

1 Pole and Barn Paradox

A 10-meter-long pole is moving toward a 5-m-long barn fast enough that the pole appears to be on 5-m-long from the barn's perspective. As soon as both ends of the pole are in the barn, the doors at the front and back of the barn slam shut and then quickly reopen, allowing the pole to pass through without damage to the pole or to the barn.

1. From the point of view of the pole, how long is the barn?
2. What is the paradox in this situation?
3. Draw a spacetime diagram for this situation. Label the spacetime coordinates of all important worldlines and events.
4. Based on the spacetime diagram, draw a series of pictures conveying (1) happens in the barn's frame and (2) what happens in the pole's frame during this interaction.
5. What is the resolution to the paradox?