CHAPTER OVERVIEW

6: Acceleration and General Relativity

General relativity is Einstein's extension of special relativity to include gravity. An important aspect of general relativity is that spacetime is no longer necessarily flat, but in fact may be curved under the influence of mass. Understanding curved spacetime is an advanced topic which is not easily accessible at the level of this text. However, it turns out that some insight into general relativistic phenomena may be obtained by investigating the effects of acceleration in the flat (but non-Euclidean) space of special relativity.

The central assumption of general relativity is the equivalence principle, which states that gravity is a force which arises from being in an accelerated reference frame. To understand this we must first investigate the concept of acceleration. We then see how this leads to phenomena such as the gravitational red shift, event horizons, and black holes. We also introduce in a preliminary way the notions of force and mass.

6.1: Acceleration
6.2: Circular Motion
6.3: Acceleration, Force, and Mass
6.4: Acceleration in Special Relativity
6.5: Accelerated Reference Frames
6.6: Gravitational Red Shift
6.7: Event Horizons
6.8: Problems

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