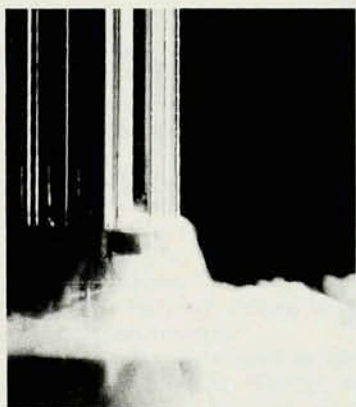


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Tools of Radio Astronomy by Kristen Rohlfs first presents the fundamental principles and measurement techniques that are the topic of the other books, and then focuses on the physical interpretation of the data. The emphasis is on cm-wavelength astronomy with single telescopes rather than the higher-resolution interferometric approach.

An outline of the theory of electromagnetic waves and their propagation through an ionized plasma opens the first half of the book. This is followed by discussion of the application of this theory to antennas, including both interferometers and parabolic telescopes. Finally, there are a succinct, well-developed section on signal processing and brief discussions of the fundamentals of receivers, mixers and spectrometers. This summary of all technical aspects of radioastronomy is the broadest among the three texts.

The second half of the book deals with the astrophysical interpretation of data. Two primary continuum emission mechanisms, thermal bremsstrahlung and nonthermal synchrotron radiation, are derived from first principles. The detail of the derivations is appropriate for this kind of book: The finer points involving detailed mathematical analysis are omitted, but the basic physical principles are emphasized with full rigor. Rohlfs then applies these theories to a few "textbook" examples to illustrate the basic observational results to be expected.

The discussion of synchrotron emission of an individual particle is particularly useful, because it succinctly presents the full range of physical principles required for a full understanding of the process. However, the absence of topics such as the "low-frequency turnover," which results from either opacity or diffuse plasma effects, and the evolution of the energy distribution of emitting particles is disappointing.

The physical principles of spectral-line radiation are first developed at an appropriate level, and then applied to the 21-cm hydrogen line and to recombination lines. Rotational and vibrational spectra of molecules are briefly treated, and considerable detail is given regarding 2.6-mm emission from the abundant molecule CO. While the absence of further information on mm-wavelength spec-

tral transitions of molecules is reasonable given the book's emphasis on cm wavelengths, Rohlfs gives little information on molecules that emit at cm wavelengths. A table of molecules, line frequencies, transition probabilities and energy levels involved in at least the most important cm-wave molecular transitions would have improved this part of the text. The theoretical treatment of interstellar masers, again at a nice level of detail, surprisingly is not accompanied by a discussion of the important masers: OH, H₂O and CH₃OH.

The three books serve quite different purposes. Christiansen and Högbom's book provides a broad coverage of most instrumental topics germane to radiotelescopes. Thompson, Moran and Swenson's is a densely packed reference book for all aspects of interferometry and aperture synthesis, one that we are all glad that "someone" has written. Rohlfs's *Tools* presents basic topics in radioastronomy that cover both instruments and astrophysics. The former two would be appropriate for a techniques-oriented graduate course, while the latter is designed for a broader survey of radioastronomy. *Interferometry and Synthesis* is the most important technical source book available for practicing astronomers and observatory staff.

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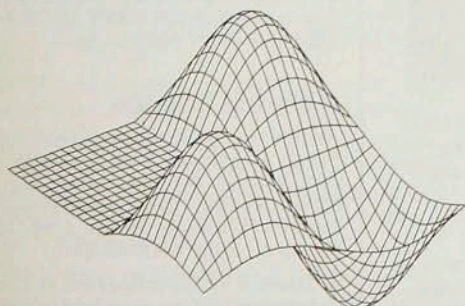
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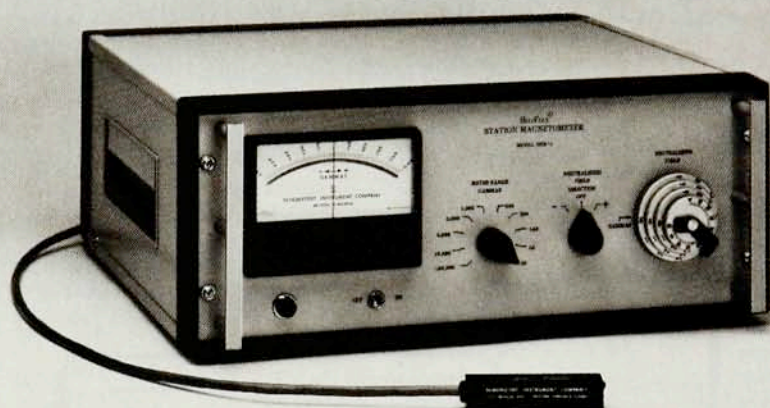
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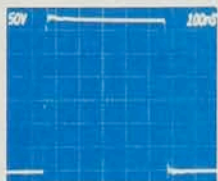
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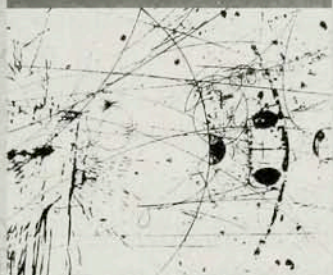
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