

The people who made us look small

Galactic Encounters Our Majestic and Evolving Star-System, from the Big Bang to Time's End

William Sheehan and
Christopher J. Conselice
Springer, 2015. \$44.99 (385 pp.).
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Reviewed by Louise Edwards

After seeing the book's title, one of the author's names—Christopher Conselice, a well-known astrophysicist working on galaxy evolution—and a cover image of two merging galaxies, I was expecting to learn all about galaxy dynamics. As it turns out, *Galactic Encounters: Our Majestic and Evolving Star-System, from the Big Bang to Time's End* refers to encounters between people in history who studied the nature of galaxies. I wish the authors—Conselice and William Sheehan, a prolific historian of astronomy—had hinted at that in the title, because I think a large audience of history lovers might miss this book.

Galactic Encounters consists of three distinct parts, each with its own voice. The first, comprising the bulk of the text, provides inside stories. If you are an educator looking to bring more human interest to your lectures, then the first section, chapters 2 through 12, is a fantastic resource—I plan to take advantage of it for my own courses. Unfolded in chronological order, the personal histories include fascinating tidbits about the lives of notable astronomers—characters such as William Herschel, William Huggins, and Edward Emerson Barnard—who amassed knowledge on what turned out to be galaxies.

During some parts, I literally gasped out loud, such as when I read about siblings William, Caroline, and Alexander Herschel and thought of them tirelessly working together on their observations, independent from the rest of the community; they even built their own tele-

scopes! Furthermore, until reading the book, I didn't have a clear appreciation of how important the great amateurs and private funding were to pushing astronomy along in Europe and the US in those early days.

Highlights of the first section include the story of how finding tiny wisps of clouds in the sky revolutionized our understanding of our small place in the universe, an account of Sheehan's joys and personal tribulations at doing backyard astronomy, and discussions of what it was like to practice astronomy as the modern telescopes were being built. The presentation rightly emphasizes that as the telescopes increased in power, so did our ever-expanding view of the universe. Though much interesting information is found in the section, I feel the authors could have been

more focused: The roughly 300 pages include lengthy quotes and long tangents, all before nebulae are even identified as galaxies.

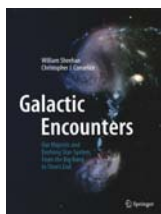
The second part of the book is a faster-paced read and does a good job relating to the subtitle. Once the authors arrive at the early 20th century, by which time large-aperture reflecting telescopes had been built, they focus more on the advancement of the field as a whole and less on individuals. The section includes a discussion of the nature and size of galaxies and the interpretation that their great velocities manifest the expansion of the universe. It also provides accessible descriptions of dark matter and dark energy.

Overall, the second section is clear, complete, and presented in a well-organized and logical way. In general, the material is written at a level accessible to enthusiasts looking for a narrative introduction. However, the language sometimes can be a bit too technical. For example, cold and hot dark matter are discussed but never really defined. I also noticed one technical error (on page 339): An accretion disk is said to be 2 kiloparsec across, but that is much too large; they are typically only a fraction of a parsec across.

I consider the book's final chapter, "Afterglows," to be its own section, as it completely switches gears from astronomy and astronomers to musings on a conscious and intelligent universe.

Statements such as "the universe itself appears to be highly intelligent" are unsubstantiated, are unconvincing, and make for a confusing end to an otherwise lovely narrative on galaxies and cosmology.

If you enjoy reading stories about astronomers, or if you want an excellent introduction to galaxies and cosmology, then much of *Galactic Encounters* is perfect: fun to read and full of information. But if you already have been introduced to galaxies and are looking for a book that focuses on galaxy encounters, mergers, and dynamics, better to stick with such standards as *Galactic Dynamics* (2nd edition, Princeton University Press, 2008) by James Binney and Scott Tremaine and *Galaxy Formation and Evolution* (Cambridge University Press, 2010) by Houjun Mo, Frank van den Bosch, and Simon White.

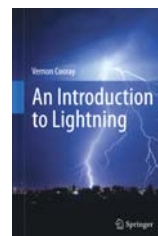


An Introduction to Lightning

Vernon Cooray
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Lightning is a phenomenon with important consequences for humankind. It kills hundreds of people around the world each year and causes billions of dollars in damage. The present understanding of lightning is based on more than 200 years of detailed research and observation since the time of Benjamin Franklin, and contributions to the field are growing rapidly.

An Introduction to Lightning gives a solid overview and emphasizes the contributions of the author, Vernon Cooray, who has studied the physics of lightning for more than three decades. The book takes a physics-based approach: In a clear and digestible manner, it provides detailed information about the physical processes involved in the lightning discharge and discusses the pertinent principles of lightning protection from the perspective of a general reader. The author's intention is to convey information at the introductory level, and in that he is successful. However, the text is by no means compre-



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