

**CHAPTER 23**

**Reading:** Chapter 23, *From Special to General Relativity*.

Students who were not in this class first term may need to read some sections of Chapter 1, which are cross referenced in Chapter 23. Students who were not in this class second term should read the introduction to Connection Coefficients in Sec. 10.3.

**Problems**

*NOTE:* The students in this class have a wide variety of backgrounds in relativity theory, so problems that are appropriate for some students are inappropriate (too sophisticated or too elementary) for others. Choose four problems appropriate for you from the following selection.

- A. Ex. 23.1 Invariance of a Null Interval AND Ex. 23.2: Causality
- B. Ex. 23.4: Index manipulation rules from duality
- C. Parts (a) and (b) of Ex. 23.6: Commutation and connection coefficients for circular polar bases. Also part (b) of Ex. 23.5: Transformation matrices for circular polar bases
- D. Ex. 23.9: Index gymnastics — irreducible tensorial parts of the gradient of a 4-velocity field
- E. Ex. 23.10: Integration — Gauss's theorem
- F. Ex. 23.11: Stress-energy tensor for a perfect fluid
- G. Ex. 23.14: Stress-energy tensor for a point particle
- H. Ex. 23.15: Proper reference frame
- I. Ex. 23.16 Uniformly accelerated observer