

Physics Questions about Relativity

- What is the universe expanding into? Are there other universes?
 - General Relativity- Non inertial frames of reference
 - Elevator- Accelerating, can't tell the difference b/t accel/gravity
 - Light- $v=c$, $\gamma = \infty$, Light always takes the shortest path between two points
 - Have a laser in said elevator at one side, and shine it at the other, if it accelerates fast enough, the light would appear to travel in a parabolic path
 - This means that gravity curves photon paths; the shortest path can be curved
 - Space/time is curved
 - Mass/energy will cause gravity; gravity is the warping of space time
 - Curvature tells mass/energy how to accelerate
- Curved universe – Simplified example: circle
- 1D space + 1 time; space is a circle and a bug lives on it; no boundary
- r : Radius of the universe. Can expand or contract.
- Expand into what? Not into anything proper
- What does it look like? Distances get bigger! Expansion!
- Other Universes? Quite possibly, no reason to think that our universe is the only one
- What would FTL be like?
 - Cheat?
 - Distances in an expanding universe could change faster than the speed of light.
 - Can't travel faster than light by "traveling" (going from point A \rightarrow B)
 - Bend space/time so that you destroy space in between
 - Bend space; doesn't work without negative mass, no such thing
- Black Holes: do they have different Time Dilation factors?
 - Same for each black hole? No. Depends on size of black hole; strength of gravity just outside of "event horizon."
- Time Paradox?
 - Planet earth and Planet Zed
 - Why doesn't the other twin actually age instead of the twin moving/accelerating to light speed
 - The Earth twin is at rest when compared to planets E and Z