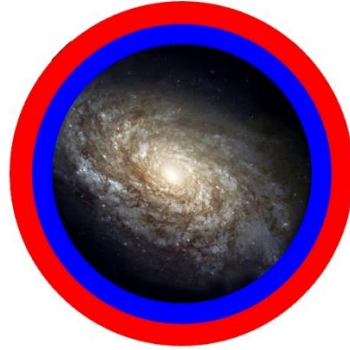


An Einstein-Rosen Reinterpretation of Lieu's Zero-Mass Spacetime Defects

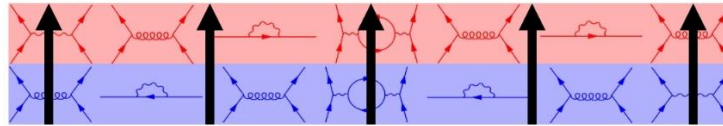
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Lieu's spherical 3D galaxy-scale massless topological defects embed a positive mass spacetime solution (blue) inside a negative solution (red), giving acceleration with zero net mass. Lieu does not specify the origins or placements of these spherical defects.

An Einstein-Rosen reinterpretation of Lieu: The negative and positive spacetime solutions become the two full-universe 4D sheets (hyperplanes) of the 1935 ER paper. A slight excess of positive-mass particles drives the paired sheets forward in time. If interpreted as mass-canceling sheets of positive- and negative-mass QED foams, the resulting flat-space cancelations replace QED renormalization:



Lieu's spherical zero-mass spacetime defects work better if reinterpreted as Einstein-Rosen sheets. [1]

Sabine [2], if you or anyone else is seriously interested in the 2024 Lieu concept of modeling dark matter using co-located shells of positive and negative gravitational mass with net zero mass [3], the simplest architecture is to move the idea from concentric 3-shell pairs at galactic scales to a single concentric 4-shell encompassing the entire universe. Embedding a slight excess of positive mass Standard Model particles within this universe-spanning net-zero dual shell creates dynamics in which galactic-scale concentrations of matter gain the same acceleration proposed in 2024 Lieu.

Dual shells would be a variant of the 1935 Einstein-Rosen (ER) proposal [4] that the universe consists of two nearby spacetime sheets. The difference is that one of the two sheets would have negative gravitational mass, making the overall spacetime construction almost perfectly flat. That is in keeping with observation and eliminates the need for inflation.

Dark matter equivalence would arise as a dynamic effect of how that slight positive mass excess affects the dynamics of the dual sheet. More specifically, the slight excess of positive mass particles would make the 4D-embedded sheet move forward like a wave in the direction we perceive as causal time. As in the ER model, the particles would be tiny Einstein-Rosen bridges crossing the sheets.

This model is simpler than 2024 Lieu because the dual sheet — I would call it a polarized sheet — becomes an integral part of the model for spacetime itself. You no longer need ad hoc construction of polarized shells around and within galactic-scale collections of concentrations.



Notice that a universal polarized spacetime model requires chirality. In particular, the weak-force-aware fermion types — left-handed matter fermions and right-handed antifermions — and forward-in-time bosons (e.g., retarded Maxwell waves) must have positive gravitational mass. Conversely, the weak-force-blind fermion types — right-handed matter fermions and left-handed antifermions — and backward-in-time bosons (e.g., advanced Maxwell waves) must have negative gravitational mass.

A universal zero-mass polarized spacetime shell also provides a much cleaner approach to renormalization. Instead of arbitrarily discarding mass at smaller scales, polarized spacetime fights fire with fire: No matter how dense the positive mass particles get in a given region of spacetime, polarization ensures there is always a (mostly) canceling intensity of negative mass at the same location.

This cancellation breaks in two ways:

- (1) an initial excess of positive mass particles adds the mass we observe as ordinary matter, and
- (2) downward curvature of the polarized sheet squeezes (reduces) negative mass concentration on the trailing (negative) side of the polarize spacetime sheet, allowing gravity itself to possess positive mass-energy.

Finally, this is necessarily a dual-universe “virtual universe pair” model [5]. We live on the side with the slight positive excess, but unlike the case of antimatter, the particles in our contraverse partner are exactly CPT symmetric with ours. As I mentioned earlier, we already know those particles from our Standard Model. We just forgot to check whether the weak-force-blind fermions and advanced boson solutions have negative gravitational mass. And yes, best of luck figuring out how to measure that! On the other hand, that’s precisely how negative-gravitational mass can hide in plain sight. Folks have been studying negative-mass particles for decades in accelerators but had no easy way to detect that aspect of their behaviors.

References

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