Topological issues about the 6D ISST in Physics

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The recent proposals of a three-directional time [6], of a time vector [7], and of a 6D spacetime with SO(3,3) symmetry [5], have renewed the interest for the hexadimensional extension of Einstein's General Relativity formulated two decades ago via three-dimensional time [1, 2, 3]. We wish to enrich the discussion about the hypothetical 6D geometrodynamics by giving a topological response to two fundamental questions: 1) Why should the spacetime manifold require six dimensions instead of four? 2) Why should the two extradimensions be timelike? The 4D universe is supported by an intuitive logic: in order to describe an *event*, we need to know *where* and *when* it is occurring, for a total amount of four coordinates (three spatial and one temporal). Although reasonable, the current representation of the spacetime's intimate structure could be incomplete: we suggest adding the *spin angular velocity* among its intrinsic properties. If we assume that each point of the continuum is a structureless rotating sphere of null radius, we obtain a 6D inherently spinning spacetime (acronym ISST). In the ISSTconstruction, we choose to neglect both the spinning magnitude and its direction (up or down), focusing only on the plane of rotation (perpendicular to the spinning axis) as essential information about *how* an event happens. The two parameters defining the orientation of the rotation plane of a spinning point are interpreted as *time* extradimensions because they are surely not spacelike (i.e., not related to the position in a fixed *Oxyz* reference frame) and, as surface measures, they are basically timelike [4]. Our geometric analysis raises open questions ranging from the observation of a preferential arrow of time to the role of temporal "hidden variables" in classic quantum phenomena.

References

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