

## NEWS

# Data show extent of sexism in physics

Women are poorly represented in physics, making up just 10% of faculty in the United States, for example, but the reasons for this have proved contentious. Now a particle physicist claims to have hard data showing institutional sexism at an experiment at one of America's highest-profile physics labs.

Sherry Towers claims that female postdocs worked significantly harder than their male peers but were awarded one-third as many conference presentations proportionally. "There was this shocking difference," says Towers, who now studies statistics at Purdue University in West Lafayette, Indiana. "Particle physics really hasn't moved forward in 30 years."

Towers used data from publicly available work records to chart the careers of 57 postdoctoral researchers, including nine women, who worked on the 'DZero' particle detector at Fermilab in Batavia, Illinois, between 1998 and 2006. Towers herself worked as a postdoc on the project between 2000 and 2005. The findings of her survey were striking, she says. She claims that women did 40% more maintenance work than their male counterparts, and that female postdocs produced significantly more 'internal papers' per year. But based on that productivity they were only one-third as likely to be allocated conference talks as their male peers, she claims (<http://arxiv.org/abs/0804.2026>).

Conference presentations are critical to a young particle physicist's career. Papers from collaborations such as DZero have hundreds of authors in alphabetical order. Being given the chance to present results at a meeting is a major way for young researchers to stand out. "It's important," says Pauline Gagnon, a physicist with the ATLAS detector at CERN near Geneva,

Switzerland. "Being able to give talks is a way of rewarding individuals for their work."

Most particle detectors have internal committees that allocate conference presentations to researchers. These committees are frequently male-dominated, and Towers believes this lies behind the discrimination. "I don't think for a second that there is a conscious bias going on," she says. But the committees "are in danger of being prone to patronage and cronyism".

Male committee members are more likely to nominate male protégés to receive presentation time, she claims.

Some are sceptical of the findings. "I wasn't convinced that the effect she has found is real," says Kevin Pitts, a particle physicist at the University of Illinois at Urbana-Champaign. Internal papers are not necessarily a direct measure of productivity, he argues, and the small number of physicists surveyed is not enough to prove systematic bias. But Pitts is quick to add that he has little doubt that females do suffer gender discrimination: "In fact," he says, "I have personally observed this on more than one occasion."

Female physicists contacted by *Nature* said Towers's data matched their personal experiences of institutional sexism in physics. "You often see a young guy with an older guy gossiping and having coffee, but never a woman," says Freya Blekman, a physicist on the CMS experiment at CERN. "I'm convinced," agrees Gagnon. "There is absolutely no shadow of a doubt in my mind." She says the ATLAS collaboration is thinking about how to



Sherry Towers assessed work data for an experiment at Fermilab.

address the problem in its own speakers' committee.

After Towers complained, Fermilab launched an internal review in autumn 2006, says Bruce Chrisman, the lab's chief operating officer. An edited copy of the review obtained by *Nature* found that the collaboration "followed its policies correctly". But the investigator, a senior female physicist, added that complaints of gender discrimination in the group "should not

be summarily dismissed". There was a general feeling that females were being "passed over" for leadership roles, the report says.

DZero's leaders counter that bias, if it ever existed, is not plaguing the current collaboration. A survey of data between August 2006 and 2007 showed that women gave 17% of all talks despite making up just 12% of the collaboration, says DZero spokesman Dmitri Denisov.

Powers says the investigation didn't focus on postdocs and hasn't led to real changes at DZero. She wants the conference allocation system to be made more transparent and balanced. "The changes that need to be made are simple," she says. "It wouldn't cost them a dime."

And Towers says gender discrimination ultimately forced her out of particle physics. She adds that in 2004 her former employer, a prominent northeastern public university, tried to terminate her contract after she complained that she wasn't given adequate maternity leave. She has since filed a lawsuit against the university. ■

Geoff Brumfiel

M. JONES

## Italian group claims to see dark matter — again

Physicists in Italy claimed last week to have seen particles of dark matter. Their announcement has got their rivals riled and raises questions about what constitutes evidence of a new particle.

Rita Bernabei of the National Institute of Nuclear Physics in Rome presented her team's latest results on 16 April at an international meeting of particle physicists in Venice, Italy. Their detector, DAMA/LIBRA (Dark Matter Large Sodium Iodide Bulk for Rare Processes), located deep under the country's Gran Sasso mountain, seems to be observing dark matter, Bernabei says.

Most agree that the experiment is picking up

something: "They're seeing a signal, there's no doubt about that," says Tim Sumner of Imperial College London. But despite this, critics say that they don't believe the detector has found the elusive particles. "For me, it's not proof that they have seen dark matter," says Gilles Gerbier, a physicist at the Centre for Atomic Energy in Saclay, France. He adds that he's stumped by what's causing the signal.

Dark matter is believed by most physicists and astronomers to make up some 85% of the matter in the Universe. Most theories predict that it is some form of massive particle that interacts very

rarely — if at all — with regular matter such as atoms. To date, most believe that dark matter has been spotted only indirectly via its pull on rotating galaxies and its effect on the shape of the early cosmos.

It's not the first time that Bernabei's team has made this claim. In 2000, they also claimed to have directly observed dark matter. The team uses ultrapure sodium iodide crystals, which theory predicts will give off flashes of light when they are struck by dark-matter particles. After several years of collecting data in the late 1990s, the group saw an increase in the number of flashes



## GUT REACTIONS

Analytical technique shows how metabolism varies between populations.

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ANATOMICAL TRAVELOGUE/SPL

# Swiss 'dignity' law is threat to plant biology

When it comes to the ethics of experimenting on living subjects, plant biologists have had cause for a certain smugness. But perhaps no longer in Switzerland.

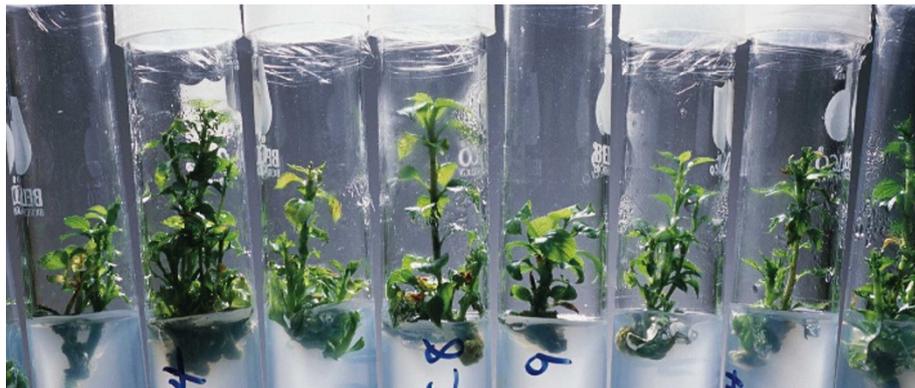
The Swiss federal government's ethics committee on non-human biotechnology has mapped out guidelines to help granting agencies decide which research applications deeply offend the dignity of plants — and hence become unfundable.

Although most people might be bewildered that a discussion on how to define 'plant dignity' should be taking place at all, the stakes for Swiss plant scientists are high. The Gene Technology Law, which came into effect in 2004, stipulates that 'the dignity of creatures' should be considered in any research. The phrase has been widely criticized for its general woolliness, but it indisputably includes plants.

All plant biotechnology grant applications must now include a paragraph explaining the extent to which plant dignity is considered. "But scientists don't know what it means," says Beat Keller of the Institute of Plant Biology at the University of Zurich who is running the first field trial — of disease-resistant corn (maize) — to be approved under the new legislation.

"At the moment not even authorities who decide on grants know what the 'dignity of plants' really means," says Markus Schefer, a constitution lawyer at the University of Basel and a member of the ethics committee. "That's why we were asked to deliberate."

The constitution says that the 'dignity of creatures' must be taken into account in the gene-technology arena, which is why the term has been adopted into the regulations.



J. RICHARDSON/CORBIS

Living creatures trapped in undignified conditions? A tricky ethical question for Swiss plant biologists.

The government called on the advice of its ethics committee two years ago to help develop a definition for plants. "My first reaction was — what the heck are we doing considering the dignity of plants," says Schefer. "But this very broad provision exists, and we have to help to prevent a legal mire."

The committee has created a decision tree presenting the different issues that need to be taken into account for each case. But it has come up with few concrete examples of what type of experiment might be considered an unacceptable insult to plant dignity. The committee does not consider that genetic engineering of plants automatically falls into this category, but its majority view holds that it would if the genetic modification caused plants to 'lose their independence' — for example by interfering with their capacity to reproduce. The statement has confused plant geneticists, who point out the contrast with traditional plant-hybridization

technologies, for example in roses, which require male sterility, and the commercial development of seedless fruits.

Keller sees the issue as providing another tool for opponents to argue against any form of plant biotechnology, which is already very difficult to conduct in Switzerland. Schefer says that things will start to become clearer when legal challenges to specific research projects come to court, and case law becomes established.

The definition of what constitutes dignity in animals is currently being tested in a Zurich court. Primate-research projects at the ETH Zurich technology institute, which involve separating young marmosets from their mothers, have been put on hold while the court decides if they conflict with the animals' dignity. A ruling is expected this year. Whichever way it falls, the decision is likely to end up in the federal constitutional court.

Alison Abbott

every June and a decrease during December. The seasonal oscillation, they claimed, was due to Earth's annual motion with and against a stream of dark matter swirling around the Milky Way.

But rival groups failed to see the signal and heaped criticism on the group. They demanded proof that the Italians' detection was not caused by systematic errors such as natural radiation or glitches in their electronics.

This time around, the DAMA/LIBRA team seems to have addressed some of those concerns, according to Bernard Sadoulet, an astrophysicist at the University of California, Berkeley. For example, their new detector uses larger, less strongly radioactive crystals, and they have proven the stability of their detectors.

But once again, DAMA/LIBRA's rivals are coming up empty-handed. Sadoulet's own Cryogenic Dark Matter Search II detector announced a null result earlier this year (see *Nature* 452, 6-7; 2008). And other second- and third-generation experiments are similarly failing to see a signal. If the signal DAMA gets is dark matter, Sadoulet says, "it's certainly not the dark matter we were looking for". He also continues to criticize the group for failing to share enough details of its data. "There has not been enough information provided to the community," he says.

Bernabei defends her group's finding. Most other detectors try to measure direct collisions between a dark-matter particle and an atomic nucleus, she says. DAMA/LIBRA is the only

experiment with the years of data needed to see the annual fluctuation in dark-matter particles. And the fluctuation matches "all the several requirements of dark matter", she says, adding that two papers have just been posted on the popular preprint server ArXiv, which provide the details of her work.

But unless another team sees something, Gerbier says, it's unlikely that the wider physics community will accept the Italian claim. "There should be different ways of seeing the same thing," he says. "A single experiment cannot discover dark matter."

Bernabei agrees. Proving her team's findings will take "time and patience", she says.

Geoff Brumfiel