How physicist Sameera Moussa went from a role model to a target

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Science and the technology it enables have always had a close relationship with warfare. But World War II saw science’s destructive power raised to new levels. As the threat of nuclear annihilation remained high for much of the Cold War, many in the public became uneasy with their governments and the scientists working for them.

Many physicists realized that the genie was out of the bottle and recognized this mistrust—or shared it. They created conferences or drafted policies to distance themselves from the nuclear threat. Others tried to spin nuclear technology more positively by focusing on the advances it enabled in energy or medicine. These efforts to reassure the public have continued through today as scientists have taken similar actions for newer, potentially destructive technologies such as gene editing.

During World War II, Sameera Moussa, a relatively unknown Egyptian physicist, was one of the key individuals who tried to use atomic energy for good and made efforts to involve the public in that choice. Her work makes her a worthy role model for women and physicists worldwide, but she’s largely unknown

because her crusade for peaceful nuclear power would eventually cost her her life. Moussa was assassinated at age 35 in a case that remains unsolved today.

Moussa’s early life and work on X-rays

Unfortunately, of the few records of Moussa’s life today, most are second-hand accounts or retellings of rumors, making it difficult to track her movements. She was born just north of Cairo on March 3, 1917. There isn’t much information on her childhood, but we know her mother died of cancer when Moussa was young. Her mother’s death would later inspire Moussa to study the use of radiation for cancer treatments. After her mother’s passing, Moussa and her father moved to Cairo, where her father established a hotel business. Some reports claim that Moussa’s father was a political activist, which may have inspired her later activism.

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After success as a primary and secondary school student, Moussa was accepted to Cairo University’s nuclear physics program, specifically focusing on X-rays. Moussa could not have picked a better field of study for the 1930s. X-rays were becoming a popular tool for many hospitals and private practices, as it was then the norm for each establishment to own an X-ray machine. In the US, this fostered the formation of many organizations of X-ray technicians and X-ray-focused journals. Europe had an even more extended history with X-ray development, as scientist Marie Curie transported a mobile X-ray machine across World War I battlefields.

Like others before her, Moussa studied radioactive isotopes used to create medical images, a technique still used today. Her PhD work caught the eye of Cairo University’s chair of science, Moustafa Mousharafa, who recruited Moussa as a lecturer. Later, she became an assistant professor there,

apparently becoming the first woman anywhere to teach in a university setting while getting her PhD. It was a nearly impossible achievement, as British and other foreign professors still dominated many Egyptian universities. Nevertheless, Moussa achieved a series of firsts.

Finding a formula for nuclear fission

Thanks to her reputation, Moussa could travel to the UK in the mid-1940s, where she finished her PhD. There, she collaborated with several researchers to make further advancements in nuclear physics. With her colleagues, Moussa developed an equation that helped explain how to generate X-rays from cheaper metals like copper, which could help make medical imaging more affordable. According to a 2022 Inside Arabia article, Moussa's "research laid the groundwork for a revolution and the affordability and safety of nuclear medicine."

Excited by her discovery, Moussa kept her focus on medical applications, including shortening patient X-ray exposure times and making X-ray procedures more mobile and flexible. She said, "I'll make nuclear treatment as available and as cheap as Aspirin." Still, she was concerned that this formula could be twisted to create something much more deadly: an atomic bomb.

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