

## CSAAPT Spring 2023 Semi-Virtual Meeting



Chesapeake Section of the  
American Association of Physics Teachers  
Spring 2023 Semi-Virtual Meeting  
April 1, 2023 @ **JAMES MADISON UNIVERSITY**

Contribution ID: 4

Type: **talk (15-minute)**

# RIDING ON A LIGHT BEAM: ACCELERATION AND MASS RISE

*Saturday, April 1, 2023 10:30 AM (15 minutes)*

This presentation is a continuation of one I gave on April 1, 2022 on the velocity triangle and the Brehme Angle as a graphical solution to problems in Special Relativity. This presentation applies those concepts to a body undergoing uniform linear acceleration, to determine that linear acceleration is rotary motion in four dimensions. The simple graphical solution satisfies the classical equations of motion  $v=at$  and  $s=1/2at^2$  at small angles of rotation ( $v \ll c$ ), and observed relativistic mass rise for rotational angles for greater velocities. The simple trigonometric model predicts that an unaccelerated observer will measure the body's location along a hyperbolic worldline, consistent with the trajectory derived in Gravitation (Misner, Thorne and Wheeler) using tensors.

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**Session Classification:** Morning Session 2B