As it is elegantly used in chapter V to compute the Mollow resonance-fluorescence triplet, one might have expected more emphasis on both this method and on the quantum regression hypothesis.

The last chapter discusses the dressed-atom formalism, an approach made famous by the French school that offers unique insight into many aspects of light–matter interactions. It is sometimes argued that relaxation phenomena are difficult to handle with this formalism and that a bare-atom description is preferable in such cases. The dressed-states basis master equation, also discussed in this chapter, shows that this need not be the case, and the recent success of this approach in the theory of Sisyphus cooling speaks for itself.

*Atom–Photon Interactions* is an essential addition to the personal bookshelf of any serious student or researcher in the field. My hope is that we will soon be treated to a follow-up volume of the same caliber, one that concentrates perhaps on atomic motion in laser light, a field in which the authors have made a number of trailblazing contributions.

## Matter and Methods at Low Temperatures

**Frank Pobell**
*Springer-Verlag, New York, 1992. 319 pp. $79.00 hc*
*ISBN 0-387-53751-1*

If we follow the introduction to Frank Pobell's new book, then the area of science we call low-temperature physics is about 150 years old, starting with Faraday's liquefaction of a gas. Temperatures achieved in the laboratory have plunged logarithmically with time. The quest for lower temperatures has led to the discovery of new quantum states in liquid and solid materials, with superconductivity and superfluidity being the most notable examples. There is no doubt that as temperatures are reduced to even lower decades, new physical phenomena will be found.

Pobell's work is the latest in a growing number of books treating this topic. I have been asked by my colleagues if they should add this one to their libraries. The answer is yes, for the following reasons.

Pobell's book addresses the properties of materials and the methods of low-temperature physics between 10 K and 12 μK, this lowest temperature being a record held by the author and his research group at Bayreuth in Germany. Topics covered in seven chapters include cryoliquids and oth-

er materials at low temperatures; thermal transport; helium-3, helium-4 and dilution refrigeration; Pomcranchuk cooling; electronic and magnetic demagnetization cooling; temperature and thermometry; and cryogenic techniques.

The book contains 192 figures, which present a good balance of schematic representations of instrumentation and graphical descriptions of physical parameters and properties. Approximately 25 tables provide important additional information on materials and processes. The appendix is brief; most tabular information is in the text proper. Each chapter has extensive references: Do not look for detailed discussions of such topics as the two-fluid model or Fermi liquid theory; Pobell refers the reader to other works.

The book is part of the Springer textbook series, and it would serve well as the main text in a postgraduate course on experimental low-temperature physics. However, it has no exercises or problems. Of equal or greater importance is the role of Pobell's book on the shelf of an active low-temperature research laboratory. There are nearly a half dozen books on the same topic (referenced by Pobell in his introductory chapter), the most recent of which is Robert C. Richardson and Eric N. Smith's *Experimental Techniques in Condensed Matter Physics at Low Temperatures* (Addison–Wesley, Redwood City, Calif., 1988). Another book that comes to mind is Olli V. Lounasmaa's monograph *Experimental Principles and Methods Below 1 K* (Academic, London, 1974). My general impression is that the style of Pobell's book lies somewhere between the pragmatic nuts-and-bolts approach of Richardson and Smith and the classic elegance of Lounasmaa's much earlier, but still very useful treatise. Of course, each book is unique, because each represents a distinct school of thought and provides technical pointers specific to the author's (or authors') research group.

Pobell treats each topic in considerable depth, usually starting with a historical perspective and followed in turn by the theoretical background, physical properties, practical considerations in experimental design, detailed schematic drawings of experimental apparatus and the performance of the instrumentation. Take for instance the chapter on thermometry. Pobell prefaces the chapter with some general comments on the practicality of primary and secondary thermometers. He then discusses primary thermometry, including gas thermometry, vapor pressure, the helium-3 melting curve and thermoelectric thermometers. Then comes a discussion of the practical application of secondary resistance thermometers, in terms of both the sensors (including the more recently employed $RuO_2$ and Matsushita components) and the measuring instrumentation. The chapter ends with sections on thermometers based on noise, dielectric constant, magnetism (electronic and nuclear) and nuclear orientation. In each case Pobell gives ample theoretical background and discusses applications.

In summary, the high points of Pobell's book are its elegant and thorough treatment of the central topics in experimental low-temperature physics, the extensive graphs and tables describing the properties of cryogenic fluids and other materials used in low-temperature physics, and the discussion of up-to-date aspects of the technology of low-temperature instrumentation. *Matter and Methods at Low Temperatures* is a worthy addition to any research or instructional library involved in low-temperature physics.

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## Boojums All the Way Through: Science in a Prosaic Age

**N. David Mermin**
*Cambridge U. P., New York, 1990. 308 pp. $16.95 pb*
*ISBN 0-521-38880-5*

David Mermin is one of those rather rare scientists who can write with cleverness and style. However, his book *Boojums All the Way Through* falls a bit short of the promise. It is a collection of previously published essays, articles, conference proceedings, and book reviews, gathered under the rubric "communicating science in a prosaic age." (I am still not sure what that really means.)

The opening essay is appropriately titled "E Pluribus Boojum: The Physicist as Neologist." We learn that "boojum" is a doggerel word from Lewis Carroll's "Hunting of the Snark," and is a word Mermin deployed in 1976 to describe a construction of vortex lines in liquid helium-3. We then hear everything there is to know—I believe—about how this word actually became incorporated into the contemporary physics literature. The essay includes lengthy quotations from correspondence with editors and physicists and lots of other historical debris. For an introductory piece that is to set the stage for the rest of the book, we get far too much boojum—as well as too much Mermin.

There is excellent writing and provocative material in the remainder of the collection, although some parts carry a bit too heavy and wordy a Mermin load. But let us start with a bit of the good. Here is a passage from the beautiful commemorative talk "My Life with Landau":

> I did my PhD research thirty years ago at Harvard. It was then the practice at Harvard never to mention the names of non-Harvard physicists, so I knew of Landau only as the coauthor of a formidable series of textbooks, until I stumbled across him in the middle of my thesis.

Good stuff. And another gem, from "What's Wrong with These Equations?"

> When I was a graduate student teaching assistant in a physics course for nonscientists, I was struck by the exceptional clumsiness with which extremely literate students, who lacked even the exposure to such examples, treated mathematics in their term papers. The equations stood out like dog turds upon a well-manicured lawn.

I wish I had written that! But his implicit call for literary clarity is all too often ignored by Mermin himself. He writes, for example:

> Bell thereby demonstrated that, Pauli to the contrary notwithstanding, there were circumstances under which one COULD settle the question of whether "something one cannot know anything about exists all the same," and that if quantum mechanics was quantitatively correct in its predictions, the answer was, contrary to Einstein's conviction, that it does not.

Wow. To quote Professor Gabriel Weinreich, I can only say, Professor Mermin, that "I could not fail to disagree with you less."

After reading the whole book, I realized what the problem was. As a reviewer I had felt compelled to read the entire thing! Had I bought the book as a companion for a long plane flight or for an evening at home, I am sure I would have found it by and large delightful, because I would have picked and chosen my way through the collection. I would, for example, have skipped a large part of the first piece and thereby not have become annoyed, and I would have undoubtedly read "What's Wrong with this