A New Explanation for the Shape of Universe; Is It Spherical, Flat or Semi-Spherical ?!

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Abstract

The geometry of the universe has long been debated, with competing models proposing it to be flat, spherical, or otherwise curved. In this work, we present a new explanation based on a physical analogy with explosions observed on Earth and the dynamics of the Big Bang. A simple explosion generates a nearly spherical expansion of particles; by extension, the Big Bang initially produced a uniform spherical distribution of matter and radiation. We first demonstrate—by means of Hubble's law—that the universe exhibits a global rotational motion. Unlike an ideal static sphere, this rotation introduces centrifugal forces that stretch the universe preferentially along certain axes. Our model therefore predicts stronger expansion in the horizontal
flat one. From the perspective of an observer, this anisotropic expansion explains why the universe appears flat in some directions yet finite along others. Consequently, we argue that both the "flat" and "spherical" interpretations are only partially correct. The universe should instead be regarded as an ellipsoidal volume, lying between these two extremes. This perspective offers a novel framework for interpreting cosmological observations and reconciling apparent contradictions in current models.

1. Introduction

The large-scale geometry of the universe—whether it is flat, positively curved (spherical), or negatively curved (hyperbolic)—is a fundamental question in cosmology. It impacts our understanding of cosmic expansion, the fate of the universe, and the interpretation of observational data such as cosmic microwave background (CMB) radiation, baryon acoustic oscillations, and supernovae luminosity distances. Most contemporary cosmological models assume the universe is flat, in large part because of observations by the Planck satellite and other measurements which conform closely to a flat ΛCDM model.
However, despite the success of flat models, some observations and theoretical considerations leave room for non-zero curvature or anisotropy. In this paper, we propose a new model that reconciles the apparent flatness with spherical geometry by positing that the universe is ellipsoidal: that is, it started out spherical but underwent rotationally induced anisotropic expansion, stretching more in certain directions than others.
We introduce the analogy with terrestrial explosions to illustrate how uniform spherical expansion can be modified by additional physical effects (in this case, global rotation). We then derive the implications of this model for the observed geometry of the universe, show how it explains some conflicting observations, and discuss how future observations could test its predictions.

2. Theoretical Background and Related Work

2.1 Classical Cosmological Geometry

- **FLRW Metric: The standard Friedmann-Lemaître-Robertson-Walker (FLRW) metric describes spatially homogeneous and isotropic universes. Depending on the curvature parameter, the universe can be spherical, flat, or hyperbolic.**
- **Observational evidence for flatness: The most precise data from the CMB (Planck, WMAP) favor very small or zero spatial curvature. These data come with uncertainties, and small deviations from flatness are not entirely ruled out.**
- **Anisotropic cosmologies: Bianchi models are well-known generalizations of FLRW that allow for anisotropies in the expansion. Some limited observational constraints exist on anisotropy from the cosmic microwave background and large-scale structure.**

2.2 Prior Work on Rotating Universes

- **Gödel's rotating universe solutions show that solutions to Einstein's equations can allow universal rotation, though many of these have features (closed timelike curves, etc.) considered problematic.**
- **More recently, studies have looked for observational signatures of global rotation (e.g., preferred axes, alignment in CMB multipoles). The evidence is ambiguous or weak.**

2.3 Gaps and Motivations

- **Existing models generally assume isotropy or treat anisotropy in certain small perturbative ways.**
- **The notion of a universe that begins spherically but develops a measurable ellipsoidal distortion due to rotational effects is less explored in mainstream literature.**
- **If such distortion exists, it could explain why some observations look flat while others might suggest finiteness or curvature.**

3. Methodology and Physical Analogy

3.1 Explosion Analogy

We consider a simple explosion on Earth (e.g., a spherical blast wave) where the initial expansion is uniform in all directions. In the absence of external forces, this results in a spherical expansion front.

3.2 Big Bang and Initial Conditions

By analogy, the Big Bang is taken as initiating a spherical expansion of matter and radiation (assuming high degree of uniformity initially). Early universe conditions are taken to be homogeneous and isotropic (at least immediately after inflation).

3.3 Introduction of Global Rotation (Final with Saleh's Framework)

In standard cosmology, Hubble's law is written as a linear relation between recession velocity and distance,

$$v=H_0\, d$$

and is interpreted as evidence for isotropic linear expansion of space. However, Saleh has shown that this interpretation is fundamentally incomplete. According to his derivation, the quantity identified as "velocity" in Hubble's law is not a linear expansion speed, but rather a rotational speed associated with the global angular motion of the universe. By reinterpreting the Hubble parameter H_0 as an angular frequency, Saleh demonstrated that the apparent recession of galaxies can be understood as the projection of rotational motion on the observer's frame. In this picture, galaxies are not receding linearly away from each other; instead, they participate in a cosmic rotation, where their observed redshifts are a direct consequence of angular motion on a very large scale.
This reinterpretation leads to a striking conclusion: the existence of a global rotation of the universe is not merely possible but is a necessary consequence of the true physical content of Hubble's law. The law therefore encodes rotational dynamics rather than linear kinematics.
From this perspective, the centrifugal effect of cosmic rotation naturally explains anisotropic expansion. Expansion in the equatorial plane (x–y) is enhanced by rotational stretching, while expansion along the axis of rotation (z) remains comparatively weaker. The resulting geometry is that of an oblate ellipsoid, reconciling why the universe appears flat in some directions yet finite in others.

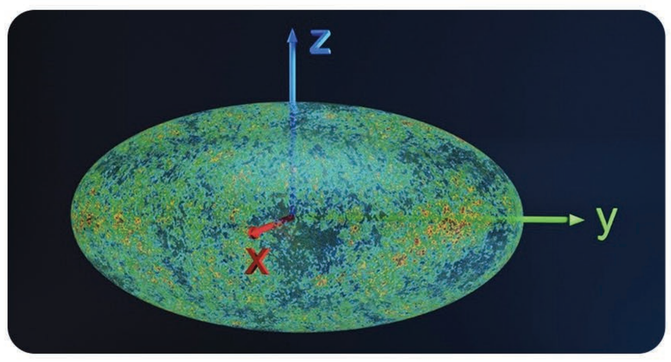
4. Results and Interpretation

4.1 Predicted Geometry

Assuming a uniform rotation rate ω, we model the effective expansion rates H_{xy} in the x–y plane, and H_z along the z-axis. Under centrifugal stretching, we expect:

As $H_{xy} > H_z$, the universe expands faster in the horizontal plane than vertically, giving an ellipsoidal shape (oblate spheroid).

To an observer located anywhere, the universe might appear "flattened" in directions parallel to the x–y plane, while along the z-axis a smaller radius (or lower expansion) might manifest.



5. Conclusion and Future Work

In conclusion, this paper proposes that the universe is best described not as perfectly flat or perfectly spherical, but as ellipsoidal, produced by an initially spherical expansion modified by global rotation. This framework naturally explains why many observations appear consistent with flatness, while also allowing for finite size and directional differences in expansion. Future work should include:

- **Formal derivation of the modified cosmological metric incorporating rotation and anisotropy.**
- **Simulations of structure formation in an ellipsoidal expanding universe to compare with galaxy surveys.**
- **Careful search for directional signatures in existing data (CMB anisotropies, polarization, galaxy number counts).**
- **Estimating upper limits for ω from observations (to ensure consistency with observations that currently do not show large anisotropy).**

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