I GENDER EQUALITY PLAN - INSTITUTO DE ASTROFÍSICA DE ANDALUCÍA

Index:

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1. Introduction

The incorporation of women in research, teaching and management to science and humanities is synonymous of social progress. Nevertheless, participation of women in these areas is not equalitarian if compared to that of men, yet in the XXI century. Despite the long background of women promoting equality in opportunities between men and women and the laws against discrimination by means of gender, macro or micro discriminations in the career of female scientist and technologist can still be detected. Facing this context, the elaboration of equality plans in the public administration promoting accomplishment of all current laws is necessary.

A little bit of history: Legislation in Equality Matters

The Human Rights Universal Declaration of 1948 established that "each individual possesses all rights and freedom as stated in this declaration, with no distinction of any kind, whether race, color, gender".

The Declaration about suppression of discrimination against women is signed in 1967. In 1979, the United Nations' General Assembly approves the Convention about suppression of all kinds of discrimination against women, that obliges the 141 signing to the commitment for equality of rights in political, economical, social, cultural and civil spheres. According to the equality politics of the United Nations, worldwide conferences are organized every 5 years since 1975 in order to warrant the same rights and opportunities to men and women, and to promote changes in behaviors needed for men and women sharing of responsibilities in all areas. During the conference of 2010, the UN created UN women with the goal of promoting gender equality and women empowerment [1].

At a European level, the objective of equality among women and men was defined at the beginning of the cohesion politics in the European Union as a transversal right. In this sense, one article says: "Equality between men and women is a fundamental right of the Union laws. It affects all facets of social life, including, unquestionably, work." Details of the different legal aspects using this common objective of gender, juridical, working, educational and cultural equality can be found in the European commission webpage [2].

In Spain, the Constitution includes the gender equality principle implicitly. Assuming these preceding

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principles of gender equality as fundamental rights that a civilized society must respect, other laws have also been developed:

- *Law 39/1999 of working and family life conciliation.*
- *Royal Law 1986/2000 from which the Observatory of Equality between men and women is created.*
- *Law 30/2003 about actions for incorporation of gender impact in the rules and laws elaborated by the Government.*
- *Organic Law 1/2004 of actions for integral protection against gender violence.*
- *Organic Law 3/2007 for effective equality between women and men.*
- *Resolution 20th May 2011 by which the I Plan of Equality between women and men of the Administration of the State and its public organisms is created.*

Promoting research excellence by integration gender equality

Looking only at scientific research, the first legislative milestone was the ETAN report about women and men in Science in the European Union [3], published in 2000. The declaration of principles in the report, as embedded in its title, is "To promote excellence by means of integration of gender equality". The report includes for the first time the situation of presence and participation of women in different research areas in the countries of the European Union. It was discouraging both in all fields of knowledge and in all countries. The diagnostic of the situation at the beginning of the XXI century makes the implantation of positive actions necessary in order to stop this historical injustice. The following actions, assumed by all member states, are proposed:

1) A new rule obliging companies to elaborate statistics segregated by gender.

2) New member States' laws about access to public registries.

3) Abrogation of laws and rules that impede progress of women.

As a result of this first report, reports with updated data are generated every three years since 2003, including evaluation of progress in the matter of gender. The preliminary data of the "*She Figures 2015*" report [4] shows that, indeed, the situation is somehow better as compared to 2000 but the progress is very slow and the conclusions of the 2012 report have not significantly improved. The report concludes that, although the fields of Medicine or Agriculture almost reach parity, there is still a long track to walk for that to happen in STEM disciplines as Physics, Math or Engineering. Additionally, it is regrettable that, despite the recommendations from the European Commission, only 36% of its scientific organizations have implanted gender equality plans (see Fig. 1 based on data from 2013).

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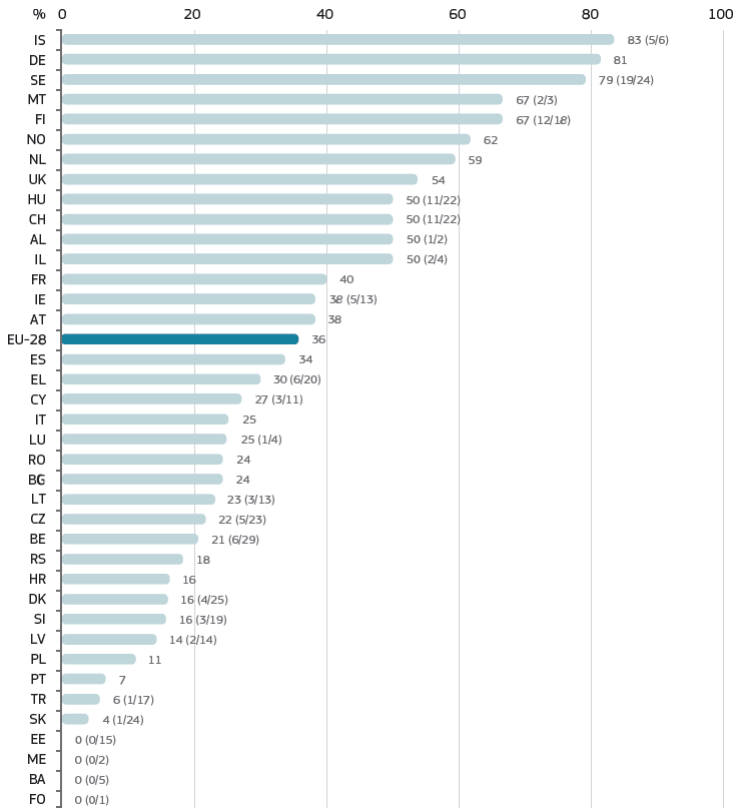

Figure 1. *Research Organizations (in percentage) applying Gender Equality Plans. Dark blue shows average data for the European Union (EU-28). Note that Spain (ES) is below the mean value and Nordic countries (Iceland-IS, Denmark-DE or Sweden-SE) follow the recommendations of the European Union. Source: "She Figures 2015"*

At the end of 2013, the European Commission stepped further. Article 16 of the Rules (UE) no. 1291/2013 is a new milestone since it establishes a H2020 program especially dedicated to gender equality, which is also assumed by the FP9.

Three fundamental objectives are defined:

1) Gender balance in research teams to all levels.

2) Gender balance in decision taking.

3) Integration of gender dimension in the research and innovation of contents.

In Spain, the first study, promoted by the Ministry of Science and Innovation, was presented in 2011 in the so-called "*White book. Situation of Women in Spanish Science"* [6] and the subsequent updates in the documents "*Female Scientists in digits 2011*" [7], "*Female Scientists in digits 2013*" [8], "*Female Scientists in digits 2015*" [9] and "*Female Scientists in digits 2017*" [13].

The results reproduce the conclusions obtained for the EU-28: infra-representation in technical careers

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and responsibility positions.

It is worth noting that, for the first time, the perspective of gender is included in 2013 in the public politics of R+D+i in the Spanish Strategy of Science and Technology and of Innovation. This gave room for the implantation of gender equality plans in lots of scientific institutions. The "*Female Scientists in digits 2017*" report concludes that "*it is worth noting that all Research Public Institutions (OPIs), 96% public Universities and 83% private Universities had at least one gender equality plan or was in elaboration in 2017 or before*".

In CSIC, the first exhaustive report on the situation of female scientists in the institution was presented in 2002 in a special number of the ARBOR magazine [10]. The report proves a gender inequality in the institution between female and male scientist, particularly in positions of responsibility and among all research areas. The former CSIC president, Rolf Tarrach, writes in the presentation of the report:

"*How is that the research areas are so different? I recommend the reader to take a look at the contributions corresponding to some extreme areas: Food, with 28% female Professors and one institute in which 4 out of 5 Professors are female; Material Science, with 3% female Professors and one institute in which none of the 17 Professors is a female; and Physics, with less than 20% female researchers".*

This report motivated the creation of CSIC's "Women and Science" Commission (CMyC) [11]. The work developed by CMyC between 2002 and 2012 gave rise to another publication in the ARBOR magazine [13], showing an analysis of the progress of CMyC in 10 years:

"*When analyzing specifically data on the situation of females in 2003 and 2012 separated by areas of knowledge, a progress on the percentage of women in almost all areas is detected, but we are still far from the objective of parity. The deficit in female presence is larger in certain areas and in the highest professional level. Therefore, active actions promoting gender equality are still needed. That will contribute to excellence in the research activities of CSIC".*

Despite previous recommendations of European institutions and CMyC, CSIC did not elaborate its first gender equality plan until 2013. In 2015, CSIC produced its second plan (http://www.csic.es/mujeres-y-ciencia/normativa), which is still the current plan. That plan constitutes the legal frame our plan belongs to.

2. Diagnostics of the situation of female scientists at IAA:

Analysis of gender parity at Instituto de Astrofísica de Andalucía - CSIC during 2013-2017

The Instituto de Astrofísica de Andalucía, with approximately 200 workers, out of which 100 are scientists, is divided in four scientific department (Solar System, Radioastronomy, Extragalactic Astronomy and Stellar Physics), a Technological and Instrumental Development Unit (UDIT) and a general services' unit. Table 1 shows the evolution in percent of women in the different stages of the institute during 2013-2017. Figure 2 shows these data on a plot. "Staff" refers to the scientific personnel, "perm" refers to permanent staff, "PhD" refers to predoctoral staff, "Postdoc" refers to postdoctoral staff, "Serv" refers to staff working in services' units (library, administration, computer center, maintenance) and "Tech" refers to personnel ascribed to UDIT. It is regrettable that results for scientific permanent staff have not changed since the first statistical study, in 1994, 20% females.

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Table 1

Year	Staff(%)	Perm(%)	PhD(%)	Postdoc(%)	Serv.(%)	Tech(%)
2013	34	20	53	48	48	22
2014	32	20	49	40	46	20
2015	33	20	46	46	52	19
2016	31	21	50	38	54	17
2017	29	21	44	34	48	16

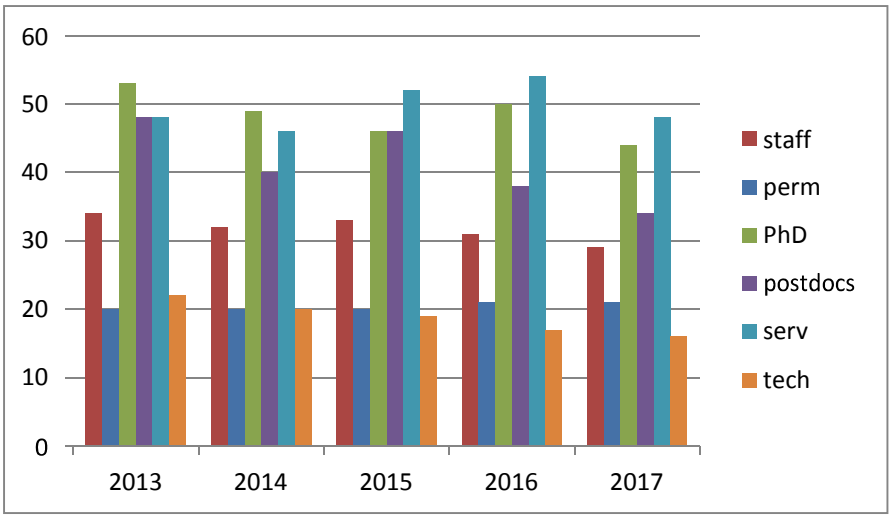

Figure 2. *Evolution in % of the different professional stages at IAA.*

In general, there is little evolution in all stages for the last five years. Moreover, it is worth noting that the percentage of female predocs decreased 14 points in the last analyzed period. Similarly, female technicians percentage decreased 6 points. The percentage of female permanent staff seems stable around 20%.

Tables 2a and 2b show the evolution of scientific staff and the percentage of female researchers at IAA in the different scientific scales. RyC, JdC and ERC acronyms refer to positions obtained in the Ramón y Cajal, Juan de la Cierva and European Research Council calls.

Table 2a

Año	Personal Cien. Total		Plantilla		Post-Doctorales		RyC+ERC		JdC+Otros Postoc.		Predoctorales	
	Total	%Muj.	Total	%Muj.	Total	%Muj.	Total	%Muj.	Total	%Muj.	Total	%Muj.
2013	136	37.5	53	18.9	43	46.5	6	16.7	37	51.3	40	52.5
2014	140	35.0	52	19.2	48	39.6	9	22.2	40	43.6	40	50.0
2015	127	36.2	51	19.6	39	46.1	9	22.2	30	53.3	37	48.6
2016	119	32.8	51	19.6	41	36.6	9	22.2	32	38.2	27	51.9
2017	113	31.9	49	20.4	35	34.3	7	28.5	28	35.7	29	48.3

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Table 2b

Años	% Total Investigadoras	% Investigadoras en Plantilla	% Investigadoras RyC + ERC	% Investigadoras JdC + Postdoc. Proyectos	% Total Investigadoras postdoctorales	% Investigadoras Predoctorales
2012-13	37.7	19.6	16.7	54.5	48.8	50.6
2014-15	35.6	19.4	22.2	48.5	42.9	49.3
2016-17	32.3	20.4	25.3	37.0	35.5	50.1

In the predoctoral period, there is gender parity, which remains through the years. However, there is a 12% decrease of female postdocs from 2013 to 2017, which is worrying. At highest postdoc level (RyC and ERC), we are not even close to gender parity in 2013 (16.7%) and 2017 (28.5%). Indeed, Figure 3a shows the trend in these years. There is a clear decrease in the number of female postdocs during these years, that is not seen in the number of male postdocs.

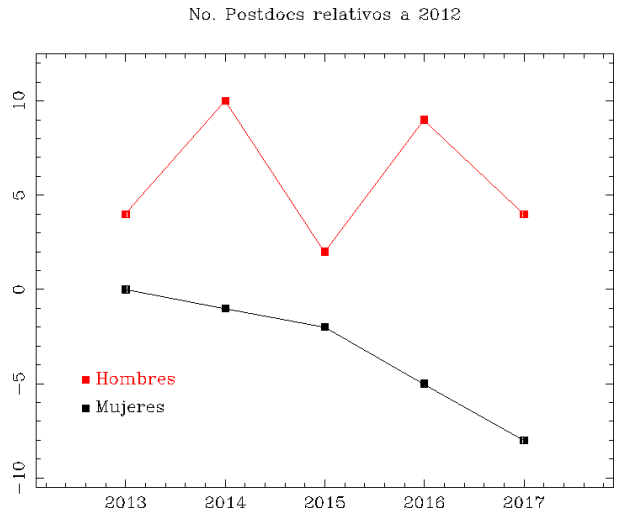

Figure 3a. *Evolution of number of postdocs between 2013 y 2017 relative to 2012.*

The relative presence of women in the permanent staff positions clearly shows the scissors' effect (see Fig. 3b), less women as the research track advances. Nevertheless, it is remarkable that the effect breaks down at the level of IC (Investigador Científico). Both in 2013 and 2017, the percentage of women in this level is higher than in the level of CT (Científico Titular). Since we are analyzing statistics with a small sample, we can perform a detailed analysis of promotions to IC and PI (Profesor de Investigación) since IAA's birth. In the history of IAA, there have been 17 promotions to IC (6 women and 11 men) and 8 promotions to PI (1 women and 7 men). That means that, while men promote more often to higher sclaes, PI in this case, that is not the case for women. The increase in the percentage of IC as compared to that of CT contrasts with values obtained for our area in CSIC, Phisics aScience and Technology, with 24,86% female CTs, 23,68% ICs and 11,49% PIs.

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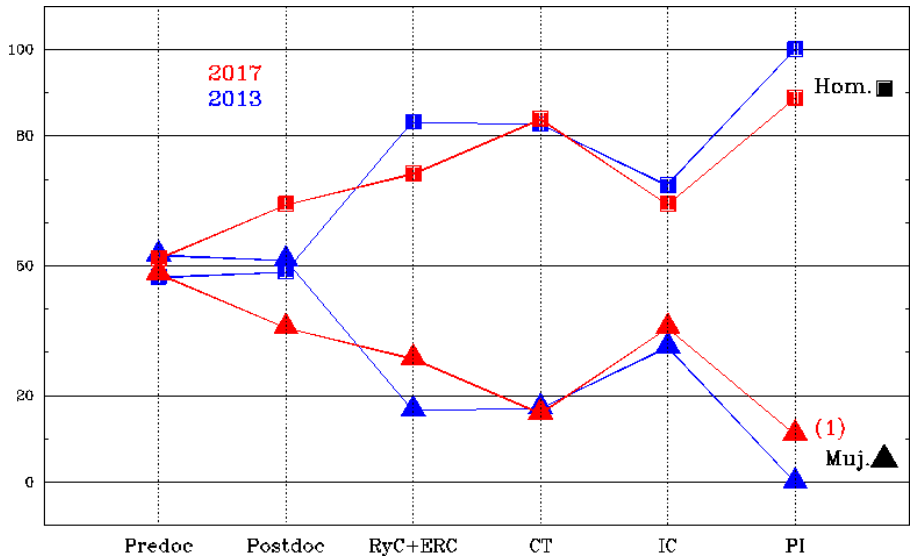

Figure 3b. *Evolution in the scissors diagram in the period analyzed, from 2013 to 2017. The % at each proffesional level is shown. Acronyms for the permanent scientific staff stand for Científicos Titulares (CT), Investigador Científico (IC) and Profesor de Investigación (PI).*

In Fig. 3, we present a histogram with ages of the scientific personal. It somehow shows that the ICs do not follow a scissors' diagram. We note that, besides the lack of promotions to the highest level, no women have become a CT in the period analyzed. This fact leads to larger aging of the female scientists as compared to that of males.

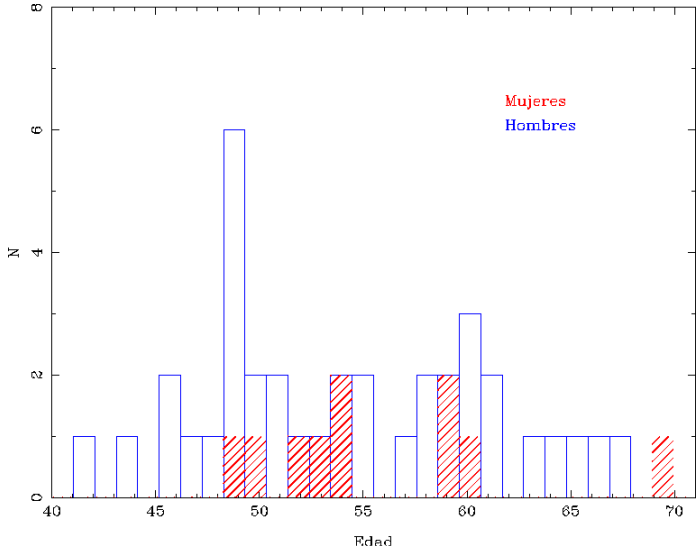

Figure 3c. *Distribution of scientific staff ages at IAA. Red: females; Blue: Males.*

Female scientists' leadership at IAA. Projects

Regarding IAA's women leadership and participation in scientific projects, we took into account national projects (AYA and SPACE) and international projects (EU).

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Figure 4a shows the evolution in the total number of projects lead by female (green symbols) and male (orange) scientists at IAA during 2013-2017. The figure also shows the average value (solid lines) in both cases. We can see that the mean values of these two groups differ by a **factor of three**, which remains in the last five years. Figure 4b shows that the percentage of female researchers (with respect to the total number of researchers) leading projects is 30%. This percentage is compatible with the small percentage of women with permanent positions (who can lead projects).

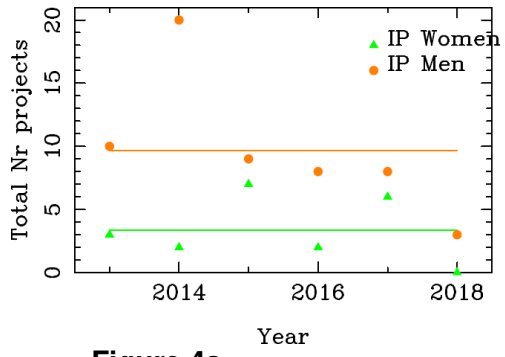

Figure 4a

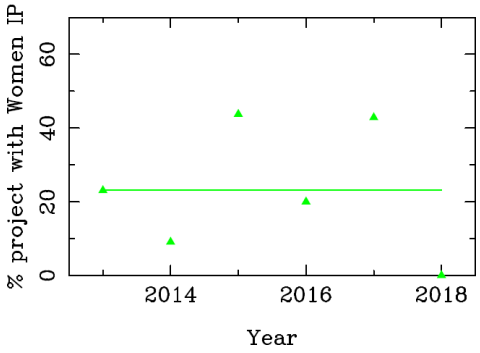

Figure 4b

Analyzing the participation (both women and men) in IAA projects lead by women in the last five years is also interesting. Figure 4c shows that, despite the large dispersion in the data, the participation of researchers (considering both genders) in projects lead by women is similar to those in projects lead by men (solid lines show mean values between 5 and 6). Initially, this results stays for the case in which the participants are all women (dashed lines and empty symbols). However, the mean percentage of female participation in scientific projects lead by men is half that in projects lead by women (see Fig. 4d).

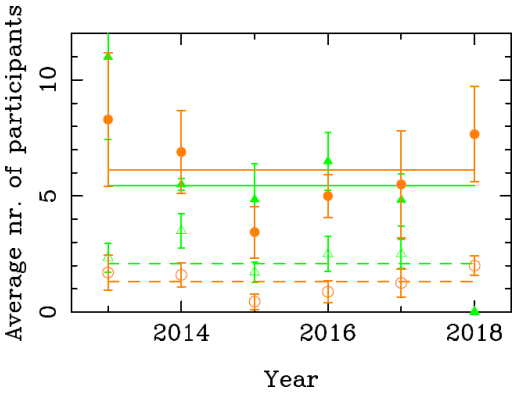

Figure 4c

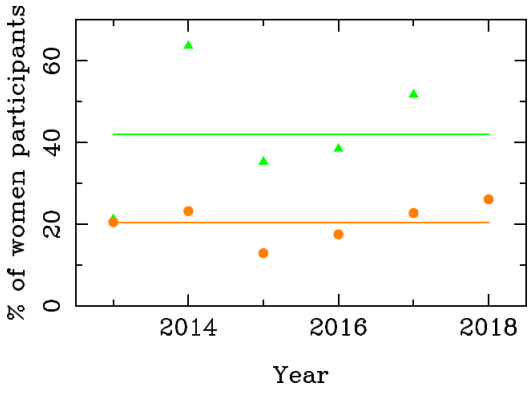

Figure 4d

Figures 5a and 5b shown the total income (in Euros) and the yearly average (since 2013) by male researchers (orange symbols) and female (green symbols) researchers and the overall average. Even if the income by female researchers is smaller in absolute value, the yearly average is very similar in both cases (Fig. 5b).

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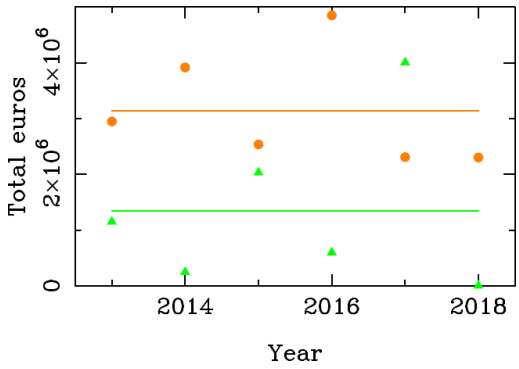

Fig 5a

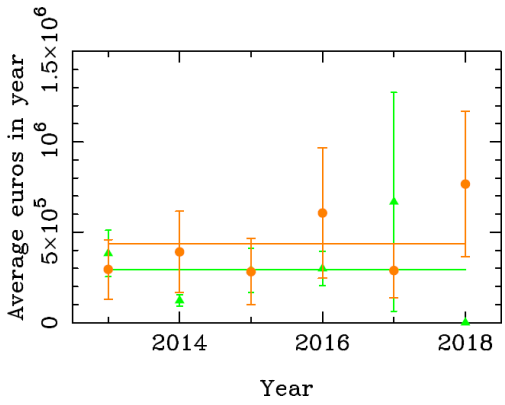

Fig 5b

Female researchers' leadership. Publications

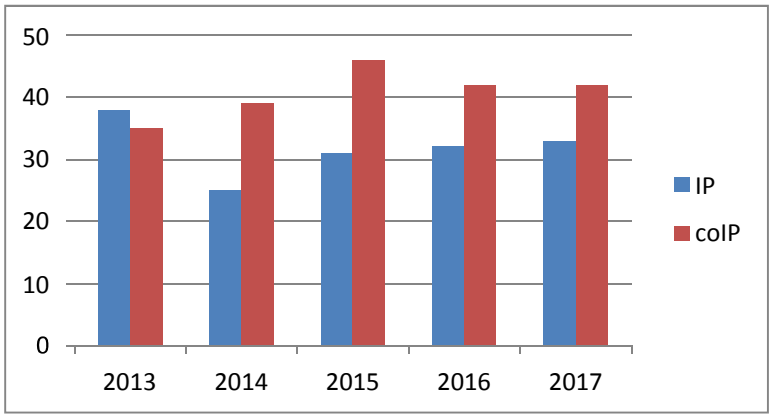

Figure 6. *Evolution (%) of female scientists' participation in publications lead by IAA. Blue corresponds to those in which the first author is a female researcher, coded with IP and red corresponds to those in which she is not the first author, coded with coIP.*

The leadership in publications does not reach parity, except in 2013, when there were more publications with women as first author than as co-author. On average, we can conclude that there is a 10% smaller participation as first author (~30%) than not as first author (40%) from 2013 to 2017.

Female researchers' leadership at IAA. Management

Regarding management positions, since IAA's birth back in 1975, we have only have one female director out of a total of 8 directors (12,5%) and 4 vice-directors out of a total of 12 vice-directors (33%). Up to now, IAA has never had a female manager.

3. Specific Gender Equality Plan Actions

Actions to be taken by this gender equality plan must lie within the frame of those active at CSIC's II Gender Equality Plan, in force since 2015 (see http://www.csic.es/mujeres-y-ciencia/normativa). These

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actions mainly refer to warrant gender equality in all selective processes of the institution, awareness of gender equality through yearly courses and situations needing special protection through the harassment protocol. Thus, our gender equality plan is a complement to this general frame and has the objective that the CSIC's plan precepts are fulfilled and some other actions helping to improve the situation of IAA's women research careers.

We establish two scopes:

1. Actions for the work and family life conciliation:

- Creation of a nursery room for breastfeeding exclusive use.
- Creation of a playroom and kindergarten, preferably at IAA. The playroom would be offered during working periods with school vacations and during meetings organized at IAA.
- Recognition of telework by IAA for those workers caring for dependent people.

2. Gender equality actions:

- An update of the diagnostics defined in section 2 of this document will be done on a yearly basis. The report will be included in IAA's Annual Memorandum.

- All activities (courses, seminars, meetings, etc.) organized by IAA must provide a report on gender equality impact.

- The institute will organize activities for IAA's female workers' visibility during the dates especially devoted to women visibility, February 11th "Women and girls in science Day" and March 8th "Women's Day".

- CSIC protocols of use of no-sexist language and work and sexual harassment should be accomplished (http://www.csic.es/web/guest/documentos).

- IAA's executive board will recommend workers at the institute to take the Gender Equality courses organized by CSIC yearly. The board will evaluate positively justifications of assistance to such courses in institutional positions' appointments.

4. Organization, Implementation and Tracing of this Plan

In order to comply the precepts established in this I IAA's Plan of Gender Equality, a tracing commission will be appointed including the following members:

1 representative of the scientific permanent staff 1 representative of postdoctoral staff
1 representative of predoctoral staff
1 representative of technical staff
1 representative of administration and service staff

The president of this commission will be the representative of the scientific permanent staff. All representatives will be elected by the part of the staff they represent. Previous experience in gender equality activities will be taken into account.

This commission is responsible for generating yearly reports on the accomplishment of the gender equality actions. It will act as a gender equality observatory and an advisory commission for IAA's

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executive board and it will be responsible for the implementation of the gender equality actions at IAA.

5. References

WEB pages:

[1] http://www.unwomen.org/.
[2] http://eur-lex.europa.eu/summary/glossary/equal_treatment.html.
[3]http://www.amit-es.org/assets/files/varios/informe_ETAN.pdf
[4] http://ec.europa.eu/research/swafs/pdf/pub_gender_equality/she_figures_2015- leaflet-web.pdf
[5] http://ec.europa.eu/programmes/horizon2020/en/h2020-section/promoting-gender- equality-research-and-innovation **[6]**http://www.idi.mineco.gob.es/stfls/MICINN/Ministerio/FICHEROS/UMYC/LibroBlanco-Interactivo.pdf **[7]**http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/CientificasCifras2011-30nov.pdf
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