

Ultrafast lasers to inclusive empowerment: a 40-year journey

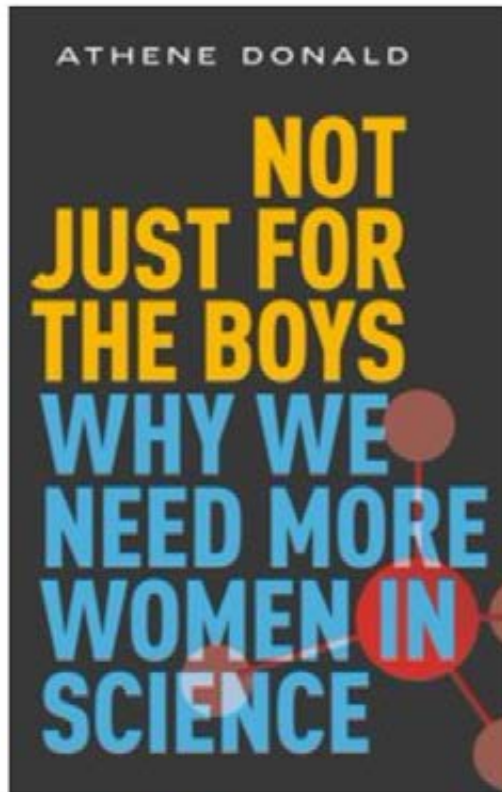
Ursula Keller

Physics Department, ETH Zurich, Switzerland

IEEE Histelon 2023, IEEE HISTory of ELectrotechnology CONference
Florence, Italy, 7-9 Sep. 2023

**Panel Meeting: Women step into technology – how it may change the history?
Friday 8. Sep., 11:10 am, Talenti room**





Not Just for the Boys

Why We Need More Women in Science & Technology

Athene Donald

- A leading scientist highlights the obstacles, blatant and subtle, faced by women in science
- Explores historical attitudes towards women doing science, and what progress has been made
- Contrasts the common, damaging perceptions of science with the creative, collaborative reality
- Examines the impacts of societal expectations and stereotyping
- Considers the ways in which women are belittled, ignored, and harassed in scientific research contexts
- Provides moral and business cases for encouraging girls and women to pursue science

Oxford University Press, May 2023:

Dr. Athene Donald, Professor Emerita of Experimental Physics and Master of Churchill College, University of Cambridge



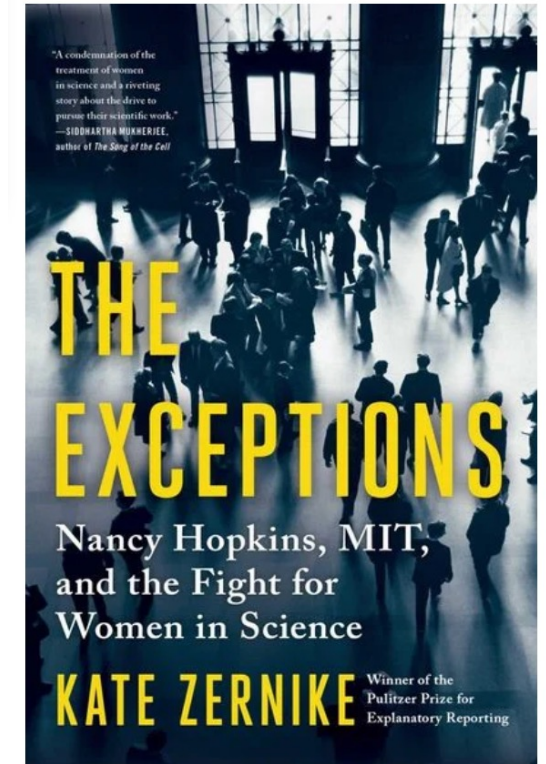


Not Just for the Boys

Why We Need More Women in Science

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- **Women in leadership positions: why is our experience different?**
Explained with examples - from my career - and from the new book
“The Exceptions – Nancy Hopkins, MIT, and the Fight for Women in Science” (2023)
- **I am increasingly concerned about “hostility” towards excellent women in leadership positions in STEMM fields, which I see as a key challenge for further progress in gender diversity**
- I will suggest some explanations – and propose some measures to improve ...



“I just want to do good science for the love of lasers ...”

- 1984: graduating from ETH Zurich with a Masters (i.e. Diplom), I was convinced there where NO MORE gender issues for working women!
- If I brought good **performance**, I could achieve anything ... (and nobody said it was easy ...)
- And I did. I felt supported when I was young, had great sponsors ...



ETH Zurich

1984 Diplom (Masters) in Physics

Graduated top of class

Motivated to win the Fulbright fellowship to study in the USA

Stanford University

1985-1989 Ph.D.

Rotation of PhD advisor during the first year

Visiting woman professor helped to find “the right professor” for me

Great experience

Bell Labs, Holmdel

MTS (Member of Technical Staff)

1989-1993

Started independent research immediately after PhD

Formal mentor assigned for all women MTS, better networking

In response to recent gender lawsuit there

ETH Zurich

Since 1993

Political pressure in Switzerland for women professors

First tenured woman professor in physics

Anthony Johnson: take the position and show them you can do it!



- March 1993, start at ETH: resources - space and personnel - far below average (<50%). I realized this much later. No transparent information available.
- Promised when hired: more office and lab space when needed!
A struggle over the next 10-years to expand, even after success in research and funding, to a level comparable to new professors, typically receiving double the space at hire.
No transparent information available.
- Written promise at hire: more personnel resources will be awarded, based on good performance, after retirement of next two professors in 96/97 ... Did not happen. Why?
- 1996 – My first pregnancy. Institute Leader's response, when I informed him:
"This is what you get for hiring a woman!"
- My ongoing promotion process from associate to full professor was stopped:
"How can you do your job with children?"
- Asked for help from Prof. Rice (theoretical physicist and who recruited me from Bell Labs)

20. Dec. 1996, one month before birth: Met the Heads of the Institute and the Department to answer the following three questions:

- 1) Can you fulfill your teaching obligations with children?
- 2) Have you been lobbying for your promotion?
- 3) And – as a condition to continue the promotion process – can you apologize for claiming that this is a discrimination case.

And I did!

I was then told: If even one recommendation letter is not good, my promotion would be delayed - indefinitely. Do I really want to risk continuing with the promotion?

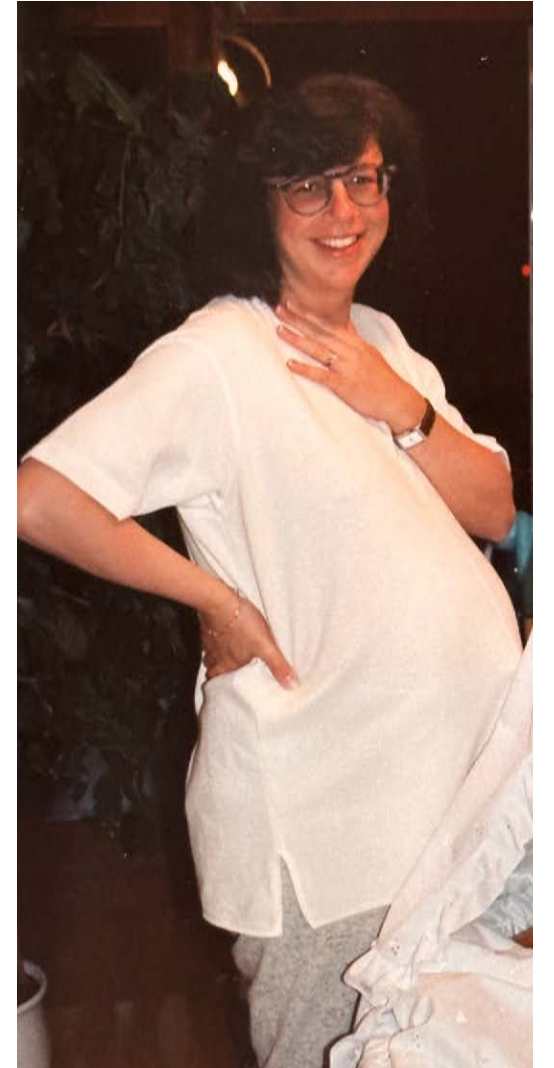
And I answered Yes! (but still worried of course ...)

January 1997: healthy birth of my son!

October 1997: promoted to full professor. Additional promised resources delayed.

Three male peers in physics, however, promoted within 3 years (4.5 years for me)

In the end: a “big mess”, other professors “annoyed about wasting their time” on this issue, and I was branded a “trouble maker”.



- November 1998 – birth of our second child
- Challenge – insufficient daycare for babies at the university. But full access to university daycare was promised when hired!
- January 1999 - met with new president to request promised daycare support. This president, unfortunately, considered “daycare a private matter.”
 - And I was told: “shut up - or I will lose his goodwill, the goodwill of the whole ETH leadership, and everybody in Switzerland!”
- I considered legal action, but was informed “hopeless”, “will destroy your career” ...
- And decided to keep my head down, **focus on my research**, and show them that I can do it – even with children
- but - continued **to personally struggled with this injustice ...**
- **And almost decided to leave academia**

- Motherhood is a significant (but not the only) contribution to the leaky pipeline
- More women professors today consider having children (as most men have been doing).
 - Where we can make a change: Reliable daycare, support for sickness, important deadlines, ...
 - Need special measures. **Having children is not “business as usual.”**
 - Positive examples: ERC starting grant - within 7 years after PhD + one more year per child. For professors - no teaching for one year around birth. Postdoc program - add additional PhD.

OPN Column December 2016

Retaining Postdoc Mothers in an Academic Career, Ursula Keller and Anna Garry



Many female postdocs do not return to academia after their position ends. One way to increase retention could be fellowships specifically geared to the needs of postdocs who are also mothers.

Here, we introduce the idea of competitive fellowships for postdoc mothers that enable them to pay for a Ph.D. student or early postdoc researcher, whom they will then supervise while in the early stages of motherhood. Such grants, we believe, could help these scientists maintain ties to their labs, their research, and their academic career path during a period of significant personal transition.

Department of Physics, ETH Zurich
introduced Fellowship for Postdoc Mothers in 2018

<https://www.phys.ethz.ch/research/research-promotion.html>

Explanation why this makes sense:

For example read OPN Column, Dec. 2016

[Link](#)

- **1999 - MIT president Charles Vest “admits discrimination against female professors”** (The New York Times, March 23, 1999, [Link](#))
- A powerful message to promote awareness around gender bias in academia worldwide.
- First published in the MIT Faculty Newsletter (March 1999), now known as the **1999 MIT Report**, [Link](#), catapulted MIT into a pacesetter role in gender diversity in STEM. The recent book **“The Exceptions – Nancy Hopkins, MIT, and the Fight for Women in Science”** gives a deeper history behind the making of this report
- This report came from initiatives by senior women professors in science at MIT, who organized and collected data on resource allocation and gender issues
- And while I was struggling **with my experiences at ETH ... and considering leaving academia**
- **... this report rescued my academic career**
- I realized that I was **not alone**, it was **not just my fault**, and the stigma of a “trouble maker” branding was symptomatic of deeper **systemic issues**.
15 years after graduating from ETH with a Master in physics!
- This gave me the strength and resolve to keep going ...

- Something important, and amazing at that time, happened for these women at MIT:
They found outstanding supportive leadership – from Dean Birgeneau and President Vest.
- *“First, I have always believed that contemporary gender discrimination within universities is part reality and part perception. True, but I now understand that **reality is by far the greater part of the balance.**”*
- *“Second, I, like most of my male colleagues, believe that we are highly supportive of our junior women faculty members. This also is true. They generally are content and well supported in many, though not all dimensions. However, I sat bolt upright in my chair when a senior woman, who has felt unfairly treated for some time, said **I also felt very positive when I was young.**”*
- With only a few isolated women, “patterns of discrimination” are hard to recognize:
*“Often it is difficult to establish discrimination as a factor, because any one case, no matter how disturbing or aberrant, can usually be ascribed to its special circumstances. Thus, we need to develop **safeguards to prevent, and promptly correct the experiences that together constitute gender discrimination**”*
- Identifying bias requires a systematic evaluation of multiple cases
And - unfortunately - “privacy rules” are being used to limit this, even acting as a shield to protect an organization, and more easily blame the victim (and we are seeing this today in Switzerland, Germany and Austria ...)

- Motherhood is not the only leak in the pipeline.
- MIT showed that senior women experience more discrimination. Why?
- For senior women to succeed and excel in leadership positions:
 - there is direct competition for access to power, resources, and privileges
 - current academic culture often dominated by informal power groups, the “insider group”, with privileged access and no incentive to change status quo
- We call this the “**second glass ceiling**” after the “normal” glass ceiling (e.g. reaching tenure)
- Increasing number of excellent women moving into senior academic positions further increases competition for these rare positions, even triggering hostility and backlash against these women.
- Many women are not prepared or reject such a hostile culture (another major leak in the pipeline)
- Current stereotypes makes women leaders “too nice to lead” or “not nice enough” ... and this can have negative consequences for them. Examples to follow.
- I will also bring suggestions to help keep women empowered and promote inclusive excellence.

- After 2000, ETH management moved even further to strong departmental autonomy ...
- I got sidelined – by simple majority vote – when I proposed better governance i.e. stronger transparency, accountability, and a definition of excellence criteria ...
- For 22 years (1994-2016), new professors then hired by regular selection committees.
Results: **Male professors: 24. Female professors: 0.**
- 2010-2022: Earned a leadership position outside of my department, with the award and directorship of a well-funded, multi-institute Swiss research network (NCCR MUST).
 - We created an inclusive leadership team, with shared power and responsibilities for my male co-director and myself.
 - One additional key task: “develop measures for the advancement of women in STEM”, with support from the funding agency, and my co-director!
- With this support, we started the **Women Professors Forum (WPF) in 2012**, with MIT as a role model (13 years after MIT Report) to better network women academics at ETH.
History [Link](#), ETH WPF [Link](#)
- Continued to volunteer for leadership roles in the physics department since 2010: never received the required majority vote (even criticized for striving to have “too much power”!)

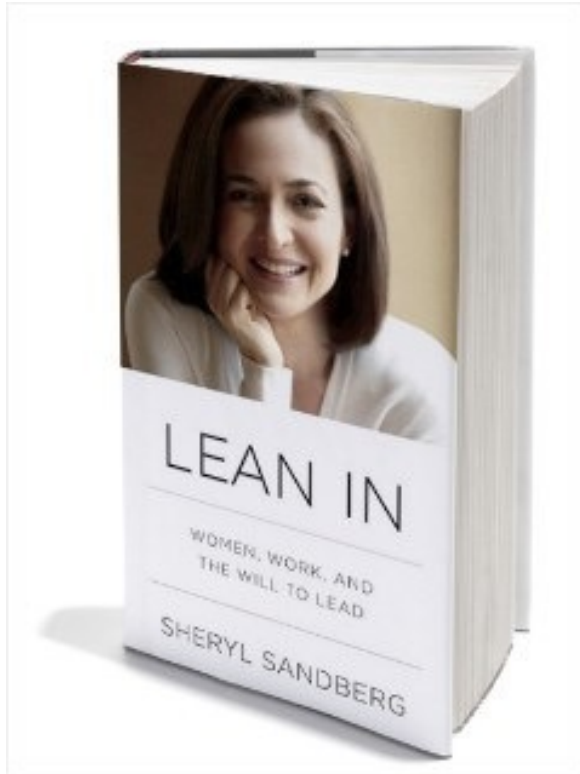


First assembly meeting, 7 March 2012

Ursula Keller, Physics, **President**

Janet Hering, EAWAG Director, **Vice President**

- Established a women professors network with scientific lunches, informal mentoring, access to information...
- But ... the “amazing” supportive MIT leadership was not there at ETH yet ...
- 2019 WPF published a survey of issues important to women professors at EPFL/ETHZ [Link](#)
An inclusive work culture, set by the leadership, plays an important role in the success of women (>90%)
- WPF leadership based on change every 4 years: Keller (2012-2016), Hering (2016-2020)
2021: could not motivate other senior women to get engaged! Leadership was not ready for a change ...
- **A new crisis:** ETH fired their first professor in 2019 – my colleague, the only other tenured woman professor in the physics department. WPF had been asking for a fair, unbiased due process since 2017 ...
- 2022 Federal Administrative Court ruled that dismissal was “disproportionate and unjustified” ... but ...



Stereotypical bias:

*"When a woman excels at her job, **both male and female co-workers** will remark that she may be accomplishing a lot but is 'not as well-liked by her peers' .*

She is probably also 'too aggressive', 'not a team player', 'a bit political', 'can't be trusted' or 'difficult'."

A hostile working culture with this stereotypical bias can result in character assassination ("Rufmord" in German), spreading rumors and isolating targets.

... and often with little or no benefit of the doubt ... "guilty until proven innocent" ...

This also increases risk for both upwards and top-down bullying (*naturehumanbehaviour* April 2023 [Link](#))

“Mission: Character Assassination”

MISSION:
RUFMORD

ARBEITSRECHT Kantige Führungskräfte werden zunehmend Opfer anonymer Vorwürfe. Vor allem an Universitäten und den höchsten deutschen Forschungseinrichtungen verrohen die Sitten.

Foto: Evelyn Degen für manager magazin

84 manager magazin FEBRUAR 2020

Accusation

“significant misconduct in management or inappropriate leadership”

The accusers remained anonymous ...

The allegations undermined their personal integrity and reputation

Thomas Sattelberger (German manager and politician):

“This is a career risk, especially for women”



Prof. Heike Egner

TRENDS ARBEITSRECHT



Prof. Tania Singer

DEGRADIERT
Die Neurowissenschaftlerin **Tania Singer** war ein Star der Max-Planck-Gesellschaft. Nach anonymen Vorwürfen musste sie ihr Direktorenamt niederlegen.



Prof. Marcella Carollo

RAUSGEWORFEN
Die Astrophysikerin **Marcella Carollo** von der ETH Zürich sah sich anonymer Kritik an ihrem Führungsstil ausgesetzt. Sie musste die Uni verlassen.



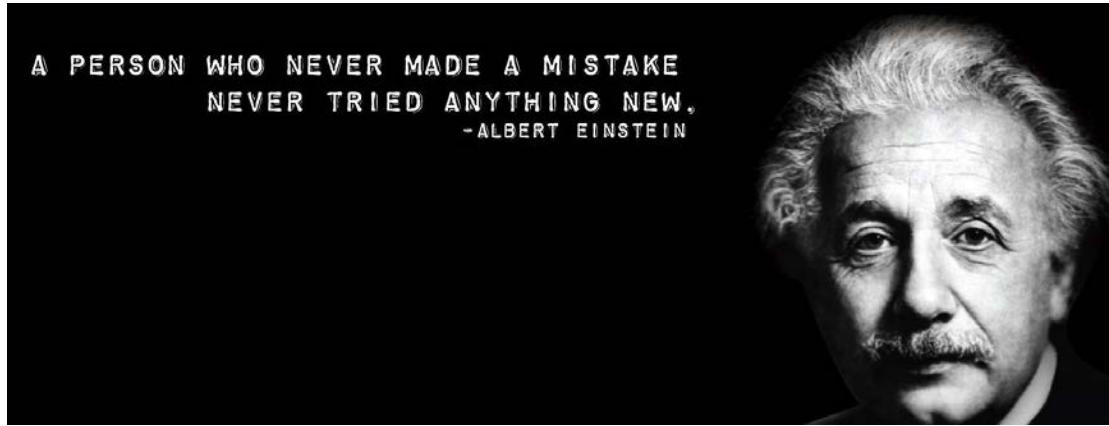
18. Nov. 2021: Open letter signed by 145 women scientists expressing their concerns

This was organized by former ETH Women Professors Forum (WPF) leadership (Hering and Keller), [Link](#)

“We are writing to express our concern at the highly publicized dismissals, demotions, and conflicts involving female Directors of Max Planck Institutes (MPI).

... Similar reports have also publicized cases involving women in top academic positions at the University of Copenhagen , ETH Zurich, and the University of London, indicating that these issues involving senior women extend well beyond the MPG.

... Failure of a highly successful individual who has attained a high rank **is in a very real sense an institutional failure.**”



... and this must include women scientists too ...

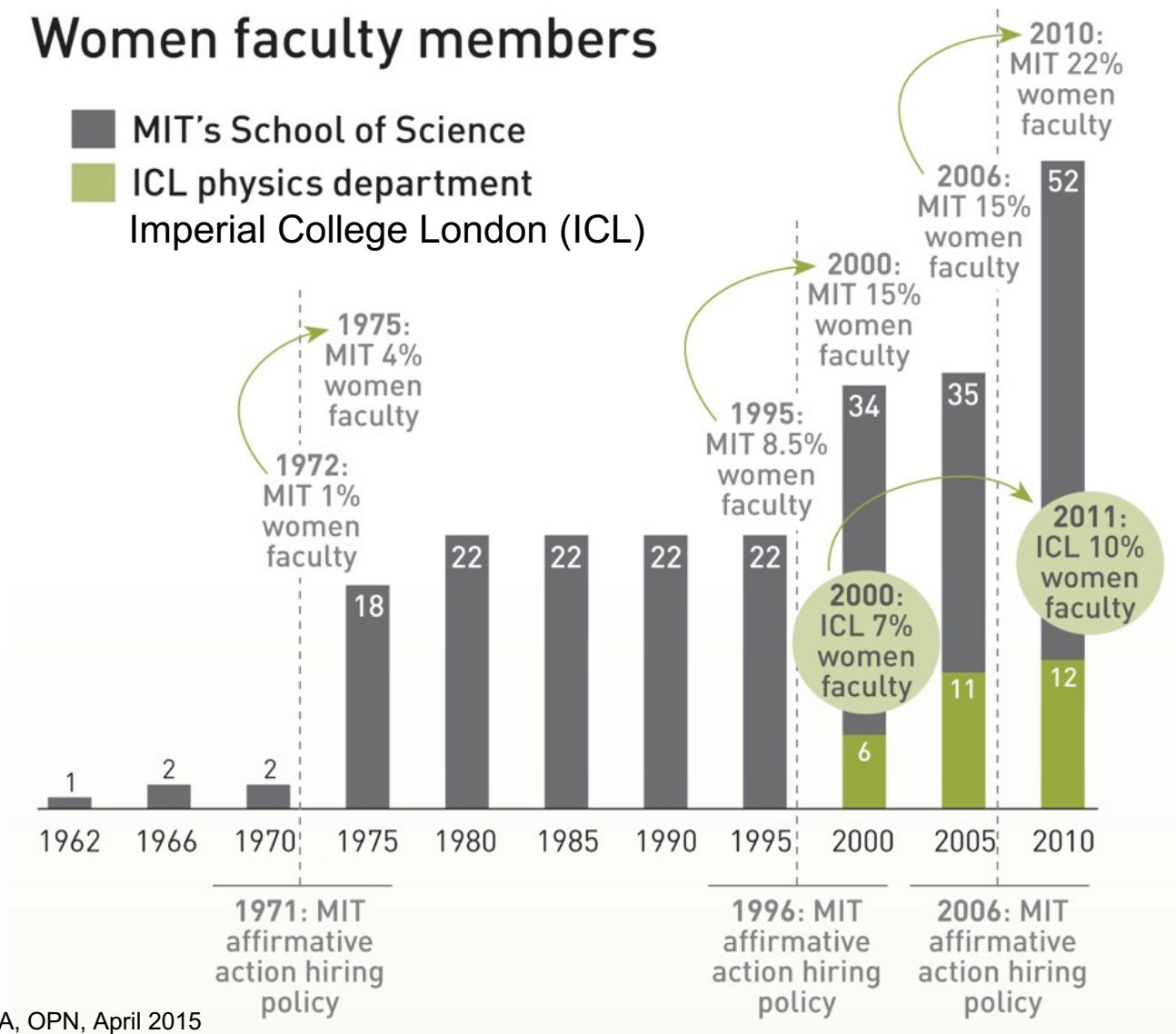
- I have never seen a perfect manager; we all make mistakes.
- There is often a gender bias against women leadership (from both women and men!)
- Women and other outsider groups often have lower mistake tolerance and are punished more harshly.
- Lack of independent grievance procedures and a perception of "reverse discrimination": minor mistakes or even fabricated issues can become weaponized, supports a management culture of intimidation to accept status quo (using disgruntled PhD students, overly ambitious postdocs, fabricated scientific misconduct charges ...)
- Unequal treatment depending on "how many friends" one has in leadership. This does not support excellence, wastes resources, and hurts the science.

- **“Autonomy” drives many issues and hinders progress (especially in Europe)**
 - What works in the USA does not always work in Europe.
 - Highly ranked science organizations (MPI, ETH, ...) are too often considered “untouchable.”
 - Their “scientific excellence” would be damaged if “autonomy” is not preserved.
 - ... but used as excuse to maintain status quo for well-established informal power groups.
 - current academic working culture often dominated by informal power groups, the “insider group”, who are used to their privileges and are not ready to share them, with unbiased, fair, and transparent procedures and accountability of leadership decisions
- **Steps in the right direction:** Academic leadership just announced the first “Sexual Harassment Awareness Day” in Switzerland on 23. March 2023, [Link](#)
- MIT did this more than 20 years ago: MIT is still number one and became a pacesetter for gender issues in STEM.
- **Required as a next step:** a clear separation between **scientific autonomy** and excellence, from **management autonomy**, excellence, and international best practices

- Separate **scientific autonomy** and **management autonomy**
- One of the root causes of our slow progress has been a conflation of scientific and management autonomy.
 - **Problems typically eat up management's time** – taking away from core efforts in education & science. Professors mostly not motivated to get involved, but ignoring problems often makes them worse. And good science does not guarantee good management ...
 - **Life is more complicated:** there is upwards and top-down bullying! Bullying does not always follow the direction of power differential. Often it is about stereotypical bias; realistic and well-defined performance criteria [Link](#)
 - **Leadership:** “sign up” and empower a consortium of stakeholders – the people affected, the critical voices, experts, administration – and empower them to make actual change, not just “recommendations”.
 - **Improve grievance procedures, free of conflict of interest** (or even the appearance of potential conflict of interest). These procedures must be independent and worthy of trust from the community.
 - **Develop some excellence criteria** ... otherwise we fall back on “I recognize excellence when I see it”, sometimes called “gut-feeling” ... this tends to maintain status quo and limit diversity.
 - Reduce excessive standards of “data privacy” as an institutional shield against addressing systemic issues ...

Women faculty members

MIT's School of Science
 ICL physics department
 Imperial College London (ICL)



Progress at MIT tied to affirmative action hiring: 1971, 1996, 2006 (see "The Exceptions," 2023)

1994: establishing a committee on women faculty in the school of science (16 out of 17 tenured women Professors): 1999 MIT Report

"the feeling of an injustice, the anger that accumulates from this recognition, and the strong desire for change for themselves and future generations"

2018-2020: Crisis in physics department at ETH Zurich triggered progress. For 22 years, 24:0 male professor selected 5 hires for tenure-track female assistant professors, with a focused search for excellent women. **And many found!!!**

Source: OSA, OPN, April 2015

http://www.nccr-must.ch/equal_opportunities/opn_column_reflections_in_diversity/opn_column_april_2015.html



Continue to recruit more women: goal >30%

- Affirmative action to hire more women, to establish inclusive excellence, to change culture
- Address stigma of “token woman”, and “perception of reverse discrimination”
- Better honest education on diversity and inclusive excellence, and a clear plan with everybody on board (buy in)

Stronger efforts on retention, performance, promotion, and culture change

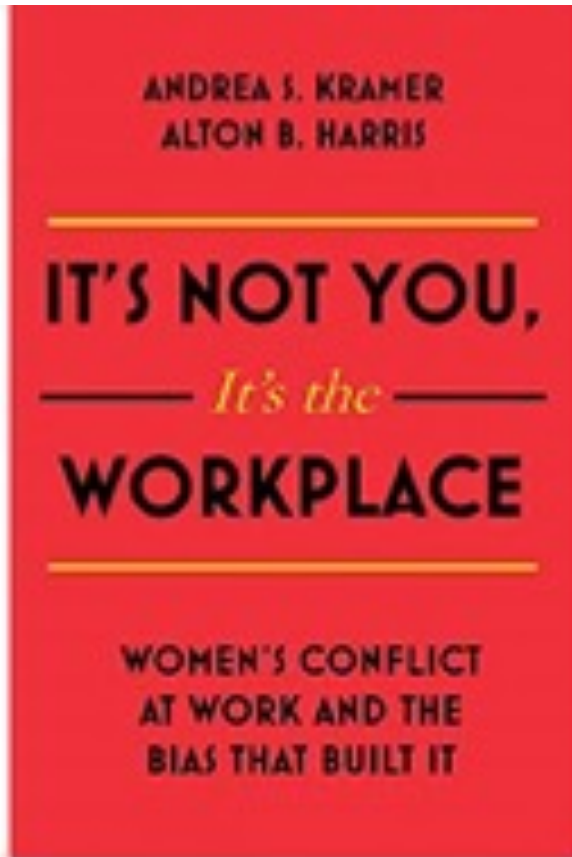
- Maintain a diverse community and reward their contributions
- Give access to sufficient resources to establish inclusive empowerment
- Establish leadership and networks to promote a culture change with better governance
- Fix the institutional practices, not only the individuals
- Everybody is welcome to join these efforts, and it should benefit us all.

Real incentives for both men and women to engage on these issues

- This does not happen on its own based on my experience!
- There is much written material on university websites, but action plans are limited.
- Develop institutional plans for inclusive empowerment, with measurable results and independent checks
- Tie funding to results – to increase motivation and willingness to change (e.g. Juno in the U.K.)

Recommended for reading: Kramer and Harris in their book

It's Not You It's the Workplace: Women's Conflict at Work and the Bias that Built



- There is no evidence that women have more frequent conflicts in working with other women
- Women actually spend more time supporting, counseling, and advocating for women than men do
- Unfortunately, when women actively promote other women, they often face career penalties
- Not even white male executives received any career-related advantage for actually working to create diversity (diversity is clearly not a woman-only topic!)
- Many highly educated and talented women are opting out of their careers because they are rejecting the workplace
- **Cultivate women-only networks to feel more welcome in current work culture & broader education of issues**

2017 Forbes report (p. 62):

women leave the tech field at a rate that is 45% higher than men

- **ETH Women Professors Forum:** <https://eth-wpf.ch/>
- **WiSTEE CONNECT: Connecting Women in Science, Technology, Engineering, and Entrepreneurship**
<https://www.wisteeconnect.org/>

When you fight for the right goals, you cannot lose when you support each other, it is just a question of time.

I believe the time is right for a culture change with better governance to support inclusive excellence and inclusive empowerment.

... join a women's network to change the work culture!

... everybody is welcome to join our efforts, in the end, this will be better for all of us.