

Reasons for the persisting underrepresentation of women in physics: insights from research on disciplinary cultures

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Disciplinary cultures

Disciplinary cultures are complex systems which are characterized by e.g.:

- Research methods and paradigms

But also:

- Shared values, norms, opinions, rituals
- Implicit rules of conduct/behavior (e.g. dresscode)
- Typical patterns of perception and judging
- Common everyday practices, interactions, communication

} all this happens
largely
unconsciously

How do you become a member of a disciplinary culture?

- by being socialized, acquiring the specific habitus (Bourdieu)
- by being validated by established members of the culture

(Huber 1991; Arnold & Fischer 2004)



Physics workplace cultures & gender: UPGEM project

- Interviews with 208 physicists in 5 European countries: Denmark, Italy, Finland, Poland, Estonia
- Found 3 different types of workplace cultures:

Hercules culture: strong devotion to physics; high relevance of interpersonal competition, individualistic, risky, not interested in how research relates to society

found to be dominant in Denmark: **lowest share of women in physics**, 10% of assoc. prof., 3% of full prof.

Caretaker culture: high priority of work-life-balance; no competition inside research groups, strong social ties within groups; concerned with societal effects of research results

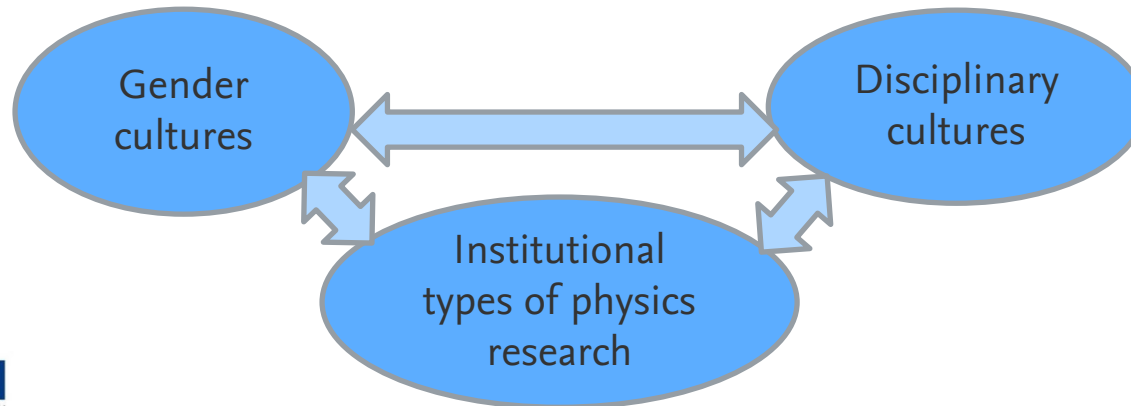
found to be dominant in Italy: **highest share of women in physics**, 33% of assoc. prof., 23% of full prof.

Workerbee culture: work 9-5, focus on given tasks, no competition, clear division of work and private life

Gender appeared to be unimportant in this culture, found to be dominant in Estonia and Poland

Disciplinary & gender cultures: "genderDynamics"

- "genderDynamics: Disciplinary Cultures and Research Organizations in Physics"
- How are gender cultures and disciplinary cultures in physics entangled when comparing different organisational types of research institutions?
- 12 case studies in 3 sub-projects at universities, non-university institutes and excellence clusters resp. CRCs
- Ethnographies: Participant observation combined with qualitative interviews over a period of several months
- Research-based recommendations for gender equity in science (Baur, Erlemann, Hark et al., 2015)



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"genderDynamics" Key results

- 1) Genderings that were brought in by team leaders have severe effects onto the team, especially when the team communication is strongly governed by the leading person.
- 2) Proportion of women varies between case institutes. But in each case institute, there are single groups with a higher rate of women than in other groups of the institute, regardless if theoretical or experimental physics.
- 3) Team leaders of groups with a relatively high rate of women had striven for getting more women into the group.
- 4) Team leaders who value gender parity as important for the group, mostly show positive attitudes also towards gender equality actions.
- 5) Reasons for the low rate of women in physics are seen in the structures of academia and in the research cultures of physics and not in the women themselves.
- 6) Low percentages of women among first-year university students are explained as due to influences in early childhood and experiences of alienation from physics in school.

Erlemann (2018)



Projects of the working group on women in physics

Annual Women in Physics Conference (“Physikerinnentagung”) since 1997 at varying universities in Germany with 120-350 female physicists and students



Annual Lise Meitner Lecture, held in 2022 by Donna Strickland, accompanied by a poster exhibition portraying women in physics as **role models**

„Physicist of the week“ campaign only showing female physicists to **increase the visibility of women in physics**

Projects with students (see „Fascination physics“-poster)

Reasons for the persisting underrepresentation of women in physics, Bossmann, Erlemann and Sandner – ICWIP 2023



Women in physics sessions, talks and panel discussions, and a quiz on gender in physics topics during lunch at the annual physics conferences of the German Physical Society



Thank you!

Literature

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Hasse and Trentemøller (2011): Cultural work place patterns in Academia, Science & Technology Studies, 24(1), pp. 6–25. doi: 10.23987/sts.55267.

Huber (1991): Fachkulturen. In: Neue Sammlung, 31(1): 3-24.

Gender and Science Studies in Physics working group at Freie Universität Berlin:

<https://www.physik.fu-berlin.de/en/einrichtungen/ag/ag-erlemann>

Working group on women in physics of the German Physical Society:

https://www.dpg-physik.de/vereinigungen/fachuebergreifend/ak/akc?set_language=en

