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Newsletter of the Committee on the Status of Women in Physics & the Committee on Minorities of the American Physical Society

INSIDE

In Search of Excellence and Equity in Physics

Emanuela Barzi, Fermilab Senior Scientist and OSU Adjunct Professor, APS Fellow (and APS Ethics Committees Member)

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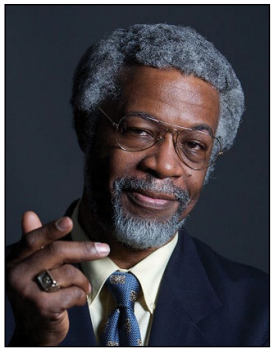
Roxanne P. Springer, Professor, Duke University Physics Department, APS Fellow

Physicists often assert that most scientific work is judged on its merits and that opportunities in physics are equitably available to all aspirants. Equal opportunity is central to the concept of meritocracy. Opportunity and leadership should go to the people most qualified by performance, and not on the basis of arbitrary or irrelevant attributes. This principle is arguably most important for high-level leadership due to their outsized impact on the field. Aside from the ethical responsibility, research exists showing that traditionally underrepresented people draw new relations between ideas and concepts that lead to increased innovation [1]. Nevertheless, far worse underrepresentation persists than could be expected from a functioning meritocracy [2]. The expectation that our physics community is a meritocracy is thus challenged. If we want to change this, we need to change our behavior, i.e., practices. Practices of a community ought to be based on its stated underlying values. To begin, we should rigorously query assumptions that our organizations and the decisions made within them are equitable and seek good evidence that supports this assumption. As scientists, we need to learn from scientists who specialize in the study of human behavior.

Equitable processes and procedures, as opposed to hierarchical structures, do not occur naturally in human societies. Developing and maintaining fair procedures, and eliminating barriers to traditionally underrepresented people require focused effort, frequent measurement, and continuous correction. The risk along the way is that the concept of "Equity, Diversity, and Inclusion" (EDI) and associated activities become a meaningless checkbox [3], [4]. This risk is understandable from a sociological point of view; those in power are less aware than others in their organization of the harmful consequences of inequity, as well as being poor judges of their own competence as leaders. Thus, organizations tend to respond to demands for change by offering the appearance of change, without monitoring mechanisms or measurable impacts.

The importance of equity in the workplace is discussed by E. Kevin Kelloway, the Canada Research

Emanuela Barzi



S. James Gates, Jr.

Roxanne Springer

Chair in Occupational Health Psychology at St. Mary's University, who says "Injustice is a particularly toxic stressor because it strikes at the core of who we are … When you treat me unfairly, you attack my dignity as a person — essentially saying that I don't deserve fair treatment or to be treated the same as others" [5]. Increased stress can impact human health by compromising the immune system. Stress effects on the body are described in a study by the American Psychological Association [6]. Jeffrey Pfeffer, Thomas D. Dee II Professor of Organizational Behavior at Stanford University, writes, ``Job stress costs US employers more than $300 billion annually and may cause 120,000 excess deaths each year" [7]. The effect on science generally from bullying and/or unequal opportunity is presented in a report of the National Academies [8].

To address this, the physics community should implement best practices on how to unite excellence

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Publication Information
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Basta

Simonetta Liuti, Research Professor, University of Virginia and CSWP Member

This has to stop [1]. Yes, we are sounding an alarm. We would, however, still like to convey a sense of optimism. Sexual harassment in physics urgently needs to be addressed. It has been going on for too long and causes the continuous loss of women to the world of research and education [2]. Bullying women out of physics hampers the development of uniquely creative and competitive approaches to problem solving. It is not only vicious, it is damaging towards any form of progress. This is not, however, a lost battle. Paraphrasing entrepreneur Shelly Bell [3],

``The world of physics might be like a boxing match but we, the women, know how to stay light on our feet".

Leaders in our field are starting to take concrete action. The NSF, the DOE, and the APS are starting to effectively invoke anti-harassment policies. There is now some hope that our community will stop losing women.

Those to Come

Kaitlin Rasmussen, Postdoctoral Research Fellow, Department of Astronomy, University of Michigan

[CW: SA]

You're a high school student. Your calculus teacher always calls on the boys first. One day you call him out on it. You get sent to the principal and it goes on your permanent record. But the teacher calls on girls, sometimes, now, too. You figure it's worth it.

You're an undergrad. Classes are getting harder, and your classmates are buddying up to get homework assignments done. But no one invites you to study. You tell your academic advisor, who alerts your professor. He now assigns study groups, and everyone knows it was you. Now they have to study with you, but they definitely won't invite you to the bar later. But at least you fixed things for students to come.

You're applying to graduate schools. You can't read your rec letters, but you've heard the nightmare stories. You email an article about the gender disparity in rec letter language to the undergraduate chair who forwards it to the department. You lose sleep over what this has done to your rec letters. No one else seems to worry about their letters.

You're in graduate school. Classroom policies haven't been updated since the 70's. Your professors have a strict attendance policy for their 8 AM classes. But you're a parent. Or you're disabled. Or you can't afford a car, and the bus is frequently late. When you complain, your classmates call you a slacker and your teacher grades you harder than everyone else.

Classes end and research begins. Why does your professor assign all the male graduate students theory work and everyone else busywork? You bring it up to the graduate advisor, but he tells you you're imagining it. You go to the department chair and he doesn't believe you either. You go to the dean. The dean emails the department chair who is forced to scold your advisor. Now your interactions with him are cold and intimidating. You take on extra research to prove you're worthy of a Ph.D. and a good letter of rec. But the incoming grad students won't have to put up with this, right?

Simonetta Liuti

Kaitlin Rasmussen

You're still in graduate school. Your male classmates think you're a bitch because you won't sleep with them. One of them grabs your ass at a bar, but you're too scared to report it. You're dismissed. You're spoken over. You're spoken about. Your classmates speak badly about people who look like you and think you won't mind. All of this takes a toll on you, every day. At least you'll graduate one day, you tell yourself.

Your former classmates are still best friends. They play Fortnite together. They get each other jobs and go to networking events together. You've never been invited. You look back at your actions in graduate school and hope you made a difference for the next one of you that comes along.

You're a postdoc. Your department doesn't have a DEI committee, so you organize one. None of the men show up. Since you're the head of the committee, everyone brings their problems to you. You know that if you don't care, no one else will. You're exhausted. Your white colleagues don't have to deal with this. But maybe someone else will pick up the DEI committee when you leave.

You're applying for faculty jobs. Over and over, you hear *You're going to get a job, and I won't, because you're, you know… diverse.* This doesn't ring true in the job market. You spend way too much time looking at the online rumor mill. Everyone who got a postdoc fellowship gets an offer, but everyone who got a postdoc fellowship went to Harvard. Everyone who went to Harvard went to MIT first. Everyone who went to MIT did so because their parents could afford it. Every day you eat less and less, and every night you wake

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Inclusion in Physics: What I've Been Learning

Narbe Kalantarians, Professor, Virginia Union University

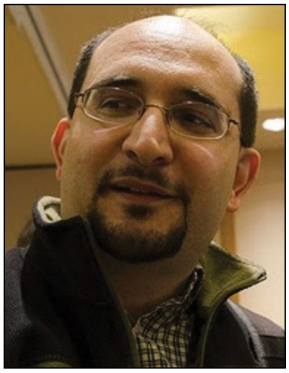
Professor Kalantarians and his students at VUU

Over the past 9 years I've embraced the mission of recruiting and mentoring Black physicists, motivated by the fact that physics has been largely monotone in culture for the majority of its existence and is in desperate need for some real diverse perspectives. What I've been learning in my role as a faculty member and researcher in physics is that it entails empathy, patience, and recognition to establish an environment that truly fosters growth for future physicists from underserved groups. This has been seen in the classroom, lab, and in collaborations.

In order to be successful, students from underrepresented groups need a sense of belonging in a field that has been predominantly White. It is crucial that they see physicists who look like them. Black students whom I've worked with, have genuinely appreciated it when I've brought in Black colleagues in nuclear and medical physics.

Helping communities of color is also significant to students from underrepresented groups. This is a major reason why I stress to my students how the research they participate in will result in obtaining skills for careers in medical imaging, national defense, as well as interpreting and communicating data that could pertain to issues of environmental and health disparities. I also encourage my students to take part in outreach activities/initiatives, such as the collaboration my colleague and I have had with Richmond Public School high school physics classes.

Learning to understand the viewpoint of Black students has been both the most challenging and also instructional part for me. Through real discussions with these students, I have learned to appreciate how they view their role in society and their backgrounds. During my postdoc at Hampton University I had an undergraduate and a Master's student once tell me about how seeing what happened with Ferguson [1] and Michael Vick [2] made them feel that their lives as Black men in our society seemed to have less value than a dog's. On a trip to the 2018 Virginia Academy of Sciences Fall Undergraduate Research Conference, one of my research students at Virginia Union (who presented there) told me about how his step-father was abusive and he would often have to protect his mother and siblings. It was not easy to hear these things, and yet it's huge that these young Black students felt they could talk to me. It's these interactions (and others that have been similar) that have made me realize how important my role is—we can truly impact lives.



Narbe Kalantarians

I joined Virginia Union University (VUU) in the fall of 2016, when the physics program was brought back with a planning grant from the National Science Foundation. We started with 7 students and, since then, it has grown to 25 majors at present. In 2021, we also established a National Society of Black Physicists Student Chapter at VUU. During this time, I have also established an active research program where I have mentored 10 undergraduate students. One of these students became coauthor on a paper published in a major journal. The crucial first step was to have an initial cohort of student participants in research and majoring in physics. This subsequently leads to positive peer pressure.

We reside in a central location of one of the most sizable Black populations in the United States, meaning that there is enormous potential for finding Black excellence/talent in physics in that area. With its resources and the well established presence at Jefferson Lab. to help support these aforementioned points, these students would be edified for being successful in this field. I fully believe that this will further enrich our field, with fresh new energy and viewpoints. ■

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Melting the Glass Ceiling in Physics

Amy L. Graves, Professor of Physics, Swarthmore College and CSWP Member

Amy L. Graves

"We all need permission to do science, but for reasons that are deeply ingrained in history, this permission is more often given to men than to women."

– Vera Rubin, pioneering astronomer

The words "glass ceiling" have long described the barrier preventing women and other minority populations from being promoted to top tier positions in their professions. The 1400 Degrees Initiative, which borrows its name from the typical melting temperature of glass, takes a multifaceted approach to the issue of gender equity in physics and astronomy. The Heising-Simons Foundation rolled out their 1400 Degrees website (https://1400degrees.org/) in June, 2021. This web-based platform is an outgrowth of the Foundation's commitment, via grant-making and dissemination of information, to empower a diverse U.S. physics and astronomy community. In early 2022, it was recognized with an Anthem Award, at the Silver level, in the Diversity, Equity and Inclusion category. (These awards, an outgrowth of the Webby Awards, are meant for socially impactful work).

Central to the platform is the building of a highly inclusive, comprehensive "Find a scientist" directory (https://1400degrees.org/directory/) which is searchable by name, institution and field.

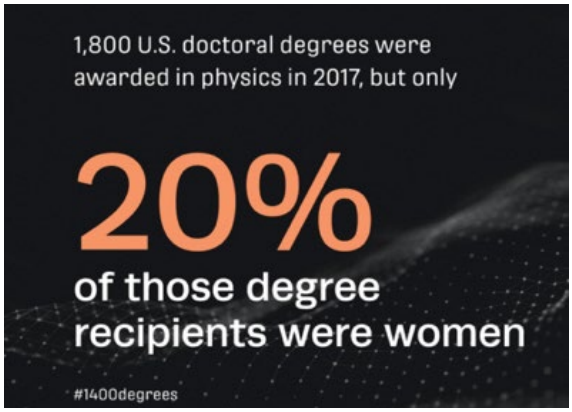
Any female or marginalized gender identity in physics or astronomy who has completed at least a bachelor's degree is invited to register. There, one can showcase achievements, serve as a model for others, and grow one's own collaborative network. At the time that this article is being written, 205 physical scientists are already members of the directory. Clearly, more are needed and participation is welcomed.

The 1400 Degrees site contains additional resources. Currently there are:

- Interviews with women physicists and astronomers conducted by science writer Sophia Chen.
  Chen has been featured in *Wired*, *Science*, *New Scientist*, and *Physics World*, and on the well-subscribed YouTube channel, "Physics Girl" (https://www.youtube.com/channel/UC7D-dEm33SyaTDtWYGO2CwdA).
- A one-stop shop to find evidenced-based resources with informative glosses and easy access. For example, the site collects reports from the AAPT Team-Up project and "Opening Doors" from The National Academies; as well as landmark journal articles which both document bias in academic and research environments, and advises on best practices to eradicate it.

A graphic depicting the 1400degrees platform, where any female or marginalized gender identity in physics or astronomy can join the directory. By definition, those who join are extraordinary individuals who, by virtue of their presence in these fields, are transforming them.

The 1400 Degrees site further promises a space for networking, mentorship, advocacy, and communication. While these features are clearly a work in progress, by joining one has the initial opportunity to receive updates on progressing capabilities, and continuing activities of the 1400 Degrees project to address diversity and equity in our field. ■



Social-media-ready graphics (above) and quotes (left) like these are available at the site under the "Share" link.

and equity from other very competitive fields. The private sector has already done much work in mitigating the financial and reputational damages that followed the public exposures of misconduct by the #MeToo and similar movements. In business, both the financial bottom line and the swiftness of information flowing to potential customers forces nimble adjustments. When inequity threatens the success of a business, the business changes its practices or fails. Therefore, corporations have been increasing research funding of Industrial-Organizational Psychology (I/O Psychology), the aim of which is to match behavior, i.e., best practices, to the values of an organization.

The most prevalent forms of discrimination include harassment (verbal and nonverbal behaviors that convey hostility, objectification, exclusion, or second-class status) and retaliation. In discrimination, the most potent predictor is the degree to which misconduct is perceived to be tolerated in the organization [8]. Institutions can reduce harassment and retaliation by making systemic changes to demonstrate that misconduct will not be tolerated and reports of misconduct will be taken seriously. Rigid bureaucratic/severe hierarchical structures and concentrated power centers often are correlated with fostering and sustaining harassment and promoting retaliation [9]. Organizations that enable a climate of aggression and bullying are more likely to have managers who abuse power, and who are more likely to ruminate over perceived offenses, ultimately seeking retaliation [9].

Efforts to create an equitable, diverse, and inclusive discipline are currently being undertaken at the American Physical Society [10], [11], [12], [13]. But how do we implement the changes needed in the physics community at large to improve our excellence and equity? An important starting point is how we choose our leaders for high-responsibility positions in academia, national labs, managing organizations, funding agencies, and industry. At the moment, many in the community perceive that the choice of leaders is infused with a lack of meritocracy and too often driven by cronyism.

Our community needs leaders who exhibit the highest integrity, who inspire others, who own their mistakes, who continue to learn and grow in the face of new evidence and new circumstances, who value equity and excellence over the appearance of it, who understand that an organization's culture is dictated by the experience of its most vulnerable members, and who will put facts and fair play above politics and convenience.

To identify such a leader, searches can follow best practices developed by I/O Psychology. The National Science Foundation has also been funding studies in this area [14], [15]. An ethical hiring process for leaders who are excellent and will promote equity should include:

1. Identifying the characteristics needed for a successful performance in the leadership role. In I/O Psychology this is part of a quantitative process called "job analysis."
2. Advertising open leadership positions broadly, including among professional societies who reach traditionally underrepresented people, for example, the National Society of Black Physicists, the National Society of Hispanic Physics, the National Technical Association, and the Society for the Advancement of Chicanos/Hispanics and Native Americans in Science.
3. Creating search committees that consist of a diverse representation of stakeholders, measured by position, location, race, gender, etc.; inviting representation from advocacy groups within the organization.
4. Training search committees to identify their own biases and that of others (for example, when reading letters of recommendation) and to mitigate them. The training should address not just legal guardrails but practices that have been shown to improve equitable hiring.
5. Agreeing on a rubric before examining applications. This rubric should be based on the characteristics identified in item (1), prioritize the characteristics, and create a normalized scoring procedure.
6. Building the selection process to include only steps that add value and measurement to the process; measuring the critical skills and abilities from item (1) multiple times throughout the process; informing everyone, and particularly the selection committee and the stakeholders, about the process.
7. Using reliable assessment tools [16] so as to add value in the form of predicting future behavior since assessments consistently outperform and outpredict all other aspects of the hiring process.
8. Interviewing candidates using a structured and consistent process across applicants, including personality evaluations, integrity and reliability tests, work simulations, i.e., both situational and behavioral interview questions. Behavior research shows that unstructured interviews are two to three times less reliable than a structured process [17].
9. Inviting candidates to submit a short statement that does not contain their name or current institution, but instead lists how they qualify for the leadership position, why they want it, and what they wish to accomplish in the leadership position, including efforts to create and sustain a fair and equitable work environment.
10. Providing each candidate with a case study that involves an EDI related problem that they have not seen in advance, where they are invited to discuss how they would handle the problem were they to be hired into the leadership position.
11. Considering the appropriateness of confidentiality of the leadership candidate names. When stakeholders are invited to provide feedback, the search committee obtains valuable information that re-

duces the risk of unexpected and potentially embarrassing information arriving after a new leader is announced.

When a transparent and equitable search that follows best practices is not performed, it sets the tone for the lack of trust the stakeholders will have in leaders of the institution. Further, behavioral change cannot be accomplished without the advocacy of leaders; institutions like physics departments, national labs, etc., cannot be healthier than the organizations that manage them. Likewise, it is also in the interest of funding agencies, as stewards of taxpayer's money, to require ethical practices and monitor behavior for the most cost-effective use of their money.

Examples of what happens if equity is not prioritized are given in [18], [19], [20]. We can do better. If we expect to keep the best and brightest in our field, then we must do better. Discounting deserving, productive scientists from the scientific enterprise, be it for inequity, exclusion of minorities or even illegal discriminatory behavior, undermines the integrity of science and affects it at its core now and in the future. ■

Acknowledgments

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Basta *(continued from page 2)*

up sweating. But you have to get a job, because you're the only one who actually wants to make a difference.

You're faculty. You take on extra marginalized students from unprivileged backgrounds. You attend DEI meetings and work to make real changes. You volunteer for the admission committee. You volunteer for the faculty search committee. You volunteer to be the graduate coordinator. You try so hard to make a difference, but you know that one person isn't enough. You try to change minds. You take leadership workshops. You run for department chair. It's not enough. Students still slip through the cracks. Your privileged colleagues are too busy to notice. Your research slips because you spend all your time trying to make your department a better place. You don't have enough papers to make tenure, but our activism must count for something, right?

Your all-male tenure committee evaluates you on the same scale as everyone else. *That's what equality means*; they say. *This is purely merit-based.* Did you meet someone else's standard of professional dress today? Does your natural hair make them take you less seriously, or did they actually attend the anti-racism workshop? *Let's take a look at your teaching record*, they say. You sigh a sigh of relief. *Just kidding*, they say, *looks fine*. *Next*, the men spend most of the hour interrogating your research. Have you published in Nature recently? No? *We hired you to do high-impact research, you know, to elevate the standing of this department. Not to make the bathrooms gender neutral.*

We'll email you later, they say, at the end of the hour, but you already know what the email is going to say, because there are 500 white men waiting to take your place, and half of them have the time to get the funding to hire the students to do the work to publish in Nature, and the 'moment' has already passed for you and for people who look and think like you and who cares about retention rates anyways, what are you, some kind of social justice warrior?

You quit.

Full Stop

Anonymous

This story is about me, a female physicist at a research university in the USA. It is about the hounding I had to overcome throughout the decades as a physicist, but it is also a story about the only female graduate student I have ever had. Differently than me, she has been *hounded out* of our field early in her postgraduate career. As she moves on with her life elsewhere, I will lose an incredible collaborator, an ally, a friend. Physics will lose an exceptional contributor, and progress will be hampered.

Sexism occurs in the form of sexual harassment, gender role stereotypes and blatant, overt discouragement. It is, more generally, the outcome of a cultural environment where men are believed to be superior to women, and it can deliver a slow death by a hundred cuts through microaggressions, subtle insults and slights.

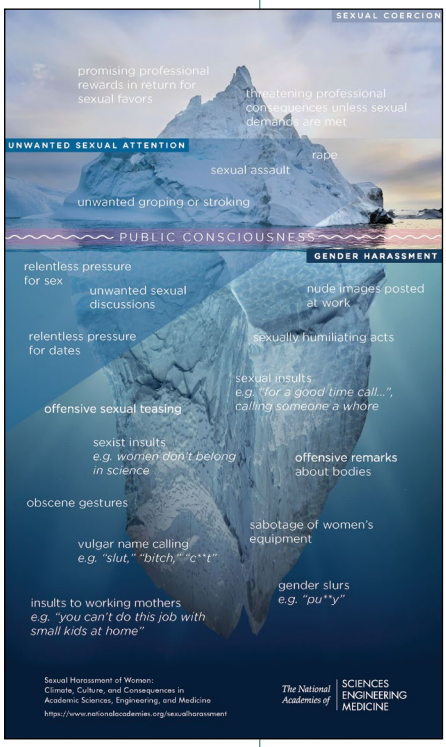
I have endured all forms of harassment since day one of my career, from below the water line of the NAS iceberg model to the icy tip of overt harassment. This started from my early days as a physics student, when the Calculus professor used to call female students in the auditorium to clean the blackboard, giving them lecherous looks while they were cleaning up. On the day my turn came, I refused, loudly speaking my mind in front of a class of one hundred students. The professor reacted with a public fit and he gave me a hard time for the whole year. I started to learn the lesson: I was a woman in a field populated by men, and it would be hard rain falling from then on. That surreal initial episode was just the beginning of a long series of even more appalling forms of harassment that to date, as I am writing this article, has not ended. When I was sexually harassed by older, well established physicists, sometimes I would put my foot down. Other times I was chased and ambushed but managed to escape. Thoughts of low self-esteem crowded my mind: was I worth it, what was the real reason they were paying attention to me? Were they really interested in what I could do with my brain, or...? My mind would be filled with doubts, especially in the moment I needed a proactive push to help me move forward in my career. There have been times I have not managed to untangle myself from the harshest forms of harassment and the concurrent playing of mind power games, hinting at my demise, all along thinking that the best course of action would be to endure it for a few minutes of my life, and trying to move on. More doubts would fill my mind: why did a physics discussion turn into groping? Was it my fault? What would happen to me and the scientific ideas I wanted to carry out? But especially, how could I be misunderstood so badly? Why was my thinking potential deemed to be zero?

As puzzling as it sounds, in all of this mayhem, throughout the years I have managed to preserve my self-confidence, even if at times it was reduced to a sliver. Physics is my passion and I knew that I was good at it: I could get funded and publish my research.

Whether in Europe or in the US, the harassment issues are similar: being ignored, not being taken seriously, having my ideas be rejected unless vetted by the old white boys network, and I could go on forever. To this date, I have learned that white male physicists can turn into predators the moment they feel intellectually threatened, limiting as much as possible the presence of women. Even if this is not carried out at the conscious level, the outcome is clear: the number of women in physics is still lagging behind by an incredibly large amount.

I have learned this once again through the experience of my brilliant and productive female graduate student, who is quitting physics after crippling postdoc experiences. I cannot comment on details about her private life, but I have seen her lose hope for a fair and supportive working environment as years went by. It started from a peer male physicist being dismissive of scientific work she knew how to do better and pushing her out of a collaboration. It then continued with an abysmal postdoc experience in a male dominated group at a national lab, where her ideas were not even considered and, in her own words, she was *"treated as a junior graduate student"*. This toxic atmosphere certainly did not improve with the Covid lockdown. At the end of her postdoc, the head of the group was taking for granted that she was leaving physics, because of her ``inability'' to fully engage with the group, from his point of view, and because (wisely) she did not ask him for any letter of recommendation for a future job. He chose to discuss this with her during a social event rather than addressing the issue in a timely manner. That alone made her feel worthless, needless to say. She moved on to another postdoc and despite what seemed like an initial improvement of climate, the old boy culture resurfaced to taint her experience again. She found herself joining a project where, despite her known expertise, two emerging young male physicists were chosen to be in the lead: why was she not chosen? Why are women kept working in the shadow of men all the time? This was the last blow.

She quit. ■



Iceberg model representation of sexual harassment (adapted from Ref.[2])

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