

sensation is aimed at graduate students and researchers, who would find such a summary of the field useful.

Stewart describes the two-component spinor formalism associated with Ted Newman and Roger Penrose, and reviews some of its applications. This part will become required reading for my graduate students. It is both an excellent survey of the technique aimed at the practical use

of the formalism and an introduction to the more extensive treatment in the two-volume *Spinors and Space-Time* (Cambridge U. P., New York, 1984) by Penrose and Wolfgang Rindler. The appendix, which contains complete sets of equations and transformation laws, is valuable in itself.

What makes the book unique among texts—as distinct from anthologies of review articles—are the dis-

cussions of “asymptopia” and the characteristic initial-value problem. Asymptopia, the geometry of conformal infinity, provides a rigorous way of discussing the “far field” that, for example, enables one to define mass loss by gravitational waves using the asymptotic four-momentum introduced by Hermann Bondi. Stewart describes tools such as spin-weighted spherical harmonics in a unified notation, avoiding the confusions that arise in the research literature.

The characteristic initial-value problem and methods for solving it are the ultimate theme of this text. In the characteristic initial-value problem the field equations for general relativity decompose in a rather subtle way, and the author's work, together with that of Helmut Friedrich on the conformal vacuum field equations, provide the most advanced framework available for solving the problem. The last point reached in this discussion is the relation of the possible caustics of gravitational waves with Vladimir I. Arnold's classification of singularities, which is nicely illustrated in this book.

One can always find minor quibbles with any text. For example, I think a clearer link between the book's definitions of hyperbolic equations and the ones familiar to many from elementary courses would have been useful. Also, the many problems and exercises, some extremely difficult, could have been accompanied by sketch solutions or suitable references to the literature. But dwelling on such minutiae would give a misleadingly negative tone to my review. This is a fine and very useful book, which I strongly recommend to all interested in the subject.

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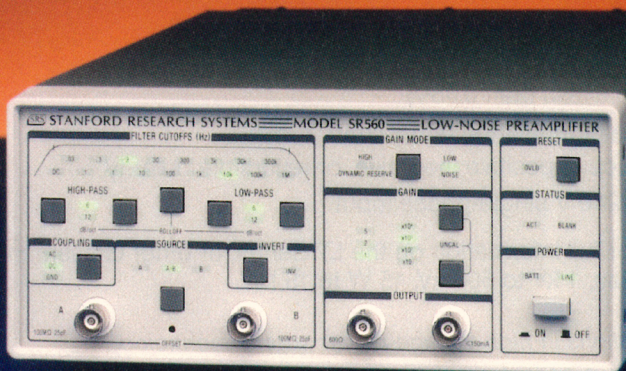
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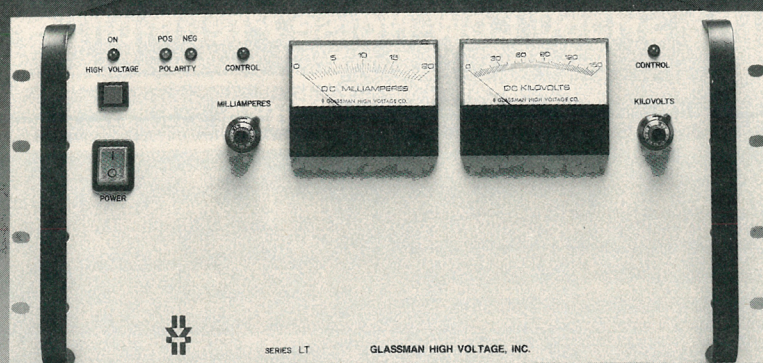
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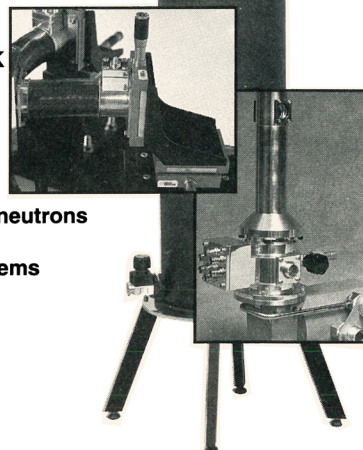
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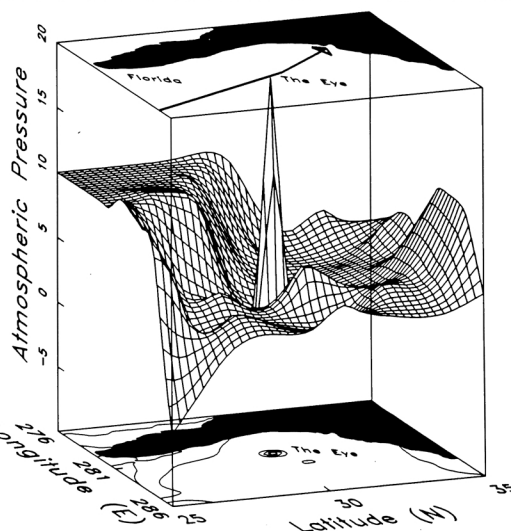


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