

It became clear to me only after reading the book just how ambitious and challenging it is to cover all that material. Moessner and Moore generally chose to illustrate through examples instead of presenting a systematic overview of the topic. That makes the book more accessible, but at the same time it can be limiting. Moreover, the choice of examples may sometimes reflect the authors' predispositions rather than being entirely representative. I found it strange, for example, that although disorder and localization are discussed in chapter 8, there's no discussion of them when the integer quantum Hall effect is introduced in chapter 3, nor any mention of the Kubo formula. Both are essential to understanding the exactness of quantization and the existence of plateaus in the Hall effect.

Analogously, the chapter on gauge theory contains a thorough yet concise discussion of Ising gauge theory, but it presents without explanation Alexander Polyakov's famous result that proved the instability of $U(1)$ gauge theory in two spatial dimensions. I also was frustrated that the presentation of spin liquids in several chapters completely avoids the concepts of Gutzwiller projection and general parton constructions, both of which are central to the subject. Finally, tensor networks and matrix product states, which provide a powerful tool to understand many topological phases, are essentially absent.

But Moessner and Moore are clear about the choices they make, and in the preface, they explain their reasons for being less than encyclopedic. On balance,

Topological Phases of Matter is an enjoyable read and a particularly broad introduction to diverse aspects of topological ideas in quantum theory. Its main weaknesses are ones of omission: Many results aren't derived in the text, and some topics—such as those mentioned above—are left out entirely. That means that the level of detail is probably less than one would want to present in a graduate physics course, but a knowledgeable instructor could fill in the gaps and rely on the book as a resource to guide the order of topics presented in the class. The volume should be a helpful resource for anyone wanting to learn more about a topic that has become increasingly central to modern physics.

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NEW BOOKS & MEDIA

When the Heavens Went on Sale

The Misfits and Geniuses Racing to Put Space Within Reach

Ashlee Vance

Ecco, 2023. \$35.00

Although space tourism and the efforts of billionaire entrepreneurs such as Elon Musk have tended to dominate public perceptions of the private space industry, a host of startup companies have been proliferating to cash in on another burgeoning market—smaller, faster, and cheaper satellite launches. In *When the Heavens Went on Sale*, writer Ashlee Vance focuses on four of the leading pioneers in that field: Planet Labs, Rocket Lab, Astra, and Firefly Aerospace. Having gained exclusive access to the companies and their founders, Vance provides a firsthand account of their race to build new types of satellites and rockets, and the many adventures and misadventures along the way. —CC



The Short Story of the Universe

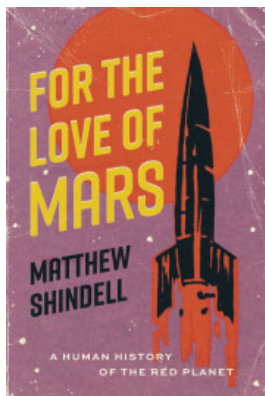
A Pocket Guide to the History, Structure, Theories and Building Blocks of the Cosmos

Gemma

Lavender

Laurence King, 2022. \$19.99

With the beautiful illustrations of a coffee-table book and the conciseness of a primer, *The Short Story of the Universe* aims to provide an easily digestible overview of current astronomy knowledge. Divided into four parts—structure, history and future, components, and theories—the book comprises some 100 two-page spreads featuring encyclopedic entries on such subjects as spacetime, the origins of our solar system, individual planets and their moons, and special and general relativity. Color and black-and-white images, callouts of notable scientists involved in or notable examples of the phenomena in question, lists of key publications or developments, and cross-references round out the entries. —CC



For the Love of Mars

A Human History of the Red Planet

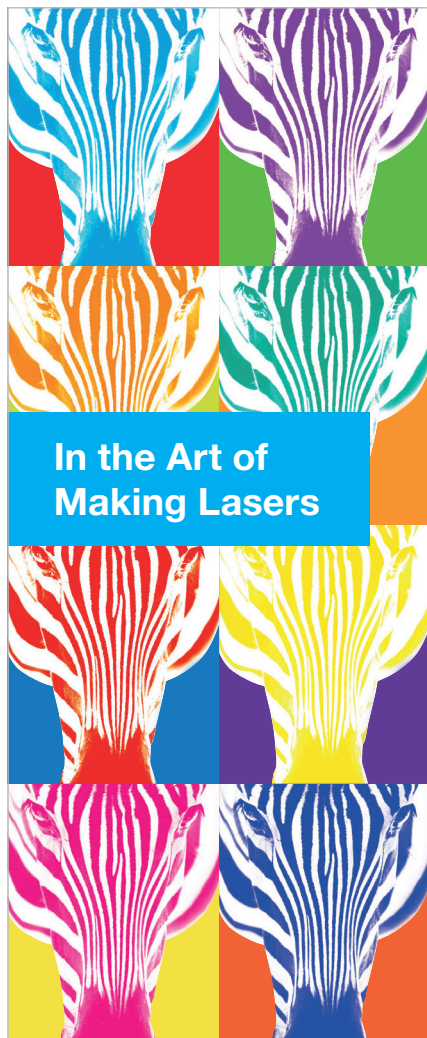
Matthew Shindell

U. Chicago Press, 2023. \$27.50

What is it about Mars that has captivated humanity for centuries? In this new book, Matthew Shindell, a curator at the Smithsonian's National Air and Space Museum, investigates why the red planet has cast a spell on societies from antiquity to the present. Early portions of the book, including a section on the depiction of Mars in Dante Alighieri's *Divine Comedy*, are highly intriguing. But the meat of the book focuses on 19th- and 20th-century conceptions of Mars. It interrogates the key tension of modern Martian "history":

Missions searching for signs of life on the planet have had both scientific and geopolitical motivations. As with so many other fields during the 20th and 21st centuries, advances in planetary science have often been linked to superpower rivalries. —RD

BOOKS



In the Art of Making Lasers

High performance lasers with dependable excellence



C-WAVE.
Tunable Lasers.



Cobolt.
Single & Multi-line Lasers.



C-FLEX.
Laser Combiners.



VALO.
Femtosecond Lasers.

HÜBNER Photonics
hubner-photonics.com



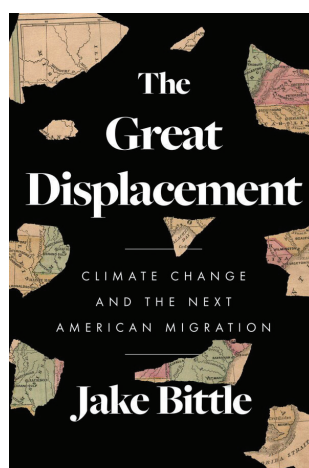
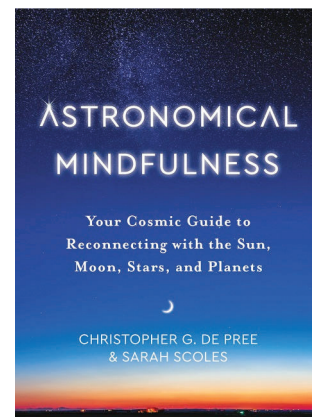
Astronomical Mindfulness

Your Cosmic Guide to Reconnecting with the Sun, Moon, Stars, and Planets

Christopher G. De Pree and Sarah Scoles
HarperOne, 2022. \$24.99

A starlit sky can inspire awe and wonder, yet how often do we take the time to stargaze? In *Astronomical Mindfulness*, the astronomer Christopher G. De Pree and the science writer Sarah Scoles focus on the value of becoming better acquainted with the stars and planets as a means of pursuing a heightened awareness of oneself and one's place in the cosmos. They achieve that through a combination of practical astronomical instruction and homework interspersed with mindfulness exercises, which involve such activities as observation, breathing, and visualization. The book is a timely reminder for people caught up in their daily jobs and routines to take a moment and see the bigger picture.

—CC



The Great Displacement

Climate Change and the Next American Migration

Jake Bittle
Simon & Schuster, 2023. \$28.99

One potential effect of climate change will be the forced relocation of individuals and entire communities as extreme temperatures, droughts, flooding, and forest fires occur more frequently and become more widespread. In *The Great Displacement*, the journalist Jake Bittle focuses on the US, where climatological events are already driving people to abandon their homes and move elsewhere. He discusses the havoc wreaked by several 21st-century catastrophes, such as Hurricane Irma in Florida and the Tubbs fire in California; the loss of community and history that results from such tragic events; and the need for improvement in economic and government programs to help those most affected, who tend to be minorities and the less affluent.

—CC

"You Are Not Expected to Understand This"

How 26 Lines of Code Changed the World

Torie Bosch, ed.
Princeton U. Press, 2022. \$19.95 (paper)

Contrary to the book's title—a comment made in 1975 by a Unix programmer—this collection of 26 essays aims to enlighten readers, programmers and nonprogrammers alike, about the history of computers and coding. Written by leading technology experts and journalists, the essays cover diverse topics: Some focus on actual lines of code, while others discuss software, coding languages, and the very act of coding. As editor Torie Bosch writes in her introduction, by revealing both moments of genius and major mistakes, she aims to tell the stories of the people behind the programming and convey the complexity of the technical environment in which we live.

—CC PT

