Gender Dimensions in STEM – always there, often forgotten

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PUSHING THE FRONTIERS OF INNOVATIVE RESEARCH

Why me?

Disclaimer

- We should use evidence and gender research
- … but here, I will only be able to describe it briefly.
- I will use it to illustrate useful concepts,
- … but for full understanding and critical evaluation – go to original work.

Taxonomy of Change

Londa Schiebinger, Stanford University

1. Fix the number

Fix the women

Indicator

Trap!

2. Fix the institutions – Culture

3. Fix the knowledge – Subject

Focus!

Level 3. Gender in knowledge

http://genderedinnovations.stanford.edu/

Genderedinnovation 2

Gender in the knowledge

Sometimes it is ”obvious” (but often forgotten):

- Sex and/or gender in the topic you research: Medicin, Biology, Organic Chemistry, Biophysics. Example Animal research
- Or it is applied: Meterology, Engineering, Climatology. Example Transport system.
- There is always the sex of the researcher! Example.
- But, what about when it is not? Are you immune?

Not obvious?

- Where sex and gender is not a part of what is studied,
- or what it is applied to …
- Where there is a strong resistance against a gender perspective
- Where the Positivistic Paradox prevails…
- Worst case scenario(?): Physics and Maths

The Positivistic Paradox in Science:

Science is considered to be objective

– not affected by the sex or gender or … of the people involved (researcher, teacher, student …)

… but ….

Culture of Science is affected by sex, gender, …

- Class-rooms, labs, history, board rooms are almost always dominated by white men

… seems like a **contradiction** …

What we are up against …

The Scientist looks out in the universe and wonders why there is only matter and no antimatter.

Where did the antimatter go?

Is one of the most prestigious questions in Science and the **subject of thorough research**.

The Scientist looks out over the classroom, lab or board room and notes that it is dominated by men.

Where did the women and minorities go?

Is often a **non-question for Physicist** and sometimes answered **without scientific method**.

Resistance 1: The God Trick

- *I study electrons or stars – they don't have a sex!*
- *I study differential equations – their solutions do not depend on gender/sex!*

This is a version of the "God Trick" – we pretend we have an objective and transcendent sight or we are situated were we have an objective view. (Harraway)

From a sociology of science point of view we have to go further …

Resistance 2: Curiosity

- *“I am involved in curiosity-driven science”*

- But who’s curiosity is driving Science and who decides what and how things should be researched?

Conclusions 1

The only useful definition:

Science is what Scientists do! (“Doing Science, Doing Gender”)

.. and we do a lot of gendered things:

- We use metaphors, similes, clichés, analoges
- We choose examples
- We name things –machines, labs, particles, equations, properties ….
- We represent science with labels, pictures, …
- We use role models
- We build our science on an epistemology.
- **We choose methods, teams, collaborations, what to research**

Using GRI-homepage

Some useful methods from GRI:

- Rethinking research priorities and outcomes
- Rethinking language and visual presentations

Ex: Combustion Physics

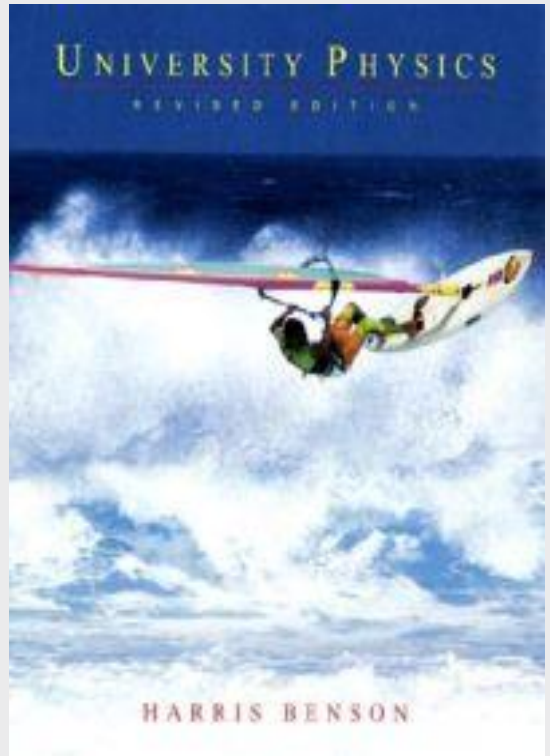
Some examples from Physics

Ex: Visual representation

A Standard first year Physics book.

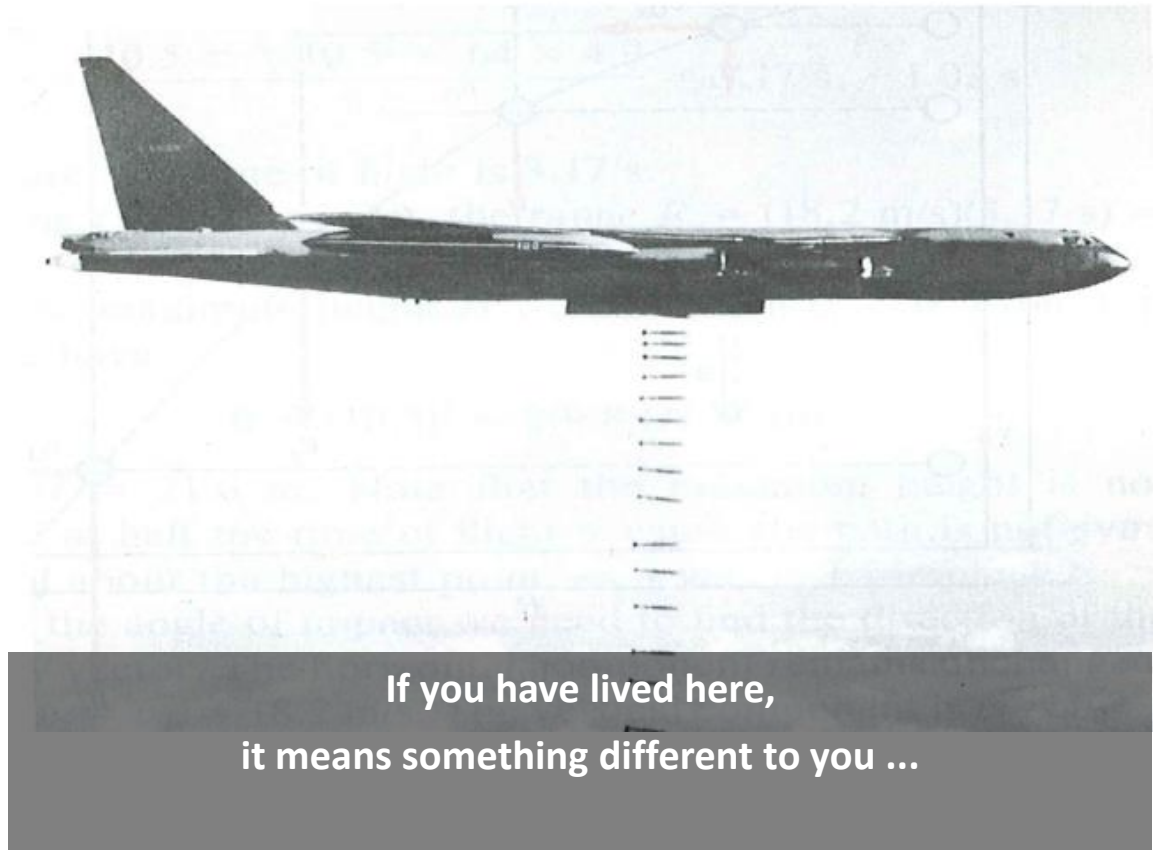
Benson: University Physics.

Reported to be sexist!



Visual representation

We should have been suspicious – first picture:



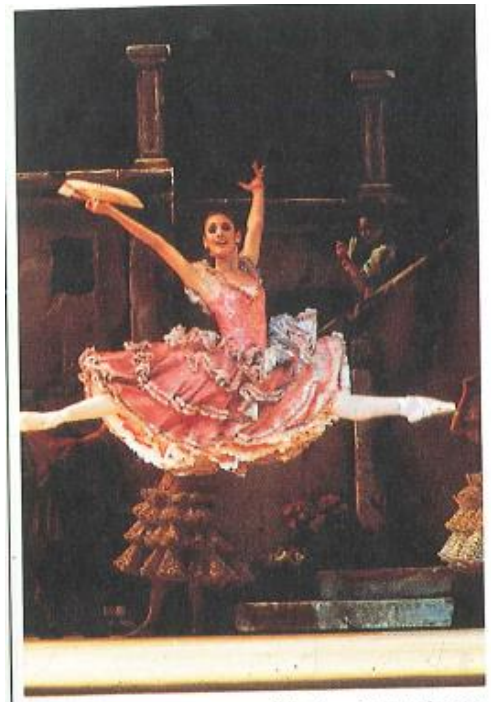
mirrors would produ
the multiple images of
Ann Margaret shown in
Fig. 35.51?

Sexist?

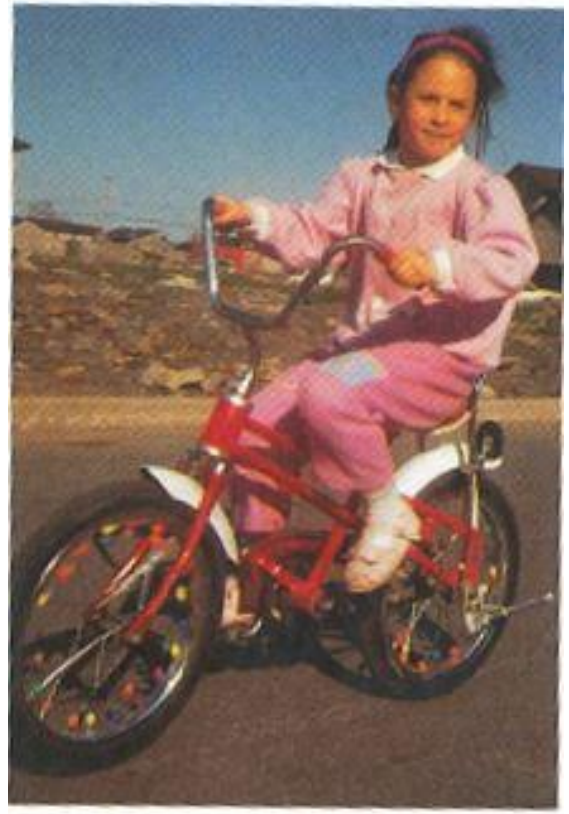
If you have experienced sexual harassment,

It means something different to you

Elizabeth Manley controls her angular speed by varying her moment of inertia.



During a grand jeté, a ballet dancer appears briefly to "float in air". However, the center of mass still follows a parabolic path.

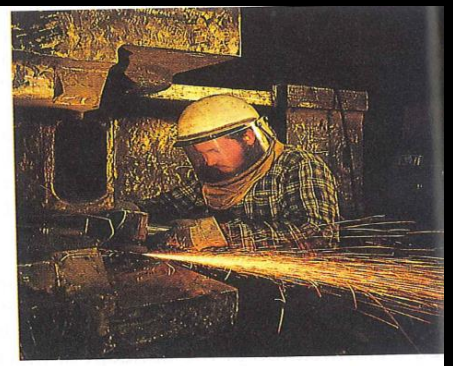


The net work done on the javelin is equal to the change in its kinetic energy.

Pictures of women

Pictures of men

FIGURE 9.1 René Descartes (1596–1650).



(b)

FIGURE 1.8 Johannes Kepler (1571–1630).

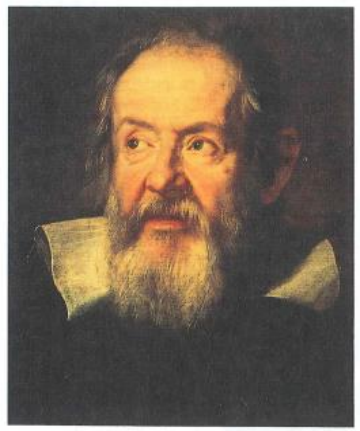


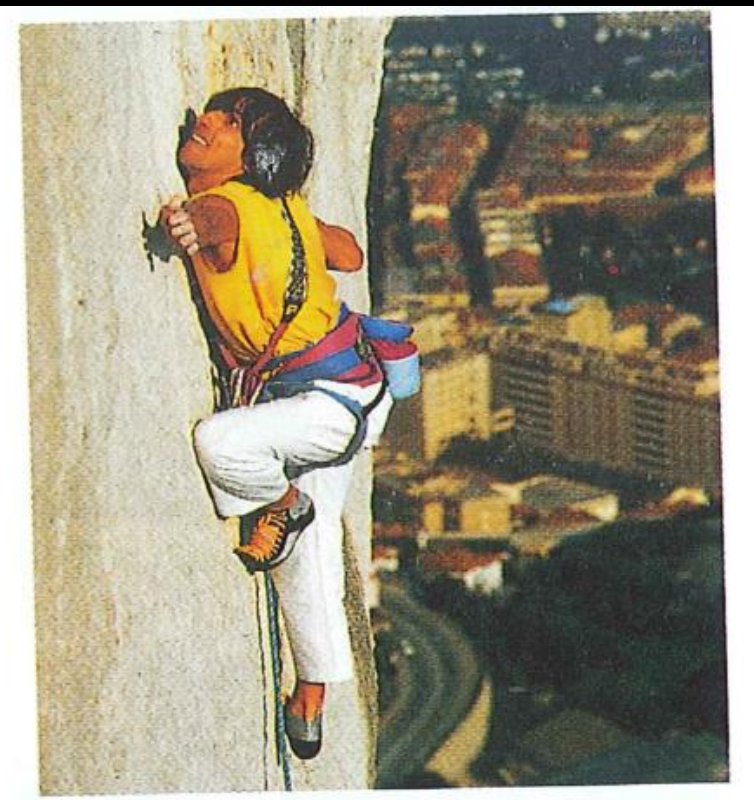
FIGURE 1.9 Galileo Galilei (1564–1642).

FIGURE 5.1 Sir Isaac Newton (1642–1727).

FIGURE 8.2 Gottfried W. Leibniz (1646–1716).

A weightlifter does work to lift weights but not to hold them at rest.

Although the mass of Edwin Aldrin, Jr., had not changed, his weight on the moon was roughly one-sixth his weight on earth.



The climber has done work to increase his potential energy.

Ex 2: Richard Feynman and sexism

That was the beginning, and the idea seemed obvious to me and so elegant that I fell deeply in love with it.

And, like falling in love with a woman, it is only possible if you do not know much about her, so you can not see her faults.

…The message I intended to convey was, nobody thinks of Madame Curie as a woman, as feminine, with beautiful hair, bare breasts, and all that. They only think of the radium part.

(comment on his nude portrait of Marie Curie)

The idea of the bohemian – the rule breaking – brilliant Scientist – goes wrong!

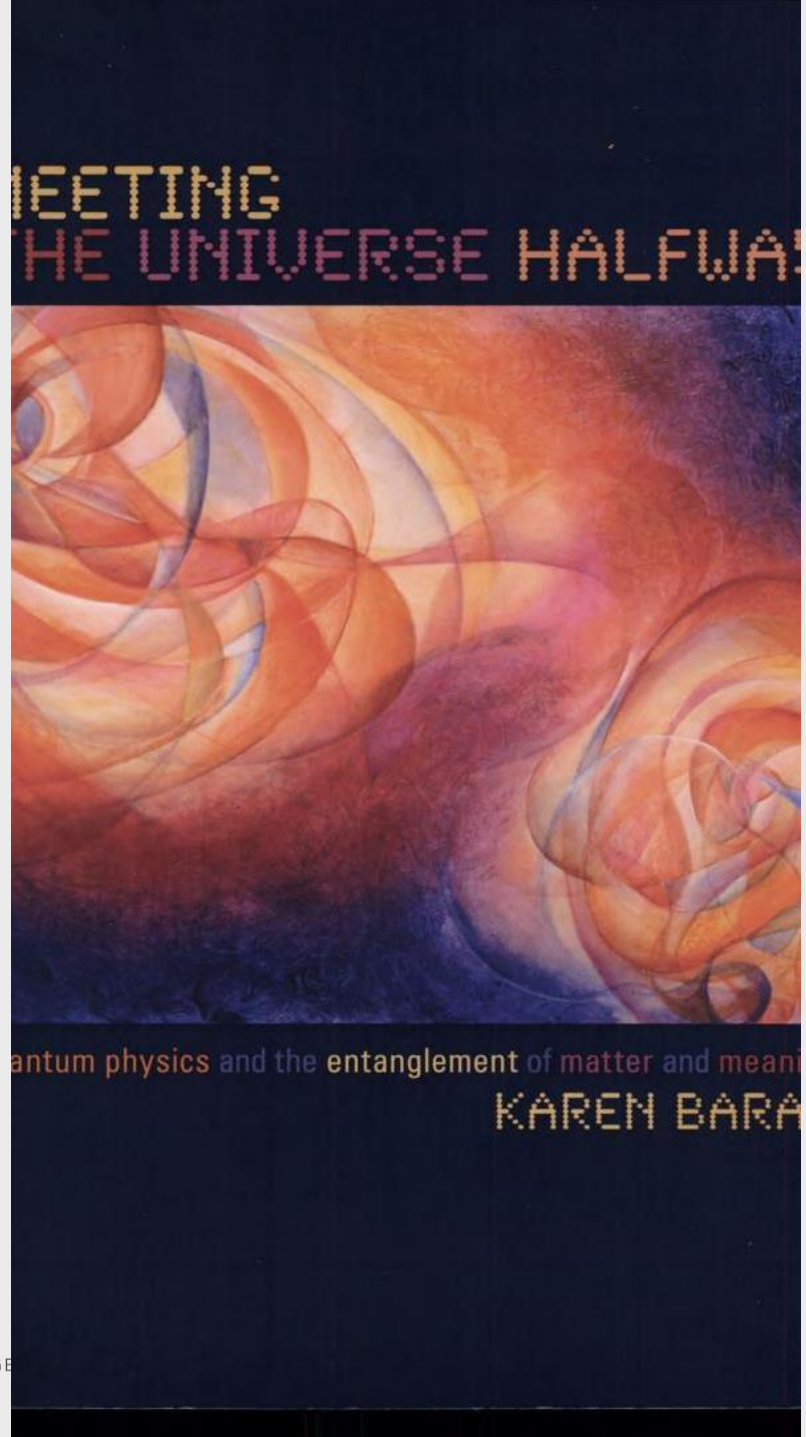
Ex 3:Electromagnetism

William Gilbert in 1600's
Magnetism was useful ("compass") and active.
Electricity useless and inactive. Feminine.

Electron (amber stone in Greek) represents tears of women – female morning. Female – water.

When electricity became useful electricity became male – fire.

See Helene Götschel: Plotina-talk: Physics and Gender
https://www.youtube.com/watch?v=U5Yy6LL9FTY&t=2251s



Deeper? Epistemology

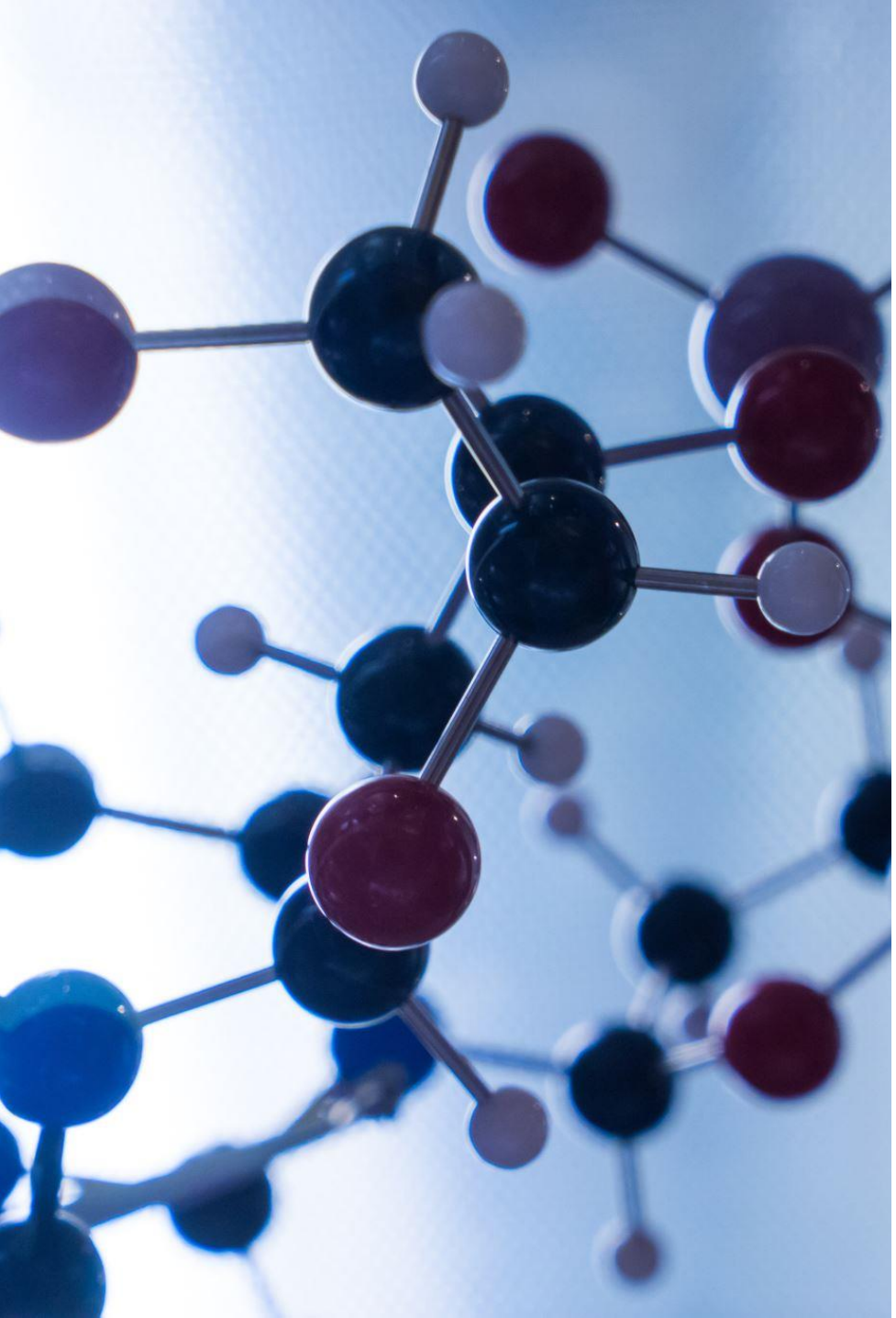
Ex: Agential Realism

Newtonian Physics – objective and extremely positivistic

Quantum physics might offer something different:
Entanglement of Reality-Experiment-Observer

Not relativism, but
Agential Realism: phenomenological postivism?

See Karen Barad, Meeting the Universe Half-way.



Quantum Science

Is Science in itself excluding some people? Or is it our way of portraying it?

Opening for Physics to be a part of Humanism – Philosophy.

Describing **human** interaction with and understanding of nature (Copenhagen interpretation).

– and not as incomprehensible:

“if you think you understand quantum mechanics, you have not understand it at all”.

Sometimes quantum physics can be very inclusive …

Quantum and Queer

- https://www.youtube.com/watch?v=yAYPi0nqJ50

Conclusion 2

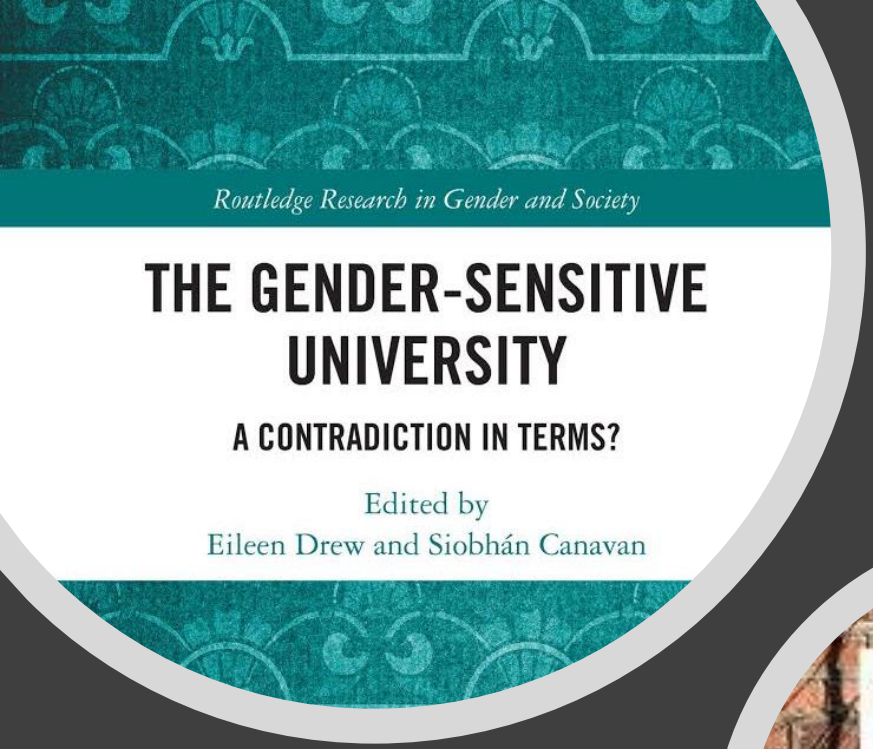
- Culture and Subject are intertwined – can't be separated.
- Ex: Culture is breeding certain leaders, who makes priorities that shape Science.
- Culture creates an "image" of Science (and the Scientist), which affects knowledge production and sense of belonging.
- To understand the Knowledge production, we need to understand the Culture.

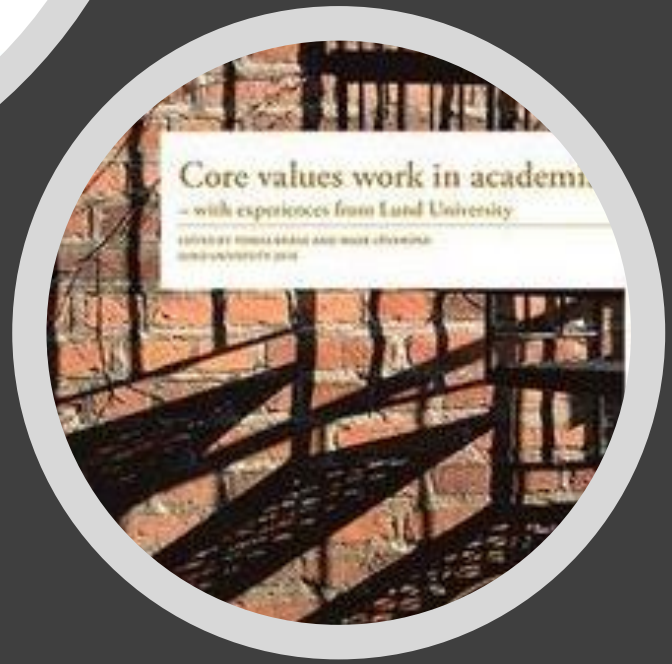
Exit

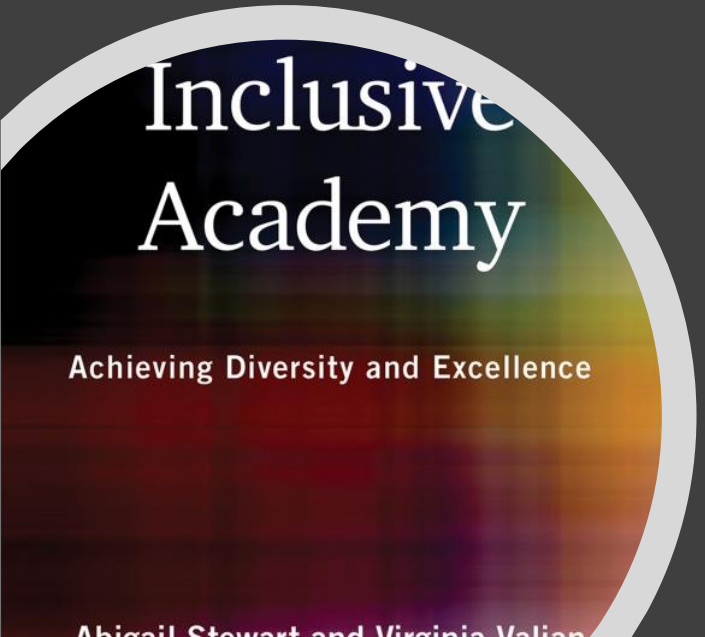
Level 3: Culture of Science

Myths in Science that affect knowledge production:

- Culture without culture (Beamtimes & Lifetimes) Traweek 1998
- Priesthood/Toolmaker/Indiana Jones Wertheim 1995, Vainio 2012
- Hercules culture (UPGEM project) Hasse&Trentemöller 2008
- Myth of effortless success (Physics Education and Gender) Gonzalves & Danielsson 2021
- Nerd culture of cosmopolitans (CERN study) Dippel 2021







More about these topics

- *Stewart and Valian 2018, Inclusive Academy*
- *Drew and Caravan 2021, Gender-Sensitive …*
- *Brage and Lövkrona 2016, Core values …*

Exit

Toolbox from LERU

- Just one of many Advice and Position papers.

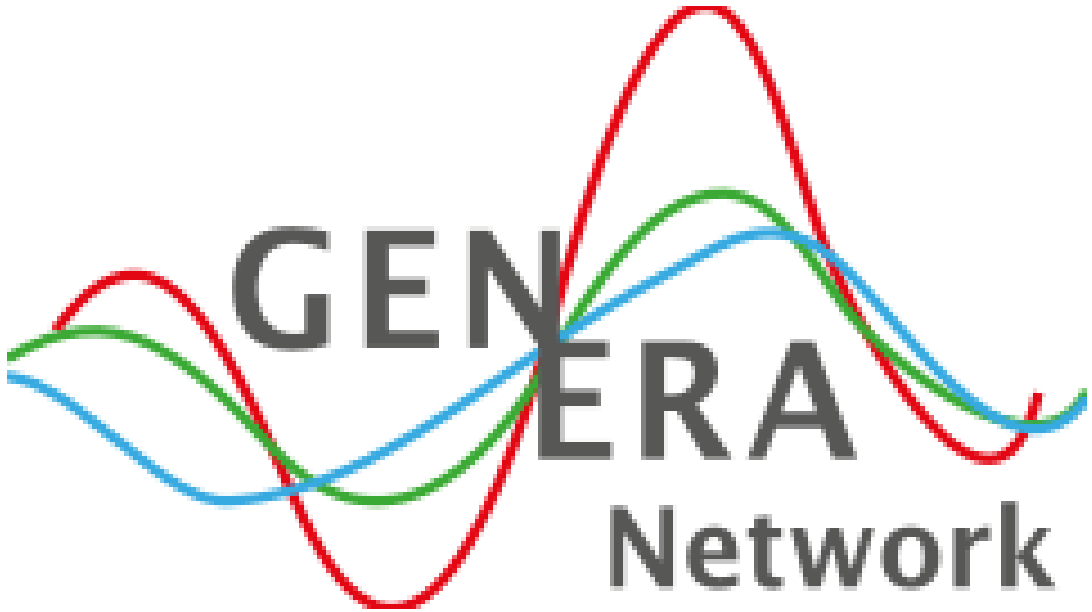
GeDiMIRT conference in Lund, June 2022

GENERA conference on

GeDiMIRT :

“Gender Dimensions in Physics and other Math-intensive Research and Teaching”

Interview and talk available in youtube channel: **GeDiMIRT**



GENDER FOR EXCELLENCE IN RESEARCH

The GenderEX project

- Horizon 2020 project on Gender for Excellence in research.
- Homepage: Genderex.eu

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Thank you for your attention!

Questions?

Discuss and post!

Discuss in bee-hives, based on workshop(s):

1) What could Uppsala university, faculties, departments do?

2) What could I do?

Post on jamboard: https://jamboard.google.com/d/1DdS1FHo_k91L5S4LahmzfbuFY8ehQDkqZXiOA3DaOJ8/edit?usp=sharing