A First Course in String Theory, *B. Zwiebach*, Cambridge University Press, 2004, pp: 558, ISBN 0521831431 (hc); Price: US$60.

Quantum string theory has been around since the 1960s, and came to be the dominant idea in the unification of fundamental physics more than twenty years ago. For all its profundity, string theory is a very simple idea: the quantization of a rather mundane example covered in many classical mechanics courses, the oscillating string. So it is an enormous puzzle why only a handful of physicists know anything serious about it. String theory is largely still a conversation between cognoscenti at Princeton and a precious few other places, who constitute maybe one out of every hundred working physicists. And until now, many string theorists have not felt compelled to change that by communicating their subject to the rest of us in a meaningful and substantive way.

That's what makes Barton Zwiebach's book soooooo refreshing. He appears to see no reason why the rest of the physics world can't join in, and he's right. He's written a book that good fourth-year undergraduates should have no trouble understanding, and yet has both depth and breadth. This makes it possible to expose all undergraduate students, at least those interested in the theoretical side of physics, this exciting topic—and to teach them something in the process.

Moreover, the book answers the question of why such students should study string theory. In a very complete manner, it ties together the core topics that undergraduates should practise and become comfortable with at fourth-year level: mechanics, variational principles, conservation laws, quantization, gauge fixing, electromagnetic theory, and special relativity to name a few. What other fourth-year course can achieve this as effectively? As such, a course based on this book would make for a very nice terminal course for a programme in theoretical physics.

The book is written in a chatty style that undergraduates will likely feel comfortable with. Older readers might occasionally feel put off, but so what? The mathematics is quite often precise without being tedious: I particularly liked the discussion of the relativistic string, Nambu-Goto action, and minimal surfaces (a term he wisely avoids).

The praise for the editor at the end of the Acknowledgements is somewhat nullified by a glaring typo on page 1. It gets worse by the end. Chapter 14 on branes is not recommended, because the author begins to slip into unfortunate jargon popular in string research papers, wherein surfaces are called "planes", planes are called "hypersurfaces", dimensions (quantity) are called "dimensionalities" (quality), and geometric quantities, or sometimes their indices, are said to "live on" branes (meaning what exactly?). Sure I'm ranting, but consider that undergraduate readers of this book likely have enough mathematics to have heard of a hyperplane and may know that it must have co-dimension one, and may be confused if it doesn't. They'll get it eventually, but if the right word were used they'd get it the first time. Anyway, this sloppiness is the exception rather than the rule. The early, core chapters, are precise, clean, clear, and remarkably easy on the reader.

If you use this for a course, you should be able to move quickly through the text. Most sections require only a portion of a lecture, though Zwiebach's syllabus suggestions in his preface are probably too ambitious. Personally, I'd look forward to the opportunity to teach from this book. I feel it would be a positive development if a few such courses sprang up in Canadian universities. With a few recent exceptions, our universities have not cultivated string theorists. Perhaps we should start growing our own.

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