Dame Jocelyn Bell Burnell was in İstanbul

Famous astrophysicist lectured on her discovery of pulsars

The Science Academy welcomed world-renowned astrophysicist Prof. Dame Jocelyn Bell Burnell, in the first ever of its recently launched Annual Lectures. At the conference held on 4 February 2016 at Boğaziçi University, Dame Jocelyn gave a lecture on pulsars, which she discovered in 1967, in the context of relativity and gravity.

Prof. Dame Jocelyn Bell Burnell(1) figures among today's most prominent scientists. When only 24 years old, as a PhD candidate at Cambridge University, she set up and operated a 81.5 megahertz radio telescope under the supervision of Antony Hewish, and started to analyze the scintillation of interplanetary compact radio stars. It was the first time in the history of radio astronomy that such a large section of the sky was scanned via an extraordinarily sensitive radio telescope.

The discovery of pulsars in 1967 as a result of these efforts is viewed as a milestone in the history of astrophysics. **Sir Martin Ryle**, President of the Radio Astronomy Group in University of Cambridge's Cavendish Laboratory and Jocelyn Bell's PhD advisor **Sir Anthony Hewish** garnered the Nobel Prize for Physics in 1974 for this discovery and their contributions to radio astronomy. This was the first time an observational study in astronomy was deemed worthy of the Nobel Prize.

'LIGHTHOUSES' OF THE SKY

In her Istanbul lecture, Dame Jocelyn talked about her discovery of pulsars and their chief characteristics. She elaborated on these celestial bodies, which she had first jokingly called "Little Green Men" but later found to be thitherto undiscovered objects, in a way that even an uninformed listener would easily understand. She also emphasized that pulsars, also known as lighthouses in the sky, are yet another proof of Einstein's Theory of General Relativity.

According to Dame Jocelyn, pulsar astronomers still have a very long way to go. As studies on pulsars progress, new findings will help spaceships navigate during their journeys; in other words, pulsars will function like veritable lighthouses.

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(1) In the UK, the title "Dame" granted by the Queen is the equivalent of the title "Sir" given to men.

HER DECISION TO BECOME AN ASTROPHYISICIST

Just like many scientists, Jocelyn Bell became interested in astronomy at a very early age. Since her father was the architect of the **Armagh Observatory** in Northern Ireland, she had the chance to spend some of her time there. Her interest in astronomy, roused by the astronomy books that her father brought home, was especially intensified after reading **Fred Hoyle**'s *Frontiers of Astronomy*: "Although a bit complicated for a child of that age, the book shed light on various unknown aspects of the sky. The book was key to my decision to choose this profession."

HER STRUGGLE AGAINST PREJUDICE IN THE SCIENCE COMMUNITY

In addition to her scientific research, and work at various scientific institutions, Dame Jocelyn also waged a struggle to increase the number of women in the scientific community, and to make sure that female scientists are duly recognized for their work. She believes that subconscious prejudices across the society on gender equality must be shattered first. According to Bell Burnell, the scarcity of female scientists, and gender discrimination in the scientific community call for a resolute struggle. Individuals in decision-making positions need to be much more sensitive on this issue, and public awareness must be raised.

Dame Jocelyn's suggestions for overcoming these prejudices are as follows: "The society must be informed more about women scientists. Families who see the presence of successful female scientists would encourage their girls to study science. If the number of successful female scientists remains limited, however, young girls will struggle to find role models."

"Some countries have no shortage of women physicists," said Dame Jocelyn: "Malaysia is a case in point. When I urged Malaysian girls to choose natural sciences, they told me why I felt the need to make such an emphasis. Later I learned that girls make up 60% of all students in Malaysian physics faculties, which goes to show that the choice of scientific discipline is determined not by individual capacity and talent, but by national culture. However, neither is it correct to change that culture abruptly; because a sudden change could easily backfire."

HER EFFORTS ON SCIENCE EDUCATION

Dame Jocelyn has also expended efforts on science education. In the UK, she focuses on women's education in science and engineering disciplines. Indicating that the number of women scientists in the UK is very limited and that women do not show much interest in computer engineering and other engineering disciplines, Bell Burnell added that "If individuals with the same characteristics form the majority in a science discipline, similar opinions will dominate the field. Diversity is key here. In other words, stronger organizations are created when women, or individuals from different cultures and countries work together. If you cooperate exclusively with people who think the way you do, you cannot create a strong organization. We learned a lot from the crisis that hit the banking sector in the UK. The committees set up to find a solution to the crisis always spoke with a single voice. And the banks went under. Things could have been different if there was a different opinion among them."

A DEVOUT SCIENTIST

Dame Jocelyn indicates that she is a devout person, but that her faith does not interfere with her scientific work: “I am a follower of Quakerism (2), which does not come into conflict with my scientific efforts. My beliefs are in harmony with science. At that point, it is important which religion you are attached to. Some religions dictate what you should believe in and what you should not. My religion is not like that; it leaves me totally free as to what I can believe in. I could have had problems, had I followed another religion.”

HER BIOGRAPHY

Born in 1943 in Belfast, Northern Ireland, she studied at Mount School in York from 1956 until 1961. In 1965, she graduated from University of Glasgow, department of physics. In the same year, she started her PhD studies at University of Cambridge, where she analyzed the interplanetary compact radio stars under the supervision of her doctoral advisor **Anthony Hewish**.

For two years, Bell Burnell worked on constructing the first radio telescope out of a series of rod antennas, and started using it in 1967. It took the radio telescope four days to scan the entire sky. She discovered the first four pulsars with this telescope. The term “pulsar” was short for pulsating radio star. Bell Burnell had to analyze her data on 120-meter long paper charts. Each pulsar signal occupied only 1.25 cm in these 120-meter charts.

The discovery of pulsars was a turning point in the history of astrophysics. In 1974, **Sir Martin Ryle** and **Sir Anthony Hewish** of the Cavendish Laboratory at the University of Cambridge won the Nobel Prize for Physics. The prize, however, led to controversy in the science community. The prominent British astronomer **Sir Fred Hoyle** stated that Bell Burnell, too, had to be included in the Nobel Prize.

Bell Burnell was granted the title of Dame in 2007. She was the president of Royal Astronomical Society from 2002 to 2004, and of Institute of Physics from 2008 to 2010. In 2014, she was elected president of Royal Society of Edinburgh.

She is well known for her scientific studies and leadership, as well as her crucial efforts to ensure the presence of more women in key positions across the scientific community.

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(2) Quakerism: A denomination established in northwestern England by those unpleased with contemporary Christian denominations and sects.

WHAT IS A PULSAR?

In her Istanbul lecture, Jocelyn Bell Burnell characterized pulsars as follows:

-Pulsating radio stars; very rapidly rotating neutron stars formed by supernova explosions. In the final stage of their evolution, iron (Fe) and nickel (Ni) become concentrated in the core of the star. Since Fe and Ni are endothermic, the star's core collapses.

-A radius of around 10 km and a mass of 10^{27} tons

-A teaspoon of pulsar material would weigh over 100 million tons on the Earth.

-A magnetic field of 10^{8} Tesla

-Rotates around itself 11 times per second

-As in a lighthouse, a beam of radiation hits us as every time the star rotates

-An atmosphere which is 10 cm thick

-We can see through pulsars since gravity bends light

Reyhan Oksay

Sources:

http://www.encyclopedia.com/doc/1G2-3404700546.html

http://www.famousscientists.org/jocelyn-bell-burnell/