social development of a nation or on the construction of European thought over the centuries. Finally, in the list of the main prejudices against science, the study of mathematics and physics in all grades of school is considered to be difficult and boring, as well as not essential for education, so much so that eminent intellectuals can proudly state that they do not understand anything in this regard.

Well, if these are the general premises, which concern everyone, and this is the level of the value of science, as socially recognised, you can just imagine if women, who as children are given dolls and prams and almost never a microscope or a telescope or even a video game, ought to get involved in science and technology.

We are probably used to it, but with a little attention anyone can notice the pedagogic or ironic tone with which certain men address women when talking about even vaguely technical topics that are considered the domain of men. And how often do we address women in the workplace without using their proper academic titles?

We should all keep in mind a golden rule: always ask women we meet what they do, as a first question, assuming they might have a profession and education even higher than ours, as we usually do when addressing a man. Finally, how can we forget what we have all heard Italian politicians say recently: "As President we propose a woman *but* one who is competent". And the list of examples is much longer.

Your history as a successful researcher who achieved a leadership position in her field shows that gender stereotypes can be overcome. What difficulties did you encounter and what does being the head of a large research centre like the Gran Sasso National Laboratories entail, also from the point of view of managing your private life?

I think I was lucky. I grew up, albeit living in the 1950s in the deep South of Italy, in a family where it was taken for granted that women could graduate and succeed professionally, following their inclinations. In addition, my father, a doctor and research enthusiast, would occasionally show us something new, as happened for example when DNA was discovered. Another fortunate event was meeting a young physics supply teacher who managed to make me understand the fascination of this subject during some private lessons that I followed when I was about to take my high school leaving exam, aware that for the five years of classical high school the mathematics and physics teacher had not taught us anything.

Finally, I was able to balance my research commitment with my family life thanks to the continued support of my husband and family members, and also thanks to the patience of my son. Now I am also a grandmother and

I see that, after my generation that led the way a bit, young female researchers no longer have to give up a full emotional life if they so desire. It's certainly not easy but it is possible.

Certainly the difficulties increase along with responsibilities, and this is one of the many causes of the vertical segregation that keeps women further away from leadership positions. In the case of me being director of the Gran Sasso Laboratory, I was able to devote as much time to this complex job as I needed, because I only got there at the end of my career - probably an example of the vertical segregation I mentioned earlier - when the difficulty of reconciling profession-family life had eased somewhat.

Women's access to scientific careers has been undergoing a positive trend in recent years. Nevertheless, women in science are still vastly outnumbered by men, and even fewer women are getting leadership roles. What role should women play in this process? And who else should take care of this issue and with which actions?

Women must take it upon themselves and become the protagonists of a battle for a historical turning point that in Italy must concern investments in research, education and training. Although there has been a reversal of this trend in recent years, in the last twenty years the interest of the various governments in these issues has been decreasing overall, in step with the decrease in investments. Italian industry also has its responsibilities, since it has always had very little propensity to invest in applied and process research. We are almost last in Europe and among OECD countries in terms of public and private investment in research and development. The net result is that the Italian production system churns out products and services with a medium/low innovation content, even though it is part of that global knowledge economy that sees the production of new knowledge as the primary driver of development and of the inequality reduction process.

Italy is the country with one of the lowest percentages of university graduates and researchers, especially in scientific subjects. Moreover, about 20 thousand young graduates leave Italy every year to find work abroad. And the same is often true with our researchers. If Italy were to become a more science-friendly country, women, who in all sectors represent a weak link in the social chain, could also have better opportunities. The problem is too serious and with a strong direct impact on women for it to be left in the hands of men alone! And Italy cannot go fast if half of its human capital, the female half, is not used to the best.

It is therefore right for women to demand specific measures to achieve equal opportunities in the workplace, and in scientific research in particular, but they must first of all demand a much more decisive change in investments in research and in the quality of education. The problem needs to be addressed at its root.

Particle physics, which you work on as a researcher, now offers frontiers to be broken down in order to increase our level of knowledge of the universe. Some of which are particularly challenging, such as the study of dark matter or the structure of the cosmos in general. Do you think the participation of more competent women can help broaden the spectrum of ideas, methods and tools potentially useful in breaking down these frontiers?

First of all, it is obvious that the results are in some way proportionate to the research activity carried out, provided of course that it is good research which is competitive on an international scale. So more women, more research, more results. I understand, however, that the question implies something else.

As far as I know, there is no scientific basis for asserting that scientific research pursued by a woman follows

different paths from that of men and, of course, it goes without saying, a lower potential of women, or men, in the hard sciences. Nevertheless, we are indeed different and also have different life needs. So, I don't rule out the possibility that women may have different approaches in their interactions with colleagues, in organising their work, especially when taking on responsibilities, or in dealing with problems in general. Indeed, it's a good thing, for example, that women don't mimic too much the power management of men.

In any case, long live diversity: it is a value that enriches society and should be cultivated.

What advice would you give to a young female student with an interest in science who had to choose what to study today?

I advise young female students to follow their inclinations and passions to the utmost, with perseverance and determination, to have confidence in themselves, and to put their emotional life and the development of their professional career on the same value level. It's not easy, but it can be done, and being a researcher can be rewarding and fun. Work is an essential part of women's and men's lives; everyone should have an equal opportunity to develop intellect and skills in order to have access to a job that is satisfying from all points of view.