CHAPTER 1: PHYSICS IN FLAT SPACETIME: GEOMETRIC VIEWPOINT

Reading:

Chapter 1 of Blandford and Thorne: Available at
http://www.pma.caltech.edu/Courses/ph136/
Note: This chapter is much longer than the other chapters of the book. However, it should be fairly easy reading since the material it covers will largely be familiar from previous courses; only the viewpoint will be new.

Problems

Note: I give you many options as to which problems to work. Please choose the ones that will teach you the most. Avoid those that are trivial for you, and abandon those that you find so difficult that you get badly hung up. If, in any problem, the choices I give are all trivial or all terribly difficult, then say so and pick some other problem from the chapter.

A. Work one of the following:
   - 1.1 Geometrized units
   - 1.6 Meaning of slot-naming index notation
   - 1.15 Vectorial identities (I especially recommend this one).

B. Work one of the following:
   - 1.3 Derivation of Lorentz force law
   - 1.7 Frame-independent expressions for energy, momentum and velocity

C. Work one of the following:
   - 1.8 Doppler shift without Lorentz transformation. I did this is class; if you fully understood it and now regard it as trivial, then do the analogous problem for a particle with finite rest mass rather than a photon, or do:
   - 1.16 Reconstruction of $\mathbf{F}$.

D. If it is not trivial for you, *do* work 1.11 Spacetime diagrams. Otherwise work 1.14 Around the World on TWA.

E. Work one of
   - 1.21 Global conservation of 4-momentum in a Lorentz frame.
   - 1.22 Stress-energy tensor for a perfect fluid

TA For This Week:

So far, one TA has been firmly assigned to this class: Xinkai Wu [Office: 118D Sloan Annex; phone ext. 2953; mail code 114-36; mailbox in Sloan Annex; email xinkai@its.caltech.edu]. Since many people will be working on problem sets during the weekend, Xinkai has offered to hold office hours this Saturday from 10AM to noon, in the Fairchild Library.