

## A note on the choice of metric

There are two popular choices for the metric of flat Minkowski space. One, often referred to as the West Coast metric, is particularly convenient for particle physics applications. Here

$$ds^2 = dt^2 - d\vec{x}^2 = \eta_{\mu\nu} dx^\mu dx^\nu. \quad (0.1)$$

This has the virtue that  $p^2 = E^2 - \vec{p}^2 = m^2$ . It is the metric of many standard texts in quantum field theory. But it has the annoying feature that ordinary space-like intervals – conventional lengths – acquire a minus sign. So, in most general relativity textbooks as well as string theory textbooks, the East Coast metric is standard:

$$ds^2 = -dt^2 + d\vec{x}^2. \quad (0.2)$$

Many physicists, especially theorists, become so wedded to one form or another that they resist – or even have difficulty – switching back and forth. This is a text, however, that is intended to deal with particle physics, general relativity and string theory. So, in the first half of the book, which deals mostly with particle physics and quantum field theory, we will use the West Coast convention (0.1). In the second half, dealing principally with general relativity and string theory, we will switch to the East Coast convention (0.2). For both author and readers this may be somewhat disconcerting. While I have endeavored to avoid errors from this somewhat schizophrenic approach, some will have surely slipped in. But I believe that this freedom to move back and forth between the two conventions will be both convenient and healthy. If nothing else, this may be the first textbook in physics in which the author has deliberately used both conventions (many have done so inadvertently).

At a serious level, in computations the researcher must always be careful to be consistent. It is particularly important to be careful when borrowing formulas from papers and texts, and especially when downloading computer programs, to make sure that one has adequate checks on such matters as signs. I will appreciate being informed of any such inconsistencies, as well as of other errors both serious and minor, which have crept into this text.