

belongs to Louis de Broglie, who first postulated electron waves in 1923. The author also gives credit incompletely for the origin of string theory, with no mention of the seminal contributions by, for example, Gabriele Veneziano, Yoichiro Nambu, or Holger Bech Nielsen.

Randall is quite willing to share her views. For instance, she is “agnostic” about string theory, a compelling theory that motivates the book’s speculation. She personally does not believe extra dimensions are large—that is, directly detectable at colliders—but she does admit to believing in some form of extra dimensions. Quite frankly, I agree with all of the above views. In the book, Randall describes a humorous episode in 2001 when well-meaning conference organizers, who misunderstood her work, invited her to speak on “large” extra dimensions, which would exclude her own papers!

All in all, *Warped Passages* is a major accomplishment. The intended readership includes adult nonscientists and high-school students who want to learn about scientific research. One can hope it will help convince politicians to support the expensive research and encourage the public at large to embrace science.

Make Your Mark in Science: Creativity, Presenting, Publishing, and Patents—A Guide for Young Scientists

Claus Ascheron and Angela Kickuth
Wiley, Hoboken, NJ, 2005.

\$29.95 paper (235 pp.).

ISBN 0-471-65733-6

Make Your Mark in Science: Creativity, Presenting, Publishing, and Patents—A Guide for Young Scientists, by physicists Claus Ascheron and Angela Kickuth, is intended as a guide for young scientists who face the challenges of doing creative scientific work and producing it in concrete form. Although most of its examples are, of course, drawn from physics, the book is just as relevant to other scientific fields.

Chapters 3, 5, and 6, on scientific presentation and publishing, are quite useful. Chapter 3, on talks and posters, contains much of the advice that mentors should give to young scientists but sometimes don’t, as evidenced by the poor talks and posters

one can see at any meeting. Also covered in the chapter are suggestions on how to plan different types of talks for different audiences; how much detail to include (less than you think); how to make good visual aids, speak clearly, and point to the screen effectively; and how to respond to questions at the end of the talk. A section within the chapter discusses how to produce a visually appealing and informative poster. Any inexperienced scientist—and many experienced ones!—could benefit by carefully studying and applying the principles outlined in the section. Chapter 5, on writing a good paper, includes a complete set of guidelines for organizing the paper, writing clearly, and preparing good figures, tables, and reference lists. Chapter 6 covers electronic publishing, including its benefits, problems, and future. The pages of all three chapters could easily become dog-eared if placed in an office occupied by graduate students and postdocs.

The seventh and final chapter concerns the patent process and succinctly describes what may or may not be patented and how the process works in Europe and the US. The main advice running throughout the chapter is “hire a good patent attorney,” which is no doubt wise.

Chapter 4, on the culture and ethics of scientific publishing, is somewhat unusual for such a book. Its contents are rarely discussed in research groups, perhaps because mentors assume the implications of publishing and ethical dilemmas and behavior are more obvious to young scientists than is truly the case. The first part of the chapter is a brief description of the different purposes of various kinds of scientific publications—general science journals like *Nature*, specialist journals, multiauthored books, monographs, preprints, conference proceedings, and so forth—coupled with discussions on why and when to publish. The second part, on ethics, includes an explication of the American Physical Society’s “Guidelines for Professional Conduct” and a summary of several cases of scientific fraud, most notably that of Jan Hendrik Schön. Although the coverage is brief, including

the culture and ethics of publishing is valuable because those are issues that young scientists are unlikely to ask their elders about.

Chapter 2, on scientific creativity, is unfortunately the least successful. One hopes that most students will receive guidance from their mentors on how to write a

good paper, give a good talk, or produce a good patent application. However, how to become a creative scientist is much more of a mystery, even to those who have accomplished the feat. The authors discuss various “prerequisites for creative work,” including diligence, curiosity, and an understanding of the foundations of the field. To foster creativity, they suggest that one work at a time of day and in a place that promotes concentration, with good lighting and fresh air; eat a healthy diet; and exercise. Readers cannot take exception to their advice, but most young scientists will already have heard it from their mothers. Discussions on the kinds of intelligence typically displayed by younger and older scientists, and statistics about regional differences in scientific output, complete the chapter but do nothing to guide readers.

Make Your Mark in Science largely succeeds at its intent, which is to give good advice on basic skills necessary for a successful scientific career. It is marred by mostly irrelevant illustrations, some of which are meant to be more humorous than they actually are, and by sloppy editing. For example, the lead journal of the American Physical Society is not titled *Physics Review Letters*. Yet such slips do not detract significantly from the book’s usefulness. A good mentor might consider putting a copy in a room where graduate students and postdocs socialize or work. For students who have a negligent mentor, the book will be even more valuable.

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A World Without Time: The Forgotten Legacy of Gödel and Einstein

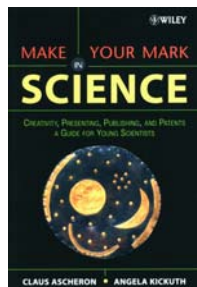
Palle Yourgrau

Basic Books, New York, 2005.

\$24.00 (210 pp.).

ISBN 0-465-09293-4

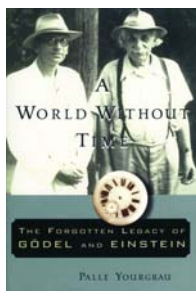
During the World Year of Physics 2005, hundreds of authors couldn’t resist using the golden recipe “Albert Einstein and X” to publish yet another book on their pet subject of X. Unfortunately, Palle Yourgrau, a philosopher at Brandeis University in Waltham, Massachusetts, and an acknowledged expert on Kurt Gödel, is no exception with his *A World Without Time: The Forgotten Legacy of Gödel and Einstein*.



Everyone has been trying to make a buck during this celebratory year. True, Einstein and Gödel both stayed at the Institute for Advanced Study in Princeton, New Jersey, and because Einstein did not like to speak English, he naturally turned to his Austrian-born colleague and shared walks and conversations with him. But Yourgrau blows that contact way out of proportion, into a cosmic friendship. It simply wasn't so. Sorry. Pressed by his publishers, Yourgrau tried to keep the book on a popular level; thus almost no topic receives more than half a page of discussion. Anticipating readers' rather short attention span, with the publisher wisely setting the slim book in huge print, the author races through Vienna coffeehouses, Hilbertian mathematics, the Fregean logics, logical positivism of the Vienna Circle, Wittgensteinian philosophy, Heisenberg's uncertainty relations, the special theory of relativity, and as a bonus, the general theory of relativity and gravitation.

Nothing can be gained from this whirlwind tour except, perhaps, enough hearsay for small talk at the next party. For example, did you know that Gödel used to hide behind the furnace in the basement of his house? Did you know that he wore warm clothes even during the hottest summer, and that he ultimately died of malnutrition, caused by his paranoia? Is this what you always wanted to know? I doubt it. Aren't there any more serious topics in Yourgrau's book? Oh, yes. In order to explain Gödel's incompleteness theorem of 1931, Yourgrau actually invests more time (does it still exist?), but the reader is wisely advised not to be intimidated and, if bored, to just skip the hardly comprehensible technicalities: "You can admire the music without attending to the words" (page 59). Then why bother to read anymore at all?

The book's main thesis is simply balderdash. Yourgrau claims that Gödel proved time to be nonexistent (page 6): "He would make time disappear." How? Just because one solution of Einstein's field equations found by Gödel does allow closed timelike curves? The author's statement is a sensational blowup and ripe for the shredder. Yourgrau scolds Stephen Hawking for demanding that proper solutions of the field equations not exhibit the time-travel feature, yet nowhere does Yourgrau say that the Gödel solutions are simply inapplicable to our universe. All the above



statements are made for the sake of sensationalism and allegedly to rescue Gödel from obscurity; the whole last chapter is a strange defense of Gödel against other philosophical interpreters of the mathematician, as if the broader public were interested in Yourgrau's excerpts of talks and quibbles at obscure philosophy conferences in Helsinki, Finland. I wonder how many readers will make it that far in the text.

Keen readers should look into *Kurt Gödel: Collected Works* (Oxford U. Press, 1986–2003), edited by Solomon Feferman and colleagues, if they want better information about his research. Biographies that are more straightforward than Yourgrau's include John W. Dawson Jr.'s *Logical Dilemmas: The Life and Work of Kurt Gödel* (A. K. Peters, 1997) and Torkel Franzén's *Gödel's Theorem: An Incomplete Guide to Its Use and Abuse* (A. K. Peters, 2005).

Not to be forgotten in *A World Without Time* is the author's take on the role of philosophers. Yourgrau outs himself as a philosopher but recommends, if you too are one, not to let anyone know, so as to avoid being caught up in embarrassing questions about the hows and whys of the universe and all the rest. It's better to say you are an architect, and leave it at that (page 164). Well, he must have had bitter experiences, and we all understand why by now.

Three of the book's seven illustrations gratuitously feature Gödel with his wife, Adele, a former nightclub dancer. If you can resist that temptation as well, don't get *A World Without Time*, and save yourself a lot of time—it does exist after all, and time is money, according to the pragmatists—money better spent elsewhere.

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Gravity's Shadow: The Search for Gravitational Waves

Harry Collins
U. of Chicago Press, Chicago,
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ISBN 0-226-11378-7 paper

Gravity's Shadow: The Search for Gravitational Waves, by Harry Collins, is an account of the experimental search for gravitational

waves, from the quest's beginnings around 40 years ago to the very recent past. Collins, a research professor of sociology at Cardiff University in the UK, is particularly concerned with the sociology of doing science and the growth from small-scale research to some of the current large-scale research projects. He also covers many aspects of the development and interpretation of gravitational-wave research in unprecedented detail. The book is impressive and contains material that will interest many scientists and other readers.

The book's 900-page mass may be a deterrent to some, but even individual chapters are unusually engaging. The gravitational waves referred to in Collins's book are traveling disturbances in spacetime, believed to be generated by accelerating masses in such astrophysical phenomena as a supernova outburst or a rapidly rotating and slightly asymmetrical neutron star. Gravitational waves are a long-standing prediction of Albert Einstein's relativity theory, but the expected observable effects on Earth are so minute that some physicists had thought these effects to be practically undetectable. Detection of the waves could be very valuable as a new tool for studying astrophysical processes, particularly those hidden by the absorption of the electromagnetic or other radiations emitted.

In the 1960s, Joseph Weber began publishing results of experiments involving measurements of small vibrations in large, isolated aluminum bars. He claimed some of the vibrations he observed were caused by gravitational waves. His claims stimulated a first generation of experimental attempts around the world to detect gravitational waves. A careful account of Weber's work, and of related experiments and interpretations elsewhere, forms an important part of Collins's book. The author describes interviews he had with Weber up to the physicist's death in 2000, as well as those with Weber's former graduate student Joel Sinsky, who provides some interesting experimental details.

Taken all together, I think the parts of the book that deal with Weber give the best account of his work I have read. The author's experiences with Weber are in good accord with my own. Collins paints a fascinating picture of a scien-

