A Proposed Laboratory Test of Einstein's One-Way Light-Speed Isotropy Convention Using a Mid-Point Timing Measurement

Christopher J. Clyde
Independent Researcher
CJCmail@pm.me
Experimental design assistance and analysis: Grok (xAI)
Date: 6 December 2025

Abstract
Special Relativity (SR) rests on two postulates and one critical convention: the isotropy of the one-way speed of light (c in both directions) in every inertial frame. This convention is not directly testable by experiments presupposing clock synchronization via light signals. The present work identifies a logical contradiction between the postulates when the convention is examined without prior synchronization and proposes a simple, low-cost optical experiment capable of directly measuring whether the time for light to travel from source A to midpoint M equals the time from M to source B when the apparatus moves relative to the hypothesized rest frame of the emission events. A deviation from equality would falsify Einstein's one-way isotropy convention and demonstrate an absolute simultaneity frame tied to light events.

1. The Logical Contradiction

Einstein's 1905 paper establishes SR on:
  1   The laws of physics are identical in all inertial frames (principle of relativity).
  2   The speed of light in vacuum is constant (c) in all inertial frames.
Clock synchronization requires assuming isotropy of the one-way speed of light, a convention not directly measurable [1].

This work reveals a logical contradiction: SR denies measurable motion between a light source s and its emission event e in s's rest frame, yet requires it in moving frames to derive the relativity of simultaneity. This "never vs. always" paradox implies a preferred frame where sources are truly at rest with emission events, violating the first postulate.

Consider emission events e and e_1 from sources s and s_1, equidistant from observer O in O's rest frame S, simultaneous at $t=0$. Light arrives at O at $t = d/c$.

In S, SR claims s and s_1 never move relative to e and e_1. In frame S' moving at v relative to S, Lorentz transformation yields $t'\_e = \gamma \, (v \, d/c^2) \neq t'\_e_1 = -\gamma \, (v \, d/c^2)$, making events non-simultaneous—s and s_1 always move relative to e and e_1.

SR cannot forbid motion in s's rest frame (as S' sees it) without contradicting the first postulate, nor allow it without falsifying simultaneity's relativity. The axioms are logically inconsistent.

2. The Mid-Point Trigger Test

A rigid rod AB of proper length L carries:
  •   Fast laser and photodetector at A.
  •   High-reflectivity mirror at B.
  •   Photodetector with 99/1 tap at exact midpoint M.
Procedure:
  1   Emit pulse at A; tap at M starts midpoint timer.
  2   Pulse reflects at B, returns; tap at M stops midpoint timer.
  3   Full return at A records round-trip ABA.
If the convention holds, midpoint time $tM = ABA/2$. If the apparatus has velocity v
parallel to AB relative to the absolute light-events frame, $tM = (L/2c) \, (1 + v/c)$ to first order.

For 1 km fiber and Earth's orbital $v \approx 30$ km/s, expected $\Delta t\_M \approx \pm 330$ ps—resolvable with commercial electronics.

3. Experimental Protocol
See Supplementary Material for full design (budget < $1,200):
- 1 km duplex armored SMF-28 fiber.
- TDC7200EVM timing system (55 ps resolution).
- Hamamatsu SiPM detectors.
- Raspberry Pi Pico controller.

Orient apparatus parallel/anti-parallel to Earth's velocity; average 10,000 shots. Systematic, orientation-reversing $\Delta t\_M \neq 0$ (uncorrelated with temperature) falsifies the convention.

4. Conclusion
This test requires no prior synchronization. A positive result establishes absolute simultaneity tied to light events, resolving SR's contradiction.
The author invites immediate replication.

Acknowledgments

References

[1] A. Einstein, Ann. Phys. 322, 891 (1905).
[2] H. Reichenbach, *The Philosophy of Space and Time* (Dover, 1958).