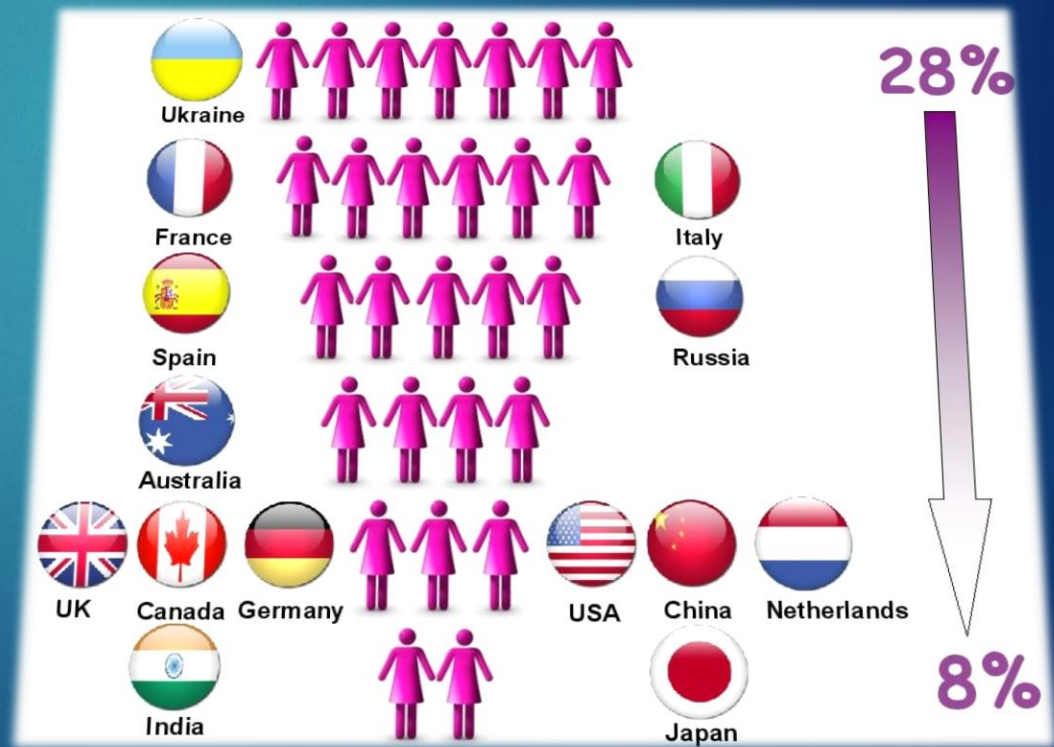


WOMEN ASTRONOMERS IN SPAIN

Isabel Márquez (IAA-CSIC, Granada)

- ▶ When we started, almost 10 years from now
- ▶ What we did
 - ▶ For the IYA 2009
 - ▶ “Women and astronomy”, SEA
 - ▶ Up to now
 - ▶ For the next
- ▶ Statistics and Sociological study





Montse Villar
IAA-CSIC



Adriana Kiczkowski
(consulting)



Eulalia Pérez-Sedeño
CCHS-CSIC



Isabel Márquez
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Cesca Figueras
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Josefa Masegosa
IAA-CSIC



Josefina Ling
Universidad
Santiago de
Compostela



Belén López-Martí
LAEX



Blanca Thoughton
IES - Málaga



SHE IS AN ASTRONOMER
+ + +



THE UNIVERSE
YOURS TO DISCOVER

INTERNATIONAL YEAR OF
ASTRONOMY
2009

Promoting gender equality and empowering women is one of the **United Nations Millennium Development Goals**

Approximately one quarter of all professional astronomers are women (wide geographical diversity)

Drop in numbers towards more senior levels

Visibility (resources on historical and living female astronomers)

Forum to discuss issues, lessons-learned and challenges

IAU 2009 RESOLUTION B4: On Supporting Women in Astronomy

The International Astronomical Union XXVII General Assembly,

recalling

1. the UN Millennium Development Goal 3: *promote gender equality and empower women*,
2. the IAU/UNESCO International Year of Astronomy 2009 goal 7: *improve the gender-balanced representation of scientists at all levels and promote greater involvement by underrepresented minorities in scientific and engineering careers*,

recognizing

- 1.that individual excellence in science and astronomy is independent of gender,
- 2.that gender equality is a fundamental principle of human rights.

considering

- 1.the role of the IAU Working Group for Women in Astronomy,
- 2.the role of the IYA2009 Cornerstone Project She is an Astronomer,

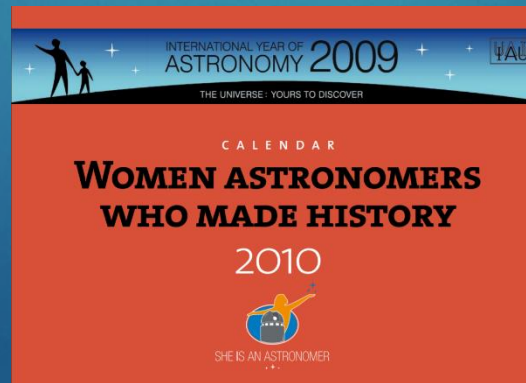
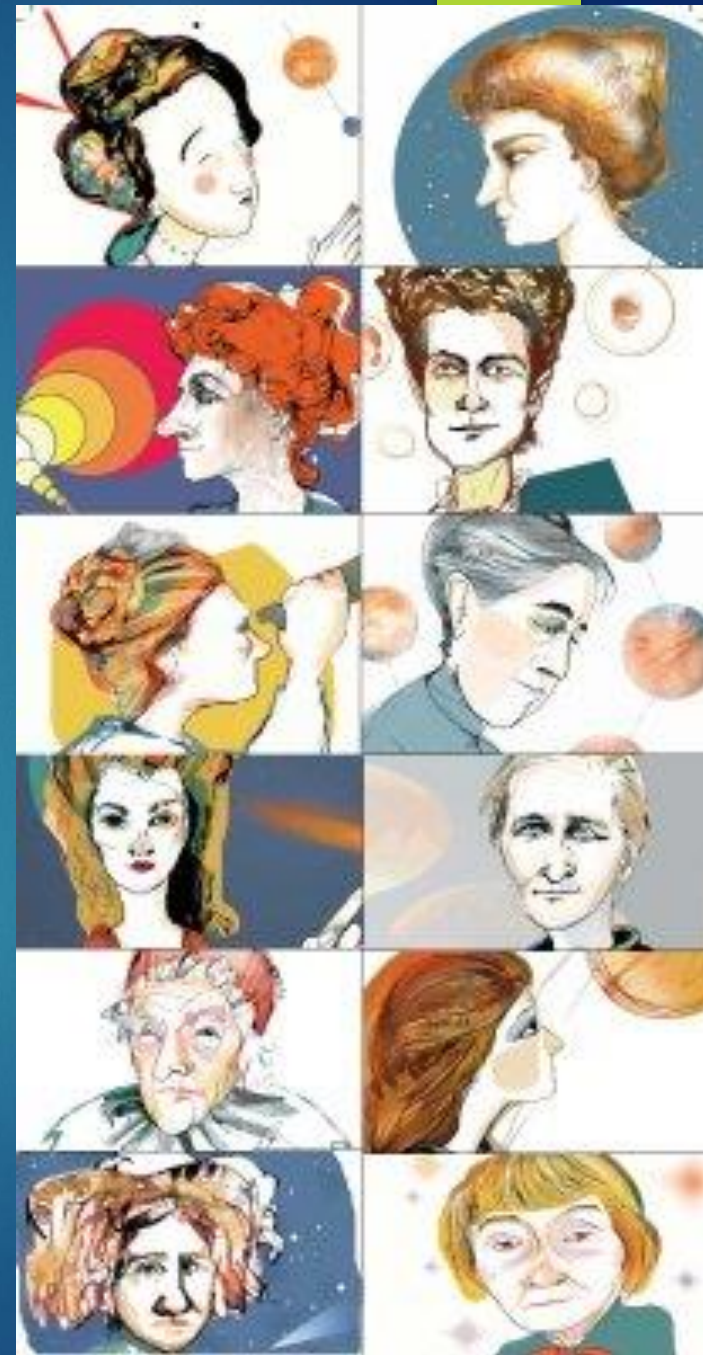
resolves

- 1.that IAU members should encourage and support the female astronomers in their communities,
- 2.that IAU members and National Representatives should encourage national organisations to break down barriers and ensure that men and women are given equal opportunities to pursue a successful career in astronomy at all levels and career steps.

Female astronomers: present along the history of Astronomy

They significantly contributed to our present-day concept of the universe

CALENDAR



+ Researchers

More women astronomers who have contributed to our knowledge of the stars.



Margherita Hack
(Italy, 1918)

One of the first women to be hired at the Observatorio Nacional de Astrofísica, Mexico, in 1951. In 1961, she was the first woman to be elected to the Italian Academy of Sciences. She was also the first woman to be elected to the Italian Academy of Sciences. She was also the first woman to be elected to the Italian Academy of Sciences.

Joanna Barrow
(United Kingdom, 1927)

She was the first woman to be elected to the Royal Society. She was also the first woman to be elected to the Royal Society. She was also the first woman to be elected to the Royal Society.

Julia Taylor
(United States, 1946)

She was the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society.



They also die

Stars have a beginning and an end. They are born in clouds of gas and dust, which come

Virginia Trimble
(United States, 1922)

She was the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society.

Wendy Freedman
(Canada, 1921)

She was the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society.

The age of the Univers

The astronomer Edwin Hubble discovered in 1929 that the universe is expanding, and that the farther a galaxy is from us, the faster it is moving away from us. This discovery led to the discovery of the Hubble Constant, the constant of proportionality between distance and recession velocity.

During the 1990s, the astronomer Wendy Freedman was able to determine the value of the Hubble Constant. Her work showed that the universe is 13.7 billion years old, which is the age of the universe today.

Sandra Deller
(Australia, 1944)

She was the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society.

Wendy Freedman
(Canada, 1921)

She was the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society.

ASTRONOMICAL MILESTONES IN THE STUDY OF COSMOLOGY

1916	Albert Einstein published his general theory of relativity, which provided a mathematical framework for understanding gravity and the universe.
1927	Edwin Hubble discovered that the universe is expanding, and that the farther a galaxy is from us, the faster it is moving away from us.
1929	Edwin Hubble published his discovery of the Hubble Constant, the constant of proportionality between distance and recession velocity.
1931	Wendy Freedman was born in Canada.
1964	The Cosmic Microwave Background (CMB) was discovered, providing strong evidence for the Big Bang theory of the origin of the universe.
1974	Wendy Freedman and Allan Sandage published their determination of the Hubble Constant, which was 70 km/s/Mpc.
1998	The discovery of dark energy, which is a mysterious force that is causing the universe to expand at an accelerating rate.
2003	The Wilkinson Microwave Anisotropy Probe (WMAP) was launched, providing a detailed map of the CMB.
2013	The Planck satellite was launched, providing the most precise measurements of the CMB to date.

+ Spanish Women



SHE ASTRONOMER

- THE ASSOCIATION OF SHE ASTRONOMERS (ASA) IS A NETWORK OF WOMEN ASTRONOMERS WHO ARE INTERESTED IN PROMOTING THE CAREERS OF WOMEN IN ASTRONOMY AND RELATED FIELDS.
- MEMBERSHIP IS OPEN TO ALL WOMEN ASTRONOMERS WHO ARE INTERESTED IN JOINING THE ASSOCIATION.
- FOR MORE INFORMATION, VISIT OUR WEBSITE AT WWW.ASTRONOMER.SHEA.AS

+ Researchers

More women astronomers who have contributed to our knowledge of the stars.

Verma Rubin
(United States, 1920)

She was the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society.

Margaret Geller
(United States, 1947)

She was the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society. She was also the first woman to be elected to the American Astronomical Society.

The Univers is everything



Verma Rubin discovered that the stars in the central region of galaxies rotate at the same speed as those at their edge. This discovery led to the discovery of dark matter, which is a mysterious substance that makes up most of the universe.

Verma Rubin's work suggests the existence of dark matter. It is currently thought that 25% of the matter in the universe is made of dark matter and that 70% of its dark energy accounts for the remaining 5%.

Margaret Geller's work led to one of the most important discoveries in astronomy: galaxy clusters are not distributed throughout space, but are in walls, with large empty spaces in between. The structures they are in look like foam or a sponge.



SHE ASTRONOMER

EXHIBITION

Sociological study 2009

1st research done on the situation of women in A&A in Spain, 2009

Both quantitative and qualitative (both women & men)



Map of the situation of
Women astronomers
In Spain



29% of staff
20% of project leaders



In-depth
interviews
to teaching
and
research staff



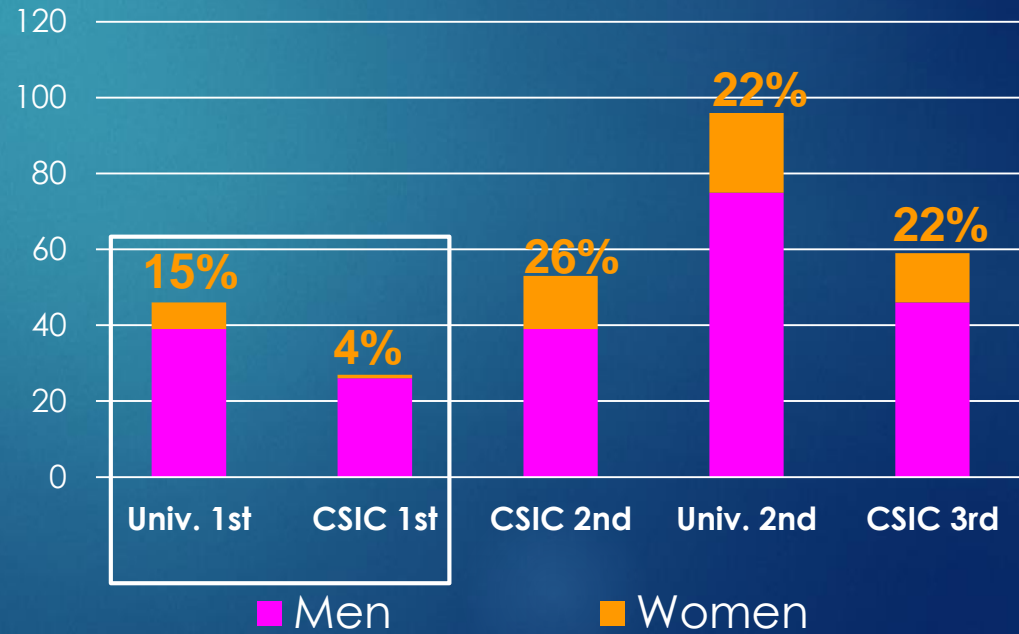
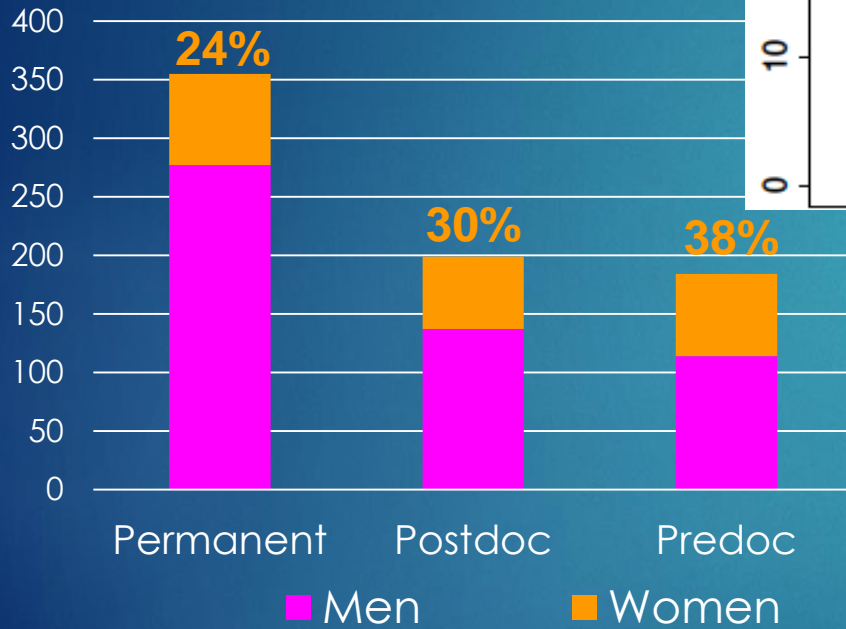
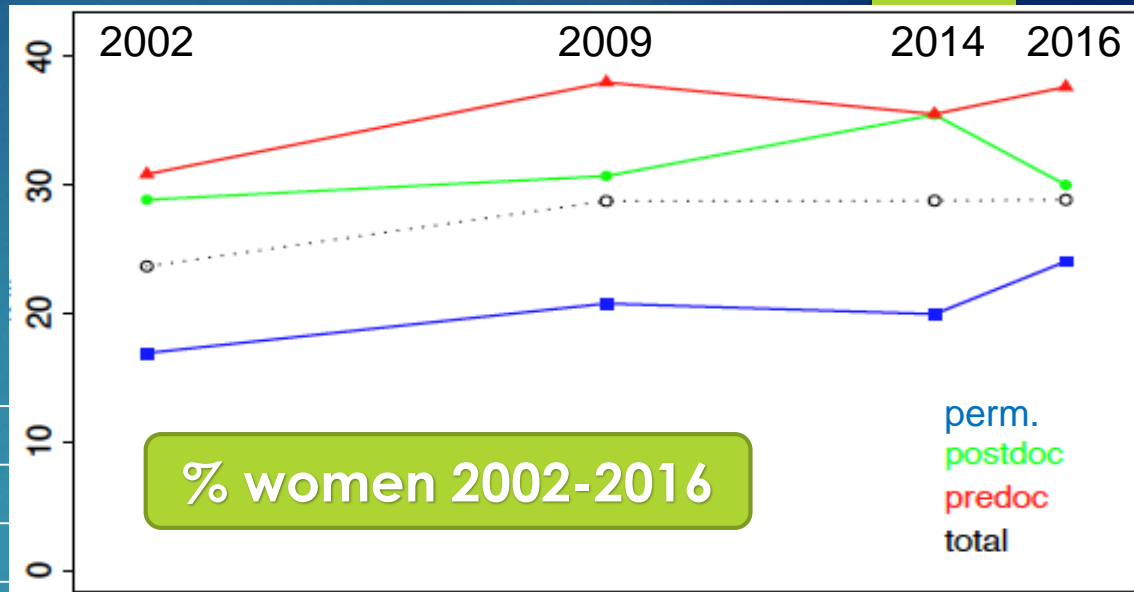
Focus groups for PhD
candidates and postdocs

NUMBERS 2016

(Barcons 2002)



(Gorgas 2016)



W/M	Perm	Post	Pre	%M _{tot}
Univ.	47/135	14/44	18/37	27%
OPIs	31/142	48/93	52/77	30%
%M_{tot}	24%	30%	38%	29%

Results of the qualitative study 2009

- At first glance, no discrimination in their research area
- **Women face many more difficulties**
- **External origin, no special responsibility**
- “It is just a matter of time”

Past work conditions have improved but still a good distance to go (glass ceiling)
Awareness of inequalities in the National System of Science and Technology
(less relevant for younger)

Discriminative situations not a direct consequence of close environment

Young:

Inequality or discrimination makes part of the past, irrelevant from now on

Family/children care will eventually turn into a problem they will have to face

Family responsibilities are not a hindrance, difficulty or issue for deeper reflection

Affirmative actions:

Indirect criticism

Huge work load

SEA Committee
“Women and
astronomy” 2017



- Miguel Cerviño (IAC)
- Marisa García Vargas (FRACTAL, S.L.)
- Vicent J. Martínez (Univ. Valencia)
- Silvia Martínez (Univ. Cantabria)
- Mercedes Mollá (CIEMAT)
- Mayra Osorio (IAA)
- Ana Ulla Miguel (Univ. Vigo)
- Eva Villaver Sobrino (Univ. Autónoma de Madrid)

Next future

Upgrade of sociological study in 2019

Impact of the Equality Plan of the Spanish
Astronomical Society (2016)

- Provide statistics of women in SEA meetings,
panels, nominations, leading positions