A Simple Explanation of Traian Surtea's *Universe: A Topological Theory*

Prepared as an explanatory note

The Basic Idea

The simplest way to read Traian Surtea's paper is this: he is trying to build a toy universe from topology alone. He does not begin with space, time, matter, forces, mass, distance, energy, or measurement. He begins with only two things:

$$U = (M, \mathcal{D}),$$

where M is a set of basic "material points", and $\mathcal{D}$ is a partition of M. That means $\mathcal{D}$ cuts M into non-overlapping pieces whose union is all of M. Traian calls those pieces $\mathcal{D}$-photons. Mathematically, they are the indivisible cells of the universe at that level of description.

The key move is that, from the partition $\mathcal{D}$, he builds a topology. The open sets are exactly the unions of whole $\mathcal{D}$-photons:

$$[\mathcal{D}] = \{[[\mathcal{K}]] \mid \varnothing \subseteq \mathcal{K} \subseteq \mathcal{D}\}.$$

So in this universe, a set is "open" only if it is made from whole partition-pieces. If a subset cuts through a $\mathcal{D}$-photon, then it is not fully open at that place. This is the engine of the whole paper.

The Jigsaw Analogy

A useful picture is a jigsaw puzzle. The puzzle pieces are the $\mathcal{D}$-photons. The image drawn across the puzzle pieces is a physical object. If an object covers whole pieces, it behaves one way. If it cuts across pieces, it has a boundary. If it is spread thinly through many pieces without containing any whole piece, it behaves like a wave-like or space-like object.

In Traian's language, a physical object is any non-empty proper subset of M:

$$\varnothing \subsetneq X \subsetneq M.$$

Then he classifies objects by comparing four things:

$$\varnothing \subseteq X^\circ \subseteq X \subseteq \overline{X} \subseteq M.$$

Here X° is the interior of X, meaning the largest union of whole $\mathcal{D}$-photons contained inside X. The closure $\overline{X}$ is the smallest union of whole $\mathcal{D}$-photons that contains X.

The Main Object Types

This gives his deliberately unusual vocabulary, which he jokingly calls "barbarisms". The point of these words is not decoration. Each word marks a precise topological case.

Name	Simple meaning	Topological behaviour
Korpuskon	Body-like object	Has interior, but does not fill the universe.
Spation	Space-like object	Has no interior, but is not everywhere.
Tempon	Time-like object	Has interior, and its closure is all of M.
Undon	Wave-like object	Has no interior, but its closure is all of M.
Lighton	Light-like beam or block	A union of whole $\mathcal{D}$-photons.

So the paper's central idea is not simply that there are particles in space and time. It is more radical than that. It suggests that space-like, time-like, body-like, wave-like, and light-like behaviours can be described as different topological statuses of subsets of one underlying set.

Boundary and Interaction

The boundary of X is defined by

$$\partial_{\mathcal{D}} X = \overline{X} \setminus X^{\circ}.$$

In plain words, the boundary consists of the $\mathcal{D}$-photons that X cuts through. A $\mathcal{D}$-photon is in the boundary if part of it lies in X, and part of it lies outside X.

This lets Traian define interaction. Two disjoint objects A and B interact if their closures overlap:

$$\overline{A} \cap \overline{B} \neq \varnothing.$$

They do not share material points, because

$$A \cap B = \varnothing.$$

But they can still touch the same $\mathcal{D}$-photon at the level of closure. So interaction happens through shared boundary structure, not through direct overlap.

One of the paper's cleanest results says that this interaction field is exactly

$$\overline{A} \cap \overline{B} = \partial_{\mathcal{D}} A \cap \partial_{\mathcal{D}} B.$$

That is the simple slogan:

> Interaction is boundary overlap.

Electronic, Gluonic, and Synergy

The distinction between electronic and gluonic interaction is then a way of classifying how the shared boundary works. Very roughly, electronic-type interaction involves the exterior boundary parts of both objects. Gluonic-type interaction happens when a $\mathcal{D}$-photon is shared in a more internally binding way, so that pieces of different objects together complete something that neither object completes alone.

That leads to one of the nicest ideas in the paper: synergy. Suppose two separate objects A and B each fail to contain a whole $\mathcal{D}$-photon. Individually, they have no interior there. But together, $A \cup B$ might complete a whole $\mathcal{D}$-photon. Then

$$A^{\circ} \cup B^{\circ} \subsetneq (A \cup B)^{\circ}.$$

In simple terms, the union has more interior than the sum of the interiors. Something new appears when the objects are taken together. Traian compares this, cautiously, to mass defect, while saying that at this stage it is only topological.

Hidden Symmetry

The hidden symmetry is also elegant. Taking the complement,

$$X \mapsto M \setminus X,$$

swaps spations and tempons. So space-like and time-like objects appear as duals of one another. Korpuskons, undons, and lightons remain within their own kinds under this complement symmetry.

Heating the Universe

Heating does not mean temperature in the ordinary physical sense. It means refining the partition. A colder universe has a coarser partition. A hotter universe has a finer partition:

$$\mathcal{C} \preceq \mathcal{H}.$$

When the partition becomes finer, interiors grow and closures shrink:

$$\pi^{\circ}_{\mathcal{C}}(X) \subseteq \pi^{\circ}_{\mathcal{H}}(X),$$

while

$$\overline{\pi}_{\mathcal{H}}(X) \subseteq \overline{\pi}_{\mathcal{C}}(X).$$

So boundaries shrink. Since interaction is boundary overlap, heating can weaken or remove interactions. This is why Traian says heating reduces the field of interaction.

A simple analogy is image resolution. If a shape is viewed through a coarse grid, it cuts through many cells, so its boundary is large. If the grid is refined, the shape can be represented more accurately, and the uncertain boundary shrinks. In Traian's language, heating makes the universe's partition finer.

Quantonic and Broglionic Objects

The quantonic and broglionic language is about the size of the boundary field

$$\partial_{\mathcal{D}} X.$$

If the boundary field is minimal, the object is quantonic. If the boundary field is maximal, it is broglionic. So this is not quantum mechanics in the usual formal sense. It is a topological analogue: objects with the smallest possible interaction boundary are quantonic, and objects with the largest possible interaction boundary are broglionic.

One-Paragraph Summary

Traian's paper says that if one divides a universe into primitive indivisible cells, then every object can be studied by how it sits across those cells. Some objects contain whole cells, some merely cut across cells, some spread everywhere without containing cells, and some are exact unions of cells. From those simple facts, he defines body-like, space-like, time-like, wave-like, and light-like objects. Interaction becomes shared boundary. Heating becomes refinement of the partition. Quantum-like and Broglie-like behaviour become minimal or maximal boundary capacity. The whole paper is an attempt to derive a physical vocabulary from topology before introducing measurement.

Worth Encouraging

The reason this work is worth encouraging is that the paper has a genuine organising idea. It is not merely inventing words. The invented words are attached to precise topological cases. The physics is speculative, but the mathematical architecture is clear:

> Start with a partition, build a topology, classify subsets, define boundary, define interaction, study refinement.