The Causality Sharing Metric: Lidar Awareness Units (LAUs)

Terry Bollinger
2024-01-21.09:17 EST Sun
https://www.linkedin.com/feed/update/urn:li:activity:7153774542992084994?commentUrn=urn%3Ali%3Acomment%3A%28activity%3A7153774542992084994%2C7154874788459540482%29

Swapnonil Banerjee, your posts nicely take well-known ideas and make folks look closer. This one made me ponder a product-of-terms SR metric.

I'll call it a lidar awareness unit — a "lau." Run a lidar (light radar) for one nanosecond as defined by clocks in your inertial frame. What is the total Euclidean spacetime volume over which you can acquire data via lidar returns?

Since one light-ns is close to one UK-American foot (we have big feet), the 1-ns lidar pulse acquires data in a ball with about a half-foot (0.4918 ft) radius. Using the ball volume formula $V = \frac{4}{3}\pi r^3$, the lau for a 1-ns lidar cycle is about 0.4983 $\text{ns}\cdot\text{ft}^3$.

What's interesting is that laus are invariant across all observation frames. If you watch a 1-ns lidar cycle zip by in front of you at $v = 0.99995\,c$ ($\gamma = 100$ [1]), you'll see it also encloses 0.5236 lau units of *your* spacetime.

Is it just a minor tech coincidence? Nope. Lau invariance also *locks down quantum causality for both frames* by creating shared mutual data. Lau invariance thus makes multiverses go poof.

---
[1] To find the v (fraction of c) for SR $\gamma = 10, 100, 1000, \ldots$, append two v 9s after the decimal for each γ 0, then append 5. The larger the gamma, the more accurate this gets.

Addendum comment in PDF version only: The lau invariance is best described as a *potential* for causality since the outcome is competitive. If, for example, the lidar is extremely dim — e.g., it emits only 1 photon per nanosecond — while the observer frame is massive, the observer frame utterly dominates the causality agreement process.