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# Gender mentoring inside INFN: a transformative path towards inclusion and equity in the research

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How can we foster gender equity in academia and in the field of research? Which gender equity practices could be able to counter the many gender inequalities? Many measures focus on women, trying to increase the number of female staff at all career levels, helping women to adjust to the male world. These programs meet the organization needs without disrupting the gender status quo. The masculine model of the ideal academia remains unquestioned. In 2018 we promoted a gender mentoring program with the intention of operating a transformative process within the organization starting from the younger generations (mentees) and their mentors. The program has been the first gender mentoring inside an Italian research institute. This action works on two lines: empowering the individuals while at the same time generating transformative process inside the institutions and raising awareness about the persisting gendered dimension of academia and research. In order to foster institutional change and better exploit the mentoring potential, during the second edition we included also men and brought concrete proposals to the management table to counteract the multitude of gender inequality practices. The mentoring model implemented was designed, including some tools, by University of Naples "Federico II" researchers following an evaluation study considering the INFN specific needs and organization.

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## 1. Introduction

We figured out that there is not only a numerical problem of female representation in research, but there is also a necessity to increase consciousness about the influence that gender stereotypes play not only in daily life but also in the work and the research field. Moreover, there is a need to promote new role models and leadership figures that disrupt the "*masculine*" characterizations. Some proactive measures, such as mentoring, need to be put in place to increase gender equality processes and accelerate the progress. The aim of our gender mentoring programme, in line with the most recently approaches, has the ambition to be transformative, trying not only to support the career paths of young female researchers, but above all to start a process of growth and awareness on the gender dimension that involves the entire institution. To better understand our activity, a brief overview of the *"state of the art"* of gender issues at international and Italian level is necessary.

### 1.1 International overview

The latest global gender gap report [1], issued by the World Economic Forum, shows that globally we are still a long way from gender equality, and, in the absence of corrective measures, it will theoretically take 132 years to bridge the gender gap worldwide. The current progress rate represents a slight four-year improvement compared to the 2021 estimate, however we need to consider several factors, such as the ongoing pandemic, the climate emergency and large-scale conflicts and displacement, that could hinder the growth towards gender equality. It is estimated that it will take 155 years to bridge the Political empowerment gender gap, 151 years for the Economic Participation and Opportunity gender gap and 22 years for the Educational Attainment gender gap. The time to close the Health and Survival gender gap remains currently undefined. The crisis factors have had a greater impact on women than on man. Italy currently ranks 63rd out of 156 states. Referring to the eight macro regional performance 2022, Europe has the second highest level of gender equality in the world, but Italy is at the bottom of the European regional ranking together with North Macedonia and Bosnia and Herzegovina for the Economic Participation and Opportunity sub index. Moreover, while several European countries are bridging the gender pay gap, Italy has closed less than 70%. In general, the others sub-indices (Educational Attainment and Political Empowerment) mark good progress across Europe. Additionally, the report highlights a steady under-representation of women in STEM disciplines (Science, Technology, Engineering and Mathematics) while they remain overrepresented in Education and Health sector.

#### 1.1.2 Gender gap in Research &Innovation and STEM disciplines in European Union

Over the past decade the European Union (EU) reached considerable goals and overall, the presence of women is slowly improving. However, relating to the gender gap in research and innovation, the last report "She Figures 2021" [2] observes that at EU level women accounted on average for more than 40% of academic staff in 2018, but moving up the ladder, the proportion of women in top academic positions was only a quarter (26.2%). European research still shows marked underrepresentation of women, 32.8% of the total researchers, particularly in STEM disciplines and leadership positions; less than a half of women completing a PhD will become professional researchers. In addition, gender - based differences also exist in access to EU funding

for research: men had 3.9% higher chances of accessing research funding than women and this may exacerbate the gender gap, *"as it may lead to a vicious cycle where lower funding could lead to lower publication and innovation output, which in turn could lead to reduced chances of being funded: men are more highly represented on publication teams than women".* Similarly, for every 100 patent applications held by men, only 12 were held by women. In detail, the European report summarizes the Italian situation regarding the gender gap as follows: *"Italy performed above the European average in terms of the proportion of women among doctoral graduates, the proportion of self-employed women among Science and Engineering and ICT Professionals, and the proportion of women among authors on publications in all fields of R&D. However, Italy has a relatively low share of women on boards as members and leaders and was below the European average (26.2%) regarding the proportion of women in grade A positions (23.7%). This indicates that further improvements are needed in decision-making and leadership positions to progress towards gender equality in research and innovation."* The report also highlights some positive aspects such as the promotion of gender equality plans (GEP), although Italy does not impose any requirements. The INFN approved its first GEP in March 2022.

### 1.1.3 Gender gap into INFN

The gender gap in INFN is in line with international and national statistics. The last report of the internal Guarantee Committee in 2021[3], shows the ratio of men and women according to career level and position: 1 out of 5 male researchers become manager while just over 1 out of 7 women reach the head positions (I level in the INFN career). The technologists' career growth is worse considering that only 1 out of 33 women become manager, as compared to 1 out of 6 men. Moreover, the last report of the International Evaluation Committee (CVI) [i] underlines a critical gender gap situation particularly among theoretical physicists inside INFN: *"We take note of the statistics of gender diversity in scientific commission 4 (CSN4)* [ii] *where the female percentage is between 13% (associates) and 15% (employees) compared to 22% for researchers in INFN as a whole. The reasons for this gender disparity are many. The limited number of female role models is believed to be part of the reason. In this regard we note that there is a large diaspora of distinguished Italian women theoretical physicists in many parts of the world".*

## 2. Overcome gender inequality

Starting from this scenario our mentoring activity aims to outline a possibility to enhance gender equality in our institution. We figured out that society does not evolve spontaneously towards increasing forms of equality, but there are cultural and social stereotypes that perpetuate bias and unconscious discriminations [4]. Prejudices and stereotypes, which are related to our reference culture are consolidated since childhood, moreover gender creates role expectations not only in our society but also in any organisational structure: this *"traditionally assigned"* role creates discrimination and disparity of treatment. In the scientific world there is an inclination to deny the relevance of gender in roles, needs, opportunities, and interactions inside the research, the so called *"gender blindness"*, believing that science and merit are neutral. This approach is

[i] The CVI is an international and independent body composed by five outstanding physics researchers in charged to evaluate the overall status of the Infn scientific and management activities. The report is available at https://wwwpresid.infn.it/images/PDF/Rapporti_CVI/CVI_2021_Final.pdf.

[ii] INFN research activity is organized into five National Scientific Commissions: subnuclear CSN 1, astro particle CSN 2 , nuclear CSN 3, theoretical CSN 4, technological CSN 5.

disproved by statistics and causes several effects that hinder the woman career growth: for instance, an underestimation of the effects for female researchers of working in male-dominated environments or the CV evaluation, that often ignores career path without considering parental leave breaks or giving space to peculiarities. The concept of career is not at all neutral, stereotypical male models are still proposed identifying the researcher as a solitary hero who sacrifices everything for his job and lead top position with arrogance: in such a representation of science, is it possible to find any room for a female researcher, for a different behaviour? We need to rethink evaluation mechanisms within institutions, including measures to counter segregation, both horizontal and vertical. Vertical segregation produces the so-called *"glass ceiling effect*", an invisible barrier that prevent women from reaching top positions. Recently, the researcher Ilenia Picardi proposed a different, much more effective metaphor, to describe these obstacles to career development: *"crystal labyrinths"* [5]. According to the author the problem is not only the *"glass ceiling effect*" that hinders top-level careers, but also multiple mechanisms at different career levels that influence and hinder women's entry, retention and exit from the scientific and academic path. The goal of our mentoring programme is not only to change the women's perception of their career path, but also to transform the entire institution, through an integrated approach that considers the latest innovative theories represented in the next section.

### 2.1 Gender paradigms and measures

In these years, three main strategies have been defined to overcome the gender gap:

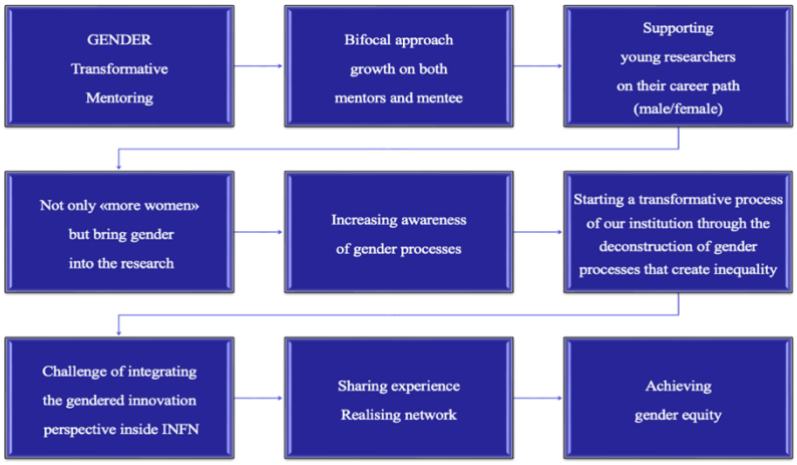
1. **Fixing the women**: to increase the participation of women and underrepresented groups.
2. **Fixing the institution**: to promote equality in careers through a structural change in the organization of research (*gender processes and organization*) [6].
3. **Fixing the knowledge:** to foster excellence in science and technology by integrating sex, gender and intersectional analysis into research (*gendered innovation*) [7].

Moreover, the mentoring programs are quite wide-spread and recognized as useful tools for women to overcome obstacles towards their career progression. The literature has gradually identified different mentoring models that relate to these paradigms. In 2010 De Vries [8] proposed a new *"transformative"* mentoring model, integrating a *"bifocal approach"* to emphasize the need for programs to focus on both women and organizations. This model inspired our mentoring scheme since it can empower the gender perspective, operate short-term changes (by supporting women's careers) and long-term changes (transforming institutions focusing not only on mentees but also on mentors' growth) and finally remove institutional barriers that create inequalities.

## 3. INFN gender mentoring programme

The INFN gender mentoring programme, the first in an Italian Research Institute, aims to transform the organization of work from inside the institution and to remove the barriers and the gender inequalities that permeate our living. This can be done raising awareness and including the gender perspective not only in research but also in reference models. Indeed, the main role models relate excellence to extreme competitiveness, portraying it as incompatible with the balance of personal life. Moreover, there is an idea of leadership that is historically constructed with *"masculine"* characteristics (power, strength, arrogance). The gender perspective must be integrated through awareness-raising paths that grow within the organization, presenting new models to show that it is possible to share and work together to achieve better results. We foster a

different leadership model that can be defined as dialogic and synergetic, capable of exercising leadership through *"attraction"* rather than domination or oppression. Our programme involved both mentors and mentee, inviting them to reflect on their career paths as well as their personal life from a gender perspective while at same time triggering transformative processes within our institution. The following scheme summarized the principles underlying our mentoring:




### 3.1 Methodology

First edition: in 2018 we started the 1st edition as a pilot project within the INFN national training plan, exclusively for women. The coordination group consisted of two INFN people (M.R. Masullo, S. Pellizzoni) and two University of Naples Federico II (UniNa) sociologists who were also teachers in the programme (E. Madonia, I. Picardi).

We selected seventeen couples as follows:

Mentees: young researchers and technologists, not staff or recently recruited (including PhDs);

Mentors: INFN senior physicists or technologists, or university associates to INFN projects at the top of their career.

The objectives were:

Mentees: improving the ability to identify, to face, and to overcome obstacles found in the early stages of the career path through discussion with mentors and other mentees; providing a tool for identifying career goals through critical reflection of one's choices and being aware of the gender processes and practices in research.

Mentors: being a *"mirror"* for mentees; reflecting on gender dimensions, practices and processes in research to trigger the change and promote transformative processes in mentors to produce changes in research structures, towards greater gender inclusion and equality.

Second edition: the main novelty was the opening of the programme to men, both mentors and mentees, because we became aware that changing the institution requires a cross-gender approach. We selected twelve couples. The format remained unchanged, except for the application: the mentees were free to apply, while the mentors have been selected by the coordination group - the same team as in the first edition plus A. Gargano (INFN) and Carmen Ferrara (UniNa). This choice came since we realized that this role is very sensitive and not all persons are eligible for it. The pandemic precluded face-to-face meetings, so limiting the development of the programme full potential. However, during the final in-presence meeting, it was possible to work together and reflect about the capacity of generating changes in the

organization, starting from the identification of behaviours and practices that hinder them. The focus was on gender integration in research and teaching programmes; gender balance in senior positions, recruitment and career progressions; work/life balance and the organisation's culture. The output is a participative document with concrete ideas that we are finalizing to be presented to INFN management.

## 4 Conclusion

Evaluating the results of a mentoring programme requires a long time, however after the end of the programme some mentors have become directors of INFN structures, bringing with them a new focus on *"diversity"* and care - taking to create more inclusive environments. Moreover, many mentees have also achieved significant career advancements in recent years (permanent positions, grants, roles of responsibility). For all, awareness of gender issues, the importance of networks and proper time management increased. Unconscious biases influence the way people progress and reach leadership positions, and the way people of responsibility perpetuate this inequality models. Our programme is creating a different environment and culture within INFN that works for women as for the majority, without standardizing but renewing role models. Our programme has already received its first acknowledgment from the independent observatory European Institute for Gender Equality as a relevant Italian gender practice [9]. In conclusion, INFN gender mentoring programme has the ambition to attain an individual, cultural and institutional change, not just a support to achieve equity, but an awareness-raising to change the narrative and shift from *"equal opportunities"* to inclusion, removing the systematic barriers that create inequalities.

## References

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[7] The term "Gendered Innovations" was coined by L. Schiebinger in 2005 more information at: http://genderedinnovations.stanford.edu/what-is-gendered-innovations.html.

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[9] https://eige.europa.eu/gender-mainstreaming/toolkits/gear/legislative-policy-backgrounds/italy.