SUGGESTED REFERENCES: Chapter 7

A.P. FRENCH. *Special Relativity* The literature oil relativity has been one of the worlds growth industries. especially during the last few decades. It would overstrain all the constraints of space limitation to list even a ,goodly fraction of the worthwhile references, and only a highly individualistic selection can be given here. French's book has been physics praised as one of the best introductory treatments. The mathematics is at the level of freshman or sophomore physics, there is a heavy emphasis on tile experimental phenomena that led up to, and verified. the theory of special relativity. Two chapters relate to mechanics. mainly on conservation theorems and relativistic forces.

ALBLERT EINSTEIN, *The Meaning of Relativity*. This is *not* a treatment designed for popular audiences. Little more than a third of this brief book is concerned with special relativity, but it contains a great deal of information. A considerable background in electrodynamics is assumed.

R. D. SARD. *Relativistic Mechanics: Special Relativity and Classical Particle Dynamics*. This is relativistic mechanics at the level of an intermediate mechanics course; Lagrangian mechanics is not discussed. There is otherwise an incredible amount of material here. In deriving,, the Lorentz transformation special care is taken to reduce the necessary presuppositions to the minimum. Considerable emphasis is given to particle kinematics. Minkowski space is used almost throughout.

K. R. SYMON, *Mechanics*. The last two chapters are an unusually elaborate treatment of relativity for an intermediate level text. Four-space is introduced early with a metric tensor of trace + 2 and thus provides a gentle introduction to manipulations in a non-Euclidean space.

J. L. SYNGE and **A. SCHILD** *Tensor Calculus*: Chapter 2 of this book is one of the best compact references for the manipulation of tensors in Riemannian spaces. The senior author's books on relativity, both special and general, are so voluminous as to dismay the incidental reader, but that should not deter one from this text.

J. D. JACKSON. *Classical Electrodynamics* The first edition of this renowned text covered almost all topics in special relativity, from the Michelson-Morley experiment to relativistic motion in particle accelerators, with an unusually extensive section on relativistic kinematics. It used a complex Minkowski space with $x_4 = ict$. The second edition has changed to a space with trace –2 and has dropped most of' the early experiments and all of the section on kinematics. Discussions on Lagrangian formulations have been extended, including, Lagrangians for- more than one particle that are only approximately relativistic, and Lagrangians for fields. to be treated in Chapter 12 (3rd Ed. – Chapter 13). Below.. Between the two editions one has almost all that would be wished for- on special relativity. For present purposes the first edition version is in fact more useful.

H. M. SCHWARTZ. *Introduction To Special Relativity*. This reference is representative of the full-scale treatises on special relativity, in particular one ,with an approach roughly corresponding to that taken here. Notable are the treatments of group properties of the Lorentz transformations and of Thomas precession. Initially, the discussion is, based on Minkowski space. Although the use of tensors in flat spaces is gone into in great detail. it is not clear what trace or signature is finally decided on.

V. FOCK, *Theory of Space, Time and Gravitation*. Most of this treatise by a distinguished Russian physist is devoted to what we call general relativity. The first 100 pages, however, are on specialrelativity with a number of exceptional features, such as detailed analysis of the "paradoxical" experiments and the decomposition of a Lorentz transformation into a rotation and a pure Lorentz transformation. Where tensors are used the space mostly has a trace or or signature –2.

C. W. MISNER; K. S. THORNE; and **J. A. Wheeler,** *Gravitation*. This massive treatise (1279 pages! (the pun is irresistible)) is to be praised for the great efforts made to help the reader through the maze. The pedagogic apparatus include, separate marked tracks. boxes of various kinds. marinal comments. and cleverly designed diagrams. An angle blowing a trumpet marks the end of the book, celebrated., along with other items, with a couple of French songs and a diagram of the phrenology of a devoted "relativist." It makes the reading great fun, if not completely, painless for all that. The physics of flat space time (i.e., special rrelativity) covers only 193 pages, and there is a refreshing new viewpoint on every one of them. The death of *ict* is proclaimed on p. 51; the metric with signature +2 is used instead.

A. O. BARUT, *Electrodynamics and the Classical Theory of Fields and Particles.* As a preliminary to a treatment of Lorentz covariant field theories, Barut gives a brief introduction to the covariant dynamics of a particle. Noteworthy topics include the group structure of the Lorentz transformation, the rotation matrix that lurks in the Lorentz transformation, and the variety of covariant Lagrangians. The metric used has a trace – 2.

R. HAGEDORN,. *Relativistic Kinematics* Naturally this book covers much more ground than our discussion of kinematics. but it does include all the topics treated here. The equations of the Lorentz transformation are used directly, for the most part, along, with the invariants, but there is a brief chapter on tensor notation. where formulas are given for *both* signatures – 2 and + 2. As is customary in particle physics. □ is used throughout instead of *□*, (though it's written as *v*) and masses are relative to the proton mass. The typography is directly from typescript and is abominable.

H. RUND, *Hamilton-Jacobi Theory in the Calculus of Variation,* This reference is one of the few books that openly confronts the homogeneous problem and considers it at length (in Chapter 3). The particular solutions proposed are not adopted here, but the discussion of the mathematical aspects provides a useful orientation. In talking about relativity Minkowski space is used.

R. A. MANN, *The Classical Dynamics of particles: Galilean and Lorentz Relativity,* Special relativity occupies only a fraction of this relatively brief book, which is primarily a general text on mechanics, so the treatment is sketchier than might be expected. It is one of the few books that says anything about tachyons and includes a proof of the "nointeraction" theorem. Special relativity is described in terms of a space with signature – 2. The author is infatuated with group theory.

E. H. KF.RNER, ed. *Theory of Action-at-a-Distance in Relativistic Particle Dynamics,* Primarily a collection of reprints of basic papers on the question. there is a brief introductory essay by the editor surveying the state of affairs as of 1972. Since then the field has developed, and is continuing to develop. One must keep up with the journal literature.