

Andrew Robinson

The tempestuous genius of Fritz Zwicky



AIP Emilio Segrè Visual Archives

Difficult and enigmatic

Fritz Zwicky feuded with many leading scientists of his day. He is shown here at the California Institute of Technology in 1931. Front row (from left): Robert Oppenheimer, Harry Bateman, Richard Tolman, William Houston, Robert Millikan, Albert Einstein, Paul Sophus Epstein, Zwicky, Ernest Charles Watson.

Zwicky: the Outcast Genius Who Unmasked the Universe

John Johnson Jr
2019 Harvard
University Press
352pp £28.95hb

“I have read every paper you ever wrote, I have listened to every presentation you have ever given, and I can tell you quite categorically that I have never found a single original idea that you could honestly call your own.” That’s what Swiss physicist Fritz Zwicky once said when he was just 32, to Nobel laureate Robert Millikan. Despite the fact that Zwicky was yet to establish his scientific reputation at the time, Millikan – who was the head of Zwicky’s laboratory at the California Institute of Technology (Caltech) – simply responded: “All right, how about you?”

“I have an original idea every two years,” replied Zwicky. “I’ll go further: you name the subject, I’ll come up with the new idea.” “All right young man,” said Millikan. “Astrophysics.”

Three years later, at a dramatic meeting in Stanford University in 1933, Zwicky, along with the astronomer Walter Baade from the Mount Wilson Observatory, proposed the

supernova – a phenomenon first observed by Chinese astronomers in 185 AD – as a new category of astronomical object. When a supernova flares up, they suggested, it “represents the transition of an ordinary star into a neutron star, consisting mainly of neutrons” (a particle that had been identified just one year earlier). It also becomes the source of the then-mysterious cosmic radiation detected on earth.

For decades, this theory was controversial, until neutron stars were detected in the form of pulsars in 1967 by Antony Hewish and Jocelyn Bell. In his 1994 book *Black Holes and Time Warps: Einstein’s Outrageous Legacy*, Caltech’s Kip Thorne described the Baade/Zwicky Stanford presentation and their subsequent five-page research paper, “Cosmic rays from super-novae” (*PNAS* 20 259) as “one of the most prescient documents in the history of physics and astronomy”. It was essentially the birth of high-energy astrophysics.

Zwicky used to recount this story about Millikan often, writes John Johnson Jr, a prize-winning science journalist formerly with the *Los Angeles Times*, in his new book *Zwicky: the Outcast Genius Who Unmasked the Universe*, a detailed and insightful biography. The story certainly captures both the way in which Zwicky liked to see himself and the way in which some leading physicists responded to him. Others, however, took offence and did their best to ignore the astronomer, both during his lifetime and afterwards – one of the reasons why he is largely forgotten today. Indeed, Johnson’s book is the first biography to be written in English since the astronomer’s death aged 75 in 1974.

Zwicky had a “preternatural ability to welcome opposition as proof that he was on the right track”, writes Johnson in an excellent introductory chapter. “It was a characteristic that would underpin all the accomplishments of his working life, one that would bring him both honour and calumny,” the author writes. “It lay behind his prediction of dark matter [also in 1933]... And it was critical to his research into jet propulsion and rocket fuels during and after the Second World War, which helped transform the humble rocket, a toy of backyard dabblers, into ballistic missiles capable of ending life on Earth and carrying astronauts to the Moon.”

It also contributed to Zwicky’s reputation as a difficult, enigmatic man. “Feuding with many of the important scientists of his day, he inspired so much resentment that after his death his critics did all they could to forget or disparage what he had done. Like the great forces he chronicled, Fritz Zwicky distorted the orbits of everyone who came in contact with him, attracting many, driving just as many away.”

Among his supporters appears to have been Albert Einstein, who is said to have taught Zwicky in Switzerland during the First World War. In the US – to which Zwicky emigrated in 1925 to join Caltech – journalists called him Einstein’s “most promising” pupil, perhaps borrowing the phrase from Zwicky. According to him, Einstein once told him

with reference to his own search for a unified field theory, that the theory's aim was "to obtain a formula that will account in one breath for Newton's falling apple, the transmission of light and radio waves, the stars, and the composition of matter". It sounds like Einstein – though maybe with a soupçon of Zwicky.

Like Einstein after 1933, Zwicky settled in the US. But unlike Einstein he revisited Europe, even educating his children in Switzerland while living in California. However, he refused to take American citizenship, which caused him difficulties during the "Red Scare" of the 1950s, despite his very public opposition to Communism.

He also visited Germany in the immediate aftermath of the war, and conducted extensive interviews with German rocket scientists, including General Walter Dornberger, the man in charge of the Peenemünde Army Research Centre – where the V-2 rocket was developed – and Wernher von Braun, who became a key figure in the American space programme of the 1950s. Indeed, Zwicky and two associates (one from General Electric, the other from

Zwicky had a preternatural ability to welcome opposition as proof that he was on the right track

Caltech – Millikan's son) were the first to question von Braun, in May 1945. The following year, Zwicky used this knowledge to launch a V-2 rocket from the White Sands Proving

Ground in New Mexico in his first (failed) attempt to penetrate space.

Regrettably, Johnson gives us little idea of how Zwicky and von Braun, the former Nazi, interacted at a non-technical level. Given Zwicky's abrasive comments on so many of his scientific colleagues – "horses' asses", "spherical bastards", by way of (mild) example – one suspects a degree of empathy between him and von Braun, based on their joint fascination with science and technology regardless of its ethical implications. "Once the rockets go up, who cares where they come down?/ That's not my department, says Wernher von Braun" wrote Tom Lehrer in his classic song of 1965 (not quoted by Johnson). Zwicky was never a man willing to compromise with others in order to fulfil his own promise. If he had been, concludes Johnson, "he wouldn't have been Fritz Zwicky".

Andrew Robinson is the author of *Einstein on the Run: How Britain Saved the World's Greatest Scientist* (2019 Yale University Press)

• See p44 for our review of Andrew Robinson's latest book

For over 46 years, UC Components Inc. has produced higher quality vented screws than any other supplier worldwide. We're not your ordinary screw company, and here are

Ten Reasons that Make Us the Logical Choice

Superior Pricing

We've compared our pricing against the competition, and we provide a far better pricing and discount structure.

Cleanliness

UC Components offers RediVac® cleaned and packaged products – certified ready for vacuum.

Packaging

Only UC Components packages products in a clean room with the proper packaging for use in clean, controlled environments.

Product Range

UC Components offers an unparalleled range of metric and inch sizes, lengths, and head types.

Speciality Materials

We offer the broadest range of speciality materials for the unique demands of extreme environment applications.

Coatings

We offer a tremendous range of coatings and surface treatments you won't find anywhere else.

Tight Tolerances

Only UC Components offers specific tolerances in vented screw hole sizes, to ensure the strength of the fastener.

Product Traceability

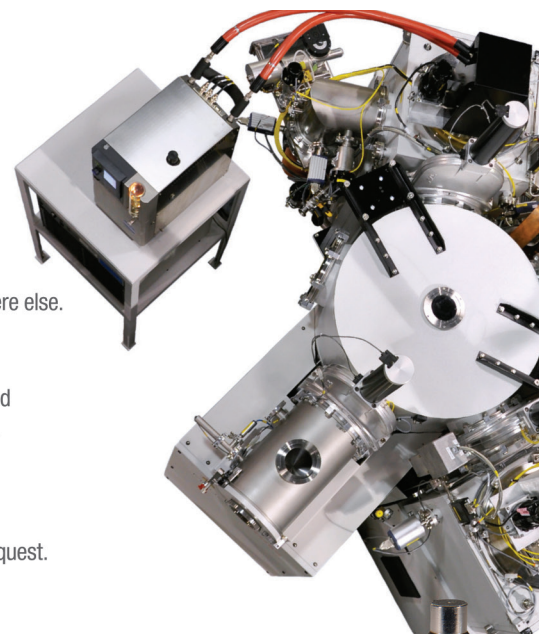
We provide documentation on Country of Origin, Conflict Materials, and Certification of Analysis upon request.

Customer Support

Our knowledgeable staff members deliver industry-leading customer support, via live desk communication, 7am to 5pm.

Engineering Support

If you have questions about which fastener is best suited for your application, our staff engineers are ready and waiting to answer your questions.



NOT YOUR ORDINARY SCREW

Call for a free consultation
408-782-1929
 uccomponents.com