Chapter R4: The Metric Equation

R4.3 Deriving the Metric Equation

This derivation is good to understand. We'll go over it in detail in class.

The metric equation is super important:

$$\Delta s^2 \;=\; \Delta t^2 - \Delta x^2 \;. \tag{1}$$

R4.4: About Perpendicular Displacements

I found this section to be very confusing. The bottom line is that distances perpendicular to the direction of the relative motion do not shrink or expand.

R4.5 Evidence Supporting the Metric Equation:

Muon decay is one of the essential pieces of experimental evidence for special relativity.

R4.6 Spacetime is not Euclidean (flat)

When representing a non-euclidean space on a flat piece of paper, strange things happen: The distance on the paper does not equal the true distance, i.e. the distance in the curved space itself.

The metric equation *is* the geometry. Specifying the metric tells you how to measure all distance in the space. From this, all geometry follows.

R4.6 More about the geometric analogy

In euclidean space, the set of all points equidistant from a point A is a circle centered at A.

In space-time, the set of all points with the same spacetime interval from A is a hyperbola "centered" at A.