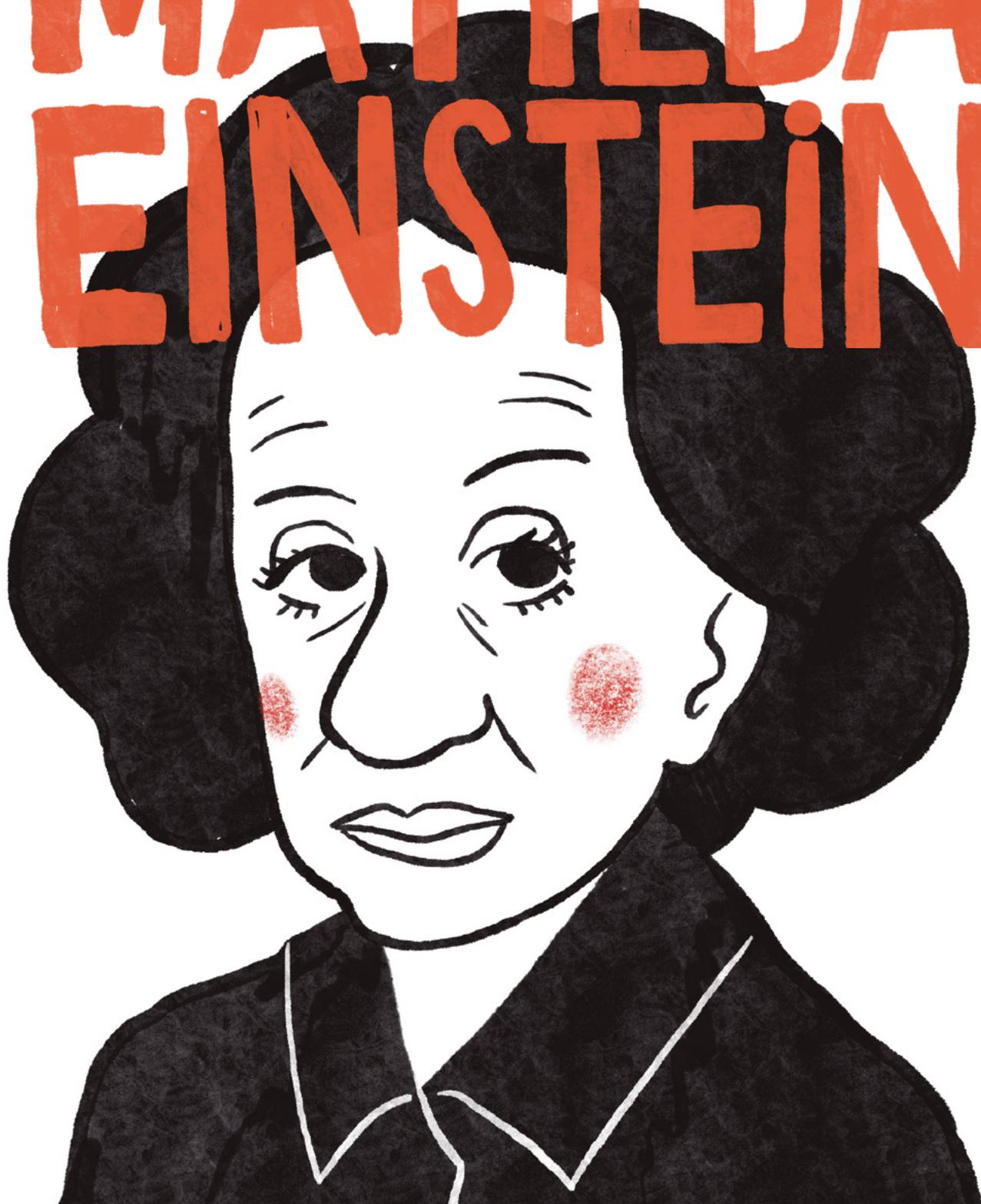


#NOMOREMATILDASPRESENTS THE HYPOTHETICAL LIFE OF

MATILDA EINSTEIN



An idea of GETTINGBETTER
for AMIT (Association of Women Researchers and Technologists)
with the collaboration of DOS PASSOS

Text/Illustrations/Design: GETTINGBETTER
www.gettingbetter.es

Translated by WorldTribe Guadalajara and reviewed by Karin
Marchand, from the European Patent Office and Carla Botella
from the University of Alicante

Publisher: Gettingbetter Creative Studio S.L.
Legal Deposit: A 494- 2020
ISBN: 978-84-09-25666-2
www.nomorematildas.com

**TO ALL THOSE GIRLS WHOM
WE HAVE MADE BELIEVE THAT
“SCIENCE IS A MAN’S THING.”**

Prologue by Ángeles Caso

Journalist and writer

This book is a story. A good way to ask yourself what history would have looked like if women had been able to do many more things than they were able to do.

But the truth is that Matilda Einstein existed. Her name was Milena Marić and she was Albert Einstein's fellow student and his first wife. And she may have been his collaborator in the Theory of Relativity.

But only "may": the history of women is not easy to reconstruct. I start the story from the beginning. Milena Marić was born in 1875 in Serbia. She was so smart, so brilliant at science, that she was awarded a special permit to study in a school that was only for boys. So smart that her parents agreed to send her to Zurich to study Medicine.

But what Milena really liked were the abstract subjects at which she had already excelled, mathematics and physics in particular. So she immediately dropped out of medical studies and managed to gain a place at the Polytechnic School of Zürich. This would have been demanding for anyone, but even more so for women who were not often seen in the school's corridors.

Albert Einstein was one of her companions. They immediately became friends and then they started dating. But soon the end of the story began: five years after they had met, Milena became pregnant by Albert. That untimely pregnancy –they weren't married– ended her career. She had to interrupt her studies and go back to her parents' home to give birth to a girl about whom very little is known, but who probably died soon.

The following year, 1902, they married and settled in Bern, where Albert had found a job at the Patent Office. In 1905, he published four articles that would begin to change the course of science and that would lead to his famous Theory of Relativity, published in 1915.

By the time Albert had begun to shine, Milena had already given birth to her second son, Hans Albert. Then came the third, Eduard. The talented scientist had become a self-sacrificing wife and mother –so to speak– who took care of everything so that her husband could dedicate himself to his studies and develop his genius. In fact, he had even required her to do this in a kind of private contract which he had written a short time before they finally got divorced. But that story, propagated by historians, biographers and journalists, has been questioned in recent years. There are different testimonies that indicate that Milena and Albert worked together. Their eldest son even said so, and some of the letters between them, in which Albert speaks about "our work", seem to indicate this as well. Or the fact that when he won the Nobel Prize in 1922, he sent her all the money, even though they were already divorced by then. Some believe he only did it out of generosity and parental responsibility, but it might also be assumed that perhaps it was his way of acknowledging the collaboration of his ex-wife.

In any case, there is no way to prove it. There is no scientific article signed by her, no private papers to confirm her work. Einstein's papers were carefully saved and preserved. Hers, if there were any, disappeared, as has happened so many times with women's work.

And that's how Milena Marić became Matilda Einstein.

Snip, snap, snout, this same old story tale's told out.

#NO MORE MATILDAS

It is likely that if Einstein had been born a woman, today, that last name would hardly sound familiar to us. And the merits of her discoveries would have been taken by a fellow male researcher or even by her husband. This phenomenon, which is known as the **Matilda Effect**, points out the injustice that has consciously and systematically relegated to oblivion the findings of brilliant scientists such as **Hildegarda de Bingen, Nettie Stevens, Lise Meitner, Marietta Blau** or **Rosalind Franklin** among many others. It was the science historian **Margaret W. Rossiter** who named this injustice in honour of **Matilda Joslyn Gage**, a womens' rights activist, and it is the name that we have decided to give the protagonist of this illustrated uchronia.

A story that joins the actions raised from the **No More Matildas** campaign to report this fact and to recover all these scientists. Women who could have become role models for all the girls whom we have made believe that science is only for men by depriving them of female examples.

THE LARGEST STUDY ON THE PRESENCE OF WOMEN IN EDUCATIONAL MATERIAL, CARRIED OUT BY ANA LÓPEZ-NAVAJAS, REVEALS

AN AVERAGE FEMALE REPRESENTATION OF 7.5%

IN ALL SUBJECTS IN THE SPANISH COMPULSORY SECONDARY EDUCATION CURRICULUM.

ACCORDING TO UNIVERSITY STATISTICS PUBLISHED BY THE MINISTRY OF EDUCATION DURING THE 2019 SCHOOL YEAR,

THE NUMBER OF FEMALE ENROLMENTS IN SCIENCE DEGREES STANDS AT 28.5%

AT AMIT WE BELIEVE **THAT TALENT HAS NO GENDER**, AND TO IGNORE THE ONE THAT COULD EMERGE IN GIRLS AND TEENAGERS WHO DO NOT CHOOSE A SCIENCE DEGREE BECAUSE THEY DO NOT HAVE MIRRORS IN WHICH TO SEE THEMSELVES REFLECTED, IS A CULTURAL LEGACY THAT WE SHOULD STOP PERPETUATING.



#NOMOREMATILDAS PRESENTS THE HYPOTHETICAL LIFE OF
**MATILDA
EINSTEIN**

“Congratulations, you have had a healthy and beautiful girl” was the bittersweet news that the gynecologist at the hospital in the small town of Ulm communicated to Herman Einstein on 14th March 1879. Bittersweet because, although everyone wants the newborn to be in good health, the truth is that, in those days, the most common desire was to have a son to continue the family line.





Herman Einstein and Pauline Koch wanted to be the best possible parents for little Matilda. They were ready to support, understand, motivate and listen to her. Although this last thing was not going to happen until the girl was three years old.

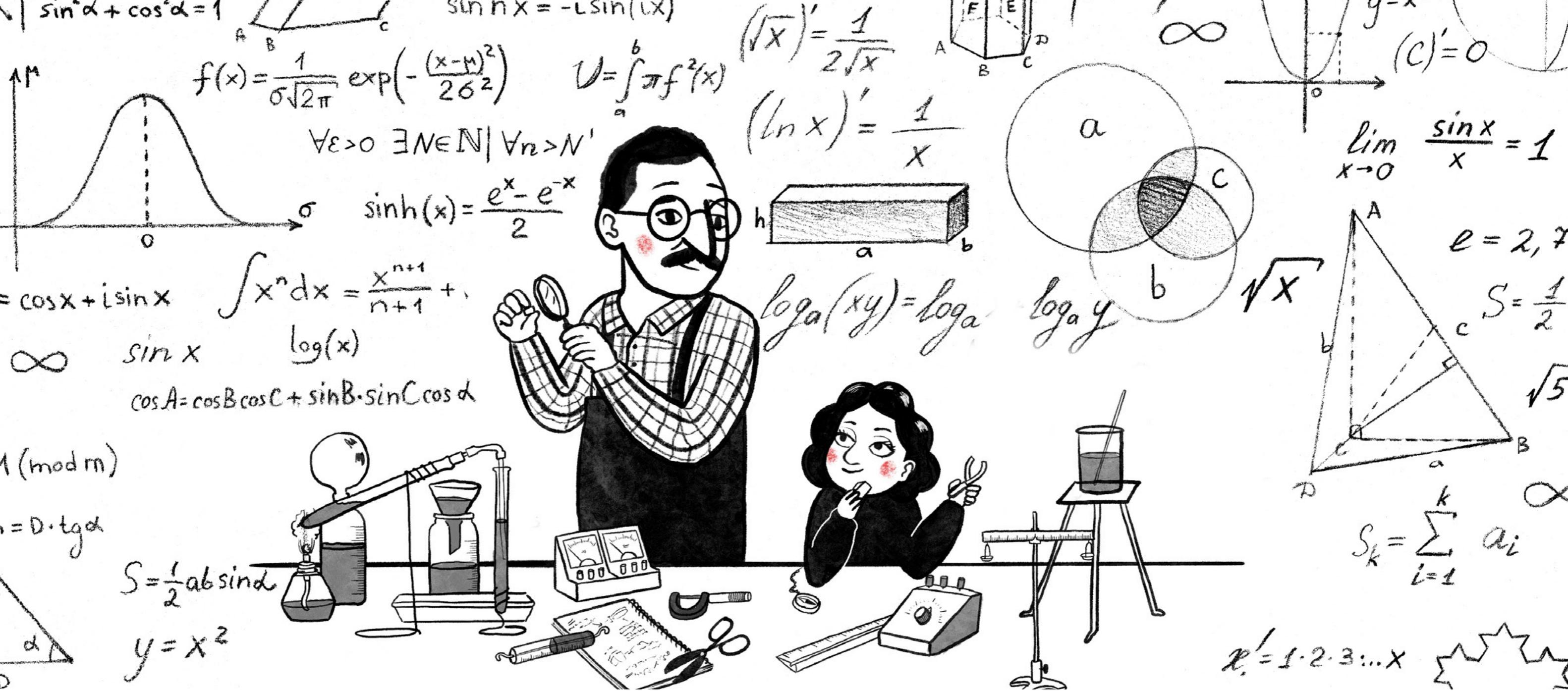
The thing is that Matilda took a long time to speak (something curious about someone with so much to say in so many fields later on). Her mother, concerned about the development of her daughter, constantly complained to her husband: “this girl is not normal, she is not like the others.” Of course she was not!

Herman Einstein may have never known the impact he would have in giving Matilda her first toy. He might not have had anything else close at hand at home but the truth is that that compass, with which he did not intend anything other than to entertain his daughter, was going to mark the course of our little scientist.

Matilda had just tested the power of attraction: the magnetic force that made that needle point always in the same direction, and the one that she was going to feel from that day and forever, for understanding the world around her.

Even though she later received many different dolls with all sorts of dresses, none of them was able to dethrone Matilda's favorite toy.





Jacob, Herman Einstein's older brother, soon realized Matilda's early scientific vocation. He liked to think that it was something his niece had inherited from him and, as a good uncle of hers, he decided to cultivate that passion in her in order to share it together.

That is how they spent countless afternoons inventing and experimenting in the family business, the *Elektrotechnische Fabrik J. Einstein & Cie*, a workshop built in his own home to manufacture devices and gadgets to supply power stations.



$$V = \frac{4}{3} \pi R^3$$

$$T = 2\pi \sqrt{\frac{l}{g}}$$

$$a_n = \frac{v^2}{r}$$

$$F_n = qvB \sin \alpha$$

$$Q = cm \Delta t$$

Pauline, who had been a pianist in her youth, was determined to instill in Matilda her love for music. That is why, at a very young age, she signed her daughter up for violin classes.

She thought that by making her practice daily she would not only help develop her artistic sensitivity, but also keep her far, even for a couple of hours a day, from her uncle's workshop, a place that may be hostile to any girl her age.

“You will never achieve anything in life.” The categorical diagnosis from Professor Degenhart, Matilda’s tutor at the Luitpold Institute of Munich, only confirmed the suspicions of her worried mother.

What was wrong with her little girl? Why was she this way? She did not understand why Matilda never wanted to play with her friends. She did not understand why she did not want to meet boys her age.

She did not understand why she preferred to lock herself in her room learning infinitesimal calculus on her own. She did not understand anything!

But the fact is that, objectively, when she just turned fifteen it was no longer easy to understand what was going on in the head of the young Matilda Einstein.



With the aim of finishing high school, Matilda was sent by her family to the cantonal school of Aarau in Switzerland. There she enrolled in the Polytechnic School of Zurich, where she met students who shared her intellectual concerns and who introduced her to philosophers like Spinoza, Hume or Kant but also Marx or Adler. Matilda already had every characteristic to be officially considered a weirdo: woman, Jewish, scientist and with socialist inclinations in the newly released 20th century.



Matilda Einstein always wanted to start a family, and on the 6th of January, 1903, she took the first step getting married in the city of Bern to Milo Marić, the Serbian student with whom she shared a desk years ago. Together, they ended up having three children: Lieserl, Hans and Eduard.





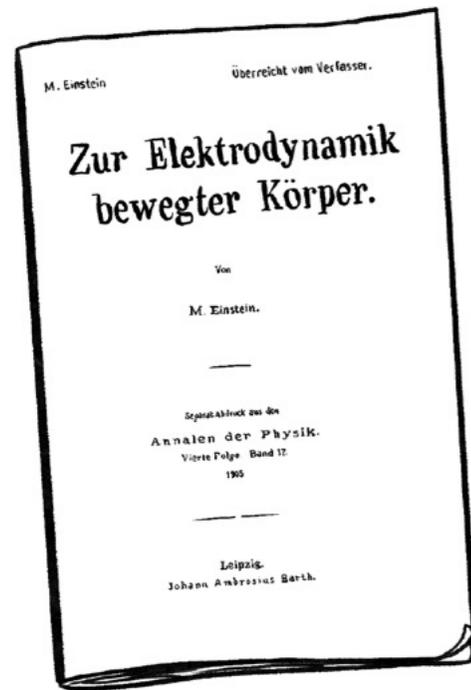
Matilda soon realized that being a woman, housewife and scientist raised problems even more difficult to solve than those posed by physics. But that wasn't going to stop her from trying to continue researching and developing her own theories.

No one knew how this woman found the time. Maybe because they couldn't understand, like her, that time... was going to turn out to be relative!

Having a dream usually implies being very sleepy, and after many, many sleepless nights, Matilda was going to fulfill her goal: she was about to revolutionize physics with four discoveries that would totally astonish all her fellow scientists.

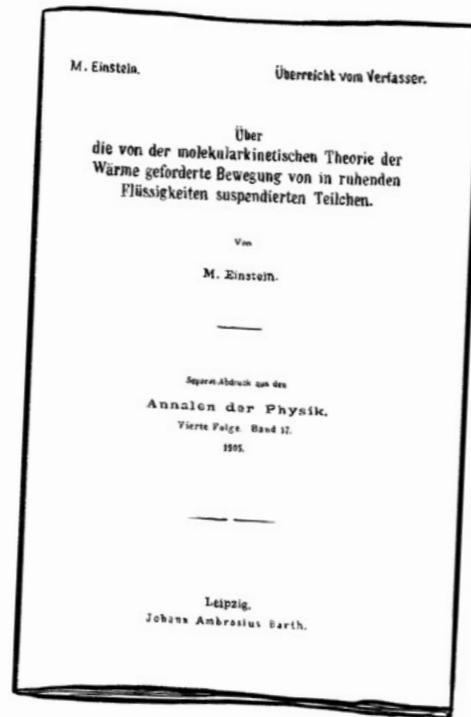


At the end of 1905, the entire scientific community commented on the discoveries of someone called Matilda Einstein. Her four scientific contributions, carried out in what should have been considered a “miraculous year”, were nevertheless analyzed with a magnifying glass and always under suspicion.



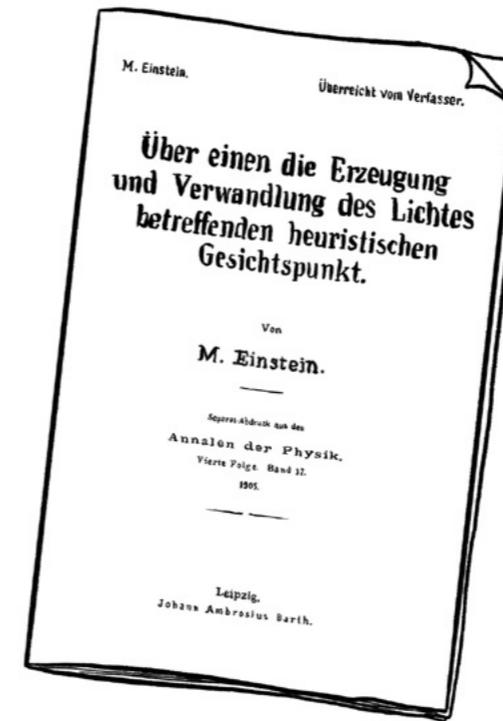
The photoelectric effect

In March 1905, Matilda defended a surprising hypothesis: what if light, instead of being a wave, was a jet of particles? An idea that would explain a phenomenon like the photoelectric effect and that could give a way to a whole quantum revolution.



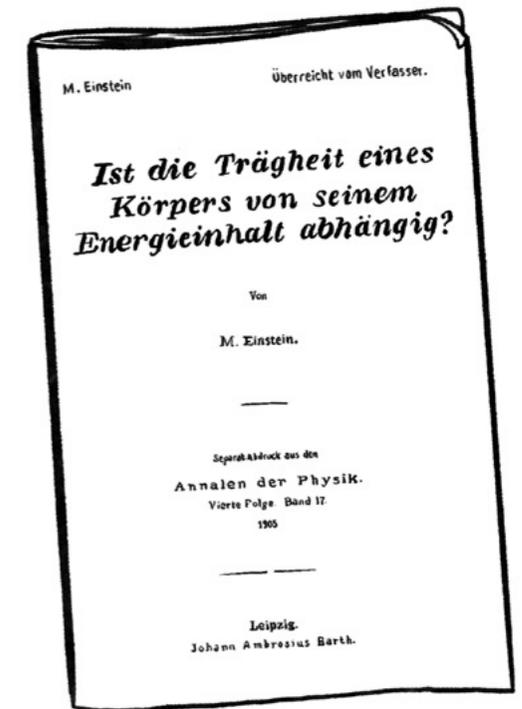
Brownian movement

In May, Matilda ended the debate on the existence of atoms. The general belief that they were only a useful fiction fell apart when Matilda showed that the behaviour of those small particles that move randomly around in a liquid, (known as Brownian motion), could be accurately predicted due to collisions of millions of invisible atoms.



Theory of special relativity

It can be said that Matilda saw the light in June. She wondered what would happen if the speed of light was maintained constant, regardless of the frame of reference, being time and space relative to the observer. A theory that turned the previous understanding of reality upside down.



E=mc²

In September, Matilda perfected her theory, deducing that both the mass and energy, (the first one apparently solid and the other supposedly ethereal) were actually equivalent. This relationship could be expressed in what would become the most controversial equation of the moment: E=mc².

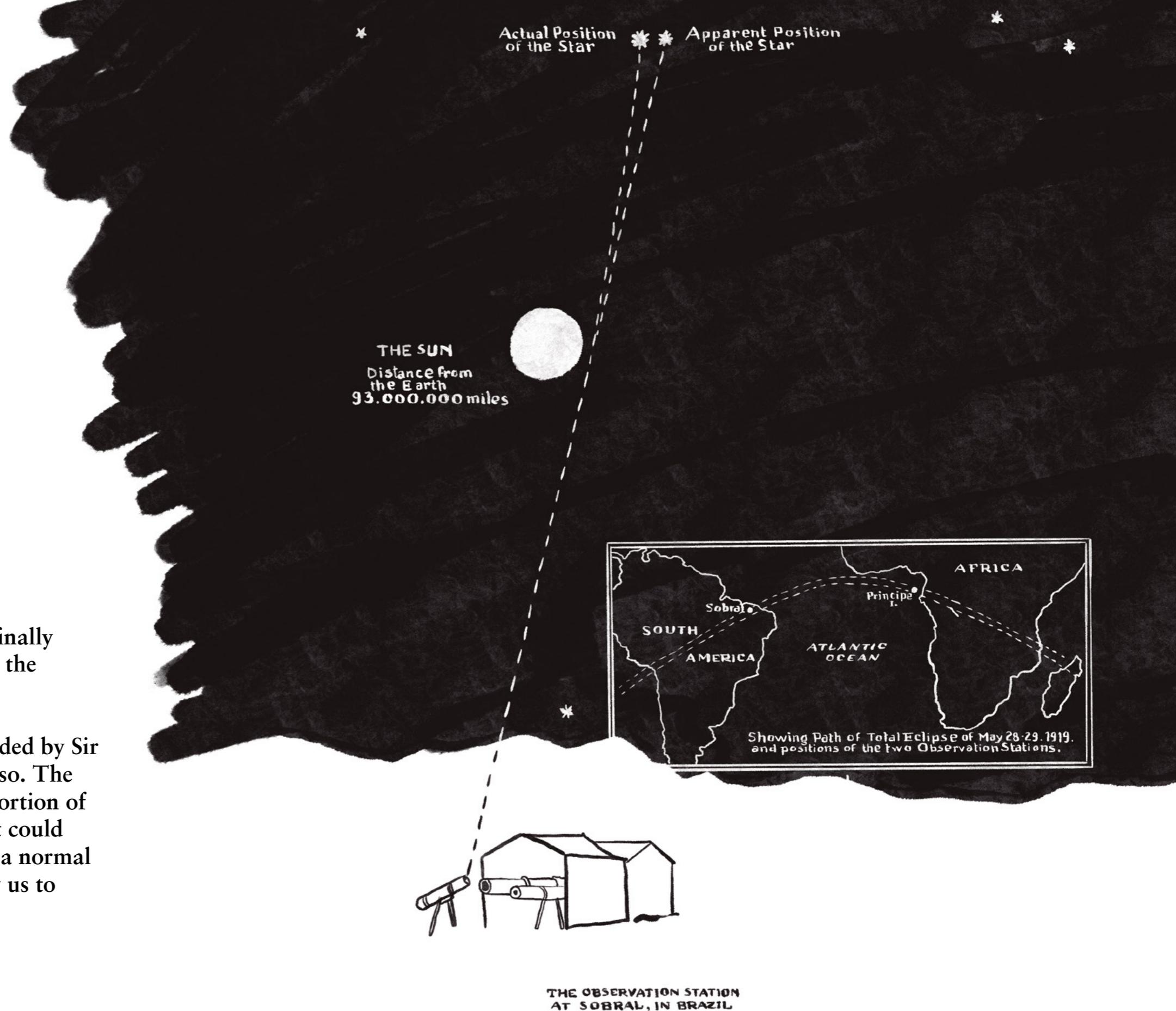


Matilda's theories were as far ahead of their time as she herself. The fact is that when in the first decade of the 20th century a woman with Jewish origins dares to question our way of understanding reality, the normal thing is that those who have shaped that reality, turn against it.

Many physicists from her native Germany, taken over by the Nazis, including such notable eminences as Nobels in Physics Johannes Stark and Philipp Lenard, tried to debunk her theories. And up to a total of one hundred authors signed the book *One Hundred Authors Against Matilda Einstein's Theories* to discredit her investigations!

Years passed before a group of researchers finally confirmed Matilda Einstein's predictions on the behaviour of light in relation to gravity.

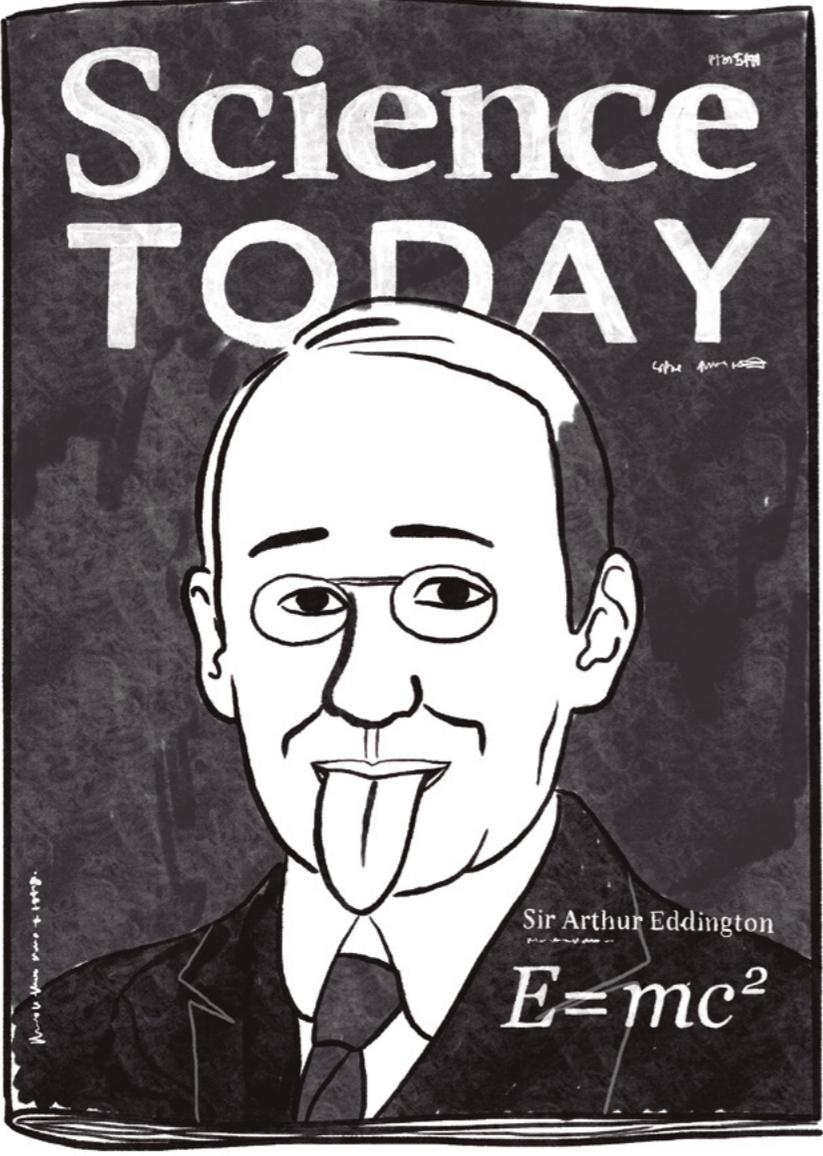
An expedition of British scientists, commanded by Sir Arthur Eddington, travelled to Brazil to do so. The objective was to check the gravitational distortion of light that Matilda predicted, something that could only be observed during an eclipse, since in a normal day the brightness of the sun does not allow us to observe the light of the rest of the stars.



THE OBSERVATION STATION AT SOBRAL, IN BRAZIL

And it worked. And fate wanted, not without certain cruelty, an eclipse to eclipse Matilda forever, while Arthur Eddington received the Nobel Prize for illuminating, with the birth of physical cosmology, a new era for science.





#NO MORE MATILDAS



The hypothetical life of Matilda Einstein is an illustrated story that joins the actions launched to denounce the consequences of the Matilda Effect through the **No More Matildas** campaign. This is an initiative that seeks the recovery of feminine references, in order to inspire and promote the scientific vocation in all those girls whom we have made believe that science is only for men.

WWW.NOMOREMATILDAS.COM