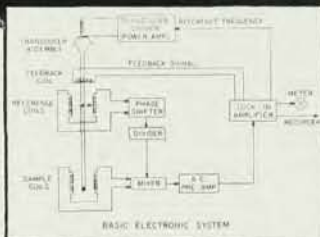


VIBRATING SAMPLE Magnetometer

FOR MEASURING MAGNETIC MOMENTS of Solids, Liquids & Gases

First commercially available Foner* type Vibrating Sample Magnetometer. This precision research instrument vibrates a sample in a relatively uniform magnetic field in a direction perpendicular to the field. The AC signal produced by the moving sample is detected and analyzed by associated electronic systems. The Magnetometer is versatile and sensitive, and can be used with any conventional laboratory electromagnet.



A wide range of magnetic moments can be precisely measured over an extended range of temperature, field and crystallographic orientation. Errors are minimized. Calibration is simple. Stability is high. Permanent or induced magnetic moments can be measured and the orientation of the magnetic moment vector can be determined for any direction in space. Magnetic moment measurements of Superconductors, and Ferri-, Para-, Ferro-, Dia-, Antiferro-, and Meta-magnetic materials have been made with this system. Custom built to order. Several optional features such as dewars, ovens, recorders, and special-purpose coil assemblies are available. Your inquiries on specific magnetic measurement problems are invited.

*Manufactured exclusively by PAR under license in U.S. Patent No. 2,946,948.

Pertinent Specifications

DIFFERENTIAL SENSITIVITY: Change in magnetic moment of 5×10^{-4} to 5×10^{-5} emu corresponding to change in magnetic susceptibility of 5×10^{-8} to 5×10^{-9} cgs for 1 gram sample at 10^4 gauss.

STABILITY: Stability of output signal better than 1 part in 10^4 /day for fixed coil geometry.

ABSOLUTE ACCURACY: Better than 2%.

PRICE: By quotation only. Approximately \$8,800 for basic system.

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one and several other of his books amply show how masterfully the subject could be handled by him.

La Poussière cosmique. Les Milieux interplanétaire, interstellaire et intergalactique. By A. Dauvillier. 207 pp. Masson et Cie, Paris, 1961. 25 NF. Reviewed by E. J. Öpik, University of Maryland.

THE author of the book has published some essays in cosmogony. Not having seen these works before, this reviewer decided to start with the book on cosmic dust, one of his own subjects. The disappointment was complete. After reading the first 40 pages, and a rapid perusal of another 50, the numberless misstatements convinced the reviewer that further reading was useless.

The most flagrant example is on pp. 47 (Fig. 5) and 48, where Phobos, the inner satellite of Mars, is represented as having retrograde motion, opposite to the sense of rotation of the planet and that of the other satellite, Deimos. This serves some of the author's cosmogonic speculations, but is pure invention.

Some other pearls: on p. 11, in the first introductory paragraph of the book, gas pressure depends on density only; on p. 12, Phobos (the retrograde!) is said to be a cloud of small particles (what about tidal disruption by Mars?); on pp. 12 and 88, comets are said to be strongly influenced by planetary perturbations, by virtue of their small masses ("de par leur faible mass", thus Newton amended); on p. 15, solar wind is rejected as the cause of repulsive forces in comet tails because it would blow away the planetary atmospheres; on p. 72, to avoid tidal breakup of a solid body inside Jupiter's Roche's limit, Sir Harold Jeffereys' theory is quoted as requiring the diameter to *exceed* 400 km, whereas it is just the opposite, only small bodies being able to maintain their integrity by cohesion; on p. 80, 10^{20} molecules per cm^3 are said to yield a density of 10^{-13} gm^{-3} . This may suffice.

Mathematics for the Physical Sciences. By Herbert S. Wilf. 284 pp. John Wiley & Sons, Inc., New York, 1962. \$7.95. Reviewed by Peter L. Balise, University of Washington.

A TEACHER of applied mathematics in science or engineering may choose from a rapidly increasing number of texts, all covering about the same topics, emphasizing applications and minimizing rigor, and differing mostly in writing style (which of course can be a vital difference). Although Professor Wilf's book also deals with the subjects common to these texts, it is refreshingly different in a way that will make it attractive for some teachers and unusable for others.

Physical applications are not mentioned, and the approach is rigorous, but the exposition is obviously aimed toward applications, giving the text a clarity for nonmathematicians reminiscent of Ralston and Wilf's *Mathematical Methods for Digital Computers*. There is some discussion of numerical methods, but more prominent is the author's attention to mathematically

unifying topics that are superficially different, which makes the work of modern value even though its subjects are mostly classical.

This approach is illustrated by the first two chapters, in which the general concept of vector space is first outlined, specialized to Hermitian space, and then applied to particular subjects such as eigenvalues, matrices, and orthogonal functions. A presentation of iteration procedures for calculating roots is preceded by a quite thorough discussion of the behavior of the zeros of a polynomial. Similarly, characteristics rather than techniques are emphasized in chapters on ordinary differential equations, conformal mapping, and extremum problems, and in a particularly informative chapter on asymptotic expansions.

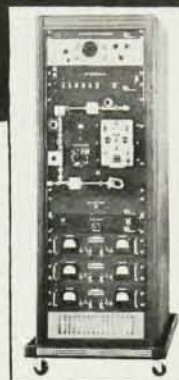
This text would not be appropriate for teachers who wish to use many physical applications for illustrating the similarity of the underlying mathematics, nor for mathematics courses where depth of treatment is desired. But to give graduate students in science and engineering some insight into the fundamental relationships among various mathematical subjects, this work is warmly recommended.

Mathematics for Quantum Mechanics. By John David Jackson. 97 pp. W. A. Benjamin, Inc., New York, 1962. Paperbound \$3.50, clothbound \$4.75. *Reviewed by Michael Danos, National Bureau of Standards.*

WHEN embarking on a serious study of quantum mechanics, the student frequently does not have the necessary mathematical tools at his disposal and finds that he has to learn the mathematical techniques while trying, at the same time, to fathom the subtle concepts of quantum mechanics. As a result, he frequently mistakes mathematics for physics and vice versa. Of great help would be a book on the mathematics for quantum mechanics which would provide sufficient mathematical understanding and skill to enable the student to concentrate on the physics and use the appropriate mathematical tools with assurance.

Jackson, being an experienced teacher, is painfully aware of the need for such a book, and also of the difficulty of writing it. He therefore sets himself a lower goal. "The purpose of these notes is to set forth the (bare) essentials of the mathematics of quantum mechanics with only enough mathematical rigor to avoid mistakes in the physical applications." Unfortunately, his book falls short of this goal. One probably has to expect nonuniform convergence in the efforts of providing an adequate book. Some sections (particularly in the chapter on linear vector spaces) have practically "hit the mark"; others (e.g. in the chapter on orthogonal functions) can, at best, be considered to provide a description of the mathematical concepts. The coverage of the book ranges from a mere listing of the necessary mathematical subjects to a treatment of adequate thoroughness. Using this book alone, a student not already familiar with the mathematics could not acquire

MICROWAVE Interferometer FOR MEASURING ELECTRON DENSITIES IN PLASMA



This "zebra stripe" presentation type instrument is essentially a swept-frequency dispersive bridge. It is self-calibrating and self-zeroing, so that in making a measurement only the relative fringe shifts must be determined.

Significant features of this display scheme are:

- Fringe pattern deflection is directly proportional to phase shift (which, in turn, is a function of electron density).
- Direct and continuous calibration, in terms of inter-fringe spacing.
- Continuous fringe display permits wide dynamic range for phase shift measurements.
- Capability of resolving fast transient phase shifts.

The units are completely self-contained in a relay rack and are supplied with 32 feet of waveguide for use in the long path of the bridge. To be used they must only be plumbed into the plasma experiment under investigation. Custom built to order. Available at discrete frequencies up to 70 KMC (4mm). Your inquiries on specific plasma diagnostic measurements are invited.

Specifications	4 MM	8 MM
Maximum Plasma Density:	$6 \times 10^{13} / \text{cm}^3$	$1.5 \times 10^{13} / \text{cm}^3$
Minimum Plasma Density:	$10^{12} / \text{cm}^3$ (Depends on plasma thickness and noise generation)	$3 \times 10^{11} / \text{cm}^3$
Time Resolution:	approx. $5 \mu\text{s}$	approx. $5 \mu\text{s}$
Price: By quotation only:	4 MM system approx. \$20,000	8 MM system approx. \$18,000

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