some readers, but the remainder of the chapter is quite straightforward and provides excellent references to other more detailed work. The chapter includes a discussion of the various exotic varieties of cooling, and it ends with a discussion of momentum diffusion, which limits cooling in most cases but can be overcome by velocity-selective coherent population trapping, a technique that allows cooling without limit.

The third chapter describes the use of these forces to enhance the brightness of atomic beams, a process that has no analogy in conventional optics. The fourth chapter discusses various techniques for focusing atoms, and includes a nice presentation of the limits on the effectiveness of focusing.

Chapter 5 discusses the channeling of atoms, which is analogous to the guiding of light in optical fibers and waveguides. It also covers methods for lowering the one-dimensional temperature without requiring any nonconservative processes. Chapter 6 discusses atom mirrors, and the final, seventh, chapter considers the use of mirrors to form resonators in which atoms bounce back and forth many times, interfering with themselves to form mode patterns like those in optical cavities.

The recent demonstration of Bose–Einstein condensation, then, raises the possibility of an atom laser, a source of a coherent beam of atoms. Such a device would advance atom optics in the same dramatic way that lasers revolutionized conventional optics. Atom gyroscopes may be able to realize a 10^{10} improvement in sensitivity over optical gyroscopes, and the capacity of a "compact disk for atoms" might exceed that of an optical disk by eight orders of magnitude.

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Superconductivity

C. P. Poole Jr, H. A. Farach and R. J. Creswick
Academic P., San Diego, Calif., 1995. 620 pp. $149.00 hc
ISBN 0-12-561455-1

This book is about superconductivity in general and the new class of cuprate (high-temperature) superconductors specifically. With regard to the latter, the authors remark in the preface that, while the underlying mechanism of superconductivity in these materials is open to question, "the overall picture is now clear enough to warrant the writing of a textbook."

While no doubt many of you have your own lists of what properties of the cuprates have in fact become "clear" in the last ten years, I think most people would agree on three major respects in which they differ, in the superconducting state, from the standard (Bardeen–Cooper–Schrieffer) superconductors: (1) Because of the short coherence length of the cuprates, fluctuations are vastly more important and often change the picture of the macroscopic electromagnetic behavior almost qualitatively with respect to the BCS case; (2) the density of elementary excitations is finite even at energies much smaller than kT_c; and (3) the order parameter (internal wavefunction of the Cooper pairs) does not have the symmetry of the Hamiltonian and is very probably of the so-called $d_{x^2-y^2}$ type.

Unfortunately, anyone whose only acquaintance with cuprate superconductivity comes from this book will know little of (1), virtually nothing of (2) and nothing whatever about (3). (This issue, apart from the mechanism itself, has probably been the most intensely discussed in the whole subject over the last five years; it is dismissed in this 600-page book with a one-line reference to the literature on page 172.) I think the average reader of *Superconductivity* will be left with the impression that the only unusual thing about the cuprates is their peculiar crystal structure and consequent strong electromagnetic anisotropy; the authors display a striking lack of curiosity about how this structure relates to the high transition temperatures of these materials.

The book's general material on superconductivity may conveniently be divided into (1) basic phenomenology and microscopic considerations, (2) macrosopic electromagnetic properties and (3) tunneling, transport and spectroscopy. With the possible exception of parts of (2) where I do not feel competent to judge, the presentation of this material seems to me nowhere superior to that available in existing texts such as *Superconductivity of Metals and Alloys* by Pierre Gilles de Gennes (W. A. Benjamin, 1966) or *Introduction to Superconductivity* by Michael Tinkham (McGraw-Hill, 1975) and indeed in many cases it is much worse; the writing is repetitive, ill-organized and often sloppy, with a tendency to bolster disconnected bits of material with lengthy and indiscriminate lists of references. (On some pages, virtually half the "text" is in fact references!)

No doubt one should expect the odd slip in a book of this length, but this one is full of them. They include irritating minor errors (for example, the statement in table 3.3 that the atomic number of lithium is 2), inconsistent, ambiguous or misleading definitions (for example, of the anisotropic penetration depths in section 9.IV.A), misstatements of experimental fact (for example, the unqualified statement on page 258 that ρ_c is proportional to $1/T$ in the cuprates), passages so sloppily written as to be almost unreadable, and theoretical misconceptions, in some cases quite serious (for example, that the reason the nonpairing terms are normally neglected in BCS theory is that they are much smaller than the pairing terms).

The most useful feature of the book is its extensive data tabulations and diagrams, and for this reason it may be helpful as a reference work. Apart from this, frankly, I can see no good reason to recommend it.

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Heinrich Hertz: A Short Life

Charles Susskind
San Francisco P., San Francisco, Calif., 1995. 190 pp. $18.25 hc
ISBN 0-911302-74-3

In Victorian times a proper biography required both great length, to show respect, and appropriate silences, to avoid offending propriety. Contemporary tendencies in the writing of lives are considerably different, and many readers today expect to find scandal, hypocrisy, cupidity and lust in its myriad forms—indeed all things formerly thought to be vices—placed at the very center of the story. "The mighty made humble" could well be the motto of many a biography today.

Scientist-subjects have not escaped the general trend, as a cursory glance at bookstore shelves will make amply evident. An argument can be made that prying open the boundary between private and public life occasionally helps to illuminate scientific work. Nonetheless, it can just as easily be simply prurient.

Charles Susskind's biography of the German physicist Heinrich Hertz, who in 1887 and 1888 produced and detected electric waves in air, will hardly satisfy the scandalmonger, the sociologist or the cultural critic. Neither, however, will it provide much sustenance for those deeply interested in Hertz's laboratory work and papers, since Susskind gives only brief accounts of these matters. Nevertheless, in the small compass of this book the author nicely provides a solid, and often quite insightful, look at the life of a striving young member of the growing German physics community in the period between 1875 and 1894,