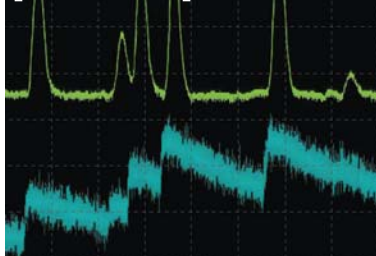


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Astrophysicist's personality outshines his scientific legacy

Today the term “rocket man” has become associated with President Trump’s 2017 characterization of North Korean dictator Kim Jong Un. But in the 1950s, it would have referred to Fritz Zwicky, the brilliant yet controversial astrophysicist. In *Zwicky: The Outcast Genius Who Unmasked the Universe*, science reporter John Johnson Jr details Zwicky’s contributions to jet engineering and rocket science during and after World War II. As head of research at the Aerojet Engineering Corp beginning in 1943, Zwicky became a leader in the US Air Force’s rocket program and earned the Medal of Freedom in 1949. Yet his status in the history of science is primarily associated not with his work in rocketry but with his important contributions to astronomy and astrophysics.

Although he was born and raised in Varna, Bulgaria, Zwicky was a Swiss citizen and spent most of his career in the US. He graduated from the prestigious ETH Zürich, where he specialized in physical chemistry, specifically the quantum the-

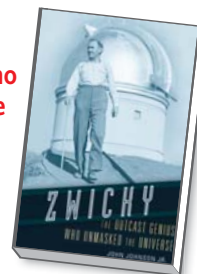
Zwicky

**The Outcast Genius Who
Unmasked the Universe**

John Johnson Jr

Harvard U. Press, 2019.

\$35.00



ory of crystals and electrolytes. Years after arriving at Caltech in 1925, he shifted to astrophysics; one of Zwicky’s first papers was a critical response to Edwin Hubble’s announcement of the law that was subsequently named for him.

Strangely, Johnson ignores Zwicky’s 1929 paper introducing the now debunked “tired light” hypothesis as an explanation for galactic redshifts. Johnson’s chapter on the early expanding universe is uninformative and sometimes misleading—for example, when he characterizes astronomer James Jeans as a “leading advocate for what came to be known as the steady state theory.” Jeans

died in 1946, two years before the steady-state cosmological theory was introduced, and he never supported the idea of an eternally expanding universe with continual matter creation. Johnson also incorrectly states that Georges Lemaître, the physicist who in 1927 proposed an expanding universe model, had “no proof,” by which he presumably means a lack of redshift–distance data. The book contains several similar errors, exaggerations, and questionable statements.

Zwicky’s resistance to the expanding universe was clearly a mistake, although he never admitted it. But he did publish a series of remarkably prescient papers, which secured his reputation as one of the most innovative astrophysicists of the 20th century. His now-famous prediction of dark matter in the Coma cluster dates from 1933, when it appeared in a Swiss journal. That paper was followed by a collaborative work with Walter Baade, in which they introduced the radical idea of neutron stars. And in a short article in 1937, Zwicky explained that Albert Einstein’s predicted gravitational lensing effect was more useful for observing galaxies rather than stars. Much

later, with the help of several collaborators, Zwicky completed an impressive and heavily used six-volume catalog of galaxy clusters. Johnson’s book covers all that work—but only briefly and with little emphasis on the science.

The book’s focus is more on Zwicky’s peculiar character and involvement in countless feuds and controversies. With a big ego and a well-deserved reputation for abrasiveness, he deliberately fell out with many of his colleagues, including Baade, J. Robert Oppenheimer, Allan Sandage, and Subrahmanyan Chandrasekhar. Zwicky had no tolerance for people who did not recognize his genius or otherwise disagreed with him.

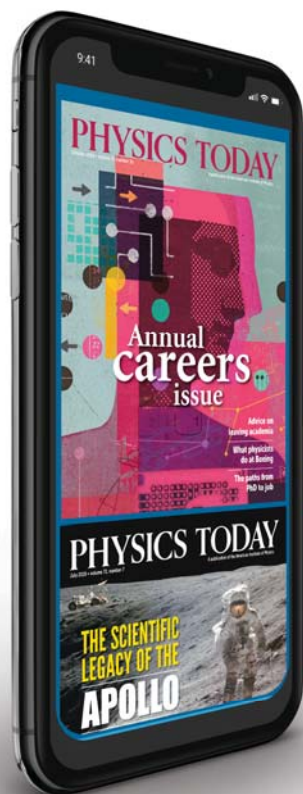
As Johnson points out, Zwicky’s greatest weakness was his unwillingness to compromise or listen to critics. That stubbornness was the reason that he never accepted the expanding universe and, after World War II, that he adopted strange ideas, such as pelting the Moon with missiles and artificial meteors and turning the Sun into a spaceship. He justified some of those claims with his so-called morphological philosophy, a variant of empiricism. Zwicky insisted that his morpho-

logical method applied not only to science but also to society. Most scientists and philosophers ignored his ideas, and posterity hasn’t been kinder to the morphological gospel.

Johnson’s biography is well researched, drawing from interviews, articles from local newspapers, and, not least, material from the Fritz Zwicky Foundation archive in Glarus, Switzerland. However, many of the sources are anecdotal reminiscences, which make the book an enjoyable read but questionable as a scientific biography. Johnson doesn’t discriminate properly between what is interesting and relevant and what is not. The book is filled with sometimes charming but still trivial details about the life of Zwicky and his family. In short, Johnson’s work about the outcast genius who allegedly unmasked the universe is primarily aimed at a broad audience, and as such it is recommended. But it may not satisfy physicists and astronomers with a serious interest in the history of 20th-century science.

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