



*Celebrate*

# WOMEN'S HISTORY MONTH

Presented by **Turner**

*We believe science creates opportunities and shapes our world.*

Countless scientific and technological accomplishments influence our lives and form the framework for our modern society, and most are led by individuals whose stories often go untold. As we honor Women's History Month, we are pleased to highlight people whose groundbreaking accomplishments opened new doors of possibility in biotechnology and medical research, boldly championed community well-being, and improved our understanding of the impacts of climate change on the world. We encourage

you to seek out the outstanding individuals of today who are living and working right here in Buffalo and around the world.

By making observations, asking questions, and striving to understand how aspects of our world are connected, each of us is an explorer. At the Buffalo Museum of Science, we hope all of our guests will be inspired to seek out hidden stories, and recognize their own potential to explore, to discover, and to advance our society.



# MARYAM MIRZAKHANI

1977-2017

MATHEMATICIAN

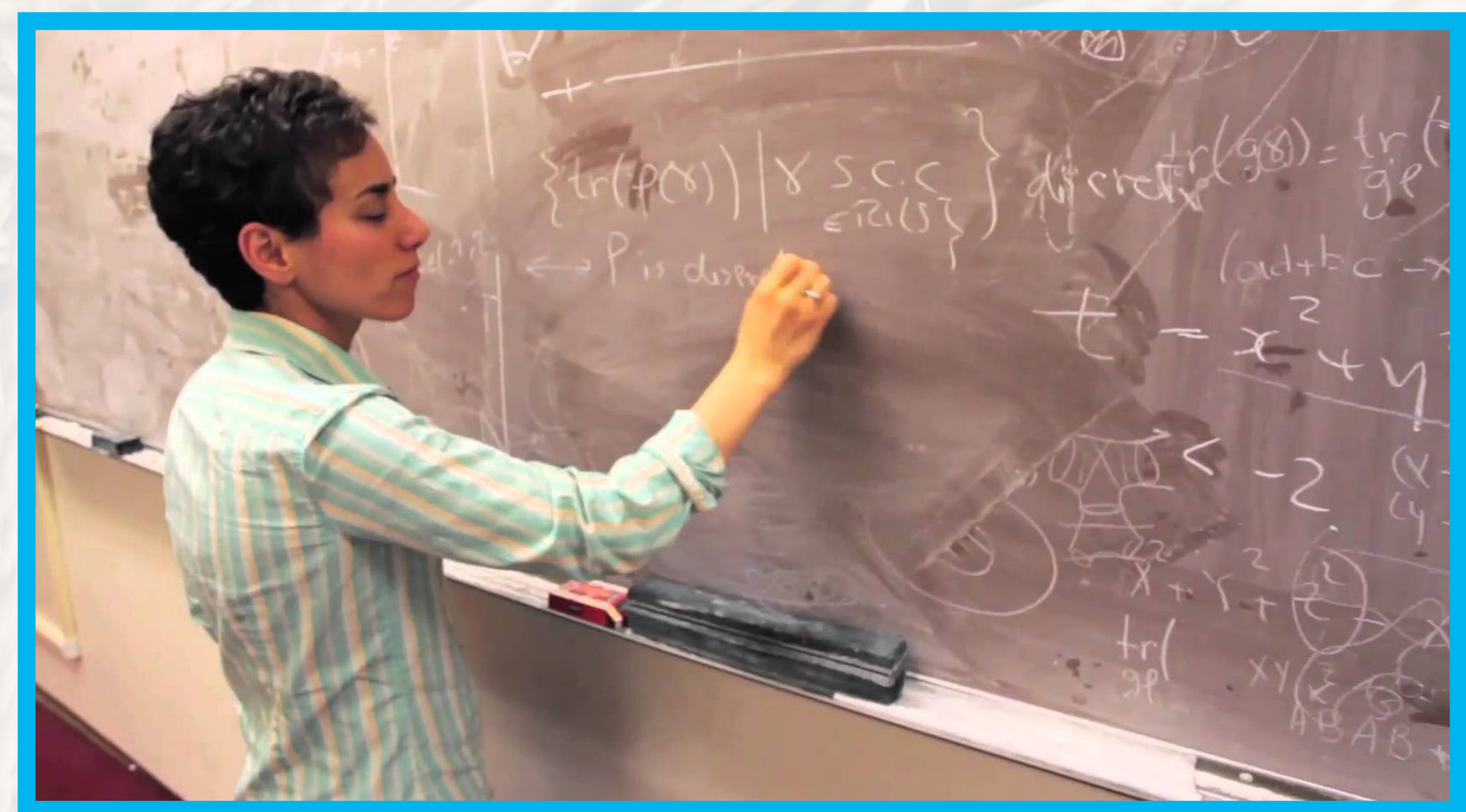


*“I don’t have any particular recipe [for developing new proofs]. ... It is like being lost in a jungle and trying to use all the knowledge that you can gather to come up with some new tricks, and with some luck you might find a way out.”*

Iranian mathematician Maryam Mirzakhani dreamed of becoming a writer until high school, when she discovered the beauty of mathematics. She was one of the first girls to compete in Iran’s International Mathematical Olympiad, where she won a gold medal. She moved to the U.S. to complete a PhD at Harvard University where she specialized in geometry and took notes in her native Farsi.

Dr. Mirzakhani’s work in complex geometry, including Reimann surfaces, has provided a theoretical basis for how particles might behave and informs quantum field theory, with applications in engineering and material science. Her research includes geometric and dynamic complexities of curved surfaces – spheres, doughnut shapes and even amoebas. In 2014,

Mirzakhani was awarded the Field Medal - the equivalent of a Nobel Prize in mathematics.



In 2018, the International Council for Science declared Maryam Mirzakhani’s birthday, May 12, to be International Women in Mathematics Day in her memory.



# REAR ADMIRAL GRACE HOPPER

## 1906-1992

COMPUTER PROGRAMMER



*“You don’t manage people; you manage things. You lead people.”*

Grace Hopper was a Navy Rear Admiral and is considered the mother of computer programming. At a time where computations were done by large groups of people, Hopper was brought on to work on one of the first electronic computers, the Mark I, through the Bureau of Ships Computation Project at Harvard University.

In order to talk to these electronic computers, people needed advanced degrees in mathematics and knowledge of binary code. Hopper changed this by creating the first compiler, which converts written language to machine code, making it simpler for humans to communicate with computers. She then created COBOL, Common Business-Oriented Language, the first computer

language that could be run on different brands of computers.

COBOL became ubiquitous largely due to Hopper’s application of its software and compiler for the entire U.S. Navy during her time as director of the Navy Programming Languages Group. Millions of banking transactions are still processed daily with COBOL programs.





# SAU LAN WU

## 1940s-

### PARTICLE PHYSICIST

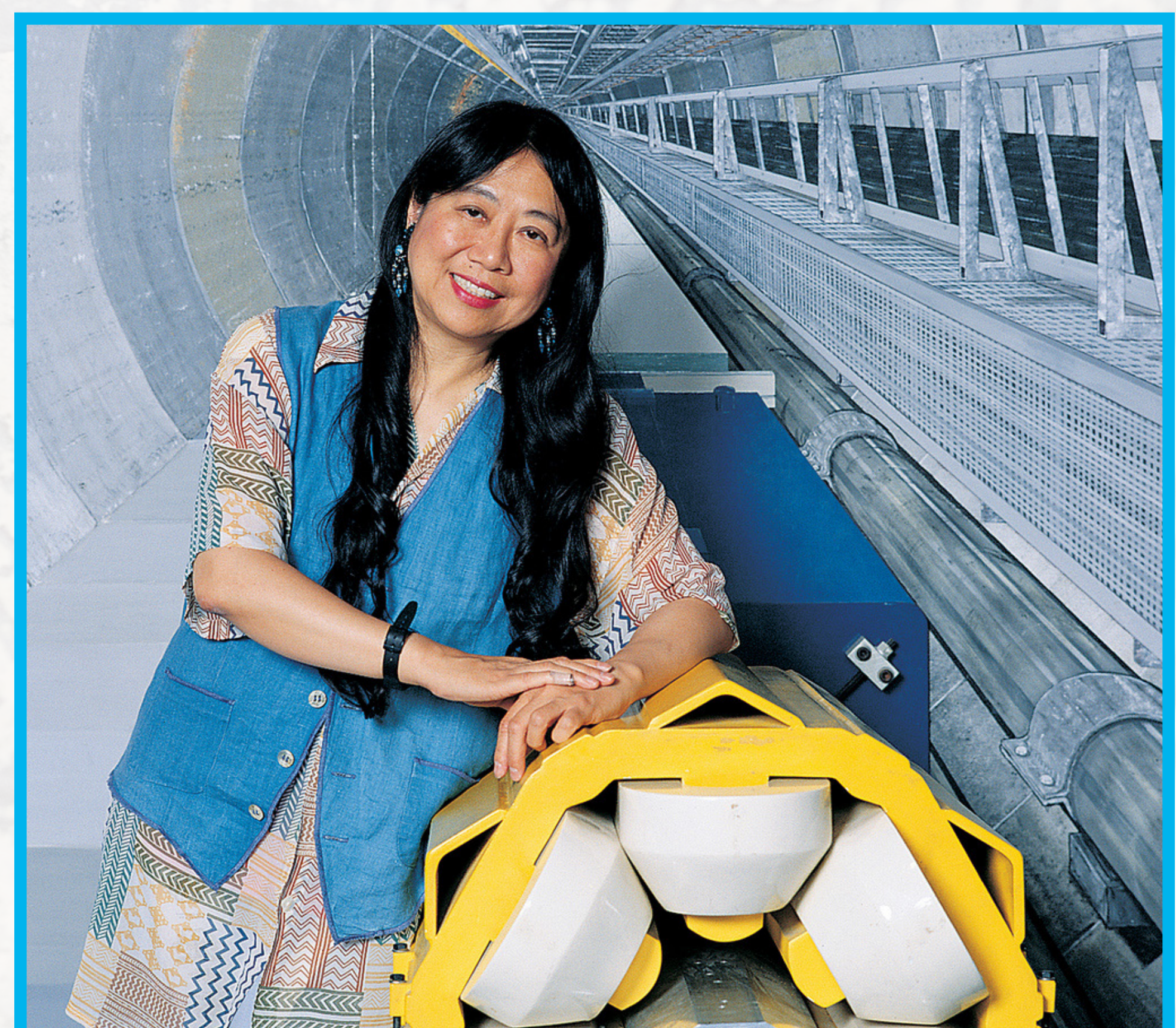


*“Communicate. Don’t close yourselves off. Try to come up with good ideas on your own but also in groups. Try to innovate. Nothing will be easy. But it is all worth it to discover something new.”*

Born in Hong Kong in the early 1940s, Sau Lan Wu did whatever she could to get a good education. After graduating with a PhD from Harvard, she began researching the physics of subatomic particles, such as quarks. She contributed to the discovery of the charm quark and the gluon particles.

In 1964, a theory was created that mass is caused by interactions of a subatomic particle called the Higgs boson. To prove this theory, Wu and other teams of researchers used a massive, 17-mile long particle collider called the Large Hadron Collider to smash together particles and observe how they scatter. In 2012, they were able to prove the existence of these tiny particles.

Wu continues her work on the ATLAS project, which studies the properties of the Higgs boson including finding hints of dark matter in the form of missing energy and studying the momentum in a collision that produces a single Higgs boson.





# MAMIE PHIPPS CLARK

## 1917-1983

SOCIAL PSYCHOLOGIST



*“[L]ife is the harmonious organization of events, the resultant of a communion of structures and reactions.”*

Throughout her career Mamie Phipps Clark recognized a shortage of psychological services available to the African American community. Her work on the impact of racial discrimination and stereotypes was invaluable to developmental psychology and the psychology of racial identity.

In her groundbreaking “Doll Tests” Black and white preschoolers were asked to name their preferences between black and white dolls in order to test what biases they may have. Her research showed that racial segregation has a negative impact on black children and their self-esteem. The results of her research helped lawyers in the case of Brown vs. Board of Education in 1954, ending legal segregation in US public schools.

In 1946 Clark and her husband Kenneth founded the Northside Center for Child Development. When they opened Northside it was the only organization providing mental health services to Black children. Quickly expanding to provide academic support the Center became a hub for activism and advocacy for Harlem, working to alleviate some of the social barriers to success.





# MAY EDWARD CHINN

## 1896-1980

ONCOLOGIST AND PHYSICIAN

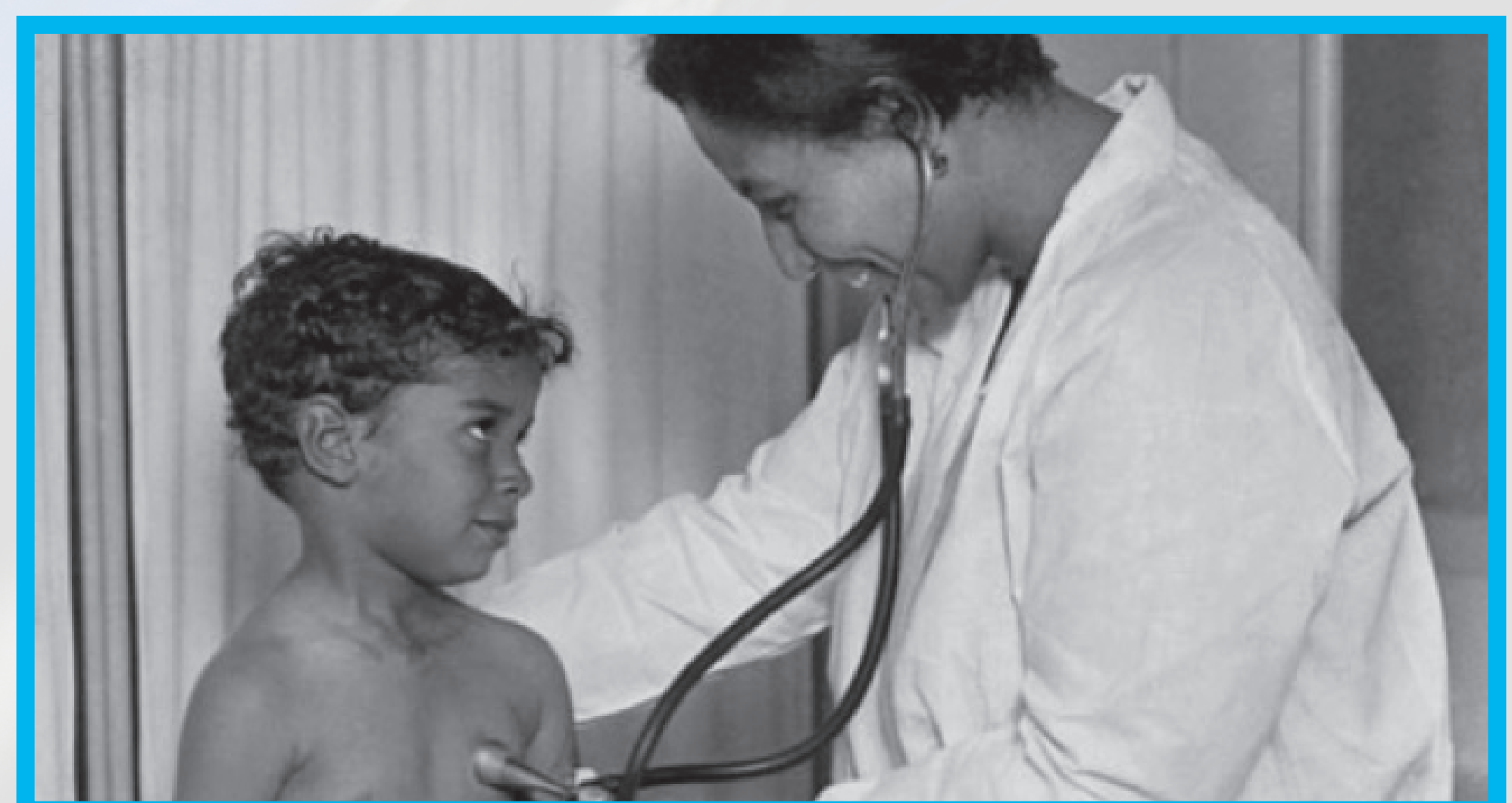


*“Become involved with the problems of your Nation, your State, your City, and especially your immediate neighborhood. Help those with problems—help them to take the next step UPWARDS.”*

May Edward Chinn was an oncologist who practiced medicine in Harlem for fifty years. In 1926 Chinn was the first African American woman to graduate from the University and Bellevue Hospital Medical College, and the only female physician in NYC. As part of a private practice she and other African American physicians focused on care for non-white patients with advanced, often previously untreated diseases and cancers.

Denied research information from city hospitals about her patients on account of her race, Chinn began attending her patient's clinical visits as a family physician. Her regular visits to the hospital served as a work-around to the lack of continuing professional development for black physicians.

Chinn promoted cancer screening methods for non-symptomatic patients, routine Pap smears, and the use of family medical histories to predict cancer risk. She supported new methods to detect cancer in its earliest stages, and provided her biopsy skills to other African American physicians and their patients.





# JULIANA RANGEL

## ENTOMOLOGIST



*“Learn a wide set of experimental tools to be competitive in the current job market, be flexible with your job expectations, and do good, ethical work, always. Oh, and have fun while doing it!”*

Juliana Rangel studies honey bees and is responsible for designing a research program that focuses on finding solutions to problems that face the apiculture, or beekeeping, industry. After moving to the U.S. from Colombia in 1998, she earned a Ph.D. in Neurobiology and Behavior from Cornell University and is now an associate professor in Entomology at Texas A&M University in College Station, TX.

Dr. Rangel leads Texas A&M University's Honey Bee Research Program, which investigates honey bee pathogens and parasites, reproductive strategies, foraging behaviors and nutrition. The research produced by her laboratory group helps inform beekeepers of best

practices for mitigating the many causes of colony collapse in apiaries.

As a Latin American woman in the United States holding a position as leader of a research group at a major tier-one university, she actively tries to encourage students from diverse backgrounds to continue their education and to consider entering graduate school.





# ZOHRA BEN LAKHDAR

1943-

PHYSICIST



*“Be aware of the importance of culture; be open-minded as a scientist and as a person. Seek independence. Understand how important it is to be a responsible citizen. Be of good heart and be confident.”*

Tunisian physicist Zohra Ben Lakhdar has dedicated her career to spectroscopy - using light to understand the composition of matter - and to lighting the way for future scientists.

After receiving her PhD in atomic spectroscopy from the Pierre and Marie Curie University in France, she returned to Tunisia. Her career goals include improving scientific teaching procedures and conducting applied science research to benefit her homeland. She was the first woman to establish a research laboratory in Tunisia.

She has developed new and experimental spectroscopic methods to study the influence of pollutants

on the quality of air, water, and even plant tissues. Her studies are important starting points for many applications, including astrophysics, agriculture, and even medicine.

Dr. Ben Lakhdar was awarded France's Legion of Honor in 2017 for commitment to developing science education in Tunisia.





# JUNE ALMEIDA

## 1930-2007

### VIROLOGIST

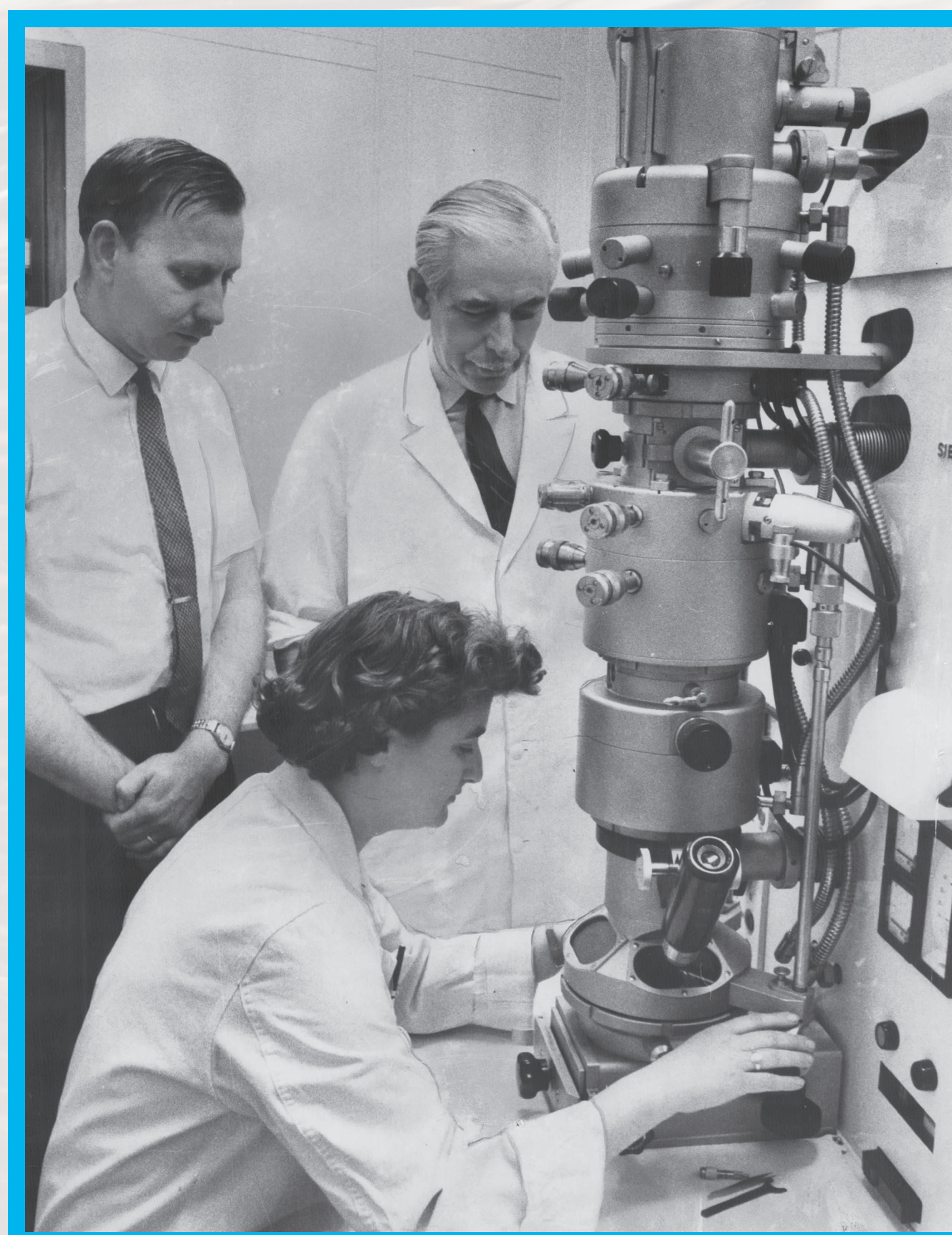


*“Virus, virus shining bright,  
In the phosphotungstic night,  
What immortal hand or eye,  
Dare frame thy fivefold symmetry.”*

June D. Almeida was a Scottish virologist and the first person to identify the group of viruses called coronaviruses. Almeida pioneered the field of immune electron microscopy, mixing virus preparations with antibodies to make the viruses visible in clumps.

In 1954, Almeida joined the Ontario Cancer Institute in Toronto where she perfected the technique of negative staining, and produced the first visualizations of the rubella virus and hepatitis B. Working with the Common Cold Research Centre, she identified the group of previously

uncharacterized human respiratory viruses that would be named coronavirus for their symmetrical halo-like shape.



Throughout her career she trained many virologists in negative staining and immune electron microscopy. In the late 1980s she returned to publish some of the first high-quality micrographs of HIV. Almeida was awarded a Doctorate of Science based on her publications, and today most virology review

articles and textbooks include her electron micrographs of viruses.



# ESTHER TAKEUCHI

1953 -

MATERIALS SCIENTIST AND INVENTOR

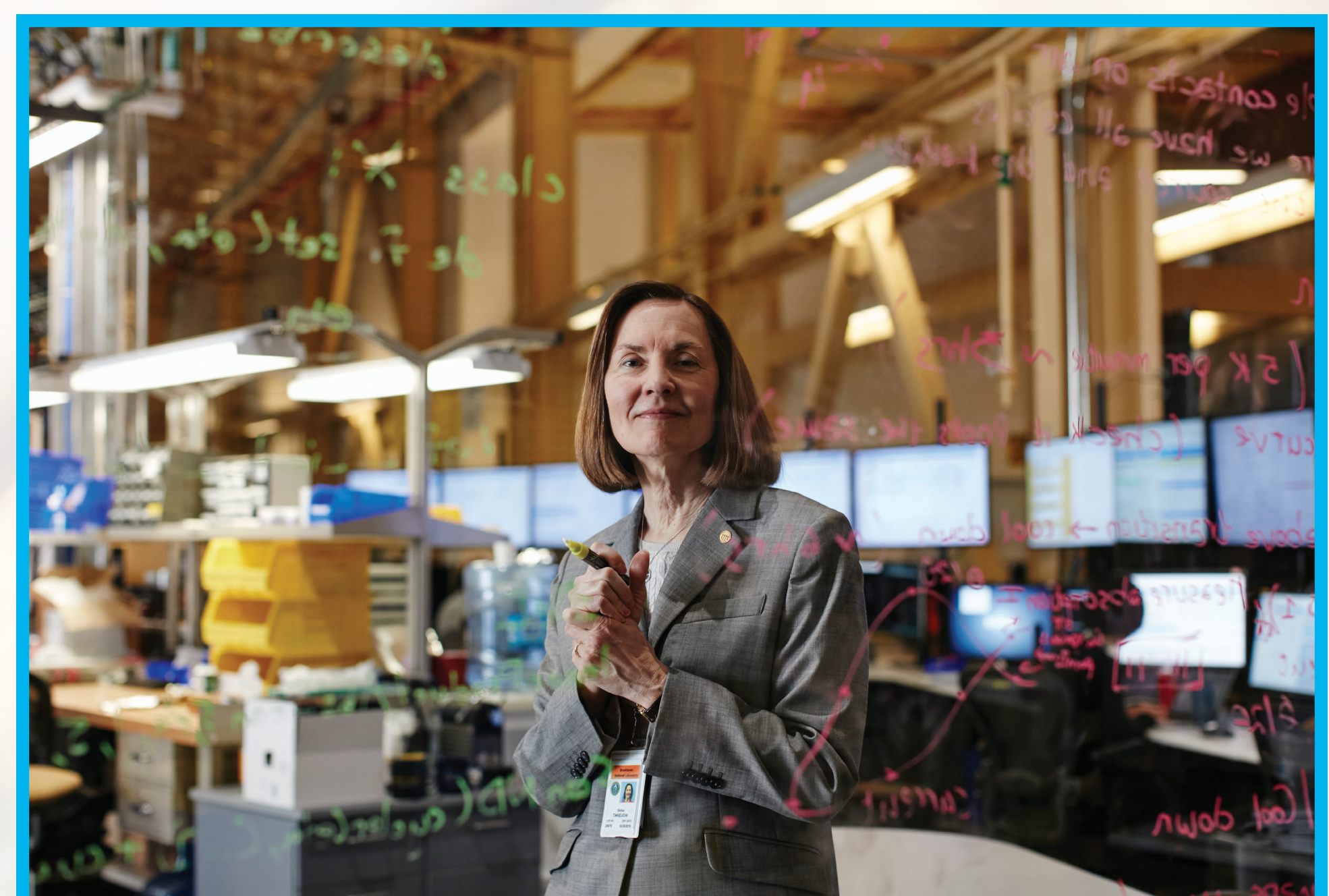


*“Maybe by being a participant in the educational realm, I can send a message to a broader group of people that it’s not only okay to work in this type of field, but that it’s very exciting.”*

With nearly 150 patents to her name, Esther Takeuchi is a prolific inventor and may hold the record as the woman with the most U.S. patents to her name. Her patents are related to her work in the advancement of battery systems and energy storage through materials science and chemical engineering. The lithium power sources she developed with her team at the biomedical device company Greatbatch, Inc are used in pacemakers, cardiac defibrillators, and neurostimulators for diseases like epilepsy, Parkinson’s and chronic pain.

Takeuchi left the private sector and entered higher education in 2007 with a joint appointment in the Department of Chemical and Biological Engineering and the Department of Electrical Engineering at the University

at Buffalo. While in Buffalo, she helped build connections between the research institution and the biomedical device industry, and served on the Buffalo Society of Natural Sciences Board of Managers and Executive Committee. She is now a distinguished professor at SUNY Stony Brook and holds a joint appointment at Brookhaven National Laboratory.





# BARBARA MCCLINTOCK

1902-1992

CELL BIOLOGIST AND GENETICIST



*“Over the many years, I truly enjoyed not being required to defend my interpretations. I could just work with the greatest of pleasure. I never felt the need nor the desire to defend my views. If I turned out to be wrong, I just forgot that I ever held such a view. It didn’t matter.”*

Barbara McClintock was the first person to make a complete genetic map of corn. She was a meticulous observer who always trusted her data; McClintock never dismissed an irregularity even if she didn’t understand exactly what she was seeing. For over 25 years she was a researcher at the Cold Springs Harbor Laboratory on Long Island, and maintained a connection there until her death.

In 1951 she presented her discovery of mobile genetic elements, or “jumping genes,” that could move to other parts of the chromosome

and turn on or off nearby genes. Her techniques were so advanced that most scientists were confused



by her findings. Her work was considered so audacious that she was ostracized by the mainstream scientific community and stopped publishing and lecturing after 1953. She continued to share her unpublished research with colleagues.

McClintock’s discovery of mobile genetic elements earned her

the Nobel Prize for Physiology or Medicine in 1983, more than thirty years after her discovery.