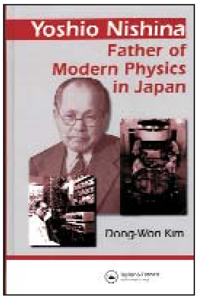


studied subjects in the history of science. Japan is a major player in contemporary physics, and the transmission of modern physics into the country might provide a key to understanding the globalization of Western science. Yoshio Nishina (1890–1951) is a relatively unknown but significant Japanese physicist who was instrumental in transforming the Japanese physics community into an active, internationally competitive group. Dong-Won Kim's *Yoshio Nishina: Father of Modern Physics in Japan* gives a compact account of Nishina's life. It is successful as introductory reading for the general public, but not so much as a serious scholarly contribution to the literature.

Kim is an independent scholar who retired from the Korean Advanced Institute for Science and Technology and is now a visiting professor in the department of science and technology at the Johns Hopkins University. His book seems not to be intended as a scholarly monograph. It relies heavily on secondary literature but contains little explanation of his position on whether he agrees with the preceding works on the subject. In the introduction, Kim states that his "appreciation of [Nishina's] greatness is based on ideas and opinions that are not necessarily those expressed in traditional Japanese scholarship, particularly in areas on how and why Nishina's role and contributions were critical to the development of the Japanese physics community." What he means by "traditional Japanese scholarship" baffles me. In any event, Kim overrates his own contribution if he claims novelty in discovering that Nishina's "greatness" lies in how the scientist contributed to the development of the Japanese physics community. Nishina's importance in this regard has been more a matter of common sense among those who have written about him ever since physicist Sin-itiro Tomonaga. Moreover, despite Kim's critique of his Japanese colleagues, a considerable proportion of the book depends on works by Japanese scholars. His direct citation of primary sources already covered in the secondary works, however, blurs his scholarly dependence on the secondary literature. For example, section 2 of chapter 1 seems to rely totally on my own 2002 dissertation; but in most footnotes, Kim cites primary sources without mentioning they have been cited and discussed in my thesis.

Kim's book also expresses unacceptably stereotypical views on Japanese and other East Asian cultures. Kim states, "In East Asia, such celebrated figures as Nishina traditionally are depicted as 'perfect' men. . . . Criticism of heroes, particularly great *sensei*, is not permitted." But that is not the case in Japan, where even Nishina's students did not always depict him as perfect. Soon after Nishina's death, in a 1951 journal article devoted to him, Tomonaga likened Nishina to a mountebank entrepreneur. He recalled that when some of Nishina's students saw an advertisement by a quack doctor for electronic treatment, they joked that it was something Nishina would do.

Kim writes that "[Nishina] was typically Japanese. He had been a model student from elementary school to university. . . . He had behaved exactly as the typical Japanese did when he met and dealt with senior Japanese scientists or nonscientists outside his laboratory." Kim, however, does not explain what, exactly, "typical" means and how being typical led to Nishina's success. Kim asks "How much did being Japanese influence Nishina's scientific work and contribute to his success?" Such cultural essentialism, assuming "typical" Japanese behavior, should no longer appear in academic literature, especially after the intense critique of *Nihonjinron*, the theory of "Japaneseness," in Japanese studies in North America.

The book's reliance on disproportionately English-language sources further undermines its value. For example, in the discussion of the Japanese research institute, RIKEN, Kim cites Tessa Morris-Suzuki's tertiary work in English rather than Satoshi Saito's secondary work in Japanese, which Morris-Suzuki cites. Also in the introduction, Kim claims that theoretical physicist Hideki Yukawa and Tomonaga often called Nishina "Professor Nishina" in their memoirs even though he never was one, because the prefix of "professor" in Japanese conveys respect and authority. That misconception probably originates from Kim's reliance on English translations, in which *sensei* is often mistranslated as "professor," as in Tomonaga's *The Story of Spin* (University of Chicago Press, 1998).

Even when Kim uses primary sources, he interprets them inadequately. He quotes Tomonaga's recollection of his first encounter with Nishina: "Nishina looked far from the world-class scientist we imagined (we guessed a sharp looking figure). He looked mild and talked without any sharp remarks" (page 66). From that testimony, Kim concludes that Nishina's treatment of students was different from that of most Japanese university professors, who, Kim claims, were traditionally arrogant. But Tomonaga was talking about the contrast between the actual Nishina and his imagined Nishina, a razor-sharp international scientist trained in Europe, not a "traditional" Japanese professor. Apparently, Kim's projecting his preconception about Japanese professors, for which he provides no basis, has led to the misinterpretation.

With so few biographies of Japanese scientists available in English, *Yoshio Nishina* certainly contributes to the English-language, general interest literature on the history of non-Western science. But its contribution fails to be scholarly. I agree with Kim in hoping "that more extensive biographies of Nishina with fresh perspectives will appear in the near future."

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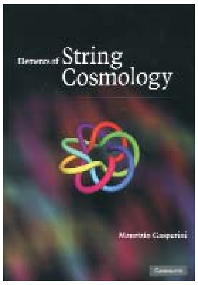
## Elements of String Cosmology

**Maurizio Gasperini**
*Cambridge U. Press, New York, 2007. $85.00 (552 pp.).*
*ISBN 978-0-521-86875-4*

One of the most important ongoing challenges in theoretical physics is to understand the nature of the Big Bang that started our universe. Albert Einstein's general theory of relativity, the best classical theory of gravity, predicts that the Big Bang is a singularity in which the density of matter and the curvature of spacetime both become infinite. General relativity, however, must break down before such singularities can form because quantum effects will become important. The physics near the Big Bang is thus a problem in quantum gravity.

String theory is the most actively studied approach to quantum gravity, and using it to try to determine the physics of the early universe is only natural. Maurizio Gasperini's *Elements of String Cosmology* is a good introduction to that active area of research. Gasperini, a professor of theoretical physics at the University of Bari in Italy, is a recognized expert in string cosmology and one of the inventors of the pre–Big Bang model (which is described later in the review). There are several excellent books on string theory, such as the two-volume *String Theory* (Cambridge University Press, 1998) by Joseph Polchinski (see the review in PHYSICS TODAY, June 1999, page 59) and *String Theory and M-Theory: A Modern Introduction* (Cambridge University Press, 2007) by Katrin Becker, Melanie Becker, and John Schwarz (see the review in PHYSICS TODAY, May 2008, page 57). But unlike those texts, Gasperini's is dedicated to string cosmology. The book is intended for graduate students who have a background in general relativity and quantum field theory, but not necessarily in string theory or cosmology.




Gasperini's book has many attractive features. Its cosmology side offers a good introduction to inflationary cosmology and an extensive discussion of scalar and tensor perturbations—potentially observable signatures that might be used to distinguish models of the early universe. The string-theory side presents good discussions of the low-energy effective action of string theory, homogeneous and anisotropic solutions to the theory, T-duality symmetries, and the physics of the dilaton. The author even includes the first-order higher-derivative corrections from bosonic and heterotic string theory. Most calculations are carried out in detail to make it easy for students to follow.

Despite the enormous progress in string theory, experts have reached no consensus about what it predicts for the early universe. A large part of the book is devoted to the pre–Big Bang scenario. That model posits an early collapsing phase of our universe before the Big Bang and assumes that the Big Bang was really a "big bounce." Gasperini makes clear in the preface that he does not intend to provide a comprehensive review of all the work in string cosmology, but even so, I found the focus on the pre–Big Bang scenario to be excessive for "the first book dedicated to string cosmology," as mentioned on the back cover. For example, the popular and extensively studied brane-world models are only discussed in the final chapter.

A few other things bothered me about the book. Including the first-order string corrections makes the equations of motion much more complicated, and it is not clear how much one learns for the extra effort. Typically, when the first correction becomes important, all the higher-order corrections, which have not been included, also become significant, and one loses control of the calculation. Moreover, the book does not include any problems for the student, so it is not ideal as a textbook. Most of the chapters include appendixes that the author claims are self-contained discussions of special topics. However, chapter 4 begins by referring frequently to the equations in the 40-page appendix to chapter 3, which discusses the quantization of the free bosonic and supersymmetric strings.

Despite such shortcomings, *Elements of String Cosmology* is an excellent resource for the graduate student interested in learning string cosmology, especially the pre–Big Bang scenario. The text provides a clear explanation of the results of hundreds of research articles. Thus it is a good starting point for those entering this exciting field.

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