

from each other, yielding a wider temperature range and an increased uncertainty. Today the experts are confident that they know better than the models.

The last part of the book discusses the human side of climate change; determining future warming is only the first step in dealing with the climate crisis. We need to evaluate the social, economic, and environmental consequences of a warmer planet. Stainforth summarizes some of the contentious results of mainstream economists; he not only underlines the wide divergences among them but also stresses how even a small change in the predicted warming drastically changes the damage estimates.

In *Predicting Our Climate Future*, Stainforth lists many factors for the divergences, perhaps the most important of which is the choice of discount rate, which is used to express the costs of future climate damage in terms of today's currency. A typical discount rate of 6%—advocated by the economist William Nordhaus—would put the cost of avoiding \$200 trillion of climate damage in the year 2100 at a mere \$2 trillion today. If we really care for our children, we should instead follow Nicholas Stern in his 2006 report on the economics of climate change and use a much lower rate: Stainforth discusses a discount rate of 0.1%, while Stern used an average rate of 1.4%. Using the latter rate yields \$72 trillion today, comparable to the global GDP, and it led to Stern being accused of making “fear-mongering arguments” in a *Wall Street Journal* editorial.

Stainforth does an admirable job navigating the wide-ranging and technically demanding material, yet statistical physicists may have reservations. Why forecast the weather to the year 2100 when the goal is a decadal average? Why care about the positions and velocities of the particles in a box if all you want is the macroscopic pressure or temperature? Indeed, an entire historical strand of fluid mechanics and atmospheric sciences—turbulence theory—is dedicated to elucidating the relevant higher-level statistical laws, and that neglected strand has already started to evolve with new stochastic models that substantially reduce uncertainties. Still, for those interested in an introduction, Stainforth's book is a useful place to start.

Shaun Lovejoy

(lovejoy@physics.mcgill.ca)
McGill University
Montreal, Quebec, Canada

NEW BOOKS & MEDIA

The Six

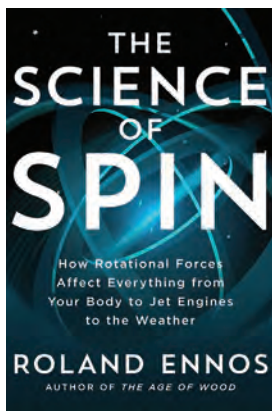
The Untold Story of America's First Women Astronauts

Loren Grush

Scribner, 2023. \$32.50

In 1978 NASA accepted six women into its previously all-male astronaut corps: Sally Ride, Judy Resnik, Kathy Sullivan, Anna Fisher, Margaret “Rhea” Seddon, and Shannon Lucid. *The Six* tells the inspiring story of the women's journeys up to entering the astronaut program, their experiences once they were admitted, and the pioneering missions that made them the first US women to fly into space. According to the author's note, as part of her research, science reporter Loren Grush conducted more than 100 hours of interviews, consulted archival documents, and reviewed audio and video footage of old interviews and press conferences. The result is a vivid, blow-by-blow account of a groundbreaking period in history.

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The Science of Spin

How Rotational Forces Affect Everything from Your Body to Jet Engines to the Weather

Roland Ennos

Scribner, 2023. \$28.00

In this popular-science book, biologist Roland Ennos sheds light on a fundamental physics principle that he claims has not received the attention it deserves. As Ennos points out, the science of spin “pervades” the world around us. Spin helped form the universe, made Earth habitable, allows humans to walk upright, and is integral to machinery and technology. Yet most people don't really understand how it works. To explain the mechanics of rotation, Ennos eschews mathematical formulas and equations in favor of more intuitive physical explanations of the workings of the universe, human beings, and the machines we've created. The result is a highly approachable book for general readers and scientists alike.

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Starstruck

A Memoir of Astrophysics and Finding Light in the Dark

Sarafina El-Badry Nance

Dutton, 2023. \$29.00

Long fascinated with the stars, astrophysicist Sarafina El-Badry Nance presents a memoir that blends tales of her educational experiences and family life with observations about the universe. Growing up in Texas in the 1990s and 2000s with an American father and Egyptian mother, Nance battled racism, sexism, her parents' marital strife, and her own insecurities to pursue her dream of becoming an astronomer. But even after gaining entry to the graduate astronomy program at the University of California, Berkeley, she found that life had thrown her yet another curveball—she'd inherited her father's cancer gene, which prompted her to undergo a double mastectomy. Despite the heavy subject matter, *Starstruck* is engaging and inspirational.

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