Physics maths are badly out-of-date

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Email Excerpt

If distance in physics varies by observer, why does calculus treat distance as a fundamental data type?

The reason is that people designed such maths in the 1700s and 1800s when classical physics was the only available model. That was before relativity proved that length varies by observer, and quantum theory proved that the mathematical concept of a point is, at best, an unstable and infinitely costly limit of highly energetic processes.

The good news is that a real, self-existent universe exists. The bad news is that what we call "space" and "time" cannot describe this universe's structure. In particular, the spacetime distance between any pair of objects is the square of what we consider "distance."

Thus an object twice as far away in meters is four times as far away using Lorentz-invariant spacetime metrics. The greater "slack" provided by squared distances ensures the preservation of the Poincaré symmetries without undermining causality.

For medium-scale spaces — that is, for regions in which the "classical" space approximation is accurate and helpful — three squared distances capture this network structure nicely. Adding a fourth number creates redundancy and infinitely-stretched mirages, with world lines being the most notable example.

Distances in this framework are better thought of not as lines but as volumes. These volumes can easily encompass entire regions of what we think of as space and time. In that sense — and not coincidentally — special relativity is as "entangled" as anything in the quantum world. Special relativity and quantum theory become two ends — one causal and the other acausal — in the dynamics of volume-like distances.

The scary part is that "fundamental" time and space become nothing more than multi-scale, local-only interpretations of data arriving from the external squared-distances fabric. Universal spacetime crumbles and is replaced by an oddly ratty-at-the-edges universe with bottom-up causality, space, and time.

The only object states possible in such a universe are "now" states since any attempt to extend an object's state into the past or future presumes an xyzt model that cannot extend beyond the observer's limited ability to define these orthogonal pseudo-metrics.

This singular universe resembles a state machine, but one from which our narrower concept of "causal time" emerges only in bits and pieces. The ratty stringiness of the largest-scale universe reflects the dimensional collapses as the underlying squared-distances fabric reaches its mass-limited ability to emulate xyzt space.

At particle scales, the classically impossible concept of half-spin and the broader issue of why the Standard Model particle set exists in the first place should become more tractable within a calculus framework where points and distances emerge only as extreme limits of the xyzt emulation process. Even nominally pure-math constants such as π likely are convergence limits created by the distance-squared negotiation process since such negotiations for creating specific xyz lengths must also result in continuous classical "angles" that relate those distances to each other.

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