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Gendered Organizations. The Case of Italian Astrophysics

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Gendered Organizations. The Case of Italian Astrophysics

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Abstract

Focusing on the Italian astrophysical sector, the article summarizes the results of a qualitative study that explores the role played by gender in scientific organizations. In the workplace, social and cultural practices related to gender can be considered as interpretative keys to investigate the relations of power and the processes of stratification and mobility. Furthermore, the study analyses how women-scientists define themselves on the basis of processes that act interactively on different levels and spheres of life. Only by re-defining the relationships that women and men have established, both with the socio-political order of the scientific environment and with the rest of everyday reality, gender equality can be achieved.

Keywords: gendered organizations, gender and science, scientific careers, identity.



La Dimensión de Género en las Organizaciones. El Caso de la Astrofísica en Italia

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Resumen

Ubicado en el análisis del sector astrofísico italiano, el artículo resume los resultados de un estudio cualitativo que explora el papel jugado por la dimensión del género en las organizaciones científicas. En el lugar de trabajo, las prácticas sociales y culturales relacionadas con la variable género pueden ser consideradas como claves interpretativas para investigar tanto las relaciones de poder como los procesos de estratificación y movilidad. Por otra parte, el estudio analiza cómo las mujeres científicas se definen a sí mismas de acuerdo a procesos que influyen de forma interactiva en diferentes niveles y ámbitos de sus vidas. Sólo redefiniendo las relaciones establecidas entre mujeres y hombres, tanto en el orden socio-político del ámbito científico como en el resto de ámbitos cotidianos, puede lograrse la igualdad de género.

Palabras clave: organizaciones por género, género y ciencia, carreras científicas, identidad.



The term “scientist” was coined by William Whewell in 1834 in his review of the Mary Somerville’s volume “On the Connection of the Physical Sciences”, in which she attempted to define a common identity for professionals working in the different fields of natural philosophy (Noble, 1992). However, this new collective identity has soon assumed a gender connotation. After almost two centuries, and despite the exponential growth of female participation in the labour market, women’s under-representation in research and technology is still significant, especially in leadership and decision-making positions (European Commission, 2012). For this reason, over the last decades women-scientists have become the object of a new field of academic study called “gender and science”. Scholars involved in this area of research investigate the inequalities that characterise the scientific sector, starting from different disciplines and according to various perspectives (Schiebinger, 1999). For instance, historians study the lives of women-scientists in different contexts and times; sociologists focus on women’s access to the scientific field and on the barriers they face; cultural critics investigate normative concepts of femininity and masculinity; philosophers and historians of science analyse the influence of gender on the content and methods of the sciences and on the construction of scientific knowledge (see for example Keller, 1985; Harding, 1986; Kohlstedt & Longino, 1997; Schiebinger, 1999; Kourany, 2010). Some contributions by gender studies researchers have been accepted by national and supra-national authorities (European Commission, 2002). From a policy perspective, European institutions have been among the first to analyse systematically women’s presence in the scientific field, in order to develop equal opportunities in a mainstreaming perspective – a method that requires to integrate gender equality into institutions, policies, programs and practices (European Commission, 2000).

Focusing on the organizational dimension, the present study addresses two closely related topics: the professional experiences and the identity construction of women-scientists. Scientific organizations represent areas in which gender differentiations and inequalities are constructed and reproduced. There are different levels of understanding organizations as gendered (Newman, 1995b). The first concerns gender as a social division within organizations and it highlights the ways in which work structures are

both horizontally (some kinds of job are seen as “men’s work” and others as “women’s work”) and vertically segregated (women occupy lower grades and status positions). The second involves gender as an experience. Researching women’s experience «brings into focus many of the hidden dimensions of the emotional and sexual regimes of organizations, which are masked by the apparent rationality of organizational structures and by dominant organizational ideologies» (Newman, 1995b, p. 285). A third approach, then, concerns organizational culture as a site of gendered meanings and identities. In particular, social and cultural practices related to gender can be considered as interpretative keys to investigate the structure of power relations and the system of classification and identity, that encompass multiple dimensions and refer to processes, practices and ideologies embedded in thought, language, social structures and organizational facts.

Integrating these perspectives, in the following pages I examine the role that gender plays in scientific career paths in the astrophysical sector. After explaining the object and method of the research, I structure my arguments into two parts. Firstly, I explore how the careers of women-scientists take shape in a traditionally male-dominated field. Secondly, I analyse women-scientists’ identity construction. Concluding remarks focus on the need to redefine the relationships that both genders have established with the political and social order of the scientific environment and with the rest of everyday reality to achieve gender equality.

Object and Method

The aim of this study is to analyse the gender structuring and assumptions which underpin Italian astrophysical organizations, bringing out scientists’ experiences of working life. The astrophysical scientific sector has the right characteristics to attract at the educational level a higher number of women compared to other “hard” sciences but, as in other disciplines, the professional sphere is historically, culturally and numerically male-dominated¹ (Urry, 2008; Cesarsky & Walker, 2010).

Gender is an important element in the development of scientists’ careers. It denotes power relations between the sexes and refers to the social

characteristics whereby women and men exist in a dynamic relation to each other, being «the effect of social definitions and internalizations and reproductions of the meaning of being a man or a woman» (Alvesson & Billing, 2009, p. 21). Gender, then, is «an activity and a social dynamic, something that we do in everyday reality, and something that we make accountable to others» (Gherardi & Poggio, 2001, p. 247) and it prescribes and defines the parameters of individual experience in which women's lives are different from men's. The gender perspective I follow represents a key to understand the relationship between individuals and social settings, and the interdependencies between public and private spheres of life. It should be seen as a basic orientation rather than a distinct and clearly elaborated theoretical position. Through this general approach I describe and comment on the gendered organizations rather than promoting distinct viewpoints. The purpose is to collect the voices of scientists working into the same field, studying experiences, practices, meanings and orientations expressed by them. How do each gender rises through the organizational hierarchy? Asking this question means considering bodily differences a decisive distinction and accepting that women and men are robust categories. However, gender is not simply a fixed element imported into the workplace. It is an organizational accomplishment constructed in part through work, culture and relations that influence the functioning of organizations and the general way of thinking about aims, values, practices and so on. Therefore, I follow a broader gender approach which also focuses on other questions. Which are the predominant relations of power for men and women within scientific organizations? How do the identity constructions of women-scientists take shape?

To answer these questions we have to consider that the organizational culture, especially in male-dominated professions, is a significant barrier to change. It is defined «in terms of shared symbols, language, practices (...) and deeply embedded beliefs and values. Each of these domains has to be understood as gendered, and together they constitute an important field in which gendered meanings, identities, practices and power relations are sustained» (Newman, 1995a, p.10). The gendered culture of organizations defines «settings, tasks and behaviours specific to the men and women who work within them» and presupposes «a set of already hierarchically normed

488 *F. Gaspani – Gendered Organizations. The Case of Italian Astrophysics*

interactions based on the sexual division of labor and on gender expectations» (Gherardi & Poggio, 2001, p. 257).

Within organizations, gender division is historically rooted in cultural systems of meanings and ideas about what is “feminine” and “masculine”, two concepts constructed as oppositional, dichotomous and hierarchical where the second one is (usually) privileged. In these contexts, women relate to practices and models of action that point to social norms and representations associated to gender roles and to the system of constraints and opportunities each gender has to deal with. Their identity as women-scientists is the result of processes that act interactively on different levels and spheres of life: subjectivities and gender belonging; the images which women and men express and how they are perceived; the relations and practices that guide organizational and work activities; the behaviours of the management – a staff of male directors – and their impact on the system of careers. In these processes, gender stereotypes (Camussi & Leccardi, 2005) have the function to support and legitimize the social order determining and reinforcing the meaning of “being” a woman or a man in everyday life and in the workplace.

In Italy, the astrophysical profession can follow two possible career paths: academic departments or research institutes – since 2003 Observatories and Authorities of the National Research Council have merged into a single institute named National Institute of Astrophysics (INAF). University departments and INAF Institutes maintain consolidated relations in order to cooperate and develop research and educational activities. The institutes taken as a reference for this study are of both types.

The role of gender in scientific organizations is investigated through the analysis of the narratives of their members, that make possible to understand how scientific culture is shaped, gendered practices are legitimated and identities are constructed in (and outside) the workplace. The analysis draws on a qualitative study in which forty astrophysics (twenty men and twenty women) were interviewed. The interviewees were selected among the research staff at different professional levels – L4: post-doc/fellowships; L3: researchers; L2: associate astronomers/professors; L1: full astronomers/professors. Each person answers to a semi-directed interview

focusing on professional experience and on the system of representation (Farr & Moscovici, 1984) of science and its actors. The qualitative data are analysed favouring a thematic approach with the aim of highlighting the recurring and cross elements of the narratives gathered, rather than keeping the vertical structure of individual experiences.

In the following sections, a selection of extracts taken from the qualitative analysis of the interviews is presented. These fragments are not representative of all the opinions collected, nor are they intended to outline inappropriate generalizations or to propose an exhaustive analysis of the explored topics. They were rather chosen as examples of scientists' statements, considered to be significant illustrations of how gender differences are constructed and maintained by the discursive and relational practices of men and women.

Rising through the Hierarchy

Constitutive elements of gender segregation in the workplace are discrimination against women in promotions and the gradual spreading apart between their careers and those of male colleagues. According to Luciano (1993, my translation), careers have multiple dimensions:

There is a demographic dimension, concerning the structure and the number of positions. There is an institutional dimension which is constituted of meanings, of mechanisms of control and legitimacy, of rules that define the behaviour allowed, the foundations of authority, the decision-making procedures, the value-criteria to measure performance and rewards. (...) There is an interactive dimension which consists of daily adaptations and face-to-face relationships through which the rules are interpreted, modified, re-invented and individuals give meaning to their stories, build and test their self, realize their aims. There is also a subjective dimension, which consists of adjustments and transitions that alternate in the course of adult life and that may (or may not) coincide with the organizational career marked by passages of status, role changes, pay increases. (p.56)

Thinking about women's scientific careers means trying to read the current situation both in its factual aspects and for the cultural and symbolic significance that accompanies the female figure in research and in society.

The career system refers to issues regarding professional mechanisms and the maintenance of membership in organization. Its activities can be clustered into the functions of entry (human resource planning, recruiting and selection), development (socialization, training, and promotions) and exit (retirement, resignations and dismissal) (Sonnenfeld, 1989). Regarding the entry and the development phases, public competition represents the main selection tool, although all interviewees believe that it is not an objective manner for the recruitment of professionals. In fact, informal networks in scientific organizations have an important role, especially if personal ties are stable and have "sponsors", i.e. prominent personalities operating at higher hierarchical levels. Despite strong competition and the existence of a scoring system – designed to make the access to organizations more open and fair – sponsors are able to assist their postgraduate students or subordinates in their careers. In the interviewees' opinion, public competitions are spoiled because of the social relationships of the candidates or their membership of particular scientific groups, and not because of gender. However, as we will see later, candidates' gender and the "quality" of their social relations may be somehow connected.

Regarding scientists' recruitment and career transitions through public competition, it should be underlined that, in order to achieve equal opportunities, public authorities have at their disposal several tools, for instance reserving at least one third of the posts among the members of the selection committees for women. The women-astrophysics interviewed – although they pointed out, in some cases, not to completely appreciate such "forcing" – are in favour of the application of this rule, complaining that this often remains unnoticed (INAF, 2010a) and that the boards, being largely composed by men, may contribute to foreclose women from professional promotions. This kind of practices and decisions reflect the fact that within scientific organizations decision-making power is mostly in the hands of men, especially as far as career mechanisms are concerned. On this point, it is also noted that, for example, the Board of Directors of INAF has not

resorted to the consulting and advisory functions of the Committee on Equal Opportunities for the approval of the Human Resources Regulation, although this is in contrast with the current norms (INAF, 2010b).

Homosexuality at the highest hierarchical levels and the male culture that it reflects perpetrate gender segregations within scientific organizations. Despite the public competitions system, promotions are often based on integration mechanisms for which the new member is recruited through the designation of those already in office. The so-called “old boys’ network” refers to the relations between men in formal and informal decision-making contexts and groups. However, such network is not only about excluding non-members. It involves information giving and the socialisation into masculinity of younger professionals in a place where masculinity is equivalent to senior management behaviour. These practices outline the processes of “homosexual reproduction” (Monaci, 2002, p. 77, my translation), through which «the leaders with powers of selection and promotion of staff (...) generally prefer to promote and appoint individuals with social traits corresponding to their own; (...) acting on the assumption that, in each case, they will be “naturally” more inclined to make decisions in line with their expectations and visions of the world». The uncertainty of the organizational work leads to the development of rigid inner circles to keep control in the hands of a socially homogeneous group. Women who wish to climb the professional hierarchy must satisfy a certain system of behaviour and learn a complex and hidden set of rules that reflects the male culture at its base.

It comes to my mind the case of three women who have been department or institute directors: Woman/X, Woman/Y and Woman/Z... W/X is completely different from the other two: she has become a director because she was good, scientifically speaking; instead the others used to give more importance to “political” aspects, maintaining good contacts and relations without antagonizing anybody... At a certain point in their careers, they were already thinking about becoming directors. W/X, quite the opposite, has never had this ambition and she has become a director because there weren’t any other candidates at the time. I’ll tell you... Some years ago, an authority needed a new director. *Man/X*

492 *F. Gaspani – Gendered Organizations. The Case of Italian Astrophysics*

sponsored a candidate who was rejected by an overwhelming majority. The director had to be a full astronomer: *Man/X* wanted to step aside; *Man/Y* wasn't available; *Man/Z* was finished (because some years earlier he had tried to become a director without success) and – in the opinion of many – *W/X* wasn't fitting: she isn't aggressive, she is too kind and correct... But she was the only admissible candidate and so she became the director, almost by chance... otherwise they would have had to choose an associate, but it wouldn't have been wise to appoint an associate astronomer as a director... and if *W/X* had been passed over, they would have been accused of discrimination. If *W/Y* or *W/Z* had been in *W/X*'s place, this problem wouldn't have existed...but I have to admit that *W/X* made it better than many people could have expected. (Man1, Level4).

This extract reveals two different topics: the perceptions/representations of the female figures in science and the importance of networks and social capital in organizations. On the first point it should be observed that the woman's position (*W/X*) as a minority subject can be described in terms of both visibility – she is seen as an anomaly – and invisibility – she is not recognized as a legitimate leader (Kanter, 1977). In society and in the organization there is a wide range of activities that refer to symbolic categories and collective representations that reflect the polarity of genders. In the scientific institutes involved in this work, leadership is socially constructed in masculine terms, making it difficult for a woman to find a balance between being seen as a competent leader and as sufficiently feminine not to disregard gender expectations. Traditional conceptions of leadership imply that there is only one “right” way to lead in an organization, and the sort of people equipped for this leadership have to be men. In the interview, woman's visibility (*W/X*) as a leader depends on a different notion of leadership, linked to the gender role. However, «for women raised to be polite and deferential, the physics culture is not a natural home» (Urry, 2008, p. 154). The model of “female” leadership is the antithesis of “real” leadership, which use power in more direct and overt ways. Since women in leadership lack legitimacy within the dominant

discourse, their visibility (success and acceptance) as a leader entails disappearing as a woman through the acceptance of masculine ideals (Binns, 2010).

In order to move to the top of organizations, women have to understand the organizational culture and develop suitable coping strategies, finding individualised means of survival. Some studies have examined the reasons why women who reach positions of power tend not to work in favor of other women. There are two references in particular: “tokenism” and the “queen bee syndrome”. Tokenism is a theory based on interactions and numerical proportions within a group. When there is a large preponderance of one group over another, the minority-group members are called tokens because they are typically treated as symbols of their category rather than as individuals (Kanter, 1977). Moreover, in situations in which the borders among groups – between men and women – are somewhat permeable, only a few members of the minority group will manage to gain access to non-disadvantaged positions. This explains why single individuals tend to disassociate themselves from the disadvantaged groups and to embark on personal routes – therefore unfavorable to the ingroup – instead of collective actions. The “queen bee syndrome” also shows female behaviour unfavorable to other women. In this pattern, women who have attained senior positions do not use their power either to assist struggling young women or to change the system – tacitly validating it (Camussi & Leccardi, 2005).

Women at the top want to remain “unique” and they tend to preserve their privileges... and they also feel under pressure because they think they have to prove themselves more than men... women are always competitive with each other... they are probably more male chauvinist than men. (Woman5, Level4).

Women at the top may have prejudices towards other women... if they had to make sacrifices and to conform to a certain kind of behaviour they could say “Why should I help other women?” (M6, L4).

In a male-dominated workplace, the pervasive rules embedded in the organizational facts collide with the women's paths to emancipation, pushing them to conform to particular ideas, behaviours and practices to be accepted in the scientific field. For a woman to become a leader, «it is then necessary to transcend the normative (ideas about) women's roles because of the incompatibility between management and what is stereotypically ascribed to women» (Alvesson & Billing, 2009, p. 60). However, if women who wield leadership in accordance with gender role stereotypes are other-perceived as “inadequate” (like women at lower positions), assertive and forthright women are perceived, instead, as aggressive or “over-the-top” and are characterized by perpetuating sexist behaviours. These viewpoints reiterate a stereotyped view of sexual difference due to the ambivalence that marks female subjects, which are confronted by the conflicting logics of public (work-related) and private (family-related) life.

We must also distinguish the scientific knowledge from the social capital linked to the workplace, that is «the set of the current and potential resources linked to the possession of a stable network of more or less institutionalized relationships (...) and to the belonging to a group as a set of agents not only provided of common properties but also joined by permanent and useful relationships» (Bourdieu, 1980, p. 3, my translation). Highlighting the importance of social networks to find and change jobs, Granovetter (1973, 1974) emphasizes “weak” ties – acquaintances at work, friends of friends – which include a greater access to new information because they involve people coming from different social circles. Instead, “strong” ties convey redundant information since the members of the network are similar to each other and belong to the same social circles. In a male-dominated organizational structure there are important differences between men and women in relation to access and mobilization of social capital. The men-astrophysicists preparing to climb the professional hierarchy appear to benefit mainly from informal networks, using a social capital structured in weak ties – i.e. those with other male colleagues – typical of a system of co-optation and male-domination. On the contrary, for women-scientists, simply having working contacts with individuals who hold higher positions do not lead to a rapid increase in their employment status. For this to

happen, they have to rely on strong ties, such as a marriage with a man-astrophysicist. If it is plausible to assume that every member of a family can take advantage of the resources accumulated by another, it is admissible to think that having a successful partner implies the advantage of being able to reach a variegated and rich basket of resources to which one could not otherwise access, and that would increase the chances of mobility (Zajczyk 2002).

Some women in astrophysics are wives or partners of very powerful men-astrophysicists. Sometimes they don't have an impeccable curriculum vitae, but they have reached high professional levels! (W1, L4).

There is a difference between women-astrophysicists married with men-astrophysicists and those who are not married with a man-astrophysicists! I have the impression that at least some of them have had more success thanks to a little help... (W7, L3).

If the “double presence”² of women in the family and at work can be a hindering factor that prevents women to conduct their scientific work with dedication (see paragraph below), the creation of a family, or even a simple “flirtation”, with the “right” man may allow women to climb the occupational hierarchy faster.

In some situations, when leaders are men, there are women who climb the hierarchy quickly for unknown reasons, even if they don't reach senior levels.... Without going as far as talking about “prostitution”, I note the existence of such phenomena... (M1, L3).

The sexual dimension is a sensitive area and it is not easy to interpret. The interviews also reveal experiences of sexual harassment³ against women in the workplace, which occur especially during the early years of the profession, when mentoring, defined as a positive action, is an essential tool for understanding the functioning of the scientific system. According to the interviewees, in some cases when a powerful personality decides to become the mentor or “sponsor” of a young woman, his actual function is not limited

496 *F. Gaspani – Gendered Organizations. The Case of Italian Astrophysics*

to his ideal purpose. In fact, as noted by Keller (Donini, 1991, p. 69, my translation) we should not «underestimate the erotic arousal that men-scientists experience when encouraging young women». Harassments by the mentor take place in the typical scenario of teacher-student interaction and are generally configured as sexual approaches upon which promotion or punishment depends.

I've heard of some unpleasant experiences of young female students subjected to pressures, more or less explicit, of course unwanted... From this point of view, it seems to me that the scientific community is a mirror of society. (M3, L3).

These behaviours support the code of segregation and reinforce the idea that women are primarily sexual subjects, rather than individuals with intellectual abilities. If in most cases harassing behaviours are not well-accepted, some female permanent members of the astrophysical staff, thinking back to their experience of mentoring, also show a “regret” for not having taken advantage – in terms of work and career opportunities – of situations resulting from a particular “interest” towards them.

If you are a pretty young woman everyone would like to be your “mentor”... and this is a card that you can play in your favor if you're shrewd enough. Now, with hindsight, I would play that card better, of course! Instead, at the moment I felt uneasy... seniors were always looking for me ... (W6, L3).

In a male-dominated workplace, women worth is often valued according to cultural standards of beauty and women who wish to be successful need to compete with other women also on these terms. The organization of scientific research configures itself as a laboratory in which gender relations are negotiated. However, gender is not the only component which acts at the core of relationships. In some situations, social interactions emphasize biological/sexual differences, while at other times they minimize, contradict or complicate them.

Towards Women-scientists' Identity

Work has long been understood as central to male identity, signifying personal/family responsibility and commitment to the duties of citizenship. It determines the status in society, and vocational identity helps considerably in establishing a sense of worth and knowledge about oneself. In other words, working activity helps building the social identity of the subjects, even in a historical phase in which a relative loss of centrality of the meaning of work, compared to other spheres of life, can be assumed. With the rise in female participation in the labour market, work is increasingly influencing also women's identity and self-esteem. However, women who undertake professional careers are often seen (and they see themselves) as stepping outside the traditional female role, especially those who are employed in male-dominated professions. In fact, the professional sphere represents a relevant context for gender differences, influencing the development of identity and defining the expectations of women and men.

Identity «is the system of meanings that, linking the individuals with the cultural universe of shared values and social symbols, allows them to give their actions a meaning for themselves and others, to make choices and to give coherence to their own biography» (Sciolla, 1983, p. 105; my translation). From a gender point of view, identity can be seen as a key reference point where cultural masculinities and femininities are played out – through expectations and feedback – and expressed, as people act following their sense of who they are and what they want (Alvesson & Billing, 2009). Gender identity plays an important part in the process of identity construction and can be defined as «the recognition of the implications of one's belonging to one sex in terms of the development of attitudes, behaviours and desires, more or less conforming to the cultural and social expectations» (Ruspini, 2003, p. 17; my translation). Therefore, the process of acquisition of gender identity is related to the definition of gender roles and it has its origin in the social and relational network of the subject (Melucci, 1991). Identity develops and changes over time in a social and cultural context and in close interaction with other people who confirm, support or disrupt – through policies, rewards and sanctions, acts, language and so on – different claims⁴. This continual process ensures that the

498 *F. Gaspani – Gendered Organizations. The Case of Italian Astrophysics*

attainment of social identity is at one and the same time a «referent for individual continuity, an index of collective similarity and differentiation and a canvas upon which identification can play» (Jenkins, 1996, p. 21). In other words, the ways in which meanings are created in the multiple dimensions of the identitarian process answer to the expectations and constraints of particular environments. In Giddens' words (1991, p. 52), identity «is not something that is just given, as a result of continuities of the individual's action system, but something that has to be routinely created and sustained in the reflexive activities of the individual», in accordance with a model that considers both continuity and mutability of identity – the ability to adapt to changing circumstances in order to create a coherent individual/social identity.

In order to explore the identity construction of women-scientists, it is necessary to examine the generative power of conventions, beliefs and representations regarding women's scientific work, analysing the effects produced by these socio-cultural dimensions on individuals' behaviours and interpretations. However, not only the professional setting has to be considered; also domestic arrangements «are part of the culture of science. Despite the historical distinction between the domestic and public spheres, private life is not separate from public life» (Schiebinger, 1999, p. 93). Studying how individuals relate to social facts and face everyday reality as a whole, we are able to explore the foundations of their decisions and to highlight the conflicts between roles, the processes of categorization and the socially legitimated conventions about women-scientists. Analysing women's personal orientations we can cast a light on their attitudes, values and choices, that are significant elements for identity.

According to the majority of the women interviewed, scientific activity is a significant source of self-esteem. However, women-astrophysics do not always consider the working dimension as a foundational experience of their identity or as a preeminent space of evaluation of their existence. The analysis reveals instrumental attitudes towards employment, in respect of which it is necessary to review and re-balance personal priorities.

Two years ago I wouldn't have hesitated in telling you that my work was an important part of my life. Today I have a permanent

position but to get there I made sacrifices... Now I have two children and the focus of my life has shifted. (W8, L3).

In reference to the Italian case, the issue of women-mothers who are forced to neglect work for childcare refers to the low degree of de-familization through the welfare state – the lack of public interventions that provide adequate support services – and to the “familistic” cultural heritage that appoint women to perform care activities and take on household responsibilities (Esping-Andersen, 1996). The only way to make scientific career easier seems to be to postpone or renounce to motherhood, acquiring a professional model constructed on male ideals. In fact, give birth to and look after children prevent women from maintaining a network of contacts and a competitive curriculum vitae in terms of number and quality of publications. Trying not to appear different from their male colleagues, women with children have to eliminate almost everything (i.e. time for themselves) but work and family, nevertheless they also lose the flexibility that would be needed to work late or to engage colleagues in informal discussions. Moreover, as they experience motherhood in most cases with a precarious job, women may find themselves without economic protection.

I know a woman who had a post-doc position... She had a difficult pregnancy, and had a bad time because she had no protections... She kept her job because our supervisor avoided pointing out her absences. For this reason later she changed her job. This is an example of how the rules of the system tend to exclude women... (M6, L4).

Although the majority of the men interviewed know about these difficulties, they tend to think about motherhood as “a women’s thing”. Many men-astrophysicists also suggest women should not renounce their private life, considering sexual characters as the determining features of what is “natural” in society. On the contrary, career and achieving power are presented as unfeminine and somehow “damaging” to femininity. These opinions are also based on sexual ambivalence, a mix of hostile sexism that considers women “inferior”, thus legitimizing the male social control, and benevolent sexism that idealizes women as wives and mothers.

500 F. Gaspani – *Gendered Organizations. The Case of Italian Astrophysics*

There are women who do not have children and have dedicated their lives to their career, but this is not a good thing and it is not the winning choice! You cannot have everything in life, you must be able to find a balance between your spheres of life and try to be happy with what you have. I think women who have reached top positions by giving up other aspects of their life then repent ... (M7, L3).

Careers of women-scientists are interpreted as individual choices – not always approved by male colleagues – in a context of constraints and opportunities biologically and socially defined. Female biological and social – gender-related – characters, can also affect the decisions of hiring and promotion, and they ensure that the male model of worker – without “extra-organizational” commitments – appears the only one able to offer guarantees.

During the selection phase, anything can be used against a woman: "she has children, then she will have to stay at home because they get sick", or "she has no children, and then she will want to become a mother". If she is not married: "she is a bitch, no-one wants to marry her" if she is divorced "she is a bitch because she is divorced"... (W1, L1).

The analysis of the interviews shows that excessive engagement in science can often make women feel guilty. This emotion especially grips women who live a discontinuous presence in their family, and it is accompanied by the idea not to pay adequate attention to the family members. Any deviation – even temporary – from the path defined by gender roles and social rules implies a self-stereotypization – i.e. the tendency of self-appraise themselves on the basis of the stereotypic traits – within the image of the “unnatural mother”, more inclined to work ambitions rather than to her “natural” role of social reproduction.

I used to pick my son up from childcare at 6 pm, and when he learned to talk he asked me "Mom, why do you come so late? The

other moms come at 4 pm or 2 pm". My son was three years old, poor creature... I used to see the other mothers who had more time and to feel guilty... (W2, L2).

Women who totally commit themselves in a male-considered profession – not devoting themselves to the traditional role – risk being considered “unfeminine” and feeling unfulfilled. Women-scientists engaged in both roles wonder if their activities are effective. Women who heavily invest in their profession but do not reach – for any reason – concrete recognition, may experience a re-visitation of their priorities, restructuring their actions in accordance with new orientations. Compared to men-astrophysics, self-image and self-esteem of women-astrophysics seem to be less dependent on their job and social position. If it is difficult to accept male gender models and conciliate the different roles that women are – or want – to play at the same time (wife, mother and scientist), younger women-researchers – who are in the hierarchy-based professional positions – seem willing to make radical choices. When they feel their biological clock is clicking away, they wonder about the possibility of finding a balance between work and private life and they tend to prefer biographical trajectories focused on family. This is partly due, beyond doubt, to the precarious conditions in which young researchers have to work and to the increasingly higher age at which scientists gain permanent positions in universities and research institutes. The uncertainty related to the future – and the impossibility to control it – is crucial to structure and redefine values and priorities in the light of how individuals represent reality and imagine their identity to be socially perceived. Although most women are today involved in a process of gender-role fluidization, performing multiple gender roles depending on the different social realities they have to deal with, when the context interferes with this ambivalence, the balance can be redressed through the “shelter” of the traditional gender role, which is still able to provide some control over reality.

If in the future I won't be able to continue to work in the astronomical field I will change job... I'd be sorry for this, but I must also think about my family and my life ... I can also adapt myself... (W2, L4).

502 *F. Gaspani – Gendered Organizations. The Case of Italian Astrophysics*

I may feel satisfied when I write an article, but I'm happy for other things... If I have to give up astronomy to have a family I wouldn't have problems... of course, I would be disappointed but I think I have the "feminine" spirit of sacrifice... (W4, L4).

The willingness to perform an act of deprivation in the professional sphere in order to devote to the role of wife and mother seems to represent a potentially constitutive act of the identity of the women interviewees. These "sacrifices" go hand in hand with the traditionalist and familistic Italian culture, which tends to take for granted, even in the laws and social policies, that the management of most of the household tasks is women's business. On the contrary, it is very rare for men to limit or interrupt their work commitments. When the trade-off between professional life and household responsibilities interest fathers, men have to deal with an unsympathetic social context: the work environment disapprove requests for leave or special permissions by men, considered as evidence of weak attachment to the profession. In fact, family-oriented fathers have not yet been fully legitimated in the social and cultural codes, also because of women acceptance.

I have two children and at times I had to put barriers to work, not to have my private life invaded... but it was held against me. I was told that I should be clearer and decide if I wanted to take care of my children or of my job... the most surprising thing was that it was always emphasized by women. (M8, L3).

A stereotyped conception of gender roles is strong among the interviewees. In women's interviews, we can appreciate negative representations of themselves and of their own gender-belonging, resulting from the comparison with the dominant (high-status) group – the reference point in relation to which the other group is defined. In case of stereotypical behaviour, the gender victim of it is devalued and the responsibility of the unfair treatment suffered is attributed to it.

Every woman will certainly say, "We need more women in decision-making positions!", but then she is not so sure... maybe for cultural issues or because, as some people say, women are really less suited to decision-making positions. (W1, L3).

The dominant norms of organizational culture conflict with, or at least severely undervalue, the norms and expectations associated with "being a woman". Stereotypes linked to roles place men and women in a sort of "natural" (supported, or at least tolerated) order, and they play a fundamental role in maintaining power imbalances between genders (Camussi & Leccardi, 2005). In addition, the working path of the majority of women-astrophysics interviewed is marked by the recognition of their shortcomings and failings, without claiming what it is not perceived as deserved.

I do not know if the scientific environment values the contribution of women... I have produced less than a man of my age⁵. (W8, L3).

I can't stand competitiveness, and I have never been able to get a political-organizational mindset, and this is not a positive thing... it is a fault. (W2, L1).

The focus on individual accountability and the interconnections between self-affirmation and recognition of the "others" qualify many women-astrophysics' attitudes more than men's. Women's emphasis on their own limitations refer to the belonging (or not) to the scientific context and to the dynamics that take shape in it. The process of identity construction, in fact, is in part linked to the socio-cultural dimension of the context in which the individual is placed (Melucci, 1991), that is the framework of resources and constraints that nourish and define the meanings of that context and manage its terms and conditions, purposes and expectations.

The potentiality of the ambivalence related to the female gender often introduces the need for a (difficult) harmony of roles and identities. In fact, women-scientists' identity is also defined in relation to the allocation of values and priorities to different activities. The asymmetric distribution of household and care responsibilities, the gendered nature of scientific organizations, the persistence of the ideal-type of the male breadwinner and

the deficit in the provision of assistance services, have an impact on women's professional chances. These aspects may lead the women-scientists interviewed to quite homogeneously define themselves as low-status group – i.e. the identity that is assigned by comparison with the male-group benchmark and that is experienced within male-dominated contexts – and the researcher to perceive the absence of intra-gender differences, without finding an identity construction potentially unhitched from the traditional gender role. Women-scientists' identity struggles to establish itself in the present, but it can try to project itself into the future of female subjects who choose to work to assert it.

Concluding Remarks

The hard recognition of women-scientists' role and their persistent difficulty in reaching senior positions in research are central issues for national and supra-national institutions and authorities (European Commission, 2000), also regarding the specific sector of astrophysics (IAU, 2009; INAF, 2010b). Legislative progress in the field of equal opportunities and the achievement of formal equality have not yet eliminate discriminations and prejudices towards female subjects. This situation brings to women's careers being "slower" than men's (INAF, 2010b) and to the fact that women gradually desert the scientific field – the metaphor of the "leaky pipeline" (European Commission, 2000, 2002).

As observed, within workplaces gender order takes shape from different interacting factors – such as individual, organizational, interpersonal and socio-cultural features – and puts women in a position of estrangement in hierarchically, relationally and symbolically male-dominated contexts. These considerations point to the issue of citizenship of women in science. To ensure that women become citizens with full rights in the scientific field, policy makers should not simply work to reach a balance in the numerical proportions between genders in scientific organizations or to analyse their chances of inclusion and participation in a given context. Instead, they must especially investigate the relationships that both genders have established with the political and social order of the scientific environment, their

recognition and their gazes on the scientific community. Only by redefining the mechanisms on which wills, expectations and values of individuals (women and men) depend, the potential of critique and innovation can be developed within paths that seem universally established. According to Schiebinger (1999, p. 195), however, «change will have to happen simultaneously in many areas», that is the social and cultural dimensions of everyday reality as a whole – e.g. gender roles and interactions and the relationship between home life and the profession. Giving a critical visibility to the hegemonic masculinity of gender relations and practices may represent a path to change.

Notes

¹In Italy, women attending Ph.D programs in Physics are around 30% of the total and in Astronomy the gender participation is equal (Masciadri & Schneider, 2009). However, the presence of women among university research staff is rare (Tot: 14.8%; Researchers: 26.1%; Associate Professors: 11.7%; Full Professors: 3%) and into the National Institute of Astrophysics (INAF) women-scientists are about 27% of the total research staff (35% at the start level, 15% at the top level) (INAF, 2010b).

²The concept of “double presence” indicates cross-gender experiences and women’s simultaneous presence – both in the physical and in the symbolic sense – in different and conflicting spheres of life (Balbo, 1978).

³Sexual harassments may occur at different levels of gravity and have the purpose or effect of violating the dignity of a worker through physical, verbal or non-verbal practices.

⁴The identitarian process has a social component (the conception a person has of itself as being a part of a group) and a personal one (the experience of self-reflection – on individual history, hopes and plans – based on the needs of personal coherence), routinely related to one another.

⁵On this point, it is noted that «factors such as age at promotion, disciplinary fields, number of publications are only a partial explanation of the gender differences in the career pathways in science. The main explanatory factor is and remains gender» (Palomba, 2006, p. 136).

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508 *F. Gaspani – Gendered Organizations. The Case of Italian Astrophysics*

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