

Being valued and feeling welcome. Negotiating Diversity and Equity in Physics

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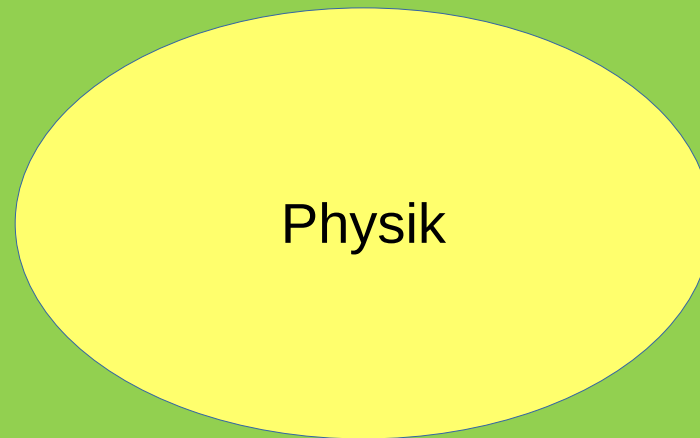
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Prisma+ Colloquium

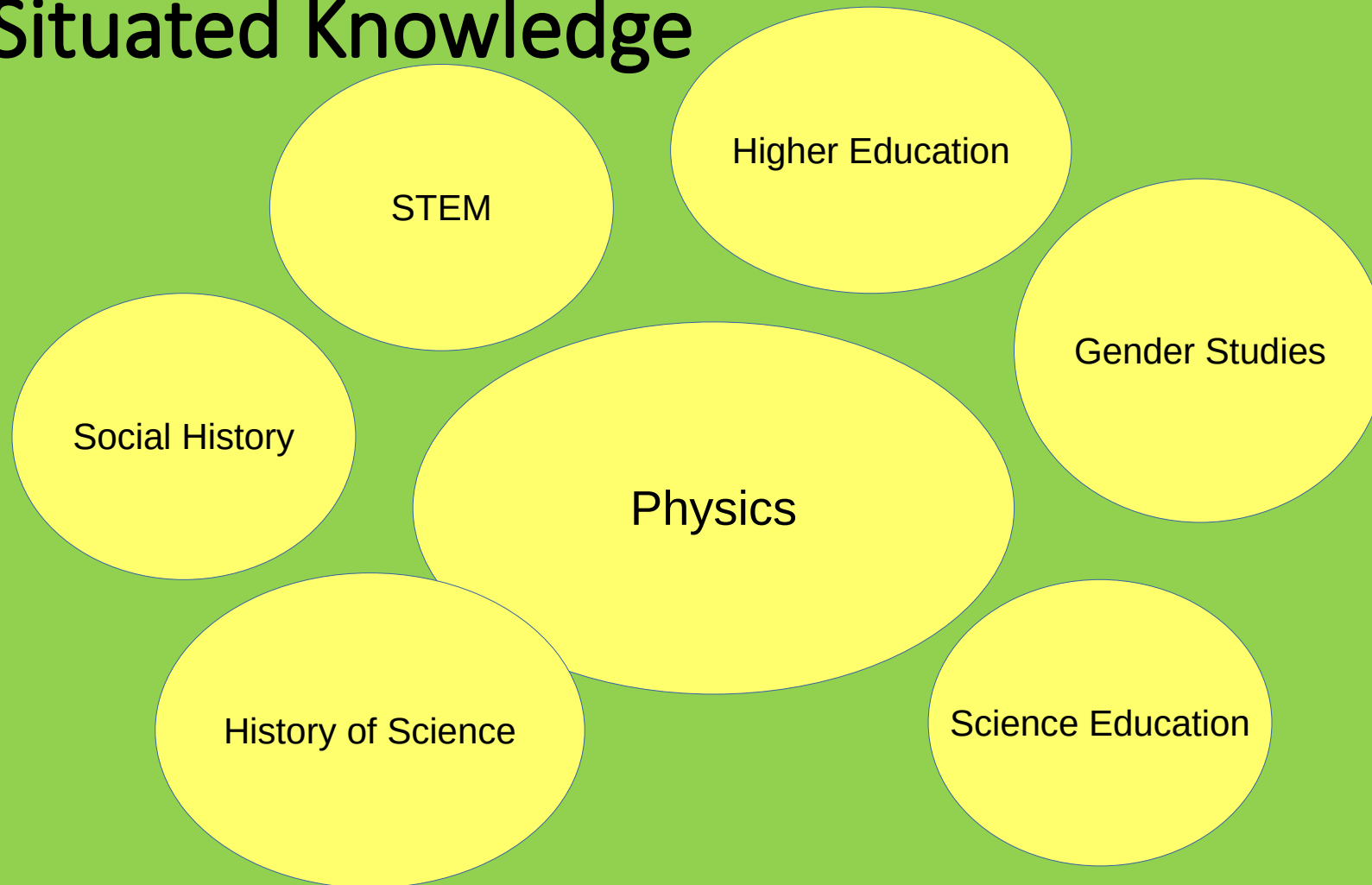
Johannes-Gutenberg-Universität Mainz

2022-06-29

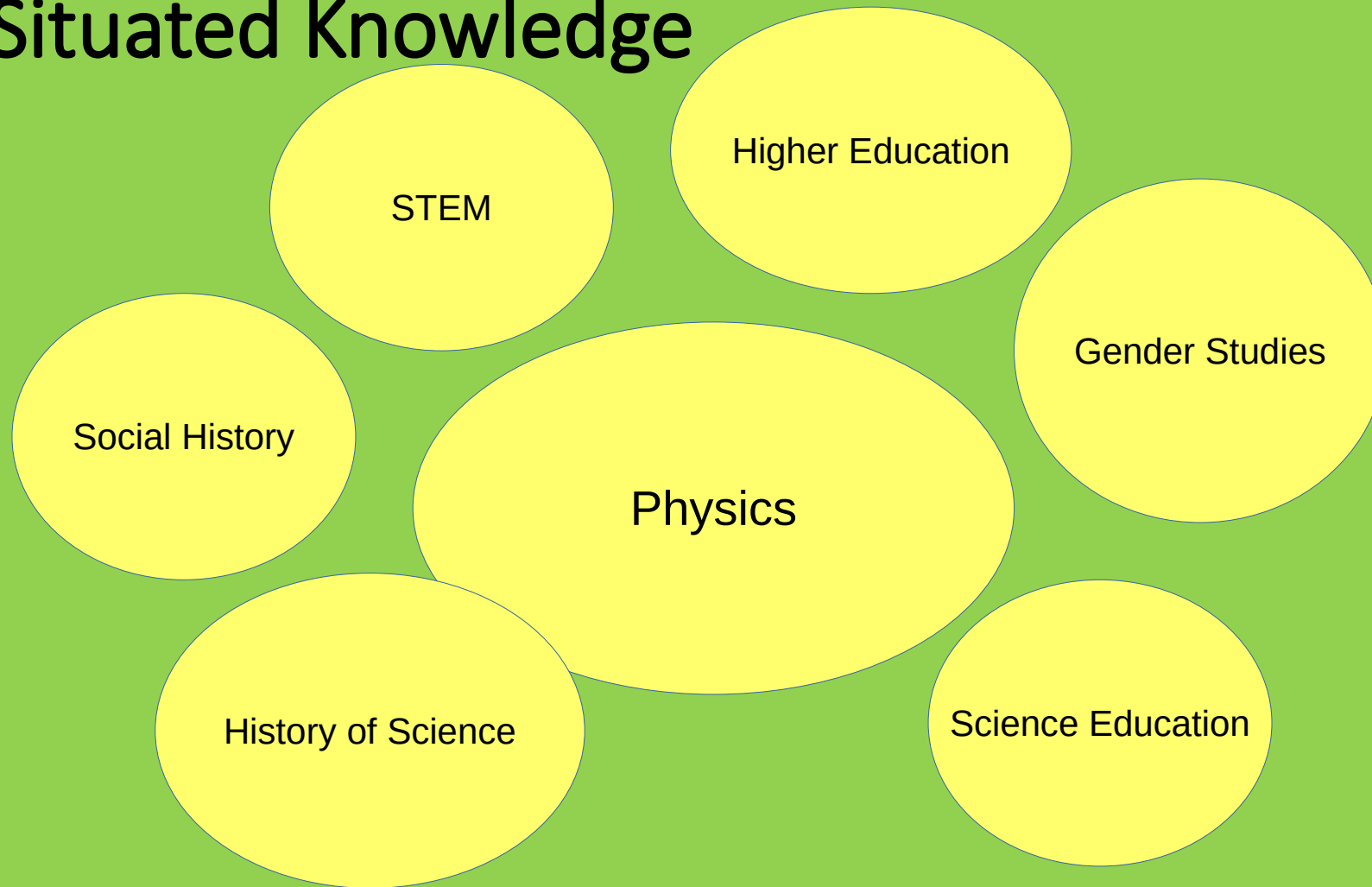
Situated Knowledge



Situated Knowledge



Situated Knowledge



1990 Master/
Diploma Physics
2000 Dissertation
2001
Frauenförderpreis
2002 research
assistant education
2007 PostDoc
Uppsala University
2011 Invited Talk at
CERN
2012 Visiting
Professorship TU
Darmstadt
2014 Professorship
Hannover
University of
Applies Sciences
2021 Interim Prof
Education and
Digitalisation TU
Darmstadt
2022 FU Berlin

Being valued and feeling welcome. Negotiating Diversity and Equity in Physics

Content

- Theoretical Background – Diversity
- Empirical Studies – Diversity in Physics
- Research Proposal – Valued and Welcome in Physics

Theoretical Background- Diversity

Diversity policies as practiced in Organizations

- When we speak of diversity we are pursuing several goals, including
 - equality of opportunity,
 - freedom from discrimination and
 - treating each other with respect and appreciation.



<https://www.peoplesmatters.in/article/diversity/taking-a-global-approach-to-diversity-inclusion-and-belonging-30520>

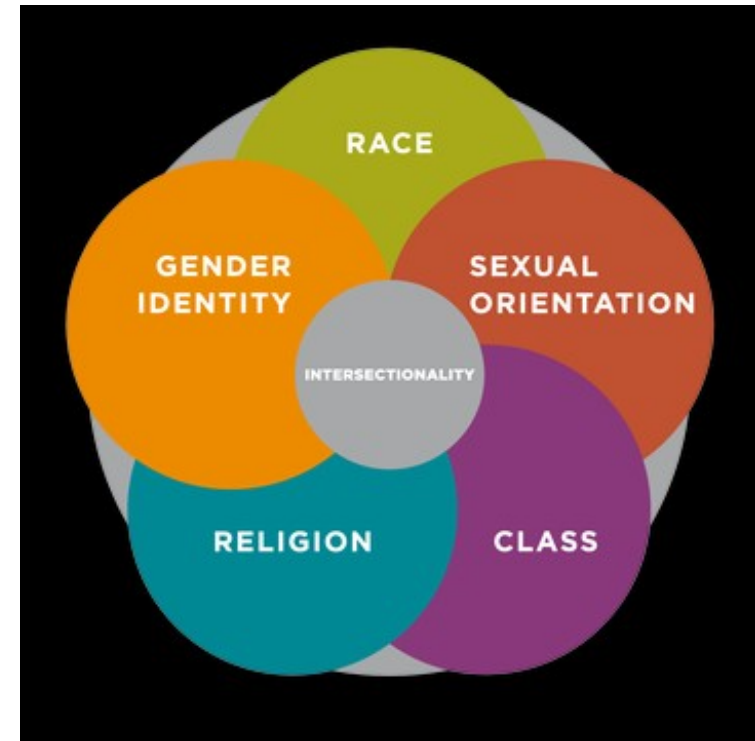
Theoretical Background

Diversity Studies are an academic Field of Research

- Diversity has main categories: Race, Class, Gender
- Further Categories depending on the topic
- Personal, institutional, symbolical level

- **Intersectionality:**

Taking an intersectional approach to categories of diversity means looking at the overlapping of the different categories. Different forms of discrimination, such as racism and gender, are related and need to be viewed in their relations to each other.



<http://race.unm.edu/news/complex-inequality.html>

Theoretical Background

Simplified (**Static or Essentialistic**)
Understanding of Diversity

People (or things) differ in some (or many) categories/ dimensions. They **are** different. The difference is essential (just there). We have to accept it and deal with it. It can bring advantages (e.g. gender marketing).



<https://www.spsp.org/news-center/blog/chen-ratliff-essentialism>

Theoretical Background

More Complex (**Dynamic or Deconstructive**) Understanding of Diversity

Categories of diversity are sociocultural structures to order people (or things). They are concepts which create and support power structures.

We are entangled in power relations and are **made** different to create and legitimate inequality in society.



<https://www.gendercampus.ch/de/blog/post/diversity-management-kritisch>

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Empirical Studies

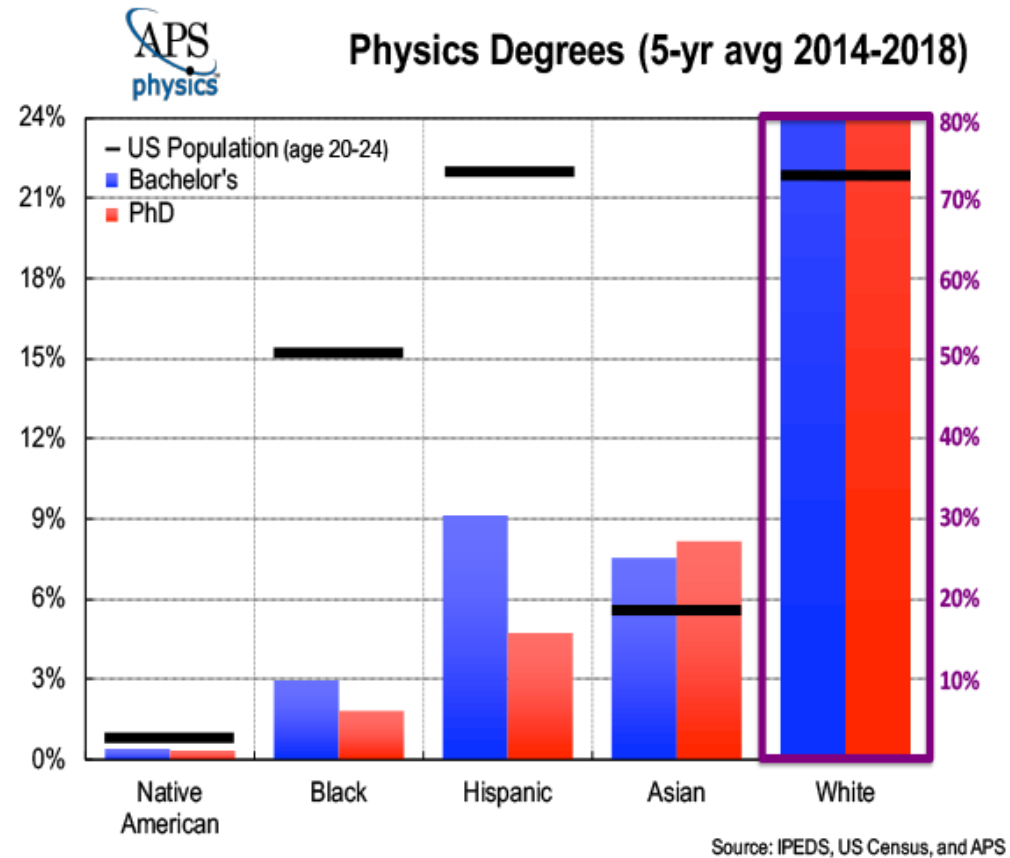
What do Gender and Diversity have to do with Physics?

Facts about

- Gender & Diversity and People in Physics
- Gender & Diversity in the Professional Culture of Physics
- Gender & Diversity in the Narratives of Physics

People in Physics

- Physics Degrees by **Race/Ethnicity** (USA 2018)
- Native Americans, Black People and Hispanics in Physics

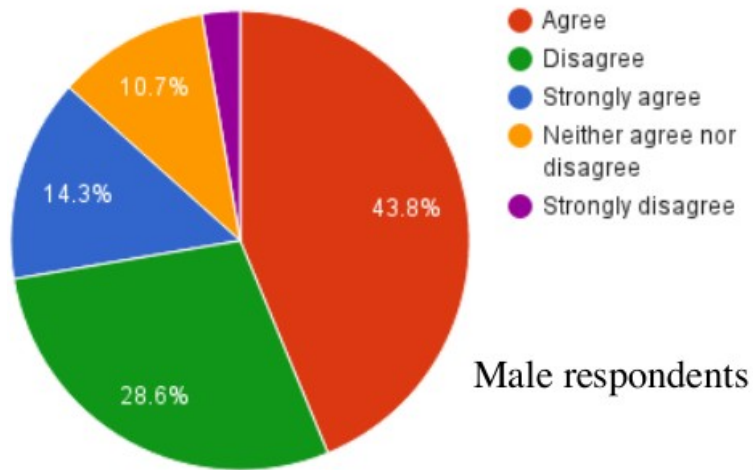


<https://www.aps.org/programs/education/statistics/degreesbyrace.cfm>

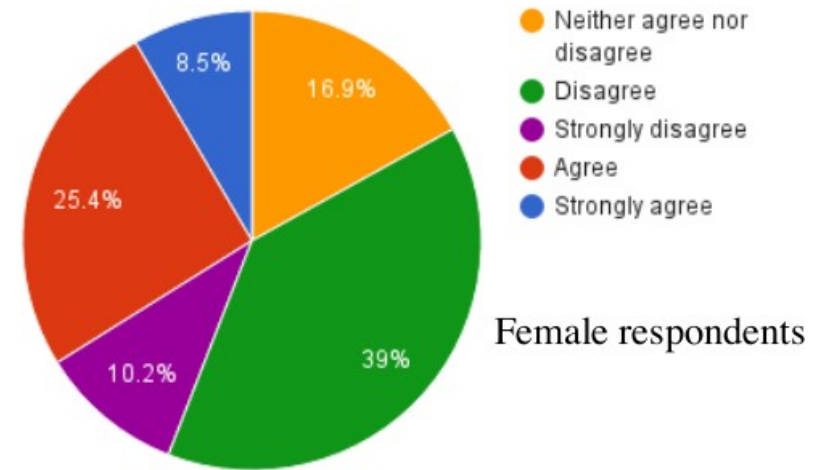
People in Physics

The new EU Working Group on **Gender Issues in Theoretical Physics** Year: 2015, N = 557

Women and men in my field have equal opportunities for career advancement



Women and men in my field have equal opportunities for career advancement



Male: 58.1% agree
31.3% disagree

Female: 33.9% agree
49.2% disagree

<https://genhet.web.cern.ch/talks/new-eu-working-group-gender-issues-theoretical-physics>

People in Physics

- Nobel prizes in Physics
- Marie Curie (left), French physicist and winner of the 1903 Nobel Prize for physics
- German physicist Maria Goeppert Mayer (second) won the prize for her work in atomic physics in 1963
- Canadian Donna Strickland (third), won the 2018 Nobel prize for her work with lasers
- US American physicist Andrea Ghez (right) has been awarded the prize for the discovery of a super-massive black hole in the Milky Way's center in 2020

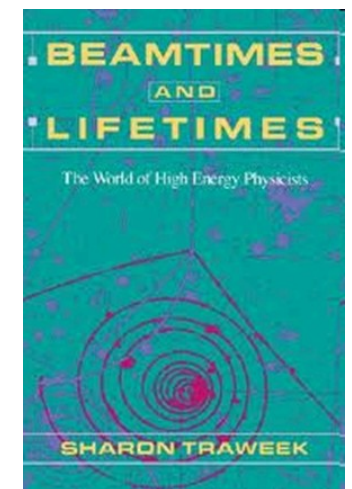
4 women and 0 further gender/diverse persons out of 228 honorees



<https://www.wondersofphysics.com/2020/10/andrea-ghez-becomes-fourth-woman-to-win.html>

The Culture of Physics

- Sharon Traweek
- Beamtimes and Lifetimes. The World of High Energy Physicists. Cambridge & London: Harvard University Press, 1992 (orig. 1988)
- Chapter 3: "male tales" told during a life in physics:
In their careers, physicists journey from romantic readings of other's lives [as students], through handling on mimetic tales of heroic action and quest of survival [post-doc], to becoming [as group leaders] skilled practitioners of gossip and rhetoric. [As geniusses] They complete the circle by telling erotic tales about physics, tales transformed into romance for the next generation of neophytes. [Traweek 1992: 103]



<http://www.history.ucla.edu/people/faculty?lid=391> <http://us.books-online-store.net>

The Culture of Physics

Example „Genius“

Richard Feynman: „That was the beginning, and the idea seemed so 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.“

Burton Richter: „Writing this brief biography has made me realize what a long love affair I have had with the electron. Like most love affairs, it has its ups and downs, but for me the joys have far outweighed the frustrations.“

Such stories express the desire for knowing about nature. But at the same time they express the physicists opinion about knowing and loving, and their image of women. The picaresque genre [story of rogue] excludes women as proper subjects from the story and therefore from the history of physics. [Traweek 1992:102-105]

The Culture of Physics



Jatila van der Veen & Jenny Cook-Gumperz (2012):
The Role of Narratives in the Co-construction of Community
Identity in Physics (Preprint),

http://web.physics.ucsb.edu/~jatila/papers/physics-narratives_2010.pdf



The social character of a community is reflected in, and continually shaped by, its cultural mythology. (...) The narratives most often repeated during professional physics conferences appear surprisingly similar in their underlying structure to traditional fairy tales of heroic journeys. The heroes – usually one of the icons of the physics community, or the narrator's thesis advisor - are almost always male. Women in traditional physics stories are portrayed most often as helpmates to the male physicists, while the few women physicists are portrayed as eccentric “others,” tragic figures.

The Culture of Physics

In the Nobel Laureat's narrative of the Manhattan Project Van der Veen and Cook-Gumperz found almost a line-by-line correspondence with the elements of the fairy tale:

1. Evil is recognized:

there HAVE been a FEW occasions... a few histORical occasions
when there HAVE been treMENDous URgent threats ...

2. There is imbalance in the world, and a restoration of balance is desired:

the first one goes back to the second world war
and it was the THREAT of Nazi Germany acquiring NUclear weapons.

3. The hero emerges and is recognized for his qualities:

There was a RELatively small number of SCientists
throughout the WORLD who were ABle to really assess this,
to SOME extent.... and ah ONE of them, namely Szilard,

4. The hero goes on a journey:

persuaded the most pacific man that one can imagine,

5. The hero seeks the help of a wizard:

namely Albert EINstein
to write his famous LETter to President Roosevelt

The Culture of Physics

The Nobel Laureat's narrative of the Manhattan Project:

6. The king bestows favors so that the evil can be overcome:
which authorized the establishment of the Manhattan Project.

7. There is a battle:

(The battle is understood to be World War II)

8. The hero emerges victorious:

(Again, this is understood as common knowledge, as the allies won the war.)

9. The hero takes a bride and ascends to the throne:

-- (#9 has been intentionally omitted = the absence of the feminine)

10. Order is restored, with the price of a loss of innocence.

On the Manhattan project was a theoretical physicist,
namely Robert Oppenheimer,

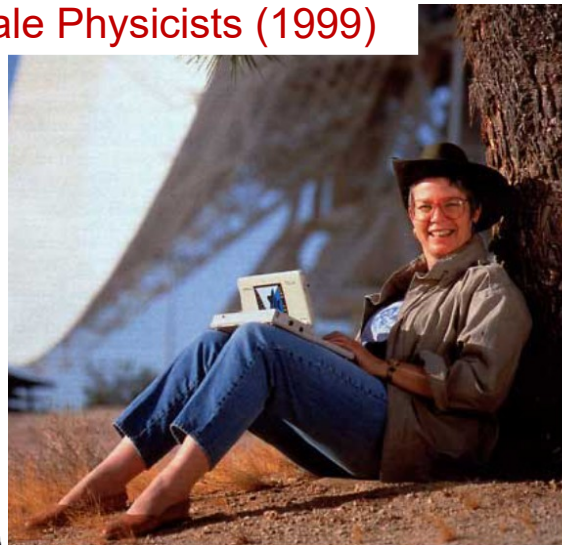
You don't need to be reminded the final outcome of it

. It was enormously tragic.

200,000 people lost their lives in Hiroshima and Nagasaki

(Old) Narratives of Physics

Representations of Female Physicists (1999)



Astronomin Tarter: Lauschangriff auf 1000 Nachbarsterne

Beseelt oder besessen?

Mit riesigen Radioteleskopen horchen US-Forscher auf Funkbotschaften aus dem All. Jetzt helfen Tausende PC-Besitzer übers Internet bei der Fahndung nach Aliens.

[Literature: Erlemann, Martina (2004). Menschenscheue Genies und suspektae Exotinnen. Mythen und Narrative in den medialen Repräsentationen von PhysikerInnen. In: Junge, T. & Ohlhoff, D. (Hg). Wahnsinnig Genial - Der Mad Scientist Reader. Aschaffenburg: Alibri Verlag, S. 241-265]



Jill Cornell Tarter

Astronomin

Jill Cornell Tarter ist eine amerikanische Astronomin und war bis 2012 Direktorin am SETI-Forschungszentrum. Sie hält den Bernard M. Oliver Chair of SETI im SETI Institute. Tarter machte ihren Hochschulabschluss an der Cornell University und 1975 ihren Ph. [Wikipedia](#)

Geboren: 16. Januar 1944 (Alter 76 Jahre), USA

Kind: Shana Tarter

Beeinflusst von: Richard Feynman, Grace Hopper, Margaret Burbidge

Beeinflusst: Natalie Batalha, Debra Fischer, Margaret Turnbull

Ausbildung: University of California, Berkeley, Cornell University, Eastchester High School

Gegründete Organisation: SETI-Institut

Illustrations: Cover of DVD as taken from Amazon.de <https://www.spiegel.de/politik/beseelt-oder-besessen-a-8965c7fe-0002-0001-0000-000013470643> <https://www.google.com/search?channel=trow5&client=firefox-b-d&q=jill+tarter>

(Old) Narratives of Physics

Representations of Female Physicists (2012)

Familie und Forschung ist schwer zu vereinbaren



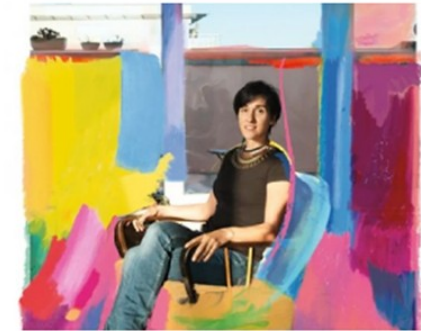
Die Schönheit der Gedanken: Fotini Markopoulou-Kalamara am Schreibtisch ihrer Wohnung in Kanada. In Physikerkreisen ist sie für die eleganten Visualisierungen ihrer Gedanken bekannt.



Ein Porträt der Physikerin als Strandmädchen in der Nähe Athens. Ihre griechische Heimat verließ sie mit 19, um in London zu studieren



Die meisten Mütter hätten ein Problem mit Filzstiften auf Türen. Aber Fotini Markopoulou-Kalamara schreibt sie selbst mit Formeln voll, wenn sie mit ihren Kollegen über physikalische Fragen diskutiert. Ihr Sohn wurde vor 20 Monaten in Berlin geboren.



WISSEN

Die 40-jährige Fotini Markopoulou-Kalamara

»Physiker denken nicht über Gott nach, weil er ein wenig langweilig ist.« Ein Gespräch mit Deutschlands modernster Physikerin über den Hunger nach Erkenntnis und die Grenzen des Vorstellbaren.

Illustrations taken from: Peter Praschl (Interview): Die 40-jährige Fotini Markopoulou-Kalamara. Süddeutsche Zeitung Magazin. Nr. 10 vom 9. März 2012. Schwerpunktheft: Mit 20 hat man noch Träume, mit 100 erste recht. Zehn Jahrzehnte, zehn Gespräche. Fotos ebenda.

(Old) Narratives of Physics

Childrens' books

- Professor Astro Cat (by Dominic Walliman & Ben Newman, London: Nobrow Press 2013)

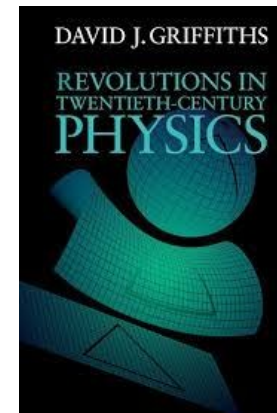


Page of the book (cutout)

(Old) Narratives of Physics

Science books

- Original (US-American version):
Revolutions in twentieth century physics
(*Cambridge University Press 2013*)
- German version:
Einführung in die Physik des 20. Jahrhunderts
(= Introduction to 20th century physics)
(*Pearson Deutschland GmbH 2015*)



Bookcover
Hideki Yukawa
among Western
male physicists

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(New) Narratives in Research

2000 – YEAR OF PHYSICS

2000/2001

- German Physics Society (DPG)
- Memorandum (book, 218 pages)
- Physics. Topics, Importance and Perspectives of Physical Research. A Report to Society, Politics and Economy

2002

- Working group on equal opportunity (AKC)
- Article in „Physik Journal“
- Is physics ready for an image campaign?

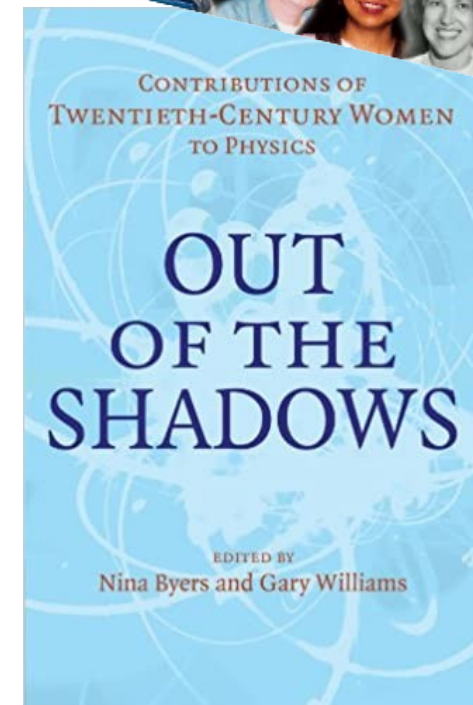
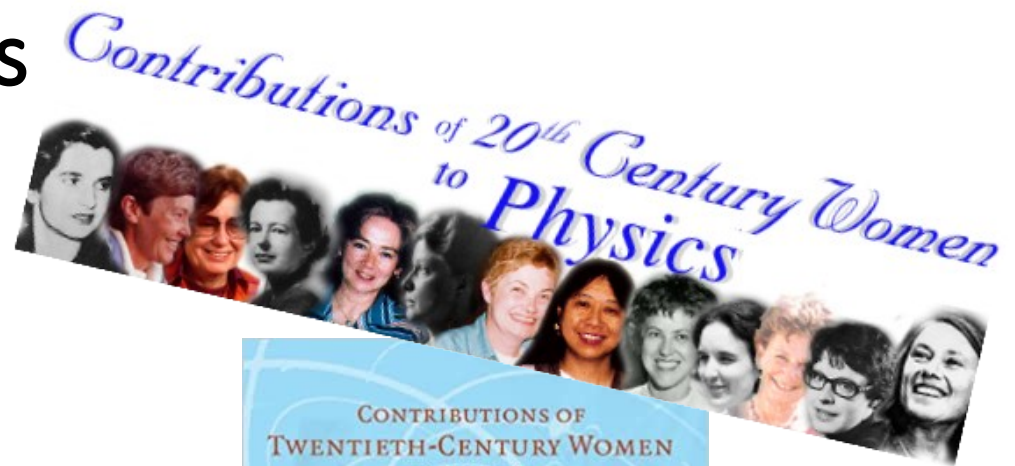


Illustrations: Foto of Book Cover, Foto of Article

(New) Narratives of Physics

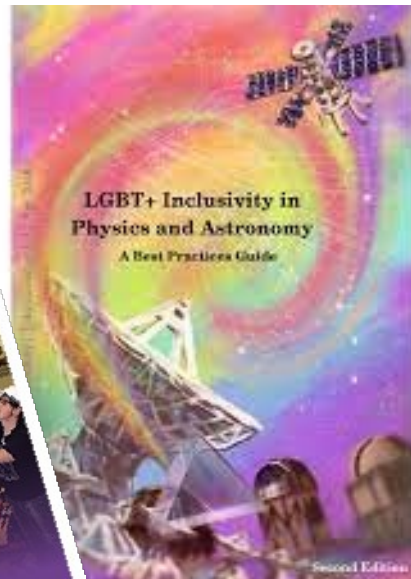
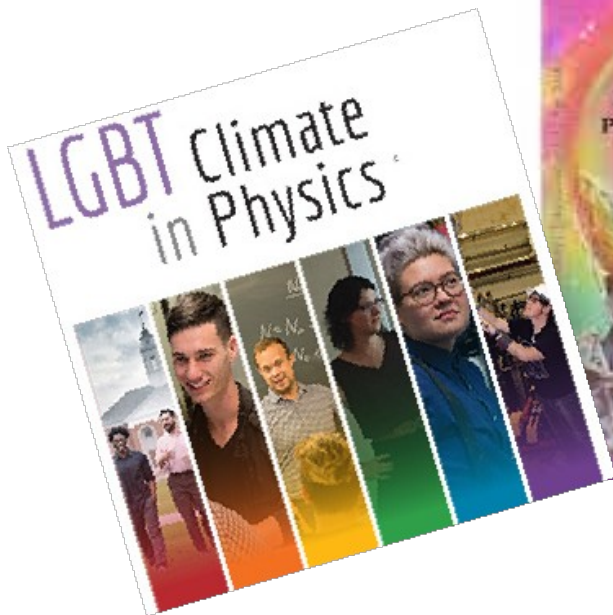
Science books

- Out of the Shadows. Contributions of Twentieth-Century Women to Physics
- Edited by Nina Byers and Garry Williams
- Byers taught atomic physics by using female physicists biographies and research areas.
- Extended website of the project:
<http://cwp.library.ucla.edu/>



<http://cwp.library.ucla.edu/> Bookcover taken from Amazon.de


(New) Narratives in Research



- American Physical Society
- Women in Science
- Minorities in Physics
- LGBT+ Physicists (2014)
- <https://www.aps.org/programs/lgbt/index.cfm>

(New) Narratives of Physics

- Professor of Astrophysics at MIT
 - Nergis Mavalvala (1968 -)

 - Positions: since 2002 professor of Astrophysics, associate head of the physics department at the Massachusetts Institute of Technology
- 
- A portrait photograph of Nergis Mavalvala, a woman with dark hair, smiling, wearing a light orange shirt. The background is a blurred brick wall.
- <https://www.macfound.org/fellows/class-of-2010/nergis-mavalvala>
- Scientific achievements: Work on the detection of gravitational waves in the Laser Interferometer Gravitational-Wave Observatory project, work on the generation of squeezed quantum states of light
 - Political achievements: “out, queer person of color.” e.g. 2015 keynote speaker at a conference for LGBTQ students and scientists where she argued strongly for more diversity in physical science.

(New) Narratives of Physics

- **Professor of Physics Savanna Garmon (ca. 1982 -)**
- Position: Assistant professor of Physical Sciences at Osaka Prefecture University / Japan
- Scientific achievements: Research focus on open quantum systems in condensed matter and quantum optics.
- Political achievements: Herself a trans woman she is active for LGBT rights and writes on feminist issues from a transgender perspective
- *Physics Today: What do you consider the most pressing issues for LGBT physicists?*
GARMON: “(...) In the context of larger climate issues, it would be good if physics departments would think about [LGBT-] issues, and talk openly about them, so that people create an inclusive environment. We don't want an office environment that is completely sterile, but there is a difference between collegial banter, and things that border on someone being isolated. That message can be communicated in a lot of subtle ways, and the person communicating it may not even be aware that's the message they are sending out.
(Feder, Toni: »Scientists talk about their experiences as sexual and gender minorities«, *Physics Today*, February 2015)



https://www.p.s.osakafu-u.ac.jp/personal/profile_savannah_e.html

Time for New Narratives

- Without doubt, these are all very important and necessary activities and initiatives to support diversity and equity in physics.
- Furthermore, change is possible – and necessary – not only on the level of people in science and the professional culture. Change can and should go deeper. It is time for new narratives welcoming diversity in physics teaching and research.
- Resistance might occur, because it includes the loss of privileges and power, because “being normal” will need an explanation. Nevertheless, to create and promote an environment that is welcoming and free of prejudice, it is essential to detect old narratives and include new narratives in physics on all levels.
- As researchers, team leaders or teachers you can make a change!

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<https://doi.org/10.1007/978-3-030-25304-2>

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Further Readings

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