

relativity, as Choquet-Bruhat states in the foreword. Those chapters, which require that the student understands calculus, are titled "Lorentz Geometry," "Special Relativity," "General Relativity and Einstein's Equations," "Schwarzschild Spacetime and Black Holes," and "Cosmology." That opening section is just 140 pages long, but it has enough material for a reasonably paced, solid course. Even the introductory content is delivered with some rigor and attention to detail—for example, there is some discussion of homogeneous non-isotropic cosmologies—a hint of what is to come.

The next five chapters—directed at researchers—deal with global-in-space, local-in-time results for generic solutions of the Einstein equations. Now, the reader is expected to have a more solid footing in mathematics. Readers can obtain the relevant mathematical background from *Analysis, Manifolds and Physics* (North-Holland, 1996, part 1; 2000, part 2), written by Choquet-Bruhat and Cécile DeWitt-Morette.

The next chapters are "Local Cauchy Problem," "Constraints," "Other Hyperbolic-Elliptic Well-Posed Systems," "Relativistic Fluids," and "Relativistic Kinetic Theory." The author then interjects a chapter on a rigorous approximation

method applicable to the study of relativistic fluids, electromagnetic waves, and gravitational waves. The remainder of the book covers global-in-time problems—an active and open area of investigation. Two of the topics discussed are global hyperbolicity and global existence theorems for asymptotically Euclidean data. The volume is supplemented with a series of appendices—for example, Sobolev spaces on Riemannian manifolds, general hyperbolic systems, and conformal methods—and a set of relevant papers.

Given that two-thirds of the book is very sophisticated indeed, would I really recommend it for a first course in general relativity? My answer is yes. The introductory material would need to be supplemented with problems, but good problems on the subject are not hard to come by. But perhaps the primary reason to recommend this book is because a student, or indeed a lecturer, just might turn to page 142 and start a fascinating journey.

For anyone who conducts research in general relativity, *General Relativity and the Einstein Equations* is a remarkable resource. Choquet-Bruhat and her guests explain many difficult points in the theory with a rigor and clarity not found anywhere else. But the book is

also a refreshing exposition of what is not known: The reader will come away feeling that general relativity has many exciting aspects to it just waiting to be discovered.

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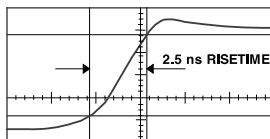
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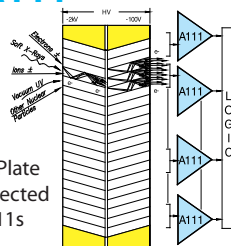


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