

# feature

## Struggling to contribute: Stories of women in physics



Maria Mitchell

COURTESY OF THE MARIA MITCHELL ASSOCIATION

BY JHENIFER PABILLANO

Historically, ventures by women in the realm of physics have not been received kindly. On the way home in 415 AD, Hypatia – a renowned teacher in ancient Alexandria considered the greatest woman in science until Marie Curie – was unceremoniously slaughtered by a gang of fanatical monks. The mob stripped her naked, reduced her flesh to a pulp, then quartered and burned her body. Alexandria's devout Christian leader associated paganism with Hypatia's pursuits of scientific writing, which included a commentary on Ptolemy's works on astronomy. It was not long before Hypatia met her brutal end.

Bloody death, however, was not often the major roadblock for female physicists following Hypatia. More frequently, societal attitudes kept them from research in the field.

Nevertheless, many women managed to make significant contri-

butions to physics, laying the foundation for greater acceptance of women in science.

The most famous, of course, was Marie Curie, the Polish-born nuclear physicist who studied in France at the turn of the twentieth century. She won two Nobel Prizes for her study of radioactivity with her husband Pierre and discoveries of radium and polonium. For most of their research, the Curies were unable to secure adequate lab space and worked out of a cramped converted shed. They struggled for funding to support their family while undertaking their expensive research project. Pierre died in a traffic accident in 1906, and Marie took his place teaching at the Sorbonne, becoming the first woman to do so. She developed a state-of-the-art nuclear physics research institute in Pierre's honour, brought radium into use as a medicine and set up x-ray units during the First World War. After her death, her excellence in physics

lived on in her daughter, Irène Joliot-Curie, who later won the Nobel Prize for discovering artificial radioactivity.

Lise Meitner was another notable nuclear physicist, responsible for discovering nuclear fission with her collaborator in Berlin, chemist Otto Hahn. But as they were unravelling the puzzle of what uranium produced when bombarded with neutrons, Meitner, who was a Jew by birth but had become a Protestant, was forced to flee Germany for Sweden after the Anschluss. Hahn and Meitner continued to communicate: he kept working on the chemical side of fission in Berlin, while she worked to explain it through proofs.

In early 1939, both came to their conclusions simultaneously: the product element was barium, and the process was fission. Confused about Meitner's residence in Sweden, the Nobel committee later awarded its prize to Hahn for the

work completed by them all. While her role in the discovery was hidden, it was later partially recognized by the US Fermi Prize in 1966, awarded to Meitner, Hahn, and another research collaborator, Fritz Strassman.

Plasma physics finds its roots in the work of Hertha Marks Ayrton, whose scientific pursuits began at Girton College at Cambridge in 1873. There, Ayrton invented a device that recorded heartbeats and an instrument that could divide a line into any desired number of equal parts. Following her graduation, Ayrton studied physics and electrical engineering at Finsbury Technical School, where she met her husband, researcher William Ayrton. His studies of the electric arc piqued her interest, and soon Ayrton began to analyze them in earnest. Ayrton's husband was careful to stay out of her work to ensure her research was recognized as her own. The results of her efforts were a



Hypatia



Lise Meitner

COURTESY OF THE HAHN-MEITNER INSTITUTE



Hertha Marks Ayrton

COURTESY OF THE INSTITUTION OF ELECTRICAL ENGINEERS



Caroline Herschel

REPRODUCED FROM MEMOIRS AND CORRESPONDENCE OF CAROLINE HERSCHEL (JOHN MURRAY, LONDON, 1879, FRONTISPIECE).

number of renowned papers on the arc's anomalous behaviour, which seemed to defy Ohm's Law. The brilliance of her studies caused the Institute of Electrical Engineers to elect her their first female member, and won her the Hughes medal, a major British scientific prize.

The field of astrophysics was one of the first areas where women made inroads. Caroline Herschel, one of the most famous female astronomers, assisted her brother William while making discoveries of her own. Born in 1750 in Hannover, Germany, she suffered childhood diseases that destroyed her chances for marriage, leaving her with bad facial scars and a height of four foot three inches. She was devoted to William, an accomplished astronomer who discovered Uranus in 1781. Together they began the field of sidereal astronomy, measuring and categorizing the stars. Caroline at first did the heavy calculations necessary to process William's data, but when she received her own telescope in 1782, she began her own research during her brother's absences. She discovered eight comets between 1786 and 1797 (her brother never discovered any) and helped William find over 1000 double stars. Her status as an astronomer grew

and her efforts were recognized with numerous accolades, including an honorary membership of the Royal Astronomical Society, making her one of the first women to enter into the organization. However, she remained modest her whole life, deeply disliking any praise she received lest it detract from her brother William.

The subsequent success of women in astronomy was attributable in part to the work of Maria Mitchell, the director of the observatory at the all-women Vassar College. In 1847, Mitchell won a medal from the King of Denmark for discovering a comet unseen to the naked eye, and was hired on to do computations for the large United States Coast Survey. A strong supporter of the women's movement, Mitchell inspired many of her students to become professional astronomers. Her efforts laid the foundation for the acceptance of women as credible scientists who deserved to be compensated with proper pay. As she once wrote, "I consider it one of my duties to the young women who come into my department to encourage a respect for remunerative occupation. Why should girls be brought up with an idea that paid labour is ignoble?"



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Marie Curie with her daughter, Irène Joliot-Curie

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Le CCÉP aura lieu à l'Université McGill cette année, à Montréal, du 30 octobre au 1er novembre. Il s'agit d'une occasion exceptionnelle pour les étudiants du bac de faire une présentation scientifique professionnelle. Si vous êtes intéressés, informez-vous auprès de votre association pour étudiants de physique. Nous espérons que vous envisagerez appliquer!

Catherine Haberkorn & Joachim Harnois-Déraps

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