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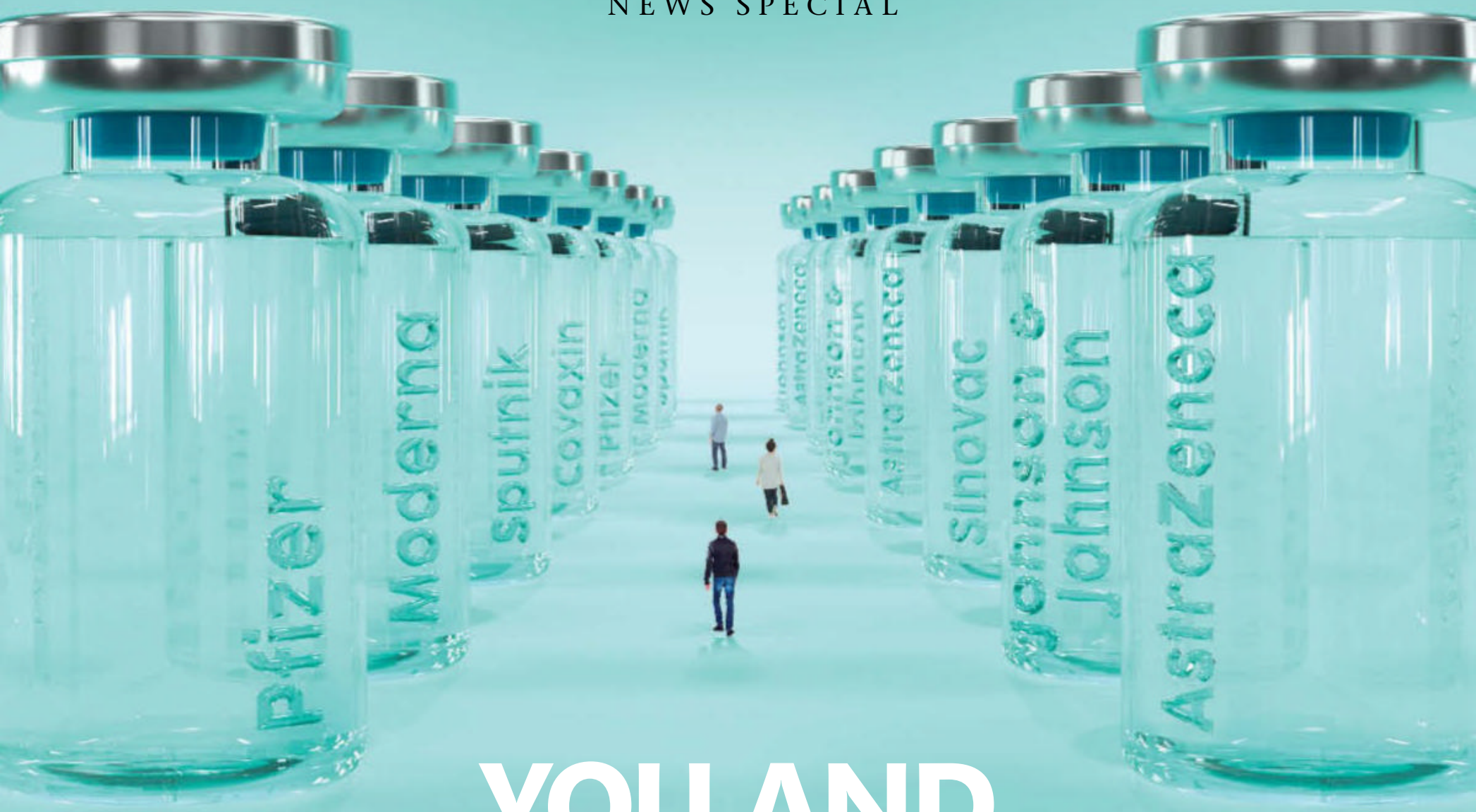

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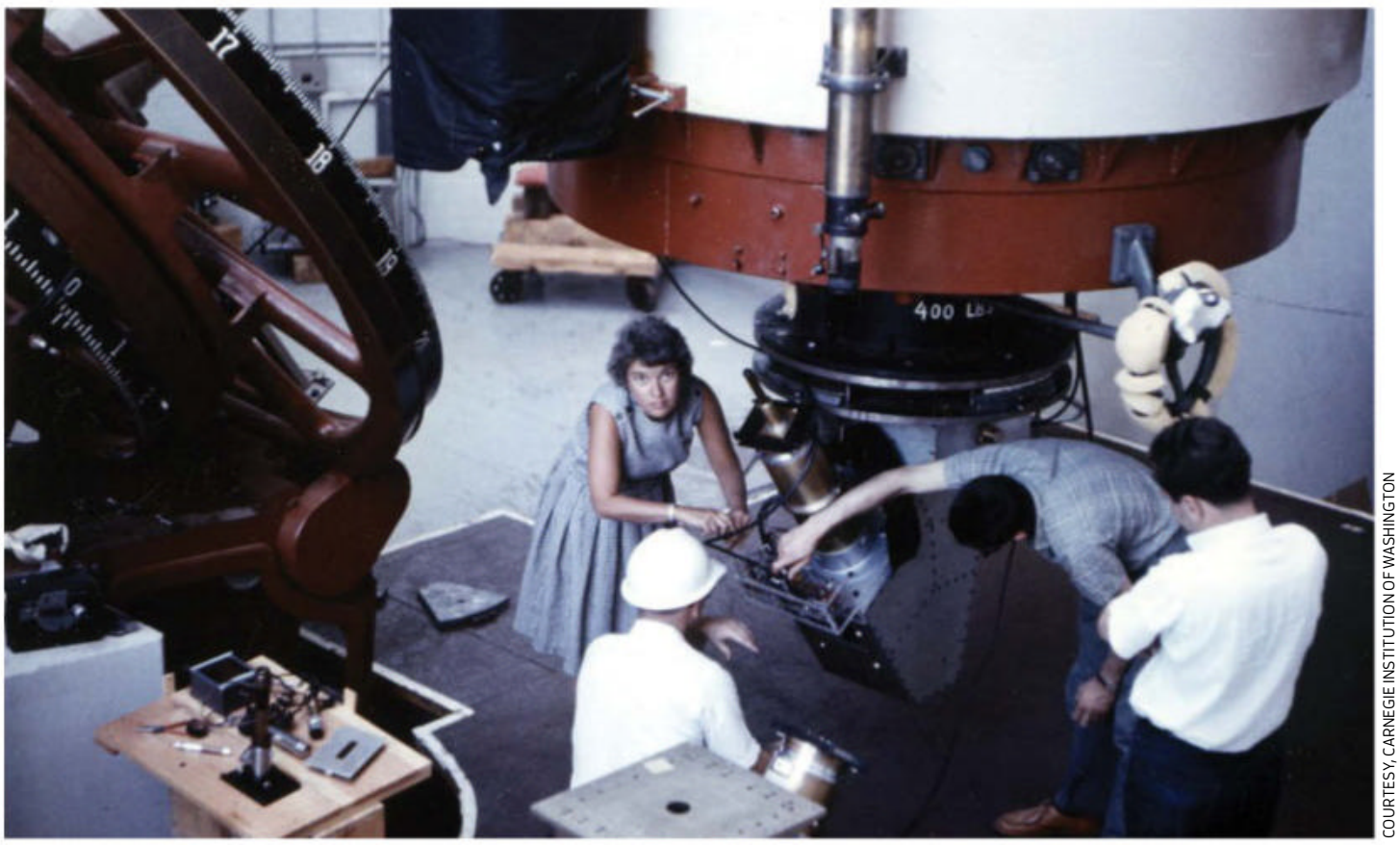
The rising star of Vera Rubin

The stellar career of the astronomer who brought dark matter into the mainstream was a trailblazer for many others, writes **Vijaysree Venkatraman**



COURTESY, CARNEGIE INSTITUTION OF WASHINGTON

Vera Rubin at the Lowell Observatory in Flagstaff, Arizona, in 1965

Book

Bright Galaxies, Dark Matter, and Beyond: The life of astronomer Vera Rubin
Ashley Jean Yeager
MIT Press

VERA RUBIN began her career at a time when women were denied access to telescopes at leading observatories. Eventually her work helped scientists rethink the content of the cosmos.

In *Bright Galaxies, Dark Matter, and Beyond*, science writer Ashley Jean Yeager traces the journey of this remarkable astronomer, the first woman to have a national observatory named after her: the Vera C. Rubin Observatory, planned to open in Chile next year.

Born Vera Cooper, Rubin's parents were supportive of her dream of being an astronomer, but on the first day of graduate school, her adviser told her to study something else. Undeterred, she did the coursework, picked an intriguing problem in galaxy dynamics, and began work on her master's thesis. When her calculations proved interesting, her adviser offered to present her results at a conference – in his own name. She said no.

In December 1950, weeks after her first child was born, she spoke at her first professional meeting. "A young mother, in her early 20s, startled the American Astronomical Society with her presentation on the group of galaxies she studied," says a media report cited in the book.

In reality, most astronomers scoffed at Rubin. Only one astrophysicist from Princeton University (which didn't accept female graduate students at the time) gently remarked that she would need more data to conclusively make her claim. But she had no access to a telescope powerful enough to collect the data she needed. She went on to get her PhD based on another question, which could be answered using data others had already gathered from telescopes.

Some 10 years after her PhD, Rubin finally gained access to powerful telescopes. This was a turning point. She chose to study the motions of stars in the Milky Way and in distant galaxies. Kepler's laws say planets closer to the sun move faster than those that are farther away. Astronomers had assumed that the velocities of stars would also slow away from the centre of their galaxy.

"If an article aimed at physicists used only the male pronoun, she would write the editor a blistering letter"

Rubin's work, however, revealed that stars orbit at more or less the same speed regardless of where they are located in a galaxy. This was possible only if galaxies have much more mass than can be accounted for by luminous matter. Rubin's work was the strongest evidence yet for dark matter.

Many astronomers and cosmologists had worked on this non-intuitive idea of dark matter, but Yeager shows the full context and importance of Rubin's work. She also brings to life the supportive framework of family (and some scientists) who made her stellar career possible.

Margaret Burbidge, a senior colleague and mentor, was the observational astronomer who showed Rubin she could have it all: a fulfilling career and a happy family. Vera was married to mathematician Robert Rubin. When their daughter became an astronomer, Rubin could clearly see what had changed for women in astronomy and what still needed to change.

Rubin was an advocate of that change, a mentor fondly recalled by many astronomers today, especially women. She opposed all-male conference panels, all-male departments and all-male committees, and called out sexism relentlessly. If a journal article aimed at physicists used only the male pronoun, she would write a blistering letter to the editor.

Rubin also liked to unearth, and popularise, stories of women in the history of science. Her own story will doubtless inspire generations to come thanks, in part, to this excellent biography. The telescope named after her should help astronomers delve deeper into the mysteries of the universe – including dark matter, which remains undetected. ▮

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