TRIBUTE

Esther Conwell '44 (MS): 'Lived and Breathed Science'

Esther Conwell '44 (MS) first came to the University in 1942 to pursue a PhD in physics, immediately after graduating from Brooklyn College that same year. It was at Rochester that Esther, working with Professor Victor Weisskopf, made one of her most important scientific contributions, one that helped her to earn the National Medal of Science in 2010.

It was the development of a theory that describes the scattering of electrons by impurities in a semiconductor. Ultimately, this work would lead to an understanding of how transistors operate, which are the building blocks of integrated circuits. But at that time, physicists were just beginning to study silicon and germanium materials; and the Conwell-Weisskopf theory helped to explain how impurity atoms would affect the transport of electrons through the semiconductor.

Remarkably, Esther completed this signature work in effectively a few months, as Weisskopf was being sent to Los Alamos to aid in the war effort there. She would receive a master's degree in physics from Rochester in 1944, and move on to the University of Chicago for her doctorate, which she earned four years later.

The seminal paper describing the Conwell-Weisskopf theory did not appear in print until 1950, as it was deemed classified material.

Meanwhile, Esther went on to a career largely in industry, working first at Bell Laboratories (1951 to 1952), and then at GTE laboratories until 1972. It was at GTE that she studied the effect of high electric fields on the transport of "hot" (or highly energetic) electrons in semiconductors. In fact, for one of my own research projects we were interested in understanding the transport of "hot" electrons in nanometer scale semiconductors, and we discovered that Esther had literally written the defining book on this topic some 30 years earlier!

PRESIDENTIAL HONORS: President Barack Obama named Conwell a National Medal of Science winner in 2010.

In 1972, Esther returned to Rochester to work at Xerox, where she investigated the conduction of electrons in organic molecules, which had direct relevance to the xerographic process. After "retirement" from Xerox in 1998, Esther joined the chemistry department at Rochester, with an appointment in physics coming several years later. At Rochester, she was interested in understanding the conduction of electrons through DNA molecules, and especially how the electrons would interact with the DNA molecular vibrations to create "polarons."

Esther lived and breathed science. Her accomplishments earned her many accolades even before President Barack Obama honored her with the National Medal of Science. She was the only Rochester faculty member to be a member of the National Academies of Science and Engineering and a fellow of the American Academy of Arts and Sciences. In 1997, she received the Edison Medal. In 2011, the University awarded her an honorary doctorate.

When Esther died last November at the age of 92, she was still actively working, coming to her office almost daily. It is important to note that besides her scientific contributions, Esther's lasting legacy will be her inspiration to women around the globe to enter the physical sciences. Often the only woman, at times unwelcomed, in a field ruled by males, Esther had to overcome countless barriers to achieve the success and recognition that she deserved. R

—TODD KRAUSS

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