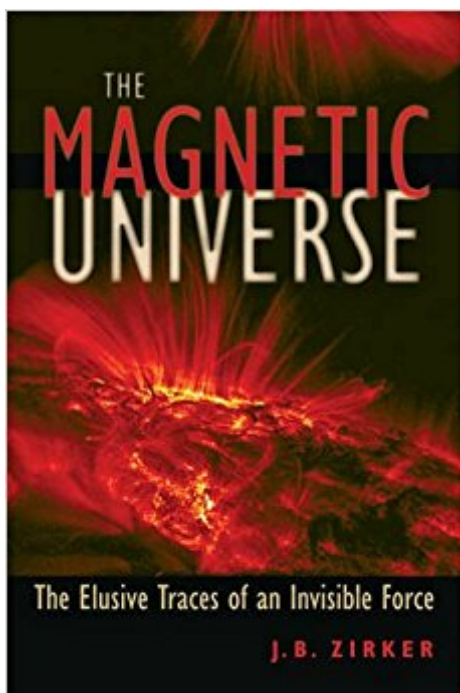


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# The Magnetic Universe: The Elusive Traces Of An Invisible Force



## Synopsis

Magnetic fields permeate our vast universe, urging electrically charged particles on their courses, powering solar and stellar flares, and focusing the intense activity of pulsars and neutron stars. Magnetic fields are found in every corner of the cosmos. For decades, astrophysicists have identified them by their effects on visible light, radio waves, and x-rays. J. B. Zirker summarizes our deep knowledge of magnetism, pointing to what is yet unknown about its astrophysical applications. In clear, nonmathematical prose, Zirker follows the trail of magnetic exploration from the auroral belts of Earth to the farthest reaches of space. He guides readers on a fascinating journey of discovery to understand how magnetic forces are created and how they shape the universe. He provides the historical background needed to appreciate exciting new research by introducing readers to the great scientists who have studied magnetic fields. Students and amateur astronomers alike will appreciate the readable prose and comprehensive coverage of *The Magnetic Universe*.

## Book Information

Hardcover: 312 pages

Publisher: Johns Hopkins University Press (November 18, 2009)

Language: English

ISBN-10: 0801893011

ISBN-13: 978-0801893018

Product Dimensions: 6 x 1 x 9 inches

Shipping Weight: 1.2 pounds (View shipping rates and policies)

Average Customer Review: 3.3 out of 5 stars 7 customer reviews

Best Sellers Rank: #835,572 in Books (See Top 100 in Books) #92 in [Books > Science & Math > Physics > Electromagnetism > Magnetism](#) #1146 in [Books > Science & Math > Astronomy & Space Science > Astrophysics & Space Science](#) #1907 in [Books > Science & Math > Astronomy & Space Science > Astronomy](#)

## Customer Reviews

"Written in a clear, readable style, the book should be accessible to anyone with a high-school or college background in physics or astronomy." (Physics Today)"An excellent, up-to-date overview of what is known about magnetism and its myriad manifestations in astrophysics... Highly recommended." (Choice)"Extremely readable... The author's enthusiasm is apparent through every chapter." (Nigel Weiss The Observatory)"Students and amateur astronomers alike will appreciate

the readable prose and comprehensive coverage of this book." (Spaceflight)

J. B. Zirker is an astronomer emeritus at the National Solar Observatory and author of *Total Eclipses of the Sun*; *Journey from the Center of the Sun*; *Sunquakes: Probing the Interior of the Sun*; and *An Acre of Glass: A History and Forecast of the Telescope*, the last two published by Johns Hopkins.

I have thoroughly enjoyed reading this book. I am a *Scientific American* reader who loves to get a glimmer of understanding into a wide range of scientific fields without struggling with mathematical equations. *The Magnetic Universe* is just such a readable book delving into a different world. It provides insight into the strange world of magnetism, from the simple children's experiment with bar magnets and iron fillings, to the Earth's wandering magnetic poles and the Sun's explosive coronal mass ejections, and far out into the universe in the birth and death of stars. I would recommend it to anyone who enjoys *Scientific American*.

Meaningful for physicists and certainly beyond "armchair" chaps such as myself. I gained nothing by struggling through this to the bitter end, hoping to reach the point of understanding which I never encountered! As a brain surgeon I can explain to a janitor the organization and functioning of the human brain and leave them with a grasp they could then share with others. This author made no effort to make such a transference of knowledge. I'll seek understanding from other portals.

Great book at a great price with fast ship.

Still reading as of this review but so far so good. A little more technical than my knowledge will allow but that is why I read these kinds of books. Broaden your horizons kind of thing.

There is so much more to the science of astronomy than peering at the stars through a telescope. In *"The Magnetic Universe: The Elusive Traces of an Invisible Force"*, J. B. Zirker (astronomer emeritus at the National Solar Observatory) introduces the reader to the phenomena of the magnetic fields permeating the universe. These are magnetic fields involving streams electrically charged particles, solar and stellar flares, pulsars and neutron stars. By studying this universal phenomena through visible light observations, radio waves and x-rays, a great deal of progress in our understanding of astrophysics has been steadily advancing in terms of how magnetic forces are

created and how they affect the very shape of the universe itself. Also available in a hardcover edition, "The Magnetic Universe" is superbly written so as to be completely accessible not only to academia, but to the non-specialist general reader with an interest in astronomy.

In purely verbal terms this book does give an acceptable overview of all the salient aspects of magnetic fields in a cosmic context. However there are a few aspects of the book that I found very disappointing, the main one being the shortage of explanatory diagrams. The following topics would have benefited from a few diagrams: The Zeeman Effect, Interstellar Polarization and the Synchrotron Effect. The author could have discussed at least one model that could explain the Maunder Butterfly Effect. Another aspect that I found disappointing was the authors failure to explain how Faraday used his lines of force concept, with real physical properties, to explain the interaction of magnetic fields, magnets and current carrying conductors, in a laboratory context. I feel that this was very necessary pre-requisite to explaining the use of the lines of force in astrophysical situations. Some of the treatment of particular topics is rather superficial. When discussing the magnetic field of the Milky Way, he says: "By 1970, 7,000 stars in the Galaxy had been measured for interstellar polarization. Australian astronomers Donald Mathewson and Victor Ford collected all the data in a remarkable map. It showed that magnetic fields are mainly parallel to the plane of the disc with marked irregularities. The real surprise was the great loop of field above the disk that extends 120 degrees across the sky. It seems to lie nearby, between 100 and 200 pc of Earth". He is obviously referring to 'The North Galactic Radio Spur' although he does not say so. I found the distance to this feature, before the map of Mathewson and Ford, in 1966, when I applied spherical harmonic analysis to the study of interstellar polarization in groups of shells, at varying distances from the Sun. I went over to Leiden Observatory to discuss my work with Professor Jan Oort, who believed that 'The Spur' was in the halo. At this stage he did not believe my calculations, but by 1975 he was willing to accept the fact that he had been wrong. In 1984 I wrote a book called COSMIC MAGNETISM (under my professional name of Dr Percy Seymour) which covers the same ground as Zirker's book, but I went to great pains to show how researchers in cosmic electrodynamics had given a new lease of life to Faraday's Lines of Force concept. I also presented a summary of my thoughts on the subject in 1991 at a special conference organised by the Institute of Physics at their London Headquarters to celebrate the two hundredth anniversary of Faraday's birth. My paper was called A COSMIC EXTENSION OF FARADAY'S LINES OF REASONING. In my more recent book DARK MATTERS: Unifying Matter, Dark Matter and Dark Energy and the Universal Grid (again under the name Dr Percy Seymour, published by New Page Books in 2008), I

updated the essential features of COSMIC MAGNETISM, in part one of the book, before moving on to formulate a new theory of matter and space, in part two. This new theory is able to explain the essential features of dark matter and dark energy, and the universal grid offers an explanation for the nature of the basic 'particles' of physics and quantum effects.

I really wanted to like this book; but after a hundred pages I've given up. Perhaps it's me, but the writing is far from clear, at least at the level of understanding that seemed to be the advertised target audience. I can't seem to understand who would benefit from this book; anyone who knows enough to easily follow the material almost certainly knows more than is presented here. My education included some college physics and higher mathematics, yet I found most of the discussion far over my head, and the illustrations added next to nothing. There was apparently a conscious decision to avoid any mathematics, which for me meant that imprecise language carried all of the weight, and was most definitely inadequate for the task. Some caveats: There is a fairly good description of the history of the science, including the specific individuals involved; and I did not make it past the first half of the book, so things might have improved. The subject of Solar physics is obviously a young one, and a terrifically complicated one, so perhaps I'm asking too much. The prose is not actually poorly written, it's just that the only impression I get after reading about the different processes (or the various hypotheses of same) is that they're complex. It seems to me that one could have simply said that and saved the pages of inadequate explication. Maybe a better, and better illustrated, section on what exactly magnetic lines of force are, and how they are studied, would have been better.

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